Fuzhou World Bank Financed Project

Nanjiang Binlu, Phase-II of Third Ring Road, Kuiqi Bridge and Jinshan Depot

ENVIRONMENTAL IMPACT REPORT

EXECUTIVE SUMMARY

Constructor: Fuzhou Urban Utility Development and Construction Company

Author: Guangzhou Research Institute of Environmental Protection

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Constructor: Fuzhou Urban Utility Development and Construction Company  
Compiler: Guangzhou Research Institute of Environmental Protection  
Legal person: Luo Jiahai  
Institute's technical chief: Cui Xia  
Environment assessment project chief: Xu Guanpu

Outline compilers:

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Env. ass. post certificate No.</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Xu Guanfu</td>
<td>Senior engineer</td>
<td>No.A28020052</td>
<td>General provisions, project analysis, ecologic environmental impact assessment</td>
</tr>
<tr>
<td>Wang Weide</td>
<td>Senior engineer</td>
<td>No.A28020024</td>
<td>Current noise environment and impact, noise treatment measures</td>
</tr>
<tr>
<td>Lu Yan</td>
<td>Assistant engineer</td>
<td>No.A28020058</td>
<td>Alternative plan, profit and loss analysis of environmental economy, relocation and resettlement</td>
</tr>
<tr>
<td>Peng Lin</td>
<td>Engineer</td>
<td>No.A28020044</td>
<td>Current water environment and impact, risk evaluation, treatment measures of water pollution</td>
</tr>
<tr>
<td>Wang Junbo</td>
<td>Engineer</td>
<td>No.A28020039</td>
<td>Current environmental air and impact, treatment measures of atmosphere, cultural property assessment</td>
</tr>
</tbody>
</table>

Reviewer:

<table>
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<tr>
<th>Name</th>
<th>Title</th>
<th>Env. ass. post certificate No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cui Xia</td>
<td>Professor-level senior engineer</td>
<td>No.A28020003</td>
</tr>
<tr>
<td>He Liangwan</td>
<td>Senior engineer</td>
<td>No.A28020025</td>
</tr>
</tbody>
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## List of Abbreviations

<table>
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<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3RR/S</td>
<td>Third Ring Road/South</td>
</tr>
<tr>
<td>BOD</td>
<td>Biological Oxygen Demands</td>
</tr>
<tr>
<td>CO</td>
<td>Carbon Monoxide</td>
</tr>
<tr>
<td>COD</td>
<td>Chemical Oxygen Demands</td>
</tr>
<tr>
<td>dB(A)</td>
<td>Decibel (Acoustic)</td>
</tr>
<tr>
<td>DO</td>
<td>Dissolved Oxygen</td>
</tr>
<tr>
<td>EA</td>
<td>Environmental Assessment</td>
</tr>
<tr>
<td>EIA</td>
<td>Environmental Impact Assessment</td>
</tr>
<tr>
<td>EMP</td>
<td>Environmental Management Plan</td>
</tr>
<tr>
<td>FBSRI</td>
<td>Fuzhou Building Sciences Research Institute</td>
</tr>
<tr>
<td>GERI</td>
<td>Guangzhou Environmental Research Institute</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographic Information System</td>
</tr>
<tr>
<td>GPS</td>
<td>Global Positioning System</td>
</tr>
<tr>
<td>MIS</td>
<td>Computerized Management Information System</td>
</tr>
<tr>
<td>NH$_3$-N</td>
<td>Ammonia Nitrogen</td>
</tr>
<tr>
<td>NJBL</td>
<td>Nan Jiang Bin Lu, a project component road</td>
</tr>
<tr>
<td>NO$_2$</td>
<td>Nitrogen Dioxide</td>
</tr>
<tr>
<td>OP</td>
<td>(World Bank) Operational Policies</td>
</tr>
<tr>
<td>pH</td>
<td>Acidity unit</td>
</tr>
<tr>
<td>NMHC</td>
<td>None Methane Hydrocarbon</td>
</tr>
<tr>
<td>PM$_{10}$</td>
<td>Particulate Matter smaller than 10 microns</td>
</tr>
<tr>
<td>PMO</td>
<td>(Fuzhou) Project Management Office</td>
</tr>
<tr>
<td>PRC</td>
<td>The People's Republic of China</td>
</tr>
<tr>
<td>SEPA:</td>
<td>State Environmental Protection Administration</td>
</tr>
<tr>
<td>SS</td>
<td>Suspended Solids</td>
</tr>
<tr>
<td>TOR:</td>
<td>Terms of Reference</td>
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1. Introduction

This document is the Executive Summary of Environmental Assessment (EA) for the partially World Bank financed Fuzhou Nantai Island Peri-Urban Development Project (the Project) which consists of new roads to be constructed on green field, upgrading of existing urban roads, public transport (including bus depot construction) and technical assistance in the provincial capital of Fuzhou, Fujian province, P.R.China (PRC). The document provides a general summary of the findings from the Project Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for both the road/bridge and bus depot components, including legal and policy framework and applicable environmental standards, environmental baseline, major potential adverse impacts to the physical, ecological and socio-economic environments in the Project area, analysis of alternatives, mitigation measures, public consultation programs, and environmental management plan for the Project. This Executive Summary could serve as a concise Project environmental report to environmental administrators, decision-makers, project-affected groups, non-government organizations (NGOs), the general public and other stakeholders, as well as to the Executive Directors of the World Bank Board.

1.1 Project Background

Along with other major urban centers in China, Fuzhou has been experiencing a continued rapid economic development and urban expansion over the past 20 years. This has been accompanied, particularly over the last few years, an unprecedented growth of motorization. It is expected that in about 2005, the city’s motor vehicle fleet will reach a size of over 100,000 units in the urban area alone. At the same, as a regional translation hub the city has been also seeing a rapid growth of passing through motor vehicle traffic along the coast and entering into the interior, which has been utilizing the already highly congested urban roads. At the same time, the urban transportation system has lagged behind the overall economic development and motorization pace, impeding sustained development and improvement of standard of living for its residents. In particular, infrastructure such as road development in the Nantai Island, a peri-urban area south of Min Jiang River has been slow, seriously affecting the overall peri-urban development, as well as Fuzhou integrated urban transportation system and overall environmental quality of the city area. The proposed Project, to be partially financed by a World Bank loan, represents a major effort in alleviating transportation congestion in the urban center by providing access for through traffic at peri-urban area, improving the city transport system, and stimulating the overall economic and urban development in this peri-urban area of the city.

During the project preparation, Guangzhou Environmental Research Institute (GERI, or the EA team), was retained to prepare project EA. The EA team has been working concurrently with the independently engaged project feasibility study and engineering team, contributing to project design and alternatives selection from the environmental perspective during the project preparation. For the EA itself, a terms of reference (TOR) was prepared in September 2004 and on November 2004 the TOR was reviewed by an expert panel and revised TOR was approved by the State Environmental Protection Administration (SEPA) in January 2005. The first draft Environmental Impact Assessment (EIA) report was prepared in November 2004 which was pre-appraised by the World Bank. After revision accordingly to the Bank’s pre-appraisal comments, the revised draft of EIA, together with Environmental Management Plan (EMP) and EA Summary (this document) are complete in January 2005 and submitted to the SEPA for
its final review and approval, and to the Bank for its appraisal, which was conducted in
March 2005. All EA documents were revised again based on the comments from the
World Bank appraisal mission and final reports were submitted to the Bank for safeguard
clearance by the end of March 2005.

The Project is classified as a Category A project since it involves massive infrastructure
construction on green field in the rural as well as built-up field in peri-urban areas. The
construction and operations of the Project roads would result in increased noise, motor
vehicle air emission, discharges to the rivers, disturbance to the ecosystem, visual
impacts and resettlement of urban and rural residents.

1.2 Basis of the EA

Relevant regulatory, policy and administrative requirements for environmental
assessment of development projects in China, both at state and municipal levels, were
followed during the preparation and evaluation of environmental assessment, as were the
Bank’s ten safeguard policies. Major laws and regulations applied in the EA are as
follows:

- Laws of Environmental Protection of the PRC of December 26, 1989;
- Law of Air Pollution Control of the PRC of September 1, 2000;
- Law of Water Pollution Control of the PRC of May 15, 1996;
- Law of Environmental Noise Pollution Control of the PRC of March 1, 1997;
- Fujian Environmental Protection Regulations of 2002;
- Management Regulations on Environmental Protection for Construction Projects of
  November 18, 1998;
- Circulation on Strengthening EIA for Construction Projects Receiving International
  Financing of 1993;
- Technical Specifications for Environmental Impact Assessment; and
- Various applicable regulatory standards for air, water, noise, and electromagnetic
  fields.

Of the ten World Bank safeguard policies, Environmental Assessment (OP/BP/GP4.01),
Involuntary Resettlement (OD4.30), Cultural Property (OP4.11), and Natural Habitats
(OP/BP4.04) are applied in the EA first as a screening and, where triggered, included in
the full assessment. Since there are no project components that would involve forest, pest
control chemicals, indigenous people, international waterways, dams or construction in
disputed areas as defined under the World Bank’s OP7.60, safeguard policies related to
these subjects are not applied in the EA. Relevant international environmental agreements
in which China is a signing party have also been included where applicable as a basis for
the EA.

The EA also makes the reference to various project preparation documents, including
project proposal, feasibility study reports for various project components, as well as
expert opinions and review comments for the EA TOR. Fuzhou’s Master Development
Plan (1995-2010), Fuzhou City Environmental Master Plan of September 2001 and
Fuzhou Nantai Island Development Plan of September 2000 have also been the basis for
the EA.
2. **Project Description**

The Project is located mostly in the peri-urban area south of the Fuzhou city core. Project components will include large scale physical works as well as improvement and upgrading of relevant management systems. According to the common characteristics of various components, the project may be divided into three categories: road infrastructure development, public transport component, and technical assistance to implementation and institutional development. A summary description of the contents of Fuzhou Nantai Island Peri-Urban Development Project is shown in Table 2-1, their locations on Figure 1-1 and a more detailed description for each of the components are provided in the EIA report.

**Table 2-1 Fuzhou Nantai Island Peri-Urban Development Project**

<table>
<thead>
<tr>
<th>Components</th>
<th>Contents</th>
<th>Cost (US, million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road Infrastructure development</td>
<td>Nan Jiang Bin Lu (NJBL) road</td>
<td>5.23 km total length, 40 m wide, mostly upgrading and widening of existing road along Min river bank</td>
</tr>
<tr>
<td></td>
<td>3rd Ring Road/South (3RR/S)</td>
<td>12.47 km total length, 50-100 m wide, mostly new construction on green field</td>
</tr>
<tr>
<td></td>
<td>Kuiqi Bridge</td>
<td>1100 m long, 36 m wide</td>
</tr>
<tr>
<td>Public transport Component</td>
<td>Bus depot</td>
<td>186.3 mu total and 65.1 mu Phase I, 300 bus units total and 200 in Phase I, maintenance and repair facility, refueling facility</td>
</tr>
<tr>
<td></td>
<td>Dispatch Center</td>
<td>GPS-based vehicle location system, GIS-based database, Computerized management information system (MIS)</td>
</tr>
<tr>
<td></td>
<td>Bus Priority</td>
<td>bus priority lanes in major transport corridors</td>
</tr>
<tr>
<td>Technical Assistance to Implementation and institutional development</td>
<td>Support for Investment Framework - Master Plan, Support for Sustainable Management of Fuzhou's Urban Development - Strategic Planning, Support for implementation of investments - Construction Supervision, Ensuring economic sustainability of investments - Road Maintenance, Support for equity in service provision - PT operational, Support for financial sustainability of investments - Financial Planning.</td>
<td>3.1</td>
</tr>
</tbody>
</table>

**Total cost** 274.5

3. **Baseline Environment**

**Physical Setting**

Fuzhou City is situated along the China’s east coast while Nantai Island is in the south part of the city, with Min River split around the island and a total area of 142 km². The terrain of the island is partial plain with low hills of up to 202 m above the sea mostly on northwest and middle part of the island. Fuzhou belongs to humid sub-tropical monsoon region with abundant precipitation and mild climate. The average annual temperature is 19.6°C, and average annual precipitation from 1000-1500 mm, concentrated mostly in the
months of May through September. The predominant wind direction on a yearly basis is southeast in June through August and south in the summer and west in the winter. One of the major characteristics in terrain of the Fuzhou area is its abundant surface water resources. Most of the hilly areas is woodland or bushes while the plain, fruit garden and vegetable fields. As a peri-urban area, there are some urban built-up areas along the north bank of Min river along the existing NJBL road.

**Air Quality**

Air quality in the project area was monitored during the EA. The monitoring program included five monitoring points along both the NJBL and 3RR/S alignment with the considerations for sensitive receptors, dominant wind direction and relevance to the potentially impacted areas. These air quality data, collected in December 2003 in five consecutive days, represent the air quality baseline of the project area. In addition, one of Fuzhou’s routine air quality monitoring stations, the Yantaishan station, is also located close to NJBL area and its data is also used to demonstrate baseline air quality in the project area. These air quality data are presented in Table 3-1.

**Table 3-1 Ambient Air Quality Monitoring Results for the Project Area**

(3-hour average, mg/Nm$^3$)

<table>
<thead>
<tr>
<th>Project components</th>
<th>Locations</th>
<th>CO</th>
<th>NO$_2$</th>
<th>PM$_{10}$*</th>
</tr>
</thead>
<tbody>
<tr>
<td>NJBL</td>
<td>Fanchuanpu Cathedral</td>
<td>0.75-2.38</td>
<td>0.020-0.090</td>
<td>0.063-0.111</td>
</tr>
<tr>
<td></td>
<td>Jiangbian Primary School</td>
<td>1.13-2.75</td>
<td>0.022-0.211</td>
<td>0.066-0.225</td>
</tr>
<tr>
<td></td>
<td>Yantaishan Monitoring Station</td>
<td>-</td>
<td>0.030-0.060</td>
<td>0.076-0.131</td>
</tr>
<tr>
<td>3RR/S</td>
<td>Wushan Primary School</td>
<td>0.50-2.63</td>
<td>&lt;0.003-0.028</td>
<td>0.010-0.082</td>
</tr>
<tr>
<td></td>
<td>Fujian Information Technology College</td>
<td>0.75-2.13</td>
<td>0.008-0.067</td>
<td>0.072-0.203</td>
</tr>
<tr>
<td></td>
<td>Nandi Palace</td>
<td>0.63-2.63</td>
<td>0.010-0.058</td>
<td>0.039-0.087</td>
</tr>
<tr>
<td>Standards</td>
<td>Class I</td>
<td>10.0</td>
<td>0.12</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>Class II</td>
<td>10.0</td>
<td>0.24</td>
<td>0.15</td>
</tr>
</tbody>
</table>

* Daily average

The above results show that monitored CO concentration were all below to well below the highest standard, Class I standard although the applicable standard for the area is Class II. The monitoring results for NO$_2$ was mixed with some data complied with the Class I standard (0.12 mg/Nm$^3$) while others exceeded it, although all data met the Class II standard (0.24 mg/Nm$^3$). The area where the standard was exceeded was basically Jiangbian Primary School and the main source of exceeded NO$_2$ was from the traffic outside the school on the existing NJBL. Baseline PM$_{10}$ mostly exceeded Class I and some even exceeded Class II standards (0.05 and 0.15 mg/Nm$^3$, respectively), some very seriously. The main reason for the elevated PM$_{10}$ was mainly the traffic and other human activities including sport activities at the schools. The several months drought proceeding to the monitoring also contributed to the high PM$_{10}$ results.

**Noise Baseline and Sensitive Receptors**

Along the project roads and within the impacted areas, a total of 23 sites along the three road components and two near the bus depot (discussed in greater detail in Section 7 of this document) have been identified during EA field investigation as sensitive or otherwise vulnerable to negative changes in the surrounding environment, such as air pollution, increased noise, construction dust, in water construction, and other project construction and operation activities. These sensitive receptors include 17 urban, peri-
urban or rural residential housing developments or zones, two schools, three cultural properties and one water supply plant. These sensitive receptors are located about zero (passing through) to 47 m from the red line (proposed road boundary) to the nearest points in these sensitive receptors.

To understand the noise baseline, a monitoring program was conducted covering representative sensitive receptors. The results from the monitoring program for the most sensitive receptors (a total of 26 schools, hospitals and kindergarten) along project roads are presented in Table 3-2.

### Table 3-2 Existing Noise Level at Key Sensitive Receptors along Project Roads

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of sensitive receptor</th>
<th>Location</th>
<th>Distance to road red line (m)</th>
<th>Noise monitoring results (dB(A))</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yangqi primary school</td>
<td>3RR/S</td>
<td>3.5</td>
<td>51.7-52.3 42.3-42.5</td>
</tr>
<tr>
<td>2</td>
<td>Yangxia village</td>
<td></td>
<td>3</td>
<td>51.8-52.1 42.2-42.6</td>
</tr>
<tr>
<td>3</td>
<td>Wushan primary school</td>
<td></td>
<td>1</td>
<td>46.0-47.1 42.1-42.4</td>
</tr>
<tr>
<td>4</td>
<td>Pukuxiazhou village</td>
<td></td>
<td>15</td>
<td>51.2-52.6 42.8-43.2</td>
</tr>
<tr>
<td>5</td>
<td>Fujian Information College</td>
<td></td>
<td>23</td>
<td>54.3-56.8 42.7-43.0</td>
</tr>
<tr>
<td>6</td>
<td>Duyuan village</td>
<td></td>
<td>6</td>
<td>55.7-57.6 42.5-42.7</td>
</tr>
<tr>
<td>7</td>
<td>Linpu primary school</td>
<td></td>
<td>8</td>
<td>51.3-51.8 42.8-43.2</td>
</tr>
<tr>
<td>8</td>
<td>Puxia village</td>
<td></td>
<td>7.4</td>
<td>54.9-55.2 42.3-42.5</td>
</tr>
<tr>
<td>9</td>
<td>Fanchuanpu Cathedral</td>
<td>NJBL road</td>
<td>14.3</td>
<td>53.8-54.3 41.8-42.0</td>
</tr>
<tr>
<td>10</td>
<td>Anlan shrine</td>
<td></td>
<td>12</td>
<td>57.6-57.9 45.6-46.7</td>
</tr>
<tr>
<td>11</td>
<td>Yinghua English school</td>
<td></td>
<td>71</td>
<td>58.6-64.0 45.8-46.9</td>
</tr>
<tr>
<td>12</td>
<td>Residential area</td>
<td></td>
<td>3.8</td>
<td>67.2-67.8 47.7-48.8</td>
</tr>
</tbody>
</table>

The above noise monitoring results show that noise along the proposed 3RR/S alignment mostly met or near Class I noise standards (55 dB(A) for day time and 45 dB(A) for night). There is no major road or other major noise sources in these undeveloped and most rural areas which is the primary reason for the high acoustic environmental quality. Along the NJBL road areas, baseline noise in most areas are between Classes III and IV although some of the areas such as the cathedral, the acoustic baseline enjoys a high quality (meeting Class I). This is most of the monitored areas are near the existing NJBL where there was traffic contributing the relatively high noise levels in the areas. Where the NJBL has not extended such as the cathedral, there is virtually no major noise source and area has very low noise level, as confirmed by the monitoring results. In general, as a peri-urban district, the baseline noise in the project impacted area is relatively low compared with typical urban built area areas.

### Surface Water

Fuzhou, including the Nantai Island, has abundant water resources. Besides the landmark Min River whose north branch divides the city proper with the peri-urban area of Nantai, NJBL road crosses seven rivers and creeks while the proposed 3RR/S, four, all of which are tributaries of, and discharged eventually to, Min River.
Surface water quality from Min River (two cross sections) and all 11 affected tributaries were monitored during the EA for pH, COD, BOD, DO, SS, petroleum oil, NH3-N and lead. The results, as shown in Table 3-3, indicate that Min river quality met its quality standards, while all tributaries exceeded Category V standard for NH3-N. Most crossed by NJBL and some by 3RR/S also exceeded COD/BOD standards. The primary reason of the poor water quality in these tributaries is municipal discharges and agricultural runoff coupled with limited dilution and assimilative capacity.

### Table 3-3 Surface Water Quality Standard Compliance Status

<table>
<thead>
<tr>
<th>Water body</th>
<th>Applicable Standard (category)</th>
<th>Main functions</th>
<th>Parameters exceeding standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min river – Kuiqi</td>
<td>III</td>
<td>Navigation, fish habitats</td>
<td>Meet the standards</td>
</tr>
<tr>
<td>Min river – Oufengzhou</td>
<td>II</td>
<td>Drinking water sources, fish habitats</td>
<td>Meet the standards</td>
</tr>
<tr>
<td>NJBL crossed rivers</td>
<td>V</td>
<td>Drainage, receiving water, flood discharge</td>
<td>NH3-N, DO (half), COD/BOD (most)</td>
</tr>
<tr>
<td>3RR/S crossed rivers</td>
<td>V</td>
<td>Drainage, receiving water, flood discharge</td>
<td>NH3-N</td>
</tr>
</tbody>
</table>

**Ecosystem**

At the Min river estuary from the city area all the way to the East China Sea including Nantai Island, there are numerous wetland areas with diversified biomass. Among the nine wetland areas, Puxiazhou wetland is located most close to Nantai Island and thus the project area, in particular the NJBL and Kuiqi bridge. Based on observations and study reports by Fuzhou Planning Bureau and Fujian Normal University, the wetland areas have a total of 118 species of birds, including 72 species of winter migrating birds which arrive from the north in October and leave in April next year, 12 species of summer migrating birds which arrive in March from the south and leave in October, and 9 species of transit migrating birds which in September and again March each year stop over briefly at the wetland on their migrating journeys. In addition, there are 19 species of resident birds staying at the wetland year round. The largest population, up to 10,000 per flock, may be found in goose and willet. In addition, various species of aigrette can be several thousands per flock.

Among the birds, there are 12 which belong to state Class II protected species but none of these are observed in Puxiazhou wetland. Among the more commonly found species Puxiazhou, there are three provincial level protected species, including Podiceps ruficollis poggei, Ardea cinerea, and Egretta garzetta garzetta commonly observed in Puxiazhou wetland. In addition, Puxiazhou wetland often observes five species of migrating birds among the 81 protected species in a Sino-Australian migrating birds protection agreement of October 1986. These are Nycticorax, Anas creacca, Anas poecilorhyncha zonorhyncha, Tringa nebularia and Tringa nebularia.

The wetland areas have a total of 946 species of plants. The most common plant groups in Puxiazhou wetland include Cyperus malacceusis var brevifollius, Salix babylonica, and Dendrocalampsis oldhami forms. The wetland area is well covered by these various trees, bushes, grass and other forms of plants.
The Puxiazhou wetland area has diversified and large quantity of water life biomass, from algae, plankton, hydroidophyte, benthos to fish. These provide abundant foods to the migrating birds and are the primary reason for the wetland to continue attracting the birds to spend the winter/summer or stop over during the longer migrating journeys.

According to Fuzhou Ocean and Fisheries Bureau, Min river section close to Nantai Island is the migrating route for fresh water ells. Adult ells go back to ocean for spawning in November each year, while juvenile ells swim back to fresh water in March next year. In addition, Chinese crabs also swim to the sea October each year for spawning and swim back to fresh water May-June the next year. There are also 720 mu of water area in Min River south of the proposed Kuiqi bridge site for fish farming by the local villages.

Other components in the peri-urban ecosystem consist mainly of fruit gardens, vegetable land, fish ponds, woodland and agricultural lands. There are about 36 species of trees in Fuzhou, mostly belong to broad leaf trees and deciduous broad-leaf trees, located along existing NJBL sides, parks and open areas in the island.

**Cultural Property**

Nantai Island, surrounded by the river, has a long history of human activities and many cultural properties and scenic sites. Based on consultation with the city’s cultural bureau, there are over 120 historical sites on the island but a detailed site investigation by the EA team along the NJBL, the proposed 3RR/S and the bridge site, there will be three sites likely to be impacted: Fanchuanpu catholic cathedral which is a provincial level protected cultural relics, Anlan shrine, Lianjiang ancient collage and Song Dynasty station. Those identified as likely to be impacted are based on distance and locations. There are several two Buddhist temples in the project area which have no particular cultural, religious or historical values and thus not in any protection lists. In general, if a site is or to be on the first row to the road, then it is a likely site to be impacted by project construction and operation. Otherwise, they are considered not sensitive.

**Socio-economic Baseline**

According to the 2002 census, the total population in Fuzhou was approximately 5.98 million including 1.58 million urban population, or about 26% of the total. As the provincial capital, Fuzhou is the political, economic, science and cultural center of Fujian province and one of the important urban centers along China’s east coast and one of the 14 open cities. As a peri-urban area, Nantai Island was merged recently into one of the five urban districts in Fuzhou. The island itself has five townships, 45 urban neighborhood committees with a total area of 142 km² and a total population of 369,000. Other key socio-economic indicators of Fuzhou are presented in Table 3-4.

<table>
<thead>
<tr>
<th>Items</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>RMB 121.4 billion</td>
</tr>
<tr>
<td>Economic growth over the previous year</td>
<td>10.6%</td>
</tr>
<tr>
<td>Average per capita GDP</td>
<td>RMB20,292 per capita</td>
</tr>
<tr>
<td>Main agricultural produce</td>
<td>Fruits, rice, vegetable, flowers</td>
</tr>
<tr>
<td>Main industries</td>
<td>Electronics, textile, port, logistics, general machining, tourism</td>
</tr>
</tbody>
</table>

EA Executive Summary 7  Fuzhou Nantai Island Peri-Urban Development
4. Analysis of Alternatives

As a key methodology of incorporation of environmental considerations into project design and decision making, several alternatives have been identified, evaluated and compared from the environmental perspective during project preparation and, together with other project preparation teams such as feasibility study, RAP, etc., optimal alternatives were selected when all factors were considered. 'With' and 'without' project options were analyzed and components were confirmed only after the analysis confirmed their least adverse environmental impacts as well as economic benefits. From city wide perspective, the project would reduce the traffic congestion in the urban areas, increase average motor vehicle speeds, reduce the need for acceleration/deceleration, and thus reduce motor vehicle emissions. Alternative scale and design options for individual components were also considered. The current proposals reflect decisions that reflect a balance between technical, economic social and environmental considerations.

**Nan Jiang Bin Lu (NJBL):**

- **Western section of NJBL between the 4th Min River Bridge and Jiefang Bridge.** An initial plan to widen the existing road in this section was modified in order to minimize resettlement and disruption to the existing urban environment such as grown trees.
- **Fanchuanpu Cathedral.** The proposed red line encroaches upon the property of an active Catholic Cathedral. Following an exhaustive process, a range of different alternative alignments and designs have been proposed, including (a) extend the road and dyke into the river (rejected because of the potential hydrological impacts on the river and the subsequent need to obtain very time-consuming approvals from National level flood control authorities); (b) reduce the width of the pedestrian/green areas (rejected as would not make a material impact on the encroachment needed); and (c) maintain the road design and at the same time minimize the impacts to the church. These alternatives were evaluated and consulted with the church community, Alternative C was selected which would avoid impacting directly the main church building, though an adjacent office/dormitory building will need to be relocated, and a square in front of the church would also be partially occupied.
- **Eastern section.** The original plan called for NJBL to continue for 5 km beyond Qian Heng Bridge (where the road would have terminated and connected with the local Nantai Island road network). This Eastern section would mostly be constructed on Puxiazhou wetland, which if built would have significantly impacted the birds, plants, aquatic life and the overall ecosystem of the wetland, seriously reduce the wetland area, cut off the ecological and wetland chains connecting estuary and inland wetland and water ways, and eventually render the wetland losing its ecological functions. This option or several variations which would have encroached into the wetland were rejected based on these environmental considerations. The NJBL now turns south at the proposed location of the Qian Heng Bridge onto South Qian Heng Road to connect with the local road network. The total length of the NJBL component has been is reduced to 5.13 km from 9 km.

**3rd Ring Road/South**

- **Alignment.** Several alignment and design alternatives have been proposed and evaluated. The current alignment and design, reducing the road width from 100 m to 79 m in several sections have avoided direct encroachment into several...
sensitive receptors including a college, a temple, and several villages as well as increased distances to several more sensitive receptors and thus virtually eliminate potential impacts of the projects to these sensitive receptors.

- **Phasing.** Two alternative phasing alternatives have been proposed: (a) to construct the road in two phases, with an initial phase (dual 2-lanes) designed to allow the early development of adjacent areas; the subsequent upgrading to full expressway standards would be undertaken when traffic volume warrants. (b) to construct two sections in phases – the first between Wanbian Bridge and FuXia Highway (km0-km8.7) and the second from FuXia Highway to KuiQi Bridge (km8.7-km11). Alternative B is selected on the ground of its practicality and avoid land occupation and environmental impacts ahead of the bridge construction which is the key for traffic.

**Kuiqi Bridge**
- **Location.** Several alternative locations were considered including a combination with a proposed rail bridge before the present location was selected. All of the other potential locations were rejected due to technical (construction costs, approach routes, or need for a minimum spacing between adjacent bridges) or social (scale of involuntary resettlement) reasons.
- **Bridge Type.** Three alternative bridge types were considered, including both continuous beam and cable-stayed bridge structures. The preferred option – a continuous beam with V-shaped piers – was selected on the basis of both cost and aesthetics.

**Public Transport Component:**
- **Depot Scale and Size.** Two alternatives were considered: (a) to develop a large depot and a dispatch centre on the full Jinshan site of over 12,000sq m; and (b) to divide the site into two portions and to develop it in two stages with the second stage items being subject to the positive findings of associated TA. Alternative B was selected on the ground of avoiding poor and unnecessary use of the available land prematurely.
- **Dispatch Centre:** It was initially shown as an office building larger than needed for a dispatch room even with a GPS control room. The item was placed in Stage 2 and made subject to more stringent design criteria.
- **Bus Priority.** Initially no bus priority was included in the component. Following representation by the Bank the need for such an item was accepted and put forward for inclusion.
- **Bus Depot Site:** Two alternative sites were proposed for the bus depot during the preparation stage: one at west side of Pushang Industrial Zone and the other northwest of Bianwan Industrial Zone. Both locations are in the same district to be served by the facility although the one by Pushang Industrial Zone is located in the geographical center of the service area and thus would have short dead distances and less emissions, noise, and other impacts from buses leaving and returning the depot, compared with the other site. The other site was rejected also because it has a school near the site, zoned as mixed residential and commercial uses, more resettlement, and insufficient existing infrastructure, compared with the Pushang site which is selected for the bus depot in this project.
5. Environmental Impacts

5.1 Noise

Construction Phase Including Night Time Construction

Construction noise will be primarily from construction machinery and heavy duty construction trucks. Based on the noise intensity and compounded effect of simultaneous operation of multiple machines, it is expected that noise impacted areas will be approximately 50 m from the noise sources for day time and 100-150 m at night. Therefore, it will take about 150 m for the noise to meet the standards at night. The night time construction cannot be avoided as many construction activities in urban and peri-urban areas may be restricted (e.g., heavy duty truck movement), other activities required non-stop operation (e.g., concrete pouring for interchanges and bridges) and demanding construction schedule may require construction around clock. These activities together with likely on-site power generators would produce high noise impacting residents living up to 150 m to the construction sites. Compared with the stringent night time noise standard of 45 dB(A), the construction noise will exceed the standard significantly (exceeded by up to 23 dB(A)). While night time construction activities are prohibited in general, some may take place for technical and schedule reasons. Night time construction would have the high noise impacts to the residents, if occurred.

Operation Phase

Based on the predicted traffic flow on project roads and considering site conditions, including road surface, slope, buildings along the roads, noise levels at different distances to the proposed roads were predicted during the EA for the years 2010 and 2020. For 2010, areas about 160 m from the NJBL can reach Category IV and beyond, Category I1 noise standards during the day time. Night time noise impacted is much larger. At selected sensitive receptors, the noise is expected exceeded the applicable standards by 7-9 dB(A) in 2010 and 9-11 dB(A) in 2020 during the day time, and by 11-15 dB(A) in 2010 and 13-17 dB(A) in 2020 at night. These impacts would disturb the schools along the roads during the day time and residents at night.

5.2 Vibration

Vibration sources are mainly from construction machinery. Experience from similar construction activities show that at an average of 30 m from heavy construction machines, vibration levels are expected to near or below 72 dB, which is the applicable standard. The construction activity which would cause the strongest vibration is piling operation which will occur at the elevated interchange and bridge sites. The impacted areas where vibration levels would exceed the applicable standard, are up to 80-100 m from the piling operations. Several thousands residents will be affected by the vibration during the construction phase. During the operation phase, the vibration impact is mainly from the interchange. As there is only one interchange in this project, the impact would be limited only to area near this site.

The most sensitive receptor to the increased vibration is the Fanchuanpu Cathedral. The project NJBL road will be constructed at about 25 m from the main building of the church, which is within the impacted area. The 1930 built structure has already shown some cracks in its wall and the church community is concerned about the safety of the building from the construction vibration. As the original structure and foundation
drawings have lost over the years, it is difficult to evaluate the safety impacts from the construction activities without detailed on-site analysis.

5.3 Air Quality

Construction Phase

Airborne dust will be a primary air contaminant during the construction phase. The sources of the dust will primarily be demolition activities, materials storage areas and transportation. The factors affected dust airborne will include climate conditions, mainly wind speed and direction, and moisture in the ambient air, and type of construction activities. The impact area can be about 40 m from the source of dust based on construction site and road side tests, while areas beyond 50 m the impacts will be gradually phased out. Another source of air emission is asphalt and concrete mixing stations. The impacted area can be 100 m leeward from the source according to a MOC study in 1999. Once air borne the dust impact may last 30 minutes and PM$_{10}$ could last even longer. Residents, school students and church goers along the proposed roads would be impacted by the increased airborne dust during construction.

Operation Phase

Based on local climate conditions, a SEPA recommended model was used for motor vehicle emission intensity and CALINE4, for the air pollutant dispersion in the EA to forecast the impact of exhaust emission of motor vehicles to the environment immediately adjacent to the project roads. The modeling results indicate that CO is expected to meet applicable standard (Class) in all weather conditions and in all road sections, whereas NO$_2$ can meet the standard in the common weather conditions but exceed the standard under the unfavorable weather conditions (low wind speed and stable climate). The impacted area can be up to 50 m between Bifengzhou bridge and Sanxianzhuo bridge in year 2020. Similar impacts are also predicted for most sections of the 3RR/S roads, but the impacted area would be smaller (5-10 m from the road). To the sensitive receptors, the impact of CO is expected to be minimum as the model predicts CO will meet the applicable standards. But the residential houses, schools and other sensitive receptors listed in this project for NJBL, 3RR/S and Kuiqi bridge will be impacted by the increased NO$_2$.

However, by 2020 as more stringent motor vehicle emission standards (Euro4) will be introduced and enforced in the city, improvement in air quality from reduced emissions from individual motor vehicles will offset the effect from increased motor vehicle traffic. In addition, on a city wide perspective, air quality emission of individual motor vehicle is expected to reduce as the project will improve driving conditions, divert the through, reduce congestion, promote public and improve public transport service, and increase average driving speeds. Therefore, the project will help improve air quality in the city, particularly in the currently congested roads and intersections, compared with the scenario of without the project.
5.4 Water Environment

Construction Phase

This project will cross several rivers and other water bodies including the landmark Min Jiang river by Kuiqi bridge. In addition, most part of NJBL will be constructed along the Min Jiang river in very close distance. The in-water construction could impact water quality through oil leaking/dripping which then enter into the water, re-suspension of sediment during in-water construction, surface runoff contaminated with waste and/or materials piles, increased suspended solids from surface runoff from construction sites near water and sewage from construction camps. If not handled properly, these activities will result in pollution of surface water bodies including the wetlands downstream on Min Jiang river estuary. The area affected will generally be a short distance downstream from the bridge or other near water construction sites and the impacts will last the time of construction to shortly after construction activities cease. But, as the river flows, the impact can extend to a large area although as it will decrease significantly with the increasing distance through dilution, sedimentation, and natural degradation. Based on a model prediction during the EA, the impacted area, primarily for oil spills can be 130 m from the point of spills and discharges.

Most construction camps for this NJBL will be set up in rented facilities in the peri-urban area which are serviced with municipal sewer system while those for 3RR/S and Kuiqi bridge will be in rural areas without such service. If not handled properly, domestic sewage as well as other wastewater may be discharged into lakes directly, resulting in lake water contamination.

Operation Phase

Wastewater sources from the operation phase will include mainly pavement runoff of the first flush in a rainfall event. The surface runoff are relatively small compared with the receiving river flows but contaminant concentrations such as COD and SS can be high, particularly the first 15 minutes of a rain event. As the volume is relatively small and the lake water is stagnant, impacts from surface runoff will be limited both in terms of strength and areas in the receiving water.

The transportation of hazardous materials could pose a risk of water contamination from traffic accidents occurring while on the NJBL and Kuiqi bridge over the Min Jiang river which involve vehicles loaded hazardous materials and result in major spills. Based on the frequencies of occurrence of such severe accidents, the prediction results indicate that there exists a very small probability (1.95% per year in 2010 and 1.87% per year in 2020), based on the motor vehicle fleet, tank trucks which may be involved in transportation of dangerous goods, and traffic accidents records over the past 30 years. If this types of unlikely accidents do happen, catastrophic consequence may result to water quality, aquatic life, ecosystem including birds and other wildlife who depend on these surface water bodies, health and safety of the people living downstream from the accident locations. The EA predicts with a model that if there is a major spill of a typical tank truck of hazardous material, the impacted area will be up to 400 from the bridge and the impacted time, 47 minutes.
5.5 Ecosystem

One of the NJBL alternatives is to build the road across Puxiazhou wetland on Min Jiang river. If this alternative were adopted, a large area of the wetland will be occupied and the road and the traffic on the road will separate existing wetland, seriously impact migrating birds, local birds, water fowls, aquatic life and vegetation on the wetland. Actually, should the alternative be implemented, the wetland and natural habits for most of the birds and water fowls would basically lose its function. This alternative was rejected by the EA and the new alternative, adopted by the project turns south before encroach into the wetland.

The construction and operation of NJBL and Kuiqi bridge will increase noise levels in this otherwise quiet environment, which could drive away migrating birds and other wildlife. The traffic lighting on the road and bridge may also affect the birds. The runoff from the bridge and NJBL can be contaminated (see water quality section), and if allowed to discharge freely, it would enter the Min Jiang and wetland directly and quickly resulting in contamination, affecting vegetation, zooplankon and fish, which are food sources to birds. The in-water construction activities of Kuiqi bridge may also affect the migrating ells and crabs which in certain months of each year, swim to and from the ocean.

However, the core area of the Puxiazhou wetland itself is located about 300 m upstream from Kuiqi bridge. At this distance, the noise and other factors of road operation will be mostly limited to the areas immediately adjacent to the road and not directly impact the wetland core or more sensitive areas of Puxiazhou wetland.

5.6 Socio-economic Impact

Community development

The project will greatly improve the transportation conditions in those peri-urban areas where road conditions are poor and/or insufficient, some even without proper road to connect with the rest of the city. The new road construction, as well as road upgrading will improve the peri-urban or some of the rural communities. With the improved transportation will help attract further development, investment, commercial activities and services to the new area or suburb/rural areas. Clearly the new or improved transportation infrastructure and services will provide more convenience to residents in these communities, as well as to contribute to improving the quality of life and standards of living.

Community severance

Because the new roads or newly widened roads may be separated at the middle media and/or because the traffic volume and traffic speeds on project roads will be significantly increased, local residents may feel being separated from the other side of the roads which may have the schools, hospitals shops and other services. Besides intersections where there will be traffic lights to control and relate the motor vehicles, the project will have grade separate crossings including pedestrian overhead passes and underground pedestrian passes. In addition, street level crossings and dedicated pedestrian traffic lights will also be created. These street crossings will be located in strategically important sites, such as schools, large department stores, tourist attractions, markets and other public places where there are large crowds. Together with regular traffic light controlled
intersections, these street crossing provisions in the project will help minimize the impacts of community severance and provide maximum convenience to the citizen of Fuzhou.

Cultural Relics

The primary impacts to cultural relics are to Fanchuanpu Catholic Cathedral, a provincial level protected and historical/cultural property. As described above, currently designed alignment will encroach on the square and an office building of the church (the main building of the Church will not be directly affected). As per the proposed plan, the project construction and operation would occupy part of yard in front of the main church building as well as relocate the office/dormitory, increase the noise to the church site and affect, potentially, the structural safety of the main building.

5.7 Resettlement and Relocation

The resettlement and relocation of the proposed project will occupy permanently 2332.43 mu of land, involving 480 households, 1339 people and demolition of 32,451 m² of various houses. The total cost of resettlement and relocation including livelihood rehabilitation is RMB235.05 million.

Based on the experience of similar previous projects else in China and lessens learnt from those earlier projects, potential impacts of the project to the communities could include mis-management of house compensation funds, insufficient compensation for house replacement and delayed payment of the compensation funds. However, in general, the new houses following the relocation are expected to be better and bigger than the houses they replace with using the resettlement and relocation compensation funds, representing an improvement of housing conditions and the standards of living for the affected. Most houses to be dismantled by the project are of poor or very poor conditions and some even without tap water and/or sanitary facilities. The relocated housing is modern design with all the comfort and facilities. However, the relocation itself will disrupt the residents' daily life and routines. Many who have been living in the same neighborhood for years or even generations may not be used to or like the new environment even if they represent a substantial improvement. Furthermore, people may lose some of the convenience available only in downtown areas, as well as losing potentially money when relocating to new houses.

A major relocation issue is the relocation of the office/dormitory building of Fanchuanpu church. The new site is just adjacent to the existing ground and the new building will be designed in the same style as the one to be demolished. Close consultation has been conducted with the church community and will continue during the course of relocation to satisfy concerns and demands if any.

The project will also involve relocation of 14 commercial outlets, 13 industrial enterprises, and two offices. The relocation plan is well prepared in consultation with the affected to minimize and well compensate the impact and disruption to business.

5.8 Safeguards Policies Assurance

The EA team conducted a screening for ten safeguard policies of the World Bank and, when triggered by the Project conditions, full assessment. The safeguard policies which are incorporated in the EA include Environmental Assessment (OP4.01), Natural Habitat
(OP4.04), Cultural Property (OP4.11), Involuntary Resettlement (OP4.12) and Public Disclosure (BP 17.50). Those safeguards which have gone through an initial screening but found not warrant a full assessment include Pest Management (OP4.09), Forest (OP4.36) and Indigenous Peoples (OP4.20). The remainder safeguards are not applicable because the Project does not have any components involved these safeguards issues. These include Safety of Dam (OP4.37), International Waterways (OP7.50) and Disputed Areas (OP7.60).

6. **Mitigation**

For the adverse environmental impacts of the project, the EA team has developed a series of measures to avoid, minimize, mitigate or otherwise compensate adverse impacts from the project. These mitigation measures are summarized below.

6.1 **Design Phase**

**Air quality**

As part of the overall transport strategy for Fuzhou, the project road design will be given full consideration to optimize the transport network. Construction and operation of the project would detour the through traffic from the city proper to the peri-urban area, thus reduce the traffic congestion in the city. The over loading of traffic at downtown roads will be minimized and transit traffic through city center will be avoided. The project itself will significantly improve the motor vehicle operation efficiency and average speeds and thus reduce air emissions by individual motor vehicles.

In addition, in the future development of Nantai area which is one of the objectives of this project as well as a direct consequence, areas significantly impacted by the project operation will be developed only for facilities not sensitive to traffic. Those sensitive ones, particularly schools, hospitals, kindergartens, seniors' houses, as well as residential buildings will be built away from these impacted areas.

**Noise**

A number of measures to minimize noise have been incorporated into the design for sensitive receptors at which there will be significant incremental increase in noise level. These measures are summarized in Table 6-1.
Mitigation Measures

The implementation time is determined based on the noise prediction results. Basically the measures will be implemented prior to the increase in noise levels at the application locations. In sensitive receptors where noise impacts will be significant during the construction phase, the implementation time will be in the construction phase.

Vibration

As road surface quality directly affects vibration levels from the roads, high quality asphalt materials will be designed for road surface paving materials, particularly at the elevated viaducts and multi-layers interchanges. The mitigation for potential vibration impacts to Fanchuanpu Cathedral is described below.

Xiazhou wetland

The following mitigation measures will be incorporated into the urban road design:

- The Xiazhou wetland management authority was consulted to participate in the design of Kuiqi bridge and NJBL road for their input in achieving harmony with the surrounding environment;
- Consultation also covered the surface runoff collection system for NJBL and Kuiqi bridge. Such systems are to collect all surface runoff and direct it to a holding tank at storage before discharged directly to the river;
- High quality asphalt will be used for NJBL and 3RR/S so that the noise from road surface friction will be minimized;

Community Severance

To minimize the impacts of community and access to services in the project areas, numerous grade separate pedestrian passes have been included in the project design. In addition, the project design will also include street level pedestrian crossings and traffic light controlled pedestrian crossings. Together with intersections which are controlled by traffic lights and thus provide additional street crossings among the project roads, the impacts on community severance and access to services will be minimized. As bicycles are a main transportation tool used by Fuzhou citizens, all grade separate passes will include provisions in the design to allow bicycles to use readily.

<table>
<thead>
<tr>
<th>Mitigation Measures</th>
<th>Implementation Places</th>
<th>Estimated quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low noise asphalt payment</td>
<td>Entire project roads</td>
<td>363,000 m²</td>
</tr>
<tr>
<td>Seamless joints, less number of joints, flexible supports</td>
<td>Kuiqi interchange</td>
<td>Entire interchange</td>
</tr>
<tr>
<td>Noise insulation windows</td>
<td>Fancchuanpu Cathedral</td>
<td>443 m²</td>
</tr>
<tr>
<td>Noise barrier</td>
<td>Yinhua English school</td>
<td>30 m²</td>
</tr>
<tr>
<td>Tree planting</td>
<td>Kuiqi interchange</td>
<td>35 m × 2 m</td>
</tr>
<tr>
<td></td>
<td>Entire project roads</td>
<td>236010m²</td>
</tr>
</tbody>
</table>

The implementation time is determined based on the noise prediction results. Basically the measures will be implemented prior to the increase in noise levels at the application locations. In sensitive receptors where noise impacts will be significant during the construction phase, the implementation time will be in the construction phase.
Resettlement and Relocation

All relocated residents will be properly compensated and received training for new employment. Special consideration will be given to the elderly, illiterate and farmers in terms of compensation. For people whose sources of well water will be disrupted by the construction by the construction of tunnels, additional water wells and other water supply sources will be developed.

Cultural Relics

The Fanchuanpu church administration/dormitory building is a brick and wood structure with stone basement and wood floor. Basically the building is in good shape and structurally according to expert observation sound although over a nearly hundred years, some elements such as wooden windows and floors have rotted, or been damaged or lost. According to detailed site survey, investigation and structure studies by historical building and structural experts from Fuzhou Building Science Research Institute (FBSRI), it has been decided to dismantle and rebuild the building at the neighboring shipyard which is to be returned to the church.

Based on relevant regulations, technical guidelines and site investigations and measurements, FBSRI has developed a detailed, step by step dismantling, moving and rebuilding plan for the administration/dormitory building. The basic principles of this plan are to carefully dismantle the building, use the same materials to the maximum extent possible for the rebuilding, and reconstruct the building in the same way as the existing structure, architecture style and appearance. In the places where identical reconstruction cannot be achieved or re-construction in the same style is very difficult or not safe, the designers will be called in to determine the alternative construction methods with the objective to maintain the same architectural style toe the maximum extent possible. The reconstructed administration/dormitory building will finally be painted with the paints which can best reflect the original and historical flavor.

To mitigate the potential adverse impacts from vibration to the main church building, a strengthening and reinforcement plan has been developed by FBSRI on the basis of a detailed site investigation and structural analysis of the building and with the considerations of the potential vibration during project construction and operation. The plan will cover all elements of the main church building, including foundation, exterior walls, roof, windows, columns, and other structures. Cautions and considerations have been given to plan for using the materials which can be harmonized with the existing ones and the strengthening and reinforcement would not cause significant changes in architectural styles and appearance of the building. The current plan is a preliminary plan. Further structure study and evaluation will be needed to confirm the plan and this study will be conducted prior to the start of the strengthening plan implementation. The estimated costs for the plan, including further expert evaluation and design will be about RMB1.23 million.

6.2 Construction Phase

Construction noise and night time construction

Large and noisy construction activities will be kept away from populated areas (150 m minimum) where possible. Operation of loud construction machinery and major construction activities such as piling for interchanges will strictly restricted to the day
time. Temporary noise barriers will be constructed to protect the sensitive receptors from
the impact of construction noise. Construction traffic will be directed to avoid sensitive
locations and banned at night time. Noise construction activities will be carefully
scheduled to avoid the most sensitive time. In the school areas, construction may be
scheduled for vacation months and on weekend if possible. In the residential areas, noisy
construction activities will be scheduled not to be between 12:00 to 2:30 in the afternoon
to avoid disrupting the afternoon naps.

Where night time construction activities must be conducted, the following measures will
be taken for the night time construction: (1) nearby urban residents and villages will be
notified ahead of time for the length and noise intensity of the proposed night time
construction and consulted for their concerns, (2) night time construction will be arranged
in such a way to avoid school exam time (about one week in the summer) and harvest
time (about half month each in the summer and fall), (3) concrete mixer, power generated
and other stationary equipment will be carefully placed to be far away from residential
areas and villages to ensure no noise impacts from these machines, (4) equipment with
lower noise levels will be used for concrete pouring operations, (5) temporary noise
barriers at the appropriate places may be erected to reduce the noise impacts at the night
time, (6) 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, and (7) 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.

Air

Roads used for construction vehicles and construction sites will be water sprayed three
times a day (morning, noon and afternoon), or more frequent on dry and windy days to
suppress airborne dust (once every two hours). The demolition sites will be separate with
sailcloth or similar sheet from the surrounding areas to filter the air borne dust. The
buildings under demolition will also be water sprayed to suppress the dust. The mixing
stations and other point sources of air emissions will be located leeward far enough from
sensitive receptors (300 m minimum). Trucks loaded with soil and other dusty materials,
as well as materials stockpiles will be covered with canvas. All trucks leaving
construction sites will be washed to clear up the dirt and mad on vehicle tires. Construction
trucks will be allowed to use only the pre-selected roads in the urban areas.

Water

To minimize adverse impacts to surface water during construction, the discharge from
construction camps located in rural areas will not be allowed to discharge to surface
water bodies directly. The sewage will be either held at the site and empties to treatment
facilities regularly or through on site treatment such as septic tanks to meet the irrigation
discharge standards.

Aquatic life

Cofferdam method will be used for Kuiqi bridge pillar construction. All slurry will be
treated before discharged back into the river, to minimize the impact of the increased
suspended solids. The in-water construction activities will be carefully planned to avoid
the time of November-December and again May-June when ells and crabs migrating to
and from the sea. Additional juvenile ells and crabs will be released to the river to compensate any loss in population from the bridge construction activities.

Cultural Relics

All trucks and other transportation vehicles speeds will be strictly enforced at the areas near the two cultural property sites to minimize the potential vibration and noise. Trucks loaded with bulk materials will be covered with canvas to minimize potential dust and the roads and construction sites near the properties will be frequently watered daily. Low noise machinery will be used for construction in the areas near the cultural properties if possible. The following protocol shall be used for dealing with any chance finds: (1) provide training to contractor staff for them to become familiar with the basic knowledge, procedures and applicable policies for cultural relics chance finds; (2) immediately stop all construction activities in an event of a chance find, and protective measures will be taken to protect the sites and any finds; (3) The contractors will inform the cultural authority immediately of the chance finds; (4) With the consultation with the cultural authority, archaeologists will be called or arranged to the site to make proper investigation; (5) Design changes may be considered if necessary and/or recommended by the professional archaeologists or requested by the cultural relics authority; and (6) The construction activities may be resumed only after the site has been fully investigated and a permit granted by the cultural relics authority.

Contractor Management

Experience with previous World Bank financed urban transport projects in China, has indicated that high awareness and full participation of contractors in environmental management during the construction phase are critically important to ensure environmental performance and pollution control at the construction sites. Environmental protection will start from pre-qualification of contractors when environmental awareness and management systems will be an evaluation criterion. The environmental mitigation measures, management and monitoring plans will be incorporated into bid documents to ensure there will be sufficient funding prepared by the bidding contractors for these activities and the environmental management will be contractual obligations to the contractors. Finally, short course training will be provided to all winning contractors and construction supervision on environmental policies and regulations, potential impacts, mitigation measures, daily monitoring and reporting, and emergency handling.

6.3 Operation Phase

Noise

Traffic management will be enforced and motor vehicles will not be allowed to speed or horn while going through sections near sensitive receptors such as schools, hospitals, seniors houses, cultural properties, etc. These bans will be informed to drivers through traffic control boards/signs along the project roads.

Air emission

A motor vehicle air emissions control strategy requires an integrated approach from numerous government agencies as well as private sector stakeholders. The city will enforce applicable standards for motor vehicles and fuels and implement the motor vehicle inspection programs to minimize the air emissions from the increased motor
vehicle traffic on the urban roads. Other measures include (1) motor vehicles not meeting the emission standards will be banned from sales in the city (2) accelerate the old vehicle retirement program (3) continue the random emission testing for buses (4) continue and improve the annual motor vehicle emission testing for entire fleet (5) continue the roadside testing program, and (6) promote the clean fuel programs. A full description of the existing programs and future plans for motor vehicle emission control strategy in the city is presented in Annex 1 of this report (being prepared for this draft and will be included in the final EA Summary).

Water and transportation of hazardous materials

Leaking vehicles, whether from their fuel tanks or from the containers they carry, will not be allowed to use the project roads as it will go several sensitive and ecologically valuable surface water bodies. The city will set up an emergency response group involving relevant agencies and professional institutions to handle transportation of hazardous materials and emergency response in an event of a traffic accident involving trucks located with hazardous materials, particularly in sensitive locations such as NJNL road. The city's emergency response system, which includes fire department, municipal emergency maintenance and repair and environmental monitoring will be further strengthened which, after proper training, will be able to provide emergency assistance together with its other municipal services 24 hours day. In addition, licensing and permitting procedures will be strictly enforced to control the traffic involving hazardous materials on urban roads in the city, connecting road and rural roads network.

Fisheries

As discussed in the EA report, migratory fish and aquaculture sites in Minjiang river near Kuqi bridge may be impacted by the bridge construction and to a lesser extent, operation. However, according the fish bureau, although the impact can be considered modest, the exact extent of the impacts will require very detailed and long term studies. Based on detailed consultation with the fisheries experts at the fish bureau, mitigation of introducing fish fry or juvenile fish down stream from the bridge on the migrating routes to ensure any impact by the bridge to the migratory fish will be compensated. The introduction will be done on the yearly basis at the fish spawning and migration seasons.

Urban planning

To avoid sensitive receptors from being exposed to adverse impacts such as noise, air pollution, vibration and reduced sunshine, no such sensitive buildings will be allowed to be built within the impacted areas from the project roads. No new school, hospital or other sensitive facilities will be allowed to build within 100 to 200 m from the central line of the project roads (noise and air pollution) or 30 m from the interchanges (sunshine and vibration). The project is to include a technical assistance program to provide professional expertise to assist the city revise its Master Plan as well as study o strategic planning for sustainable management of Fuzhou urban development. These environmental considerations will be incorporated into the planning to ensure balanced and sustainable approach to economic development and environmental and community protection.
Monitoring

Extensive environmental monitoring programs will be implemented during both construction and operation phases (details below) to ensure that adverse environmental impacts are as projected during the EA and the mitigation measures proposed will be implemented and effective. In adequate mitigation or new adverse impacts emerged beyond the EA prediction will be detected by the monitoring programs promptly and appropriate new actions will be taken to address them.

7. Public Transport

7.1 Project Background and Area Baseline

The main public transport component consists of a bus depot with a capacity for 300 buses in Phase I expanding to 500 buses in Phase II, equipped with fueling and simple repair and maintenance facilities and a bus dispatching center as well as corporate headquarters for Fuzhou Bus Corporation.

The bus depot will be constructed near the Linpushang Industrial Park on the Nantai island. The facility will occupy a total area of 183.6 mu, which currently has a small office building for the nearby township development zone, some rural houses, farmland and high voltage power transmission towers. At the south of the proposed site are 32 households of Gaozai and Geyue villages, with the closest distances to the site boundary of about 3-14 m. About 10 m to the west is Zudian temple, in Fenggang village. The 1914 re-constructed temple has been repaired recently and has no particular protection status due to the absence of particular historical, cultural or religious values. On the west and northwest of the site, about 110 m to the site boundary, is the Jinshan park. These are sensitive receptors vulnerable to the increased noise, air emission, wastewater discharges and other potential impacts once the bus depot is constructed and in operation.

Based on the baseline monitoring results, the proposed bus depot site currently enjoys a good ambient air quality and low noise, indicating a fair environmental quality under the currently conditions. There is no apparent environmental discharges, except domestic wastewater from the households which is discharged to the municipal sewer on Pushang road. Along this road, the wastewater will be diverted to Jinshan wastewater treatment plant before discharged to Min river north branch.

7.2 Impacts

During bus depot construction, noise from construction machinery and materials transportation trucks is expected to exceed the applicable standards. The noise impact would be particularly significant to the nearby residents during the night (by up to 37 dB(A) over the standard), if there are night time construction activities. Air borne dust, from demolition, earth work, and materials handling would also impact the residents. The wastewater discharge during construction is mostly from construction camps on site as well as site runoff. The wastewater will be discharged to the municipal sewer to minimize the impacts to the environment. But, surface runoff, likely containing high concentration of sediments could affect or even clog the sewer, if not handled properly.

During the operation phase, the main noise sources will be bus operation (in and out of depot from 20:00 to 22:00 in the evening and 6:00 to 8:00 in the morning, respectively and idling while warming up), power generator, air compressor, and lathes and other
repair and maintenance machine operation. A mathematical model was used in the EA for predicting the noise and the results show that the nearby residents will be exposed to the increased noise which will exceed the applicable standards, day and night.

The main air pollution sources during the operation phase will be emissions from operating buses. Again, the buses will be most operating 2 hours each in the morning and evening except a small number of buses which will operate during maintenance. A dispersion model during the EA shows that air emission will impact (exceeding the applicable standards) the surrounding areas of up to 100 m from the site boundaries. As such, the residential houses in the south will be exposed to the increased CO, NO₂ and NMHC.

During the operation, wastewater will be generated from three sources: bus washing, domestic wastewater from the facility toilets and first flush of rain water which is likely contaminated by dust and oil dripped on the floor and ground. The key contaminants will be oil, suspended solids, and organics. The total wastewater volume is estimated to be 446 m³/day. The impact is not expected to be significant if handling properly as the wastewater, following onsite pre-treatment, will be discharged to a municipal sewer leading to a municipal wastewater treatment plant.

The air emission from bus depot operation would also affect the neighboring Jinshan park, particularly to the elderly park goers who may be sensitive to the deteriorating air quality when they visit or exercise in the park. However, this impact is limited as the air pollution may occur mostly at the 5:00-6:00 and again 22:00-23:00 each day when up to 400 buses leave and return to the depot. Both these time slots are beyond the normal park visiting hours. The flower culture near the bus depot may also be affected by the increased air pollution, but the exact impacts depend on a host of complex factors and may need long term study and observation to determine. The flower farming, together with the rural housing in the area are planned to be relocated (not related to this project) for development of the industrial park in the area.

The facility could pose a visual impact to the nearby temple and wetland park. In particular, the facility is close to the temple and will be highly visible to the temple and Jinshan Park visitors.

As there are two high voltage (110 kVA and 220 kVA respectively) power transmission lines going through the site and a nearby power substation, the electromagnetic field could affect the bus depot, particularly the dispatching center, waiting halls and dormitory. Based on site measurement, the maximum level of electric intensity at the ground is 0.253 kV/m, significantly lower than the applicable standard of 4 kV/m to people. The magnetic field intensity is 0.672 μT (maximum) and 0.327 μT at the (sensitive receptors), far below the applicable standard of 100 μT and even the most stringent international standard of 1 μT. EA’s assessment also confirms the electromagnetic fields will have virtually no impacts to GPS system, radio communication on site (walkie-talkie).

The fuel storage and fueling facilities on site could pose safety hazards of potential spills, fire, and explosion. If occurring, these events would have significant impacts to the communities, the environment as well as the staff and asset of the bus depot.
7.3 Mitigation

At the design stage, the site selection and layout are carefully planned to minimize the potential impacts to the surrounding environment. The site has been located to avoid any encroachment of the temple compound. Furthermore, the architecture design will be prepared in such a way it will try to harmonize with the surrounding area to minimize the visual impacts.

High (2 m), solid perimeter walls will be erected to reduce the noise impacts to the residents and the Zudian temple. The open areas in and at the property border of the bus depot will be landscaped with trees. The power generator, air compressors and maintenance shop will be located away from these sensitive receptors. Furthermore, the structures housing these facilities and operations will be designed and constructed with full consideration of noise isolation.

For air emission, all buses will be maintained to their best conditions possible, particularly air emission control. The operations will be managed in such a way that will minimize the bus idling time on site and smooth in and out of the bus depot with minimum congestion. The air ventilation will be designed for efficient air emission dispersion to minimize pollutant built up. Bus emission control program will be developed which will include mandatory and regular inspection and repair, converting to clean fuels, and procure clean buses during the bus fleet replacement and renewing.

The bus depot will provide background information to Jinshan park about the air quality and potential impacts of the bus depot operation to air quality in the park area. Advices will be given to the park to avoid admitting visitors during the bus depot peak operating hours (early morning and late evening) or provide warning to the visitors of the potential health impacts.

Domestic wastewater will also be discharge into onsite septic tanks. First flush rain water and bus wash water will be collected in a holding tank. From there the wastewater will be diverted to an oil/water separator. Following these pre-treatment, effluent from the septic tank and oil/water separator will be discharge to the municipal sewer leading to Jinshan wastewater treatment plant for further treatment before discharged to the environment.

All structures of bus depot will be designed with the consideration of the high voltage power transmission lines. Particularly the structure heights will be controlled to the safety range and with full thunder proof facilities.

The fueling facility design will strictly follow applicable design codes and include provisions for static electric, thunder and fire proof, as well as safety distance. The underground fuel tanks will have secondary containment and monitoring facility to detect any potential leaks. The fueling station staff will be trained and equipped for emergency response for fires as well as fuel spills.

Selecting a site with the least environmental and community adverse impacts while still meeting the technical and engineering needs for the bus depots is a critical and effective impact prevention measure. The current site was selected based on these considerations when compared with alternative site, as described above.
8. Environmental Management Plan

An environmental management plan (EMP) has been developed in a separate and stand alone document. The EMP includes policies basis and applicable environmental standards, environmental management system, mitigation measures and monitoring plans for both the construction and operation phases.

8.1 Objectives

The EMP provides a framework for the implementation of mitigation measures and environmental management and monitoring during the Project implementation. As such, it represents the commitment of Project proponent as well as the governments of the Project area for environmental protection, pollution control and impact minimization. More specifically, the EMP is to:

- Set out the legal and policy framework as well as applicable environmental standards with which the Project will be compliance;
- Identify and design with sufficient details and specifics of mitigation measures for adverse impacts of the Project;
- Specify institutional roles and responsibilities for mitigation measures implementation and environmental management during Project;
- Outlines the requirements for environmental monitoring programs and reporting needs; and
- Provides a stand alone document which may be used during Project implementation for Project supervision.

8.2 Management and Supervision Organizations

There will be two layers of organizations who will be responsible for environmental performance of the Project. The first is environmental management organizations including the Fuzhou Construction and Development Corporation, the Project Management Office (PMO) which is the Project proponent, the urban road maintenance which will be responsible for road maintenance and various technical groups for environmental monitoring and design, as well as contractors and construction supervision companies. One or two environmental personnel will be staffed at the PMO and each of the contractors for mitigation measures implementation, environmental management and supervision. The other group is the environmental law enforcement agencies including SEPA and Environmental Protection Bureaus of different levels of government in the Project region.

8.3 Environmental Monitoring

The EMP includes environmental monitoring programs for both construction and operation phases. The parameters to be monitored include resettlement, noise, dust, water quality, and solid waste disposal. During the construction phase, environmental monitoring will be conducted in two approaches: daily and routine monitoring consisting of mainly visual observations and limited equipment measurements such as hand-hold noise meters by contractors and construction supervision companies; and periodic monitoring by professionals using standard methods recognized by regulatory authorities. Proper training of contractor and construction supervision staff for the environmental monitoring, as well as on-going supervision and assistance to these staff, will be provided by environmental professionals. Monitoring reports will be compiled at intervals of once every three to four months, summarizing the findings of the monitoring. The reports will
be submitted to project proponent as well as relevant agencies and the World Bank. During the operation phase, noise levels will be monitored once a month for the first six months and once every six months thereafter for the first three years of operation. The general environmental monitoring program is summarized in Table 8-1.

Table 8-1  General Environmental Monitoring Program

<table>
<thead>
<tr>
<th>Items</th>
<th>Parameter</th>
<th>Monitoring frequency</th>
<th>Monitoring time</th>
<th>No. of monitoring points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Phase</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air</td>
<td>PM$_{10}$</td>
<td>Once a quarter for 5 consecutive days</td>
<td>0:00-24:00 Daily average: 0:00-24:00; hourly average: 4 times per day</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>NO$_2$, CO, TSP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise</td>
<td>Leq(A)</td>
<td>Once a quarter for 1 day</td>
<td>0:00-24:00</td>
<td>15</td>
</tr>
<tr>
<td>Vibration</td>
<td>VL$_{210}$</td>
<td>Once a day</td>
<td>0:00-24:00</td>
<td>2</td>
</tr>
<tr>
<td>Water quality</td>
<td>SS and Oil</td>
<td>One day a quarter</td>
<td>3 times per day</td>
<td>3</td>
</tr>
<tr>
<td>Daytime</td>
<td></td>
<td>Once a day of random noise monitoring for each road section under construction, visual observation dust and other environmental issues; vibration monitoring at hospital, school or kindergarten, to be conducted by contractors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nighttime</td>
<td></td>
<td>Once a day of noise monitoring for each road section under construction each night; vibration monitoring when hospitals are involved, to be conducted by contractors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation phase</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air (road)</td>
<td>PM$_{10}$</td>
<td>Once a quarter for 5 consecutive days</td>
<td>0:00-24:00 Daily average: 0:00-24:00; hourly average: 4 samples per day</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>NO$_2$, CO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise (road)</td>
<td>Leq (A)</td>
<td>Once each quarter, for 2 consecutive days</td>
<td>0:00-24:00</td>
<td>15</td>
</tr>
<tr>
<td>Vibration (road)</td>
<td>VL$_{210}$</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Water quality (road)</td>
<td>SS</td>
<td>One day each quarter</td>
<td>3 times monitoring per day</td>
<td>3</td>
</tr>
</tbody>
</table>

The monitoring, as well as site supervision reports will be reported to PMO periodically. During the construction, the monitoring reports will be provided once every three months while during the operation the monitoring reports will be provided once a year for two years. PMO, the ultimate party responsible for environmental performance for the project during construction will review and take necessary mitigation actions promptly while the transportation bureau responsible for the operation phase. If needed, the PMO and transportation bureau will call upon professional consultants and expert to develop mitigation measures and supervise the implementation.
8.4 Institutional Strengthening and Training

To ensure the environmental performance of the Project, the EMP emphasizes the institutional building and strengthening. Besides an organizational structure involving various management and supervision organizations for environmental decision making, monitoring, reporting and further mitigation planning and implementation, the EMP includes detailed programs for personnel training. The programs involve training aboard and domestically for professional, managerial and technical personnel from the governments, project proponent and operation units, environmental institutions and contractors and construction supervisions, to enhance their awareness with the applicable regulations.

The environmental training for contractors and construction supervisions will be held prior to the commencement of construction. The objective is to ensure that each contractor and construction supervision unit will have staff on site full time for environmental monitoring on a daily basis. The training will cover the basic knowledge of environmental protection and pollution control, the result of EIA and requirements of EMP, methodology of site environmental management and monitoring, and reporting requirements. The training for the Fuzhou Construction Committee, the PMO, the road maintenance company, and environmental institutions will cover environmental management, regulatory framework, applicable environmental standards and their implications to the Project, mitigation planning, environmental decision making and pollution control technologies.

8.5 Estimated Cost for Environmental Management

The cost for environmental management and mitigation measures have been estimated and included in the Project budget. The estimated cost is summarized in Table 8-2.

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifics</th>
<th>Estimated Cost (RMB x1000)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Road/bridge</td>
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<tr>
<td>Environmental Monitoring</td>
<td>Construction phase monitoring</td>
<td>668</td>
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<tr>
<td></td>
<td>Operation phase monitoring</td>
<td>602</td>
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<tr>
<td>Impact mitigation</td>
<td>Noise</td>
<td>1,200</td>
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<tr>
<td></td>
<td>Wastewater</td>
<td>575</td>
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<td></td>
<td>Air emission from canteen</td>
<td>101</td>
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<tr>
<td></td>
<td>Juvenile fish replenishment</td>
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<tr>
<td>Staff and contractor training</td>
<td>Overseas and domestic</td>
<td>800</td>
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9. Public Consultation and Information Disclosure

Two rounds of public consultation have been carried out during the EA: the first round at the preparation of EA terms of reference (TOR) between July to September, 2004 and the second round at draft EA reports between October to November, 2004. The primary technique used in public consultation was public opinion surveys through questionnaires, which was supplemented by focused interviews and public meetings with key affected groups and individuals. The people consulted included mainly those who will be affected directly by the project. Relevant government and non-government organizations and...
experts from academic institutions on various environmental and socio-economic issues have also been consulted. In total, 180 individuals responded to the questionnaire survey and over 200 person-times have participated in the interviews and consultation meetings.

The public was fully aware of the proposed and expressed their support in general. The predominant concern from the affected public was increased noise following the project implementation. A focused issue is the potential impacts to Fanchuanpu Cathedral. Concerns from the church community were basically building/structure safety, relocation of the office/dormitory building, occupation of the land, visual impacts, etc. Other concerns expressed by the affected public included air borne dust during construction, location of asphalt mixers, motor vehicle air emissions, landscaping, community severance, resettlement, cultural relics and wetland protection, etc.

Besides the directly affected residents in the project areas, the EA team met with experts from cultural and fisheries bureaus and universities. The experts provided their opinions on environmental and cultural relics issues and provide recommendations from technical point views.

The EA team has responded to the public concerns and suggestions including a series of dust control measures during construction, noise insulation windows and noise barriers at sensitive receptors which are expected to experience significant incremental increase in noise levels after the project, pedestrian and bicycle traffic and street crossing, a large scale landscaping programs with much more new trees planted than those cut during the project and structure strengthening for the church building. The concerns expressed by the public on the resettlement, relocation and livelihood rehabilitation to the RAP team and these concerns have been addressed with appropriate measures in RAP.

In compliance with EIA process requirements of Chinese government and the World Bank, the completed draft EIA and EMP reports were released in public places in the project area, including libraries, village meeting halls, etc. The concerned public can have the access to and review of the reports at these places. In addition, Project information, and availability of the reports were advertised in Fuzhou Daily, a major and widely distributed local newspaper and Fuzhou Construction and Development Corporation internet web site. The EA team plans to disclose the final EA reports in public places to the general public once the final version is completed.

Public consultation activities and information disclosure for this Project is summarized in Table 9-1 and Table 9-2, respectively.
<table>
<thead>
<tr>
<th>Stage</th>
<th>Form</th>
<th>By whom and for whom</th>
<th>Time</th>
<th>location</th>
<th>WB policy</th>
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</thead>
<tbody>
<tr>
<td>First round</td>
<td>Questionnaire</td>
<td>By PMO and EA team for 60 local NJBL affected people</td>
<td>June 5-20, 2004</td>
<td>NJBL neighborhood</td>
<td>OP4.01</td>
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<tr>
<td></td>
<td>Survey</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>Questionnaire</td>
<td>By PMO and EA team for 120 3RR/S affected residents</td>
<td>June 5-20, 2004</td>
<td>3RR/S neighborhood</td>
<td>OP4.01</td>
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<td></td>
<td>survey</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Questionnaire</td>
<td>By PMO and EA team for 40 Kuiqi bridge affected residents</td>
<td>August 3-10, 2004</td>
<td>Lipu, Shaoqi and Kuiqi villages</td>
<td>OP4.01</td>
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<tr>
<td></td>
<td>survey</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Interview</td>
<td>PMO and EA team for priests of Fanshenpu cathedral</td>
<td>June 11, 2004</td>
<td>PMO office</td>
<td>OP4.01</td>
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<tr>
<td></td>
<td>Group meeting</td>
<td>PMO and EA team for priests of Fanshenpu cathedral</td>
<td>June 22, 2004</td>
<td>PMO office</td>
<td>OP4.01</td>
</tr>
<tr>
<td></td>
<td>Group meeting</td>
<td>PMO, design team and EA team for the church community</td>
<td>July 14, 2004</td>
<td>Fanchuanpu church</td>
<td>OP4.01</td>
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<td></td>
<td>Group meeting</td>
<td>PMO, design, RAP and EA teams for general public</td>
<td>August 2, 2004</td>
<td>Fuzhou Hotel</td>
<td>OP4.01</td>
</tr>
<tr>
<td></td>
<td>Group meeting</td>
<td>PMO, design, RAP and EA team for the church community</td>
<td>August 18, 2004</td>
<td>Fanchuanpu church</td>
<td>OP4.01</td>
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<tr>
<td></td>
<td>Group meeting</td>
<td>PMO, design, RAP and EA team for the church community</td>
<td>October 25, 2004</td>
<td>Fanchuanpu church</td>
<td>OP4.01</td>
</tr>
<tr>
<td>Second round</td>
<td>Focused interviews</td>
<td>By PMO and EA team for affected residents, church, schools and industries</td>
<td>Nov 22, 2004</td>
<td>Foreign language school, Anlan Shrine, the church, Wetland authority, Linpu village, Taipingyang, Canqian, and Hebian residential areas, commerce school and Jufeng Paper Co.</td>
<td>OP4.01</td>
</tr>
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<td></td>
<td>Focused interviews</td>
<td>By PMO and EA team for affected residents, schools, temple</td>
<td>Nov 3-5 2004</td>
<td>Wanbian, Shanzhi, Yangzhi, Wushan, Wufeng, Puxiazhou, Oushan, Duyuan villages, Fushan temple, Yixu water plant, Information college</td>
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<td></td>
<td>Focused interviews</td>
<td>By PMO and EA team for affected residents, business owners</td>
<td>Nov 18, 2004</td>
<td>Lipu, Shaoqi and Kuiqi villages, Linpu water plant,</td>
<td>OP4.01</td>
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<td></td>
<td>Group meeting</td>
<td>By EA and design team</td>
<td>Nov 26, 2004</td>
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<td>OP4.01</td>
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</table>
### Table 9-2 Information Disclosure Summary

<table>
<thead>
<tr>
<th>Information</th>
<th>Date</th>
<th>Location/media</th>
<th>WB policy</th>
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</thead>
<tbody>
<tr>
<td>Notice to the public about the public meetings and locations and contents</td>
<td>June 2004</td>
<td>Fuzhou Evening News</td>
<td>OP4.01</td>
</tr>
<tr>
<td>Project summary and Key EA information</td>
<td>August 3, 2004</td>
<td>Fuzhou Daily</td>
<td>OP4.01</td>
</tr>
<tr>
<td>Notice to the public on second round of public consultation including locations and contents</td>
<td>Nov 15, 2004</td>
<td>Fuzhou TV stations, Fuzhou Evening News</td>
<td>OP4.01</td>
</tr>
<tr>
<td>Advertisement on draft EA report locations</td>
<td>January 2005</td>
<td>Fuzhou Evening News</td>
<td>OP4.01</td>
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<tr>
<td>Draft EA report and EMP</td>
<td>(planned) February, 2005</td>
<td>Fuzhou public library, Project affected village halls</td>
<td>OP4.01</td>
</tr>
<tr>
<td>Final EA and EMP</td>
<td></td>
<td>Fuzhou public library, PMO, Project affected village halls</td>
<td>OP4.01</td>
</tr>
</tbody>
</table>

### 10. Conclusions

The Fuzhou Nantai Island Peri-Urban Development Project will play an important role in improving the basic transport infrastructure on the Nantai island, thus further urban and general economic development in the peri-urban area as well as the standard of living for the island residents. The upgrading and newly built road will also help reduce traffic congestion in the city of Fuzhou particularly the center areas, by attracting and bypassing through traffic which otherwise would have to use the urban roads. The project complies with the Fuzhou Master plan and Fuzhou Transport Master Plan and as such the project roads will contribute to the completion and upgrading of the city road and transportation network.

The project will bring positive impacts or benefits to the environment and communities. From the city wide perspective, air quality is expected to improve due to the improved motor vehicle operation efficiency and increased average driving speeds. The new and upgraded roads including improved sidewalks and non-motorized vehicle facilities as well as public transportation will provide better services to citizens of the city and contribute significantly to community development, attracting outside investment, quality of life of area residents, convenient outings and getting around in the city. The technical assistance in environmental planning for the transportation sector will help the city in establishing sustainable development approach when making further improvement into its urban transport system into the future.

However, construction and operation of the project will result in a number of adverse impacts to the physical and socio-economic environment in the Project areas. Potentially, these impacts include increased dust, noise (day and night time), land occupation, wastewater discharge, vibration, encroachment to cultural relics sites and tree cutting during construction and motor vehicle emissions and deteriorating air quality along project road areas, significantly increased noise levels at sensitive receptors, surface runoff to the river and wetland areas, community severance, and accidental releases of...
hazardous materials from tank trucks to the river. Some of these impacts can be significant.

With the mitigation measures designed specifically to address the above listed adverse impacts, the impacts will be prevented, reduced, minimized or otherwise compensated. Furthermore, an environmental management systems involving environmental management and supervision organizations, environmental monitoring, institutional strengthening and personnel training will be established to ensure the environmental performance of the Project. With appropriate implementation of the mitigation measures, as well as the environmental management systems, the adverse impacts will be reduced to acceptable levels. The Project is environmentally acceptable and feasible when mitigation measures and EMP are implemented effectively.