Environmental Assessment Report

Initial Environmental Examination
Project Number: 40641-013
October 2013

People's Republic of China: Hebei Small Cities and Towns Development Demonstration Sector Project (Longhua Miaoshan Waste Water Treatment Component)

Prepared by the Hebei provincial government for the Asian Development Bank (ADB)

CURRENCY EQUIVALENTS

(as of 10 May 2011)

Currency Unit – yuan (CNY)

CNY1.00 = $0.15

$1.00 = CNY6.5

ABBREVIATIONS

ADB	–	Asian Development Bank
AP	–	Affected Person
LCG	–	Longhua County Government
COD	–	Chemical Oxygen Demand
EA	–	Executing Agency
EIA	–	Environmental Impact Assessment
EMC	–	Environment Monitoring Center
EMP	–	Environmental Management Plan
EPB	–	Environmental Protection Bureau
GDP	–	Gross Domestic Product
IA	–	Implementing Agency
IEE	–	Initial Environmental Examination
MEP	–	Ministry of Environmental Protection
NH_3-N	–	Ammonia Nitrogen
NO_x	–	Nitrogen Oxide
PMO	–	Project Management Office
PPTA	–	Project Preparatory Technical Assistance
PRC	–	People's Republic of China
SEIA	–	Summary Environmental Impact Assessment
SPS	–	Safeguard Policy Statement

WEIGHTS AND MEASURES

Ha	–	hectare
km	–	kilometer
km^2	–	square kilometer
m	–	meter
m^2	–	square meter
m^3	–	cubic meter
m^3/a	–	cubic meters per annum
mg/l	–	milligrams per liter
mg/m^3	–	milligram per cubic meter
mm	–	millimeter
t/a	–	tons per annum

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附图1　拟建项目地理位置示意图

I. EXECUTIVE SUMMARY

A. Background

1. Located in the north of Chengde City, Hebei Province, Longhua County is situated in the north of Yanshan Mountains where the Inner Mongolia Plateau borders with Yanshan Mountains. The geographic coordinates of Longhua is E116° 47′ ～118° 18′ , N41° 08′ ～ 41° 50′ . The industry of the county is pillared with mineral extraction and processing, machinery manufacturing and processing, and agricultural product processing. The main industrial products of the county include iron powder, air blower, pig iron, valves, patent herbal medicine, graphite and carbon products, cement, bricks, rice, juice, juice drinks and etc.

2. The sewage system of Longhua is combined of domestic waste water and storm water discharge. The drainage pipes are covered trenches aligned along either or both sides of the pedestrians. Most wastewater are collected into a water collecting pool through the covered ditches, and then discharged into Luan River through open canals. When precipitation is low, the rain water mostly discharged by the covered tunnels. When precipitation is high, storm water discharged by trenches and streets simultaneously. During the wet seasons, contaminated water often flow across the streets, which causes serious pollution and obvious decrease of water quality in the water body. In 2008, a wastewater treatment plant (WWTP) was built by the county government. The treatment capacity of the WWTP is 20,000 m^3/d. It was mainly designed to collect wastewater from the urban area of Longhua.

3. With the rapid industry and agriculture development, as well as the constant increasing of urban population, the generated wastewater is also increasing. So far, the daily wastewater discharge has already exceeded 20,000 m^3, thus the existing 20,000 m^3/d wastewater treatment plant cannot meet the treatment demand. In the mean while, there are still no wastewater collection networks in the south area of the county. Ground water is threatened by the uncollected wastewater, so is the living standard and investment environment of the county.

4. According to the Luan River-Hai River Pollution Prevention and Remediation Planning, the national requirements for the remediation of 3 Rivers, 3 Lakes and 2 Basins, and Chengde City's requirements to secure the water safety of relevant counties and Beijing, the urban wastewater of Longhua County plays a very important role along the diversion of Luan River to Beijing must be treated to guarantee the safety and sustainable development of Luan River-Hai River water basin. Promoting urban drainage system and treating wastewater before discharging to meet relevant standards are necessary for social development, which will bring huge social and environment benefits. As per the request of the State Council and Hebei Provincial Government, Longhua Miaoshan wastewater treatment plant must be constructed to meet the remediation requirements, improve environment quality, save energy and promote employment.

5. The SEIA for the original the Hebei Small Cities and Towns Development Demonstration Sector Project followed ADB's Environmental Assessment Guidelines (2003) and ADB Environment Policy (2003). The proposed Longhua Miaoshan Waste Water Treatment Component need to fulfill the domestic environmental impact assessment (EIA) process and ADB's Initial Environmental Examination (IEE) process respectively, according to both the PRC related environmental legislation requirements and ADB's Safeguard Policy Statement (2009) (SPS) requirements.

6. In order to facilitate ADB's final approval for the proposed Longhua Miaoshan Waste Water Treatment Component, a consulting firm was assigned to assist the Longhua County Government to prepare the related IEE in 2013.

B. IEE Features and Findings

7. The purpose of this IEE is to consolidate the results of the domestic EIA. The domestic EIA report has been prepared by qualified local institutes, using methodologies and standards consistent with relevant guidelines established by the PRC Ministry of Environmental Protection (MEP, former SEPA). The IEE was prepared in accordance with the requirements of the ADB Safeguard Policy Statement (2009)1 on the basis of the domestic EIA report that meets the requirements of the People's Republic of China (PRC) EIA Law (2003) and associated regulations. The approval authority for the domestic EIA document is Hebei Provincial Environmental Protection Bureau (EPB). The approval was gained in January 2013.

8. The IEE paid particular attention to issues such as project alternatives, public consultations, environmental economic analysis, environmental management plan and environmental monitoring program. Additional studies were undertaken in case deficiencies were discovered, to strengthen the IEE. The detailed environmental management plan (EMP) prepared under project implementation follows ADB requirements.

9. The IEE mainly contains ten sections. Section II of description of the Project presents the project rationale and its elements. Section III of policy, legal and administrative framework provides the PRC's EIA administrative framework, ADB's requirements and domestic EIAs situation at present. The information on physical and socioeconomic environment is illustrated in Section IV of description of environment. The environmental safeguard concerns are discussed in this section. Alternative analysis is given in Section V. Section VI, anticipated potential environmental impacts and mitigation measures, is a very important part of this IEE. In this section, the impacts and mitigation measures for both of construction phase and operation phase have been studied for the corresponding project activities. Section VII is about the environmental economic analysis. Environmental management plan is discussed in Section VIII. Public consultations and grievance redress mechanism are described in Section IX. The specific consultation activities for the proposed component are described in this section. Section X is the conclusion of this IEE. The EMP entails a summary of the anticipated impacts and mitigation measures, environmental monitoring program, public consultation program, responsibilities for implementation and supervision, institutional strengthening and training plan, reporting and supervision, work plan, cost estimates for environmental management, and mechanism for feedback and adjustment.

[1] ADB. 2009. *Safeguard Policy Statement.* Manila, Philippines.

II. DESCRIPTION OF THE PROJECT

A. Justification and Rational

10. Located in the north of Chengde City, Hebei Province, Longhua County is situated in the north of Yanshan Mountains where the Inner Mongolia Plateau borders with Yanshan Mountains. The geographic coordinates of Longhua is E116° 47′ ～118° 18′ , N41° 08′ ～41° 50′ . The industry of the county is pillared with mineral extraction and processing, machinery manufacturing and processing, and agricultural product processing. The main industrial products of the county include iron powder, air blower, pig iron, valves, patent herbal medicine, graphite and carbon products, cement, bricks, rice, juice, juice drinks and etc.

11. The sewage system of Longhua is combined of waste water and storm water discharge. The drainage pipes are covered trenches aligned along either or both sides of the pedestrians. Most wastewater are collected into a water collecting pool through the covered ditches, and then discharged into Luan River through open canals. When precipitation is low, the rain water mostly discharged by the covered tunnels. When precipitation is high, storm water discharged by trenches and streets simultaneously. During the wet seasons, contaminated water often flows across the streets, which causes serious pollution and obvious decrease of water quality in the water body. In 2008, a wastewater treatment plant (WWTP) was built by the county government. The treatment capacity of the WWTP is 20,000 m^3/d. It was mainly designed to collect wastewater from the urban area of Longhua.

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14. The existing sewage treatment plant in Longhua County is the Longhua County Waste Water Treatment Plant (WWTP), with treatment capacity of 20,000 m^3/d. The used sewage treatment technology is the BIOLAK sewage treatment craft, and the plant was examined and accepted by the environmental protection agency of Chengde City. In recent years, with the economic development of Longhua County and continuously extending of the urban scale, the domestic sewage in urban area of Longhua County has increased greatly, and the sewage treatment plant is close to full-load operation. At present, there are no sewage pipe networks in the southern part of the county, thus the sewage generated at the southern part of the county is unable to be collected. Due to that the untreated sewage is discharged into water body directly,

it causes great pollution to the surrounding surface water environment (Yixun River). Meanwhile, the Yixun River, as one of the surface water bodies supplying water to the Tianjin City, is class Ш water body, thus it is urgent to treat the water pollution.

15. In summary, the implementation of district heating will significantly improve local environment, and is important to the economic development and urbanization construction of the county. The improvement of infrastructure construction will not only make the county beautiful, but also improve investment environment, increase employment and boost economic development.

B. The Features of Proposed WWTP

16. In order to guarantee sustainable development of the local economy, to increase the people's living environment quality and improve the regional water environment quality, the Longhua County has decided to invest RMB 102.2521 million Yuan to build one urban WWTP at the downstream of existing sewage treatment plant, 8km to the present plant. The construction scale is 20,000 m3/d and collecting scope is the domestic sewage within Longhua county. Meanwhile, it will build corresponding sewage pipe networks.

Table 1：Engineering scope

Component	Equipment and material	Remark
Wastewater treatment plant	1. Process equipment; 2. Electrical equipment; 3. Control equipment	The designed capacity for shor-term (2015) is 20,000m^3/d, and 40,000^3/d for long-term (2020).
Associating networks	The total length of the network is 18687m. Material si reinforced cement.	Pipe diameter covers: DN300, DN400, DN500, DN800, DN1000, DN15000.

III. POLICY, LEGAL AND ADMINISTRATION FRAMEWORK

A. National and Local Legal Framework

17. This IEE and domestic EIA have been undertaken within the PRC national and local legal and institutional framework, which includes the PRC laws, regulations and standards listed below along with applicable provincial and local ordinances.

(i) Laws
   (1) Environmental Protection Law of the People's Republic of China (December 26, 1989);
   (2) Law of the People's Republic of China on Environmental Impact Assessment (October 28, 2002);
   (3) Law of the People's Republic of China on the Prevention and Control of Atmospheric Pollution (April 29, 2000);
   (4) Law of the People's Republic of China on the Prevention and Control of Water Pollution (Revised on February 18, 2008);
   (5) Law of the People's Republic of China on Prevention and Control of Pollution From Environmental Noise (October 29, 1996);
   (6) Law of the People's Republic of China on Prevention and Control of Environmental Pollution Caused by Solid Waste (December 29, 2004);
   (7) Cleaner Production Promotion Law of the People's Republic of China (Revised on February 29, 2012);
   (8) Law of the People's Republic of China on the Energy Conservation (Revised on October 28, 2007);
   (9) Circular Economy Promotion Law of the People's Republic of China (August 29, 2008);
   (10) Land Management Law of the People's Republic of China (August 28, 2004);
   (11) Water and Soil Conservation Law of the People's Republic of China (Revised on December 25, 2010).

(ii) Regulations
   (1) Document GF (2005) No. 39 Decision of the State Council on Implementing Scientific Outlook on Development and Strengthening Environmental Protection;
   (2) Order No. 253 of the State Council of the People's Republic of China Regulations on Construction Project Environmental Protection Management (November 18, 1998);
   (3) Guidance Catalog of Industrial Restructuring (2011 edition);
   (4) Interim Measures for Public Participation of Environmental Impact Assessment (March 18, 2006);
   (5) Systematic Management Directory for Environmental Impact Assessment of Construction Project (October 1, 2008);
   (6) Notice on Practically Strengthening Risk Prevention and Strictly Executing Environmental Impact Assessment Management (Document No. HF (2012) 98);
   (7) 10th NPC Standing Committee of Hebei Province Environmental Protection Act of Hebei Province (March 25, 2005);
   (8) 8th NPC Standing Committee of Hebei Province Regulations on Prevention and Control of Water Pollution in Hebei Province (October 25, 1997);
   (9) 8th NPC Standing Committee of Hebei Province Regulations on Prevention and Control of Atmospheric Pollution in Hebei Province (November 3, 1996);
   (10) Board No. 80 of NPC Standing Committee of Hebei Province Regulations on Construction Project Environmental Protection Management (December 17, 1996);
   (11) 10th NPC Standing Committee of Hebei Province Regulations on Pollutant Emission Reduction in Hebei Province (May 27, 2009);

(12) Order [2008] No. 2 of People's Government of Hebei Province Supervision and Administrative Measures for Prevention and Control of Environmental Pollution in Hebei Province (March 5, 2008);
(13) JZ (2008) No. 10 of People's Government of Hebei Province Several Opinions on Striving to Resolve Livelihood Issues;
(14) Directory of Construction Project with Support, Restriction and Prohibition in Environmental Sensitive Area of Hebei Province (Environmental Protection Bureau of Hebei Province, Development and Reform Commission of Hebei Province, September 2005);
(15) People's Government of Hebei Province (JZ (2009) No. 89) Opinions on Construction Project Implementation with Prohibition (Restriction) Approval in Area of Hebei Province (Trial);
(16) General Office of People's Government of Hebei Province BZ (2009) No. 36 Notice on Division of Power for Document Approval for Environmental Impact Assessment of Construction Project;
(17) Environmental Protection Bureau of Hebei Province JHBF (2007) No. 65 Interim Provisions for Several Issues of Construction Project Environmental Management;
(18) JHBF (2007) No. 70 Compilation Points for Technical Assessment Report of Construction Project Environmental Protection;
(19) JHBF (2007) No. 163 Pertinent Provisions on Strengthening Administration of Environmental Impact Assessment Document Compilation;
(20) Notice on Controlling Over Capacity and Repeated Construction of Some Industries and Guiding Sound Development of Industry (GF (2009) No. 38);
(21) Notice of the State Council on Further Strengthening the Elimination of Backward Production Capacity (GF (2010) No. 7);
(22) JHBF (2010) No. 238 Notice on Further Strengthening the Public Participation of Construction Project Environmental Assessment;
(23) Notice on Further Strengthening Prevention Environmental Risk of Environmental Impact Assessment Management (Document of Ministry of Environmental Protection, HF [2012] No. 77)
(24) Board on releasing Compilation Requirements of Abridged Edition of Construction Project Environmental Impact Statement (Board of Ministry of Environmental Protection, No. 51 in 2012)

(iii) Technical Code of Environmental Protection

(1) Technical Guidelines of Environmental Impact Assessment – General Principles (HJ 2.1-2011);
(2) Technical Guidelines of Environmental Impact Assessment – Atmospheric Environment (HJ 2.2-2008);
(3) Technical Guidelines of Environmental Impact Assessment – Surface Water Environment (HJ/T 2.3-93);
(4) Technical Guidelines of Environmental Impact Assessment – Acoustic Environment (HJ 2.4-2009);
(5) Technical Guidelines of Construction Project Environmental Risk Assessment (HJ/T 169-2004);
(6) Technical Guidelines of Environmental Impact Assessment – Ground Water Environment (HJ 610-2011);
(7) Technical Guidelines of Environmental Impact Assessment Ecological Impact (HJ19-2011);
(8) Technical Code on Identification for Hazardous Waste (HJ/T298-2007);
(9) Technical Assessment Guidelines of Construction Project Environmental Impact (HJ 616-2011);

(10) Technical Code for Wet Flue Gas Desulfurization of Industrial Boiler and

(iv) Other Technical Documents

(1) Feasibility Study Report of Waste water treatment plant construction by Longhua County, Chengde City at Loan of Asian Development Bank;
(2) Geological Survey Report of Longhua WWTP
(3) Required Data List for Construction Project Environmental Assessment Approval of Environmental Protection Department of Hebei Province;
(4) Power of Attorney for Construction Project Environmental Assessment;
(5) Other technical data provided by Sewage Treatment and Management Office of Longhua County

18. The main applicable national environmental standards include:

(i) *Integrated Wastewater Discharge Standard (GB8978-1996)*, 1998
(ii) *Integrated Emission Standards of Air Pollutants (GB16297-1996)*, 1997
(iii) *Environmental Quality Standard for Surface Water (GB3838-2002)*, 2002
(iv) *Ambient Air Quality Standard (GB3095-1996)*, 1996
(v) *Standard of Environmental Noise of Urban Area (GB3096-93)*, 1994.

B. Administrative Framework

19. Article 16 of the PRC EIA Law (2003) stipulates that an EIA is required for any capital construction project producing significant environmental impacts, so as to provide a comprehensive assessment of these potential environmental impacts. On 2 September 2008, the Ministry of Environmental Protection (MEP) released the Management Guideline on EIA Categories of Construction Projects, which came into effect on 1 October 2008. According to this guideline, a project is classified into one of the following three categories:

(i) **Category A**: Projects with significant adverse environmental impact, an Environmental Impact Statement (EIS) is required.
(ii) **Category B**: Projects with adverse environmental impacts which are of lesser degree and/or significance than those of Category A; a Tabular environmental Impact Assessment Report (TEIAR) is required.
(iii) **Category C**: Projects unlikely to have adverse environmental impact; an Environmental Impact Registration Form (EIRF) is required.

20. The EIS and TEIAR under PRC EIA regulations are similar to the EIA and IEE, respectively, and the EIRF is equivalent to the ADB Category C, under the ADB Safeguard Policy Statement (2009). Under PRC EIA Law (2003), public consultations are not required for TEIAR and EIRF.

21. According to the Administrative Framework, this component need fulfill the TEIAR document (Category B).

C. Applicable ADB Policies, Regulations and Requirements

22. This IEE was prepared following the ADB's Safeguard Policy Statement (2009). The additional project scope discussed in this IEE was classified as Environment Category B in line with the environmental assessment management framework (EAMF) as addressed in the SEIA. All projects funded by ADB must comply with ADB's Safeguard Policy Statement (2009).

IV. DESCRIPTION OF ENVIRONMENT

A. Physical Environment

Topography and Geology

23. The Longhua county is located at the north of Chengde City, Heibei Province, northern latitude 41° 08′ to 41° 50′ and east longitude 116° 47′ to 117° 19′. The whole county is 127.8km long from east to west, and 76.5km wide from west to east, the total area being 5497km2. It is north to the northeast and connected with Weichang County and Chifeng City of Inner Mongolia, east to the southeast and bordered with Chengde City, Luanping County and Chengde County, and connected with Fengning County in the west.

24. The proposed project is located at the south direction of Sidaoying Village of Longhua County, the downstream of Yixun River. The central geographic coordinate is northern latitude 41°14'31" and east longitude 117°40'494", and the current situation is wasteland. North side of the factory site is planned for road, west side is space area, south and east sides are mountainous area. The project is 330m to the Sidaoying Village in the north, 1030m to the Shanqian Village in the northeast, 620m to the bocaigou Village in the southeast, and 40m to the Yixun River in the north. The plant area and outlet section of the project are not in the scope of surface drinking water source protection zone, and there are no nature protection area, scenic spots, ecological function protection zone, cultural relic protected area and other environmental sensitive areas regulated by laws and regulations around the project.

25. The Longhua County is located at the mountainous area of northern Hebei Province, at the transition area between Inner Mongolian axis (north rim of North China tableland) and Yanshan Mountain subsidence zone. The mountainous platform of the whole county can be divided roughly as middle mountains, middle and lower mountains, hills and intermountain river valley. Among them, the elevation of middle mountains are over one kilometer, mainly scattered at the northwest and northeast of the county; middle and lower mountains are the major platform in the county, mainly scattered at the north of Dawopu—Longhua Town—Yaojiying line, and the average elevations are 550m to 1000m; hills are basically located at the southern foot of middle and lower mountains, the altitudes are unequal, and the relative altitudes are from 50m to 200m; valley terraces are mainly distributed at the both sides of large and small rivers of the county, smooth and flat. Yanshan Mountain chain is extending slantingly from northwest to southeast, forming a terrain of high northwest and low southeast. The average elevation of the whole county is 750m. Numerous mountain ranges are entrenched in the county, mainly Yanshan Mountain and its mountain chain, Qilaotu Mountain Range which is stretching itself at the east part. There are 105 peaks with elevation over 1000m, among which, 11 peaks are over 1600m elevation. The highest peak is Aobao Mountain at the junction place of north part and Weichang County, elevation being 1852m.

Climate

26. The area belongs to continental monsoon climate. In winter, it is dominated by Mongolian high pressure, mostly northerly wind and in summer, it is influenced by the pacific subtropical high pressure, mostly southerly wind. In spring and autumn, it is influenced by the two airflows alternately. At the last ten days of April and September, the area is mainly controlled by northwest wind, then the southeast wind. The winters of the area are cold and dry and summers are hot and rainy. The main climates and weathers of the Longhua County over many years are shown in **Table 2**.

Table 2: Main Climates and Weathers Characteristics

Item	Unit	Data	Item	Unit	Data
Average annual temperature	℃	7.0	Average wind speed in recent 30 years	m/s	1.3
Annual extreme maximum temperature	℃	40.7	Prevailing wind direction in recent 30 years	--	NW
Annual extreme minimum temperature	℃	-26.2	Average wind speed in recent 5 years	m/s	1.3
Average annual rainfall	mm	500.06	Self calculated maximum wind velocity/wind direction	--	15.0m/s
Annual maximum rainfall	mm	696.8	Timed maximum wind velocity/wind direction	--	13.0m/s，NW
Month maximum rainfall	mm	348.2	Annual average relative humidity	%	56
Daily maximum rainfall	mm	140.5	Average sunshine duration over years	h	2769.9

Hydrology

27. The underground water of the area mainly exists in pores of loose rocks, structural fractures of bedrocks and weathering fractures. Thus the underground water type is pore water of loose rocks and bedrock fissure water. Pore water of loose rocks is the main underground water type of the area, scattering in ravines. The aquifer lithology is proluvial sand and gravel cabbles, with thickness from 5m to 15m, and buried depth of groundwater 2m to 4m.

28. The underground water within the area is mainly supplied by meteoric water, then the side direction replenishment. Bedrock fissure water runs out to downstream by spring or undercurrent; the quaternary system pore water runs out by runoff and artificial exploitation. The underground water of the area has obvious seasonal change rule. The change of underground water level and variation of water yield have close relation with amount of precipitation.

29. Main rivers at the surface of Longhua County belong to Luanhe River system. Luanhe River is originated from Jiepailiang of Northwest Datan town, Fengning County, and westward passes the Guyuan County of Zhangjiakou, northward passes the Duolun County of Inner Mongolia, and southward passes the Chengde City. It passes thorough Fengning County, Longhua County, Luanping County, Shuangluan District, Shuangqiao District, Chengde County, Xinglong County and Kuancheng County, and finally pours into the Panjiakou reservoir. The overall length of the main stream is 877km, and the length of river within the Chengde City is 374km. In Longhua County, the major tributaries of the Luanhe River System are the small Luanhe River, Yimatu River, Yixun River and Yingwu River. The Yixun River is originated from the Haliha Village of Weichang County, Hebei Province, passes through the Longhua County and Luanping County, and finally enters into the Luanhe River in Luanhe Town, Chengde City. The overall length is 195 kilometers.

B. Ecological Resources

30. Heibei Maojingba National Nature Reserve has planning area 400.38km2, and belongs to forest ecosystem type natural conservation area. The protection zone is composed of Maojingba area and Jianfang area. In 2008, the General Office of the State Council issued a document and promoted it to the national level nature reserve. A large area of integral natural

broadleaved deciduous forest and typical North China coniferous forest are scattering in the protection zone. The main protection objects of the nature reserve are the forest ecosystem, biological diversity, rare and endangered species and habitats, natural ecological environment and Luanhe River upstream water source. In the protection zone, there are natural North China larch forest, Juglans mandshurica forest, spruce forest and natural pinus tabulaeformis forest. Meanwhile, there are 20 national level wild rare and endangered key protective plants and 34 national level rare animals.

31. The Maojingba National Nature Reserve is located at the northeast direction of the Longhua County, within the scope of Maojingba village. The project site is located at the south part of Longhua County, thus it is not within the area of Maojingba National Nature Reserve.

32. No rare, threatened, or endangered species have been recorded in the Project areas.

C. Social Environment

33. At present, the Longhua County governs 10 towns, 15 villages and 362 administrative villages. The total area is 5497km2 and total population is 43.38 (不确定). There are plow land 571.92km2 and forest land 3852km2 in the whole county. In 2009, the gross domestic product in the whole county is RMB 5.683 billion Yuan. If calculated by comparable prices, it has increased 11.6% than the last year. Among them, the added value of primary industry is RMB 1.461 billion yuan, increased 8.3%; the added value of secondary industry is RMB 2.691 billion Yuan, increased 16.8%; the added value of tertiary industry is RMB 1.531 billion Yuan, increased 8.1%. The industrial structure proportion of the primary, secondary and tertiary industries is 25.7: 47.4: 26.9. The urban per capita disposable income is RMB 11,941 Yuan and rural per capita net income is RMB 3,524 Yuan. The leading industries of the whole county are minerals mining and processing industry, agricultural product and by product processing industry, mechanical and electrical products manufacturing and processing industry. The traffic in the Longhua County is very convenient, with Chenglong and Jingtong railways running through the county in south-north direction. Meanwhile, there are 4 provincial arterial highways and 4 county level highways in the county.

34. The Longhua Town, which is the location of the project, governs 28 administrative villages, total population being 436,000 and total area being 5475km2. In 2010, the gross output value of industry and agriculture reached to RMB 7.15338 billion Yuan and average per capita income reached to RMB 3.735 Yuan.

35. No cultural, historical, or archaeological sites have been identified in the Project areas.

D. Baseline of Environmental Quality

36. According to the 2012 routine monitoring data provided by the environmental protection agency of Longhua County, it can be seen that.

Ambient Air Quality

37. According to the monitoring data, the average daily concentrations of PM10 at all monitoring points are from 0.02mg/m3 to 0.106mg/m3; the average daily concentrations of SO2 are from 0.129mg/m3 to 0.140mg/m3, the average daily concentrations of NO2 are from 0.004mg/m3 to 0.022mg/m3; the hour concentrations range of SO2 are from 0.030mg/m3 to 0.127mg/m3 and hour concentrations range of NO2 are from 0.001mg/m3 to 0.076mg/m3. All of

them can satisfy the second standard requirements of the AAQS (ambient air quality standard) (GB3095-2012).

Water Quality

38. The surface water monitoring scope of the project is the section of Yixun River to Maoci Road. According to the surface water monitoring data, the pH value is 7.53, COD18mg/L and ammonia nitrogen is 0.39mg/L. All monitoring factors can satisfy the III class standard of Environmental Quality Standards for Surface Water (GB3838-2002).

39. According to the underground water monitoring data, the pH value is 7.6, total hardness is 280mg/L, permanganate is 1.76mg/L, ammonia nitrogen is 0.110mg/L, nitrate is 8.50mg/L and fluoride is 0.50mg/L. All monitoring factors can satisfy the III class standard of Environmental Quality Standards for Underground Water (GB/T14848-93).

Noise

40. According to the monitoring data, the daytime noise is between 43.7 dB to 47.6dB (A), and the nighttime noise is 39.8 dB to 44.6dB (A). All the day and night noise values can satisfy the second standard requirements in the Environmental Quality Standards for Noise (GB3096-2008).

Physical Cultural Resources

41. The implementation activities of proposed component is not placed at or not near by the areas of physical cultural resources assigned by PRC legal.

V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. Expected Positive Impact

42. After completion of WWTP expansion and associated sewer network, wastewater will be treated before being discharged into natural water bodies.

B. Impacts and Mitigation Measures during Construction

(I) Environmental Impact Analysis of the proposed project construction of plant structures

43. Pollution problems of dust in the construction, construction waste, construction noise and so on will be brought about during project construction.

44. **Construction Dust:** The main control measures are retaining and hoarding, covering and watering with sprinklers to the construction site, prompt covering with tarpaulins or dense net on the mound to reduce the dust from the construction site. In addition, the wheels of the transport vehicles should be flushed when they are driving out to reduce the road dust pollution caused by entrained vehicle. Development unit and construction unit shall conscientiously implement pollution prevention measures to reduce dust pollution.

45. **Noise.** During the construction period, the main noises come from the noise generated by concrete mixers, excavators, bulldozers and other construction machinery construction machinery, and the noise value can reach 70 ~ 100 dB (A) in case of no measures are taken, the impact of the noise in the daytime can reach the range of 50m or so, and 300m in the nighttime. The drafted control measures to be taken are: select those low-noise construction equipment, set up retaining and hoarding around the construction site with reasonable arrangements for the construction time, and prohibit construction from 22:00 to 6:00 the next day and from 12:00 to 14:00. After effective implementation of these measures, the impact of noise on sensitive points during the construction period can be minimized. Environmental impact on the construction period is temporary, and it will be eliminated once the construction period is due.

46. **Solid Waste:** Solid waste generated in construction mainly is construction spoil and construction waste, and free from hazardous solid waste. Construction waste shall be landfilled at designated construction waste disposal plant by the construction party. Construction spoil shall be transported to designated landfill plant by the construction unit as required. Construction workers shall not discard garbage everywhere, and shall be placed in fixed stacking, and timely removed by the local sanitation department. The solid waste can be properly disposed, and will not pose serious impact on the surrounding environment.

47. **Waste water:** The waste water in this project mainly comes from construction equipment flushing drainage and cement maintenance drainage and sewage. Sewage is less in quantity, which will be disposed by the set temporary toilets with the regular cleaning and processing. For the construction equipment flushing drainage and cement maintenance drainage, they will be processed by sedimentation tank for effluent clarification and recycled without discharging to the outside. In summary, the waste water generated in the construction period won't pose significant impact on surface water and the surrounding environment.

(II) Environmental Impact Analysis of Pipeline Construction

48. During the construction period, less environmental impact will be brought about to the site around; the pipeline area of this project is mainly laid out along the riverway of Yixun River, which has a single regional ecosystem type. Besides the riverways, the ecosystem along the river has basically become artificial ecosystem. In artificial ecosystems, farmland ecosystems is the most widely distributed, and the pipelines are primarily farmland, and there are no rare flora and fauna, nature reserves, scenic spots and other ecologically sensitive targets along the river, therefore, the sensitivity level of the regional ecosystems is very low. The environmental impact analysis of pipeline construction will be focused on the impact analysis of the ecological environment and water environment.

49. **Land Occupation.** The width of trench excavation of the project should be about 4m, and the depth about 1.66m, the bottom groove width is 1.3m, and the construction work range is of about 16m, therefore, the construction will occupy a lot of land, the construction pipeline length of the project is 18.687km. The temporary covering is 7.4748 × 105m2, which is mainly used for the stacking of pipe excavated soil, the stacking of construction materials used in the construction, temporary pavement land, construction machinery and yard land, as well as the camp buildings. After the completion of construction, ecological restoration measures shall be taken on the ecological damage caused by temporary project covering. The impacts of temporary land occupation of the construction on the ecological environment along the main are:

(i) Temporary land occupation will damage the original surface vegetation crops;
(ii) The compaction from the vehicle rolling in the construction process will increase the soil compactness within the area, which is unfavorable to crop root development and growth after second ploughing of the land;
(iii) The construction dust attached in the crop foliage, which will decrease the crop photosynthesis and affect the crop growth;
(iv) In short, temporary land occupation will affect the land use conditions along the line in the short term, and such impact will gradually decrease or disappear after construction is completed with the ecological compensation or restoration measures are taken.

50. **Vegetation.** Destruction of vegetation along the pipeline is temporary, and is usually terminated after the end of construction. Analysis shall be conducted according to the soil, climate and other natural conditions of the areas passed by the pipeline. After construction is completed, the surrounding plants will gradually emerge, and began to enter the restoring succession process. The artificial measures of planting trees and grass to restore vegetation cover will bring about the result that herbaceous vegetation can be generally recovered in 2 to 3 years, and shrubby vegetation can be restored in 3 to 5 years, and tree vegetation in 10 to 15 years.

51. Soil contamination. The pipeline construction method of this project is mainly channel-buried approach, therefore, the soil excavation and backfill have the impact on soil environment mainly in the following aspects:

(i) Damage of the soil structure: The soil layered characteristics and crumb structure are formed in longer-term development process under the local natural conditions. The land excavation and landfill in the construction process will damage the original soil structure, and takes longer time for recovery; while the mechanical rolling in the construction process and personnel trampling will adversely affect soil structure.
(ii) Changes of soil texture: Soil is clearly structured in the formation process, in which the surface layer is the plough layer, the middle layer is the leaching illuvium, and the bottom layer is the parent material layer. There are significant differences between the texture of

the surface soil and the bottom layer, while the pipeline excavation and backfill mixed the original relatively stable soil, and the mixture of different soils will affect soil development and surface vegetation.

(iii) The impact on soil compaction. The original density and compactness is difficult to restore within short time after the pipeline backfilling. The loose surface layer, irrigation and precipitation could easily lead to water infiltration, causing the obvious groove in the formation of soil subsidence. The vehicles and heavy machinery during construction can cause soil surface on both sides of the pipes too dense and compact, affecting surface water infiltration, and is not conducive to vegetation growth.

(iv) Soil Nutrient Loss. In each soil layer of the planning surface of the soil, in terms of the nutrient status, the surface soil (humus layer) is better than the heart is subsoil in nutrients, and the organic matter, total nitrogen, total phosphorus of which is in higher level than other layers. Excavation and landfill construction activities cause soil disturbance on the original structure of the soil, and cause changes of the soil property with the affection to the soil nutrient status, thus affecting the growth of plants.

52. The pipeline construction is closely related to the impact on soil nutrients and soil physicochemical properties and the construction operating type. Under the measures of layered stacking and layered earthing, the soil organic matter will be decreased by 30-40%, and soil nutrients decreased by 30 - 50%, of which total nitrogen will decrease by about 43% and phosphorus 40%, potassium 43%. This shows that even under the measures of layered stacking and layered earthing for the topsoil, it is still difficult to ensure the soil nutrient in topsoil will not drain after the completion of pipeline project; without implementing layered stacking and layered earthing, the soil nutrient loss will be to a greater amount.

53. **Ecosystem along the river.** As the pipeline route of the project is arranged along the Yixun River, hence it will not have an impact on aquatic organisms. The herbaceous vegetation crossed by the pipeline are common local herbaceous plant, and no rare animals and plants under state protection, and the vegetation damaged by the project can be basically recovered naturally within one year.

54. **Surface water environment.** The project pipeline is laid out along the Yixun River, and there's no need to cross the river, Therefore, no impact on the excavation of river water quality will be posed during the construction period. The wastewater generated in the project construction process mainly is pipeline pressure test wastewater and sewage water. Camp buildings may not set alone along the pipeline with better social support conditions, from which temporary rental of nearby homes and assisted living facilities are available, and a smaller amount of sewage will be produced and can be evaporated at site. Temporary pit toilets can be set in each construction work area and ultimately disposed in landfill approach. Through these measures, the sewage generated by construction workers will not have a significant impact on surface water environment. Since the pipeline has been cleaned before pressure test, and clean water is used for pipeline pressure test, the water for pressure test is also the clean water, which mainly has the small amount of SS, and rare amounts of other pollutants. The pipe pressure test water is discharged into nearby water agricultural irrigation channels, roads and ditches.

55. **Eco-environment of terrestrial flora and fauna by pipeline construction.** There're no national forest parks, nature reserves and large tracts of forest in the area that is crossed by the pipeline, so there is no impact on forest ecosystems. As no large pastures can be found in the construction range except the small amount of weeds along some of the flood land or wasteland, so it will not pose an impact on the grass resources, and there are no rare wildlife animals along

the river except the common terrestrial wild animals and birds along the pipeline. Since pipeline construction work surface is very narrow, and the construction period of the local sites is short, hence it will not affect the ecological environment of these wild animals.

56. **Acoustic Environment.** Noise of pipeline construction. The excavation of pipeline laying, loading and unloading of pipes and lifting equipment, and the station construction process will produce some construction noise. According to survey results of analogy, the construction site boundary noise limits can be met if construction site spacing 50m during daytime, and 220m at night. The closest distance between the pipeline construction site and the residential area is 100m, and there are no sensitive sites such as hospitals, schools and so on; as a result, if effective measures are not taken, the pipeline construction noise will have some impact on the villages nearby; In order to avoid the impact to the surrounding acoustic environment by the construction machinery, the following measures shall be taken in the construction pipeline laying process:

(i) use equipment with low noise, small vibration possible;
(ii) for the pipeline section close to residence areas, construction time should be reasonably arranged with the prohibition of construction at night (22:00 to 6: 00 the next day) and afternoon (12:00 - 14:00); meanwhile, a 2.5m sound insulation retaining wall should be laid out between the residential area and the construction site to reduce construction noise impact on the surrounding acoustic environment;
(iii) mixing plant and concrete mixing station at the construction site are strictly prohibited.

57. Material Handling Noise. When the pipeline project is under construction, the sand required for the trench backfill, the materials and equipment required for pipeline construction should be transported by the car to the construction site, and the construction waste is also required to be transported by the car to the designated locations for stockpiling; when the materials are shipped during transport, the traffic noise will have some impact on the acoustic environment along the route. The project intends to control the speed and bans of horning when the vehicle is passing through the village within the city and to enhance vehicle maintenance so as to reduce the noise impact on the surrounding acoustic environment.

58. **Atmospheric Environment.** The large area of earth excavation during the cleanup of the construction site, trench excavation, and backfilling process, turning and stacking process will cause the construction dust by the wind blows, and the vehicle transportation will also produce a lot of dust. To prevent impact on the surrounding environment by the dust during construction, the following preventive measures shall be taken during the construction process:

(i) When the pipeline construction site is passing through the nearby area of village and other neighborhoods, both sides of the construction works area should be set with the retaining wall of color steel plate no lower than 2.5m in the manner of closed construction. The setting of retaining wall of color steel plate settings shall be calculated for the structural design by the units or the manufacturer according to the local wind and loads, etc. to ensure safety use.
(ii) The dust suppression measures of covering and watering shall be used for the stockpiling of earthworks, sand and other materials during the construction process so as to minimize dust generation.
(iii) The construction unit shall make reasonable arrangements to take the construction methods of section by section, construction one section after retaining one section and strive to achieve the earthworks movement after excavation, and the medium sand fill after arrival to reduce the retention time.

(iv) The vehicle for the transportation of earthworks, medium sand and all kinds of construction materials shall be covered in the enclosed manner to prevent the material scattered along the way.
(v) The site leveling, cleaning soil, piling of material and so on shall be promptly conducted after the end of the construction.
(vi) The supervision and management of construction work shall be strengthened; in the event of windy weather in the level of four or above, the filling excavation operations shall be suspended, and the stockpiling covering work shall be further implemented.
(vii) During the construction process, when the construction is near the village and in other sensitive areas, the construction short road shall be watered to reduce dust, and in windy weather, the mound surface on both sides of the trench shall also be covered and watered.
(viii) The construction work time shall be reasonably arranged to avoid the long exposed land surface during the monsoon season. The repairing and maintaining plus watering shall be conducted for the construction site to keep the moisture content of the bare surface and surface evenness of manual repairing, and large parts of exposed area shall be covered with dust cloth to control the blowing dust of construction work surface.
(ix) As the road for construction work and construction of access is low in road grade, the gravel roads shall be the main road; depending on weather and construction strength, the pavement shall be timely watered and the pavement moisture shall be controlled to avoid the formation of large-scale dust in the construction road.
(x) All vehicles are subject to the scheduled maintenance so that the construction work vehicle and equipment exhaust emissions can meet the standards.
(xi) During the pipeline project streamline construction, engineering measures of timely clean-up of the construction site, restoring vegetation, site hardening and slope protection for the pipe sections shall be taken to finished construction sections to end the wind blew dust.

59. In addition, during the pipe network construction process, the construction contract signed by the development unit and construction unit shall expressly provide the liability to control dust pollution by the construction unit. The construction unit shall, according to the relevant provisions, enact dust pollution prevention and control programs, and arrange for the special personnel to be responsible for the environmental management of the construction process. Clear signs shall be set in the construction site, indicating the name of the project, construction unit, commencement and completion time, number of construction permits and other approvals, which is subject to public supervision.

60. **Solid Waste.** As the layered compaction is needed for pipe trench backfill process and trench backfill earth shall not be less than 0.3m above the ground (the width of the trench shall be the opening width of piping trench), the earthwork quantity of each pipe section of project shall be free from surplus volumes. In addition, the evaluation requirements provide that earthwork construction shall be "fast excavation with fast filling", "layered excavation", "layered stacking", and "layered backfill". The earthwork in the landfill process should be compacted layer by layer to reduce the spoil dust. For a small amount construction waste that cannot be backfilled, they shall be temporarily focused for stockpiling at appropriate locations during construction process, and covering shall be made during stockpiling process to avoid the resulted reentrainment of dust until construction has been completed. According to local building department, the construction waste shall be transported to designated locations for channel pit landfill, and this will not pose a negative impact on the surrounding environment. The remaining earthworks produced at the construction on the station can be used as site preparation and greening. The household garbage generated by construction workers shall be transported to the

local civilian facilities in good condition of the community and disposed together with local residents living garbage, for the household garbage away from residential areas; they can be temporarily stockpiled and transported to a designated disposal site together for disposal after completion of construction.

61. **Soil erosion.** The minor erosion area along the sewer line in the project is mainly wind erosion, while the slight erosion area is mainly wind erosion and water erosion. Soil erosion occurs mainly in disturbed areas along the project, and the increased amount of soil erosion is less. The impact on soil erosion during construction can be substantially eliminated after construction is completed and the recovery of the earth surface. The proposed project is located in low mountain areas of northern Hebei Mountain, and is in the Luan River Basin. The reasons of the cause of water and soil erosion by the project mainly include:

(i) Earthwork Engineering. The site excavation and backfill shall be carried out for the project with large volume of earthwork. In the processes of excavation, reshipment, backfilling and stacking, the loose soil and excavation exposed surface will cause water and soil erosion under the action of water erosion. Failure to take effective preventive measures will bring about the earthworks construction as the main factor causing soil erosion.
(ii) Temporary spoil. For the temporary spoil generated by the excavation in the project, if not spoiled at the specified location or no blocking, drainage, land reclamation, plant protection and other measures are taken timely at spoil site, and then serious soil and water erosion will be generated.
(iii) Surface disturbance. The construction area laid out in the construction area and other activities will change the original topography of the project area, and cause vegetation damage with the formation of a variety of man-made landscape remodeling and the more serious water and soil erosion. And
(iv) Construction procedures. The scheduling of soil and water conservation construction will have a great effect on its prevention, and the temporary spoil should be discarded after block; and the temporary drainage system shall be constructed in the construction area. If improper construction scheduling is made, the soil erosion generated in the construction will not be effectively prevented. For the reasons of water and soil erosion may caused by each part land occupation and temporary construction land occupation of the project, the measures of water and soil erosion control taken are shown in Table 3.

Table 3: List of Soil and Water Conservation Measures

Location	Type of measures		Content and specifications
The proposed plant	Engineering measures	Plant area	700m temporary iron plate retaining wall around the plant
		Drainage ditch	Drainage ditch shall be set around the construction site to drain rainwater, 600m
	Prevention measures	Watering on the site	Watering regularly, the temporary bulldozers shall be covered on windy days
Construction site	Engineering measures	Topsoil collection	The topsoil in the construction area shall be collected for 10000 m^2 before construction
		Land levelling	4000m^3 land leveling and soil preparation
	Prevention measures	Watering on the site	Watering regularly, the temporary stacked materials shall be covered on windy days
Overall greening	Plant measures	Open space of plant area	Plant greening in the open space of the plant

62. With the analogy conducted on similar projects, the water and soil erosion in the project area has been under control using the above water conservation measures.

63. In short, the environmental impact generated in the project construction period is on a short-term basis, and such impact can be eliminated after completion of the project. Low noise equipment shall be used in construction period with the strengthening of the construction management, followed with regular watering for dust suppression, thus bring less impact on the surrounding environment.

C. Impacts and Mitigation Measures during Operation

64. **Water.** Impact analysis of surface water environment. Impact analysis of environmental surface drinking water source. The volume of discharged waste of the project is 20,000 m3 / d, after meeting standard A of class 1 in the Urban Sewage Treatment Plant Pollutant Discharge Standards (GB18918-2002), it is discharged to Yixun River. The plant area and the emission cross-section project are not in the range of surface water drinking water source protection area. The construction of sewage treatment plant will basically solve the situation that the sewage from southern city of Longhua County is directly discharged into the Yixun River, which will greatly improve river water quality; the major pollutants in wastewater from the laboratory are acids, bases, etc. with minor output, after it is neutralizing treated, it is disposed together with domestic sewage into the sewage treatment system. Therefore, the project will not pose a significant impact on improvement on surface water and drinking water source protection areas of Yixun River.

65. The sewage outfall of the project is set up in the south of Sidaoying Village, Longhua Township, Longhua County, and the receiving water body is Yixun River. According to the requirement of *Urban Sewage Treatment Plant Pollutant Discharge Standards* (GB18918-2002): "standard B of Class 1 shall be executed for GB3838 Ⅲ functional waters of urban sewage treatment plant effluent discharged to surface water (except drinking water source protection areas designated swimming area), II functions waters of GB3097 marine waters and enclosed or semi-enclosed waters of lakes and reservoirs". Yixun River belongs to Class III surface water body. In the project, the discharged waste water of treatment plant project is in the execution of standard A of Class 1 of Urban Sewage Treatment Plant Pollutant Discharge Standards (GB18918-2002), and there’re no designated drinking water source protection areas and swimming area in the project area, thus meeting the Class III surface water discharge requirements in Urban Sewage Treatment Plant Pollutant Discharge Standards (GB18918-2002). Therefore, the measures were feasible.

66. Since there is no sewage pipe network, currently the sewage from southern county is directly discharged to Yixun River without treatment, and the emission load is of about 20000m3 / d, COD concentration of domestic wastewater is 500mg / L, and the concentration of BOD5 is 250mg / L, concentration of SS is 200mg / L, concentration of ammonia is 35mg / L. 3650t COD and 256t ammonia nitrogen are discharged into the Yixun River every year. After the completion of this project, the sewage from the southern county is collected and disposed in a centralized manner. After treatment, the COD concentration is 50mg / L, BOD5 concentration is 10mg / L, SS concentration is 10mg / L, ammonia concentration is 5mg / L, the content of COD and ammonia nitrogen discharge to Yixun River were reduced to 365t / a and 36.5t / a every year.

Table 4: Water Quality Index Before and After Treatment

	pH	CODmg/L	BOD5mg/L	SSmg/L	Ammonia mg/L	Total phosphorus mg/L
Inflow	6~9	500	250	200	35	2
Emissions（t/a）	**—**	**3650**	**1825**	**1460**	**256**	**14.8**
Outflow	6~9	50	10	10	5	0.5
Emission load（t/a）	**—**	**365**	**73**	**73**	**36.5**	**3.7**
Increase or decrease load（t/a）	—	**-3285**	**-1752**	**-1387**	**-219.5**	**-11.1**

67. It can be seen from the above table, after the completion of this project, COD emission has been reduced by 3285t / a, BOD5 emission has been reduced by 1752t / a, SS emission has been reduced by 1387t / a, ammonia emission has been reduced by 219.5t / a, and total phosphorus emission has decreased by 11.1t / a. Therefore, after the implementation of the project, the water quality of Yixun River can be further improved after meeting the Class III standard in *Surface Water Environmental Quality Standard* (GB3838-2002).

68. The project is the encouraged project in the *Guiding Catalogue of Industrial Structure Adjustment (2011 version)* and Water Authority of Longhua County has issued Notice on the *Newly Built Outfalls of Miaoshan Sewage Treatment Plant in Longhua County*, and agreed the discharge port set at Yixun River. In summary, after this project is completed, the status quo of the direct discharge of sewage in southern county can beeffectively changed, and has a significant improvement effect on the water quality of Yixun River. In addition, water authorities have agreed to set up outfalls in Yixun River. Therefore, it is feasible for wastewater discharged into Yixun River.

69. **Groundwater.** The possible impact on groundwater by proposed project is the leakage of sewage from plant and pipeline. The main measure to prevent contamination of groundwater is to cut off the way of contaminant into the groundwater environment. The anti-seepage measures of the project: In order to prevent the impact on groundwater of this project, comprehensive anti-seepage measures shall be taken for the sewage pipes set up in the project and plant area with the permeability coefficient <10-7cm / s to reduce pollution of groundwater. Main measures are as follows:

(i) The treatment of anti-seepage measures shall be carried out in the whole plant area except the green space. The plant roads shall be treated with cement seepage with a thickness of 15 ~ 20cm; the concrete bottoming shall be adopted for workshop and warehouse floor, and then a thickness of 10 ~ 15cm cement shall be paved on the upper later for hardened effect. The cesspools shall be treated with cement anti-seepage measures with the permeability coefficient less than 10-7cm / s to prevent the infiltration of sewage contamination of groundwater.

(ii) The sewage conduit can be made with corrosion resistant pipes, and seepage-proofing cement shall be used for wastewater collection pipelines, and the sewage tank bottom and walls shall be well seepage treated with impermeable layer permeability coefficient less than 10-7cm / s; In summary, under the premise that the anti-seepage measures have been implemented and the maintenance and management of the factory environment is strengthened, the wastewater pollutant infiltration can be effectively controlled in the plant area to avoid contamination of groundwater. Therefore, the project will not significantly affect the regional groundwater environment.

(iii) Feasibility Analysis of Treatment Efficiency of Sewage Treatment Facilities in winter. The biological wastewater treatment project segment using BIODOPP process (Biological Double-efficiency Process), and such process is carried out coordinately in a single biological tank with many steps such as hydrolytic acidification, biological selection area, decarbonizing, denitriding, sediment, dephosphorization, and so on. The sewage in each pool of the reaction tank is still circulating unit, which will not freeze in winter. (i) The maximum and minimum limits of BIODOPP biochemical activation temperature are 35 ℃ and 10 ℃ respectively. According to the survey, urban sewage is transported by a buried pipeline with incoming water temperature generally above 10 ℃, and the temperature of the blast blower in aeration zone can be 80 ℃ ~ 90 ℃. During the sewage treatment process, the biological sewage temperature never drops below 10 ℃, and will not lower than the lowest temperature of BIODOPP biochemical activity limits. (ii) The normal sludge concentration of BIODOPP (MLSS) is 5-8g / L. Since sludge is low activity in cold winter weather conditions, sewage treatment plant shall take the measure of improving the return sludge in operation, and the improved sludge concentration should be 10-12g / L, which can ensure the treatment effect of the biological section. (iii) After investigation, there is one urban sewage treatment plant of 20,000 m3 / d in Longhua, the biochemistry segment of the plant uses Biolak process (using the hanging chain intermittent aeration, similar aeration form to BIODOPP) has passed the acceptance of Chengde Municipal Environmental Protection Bureau in September 2009. By taking the method of improving sludge load in winter, after many years of operation, no negative impact has caused due to low temperature in winter for the operation of sewage treatment facilities. Based on the above analysis, by increasing the sludge concentration, the project in the winter low temperatures biochemical processing segment results will not significantly reduced.

70. **Atmospheric Environment.** Project emissions are mainly NH3 and H2S and other odorous gases produced in the workshop stations of thick and fine grid drainage, BIODOPP biochemical reaction tank, sludge thickening, sludge dewatering, etc., and its pollution control measures are as follows: (i) Both of the thick and fine grid room and sludge dewatering room are arranged in a confined plant; and a reasonable distance of health protection shall be set, so that enough distance can be kept between the plant and the residential area to avoid the impact on the residents. (ii)The sludge shall be timely removed to reduce storage time. (iii) The greening in the plant shall be strengthened, and arbour and shrubs shall be planted in the plant area and all around the plant boundary; and the green belt shall used to separate the other functional blocks. (iv) The comprehensive office building shall be set in the upwind or wind direction of the plant area. And (v) Determination of health protection distance

(i) Analog survey. The determination of the health protection distance in the project shall be conducted by the analog survey of Zhuozhou Sewage Treatment Plant, in which the plant boundary malodorous gas monitoring data is listed in Table 5. As can be seen from Table 5, the monitoring results of Zhuozhou sewage treatment plant boundary downwind fugitive emission monitoring points of ammonia, the maximum monitoring value is 0.38mg/m3, and a maximum monitoring value of hydrogen sulfide is 0.01 mg/m3, both of which can meet the requirements of Standard value Level two in Table 4 of Urban Sewage Treatment Plant Pollutant Discharge Standards (GB18918-2002) (ammonia: 1.5mg/m3, H2S: 0.06mg/m3). By the analog of plant health protection distance (300m), the project health protection distance is determined to be 300m.

Table 5 : Unorganized Emissions Monitoring Results of Factory Sector

Facilities	monitoring items	monitoring date	monitoring point location	monitoring results (mg/m^3)			
Sewage treatment facilities	NH_3	07.06.06	○1-1	0.18	0.08	0.04	0.17
			○1-2	0.13	0.17	0.19	0.19
			○1-3	0.25	0.06	0.28	0.19
		0.706.07	○2-1	0.10	0.06	0.09	0.16
			○2-2	0.20	0.10	0.07	0.15
			○2-3	0.12	0.15	0.38	0.11
	H_2S	07.06.06	○1-1	7.6×10^{-3}	not detected	not detected	not detected
			○1-2	not detected	not detected	not detected	not detected
			○1-3	not detected	not detected	not detected	not detected
		0.7.06.07	○2-1	4.6×10^{-3}	6.8×10^{-3}	7.3×10^{-3}	2.4×10^{-2}
			○2-2	0.01	9.6×10^{-3}	5.4×10^{-3}	0.01
			○2-3	0.01	6.8×10^{-3}	7.0×10^{-3}	8.4×10^{-3}

(ii) Model Calculation. Since the generation of odor pollutants is affected by many factors, it is difficult to accurately calculate the source strength, the representative NH3 and H2S are selected in the project, by analogy of the data from Zhuozhou sewage treatment plant sludge treatment facilities, the source strength of this project is calculated in the analogy--NH3 is 0.71kg / h, and H2S is 0.048kg / h. Health protection distance is calculated using the calculation method in The Development of Technology for Local Air Pollutant Emission Standards (GB/T3840-91):

$$\frac{Qc}{Cm} = \frac{1}{A}(BL^c + 0.25r^2)^{0.50} L^D$$

L：The required health protection distance, m;

Qc：The reachable level of control of fugitive emission, kg / h;

r： The equivalent radius of the unit of fugitive emissions of harmful gases, m;

C_m： standard concentration limits;

A, B, C, D： Selected according to the three-year average wind speed of source categories and the enterprise location.

After calculation, the protection distance of NH3, L = 181m, the protection distance of H_2S, L = 241m, according to *The Development of Technology for Local Air Pollutant Emission Standards* (GB/T3840-91), the health protection distance of this project is determined to be 300 meters.

(iii) Sniffing Investigation. The odor investigation of ordinary stench of sewage treatment plants of the method of Aeration in Shanghai is made as analogies. In order to understand to the environment impact by the wastewater treatment plant, a special status odor investigation on the 100,000 m3 / d scale ordinary aeration sewage treatment plant in Shanghai has been made. 10 unmarried young men and women without alcohol addiction aged under 30 shall be organized on-site for the odor sniffing. Investigators set the odor sniffing at the spaces of 5,30,50,70,100,200,300 m at downwind location and sniffing at the downwind direction is made as comparisons. The wind direction of the survey day was NE, and the wind speed is 4.5m / s, temperature at 12 ℃. Statistics of odor sniffing shows that in the range of 5m downwind of the sewage treatment facilities, a strong odor can be felt; in the range of 5 ~ 100m, the odor is easy to feel, and the odor is very weak at the distance of 200m; the odor can be barely sniffed in the distance of 300m. After the

comprehensive consideration of the analogy of the evaluation findings and sniffing survey, the sewage plant health protection distance is determined to be 300m.

(iv) Control Measures. In order to reduce odor emissions, and the stringent requirements have been set by the state in terms of the stench of sewage treatment plants; therefore, the project intends to take the measure of reasonable adjustments of the general layout, which the layout of the mud line structures are concentrated in the south of the plant, which is away from the direction of the northern villages; the sludge pond shall be sealed; the generated sludge shall be timely removed; construction of green belts shall be carried out along the plant boundary (width greater than 5m), plant trees with odor adsorption function; construction of new hospital, schools, residential, office and other facilities 300m beyond the wastewater treatment plant odor sources of pollution is prohibited; health and epidemic prevention work shall be strengthened in the plant with the regular disinfection and kill mosquito, flies and other work. After taken the above measures, the impact on the environment malodorous gases can be minimized. In addition, this project can meet the requirements of health protection distance at 300m, and the resulted stench of external environmental impacts is acceptable.

71. **Solid Waste**. The solid wastes produced in the project operation period include screenings and grit, garbage and sludge, and the generation volumes are 3t / a, 7.3t / a and 2350t / a respectively. The main wastewater in the project is sewage, after the treatment of belt press filter press, the sludge is treated with the gate residue, grit and garbage for disposal at refuse landfill in Longhua County. The solid waste transport vehicles shall be sealed tankers to prevent scattered wastes along the line in transit. All solid wastes have been reasonably utilized and disposed, and not directly discharged into the environment. Thus, it will pose no impact on the environment.

72. **Noise.** The noise in the operation period mainly comes from the pumps, fans and sludge dewatering machine with the source intensity range at 80 ~ 95dB (A). Pumps, fans and sludge dewatering machines are arranged in a closed workshop and installed with damping base; The draught fan shall be installed with acoustic enclosures, and the fan mouth shall be installed with silencer; sewage treatment equipment workshop are arranged in the central and south-east of the plant. After taken the above measures, the noise at the distance attenuation of factory can meet Class 2 standards of *Industrial Enterprises Environmental Noise Emission Standards* (GB12348-2008). Therefore, it will not have a significant impact on the surrounding acoustic environment.

73. Environmental Risk. After investigation, the environmental risks of the sewage treatment plant mainly come from the fact that in case of the power failure and damaged sewage treatment equipment, the abnormal discharge caused by the failure of timely sewage treatment. According to the information provided by the enterprise, in event of the power failure of sewage treatment plant and equipment damage, the facilities will be shut down timely and sewage sewers can be led to accidents temporary storage pool through accidents sewer line. The general accidents will be within two hours, and the scale of this project is 20000m^3 sewage treatment / d, there will be 1667m^3 sewage cannot be disposed according to two hours' accident time. Therefore, in order to respond to emergency power outages, equipment damage and other emergencies in this project, an accident temporary storage pool can be set in the factory. The amount of water can be stored is 2 hours, which is obtained according to the amount of coefficient of 1.2 of accidents sewage. The accident sewage temporary storage pool is in the size of 2000m^3. After the power supply system restored the power supply, and the equipment maintenance has been completed, it will be deeply disposed into the sewage treatment system through the sewer network in the plant area.

VI. ANALYSIS OF ALTERNATIVES

A. Environmental Considerations

74. The primary objective of alternative analysis with respect to the environmental criteria was to identify and adopt options with the least adverse environmental and social impacts and maximum benefits. The following key environmental factors were used in comparing alternatives (i) land occupation; (ii) degree of community disturbance; and (iii) resettlement and economic displacement. The alternative analysis also includes the no project alternative.

B. With-Project and Without-Project Scenarios

75. The Project provides waste water treatment and drainage network rehabilitation to Longhua City. Without these, untreated wastewater would continue to be discharged into the River, worsening the river's water quality and siltation problems. In addition, local residents would remain affected by poor sanitation and threatened with the loss of property.

C. Heat Source Alternatives

76. A comprehensive comparison is made between the process of BioDopp, A2/O, oxidation ditch, and CASS, as described in the following **table 6**.

Table 6： Alternatives comparison

Item		A^2/O	Oxidation Ditch	CASS	BioDopp
Load （kgCOD/m^3·d）		0.6-0.9	0.6-1.2	0.6-1.0	0.9-1.2
Land occupation (mu)		60-80	70-90	50-70	50-60
Installed/in common use capacity （kW）		1400/1000	1800/1200	2000/1000	1000/650
Unit construction cost （CNY/ton wastewater）		1500-1800	1400-1800	1500-1600	1500-1600
Unit operation cost (CNY/ton wastewater)		0.7-0.8	0.8-0.9	0.7-0.8	0.5-0.6
Sludge generation		High	Medium	Medium	Low
Medicine consumption		High	Medium	Medium	Low
Effluent quality		Less stable	Less stable	Less stable	Stable
Operation and management		Complex	Simple	Complex	Simple
Technical evaluation	Advantage	High aeration rate and easy operation	Simple process, easy management, stable operation, blower workshop free.	Compact strcture with anti-impact capacity	Short process, easy management, stable operation, high aeration rate, on-operation maintenance, low energy consumption, low land occupation

	Disadvantage	Many structures and equipments cause inconvenience for maintenance. Aerator is easily stuffed.	Low aeration rate, high energy consumption, large land occupation.	Inconvenient operation	High requirement for the dissolved oxygen meter sensitivity, associating volume type frequency conversion blower needed.

77. Based on above comparison, BioDopp process has the following advantages: i) low investment; ii) low operation cost; iii) less structures, simple process, low land occupation; iv) good and stable treatment effect, less sludge, ability of anti-impact; v) advanced German aeration process and aeration pipe, high oxidation utilization rate, on-operation maintenance, and self-cleaning system to ensure a long time block-free operation; and vi) the structural layout easily adapts to future alteration and expansions. In conclusion, BioDopp process is considered adequate and appropriate for the subproject.

VII. ENVIRONMENTAL MANAGEMENT PLAN

78. The EMP is prepared as **Appendix 1**.

VIII. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. Public Consultation

79. During the feasibility study and domestic EIA study of the subproject, the public participation survey was made in two forms involving posting the information publicity and issuing the public opinion questionnaire. The construction unit posted the publicity materials in all sensitive points within the assessment range respectively. It can be seen from the public survey statistics results that 100% of the respondents support the construction of the project without objection; 100% of respondents believe that the location of the project is reasonable. The survey results show that all the respondents are concerned about environmental problems and the environmental problem during the operation time that they concern the most is wastewater, which accounted for 100% of the respondents; 2.5% of the people think that it will improve their life quality a lot after completion of the project while 97.5% of the people think that it will improve slightly. Generally, the two publicities and result of public participation survey that the local public hold that the project construction will promote the economic development of the region and agree the construction site and the construction of the project.

B. Grievance Redress Mechanism

Environmental Complaints Form

80. The Project should establish a sound environmental complaint and response mechanisms, to encourage the public to report the Project's environmental violations, in order to avoid environmental disputes.

81. The PMO, IAs and construction contractors will designate a person or set up complaint handling team to deal with the public environmental complaints. The PMO, IAs and construction contractors should strengthen environmental complaint and response mechanisms for the proposed road alignments. Through the relevant agencies, residential communities and other administrative departments, the environmental complaints will be collected and then reported to the IAs or construction contractor's environmental complaint handling team. In addition, the identity of the complainants will be kept strictly confidential. Complaints and responses will be documented, and timely notify to the environmental protection departments on the response to the complaints and the implementation. Complainants will be notified in writing and in a timely manner about the response to their complaints. Complained units are mainly responsible for the implementation of complaints. Environmental protection bureau is responsible for supervision.

Grievance Redress Procedure

82. **Public** participation, consultation and information disclosure undertaken as part of the local EIA process, and consultations undertaken by the Project consultants have addressed major community concerns. Continued public participation and consultation is emphasized as a key component of successful project implementation. As a result of this public participation and safeguard assessment during the initial stages of the Project, major issues of grievance are not expected. However, unforeseen issues may occur. In order to settle such issues effectively, an effective and transparent channel for lodging complaints and grievances has been established.

83. In the event of a grievance issue, the basic stages established for redress are:

(i) Stage 1: The affected person should submit an oral or written petition/complaint to the village committee or neighbourhood committee. For an oral complaint, the village committee or neighbourhood committee must make written records properly and give a clear reply within 2 weeks and convey the petition/complaint to the IAs or construction contractors. The IAs and/or construction contractors should give appropriate response to the affected person and convey the response to the relevant village committee or neighbourhood.

(ii) Stage 2: If the complainant is not satisfied with the reply in Stage 1, he/she can appeal to the township government/sub-district office after receiving the reply in Stage 1 and the township government/sub-district office will deal with the complaint within 2 weeks and convey the petition/complaint to the IAs or construction contractors. The IAs and/or construction contractors should give appropriate response to the affected person and convey the response to the relevant township government/sub-district office.

(iii) Stage 3: If the affected person is still not satisfied with the reply in Stage 2, he or she can appeal to County/District EPBs. The District EPBs must give a reply within 30 days and convey the petition/complaint to the IAs or construction contractors. The IAs and/or construction contractors should give appropriate response to the affected person and convey the response to the relevant District EPBs.

(iv) Stage 4: If the affected person is still not satisfied with the reply of county/District EPBs, he/she can appeal to PMO or Municipal EPD after receiving the reply of Stage 3. They also have the right to appeal to the civil court within 3 months of receiving the reply.

IX. CONCLUSION

84. The risks can be adequately mitigated through the implementation and enforcement of the EMP and the mitigation measures, including the organizational and legal mechanisms specified in the EIA and the EMP.

85. The major potential adverse environmental impact of the proposed component during construction and operation include the disturbance of soil and vegetation; water pollution from runoff; high-sediment-load runoff infiltrating rivers and tributaries; noise impact on residential areas; and solid waste disposal. The EMP contains comprehensive environmental mitigation measures. The estimated costs of the environmental protection and mitigation measures account for around 20% of the total budget.

86. Any adverse environmental impacts associated with the project will be prevented, reduced, minimized, or otherwise compensated. The EMP has been established to ensure the environmental performance of the project and it includes (i) environmental management and supervision structure, (ii) environmental mitigation and monitoring plans, (iii) institutional strengthening and personnel training. With the implementation of the mitigation measures defined in the EMP, the adverse impacts will be reduced to acceptable levels.

APPENDIX 1: ENVIRONMENTAL MANAGEMENT PLAN

A. Objectives

1. The objectives of the EMP are to (i) ensure implementation of identified mitigation and management measures to avoid, reduce, mitigate, and compensate for anticipated adverse environment impacts, and (ii) monitor and report against the performance indicators, while ensuring that the project complies with the PRC's environmental laws, standards and regulations and to ADB's Safeguard Policy Statement (SPS 2009). Organizational responsibilities and budgets are clearly identified for execution, monitoring and reporting.

B. Implementation Arrangements

2. This project is the scope change to the ADB financed Hebei Small Cities and Towns Development Demonstration Sector Project, which has several district heating subprojects. Hebei Government is the executing agency for the project. A project leading group was established and is responsible for directing the project and providing policy guidance during project implementation. The HPMO was established years ago and is responsible for coordinating the implementation of project activities on behalf of the Hebei Government.

3. HPMO is overall responsible for implementing EMP. HPMO will nominate a qualified environment officer to undertake effective environmental management activities specified in the EMP. Environmental engineers of a construction supervision company (CSC) contracted by each IA will be responsible for the daily inspection, monitoring, and evaluation of mitigation measures at each construction site.

4. Each IA will form an environmental management unit (EMU), which consists of a leader and an appropriate number of staff to coordinate environmental issues with the contractor, CSC and HPMO. The EMU will be supported by the loan implementation environment consultant and supervised by the local EPBs. Contractors are responsible for implementing relevant mitigation measures and EMP monitoring during construction specified in the EMP supported by the CSC. Each IA is responsible for mitigation measures and EMP monitoring during project operation.

5. The local EPBs and Environment Monitoring Stations (EMS) under EPB in Longhua will ensure in compliance with the PRC's environmental standards and regulations through regular and random environmental compliance monitoring and inspection during construction and operation. The EPB/EMS will conduct the PRC's environmental compliance monitoring and inspection and local ambient air quality monitoring according to PRC regulations on behalf of each municipal EPB.

6. ADB is responsible for monitoring and supervising the overall environmental performance of the project. ADB will also disclose the project monitoring reports on its website. ADB will review the semiannual environment performance reports submitted by HEBEI PMO, and conduct due diligence of environment issues during the project review missions. If the EA and IAs fail to meet safeguards requirements described in the IEE and the EMP, ADB will seek corrective measures and advise the EA and HPMO on items in need of follow-up actions. The institutions and their responsibilities are summarized in Table A-1.

Table A-1: Summary of Institutions and Responsibilities for EMP

Name of Institution	Responsibilities
Project Leading Group	Direct the project and provide policy guidance during project implementation; Review project implementation progress and take additional measures if necessary.
ADB	Monitor and supervise the overall environmental performance of the project; Review the semiannual environment reports and disclose the project monitoring reports on its website; conduct due diligence of environment issues during the project review missions.
HPMO	Responsible for overall implementation of the EMP with the support from consultants and IAs; Coordinate with IM Finance Bureau, IAs, the tender companies, consultants, and other governmental agencies.
Longhua IAs	Establish EMU; Provide supervision to CSCs and submit monthly reports to the PMO; Work with design institutes and the tender companies in preparing bidding documents to ensure environmental protection provisions are included in them.
Longhua EPB	Conduct environmental monitoring according to the monitoring plan and inspect the facilities during construction and operation to ensure compliance; Enforce applicable environmental laws and regulations.
CSCs	Responsible for the daily inspection, monitoring, and evaluation of mitigation measures at each construction site.
Environmental consultant	Provide technical assistance to PMO and IAs for implementing the EMP; Provide training to the staff of the PMO, IAs and CSC. Prepare the semiannual environmental reports.

CSC – construction supervision company

7. **Institutional Strengthening and Capacity Building.** The provincial EPB and

environment consultants will offer series of trainings to strengthen the capacity of HPMO and implementation agencies concerned for EMP implementation. Environmental consultants will be responsible for developing training materials and providing training.

8. In order to ensure the smooth and effective development of the environmental management work, the staff shall be through knowledge and skill training, and in addition to the introduction of the importance and significance of implementation of the engineering, different trainings shall be applied to different jobs. Related environmental protection personnel training plan of the project is shown in table A-2.

Table A-2: Training plan list of environmental protection personnel

Item	Phase	Classification	Quantity	Total	Time	Cost (RMB ten thousand Yuan)
Sewage treatment plant	Construction period	Environmental protection personnel of investment company	The project and environment management shall be respectively arranged 2 person	4		4.0
		environment administrator	3	3		3.0
		Environment supervising engineer	The contractor unit and investment company shall be respectively arranged 1 person	2	2013-2014	2.0
		Personnel that take emergent measures	1	1		1.0
	Operating period	Environment management personnel	7	7		7.0
		environment workers	33	33	After completion of the project	33.0
Total				50		50.0

C. Potential Impacts and Mitigation Measures

9. The potential impacts of the project during construction and operation have been identified and appropriate mitigation measures have been proposed (see Chapter V for details) and will be implemented during the project implementation. The effectiveness of mitigation measures will be evaluated through environmental inspections and monitoring. Detailed impacts mitigation measures are presented in **Table A-6.**

D. Environment Monitoring Plan

10. An environment monitoring plan has been developed which is included in **Table A-7**. The monitoring plan covers air quality, wastewater, and solid waste parameters during construction as well as operation of each subproject. Monitor frequencies, responsible parties and estimated costs are identified in the plan.

11. The contractors and CSCs will be responsible for onsite routine environmental monitoring during construction. The IAs will be responsible for supervising the contractors under the guidance from HPMO and the local EPBs and with the assistance from the loan implementation environment consultant. The IAs will be responsible for ensuring that the proposed environmental mitigation measures in the EMP to be properly implemented. The EMU under each IA will be responsible for their internal monitoring during operation.

12. The local EPB environmental monitoring stations will be responsible for monitoring the project to ensure that they comply with applicable regulations and requirements specified in the

domestic EIA reports approved by the local EPBs.

13. **Standard Monitoring Methods.** The monitoring methods, detection limits, and the standard code for each monitoring parameter are shown in **Table A-3.** The data and results of environmental inspection and monitoring activities will be used to assess: (i) the extent and severity of actual environmental impacts against the predicted impacts and baseline data collected before the project implementation; (ii) performance or effectiveness of environmental mitigation measures or compliance with pertinent environmental rules and regulations; (iii) trends in impacts; (iv) overall effectiveness of EMP implementation; and (v) the need for additional mitigation measures and corrective actions if non-compliance is observed.

Table A-3: Monitoring Parameters and Methods

Media	Monitoring Parameter	Method (Standard No.)	Detection Limit	Standard Limit
Air	TSP (mg/m^3)	Gravimetric (GB/T15432-1995)	0.001	0.30[1]
	PM_{10} (mg/m^3)	Gravimetric with specific sampler (HJ/T93-2003)	0.0002	0.15
	SO_2 (mg/m^3)	Spectrophotometry (GB/T15262-1994)	0.003	0.15
	NO_X (mg/m^3)	Saltzman Method (GB/T15435-1995)	0.002	0.12
Noise	Equivalent Continuous A Sound (Leq)	Acoustimeter Method (GB12524-90)	0.5	60 (day)/ 50 (night)
Surface water	pH value	Glass electrode method (GB6920-86)	0.02pH	6-9[2]
	COD_{Mn} (mg/L)	Permanganate index (GB11914-89)	0.5	6
	Petroleum (mg/L)	Infrared spectra photograph (GB/T16488-1996)	0.04	0.05
	SS (mg/L)	Gravimetric method (GB11901-89)	4	250
	Total coliforms (no./L)	Membrane filter (GB/T575.12-2006)	10	10,000

Source: PRC standards

14. **Quality assurance (QA) and quality control (QC) for compliance monitoring.** To ensure monitoring accuracy and data integrity, the QA and QC procedures are established in accordance with the following regulations:

(i) Regulations of QA/AC Management for Environmental Monitoring (SEPA, July 2006);

(ii) QA/QC Manual for Environmental Water Monitoring, the State Environmental Monitoring Centre in 2001; and

(iii) QA/QC Manual for Environmental Air Monitoring, the State Environmental Monitoring Centre in 2001.

[1] All the air parameters are Grade II ambient air standard (daily average).
[2] All the water parameters are Grade III standard.

E. Reporting Requirements

15. The IAs supported by the CSCs will submit the monthly environment monitoring report to HPMO, who will prepare and submit environment monitoring reports to ADB semiannually during construction and annually during operation. The environmental specialists of the loan implementation consultants will provide technical assistance and training to the staff of the PMO, IAs and CSCs.

16. The local EPB's EMS will conduct required measurements according the EMP environmental monitoring plan and submit the monitoring reports to HEBEI PMO. A consolidated monitoring report will be prepared by HPMO with the assistance from the implementation environment consultant.

17. No later than two months after completion of the construction work, the IAs shall collect data from all contractors and CSCs, and submit construction completion report to HPMO and the local EPBs in order to comply with the PRC regulations. Within two months after project completion, environmental acceptance monitoring and audit reports of project completions shall be (i) prepared by the local EMSs; (ii) reviewed for approval by the local EPBs, and (iii) submitted to HPMO. ADB can request to PMO a copy of the construction completion report for the project record.

18. The environmental reporting requirements during the implementation of the project are summarized in the **Table A-4**.

Table A-4: Reporting Requirements

Report	Prepared by	Submitted to	Frequency
A. Construction Phase			
Monthly environment monitoring report	IAs supported by Contractors, CSCs	HEBEI PMO	Monthly
EMP monitoring report	HPMOsupported by loan consultants	ADB	Semiannually
B. Operation Phase			
Subproject EMP monitoring report	IAs	HEBEI PMO	Annually
EMP monitoring report	HPMOsupported by loan consultants	ADB	Annually

CSC = construction supervision company, EMS = environment monitoring station
Source: Domestic EIA Reports.

F. Performance Indicators

19. Performance indicators (**Table A-4**) have been developed to assess the implementation of the EMP. These indicators will be responsive to changes in project design, such as a major change in boilers and their auxiliary facilities, or in technology, unforeseen events, and monitoring results.

Table A-4: Performance Indicators

No.	Description	Indicators
1	Staffing	(i) Qualified environment officer was assigned in HPMObefore project implementation (ii) Local EMS is hired by the IA before construction (iii) EMU is established with appropriate number of staff in each IA before project implementation
2	Budgeting	(i) Environment mitigation cost during construction and operation is timely allocated (ii) Environment monitoring cost is timely allocated (iii) Budget for capacity building is timely allocated
3	Monitoring	(i) Internal environmental inspection and monitoring during construction period is included in the contracts between the IAs and

No.	Description	Indicators
		CSCs (ii) Compliance monitoring is conducted by the local EMS biannually (iii) EMP monitoring is conducted by contractors, CSCs, IAs, and EMSs as scheduled.
4	Supervision	(i) HPMOsupervises environmental inspection and monitoring done by CSCs (ii) ADB mission will review EMP implementation at least once a year during the project implementation period
5	Reporting	(i) Monthly environment monitoring reports prepared by IAs and CMSs are submitted to HPMO (ii) Compliance environment monitoring reports prepared by EMS are submitted to local EPBs and IM PMO semiannually (iii) Semiannual and annual EMP monitoring reports prepared by HPMOare submitted to ADB (iv) Construction completion report prepared by IAs is submitted to HPMO (v) Environment acceptance monitoring and audit report prepared by local EMS is submitted to HPMOand local EPBs within two months after project completion
6	Capacity building	(i) Training on ADB safeguard policy is provided to HPMOand IAs at the beginning of project implementation (ii) Training on grievance redress mechanism (GRM) is provided at least once during the project implementation (iii) Training on EMP is provided at least once a year during the project implementation
7	Grievance Redress Mechanism	(i) Project public complaints unit (PPCU) is established in each IA before project implementation (ii) Contact persons of PPCU are assigned and disclosed to the public before construction (iii) Complains are recorded and processed within the set time framework in the GRM of this CIEE.
8	Compliance with the PRC standards	(i) All subprojects comply with the PRC's environmental laws and regulations and meet all the required standards.

G. Mechanisms for Feedback and Adjustment

20. Based on environmental inspection and monitoring results, the local EPBs will decide whether (i) further mitigation measures are required as corrective actions, or (ii) some improvements are required for environmental management practices.

21. The effectiveness of mitigation measures and monitoring plans will be evaluated through a feedback reporting system. HPMO with assistance from EPBs and the loan consultants will assess the results of environmental monitoring and then propose any changes to EMP monitoring and mitigation plan. If necessary, adjustments can be proposed to the EMP. However, any major adjustments will be subject to ADB review and approval.

22. If, during inspection, substantial deviation from the EMP is observed or any changes are made to the project that may cause substantial adverse environmental impacts or significant increase in the number of affected people, then HPMO should consult with the Hebei EPB, the local EPBs, and ADB and form an environmental assessment team to conduct additional environmental assessment and, if necessary, further public consultation. The EMP can be revised based on the changes of the project activities and the revised EMP will be passed to the contractor(s) and the IAs for implementation.

23. Any revised EMP should be sent to ADB's review. The revised EMP with ADB confirmation is subject to reposting on the ADB's website as the ADB public communications policy (PCP) requires. The mechanism for feedback and adjustment of the EMP is shown in **Figure A-1**.

Figure A-1: Mechanism for Feedback and Adjustment of EMP

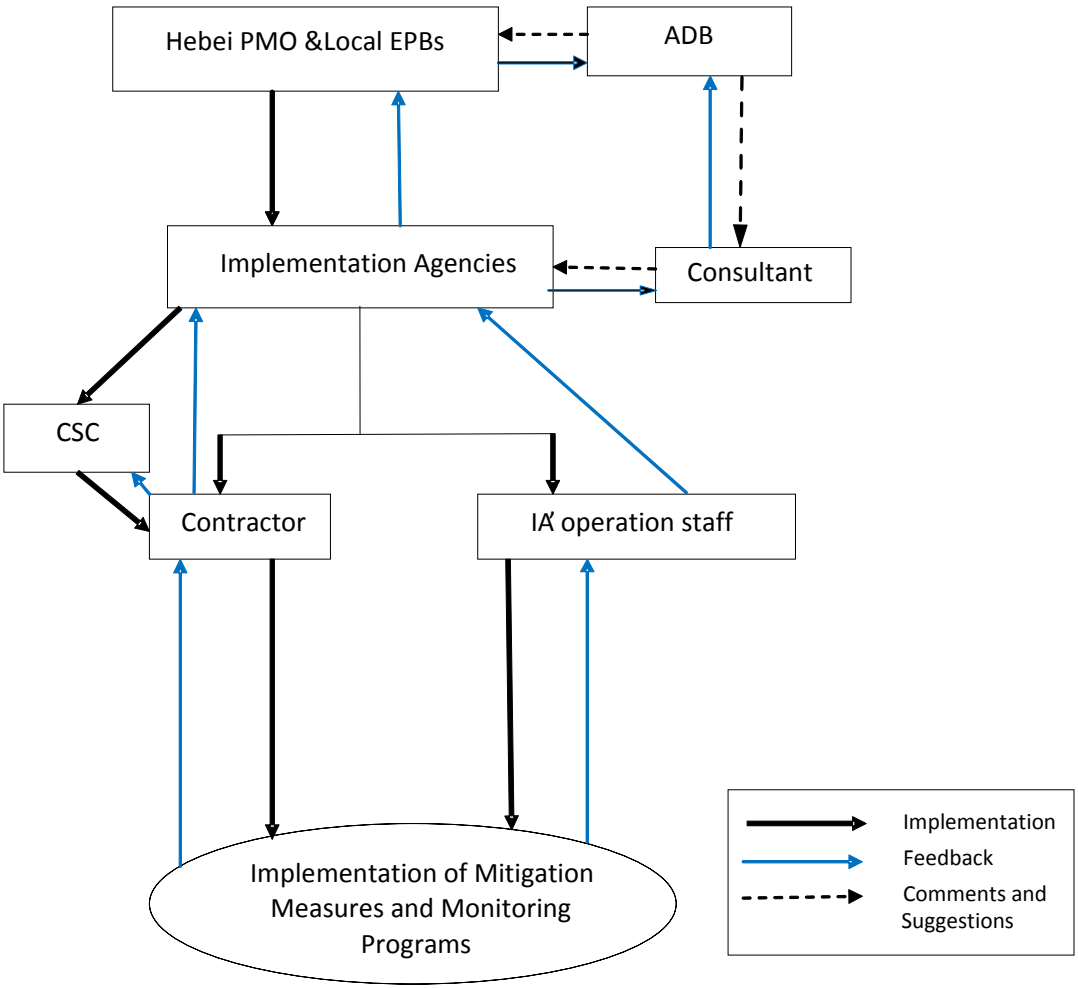

Table A-5: Environment Impacts and Mitigation Measures

Contents / Types	Source of Discharge（No.）	Pollutants	Prevention and Control Measures	Expected Treatment Effect
Air	grid, sand pool, the reaction tank, dewatering pump	ammonia, sulfueted hydrogen, concentration of stench	Set a 200 meters protection distance and clear the pollutants timely, cut down the pilling time in the plant, afforestation in the plant and at boundaries etc.	odor concentration satisfies the Class II standard of the maximum allowable concentration limits at the plant boundaries of the Sewage Discharge Standard of Pollutants for Municipal Wastewater Treatment Plant (GB18918—2002)
Wastewater	urban residents and industrial enterprise	COD, SS, BOD5, Total-N, NH3-N, total-P	CASS, main structures include screens, regulating reservoir, CASS pool, sedimentation tank, V type filter, dewatering machine house and blower house.	satisfy the Class I standard of Table 1 of the Sewage Discharge Standard of Pollutants for Municipal Wastewater Treatment Plant (GB18918—2002)
	effluent of the WWTP (reclaimed water for reuse)	COD, SS, NH3-N,	Efficient sedimentation tank + Carbon adsorption tank + Disinfection and cleaning tank	Satisfy the standard of reuse of reclaimed water for Urban Water Quality Standard for Urban Miscellaneous Water Consumption（GB18920-2002）
Solid Waste	phase II of WWTP	grit slag	transport to disposal processing by sanitation department	All will be disposed, not discharge
		waste residue		
		sludge	transport to Li County Waste Treatment Co. Ltd to disposal	
	advanced treatment for reclaimed wastewater	sludge		
		waste coke	all be recoveried by vender	
Noise	The noise is generated mainly from the operating mechanical equipments, water pump and motors etc. Low-noises equipment is selected for the project, and the value of noises is between 75 ~ 100dB（A）. The equipment is put in the house, and noise reduction measures such as noise insulation, base damping, and use of mufflers are taken. Wide greenbelt is set around the plant to reduce noise influence on surrounding environment. The plant boundary noises is expected to meet the second class standard of the Emission Standard of Noise at Boundary of Industrial Enterprises (GB12348—2008）.			
Others				

Table A-6: Environment Monitoring Plan

Project		Budget, CNY (10,000)
Before Construction		
Air	Monitoring points：to lay each point on the 200 meters of the upwind of BeiZhang village and Under the direction of the wind	**6.5**
	Monitoring parameters：SO2、PM10、NO2、NH3、H2S	
	Monitoring time：continuous monitoring for 7 days, SO2, PM10, NO2 24 hours daily average concentration sampling of not less than 20 hours, SO2, NO2, NH3, H2S 1 hours a day 4 samples, each sample for 45 minutes, the specific time for the 2:00, 8:00, 14:00, 20:00.	
Noise	Monitoring points：in the four legal boundaries to set four monitoring points on the distance of one meters, technical supervision Bureau one monitoring point, the IRS District one monitoring point	**0.5**
	Monitoring parameter：equivalent continuous sound level A	
	Monitoring frequency：monitoring two days，to monitoring once on day and night	
Surface Water	monitoring points: the upstream fifty meters of Yueming river, downstream five handred meters, downstream one thousand meters	**0.5**
	Monitoring parameters：pH、BOD5、COD、SS、DO、total phosphorus, total nitrogen, ammonia nitrogen, petroleum, fecal coliform bacteria	
	Monitoring frequency：sampling for two days in a row, each section sampled once every day. Simultaneous monitoring of temperature, velocity and other parameters	
Groundwater	Monitoring points：according to the direction of groundwater, construction projects in the upstream water county one monitoring points, the construction project, the downstream HuCun, BeiZhang Cun wells each laid one monitoring points.	**0.3**
	Monitoring parameters：pH、total hardness, permanganate index, total dissolved solids, sulfate, nitrate, nitrite, ammonia nitrogen, total coliforms, synchronous recording depth of wells	
	Monitoring frequency：continuous sampling and monitoring for two days, sampled once every day.	
Boundary	Monitoring points：each of the four legal boundaries of the project for one	**2.5**
	Monitoring parameters：NH3、H2S、odor concentration	
	Monitoring frequency：NH3、H2S 1 hours a day 4 samples, each sample for 45 minutes, the specific time for the 2:00, 8:00, 14:00, 20:00, continuous monitoring for 2 days. The odor concentration continuous monitoring of two days, daily monitoring of two times, once in the morning, afternoon.	
Others	The report, vehicle and personnel costs	**0.5**
Construction		
Air	Monitoring points：A total of two monitoring points in the northwest side of the IRS district projects and project on the west side of bureau of Technical Supervision Area	**12**
	Monitoring parameters：PM10	
	Monitoring frequency: Monitoring for at least 20 hours average concentration of every day, twice a year	
Noise	Monitoring points：Each project works out one meters and project northwest side of IRS district and West District Project Technical Supervision Bureau	**6**
	Monitoring parameters：Equivalent continuous sound level A	
	Monitoring frequency：twice a year, on day and night	
Operation		
	Monitoring points：Sewage treatment plant inlet	**7**
	Monitoring frequency：BOD5、COD、SS、Dissolved oxygen, pH, chromaticity, turbidity, total phosphorus, total nitrogen, ammonia nitrogen	

Wastewater	Monitoring frequency：Daily monitoring of total nitrogen, total phosphorus, two times a month	
	Monitoring points：Sewage treatment plant.	**7.2**
	Monitoring parameters：BOD5、COD、SS、Dissolved oxygen, pH, chromaticity, turbidity, total phosphorus, total nitrogen, ammonia nitrogen	
	Monitoring frequency：Coliform were monitored monthly, every day for the rest of the monitoring time	
Reclaimed Wastewater	Monitoring points：Water treatment process	**3**
	Monitoring parameters：BOD5、COD、SS、Dissolved oxygen, pH, chromaticity, turbidity, total phosphorus, total nitrogen, plant and animal oil, coliform, petroleum	
	Monitoring frequency：Coliform were monitored monthly, every day for the rest of the monitoring time	
Sludge	Monitoring points：The sewage treatment plant and landfill	**7**
	Monitoring parameters：Dry matter and heavy metals	
	Monitoring frequency：According to the date of disposal can be set different monitoring frequency and duration	
Groundwater	Monitoring points：Surface water control section	**10**
	Monitoring parameters：pH、BOD5、COD、SS、Dissolved oxygen, total phosphorus, total nitrogen, ammonia nitrogen, petroleum, fecal coliform bacteria	
	Monitoring frequency：According to the sampling method of monitoring	
Air	Monitoring points：Sewage treatment plant factory	**7**
	Monitoring parameters：odour	
	Monitoring frequency	
Noise	Monitoring points：Sewage treatment plant and the northwest side of IRS district and West District Technology Supervision Bureau	**20**
	Monitoring parameters：Equivalent continuous sound level A	
	Monitoring frequency：once a month, monitor by day and night	
Groundwater	Monitoring points：Monitoring in the upstream, downstream and to the sewage treatment plant according to the groundwater flow	**4**
	Monitoring parameters: pH、Total hardness, permanganate index, total dissolved solids, sulfate, nitrate, nitrite, ammonia nitrogen	
	Monitoring frequency：once a quarter (of a year)；	
	Total	**94**