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SCOPE OF WORK
FOR
THE STUDY
ON
OPTIMAL POWER GENERATION FOR PEAK DEMAND
IN
TURKEY

AGREED UPON BETWEEN

ELECTRIC POWER RESOURCES SURVEY AND DEVELOMPENT ADMINISTRATION

TURKISH ELECTRICITY TRANSMISSION COMPANY

AND

THE JAPAN INTERNATIONAL COOPERATION AGENCY

Ankara, 22 June, 2009

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I. INTRODUCTION

In response to the official request of the Government of Turkey, the Government of Japan decided to conduct the Study on Optimal Power Generation for Peak Demand in Turkey (hereinafter referred to as "the Study") in accordance with the relevant laws and regulations in force in Japan.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programs of the Government of Japan, will jointly undertake the Study with the authorities concerned of the Government of Turkey.

The present document sets forth the scope of work with regard to the Study.

II. OBJECTIVES OF THE STUDY

The objectives of the Study are:

1. To formulate the optimum plan of peak power supply in Turkey,
2. To review of existing proposal of pumped storage power plants, considering technical aspect, economic/financial conditions, location requirements like connection with the transmission grid, and environmental impacts.
3. To enhance Technical capabilities of Turkish counterpart agency throughout the course of the Study,

III. STUDY AREA

The Study will cover whole Turkey.

IV. SCOPE OF THE STUDY

In order to achieve the objectives mentioned above, the Study will cover the following items. All works will be done by the JICA study team in collaboration with Electric Power Resources Survey and Development Administration (hereinafter referred to as "EIE") , Turkish Electricity Transmission Company (hereinafter referred to as "TEIAS"), and other related organizations.

The Study will be carried out in the following three (3) stages:

1. Preliminary Assessment Stage
2. Pumped Storage Potential Review Stage
3. System Optimization Stage

1. Preliminary Assessment Stage

(1) Peak power supply alternatives

a. Collection and review of relevant data, reports and other information on Turkish power sector development

b. Review and analysis of various alternatives for peak power supply including those for expansion/conversion of the existing hydropower plants to peak power supply, new hydropower construction, and power inter-connection with the neighbouring countries

(2) Power system survey

a. Review and analysis of the current peak power supply (load dispatching) and characteristics of the daily and seasonal load duration curves of the power system

b. Review and analysis of methodology used in Turkey for planning peak power supply

c. Review and analysis of the methodology, data and pre-determined conditions assumed in the formulation of Turkish long-term power system development plan with respect to the growth of power consumption, forecasts of energy and peak demand, power system development, and exports and imports of power

2. Pumped Storage Potential Review Stage

(1) Survey of pumped storage potentials

a. Review of EIE proposal on pumped storage hydropower development and modification, if necessary, of the project layout and development scheme

b. Identification and determination of new sites for pumped storage hydropower potentials based on the existing maps and relevant data

c. Selection of the prospective sites for development based on the site reconnaissance survey and comparison with respect to the technical, economical and environmental viewpoints

d. Basic study of the selected prospective sites on the project layout, conceptual design, and rough cost estimate, etc

(2) Study on development of pumped storage hydropower

a. Study on development scale and timing of pumped storage hydropower including the associated transmission system expansion in line with the proposed optimal power development plan as established in item 3. (2) b

b. Proposal on additional data collection/observation and survey works for further study on the prioritized prospective sites of pumped storage development with respect to topography, geology, hydrology and social and natural environmental considerations

c. Study on the prioritized prospective sites for development of pumped storage hydropower projects based on further field investigations, survey maps and so on.

(3) Conclusion and recommendation

3. System Optimization Stage

(1) Establishment of alternative projects for peak power supply

a. Selection and evaluation of various alternatives for peak power supply of hydropower development plan on the basis the time schedule and the associated transmission line expansion plan

b. Improvement of the peak power supply planning methodology for more detailed analysis

c. Preliminary economic assessment by using the improved methodology for peak power supply alternatives among those for expansion/conversion plan of the existing hydropower, pumped storage development potentials, and others

(2) Case study and simulation of optimal plan

a. Case study on system optimization taking network reliability and stability into consideration for the various development alternatives and scenarios

b. Proposal of optimal power development plan for peak power supply in consideration of the results of case study analysis and general features of project including the social and natural environmental impacts

V. SCHEDULE OF THE STUDY

The Study will be carried out for 12 months in accordance with the schedule as attached in the Appendix. The schedule is tentative and should be finalized among EIE, TEIAS and the JICA study team during the first work in Turkey by the team. The schedule could be modified when EIE, TEIAS and the team agree during the course of the Study.

VI. REPORTS

JICA shall prepare and submit the Inception report, Draft Final Report and Final Report in English and Turkish to EIE and TEIAS. Interim report shall prepare and submit in English.

1. Inception Report:

Twenty (20) each copies in English and Turkish, at the time of commencement of the Study

2. Interim Report :

Twenty (20) copies in English, within six (6) months after commencement of the Study

3. Draft Final Report:

Twenty (20) each copies in English and Turkish, within eleven (11) months after commencement of the Study

EIE and TEIAS will provide JICA with its written comments in English within one (1) month after receipt of the Draft Final Report.

4. Final Report:

Twenty (20) each copies in English and Turkish and three (3) sets of CD-ROM in English and Turkish within half (0.5) month after receipt of the comments on the Draft Final Report.

Ⅶ. UNDERTAKINGS OF EIE

1. To facilitate the smooth conduct of the Study, EIE shall take necessary measures, within its competence in accordance with relevant laws and regulations in force in the Republic of Turkey:
   (1) to facilitate the members of the JICA study team to enter, leave and sojourn in Turkey for the duration of their assignments therein and offer the convenience for procedures of foreign registration requirement;
   (2) to undertake the payment of taxes, duties and any other charges on equipment, machinery and other material brought into Turkey by the members of the JICA study team for the implementation of the Study;
   (3) to undertake the payment of income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the Team for their services in connection with the implementation of the Study;
   (4) to provide necessary facilities to the JICA study team for the remittance as well as utilization of the funds introduced into Turkey from Japan in connection with the implementation of the Study.

2. EIE shall bear claims, if any arises, against the members of the JICA study team resulting from, occurring in the course of, or otherwise connected with, the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the Team.

3. EIE shall act as counterpart agencies to the JICA study team and also as coordinating bodies with other relevant organizations for the smooth implementation of the Study, on behalf of the Government of Turkey. TEIAS shall commit to the technical undertakings as required by the Study.

4. EIE shall, at its own expense, provide the JICA study team with the following, in cooperation with other organizations concerned.
   (1) Security-related information and measures to ensure the safety of the JICA study team.
   (2) Information and support to obtain medical service.
   (3) Available data and information related to the Study.
   (4) Counterpart personnel.
   (5) Suitable office space with necessary equipment at EIE and/or TEIAS
   (6) Credentials or identification cards. and,
   (7) Vehicles with drivers

5. EIE shall, as the executing agency of the Study, take responsibilities that may arise from the products of the Study.

Ⅷ. UNDERTAKINGS OF JICA

For the implementation of the Study, JICA shall take the following measures;
(1) To dispatch, at its own expense, JICA Study team to Turkey;

(2) To pursue technology transfer to Turkey counterpart personnel in the course of the Study;

IX. CONSULTATION

TEIAS, EIE and JICA shall consult with each other in respect of any matters that may arise from or in connection with the Study.

Appendix: Tentative Study Schedule

Optimal Power Generation for Peak Demand in Turkey (Tentative Schedule)

Months	1	2	3	4	5	6	7	8	9	10	11	12
1 Preliminary Assessment Stage												
(1) Peak power supply alternatives												
a. Collection and review of the related existing data, reports and other relevant information for the Study												
b. Review and analysis of various alternatives for peak power supply including those for expansion/conversion of the existing hydropower plants to peak power supply, new hydropower construction, and power inter-connection with the neighbouring countries												
(2) Power system survey												
a. Review and analysis of the current peak power supply and characterristics of the daily and seasonal load duration curves of the power system												
b. Review and analysis of methodology used in Turkey for planning peak power supply												
c. Review and analysis of the methodology, data and pre-determined conditions assumed in the formulation of Turkish long-term power system development plan with respect to the growth of power consumption, forecasts of energy and peak demand, power system development, and exports and imports of power												
2 Pumped Storage Site Review Stage												
(1) (1) Survey of pumped storage potentials												
a. Review of EIE proposal on pumped storage hydropower development and modification, if necessary, of the project layout and development scheme												
b. Identification and determination of new sites for pumped storage hydropower potentials based on the existing maps and relevant data												
c. Selection of the prospective sites for development based on the site reconnaissance survey and comparison with respect to the technical, economical and environmental viewpoints												
d. Basic study of the selected prospective sites on the project layout, conceptual design, and rough cost estimate, etc												
(2) Study on development of pumped storage hydropower												
a. Study on development scale and timing of pumped storage hydropower including the associated transmission system expansion in line with the proposed optimal power development plan as established in [illegible]												
b. Proposal on additional data collection/observation and survey works for further study on the prioritized prospective sites of pumped storage development with respect to topography, geology, hydrology and social and natural environmental considerations												
c. Study on the prioritized prospective sites for development of pumped storage hydropower projects based on further field investigations, survey maps and so on												
(3) Conclusion and recommendation												
3 System Optimization Stage												
(1) Establishment of alternative projects for peak power supply												
a. Selection and evaluation of various alternatives for peak power supply of hydropower development plan on the basis the time schedule and the associated transmission line expansion plan												
b. Improvement of the peak power supply planning methodology for more detailed analysis												
c. Preliminary economic assessment by using the improved methodology for peak power supply alternatives among those for expansion/conversion plan of the existing hydropower, pumped storage development potentials, and others												
(2) Case study and simulation of optimal plan												
a. Case study on system optimization taking network reliability and stability into consideration for the various development alternatives and scenarios												
b. Proposal of optimal power development plan for peak power supply in consideration of the results of case study analysis and general features of project including the social and natural environmental impacts												
Report (Ic/R = Inception Report, It/R = Interim Report, DF/R = Draft Final Report, F/R = Final Report)	▲ Ic/R					▲ It/R					▲ DF/R	▲ F/R
Workshop		△					△				△	

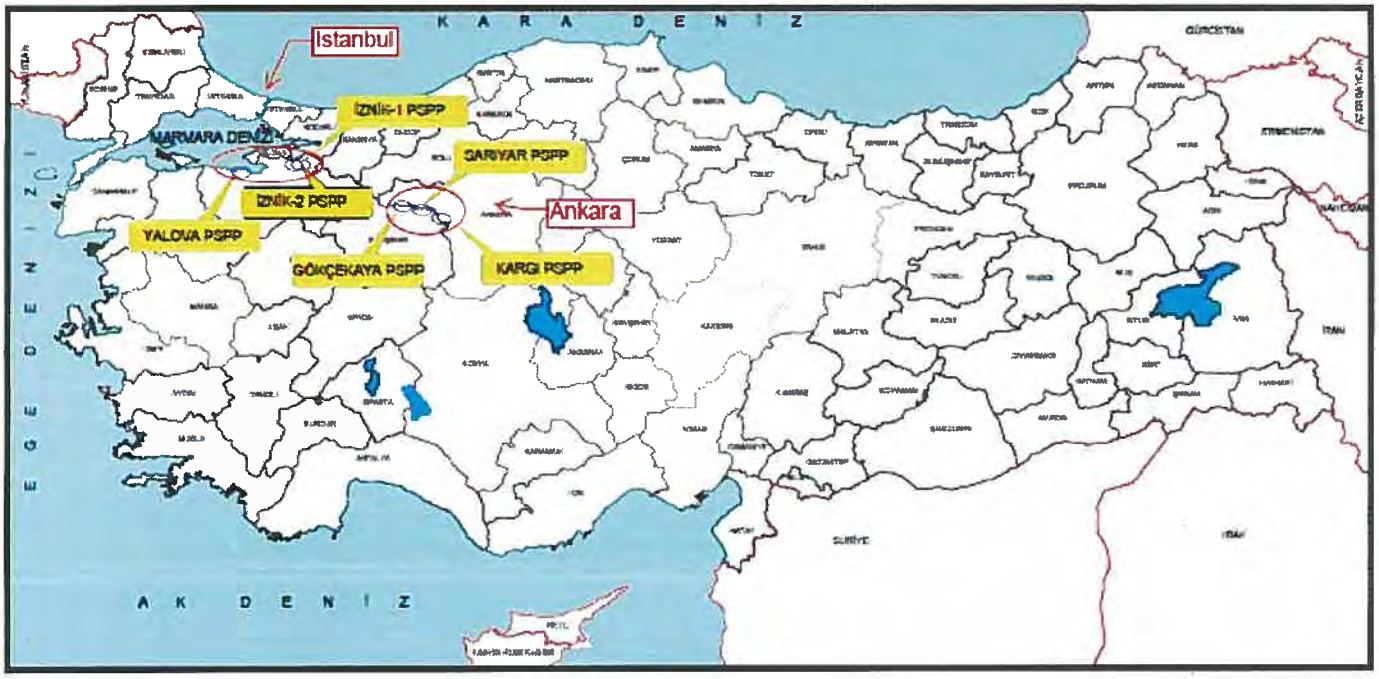
THE STUDY
ON
OPTIMAL POWER GENERATION FOR PEAK DEMAND
IN
TURKEY

SUMMARY REPORT
ON
ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

DECEMVER 2008

SOWA CONSULTANTS INC.
Nobuyuki NAKAZAWA

LOCATIONS OF PROJECTS in TURKEY



Location Map

The site reconnaissance were conducted in two (2) areas, Beypazari and Yalova, in November 2008, as the promising potential areas located near the large cities, Ankara and Istanbul. Three (3) points were selected in each area by EIE (General Directorate of Electric Power Resources Survey and Development Administration), which were Kargı, Sarıyar, and Gökçekaya in Beypazari area and Yalova, İznik-1, and İznik-2 in Yalova area.

1. BACKGROUND

The Government of the Republic of Turkey (hereinafter referred to as "the Government of Turkey") officially requested the Government of Japan to extend technical assistance for carrying out the Master Plan Study on Optimal Power Generation for Peak Demand in Turkey (hereinafter referred to as "the Study") in June 2008. In response to the request, the Project Preparatory Study Team (hereinafter referred to as "the Team") organized by the Japan International Cooperation Agency (hereinafter referred to as "JICA") was dispatched and had a series of discussions with Electric Power Resources Survey and Development Administration (hereinafter referred to as "EIE"), Turkish Electricity Transmission Company (hereinafter referred to as "TEIAS"), and other authorities concerned with the Government of Turkey from 9th November to 29th November, 2008.

This report is a summary of the environmental and social consideration study conducted from 9th November to 29th November, 2008 based on the JICA Guideline for Environmental and Social Considerations (April 2004).

2. OBJECTIVES

The objectives of the Study are:

(1) To formulate the optimum plan of peak power supply in Turkey,

(2) To review of existing proposal of pumped storage power plants, considering technical aspect, economic/financial conditions, location requirements like connection with the transmission grid, and environmental impacts.

(3) Capacity building of Turkish counterpart agency throughout the course of the Study,

3. RESULT AND DISCUSSION

3-1 Environmental Administration

In 1991, the Under Secretariat of Environment was merged with the Special Environmental Protection Institution and thus the Ministry of Environment was established by the Decree in the Force of Law of 443. The Ministry of Environment and Forestry (hereinafter referred to as "MoEF") was established in 2003, merging two central bodies, the Ministry of Environment and the Ministry of Forestry.

The Law No.4856 dated May 8th, 2003 aims to set forth the principles regarding the establishment, organization and responsibilities of the MoEF.

3-2 Environmental Laws and Regulatios

The basic framework within the Turkish Legal System with regard to protection of environment is the Environment Law No 2872 dated 9th August 1983. Purpose of the Law is to protect and improve environment and to ensure optimum and efficient use of lands and natural resources.

These principles can be summarized as follows:

(1) Real and legal persons are responsible for protecting the environment and preventing the environmental pollution,

(2) The polluter pays principle,

(3) Most appropriate technologies and methods are selected and implemented in economic activities with the objective of preventing and limiting environmental problems, and

(4) The measures to be taken to protect the environment and to prevent pollution, shall be identified and implemented as an integrated whole country.

The Environmental Law can be defined as framework law. Under the Law, 41 laws and regulations are stipulated.

3-3 Environmental Impact Assessment (EIA)

3-3-1 EIA System

Since the promulgation of the By-law on EIA (Official Gazette, 7th February 1993, No: 21489), four (4) revisions were made by the MoEF.

The process of the EIA is as follows:

(1) Screening,

(2) General evaluation,

(3) Scoping,

(4) Consultations with related authorities,

(5) Final decision, and

(6) Monitoring and control.

To ensure the quality control of the EIA reports, the MoEF gives the qualification certificate to the firms that are eligible to prepare EIA reports.

It is evaluated that the EIA system of Turkey is in a level equivalent to the systems of developed countries.

3-3-2 Overview of Environmental and Social Considerations on Existing Dam Construction

As Turkey is a country endowed with water resources, more than a few hundred dams for the purpose of power generation and irrigation have been constructed so far. Since the EIA Law was established in 1993, 80 dams were constructed, which includes eight (8) dam projects accompanied with resettlement. There is no project which is under construction or planning with resettlement.

In order to understand an overview of the environmental and social considerations on the dam construction projects in Turkey, 10 typical projects in which mitigation measures were planned against foreseen environmental negative impacts, are selected and examined. As the result of this overview, it seemed that all project took the adequate mitigation measures, including downstream environmental flow release, agricultural soil protection, noise and vibration control, compensation for the settlements and the fields, creation of fish passage, rehabilitation of material borrow areas, and dust control.

It is possible to examine the EIA project information from the web site of MoEF.

3-4 EU Screening Process on Environment

Since the European Commission launched the screening process with Turkey on 20th October 2005, the explanatory screening meeting and the detailed screening meeting have been held in compliance with the EU Acquis. Some progress can be reported only in the field of waste management, nature protection, and noise. The overall transposition level to Turkey is still low. It needs to pay attention to watching the ongoing EU screening process on environment to understand the future trend of the Turkey's environmental legal framework.

3-5 Site Reconnaissance

In order to verify the EIE's basic technical knowledge on Pumped Storage Power Plant (hereinafter referred to as "PSPP"), the site reconnaissance were conducted in two (2) areas, Beypazari and Yalova, in November 2008, as the promising potential areas

located near the large cities, Ankara and Istanbul. Three (3) sites were selected in each area by EIE, which were Kargı, Sarıyar, and Gökçekaya in Beypazari area and Yalova, İznik-1, and İznik-2 in Yalova area.

Through the site reconnaissance, Sarıyar and İznik-2 were selected as the most promising potential sites from two (2) areas. The studies on environmental and social consideration at the level of IEE were conducted targeting at these two (2) sites with EIE's environmental engineer.

EIE currently plans following three (3) categories as the PSPP construction criteria:

- Case 1: Existing dam as lower reservoir + Dam reservoir or pond newly constructed as upper reservoir,
- Case 2: Dam reservoir or pond newly constructed as lower and upper reservoirs, and
- Case 3: Natural Lake as lower reservoir+ Dam reservoir or pond newly constructed as upper reservoir.

Case 1 was applied to the Sarıyar site, and Case 3 was applied to the İznik-2 site.

As the result of the studies, severe negative impacts were not found at the Sarıyar site, because the upper reservoir construction site was a waste land and the lower reservoir, Sarıyar dam, had been constructed only for power generation without any other water uses. On the other hand, water quality degradation by the suspended sold from the bottom sediment in the lower reservoir, Iznik Lake, was predicted at the İznik-2 site. The water degradation is thought to be induced by the water discharge from the upper reservoir for power generation, since the Iznik Lake has the shallow depth and the silty bottom sediment.

3-6 Provisional Scoping

In order to understand the environmental key issues on the PSPP construction, provisional scoping of environmental and social considerations on PSPP construction was conducted according to the the JICA Guideline for Environmental and Social Considerations prepared in April 2004. The result of the provisional scoping is shown in the attached table.

4. RECOMMENDATIONS

(1) Considering environmental and social impacts on PSPP construction and operation, there exist some characteristic negative impacts, such as disturbance of bottom sediment and turbidity increase of water quality in lower reservoir due to water discharge for power generation from upper reservoir, and impingement of aquatic biota living in lower reservoir by intake water to upper reservoir. These characteristic negative impacts generated from PSPP should be compiled and investigated based on the relevant existing PSPP EIA reports and documents.

(2) In case of new dam construction of upper and/or lower reservoirs, careful investigations would be required to identify and avid negative impacts on environment according to the domestic laws and regulations in Turkey and the international guidelines on environmental social considerations, including JICA/JBIC guidelines and World Bank safeguard policies.

(3) Collecting information on EU Screening Process on Environment with Turkey is considered to be important to understand current situation and future trend of environmental legal framework in Turkey.

(4) For smooth implementation of the Study, good relationship with relevant government agencies, including DSI, MoEF, and Ministry of Agriculture and Rural Affairs, should be constructed.

(5) Information on NGOs relating to PSPP construction should be collected.

5. TERMS OF REFERENCE

(1) Objectives

The objectives of the the Study on Environmental and Social Consideration are:

(a) To verify the environmental impacts on the PSPP promising potential sites,

(b) To prepare the draft technical guideline on environmental and social considerations for the PSPP construction, and

(c) Capacity building of Turkish counterpart throughout the course of the Study.

(2) Study Site

17 candidate sites selected by EIE and additional sites selected through the Study

(3) Basic Information Study

(a) To investigate the EIA system in Turkey through the case study on the past projects, which involve environmental negative impacts including relocation of residents, large scale of inundation area, and compensation for income loss

(b) To compile and analyze the existing EIA reports and the relevant information on the PSPP construction and operation

(c) To compile the domestic environmental laws and regulations and international guidelines, including JICA/JBIC guideline, Safeguard Policies of World Bank, and EU Directives, relating to dam construction

(4) Scoping Study

(a) To evaluate the environmental and social conditions at the PSPP promising potential sites

(b) To conduct the Initial Environmental Evaluation (IEE) at the PSPP promising sites in collaboration with C/P and evaluate the negative and positive impacts according to the the JICA Guideline for Environmental and Social Considerations

(5) Guideline Preparation Study

The provisional title "Technical Guideline for Environmental and Social Considerations of PSPP Construction in Turkey" (draft) should be prepared for the future use of C/P.

(6) Workshop / Seminar

During the Study period, workshops / seminars should be held for the technology transfer.

Provisional Scoping

Name of Cooperation Project			The Project preparatory Study on Optimal Power Generation for Peak Demand in Turkey						
				Construction Phase			Operation Phase		
	No	Likely Impacts	Overall Rating	Access road creation	Land creation *	Transportation/Operation of equipment	Existence of Upper reservoir/Water intake/Power line	Pump up water to Upper reservoir	Water discharge for power generation
Social Environment: be related to all criteria of Social Environment be related to all criteria of Social Environment	1	Involuntary Resettlement	A	A	A				
	2	Local economy such as employment and livelihood etc.	B	B	B		C		
	3	Land use and utilization of local resources	A	B	A				
	4	Social institutions such as social infrastructure and local decision-making institutions	B	B	B				
	5	Existing social infrastructures and services	B	B	B	B			
	6	The poor, indigenous of ethnic people	A	A	A				
	7	Misdistribution of benefit and damage	B		B		B		
	8	Cultural heritage	A	A	A				
	9	Local conflict of interests	B	B	B				
	10	Water Usage or Water Right and Rights of Common	A	B	A			B	B
	11	Sanitation	B	B	B				
	12	Hazards (Risk) Infectious diseases such as HIV/AIDS	B	B	B		B		
Natural Environment	13	Topography and Geographical features	A	A	A				
	14	Soil Erosion	A	B	A		A	B	B
	15	Groundwater	A	C	A		A		
	16	Hydrological Situation	A		A		A	B	B
	17	Coastal Zone (Mangroves, Coral reefs, Tidal flats, etc.)	A		A		A		
	18	Flora, Fauna and Biodiversity	A	A	A	B		B	B
	19	Meteorology	B				B		
	20	Landscape	A	A	A		B		
	21	Global Warming	C				C		
Pollution	22	Air Pollution	B	B	B	B			
	23	Water Pollution	A	B	B			B	A
	24	Soil Contamination	C	C	C	C			
	25	Waste	A	B	A	C	C		
	26	Noise And Vibration	A	A	A	A	C	C	C
	27	Ground Subsidence	C				C		
	28	Offensive Odors	C		C				
	29	Bottom sediment	A		A		A	B	A
	30	Accidents	C		C		C		

* Upper re savoir/Water intake/Transformer/Generator/Aqueduct/Power line

Rating:

A: Serious impact is expected.

B: Some impact is expected.

C: Extent of impact is unknown (Examination is needed. Impact may become clear as study progresses.)

No Mark: No impact is expected. IEE/EIA is not necessary.