Fuzhou World Bank Financed Project

Jinshan Central Bus Depot

ENVIRONMENTAL MANAGEMENT PLAN
(EMP)

Prepared for:
Fuzhou Municipal Engineering Development and
Construction Corporation
and
Fuzhou Municipal Transport Commission

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March, 2005
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Environmental Management Plan of Fuzhou Jinshan Central Bus Depot Project

1. INTRODUCTION

1.1. Project Background

Urban public transport is an important part of a city’s traffic system and public transport service is an important factor in the urban residents’ living quality. During the Ninth Five-Year Plan period, Fuzhou’s social and economic development has been very fast and city started expansion outwards. Great changes have taken place in urban population and land uses while city public transport system has not responded fast enough to meet the changing demands. Under the guidance of the policy of Fuzhou Municipal Party Committee and Fuzhou Municipal People’s Government on “great change in three years” and “great development in priority” of the public transport, Fuzhou’s public transport speeds up its development in the recent years. Although there is a great development in the public transport in recent years, planning and construction of the bus parking lot, maintenance bay and hub station, starting bus stations and destination stations are not systematic, and there is a serious shortage of starting bus stations and destination stations and as well as land for parking lots. All those have restricted further development and improvement of the public transport system. Therefore, Fuzhou Municipal Party Committee and Fuzhou Municipal People’s Government has decided to build Fuzhou Jinshan Central Bus Parking Lot to supplement and complete the public transport parking lot system at the central urban area and the new urban area, and improve service levels and quality of the public transport.

The Environmental impact assessment (EIA) of this project shows that the construction phase and the operating period will produce adverse environmental impact on surrounding areas. As a part of the EIA, the Environmental Management Plan (EMP) of this project is an important document required by the World Bank. This version of the EMP aims at ensuring the implementation of the environmental mitigation measures raised in the EIA. Implementation of the necessary environmental mitigation measures is a must for a project pursuing the rational environmental protection benefit.

1.2. Objective, Strategy and Performance Indicator of the EMP

1.2.1. Objective

The EIA Report mainly describes the environmental impact produced during the project construction and operation while the EMP explains how to implement the measures to mitigate the environmental impact produced at the construction phase and operating period.

Detailed descriptions are given in the EMP for the environmental mitigation measures for environmental management, supervision and monitoring at the construction pause and the operating period, which is a guiding document for implementation of those activities.
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The EMP plays the following roles:

- Defines the environmental mitigation measures for the project-affected targets. The project construction unit, EA unit and design institute have made site investigation and verification for the project affected targets, and raised effective environmental mitigation measures, which have been incorporated into the project design.
- Provides an environmental guiding document. The EMP, after being reviewed by WB, will be the environmental document provided to the construction supervision unit, environmental supervision unit and other project-related institutions during the construction and operating periods.
- Defines the roles and responsibilities of relevant institutions. The roles and responsibilities of the relevant functional organizations and administrative institutions are defined. The approaches for communications and exchanges between different institutions are also proposed.
- Raises plan for environmental monitoring at the construction and operation phases. In order to guarantee the effective implementation of the environmental mitigation measures and to handle the unpredictable environmental problems or contingency at the earliest time possible, the EMP has raised environmental monitoring plans for the construction and operating periods.

1.2.2. Strategy and performance indicator

In order to minimize the environmental impact of this project, a general environmental management objective for the environmental management at the construction and operating periods has been worked out with the joint efforts of the officials of the World Bank, the international consultants, EA unit and the project construction office, which aims at maintaining a sustainable development of Fuzhou’s society, economy and environment, improving Fuzhou’s environmental quality, and mitigating or compensating the communities and environment for adverse impacts brought by the project construction.

The detailed actions and indicators are as follows:

Actions:
- Developing and implementing an EMP and environmental monitoring plan;
- Developing and implementing the vehicle noses control strategy to mitigate the impact on the ambient air;

Indicators:
- Inspecting the monitoring results of the monitoring factors listed in the environmental monitoring plan during the construction and operating periods
- Implementing all the environmental mitigation measures as stated in the EIA according to the specified schedule.

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1.3. Legal Basis and Applicable Standards

The EMP is prepared in accordance with the results of the EIA. The project-related regulations and applicable standards are as follows.

1.3.1. Legal Basis

(1) 《Management Regulations on Environmental Protection for Construction Projects》 Decree No.253 of the State Council, November, 1998;
(2) 《Law of the People’s Republic of China on Environmental impact Assessment》 (becomes effective on September 1st, 2003);
(4) World Bank Business Manual - Environment Assessment (OP4.01);
(5) World Bank Business Manual - Natural Ecologic Environmental Protection (OP4.04);
(6) World Bank Business Manual - the Cultural Properties Protection of World Bank Financed Project (OP4.11);
(7) The trust letter of Fuzhou Development Planning Commission to entrust Guangzhou Research Institute of Environmental Protection to work out the 《Environmental Impacts Report of Fuzhou Jinshan Central Bus Parking Lot》;
(8) 《Project Proposal (including pre-feasible study report) of Fuzhou Jinshan Central Bus Parking Lot》;
(9) 《Environmental impact Assessment Outline of Fuzhou World Bank Financed Jinshan Central Bus Parking Lot》; Laws and regulations;
(10) 《Summary of the Technical Evaluation Meeting of the Environmental impact Assessment Outline of Fuzhou Jinshan Central Bus Parking Lot》 (October 27~29, 2004).

1.3.2. Laws and regulations

(1) 《Environmental Protection Law of the People’s Republic of China》 (December, 1989);
(2) 《Prevention and Control Method of Environmental Noise Pollution of the People’s Republic of China》 (October, 1996);
(3) 《Prevention and Control Method of Atmospheric Pollution of the People’s Republic of China》 (revised in April, 2000);
(4) 《Prevention and Control Method of the People’s Republic of China on Water Pollution》 (revised in May, 1996);
(5) 《Prevention and Control Method of the People’s Republic of China on Solid Wastes Pollution》 (October, 1995);
(6) “Circular on Publication of the 《List of Environmental Protection and Management of the Construction Project》 (the first batch), [2001] No.17 document issued by the State Bureau of Environmental Protection);
1.3.3. Environmental quality standard

(1) Noise environment: according to the requirements as set in the 《Fuzhou Urban Environmental Planning》, the functional area within the project noise environmental assessment scope is mainly Class-II and Class-IV areas. The noise environmental quality shall respectively implement the standards for Class-II and Class-IV areas as stated in GB3096-93.

Table 1.3-1 Standard value for environmental quality assessment  Unit: dB(A)

<table>
<thead>
<tr>
<th>Class</th>
<th>Daytime</th>
<th>Nighttime</th>
<th>Boundary</th>
<th>Applicable standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>70</td>
<td>55</td>
<td>West and north boundaries to parking lot</td>
<td>《Environment Noise Standard Urban Area》 (GB3096-93)</td>
</tr>
<tr>
<td>2</td>
<td>60</td>
<td>50</td>
<td>East and south boundaries to parking lot</td>
<td></td>
</tr>
</tbody>
</table>

(2) Ambient air: according to relevant contents of the 《Fuzhou Urban Environmental Planning》, all areas within the ambient air assessment scope of this project may be classified into Class-II functional area of the ambient air quality. 《Ambient Air Quality Standard (GB3095-1996)》 and Class 2 standard as set in the revised edition shall be
Environmental Management Plan of Fuzhou Jinshan Central Bus Depot Project

implemented.

Table 1.3-2 Standard value for ambient air quality  Unit: mg/m³

<table>
<thead>
<tr>
<th>Monitoring assessment factor</th>
<th>Value-taken time</th>
<th>Concentration limited value</th>
<th>Applicable standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO</td>
<td>1h</td>
<td>10.00</td>
<td>《Ambient Air Quality Standard (GB3095-1996)》 Class 2 standard</td>
</tr>
<tr>
<td>NO₂</td>
<td>1h</td>
<td>0.24</td>
<td></td>
</tr>
<tr>
<td>PM₁₀</td>
<td>24h</td>
<td>0.15</td>
<td></td>
</tr>
</tbody>
</table>

(3) Water environment: Project’s sewage drains to Jinshan Sewage Treatment Plant, the last water body receiver is Beixiang, Class III standard of (GB3838-2002) shall be implemented.

Table 1.3-3 Standard value for surface water environmental quality  Unit: mg/m³(except pH)

<table>
<thead>
<tr>
<th>Item</th>
<th>PH</th>
<th>CODMn</th>
<th>BOD₅</th>
<th>DO</th>
<th>SS</th>
<th>Petroleum</th>
<th>NH₃-N</th>
<th>Lead</th>
</tr>
</thead>
<tbody>
<tr>
<td>GB3838-2002 Class III</td>
<td>6~9</td>
<td>6</td>
<td>4</td>
<td>5</td>
<td>-</td>
<td>0.05</td>
<td>1.0</td>
<td>0.05</td>
</tr>
</tbody>
</table>

1.3.4. Drainage standard

(1) Noise: during the operating period, boundary noise standard implements the Class II and IV standards of the《Industrial Plant Boundary Noise Standard》(GB12348-90). Refer to Table 1.3-4 for standard values. Construction phase boundary noise standard implements 《Structure Construction Boundary Noise Limited Value》.

Table 1.3-4 Standard value for boundary noise  Unit: dB(A)

<table>
<thead>
<tr>
<th>Class</th>
<th>Use scope</th>
<th>Daytime</th>
<th>Nighttime</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV</td>
<td>East and south boundaries to parking lot</td>
<td>60</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>West and north boundaries to parking lot</td>
<td>70</td>
<td>55</td>
</tr>
</tbody>
</table>

Table 1.3-5 《Noise Limited Value at Boundaries of Construction Sites》 (GB12523—90)  Unit: Leq(dBA)

<table>
<thead>
<tr>
<th>Construction phase</th>
<th>Main noise sources</th>
<th>Noise limited value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Daytime</td>
</tr>
<tr>
<td>Earthwork and</td>
<td>Bulldozer, excavator, and</td>
<td>75</td>
</tr>
<tr>
<td>stonework</td>
<td>shovel loader, etc.</td>
<td></td>
</tr>
<tr>
<td>Piling</td>
<td>Various piling machines</td>
<td>85</td>
</tr>
<tr>
<td>Structure</td>
<td>Concrete mixer, vibration bar, and electric saw, etc.</td>
<td>70</td>
</tr>
</tbody>
</table>

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(2) Sewage: It will drain into the urban sewage pipeline, Class III standard as set in the《Sewage Integrated Drainage Standard》(GB8978-96) shall be implemented.

<table>
<thead>
<tr>
<th>Sewage project</th>
<th>CODCr</th>
<th>BOD5</th>
<th>SS</th>
<th>Petroleum</th>
<th>Animal &amp; plant oils</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class III standard in GB8978-96</td>
<td>500</td>
<td>300</td>
<td>400</td>
<td>30</td>
<td>100</td>
</tr>
</tbody>
</table>

1.4. Role and Responsibilities of Implementation Organizations

Fuzhou Construction Bureau and Fuzhou Public Transport Group Company should be the organizations responsible for project environmental management, under which an engineering department shall be setup with 4—5 full-time employees on environmental protection (at least two professionals with title of engineer or above), who shall be completely devoted to environmental management. Fuzhou Environmental Protection Bureau will be responsible for supervision over the whole project environment management. Refer to Diagram 1.4-1 for relationship between departments.

Fig. 1.4-1 Environmental management structure of Fuzhou Jinshan Central Bus Parking Lot

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1.4.1. **Fuzhou Environmental Protection Bureau**

As a functional department of Fuzhou Municipal People's Government on environmental protection management, Fuzhou Environmental Protection Bureau shall perform supervision and management over environmental protection of this project in accordance with laws, decrees and regulations of the State, Fujian Province and Fuzhou City while it guides to operate the vehicle emission automatic monitoring system and the traffic noise automatic monitoring system.

1.4.2. **Fuzhou Public Transport Group Company**

Fuzhou Public Transport Group Company is responsible for the environmental protection management of the public transport facilities during the operating period. Project engineering department is provided with 2 full-time professional coordinators devoted to environmental protection, one has senior title and another has semi-senior title. Their remuneration shall be paid by the project construction unit. Coordinators in charge of the environmental protection will be responsible for this project design and environment management at the construction phase.

The responsibilities of the project engineering department on environment management are as follows:

- Guarantees the environmental mitigation measures raised in the EI Report to be included in the project design;
- Guarantees the construction unit to build in accordance with the environmental mitigation measures listed in the project design;
- Receives and replies the complaints made by the residents and units within the project affected scope;
- According to the complaints made by the residents and units within the project affected scope, revises and adjusts or increases the environmental mitigation measures.

1.4.3. **Fuzhou Construction Bureau**

Under the leadership of Fuzhou Government, Fuzhou Construction Bureau performs routine management on the project construction.

1.4.4. **Fuzhou Environment monitoring Station**

Entrusted by Fuzhou Construction Bureau, Fuzhou Environment monitoring Station is responsible for routine monitoring on the environmental impact at the construction and operating periods, preparing the monitoring report, and providing the leading department with evidences for decision-making on environment management. Fuzhou Environment Monitoring Station is equipped with many monitoring analysis equipments of international level, which can carry out the monitoring on urban ambient air quality, water environmental quality, noise environmental quality, soil quality and natural ecology. Its main responsibilities are as follows:

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- Environment monitoring at the construction phase and the operating period of this project;
- Evaluation of this project’s environmental benefit, routine monitoring on urban environmental air quality, noise environment and vibration environment;
- Monitoring on vehicle emission; and
- Monitoring incidental pollution accident occurred within this project scope, ascertaining the pollution type and size, raising corresponding mitigation measures.

2. PROJECT DESCRIPTION

2.1. Basics of the Project

Project name: Fuzhou Jinshan Central Bus Parking Lot
Project nature: Newly built
Total project investment: Investment is RMB ¥ 147.3439 million, investment of the World Bank accounts for 35%, totaling RMB ¥ 51.5704 million (converted to US$6.2283 million).

Project scope and location: This Project is positioned on the north side of Pushang Industrial Zone, north is Pushanglu, east is a substation, south are Gaozhaicun Village and Geyucun Village (there is proposed Hongjianglu), east is the proposed Hongwanlu. Refer to Fig. 2.1-1 for concrete locations.

The total area needed for this Project is 12.288 hectares (including part of roads), among which construction area will cover 42.15mu, pond area is about 3m, nursery covers 104.19u, the rest is grassland or vacant land.

2.2. Project Construction Scope

The final capacity of Fuzhou Jinshan Central Bus Parking Lot can accommodate 450 buses, which shall be equipped with bus control center, hub station, maintenance bay, filling station and employees’ apartment building, etc. This project will be built in two phases.

Fuzhou Jinshan Central Bus Parking Lot Project is a World Bank financed project of Fuzhou. The main scope is as follows:

(1) Parking capacity of the parking lot is 450 buses;
(2) Hub station has 8 lines to start 100 bus times each hour;
(3) Maintenance bay can maintain about 38 buses daily;
(4) Each day the filling station can refill 300 buses at the parking lot with an amount of 19500m³ gas and cabs with an amount of 7800m³ gas.
3. SUMMARY OF ENVIRONMENTAL IMPACTS

This chapter summarizes the adverse environmental impact produced by this project; these data mainly are from the EIA Report of this project.

3.1. Environmental Baseline Quality

(1) Ambient air quality status
Assessment item is NO2 and PM10; assessment standard is the Ambient Air Quality Standard and Class II standard in its revised edition; the monitoring points are Meitingcun Village, Panbiancun Village and Gangtoucun Village. According to the monitored results obtained at those three monitoring points in 2001, it is known that NO2 and PM10 don’t exceed the standard and meet the requirements for Class II functional area, which means that the environmental quality is fine in this area.

(2) Water environmental quality status
Assessment section is the State-controlled section at Beigang, i.e. Kuiqi section and Aofengzhou section. According to the classification of the water environment functional area along the Fuzhou Minjiang river section, water environmental quality at Kuiqi section and Aofengzhou section shall implement Class III water quality standard as set in the GB3838-2002. Analysis made on the regular monitoring data of 2002 at Kuiqi section and Aofengzhou section shows that Kuiqi section and Aofengzhou section could meet the requirements for Class III water quality standard, which means that water quality status at Beigang’s Aofengzhou-Kuiqi river section is fine.

(3) Noise environmental quality status
Noise environmental quality status monitoring is provided with 6 monitoring points, which are 1# Gaozhaiicun Village, 2# Geyucun Village, 3# parking lot west side, 4# parking lot north side, 5# parking lot middle. Noise environment at Gaozhaiicun Village and Geyucun Village belongs to Class II area, so Class II standard shall be implemented; parking lot west side and north side are parking lot’s noise environment of the road, belonging to Class IV area, so Class IV standard shall be implemented. From November 10th to 11th, 2004, daytime and nighttime noise monitoring is performed at those 6 monitoring points daily. Although north boundary is Pushanglu, traffic volume on Pushanglu is little according status investigation. At present, the surrounding noise environment is good, the surrounding area is relatively tranquil, noise environmental quality at the place where the project is good.

3.2. Construction Environmental Impact

At the construction phase, noise, floating dust, solid wastes and sewage resulted from land requisition, demolition, ground excavation, material transportation and construction of the parking

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lot will cause certain impact on city’s ambient air, noise environment, water environment, traffic, safety, communities and residents’ life. On the basis of the features of the environmental impact at the construction phase, it is necessary to take environmental mitigation measures to reduce and eliminate the adverse impacts.

### 3.3. Environmental impact at the Operating period

(1) Ambient air impact assessment

Main atmospheric pollution source of this project is vehicle emission smoke from the kitchen. After the smoke from the kitchen is class-two treated, it will discharge through the preserved chimney on the roof of the building, so it will produce a relatively small environmental impact.

Vehicle emission is a surface source. Vehicle emission’s atmospheric pollutants mainly include NO\textsubscript{X}, CO and HC. Items affecting prediction analysis are NO\textsubscript{X}, CO and NMHC. For total hydrocarbon source intensity, the regression equation for CTHC and CNMHC in the 《Relationship between the total hydrocarbon and non-methanid discharged by city vehicles》 (Deng Shunxi) shall be used for calculation. Source intensity of NO\textsubscript{X} shall be calculated with NO\textsubscript{X}.

Since the atmospheric pollutant source of this project is discontinuous discharge, it is only to predict the ground concentration distribution at downwind axis in an hour and impact on surrounding environmental quality and scope when vehicle emission of parking lot has the largest discharge.

This project is at Class II ambient air, it shall implement the 《Ambient Air Quality Standard》 (GB3095-1996) and Class 2 standard as set in the revised edition. As the NMHC concentrate is not set in the《Ambient Air Quality Standard》 (GB3095-1996) and the revised edition, this assessment will only carry out analysis on impacts of CO and NO\textsubscript{2}.

The predicted result shows that impact scope of NO\textsubscript{2} at 100m position resulted from the vehicle emission of this project at rush hours is 0.005～0.0713mg/m\textsuperscript{3}, which accounts for 0.2%～29.7% of the assessment standard; impact scope of CO at 100m position resulted from the vehicle emission is 0.0082～1.1020mg/m\textsuperscript{3}, which accounts for 0.082%～11.02% of the assessment standard; the maximum impact value of the NMHC in vehicle emission at surrounding 100m position is 0.1779mg/m\textsuperscript{3}.

Therefore, impacts of NO\textsubscript{2} and CO resulted from the vehicle emission during this project construction at 100m position or above are very little.

(2) Water environmental impact assessment

A diversion system of sewage and rain is adopted for drainage system of Jinshan maintenance bay. Sewage from car washing workshop, maintenance workshop and dinning room flows to their own oil separation tanks respectively. After it is treated through the air floating system, it will drain to...
the urban sewage system outside of the parking lot. Sewage amount is about 357.7 m³/d. Sewage will drain into Jinshan Sewage Treatment Plant to be treated to the standard and then drains to Beigang at last.

At primacy stage, rain would be 88.4 m³/d. Such rain will flow through the oil separation tank and then directly flows to the urban sewage system of Jinshan Sewage Treatment Plant to be treated after it meets the requirements of Class III standard as set in the (Integrated Sewage Discharge Standard).

Sewage of this project is relatively little, especially after it is treated by Jinshan Sewage Treatment Plant to the standard, it will flow to Beigang, so sewage of this project will have a relatively small impact on environment.

3.4. Electromagnetic Environmental impact

Fujian Radiation Environment Supervision Station performed the site survey on line frequency electromagnetic field at 45 points at project site and its surrounding areas. The results show that the maximum value of the line frequency magnetic field 1m outside of the substation enclosing wall is 1.89 μT. The maximum line frequency electric field intensity near beneath the 220kV overhead line is 0.253 kV/m and the maximum line frequency magnetic induction intensity is 0.672 μT.

It may know from the special chapter on the electromagnetic environmental impact assessment that the newly built 220kV substation and its 220kV overhead line will not interfere the operation of the intercoms, GPS equipment and CRT monitor of the control center. The impact on the public by the environmental line frequency electromagnetic field intensity of the control center, waiting bar screen, among which the impact of the line frequency electric field is zero and the line frequency magnetic field intensity is lower than that of the international strictest standard. therefore, there is few impact on the employees at the parking lot and the waiting customers. Pedestrians with umbrellas under 220kV overhead line within the project site will not be thunder-stricken on raining day.

The preliminarily designed layouts of the oil and gas stations, control center, employees' dormitory and waiting room all meet the requirements as set in the (Protection Regulations of the Power Facilities).
Thunderstrike along the proposed 110kV overhead line may endanger the filling station, so the feasibility of the proposed overhead line plan shall be approved by the thunder-proof department, otherwise, underground cable shall be used. Thunder-proof diagram and facilities shall be reviewed and accepted by the thunder-proof department as a whole.

3.5. Risk Analysis and Emergency Plan

Main risks are leakage, fire and explosion. No matter which accident happens, it will cause a very serious consequence, so prevention shall be enhanced first so as to rule out the accident. We must follow the fundamental environmental protection policy of "Focus on Prevention and Safety First". All employees of the parking lot shall familiarize the techniques and the whole filling process of the station and know the hazard of the accidents. Meanwhile, they should learn the prevention plan and intensify the training, so in case of an accident, they can handle the accident according to the procedures timely.

3.6. Resettlement Impact

Construction of this project is inevitable to cause relocation of some public and private structures. In accordance with requirements of the laws, decrees and regulations of the State, Fujian Province and Fuzhou City on land requisition and relocation, it shall make reasonable compensation for units and residents related to relocation. In accordance with existing experiences on urban relocation, the relocated houses for settlers should be at least equal to or better than the former ones.

4. ENVIRONMENTAL MITIGATION MEASURES

This project will carry out the decree No.253 (1998) «Management Regulations on Environmental Protection for Construction Projects» of the State Council of the People's Republic of China so as to ensure the environmental protection facilities to be designed, built and operated with the main engineering at the same time.

In order to prevent production of adverse environmental impacts by this project, it is planned to introduce following actions at different construction and operating periods:

- At project selection and design stage, it shall analyze various potential impact factors in an all-round way, maximum environmental mitigation measures will be given to the project design.
- At the project construction phase, environmental mitigation measures shall be taken to protect affected peoples, e.g. sound insulation windows shall be equipped to mitigate noise impact on noise environmental sensitive points.
- During the operating period, operation of vehicles shall be properly arranged.
4.1. Project Design Phase

Environmental protection and control design of the Jinshan Central Bus Parking Lot is an integral part of the project's main design, but environmental protection and control design must be undertaken by an institute with corresponding qualification.

4.1.1. Noise

(1) Noise control measures of the car maintenance equipment
   High noise equipment of the maintenance workshop shall be placed at a location far away from the south boundary in an individual room with proper acoustic treatment, so as to ensure that noise reaching the boundary can meet corresponding standard requirements.

(2) Noise prevention and control measures of the parking lot
   Since vehicles at the parking lot are forbidden to leave and enter at nighttime (22:00~6:00), it ensures that noise pollution on environment will be caused at nighttime. At daytime (20:00~22:00) and (6:00~8:00), when vehicles leave and enter the parking lot, noise will be the maximum; therefore, special mitigation measures should be taken:
   1) The inner surface of the ramp guard rail shall be sprayed with acoustic material.
   2) Drivers are required to maintain proper gear and speed.
   3) It shall strictly arrange on-position and order of the buses at the parking lot, the south side of the parking shall be first arranged for parking, so it can serve as an acoustic screen.
   4) If the normal noise control facilities fitted on the buses exceed the standard, they shall be maintained compulsorily.

4.1.2. Sewage

(1) Main water pollutant discharge analysis
   Sewage drainage sources of the parking lot are divided: sewage from car washing workshop, maintenance workshop sewage, waiting area sewage, office and domestic sewage and dinning room sewage. Total sewage volume of this project is $357.7 \text{m}^3/d$.

   Main pollution parameters of the water quality of the primary rainfall at the maintenance bay are BOD5, CODCr, oils and floating particles.

   Volume of the primary rainfall can be estimated with the following formula: primary rainfall drain volume $(\text{t/d}) = \text{average annual rainfall (m)} \times \text{runoff producing coefficient} \times \text{rain collection area (m}^2\text{)} \times 10\% / \text{year raining days}$, runoff producing coefficient is 0.8, the annual rainfall is 1354mm, rain collection area is 122,400$m^2$, and the annual raining days are 150.
Table 4.1-1 Pollutant production and discharge

<table>
<thead>
<tr>
<th>Sewage</th>
<th>CODCr</th>
<th>BOD5</th>
<th>SS</th>
<th>Petroleum</th>
<th>Animal&amp;plant oils</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic sewage (31.5m³/d)</td>
<td>250</td>
<td>150</td>
<td>180</td>
<td>--</td>
<td>28</td>
</tr>
<tr>
<td>Maintenance and repair workshops (240.1m³/d)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Car washing sewage (60 m³/d)</td>
<td>300</td>
<td>100</td>
<td>200</td>
<td>150</td>
<td>--</td>
</tr>
<tr>
<td>Concentration (mg/L)</td>
<td>250</td>
<td>80</td>
<td>150</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Waiting area (20.2m³/d)</td>
<td>280</td>
<td>120</td>
<td>200</td>
<td>--</td>
<td>20</td>
</tr>
<tr>
<td>Waiting area (15m³/d)</td>
<td>280</td>
<td>180</td>
<td>200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Car washing sewage (60 m³/d)</td>
<td>400</td>
<td>250</td>
<td>200</td>
<td>--</td>
<td>150</td>
</tr>
<tr>
<td>Discharged concentration (mg/L)</td>
<td>500</td>
<td>300</td>
<td>400</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>Domestic sewage (31.5m³/d)</td>
<td>250</td>
<td>150</td>
<td>180</td>
<td>--</td>
<td>28</td>
</tr>
<tr>
<td>Maintenance workshop (240.1m³/d)</td>
<td>300</td>
<td>100</td>
<td>200</td>
<td>30</td>
<td>--</td>
</tr>
<tr>
<td>Car washing sewage (60 m³/d)</td>
<td>280</td>
<td>180</td>
<td>200</td>
<td>--</td>
<td>100</td>
</tr>
<tr>
<td>Discharged concentration (mg/L)</td>
<td>400</td>
<td>250</td>
<td>200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waiting area (20.2m³/d)</td>
<td>280</td>
<td>120</td>
<td>200</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Dinning room (15 m³/d)</td>
<td>200</td>
<td>120</td>
<td>150</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>Employee office sewage (5 m³/d)</td>
<td>200</td>
<td>120</td>
<td>150</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Table 4.1-2 Primary rain pollutant

<table>
<thead>
<tr>
<th>Primary rainfall</th>
<th>Before treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rainfall volume</td>
<td>Concentration (mg/L)</td>
</tr>
<tr>
<td>88.4 m³/d</td>
<td>Rainfall volume</td>
</tr>
<tr>
<td></td>
<td>Volume kg/d</td>
</tr>
</tbody>
</table>

After the project sewage is treated to reach the pipe connection requirement, it drains to the urban sewage pipeline and Jinshan Sewage Treatment Plant for treatment. According to Table 4.1-1 and 4.1-2, we may know that sewage needs to be pretreated is oily sewage only from maintenance and repair workshops, and dining room. But safety sake, sewage from the car washing at the maintenance bay, filling station, maintenance and repair sewage and dining room shall be treated through oil separation, deposition and air floating, then it shall be sent to Jinshan Sewage Treatment Plant for further treatment.

(2) Sewage treatment technology

Primary rain drains to the urban sewage pipeline after it is pre-treated through oil separation and deposition.
4.1.3. Air Emission

(1) Treatment technology of waste gas
After the waste gas from the kitchen is collected via the smoke collecting cover, the electrostatic smoke purifier removes the oil from the waste gas, which discharges from the roof of the building through the chimney by means of the suspension discharge fan. The treatment technology is: collection of waste gas → electrostatic smoke purifier → discharge fan → discharge.

Burners are arranged in two groups. One group has 5 burners and the other has 6 burners, each is equipped with one LGCFC-8K electrostatic smoke purifier to remove oil. Then two DT22-2-I-B(1) fans to suck them to the vertical duct. Waste gas treatment volume is 33000m$^3$/h. The treated waste gas is discharged from the roof through the preserved chimney with a section of not less than 0.8m$^2$.

(2) Main waste gas treatment facilities of the dinning room
Refer to Table 4.1-3 for main waste gas treatment facilities of the dinning room.

<table>
<thead>
<tr>
<th>No.</th>
<th>Equipment name</th>
<th>Type or specification</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Electrostatic smoke purifier</td>
<td>LGCFC-8K</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Smoke discharge fan</td>
<td>DT22-2-I-B(1)</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Low-voltage power distribution cabinet</td>
<td>XL-ZL</td>
<td>1</td>
</tr>
</tbody>
</table>

4.1.4. Land requisition and resettlement

At the phase of project location selection and design, to minimize the amount of land requisition and resettlement is an important guiding principle of the project decision-making authority.

4.1.5. Summary

Table 4.1-4 summarizes the proposed mitigation measures to minimize the impacts at the construction phase of the project and implementation organizations to complete those measures.

Table 4.1-4 Summary of environmental protection measures and implementation organizations at the construction phase

<table>
<thead>
<tr>
<th>Env. issue</th>
<th>Mitigation measures</th>
<th>Implementation organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise</td>
<td>High noise equipmer. at the maintenance workshop should be placed at a location i. away from the boundary in an individual room with proper acoustic treatment. During the parking lot design, arrange the inner ramps of the two</td>
<td>Fuzhou Planning and Design Research Institute</td>
</tr>
</tbody>
</table>
ramps (up and down) closest to the residential buildings as the
down ramps, this enables to control brake noise impact on
environment while applying brake.
The inner surface of the ramp guard rail shall be sprayed with
acoustic material so as to reduce noise at the ramp area;
Height of partial ramp guard rail is higher than that of the bus inlet
and outlet, so as to serve as a screen on the environment;
Ask the drivers to maintain proper gear and speed;
It shall strictly arrange on-position and order of the buses at the
parking lot, the south side of the parking shall be first arranged for
parking, so it can serve as an acoustic screen.
If the normal noise control facilities fitted on the buses exceed the
standard, they shall be maintained compulsorily;
Through monitoring the noise at the residential buildings opposite
to the ramp, if the noise exceeds Class \( \frac{1}{2} \) standard value, and it
exceeds the background value over 10dB (A), further mitigation
measures should be taken, e.g. to increase the height of the fence or
to enclose the ramp;
If people are living in the residential building on the south side,
mitigation measures should be taken, e.g. acoustic insulation screen
should be installed on the south side of the parking lot or transform
the windows of the residential building into ventilation acoustic
windows.
If residential buildings are going to be built in the vicinity of the
project, acoustic measures shall be taken for building itself so as to
avoid possible environmental impact.

<table>
<thead>
<tr>
<th>Sewage</th>
<th>After the oily sewage is treated with oil separation and air floating, it drains to the urban sewage pipeline. After the night soil sewage is treated through the 3-step septic tank, it drains to the urban sewage pipeline.</th>
<th>Fuzhou Planning and Design Research Institute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atmospheric pollutant</td>
<td>Smoke from the kitchen is transported to the main building roof and treated by the water membrane purifier, then discharges into the air. To discharge the waste gas timely through the central discharge shaft of the parking lot via afforestation, rational layout of the parking lot lanes and strengthening the ventilation system.</td>
<td>Fuzhou Planning and Design Research Institute</td>
</tr>
</tbody>
</table>

4.2. Construction Phase

4.2.1. Noise

General Mitigation Measures
In order to maximally mitigate the noise impact on the surrounding environment produced at the
construction phase of the Jinshan Parking Lot, the construction unit shall take proper measures to mitigate the noise impact in the following aspects:

- The contractors will be requested to adopt effective measures to reduce noise caused during the construction, and minimize the noise impacts. During the construction, construction modes and construction time will be rationalized to reduce or avoid noise construction activities occurring during the most sensitive time, such as night time, class times and hospital operation time wherever possible. Use of piling machines at night (from 22:00 to 6:00) will be strictly forbidden and other noisy activities including heavy truck transportation, loading/unloading, beam lifting and stockpile of the materials will be carried out during the day time. If other noisy machinery and activities have to be used, they will be located to areas as far away from sensitive receptors as possible. If nighttime construction is absolutely necessary, the contractors will be requested to report the local environmental protection bureau as well as the PMO for approval (more on night time construction mitigation later).

- Although three rounds of public consultation at the sensitive receptors have been conducted during the EA for concerns of project impacts including night time construction, contractors will be requested notice well ahead of time the impacted public and communities and consult with the public for their concerns and opinions. The continued public consultation will be included in the tendering documents and made part of the contract obligations to the contractors, in order to receive public understanding and listen to their concerns and suggestion for mitigation. These mitigation measures, including public consultation for construction arrangement and night construction activities will be implemented prior to the start of the construction at the site to allow the public to express concern and the time to further design mitigation measures if needed.

- The construction in the residential and school areas will stop one week prior to the annual national examination time (first week in July but the actual time may change in the next few years). All construction activities, including materials transportation and preparation, will stop during the actual exam time (3 days) to provide the best possible acoustic environment during this highly sensitive period.

- For some components with a real long construction period, such as the interchange, special measures will be taken for the sensitive receptors nearby. There are several noise sensitive receptors around the sites, it will be arranged to construct during the school vacation to the extent possible.

- Contractors will select and use the construction machinery with low noise as far as possible. Temporary generators will be banned in principle and the utilities will be requested to supply additional power to meet the construction needs. In case such arrangement with the utilities cannot be made, generator sets along the roads will be equipped with sound-insulation cover and located to be away from the sensitive receptors. Contractors will be requested to provide good maintenance to all their construction machinery so that they can be kept in good shape and best working conditions to minimize noise.

- Construction time and construction sites will be rationalized. Working site with high noise will be far away from the noise sensitive receptor if possible. The access for
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construction transport vehicles in and out the site will be arranged at the side far away from the residential area. For individual construction site with serious impacts and near highly noise sensitive receptors, temporary sound-insulation enclosing structure or sound-insulation barrier will be set up. Alternatively, temporary noise barriers at the side near sensitive receptors will be built. For earthwork, contractors will arrange multiple excavators and trucks to work at the same time, and thus shorten the impact time.

- Full time supervision staff will be retained by the PMO to supervise construction activities, particularly night time construction. Hand held noise meters will be used to measure noise levels at sensitive receptors such as hospital wards and residential buildings during the night construction periods.
- With the close supervision of the PMO, the contractors will be requested to place a designated person for night time traffic management for construction vehicles. If necessary, proper training and instruction from traffic police will be provided to minimize night time traffic congestion and hooting.
- At each construction site where night time construction will be carried out, a public notice board will be put on display in a highly visible place. On this board, telephone number and contact number will be shown for the public to vent their concerns and complaints about the night time construction. All such complaints will be recorded, and investigated as needed, and then appropriate actions will be taken to address the concerns and complaints.
- The concrete structures for interchanges, bridges, etc. will be pre-fabricated in factories to the extent possible. Site concrete pouring for these elements will be minimized in order to reduce noise levels from these activities. As concrete pouring often requires continued operation, avoidance of site pouring is also an effective method to reduce the need for night time construction activities.

Night Time Construction Noise Mitigation

As night time construction would result in particularly significant impacts to residents and other sensitive receptors, besides the above mitigation measures, the following special measures will be taken during the construction phase:

- Urban residents and villages living within the potentially impacted areas will be noticed ahead of time for the length and noise intensity of the proposed night time construction. Information on why the night construction is necessary and mitigation measures to be taken will be provided to these urban and rural residents to obtain their understanding. These residents will be consulted for their concerns, difficulties, and suggestions for noise control prior to the commencement of night time construction. These concerns will be responded and suggestions adopted where appropriate.
- Night time construction will be arranged in such a way to avoid school exam time (about one week in the summer) in the urban area and harvest time (about half month each in the summer and fall) in the rural area. These are particularly sensitive time when students need the good night sleep in preparation for exams and farmers for the heavy farming activities in the field.
- Concreted mixer, power generated and other stationary equipment will be carefully

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placed to be far away from residential areas and villages to ensure no noise impacts from these machines. Where possible, municipal power supply will be utilized in construction including night time construction as diesel generators are extremely noise and avoiding using them is the best mitigation.

- Equipment with lower noise levels will be used for concrete pouring operations, which may required 24 hours non-stop operation;
- Temporary noise barriers at the appropriate places may be erected to reduce the noise impacts at the night time. These areas may include noisy stationery construction machines and/or areas with sensitive receptors.
- If necessary, the contractor will arrange temporary accommodation away from the impacted area for the extremely vulnerable people who need good night time rest, such as persons with illness and elderly,
- Notice boards will be erected at all construction sites providing information about the project, as well as contact information about the site managers, environmental staff, telephone number and other contact information so that any affected people can have the channel to voice their concerns and suggestions, and
- Close supervision personnel from the PMO will be assigned to the construction sites during the period of night time construction to ensure that the above measures are taken and to respond to any un-anticipated impacts by necessary mitigation measures.

All these mitigation measures will be included in the project Environmental Management Plan (EMP) which is a stand alone document used during the construction phase to enforce and supervise the implementation of the proposed mitigation measures. And all which require the actions of the contractors will be included in the bid documents and later the contracts to ensure that these mitigation measures and actions will become contractual obligations for the contractors which can be enforced by the PMO and the environmental monitoring team.

4.2.2. Sewage

Construction sewage contains a large amount of mud and sand, which cannot be directly discharged before being precipitated.
Sewage from the site dining room shall be discharged after being oil separated.
Domestic night soil sewage shall be treated in the septic tank before being discharged.
According to the requirements for underground water protection, when filling the equipment with oil, the spilled oil or fuel shall be cleaned at once. Any equipment that is conducive to overflowing shall be printed with level and type of material.

4.2.3. Ambient air

The Contractor will take charge of performing the following mitigation measures to prevent the dust pollution.

- According to the requirements of the People's Government of Fuzhou City, the Contractor must use protection materials to prevent the flying dust in removing the
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buildings and constructing road and buildings.

- Appoint a worker in charge of water spraying on each construction contract section to take charge of spraying the construction sites and the construction passages. The spraying frequency will be determined according to the weather. In common weather, spraying will be carried out four times a day, namely in the morning (7:30–8:30), at noon (12:00–13:00) and in the evening (17:30–19:00) as well as at peak hour.

- The vehicles transporting cement, construction materials and construction rubbish will be covered with tarpaulin to reduce falling; Washing the carriage and the tires with water before the vehicles go out of the loading or unloading sites; the truck will avoid passing through the central area of the city and try to avoid the residential area as well as the sensitive points.

- Appoint one full-time managerial person of environment protection for each construction contract section, whose responsibilities are to guide and manage the disposal, transport and storage of waste from the project, construction rubbish and construction materials. recover and harden the sites, clear the mud, waste materials on the road in construction site as well as the mud on the tires to prevent the secondary flying of the dust.

- According to the investigation on the PM10 density change around the construction site, the material factory, mixing station and other temporary materials factories during construction must be more than over 50m away from the resident areas and environmental sensitive points.

- During construction, the Fuzhou Urban Traffic Management Bureau will do well in traffic control in urban area. According to the construction plan, set warning signs at the entrance to the city to remind the vehicles of traveling from the external roads around the city. Do well in traffic control on external roads to ensure the unblocking of the roads and prevent the traffic congestion so as to reduce the impacts from the vehicle emission upon the ambient air.

- If the vehicles are blocked due to the road construction in the urban area, the traffic management department will set up the instant vehicle traveling management method, for example, regulating the traveling route for the taxi with odd and even dates, prohibiting the passing of motor vehicles and setting one-way lane and so on.

### 4.2.4 Recovery of vegetation

Following mitigation measures will be taken to minimize the impacts on vegetation damages.

- As for the green belt occupied by the Contractor due to storing raw materials, construction passage and construction sites, it will be recovered after completing the project.

- As for the trees in the place where the raw materials for construction are stored, on the construction passage and in the construction sites, if they can be planted in another place, take protective measures to plant them in another place.
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4.2.4 Trees and Vegetation

As for the trees in the place where the raw materials for construction are stored, on the construction passage and in the construction sites, if it is necessary to cut them due to the construction need while they can not be planted in another places, they will be compensated according to the principle of "cutting one, compensating two". There will be 4,542 trees to be cut within the scope of the project and 9,084 trees will be planted as the compensation after the project is accomplished.

4.2.5 Community

The following measures will be taken to mitigate the negative impacts upon the community from the construction of the project.

- All of the roads under reconstruction in urban area will be constructed in half-closed manner and leave passages for the pedestrians, bicycles and buses.
- Build temporary roads and temporary bridge for the units and the residents along the line and set necessary safety measures to ensure the unit and the residents can go out conveniently and safely. At the same time, perform centralized construction and quicken the construction progress to reduce the impacts on the communities.
- As for the section where some schools are located, carry out construction in the summer holiday or in other holidays to reduce the impact upon the going of the students.
- All construction materials will be stored on special yards by categories and types and kept by designated persons. The discarded materials will be removed out of the site to reduce space occupation and traffic inconvenience.
- As for the resident areas and the units that are separated due to being removed, rebuild the fence within one month after accomplishing removing to reduce the impacts from the

4.2.6 Cultural Relics and Chance-Find Procedures

The Zudian temple is located near the Jinshan bus depot site which would be potentially impacted by the project construction and operation. There are no regular services at the temple although it is opens to all worshipers and noise from bus depot during construction and operation may affect the temple operation. As a mitigation measure, the road alignment at this particular location has modified to retreat by about 10 m to maintain sufficient distance between the road and the temple. In addition, the perimeter walls at this side (facing the temple) will be 2 m high with solid bricks. The wall will be erected before commencing the construction. As such, the wall will function as a noise barrier for noise attenuation. Once the construction is complete, the area in and outside the property perimeter wall will be landscaped with tall trees which will have some effect on noise attenuation as well as mitigating the visual impacts of the bus depot.

Although the EA has made detailed site investigation and consulted cultural relics authorities and

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impacts on known cultural relics have been analyzed and mitigation measures proposed, there could still be potential for chance finds of archaeological properties during construction. To minimize adverse impacts or damages to these chance finds, the following procedures have been proposed and will be incorporated into contractors' standard operation procedures:

- When a chance find or potential chance find is uncovered at the construction site, all construction activities at the site will be immediately put hold.
- Workers and site management are responsible to take necessary measures to protect the chance finds from damages by construction related or other activities such as sliding, flooding, damages by machinery, access by others, stolen, etc.
- Contractors will notice the PMO, project owner and cultural relics authority immediately.
- Site investigation by professional archaeologists may be conducted to determine the nature, value, conditions, areas of the find, etc. On this basis, the professional team will recommend on next steps as to preserve the site or not.
- Construction may only resume following the reports of the professional investigation and approval of the cultural relics authority.
- If the site is of high value and site preservation is recommended by the professionals and requested by the cultural relics authority, the project owner will need to make necessary design changes to accommodate the request and preserve the site.
- All contractors and construction supervision companies will be trained by the professional before the construction starts to understand the procedures and the basics on how to recognize a potential archaeological chance find.

4.2.7 Contractor Management

It is recognized that contractors working on the project will be a key in environmental management, pollution control and impact mitigation during construction. A number of measures will be taken to ensure that the contractors will be aware of their responsibilities and obligations in environmental protection. These measures include

- All contractors and construction supervision will be required to participate in a mandatory environmental training program prior to the start of construction onsite.
- The above mitigation measures will be, where appropriate, included in the tendering documents for contractors and eventually in the construction contracts so that they will be the contractual requirements for contractors working on the project.
- Contractors will be requested to monitor their environmental activities and provide a diary on environmental performance on a daily or weekly basis. These records will be subject to supervision and review by the PMO and construction monitoring teams.
- All contractors will be requested to provide a dedicated, full time environmental staff on each section of the project roads. These environmental staff will be trained by the training program first to be qualified for their job. No contracts will be deemed effective and

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started prior to completion of the environmental training.
• The contractors will be requested to communicate and consult the communities where they work. An eye-catching public notice board will be erected in each road section to notice the public of the main construction activities at this particular site and construction duration. At the same time, the board will provide contact names and telephone numbers to the public to express their concerns and complaints about the construction activities.

An environmental requirement for bidders, which may be included in the bid documents, is presented in Appendix I.

4.2.8 Construction Camp Management

Besides wastewater and solid waste, the construction will have other impacts from poor sanitary and hygiene and poor and poor site management. The following measures will be taken during construction to prevent and mitigate the potential impacts:

• The construction camp will maintain good housekeeping and good order.
• Site will have a septic tank to hold and conduct preliminary treatment of satinary waste before discharge
• Site washrooms will be disinfected regularly
• All workers will go through basic training for diease control, maintain sanitary and housekeeping requirements at the camp
• Regular site education of workers for epidemic control and safe and hygiene lifestyle and habits, as well as basic hygiene and disease prevention knowledge
• The camp will have on-site clinic to control and monitor any diseases
• The camp will have an emergency plan in an event of outbreak of any epidemnics
• All hazardous materials and waste will be stored in designated areas in the camps which are paved and weather-proof to prevent direct contact of dripping and leaking oil with bare soil.
• The storage of fuels will have full fire prevention and fighting considerations. Emergency equipment for fire fighting and spill control will be provided at the site.
• The construction camp area will be restored to its original state at the end of the construction and dismantling of the camp. Any soil and other contamination, if exists, will be cleaned through a remediateion plan.

4.2.9 Summary

Table 4.2-1 summarizes the proposed mitigation measures to minimize the impacts at the construction phase of the project and implementation organizations to complete those measures.
Table 4.2-1 Summary of environmental protection measures and implementation organizations at the construction phase

<table>
<thead>
<tr>
<th>Env. issue</th>
<th>Mitigation measures</th>
<th>Impl. organization</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise</td>
<td>It is strictly forbidden to operate equipments with high noise (e.g. impact piling machine, etc.) at the rest time (at noon and nighttime); It shall try best to select equipment with low noise or with acoustic insulation or silencer; The construction department should reasonably arrange the construction time and location. It shall try best to perform construction at daytime, not or as less as possible at nighttime. Residents shall be informed with construction time schedule; High noise operation shall be arranged as far as possible away from the noise environment sensitive area (Geyucu Village and Gaozhaicun Village) on the basis of the construction requirements, e.g. northeast corner of the proposed project. Temporary sound insulation fence or acoustic screen shall be erected at the boundary of the construction site on the site close to Geyucu Village and Gaozhaicun Village; Periodical maintenance of the equipments, strict implementation of the operating procedures; Exit and entrance of the vehicles at the project site shall be arranged on the side far away from the residential buildings.</td>
<td>Contractor Set in the bidding documents</td>
<td></td>
</tr>
<tr>
<td>Sewage</td>
<td>Construction sewage contains a large amount of mud and sand, which cannot be directly discharged before being precipitated. Sewage from the site dinning room shall be discharged after being oil separated. Domestic night soil sewage shall be treated in the septic tank before being discharged. According to the requirements for underground water protection, when filling the equipment with oil, the spilled oil or fuel shall be cleaned at once. Any equipment that is conducive to overflowing shall be printed with level and type of material.</td>
<td>Contractor Set in the bidding documents</td>
<td></td>
</tr>
<tr>
<td>Ambient air</td>
<td>Driving route of the transport vehicles shall be far away from residential communities or other sensitive points, material transport vehicles shall be equipped with anti-dust measures, e.g. installation of canopy. Vehicle</td>
<td>Contractor Guangzhou Mud Management Set in the bidding documents</td>
<td></td>
</tr>
</tbody>
</table>
shall be flushed clean in or out of the loading and unloading sites; Closure and water spraying shall be used to reduce dispersion and pollution of the flying dust; Relevant measures shall be taken to minimize the dust during site agitation or unloading materials; Construction wastes shall be cleaned away from the construction site; Concrete agitation station shall be as far as possible away from the buildings around the project; Correctly operate and maintain the generator and building machinery so as reduce discharge amount of the waste gas.

4.3. Operating period

4.3.1. Noise

At the time when buses come back (20:00～22:00) and leave (6:00～8:00), further mitigation measures shall be taken on noise impact produced by buses. The mitigation measures shall include:

- It is forbidden to operate vehicles at nighttime (22:00～6:00).
- Road surface shall be in good condition, and noise treatment facilities shall be periodically maintained, so as to ensure normal operation of those facilities.
- Except in case of emergency, it is forbidden to horn.
- The inner surface of the ramp guardrail shall be sprayed with acoustic material.
- Drivers are required to maintain proper gear and speed.
- It shall strictly arrange on-position and order of the buses at the parking lot; the south side of the parking shall be first arranged for parking, so it can serve as an acoustic screen.
- If the normal noise control facilities fitted on the buses exceed the standard, they shall be maintained compulsorily.
- Through monitoring the noise at the residential buildings opposite to the ramp, if the noise exceeds Class standard value, and it exceeds the background value over 10dB (A), further mitigation measures should be taken, e.g. to increase the height of the fence or to enclose the ramp.
- No residential buildings are allowed to be built at the Class area of the parking lot.

4.3.2. Sewage

Maintain the sewage treatment facilities periodically and ensure their normal operation. Timely clean the oil residue from the oil separation tank and the treated sludge.
4.3.3. Ambient air

Maintain the waste gas treatment facilities periodically and ensure their normal operation. Ensure that emission control facilities at the public bus maintenance workshop are considered in priority, any buses whose emission exceeds the standard shall be repaired at once. Bus parking lot should be afforested so as to beautify the environment and purify the air.

4.3.4. Prevention measures for dangerous articles

Potential incidents resulted from oil and gas filling stations are fire and oil leakage, so active safety prevention measures shall be taken. Regulations and rules must be observed during daily operation. If the employees heighten their vigilance, incident can be avoided. Following measures shall be taken during design and operation:

Oil and gas stations shall be built as the Class 1 fire-proof structure, which shall have sufficient safety protection distance that is 25m or above away from the main structure. Structure shall be well ventilated. No fire is allowed around the structure. Measures for heat insulation and temperature reduction shall be taken in the summer. Oil and gas storage tanks should be built underground.

- Oil and gas stations shall be provided with explosion-proof according to relevant specifications and regulations. Iron tools and shoes with iron nails that could produce sparks are forbidden during operation.

- Oil storage tank design, oil product transport and pumping device shall be equipped with earthing devices so as to prevent electrostatic accumulation.

- Corresponding fire-fighting apparatus shall be well prepared according to the stored oil products and CNG nature, and maintained in good operating conditions. It shall regularly organize employees to carry out fire-fighting excise and familiarize the operation of various fire-fighting apparatus.

- Ground of the filling station shall be fully paved with concrete so as to prevent the oil from penetrating underground in case of an accident. During design, in order to collect ground cleaning water and leaked oil resulted from an oil leakage accident; filling station can be provided with an open-cut drain, which shall connect with the oil separation tank special for the filling station. In order to prevent grave accident, floating oil on the oil separation tank should be timely removed.

- Necessary measures shall be taken to prevent the underground equipment from corroding; oil storage tank and oil transport pipe shall be applied with two layers of anti-corrosion coatings so as prevent the equipment from directly contacting the soil; equipment is protected with cathode, so there is no current to enter the soil from the equipment.

- Buried-type storage oil tank shall be provided with concrete pit. Earth of the pit bottom shall be replaced. Filling station shall be refilled with clay of poor filtration, which should be tamped down mechanically or manually layer by layer. The refilled thickness is 2m.

- Sampling analysis shall be made on local soil before project construction. An underground water monitoring well shall be provided within the scope of the filling...
station. Underground water qualities shall be compared before and after project operation, corresponding measures shall be taken timely if necessary.

4.3.5. Waste Management

Industrial wastes produced by this project (waste metal parts or waste iron produced by mechanic processing) shall be reclaimed by the material reclamation company; consumer wastes shall be collected and treated by the environmental sanitary department.

The operation of the project (road and bridge operation) would contribute to the increase in waste generation in the city. For example, the increased use of motor vehicles would result in increased waste batteries, tires, as well as air emissions. Control and minimization of these waste and mitigation of impacts brought by the waste generation are a city wide issue. They are not exclusively related to the projects as the motor vehicles will not only operate on the project roads and bridge but other parts of the city as well.

As part of the project impact mitigation measures, the project will include a technical assistance for sector wide and strategic environmental impact assessment for urban transportation sector. Among the issues to be covered by this environmental assessment will be the citywide policies on waste minimization and impact control. Although details will be developed during this strategic EA, some of the general considerations for waste impact mitigation include:

- Recycling programs will be set up for both waste tires and batteries from motor vehicles.
- There will organizations set up for collection, recycling, storage, and reuse of these waste;
- Any residual or un-recycled parts from these waste will be disposed of in safe manners. In particular, batteries are hazardous waste and disposal of batteries have to be in secured and certified facilities
- A study will be initiated to consider the policy of tire and/or batteries levies to discourage over uses of batteries and tires and collect fees for disposal costs as “polluters pay” principle.
- A motor vehicles emission control strategy for the city will be developed to deal specifically of the impacts of motor vehicle emissions.

In addition, the buses will be well maintained to minimize air emission. Over the long term, the bus company, the owner of the this project, will evaluate air emission control programs, such as converting clean fuels such as CNG, LPG or LNG, regular inspection and testing program for all buses, gradual replacement of current fleet with clean buses (hybrid bus, electrical bus, etc.) over the long term.
4.3.6. Summary

Table 4.3-1 sums up measures to mitigate various impacts and lists implementation organizations to perform those measures during the operating period.

Table 4.3-1 Summary of the environmental protection measures and implementation at the operating period

<table>
<thead>
<tr>
<th>Env. issue</th>
<th>Measures</th>
<th>Impel. Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise</td>
<td>It is forbidden to operate vehicles at the parking lot at nighttime (22:00 ~ 6:00); Road surface shall be in good condition; Noise treatment facilities shall be periodically maintained so as to ensure normal operation of those facilities. Except in case of emergency, it is forbidden to horn. The inner surface of the ramp guard rail shall be sprayed with acoustic material; Drivers are required to maintain proper gear and speed; It shall strictly arrange on-position and order of the buses at the parking lot, the south side of the parking shall be first arranged for parking, so it can serve as an acoustic screen; If the normal noise control facilities fitted on the buses exceed the standard, they shall be maintained compulsorily; Through monitoring the noise at the residential buildings opposite to the ramp, if the noise exceeds Class I standard value, and it exceeds the background value over 10dB (A), further mitigation measures should be taken, e.g. to increase the height of the fence or to enclose the ramp; No residential buildings are allowed to be built at the Class II area of the parking lot.</td>
<td>Jinshan parking lot</td>
</tr>
<tr>
<td>Water</td>
<td>Maintain the sewage treatment facilities periodically and ensure their normal operation; Timely clean the oil residue from the oil separation tank and the treated sludge; In accordance with relevant regulations, prevent oil and gas leakage accidents.</td>
<td>Jinshan parking lot</td>
</tr>
<tr>
<td>Air quality</td>
<td>Maintain the waste gas treatment facilities periodically and ensure their normal operation; Ensure that emission control facilities at the public bus maintenance workshop are considered in priority, any buses whose emission exceeds the standard shall be repaired at once; Bus parking lot should be afforested so as to beautify the environment and purify the air.</td>
<td>Jinshan parking lot</td>
</tr>
<tr>
<td>Solid wastes</td>
<td>Industrial wastes produced by this project (waste metal parts or iron produced by mechanic processing) shall be reclaimed by the material reclamation company, consumer wastes shall be collected and treated.</td>
<td>Jinshan parking lot</td>
</tr>
</tbody>
</table>
4.4. Public Concerned Environmental Issues and Settlement Measures

According to repeated side surveys, visits, public consultations and meetings on project-affected residents at the surrounding area, the followings are the main public concerned sensitive and potential environmental issues that are listed in Table 4.4-1.

Table 4.4-1 Public concerned environmental issues and feedbacks

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Public opinions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Geyucun Village</td>
<td>1) Requires to protect Fenggang Ancestor Temple at Zhu Town, don’t relocate it and don’t damage it due to construction;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2) The old people worry about that the relocated houses would be occupied by their children or they have no residence to live since they don’t have enough money to buy houses, so they require to solve residence issue;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3) Most of the surveyed people require a fair compensation and an open compensated amount, each relocated house area should be publicized;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4) The middle-aged and old people worry about loss of the income source after their present farmland is requisitioned, so they ask to be employed or the government gives them living cost monthly;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5) Some villagers said that the quality of Minjiang Xincun for relocating residents from the construction of Pushang Dadao was poor, the wall cracked before the residents moves, furthermore, there is no place for complaining. So they worry about occurrence of similar thing when their land is requisitioned for construction of the parking lot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6) Local flower planters worry about that construction of the parking lot will bring waste gas discharge that will pollute flowers and affect the quality and output of the flowers. So they suggested that all land should be requisitioned if construction of the parking lot is necessary, rather than part of it.</td>
</tr>
<tr>
<td>2</td>
<td>Gaozhaicun Village</td>
<td>1) Most of the surveyed people worry about whether compensation could be made according to the relevant policies after relocation, and whether their compensated money could be pain in full amount;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2) The surveyed people worry about loss of the income source after their present land is requisitioned, thus lowering their living quality;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3) Some surveyed people worry about that although their land is not within the requisition scope, the construction of the parking lot is on the margin of their flower plots; vehicle emission would affect the quality of their flowers.</td>
</tr>
</tbody>
</table>

Aiming at those issues, the proposed mitigation measures to be taken are as follows:

- Design avoids relocation of the Ancestor Temple of the local residents;
In accordance with requirements of the laws, decrees and regulations of the State, Fujian Province and Fuzhou City on land requisition and relocation, it shall make reasonable compensation for units and residents related to relocation. In accordance with existing experiences on urban relocation, the relocated houses for settlers should be at least equal to or better than the former ones; Proper resettlement should be given to the old whose land is requisitioned so as to guarantee them happy later years.

Proper compensation should be given to farmers whose land is requisitioned so as to enable them to maintain their present living standards, which has an active meaning for maintaining social stability.

Public consultation will be a continued process throughout the project implementation. During construction phase, all construction sites will be requested to erect eye-catching billboards to explain the project background, duration, type of impacts (block traffic, noise operation, etc.) as well as contact information for the site management and environmental staff. The telephone numbers in the billboards would allow the concerned or otherwise affected public to have ways to voice their opinions and suggestions for improvement. Contractors will be requested to respond to public concerns to minimize the disturbances to the communities.

5. ENVIRONMENT MONITORING PLAN

In order to learn the effect of various mitigation measures at the construction and operating periods, for the purpose of making an early response to the predicted environment issues and verifying the correctness of the predicted environmental impact, it is necessary to carry out environment monitoring. Environment monitoring plan shall be worked out on the basis of different phases, including requirements for sampling and sample analysis, data processing, environmental assessment and preparation of the EA report.

Environment monitoring plan aims at evaluating effectiveness of various mitigation measures; making an early response to the unpredicted environment issues resulted from the construction and operating periods; drawing up policy; improving or supplementing the environmental protection measures on the basis of the monitored data.

5.1. Objective

- Records the impacts of the construction phase and the operating period on Fuzhou’s environmental quality.
- Evaluates mitigation effect of environmental mitigation measures taken at the construction phase and the operating period.
- In cooperation with the EIA group and on the basis of the monitored results, it is to improve and implement the environmental mitigation measures as set in the EI report for the construction and operating periods, and raise a settlement plan for environment issues that are
not estimated.

It is to provide monitoring data support for quick settlement of the public complaints and implementation of the alternated measures for improvement.

5.2. Distribution of monitoring points

1) Construction phase
Main monitoring factor of the project construction phase is noise impact on Gaozhaicun Village and Geyucun Village, therefore, two monitoring points are arranged for the construction phase noise monitoring, which are located at Gaozhaicun Village and Geyucun Village respectively, facing 1m outside the first row of the residential building of the proposed project. One-day monitoring is performed quarterly, which is done at two time sections - daytime and nighttime.

2) Operating period
Environmental monitoring factors of the operating period are noise, water quality and vehicle emission. Noise monitoring points are set up at 1m out of the lot boundary (totaling 4 monitoring points), one monitoring point at 1m position each outside the first row of the residential buildings of Gaozhaicun Village and Geyucun Village near the side of the maintenance bay, amounting to 6 monitoring points. Water quality monitoring aims at learning the treatment effect of the sewage treatment facilities, therefore, water quality monitoring points are respectively set up at the inlets, outlets and major outlet of the sewage treatment facilities, amounting to 5 monitoring points, frequency is one time quarterly. Jinshan Central Bus Parking Lot is provided with vehicle emission monitoring department, which is parking lot related monitoring unit. All vehicles to have secondary maintenance should have emission monitoring. Monitoring parameters include smoke color (for diesel vehicle), HC, NOx and CO. The monitoring frequency depends on the maintenance cycle of the vehicles.

5.3. Monitoring Item, Sampling Frequency and Time

Refer to Table 5.3-1 and Table 5.3-2 for monitoring item, sampling frequency and time at the construction and operating periods respectively.

Table 5.3-1 Environment monitoring item, sampling frequency and time at construction phase

<table>
<thead>
<tr>
<th>Monitoring item</th>
<th>Monitoring parameter</th>
<th>Sampling frequency</th>
<th>Sampling time</th>
<th>Number of monitoring points</th>
<th>Start time</th>
<th>Monitoring method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise</td>
<td>Leq</td>
<td>2 times daily</td>
<td>2 days per month</td>
<td>4</td>
<td>Construction phase</td>
<td>According to the State environment monitoring method</td>
</tr>
<tr>
<td>Vibration</td>
<td>VL, 10</td>
<td>2 times daily</td>
<td>2 days per month</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient air quality</td>
<td>PM10, CO, NO2</td>
<td>24h per time, 4 times daily</td>
<td>3 days per month</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sewage</td>
<td>CODCr, SS</td>
<td>1 time daily</td>
<td>2 days per month</td>
<td>5</td>
<td>Construction phase</td>
<td></td>
</tr>
</tbody>
</table>

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| Petroleum | | | |
| Animal & Plant Oils | | | |
| BOD5 | | | |

Note: monitoring for 12 months at construction phase.
Table 5.3-2  Environment monitoring item, sampling frequency and time at operating period

<table>
<thead>
<tr>
<th>Monitoring item</th>
<th>Monitoring parameter</th>
<th>Sampling time</th>
<th>Sampling frequency</th>
<th>Number of monitoring points</th>
<th>Start time</th>
<th>Monitoring method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise</td>
<td>Leq</td>
<td>1 day per quarter</td>
<td>2 times daily (each for daytime and nighttime)</td>
<td>10</td>
<td>Construction phase</td>
<td></td>
</tr>
<tr>
<td>Ambient air quality</td>
<td>PM10, CO, NO2</td>
<td>4 days per quarter</td>
<td>24h, 4 times daily</td>
<td>2</td>
<td>Construction phase</td>
<td></td>
</tr>
<tr>
<td>Sewage</td>
<td>CODCr, SS, Petroleum, Animal&amp;plant oils, BOD5</td>
<td>1 day per quarter</td>
<td>1 time daily</td>
<td>3</td>
<td>Construction phase</td>
<td></td>
</tr>
<tr>
<td>Underground water</td>
<td>Petroleum</td>
<td>1 day per quarter</td>
<td>1 time daily</td>
<td>1</td>
<td>Construction phase</td>
<td></td>
</tr>
</tbody>
</table>

Note: monitoring for years at construction phase.

5.4. Monitoring organization

Environment monitoring unit is Fuzhou Environment Monitoring Station. Fuzhou Environmental Protection Bureau will be responsible for supervision and guidance.

5.5. Monitoring Report

In accordance with environment monitoring plan, Fuzhou Environment Monitoring Station will periodically prepare the monitoring report and submit it to the relevant functional departments for review on the monitored results.

5.5.1. Category and contents of the monitoring report

Monitoring report is divided into three categories: construction phase monitoring report, operating period monitoring report and accident monitoring report.

(1) Main contents of the quarterly report and integrated annual report

- Monitoring points, sampling time, description of monitoring factors. According to corresponding standards, analyzes and evaluates the monitored results corresponding to each construction phase and operating period.
- On the basis of the monitored results, evaluates the implementation effect of the environmental mitigation measures.
- Discusses and consults with the environment supervision organization and EIA group, modifies or replaces the ineffective mitigation measures.

(2) Main contents of the accident monitoring report

- Description on accident time, location, cause and process and handled result.
5.5.2. Submitted time and acceptance unit of the monitoring report

Submission of the monitoring report:
- Phase monitoring report shall be submitted according to construction schedule at the construction phase (earlier period, middle period and later period). An integral report shall be submitted at the completion of the construction;
- A quarterly report shall be submitted in each quarter at the operating period and annual report shall be submitted yearly;
- An accident report shall be submitted within one month after an environmental accident happened.

The acceptance unit of the monitoring report:
- The acceptance unit of the monitoring report is Fuzhou Environmental Protection Bureau, Fuzhou Public Transport Group Company and the World Bank.

5.5.3. Requirements for feedback opinion on monitoring report

- Feedback opinion on monitoring report shall be given within one month after the relevant acceptance units have received the monitoring report.
- During the opinion feedback period, the acceptance unit shall analyze and evaluate the contents of the monitoring report; verify whether the environmental mitigation measures are rational and effective; work out arrangement for the next work and raise corresponding requirements.

During the opinion feedback period, acceptance units shall raise suggestions for improvement and adjustment plan for environmental mitigation measures (if needed).

6. TRAINING

In order to improve management and technical level of the environmental protection professionals, trainings shall be performed on related personnel listed in Table 6-1.

Table 6-1 Training schedule

<table>
<thead>
<tr>
<th>Trainee</th>
<th>Training contents</th>
<th>Number of trainees</th>
<th>Training time</th>
<th>Responsible unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction environmental protection</td>
<td>Environmental protection laws and regulations related to relevant engineering construction phases; environment monitoring specifications; Fuzhou's environmental protection management</td>
<td>5 persons from each unit</td>
<td>10 days</td>
<td>Fuzhou Environmental Protection Bureau</td>
</tr>
</tbody>
</table>

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In addition, as contractors management is one of the most important critical measures to for environmental management and impact mitigation during the construction phase, a training program will be developed and implemented for all contractors and construction supervision companies who have won the bids and are to work on the project. The training will take place prior to the commencement of contractor mobilization and site construction. Each of the contractors and supervision companies will have at least two persons attending this training, a managerial staff and an environmental staff, for this mandatory training program. The training will be provided by environmental professionals including the EA team and environmental monitoring team, environmental officials from local EPB and PMO and project owner. The main topic of this training will include, but not limited to:

- The main results of EA and contents of this EMP
- Technical background and procedures for all proposed mitigation measures for the construction phase
- Environmental monitoring requirements and reporting procedures for the construction phases
- Basic knowledge on cultural relics protection and chance-find procedures
- Methodology on continued public consultation and handling of public concerns and complaints.
- Basic knowledge on relevant environmental laws, regulations, standards and guidelines

The contractors training program will last about 3 days with an estimated cost of RMB30,000.

7. IMPLEMENTATION OF EMP

7.1. Organization Implementation Schedule and Responsible Organization

7.1.1. Implementation schedule

Fuzhou Jinshan Parking Lot project is planned to build in September, 2005, the construction will last for 12 years. Refer to Table 7.1-1 for implementation schedule of EMP.

Table 7.1-1 implementation schedule of EMP
Environmental Management Plan of Fuzhou Jinshan Central Bus Depot Project

<table>
<thead>
<tr>
<th>Item</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trainee</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Monitoring at the construction phase</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implementation of environmental protection measures</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental monitoring at the operating period</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7.1.2. Implementation responsibilities of the main environmental mitigation measures

(1) Implementation responsibilities of the relevant units
In accordance with the requirements of EMP, this project design company will be responsible for all designs of the environmental mitigation measures covered in EMP. By means of the invitation for bid and contract, Fuzhou Communications Commission exercises the management and is responsible for implementation of the environmental mitigation measures, e.g. through the invitation for bid, the construction unit will sign a contract with the bid winner who shall be in charge of the implementation of the environmental mitigation measures on acoustic screens, sound insulation windows and afforestation (cooperates with the horticultural department). Fuzhou Environment Monitoring Station will be responsible for the environmental monitoring at the project construction phase and operating period, and periodically submits the monitoring report to the construction unit.

(2) Preparation of the bidding documents
The construction unit shall figure all environmental mitigation measures that are covered in EMP in the bidding documents.

7.2. Estimated Costs for Implementation of EMP

7.2.1. Fee estimation for mitigation measures
In accordance with the mitigation measures as stated in the EA report and preliminary design of the environmental protection engineering, cost estimations for mitigation measures on sewage and waste gas are listed in Table 7.2-1 and Table 7.2-2. All those costs may be subject to change at

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Enironment management plan of Fuzhou Jinshan Central Bus Depot Project

Table 7.2-1 Investment estimation for sewage treatment engineering  Unit: RMB ¥ 10,000.00

<table>
<thead>
<tr>
<th>No.</th>
<th>Equipment name</th>
<th>Model or specification</th>
<th>Qty</th>
<th>Price (¥ 10,000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Oil separation tank for car washing sewage</td>
<td>6.0×2.0×4.7m</td>
<td>1</td>
<td>4.6500</td>
</tr>
<tr>
<td>2</td>
<td>Recycling water tank for car washing</td>
<td>Ø12.0m×1.5m</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Oil separation tank at the filling stations</td>
<td>3.0×1.0×4.2m</td>
<td>1</td>
<td>1.1500</td>
</tr>
<tr>
<td>4</td>
<td>Oil separation tank for maintenance workshop</td>
<td>6.5×2.5×4.2m</td>
<td>1</td>
<td>5.6300</td>
</tr>
<tr>
<td>5</td>
<td>Oil separation tank for dinning room sewage</td>
<td>5.0×2.0×4.2m</td>
<td>1</td>
<td>3.4600</td>
</tr>
<tr>
<td>6</td>
<td>Sewage air-float machine for car washing</td>
<td>F-15</td>
<td>1</td>
<td>9.5000</td>
</tr>
<tr>
<td>7</td>
<td>Air-float machine at maintenance workshop</td>
<td>F-50</td>
<td>1</td>
<td>21.5000</td>
</tr>
<tr>
<td>15</td>
<td>Pipelines, fittings and other parts</td>
<td></td>
<td>1</td>
<td>8.2500</td>
</tr>
<tr>
<td>16</td>
<td>Low-voltage power distribution cabinet</td>
<td>XL-ZL</td>
<td>4 sets</td>
<td>1.6000</td>
</tr>
<tr>
<td>19</td>
<td>Subtotal: total project investment (pre-treatment)</td>
<td></td>
<td></td>
<td>55.700</td>
</tr>
</tbody>
</table>

Table 7.2-2 Investment estimation for dinning room waste gas treatment engineering  Unit: RMB ¥ 10,000.00

<table>
<thead>
<tr>
<th>No.</th>
<th>Equipment name</th>
<th>Model or specification</th>
<th>Qty</th>
<th>Note</th>
<th>Price (¥ 10,000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Smoke water membrane filter</td>
<td>EYC7.5#</td>
<td>1</td>
<td></td>
<td>0.6400</td>
</tr>
<tr>
<td>2</td>
<td>Smoke discharge fan</td>
<td>T4-72 N=10</td>
<td>1</td>
<td></td>
<td>1.7500</td>
</tr>
<tr>
<td>3</td>
<td>Spray pressurized water pump</td>
<td>XF-101</td>
<td>1</td>
<td></td>
<td>0.1300</td>
</tr>
<tr>
<td>4</td>
<td>Sound insulation cover of the discharge fan</td>
<td>ZG-10</td>
<td>1</td>
<td></td>
<td>2.3700</td>
</tr>
<tr>
<td>5</td>
<td>Miscellaneous</td>
<td></td>
<td>1</td>
<td></td>
<td>0.6300</td>
</tr>
<tr>
<td>6</td>
<td>Low-voltage power distribution cabinet</td>
<td>XL-ZL</td>
<td>1</td>
<td></td>
<td>0.2200</td>
</tr>
<tr>
<td>7</td>
<td>Subtotal: direct engineering cost</td>
<td></td>
<td></td>
<td></td>
<td>5.7400</td>
</tr>
<tr>
<td>8</td>
<td>Indirect engineering cost</td>
<td></td>
<td></td>
<td></td>
<td>4.37000</td>
</tr>
<tr>
<td>9</td>
<td>Total: total project investment</td>
<td></td>
<td></td>
<td></td>
<td>10.1100</td>
</tr>
</tbody>
</table>

7.2.2. Cost for prevention and control of water pollution and noise at the construction phase

Contractor will be in charge of the cost for prevention and control of water pollution and noise at the construction phase since those prevention and control measures must be taken during the construction, so no cost shall be recast.

7.2.3. Cost estimation for training and study

In order to strengthen this project's environment management, ensure the implementation of the Guangzhou Research Institute of Environmental Protection  March, 2005
environmental mitigation measures, improve the integral ability and professional level of this project’s environment managerial personnel, it is essential to perform domestic and foreign trainings on the environment managerial personnel. The World Bank has five similar projects under construction in China. Since the geographic locations of Shanghai and Guangzhou are similar to that of Fuzhou, so they are proposed locations for domestic trainings. With the consideration to transport pollution control study and vehicle emission control study that are not deeply performed at home, it is necessary to organize personnel from relevant organs such as the construction unit, Fuzhou Environmental Protection Bureau and Fuzhou Environment Monitoring Station to be trained in the countries that have relatively complete and deep studies on those issues. U.S.A and Canada are proposed countries for such trainings.

Those trainings aim at making this project’s environment managerial personnel have more visual experiences on city transport project environment management. Training includes invitation of distinguished specialists to give lectures, visit of the environmental management organizations, research institutes and universities, site-visit of the environmental protection facilities and projects, academic exchange and discussion with the consultant agencies.

Implementation of the training schedule shall enable the environment managerial personnel to improve their management and application ability, study and understand the environment monitoring methods, vehicle emission control and monitoring techniques, procedures of the GPS environmental decision-making of the city transport project.

Refer to Table 7.2-3 for detailed training arrangement.
Table 7.2-3 Estimated training cost of domestic and foreign environmental protection technologies

<table>
<thead>
<tr>
<th>Training content</th>
<th>Number of trainees</th>
<th>Training countries</th>
<th>Training year</th>
<th>Training time</th>
</tr>
</thead>
<tbody>
<tr>
<td>City transport environmental management method</td>
<td></td>
<td>America</td>
<td>2005</td>
<td>4 weeks</td>
</tr>
<tr>
<td>Prevention and control techniques of transport pollution</td>
<td>3</td>
<td>Canada</td>
<td>2005</td>
<td>4 weeks</td>
</tr>
<tr>
<td>Environmental decision-making, analysis and assessment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitoring and assessment of city transport pollution</td>
<td>10</td>
<td>Beijing, Shanghai,</td>
<td>2005</td>
<td>10 days</td>
</tr>
<tr>
<td>Pollution control at the construction phase</td>
<td></td>
<td>Guangzhou</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training cost (RMB ¥ 10,000.00)</td>
<td></td>
<td></td>
<td></td>
<td>35.00</td>
</tr>
</tbody>
</table>

7.2.4. Training of environmental managerial personnel of the construction unit and the bus station

In order to make the environmental managerial personnel of the construction unit and the bus station heighten their consciousness and knowledge on environmental protection, and effectively mitigate or prevent environmental impact at the construction and operating periods, it is necessary to carry out trainings on them. Trainings shall be organized by Fuzhou Environmental Protection Bureau and the construction unit. Trainings shall be completed before project construction. Environmental specialists will be invited to lecture at the training class. Since environmental management contents of the construction unit and the bus station differ from each other, and required knowledge is also different, training contents are divided into two parts: one is for the construction unit and the other is for the bus station.

(1) Training plan for the environmental managerial personnel of the construction unit:
Number of trainees: 5 from the construction unit.
Training time: The construction unit is required to send environmental managerial personnel to take part in the training class after two weeks when it won the bid. Each training class will last for 10 days.

Training content:
- Relevant laws, decrees and regulations on environmental protection related with the project construction;
- Basic knowledge on environmental protection at the construction phase;
- Main contents of EI report of Fuzhou Jinshan Central Bus Parking Lot Project;
- Prevention and control measures on atmospheric pollutant and noise harm;
- Monitoring technologies and monitoring report format of the atmospheric pollutant and noise;
- Environmental mitigation measures and environmental management knowledge at the
Examination and certificate: trainees shall receive examination at the end of training, qualified trainees will be granted the training qualification certificates. Only those who have been granted with the training qualification certificates can take the posts, the company that they serve will be allowed to carry out construction. All those requirements shall be written in the bidding documents.

(2) Training plan for the environmental managerial personnel of the Jinshan Central Bus Parking Lot:

Number of trainees: 5 from the bus station.

Training time: It is required to send environmental managerial personnel to take part in the training class two months before the trail operation. Each training class will last for 10 days.

Training content:
- Relevant laws, decrees and regulations on environmental protection related with the pollutant source;
- Basic knowledge on environmental protection of the bus transport system;
- Main contents of EI report of Fuzhou Jinshan Central Bus Parking Lot Project;
- Prevention and control measures on atmospheric pollutant and noise harm;
- Control technology on vehicle emission;
- Knowledge on operation and management of the sewage treatment facilities;
- Procedures for reporting and handling the public opinions.

Examination and certificate: trainees shall receive examination at the end of training, qualified trainees will be granted the training qualification certificates. Only those who have been granted with the training qualification certificates can take the posts, the start and terminal bus stations that they serve will be allowed to operate.

The estimated training cost for the environmental managerial personnel of the construction unit and the bus station is: RMB¥500,000.00.

7.2.5. Environment monitoring cost

1) Analysis fee
Analysis fee is calculated on the basis of Suihuanjianzi document. Refer to Table 7.2-4 for cost.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Parameter</th>
<th>Number of</th>
<th>Frequency</th>
<th>Analysis</th>
<th>Analysis fee</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Guangzhou Research Institute of Environmental Protection*

March, 2005
### Environmental Management Plan of Fuzhou Jinshan Central Bus Depot Project

#### Construction phase (yearly)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Number of monitoring points (or times)</th>
<th>Sampling times per day</th>
<th>Frequency</th>
<th>Analysis fee unit price</th>
<th>Analysis fee subtotal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise</td>
<td>4</td>
<td>T/d: 2, D/m: 2, M/y: 12</td>
<td>T/d: 13</td>
<td>2496</td>
<td></td>
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<tr>
<td>Vibration</td>
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<td>T/d: 2, D/m: 2, M/y: 12</td>
<td>T/d: 26</td>
<td>4992</td>
<td></td>
</tr>
<tr>
<td>TSP</td>
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<td>T/d: 840</td>
<td>80640</td>
<td></td>
</tr>
<tr>
<td>PM10</td>
<td>4</td>
<td>T/d: 1, D/m: 2, M/y: 12</td>
<td>T/d: 840</td>
<td>80640</td>
<td></td>
</tr>
<tr>
<td>CO</td>
<td>4</td>
<td>T/d: 4, D/m: 2, M/y: 12</td>
<td>T/d: 37</td>
<td>14208</td>
<td></td>
</tr>
<tr>
<td>Nox</td>
<td>4</td>
<td>T/d: 4, D/m: 2, M/y: 12</td>
<td>T/d: 40</td>
<td>15360</td>
<td></td>
</tr>
<tr>
<td>CODcr</td>
<td>5</td>
<td>T/d: 1, D/m: 2, M/y: 12</td>
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<td>6960</td>
<td></td>
</tr>
<tr>
<td>SS</td>
<td>5</td>
<td>T/d: 1, D/m: 2, M/y: 12</td>
<td>T/d: 55</td>
<td>6600</td>
<td></td>
</tr>
<tr>
<td>Petroleum</td>
<td>5</td>
<td>T/d: 1, D/m: 2, M/y: 12</td>
<td>T/d: 57</td>
<td>6840</td>
<td></td>
</tr>
<tr>
<td>BOD5</td>
<td>5</td>
<td>T/d: 1, D/m: 2, M/y: 12</td>
<td>T/d: 105</td>
<td>1260</td>
<td></td>
</tr>
<tr>
<td>Plant oils</td>
<td>5</td>
<td>T/d: 1, D/m: 2, M/y: 12</td>
<td>T/d: 57</td>
<td>6840</td>
<td></td>
</tr>
</tbody>
</table>

**Subtotal:** 226836

#### Phase

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Number of monitoring points (or times)</th>
<th>Sampling times per day</th>
<th>Frequency</th>
<th>Analysis fee unit price</th>
<th>Analysis fee subtotal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operating period (yearly)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise</td>
<td>10</td>
<td>T/d: 2, D/m: 2, M/y: 12</td>
<td>T/d: 13</td>
<td>1040</td>
<td></td>
</tr>
<tr>
<td>TSP</td>
<td>2</td>
<td>T/d: 2, D/m: 2, M/y: 12</td>
<td>T/d: 840</td>
<td>6720</td>
<td></td>
</tr>
<tr>
<td>PM10</td>
<td>2</td>
<td>T/d: 2, D/m: 2, M/y: 12</td>
<td>T/d: 840</td>
<td>6720</td>
<td></td>
</tr>
<tr>
<td>CO</td>
<td>2</td>
<td>T/d: 4, D/m: 2, M/y: 12</td>
<td>T/d: 37</td>
<td>1184</td>
<td></td>
</tr>
<tr>
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<td>2</td>
<td>T/d: 4, D/m: 2, M/y: 12</td>
<td>T/d: 40</td>
<td>1280</td>
<td></td>
</tr>
<tr>
<td>CODcr</td>
<td>3</td>
<td>T/d: 1, D/m: 2, M/y: 12</td>
<td>T/d: 58</td>
<td>6960</td>
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</tr>
<tr>
<td>SS</td>
<td>3</td>
<td>T/d: 1, D/m: 2, M/y: 12</td>
<td>T/d: 55</td>
<td>6600</td>
<td></td>
</tr>
<tr>
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<td>T/d: 57</td>
<td>684</td>
<td></td>
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<td>T/d: 105</td>
<td>1260</td>
<td></td>
</tr>
<tr>
<td>Plant oils</td>
<td>3</td>
<td>T/d: 1, D/m: 2, M/y: 12</td>
<td>T/d: 57</td>
<td>684</td>
<td></td>
</tr>
</tbody>
</table>

**Subtotal:** 20928

---

Note: Analysis data unit price includes collecting fee, pre-processing fee and analysis test fee.

2) Service charge

a. Water quality monitoring service charge

Each sampling point is provided with 2 samplers and 1 driver, refer to Table 7.2-5 for service charge.

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### Guangzhou Research Institute of Environmental Protection

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---

<table>
<thead>
<tr>
<th>Phase</th>
<th>Contents</th>
<th>P/p</th>
<th>Points</th>
<th>D/t</th>
<th>T/m</th>
<th>M/y</th>
<th>Yuan/person /day</th>
<th>Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>Water quality</td>
<td>2</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>12</td>
<td>160</td>
<td>7680</td>
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<td>1</td>
<td>1</td>
<td>2</td>
<td>12</td>
<td>160</td>
<td>3840</td>
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</tr>
</tbody>
</table>
Environmental Management Plan of Fuzhou Jinshan Central Bus Depot Project

<table>
<thead>
<tr>
<th>Subtotal</th>
<th>11520</th>
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<tbody>
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<td>the driver</td>
<td>1</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
</tr>
</tbody>
</table>

b. Noise monitoring service charge
Each monitoring point is provided with 2 samplers. There are two shifts – daytime and nighttime, each shift is provided with 1 driver. Refer to Table 7.2-6 noise monitoring service charge.

<p>| Table 7.2-6 noise monitoring service charge (yearly) Unit: Yuan |
| --- | --- | --- | --- | --- | --- | --- |</p>
<table>
<thead>
<tr>
<th>Phase</th>
<th>Content</th>
<th>P/P</th>
<th>Point</th>
<th>T/d</th>
<th>D/m</th>
<th>M/y</th>
<th>Yuan/P.D</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
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<td>2</td>
<td>2</td>
<td>12</td>
<td>160</td>
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<td>1</td>
<td>4</td>
<td>160</td>
<td>6400</td>
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<td>1280</td>
<td></td>
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<td></td>
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<tr>
<td>Subtotal</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

c. Vibration monitoring service charge
Each monitoring point is provided with 2 samplers. There are two shifts – daytime and nighttime, each shift is provided with 1 driver. Refer to Table 7.2-7 for Vibration monitoring service charge.

<p>| Table 7.2-7 Vibration monitoring service charge (yearly) Unit: Yuan |
| --- | --- | --- | --- | --- | --- | --- |</p>
<table>
<thead>
<tr>
<th>Phase</th>
<th>Content</th>
<th>P/P</th>
<th>Point</th>
<th>D/m</th>
<th>M/y</th>
<th>Yuan/P.D</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Vibration</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>12</td>
<td>160</td>
<td>7680</td>
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<tr>
<td>Driver</td>
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<td>12</td>
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<td>7680</td>
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<tr>
<td>Total</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

d. Ambient air quality monitoring service charge
Each sampling point is provided with 2 samplers and 1 driver, refer to Table 7.2-8 for service charge.

<p>| Table 7.2-8 Water quality monitoring service charge (yearly) Unit: Yuan |
| --- | --- | --- | --- | --- | --- | --- |</p>
<table>
<thead>
<tr>
<th>Phase</th>
<th>Contents</th>
<th>P/P</th>
<th>Point</th>
<th>T'd</th>
<th>D/m</th>
<th>M/y</th>
<th>Yuan/P.D</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
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<td>2</td>
<td>1</td>
<td>3</td>
<td>12</td>
<td>160</td>
<td>11520</td>
</tr>
<tr>
<td>the driver</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>12</td>
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<tr>
<td>Operating period</td>
<td>Air quality</td>
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<td>2</td>
<td>1</td>
<td>4</td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
e. Total monitoring service charge
Refer to Table 7.2-9 for total monitoring service charge at the construction and operating periods.

Table 7.2-9 Total monitoring service charge (yearly) Unit: Yuan

<table>
<thead>
<tr>
<th>Item</th>
<th>Phase</th>
<th>Construction phase</th>
<th>Operating period</th>
</tr>
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<tbody>
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<td>Noise</td>
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<td>30720</td>
<td>7680</td>
</tr>
<tr>
<td>Water quality</td>
<td></td>
<td>11520</td>
<td>1920</td>
</tr>
<tr>
<td>Vibration</td>
<td></td>
<td>15360</td>
<td>--</td>
</tr>
<tr>
<td>Air quality</td>
<td></td>
<td>17280</td>
<td>7680</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>74880</td>
<td>28160</td>
</tr>
</tbody>
</table>

d. Transportation costs
Refer to Table 7.2-10 for traffic fees of the environment monitoring at the construction and operating periods.

Table 7.2-10 Transportation costs at the monitoring period (yearly) Unit: Yuan

<table>
<thead>
<tr>
<th>Phase</th>
<th>Item</th>
<th>Number of vehicles</th>
<th>Yuan/vehicle. day</th>
<th>T/d</th>
<th>D/m</th>
<th>M/y</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction phase</td>
<td>Noise</td>
<td>1</td>
<td>350</td>
<td>1</td>
<td>2</td>
<td>12</td>
<td>8400</td>
</tr>
<tr>
<td></td>
<td>Vibration</td>
<td>1</td>
<td>350</td>
<td>1</td>
<td>2</td>
<td>12</td>
<td>8400</td>
</tr>
<tr>
<td></td>
<td>Water quality</td>
<td>1</td>
<td>350</td>
<td>1</td>
<td>2</td>
<td>12</td>
<td>8400</td>
</tr>
<tr>
<td></td>
<td>Air quality</td>
<td>1</td>
<td>350</td>
<td>1</td>
<td>3</td>
<td>12</td>
<td>12600</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>37800</td>
</tr>
<tr>
<td>Operating period</td>
<td>Noise</td>
<td>1</td>
<td>350</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>1400</td>
</tr>
<tr>
<td></td>
<td>Water quality</td>
<td>1</td>
<td>350</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>1400</td>
</tr>
<tr>
<td></td>
<td>Air quality</td>
<td>1</td>
<td>350</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>5600</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7000</td>
</tr>
</tbody>
</table>

Summary of estimated environmental management costs

Refer to Table 7.2-11 for total cost of the environmental protection mitigation measures and personnel training of the parking lot project; refer to Table 7.2-12 for total cost of the environment monitoring at the construction phase (one year), and refer to Table 7.2-11 for total cost of the environment monitoring at the operating period (for two years).
### Table 7.2-11 Total cost of environmental management costs  Unit: RMB ¥10,000.00

<table>
<thead>
<tr>
<th>Contents</th>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental protection</td>
<td>Sewage treatment engineering</td>
<td>57.5</td>
</tr>
<tr>
<td>mitigation measures</td>
<td>Waste gas treatment of dinning room</td>
<td>10.110</td>
</tr>
<tr>
<td>Training</td>
<td>Domestic and foreign</td>
<td>65.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>132.61</td>
</tr>
</tbody>
</table>

### Table 7.2-12 Total cost of the environment monitoring at the construction phase (yearly)  Unit: RMB ¥10,000.00

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample analysis</td>
<td>226836</td>
</tr>
<tr>
<td>Monitoring service charge</td>
<td>74880</td>
</tr>
<tr>
<td>Traffic fee</td>
<td>37800</td>
</tr>
<tr>
<td>Equipment maintenance fee</td>
<td>3800</td>
</tr>
<tr>
<td>Data processing fee</td>
<td>62000</td>
</tr>
<tr>
<td>Report writing, printing, duplication and transplanting fees</td>
<td>34000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>439,316</td>
</tr>
</tbody>
</table>

### Table 7.2-13 Total cost of the environment monitoring at the operating period  Unit: RMB ¥10,000.00

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample analysis</td>
<td>20928</td>
</tr>
<tr>
<td>Monitoring service charge</td>
<td>17280</td>
</tr>
<tr>
<td>Traffic fee</td>
<td>7000</td>
</tr>
<tr>
<td>Equipment maintenance fee</td>
<td>18000</td>
</tr>
<tr>
<td>Data processing fee</td>
<td>51000</td>
</tr>
<tr>
<td>Report writing, printing, duplication and transplanting fees</td>
<td>49500</td>
</tr>
<tr>
<td>Average annual cost</td>
<td>143708</td>
</tr>
<tr>
<td><strong>Total (for 2 years)</strong></td>
<td>287,416</td>
</tr>
</tbody>
</table>
Figure 2.1 Project Location