December 2002

Environmental Impact Assessment Report

For

Liyang Road Old House Protection and Rehabilitation Project Hongkou district Shanghai

(Certificate No.: GHPZHJZ 1810)

Shanghai Zhongfang Real Estates Exchange Company Ltd.

Shanghai Bohong Engineering and Construction Company Ltd.

SEPA-Tongji Research Institute of
Environmental Protection
Science &Technology

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Prepared by

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1. INTRODUCTION

1.1 Assessment Origins

Shanghai is a city with a glorious revolutionary history. Many revolutionary activities have left behind precious relics and sites. While Shanghai is marching towards an international metropolis and becoming an important center of finance, economy, trading and seaport, these precious relics and sites should be protected satisfactorily as irreproducible historical and cultural recourses.

The northern part of Old Hongkou takes up about 83.6ha. In this part, near Duolun Road, Shanyin Road, Liyang Road and Luxun Park, there are lanes of old Shanghai fashions, various contemporary building and precious relics and sites, which is one of the most famous historical culture sites in China as well as in Shanghai.

According to the whole layout of Hongkou District, this Project-- Reconstruction of the Contemporary Buildings under Protection near Liyang Road, will pay equal attention on development and historical style and features protection to renovate the old buildings built in 1920~30s into inimitable ones. After reconstruction through restoration and inner decoration, their dwelling functions and using values will be highly raised.

The Project is located at Siping Road, Liyang Road and Baoan Road in the east; Changchun Road in the west; North Xingjiaqiao Rd in the south; 138 Lane of Baoan Road in the north with an area of about 9.36ha. Three Blocks, i.e. A、B、C blocks, are divided in this Project. The total investment is 1 billion yuan.

It is required by the Environmental Protection Law of the People's Republic of China and Management Regulations for Construction Project Environmental Protection to implement environmental impact assessment (EIA) regulation for construction projects that may produce impacts to the environment. According to the Category List for Classifying Management of Construction Project Environmental Protection, an EIA report must be compiled for the present Project.

Entrusted by Shanghai Zhongfang Housing Exchange Co., Ltd and Shanghai Hongbo Construction Engineering Co., Ltd, the SEPA-Tongji Research Institute of Environmental Protection Science and Technology, based on the principles and requirements formulated in Technical Guidelines on Environmental Impact Assessment - General Article (HJ/T 2.1 - 1993) and onsite surveying, is responsible for the environmental impact assessment on the Project of Reconstruction of the Protective Contemporary Buildings near Liyang Road.

1.2 Assessment Basis

1.2.1 Relevant technical documents

1) Letter of Appointment for the Environmental Impact Assessment on the Project of Reconstruction of the Contemporary Buildings under Protection near Liyang Road, Shanghai Hongbo Construction Engineering Co. Ltd, Nov., 2002;

2) The design blue-print of the Project of Reconstruction of the Contemporary Buildings under Protection near Liyang Road, German SBA Co. Ltd, 2002 月;

3) Regulations for the Protection of Excellent Contemporary Buildings in Shanghai, Shanghai Municipal Government, Nov. 5, 1991;

4) The Whole Layout of Shanghai (1999-2020);

5) Programming for the Urban Protection in Shanghai—Historical Architectures and Blocks, 1999;

6) The Notice for Implementation of the Programming for the Urban Protection in Shanghai—Historical Architectures and Blocks, Shanghai Layout Bureau, Document No. 0086, 2000;

7) The 7th Five-year Plan of Hongkou District.

1.2.2 Relevant Laws and Regulations on Environmental Protection

Environmental Protection Law of the People's Republic of China, December 26, 1989;

Air Pollution Prevention and Control Law of the People's Republic of China (revised), April 29, 2000;

Water Pollution Prevention and Control Law of the People's Republic of China (revised), May 15, 1996;

Environmental Noise Pollution Prevention and Control Law of the People's Republic of China, October 29, 1996;

Solid Waste Pollution Prevention and Control Law of the People's Republic of China, October 30, 1995;

Provisions on Construction Project Environmental Protection Management, ([98] State Department Decree No. 253), November 29, 1998;

Environmental Protection Provisions of Shanghai, May 27, 1997;

Management Provisions on Tree Planting and Greening, Decree No. 40 of Shanghai Municipal Standing Committee, Sep.22, 2000;

Technical Guidelines on Environmental Impact Assessment (HJ/T 2.1~2.3—1993, HJ/T

2.4—1995), September 18, 1993, and November 28, 1995

Ambient Air Quality Functional Zones of Shanghai, Shanghai Environmental Protection Bureau

Applicable Functional Zones for Urban Environmental Noise Standards of Shanghai, Shanghai Environmental Protection Bureau (1994), No.130

Surface Water Environmental Functional Zones of Shanghai, Shanghai Environmental Protection Bureau

Implementing methods for Air Pollution Prevention and Control Law of the People's Republic of China in Shanghai, passed by 29th Session of the Shanghai Municipal Standing Committee of 11th People's Congress, July 13, 2001;

Design Standards for the Construction Criterion of Shanghai (DGJ08-20-2001), 2001;

Notice for Opinions on the Sewerage Discharge of Newly-built Dwelling Houses in Shanghai, Decree No. 184 of Shanghai Environmental Protection Bureau and Water Conservation Bureau, May 16, 2001.

1.3 Assessment Objectives

The objectives of the present environmental impact assessment are:

In the local area of the construction site, to survey the features of the natural and social environment, to evaluate the existing environmental quality including air and noise, and to analyze the compatibility of the project construction with the development plan of the local area.

Based on engineering analysis and analogical comparison with similar projects, to determine the characteristics of pollution sources generated in main production processes, to find major pollutants and emission amounts, and to estimate emission amounts after control measures being implemented.

To predict and evaluate the impact level and extent on air quality and noise within the assessment area, during and after the construction project.

To evaluate the feasibility of the environmental protection measures, and to provide control methods and suggestions for further pollution control and impact mitigation.

1.4 Scope of Assessment and Pollution Control/Environmental Protection Targets

1.4.1 Assessment Level

This Project belongs to a real estate reconstruction program. After reconstruction, the

major water pollutant –sewerage will be disposed into the Municipal Wastewater Pipelines with daily amount of 192m^3/d. There will be no remarkable noise producing sources in this Project. The acoustic environment is mainly affected by traffic noises from North Xingjiaqiao Road in south, Baoan Road in east and Changchun Road in west. According to the character, pollutant discharge amount and environmental sensitive degree in this Project, the assessment levels are determined as following:

(1) Atmospheric environment

According to the Engineering Analysis, the major air pollutants of the end emission of this Project are NO_2 and SO_2, produced when food cooking and gas burning. Because the emission rate is not high and estimated emission strength is less than $2.5\times10^9 m^3/h$, the atmospheric environmental impact assessment for this Project is therefore determined as Grade 3.

(2) Water Environment

The major items to be assessed for the sewerage of this Project are SS、NH_3-N、BOD_5、COD_{Cr}. The sewerage will be drained into the Liyang Road Municipal Wastewater Pipelines at the middle of this Plot and finally be treated to reach the Second Class Emission Standards by the Quyang Wastewater Treatment Plant. Therefore, the present assessment only analyzes the attainment situation of the sewerage to be disposed and as Grade 3.

(3) Acoustic Environment

This Project is located in a residential and commercial mixing area. According to the classification in the Environmental Noise Pollution Prevention and Control Law of the People's Republic of China, the Second Category is applicable to the present Project. Since there is no remarkable noise producing sources in this Project, the acoustic environmental assessment is determined as Grade 3.

1.4.2 Assessment Area

(1) Water Environment

The major pollutant is sewerage for the real estate construction project. So the assessment point of wastewater discharge is selected at the discharge outlet of this Project to enter municipal wastewater pipelines.

(2) Atmospheric Environment

As described, the major air pollutants of the end emission of this Project are NO_2 and SO_2, produced when food cooking and gas burning. Because the emission amounts is not high and have little effects on surrounding environment, the assessment area for air quality is selected as a 2×2 km^2 area surrounding the Project site.

(3) Acoustic Environment

The major noise pollutants are from nearby traffic noises and during the period of Project construction. Affected by the traffic noises from Xingjiabei Road in north, Baoan Road in east and Changchun Road in west, the acoustic environmental assessment is determined as the key issue and its assessment area is selected within 100m extended from the borders of this Project.

1.4.3 Pollution Control and Environmental Protection Targets

(1) The objective of water pollution control is to let the sewerage attain the emission standards of the 3rd Grade of Wastewater Synthetic Emission Standards of Shanghai (DB31/199—1997, before entering Quyang road municipal wastewater pipeline and then treated in Quyang Wastewater Treatment Plant..

(2) The objective of air pollution control is to attain the emission standards for Grade 2 (GB3095—1996) functional zone; the target of environmental protection is the community surrounding the Project.

(3) The objective of noise control is to attain the Grade 2(Grade 4 beside main traffic line) in Urban Area Environmental Noise Standards (GB3096-93) and Category II standard of Industrial Enterprise Borderline Noise Standards (GB12348—90); the sensitive protection targets are those residents in and surrounding this Project.

1.5 Key Issues of Assessment

Respective to the features of this Project and the local environmental setting, the key issues in the present assessment include:

(1) Engineering analysis;

(2) Existing environmental quality survey for ambient air quality and noise level;

(3) Environmental impact assessment for ambient air quality and noise level;

(4) Evaluation on pollution control measures and environmental cost and benefits;

(5) Public survey;

(6) Environmental management and monitoring.

The assessment emphases are: engineering analysis, environmental impact assessment, evaluation on pollution control measures (especially on traffic noises and the exhaust gases control plan).

1.6 Assessment Indices and Standards

1.6.1 Emission standards

(1) The 3rd Grade standards in Wastewater Synthetic Emission Standards (DB31/199 - 1997) (construction after Jan.1,1998);

(2) The Category II noise standard of Noise Standards （GB12348—90） for Industrial Enterprise Borderlines.

(3) The Noise Limits for Construction Site Borderlines（GB12523—90）;

(4) The 2nd Grade standards in *Air Pollutant Synthetic Emission Standards* (GB16297 - 1996).

The details of these standards are listed in Table 1-1.

Table 1-1 Pollutant Emission Standards for the Assessment

Item	Pollutant	Emission standards		
		Type	Conc. Criterion	Discharge rate (kg/h)
Water	pH	Grade 3	6~9	—
	COD_{Cr}		300 mg/L	
	BOD_5		150 mg/L	
	SS		350 mg/L	
	NH_3-N		25 mg/L	
	Propagation oil		30 mg/L	
Noise	L_{Aeq}	Category II	Day: 60 dB(A);Night: 50 dB(A)	
Air	NO_x	Amorphous Emission Limits	0.12mg/m^3	—
	PM_{10}		1.0mg/m^3	

1.6.2 Environmental Quality Standards

(1) The Grade 2 standards for PM_{10}, SO_2 and NO_2 in the notice of the revision for Ambient Air Quality Standards (GB3095-96) by NEPA on Jan. 6, 2001;

(2) The Category II noise standard in Urban Area Environmental Noise Standards (GB3096-93);

(3) The maximum allowable concentrations of harmful substances in the residential district for CO in Hygienic Standard of Designs for Industrial Enterprises (TJ36-79);

Table 1-2 Environmental Quality Standards

Item	Pollutant	Standards	
		Type	Concentration limit
Air quality	PM_{10}	Grade 2	Daily average: 0.15 mg/m^3
	SO_2		hourly: 0.50 mg/m^3 Daily: 0.15 mg/m^3
	NO_2		hourly: 0.24 mg/m^3 Daily: 0.12 mg/m^3
	CO	Residential district	Anytime: 3 mg/m^3 Daily average: 1mg/m^3
Noise	L_{Aeq}	Category II	Day: 60 dB(A); Night: 50 dB(A)

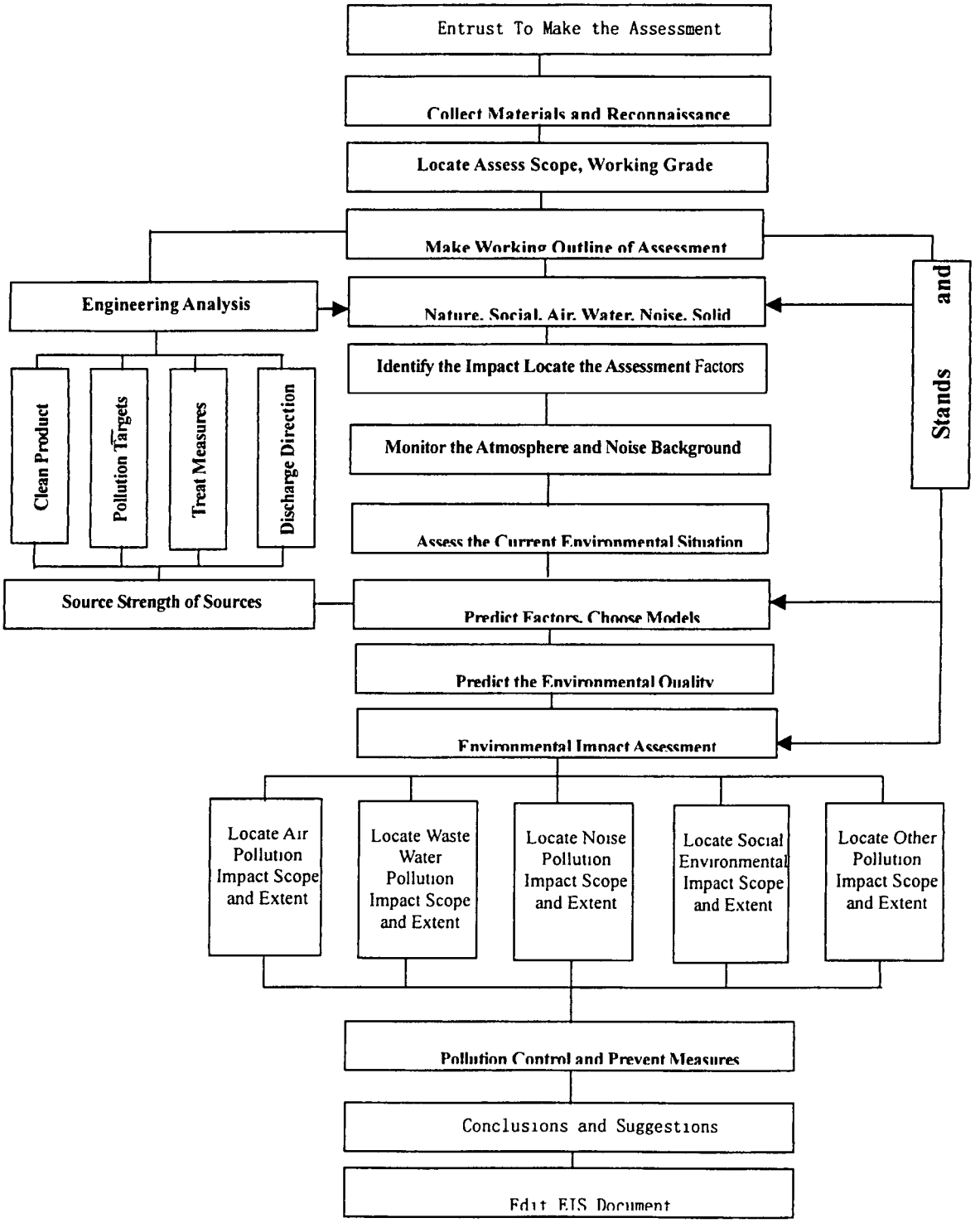
1.7 Assessment Methodology

The assessment will be carried out based on the collecting of available data, making necessary onsite surveying, performing analogical comparison and monitoring, selecting proper model to predict the impacts on the natural and social environment of the surrounding area by pollutant emissions during and after the Project construction

1.8 Assessment Procedure

The assessment methodology and procedure are summarized in Figure 1-1.

Figure 1-1 Assessment Working Procedure



2. Outline of the construction project

2.1 Project Name and Nature

Project name: Reconstruction of the Contemporary Buildings under Protection near Liyang Road;

Project nature: Real estate reconstruction

2.2 Geographical Location and Occupation Area

This Project is located in the middle of Hongkou district in Shanghai, belonging to Sichuan Road N. community, standing the area of 9.36 ha. surrounded by Siping Road, Liyang Road and Baoan Road to the east; Changchun Road to the west; North Xingjiaqiao Road and Changchun spur track to the south and 138 Lane of Baoan Road to the north; the details of the local area are shown in Figures 2-1.

The traffic is very convenient around this Plot. There are Liyang Station and Baoshan Station of No.2 Pearl Light Track to the south, Hongkou Stadium Station to the northwest. The main traffic lines are Siping Road to the east, Sichuan Road N. to the west and Hailun Road W. to the south etc. There are also Luxun Park, Hongkou Football Stadium and Helun Park near the Plot for setting-up exercises, leisurely rest and amusement.

2.3 Land Use Layout and Construction Scale

2.3.1 Land Use Layout

According investigation, the area of this Plot was slap-up uptown in early 20th century where a lot of contemporary buildings and lanes in old Shanghai fashion have been left behind until now and was one of the most prosperous commercial areas in Shanghai.

As for the latest plan of developing in Hongkou District, the district will be developed into a multifunction area with shopping, touring and sightseeing, high quality of culture and a slap-up uptown etc. The southern part between Suzhouhe Road N. and Haining Road will be a relaxation area with new cafes, bars and a five-star hotel, as well as big shopping malls; The middle part from Haining Road to Liyang Road will see four new shopping plazas, while the northern part between Liyang Road and Luxun Park will feature culture, tourism and sports, including the Duolun Road cultural complex and Hongkou Football Stadium. Meanwhile the contemporary buildings and precious historical relics and sites will be preserved and renovated.

Now, the area in northern part of Old Hongkou Area near Shanyin Road and Liyang

Road is mainly for inhabitancy with higher residence ratio. There are different styles of contemporary buildings and lanes with historical fashions, named as exhibition of contemporary buildings in Shanghai. In order to improve living conditions and qualities there, the plan area will be reconstructed as an advanced dwelling community compatible for culture consuming and service, paying equal attention to the prevention and development, according to the layout.

2.3.2 Construction Scale

2.3.2.1 Existing Scale

Three Blocks, i.e. A、B、C blocks, are divided in the resident community. Most of the existing buildings were built dozens of years ago and looks very old. The flats are crowded and the public service establishment is unsatisfactory. There are some skimpily -built building in Block B and C.

According to the site survey and census, there are 1170 units of family in the community. Most of the buildings in Block A are historical two-floor ones with a garden. But there are old buildings of brick-wood structure in Block B and C, which will be reconstructed and the people will be removed in this Project. Eleven percent of the affected units is flats with property right, while 89% is rented unit. They are listed in Table 2.1

Table 2-1 Table of affected families

Block	Family (unit)	Persons	Affected Area m^2
A	765	2232	33600
B	187	554	
C	227	563	
Total	1170	3349	49761

There are 39 corporations in this field, mainly situated in Block B and along Liyang Road. Most of them will be removed. They are listed in Table 2-2.

Table 2-2 Table of affected corporations

Block	Corporation Name	Person	Affected Area (m^2)		
			Buildings	Ground	Others
A	Lisan Kindergarten	48	761.34	367.06	
	Changchun Blueprint Group	5	587.92	57.56	
	Changchun Housing Management Dept.	24	833.61	389.84	
	Chuanbei Management Co.	16	124.03	43.81	
	No.2 Kindergarten	52	673	466.13	
	Huide Welfare House	0	323.96	463.12	
	Huide Welfare House (in Block C)	12	149.53	118.12	
	Yangpu District Pharmaceutics Co.	3	87.43		
	Yongshang Industrial Co.	2	29.89	21.15	
	Jiayin Cultural and Arts Advanced School	0	1722.81	736.39	
	Changchun Community Office	40	850.73	237.05	
	Changchun Police Station	56	574.71	244.77	
	Changchun Industrial and commercial Station	24	59.45	25.32	
	Changchun Neaten Office	14	50.69	21.59	
	Gas Station of Yuanxun Trade Co.	11	224	616	
	Chengpeixin Industrial Develpoment Co.	8	300	180	
	Zhongfang Housing Exchange Co.		740	200	
	Zhongyan Salt Transportation and Sale Office	35	399		
	Shanghai Machine Tool Industrial Group Co.	10	3320	1457	
B	Hongkou Jixiang Refreshment Room	4	40		
	Baolong Refreshment Room	3	30		
	Wenjuan Drugstore	1	25		
	Hongkou Xiaodong Drugstore	1	35		
	Hongkou Jieshi Refreshment Room	6	33 8		
	Drugstore	1	26		
	Shanghai Liyang School	677	4675	5879	
	Baoan Aged Person Service Center	5	130		
	Chengye Construction and Decoration Co.	110	1200		
	Changchun Community Office	6	57		
C	Sanxing Bathroom	20	1200		
	Shanghai Aluminum Die Factory	0	96.62		
	Shenjie Car Fittings Sales Deptartment	4	32		
	Changchun Road Kindergarten	183	1200	270	
	Hongkou Water and Electric Processing Station	8	400		
	Yimin Drugstore	1	33.8		
	Liyang Road Drugstore	2	20		
	Warehouse of Hongkou Pharmaceutics Co.	0	400		
	Shenguang Plastic Leather Products Co.	120	250		
	Hongye Office Article Co.	12	188		
Total	**39**	**1403**	**23235**	**11824**	

2.3.2.2 Scale after reconstruction

This Project is mainly to reconstruct and inner decorate 48 historical two-floor buildings with a garden in Block A. to be a top grade uptown while maintaining their original fashions. The 4 villas situated at middle of the south will be removed horizontally to the removal space of east in Block B. Those corporations and all the families in No.138 Lane of Baoan Road situated at east of Block B will be removed to other places. Besides to install the 4 above-mentioned villas, the rest spaces will be reconstruct into public green land and recreation ground. At west of Block B, the building qualities are relative better and will be renovated into chambers for recreation. At east of Block C, 5 two-floor buildings of better quality with Shanghai traditional style will be reserved and the rest ones will be removed for North Xingjiaqiao Road N. Broaden Municipal Project. At west of Block C, the buildings are taken as Grade II traditional lanes and will be reserved for House Management Offices. Liyang Road will traverse the Community and its function will be as a pedestrian street, only mini cars can pass and the existing Bus No. 47, 592, 863etc. will change their routs.

This Project covers an area of about 9.36ha. with total construction area of about 94430m^2, among which Block A of 56190.3m^2, Block B of 16806.5 m^2 and Block C of 14859.5 m^2. The assorted public facilities area is about m^2 and the capacity ratio is 0.36 with total investment of 1 billion yuan.

2.3.3 Main technical and economic index

The main technical and economic index of this Project are listed in Table2-3.

Table2-3 Main technical and economic index

Total Land Area		93600 m^2
Total Construction Area		94430 m^2
with	Construction Area of Residence	33600 m^2
	Public Facilities Area	m^2
Green Land Ratio		60%
Capacity Ratio		0.36
Construction Density		16.8 %
Total Units		96
Average floors		2floor
Parking Space		96

Figure 2-1 Geographical Location of This Project

Figure 2-2 Outline of the Project Area

2.4 Construction Layout

According to the blueprint, the layout after reconstruction is as following:

In Block A, 48 historical two-floor buildings with a garden will keep their original fashions. Besides 4 villas at the south to be removed horizontally to Block B, there will be a submerged plaza at the corner of southeast. Liyang Road will be renovated as a pedestrian street in the community.

In Block B, a green land will be at east and chambers for recreation will be at west.

In Block C, reserved only 5 buildings, the rest ones will be removed for North Xingjiaqiao Road N. Broaden Municipal Project and a green land will be built in the Planning area. The buildings at west will be reserved for House Management Offices.

There are two passageways. One is placed in east at crossway at Liyang Road and Baoan Road, the other in west at crossway at Liyang Road and Changchun Road.

There will be no garbage stations in the community. Garbage collecting trunks for different sorts of solid pollutants will be placed between every four buildings.

2.5 Water Supply and Sewerage

2.5.1 Water Supply

The water source will be not changed after reconstruction and the tap water will be taken in from the municipal tap pipeline under the Liyang Road at middle of the Plot. Now the water consumption amount is1364m^3/d and discharge amount is 1091.2m^3/d.

After reconstruction, the maximum water consumption amount will be 364.4m3/d. The water balance of the community after reconstruction is listed in Table 2-3.

Table 2 - 3 Water Balance of the Community After Reconstruction

No.	Item	Unit	Standards	Amount(m^3/d)	Discharge(m^3/d)
1	House	480 p	450 L/p·d	216	216
2	Chamber etc.	1100m^3	12 L/m^3·d	13.2	13.2
3	Unexpected	—	10%	22.9	22.9
4	Green Land	56160m^3	2 L/ m^3·d	112.3	--
Total	—	—	—	**364.4**	**252.1**

2.5.2 Sewerage

The sewerage of the Community principally adopts separate pipe systems for rainwater

and wastewater. Rainwater will be collected by rainwater pipe system inside the Project and delivered to outside rainwater disposal system at Liyang Road outlet.

The maximum discharge amount of domestic sewerage is 252.1m^3/d and collected by the municipal sewerage pipeline and finally enters the Quyang Quyang Wastewater Treatment Plant.

2.6 Energy Source and Others

The energy used in this community is electricity and gas, no change after reconstruction.

2.6.1 Gas

The gas is taken in through inlet from municipal gas pipeline. The maximum gas consumption amount is about 1000 m^3/h at present and will be 200 m^3/h after reconstruction.

2.6.2 Electricity

The electricity consumption load is about 2100KVA at present and will be 1440KVA after reconstruction. The existing transformer substation can meet the need and no change after reconstruction.

2.6.3 Sanitation

The garbage is mainly from resident living garbage and will be collected by garbage boxes for different sorts of solid pollutants, placed one for every four buildings, and finally sent to garbage station at Baoan Road.

2.6.4 Green Land

Based on the site survey, the green land ratio in this area at present is only 0.36%and can be reached to 60% with an area of 56160m^2 after reconstruction.

3. Survey of the Regional Environment of the Construct Project

3.1 Survey of Natural Environment

3.1.1 Geographic Location

Hongkou district is located in the north-east of Shanghai. It belongs to Baoshan country, Shanghai country separately in Qing dynasty. The south area was kept away as American Concession（later co-named as public concession with Britain after 1848. Hongkou district was set in 1945 named after the name of the district and transferred to north Sichuan Road district in 1956 then to Tilan Bridge district in 1960. It became the district of today after transferred once more to the region of Jiangwan town of Baoshan country and Dabasi (today's Dabaishu). The region locates in the north-east of Shanghai neighboring to the east to Yangpu district at Dalian Road, Dalianxi Road, Handan Road and Yixian Road , looking to the south over Pudong district and Huangpu district to Huangpu River, Suzhou River, linking to the west with Zhabei district alongside with Henanbei Road, Luofu Road, Dongbaoxing Road, Yujingpu, bordering to the north with Baoshan district to Sanmen Road. It is about 23.48km^2 wide and has permanent population about 860,000 along with floating population about 140,000. There are 9 streets and one town in the district, so the location is predominant and the traffic is convenience. It is a district that gathers commerce central, trade central and center district.

The object of the project locates in the north district of the old Hongkou and is adjacent to the commerce region in Sichanbei Road, east to Baoan Road and Liyang Road, west to Changchun Road, south to Xingjiaqiaobei Road, north to lane 138 in Baoan Road. It is one of the economical functional regions that will mainly develop in the future, viz. the organic constituent of the functional region which included Sichuanbei Road-Duolun Road-Hongkou soccer stadium.

3.1.2 Topography and River

Several riverway such as the branches of Huangpu River(Yujingpu, Shajing port, Hongkou port) wander across Hongkou District making up of the advantaged natural resource. The river system of Hongkou port is the maternal river of Hongkou. It is 21.6km long and 376500 m^2 wide within the district and comes across throughout the nine streets and the one town in the whole district. At the same time, it is the main channel taking up the task of flood prevention and waterlog exclusion in Hongkou, Zhabei and Baoshan district.

The cut-current project in two port was started-up completely last year. The rain-sewage

combination pumping station was built in Hengbang and Huachang and silt which were about 350000m^3 were dredged up in the Riverways. 2100t floats were dredged and this made Hongkou port had almost no floats. The survey of water pollution source was also put forward at the same time. The water quality in the whole water system was improved obviously and eliminated black and odour. Now the water quality is between □-□ according to the surface water environment quality standard.

3.1.3 Climate and Weather

Located in middle latitude zone to the east bank of Eurasia Shanghai city is extrusive part of the seaside in eastern china. The landform is flatness so cold air from the north can enter directly and wind from sea lands without hinder. Air current from north and south joining regularity makes the weather infected by ocean distinctly and changes greatly. It is a region that east-Asia monsoon prevails and the seasons are evidently perennial. The weather is mild and wet. Precipitation rain fall is flush and even. The extreme cold and hot weather is short relatively. It is the classical semi-tropical monsoon weather.

3.1.3.1 Weather Characteristic

(1) Air temperature

Average air temperature is 15.7 degree perennial. January is the coldest month whose average temperature is 3.5 degree and July is the hottest one whose temperature is 27.8 degree.

(2) Air pressure

Average air pressure is 1016hPa perennial. January is higher respectively about 1027hPa and July is lower respectively about 1005hPa.

(3) Hunmidity

The average absolute humidity is 16.5hPa perennial and lower about 5.8hPa in January and higher about 30.4hPa in July. The average relative humidity is 78% perennial and it is equally in the whole year. It reaches its lowest about 72% in December and its highest about 86% in June.

(4) Cloud cover

The average total cloud cover is 6.5 perennial. It gets its most in June at about 8.2 and gets its least in NovembMer at about 4.6 corresponding to the Yellow-plum days. The average low cloud cover is 4.0 perennial and has the same rule with the total one that reaches the most at about 5.4 in June and the least at about 2.9 in December.

(5) Rainfall

The average periods perennial is 133 days or so with the rainfall at about 1099mm and

average 92mm per month. The rainfall is highest at about 163mm in September and lowest at about 40mm in January.

(6) Evaporation amount

The evaporation amount is about 1465mm perennial and is 366mm more than rainfall. The maximal amount is about 226mm in July and the minimal amount is only 61mm in Januray.

(7) Sunlight

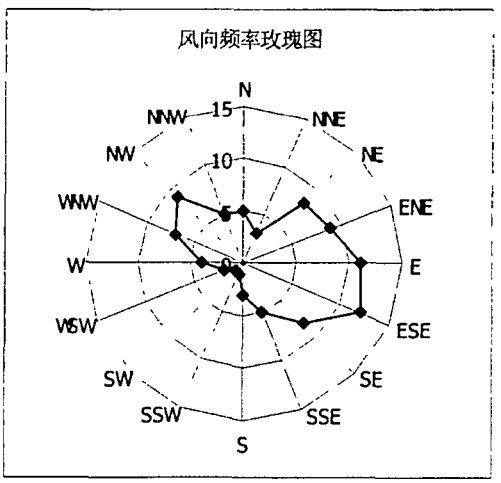
The average time of sunlight is 2091hr or so perennial. It has the most of about 246hr in August with average 7.9hr per day and has the least of about 127hr with average 4.5hr per day.

3.1.3.2 Characteristic of wind field

(1) Wind direction

The data based on the investigation of wind direction frequency in Shanghai in recent five years from 1997 to 2001 show the prevailing wind direction has changed with season obviously in the region resulting in prevailing east-south wind in spring and summer and east-north along with west-north wind in autumn and winter. The most frequent wind direction is E and ESE perennila, NW in winter(January), ESE in spring(April),SSE in summer(July) and NNE in Autumn(October). Immobile wind frequency is 7% perennial.

Picture3-1 is the integrated wind direction rose picture in recent five years.



Picture 3-1 wind direction rose picture during 1997~2001 in Shanghai

(2) Wind speed

The average wind speed is 2.8 m/s~3.0m/s perennial from 1997 to 2001 in Shanghai and the gale whose speed is faster than 3.0m/s is seldom. The average wind speed is 2.8m/s

in 2001 with faster speed in spring in which the average speed is 3.7m/s in April and slower speed in winter in which the average speed is 2.8m/s in January.

(3) Atmosphere stabilization

The weather data provided by Shanghai weather center show that the atmosphere stabilization has notable difference with the change of seasons. The percentage of D stabilization is 45.6% ,E is 17.97% ,C is 14.63% and F is 12.33% in the whole year. B stabilization appears seldom at about 9.2% and A is a fat lot at about 0.14%.

3.2 Society and Economy Status

Hongkou District is an important part of Shanghai. It is about 23.48km^2 wide and has permanent population about 860,000 along with floating population about 140,000. There are 9 streets and one town in the district.

The foundation of historical culture in Hongkou is profound. There are 72 literal sights in the district. Around Luxun park and Shanyin Road seated former residences of the top ten culture celebrities Luxun, Guo moruo, Maodun, Dingling etc. in modern times, art gallery of Zhu jiuzhan, memorial of the five left-union marties and memorial of martyr Limai. Hongkou stadium that was rebuilt from Hongkou palaestra 46 years old becomes the one and only specialty soccer stadium. The integrity functions including shopping, traveling, compete, entertainment and life fallow are emerged step by step owning to the stadium linking with Sichuanbei Road and Duolun Road. Many buildings of latter-day internal or external in different style distribute along the sides of Duolun Road which is 500m long. The road is developing primarily to be a characteristic culture and celebrity one famous for "past lane in Shanghai, former residence of celebrity, street market of culture relic, community for life fallow".

Hongkou district always lists in front of central district in Shanghai regarding the economic construct as the central task, insisting on deepen the reform, widening open both to inner and outer. Integrete economy strengths boost up notably. Finance income of the district arrived at 1.710 billion yuan, increasing 20.4% 同比。

Industry in Hongkou developes quickly and forms the urban industry pattern mainly about chest and bag, costume, lamps and lanterns, automobile fittings, processing to bullion accouterment. Sichuanbei Road that is 3.7km long has been one of the most flourishing shopping center and most attractive entertainment district in Shanghai. There are more than 40 specialty market in the region such as the famous market Quyang domestic electric

apparatus center and Shanghai lamps mall. Based on Shanghai commerce center, Dabaishu trade region is actively in exchange of manufacture materials. There are 25 different specialty market and bargain amount is more than 15 billion yuan per year. Seven foreingn trade company such as Shanghai craftwork imports and exports company and Shanghai textile imports and exports company locate along Wusong Road and Siping Road. Zhapu Road is famous for its cate street.

Recently, Hongkou district government endeavors in building the publicity, impartiality and righteous market environment for all kinds of enterprises by optimizing invest environment, improving government work efficiency and perfecting policies. These acts made rapid progress in the district. Inner invest enterprises about 2952 were introduced into in 2001 increasing 61.9% compared with the same time in history. The register capital is 3.11 billion yuan increasing 18.1% compared with the same time in history. About 46 foreign capital items were authorized the whole year with increasing about 53.3%.

Hongkou is one of the large education district in Shanghai. There are several famous schools such as Fuxing middle school, the first affiliated middle school of East China Normal University and Beijiao middle school etc. There also famous university such as Shanghai Foreign Language University and Shanghai Financial University. Hongkou is the only one culture old district that was granted *national culture model district.* It has bring up many super athletes for the nation and Shanghai. Hongkou was entitled *home of swim* and *home of Wushu.*

Facing with the challenging new century that is full of chance, Hongkou is planed to be a modern district corresponding with Shanghai city by building prosperous commerce and shopping region, comfortable inhabitation, advanced culture and education district during *the tenth five year.*

3.3 Compatibility of project implement

3.3.1 Programming function of the region related to the project

This project locates in north part of the former Hongkou. The region is one of integrate service center in Shanghai and is the main part of public service and activity center in Hongkou. It is a multifunctional district with culture life fallow, sightseeing and traveling, commerce and food service. At the same time it is the characteristic region organic combining the history with present and integrated service with middle and top grade inhabitation.

According to the general programming to north part of former Hongkou, Shanyin Road and Liyang Road are mainly functioned as inhabitation and keep intact historic style and space overall arragement. Lots of lanes in different style of different periods and many independent and coexistence garden style house were preserved and should act as the exposition of modern time house in Shanghai. The develop tactic in this region focus on combining preservation and repair. Improve the inhabitancy environment based on preserving and continuing the existing pattern and historical style. Aims to make it a characteristic top grade inhabitation region mainly functioning as dwell giving attention to culture and service industry at the same time.

3.3.2 Analysis on compatibility of environment programming

There is no industry pollution source around the project and uptowns and public establishments that had already built locate nearby. The old buildings in the east of Baoan Road are being removed and rebilt.

The reconstruction and protection of the latter-day buildings in Liyang Road is on the premise of preserving the primary construction style and the view of the community. The disordered buildings will be removed in order to improve environmental quality and increase the green ratio. In a word, the project is compatible with both surrounding environment and programming.

3.3.3 Partition to environmental functions of the region related to the project

The air environment is in the range of 2^{nd} grade and the noise environment is in the range of 2^{nd} urban noise grade.

4. Engineering analysis

4.1 pollution source in the project

4.1.1 main equipments and their usage

Equipment systems such as water supply, drainage, ventilation, raft, power distribution, power supply, fire control, communication and security are collocated perfectly in the design. The equipments and their usage related with environment protect are listed in the follow table.

Table 4-1 main equipments and their usage

Equipment system	Equipment	Setting places	Usage
Water supply and drainage	Water supply: water pump chamber		Municipal water supply and distribute
	Rainfall: submersible pump		Send to rainfall pipeline after collection
Ventilation and draft			Diffuse to upper air through central flue
Garbage box	Garbage box	Greenbelt beside roads	Collect, classify, transfer

4.1.2 identify of pollution source

The main source and pollutants together with their diffusion character after dwellers moving in when the project finish are listed in table 4-2 based on the characteristic of the project and the analysis above to the equipment.

Table 4-2 main pollution source and diffusion character

Catego-ry	Pollution source	Main pollutants	Manage methods	Diffusion character
Waste gas	Burning of natural-gas in kitchens	Flue a small quantity of NO_x	Cleansed by flue-exhauster	Diffuse to upper air through central flue
Waste water	Cliving sewage	BOD_5、NH^+ $_4$-N、SS、COD_{Cr}、progagation oil	Waste water collection and secondary bio-treatment	Diffuse to sewage canal-nettiong after tally with standard

Solid waste	Living garbage	Solid waste in kitchen, old newspaper, plastic bag	Collect classified, stack centralized, transfer daily	Send to garbage burning and covering site

The pollution source and situations of pollutants producing are as follow.

(1) Wastewater

The main wastewater is living sewage up to 252.1m^3/d after the project finished. It will tally with the third class diffusion standard of Shanghai after collection and sent to municipal sewage pipeline in Liyang. At last it will go to Quyang water quality purify factory. Pollutants in living sewage and the diffusion amount are listed in table 4-3.

Table 4-3 produce and diffusion situation of wastewater

Pollutans / Parameter	Waster-water amount (t/d)	COD_{Cr}	BOD_5	NH^+_4-N	SS	Propagation oil
Concentration(mg/l)	---	300	150	25	350	30
Amount (kg/d)	252.1	75.6	37.8	6.3	88.2	7.6
Diffusion standard (mg/l)	---	300	150	25	350	30
Diffusion amount (kg/d)	252.1	75.6	37.8	6.3	88.2	7.6

(2) Waste gas

The waste gas mainly comes from the flue produced in kitchen and the gas produced from burning fuel in the city. Flue will diffusion from top of the buildings through exhaust canal in buildings after purified by flue-exhauster.

(3) Solid waste

Living solid waste will be up to 480 kg/d. They will be put in bags and collected in 12 garbage boxes set beside roads then sent to transfer station.

4.2 Waste water drainage and analysis of its control steps

(1) Estimate to the amount of water supply and drainage

The amount of water supply and drainage is 364.4 t/d and 252.1 t/d respectively. They are listed in table 2-3.

(2) Waste water drainage amount and qulity

Concentration and amount of pollutants in drainage are listed in table 4-3.

The drainage amount of waster water is 252.1 t/d and pollutants such as COD_{Cr}、BOD_5、NH_3-N、SS, propagation oil is75.6、37.8、6.3、88.2、7.6kg/d respectively.

(3) Sewage management steps

Living sewage produced by dwelling house public building will tally with the third class diffusion standard of Shanghai after collection and sent to municipal sewage pipeline in Liyang. At last it will go to Quyang water quality purify factory and drainage to water body in city after reaching drainage standard.

(4) Feasibility analysis of sewage canal

Sewage can not let liberty restricted by sewage quality and construction status of surrounding sewage pipeline. It must ensure that sewage be treated effectively without letting to the freshwater riverway directly. Currently the living sewage let in pipeline directly and sent to Quyang water quality purify factory.

Living sewage amount will decrease after rebuilt and water quality will be improved because some offices in the region would move away and living habitual of tenements would change. At the same time the sewage let to municipal pipeline through district sewage pipeline will be treated efficiently in Quyang water quality purify factory. Since the situation provide objective conditions for pipeline the exploiter should apply to related government department for draining water to the municipal sewage pipeline directly.

Compared the two treatment methods the sewage pipeline has less influence to surrounding environment. It helps alleviating fume diffusion from sewage treatment station and solving the problem of residual sludge treatment. Furthermore, from the point of view of engineer economy it is more reasonable of treating centralize than separately.

4.3 Waste gas diffusion and analysis of its control steps

Waste gas from kitchen

Natural gas is used in kitchens in this region. The most amount consumed in city is 200m^3 /hr, average at about 100 m^3 /hr. Diffusion amount is estimated in the basis of 12.8 kg NO_x(in which, 6.3 kg NO_2)、1.0 kg SO_2、2.4 kg flue being diffused with burning 10^4 m^3 gas(diffusion parameter is cited from *Environment Practical Data Handbook*). Pollutants produced by burning gas are listed in table 4-4.

Table 4-4 diffuse status of pollutants from burning gas in the tenement and dinning-room

Consume amount of gas	Diffusion amount of $NO_x(NO_2)$	Diffusion amount of SO_2	Diffusion amount of flue
100 m^3/h	0.13 (0.06) kg/h	0.01 kg/h	0.02 kg/h
$11.00\times10^4 m^3/a$	0.14 (0.07) t/a	0.01 t/a	0.03 t/a

Flue will diffusion from top of the buildings through exhaust canal in buildings after purified by flue-exhauster.

4.4 Solid waste and analysis of its control steps

(1) Classification and amount of solid waste

Living garbage will be brought when people live in after the project finished.

Living garbage mainly come from kitchen and other living ways. The produce amount of living garbage is about 1.0kg/d.p based on present living standard of Shanghai and statistical data recent years. There are 96 tenements in the region and about 480 residents in the premise of 5 person every tenement. Garbage amount calculate based on this situation is listed in table 4-5. Components of living garbage are listed in table 4-6.

Table 4-5 source, amount and treatment methods of solid waste

Classification	Pollution source	Produce amount (t/d)	Main pollutants	Treatment methods
Living garbage	Dwelling house	0.5	Solid waste in kitchen, old newspaper, plastic bag	Collect classified, stack centralized, transfer daily

Table 4-6 Components of living garbage of the community

Average amount kg/p.d	component(%)							
	Garbage in kitchen	Clinker	Plastic	Paper	Cloth	Wood	Metal	Glass
1.0	82.09	2.19	4.19	4.26	1.14	1.44	0.95	3.74

Garbage from residents' house are sent to collection box in the community and then transferred by environment protect department.

(2) Analysis of solid waste treatment

According to the set principle of solid waste management ordinance the waste produced by the project is living garbage and belongs to common solid waste.

The amount of solid waste produced by residents after the project finished is 182.5 t/a based on the engineer analysis.

Living solid waste will be put in bags and collected in 12 garbage boxes set beside roads then sent to transfer station at Baoan road and treated together by environment protect department.

4.5 Analysis of main surrounding pollution source

4.5.1 Main waste gas pollution source

There is no industry waste gas pollution source around the project. The gas source is tail gas from Xingjiaqiaobei Road in the north, Liyang Road across mid-part of the region, Baoan Road in the east and Changchun Road in the west of the region. Among these places, Baoan and Changchun Road are so narrow and so many stalls and simple buildings distribute alongside the pavements that people have to walk on the drive-lane. This makes the traffic is heavy so the tail gas pollution of automobiles is serious. Liyang Road will rebuild to be the interior street in the community and it will help reducing vehicle flux greatly resulting in alleviating pollution. But with the degenerating of traffic function of Liyang Road will certainly increase the vehicle flux in the other three streets. They will be the main pollution resource in the future.

Sichuanbei Road locates 40m to the west of Changchun Road which is the west boundary of the region and is almost parallel with it. Siping Road locates 50m to the east of Baoan Road and Liyang Road which are the east boundary of the region and is almost parallel with them. Because these two streets being the main traffic artery in north-south direction, the vehicle tail gas has some influence in the project. But the influence is not so great for the streets are kept away by buildings from the community.

4.5.2 Noise source

At present, the main noise source comes from traffic in Liyang Road, Xingjiaqiaobei Road and Changchun Road. It will come from Xingjiaqiaobei Road and Changchun Road and Baoan Road after the rebuild being finished. The nearest distance from Xingjiaqiaobei Road to the north part of the project is about 24m. The traffic flux will increase as a result of widening the street and it will influence residents in the north part greatly. Changchun Road and Baoan Road is close to boundary of the community and they will take the traffic pressure breakaway from Liyang Road after rebuild. This part of the region will still be influenced by the noise regardless of putting up with greenbelt between the buildings and streets.

4.6 Environment analysis of plane arrangement

In view of architecture arrangement this project pays much attention to architecture arrangement and environmental sight design. Greenbelt, racket court, waterscape and club are built centralized in the community. Greenbelt ratio reaches 60%. Various dwelling houses distribute properly in the community. All these establishments provide comfortable and convenient dwelling environment.

The dwelling houses are kept away from surrounding streets that produce great noise by greenbelt. This has some effects to the residents dwell along the streets but the effects are not in evidence because of the restrict of former construct arrangement.

Circular pump in the water area is going to use submersible pump. It is anticipated that circulate noise would not affect residents nearby.

Since the garbage boxes being arranged in greenbelt besides roads in the community and the garbage being collected and transferred on schedule, they will have almost no influence to residents and sight.

Analyses in general the plane arrangements of the project have no serious environment problems except traffic noise.

Suggestion: Because the project is oriented to be a top grade uptown so the doors and windows in all rooms should be sound insulation. In order to cut down the influence to residents at the best, signs of no-horning and speed-limiting at 15km should be set in the community.

5. Survey and assessment on existing environmental quality

To understand the existing environmental quality in the area surrounding this Project, the latest monitoring data of air quality were collected from the Environmental Protection Monitoring Station in Hongkou District. In the same time, the Hongkou Environmental Protection Monitoring Station was entrusted to make noise monitoring for the acoustic environmental of the Project area. The existing environmental quality of the area surrounding the Project is assessed based on the collected and monitored data.

5.1 Assessment on Ambient Air Quality

5.1.1 Monitoring of Existing Ambient Air Quality

5.1.1.1 The Monitoring spot site

The collected monitoring data of the existing ambient air quality was monitored by Hongkou Environmental Protection Monitoring Station from Nov. 28 to Dec. 7, 2002 at Hainan Road monitoring spot, about 300m at south part of this Project. The location of the monitoring spot is shown in Figure 2-2.

5.1.1.2 Monitoring items and analysis methods

The monitor indices are PM_{10}, SO_2 and NO_2.

The monitoring and analytical methods were executed according to The Monitoring and Analytical Method of Air and Waste Gas as shown in Table 5-1.

Table 5-1 Sampling and Analytical Method for Air Quality

Monitoring Indices	Sampling and Analytical Method	Sampling Flow (L/min)
PM_{10}	Glass fiber filter membrane sampler, Gravimetric method	100
SO_2	Absorb with absorbent, Spectrophotometer	0.50
NO_2	Absorb with absorbent, Spectrophotometer	0.30

5.1.1.3 Monitoring time and frequency

The monitoring was carried out from Nov. 28 to Dec.7, 2002, for PM_{10} 10 effective days and for SO_2 and NO_2 5 effective days. Sampling lasted for 12 hours for PM_{10} and 4 times of sampling for SO_2 and NO_2.

5.1.1.4 Synchronous meteorological factors observation

Wind direction, wind velocity, air temperature and weather conditions were observed synchronously during the monitoring time, listed in Table 5-2.

Table 5-2 Meteorological Factors During the Monitoring Time

Data	Dominant wind direction	Wind power	Weather condition
28/11	ESS	4~5	Cloudy
29/11	ESS	4~5	Cloudy
30/11	NE	4~5	Cloudy to Overcast
1/12	NE	3~4	Rain
2/12	SE	4~5	Rain
3/12	NW	4~5	Overcast
4/12	NW	4~5	Fine
5/12	NE	3~4	Rain
6/12	NE	4~5	Rain
7/12	NNE	5	Rain

5.1.1.5 Statistical result of monitoring data

The result of monitoring data is shown in Table 5-3 ~ Table 5-5 respectively.

Table 5-3 Existing PM_{10} concentration monitoring result

Daily Average Concentration	
Con. Range (mg/m^3)	Over Con.Rate (%)
0.036□0.376	40

Table 5-4 Existing SO_2 concentration monitoring result

Daily Average Concentration	
Con. Range (mg/m^3)	Over Con.Rate (%)
Undected~0.008	0

Table 5-5 Existing NO_2 concentration monitoring result

Daily Average Concentration	
Con. Range (mg/m^3)	Over Con.Rate (%)
0.033□0.055	0

5.1.2 Assessment on Existing Ambient Air Quality

5.1.2.1 Assessment Indices and Standards

The assessment indices are PM_{10}, SO_2 and NO_2. The standards follow the Grade 2 standards in Ambient Air Quality Standards (GB3095-1996) as listed in Table 5-6.

Table 5-6 Air Quality Standards for Assessment

Pollutant	Daily Concentration limit□mg/m^3□	Remark
SO_2	0.15	GB3095-1996
NO_2	0.12	
PM_{10}	0.15	

5.1.2.2 Assessment methodology

According to Technical Guidelines on Environmental Impact Assessment, the Air Pollution Index (API) calculation and relevant grading are used for assessment.

The calculation formula for Air Pollution Index (API) is:

When $C_{i,j} \le C_i \le C_{i,j+1}$:

$$I_i = \frac{(C_i - C_{i,j})}{(C_{i,j+1} - C_{i,j})}(I_{i,j+1} - I_{i,j}) + I_{i,j}$$

where I_i is the calculated API value of the ith pollutant

C_i is the measured concentration of the ith pollutant

$I_{i,j}$ and $I_{i,j+1}$ are the preset API values at the two turning points (j and $j+1$) of the ith pollutant

$C_{i,j}$ and $C_{i,j+1}$ are the preset concentration values at the two turning points (j and $j+1$) of the ith pollutant

The grading of API values and concentration limits at turning points are shown in Table 5-6. The air quality classes corresponding to API values are listed in Table 5-7.

Table 5-6 Air Pollution Index (API) grading and concentration limits

API	Concentration (mg/m^3)		
	PM_{10}	SO_2	NO_2
500	0.600	2.620	0.940
400	0.500	2.100	0.750
300	0.420	1.600	0.565
200	0.350	0.800	0.280
100	0.150	0.150	0.120
50	0.050	0.050	0.080

Table 5-7 API values and respective air quality classes

API value	Air quality class	Description
0~50	I	Good
51~100	II	Fair
101~200	III	Lightly polluted
201~300	IV	Medium polluted
≥300	V	Heavily polluted

5.1.2.3 Evaluation Result

The statistical results of hourly concentration ranges, daily average concentrations and percentages beyond standard at each monitoring spot are shown in Table 5-3 ~ Table 5-5 respectively. It is shown that the daily average concentrations of SO_2 and NO_2 are all under the

assessment criterion while those of PM_{10} changed a lot and four-day results on Nov. 29, Dec. 1,3,4 are over the assessment criterion with over-ratio of 40%.

The variation trends of APIs respective to daily average concentrations of PM_{10}, SO_2 and NO_2 are shown in Table 5-8.

① **SO_2**

The daily average concentration range of SO_2: Undetcted~0.008mg/m^3 and all under the assessment criterion of 0.15mg/m^3。 API Values are all under 50 and the ambient air quality is fair.

② **NO_2**

The daily average concentration range of NO_2: 0.033~0.055mg/m^3 and all under the assessment criterion of 0.12mg/m^3。 API Values are all under 50 and the ambient air quality is fair.

③ **PM_{10}**

The daily average concentration range of PM_{10}: 0.036~0.376mg/m^3. Four-day results are over the assessment criterion of 0.15mg/m^3 with over-ratio of 40%. API values are between 36~237 and the ambient air quality is from Grade I (good) to Grade Ⅳ (medium polluted). So the main air pollutant is PM_{10}.

Table 5-8 The API and Quality Level of the Assessment Area

Date		28/11	29/11	30/11	1/12	2/12	3/12	4/12	5/12	6/12	7/12
PM_{10}	API	89	237	99	127	57	110	100	55	36	50
	Quality	II	IV	II	III	I	III	II	I	I	I
SO_2	API	2	-	4	-	undected	-	8	-	undected	-
	Quality	I	-	I	-	I	-	I	-	I	-
NO_2	API	-	34	-	31	-	33	-	28	-	21
	Quality	-	I	-	I	-	I	-	I	-	I

5.2. Assessment on Existing Acoustic Environment

5.2.1 Existing Acoustic Environmental Monitoring

5.2.1.1 Monitoring Index

Continuous Equivalence A noise level L_{Aeq} is taken as the monitoring index, meanwhile, L_{10}, L_{50}, and L_{90} are also recorded.

5.3.1.2 Monitoring sites

Eight monitoring sites are set up around the border and in the center. They are:

1# at northwest of the Plot;

2# at northeast of the Plot(near Baoan Road);

3# at west of the Plot(crossway of Liyang Road and Changchun Road);

4# at middle of the Plot(near Liyang Road);

5# at east of the Plot(crossway of Liyang Road and Baoan Road);

6# at southwest of the Plot(near Changchun Road);

7# at south of the Plot(near North Xingjiaqiao Road N.);

8# at southeast of the Plot(crossway of Siping Road and North Xingjiaqiao Road N.).

Figure 2-2 provides these monitoring sites. At sites of 3# and 8#, the noise levels were monitored continuously for 24 hours and the Vehicle flows were also recorded.

5.2.1.3 Monitoring method and instrument

The noise monitoring follows the requirement in Monitoring Methods for Urban Area Environmental Noise (GB/T14623－93). The instrument is AWA－6218 Noise Statistic Analyzer.

The monitoring frequency is based on the national standard, Urban Area Environmental Noise Standards (GB3096－93): once in daytime 06:00~22:00, and another in nighttime 22:00 ~06:00.

5.2.1.4 Monitoring result

Table 5-9 lists the noise data at various sites and period of time monitored on Dec. 13, 2002.

Table 5-9 Environmental noise monitoring results (unit: dB(A))

Site	Time	Data dB(A)				Vehicle Flow(per hour)	
		L_{10}	L_{50}	L_{90}	L_{eq}	truck	car
1#	a.m.	62.6	55.7	49.2	58.3		
	p.m.	63.7	54.6	50.2	59.6		
	night	56.2	43.1	40.0	46.5		
2#	a.m.	68.0	59.6	55.1	67.1		
	p.m.	69.2	62.1	53.4	65.2		
	night	59.4	50.6	47.3	52.7		
3#	9:00	79.5	70.2	64.6	76.5	180	1008
	13:00	75.7	62.6	58.7	69.2	72	732
	17:00	78.9	65.8	60.1	72.3	96	900
	21:00	70.2	63.4	57.5	65.1	48	504
	1:00	66.3	52.7	48.5	58.6	24	360
4#	a.m.	78.4	71.5	62.3	76.1		
	p.m.	76.5	69.2	60.5	72.8		
	night	70.2	62.6	54.3	65.4		
5#	a.m.	74.8	66.9	61.2	72.9		
	p.m.	72.3	64.1	58.6	70.6		
	night	69.5	59.4	53.5	62.7		
6#	a.m.	74.1	66.3	61.7	73.7		
	p.m.	72.5	64.2	58.5	67.8		
	night	57.6	46.7	42.3	50.4		
7#	a.m.	73.4	63.0	58.5	71.9		
	p.m.	70.6	65.1	53.6	68.3		
	night	61.3	48.6	44.2	52.1		
8#	9:30	80.8	73.5	68.3	78.1	288	2820
	13:30	79.8	72.4	67.1	76.3	252	2424
	17:30	82.7	69.2	65.6	77.8	432	3588
	21:30	78.7	67.3	60.5	75.2	228	2676
	1:30	70.1	63.2	57.3	68.6	144	1656

5.2.2 Assessment on Existing Environmental Noise

5.2.2.1 Assessment indices and method

Continuous Equivalence A noise level L_{Aeq} is taken as the assessment index. Single factor method is adopted and to compare with the assessment standards.

5.2.2.2 Assessment on the noise level

Based on the monitoring results in Table 5－9 and compared to the assessment standards in Table1－8, it is shown that:

Site 1#——the noise levels of day and night can attain the assessment standards and not affected by surrounding traffic noises.

Site 2#——the noise levels are higher than the assessment standards because of the traffic noises in Baoan Road. The maximum excess value is 7.1dB(A) in daytime and 2.7 dB(A) in nighttime.

Site 3#——the noise levels are much higher than the assessment standards because of the traffic noises. The maximum excess value is 16.5dB(A) in daytime and 15.1dB(A) in nighttime.

Site 4#——the noise levels are much higher than the assessment standards because of the traffic noises. The maximum excess value is 16.1dB(A) in daytime and 15.4dB(A) in nighttime.

Site 5#——the noise levels are much higher than the assessment standards because of the traffic noises. The maximum excess value is 12.9dB(A) in daytime and 12.7dB(A) in nighttime.

Site 6#——the noise levels are much higher than the assessment standards in daytime (13.7dB(A))but only slightly high in nighttime(0.4dB(A)).

Site7#——the noise levels are much higher than the assessment standards in daytime (11.9dB(A))but slightly higher in nighttime(2.1dB(A)).

Site 8# ——the noise levels of day and night all are much higher than the assessment standards, in daytime (18.1dB(A)) and in nighttime(25.2dB(A)).

In general, the existing environmental quality of this Plot is highly affected by surrounding traffic noises and the L_{eq} can't attain the assessment standards, especially at night.

6.Sound Environment Predict and Impact Assessment

6.1. Predict and Impact Assessment of Noise due to Traffic

6.1.1 Predict of Noise due to Traffic

Establishing prediction model, we can predict and assess noisy range and degree due to the traffic(North Xingjiaqiao Road, Changchun Road and Baoan Road)。

According《Technical Guidelines on Environmental Impact Assessment Acoustic Environment》(HJ/T2.4-1995), the following equation which is fit to predict the traffic noise along the road can be adopted. Vehicles droved on the roads are classified. Noise of all classes is calculated respectively at first. Then total equivalent sound level is calculated by superposition。

$$L_{eq}(h)_i = L_{oei} + 10\lg\left(\frac{N_i \pi D_0}{S_i T}\right) + 10\lg\left(\frac{D_0}{D}\right)^{1+a} + 10\lg\left[\frac{\Phi_a(\Phi_1,\Phi_2)}{\pi}\right] + \Delta S - 30$$

Where : $L_{eq}(h)i$ equivalent sound level of vehicles of class i in one hour , dB(A) ;

L_{0ei} average sound level outos of class i , dB(A) ;

N_i number of vehicles of class i passing predicted site in one hour ;

D_0 the reference distance of measuring sound level of vehicles , D_0=15m ;

D the distance from the center of road to prediction site , m ;

S_i the average velocity of vehicles of class i , Km/h ;

T the time of calculating equivalent sound level , 1h ;

α coefficient which is determined by covered surface , α=0 ;

Φ_a modified coefficient of road which has limited length, thereinto,

Φ_1, Φ_2 is the degree(rad) between predicted site to two end of road which has limited length;

$$\Phi_a(\Phi_1,\Phi_2) = \int_{\Phi_1}^{\Phi_2} (COS\Phi)^a d\Phi \quad , \quad -\frac{\pi}{2} \le \Phi \le \frac{\pi}{2}$$

△S attenuation bringed by sheltering object, dB(A)。

6.1.2 Parameters of equation

(1) L_{0ei}

L_{0ei} is related to the class of vehicles, velocity S_i and character of road surface. The

average sound level apart 7.5m from center road caused by vehicles of all classes can be calculated by regressive equations listed in following table。

Table 6 - 1 classified vehicles and corresponding sound level L_{0E}(dB)

Class	Rating load(truck)	Rating seat(carriage)	Sound level
Small vehicles(S)	Below 2 tons	Below 19 seats	59.3+0.23V
Middle vehicles(M)	2.5 ~ 7 tons	20 ~ 49 seats	62.6+0.32V
Heavy vehicles(H)	Above 7 tons	Above 50 seats	77.2+0.18V

（2）S_i

North Xingjiaqiao road, Changchun road and Baoan road are city road. According to investigation, average velocity of small vehicles is 40km/h and average velocity of middle vehicles is 30km/h。

（3）N_i

In terms of general planning of North Sichuan road area, transportation of the area surrounding this Project will run through uptown as little as possible to protect specific historical atmosphere of the area. Because of passable road density from south to north and obvious deficiency of road from east to west in this area, Hailun Raod which lies at the south of assessing area, Tongxin Road-East Jiangwan Road-Shanyin Road-Ouyang Road which lies at north of assessing area and North North Xingjiaqiao Road which lies in south of assessing area will be broadened to alleviate traffic jam from east to west. The vehicles running from south to north will pass through East Jiangwan Road and Tianai Road outside assessing area. Therefore, the prediction vehicle flow of North North Xingjiaqiao Road is 150% of the current vehicle flow and the prediction vehicle flows of Changchun Road and Baoan Road which are given the same value are 120% of current vehicle flow of Changchun Road.

Table 6-2 Vehicle flow in surrounding road (per hour)

North North Xingjiaqiao Road				
Class	**Current**		**Prediction**	
	Daytime	**Night**	**Daytime**	**Night**
Middle vehicles	432	144	648	173

Small vehicles	3588	1656	5382	1987

Table 6-2 (continued)

Changchun Road				
Class	Current		Prediction	
	Daytime	Night	Daytime	Night
Middle vehicles	180	24	216	29
Small vehicles	1008	360	1209	432
Baoan Road				
Class	Current		Prediction	
	Daytime	Night	Daytime	Night
Middle vehicles	180	24	216	29
Small vehicles	1008	360	1209	432

（4）Situation and greening of the road

North North Xingjiaqiao Road will be broadened to four fast lanes, two slow lanes and pavements. The total width will be 40 meters. The ground between pavement and first line of buildings will be covered by greenery.

Baoan and Changchun Road all have two fast lanes and two slow lanes. The total width will be 15 meters. The ground between pavement and first line of buildings also will be covered by greenery.

6.2.3 Prediction result and assessment

Since there are no sideways along Baoan Road, cars, bikes and pedestrians are all in the same route and the traffic is lower. After this Project is completed, the situation in Baoan Road will be almost the same as in Changchun Road, which are extended from south to north. So the traffic flow in Baoan Road is refer to that in Changchun Road in this noise assessment, the calculated results on noise levels are listed Table 6-3~6-5.

Table 6-3 Traffic Noise level prediction at North Xingjiaqiao Road N.(dB(A))

Time Period / Position	Day		Night	
	Existing	Prediction	Existing	Prediction
North Xingjiaqiao	68.3 ~ 71.9	72.0 ~ 73.6	52.1	69.9

Road N				

Table 6-4 Traffic Noise level prediction at Changchun Road (dB(A))

Time Period / Position	Day		Night	
	Existing	Prediction	Existing	Prediction
Changchun Road	65.1 ~ 76.5	63.9 ~ 67.7	58.6	62.1

Table 6-5 Traffic Noise level prediction at Baoan Road (dB(A))

Time Period / Position	Day		Night	
	Existing	Prediction	Existing	Prediction
Baoan Road	65.2 ~ 67.1	63.9 ~ 67.7	52.7	62.1

The above prediction results show that the traffic noises from the three roads will affect greatly on the first row buildings of this Project facing the roads. Now that the existing noise levels are already overrun, the effects on the buildings will be even greater, especially at night, after the reconstruction is completed owing to the broad roads. So the protective measures should be applied for the first row buildings by the unit of construction and designer.

The ideal environmental noise levels for normal sleep is 30dB(A) and the maximum value is 50dB(A). In our country, the noise level under 40dB(A) is required for bedrooms according to the "Design Criterion of Noise on Residence Building（GBJ118-88）".

The standard of noise level under 50dB(A) will be adopted for all the flats in this Project. Noise isolation measures, such as using double-windows, must be applied.

According to the "Residence Building Design Criterion(DGJ08-20-2001) in Shanghai ", noise isolation of 30dB(A) can be reached by using double-windows. After such measures are adopted, all the flats of this Project can meet the required standard of noise at night.

7. Other environmental impact analysis

7.1 Atmospheric impact analysis

With this project implemented, the main roads around the programming reconstructed community are the Liyang Road and Baoan Road to the east, the Changchun Road to the west and Xingjiaqiao north Road to the south.

With this project carried out, the main atmospheric impacts are caused by emission released from vehicles of the Liyang Road and Baoan Road to the east, the Changchun Road to the west and Xing Jiaqiao north road to the south, except underground garage. The main air pollutants are CO and NO_2. Here atmospheric impact assessment is going to focus on the effect of emission from automotives of the Xingjiaqiao north road to the south of the community, since the vehicle is not heavy.

7.1.1 Emission impact forecasting

7.1.1.1 Forecasting content

(1) The forecasting and calculating of source intensity

According to the vehicle flux predicted, linear source intensity of the Xingjiaqiao North road calculated is listed in Table7-1.

Table 7-1 Source intensity of the Xingjiaqiao north road mg/ (s·m)

Factors / Road	CO	NO_x
Xingjiaqiao north road	12. 3	2. 0

(2) Forecasting and calculating

The first row of two-store building of 7-meter height inside this community, is opposite to the Xingjiaqiao North road with 10-meter distance away. The possible maximum concentration averaged in an hour of this building is going to be calculated under conditions of different levels of atmospheric stability(B,C,D and E) and various kinds of wind speed. Besides, forecasting concentration of pollutants discharged by road vehicles in different stores will be calculated respectively.

7.1.1.3 Forecasting results

Under different atmospheric stability and various kinds of wind speed, contributions of automotive emissions to the pollutants concentration averaged in an hour in different stores are forecasted respectively and listed in table 7-2.

Table 7-2.The forecasting results of average pollutant concentration per hour in different stores

Meteorologic condition \ Stores		1	2	1	2
Stability	Wind speed (m/s)	CO(mg/m^3)		NOx(mg/m^3)	
B	2.0	0.24530	0.20790	0.02880	0.02400
	3.0	0.16390	0.13860	0.01920	0.01560
	4.0	0.11000	0.09680	0.01440	0.01200
C	2.0	0.29370	0.22990	0.03360	0.02640
	3.0	0.19580	0.15400	0.02280	0.01800
	4.0	0.14630	0.11550	0.01680	0.01320
D	0.5	1.36400	0.98230	0.15600	0.11280
	2.0	0.34100	**0.24530**	0.03960	0.02880
	3.0	0.22770	0.16390	0.02640	0.01920
E	0.5	1.87770	1.00980	0.21600	0.11520
	2.0	0.46970	0.25190	0.05400	0.02880

7.1.2 Atmosphere impact assessment

The selected assessment standard of average CO concentration per hour is 10mg/m^3.

It is manifested in Table 7-2 that the contribution of automotive emissions to the CO concentrations averaged in an hour in different stores of the south first row building is mostly under 1.0mg/m^3. Only under D and E atmospheric stability with lower wind speed, could the value be above 1.0mg/m^3. The maximum value is 1.8777 mg/m^3, which is also far lower than the concentration of the assessment standard.

The selected assessment standard of NO_2 concentration averaged in an hour is 0.24mg/m^3. It can be seen in Table 7-2 that the contribution of automotive emissions to the NO_x concentrations averaged in an hour is mostly under 0.1mg/m^3. Only under D and E atmospheric stability with lower wind speed, could the value of different stores be over 1.0mg/m^3, with the

maximum 0.2160mg/m^3.

Due to the obstruction of the first building, the impact of automotive emissions to the back buildings is much smaller.

So, the impact of automotive emissions is acceptable, and the environmental air quality will be still under the standard. Moreover, the route of the No. 47, 592 and 863 buses, which pass the single-way Liyang road every day, are going to be changed for the reconstruction project. As the result, only small vehicles will be allowed on Liyang road in the future, which will obviously improve the environmental air quality in this community.

7.2 Water environmental impact assessment

7.2.1 The total discharged water pollutants analysis

According to the investigation of the sewerage flux and quality of communities in Shanghai, the gross of sewerage and that of major pollutants at present from this community are calculated and listed in Table7-3. Moreover, the total value of sewerage and that of main pollutants from this community in the future are estimated and showed in table 7-4.

Table 7-3.The total sewerage and main pollutants of the community at present

Gross sewerage	Pollutants	COD_{Cr}	BOD_5	NH_3-N	SS	Propagation oil
39.8273 $\times 10^4$t/a	Concentrations (mg/L)	≤300	≤150	≤25	≤350	≤30
	Standards (mg/L)	300	150	25	350	30
	Total value (t/a)	119.48	59.74	9.96	139.40	11.95

It is indicated in Table7-3 that the gross of sewerage is 398.27kt/a at present, the gross of COD_{Cr}, BOD_5, NH_3-N, SS and propagation tallow are 119.48 t/a, 59.74 t/a, 9.96 t/a, 139.40 t/a and 11.95t/a respectively.

Table 7 - 4 The total sewerage and main pollutants of the community in the future

Gross sewerage	Pollutants	COD_{Cr}	BOD_5	NH_3-N	SS	Propagation oil
9.2023 $\times 10^4$t/a	Concentration (mg/L)	≤300	≤150	≤25	≤350	≤30
	Standard (mg/L)	300	150	25	350	30

	Total value (t/a)	27.61	13.80	2.30	32.21	2.76

The discharge amount of COD_{cr} is 27.61t/a, which of BOD_5 is 13.80t/a, NH_3-N 2.30t/a, SS 32.11t/a and animal and vegetable oils 2.76t/a.

Thus, the main contaminants' gross amount's variety in this subzone's domestic sewage before and after the project can be calculated, whish is shown as table 7-5.

Table 7-5 Main contaminant' gross amount's variety of sewage before and after the project

Contaminants	COD_{cr}	BOD_5	NH_3-N	SS	Propagation oil
Discharge amount(t/a)	119.48	59.74	9.96	139.40	11.95
Discharge amount(t/a)	27.61	13.80	2.30	32.21	2.76
Variety	-91.87	-44.94	-7.66	-107.19	-9.19

Through the table, it can be seen that the project is going to reduce domestic sewage by 306.25kt/a, and all the main contaminant are going to be reduced greatly. The decrement of each contaminant is COD_{cr} 91.87t/a, BOD_5 is 44.94t/a, NH_3-N 7.66t/a, SS 107.19t/a and animal and vegetable oils 9.19t/a respectively.

7.2.1 Analysis of the project's drainage effects

According to the analysis of sewage and contaminant's total discharge amount, after the project is completed and the residents live there, all the daily discharge amount of sewage and main contaminants will decrease somewhat. In term of some environment protection regulation of Shanghai, domestic sewage of this subzone lead to the metro sewer line directly, and come into Quyang sewage clarification plant finally. As a result, the construction of the project is not going to affect the surface water much.

7.3 Environmental impact analysis of construction period

The houses and supporting facilities to be reconstruct in this project have a huge scale and the construction period is relatively long, which is about five years--from Mar., 2003 to Sep., 2007. Accordingly, the relocation of residents is planned from Mar., 2003 to Jan., 2007. Thus the environmental impact in construction period should pay more attention to.

7.3.1 Atmospheric environmental impact analysis & control measures in construction period

7.3.1.1 Characteristic of atmospheric pollution in construction periods

The main factors that affect the atmospheric environment of area around the bastion during construction period include: all kinds of construction dust emission in the building site and exhaust gas discharged by construction machines burning diesel oil or gasoline. The main pollution sources and contaminates during different construction periods are shown in table 7-6.

Table 7-6 Main pollution sources and contaminates during different construction periods

Construction period	Main pollution sources	Main contaminates
Excavation, dismantle	1.exposed ground, earthwork storage space, earthwork load and unload, dust emission of roads, building materials yard etc. 2.digging machine, pile engine, forklift, transport truck etc.	Dust, NO_x, CO, HC
Building construction	1.Building materials yard, building materials load and unload, concrete mix, dust emission of roads and ground, etc. 2. Transport truck	Dust, NO_x, CO, HC

It can be seen from table 7-6 that the main contaminant discharged during construction periods is dust. In each construction period there is dust exist, including dust emission of construction storage space and dust emission of road caused by vehicle running, and last long time. Secondly, the main pollution source is the exhaust gas of construction machinery and tail gas pollution let by heavy transport trucks.

(1) Lamp black and exhaust gas of construction machinery and transport trucks

This gas include the exhaust gas exhaled by construction machinery and transport trucks burning oils, which contain NO_x, CO and HC. On the one hand, the gas can not be controlled, on the other hand the time that the gas source being used is limited. So it can be done to reduce contaminates' discharge amount through managements to control trucks and machines' running time.

(2) Construction dust emissions

Construction dust emissions include two parts: One is the dust emission of building materials' storage caused by wind, the other is the dust emission of roads caused by construction vehicles.

7.3.1.2Measurement of atmospheric environmental protection and management in

construction periods

Make fully preparation before construction, arrange each zone's construction plan as good as possible, reduce the area of the site that constructing in the same period, set up some shield with some height around the building site, strengthen the plan and management of the construction site, prevent building materials from dust escape during load and unload, storage and mixing.

There should be definite position and direction in both construction material deposit (mainly sand and stone) and concrete-mixing field, and dustproof measures. Gush out faucets should be set up in loose material deposit set up and water should be sprayed for dustproof.

Dustproof bag should be set at the under-part exit of Bulk cement in case the cement lets go.

The main arterial highway of transport vehicle pass way should be sprinkled water and cleaned regularly in order to keep road entrance and exit surface clean and moist, which can reduce the dust pollution of the ground.

Cooperate with traffic department to organize the traffic well finish during the construction time, to prevent traffic jam incurred because of construction, and to reduce the emission of waste gas because of the idle speed of vehicle.

Strengthen the maintenance of machinery and vehicle. Forbid the overloading of construction machine whose fuel is diesel oil. Reduce the discharge of the pollutant.

7.3.2 Affect analysis and managing measurements of sound environment during construction time

7.3.2.1 characters of yawp pollution during construction time

The noise pollution in the course of building can be divided into the following four kinds according to different construction stages:

(1) Stage of remove and cubic of earth and stone: Excavator, bull-dozer, air compressor, loader etc., and the noise generate from transporting vehicles; According to the survey, heavy-duty transport vehicle of earth and stone can generate equivalent sound magnitude greater than 90 dB(A) when they pass in and out building site. During the course of building, we carry out the regulation《The Noise Limit around Construction Site》(GB12523-90).

(2) Stage of piling: Noise of Pile driver, this kind of noise can up to 90 dB(A) from the place 30m far away, The adopted the pressure piling method can lighten the influence of piling noise greatly at present. Because the project amount is limited, the noise pollution has not been outstanding yet this stage.

(3) Structure stage: Noises such as concrete mixer, vibrator, electric saw etc. If adopting the commodity concrete, the noise from transporting vehicles will be very serious, too. According to national standard GB12523-90's request, boundary noise equivalent sound grade can't be greater than 70 dB(A) in the daytime and can't be greater than 55dB(A) at night.

(4) Noise from the crane and lift at fitment stage, the impact of this kind of noise on surrounding environment is relatively small; According to national standard GB12523-90's request, the boundary noise equivalent sound grade can't be greater than 65 dB (A) in the daytime and can't be greater than 55 dB(A) at night. The working noise of the construction machines, for instance air compressor machine, excavator, concrete mixer, bull-dozer and etc. will produce the noises of 70-90 dB (A). And its interfere radius is large, coverage is far.

According to the characteristics such as long building course cycle, transporting goods at night, it is easy to cause influence to adjacent resident's life. So strict control and managing measures should be taken.

7.3.2.2 The countermeasures and suggestions to environmental protection during the construction time

Carry out the regulation of management that forbid the work which can generate great noise, for example piling, and etc. strictly in Shanghai Environmental Pollution Regulations, Arrange high noise constructing activities rationally, construct at night should apply separately.

(1) Carry out the request in 《The Noise Limit around Construction Site》 (GB12523-90). If there is need to work at night, it must apply to the environmental protection department. And the construction can go on in appointed date after getting permission.

(2) Set up protective screen around the building site. Add some portable and easy sound insulation protective screen near the high noise equipment. Reduce the impact from equipment noise on environment.

(3) Strengthen the traffic administration near the building district, avoid the traffic jam and reduce blow.

(4) When assigning high noise equipments in building site, they should be set relatively far from the resident. Imports and exports of transport vehicles also should be placed relatively far from the resident.

7.3.3 Affect analysis and managing measurements of sewage environment during construction time

The major sewage of the construction period in this project is mud water that constructing and equipment produced. At the same time the wastewater generates in rain days consisted of a

large amount of silt particle, suspend solid and mineral oil. All these formed the unsafe factors to the pavements and streets around, which need great attention during construction time.

(1) Stage of constructing, when removing the groundwater in construction and the mud water generate during smashing concrete, Propose digging a simple pond at the construction site to eliminate mud water after sediment or to separate mud and water through centrifugal machine then discharge. Directed discharging into the sewage system is forbidden or it will cause the jam in cloacae.

(2) Ooze out water, wash water, rainwater and etc. within construction site should be discharged into the drainage designed in advance. When taking out the groundwater or the water accumulated in the hole, under the precondition that will not affect the traffic, it's better to discharge the wastewater into the well with hose.

(3) A 50cm high simple defending wall should be set up around the material pile site using stones or cement in order to prevent bulk material from being eroded by rainwater and washed out into water bodies.

7.3.4 The disposal and managing measures of dregs during construction time

The solid waste is mainly building rubbish in construction time. When the old building is removed or constructed, project dregs and building rubbish such as wood, brick and tile etc. will generate. This project has some removal houses and some abandon soil in the course of foundation excavation, which can be digested in or nearby the district, those surplus should be collect and cleared up as soon as possible and apply to relevant departments for the landfill in fixed position. Strengthen the constructing course management, which can control the building rubbish's amount and their impact on environment.

It will produce wood, tiles and muck when dismantling the old building and constructing. So the solid waste in the construction period is mainly construction waste. Some dismantled building and terra produced in the foundation excavating in the project can be disposed in the community and vicinage. The residue must be gathered as soon as possible and apply to the managing department for fixedpoint landfill. Intensifying management in the construction period could control production of construction waste and its influence to the environment.

The people's government of Shanghai has explicit regulation to the disposal of construction waste and engineering muck. The units undertaking projects must abide by it.

7.3.5 The quarantine and epidemic prevention of the builders

The builders came from many areas and lived in groups. They probably carried diseases and can easily catch local illness. So the epidemic prevention must be done to improve the

ability against disease and avoid epidemic. The builds' dejection and domestic waste must be properly disposed. Relieving nature everywhere and leaving waste about are forbidden. To avoid epidemic occur and illness propagation spread, there should be temporary lavatories and waste collection points in the construction situ. The management of habitation and dietetic hygiene and epidemic prevention must be paid great attention to. The disabled tabby and concrete should be deposited or landfilled in the proper bottom land after the construction. The contaminative killesses, dejection and waste must be cleaned out, sanitized and filled with cleanly earth.

8. Analysis of the Impact on the Social Environment and Comprehensive Assessment of Ecological Suitability of the Environment in the Residential Area

8.1 Public Participation

Public participation is a part of EIA work and is a kind of communication between the owner and the public. Its purpose is to allow communities and persons, especially those individuals who will be directly affected by the project to learn the property, goal, location and scope of the project, and any possible big environmental problems arising from the project. Conducting public participation will improve the effectiveness of EIA work and promote the sense of environmental protection for ordinary people.

8.1.1 Time and Approaches of Public Participation

There are various ways of public participation including information dissemination, information feedback, feedback collection and information exchange. According to the requirement of the EIA, a public participation survey was conducted for the Protective Rebuilding Project of Old Architectures in Liyang Road, Hongkou District (referred to as the Project hereinafter) in December 2002. Under the assistance of local Street Inhabitant Committees (SICs), opinions were collected using methods of information feedback such as questionnaire, field investigation and special survey. The survey form is shown in Table 8-1.

Table 8-1 Survey form for the Project

Name		Age		Gender	
Education		Occupation		Nationality	
Unit					
Address		Family Number		Living Space	
Brief introduction to the Project In order to improve the housing conditions in the North Sichuan Road and Liyang Road and implement the master planning of old architecture protection, it is decided to conduct the Protective Rebuilding Project of Contemporary Buildings near Liyang Road, Hongkou District. The Project will probably cause pollution problems such as flying dust and noise. Meanwhile buildings of enterprises and inhabitants will be resettled.					

Table 8-1 (continued)

Please answer following questions (ticking in)
1. Have you known the forementioned Project?
Have read the announcement Have heard from others Not clear
2. Do you think the Project will be beneficial to the improvement of environmental quality
Beneficial Harmful Not clear
3. Do you think these blocks are suitable for this kind of projects?
Yes No Not clear
4. You believe that the Project will cause
Severe pollution Slight pollution No pollution
5. The Project will affect your daily life during and after the project construction but will be
Yes No Indifferent
6. Do you think the environment in the Blocks has been polluted?
Yes No Don't know
7. How about the aquatic environment quality in the Blocks?
Good So-so Poor
8. How about the air environment quality in the Blocks?
Good So-so Poor
9. How about the acoustic environment quality in the Blocks?
Good So-so Poor
10. If the project construction causes traffic interdiction and noise. What is your attitude?
Understandable Complaining No attitude
11. You think the demand for improving the housing condition in the project area is
Little Much No necessary
12. If your house should be dismantled owing to the project construction, you will
Support Not support haven't considered
13 If your house is dismantled, you hope to be compensated with
Similar houses Cash in once Cash in long term
Any other opinions, suggestions and requests

8.1.2 Scope and Targets of the public participation

The survey should reflect the opinions and suggestions of the inhabitants in the entire project area and the persons to be investigated should be representative. The inhabitants, household representatives and enterprise representative in the Blocks A, B and C within the project area were selected. The persons to be investigated represent different ages, occupations, education levels and housing conditions. Besides, they should evenly distribute in the blocks and opinions from minority groups should be especially considered. The persons to be surveyed were selected among the registered ones in SICs. 280 questionnaire forms were issued and 223 were taken back. The retrieve rate is 80.71%.

The investigated persons range from 20 to 88 in age, from primary school to university in education level, with various occupations such as workers, staffs, teachers, students, engineers and technicians, the unemployed and retired. Among the 226 investigated persons, 163 live in Block A, 9 in Block B and 54 in Block C. The statistics is given in Table 8-2.

Table 8-2 Statistics of the investigated persons

Item		Persons	Percentage (%)	Item		Persons	Percentage (%)
Education Level	Below primary school	15	6.64	Age	21-30	5	2.21
	Middle school	136	60.18		31-40	10	4.42
	University	73	32.3		41-50	57	25.22
	Above university	2	0.88		51-60	61	26.99
Occupation	Worker	36	15.92		Above 60	93	41.15
	Staff	42	18.58	Living space	Less than 10 m^2	1	
	Teacher	13	5.75		10-30 m2	96	
	Student	0	0		30-60 m2	63	
	Businessman	0	0		Larger than 60 m^2	20	
	Retired	84	37.17				
	Unemployed	28	12.39				
Gender	Male	133	58.85	Nationality	Han	214	94.69
	Female	90	39.82		Minority		

It can found from Table 8-2 that among the investigated persons most are the old age and male. This is because that the Project will affect inhabitants' living conditions and thus answers were often made by the elders in families. Some people believe that the living space belongs privacy and refused to fill in the form.

8.1.3 Results of Survey

The statistics of the survey results is given in Table 8-3

Table 8-3 Statistics of the survey results

Question No.	Answer No.1	Votes	Answer No.2	Votes	Answer No.3	Votes
1	Have read the announcement	31	Have learnt from others	117	Not clear	73
2	Beneficial	120	Harmful	18	Not clear	82
3	Yes	100	No	23	Not clear	98
4	Severe pollution	29	Slight pollution	107	No pollution	46
5	Yes	111	No	37	Indifferent	60
6	Yes	60	No	35	Don't know	114
7	Good	23	So-so	161	poor	25
8	Good	30	So-so	151	poor	34
9	Good	25	So-so	134	poor	52
10	Understandable	139	Complaining	46	No attitude	34
11	Little	120	Much	18	Not necessary	38
12	Support	81	Not support	41	Haven't considered	92
13	Similar houses	116	Cash in once	52	Cash in long term	12

8.1.4 Analysis of the Public Opinions

Among the all investigated persons

(1) 63.49% know the Project, 13.72% among which learned from medias such as television and newspaper, 51.77% learned from people-to-people exchanges, and 32.20% don't know the Project.

(2) 53.10% think that the Project will be beneficial to the improvement of the environment quality in the North Sichuan Road and Liyang Road Blocks, 7.9% believe that the Project will not be beneficial to the improvement, and the remaining persons are not clear about it.

(3) 44.25% think that the area is suitable for the Project, 10.18% think that it is not suitable for the Project, and 43.36% re not clear about it.

(4) 12.83% think that the Project will cause severe pollution problems, 47.35% think that it will only cause slight problems, and 20.35% think that there will be no pollution problems resulted from the Project.

(5) 49.12% think that it will be acceptable if the daily lives are affected to some extent during and after the construction but the disturbance can be limited within relevant national standards, 16.37% think that it is not acceptable, 26.55% are indifferent of it.

(6) 26.55% think that the environment in the project area has been polluted, 15.49% think that it has not been polluted, and 50.44% don't know the issue.

(7) 10.18% think that the aquatic environment quality is good, 71.24% think so-so, and 11.06% think bad.

(8) 13.27% think that the air environment quality is good, 66.81% think so-so, and 15.04% think bad.

(9) 11.06% think that the acoustic environment quality is good, 59.29% think so-so, and 23.01% think bad.

(10) 61.50% think that it is understandable that the construction will result it traffic interdiction and noise, 20.35% will complain it, and 15.04% have no specific attitude.

(11) 53.10% think that the demand for the improvement of housing condition in the project area is little, 7.96% think much, and 16.81% think that the rebuilding is not necessary.

(12) If own house is dismantled owing to the Project, 53.10% will support it, 18.14% will not support it, and 40.71% have not considered the issue yet.

(13) If own house is dismantled, 51.33% hope to get compensation with the similar houses, 23.01% hope to get cash in once and 5.31% hope to get cash in long term.

It can be found that all the investigated persons quite support the Project and most representatives of the household and enterprises will also support it from the viewpoint of holistic interest. Some people were cautious and avoided answering in a straightforward way because their interest is related to the Project directly. Some people raised good suggestions in the respect of environmental protection and requests to the environmental department which are summarized as follows.

(1) Many people think that the current housing condition is poor and the living space is too small. They hope that the Project could be conducted as soon as possible to improve the housing condition and the environment. They have shown their initiative to support the Project.

(2) Inhabitants hope that the environmental department should manage the Project strictly according to relevant laws and regulations so that it can be smoothly conducted meanwhile their interest can be guaranteed. Especially during the construction period care should be taken of the inconvenience and disturbance resulted from the construction, controlling the disposal of solid waste, noise, piling, and noise in the evening caused by construction

(3) Most household representatives hope that the new Blocks should have better green environment and be an ecological residential area. They also hope to improve the comprehensive conditions such as security and traffic.

(4) The Project is related to individuals' interest. Some inhabitants asked that the

government should make reasonable policy for resettlement and method for compensation of resettlement. The replacement should not result in degraded living conditions and housing conditions. Some of them asked to be relocated nearby or at original places. Some old, sick and disabled persons hope to have such facilities as hospital, shopping, security and school. Most inhabitants hope to get compensation with similar houses, some of them hope to get cash in once, and only a small part hope to get cash in long term.

In conclusion, Most people support the Project. They hope that after the construction of the Project the measures of environmental protection should be substantial and the environmental monitoring should be strengthened.

8.2 Analysis of Social Environmental Impact

As one of the most important parts in Shanghai Old Downtown Area and act as one of the most important functional core areas in Hongkou District, the northern part of Lao Hongkou, covering about 83.6ha., is now facing more and more intensified pressures of redevelopment. The areas along Liyang Road, Duolun Road, Shanyin Road and Luxun Park hold great values on old town scene, historical architecture and culture, which is an important historical and cultural Special Zone in Shanghai as well as in Hongkou District. The orientation of development in this area will feature a complex of culture, tourism and relaxation etc. The balance between old downtown reconstruction and historical scene protection will be considered while up-grading the functional level of this Old Downtown to meet the needs of social development.

This Project belongs to a project featuring old downtown reconstruction, protective contemporary architecture renovation and environmental construction. During construction, some municipal roads, green lands and underground pipelines will be effected. Those buildings that are not up to the plan and no value of protection will be pulled down. Some factories, shops and families will be removed. They will be compensated accordingly. After reconstruction and inner decoration, the functional standards of each new flat and the level of the community will be up-graded greatly. The improving of living conditions and construction of more green lands will be propitious to its surrounding environment and people's living standards. The reconstructed community, featuring inhabitance, culture and tourism, will play an important role to the development of Hongkou District as well as upgrade the street of Sichuan Road N. to a high-level shopping and sightseeing complex.

8.3 Comprehensive Assessment of Ecological Suitability of the Environment in the Residential Area

8.3.1 Establishing of the Assessment Indicator System

The indicator system is a 3-layer hierarchical one. There are 2 indicators for the first layer, ie, the natural ecological environmental indicator and the cultural ecological indicator. There are 7 indicators at the second layer, ie, the environment quality, and the green and landscape (belonging to the natural ecological indicator), architecture and facility, culture and education, traffic convenience, population density, and comprehensive management (belonging to the cultural ecological indicator). There 14 items in the third layer. The system is introduced in detail in Table 8-4.

Table 8-4 Indicator System for the Comprehensive Assessment of Ecological Suitability of the Environment in the Residential Area

1st Layer	2nd layer	3rd layer	Unit	Weight	Indicator			
Natural ecological indicator	Environment quality 30%	Air environment	Level	15	1	2	3	>3
		Acoustic environment	Category	15	0	1	2	3
	Green and landscape 15%	Green rate	%	10	>35	30-35	25-30	<25
		Landscape	Level	5	Fine	Good	So-so	Poor
Cultural ecological indicator	Architecture and facility 20%	Building rate	%	10	<1.2	1.2-1.5	1.5-1.8	>1.8
		Public facility	Level	10	Complete	good	So-so	Bad
	Culture and education 15%	Education facility	Level	5	Complete	good	So-so	Bad
		Culture facility	Level	5	Complete	good	So-so	Bad
		Inhabitants' living habit	Category	5	Rural	Town	Urban	Municipality
	Traffic convenience 10%	Distance from local center	km	5	<2	2-4	4-10	>10
		Distance from bus stop	Hour	5	<0.15	0.15-0.25	0.25	0.35
	Population density 5%	Population density	10^4 persons/km^2	5	<2	2-3	3-5	>5
	Comprehensive management 5%	Comprehensive management	Level	5	Complete	good	So-so	Bad

Scoring standard: among the 3 layers' indicators, the scores got at the first layer are the

weight. The scores of the second, third and fourth layers are obtained as 80%, 60% and 40% respectively as the weight of the first layer.

Evaluation standard: If the comprehensive score is above 85 then it belongs to an ecological environment corresponding to villas; above 65 corresponding to standard housing area, below 65 corresponding to ordinary housing area.

8.3.2 Determining of Evaluation Indicator

(1) Natural Ecological Indicator

Environment Quality

The air quality in the project area mainly matches Class 2 of the Air Quality Standard. Because the area is affected by Changchun Road to the west and by Liyang and Baoan Road to the east, the existing acoustic quality has exceeded Category 2 of the Acoustic Standard. After construction, the acoustic quality of community mainly matches Category 3 of the Acoustic Standard.

Green and Landscape

The green rate of the area is only 0.36%. This Project will demolish present buildings in east part of B block and C block to build greenbelt, and demolish buildings that are not up to the plan in A block to recovery green, increase green area. After construction, the green rate of the area will be 60%. There is a big flower terrace and sculpture in the center of the community. In part of the community, some architectural creations will be inserted to make whole space of community full of artistic breath.

(2) Cultural Ecological Indicator

The building rate is 0.36. There are good facilities such as water, electricity, gas, traffic and real estate. There are dustbins collecting different types of garbage, real estate management committee and meeting centers.

8.3.3 Assessment Result

The assessment result is given in Table 8-5. The comprehensive scare is 84, corresponding to high quality housing area and near the villa area, indicating that the Project has good ecological suitability.

Table 8-5 Result of comprehensive assessment of ecological suitability for the Project

Item	Evaluation	Score
Air quality	Matching the Class 2	12
Acoustic quality	Exceeding 10 dB in the evening locally, inside the area matching Category 2	6
Green rate	Green rate 60%, larger than the highest requirement of 35%	10
Landscape	Landscape will be fine in the area	4
Building rate	Building rate is 0.36<1.2	10
Public facility	Located in city area with complete public facilities	10
Education facility	Located in city area with complete education facilities	5
Culture facility	Culture centers and cinemas available in the surroundings, with complete culture facilities	5
Inhabitants' living habit	The habit belongs to that of municipality	2
Distance from the local center	1 km from the Hongkou administrative center	5
Distance from the bus stop	Bus stop available at the entrance of the Block	5
Population density	5100 persons/km^2	5
Comprehensive management	Real estate management institute available. The comprehensive management is complete	5
Comprehensive score		84

9. The argumentation of the countermeasure to control pollution in the operating period

9.1 The commentary of the countermeasure for pollution control

In the project, the water, electricity and coal gas were switched in through municipal pipeline. The mainly sewage is domestic discharges. The sewage was brought into municipal waste pipe through the pipe in the block and was treated in the Quyang effluent plant finally. There are not underground parking lots, transformer substation and fan facilities house in the community. So the countermeasure to control pollution is seldom took into account. In the design at present, the disposal of the domestic waste is mainly considered. It is planned to setup some waste collection point. The different domestic waste will be classified and collected by bags and piled in different garbage bins respectively. The waste in garbage bins was transported to the collection point by the realty management staff everyday and was disposed by the environmental sanitation department. The waste in the community will be cleaned up everyday.

9.2 The measures for farther pollution control

The mainly environmental problem of the project is the traffic noise pollution from the circumjacent roads such as Liyang road, Changchun road, Siping road and Xingjiaqiao north road. The measures as follows is planned to adopted to settle these questions.

(1) Only the dillies can pass through the Liyang road which past across the middle of the community and the heavy traffics' passing is forbidden. To install conspicuous hooting forbidden sign at the road section which pass the community can alleviate the influence of noise to the residents in the community.

(2) When designed, sufficient frontage of the first row of the building would be left beforehand to landscaping or build earth slope. It can beautify the community and ameliorate the environment by reducing noise.

(3) The windows and doors of the houses facing the street should adopt the sound insulation measure. The chamber facing the street can't be designed as bedroom. It will be only used as accessorial chamber.

(4) Hooting is forbidden when the vehicles pass in and out the community. The speed of the vehicles passing through the community is governed.

9.3 The environment profit and loss analysis

Fixing the sound insulation windows and doors on the first row of the building near the Xingjiaqiao north road, Changchun road. Bao'an road and Liyang road will increase the investment for about ¥300,000. Furthermore, the landscaping and construction of waterscape need more investment too.

10. Conclusions and Suggestions

10.1 Main Conclusions

1.According to the whole layout of Hongkou District, this Project-- Reconstruction of the Contemporary Buildings under Protection near Liyang Road, will pay equal attention on development and historical style and features protection to renovate the old buildings built in 1920~30s into inimitable ones. After reconstruction through restoration and inner decoration, their dwelling functions and using values will be highly raised.

The Project is located at Siping Road, Liyang Road and Baoan Road in the east; Changchun Road in the west; North Xingjiaqiao Road in the south; 138 Lane of Baoan Road in the north with an area of about 9.36ha. Three Blocks, i.e. A、B、C blocks, are divided in this Project. The total investment is 1 billion yuan.

The Project covers total construction area of about 94430m^2, among which Block A of 56190.3m^2, Block B of 16806.5 m^2 and Block C of 14859.5 m^2. The assorted public facilities area is about m^2 and the capacity ratio is 0.36 with total investment of 1 billion yuan.

This project locates in north part of the former Hongkou. The region is one of integrate service center in Shanghai and is the main part of public service and activity center in Hongkou. It is a multifunctional district with culture life fallow, sightseeing and traveling, commerce and food service. At the same time it is the characteristic region organic combining the history with present and integrated service with middle and top grade inhabitation.

The reconstruction and the Protection is on the premise of preserving the primary construction style and the view of the community. The disordered buildings will be removed in order to improve environmental quality and increase the green ratio. In a word, the project is compatible with both surrounding environment and programming.

2. The latest monitoring data of air quality were collected from the Environmental Protection Monitoring Station near the project. It is shown that the hourly concentration ranges, daily average concentrations and percentages beyond standard of SO_2 and NO_2 are all under the assessment criterion while those of PM_{10} changed a lot and the percentage beyond standard is 40%. In general, the ambient air quality in assessment area is fine.

Because east ,south, west, and middle of the plot affected by traffic noise of Liyang and Baoan Road, North North Xingjiaqiao Road, Changchun Road, and Liyang Road respectively, the existing environmental quality of this Plot is worse than the assessment standards, especially at night except site 1# which is not affected by surrounding traffic noises..

3. The water source will be not changed after reconstruction and the tap water will be taken in from the municipal tap pipeline under the Liyang Road at middle of the Plot. Now the water consumption amount is1364m^3/d and discharge amount is 1091.2m^3/d.

After reconstruction, the maximum water consumption amount will be 364.4m3/d.The drainage amount of waste water of this project is 252.1 t/d and pollutants such as COD_{Cr}、BOD_5、NH_3-N、SS, propagation oil is75.6、37.8、6.3、88.2、7.6kg/d respectively. Living sewage produced by dwelling house public building will tally with the third class diffusion standard of Shanghai after collection and sent to municipal sewage pipeline in Liyang. According regulations referred to environmental protection on Shanghai, sewage will go to Quyang water quality purify factory at last.

4. The noisy sources around the project are mainly from nearby traffic noise. According to the existing monitoring and prediction results, Relatively great effects are from Liyang Road and Baoan Road at the east, North Xingjiaqiao Road at the south, Changchun Road at the west and Liyang Road at the middle of the community. After reconstruction, only mini cars can pass through the Liyang Road which past across the middle of the community and the heavy traffics' passing is forbidden, which is benefit to the sound environment inside the community. The buildings next to North Xingjiaqiao Rd is rather affected by traffic noise and so necessary noise protection measures must be applied.

5. The impact of automotive emissions is acceptable, and the environmental air quality will be still under the standard. Moreover, the route of the No. 47, 592 and 863 buses, which pass the single-way Liyang road every day, are going to be changed for the reconstruction project. As the result, only small vehicles will be allowed on Liyang road in the future, which will obviously improve the environmental air quality in this community.

6. The amount of solid waste produced by residents after the project finished is 182.5 t/a. Living solid waste will be put in bags and collected in 12 garbage boxes set beside roads then sent to transfer station at Baoan road and treated together by environment protect department.

7.The waterscape in this Project should meet the standards of Grade V in "Surface Water Environment Quality Standard". To avoid water quality deterioration, a water pump system will be adopted to make water recycle flowing while fountains are set to supplement oxygen into water. Forbidden to throw and no wastewater enter into the water through rain pipes by strengthening management measures.

8.The comprehensive score of ecological suitability is 84, corresponding to high quality housing area and near the villa area, indicating that the Project has good ecological suitability.

indicating that the Project has good ecological suitability.

The development of real estate can promote the development of commerce as well as the development of local economy. Above all, this Project is acceptable.

10.2 Suggestions

1. The restaurant in the business building should be arranged in direction of downwind of the main wind direction.
2. After reconstruction, only mini cars can pass through the Liyang Road which past across the middle of the community and the heavy traffics' passing is forbidden. And conspicuous "No horning " signs will be set on the nearby road section. This will reduce the impact on the residents in this Project. When designed, sufficient frontage of the first row of the building would be left beforehand to landscaping or build earth slope. It can beautify the community and ameliorate the environment by reducing noise.
3. The windows and doors of the houses facing the street should adopt the sound insulation measure. The chamber facing the street can't be designed as bedroom. It will be only used as accessorial chamber.
4. Horning is forbidden when the vehicles pass in and out the community. The speed of the vehicles passing through the community is governed.