External Environmental Monitoring Report

# 2 Report
February 2012

PRC: Qingdao Water Resources and Wetland Protection Project

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ADB Loan No. 2494-PRC:
Qingdao Water Resources and Wetland Protection Project

Environmental Monitoring Report

Environmental Monitoring Entity: Jiaozhou Environmental Protection Bureau Environmental Monitoring Station (JZEMS)

Consulting Firm: Easen International Co., Ltd

Project EA: Jiaozhou Project Management Office (JPMO)


1 PROJECT INTRODUCTION

1.1 BACKGROUND OF PROJECT

Jiaozhou City is one of the seven Districts and five Cities under the Administration of Qingdao City. The City has a total population of 1.1 million, including 790,000 permanent populations and the urban population of over 450,000. The City falls within the temperate monsoon climate and the average temperature of the area is 12˚C. The annual average rainfall is 686.1 mm, and the rainfalls in Spring, Summer, Autumn and Winter account for 14%, 57%, 22% and 7% respectively of the total annual rainfall. The Sanlihe River, Hucheng River, Yunxihe River and the Urban East Ditch, which together are called “three rivers”, all run through the City of Jiaozhou. The three river courses run through the Urban District from the South, Middle and North respectively, and converge into the related catchment.

The Jiaozhou City authorities have vigorously developed invitation to merchants and investment, as well as the construction of Industrial Parks since the 1990s, fact which has played a crucial role in the expansion of the Urban Area and a stable economic development. The local economic planners have formed a leading Industrial System composed of Machinery, Electronic, Chemical, Building Materials, Light Textile and Foods, among others, and the City has evolved as an important base for Industrial Processes, Commercial Storage and Logistics for the
Circum-Jiaozhou Bay Economic belt.

The construction of Urban Infrastructure Projects in the Jiaozhou City area has entered into a period of accelerated expansion. However, compared with the Economic Development in the region, the construction of Municipal Facilities is relatively backward. Population growth and the construction of Industrial Parks have caused a constant increase in sewage volume. Due to the current imperfections in the Drainage System, the collection of vast amount of sewage water and distribution to sewage treatment plants has been miscarried, resulting in discharge into urban river courses through hidden canals or self-built pipelines, practices which not only cause pollution of the urban water bodies but also pose severe threats for the water environment in the Daguhe River and the Jiaozhou Bay. Meanwhile, due to the lack of funds, inefficient Flood-Prevention Standards have been set for the “three-river” courses in the past and previous damage to the main river courses threatens the Health and Safety of neighboring residents. Furthermore, the protection banks have been damaged in several locations with severely sludged river bed and rampant wild grass. The various problems observed in the current River Course have resulted in a negative impact to the river’s flood flow and the living conditions of the neighboring residents during the flood season, fact which has put forth the pressing need for comprehensive Control and Regulation of the Urban River Courses.

The rationale for the Project arises from the need to address the aforementioned problems and constraints confronting Jiaozhou’s Water Resources and Environment Sector, and to assist the JCG in meeting its Environmental Protection and Improvement objectives and targets as embodied in its 11th FYP. Among a number of concerns identified in the course of the Sector Review and Assessment, improvement of (i) Environmental Management and Pollution Control and (ii) Water Resources, particularly Flood Management, stand out as the most pressing, requiring priority attention from the county Government. The Project is designed to ensure the sustainability of JCG’s immediate Environment and Water Resources Protection and Improvement initiatives through infrastructure investments aimed at improving Water Quality via Pollution Control and Flood/Drainage Management as part of an overall strategy for protecting environmental conditions in the Jiaozhou Bay and preserving wetland areas. In addition, the Project will reinforce the capability of Local Governments and Communities to undertake Environmental and Flood Management actions in order to complement the Infrastructure Investments.
These interventions are expected to have a positive impact on both the immediate and downstream environments which, in turn, will result in a significant positive impact on the sustainability of JCG’s and QMG’s Economic Development and on the improvement of the quality of life of affected communities.

1.2 OVERVIEW OF THE PROJECT

Component 1: Improving Water Resources and Flood Management. ADB would finance $38.85million to this component, including 3 sub-projects as follow:

a) Upgrading the Erli’he Flood Retention Facilities. Including embankment works, reservoir dredging, greening, drainage channels and a flood-discharging gate. The water conservancy capacity of Erli’he reservoir would be upgraded to 572,500 m³, and the total retention capacity would be upgraded to 873,000 m³. It would (1) reduce the risk of flood and related disaster; (2) upgrade the capacity of flood retention of the downstream, and regulate the current in the tunnels during the dry season. (3) improve the water environment in the reservoir. This component will be financed $2.87million.

b) Rehabilitation of Urban River Courses. It’s planned to implement the river dredging, embankment works and greening for Yunxi River, Hucheng River, Shidong River and Sanli River which total length will be 19.5km. Shidong River will connect with Yunxi River through dredging and cleaning up the deposits, sludge and household rubbish flushed down from the upstream areas to ensure the required water circulation. These rehabilitated river courses would rebuild the water circulation, reduce flood risk and improve the ecological environment. This component will be financed $28.28million.

c) Upgrading Storm-water Drainage. It is planned to upgrade the urban stormwater discharging pipelines of Dezhou Road, Fuzhou Road, Quanzhou Road, Beijing Road, Shanghai Road, Guangzhou Road and Hangzhou Road, and total length will be 11.4km. The improved urban drainage system will serve as the effective supplement to the flood prevention and management. This component will be financed $7.40million.

Component 2: Strengthening Wastewater Management and Pollution Control.
This component includes sewage collection system improvement and interception at the two sides of each river course which will be 27.7km. The improved sewage network will contribute to the reduction of serious water pollution issues and sedimentation in the open channels of the old urban area as well as to the improvement of the ecological environment and water environment. This component will be financed $3.64million.

**Component 3: Integrated Water and Ecosystem Management.** This component will implement a series of measures to ensure the effective utilization of related infrastructures and facilities, includes (i) capacity improvement for flood and water resources management, (ii) environmental management and pollution control, and (iii) sustaining improvement of Shaohai artificial lake ecological system. This component will be financed $1.88million.

**Component 4: Project Management and Consulting Service.** This component will strengthen the project management capacity of Jiaozhou Three Rivers Rehabilitation Management Office (act as JPMO) by trainings and provision of vehicles and equipment. The consulting service will assist with (i) procurement; (ii) hydraulic, structural, and wastewater treatment engineering; (iii) project monitoring and evaluation; (iv) resettlement supervision; and (v) environmental monitoring, etc. This component will be financed $0.93million.

### 1.3 Related Project Progress

<table>
<thead>
<tr>
<th>No.</th>
<th>Sub components</th>
<th>Job description</th>
<th>Level of fulfillment of plan</th>
<th>Time of start</th>
<th>Time of completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yunxi'he downstream sewage pipeline rehabilitation and reservoir bank</td>
<td>Bank protection 3060 square meters</td>
<td>Completed</td>
<td>2010.4.25</td>
<td>2010.7.24</td>
</tr>
<tr>
<td></td>
<td>Protection</td>
<td>Description</td>
<td>Start Date</td>
<td>End Date</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>------------</td>
<td>----------</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Erl'ihe reservoir bank protection</td>
<td>Bank protection 2900 square meters</td>
<td>Complete d</td>
<td>2010.4.20 2010.7.8</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>and steel-gate dam construction</td>
<td>3 steel-gate dams</td>
<td>Complete d</td>
<td>2010.4.20 2010.6.20</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Erl'ihe reservoir steel-gate and electrical equipment procurement</td>
<td>1.Construction and installation of 3 gates 2.Installation of 3 hydraulic hoists, 3 control boxes with supporting facilities 3.Testing</td>
<td>Complete d</td>
<td>90 days within the contract agreement</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Yunxi'he downstream and Erl'ihe reservoir integrated rehabilitation work</td>
<td>Storm water pipeline 2181 meters, bank protection with ecological bags 4383 meters, water supply pipeline 3240 meters, electrical cable 5892 meters, terrain mode construction 7920 square meters</td>
<td>Complete d</td>
<td>2010.6.5 2010.12.3</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Storm water pipeline 1729 meters, bank protection with ecological pad 4489 meters, water supply pipeline 3820 meters, electrical cable 7199 meters, terrain mode construction 17360 square meter, asphalt</td>
<td>Complete d</td>
<td>2010.6.5 2010.12.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5
<table>
<thead>
<tr>
<th>#</th>
<th>Description</th>
<th>Area / Details</th>
<th>Completion Date</th>
<th>Planned Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>work on Binhe road</td>
<td>11685 square meters</td>
<td>Complete 2010.6.5</td>
<td>2010.12.3</td>
</tr>
<tr>
<td></td>
<td>Terrain mode work</td>
<td>10972 square m, 4 landscape walls, 9 ponds, 1 pedestrian bridge, wooden walkway</td>
<td>Complete 2010.6.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>96 meter, center island 3300 square m, cable line 25700 m.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Terrain mode work with cable line</td>
<td>7000 square m, main road 1600 square m, road shoulder 3700 m.</td>
<td>Complete 2010.6.5</td>
<td>2010.12.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Yunxi'he, Xihu park-Jidanshi bridge and Hucheng'he upstream integrated</td>
<td>Dredging 50,000 cubic m, bank protection 1700 m, wastewater pipeline 1716 m,</td>
<td>Complete 2010.7.15</td>
<td>2010.12.3</td>
</tr>
<tr>
<td></td>
<td>rehabilitation work. West Lanzhou road wastewater pipeline construction work</td>
<td>landscape 610 m, terrain mode 5000 square m, 3 scenery bridges, wooden walkway 180 m.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>Dredging 4.9 cubic meter, bank protection 2300 m, wastewater pipeline 1098 m, storm water pipeline 1408 m, terrain mode 4900 square m, 1554 trees, landscape 12,000 square m, 1 scenery bridge</td>
<td>Complete 2010.7.15</td>
<td>2010.12.3</td>
</tr>
<tr>
<td>No.</td>
<td>Project Description</td>
<td>Details</td>
<td>Status</td>
<td>Start Date</td>
</tr>
<tr>
<td>-----</td>
<td>---------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------</td>
<td>--------------</td>
<td>--------------</td>
</tr>
<tr>
<td>13</td>
<td>Xihu park dredging and bank protection construction</td>
<td>Bank protection 1500 meters, dredging 20,000 cubic meters</td>
<td>Complete</td>
<td>2011.2.18</td>
</tr>
<tr>
<td>14</td>
<td>Steel-gate and supporting equipment for Simenshou road and Jinzhou road</td>
<td>1. Construction and installation of 2 gates, axle equipment; 2. 2 hydraulic gates, 3 sets of control boxes and supporting equipment; 3. Testing</td>
<td>Complete</td>
<td>—</td>
</tr>
<tr>
<td>15</td>
<td>Yuxin'he at Jiaohuang railway – Yangzhou road main channel excavation construction</td>
<td>Dredging 308,000 cubic meter</td>
<td>Complete</td>
<td>2011.3.24</td>
</tr>
<tr>
<td>16</td>
<td>Storm water drainage project for Yunxi'he (between Fuzhou road and Jiaohuang railway)</td>
<td>Road construction 1176 meter, closed conduit 1394 meters</td>
<td>80% completed</td>
<td>2011.4.18</td>
</tr>
<tr>
<td>17</td>
<td>Xihuan Park integrated rehabilitation work</td>
<td>Terrain mode 15,000 square meters, 1 boat dock, 3 water views, 6 riverside platforms, 5 scenery bridges, trail 1544 meters</td>
<td>Complete</td>
<td>2011.4.18</td>
</tr>
<tr>
<td>18</td>
<td>Dredging, bank protection and sewage project for Yunxi'he (Fuzhou road and)</td>
<td>Dredging 11,000 cubic meter, protection wall 1814 meters, closed conduit 850 meters, storm water pipeline 800 meters</td>
<td>Complete</td>
<td>2011.5.9</td>
</tr>
<tr>
<td></td>
<td>Project Description</td>
<td>Work Details</td>
<td>Completion Dates</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>-------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>---------------------</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Yunxi’he middlestream integrated rehabilitation (Changzhou road – Fuzhou road)</td>
<td>Terrain mode 12,000 square meter; capstone installation 1517 meters; land cover 11,143 square meter; cable 20,000 meters</td>
<td>2011.10.1 2012.5.1</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Yunxi’he (Taiping road – Fuzhou road) wastewater project</td>
<td>Wastewater pipeline 614 meters</td>
<td>2011.10.1 2012.2.29</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Hucheng’he dredging, bank protection and sewage project (Xihu park – Hangzhou road)</td>
<td>Dredging 20,000 cubic meter; bank protection 1746 meter; storm water/wastewater pipeline 1456 meters; road 4800 square meters</td>
<td>2011.11.1 2012.5.30</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Hucheng’he dredging, bank protection and sewage project</td>
<td>Dredging 35,000 cubic meters; bank protection 1615 meters; storm water/wastewater pipeline 2023 meters; road 7888 square meters</td>
<td>2011.11.1 2012.5.30</td>
<td></td>
</tr>
</tbody>
</table>
2 PURPOSE OF ENVIRONMENTAL MANAGEMENT

Based on the requirements in the EIA and the EMP (accessory of SIEE, which published in ADB website) of the Project, the objectives of the monitoring are:

- to assess if the statuses of constructions satisfy the project performance indicators, as well as both ADB’s and China’s environmental policies and standards;
- to evaluate extent and severity of environmental impacts compared with the predicted impacts;
- to inspect contractors’ performance of the environmental impacts mitigation measures or compliance with related rules and regulations;
- to answer and solve public complains;
- to evaluate trends of impacts and overall effectiveness of the project’s Environmental Management Plan (EMP).
3 ENVIRONMENTAL MANAGEMENT MEASURES

Entrusted by JPMO, Jiaozhou Environmental Monitoring Station (JZEMS) conducted the monitoring and the environmental inspections for those construction sections of Erli River, Hucheng River Jiaozhou Road-Lanzhou Road, Yunxi River Downstream, Yunxi River Longzhou Road-Lanzhou Road during 13 to 15 December 2010.

Table 3.1 Environmental Mitigation Measures For Construction

<table>
<thead>
<tr>
<th>Environmental Factors</th>
<th>Environmental Impact</th>
<th>Mitigation Measures and Management Arrangements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>Construction and domestic wastewater</td>
<td>The construction site should be closed; temporary simple septic tank is built; and temporary water storage tank is set up.</td>
</tr>
<tr>
<td></td>
<td>Leaching water of sediment dumping yard</td>
<td>The treatment of chemicals addition and sedimentation is adopted.</td>
</tr>
<tr>
<td>Atmosphere</td>
<td>Construction and transportation dust</td>
<td>The work site is closed; dusty roads should be sprayed with water; covering measures or sealed vehicles should be used for transportation; the transportation route should be properly selected; the speed of transport vehicles is limited; the construction materials should be covered or sprayed with water; the duration should be minimized for storing the construction materials on site.</td>
</tr>
<tr>
<td></td>
<td>Tail gas pollution due to vehicles and construction machinery</td>
<td>Excellent maintenance to make the exhaust discharge of automobiles and machineries meet the standard.</td>
</tr>
<tr>
<td>Noise</td>
<td>Noise from the construction machinery and transportation vehicles</td>
<td>The construction equipments should be well maintained and properly operated so that the equipment noise is minimized; the temporary sound-proof fence should be set up if necessary. The construction activity is rationally scheduled and should be arranged in daytime. No construction activity is allowed during 22:00~6:00; The transportation route should be carefully selected to avoid any residential area.</td>
</tr>
<tr>
<td>Solid waste</td>
<td>Huge quantity of spoils in the initial period of construction</td>
<td>The excavated earthwork is used for consolidation of the dike and road construction. The sludge should be stored at the sediment dumping yard with beneficial use. The construction waste is classified into the useful and non-useful. The useful part is reused, while the non-useful part is transported to the landfill site for disposal.</td>
</tr>
</tbody>
</table>
The Project Consultant, Easen International Co., Ltd. distributed standard forms for inner environmental monitoring to each of the contractors in 2010 end, which will be submitted to the consultant every month with the signatures of contractors and construction supervision engineers.

Easen held an environmental monitoring training in November 2010 according to the implementation status. This training content includes:

- Objectives and requirements of EMP during construction;
- Contractors’ regulations and personnel for environmental protection during construction;
- Relevant environmental laws, regulations and standards;
- Major environmental impacts and corresponding mitigation measures;
- Detailed monitoring parameters and site environmental inspection;
- Requirements and explanation for filling-in the environmental daily and monthly reports.

After the training, the training materials and the standard tables were distributed to all the contractors. Easen required the contractors to commit all the mitigation measures, and incorporated all the environmental regulations into their QA/QC systems.

All the contractors submitted the tables/forms on schedule based on the Consultant’s requirements.
# 4 ENVIRONMENT PROTECTION TARGETS

Table 4.1 List of Environment Protection Targets

<table>
<thead>
<tr>
<th>No.</th>
<th>Environmental Factors</th>
<th>Environment Protection Targets</th>
<th>Applied Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Surface Water environment</td>
<td>Erli River Reservoir Category-IV</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hucheng River Category-IV</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yunxi River Category-IV</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Atmosphere environment</td>
<td>Zhongyun District Committee Category-II</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Yunxi District Committee Category-II</td>
<td></td>
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<td></td>
<td></td>
<td>Sizhou Electric Equipment Factory Category-II</td>
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<td></td>
<td></td>
<td>Erli’he Heating Plant Category-II</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Erli’he Village Category-II</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yunxi Star Garden Category-II</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shiyan Primary School Category-II</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shizhong Farmers Market Category-II</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Guojiashuang subdistrict Category-II</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Acoustic environment</td>
<td>Zhanxi Village Category-II</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Erli’he Village Category-II</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yunxi Star Garden Category-III</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shiyan Primary School Category-II</td>
<td></td>
</tr>
</tbody>
</table>
5 WORK SCOPE OF THE ENVIRONMENT MONITORING

According to the environmental targets for sensitive receivers and identified objectives and the impact that was shown in the EIA of the project, along with the actual progress that was conducted the field survey and environmental monitoring. The scope of 1st external environmental monitoring as follows:

1) The specific monitoring location and time would be indentified accorded with the progress of construction, scope and content of work.

2) The monitoring points would be distributed around the sensitive points, as resident area, school, etc. Complying with the protection objectives of EIA simultaneously that accorded with the density of population, scope and content of work and progress of construction to distribute the representative points in plants and factories.

3) During the monitoring, the simply record was made that is composed with the time, weather situation, monitoring Parameters, contractor’s name, scope of work, working time and utilized equipments.

5.1 SURFACE WATER MONITORING

- Location: Xihu park construction site, Hucheng’he at Hangzhou bridge, Yunxi’he at Changzhou bridge.
- Date: 13 January, 2012
- Frequency: 1 time daily.
- Items: pH, SS, COD, NH₄-N, BOD₅, oil, TP.

5.2 ATMOSPHERE MONITORING

- Location: Xihu park construction site, Hucheng’he construction site between Simenshou road and Guangzhou road; and Yunxi’he construction site between Changzhou road and Fuzhou road as well as some other atmosphere environment sensitive receivers nearby.
- Date: January 13 and 14, 2012
- Frequency: sampling duration for at least 45 minutes per hour, at least 12 hours per day
- Items: TSP

5.3 NOISE MONITORING

- Location: Xihu park construction site, Hucheng’he between Simenshou
road and Guanghou road; Yunxi’he between Changzhou road and Fuzhou road and all sensitive receivers within 150 meters of the construction site boundary

- Date: January 18, 2012
- Frequency: once respectively in daytime and nighttime for a whole day
- Items: Leq(A)
6 MONITORING METHOD AND EVALUATION STANDARD

According to the relevant national regulations, environmental function division of construction spots and relevant contents in the EIA reports for the Project, the monitoring method and evaluation standards are determined as follows (see Table 6-1).

Table 6-1 List of Monitoring Methods and Evaluation Standards

<table>
<thead>
<tr>
<th>Environmental Factors</th>
<th>Sampling and Analyzing Method</th>
<th>Evaluation Standards</th>
</tr>
</thead>
</table>
| Noise                              | Environmental quality standard for noise (GB3096-2008)  
|                                   | Noise Measurement Methods for Construction Site Boundary (GB12524)  
|                                   | Agricultural Sludge Monitoring and Analysing Methods  
|                                    | Control Standards for Pollutants in Sludge from Agriculture Use (GB4284-84): Neutral and Alkaline Soil Standard |
7 ENVIRONMENTAL MONITORING AND EVALUATION

7.1 SURFACE WATER MONITORING

Table 7.1 assembles the water quality monitoring results of Erli’he Reservoir, Hucheng River and Yunxi River.

**Table 7.1 Surface Water Monitoring Results**

Unit: mg/L (except pH)

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>pH</th>
<th>SS</th>
<th>COD</th>
<th>NH₄-N</th>
<th>BOD₅</th>
<th>Oil</th>
<th>TP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.13</td>
<td>Xihu park</td>
<td>7.16</td>
<td>24</td>
<td>41</td>
<td>3.28</td>
<td>13</td>
<td>None</td>
<td>0.19</td>
</tr>
<tr>
<td></td>
<td>Hucheng’he-Hangzhou Road bridge</td>
<td>7.17</td>
<td>12</td>
<td>54</td>
<td>3.87</td>
<td>10</td>
<td>None</td>
<td>0.21</td>
</tr>
<tr>
<td></td>
<td>Yunxi’he-Changzhou Road bridge</td>
<td>7.15</td>
<td>41</td>
<td>37</td>
<td>25.6</td>
<td>16</td>
<td>None</td>
<td>0.25</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th></th>
<th>pH</th>
<th>SS</th>
<th>COD</th>
<th>NH₄-N</th>
<th>BOD₅</th>
<th>Oil</th>
<th>TP</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-9</td>
<td>30</td>
<td>1.5</td>
<td>6</td>
<td>0.5</td>
<td>0.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results showed that:

The water qualities of Xihu park, Hucheng’he and Yunxi’he do not reach the requirement of Surface Water Environment Quality Standards (GB3838-2002): Category-IV Standards. River quality of these sites actually drops in the range of Category-V Standards in GB3838-2002. The water qualities of Yunxi River at Changzhou Road are even worse and the water is totally contaminated seriously with NH₄-N high above the regulation. The COD and BOD at all the locations monitored exceed related standards much more.
7.2 ATMOSPHERE MONITORING (DUST)

Table 7.2 Construction Dust Monitoring Result  (Unit: mg/m³)

Xihu Park Construction Site

<table>
<thead>
<tr>
<th>Location</th>
<th>Contaminant</th>
<th>TSP</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>East wall of Xihu Lijing</td>
<td></td>
<td>0.145</td>
<td>Upwind</td>
</tr>
<tr>
<td>Shiyan elementary school</td>
<td></td>
<td>0.349</td>
<td>Downwind</td>
</tr>
<tr>
<td>Simenshou road Bridge</td>
<td></td>
<td>0.42</td>
<td>Downwind</td>
</tr>
</tbody>
</table>

Hucheng’he (Simenshou Road- Guangzhou Road)

<table>
<thead>
<tr>
<th>Location</th>
<th>Contaminant</th>
<th>TSP</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southwest of Hetouyuan village</td>
<td></td>
<td>0.221</td>
<td>Upwind</td>
</tr>
<tr>
<td>Inside of Shengli kindergarten</td>
<td></td>
<td>0.359</td>
<td>Downwind</td>
</tr>
<tr>
<td>North of Jialejia supermarket</td>
<td></td>
<td>0.419</td>
<td>Downwind</td>
</tr>
</tbody>
</table>

Yunxi’he (Changhou Road- Fuzhou Road)

<table>
<thead>
<tr>
<th>Location</th>
<th>Contaminant</th>
<th>TSP</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entrance of Dafulong hot pot restaurant</td>
<td></td>
<td>0.201</td>
<td>Upwind</td>
</tr>
<tr>
<td>Inside of Datong elementary school</td>
<td></td>
<td>0.453</td>
<td>Downwind</td>
</tr>
<tr>
<td>Inside of No.6 high school</td>
<td></td>
<td>0.389</td>
<td>Downwind</td>
</tr>
</tbody>
</table>

Class II standard of Ambient Air Quality Standard (GB3095-1996), the daily average concentration limit value of TSP is 0.3 mg/m³ is used as the monitoring standard.

The results show that the concentration of TSP at atmosphere sensitive receivers around construction sites in the list above all failed to meet the Class II standard that is stipulated in Air Quality Standard (GB3095-1996)
7.3 Noise Monitoring

During the monitoring period, the work was implemented in daytime and no work in nighttime, the noise monitoring results was shown in Table 7.6-1 and -2.

**Table 7.3 Monitoring Results for Construction Sites**

<table>
<thead>
<tr>
<th>No.</th>
<th>Leq</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Day</td>
</tr>
<tr>
<td>1-1</td>
<td>53.3</td>
</tr>
<tr>
<td>1-2</td>
<td>52.8</td>
</tr>
<tr>
<td>1-3</td>
<td>51.5</td>
</tr>
<tr>
<td>2-1</td>
<td>55.0</td>
</tr>
<tr>
<td>2-2</td>
<td>53.8</td>
</tr>
<tr>
<td>2-3</td>
<td>54.9</td>
</tr>
<tr>
<td>3-1</td>
<td>54.5</td>
</tr>
<tr>
<td>3-2</td>
<td>54.0</td>
</tr>
</tbody>
</table>

The equivalent continuous A-weighted sound pressure levels for construction sites complied with Earth and Stone work in “Noise limits for construction site” (GB12523-1990), namely is day 75dB(A) and night 55dB(A). Please refer to the appendix 2 for the monitoring locations onsite.

The results show that the noise level at 8 locations around all the construction sites listed above were satisfied to the Table-1 standard for earth and stone work period in Noise Limited for Construction Site (GB12523-1990).

In summary, the equivalent continuous A-weighted sound pressure levels for 3 construction sites all meet the standard stipulated in “Noise limits for construction site” (GB12523-1990), the equivalent continuous A-weighted sound pressure levels around the sensitive points in day and night were satisfied the requirements of Environmental Standard for Noise (GB3096-2008)

7.4 Summary of Monitoring

Based on the site monitoring and data analysis, the monitoring results of surface
water, air and noise of all the components are listed below:

The results of surface water and air quality monitoring for all the construction sites as well as surrounding environment sensitive points all fail to meet the corresponding regulations. Only noise level of all sites meets the standard. The water qualities of Xihu park, Hucheng’he and Yunxi’he all fail to meet the regulation. The situations at residential area along Yunxi’he banks and Fuan high school are even worse. The dredging work had been done and not much work was performed in this period, so there was no environmental impact caused by dredging in this term.

Note: the specific location and monitoring points were shown in Figure 1.
8 Conclusions and Recommendations

Based on the site survey and monitoring for the external environment monitoring report in second half of 2011, it is found that the contractors of undergoing or completed projects have undertaken the relevant environmental management measures specified in the project EIA reports and EMP, and shown enough concern on the possible negative environmental impact due to the project construction. According to the monitoring results, the mitigation measures undertaken during the project implementation have minimized the adverse environmental impact. The conclusions of the environmental monitoring are summarized as follows:

After the mitigation measures have been undertaken, the noise indicator around the sensitive points are satisfied to the related standard, however, wastewater drainage, construction dust and noise of construction boundary fail to meet the related standards in most of the construction sites. So is the TSP issue.

The water quality of Xihu park, Hucheng’he and Yunxi’he didn’t meet the requirement of Surface Water Environment Quality Standards (GB3838-2002): Category-IV Standards. Water quality of these locations actually can be classified into Category-V Standards in GB3838-2002.

As regard to the dredging, the sludge was shipped to landfill site or acclaimed far away; the dredging was not an issue for this project in this term.

The relevant recommendations are listed as below:

The mitigation measures for environment impact should be listed in related construction contracts of new sub-projects.

The contractors should carry out a good practice of environment, healthy and safety (EHS), strengthen the construction supervision and management, and minimize the negative impact on the environment.

The contractors should continue to strictly implement the environment management plan and measures, and reduce the adverse impacts of wastewater, dust and mechanical noise on the environment during construction;
### Appendix 1: Monitoring Evaluation Standards and limit value

<table>
<thead>
<tr>
<th>Environmental Factors</th>
<th>Evaluation Standards</th>
<th>Monitoring Items</th>
<th>Standard</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Surface Water Environment Quality Standard (GB3838-2002): Category-IV</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>pH</td>
<td></td>
<td>6-9</td>
<td>/</td>
</tr>
<tr>
<td></td>
<td>CODcr</td>
<td></td>
<td>30</td>
<td>mg/l</td>
</tr>
<tr>
<td></td>
<td>NH₃-N</td>
<td></td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BOD₅</td>
<td></td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oil</td>
<td></td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TP</td>
<td></td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Surface Water Environment Quality Standard (GB3838-2002): Category-V</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>pH</td>
<td></td>
<td>6-9</td>
<td>/</td>
</tr>
<tr>
<td></td>
<td>CODcr</td>
<td></td>
<td>40</td>
<td>mg/l</td>
</tr>
<tr>
<td></td>
<td>NH₃-N</td>
<td></td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BOD₅</td>
<td></td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oil</td>
<td></td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TP</td>
<td></td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Standards of Wastewater Quality Discharged to Urban Sewer (CJ3082-1999)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>pH</td>
<td></td>
<td>6-9</td>
<td>/</td>
</tr>
<tr>
<td></td>
<td>CODcr</td>
<td></td>
<td>500</td>
<td>mg/l</td>
</tr>
<tr>
<td></td>
<td>NH₃-N</td>
<td></td>
<td>35</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BOD₅</td>
<td></td>
<td>400</td>
<td></td>
</tr>
<tr>
<td><strong>Atmosphere</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Environmental Air Quality Standard (GB3095—1996): Class-II</strong></td>
<td>TSP</td>
<td>0.30</td>
<td>mg/m³</td>
</tr>
<tr>
<td></td>
<td><strong>Odorous Pollutant Discharge Standards (GB14554-93): Class-II</strong></td>
<td>ODOR</td>
<td>20</td>
<td>/</td>
</tr>
</tbody>
</table>
### Soil Control Standards for Pollutants in Sludge from Agriculture Use (GB4284-84): Neutral and Alkaline Soil Standard

<table>
<thead>
<tr>
<th>Element</th>
<th>Limit (mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pb</td>
<td>1000</td>
</tr>
<tr>
<td>Cd</td>
<td>20</td>
</tr>
<tr>
<td>Cr</td>
<td>1000</td>
</tr>
<tr>
<td>Cu</td>
<td>500</td>
</tr>
<tr>
<td>Zn</td>
<td>1000</td>
</tr>
<tr>
<td>As</td>
<td>75</td>
</tr>
<tr>
<td>Hg</td>
<td>15</td>
</tr>
</tbody>
</table>

### Soil Environment Quality Standard (GB15618-1995) Class II

<table>
<thead>
<tr>
<th>Element</th>
<th>Limit (mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pb</td>
<td>300</td>
</tr>
<tr>
<td>Cd</td>
<td>0.6</td>
</tr>
<tr>
<td>Cr (Paddy field)</td>
<td>300</td>
</tr>
<tr>
<td>Cu</td>
<td>100</td>
</tr>
<tr>
<td>Zn</td>
<td>250</td>
</tr>
<tr>
<td>As</td>
<td>25</td>
</tr>
<tr>
<td>Hg</td>
<td>0.5</td>
</tr>
</tbody>
</table>

### Noise Limit for Construction Site Boundary (GB12523—1990) (complied with Earth and Stone work)

<table>
<thead>
<tr>
<th>Time</th>
<th>Limit (dB(A))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nighttime</td>
<td>75</td>
</tr>
<tr>
<td>Daytime</td>
<td>55</td>
</tr>
</tbody>
</table>

### Environmental Quality Standard for Noise (GB3096—2008)

- **“Category II Area” Standard**
  - Nighttime: 60 dB(A)
  - Daytime: 50 dB(A)
- **“Category III Area” Standard**
  - Nighttime: 65 dB(A)
  - Daytime: 55 dB(A)
Appendix 2: Display of Noise Monitoring Spots Distribution

Pic1 Xihu Park construction site monitoring spot

Pic2 Hucheng’He construction site between Simenshou road and Guangzhou road monitoring spot
Pic3 Yunxi’He construction site between Changzhou road and Fuzhou road monitoring spot
Appendix 3: Pictures of Noise Monitoring Onsite