Environmental Impact Assessment Report for the
Extension Project of East China (Jiangsu) 500kV
Power Transmission Project

Nanjing Environmental Protection Research Institute
For East China Electric Power Corporation

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Executive Summary

This extension project (the Project) is proposed to make use of remaining sum of the East China (Jiangsu) 500 kV Power Transmission Project funded by the World Bank to construct two proposed 500 kV substations, one expansion 500 kV substation and two sections of 500 kV transmission lines (total 102 km). The Project is currently at the stage of engineering site-option (to substations) and route-option on the map (to transmission lines).

Environmental impact assessment must be done for power transmission projects according to relevant Chinese environmental protection management laws and regulations for construction projects. In accordance with Environmental Assessment Policy (OP) 4.01 of the World Bank, power transmission projects belong to catalogue B which need not complete environmental impact assessment but corresponding environmental impact analysis.

The original version of this report was delivered to the World Bank on May 30, 2002. On June 20, 2002, Mr. Baratz, principal expert of environmental protection from the World Bank, reviewed the report and provided comments. The following is updated content modified in accordance with the comments.

The content of the executive summary is listed as follows:
1. Description of the Project
2. Environmental background of the Project
3. Potential environmental impact
4. Suggested mitigating measures
5. Environmental management plan
6. Public participation
1 Description of the Project

The highest voltage level of Jiangsu power grid in operation is 500kV. Till end of 2001, it had owned 26 of 500kV transmission lines with the length of 3207km (including inter-provincial connection lines); 10 of 500kV substations (including switching stations) and 12 sets of transformers, with the capacity of 8000MVA.

Currently, 220kV power grid is still main network in Jiangsu Province. The whole network has 142 of 220kV substations with 231 sets of step-down transformers and the transferred capacity of 29549MVA and 319 of 220kV transmission lines 8062.6km long totally (including inter-provincial connection lines).

In order to improve the 500 kV network structure in Jiangsu Province, to meet the demand of growth in power consumption and social economy, to lower the cost of power transmission, to enhance the reliability of transmission in the power network, Jiangsu Province will necessarily construct the Project.

The Project includes two proposed 500kV substations, one 500kV substation to be expanded, a transferred capacity of 2500MVA to be increased and 102km of 500kV transmission lines to be built. The new lines are composed of two sections----2x1km Tianwan Power Station~Shanghe Substation line cut into the 500kV Lianyungang Substation and 2x50km of the 500kV Longtan ~ 500kV Dongshanqiao substations; they will be built by double circuit mounting on same tower. The expansion 500kV Yancheng Substation is to add another one main transformer, which would not cause any problem of ingoing and outgoing lines.

One proposed substation is located in Xiabutou, Dongliu Village and Yuanjiabian Village, Qilin Town, Jiangning County, Nanjing Municipal. The other proposed substation, in Hexingzhuang of Yuchan Village, Yilu
Township, Guanyun County, Lianyungang Municipal, lies at the farm field juncture of Beiwei Group, Hexing Village and Datangwei Village. And the expansion substation is in Tangchen Village, Guomeng Township, Yandu County, Yancheng Municipal.

2 Environmental background of the Project

The proposed 500kV substations, at the engineering site-option stage currently, are open and wide around from site investigation, will not cause resident relocation but farmland occupation and no dwelling stands within 150m away the substations' boundaries. The substation to be expanded does not need to acquire land.

Through Jiangning and Xixia districts of Nanjing Municipal, Jiangsu Province, the 500kV transmission line between Dongshanqiao and Longtan substations goes over rolling low downy (ground elevation: 13.00~120.00m) with low hills and cols as well as even and relatively low-lying terrain (usual ground elevation: 6.90~13.00). There are dwellers along the line and they should be relocated. Tower foundations will occupy farmland. The following high-grade highways will be crossed by the line: Nanjing airport highway, Ning-Hang highway, Ning-Hu highway, National Highway number 104, Nanjing second ring road and third ring road. It will also cross two navigable rivers----Qinhuai River and Jiuxiang River. With farmland along, the 500kV transmission line Tianwan Power Station~Shanghe Substation line cut into the 500kV Lianyungang Substation passes through Datangwei, Xiaotangwei and Pengzhuang Village, Yilu Township, Guanyun County, Lianyungang Municipal. No houses, highways or rivers will be relocated or crossed over.

Nanjing area and Lianyungang area to be passed through by the new lines are separately developed and underdeveloped economically.
3 Potential environmental impact

(1) During construction period

Access road during construction period will take up some farmland temporarily causing short-term impact on crop planting. Planting will recover when construction is over.

The Project sites are on the farmland. Building of the Project will have to clear all the crops in the land and occupy the land permanently. This will cause certain loss in agricultural production.

Some farmland will be acquired temporarily for the Project during construction period, which would influence crop planting for a short term. However, crop planting will recover when construction work is finished.

Building of the Project would produce construction dust and noises, resulting in short-term impact on surroundings.

In case the transmission line crosses highways, railways, rivers and existing power lines, attention should be paid to impact incurred by the line on transportation traffic and the power lines’ safe operation.

(2) During operation period

To the substations:

PCBs are no longer used in compliance with Chinese rules and there will be no any impact incurred by PCBs on the environment.

The Project’s involving farmland would affect agricultural production, leading to annual decrease of 198.9t/a in local grain output.

The Project will occupy total land of 17.33 ha. No house is required to remove but economic compensation and land reallocation should be done
with some inhabitants.

- In design, the Project has been isolated far from urban and township programming areas. No impact would occur to construction of the areas.

- In operation of the Project, the electro-magnetic field (EMF) intensity produced under the design conditions meet the recommended standard. In case some electro-magnetic intensity data under outgoing and ingoing lines of the substation are more than 4kV/m, there is no dwelling in the area though, without impact incurred on residents.

- In operation of the Project, noise produced by the substation meet II standard----- (60dB (A)，50dB (A))．

The substation’s operation will bring production and sanitary wastewater. There will be 830 tons of sanitary water annually to be treated and then discharged. Sanitary water will meet the requirement---- BOD 30mg/L，SS 150mg/L，oil 10mg/L.

To the transmission lines:
- During operation of the transmission lines, no impact will produce under the design conditions if the lines intercross highways, railways, rivers and existing power lines.

- Tower foundations occupy farmland and affect agricultural production, making an annual decrease of 27.0t/a in crop harvest.

- As estimated preliminarily, tower foundations will take up 2.37ha land, 10800m² houses need to be removed. There are 12 families, about 45 persons. That will bring some impact on residents.

- The transmission lines have been designed to shun urban and township programming area. Thus they have no impact on urban and township building.
• Tower foundations will affect agricultural mechanized farming a little.

• The residential house area should be returned to farmland when houses are removed so as to minimize impact on agricultural production.

4 Suggested mitigating measures

(1) During construction period

• Construction machinery is used during construction of the substation causing construction noise. Therefore, low noise (less than 85dB(A)) construction machines should be applied. Construction will be done at daytime and avoided at nighttime as possible to mitigate environmental impact incurred by construction noise.

• Guard fence should be established during construction of the substation. Periodic water spray should be done with excavated naked earth within the substation; soil-transporting vehicles should also be flushed and covered with surface cloth so as to prevent dust from affecting surroundings.

• Historic relics should be handled according to the Antiquity Preservation Law of the People's Republic of China once they are discovered during construction of the substation. Construction work should come to a halt in no time and it should be reported to local antiquity preservation department. Meanwhile, shielding measures should be adopted.

• Sanitary water of construction staff will be treated and discharged complying with the standard to prevent drainage of runoff water.

• In design of the substation, proper distance away residential and sensitive areas have been taken into consideration to meet associated
design regulations and environmental protection requirements.

* The transmission line intercrossing highways and rivers should avoid construction at traffic rush time.

* For the land to be occupied by tower foundations and substations, economic compensation will be provided for farmland, houses and crops in strict accordance with *Land Management Law* of China and requirement of the World Bank.

Refer to Table 1 (Page 15) about mitigating measures of the substation.

(2) During operation period

To the substations:
* Use low noise (less than 85dB(A)) equipment as possible. Low noise (less than 85dB(A)) means the noise level is less than 85dB(A).

* Make general arrangement of the substation reasonably and arrange the main transformer at center of the substation to minimize environmental impact incurred by operation noise.

* In order to prevent transformer oil leakage, the accident oil pond (capacity of which is designed to be larger than the transformer’s oil volume) has been designed in the substation. Transformer oil can run into the pond directly as any accident happens to the transformer and will be recycled together and reused.

* One operational 500kV substation will produce sanitary water of 830t/a, which would be discharged after being disposed through the buried second biochemical sewage treatment system, and meet the standard.

* Promote propagation and education on electric equipment safety
knowledge among the masses near the substation and advise residents close to the substation of the way to do agricultural production safely.

- Stand a warning sign near outgoing lines of the substation with high electric field intensity to advise residents not to stay there or do farming for a long time.

To the transmission lines:
- Self standing towers (without anchoring cables) are mostly used for transmission line stringing. Double circuit mounting on same tower is also adopted so that minimum farmland would be occupied.

- The transmission line corridor has been designed to avoid dense residential area.

- Dwelling to be removed should be relocated to ensure affected residents have houses and their living standard will not decrease.

- The transmission line has sufficient clear height when crossing highways and rivers, which would not cause impact on land traffic and water navigation.

- Strengthen education on electric power to residents near the line corridor so that they can farm safely under the line corridor.

Refer to Table 1 about mitigating measures of the substation.

5. Environmental management plan

The mitigating measures of the proposed and expansion substations have been presented according to environmental analysis results. The environmental management plan has been prepared for construction and operation periods of the Project. Environmental management during construction and operation periods is to be implemented by State Power
East China Company and Jiangsu Provincial Electric Power Company; local Environmental Protection Bureau is the supervisor for the work. And State Power Environmental Protection Research Institute is responsible for monitoring and measurement of operation period. Refer to Table 2 (Page 16) monitoring plan of the environmental management plan.

6. Public participation

Public participation was carried out by means of holding talks and sending out investigation forms. Places involved in the Project were investigated, including Xiabutou of Dongliu Village (Qilin Town, Jiangning District, Nanjing Municiple), Beishangzhuang (Tangshan Village, Jiangning District), Renjiabian Group (Yinxiang Village, Jiangning District), Hexi Group (Yilu Township, Lianyungang Municiple), Pengzhuang Group (Zhoubei Village, Yilu Township), Xiaotangwei Group (Yilu Township) and Tangchen Village (Guomeng Township, Yandu County, Yancheng Municiple) etc. seven sites.

Local government, all functional departments and the masses on the Project sites supporting construction of the Project consider it beneficial to development of local industry and traffic and to enhancement of local living quality.
### Table 1  Mitigating measures and the cost for the two proposed substations and one expansion substation

<table>
<thead>
<tr>
<th>Phase</th>
<th>Issue</th>
<th>Mitigating Measure</th>
<th>Cost (thousand yuan)</th>
<th>Institutional Responsibility</th>
<th>Supervisor</th>
</tr>
</thead>
<tbody>
<tr>
<td>construction</td>
<td>Noise</td>
<td>Use low noise (less than 85dB(A)) (&lt;85dB(A)) construction equipment and do not use high noise equipment</td>
<td>100</td>
<td>State Power Corporation East China Company</td>
<td>Environmental protection bureaus at provincial, municipal and county levels</td>
</tr>
<tr>
<td></td>
<td>Dust</td>
<td>Guard fence and water spray</td>
<td>50</td>
<td>State Power Corporation East China Company and Jiangsu Provincial Electric Power Company</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Agricultural ecology</td>
<td>Recover damaged vegetation timely when the construction ends</td>
<td>Refer to RAP</td>
<td>Jiangsu Provincial Electric Power Company</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sewage</td>
<td>Buried second biochemical sewage treatment system</td>
<td>200</td>
<td>Refer to RAP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Land occupation</td>
<td>Minimize land occupation</td>
<td>---</td>
<td>Refer to RAP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clearance in occupied land</td>
<td>Do compensation in accordance with laws</td>
<td>Refer to RAP</td>
<td>Refer to RAP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Training on environmental protection</td>
<td>Educate constructors</td>
<td>50</td>
<td>Refer to RAP</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Subtotal</td>
<td>400</td>
<td>* Institutional Responsibility : State Power Corporation East China Company and Jiangsu Provincial Electric Power Company</td>
<td></td>
</tr>
<tr>
<td>Operation</td>
<td>Noise</td>
<td>Equipment noise isn’t higher than 85dB(A). Consolidate enclosures and do afforestation to absorb dust and reduce noise</td>
<td>100</td>
<td>* Supervisor: Environmental protection bureaus at provincial, municipal and county levels</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Electric Field and magnetic field</td>
<td>Use transforming devices conform to standards; select height of the power distributing structure conform to design requirement, phase-earth and phase-phase distance</td>
<td>150</td>
<td>(Each measure indicated in the table should be γννννν in the bid document.)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wastewater</td>
<td>Treated by buried second biochemical sewage treatment system to be in compliant with the standard</td>
<td>100</td>
<td>(Each measure indicated in the table should be γννννν in the bid document.)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Training on environmental protection</td>
<td>Strengthen education to local residents and training to managers</td>
<td>50</td>
<td>(Each measure indicated in the table should be γννννν in the bid document.)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Subtotal</td>
<td>400</td>
<td>(Each measure indicated in the table should be γννννν in the bid document.)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>750</td>
<td>(Each measure indicated in the table should be γννννν in the bid document.)</td>
<td></td>
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</tbody>
</table>
Table 2  Monitoring plan of the environmental management plan for the two proposed substations, one expansion substation and the transmission lines

<table>
<thead>
<tr>
<th>Phase</th>
<th>issue</th>
<th>Monitoring Cost (thousand yuan)</th>
<th>Monitoring unit</th>
<th>Institutional responsibility</th>
<th>Supervisor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>State Power Environmental Protection Research Institute (SPEPRI)</td>
<td>State Power Corporation East China Company.</td>
<td>Environmental protection bureaus at provincial, municipal and county levels</td>
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<tr>
<td></td>
<td>Noise</td>
<td>60</td>
<td>State Power Environmental Protection Research Institute (SPEPRI)</td>
<td>State Power Corporation East China Company.</td>
<td>Environmental protection bureaus at provincial, municipal and county levels</td>
</tr>
<tr>
<td></td>
<td>Dust</td>
<td>10</td>
<td>State Power Environmental Protection Research Institute (SPEPRI)</td>
<td>State Power Corporation East China Company.</td>
<td>Environmental protection bureaus at provincial, municipal and county levels</td>
</tr>
<tr>
<td></td>
<td>Agricultural ecology</td>
<td>30</td>
<td>State Power Environmental Protection Research Institute (SPEPRI)</td>
<td>State Power Corporation East China Company.</td>
<td>Environmental protection bureaus at provincial, municipal and county levels</td>
</tr>
<tr>
<td></td>
<td>Wastewater</td>
<td>40</td>
<td>State Power Environmental Protection Research Institute (SPEPRI)</td>
<td>State Power Corporation East China Company.</td>
<td>Environmental protection bureaus at provincial, municipal and county levels</td>
</tr>
<tr>
<td></td>
<td>Subtotal</td>
<td>140</td>
<td>State Power Environmental Protection Research Institute (SPEPRI)</td>
<td>State Power Corporation East China Company.</td>
<td>Environmental protection bureaus at provincial, municipal and county levels</td>
</tr>
<tr>
<td></td>
<td>Noise</td>
<td>120 (30 for purchasing a sound level meter)</td>
<td>State Power Environmental Protection Research Institute (SPEPRI)</td>
<td>State Power Corporation East China Company.</td>
<td>Environmental protection bureaus at provincial, municipal and county levels</td>
</tr>
<tr>
<td></td>
<td>Electric field and magnetic field</td>
<td>170 (60 for purchasing a field-intensity meter)</td>
<td>State Power Environmental Protection Research Institute (SPEPRI)</td>
<td>State Power Corporation East China Company.</td>
<td>Environmental protection bureaus at provincial, municipal and county levels</td>
</tr>
<tr>
<td></td>
<td>Wastewater</td>
<td>50</td>
<td>State Power Environmental Protection Research Institute (SPEPRI)</td>
<td>State Power Corporation East China Company.</td>
<td>Environmental protection bureaus at provincial, municipal and county levels</td>
</tr>
<tr>
<td></td>
<td>Subtotal</td>
<td>360</td>
<td>State Power Environmental Protection Research Institute (SPEPRI)</td>
<td>State Power Corporation East China Company.</td>
<td>Environmental protection bureaus at provincial, municipal and county levels</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>500</td>
<td>State Power Environmental Protection Research Institute (SPEPRI)</td>
<td>State Power Corporation East China Company.</td>
<td>Environmental protection bureaus at provincial, municipal and county levels</td>
</tr>
</tbody>
</table>

* Noise monitoring is once during construction period and once every half-year during operation period; mainly monitor construction noise during construction, equipment and boundary noise level during operation; the monitor factor is Leq A. In case residents near substations and transmission lines complain, measurement will be made at that time.

* Assess dust level through observation for dust monitoring during construction.

* Electric field and magnetic field will be monitored once per year during operation period; monitor electric field and magnetic field at 1m outside the boundary after the substation is put into operation; the monitor factors are electric field and magnetic field.

* Frequency of wastewater monitoring is once every three months during construction and operation periods; the main monitoring factors are BOD, SS and oil.

* Monitoring unit: State Power Environmental Protection Research Institute (SPEPRI).

* Institutional responsibility: State Power Corporation East China Company and Jiangsu Provincial Electric Power Company

* Supervisor: Environmental protection bureaus at provincial, municipal and county levels.

* All measurement should be made on the site of Longtan Substation, Lianyungang Substation and Yancheng Substation: Xiabutou, Hexingzhuang and Tangchen Village.
Measurement should be made according to the following methods:

1. **Wastewater:** SS—GB11901 *Gravimetric Method*, BOD$_5$—GB7488-87 *Dilution and Seeding Method*. Oil—*Non Dispersive Infrared Ray Spectrometry* (Monitoring method for water and waste water (3$^{rd}$ edition). Chinese Environmental Science Press, 1989);
2. **Noise:** relevant requirements of Technical Code of Environmental Monitoring by State Environmental Protection Administration;
3. **Electromagnetic field:** to choose sunny days for measurement considering topography and avoiding high buildings, trees, high-voltage transmission lines and metal structures.

**The cost in the table will be used for monitoring work.**
Environmental Impact Assessment Report for the
Extension Project of East China (Jiangsu) 500kV
Power Transmission Project

(Two proposed substations, one expansion substation and the
transmission lines)
1 Introduction and background

In order to improve the 500kV network structure in Jiangsu Province, to meet the demand of growth in power consumption and social economy, to lower the cost of power transmission, to enhance the reliability of transmission in the power network, the Jiangsu Province proposed to use remaining sum of the East China (Jiangsu) 500kV Power Transmission Project funded by the World Bank to construct the extension project (two proposed 500kV substations, one expansion 500kV substation and the 500kV transmission lines).

This environmental impact assessment (EIA) report describes direct and potential environmental impact incurred by construction of the extension project (called “the Project” below).

The report is composed of:
(1) Introduction and background
(2) Description of the Project
(3) Environmental background of the Project
(4) Environmental impact during construction period
(5) Environmental impact during operation period
(6) Scheme analysis
(7) Environmental management plan and mitigating measures
(8) Public participation

1.1 Status quo of Jiangsu power grid

In coastland of east China, Jiangsu Province is located at Yangtze River down stream delta neighboring Shandong, Anhui, Zhejiang provinces and Shanhi municipality and is one of the most economically developed provinces in China.
Jiangsu power grid is at the center of and also an important component of east China power grid. Jiangsu Province has jurisdiction over total 13 municipals: Nanjing, Zhenjiang, Changzhou, Wuxi, Suzhou, Xuzhou, Suqian, Lianyungang, Huaiyiin, Yancheng, Yanzhou, Taizhou and Nantong etc.. In 2001, all the social power consumption of the province up to 107.844 billion k\text{W-h} and the highest load 18000MW increased 11.03\% and 9.0\% separately compared with that of the last year.

Till end of 2001, the total installed capacity of T-G sets (above 50MW) in the province had gone up to 21300MW and generating capacity of that year had become 104.012 billion kW\text{-h}.

The highest voltage level of Jiangsu power grid in operation is 500kV. Till end of 2001, it had owned 26 of 500kV transmission lines with the length of 3207km (including inter-provincial connection lines); 10 of 500kV substations (including switching stations) and 12 sets of transformers, with the capacity of 8000MVA.

Currently, 220kV power grid is still main network in Jiangsu Province. The whole network has 142 of 220kV substations with 231 sets of step-down transformers and the transferred capacity of 29549MVA and 319 of 220kV transmission lines 8062.6km long totally (including inter-provincial connection lines).

See Figure 1-1 sketch map of the 500kV power grid in Jiangsu Province, East China

1.2 Necessity of construction of the Project

Although Jiangsu provincial 500kV power grid has developed fast making use of loan from the World Bank recent years, it is still relatively weak. Besides, as the receiver end of east China power network to which Three Gorges transmit electric power, Jiangsu power grid will be
beneficial to, by constructing the Project, resolving the said bottleneck problems, strengthening the receiver end network to alleviate pressure on the existing 500kV substations for supplying power and improving reliability of the power grid for supplying power. Therefore, it is necessary to accelerate construction of the Project.

1.3 Basis of environmental impact assessment for the Project

1.3.1 The law and regulation system in China

Since the promulgation of environmental protection law in 1989, China has developed a comprehensive environmental protection law system. There have established environmental protection organizations at state level, province level and municipality level with sufficient scale. The following Chinese regulations are the basis of environmental impact assessment (EIA) for the Project.

(1) Environmental Protection Law of the People’s Republic of China
(2) Land Management Law of the People’s Republic of China
(3) Antiquity Preservation Law of the People’s Republic of China
(4) The 253 decree State Council, Management Regulations for Environmental Protection of Construction Project
(6) Document Huanfa[2001]17 SEPA, the Notice on Annunciation (the first) of Directory of Classified Management of Environmental Protection for Construction Projects
(7) Document GJ324 (1993) SEPB, the notice on strengthening the management of environmental impact assessment for construction project funded by international financial institutions
(8) SEPA HJ/T24 — 1998 Technical regulations on environmental impact assessment of electromagnetic radiation produced by 500kV ultrahigh voltage transmission and transfer power engineering
1.3.2 Relevant standards

The environmental standards to be performed during construction and operation of the substations:

(1) GB8978-88 *Standard of Wastewater Comprehensive Effluent* for wastewater effluent (BOD 30mg/L, SS 150mg/L, oil 10mg/L)

(2) GB12523-90 *Noise Limits for Construction Site* for construction noise

(3) GB3096-93 *Standard of Environment Noise of Urban Area*, class 2 [60dB (A) at daytime, 50 dB (A) at nighttime] for environmental noise

(4) GB12348-90 *Standard of Noise at Boundary of Industrial Enterprises*, class II [60dB (A) at daytime, 50 dB (A) at nighttime] for noise at the boundary

(5) Radio interference

The tolerance of radio interference level at 20m (not in outgoing direction) outside the substation enclosure is 55dB (μV/m) (frequency: 0.5MHz) in fine days with relative humidity no more than 80%.

(6) Electro-magnetic field (EMF) limits

- In case the substation stands close to dwelling, the electric field limit of the undistorted electric field is 4kV/m at the height of 1.5m in the residential area, which is deemed to be the recommended assessment standard for electric field.

- Magnetic induction intensity limits

  The limit 0.1mT of International Radiant Protection Association for all-day radiation is used as the recommended assessment standard of magnetic induction intensity.

1.3.3 Requirements for power transmission project by the World Bank

The World Bank comments that power transmission project as one with
provision of extensive environmental risk which depends on engineering scale and position. The incurred impacts are relevant to construction of the substation and risk of electro-magnetic field (EMF). The power line or substation of small capacity need not overall EIA while that of large capacity does.

Power transmission projects belong to catalogue B according to the World Bank Environmental Assessment Policy (OP) 4.01 for environmental assessment. The Project need not complete environmental impact assessment but some environmental analysis. Associated environmental impact analysis has been carried out in compliance with the Framework of EIA Report for the Project (November 2001) discussed and recognized by environmental experts of the World Bank.

1.3.4 Design reports of the Project

(1) Feasibility study of the 500kV Longtan Substation project by the East China Electric Power Design Institute, State Power Corporation (ECEPD), December 2001;

(2) Substation site option report of the 500kV Lianyungang Substation project by the JPEPDI, July 2001;

(3) Report of the 500kV Yancheng Substation expansion project by the JPEPDI, October 2001.

(4) Route Report for Power Transmission Line Project of Two Circuits between the 500kV Dongshanqiao and Longtan Substations, ECEPDI, 2002

(5) Route Report for Power Transmission Line Project of Tianwan Power Station~Shanghe Substation line cut into the 500kV Lianyungang Substation, JPEPDI, 2002
1.3.5 Project commitment

In accordance with relevant environmental protection rules of China and the World Bank, on May 21, 2001 the Jiangsu Provincial Electric Power Company entrust State Power Corporation Environmental Protection Research Institute (SPEPRI) (holding class A environmental impact assessment certificate) to carry out EIA for the Project.

The SPEPRI, a science research institute directly affiliated to State Power Corporation of China, has one after another undertake the EIA for many projects funded by Chinese government and international financial organization.

- East China (Jiangsu) 500kV Power Transmission Project
- Environmental supervision and monitoring for the Environmental Management Plan of the East China (Jiangsu) 500kV Power Transmission Project
- Zhenjiang 110kV Dashikou and Jingshan Power Transmission Project
- Wuxi 110kV Power Transmission Project
- Nanjing 220kV Daxinggong Substation Project
- Nanjing 110kV Power Transmission Project
- Nantong 110kV Power Transmission Project
- Lianyungang 110kV Maopingxian Power Transmission Project
- Power transmission project of Beijing urban grid reconstruction funded by the World Bank

Additionally, major EIA projects for thermal plants funded by foreign investment are:

- Henan Yuzhou Power Plant 1st stage engineering (2x300MW class), funded by the Asian Development Bank, EIA (including EIA for substation and transmission lines);
- Shangdong Liaocheng Power Plant 2nd stage engineering (2x600MW), funded by foreign capital, EIA;
EIA report for the extension Project of East China (Jiangsu) 500kV Power Transmission Project

- Shandong Heze Power Plant 2nd stage engineering (2x300MW), funded by foreign capital, EIA;
- Shanxi Yangcheng Power Plant 1st stage engineering (6x350MW), foreign financial project EIA;
- Anhui Luohe Power Plant 2nd stage engineering (2x300MW);
- Hunan Leiyang Power Plant 1st stage engineering (2x300MW class), funded by the World Bank, EIA (including EIA for substation and transmission lines);

Major EIA projects for thermal plants funded by the government:
- Shandong Laicheng Power Plant 1st stage engineering (4x300MW and 2x600MW);
- Shandong Heze Power Plant 2nd stage engineering (2x300MW)
- Jiangsu Xutang Power Plant renovation engineering (2x300MW);
- Jiangsu Ligang Power Plant 1st stage engineering (2x350MW);
- Jiangsu Nantong Power Plant 2nd stage engineering (2x350MW);
- Nanjing Xiangtan Power Plant renovation engineering (2x125MW);
- Suzhou Industrial Park Huaneng Power Plant 1st stage engineering (2x300MW);
- Anhui Fuyang Power Plant 1st stage engineering (2x600MW class), Asian Development Bank EIA;
- Zhejiang Jiaxing Power Plant 1st stage engineering (2x300MW), etc.
- Jiangxi Jinggangshan Power Plant 1st stage engineering (2x300MW);

After undertaking the tasks, SPEPRI collected relevant information and solicited opinions from departments concerned on the work and began to carry out EIA work for the Project. At that time, the Project was at the stage of selecting proposed substation site and some engineering designs had not been confirmed. However, we compiled on September 2001 the Framework of Environmental Impact Assessment Report for the Extension Project of East China (Jiangsu) 500kV Power Transmission Project so that persons concerned of the World Bank could know our work status, conception and progress as soon as possible. Between 8~9 Nov. 2001, Mr. Baratz, the principal expert of the World Bank, reviewed
and put forward modification suggestions on the above framework and investigated the recommended substation sites. SPEPRI has performed EIA based on the framework.

The Project at the engineering site-option stage currently has been reviewed and approved by the State Power Corporation East China Company (SPECC). SPEPRI carried out site investigation, environmental investigation (physical, ecological, social and living quality environment), public participation and ambient background measurement (of electric field intensity, magnetic field intensity and noise levels) on the recommended two proposed substation sites, on the expansion site and along the transmission lines.

For the reason that the 500kV transmission line is still at indoor route-option stage instead of investigation stage, we know physical environment of areas the line may pass through. This environmental impact assessment report has been compiled on the above basis.

The EIA report was delivered to environmental experts of the World Bank at the end of Feb. 2002. The environmental experts offered suggestions on April 25 and we modified and submitted updated report again according to the suggestions on May 30, 2002. On June 20, 2002, Mr. Baratz, principal expert of environmental protection from the World Bank, went to Shanghai and reviewed that report and provided comments. This EIA report is updated version modified carefully in accordance with the comments.
Fig1-1 The sketch map of the 500kV power grid in Jiangsu Province, east China
2 Description of the Project

2.1 Project component

The Project includes two proposed 500kV substations, one 500kV substation to be expanded and 102km of 500kV transmission lines.

2.2 Substation

(1) The 500kV Longtan Substation is programmed to install 2 sets of 1000MVA main transformers, reserving possibility of building 3rd set. The voltage is at the level of 500/220/35kV. The first phase is a 1000MVA main transformer. The 500kV outgoing line is planned to be 4 circuits, reserving possibility of expansion of 2 circuits more. In this phase, the 500kV outgoing lines are 2 circuits. The 220kV outgoing is planned to be 12 circuits, reserving possibility of expansion of 2 circuits and this phase is 6 circuits.

The area within the substation is approximately 8.88ha (New land need to be acquired and no house is required to remove.). Refer to Figure 2-1 geographic position. See the accurate plan location in Figure 2-2.

(2) The 500kV Lianyungang Substation is programmed to install 2 sets of 750MVA main transformers, reserving possibility of 3rd set. The voltage is at the level of 500/220/35kV. This phase is a 750MVA main transformer. The 500kV outgoing lines are planned to be 6 circuits and they are 2 circuits in this phase. The 220kV outgoing lines are planned to be 12 circuits and they are 5 circuits in this phase.

The area within the substation is approximately 8.2ha (New land need to be acquired and no house is required to remove.). Refer to Figure 2-3 geographic position. See the accurate plan location in Figure 2-4.
(3) The 500kV Yancheng Substation will be expanded with 1x750MVA main transformer in this phase. The first phase will be carried out within the existing 500kV Yancheng Substation and will not acquire more land.

The area within the substation is approximately 8.48ha (No land requisition in this phase). Refer to Figure 2-5 geographic position.

2.3 The transmission lines

(1) Tianwan Power Station–Shanghe Substation line cut into the 500kV Lianyungang Substation

Tianwan Power Station–Shanghe Substation line cut into the 500kV Lianyungang Substation, linetype: LGJ—4×400, total 2x1km, single circuit stringing.
Tower number: 6.
Tower foundation occupied area: 0.12ha.

Route: refer to figure 2-6 route sketch of the 500kV transmission line cut into Lianyungang Substation; figure 2-7 is physical environment layout of areas the line may pass through.

(2) The 500kV Dongshanqiao–Longtan substations line, linetype: LGJ—4×400, total 2×50km, two circuits stringing;
Tower number: 125.
Tower foundation occupied area: 2.25ha.

Route: refer to figure 2-8 route sketch of the transmission line and figure 2-9 physical environment along the line. This transmission line comes out from east of the 500kV Dongshanqiao Substation and cross Ning-Li highway and then 220kV Dongli line. It crosses Ning-Gao highway on
the south of Renjiabian, reaches Xiexi passing by Fangshan hill on the south of the hill, and then goes through Dalian hill after northward over east of Chunhua, and continues crossing national highway number 104 and Hu-Ning highway to Hushan hill, and goes into Longtan Substation finally.
Figure 2-1 Geographic position of the proposed 500kV Longtan Substation
Figure 2-2 Arrangement plan of the proposed 500kV Longtan Substation
Figure 2-3 Geographic position of the proposed 500kV Lianyungang Substation
Figure 2-4 General arrangement plan of the 500kV Lianyungang Substation
Fig 2-5 Geographic position of the expansion 500kV Yangcheng Substation
Fig 2-6 Route sketch of the 500kV Transmission Line cut into Lianyungang Substation
Fig 2-7 Physical environment layout around the 500kV line cut into Lianyungang Substation
Fig 2-8 Route sketch of the 500kV Dongshanqiao-Longtan Substations transmission line
Outgoing route of the 500kV Dongshanqiao Substation

Airport highway crossed

Figure 2-9 Natural environment layout of along the Dongshanqiao-Longtan substations 500kV line
3 Environmental background situation

3.1 Physical environment

3.1.1 General description of Jiangsu provincial physical environment

In the east coastal part of China, Jiangsu Province is lying between 116° 22′ ~121° 55′ east longitude and 30° 45′ ~35° 07′ north latitude. Located at down stream of the Yangtze River and Huaihe River, it borders Yellow Sea on the east, connects with Anhui on the west, neighbors Shanghai and Zhejiang on the south and interfaces with Shandong on the north. The whole province has an area of 102.6 thousand square kilometers, 1.07% of the overall area of China. It has a population of 72.131.3 million and is the most densely populated province of China.

The overall topography of the province is mainly plain, roughly appearing high on the north and south, low at middle and inclining from west to east. The province is mainly composed of the Huang-Huai plain, Jiang-Huai plain, Sea-bordering plain, the Yangtze River Delta, and norther and southwest hilly regions. The area of plains with elevation under 50m is 85% of the total area of the whole province and most of which with elevation under 5m.

Located at medium latitude, the whole province is mild in climate, appropriate in rainfall and clear cut in four seasons. With the line of Huaihe River and Jiangsu northern general irrigation canal as demarcation line, its northern part is of humid and semi-humid monsoon climate of temperature zone, its southern part is of humid monsoon climate of subtropical zone. The whole province annual average isotherm roughly runs in east-west direction, with temperature difference between north and south be 2.7 °C. The annual precipitation comes between 800~1150mm. The whole year average wind velocity is roughly 3.0m/s.
with prevail wind easterly.

3.1.2 Physical environment of the proposed and expansion project

(1) The 500kV Longtan Substation
Located in Xiabutou (dominating Dongliu Village and Yuanjiabian Village), Qilin Town, Jiangning County, Nanjing Municipal, the substation site is 1300m east of Jiuxiang River and 50m away Qilin Road on the east, with Xiabutou Group of Dongliu Village 150m away on the south, Pingjiagang Group of Yuanjiabian Village 500m away northwest and Qianxiang Village 200m away on the north. No house is required to be resettled within the substation site area.

The substation site area is farmland with growing wheat, paddy, rape (a kind of vegetable to be extracted food oil) and economic crops such as green vegetables and garlic. The site is open and wide but broken into pieces. On the south is an earth hummock and the remainder is comparatively flat and a little wavy. Its topography is fairly high with the natural elevation of about 11~18.2m. There are manually excavated ponds within the site area.

The substation site is located in hilly land in the low part of Ningzhen mountain on the south of lower reach of Yangtze River, 5~8km north Yangtze River. In the substation site scheme, it is designed along both sides of Qixiang River and Jiuxiang River; therefore, they are major rivers in the area. The substation site is 1300m away east of Jiuxiang River and 2250m away west of Qixiang River. Because of high topography, the one-hundred-year flood condition is chiefly caused by mountainous area at upper reach of Yangtze River. Qixiang River and Jiuxiang River are both river ways of small drainage area in the mountainous area and there is no observed water level information about them. After visiting Nanjing Municipal Water Resource Planning Design
Institute and Water Conservancy Bureaus in Xixia District and Jiangning Township and hearing their opinions, we estimated in combination with watercourse gradient ratios of Jiuxianghe and Qixiang Rivers and the water level (8.7m) of the said one-hundred-year flood at Xixiashan reach of Yangtze River: the one-hundred-year flood level on Xiabutou substation site is 11.75m, the ground elevation is above 12.0m; hence, the area will not be affected by one-hundred-year flood.

The earthquake intensity on the substation site is VII degree.

Meteorological conditions on the substation site are listed in Table 3-1. See Figure 3-1 the substation site surroundings.

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average air pressure in last five years</td>
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</tr>
<tr>
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<tr>
<td>Extreme min in last five years</td>
<td>Pa</td>
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<td>Month max in last five years</td>
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<td>Average in last five years</td>
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<td>Annual max in last five years</td>
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<td>1958.7</td>
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<td>Insolation duration</td>
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<tr>
<td>Average hours in last five years</td>
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<td>Max days in last five years</td>
<td>cm</td>
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<tr>
<td>Max depth of frozen earth in last five years</td>
<td>cm</td>
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<tr>
<td>Max depth of accumulated snow in last five years</td>
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<td>Transient max for years in succession</td>
<td>m/s</td>
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To be continued (Table 3-1)

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<tr>
<th>Item</th>
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<tr>
<td>Prevail wind direction in last five years--NE. ENE</td>
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<td>Prevail wind direction in past summers--SE</td>
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<td>11</td>
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<tr>
<td>Prevail wind direction in past winters--NE</td>
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<td>10</td>
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(2) The 500kV Lianyungang Substation

The substation site lies in Hexingzhuang of Yuchan Village, Yilu Township, Guanyun County, Lianyungang Municipal. Where the farmland of Beiwei Group and Datangzhuang connects, on the southeast of Banpu Town and south side of part national highway No. 204 (from Xiaoyizhuang crossing to Tongxing Road), the site is approximately 9km from Banpu Town, approximately 24km from Lianyungang urban roads and 30km from the road of Lianyungang Municipal Power Supply Bureau.

There is no house building within the open and flat substation site. Beyond 300m north of the site is Datangweizhuang, 600m east Xiaotangweizhuang, 300 west Hexingzhuang and 1000m South Pengzhuang Group. Yilu Township lies in northeast of the substation, 1200m away. There are some tombs in southern area of the site, most of which have been removed or buried underground and some of which are possible to be enclosed into the substation. The tombs, scattered in the farm field, were established by local farmers to bury their relatives and not ancient tombs. Under Chinese law, no tomb is permitted to be built within farm field protective area. Thus those tombs are illegal and not protected by the law. However, the project construction unit will still sign an agreement with the tomb owner providing economic compensation when the unit could not avoid the tombs in land requisition.

Definite land area to be acquired has not been determined finally; therefore, tomb problem should be considered sufficiently in actual construction design and this area should be passed by as possible. If the tomb area could not be shunned, the fact that an agreement with
compensation is signed with the tomb owner should attract enough attention in later inspection report, be laid special stress on description and be delivered to the World Bank. Now actual land requisition work has begin yet and so which tombs to be removed are not definite.

The substation site area is farmland planting principally wheat and cotton etc crops. Cultivated land on the site per capita is 2.8mou and 1.9mou separately for Beiwei Group of Hexingzhuang and Datangweizhuang.

Major rivers within the site are Shanhau River 3.5km away from the substation site on the north and Chezhou River 1.25km away on the south. Flood comes mainly from rainstorm runoff in this area. Besides, river base of Yan River etc. around the substation site has no bank, which is prone to cause overflow flood water to submerge the substation during rainy seasons. The one-hundred-year flood level in this area is 3.64m while its ground natural elevation is lower, between 2.7~2.9m. Therefore, flood prevention measures are required to be taken. Soil filling is primary consideration.

The earthquake intensity on the substation site is VII degree.

With good cleanness of environment, the substation site has no other pollution around but itself---no communication wires of Class I and II, no mutual disturbing military, broadcast television, radar station or traffic etc. facilities. No historic relics have been identified on or under the ground of the site.

The site area belongs to monsoon climate area of warm temperature zone with mild and humid climate, clear cut four seasons and obvious change between cold and hot. It is chilly and windy in spring and winter, torrid and rainy in summer and autumn.

Meteorological conditions on the substation site are listed in Table 3-2. See Figure 3-2 the substation site surroundings.
### Table 3-2 Meteorological conditions on the substation site

<table>
<thead>
<tr>
<th>Item</th>
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<td>Average air pressure in last five years</td>
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<td><strong>Temperature</strong></td>
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<tr>
<td>Prevail wind direction in past summers—E, ENE</td>
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<td>11% for each</td>
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<tr>
<td>Prevail wind direction in past winters --NE</td>
<td>%</td>
<td>12</td>
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</tbody>
</table>

(3) The 500kV Yancheng Substation expansion
The substation lies in Tangchen Village, Guomeng Township, Yandu County, Yancheng Municipal. The first phase is to expand one main transformer in the existing 500kV Yancheng Substation. See Figure 3-3 the substation site surroundings.

(4) The 500kV Tianwan Power Station~Shanghe Substation line cut into Lianyungang Substation

Located in Datangweizhuang area, Yuchan Village, Yilu Township, Guanyun County, Lianyungang Municipal, the line goes over farmland with open and even surroundings. Physical environment along the line is similar with Lianyungang Substation’s.

(5) Double circuit 500kV Dongshanqiao~Longtan substations line

Through Jiangning and Xixia districts of Nanjing Municipal, Jiangsu Province, the 500kV transmission line between Dongshanqiao and Longtan substations goes over rolling low downy (ground elevation: 13.00~120.00m) with low hills and cols as well as even and relatively low-lying terrain (usual ground elevation: 6.90~13.00). There are about 45 persons of 12 families along the line and they will be relocated. Tower foundations will occupy farmland. The following high-grade highways will be crossed by the line: Nanjing airport highway, Ning-Hang highway, Ning-Hu highway, National Highway number 104, Nanjing second ring road and third ring road. Area along the line is located in along-river and Qinhuai water systems of main steam area of Yangtze River lower reach. From northeast toward southwest, it goes via low hills and Jiuxiang River and then crosses low-lying area and Qinhuai River. This route belongs to humid and half-humid monsoon climate area of subtropical zone. Four seasons are clear-cut with quite abundant rainfall.
3.2 Social environment

3.2.1 General description of Jiangsu provincial social environment

Jiangsu Province is one of the regions developed relatively earlier, with a history of agricultural production more than 6000 years. Jiangsu today is one of the most economically and culturally developed regions. Its industrial and agricultural production plays a decisive role in the entire country. In agriculture, its grains production are mainly rice and wheat, its economic crops are mainly cotton, rape and peanut. Its light and heavy’s industries are developed and complete in range, having six pillars in industry---machinery, electronics, petrochemical industry, textile industry, light industry, foodstuff and construction material industries.

Superior in geographic position, it has convenient traffic communication. For water ways, there are Yangtze River nearly 400 kilometers running transversely through its territory and the Jing-Hang Canal section690 kilometers flowing longitudinally its north and south. For railways, there are Jing-Hu, Long-Hai, and Ning-Wu etc. Three trunk railways together with northern Jiangsu railway to be constructed totaling more than 1000km sprawling through its territory. For high ways, there are Hu-Ning, Ning-He express ways, Ning-Yan, Ning-Tong and Ning-Lian etc. First class high ways and highways network with national highways 104, 204, 205, 206, 310, 311, 312, 318, 327 and 328 etc.as its trunks covering its territory.

Till end of 2000, the total population of Jiangsu Province had been 73.2724 million with the density of 714 per square kilometer.

In 2000, Jiangsu provincial gross domestic product value (GDP) was 858.47 billion yuan, 10.6% higher than the last year with enhanced increasing amplitude of 0.5%. And the added value of primary industry was 102.8 billion yuan, 4.0% increased; and that of the secondary industry was 443.9 billion yuan, 11.6% increased; that of the tertiary
industry was 311.77 billion yuan, 11.1% increased. The per-capita GDP of the whole province reached 11700 yuan and increased by 9% than the last year.

3.2.2 Social situation of the proposed substations and the expansion substation

(1) The 500kV Longtan Substation

At the end of 2000, Nanjing Municipal had a total population of 5374.4 thousand, in which agricultural population was 2504.1 thousand, non-agricultural one was 2870.3 thousand, with the density of 815 persons/km². The total population of Jiangning County was 742.7 thousand with agricultural population of 610.8 thousand, non-agricultural one of 131.9 thousand, and the density of 472 persons/km².

At the end of 2000, Qilin Town had a total population of 28.152 thousand, in which agricultural population was 23.519 thousand. The whole town occupied an area of 62km² with 2531ha of farmland and 0.09ha per capita of cultivated land. Total economic incomes of the year was 1750.16 million yuan of which 60 million was agricultural outputs. The net income per capita was 4431 yuan in the year.

The 500kV Longtan Substation site covers Xiabutou Group, Dongliu Village, Qilin Town, Jiangning District and Pingjiagang Group, Yuanjiabian Village. Dongliu Village, ruling over 571 families of 11 village groups, has a population of 1805 and a plow land area of 139.13ha with 0.08 ha per capita. Xiabutou Group has 231 persons totally and 15.4ha of plow land with 0.08 ha per capita. Yuanjiabian Village, ruling over 515 families of 10 village groups, has a population of 1625 and a plow land area of 142.8ha with 0.088 ha per capita. Pingjiagang Group has 138 persons totally and 15.67ha of plow land with 0.11 ha per capita.
Around the 500kV Longtan Substation Xiabutou site is farmland with Qilin Road 50m away on the east. The water plant supplies potable water to residents around the site. Because it is rural area, there is no sewer works with sound equipment. Jiuxiang River is the major drainage channel. One Xigang Middle School stands 1.7km away on the northeast of the site.

With relatively good surroundings, there is neither pollution source near the substation site nor other interacting military, radio and television, and traffic facility. No ancient cultural relic has been discovered on and under the ground.

(2) The 500kV Lianyungang Substation

At the end of 2000, Lianyungang Municipal had a total population of 4556.1 thousand, in which agricultural population was 3485 thousand, non-agricultural one was 1071.1 thousand, with the density of 612.05 persons/km². The total population of Guanyun County was 1042.0 thousand with agricultural population of 840.3 thousand, non-agricultural one of 201.7 thousand, and the density of 554.85 persons/km².

Yilu Township had a total population of 34,300 of which 32,300 were agricultural persons till the end of 2000. The whole township covered an area of 4886ha with cultivated land per capita of 0.14ha/person. The total economic incomes of the year were 325.73 million in which agricultural outputs were 99.15 million yuan and the net income per capita was 1318 yuan in the year.

The 500kV Lianyungang Substation site covers Hexi Group, Xinggao Village, Yilu Township. Xinggao Village has 675 families of 2849 persons and 293.93ha of plow land with 0.10 ha per capita. Hexi Group has a population of 282 and 38.67ha plow land with 0.14 ha per capita.

Around the 500kV Lianyungang Substation Hexingzhuang site is
farmland with a country road 50m away on the north, a proposed Lian-Yan Highway 1.5km away on the south, and the National Highway 204 on the west. The water plant supplies potable water to residents around the site. Because it is rural area, there is no sewer works with sound equipment. One irrigation river of about 10m wide 260m away is the major drainage channel. One Yilu Middle stands 1.5km away on the east.

With relatively good surroundings, there is neither pollution source near the substation site nor other interacting military, radio and television, and traffic facility. No ancient cultural relic has been discovered on and under the ground.

(3) The 500kV Yancheng Substation

At the end of 2000, Yancheng Municipal had a total population of 7956 thousand, in which agricultural population was 5833 thousand, non-agricultural one was 2123 thousand, with the density of 531 persons/km². The total population of Yandu County was 861.3 thousand with agricultural population of 614.8 thousand, non-agricultural one of 246.5 thousand, and the density of 660 persons/km².

The total population of Guomeng Town was 1258.093 thousand persons till the end of 2000. Total farmland of the whole town was 4411ha with cultivated land per capita of 0.08ha. It had a total economic income of 1230.06 million yuan of which 282.37 million yuan was agricultural outputs and the net income per capita was up to 3721 yuan in the year.

The 500kV Yancheng Substation site is farmland with Ningyan Road 50m away on the west. The water plant supplies potable water to residents around the site. Because it is rural area, there is no sewer works with sound equipment. Ganggouhe River and Dongwohe River are the major drainage channels.
(4) The transmission lines

Refer to table 3-3 Social environment along the 500kV transmission lines.

Table 3-3 Social environment along the 500kV transmission lines

<table>
<thead>
<tr>
<th>Item</th>
<th>Tianwan Power Station–Shanghe Substation line cut into Lianyungang Substation</th>
<th>Double circuit 500kV Dongshanqiao–Longta substation line</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route area</td>
<td>Yilu Township, Guanyun County, Lianyungang Municipal</td>
<td>Jiangning and Xixia districts of Nanjing Municipal</td>
</tr>
<tr>
<td>Land function</td>
<td>Farmland</td>
<td>Farmland in low hills and low-lying area</td>
</tr>
<tr>
<td>Village or town</td>
<td>Datangwei, Xiaotangwei, Pengzhuang</td>
<td>Renjiaowan, Chunhua Village, Longwangmiao Village, Qinglongshan Village etc.</td>
</tr>
<tr>
<td>Waters</td>
<td>None</td>
<td>Jiuxiang River, Qinhuai River</td>
</tr>
<tr>
<td>Highway crossed</td>
<td>None</td>
<td>Six highways: Ning-li, Ning-Hang, Ning-hu, national road number 104, Nanjing outer ring roads</td>
</tr>
<tr>
<td>Cultural relics</td>
<td>No cultural relic or historic site nearby</td>
<td>No cultural relic or historic site nearby</td>
</tr>
<tr>
<td>Tourism</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

3.3 Ecological environment

Exploited more than 6000 years, the Jiangsu region is mostly covered by cultivated lands and artificial river net. The proposed substation sites are mostly cultivated farm field without original forest, wetland or species & living kinds in imminent danger.

There are many rivers near the two proposed substations. Qixiang River and Jiuxiang River flow near Longta substation. Near Lianyungang Substation are Shanhui River, Yan River, Shaoxiang River and Yunshan River.

The land occupied by the two proposed substations is cultivated field planting principally wheat and paddy and economic crops such as cotton and cole.
The 500kV transmission line between Dongshanqiao and Longtan substations goes over rolling low downy with low hills and cols. Due to human activities, most hills have been cultivated into terrace, cols become paddy fields, and low hill area are manually planted with Zashu trees, pine trees and Shamu trees. When the line crosses low hills, a few manual high trees would be cut; it will span economic crop areas at the height of the crops without necessity of cutting crops. This line crosses two rivers (Qinhuai River and Jiuxiang River).
Figure 3-1: Surroundings of the proposed 500kV Lontan Substation
Figure 3-2 Surroundings of the proposed 500kV Lianyungang Substation
Figure 3-3 Surroundings of the expansion 500kV Yancheng Substation
4 The environmental impact during construction period

4.1 Identification of environmental impact

Identification of environmental impact during construction period of the Project is listed in Table 4-1 below.

<table>
<thead>
<tr>
<th>Order</th>
<th>Item</th>
<th>Environmental impact</th>
</tr>
</thead>
</table>
| 1     | Land occupation                              | * substation and tower foundation occupation  
 * interim occupation for construction (see 4.2.5)                                          |
| 2     | Mineral resources                            | No impact (see 4.2.4)                                                                |
| 3     | Hydrological conditions and flood            | Some substations affected, others not (see 4.2.7)                                      |
| 4     | Construction dust                            | Minor impact on ambient air (see 4.2.2)                                               |
| 5     | Construction noise                           | Certain impact on constructors and acoustic environment (see 4.2.3)                  |
| 6     | Sanitary water during construction           | Minor impact (see 4.2.1)                                                             |
| 7     | Wastewater effluent during construction      | Minor impact (see 4.2.1)                                                             |
| 8     | Vegetation                                   | Vegetation damaged in occupied land; some trees cut under the route through low hills (see 4.3.1) |
| 9     | Wetland ecology                              | A little artificial wetland (ditch or pond) occupied, natural wetland not affected (see 4.3.3) |
| 10    | Scenic view                                  | Affected a little (see 4.5.3)                                                        |
| 11    | Shipping                                     | Short-term impact brought by bulky cargo shipping (see 4.4)                          |
| 12    | Highway                                      | Short-term (half a day) impact (see 4.4)                                              |
| 13    | Agricultural production                      | Loss of 198.9t/year (see 4.3.2)                                                       |
| 14    | Influx of construction teams                 | * no cultural conflict  
 * to increase residential incomes  
 * life facilities (see 4.5.4)                                                          |
| 15    | Cultural relics                              | No impact (see 4.5.1)                                                                |
| 16    | Scenery and places of interest               | No impact (see 4.5.2)                                                                |
| 17    | Resettlement                                 | No resettlement required; some emigration for the transmission lines (see 4.5.5)      |
| 18    | Post and telecom communication wires and power transmission lines | No impact on the communication wires due to a long distance away in design (see 4.4) |
4.2 Impact on physical environment

4.2.1 Impact on waters

Due to bulky cargo shipping for the two 500kV substations (Longtan and Lianyungang substations), some docks and bridges are separately required to be established and consolidated. During their construction, suspended substances in the river might increase for a short term.

During construction of the substation, there will be 100 persons participating in the construction work and some of them (about 20%) are residents nearby. A little sanitary water produced during construction for constructors’ daily consumption of water would primarily accumulate where they dwell. The sanitary water is treated in sewage tank and meets the requirement of BOD 30mg/L, SS 150mg/L and oil 10mg/L and then is discharged. Owing to small quantity of the sanitary water and farmland around the substation (wastewater is discharged into the farmland for irrigation or into drainage rivers nearby), water bodies nearby would not be affected much. The wastewater wouldn’t produce when construction is finished.

Mixing concrete needs water and so attention should be paid to stopping turbid water from running off to affect water bodies around.

When coming across waters, the transmission lines cross them directly to avoid building towers in waters. Therefore, there is no impact on suspended matter pollution and sluice function of the river way.

When construction roads go via small rivers or artificial river net, temporary bridges need to be built in some places. That may cause increase of suspended matter in the water for a short term.
### 4.2.2 Impact on environmental air

No dwelling stands near (within 150m from) the two proposed substations. Although secondary dust produced when excavating foundation which causes the ground to be naked on the substation site would not affect directly residents nearby, it would increase dust in atmospheric environment around. However, such impact will be incurred temporarily and partially.

During construction of tower foundation, secondary fly dust caused by naked soil may affect residents nearby temporarily. Such impact will disappear when construction is completed.

### 4.2.3 Impact on acoustic environment

Environmental impact during construction period comes chiefly from noises produced by construction machines. No much noise impact will be incurred by the transmission lines.

(1) Noise levels of construction noise sources

During construction of the substation, construction machines to be used contains mainly mixing machine, bulldozer, shoveling machine and automobile etc.. Power levels of their noise sources are listed in Table 4-2.

<table>
<thead>
<tr>
<th>Machine</th>
<th>Distance from the machine, m</th>
<th>Noise source, dB (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulldozer</td>
<td>1~2</td>
<td>95</td>
</tr>
<tr>
<td>Shoveling machine</td>
<td>1~2</td>
<td>95</td>
</tr>
<tr>
<td>Mixing machine</td>
<td>1~2</td>
<td>85</td>
</tr>
<tr>
<td>Loader</td>
<td>1</td>
<td>&lt;85</td>
</tr>
<tr>
<td>Vehicles</td>
<td>1</td>
<td>&lt;85</td>
</tr>
</tbody>
</table>
(2) Noise level forecasting for construction period

By means of forecasting mode, construction noise levels at the substation boundary (at 1m outside the boundary) are calculated and listed in Table 4-2. The calculation takes the following data into consideration: the two proposed 500kV substations’ occupation of land approximately 17.33ha (about 322~335m long and 186~197m wide), buildings arrangement and construction machine usage, and acoustic source data—noise level comparison of major construction machines in Table 4-3.

<table>
<thead>
<tr>
<th>Distance (m)</th>
<th>10</th>
<th>15</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>80</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise level LqdB (A)</td>
<td>92</td>
<td>88.5</td>
<td>86</td>
<td>82.5</td>
<td>80</td>
<td>78.1</td>
<td>73.9</td>
<td>72</td>
</tr>
<tr>
<td>Chinese standard</td>
<td>Daytime : 65~85dB(A)</td>
<td>Nighttime : 55dB(A)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From Table 4-3, the highest noise level at the 500kV substation boundary is 92dB(A). According to GB12523-90 *Noise Limits for Construction Site*, daytime and nighttime limits are 65~85dB(A) and 55dB(A) respectively; daytime noise level on construction site of the substation (over 30m away the enclosure walls) would meet the said limits. That is, construction machines at daytime are required to be confined to the center area over 30m away enclosure walls.

(3) Construction of the substations’ buildings is usually carried out at daytime. Moreover, the residential house closest to the substation is 150m away. Therefore, daytime construction noise on the substation site can meet relevant standards. Nevertheless, construction work must come to a stop in the evening to avoid noise impact on residents nearby. Construction machines will be required to operate only on daytime.

### 4.2.4 Impact on geologic resources
From the geologic prospecting report for the substation sites and tower foundations, there is no mine around, which would not affect exploration of mineral resources.

In preliminary design phase, the 500kV substations got official approval of Nanjing Municipal and Lianyungang Municipal Geologic Minerals Bureaus. There is no mineral within the area substation sites cover and along the transmission lines.

4.2.5 Impact on land function

Land occupation of the substation and tower foundation will shift the land function from agricultural field to industrial land. During construction of the substation and tower foundation, it is necessary to acquire some land temporarily, which would bring effect on its function. However, the acquired land will recover when construction is over.

4.2.6 Hydrological conditions and flood impact

The 500kV Longtan Substation site has relatively high topography and the one-hundred-year flood condition is chiefly caused by mountainous area at upper reaches. Xiabutou site’s one-hundred-year flood level is 11.75m while the average elevation of the site is over 12.0m; therefore, the site will not be affected by flood.

Flood suffered on the 500kV Lianyungang Substation site comes mainly from local storm runoff. Moreover, Yanhe River etc. rivers close to the site have no banks and so flood water is apt to overflowing in rainy seasons and submerging the substation site. The one-hundred-year flood level here is 3.64m while the elevation of the site is 2.7~2.9m lower than the level. Flood preventative measures should be done on the substation site. The preliminary consideration is to fill soil to add height of the site.
Low hills where the 500kV Dongshanqiao~500kV Longtan transmission line goes through do not save accumulated water due to comparatively higher topography. There is short-term water catchments in some gulch sections, especially in bench land on both sides of Qixiang River and Jiuxiang River where accumulated water level is between 0.5~1.0m.

Flood impact on the 500kV line Tianwan-Shanghe substation cut into Lianyungang is similar to the 500kV Lianyungang Substation site.

4.3 Ecological environment

4.3.1 Damage to foliage and wild environment

Construction of the substation and its access roads might cause damage to foliage and wild environment within the area occupied by the Project. However, there does not exist nature area without human trace or wild environment within the substation site because the site had human activities and agricultural production 6000 years ago.

Some route of the transmission lines goes over low hills. Due to human activities, most hills have been cultivated into terrace and trees in hill area are manually planted. Consequently, construction of the lines will not bring impact on nature area without human trace or wild environment at all, although it might cause damage to foliage and wild environment within tower foundation occupied land.

4.3.2 Impact on agricultural ecology incurred by land occupation of the Project
(1) Construction of the substation and transmission lines need acquire some land at interim such as equipment transportation roads, walking paths, and temporary houses of constructors etc.. All the occupied land will grow crops again and crop growth will recover after construction. Hence, crops would be destroyed for the occasion. Impact on crops depends on seasons—wheat and cole are major plants influenced by construction in winter and spring; cotton and paddy, in summer and autumn.

(2) The substation will occupy land of 17.33ha totally with an annual decrease of 198.9t/a. Grain production would reduce 6.54% annually in Dongliu Village where Longtan Substation is located. And Grain production would reduce 3.9% annually in Hexingzhuang where Lianyungan Substation is located. Existing plants in the land would be destroyed since construction begins and cannot rehabilitate later.

(3) Tower foundations will take up an area of 2.37ha, which would decrease 27.0t/a of crop output every year. As construction begins, the crops would be damaged and agricultural production will be affected accordingly.

4.3.3 Impact on wetland ecological environment

Site-option of the two proposed substations has passed by lakes and lowland and has no impact on ecological environment.

When the transmission lines cross rivers, no tower will be set up in water without impact on water functions.

Within the substation site area, there are some manually excavated ponds for raising fishes and other aquatic products, covering an area of 3000m² or so. The area occupied by the ponds were farm fields originally. They will be filled after being acquired for the Project with no impact on ecological environment.
4.4 Impact on social environment

Bulky cargo of the 500kV substation will be transported by means of water and land routes. The necessity of building 3 docks, consolidating 3 bridges on the highway and rebuilding 2 bridges would cause interim impact on shipping and highway traffic during construction. In addition, convoying ships for large cargo transportation will also bring short-time effect to the traffic. Therefore, it should avoid traffic rush such as 07:00~08:00 in the morning and 17:00~18:00 in the afternoon. Thus traffic will not be interrupted by bulky cargo transportation; but vehicles might run slowly which brings inconvenience to pedestrians.

Generally, construction and operation of transmission lines do not affect highway traffic and river navigation. However, stringing of transmission lines would incur some impact on highways and rivers they will intercross.

Transmission lines of the Project will span 3 highways, national road number 104 and urban 2nd and 3rd ring roads.

A little dust will produce during construction of tower foundations; but there would be no impact generally on highway environment and traffic nearby.

Stringing of transmission lines intercrossing high-grade highways would have interim impact on the highway traffic.

Navigable Qinhuai River intercrossed by the transmission lines has small ship flux and narrow riverbed; hence, stringing of transmission lines here will affect navigation little.

The 500kV Dongshanqiao~Longtan Substation line will cross 3 sections of 220kV power lines. This transmission line has not only been designed in accordance with Technical Regulation on Design of Aerial...
Transmission Lines, SDJ3 and other relevant technical specifications and rules, but has been constructed complying with operation manual and technical regulation for intercrossing high-voltage transmission line stringing. Construction of the line can not bring existing lines any impact.

Construction of tower foundations needs temporary access road which will occupy farmland until construction is finished. Thus the road would affect agricultural harvest for a short-term.

### 4.5 Impact on living quality environment

#### 4.5.1 Impact on cultural resource

(1) Culture&education, sanitary and recreation locations

There is no hospital, school, sanatorium or reaction location near the substation site and tower foundations and even the closest school is more than 1.7km away the substation; so there does not exist impact on culture&education, sanitary and recreation locations.

(2) Impact on historic relics

There is no discovered ancient graves or cultural relics on the ground or under the ground near the 500kV Lianyungang Substation, Longtan Substation sites and transmission lines as confirmed by local antiquity department.

In the phase of selecting 500kV substation sites and 500kV transmission line routes, the Project gained approval from local cultural relics management authority and showed relevant documents issued by the cultural relics management office.
4.5.2 Impact on scenic spots and places of interest

The two proposed substation sites lie in countryside area and there is no scenic spot or place of interest around. In addition, shunning beauty spots and programming area has been taken into consideration during route option of transmission lines. Therefore, no impact on scenic spot will happen.

4.5.3 Impact on scenic view in the substation site area

Construction of the substation and transmission lines would incur temporary impact on scenic view around.

4.5.4 Influx of labor force

(1) Principal work of the substation’s and transmission line’s construction is undertaken by professional staff who have been trained on special technology usually from electric construction companies within Jiangsu Province territory. Due to speciality of their work, they cannot be replaced by locals. However, some local staff may be hired to take up foundation excavation, transportation of cubic meter of earth and stone, conveyance of building materials and road building and repair etc.. That can offer locals some temporary work opportunities.

(2) The mass of construction people will locally increase the consumption and demand of social commodities and services. The staple and non-staple foodstuffs, daily requisites and other services required by the mass of construction people will lead to acceleration of social commodities and further development of tertiary industry.
(3) Demand of a great deal of building and constructing materials for the Project's building will promote development of local building material industry, initiate direct or indirect employment opportunities for the locals and forward the development of local economy and enhancement of living standard of local people.

(4) Nearly 100 persons will participate in construction of infrastructure of the substation. The construction period of the substation will be one year or so and so the immigrant construction personnel will stay in temporarily built houses or rented residential houses nearby. The construction personnel usually come alone without families and can go home to visit their families during construction period. They will return to their hometown when construction is finished.

For the construction team, its company has prepared stringent regulations and management methods. All staff must observe the regulations and will not affect social order much.

4.5.5 Land occupation and resettlement & rehabilitation

(1) From initial statistic results of present progress of the Project, the two proposed substations (the 500kV Longtan and Liayungan substations) occupy a total area of 17.33 ha without house removal or resettlement, and the 500kV Yancheng Substation to be expanded need not acquire land more. Tower foundations occupy 2.37ha and house area to be relocated is 10800m².

(2) The two proposed 500kV substations don’t require house removal. The 500kV Dongshanqiao~ 500kV Longtan Substation line need 12 families to resettle and so near 45 residents might be affected. The area covered by the houses to be removed is approximately 10800m². Accurate removal area, family number and person number will be determined in final site investigation because the transmission line project
is now in the route-option phase.

(3) During construction period, some land would be acquired temporarily and can recover for farming when construction is completed.

(4) In terms of land occupation and compensation, the project-construction unit—Jiangsu Provincial Electric Power Company has trusted East China Reconnaissance Design Institute (ECRDI) with this task. This report explains the issue only in principle. Refer to the RAP for the Project by ECRDI about relevant details.

(5) The ownership of land belongs to the state as prescribed in Chinese laws. Farmers etc. natural persons and enterprises just own right to use land. The state conducts uniform programming and management of land usage. For land requisition activity by the project-construction unit, associated requisition procedures must be implemented stringently in compliance with *Land Management Law* and other relevant laws of China. Existing land users will be compensated according to the above laws for their right of land use and for objects on the ground such as factory buildings and crops. Affected people's jobs, incomes and living standard should be guaranteed with no reduction.

(6) In case affected mass could not be resettled from construction period to operation period due to land requisition and house relocation, their daily work and life would be influenced. Governments at different levels pay much attention to this issue, make compensation and arrangement to affected mass according to relevant regulations and try to resolve problems in their daily life, labor allocation and house reconstruction, in order to minimize impact on affected mass.
5 Potential environmental impact during operation period

5.1 Identification of environmental impact

Identification of environmental impact during operation period is listed in Table 5-1.

Table 5-1 Identification of environmental impact during operation period

<table>
<thead>
<tr>
<th>Order</th>
<th>Item</th>
<th>Environmental impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Land occupation</td>
<td>Substation sites' and transmission lines' permanent occupation, land function damaged, see 5.3.2</td>
</tr>
<tr>
<td>2</td>
<td>Substation afforestation</td>
<td>Helpful to improve atmospheric Environment in some area, see</td>
</tr>
<tr>
<td>3</td>
<td>Electro-magnetic field</td>
<td>Minor impact, see 5.2.4</td>
</tr>
<tr>
<td>4</td>
<td>Noise</td>
<td>* certain impact on acoustic environment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* no harmful impact on human generally, see 5.2.3</td>
</tr>
<tr>
<td>5</td>
<td>Sanitary water and oily wastewater</td>
<td>Minor impact, see 5.2.1</td>
</tr>
<tr>
<td>6</td>
<td>PCBs</td>
<td>Use of PCBs stopped already, no impact</td>
</tr>
<tr>
<td>7</td>
<td>Wetland ecology</td>
<td>No impact except for artificial wetland (aquaculture fish ponds excavated manually on the farmland), see 5.3.4</td>
</tr>
<tr>
<td>8</td>
<td>Vegetation</td>
<td>Some vegetation damaged by the substation sites</td>
</tr>
<tr>
<td>9</td>
<td>Rare animal</td>
<td>No impact, see 5.3.1</td>
</tr>
<tr>
<td>10</td>
<td>Shipping</td>
<td>No impact, see 5.4.1</td>
</tr>
<tr>
<td>11</td>
<td>Highway</td>
<td>Designed in compliance with Design Technical Code of Aerial Transmission Line etc., no impact see 5.4.1</td>
</tr>
<tr>
<td>12</td>
<td>Wire and radio communication</td>
<td>Designed in compliance with rules, no impact see 5.2.4</td>
</tr>
<tr>
<td>13</td>
<td>Cultural relics</td>
<td>No impact see 5.4.5</td>
</tr>
<tr>
<td>14</td>
<td>Scenic view</td>
<td>No impact see 5.4.6</td>
</tr>
<tr>
<td>15</td>
<td>Human health</td>
<td>No impact see 5.4.4</td>
</tr>
<tr>
<td>16</td>
<td>Influx of operators</td>
<td>* no cultural conflict</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* commercial income increased</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Due to operational personnel all living in the substation, the entry road will be built, which will improve local transportation facility without harm impact on existing infrastructure. See 5.4.7</td>
</tr>
<tr>
<td>17</td>
<td>Agricultural production</td>
<td>No harvest on permanently occupied land see 5.4.3</td>
</tr>
</tbody>
</table>
5.2 Impact on physical environment

5.2.1 Impact on waters

(1) One 500kV substation can discharge sanitary water of 2~5 m³/d every day and a total of 800 m³/a discontinuously for one year. Major pollution factors are SS, COD and oil. After being treated through buried secondary biochemical disposal devices to meet the standard, sanitary water runs into farmland around for irrigation or drainage rivers nearby, or is used as afforestation water in the substation. Owing to small quantity, such sanitary water would not affect much water bodies around. Table 5-2 lists wastewater effluent standards.

<table>
<thead>
<tr>
<th>Wastewater effluent of the Project</th>
<th>BOD</th>
<th>SS</th>
<th>Oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>GB8978-1996 Sewage Comprehensive Effluent Standard, Class II</td>
<td>30</td>
<td>150</td>
<td>10</td>
</tr>
</tbody>
</table>

(2) Oily wastewater of the substation only comes from overhauling transformers or accidental leakage and blows off once every 2~3 years. Discharged oily wastewater will be collected in the accidental oil pond. After going through the oil-water separator, oil will be reused and the water will run into effluent rivers or used as afforestation water in the substation after being treated to meet the standard.

(3) Chinese government has issued GB13015-91 *Pollution Control Standard For Wastewater And Pollutant Containing PCBs*. For the moment, all newly built substations do no longer use equipment containing PCBs or equivalent. Therefore, there is no impact on environment incurred by PCBs.

(4) No tower will be set up in water without impact on waters and sluice
function of river way.

5.2.2 Impact on environmental air

(1) There is no impact on environmental air during the substation’s operation period.

(2) Afforestation of the substation area helps to improve local environmental air.

(3) Transmission lines during operation period have no impact on air environment.

5.2.3 Impact on acoustic environment

(1) The substations:

Before building of the substations, baseline measurement of ambient background noise levels has been done for the two proposed substations and one expansion substation. See the monitoring results in Table 5-3.

<table>
<thead>
<tr>
<th>Substation</th>
<th>Day time (dB (A))</th>
<th>Night time (dB (A))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposed 500kV Longtan Substation</td>
<td>43.2~45.9</td>
<td>37.2~42.5</td>
</tr>
<tr>
<td>Proposed 500kV Lianyungang Substation</td>
<td>46.0~50.0</td>
<td>37.0~40.5</td>
</tr>
<tr>
<td>Expansion 500kV Yancheng Substation</td>
<td>42.2~53.0</td>
<td>38.0~45.6</td>
</tr>
<tr>
<td>Standard of environment noise of urban area, catalogue 2</td>
<td>60 dB (A)</td>
<td>50 dB (A)</td>
</tr>
</tbody>
</table>
The ambient background noise level in the substation site area, between 47.2~53.0dB (A) at daytime and 37.0~45.6dB(A) at nighttime, meets standard of Standard of environment noise of urban area, Catalogue 2 (60 dB (A) at daytime, 50 dB (A) at nighttime).

Noise of the substation comes principally from the main transformer and reactor etc. large noise source equipment whose noise is between 69~76dB (A). The noise level actually measured and surveyed of BBC reactor is 73.4 dB (A); Toshiba etc main transformers, 75dB(A).

The 500kV Shipai Substation (with the main transformer of 1×750MVA) and Chefang Substation (with the main transformer of 1×1000MVA) of the East China (Jiangsu) 500kV Power Transmission Project have been put into operation. The measuring result of the said substations is 43.5~58.3 dB (A) at daytime and 36.3~43.9 dB (A) at nighttime, which is in compliance with the Standard of noise at boundary of industrial enterprise, Catalogue II (60 dB (A) at daytime, 50 dB (A) at nighttime).

The proposed 500kV Longtan Substation’s scale is 1x1000MWA; Lianyungang Substation’s, 1x750MWA and the expansion Yancheng Substation’s, 1x750MWA. They have similar scales and equipment arrangement as the above two substations. By means of noise forecasting, calculation and analogical analysis, it gets clear that noise levels during operation at boundary of the two proposed 500kV substations and one expansion 500kV substation ----45.5~58.9dB(A) at daytime and 40.6~47.9dB(A) at nighttime will meet Standard of noise at boundary of industrial enterprise, Catalogue II (60 dB (A) at daytime, 50 dB (A) at nighttime). 150m away from the substation appear dwellings. The estimated noise during the substation’s operation period will have no
impact on acoustic environment of the dwelling far away the substation. Table 5-4 is boundary noise forecasting results when the substation is put into operation.

Table 5-4 Boundary noise forecasting results in operation of the substations

<table>
<thead>
<tr>
<th>Substation</th>
<th>At daytime (dB (A))</th>
<th>At nighttime (dB (A))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Background value</td>
<td>Forecasting value</td>
</tr>
<tr>
<td>Proposed 500kV Longtan Substation</td>
<td>43.2-45.9</td>
<td>45.5-58.0</td>
</tr>
<tr>
<td>Proposed 500kV Lianyungang Substation</td>
<td>46.0-50.0</td>
<td>47.8-58.9</td>
</tr>
<tr>
<td>Expansion 500kV Yancheng Substation</td>
<td>42.2-53.0</td>
<td>46.5-58.6</td>
</tr>
<tr>
<td>Standard</td>
<td>60 dB (A)</td>
<td>50 dB (A)</td>
</tr>
</tbody>
</table>

(2) The transmission lines

Noise level of right-of-way abroad or at home is usually below 50dB(A). The actual measurement results of audible noise for East China 500kV transmission lines (Renzhuang-Huaiying, Huaiying-Jiangdu, Jiangdu-Wunan, Doushan-Huangdu and Shipai-Shengpu) show: noise value under right-of-way is 40.2-48.8 dB(A); it is estimated that noise level under corridor of newly built transmission lines will be less than 50dB(A) under normal power frequency, which will meet Standard of Environment Noise of Urban Area (GB3096-93), Class II (60dB(A) at day time and 50dB(A) at night time). Table 5-5 is operation noise level of the transmission lines.
Table 5-5 is operation noise level of the transmission lines.

<table>
<thead>
<tr>
<th>Transmission line</th>
<th>At daytime (dB (A))</th>
<th>At nighttime (dB (A))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Background value</td>
<td>Analogy value</td>
</tr>
<tr>
<td>Proposed 500kV Dongsanhqiao-Longtan Substation line</td>
<td>40.2–44.5</td>
<td>41.2–48.8</td>
</tr>
<tr>
<td>The 500kV Tianwan Power Station-Shanghe Substation line</td>
<td>40.0–44.2</td>
<td>40.2–48.0</td>
</tr>
</tbody>
</table>

| Standard | 60 dB (A) | 50 dB (A) |

5.2.4 Impact on radiation environment

(1) Environmental impact of electric and magnetic field (EMF)

① Substations
Before building of the substations, background of EMF has been measured for the two proposed substations and one expansion substation. See the monitoring results in Table 5-4.

Table 5-4 Ambient background monitoring results of the EMF intensity around the two proposed substations and the one expansion substation

<table>
<thead>
<tr>
<th>Project name</th>
<th>Measuring point</th>
<th>Electric field intensity (V/m)</th>
<th>Magnetic field intensity (mT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>500kV Longtan Substation</td>
<td>On and around the substation site</td>
<td>0.780–1.650</td>
<td>0.162×10⁴–0.232×10⁴</td>
</tr>
<tr>
<td>500kV Lianyungang Substation</td>
<td>On and around the substation site</td>
<td>0.620–1.340</td>
<td>0.192×10⁴–0.277×10⁴</td>
</tr>
<tr>
<td>500kV Yancheng Substation</td>
<td>On and around the substation site</td>
<td>0.820–4.210</td>
<td>0.220×10⁴–0.240×10⁴</td>
</tr>
</tbody>
</table>

Recommended limit | 4000V/m | 0.1mT |
From Table 5-4, the background electric and magnetic field intensity around the substations are very low, at the magnitude of V/m and 10⁻⁴ mT separately less than 1/1000 of relevant recommended standard limits.

EMF of the operational 500kV Shipai Substation and Chefang Substation, are measured—electric field intensity of 0.013~4.756kV/m and magnetic field intensity of 0.032×10⁻³~4.213×10⁻³ mT. High values of electric field intensity (4.756kV/m) slightly exceeding the standard of 4kV/m at some boundary appear in 40m wide belt areas under the ingoing and outgoing corridors. But this has been reviewed and approved by local Environmental Protection Bureau.

From the above analysis, it can be estimated that the EMF intensity at boundaries and in operation of the two proposed substations and one expansion substation will generally comply with the recommended standard limit of 4kV/m×0.1mT except for some areas under ingoing and outgoing corridors. Because the three substations are over 150m away the closest dwellings and there is no house near ingoing and outgoing corridors where only short-time farming activities are conducted, no impact would be incurred on local residents nearby.

(2) Transmission lines

- The actual measurement results of East China 500kV transmission lines (Renzhuang-Huaiying, Huaiying-Jiangdu, Jiangdu-Wunan, Doushan-Huangdu and Shipai-Shengpu) show: under right-of-way electric field intensity is 3.724~12.09kV/m and magnetic field intensity is 0.651×10⁻²~10.259×10⁻² mT.

- The ground field intensity limits for 500kV transmission lines recognized in China nowadays are:

<table>
<thead>
<tr>
<th>Route</th>
<th>Electric field intensity limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crossing farmland</td>
<td>9.5kV/m</td>
</tr>
<tr>
<td>Crossing highway</td>
<td>7.0kV/m</td>
</tr>
<tr>
<td>Close to residential houses</td>
<td>4.0kV/m</td>
</tr>
</tbody>
</table>
Magnetic field intensity: 0.1mT for the public radiation in one day

- Background values of electric field intensity and magnetic field intensity of the transmission lines are separately 0.780~1.650V/m and $0.192 \times 10^{-4}~0.277 \times 10^{-4}$ mT, far less than the recommended limit of 4kV/m, 0.1mT.

- From actual measurement results for transmission lines under operation, it can be estimated that electric field intensity within 40m wide belt area under the proposed 500kV transmission line (two circuits) corridor is between 3.802~7.807kV/m and high values occur below ingoing and outgoing line. In addition, houses 5m away the 500kV side line are required to remove without residents left. Therefore, ground electric field intensity 1.5m away the transmission line corridor in operation will be less than the limit 4kV/m and so meet the recommended limit. Magnetic field intensity produced by the transmission line is between $4.928 \times 10^{-3}~6.888 \times 10^{-3}$ mT, far less than recommended limit of 0.1mT.

(2) Radio interference

Radio interference level allowable at 20m (not in outgoing direction) outside the 500kV substation is 55dB (μ V/m) at 0.5Hz in sunny days. According to relevant information collection and monitoring results, radio interference levels of substations at 500kV voltage grade in China are less than 44 dB (μ V/m). It can be estimated that radio interference produced by the Project will meet relevant standards.

Based on collected relevant information and actual measurement results, radio interference level of 500kV transmission lines is known less than 44~46 dB( μ V/m). It can be estimated that radio interference produced by 500kV transmission lines will meet relevant standards.
There is no television station or radar station around the three substations. There is no impact on wireless communication during operation of the substation.

5.3 Impact on ecological environment

5.3.1 Impact on rare birds

There is no migration route of rare birds around the two proposed substations and transmission lines and so no impact on rare birds will be incurred by the Project.

5.3.2 Impact on agricultural ecology

The land occupied by the two proposed substations grew formerly wheat, paddy, cole and cotton ect. and economic crops such as green vegetables, and garlic. Operation of the substation changes function of the land from agricultural field into industrial land and the farmland is occupied forever, which bring affection to agricultural production.

Tower foundations will occupy farmland or low hill area a little and bring agricultural production some impact. If a tower foundation is located in low hill area, some trees will be cut, which would damage vegetation around the foundation. However, low trees will be planted around the foundation.

5.3.3 Impact on ecological environment incurred by electric field and noise

(1) Electric field will not affect growth of crops and other plants.

(2) It has not been found that electric field is likely to bring any harmful
influence to wild animals in their action or health. When the electric field intensity is up to 12kV/m, domestic animals' health and action are not affected at all.

Operational electric field intensity of the substation will not have impact on bird activity.

(3) All kinds of poultry or wild animals can live as usual under or near the transmission lines. Some research results show that audible noise of right-of-way have no impact on wild animal habitat.

### 5.3.4 Impact on ecological environment of wetland

Neither two proposed substations one expansion substation nor the proposed transmission lines do occupy wetland. Hence, the Project will not affect ecological environment.

### 5.4 Impact on social environment

#### 5.4.1 Impact on traffic incurred by transmission line operation

(1) The transmission lines have been designed in accordance with *Technical Regulation on Design of Aerial Transmission Lines*, SDJ3 and other relevant technical specifications for aerial transmission lines intercrossing highways and rules concerned. The line intercrossing highways have sufficient headroom without impact on traffic.

(2) The transmission line also has enough headroom where it crosses rivers without impact on water and navigation.

(3) Impact on traffic incurred by electric field The maximum ground
electric field intensity produced when the 500kV transmission line cross highways is no more than 5kV/m, less than the requirement of 7kV/m for line crossing highways. Therefore, it will not affect traffic.

5.4.2 Intercrossed transmission lines’ impact

The transmission lines have been designed in accordance with Technical Regulation on Design of Aerial Transmission Lines, SDJ3 and other relevant technical specifications and rules. The 500kV transmission lines over the 220kV ones have no impact on existing transmission lines.

5.4.3 Impact on agricultural production

The two proposed substations occupy an area of 17.33ha permanently, which would reduce agricultural outputs. For example, the harvest would decrease about 198.9t based upon a production level of 11.48t/ha.

Tower foundations occupy an area of 2.37ha causing annual decrease of 27.0t or so in crop harvest.

Tower foundations are built in farmland bringing inconvenience to agricultural mechanized farming.

Under transmission line corridor, low trees can be planted and there is no impact on further agricultural farming and harvest.

The area where residential houses are removed under the right-of-way can be returned to farm field for planting crops.
5.4.4 Impact on environmental sensitive areas

For the reason that the three substations are over 150m away the closest dwellings and there is no house near ingoing and outgoing corridors, no impact would be incurred on local residential areas by EMF and noise.

The side transmission lines have been designed to keep far away sensitive areas such as residential quarters, schools and hospitals etc.. At the lowest arc, residential houses within 15m from the side transmission line must be relocated and magnetic field intensity should be lower than the recommended limit of 4kV/m; at the highest arc (close to towers), residential houses within 8.5m must be relocated and magnetic field intensity should be lower than the recommended limit of 4kV/m. It is estimated residents would not be affected harmfully.

Transmission lines affect radio communication by electromagnetic interference from electric corona. In design, the lines have been far away or passed by radio communication routes, for which radio communication will not be affected.

5.4.5 Impact on cultural resources, scenic spots and places of interest

The two proposed substations and transmission lines have been designed to avoid schools, hospitals, cultural relics and scenic spots and places of interest. Hence, no impact would be produced on them.

5.4.6 Impact on scenic views

The two proposed substations and transmission lines will be constructed in even area and avoid resident gathering areas, towns and township
programming area as far as possible. There will be no harmful impact on scenic views.

**5.4.7 Influx of labor force**

It is mainly 20 professionally trained technicians who conduct routine operation during operation period of the Project. Similar with influence of the labor influx during construction period, the operating personnel would not generate inflict with locals in employment and culture. On the contrary, their daily life demand will enhance incomes of local commerce and services.
6 Scheme analysis

6.1 Impact with no newly built substations and power transmission lines

(1) Jiangsu Province lacks of available water resources and has no much exploitable coal resources. Consequently, with the coal fired thermal power plant for main electric power supply, Jiangsu power grid needs to transport coal from other regions, which meanwhile increases pressure of environmental protection in the provincial area. The State Environmental Protection Administration performs total amount control of environmental capacity, for which it is quite difficult to set up another new electric power supply point on both sides of Yangtze River.

(2) Jiangsu power grid has neither hydraulic nor oil fired thermal power plant and use basically coal fired thermal power plants as major power supply points. Due to single power supply structure of the power network, the units’ function of peak regulation is weak, which causes peak regulation capacity of units in the whole province to be insufficient seriously. Whereas, peak gap of the power grid is becoming bigger and bigger. The maximum peak gap of uniform dispatching amongst the whole grid came up to 5762MW in 2000. Systematic peak regulation had become more difficult.

(3) As rapid development of economy in Jiangsu Province, demand of electric power has increased greatly. The forecasting values of electric loads are analyzed as follows.

Electric load of Nanjing area keeps high growing speed during the Tenth Five Year Plan period. It is estimated that the annual growing speed will reach 7.72% and the highest load of Nanjing Municipal will be up to 3500MW till 2005.
Lianyungang power grid is estimated to be 580MW till 2005 and its highest insufficient electricity will be 330MW.

In conclusion, it is quite necessary to construct the Project.

6.2 Schemes comparison

6.2.1 Substations

Several schemes were offered when the proposed substations were in program and site-option phase. After being screened, all the site-option schemes were compared with each other and analyzed according to determined preliminary site locations. The scheme was selected after being approved by administrative department and governmental management departments.

(1) 500kV Longtan Substation
- At engineering site-option stage, site investigation and substation building conditions comparison were done with three site-option schemes----Xujiaqian site, Xiabutou site and Guishanzui site. As a result, the three schemes all have proper conditions for building 500kV substations.

- The three sites are environmentally feasible. There is no industrial and mining enterprises around the sites. Their environmental conditions are all good.

- By analyzing economy, technology, traffic, operation and maintenance, and physical conditions, it reached the conclusion that geographic position, land requisition situation, water sources, engineering geology, impact on communication facilities and operational management are similar generally for the three sites; from the view of outgoing line conditions, Xiabutou site is better, open and wide around; furthermore, inland inundation never happens at Xiabutou and no house should be removed there.
Xiabutou site was finally selected as the 500kV Longtan Substation site after comprehensive analysis and comparison.

(2) 500 kV Lianyungang Substation
- At engineering site-option stage, site investigation and substation building conditions comparison were done with three site-option schemes----Hexingzhuang site, Sunkouzhuang site and Dongxin farm site. As a result, the three schemes all have proper conditions for building 500kV substations.
- The three sites are environmentally feasible. There is no obvious polluting source or interacting broadcasting and television facilities or interacting traffic facilities around the sites. Their environmental conditions are all good.
- By analyzing economy, technology, traffic, operation and maintenance, and physical conditions, it reached the conclusion that Hexingzhuang site is closer to power supply and loading center; it is beyond urban program and plan; farm land area per capita on the site is larger and land requisition is easier. The three sites have their own advantages and disadvantages. However, Hexingzhuang site is superior----substation building conditions are better, outgoing line conditions for different voltage transmission lines are better, and transportation of bulky goods is convenient with less cost, and annual operational cost is lower.

Hexingzhuang site was finally selected as the 500kV Lianyungang Substation site after comprehensive analysis and comparison.

6.2.2 Power transmission lines

(1) 500kV Dongshanqiao Substation~Longtan Substation line

At rout-option stage, three route-option schemes were selected for the
500kV Dongshanzqiao Substation–Longtan Substation line. They were east scheme, mid scheme and west scheme.

The three schemes were feasible from the view of engineering. When selecting the final scheme, mass’ opinions and governmental ideas of all districts and townships along the line routes were taken into consideration.

Selected east scheme’s house number to be resettled is the smallest and its route trend would not affect local program and plan; while mid and west schemes would bring certain impact on Jiangning Nongovernmental High-tech Garden and new downtown of Jiangning District. Although east scheme route goes (on the windward side) by east of Chunhua Cement Mill, dirts of the mill would only bring minor impact on the line. Nevertheless, routes of mid and west schemes goes (on the downwind side) by west of the mill and dirts would affect the lines much. East scheme meets environmental protection requirements and feasible environmentally.

(2) Tianwan -Shanghe Substation line cut into Lianyungang Substation

This line is near the 500kV Lianyungang Substation. There is farm field around without buildings. There was no comparative schemes because the route was very short.
7 Environmental management plan and mitigating measures

This report puts forward correspondingly environmental controlling and monitoring program and mitigating measures according to environmental impact produced by the substation.

7.1 During construction period

(1) Low noise (less than 85dB(A)) construction machines should be applied to construction of the substation. Construction should be carried out mainly at daytime and be avoided at nighttime as possible to mitigate environmental impact incurred by construction machinery.

(2) Guard fence should be established during construction of the substation. Periodic water spray should be done with excavated naked earth within the substation; soil-transporting vehicles should also be flushed and covered with surface cloth so as to prevent dust from affecting surroundings.

(3) Construction personnel will set up temporary houses and life facilities. Sanitary water will be treated in septic tank and discharged complying with the standard to prevent drainage of runoff water.

(4) At site-option stage, the substation was designed to be far away from residential and sensitive areas. The shortest distance between dwelling and the substation is 150m and moreover, impact on residents will be minimized during construction to meet associated design regulations and environmental protection requirements.

(5) In design, some distance between transmission lines and residential quarters/sensitive areas has been taken into account, meeting relevant
design regulations and environmental requirements, to ensure safety of residents around.

(6) Stringing of transmission lines when crossing highways and rivers should shun traffic rush time; in design, headroom distance of conducting wires has been considered fully so as to ensure highway traffic safety and transmission line operation safety.

(7) Power distributing structure’s height should be determined according to design standard. Negative phase sequence alignment should be employed as possible for two circuits transmission lines so as to reduce electro-magnetic field intensity effectively.

Refer to Table 7-1 about mitigating measures of the substation (page 81).

7.2 **During operation period**

(1) Use low noise equipment (less than 85dB(A)) as possible.

(2) Make general arrangement of the substation reasonably and arrange the main transformer at center of the substation to minimize environmental impact incurred by operation noise.

(3) In order to prevent transformer oil leakage, the accident oil pond has been designed in the substation. Transformer oil can run into the pond directly if necessary and will be recycled together and reused.

(4) One operational 500kV substation will produce sanitary water of 830t/a, which would be discharged after being disposed through buried second biochemical sewage treatment systems, and meet the standard.

(5) The substation is designed with fireproofing and explosion-proofing walls between main transformers and with alarm system and manual/auto
extinguishing devices around the main transformers.

(6) All the electric equipments have been designed with earthing devices to strengthen operational safety.

(7) Promote propagation and education on electric equipment safety knowledge among the masses near the substation and transmission lines, and advise residents close to the substation of the way to do agricultural production safely.

(8) Stand a warning sign near the substation outgoing lines and transmission lines with high electric field intensity to advise residents not to stay there or do farming for a long time.

Refer to Table 7-1 about mitigating measures of the substation (Page 81).

7.3 Land occupation and compensation

The two proposed substations and tower foundations would occupy certain amount of land. The mitigating and compensating measures to be made are as below:

(1) Construction sites and entry roads occupied by the substation and tower foundation during construction period should be used as short and small (time----about half a year and area) as possible. Besides, corresponding crop outputs should be compensated when using the land as well as paying land rent.

(2) The two proposed substations have been arranged fully reasonably in design to minimize land occupation area.

(3) The following actions should be taken for the land to be occupied
permanently by the substation and tower foundations:

- The project-constructing unit ought to determine area and type of occupying land, give compensation—paying requisition compensation charge according to *Land Management Law*.

### 7.4 Resettlement and rehabilitation

There does not exist resettlement but land reallocation issue in building of the two proposed substations. In compliance with *Land Management Law* etc. relevant rules, economical compensation will be done with the land to be acquired for construction of the Project to assure living quality of affected masses would not depress. Refer to the Resettlement Action Plan (RAP) for the Project by ECRDI about relevant details.

Construction of transmission lines requires relocation of some residents who should be resettled. About 45 persons of 12 families are involved and detail resettlement will be described in final route investigation report. The authority should compensate these residents according to relevant national rules to guarantee life quality of the affected mass would not fall. Refer to the Resettlement Action Plan (RAP) for the Project by ECRDI about relevant details.

### 7.5 Cultural resources

In case something is found by constructors during construction of the substations and tower foundations, the site should be protected and construction work must be halted according to Chinese law. After the find is reported to local antiquity protection department, the department will make an assessment on it. Construction cannot be continued until the department grants permission.
7.6 Scenic views

Design of the substation’s buildings should be in harmony with local natural environment without impact on scenic views around. Ideas from local program department should be considered fully in terms of transmission line trend for the purpose that urban and township programming areas will be passed by without impact on scenic views along the line.

7.7 Protection of ecological environment

(1) Access roads of the substation and tower foundation would damage plants on the ground surface for a short term. The occupied land and production should recover in time in order to maintain agricultural ecological environment when construction is finished.

(2) After construction of the substation, afforestation will be done on naked ground within the boundary. In design, green area should be maximized as possible.

(3) Design of transmission line route should be optimized: under design conditions, the line going over low hills should cross the area as possible to minimize tree lop and keep ecologic environment balanced. This work should be done by the construction unit.

7.8 Labor safety and protection

(1) Labor safety and protection of the Project during construction and operation periods will be carried out according to requirements of two rules—Interim Provisions On Occupational Safety and Health Supervision of Producibility Construction Engineering Projects (Labor
Administration) and Interim Provisions of Implementing “Three Synchronousness” for Labor Safety and Industrial Health of Productivity Construction Engineering Projects (Energy Administration). This work will be in the charge of construction unit.

(2) In addition to strict implementation of work safety and protection for operators of the substation in accordance with relevant rules, education of the following aspects should be carried out aiming at the substation’s operational performances:

- Fire, explosion and dust prevention in the substation
- Prevention of injury from electric shock, machinery and others
- Prevention of operational noise, cold and moisture
- Preventing impact of EMF, for example, electrostatic-induction proof shielded clothes should be worn when patrolling under 500kV and 200kV distributing devices.
- Rail fences and metal structures around the substation should be grounded section by section to ensure safety.

7.9 Monitoring management

(1) During construction period

- Impact on ecological environment on the temporary occupied land will be monitored for construction of the substation. And the construction unit will be supervised for the purpose of occupying little cultivated field as possible and reverting ecological environment timely on the temporary occupied land.

- Measure periodically fly dust, noise, production and sanitary sewage on the construction site.

(2) During operation period
Periodic monitoring will be performed for EMF intensity, noise at the boundary and sanitary water of the 500kV substation in operation so as to estimate potential impact incurred by the operational substation.

Environmental pollution should be monitored aperiodically along transmission lines.

(3) Monitoring during construction period

The assessment institute----State Power Environmental Protection Research Institute will monitor environmental impact during construction period of the two proposed and one expansion substations.

The major monitoring factors are construction noise, wastewater and construction fly dust.

Construction noise and fly dust will be monitored once during construction period. And monitoring frequency for wastewater will be once every three months during that period.

Monitoring methods: boundary construction noise will be measured with an integral sound level meter and the monitoring cost will be 60,000 yuan (RMB); construction dust level will principally be assessed by observation and the cost will be 10,000 yuan (RMB); wastewater will be sampled and delivered to environment monitoring station for testing and analyzing, costing 60,000 yuan (RMB). In addition, recovery of temporarily occupied land during construction of the substation will be supervised and cost 30,000 yuan (RMB).

Monitoring places: two proposed substations and one expansion substation.

Monitoring device: integral sound level meter for measuring noise.
(4) Monitoring during operation period During operation period of the substation, the major monitoring factors are operational noise, sanitary water and electromagnetic field.

Monitoring frequency: noise at boundary----one time per half an year, wastewater----one time per three months and electric field intensity and magnetic field intensity----one time per year. In case local residents complain, measurement should be made.

Monitoring methods: wastewater is measured and analyzed by *Method of Monitoring and Analyzing Water and Wastewater* (3rd version); noise level is measured as required in relevant regulations of *Measuring Method of Environment Noise of Urban Area* (GB/T14623-93) and *Method of Measuring Noise at Boundary of Industrial Enterprises* (GB12349-90); and electromagnetic radiation is monitored according to the recommended method in *Monitoring Apparatus and Method of Electromagnetic Radiation* HJ/T10.2-1996.

Monitoring device: boundary noise is measured with an integral sound level meter and electric field and magnetic field will be measured with an American Holaday HI-3604 field intensity meter.

The noise monitoring cost will be 120,000 yuan (RMB) (including purchase of three sets of apparatuses----sound level meters, 30,000 yuan); the electromagnetic field monitoring cost will be 170,000 yuan (RMB) (including three sets of apparatuses----Holaday HI-3604 field intensity meters, 160,000 yuan); wastewater will be sampled from the outlet and delivered to environment monitoring station for testing and analyzing, costing 50,000 yuan (RMB).

Environmental monitoring in this extension project will adopt apparatuses and equipment ever used in monitoring for the East China (Jiangsu) 500kV Power Transmission Project.
7.10 Training plan

(1) During construction period
Constructors’ training on environmental protection and construction safety will be carried out by the construction unit and constructor company to enhance their consciousness of environmental protection.

Constructors within the substation are educated by means of holding talks and paper publicity.

The constructor company and Jiangsu provincial branch company of State Power East China Company will be responsible for the training which costs 50000 Yuan.

(2) During operation period

Operators’ training on environmental protection and construction safety will be carried out.

Environmental training’s subject is mainly environmental protection and safety----environmental impact assessment of transmission line projects, preventative and protective measures for electromagnetic radiation of transmission lines, and noise control of substations. Educate residents near the substation by dissemination telling possible problems and train operational personnel by training lectures.

The constructor company and Jiangsu provincial branch company of State Power East China Company will be responsible for the training which costs 100,000 yuan (RMB).

The Project has not begun yet and so detailed training program could not be decided including training time, venue and staff.
Jiangsu Provincial Electric Power Company has set up special environmental protection posts in Power Supply Bureaus of each city. Environmental protection specialists are assigned to these posts as full-time managers, responsible for actual environmental protection work of power supply units.

**Table 7-1 Mitigating measures and the cost for the two proposed substations and one expansion substation**

<table>
<thead>
<tr>
<th>Phase</th>
<th>Issue</th>
<th>Mitigating Measure</th>
<th>Cost (thousand yuan)</th>
<th>Institutional Responsibility</th>
<th>Supervisor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>Noise</td>
<td>Use low noise (less than 85dB(A)) construction equipment and do not use high noise equipment</td>
<td>100</td>
<td>State Power Corporation East China Company and</td>
<td>Environmental protection bureaus at provincial, municipal and county levels</td>
</tr>
<tr>
<td></td>
<td>Dust</td>
<td>Guard fence and water spray</td>
<td>50</td>
<td>Jiangsu Provincial Electric Power Company</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Agricultural ecology</td>
<td>Recover damaged vegetation timely when the construction ends</td>
<td>Refer to RAP</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sewage</td>
<td>Buried second biochemical sewage treatment system</td>
<td>200</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Land occupation</td>
<td>Minimize land occupation</td>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clearance in occupied land</td>
<td>Do compensation in accordance with laws</td>
<td>Refer to RAP</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Training on environmental protection</td>
<td>Educate constructors</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Subtotal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>400</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation</td>
<td>Noise</td>
<td>Use low noise (less than 85dB(A)) equipment, consolidated enclosures and do afforestation</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Electric Field and magnetic field</td>
<td>Use transforming devices conform to standards; take shielding actions in design</td>
<td>150</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wastewater</td>
<td>Treat sewage through buried biochemical sewage treatment system and make it compliant with the standard</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Training on environmental protection</td>
<td>Strengthen education to local residents and training to managers</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Subtotal</td>
<td></td>
<td>400</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>750</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: *Mitigating measures for construction noise:
*Mitigating measures for construction fly dust: establish dustproof defense enclosures, cover naked soil mound with rain clothing and spray water on naked ground periodically.
Defense enclosures and rain clothing will cost 40,000 yuan and spraying cost is 10,000 yuan.

*Mitigating measures for wastewater: build buried biochemical treatment system; the system plus its construction will cost 200,000 yuan.

*Mitigating measures for operation noise: purchase low noise (less than 85dB(A)) equipment, add height of enclosure walls and plant flowers and grass.

*Management expenses for wastewater treatment will be 100,000 yuan.

*Mitigating measures for electromagnetic field: add the height of the 500kV and 220kV distributing structures properly.

(Each measure indicated in the table should be specified in the bid document.)

State Power Corporation East China Company and Jiangsu Provincial Electric Power Company will be responsible for the measures.

<table>
<thead>
<tr>
<th>Table 7-2 Monitoring plan of the environmental management plan for the two proposed substations and one expansion substation</th>
</tr>
</thead>
<tbody>
<tr>
<td>phase</td>
</tr>
<tr>
<td>Construction</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>operation</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

* Frequency of noise monitoring is once during construction period and once every half-year during operation period;

* Assess dust level through observation for dust monitoring;

* Electric field and magnetic field will be monitored once per year during operation period;

* Frequency of wastewater monitoring is once every three months during construction and operation periods.

* Monitoring factors: noise (Leq A), wastewater (BOD, SS, oil), electromagnetic field (electric field and magnetic field).

*All measurement should be made on the site of Longtan Substation, Lianyungang.
Substation and Yancheng Substation: Xiabutou, Hexingzhuang and Tangchen Village.

*Measurement should be made according to the following methods:(1) wastewater:SS—GB11901 Gravimetric Method, BODs—GB7488-87 Dilution and Seeding Method, oil—Non Dispersive Infrared Ray Spectrometry (Monitoring method for water and waste water (3rd edition), Chinese Environmental Science Press, 1989);(2) noise: relevant requirements of Technical Code of Environmental Monitoring by State Environmental Protection Administration;(3) electromagnetic field: to choose sunny days for measurement considering topography and avoiding high buildings, trees, high-voltage transmission lines and metal structures.

8 Public participation

The Project will use remaining sum of the loan by the World Bank. The two proposed substations and one substation to be expanded are scattered in three cities. In compliance with requirements on EIA of the Project of the World Bank and China, opinions and suggestions have been collected widely from all circles of the society by holding talks, handing out public consulting forms and reporting through news media.

During the course of designing the substation, the construction unit and design department visited units concerned to collect information and select substation sites. They also held forums to consult all government departments for opinions and ideas on construction of the Project. Finally, the substation sites were determined after argumentation by the government and experts. Specialized investigation consulted the affected masses widely on the selected 500kV substation sites.

8.1 Public participation in site option and design

The Project has collected opinions and suggestions from the governments
at all levels, departments concerned and affected masses widely at the stages of project preparation, information collection and exploratory survey, site determination, route ingoing and outgoing directions, and scheme comparison.

Opinions from local governments, experts of functional departments, and management departments at the location of the Project were heard at the examine meeting of Longtan and Lianyungang substations' site-option in Nanjing and Lianyungang Municiples. For the purpose of selecting optimum scheme to minimize resettlement of dwelling and to avoid local township programming areas, scenery preservation zone and cultural relics, the design department offer many schemes to the said departments for discussion, screening and acceptance of their ideas.

During planning and engineering site-option of the Project, the following units were paid a visit to, mainly including Jiangsu Provincial National Land Bureau, Nanjing Municipal Plan Committee, municipal construction committee, municipal national land bureau, program bureau, mineral resource management department, antiquity protection department, navigation route management and electricity supply departments. Relevant information is contained in Table 8-1. And the summary of opinions is as below:

(1) Opinions upon construction of the Project

- Construction of the Project will not affect township construction and programming.
- Construction of the Project has interim impact on highway and river traffic but the impact will not exist after it is finished.
- Construction of the Project has no impact on communication and broadcasting facilities.
- Construction of the Project will not cover mineral resources without impact on exploit of mineral resource.
- Construction of the Project has no impact on cultural relics, historic
relics and places of interest, tourism resources and scenic views.

(2) Opinions upon impact on social economical environment

Jiangsu Province is an economically developed area throughout China. However, all parts make uneven development with disproportioned demand of energy. As all parts have rapid increase in economy recently, energy has been in short supply. In order to promote economic prosperity better, it is very necessary to construct the Project.

- Construction of the Project is quite beneficial to promote economic development of Jiangsu Province, increase employment opportunities and upgrade living quality of the people.
- Construction unit of the Project should compensate economically the affected masses so that their living standard will not lower.

Table 8-1 Opinions on determination of substation sites

<table>
<thead>
<tr>
<th>Order</th>
<th>Unit name</th>
<th>Investigation item</th>
<th>Opinion</th>
<th>Project name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lianyungang Municipal Government</td>
<td>Construction of the Project</td>
<td>Full support</td>
<td>Lianyungang Substation</td>
</tr>
<tr>
<td>2</td>
<td>Lianyungang Municipal Plan Committee</td>
<td>Programming of substations</td>
<td>Support</td>
<td>Lianyungang Substation</td>
</tr>
<tr>
<td>3</td>
<td>Lianyungang Municipal Program Committee</td>
<td>Programming and site option</td>
<td>Consent</td>
<td>Lianyungang Substation</td>
</tr>
<tr>
<td>4</td>
<td>Municipal national land resource bureau</td>
<td>Land requisition</td>
<td>Consent</td>
<td>Lianyungang Substation</td>
</tr>
<tr>
<td>5</td>
<td>Lianyungang Municipal Water Conservancy Bureau</td>
<td>Construction of docks</td>
<td>Consent</td>
<td>Lianyungang Substation</td>
</tr>
<tr>
<td>6</td>
<td>Guanyun County government</td>
<td>Construction of the Project</td>
<td>Full support</td>
<td>Lianyungang Substation</td>
</tr>
<tr>
<td>7</td>
<td>Guanyun County Construction Committee</td>
<td>Programming of substations</td>
<td>Support</td>
<td>Lianyungang Substation</td>
</tr>
<tr>
<td>8</td>
<td>Guanyun County Plan Bureau</td>
<td>Programming and site option</td>
<td>Consent</td>
<td>Lianyungang Substation</td>
</tr>
<tr>
<td>9</td>
<td>Guanyun County national land bureau</td>
<td>Land requisition</td>
<td>Consent</td>
<td>Lianyungang Substation</td>
</tr>
<tr>
<td>10</td>
<td>Guanyun County water conservancy bureau</td>
<td>Construction of docks</td>
<td>Consent</td>
<td>Lianyungang Substation</td>
</tr>
<tr>
<td>11</td>
<td>Yilu Township, Guanyun County</td>
<td>Construction of the Project</td>
<td>Full support</td>
<td>Lianyungang Substation</td>
</tr>
</tbody>
</table>
8.2 Specialized public participation investigation

In order to consult all circles of the society for the Project and its environmental protection, we made this specialized investigation for the two proposed substations, one expansion substation and the transmission lines by means of holding talks and handing out public consulting forms.

Detail places are listed in Table 8-2. Investigation was made in Lianyungang and Yancheng in the middle ten days of December, 2001, in Nanjing early February this year and in Nanjing and Lianyungang early April this year.

See location distribution in Table 8-2 where public participation was carried out. See partial public representatives’ name list in Table 8-3.

<table>
<thead>
<tr>
<th>Order</th>
<th>Project name</th>
<th>Project location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>500kV Longtan Substation</td>
<td>Dongliu Village, Qilin Town, Jiangning District, Nanjing Municipal</td>
</tr>
<tr>
<td>2</td>
<td>500kV Lianyungang Substation</td>
<td>Hexingzhuang, Yuchan Village, Yilu Township, Guanyun County, Lianyungang Municipal</td>
</tr>
<tr>
<td>3</td>
<td>500kV Yancheng Substation</td>
<td>Tangchen Village, Guomeng County, Yancheng Municipal</td>
</tr>
<tr>
<td>4</td>
<td>Tianwan Power Station–Shanghe Substation 500kV line cut into Lianyungang Substation</td>
<td>Xiaotangwei and Pengzhuang, Yilu Township, Guangyun County</td>
</tr>
<tr>
<td>5</td>
<td>500kV Dongshanqiao–Longtan substations line</td>
<td>Renjiabian and Beisangzhuang, Jiangning District, Nanjing Municipal</td>
</tr>
</tbody>
</table>
### Table 8-3 Partial public representatives’ name list

<table>
<thead>
<tr>
<th>Full name</th>
<th>Gender</th>
<th>Unit name</th>
<th>Occupation</th>
<th>Project name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Huaiyin Qiu</td>
<td>male</td>
<td>Xiabutou, Dongliu Village, Qilin Town</td>
<td>Conveyance</td>
<td>Longtan Substation</td>
</tr>
<tr>
<td>Wujiu Zou</td>
<td>male</td>
<td>Xiabutou, Dongliu Village, Qilin Town</td>
<td>Farmer</td>
<td>Longtan Substation</td>
</tr>
<tr>
<td>Dezheng Wu</td>
<td>male</td>
<td>Xiabutou, Dongliu Village, Qilin Town</td>
<td>Farmer</td>
<td>Longtan Substation</td>
</tr>
<tr>
<td>Shilin Ye</td>
<td>male</td>
<td>Xiabutou, Dongliu Village, Qilin Town</td>
<td>Farmer</td>
<td>Longtan Substation</td>
</tr>
<tr>
<td>Huazhao Qiu</td>
<td>male</td>
<td>Xiabutou, Dongliu Village, Qilin Town</td>
<td>Farmer</td>
<td>Longtan Substation</td>
</tr>
<tr>
<td>Shisheng Ye</td>
<td>male</td>
<td>Xiabutou, Dongliu Village, Qilin Town</td>
<td>Farmer</td>
<td>Longtan Substation</td>
</tr>
<tr>
<td>Guangxi Li</td>
<td>male</td>
<td>Xiabutou, Dongliu Village, Qilin Town</td>
<td>Driver</td>
<td>Longtan Substation</td>
</tr>
<tr>
<td>Zhengxiang Sun</td>
<td>male</td>
<td>Xiabutou, Dongliu Village, Qilin Town</td>
<td>Village head</td>
<td>Longtan Substation</td>
</tr>
<tr>
<td>Xinbin Zou</td>
<td>male</td>
<td>Xiabutou, Dongliu Village, Qilin Town</td>
<td>Farmer</td>
<td>Longtan Substation</td>
</tr>
<tr>
<td>Guanghe Zou</td>
<td>male</td>
<td>Xiabutou, Dongliu Village, Qilin Town</td>
<td>Farmer</td>
<td>Longtan Substation</td>
</tr>
<tr>
<td>Yuxiang Zou</td>
<td>male</td>
<td>Xiabutou, Dongliu Village, Qilin Town</td>
<td>Farmer</td>
<td>Longtan Substation</td>
</tr>
<tr>
<td>Jiafu Wan</td>
<td>male</td>
<td>Xiabutou, Dongliu Village, Qilin Town</td>
<td>Doing business</td>
<td>Longtan Substation</td>
</tr>
<tr>
<td>Qingwen Zhang</td>
<td>male</td>
<td>Xiabutou, Dongliu Village, Qilin Town</td>
<td>Accountant</td>
<td>Longtan Substation</td>
</tr>
<tr>
<td>Yubao Zou</td>
<td>male</td>
<td>Xiabutou, Dongliu Village, Qilin Town</td>
<td>Farmer</td>
<td>Longtan Substation</td>
</tr>
<tr>
<td>Jiaxing Ge</td>
<td>male</td>
<td>Xiabutou, Dongliu Village, Qilin Town</td>
<td>Farmer</td>
<td>Longtan Substation</td>
</tr>
<tr>
<td>Wuju Ge</td>
<td>male</td>
<td>Xiabutou, Dongliu Village, Qilin Town</td>
<td>Farmer</td>
<td>Longtan Substation</td>
</tr>
<tr>
<td>Jiafa Qi</td>
<td>male</td>
<td>Xiabutou, Dongliu Village, Qilin Town</td>
<td>Farmer</td>
<td>Longtan Substation</td>
</tr>
<tr>
<td>Caijiang Sun</td>
<td>male</td>
<td>Xiabutou, Dongliu Village, Qilin Town</td>
<td>Farmer</td>
<td>Longtan Substation</td>
</tr>
<tr>
<td>Changqin Zhang</td>
<td>female</td>
<td>Xiabutou, Dongliu Village, Qilin Town</td>
<td>Woman committee member</td>
<td>Longtan Substation</td>
</tr>
<tr>
<td>Wensheng Zou</td>
<td>male</td>
<td>Xiabutou, Dongliu Village, Qilin Town</td>
<td>Village head</td>
<td>Longtan Substation</td>
</tr>
<tr>
<td>Anlin Chen</td>
<td>male</td>
<td>Xiabutou, Dongliu Village, Qilin Town</td>
<td>Accountant</td>
<td>Longtan Substation</td>
</tr>
<tr>
<td>Pinghuai Chen</td>
<td>male</td>
<td>Xiabutou, Dongliu Village, Qilin Town</td>
<td>Farmer</td>
<td>Longtan Substation</td>
</tr>
<tr>
<td>Wuxi Zou</td>
<td>male</td>
<td>Xiabutou, Dongliu Village, Qilin Town</td>
<td>Farmer</td>
<td>Longtan Substation</td>
</tr>
<tr>
<td>Zhuanghui Gao</td>
<td>male</td>
<td>Hesi Group, Xinggao Village, Yilu Township, Guanyun County</td>
<td>Farmer</td>
<td>Lianyungan Substation</td>
</tr>
<tr>
<td>Fumin He</td>
<td>female</td>
<td>Hesi Group, Xinggao Village, Yilu Township, Guanyun County</td>
<td>Farmer</td>
<td>Lianyungan Substation</td>
</tr>
<tr>
<td>Full name</td>
<td>Gender</td>
<td>Unit name</td>
<td>Occupation</td>
<td>Project name</td>
</tr>
<tr>
<td>--------------</td>
<td>--------</td>
<td>-----------------------------------------------</td>
<td>------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Jiahui Gao</td>
<td>male</td>
<td>Hesi Group, Xinggao Village, Yilu Township, Guanyun County</td>
<td>Farmer</td>
<td>Lianyungnag Substation</td>
</tr>
<tr>
<td>Jiadong Gao</td>
<td>male</td>
<td>Hesi Group, Xinggao Village, Yilu Township, Guanyun County</td>
<td>Farmer</td>
<td>Lianyungnag Substation</td>
</tr>
<tr>
<td>Jiazhan Gao</td>
<td>male</td>
<td>Hesi Group, Xinggao Village, Yilu Township, Guanyun County</td>
<td>Farmer</td>
<td>Lianyungnag Substation</td>
</tr>
<tr>
<td>Yonglin Zhang</td>
<td>female</td>
<td>Hesi Group, Xinggao Village, Yilu Township, Guanyun County</td>
<td>Farmer</td>
<td>Lianyungnag Substation</td>
</tr>
<tr>
<td>Jiageng Gao</td>
<td>male</td>
<td>Hesi Group, Xinggao Village, Yilu Township, Guanyun County</td>
<td>Farmer</td>
<td>Lianyungnag Substation</td>
</tr>
<tr>
<td>Qinghu Gao</td>
<td>male</td>
<td>Hesi Group, Xinggao Village, Yilu Township, Guanyun County</td>
<td>Farmer</td>
<td>Lianyungnag Substation</td>
</tr>
<tr>
<td>Suhong Wang</td>
<td>female</td>
<td>Hesi Group, Xinggao Village, Yilu Township, Guanyun County</td>
<td>Farmer</td>
<td>Lianyungnag Substation</td>
</tr>
<tr>
<td>Peiguang Gao</td>
<td>male</td>
<td>Hesi Group, Xinggao Village, Yilu Township, Guanyun County</td>
<td>Farmer</td>
<td>Lianyungnag Substation</td>
</tr>
<tr>
<td>Jiaping Gao</td>
<td>male</td>
<td>Hesi Group, Xinggao Village, Yilu Township, Guanyun County</td>
<td>Farmer</td>
<td>Lianyungnag Substation</td>
</tr>
<tr>
<td>Jiating Gao</td>
<td>male</td>
<td>Hesi Group, Xinggao Village, Yilu Township, Guanyun County</td>
<td>Farmer</td>
<td>Lianyungnag Substation</td>
</tr>
<tr>
<td>Qinghai Gao</td>
<td>male</td>
<td>Hesi Group, Xinggao Village, Yilu Township, Guanyun County</td>
<td>Farmer</td>
<td>Lianyungnag Substation</td>
</tr>
<tr>
<td>Chengli Cao</td>
<td>male</td>
<td>Hesi Group, Xinggao Village, Yilu Township, Guanyun County</td>
<td>Farmer</td>
<td>Lianyungnag Substation</td>
</tr>
<tr>
<td>Yimeng Yang</td>
<td>male</td>
<td>The Seventh Group, Tangchen Village, Guomeng Township, Yandu County</td>
<td>Farmer</td>
<td>Yancheng Substation</td>
</tr>
<tr>
<td>Guoliang Zhu</td>
<td>male</td>
<td>The Seventh Group, Tangchen Village, Guomeng Township, Yandu County</td>
<td>Farmer</td>
<td>Yancheng Substation</td>
</tr>
<tr>
<td>Yizhu Yang</td>
<td>male</td>
<td>The Seventh Group, Tangchen Village, Guomeng Township, Yandu County</td>
<td>Farmer</td>
<td>Yancheng Substation</td>
</tr>
<tr>
<td>Shuyuan Chen</td>
<td>male</td>
<td>The Seventh Group, Tangchen Village, Guomeng Township, Yandu County</td>
<td>Farmer</td>
<td>Yancheng Substation</td>
</tr>
<tr>
<td>Yuefang</td>
<td>female</td>
<td>Guomeng Township, Yandu County</td>
<td>Member of the</td>
<td>Yancheng Substation</td>
</tr>
</tbody>
</table>
(1) Public investigation content

Main content to be told residents near the substations and transmission lines is potential impacts incurred by the Project construction and precautions near the substations and transmission lines.
(2) General description of public participation investigation

In this investigation, 80 public consulting forms (see Table 8-4) were handed out near the two proposed substations, one expansion substation and the transmission lines, of which 69 were returned and the returning rate is 86.3%. Among the public participators, those having primary school education is 17% and those having middle school or higher education is 75%. And woman representatives occupy 8% of all persons.

See consulting results of these forms in Table 8-5.

| Table 8-4 Public consulting form of the 500k substation and line |
|-------------------|------------------|----------------|------------------|
| Name | Age | Sex | Intellectual level | Profession |
| Working unit and addressing: | | | Telephone | |

Select (please write ✓ in □)

1. You think current economic development is:
   □ Very good □ Better □ Ordinary □ Worse

2. The main problem impacting economic development of region on the spot is:
   □ Electric power supplement □ Traffic condition □ Nature source □ Other □ Not known

3. You think whether construction of this power transmission project will be good for pulling regional economic development on the spot or not:
   □ Yes □ No □ Ordinary □ Not known

4. You think construction of this power transmission project is:
   □ Very necessary □ Ordinary □ Little significant

5. You think the main problem of environment on the spot is:
   □ atmosphere □ Water body □ Noise □ Dust □ Other □ Not known

6. By this power transmission project construction, the living quality of local residents will be:
   □ Enhanced greatly □ Enhanced □ Little changed □ Deteriorated □ Lowered seriously
7. Which environmental impact will be brought by this power transmission project construction:
   - Agricultural farming
   - Biological environment
   - Electro-magnetic radiation
   - Noise
   - Land occupation
   - Impact on scenic view
   - Impact on traffic
   - Not known

   Answer

1. What impact will be drawn to the society and your family do you think with this power transmission project construction?

2. Please talk about some advice and opinion relevant to environmental protection of this power transmission project construction.

   (It can be appended paper if this list is not big enough for writing)

---

### Table 8-5 Public consulting results

<table>
<thead>
<tr>
<th>Content</th>
<th>500kV Longtan Substation</th>
<th>500kV Lianyungang Substation</th>
<th>500kV Yancheng Substation</th>
<th>500kV transmission line</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current economic development</td>
<td>Good</td>
<td>10</td>
<td>22</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>ordinary</td>
<td>12</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Problem impacting economic development</td>
<td>Electric power supplement</td>
<td>10</td>
<td>18</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Traffic condition</td>
<td>15</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>Nature source</td>
<td></td>
<td>5</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>Main problem of environment</td>
<td>Air pollution</td>
<td>-</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Water pollution</td>
<td>8</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Noise pollution</td>
<td>11</td>
<td>22</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Dust pollution</td>
<td>5</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Construction of the Project will be beneficial to improving the living quality of local residents.

<table>
<thead>
<tr>
<th>Environmental impact will be brought by the Project construction</th>
<th>Electromagnetic radiation</th>
<th>Noise</th>
<th>Land occupation</th>
<th>Agricultural farming</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>16</td>
<td>19</td>
<td>3</td>
<td>4</td>
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<td>5</td>
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<td>10</td>
<td>9</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>16</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

(3) Opinions on the Project from the public near the 500kV substations

- Construction of the Project will be good for regional economic development on the spot, can increase employment opportunities and enhance living quality of the public.

- Construction of the Project should make economic compensation for the occupied land and acquired land at interim, recover the temporarily acquired land timely. Various types should be taken to arrange superfluous labor force.

- Relocated houses should be compensated economically in construction of transmission lines to ensure living standard of affected mass would not drop.

- Construction of the Project should minimize clearance of crops and compensate affected crop outputs.

- EMF and operational noise impact on environment cause by the 500kV substation was concerned much by the public and discussed ardently. Persons of relevant specifics made detail introduction of relevant issues
and dissolved worries of the public.

In response to problems put forward by the mass, concerning professionals made a detail explanation to residential representatives in terms of potential environmental impact caused by power transmission construction. The acquired land must be compensated stringently according to relevant national regulations (including land occupation and young crops compensation). Land will be reallocated to farmers who lose their farm field and surplus labor force will be arranged. Electromagnetic field of the transmission lines in service was described in detail to the representatives in addition to some respects to be cared about in future life and production. For example, ground electric field intensity from transmission line operation will decay to 4kV/m or so at the edge of right-of-way (at 20m, vertical to corridor center line on the ground), and so electromagnetic field intensity of the line can meet the standard limit if there is some distance between the line and residential houses; electric field intensity is comparatively higher near side lines ingoing and outgoing the substation and so it is not suitable to do farming for a long time under the lines; don’t use an umbrella with iron handle in rainy days. Electromagnetic field produced by the high voltage transmission lines can weaken fast with the height and distance. As long as residents keep far away the substation and transmission lines, electromagnetic field around them can meet the limit value of 4kV/m.

After their questions were answered carefully, the residential representatives thought that the power transmission construction would not bring impact on them, from the point view of long distance between the substation and dwelling (150m at least), if they pay attention to proper farming under the transmission lines and near the substation.

### 8.3 Public participation investigation results

Local government, all functional departments and the masses on the
Project sites supporting construction of the Project consider it beneficial to development of local industry and traffic and to enhancement of local living quality; long-term and short-term occupied land should be compensated in accordance with Chinese standards.