

Initial Environmental Examination

October 2015

PRC: Le Gaga Holdings Limited Greenhouse
Agricultural Development Project-Beigao Production
Base

Prepared by Le Gaga Holdings Limited for the Asian Development Bank

CURRENCY EQUIVALENTS

(As of 10 March 2015)

Currency Unit – Yuan (CNY)

CNY 1.00 = \$ 0.1597

\$ 1.00 = CNY 6. 2633

ABBREVIATIONS

ADB	–	Asian Development Bank
AP	–	Affected person
API	–	Air Pollution Index
BOD	–	Biochemical Oxygen Demand
CNY	–	Chinese Yuan
COD	–	Chemical Oxygen Demand
DEIA	–	Domestic Environmental Impact Assessment
EIA	–	Environmental impact assessment
EMP	–	Environmental management plan
EPB	–	Environment Protection Bureau
MoA	–	Ministry of Agriculture
MSDS	–	Material Safety Data Sheet
IEE	–	Initial Environmental Examination
GRM	–	Grievance Redress Mechanism
O&M	–	Operation and maintenance
PPE	–	Personnel Protective Equipments
PRC	–	People's Republic of China
SPS	–	Safeguard Policy Statement
SS	–	Suspended Solids
TEIA	–	Tabular Environment Impact Assessment
TN	–	Total Nitrogen
TP	–	Total Phosphate

WEIGHTS AND MEASURES

kg	–	Kilogram
km	–	Kilometer
m ²	–	square meter
m ³	–	cubic meter
mg/l	–	Milligrams per liter
Mg/m ³	–	Milligrams per cubic meter
mu	–	Chinese land measuring unit (1 hectare = 15 mu)
ha	–	hectare (10,000 m ²)
t	–	ton (1,000 kg)

NOTES

In the report, “\$” refers to US dollars.

This initial environment examination is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature. Your attention is directed to the “terms of use” section of this website.

In preparing any country program or strategy, financing any project, or by making any designation of or reference to a particular territory or geographic area in this document, the Asian Development Bank does not intend to make any judgments as to the legal or other status of any territory or area.

Table of Contents

Table of Contents.....	4
I. EXECUTIVE SUMMARY	8
A. Background.....	8
B. Project Description.....	8
C. Project Rationale and Benefits	8
D. Anticipated Environmental Impacts and Environmental Management Plan	8
E. Information Disclosure, Consultation and Participation.....	9
F. Grievance Redress Mechanism.....	9
G. Environment Management Plan.....	10
H. Conclusion.....	10
II. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK AND STANDARDS.....	11
A. Policy, Legislative Framework for environment impact assessment in PRC.....	11
B. Applicable ADB and PRC Policies and Assessment Categories.....	13
C. Evaluation Standards for the Project.....	14
D. Discharge Standards of the Project.....	15
III. DESCRIPTION OF THE PROJECT	17
IV. DESCRIPTION OF THE ENVIRONMENT	20
A. General	20
B. Physical Setting	20
C. Ecological Resources	20
D. Physical Cultural Resources	21
E. Socioeconomic Conditions	21

F. Environmental Quality Baseline.....	21
V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES.....	23
A. Project Rationale and Benefits	23
B. Screening and Scoping of Potential Impacts.....	23
C. Environmental Impacts and Mitigation Measures during Operations.....	26
VI. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION.....	31
A. Legislative Framework for Public Consultation and Information Disclosure	31
B. Information Disclosure and Public Consultation to Date	31
C. Public Consultation.....	33
D. Future Information Disclosure and Public Consultation Program	33
VII. GRIEVANCE REDRESS MECHANISM.....	34
VIII. ENVIRONMENTAL MANAGEMENT PLAN	35
A. Organizations and Their Responsibilities for EMP Implementation	35
B. Summary of Potential Impacts and Mitigation Measures	36
C. Environmental Inspection, Monitoring and Reporting	42
IX. CONCLUSION	46
Attachment 1: Le Gaga Internal Pesticide Management Procedures and Requirements.....	47
Attachment 2: Minutes of Environmental and Social Public Consultation.....	49

List of Tables

Table II-1 : Applicable Environmental Laws 11

Table II-2 : National and Local Administrative Regulations..... 12

Table II-3 : Applicable Environmental Guidelines..... 12

Table II-4 : Applicable Environmental Standards 13

Table II-5 : Ambient Air Quality Standard (Unit: mg/m³)..... 14

Table II-6 : Sea Water Quality Standard for Category II (Unit: mg/L, pH is dimensionless) 14

Table II-7 : Acoustics Ambient Quality Standard (Sound level: dB (A)) 15

Table II-8 : Maximum emission concentration and minimum removal rate of cooking fume treatment device 16

Table II- 9 : Water Quality Standard for Agricultural Irrigation 16

Table II-10: Construction Site Noise Limits 16

Table III-1 : Proposed works of Beigao Production Base..... 17

Table III- 2 : Estimated material usage per year..... 19

Table V-1 : Construction equipment noise impact distance 24

Table V- 2 : Municipal wastewater estimates during operation..... 26

Table V- 3 : Noise strength of the mechanical equipment used in proposed production.....26

Table V- 4 : Noise level at different distance.....28

Table VIII-1 : Potential Impacts and Mitigation Measures during Design, Construction, and Operation Phases of the Project37

Table VIII-2 : Environmental Investment for the production base42

Table VIII-3 : Environment Monitoring Plan43

Table VIII-4 : Proposed Project "Three-Simultaneity" Environmental Protection Inspection Checklist44

List of Figures

Figure III-1 : Location of proposed Beigao production base 17

Figure III-2 : Layout of proposed Beigao production base 18

Figure IV-1 : Current vegetation cover of proposed site 21

Figure V-1 : Table of sensitive receivers 23

Figure VI-1 : First Round of Information disclosure by Licheng District EPB 32

Figure VI-2 : Second Round of Information disclosure by Licheng District EPB 32

I. EXECUTIVE SUMMARY

A. Background

1. This project's Initial Environmental Examination (project IEE) report was prepared for the proposed Beigao Production Base Project (the project) of Le Gaga Holdings Limited (Hereafter Le Gaga) in Fujian Province, People's Republic of China (PRC). The IEE was prepared in accordance with the requirements of Asian Development Bank's (ADB) Safeguard Policy Statement (SPS,2009) on the basis of the domestic environmental impact assessment (EIA) report prepared by Nanjing Kehong Environmental Technology Limited Company in 2014 and The domestic Tabular EIA report was reviewed and approved by Environmental Protection Bureau (EPB) of Licheng District, Putian Municipality of Fujian Province ([2014] No. 073) on 19th December 2014.

B. Project Description

2. Le Gaga is planning to invest 100 million CNY to build 1000 mu agricultural production base in Licheng District, Putian Municipality, Fujian Province of PRC, with an annual output of 10,000 tons pollution-free vegetables. The project will rent 1000 mu farmland to construct vegetable greenhouses (600,003m²), one office building (350m²), dormitories (266 m²), a sorting workshop (800 m²), warehouse (651 m²), and three (3) pump rooms. A total of 20,231 m ditches and 8,218 m tractor road will also be build. It is planned that the whole base will be put into operation in June 2016.

C. Project Rationale and Benefits

The project is expected to reduce a farm's water consumption through the use of drip water irrigation. According to Fujian Water Consumption Norm (DB 35/T722-2007), 70 to 80% of the annual water consumption of a typical agricultural irrigation system (270m³/mu) can be reduced. The drip water irrigation average consumption ranges from 189 to 216 m³/mu. In addition, the integrated drip irrigation system will supply water and fertilizers based on the demands of plants. The nutrient efficiency will be improved. The major product, such as tomato, sweet pepper, hot pepper and cucumber will be grown in culture bags so that the nutrient inflation into soil and groundwater will be greatly reduced. Therefore, the project will reduce non-point pollution from agricultural through adoption of such advanced horticulture practices compared with traditional extensive planting methods.

D. Anticipated Environmental Impacts and Environmental Management Plan

The construction of the project will include minor field levelling. It is scheduled to be constructed within seven months period. Workers will be hired locally which will not require construction camp to be set up. Major environmental issues during construction include earthwork, noise pollution, air pollution, surface water pollution and construction waste management. Overall, construction-related impacts are localized, short term, and can be effectively mitigated through the application of good construction and housekeeping practices and implementation of construction phase community and occupational health and safety plans.

3. The potential impacts during operation of the project facilities include improper operation of waste water treatment facilities, solid waste disposal, especially pesticide and fertilizer bags and containers storage of pesticide, noise from pump operation, occupational health and safety related to application of pesticide. Appropriate mitigation measures and monitoring programs have been developed to address these issues. Project impacts, mitigation measures and impact monitoring are described in an environmental management plan (EMP).

E. Information Disclosure, Consultation and Participation

4. Public consultation for this project was conducted in accordance with the PRC Guideline. Two rounds of information disclosure were conducted by Licheng District EBP on its website on 4th December 2014 and 12th December 2014 respectively. No concerns or objections were received during the disclosure. An environmental public consultation workshop was also organized by Le Gaga on 16th March 2015 supported by General manager of E&S. Four (4) potential affected villager representatives, who are all supportive of the project, attended the workshop.

5. This project IEE will be also disclosed on ADB's website.

F. Grievance Redress Mechanism

6. Le Gaga will establish a grievance redress mechanism (GRM) on site for handling environmental and social complaints, including complaint recording, consultation, issue investigation, mitigation action, follow-up, general timeframe for resolution and delegation of responsibilities. The GRM will address any possible concerns and dissatisfaction of affected groups regarding the social and environmental impact of its subprojects, and seek a proper solution. It should be able to promptly respond to the affected groups, be transparent and free of gender discrimination, and adapt to the cultural traditions of the affected groups and communities. Moreover, it should enable different affected groups to express their opinions, with no fear of reprisal. The E&S General Manager will be responsible for (i) resolving appeals, complaints, and disputes concerning the environmental and social impacts of subprojects which have not been resolved by the plant managers at the subproject level, and (ii) for coordinating, guiding and supervising the subproject companies in handling appeals, complaints, and disputes.

7. The project company will inform the local community and the affected people of the grievance and appeal procedure through public information meetings, the resettlement information brochure and other media, so that they can fully understand their rights for grievance and appeal.

G. Environment Management Plan

8. An EMP has been prepared for the project. It is an essential document to ensure the implementation of mitigation measures. The EMP defines appropriate mitigation measures for the anticipated environmental impacts, and defines the institutional responsibilities and mechanisms to monitor and ensure the compliance with PRC's environmental laws, standards and regulations, and ADB's Safeguard Policy Statement (SPS 2009).

9. EMP supervision and monitoring results will be used to evaluate (i) the extent and severity of actual environmental impacts against the predicted impacts, (ii) the performance of the environmental protection measures or compliance with related rules and regulations, (iii) trends of impacts, and (iv) overall effectiveness of the mitigation measures.

H. Conclusion

10. The project IEE concludes that as long as the environmental mitigation and management measures defined in the EMP are properly implemented, all adverse environmental impacts associated with the project will be prevented, eliminated, or minimized to an acceptable level. The project is feasible from an environment safeguards point of view.

II. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK AND STANDARDS

A. Policy, Legislative Framework for environment impact assessment in PRC

11. The EIA management procedure has been established in the PRC since early 1990s. The domestic environment impact assessment (DEIA) upon which this project IEE is based has been prepared under the provisions of the PRC's EIA law of 2003 and the PRC Management Guideline on EIA categories of Construction Project (2008). The interim Guideline on Public Participation in EIA (2006) has also been a significant development that provides for opportunities to involve the public in the EIA process. This was further strengthened by the Requirements on Preparation of Environmental Impact Report Summary (2012[51], MEP), which requires that the summary of the DEIA reports should be disclosed on local EPB websites. The primary national laws and regulations that governed the EIA studies of the proposed project are provided in Table II-1 and Table II-2 respectively.

Table II-1: Applicable Environmental Laws

No.	Title of the Law	Year Issued
1	Environmental Protection Law	2014 revised
2	Environmental Impact Assessment Law	2003
3	Water Law	2002
4	Water Pollution Prevention and Control Law	2008
5	Air Pollution Prevention and Control Law	2000
6	Noise Pollution Control Law	1996
7	Forestry Law	1998
8	Wild Fauna Protection Law	2004
9	Solid Waste Pollution Prevention and Control Law	2013
10	Water and Soil Conservation Law	1991
11	Cleaner Production Promotion Law	2002
12	Urban and Rural Planning Law	2008
13	Land administration Law	2004
14	Circular Economy Promotion Law	2009

Table II-2: National and Local Administrative Regulations

No.	Regulation	Year Issued
1	Regulation on EIA of Plans and Programs	2009
2	Regulation on Environmental Protection Management for Construction Project	1998
3	Regulation on Protection of Wild Flora	1997
4	Requirements for the EIA Summary of Construction Project	2010
	Regulation on Cultural Heritage Protection	2003
5	Regulation on Classification of Construction Project Environmental Protection Management (MEP)	2009
6	National Biodiversity Strategy and Action Plan (2011-2030)	2010
7	Requirement for Social Risk Assessment of Large Investment Projects	2012
8	The National Biodiversity Strategy and Action Plan (2011-2030)	2010
9	National Regulation for Public Disclosure of EIAs (NDRC)	2012
10	Environmental Protection Supervision Rules for Construction Projects	1998

12. The implementation of environmental laws and regulations is supported by a series of associated management and technical guidelines (Table II-3)

Table II-3: Applicable Environmental Guidelines

No.	Guideline	Year/Code
1	Guideline on Jurisdictional Division of Review and Approval of EIAs for Construction Projects	2009
2	Guideline on EIA Categories of Construction Projects	2008
3	Interim Guideline on Public Consultation for EIA	2006
4	Technical Guideline on EIA: Outline	HJ2.1-2011
5	Technical Guideline on EIA Regarding Surface Water	HJ/T 2.3-1993
6	Technical Guideline on EIA Regarding Atmospheric Environment	HJ 2.2-2008
7	Technical Guideline on EIA Regarding Acoustic Environment	HJ 2.4-2009
8	Technical Guideline on EIA Regarding Ecological Impact	HJ 19-2011
9	Technical Specification on Water and Soil Conservation Plan	GB50433-2008

10	Technical Guideline on Environmental Risk Assessment for Construction Project	HJ/T 169-2004
11	Industrial Restructuring Directory	Revised in 2013

13. The environmental quality standard system that supports and evaluates the implementation of the environmental protection laws and regulations in the PRC is classified into two categories by function (i.e., pollutant emission/discharge standards and ambient environmental standards). The relevant main standards applicable to the project are shown in Table II-4.

Table II-4: Applicable Environmental Standards

No.	Standards	Code
1	Sea Water Quality Standard	GB 3097-1997
2	Ambient Air Quality Standards	GB 3095-2012
3	Urban Ambient Acoustic Quality Standard	GB 3096-2008
4	Integrated Emission Standard of Air Pollutants	GB 16297-1996
5	Integrated Wastewater Discharge Standard	GB 8978-1996
6	Ground Water Quality Standard	GB/T 14848-93
7	Emission Standard of Environment Noise for Boundary of Site	GB 12523-2011
8	Noise Limit of Industrial Enterprises	GB 12348-2008
9	Standard for Pollution Control on the Storage and Disposal Site for General Industrial Solid Wastes	GB 18597-2001
10	Emission Standards for Odor Pollutants	GB 18599-2001

B. Applicable ADB and PRC Policies and Assessment Categories

14. ADB's Safeguard Policy Statement (SPS 2009) provides the basis for this Project IEE. All projects funded by ADB must comply with the SPS. The purpose of the SPS is to establish an environmental review process to ensure that projects undertaken as part of programs funded under ADB loans are environmentally sound, are designed to operate in line with applicable regulatory requirements, and are not likely to cause significant environment, health, or safety hazards.

15. The project is classified as Category B for environment based on its potential environmental impacts, requiring the Company to prepare an initial environmental examination (IEE) as identified in the SPS. The project is classified as Category B in accordance with the Guideline on EIA Classification for Construction Projects issued by the PRC's Ministry of Environmental Protection (MEP) in 2008, requiring a tabular environment impact report (TEIA). The TEIA report of the proposed project was prepared by Nanjing Kehong Environmental Technology Limited Company in 2014 and reviewed and approved by Licheng District EPB on 19th December 2014.

C. Evaluation Standards for the Project

16. **Air Quality Standard.** The PRC ranks air quality into three classes according to "Ambient Air Quality Standard" (GB 3095-1996, amendment in 2000), with Class I as the "best" air quality and Class III the "worst" air quality. According to the Air and Water Quality Function Zonal of Putian Municipality, the project area is categorized as Class II, defined as "moderate to good" air quality. The specific standard values (for Class II) are listed in Table II-5.

Table II-65: Ambient Air Quality Standard (Unit: mg/m³)

Parameter	TSP	PM ₁₀	SO ₂	NO ₂
24-hour Average	0.30	0.15	0.15	0.08
1-hour Average	-	-	0.50	0.12

Source: Ambient Air Quality Standard (GB 3095-1996)

17. **Sea Water Quality.** According to the Fujian coastal area environmental function zoning (revision) approved by Fujian provincial government, the catchment in this project belongs to Agricultural fishery area, carried out the sea water quality standard classified as Category II. The key parameters set out in Table II-6.

Table II-76: Sea Water Quality Standard for Category II (Unit: mg/L, pH is dimensionless)

	Items	Category II
1	MPN	≤1000/L
2	Temperature	Temperature increase by human-caused in summer no more than 1°C, other seasons no more than 2°C
3	PH	7.8-8.5

4	DO>	5
5	COD≤	3
6	BOD5≤	3
7	DIN≤(count by N)	0.3
8	Reactive phosphate≤ (count by P)	0.03

Source: Sea Water Quality Standard (GB3097-1997)

18. **Noise.** Noise level in project area shall comply with the Category I Acoustic Ambient Quality Standard (GB3096-2008) (Table II-7).

Table II-87: Acoustics Ambient Quality Standard (Sound level: dB (A))

Function Zone	Category	Standard Maximum Level	
		Day (06:00-22:00)	Night (22:00-06:00 of following day)
Class I	I	55	45

D. Discharge Standards of the Project

19. **Air Pollutant Emissions.** Fugitive emission of particulate matter (such as dust from construction sites) is regulated under PRC's Air Pollutant Integrated Emission Standard (GB 16297-1996), which sets 120 mg/m³ as the maximum allowable emission concentration and ≤ 1.0 mg/m³ as the concentration limit at the boundary of construction sites, with no specification on the particular matter's particle diameter.

20. The Emission Standard of Cooking Fume (GB18483-2001) has specified the minimum removal rate of cooking fume. The treatment device is classified into three levels, based on the size and power of ovens. The project will have one small oven with capacity of 25kW during operation. The maximum emission concentration and minimum removal rate of cooking fume treatment device are shown in Table II-8. The minimum removal rate shall reach 60% at least.

Table II-98: Maximum emission concentration and minimum removal rate of cooking fume treatment device

Scale	Small	Medium	Large
Number of ovens	1-3	3-6	≥-
Power of oven (10 ⁸ J/h)	1.67-5.00	5.00-10	≥.0
Maximum allowable emission concentration (mg/m ³)	2.0		
Minimum removal rate of cooking fume treatment device (%)	60	75	85

21. The municipal wastewater during operation stage will be directed by the sewers in to the underground septic tank treatment system. The treated effluent will be reused for agricultural irrigation if it satisfies the Water Quality Standard for Agricultural Irrigation (GB 5048-2005).

Table II-9: Water Quality Standard for Agricultural Irrigation

Parameter	Unit	Dry land
pH	--	5.5-8.5
COD	mg/L	200
BOD ₅	mg/L	100
SS	mg/L	100
Chloride	mg/L	350

22. **Noise.** Construction noise will be assessed against the Emission Standards of Ambient Noise at Boundary of Site (GB 12523-2011) and Class I of Emission Standard for Industrial Enterprises Noise at Boundary (GB 12348-2008) during operation.

Table II-10: Construction Site Noise Limits (Unit: Leq [dB(A)])

Period	Noise Limit	
	Day	Night
Construction	70	55
Operation	55	45

III. DESCRIPTION OF THE PROJECT

23. Le Gaga is planning to invest 100 million CNY to build 1000 mu agricultural production base in Licheng District, Putian Municipality, Fujian Province of PRC (see Fig III-1), with an annual output of 10,000 tons Pollution-free vegetables (Such as sweet pepper, hot pepper, tomato and eggplant). The project will rent 1000 mu farmland to construct vegetable greenhouses (600,003m²), one office building (350m²), dormitories (266 m²), a sorting workshop (800 m²), warehouse (651 m²), and three (3) pump rooms. All pumps will be installed indoor. The detailed construction works are listed in Table III-1. The harvested vegetables will be delivered to clients within one day to keep them fresh. A total of 20,231 m ditches and 8,218 m tractor road will also be build. The whole base will be operated in June 2016. The layout of the production base is illustrated in Fig. III-2.

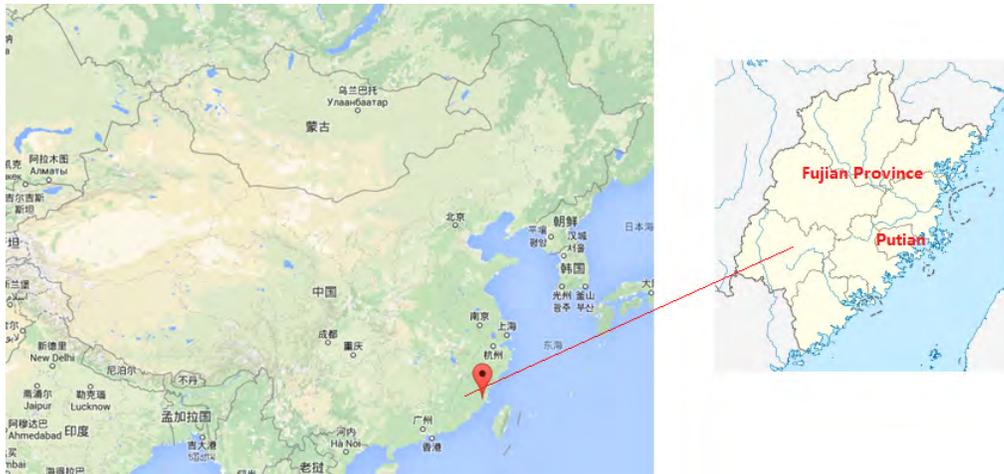


Figure III-1: Location of proposed Beigao production base

Table III-1: Proposed works of Beigao Production Base

Item	Major works
Greenhouses	600,003 m ²
Office building	floor area:350m ²
Dormitory	floor area 266m ²
Sorting workshop	floor area 800 m ²
Pump rooms	three (3) floor area 288 m ²

Warehouse	floor area : 651m ²
Tractor roads	Total length: 8218m

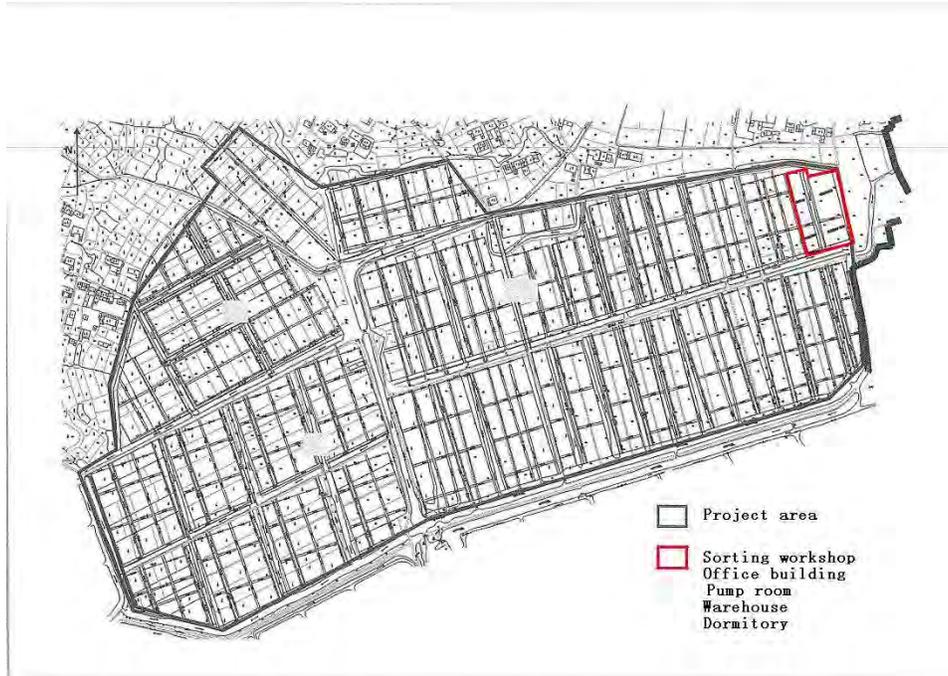


Figure III-2: Layout of proposed Beigao production base

24. **Water Supply.** The domestic water demand and irrigation water will be satisfied by the local municipal water supply system. Referring to the Fujian Provincial Industry Water Consumption Quota (DB35/T772-2013) and considering the adoption of greenhouse and advanced drip irrigation, the annual irrigation water consumption is estimated at 600 t/d based on the water quota of 219 m³/mu per year.

25. The integrated drip irrigation system will supply water and fertilizers based on the demands of plants. A stock solution consisting of a single fertilizer, or several compatible fertilizers, dissolved in water will be supplied to the vegetables by in-line drip irrigation to ensure precise delivery of water and fertilizer to crop. Electronic conductivity (EC) and pH are monitored on line to control the concentration of nutrients. The major product, tomato and so on will be grown in culture bags.

26. **Wastewater Treatment Facilities.** An integrated wastewater treatment facilities using cyclic activated sludge system (CASS) will be installed to treat municipal sewage and wastewater from canteen. Wastewater from canteen will be pretreated by oil trap.

27. **Materials.** The raw material usage is estimated by Le Gaga based on previous experiences in similar locations (see Table III-2).

Table III-2: Estimated material usage per year

Raw materials	Usage
Coconut husk	320,000
Seeds	30 kg
Fertilizer(partial purchase according to the different growth stage of crops)	300,000 kg
Plastic film	120,000 kg

IV. DESCRIPTION OF THE ENVIRONMENT

A. General

28. This section describes the environmental, (biological and physical), cultural and socioeconomic baseline conditions in the Study Area. This describes (i) the environmental setting where the project will be implemented, and (ii) the environmental conditions which will be influenced (either negatively or positively) by the project. Both of these roles are encompassed by the concept of the “baseline” environment. The baseline includes information on all receptors and resources that were identified during the scoping stage of the Impact Assessment process as having the potential to be affected by the Project.

B. Physical Setting

29. **Location.** The project is located in Beigao town, Licheng District (see Fig III-1). Beigao town is located 16 km southeast of Licheng District. Licheng District is in district of Putian, Fujian province, People's Republic of China. The north of Licheng District is Hanjiang District, the west is Chengxiang District and the east is Xinghua Bay. It has National Road 324 and Fuzhou-Xiamen Highway in its region. The project area lies within 24°59' to 25° 46'N latitudes and 118° 49' to 119°39'E longitudes. It is located in the middle of the southeast coast, east to Taiwan Strait.

30. **Topography.** The proposed site is in relatively flat terrain. The regional tectonic setting is stable and there is no active fault zone in the near area.

31. **Climate.** Licheng has a monsoonal subtropical marine climate, characterized by long, cool and humid summers and short, mild and dry winters. The average annual temperature is 19.9°C, with an annual sunlight of 1942-2002 hours and annual precipitation of 1255 mm. The average wind speed is 1.9 m/s with prevailing wind direction of north.

32. **Hydrogeology.** Licheng district is densely covered by rivers. The main rivers are: Mulan stream, Yanshou stream, Xiamo stream, Houzhuo stream, Qi stream, Dongjiao river, Heping river and Liangqiao river. Total lengths of these brooks are 431.175km, water area 9.27km, total storage 31,000,000m³. According to the site survey, 3068m northeast of the project is Beigao Agricultural fishery area.

C. Ecological Resources

33. Most lands of the project are fallow lands, not belong to the environmental sensitive areas or important ecological environment protectorate. The major animal in the project area are rodents, insects and common birds. No rare, threatened, or endangered species under the IUCN Red List have been recorded in the project area as confirmed by domestic TEIA through field survey conducted by EIA institute during November 2014. The field survey conducted was based on the requirement of the PRC Technical Guideline for Environmental Impact Assessment: Ecological Impact (HJ 19-2011) which identifies the project site as cultivated land and not located in environmental sensitive areas.



Figure IV-1: Current vegetation cover of proposed site

D. Physical Cultural Resources

34. No cultural heritage or archaeological sites are recorded within the project area.

E. Socioeconomic Conditions

35. Beigao town covers 54 km² of 24 administrative villages, including 33, 900 mu cultivated land and 12, 000 mu tidal flat. The total population of Beigao town is 96,682.

36. The GDP of Beigao reached 2 billion CNY in 2013, of which 559 million CNY is from agriculture, forestry, animal husbandry and fishery. The per capital net income in rural area is about 12,000 CNY. Local people of Beigao Township rely on aquaculture and jewelry processing business for living, only the old people farmed on the land and just for self consumption. The per capita arable land holding in the Shanqian Villge is less than 1 mu, so the output from the land is very limited.

F. Environmental Quality Baseline

37. This section presents the environmental quality baseline conditions.

38. **Air Quality Baseline.** According to the Environmental Quality Bulletin of Putian City (Q4, 2014), the average Air Pollution Index (API) ¹ of urban area in Putian was 54 that satisfied the requirement of Class II of Ambient Air Quality Standard (GB3095-1996). The project site is located in rural area of Putian. There is no significant industrial development in the project area. The air quality in the project area is assumed better than urban area of Putian and it could be concluded as “Moderate to Good” based on site field survey conducted on 14th February 2014 and air quality assessment published in the Environmental Quality Bulletin of Putian City (Q4, 2014).

¹ The API level was based on the level of 5 atmospheric pollutants, namely sulfur dioxide (SO₂), nitrogen dioxide (NO₂), suspended particulates (PM₁₀), carbon monoxide (CO), and ozone (O₃). 0-50=good, 51-100=moderate, 101-200=unhealthy, 201-300=very unhealthy, 301-500=hazardous, 500+=emergency.

39. **Sea Water Quality.** According to the Environment Quality Bulletin of Putian City (2013), the project site water quality complies with the sea water quality standard requirements of Category II (GB 3097-1997). The water environment quality is good.

40. **Noise.** The daytime noise in Shanqian village is now 46.5-51.1dB, the daytime noise in Chengtou village is now 45.6-50.3dB, both noise levels meet the Class I of Noise Limit of Industrial Enterprises (GB 12348-2008).

V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. Project Rationale and Benefits

41. The project is expected to reduce a farm's water consumption through the use of drip water irrigation. The adoption of greenhouse and advanced drip irrigation technology will save 70-80% of the water demand from the traditional irrigation system, according to Fujian Water Consumption Norm (DB 35/T722-2007). The annual water consumption is expected to 219 m³/mu. In addition, the integrated drip irrigation system will supply water and fertilizers based on the demands of plants. The nutrient efficiency will be improved. The major product, tomato will be grown in culture bags so that the nutrient inflation into soil and groundwater will be greatly reduced. Therefore, the project will reduce non-point pollution from agricultural through adoption of such advanced horticulture practices compared with traditional extensive planting methods.

B. Screening and Scoping of Potential Impacts

42. **Environmental Impacts Related to the Project.** The potential impacts (positive and negative) and risks were screened during the EIA study process in order to (i) identify the relative significance of potential impacts from the activities of the proposed infrastructure; (ii) establish the scope of the assessment which assists in focusing on major, critical, and specific impacts; and (iii) enable flexibility in regard to consideration of new issues, such as those reflecting the requirements of both the PRC's environmental laws, regulations and standards, and ADB's Safeguard Policy Statement (2009).

43. The anticipated impacts caused by the proposed Beigao production base during construction phase include: noise, air pollution (mainly fugitive dust); wastewater discharge, soil erosion; solid waste disposal; and occupational and community health and safety. The potential impacts during operation phase include noise from pumps, waste plastic films and pesticides containers and occupational and community health and safety.

44. The potential environmental sensitive receivers were presented in Figure V-1.

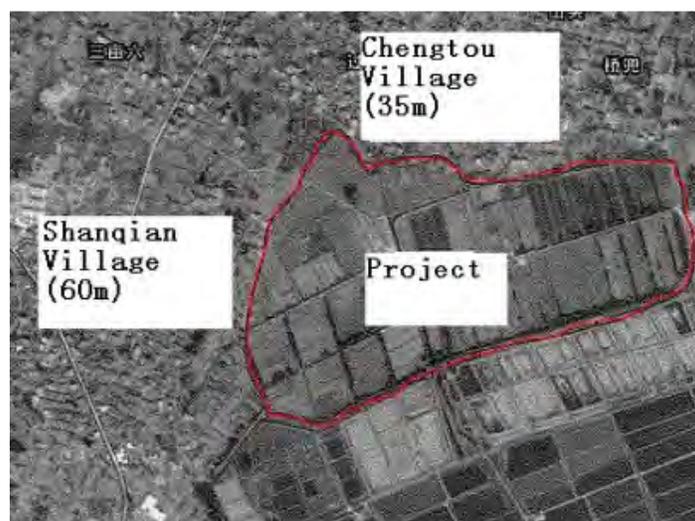


Figure V-1: Table of sensitive receivers

The following sections describe the anticipated environmental impacts of the project during the Construction and operational phases.

Environmental Impacts and Mitigation Measures during Construction

1) Noise

45. The noise mostly coming from construction machinery. The following predictive model is used to forecast the noise level in line with Technical Guideline on EIA Regarding Acoustic Environment (HJ2.4-2009).

$$L_i = L_0 - 20 \lg \left(\frac{R_i}{R_0} \right)$$

Where: L_i and L_0 are equipment noise level at R_i and R_0 respectively, dB (A);

46. The predicted noise level with different distances is presented in Table V-1.

Table V-1: Construction equipment noise impact distance

Distance (m)	5	15	20	30	40	50	100	150	200	300
Dump truck (dB)	90	75	73	69	67	65	59	55	53	49
Mixer truck	84	69	67	63	61	59	53	49	47	43
Agitator	90	75	73	69	67	65	59	55	53	49

47. The results show that the construction noise has some impact for surroundings. But this impact is short-term, temporary and partial. The following mitigation measures will be implemented to meet the PRC construction site noise limits and to protect sensitive receptors:

- Reduce noise level of the equipment: Low noise equipment shall be chosen as practical as possible; locations shall be fixed for earth excavation equipment and transportation machinery; noise shall be reduced by exhaust pipe and muffler and insulating the vibration part of the engine; idle equipment shall be closed immediately; speed of transportation vehicles shall be reduced and honing noise shall be reduced while entering the site.
- Reduce man-made noise: education awareness shall be provided for construction workers for civilized construction, construction materials shall be transported by crane or

manually, throwing down from vehicles is not allowed, loud noise should be avoided when piling up steel materials.

- Reduce impact of vehicle transportation noise: avoid transportation at night as practical as possible, reduce speed for large transportation as possible, especially when entering into environmental sensitive area, honking shall be reduced or completely avoided.

2) Air

48. Construction period is expected to be 7 months and will fall into winter and spring. Anticipated source of air pollution from construction activities is dust from ditch digging, tractor road rolling and greenhouse construction. The existing farmland has been already graded thus, large scale land leveling and excavation are not expected in the project site. The domestic TEIA estimated the maximum impact distance to be 100 m downwind of the project site based on an average wind speed of 1.9 m/s. And prevailing wind direction is north. The nearest receptors are from Chengtou Village 35 m away from site boundary at downwind direction. The following mitigation measures are defined to reduce air pollutant emissions.

- Disclose the contacts (including site engineer, Le Gaga project company ESMS manager, telephone number etc.) and dust control measures at the entrance of the site;
- Cover the construction materials during temporary stacking and transport to avoid spillage and dust;
- earthwork, demolition and other construction activities will be reduced during strong windy days;
- Arrange vehicle cleaning facilities with provision of supporting drainage and mud sedimentation facilities;
- No mud and construction waste on the site access road and within 100m of the entrance;
- Arrange one spray trunk and spray water on construction site and roads once per day during peak construction to reduce dust from earthwork excavation, transport, loading and unloading and stacking; spraying may more frequent if the construction site is within 100 m upwind from the village.
- Maintain vehicles and construction machineries to a high standard to ensure efficient running and fuel-burning and compliance with the PRC emission standards for vehicles and machineries (GB17691-2005 and GB11340-2005).

3) Water

49. The construction process will be simple and last for short time. It will create 300 job opportunities. The workers will be hired locally. It will be not necessary to set up construction camp. Mobile toilet will be provided on site. The wastewater will be collected by local farmers as fertilizer.

50. The soil excavated will be stacked far from the ditch to avoid flushing into the water body. The excavated soil will be used as backfill to low-lying area or tractor roads on a daily basis.

4) Solid Waste

51. **Construction solid waste.** The construction solid waste includes debris, sand, stones, broken brick, wood waste, scrap metal, scrap steel and other debris will be delivered by certified transportation company to the appointed landfill site if not to be reused. The appointed Baoxi landfill site is located in Xiahua Village of Huating Town, which is about 30 km away from the construction site. The contractor is responsible for cleaning up construction waste on site and contracting certified transportation company. The excavated earth of ditches will be all reused for the tractor road.

5) Impacts on Biological Resources

52. As established during environmental baseline assessment, the project site is in the existing cultivated land which cannot sustain high biodiversity due to long term human disturbance activities.

6) Physical Cultural Resources

53. Contractor must comply with PRC's Cultural Relics Protection Law and Cultural Relics Protection Law Implementation Regulations if such relics are discovered, stop work immediately and notify the relevant authorities, adopt protection measures and notify the Security Bureau to protect the site.

C. Environmental Impacts and Mitigation Measures during Operations

1) Water

54. The domestic TEIA estimated an amount of 1752 t/a municipal wastewater will be generated during operation, including 36.5 t/a from canteen and 1715.5 t/a from dormitories and office building. Wastewater from canteen will be pretreated by oil separation tank to remove oil. All domestic wastewater will be discharged into an on-site underground integrated wastewater treatment facility using cyclic activated sludge system. The defined influent quality is shown in Table V-2. The effluent is designed to satisfy the Standards of Irrigation Water (GB 5084-2005) after treatment by the integrated wastewater treatment system and can be reused for traditional agricultural irrigation.

Table V-2: Municipal wastewater estimates during operation

Parameters	COD	BOD ₅	SS	NH ₃ -N	Oil
Concentration (mg/L)	400	200	220	35	40
Amount (t/a)	0.70	0.35	0.39	0.06	0.07
Designed effluent concentration /mg·L ⁻¹	100	20	70	15	10
Amount /t·a ⁻¹	0.18	0.04	0.12	0.03	0.02
Reduction /t·a ⁻¹	0.52	0.31	0.27	0.03	0.05

GB 5084-2005	200	100	100	/	/
--------------	-----	-----	-----	---	---

55. A stock solution consisting of a single fertilizer, or several compatible fertilizers, dissolved in water is supplied to the vegetables by in-line drip irrigation to ensure precise delivery of water and fertilizer to crop. Electronic conductivity (EC) and pH are monitored on line to control the concentration of nutrients.

56. Low toxic bio-pesticides, such as Toosedarin and Matrine will be used, which are highly efficient . High efficacy, generally refers to the normal condition, the prevention and control of pesticide has the following effects: field application of effective ingredients 50 grams per mu pesticides, the control effect is greater than 90%; fungicide spraying effective ingredients 100 grams per mu field, the control effect is greater than 70%; field application of effective ingredients of 250 grams per mu, the control effect of herbicide is greater than 70%. The pesticides are also applied through drip irrigation. Therefore, fertilizers and pesticides carried by surface runoff and infiltration are limited.

57. Any pesticide leakage will pollute water and soil. The management of pesticide warehouse shall strictly follow requirements of Le Gaga’s Environmental and Social Management System (ESMS) and internal pesticide application and storage manual. This manual is applicable for all production bases of Le Gaga, which covers the associated risks of the pesticide, transportation and storage procedures, labeling procedure, and proper usage of handling of pesticides.

2) Solid Waste

On average, the production base will hire 108 workers, including 5 resident workers. It is estimated that 35.1t municipal solid waste will be generated annually, based on the assumption that each resident worker could produce 1 kg/d solid water and each non-resident work could produce 0.5 kg/d solid waste (estimated value is according to the Manual of Municipal Waste Emission Coefficient developed from the First National Pollution Source Census). The municipal solid waste will be transported to a collection point at Shanqian Village by Le Gaga and collected by local sanitation agency regularly to Licheng Landfill center.

58. About 2 t/a waste packaging materials, mainly scrap tape and plastic bags that be disposed by the project, will be collected and handled by local sanitation agency. Abandoned plastic films will be recycled by the supplier.

59. It is estimated 3.05 t/a of waste bags and containers of pesticides and fertilizers will be generated from the project. The suppliers of pesticide and fertilizer will retrieve the waste bags and containers on a periodic basis. This will be included in the procurement agreement between Le Gaga and suppliers.

3) Noise

60. Noise during operation of the production base is mainly from plant room's equipment. The equipment will only operate during daytime. Table V-3 is the main equipment list. According to the estimation model, the noise from three plant room during operation will be 88 dB. By the different distance of monitoring points, using the model the results are shown in Table V-4.

Table V-3: Noise strength of the mechanical equipment used in proposed production base

No.	Source	Set	Strength dB(A)
1	Centrifugal pump	2	83
2	Self-priming pump	2	83
3	Transmission	8	86

Table V-4: Noise level at different distance

Source	Strength (dB)	Noise at different distance (dB)							
		5	10	15	20	25	30	40	50
Plant room	88	74	68	64	62	58	54	48	40

61. All pumps will be installed indoor. Generally, the pump room can reduce 10 dB. The cumulative noise level is 88 dB. The predicted noise level at the nearest sensitive receptors (Chengqian Village, 35m north of the project site) is 54 dB. This is compliant to the Class I of Noise Standards at the Boundary of Industries and Enterprises (GB 12348-2008) which is 55dBA during daytime. In addition, all pumps will only be operated during daytime. The distance between dormitory and nearest pump room is 600m. The impacts on dormitory are limited.

4) Air Quality

62. The possible source of air emission during the operations of the project is from the cooking fumes from canteen. The oven will be operated about 4 hours per day. Fume purification device with removal rate above 60% will be installed and operated.

5) Occupational Health and Safety

63. The occupational exposures to pesticides may be through dermal exposure, and inhalation from spraying operations. The production base will use biological pesticides, such as Toosendainin and Matrine which are extracted from plants, with low toxicity to human. Toosendainin and Matrine are promoted by Ministry of Agriculture (MoA) for pollution-free agricultural products (MoA, No. 194) and are not

listed in the WHO Acute Hazard list. Both of them are organic botanical insecticides with the following compositions:

64. (1) Toosedarin: 0.6% toosedarin, (CAS:58812-37-6) (emulsion)

65. (2) Matrine: 0.3% martrine (CAS:519-02-8), (aqua)

66. Fertilizer application will vary depending on the crops growth stage. The pesticides will only be used in instances that plant diseases and insect pests are observed. Pesticides application will only be conducted by specialized team. In addition, the following measures will be taken:

- Provide safety instructions in each workshop regarding the storage, transport, handling of pesticides;
- Provide material safety data sheet (MSDS) onsite and provide training to the workers on how to use them;
- Provide the necessary personal protective equipment (PPEs) for pesticide application, equipment cleaning, or spill cleanups ;
- Ensure that employees are adequately trained;
- Provide guidelines to limit the exposure time of employees who apply, mix or handle pesticides;
- Assure that employees receive required medical surveillance;

Distribute the internal agribusiness manual covering proper fertilizer use and pesticide management to all relevant workers.

6) Social

67. Interviews with the local villagers verified that leasing of land has been widely accepted and all were satisfied. Older people age 50 and above get seasonal jobs in the greenhouse, which are mainly picking vegetables, weeding and packing. Le Gaga's business makes a significant contribution to women's employment. As of June 30, 2013, Le Gaga indirectly hired 2,379 farm workers through a labor company to perform all agricultural labor work on farms, and the female workers account for 80%. Among the total 300 staff in Le Gaga, female staff accounts for 30%. Le gaga targets to increase its female allocation from 30% to say 40% in the next 5 years. Men and women are given equal pay for equal work. The Chairman of the Board is female and among the 11 senior management staff, there is also a female production base development director. Le Gaga encourages the contractors to provide equal employment opportunities to women.

68. It's estimated that 300 job opportunities can be generated during the construction period from December 2015 to June 2016, and 60% will be provided to

the local people. Le Gaga gives local labor a priority when it comes to recruitment. Among the total 190 farm workers, the number of local people is estimated as 150.

69. To see more information please refer to the Social Compliance Audit Report,

VI. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

A. Legislative Framework for Public Consultation and Information Disclosure

70. Relevant provisions in the Environmental Protection Law of PRC and the Regulations on the Administration of Construction Project Environmental Protection (Order of the State Council, No. 253) require that domestic environmental impact assessments shall solicit the opinions of units concerned and inhabitants of a proposed project construction site. The PRC National Development and Reform Commission (NDRC) issued a requirement for “Social Risk Assessment of Large Investment Projects” in August 2012, which emphasizes the importance of public consultation in an effective manner, and requires that the results of public consultation are clearly summarized in the domestic safeguards reports, including the dates of consultations, number of stakeholders, who the stakeholders are, and the comments received.

71. ADB’s Safeguard Policy Statement (2009) also has detailed and strict requirements on meaningful participation, consultation and information disclosure. The consultation process for this project therefore followed both the PRC requirements and the ADB requirements.

72. In line with ADB’s SPS and Public Communications Policy, Le Gaga commits that its subproject companies will make relevant information (whether positive or negative) about social and environmental safeguard issues available in a timely manner, in an accessible place, and in a form and language(s) understandable to affected people and to other stakeholders, including the general public and civil society organizations, so they can provide meaningful inputs into project design and implementation.

B. Information Disclosure and Public Consultation to Date

73. The information of the proposed Beigao Production Base was disclosed on the website of Licheng District EPB on 4th December 2014, including the full report of the draft DEIA, contact details of Le Gaga and the EIA institute to solicit public comments on the preliminary findings of the EIA (<http://www.ptlc.gov.cn/hbj/tabid/306/ctl/InfoDetail/Infold/48620/mid/836/Default.aspx?ContainerSrc=%5bG%5dContainers%2fdefault%2fNo+Container>) (see Fig. VI-1).

74. During information disclosure on Licheng District EPB, Le Gaga and Licheng District EPB did not receive any written or oral feedbacks or objections from public.

75. Licheng District EPB undertook a second round disclosure on approval of the project during 12th to 18th December 2014 (<http://www.ptlc.gov.cn/hbj/tabid/306/ctl/InfoDetail/Infold/48686/mid/8635/Default.aspx?ContainerSrc=%5bG%5dContainers%2fdefault%2fNo+Container>). The information disclosed

C. Public Consultation

76. A small scale environmental public consultation workshop was organized by Le Gaga on 16th March 2015 supported by General manager of E&S. Four (4) potential affected villager representatives were consulted during the workshop. All attendees were supportive to the project.

D. Future Information Disclosure and Public Consultation Program

77. Information disclosure and public consultation relating to environment safeguard will continue throughout the project implementation. The project's environmental information will be disclosed by the local EPB and ADB as follows:

- The project IEE will be disclosed on the project website at www.adb.org;
- All annual environmental and social performance monitoring reports of Le Gaga will be available at www.adb.org;
- Environmental completion acceptance inspection result will be disclosed on the website of Licheng District EPB at <http://www.ptlc.gov.cn/hbj>

VII. GRIEVANCE REDRESS MECHANISM

78. Le Gaga, together with the subproject company, will establish a grievance redress mechanism (GRM) on site for handling environmental and social complaints, including complaint recording, consultation, issue investigation, mitigation action, follow-up, general timeframe for resolution and delegation of responsibilities. The GRM will address any possible concerns and dissatisfaction of affected groups (e.g. communities, workers) regarding the social and environmental impact of its subprojects, and seek a proper solution within a specified time frame. It should be able to promptly respond to the affected groups, be transparent and free of gender discrimination, and adapt to the cultural traditions of the affected groups and communities. Moreover, it should enable different affected groups to express their opinions, with no fear of reprisal. The E&S General Manager will be responsible for (i) resolving appeals, complaints, and disputes concerning the environmental and social impacts of subprojects which have not been resolved by the plant managers at the subproject level, and (ii) for coordinating, guiding and supervising the subproject companies in handling appeals, complaints, and disputes.

79. Each subproject company will inform the local community and the affected people of the grievance and appeal procedure through public information meetings, and other media, so that they can fully understand their rights for grievance and appeal.

80. The project company will inform the local community and the affected people of the grievance and appeal procedure through public information meetings, the resettlement information brochure and other media, so that they can fully understand their rights for grievance and appeal. All complaints submitted and actions implemented will be properly documented and be included in the grievance register.

VIII. ENVIRONMENTAL MANAGEMENT PLAN

81. The EMP defines appropriate mitigation measures for the anticipated environmental impacts, and defines the institutional responsibilities and mechanisms to monitor and ensure the compliance with PRC's environmental laws, standards and regulations, and ADB's Safeguard Policy Statement (SPS 2009).

82. EMP supervision and monitoring results will be used to evaluate (i) the extent and severity of actual environmental impacts against the predicted impacts, (ii) the performance of the environmental protection measures or compliance with related rules and regulations, (iii) trends of impacts, and (iv) overall effectiveness of the mitigation measures.

A. Organizations and Their Responsibilities for EMP Implementation

83. The E&S General Manager reports to Le Gaga's senior management. E&S General Manager has oversight for environmental and social issues, ensures that resources are made available for environmental and social management, and should sign and submit the annual environmental and social performance report to ADB. S/he should ensure that ADB is notified if and when there is material environmental or social safeguards non-compliance. S/he should ensure that ADB is notified if and when the responsible staff has been changed or replaced with new staff.

84. At the corporate office, an E&S officer will assist the E&S General Manager in effective safeguards planning and implementation. During subprojects preparation and implementation period, the safeguards team at the corporate office will be responsible for the environment and social issues, and will prepare IEE and Social Compliance Audit Report, supervise the effective implementation of the EMP; coordinate periodic environmental and social impact monitoring according to the approved monitoring plan; coordinate the project level GRM; prepare annual environment progress reports and submit them to ADB; conduct public consultation and inspect implementation of mitigation measures. Implement the ESMS system at both the holding company and Project Company levels.

85. An E&S manager of Project Company is appointed to implement the environment and social safeguards at Project Company and prepare and submit the annual environment and social impact monitoring report to the E&S General Manager.

86. Construction contractors engaged by the Project Company will be responsible for implementing the mitigation measures during construction under supervision of the

Project Company and Corporate office. In their bids, contractors will be required to respond to the environmental management requirements defined in the EMP. After project completion, environmental management responsibilities will be handed over to the Project Company.

B. Summary of Potential Impacts and Mitigation Measures

87. Table VIII-1 summarizes the potential impacts and environment safeguard issues of the production base during pre-construction, construction and operation as identified by the environmental impact assessments and set out in this IEE, as well as corresponding mitigation measures designated to minimize those impacts and address these issues.

Table VIII-1: Potential Impacts and Mitigation Measures during Design, Construction, and Operation Phases of the Project

Item	Impact Factor	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Implementing Agency	Supervising Agency
Design Phase					
Design of production base	Noise	Noise from production base	<ul style="list-style-type: none"> Technical design of the production base must be able to contain the operational noises from pumps. 	Designer	LE GAGA, Project Company
Construction phase					
	Impact on water quality	Wastewater production	<ul style="list-style-type: none"> Mobile toilet will be provided on site. The earth excavated will be stacked far away from the ditch to avoid flushing into the water body. 	Contractor	LE GAGA, Project Company, local EPB
	Impact on air quality	dust	<ul style="list-style-type: none"> Disclose the contacts (including site engineer, Le Gaga project company ESMS manager, telephone number etc.) and dust control measures at the entrance of the site; Cover the construction materials during temporary stacking and transport to avoid spillage and dust; No earthwork, demolition and other construction activities during strong windy days; Arrange vehicle cleaning facilities with provision of supporting drainage and mud sedimentation facilities; No mud and construction waste on the site access road 	Contractor	LE GAGA, Project Company, local EPB

Item	Impact Factor	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Implementing Agency	Supervising Agency
			<p>and within 100m of the entrance;</p> <ul style="list-style-type: none"> • Arrange one spray trunk and spray water on construction site and roads at a minimum once per day during peak construction to reduce dust from earthwork excavation, transport, loading and unloading and stacking; spraying will be frequent when the construction activities are within 100 m upwind from the village. • Maintain vehicles and construction machineries to a high standard to ensure efficient running and fuel-burning and compliance with the PRC emission standards for vehicles and machineries (GB17691-2005 and GB11340-2005). 		
	Impact on acoustic environment	Increase of noise level	<ul style="list-style-type: none"> • Reduce noise level of the equipment: Low noise equipment shall be chosen as practical as possible; locations shall be fixed for earth excavation equipment and transportation machinery; noise shall be reduced by exhaust pipe and muffler and insulating the vibration part of the engine; idle equipment shall be closed immediately; speed of transportation vehicles shall be reduced and honking noise shall be reduced while entering the site. • Reduce man-made noise: education shall be provided for construction workers for civilized construction, construction materials shall be transported by crane or 	Contractor	LE GAGA, Project Company, local EPB

Item	Impact Factor	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Implementing Agency	Supervising Agency
			<p>manually, throwing down from vehicles is not allowed, loud noise should be avoided when piling up steel materials.</p> <ul style="list-style-type: none"> Reduce impact of vehicle transportation noise: avoid transportation at night as practical as possible, reduce speed for large transportation as possible, especially when entering into environmental sensitive area, honking shall be reduced or completely avoided. 		
	Solid waste	Municipal solid waste from workers camps, construction solid waste	<ul style="list-style-type: none"> The construction solid waste will be transported to landfill if cannot be reused. The transport vehicles need to follow a specified route and time and should be covered by tarp to prevent spill. The contractor needs to provide appropriate number of garbage bins at suitable location. The municipal solid waste will be delivered to landfill site by the sanitation agency regularly. 	Contractor	LE GAGA, Project Company, local EPB
Impact on socio-economic resources	Physical cultural resources	Damage to unearthed cultural relics	<ul style="list-style-type: none"> Contractor must comply with PRC's Cultural Relics Protection Law and Cultural Relics Protection Law Implementation Regulations if such relics are discovered, stop work immediately and notify the relevant authorities, adopt protection measures and notify the Security Bureau to protect the site. 	Contractor	LE GAGA, Project Company, local Cultural Relics Bureau
Operation phase					

Item	Impact Factor	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Implementing Agency	Supervising Agency
Impact on physical resources	Impact on water quality	Failure to operate the wastewater treatment facility Pesticide leakage	<ul style="list-style-type: none"> Install oil trap and integrated wastewater treatment facility; Ensure proper O&M systems are in place and equipment in good working order and also ensure backup power system available; Provide operational training to the operator The management of pesticide warehouse shall strictly follow Le Gaga's internal pesticide application and storage manual which applicable for all production bases of Le Gaga. 	Operator	LE GAGA, Project Company, local EPB
	Impact on air quality	Failure to operate the fume purification device	<ul style="list-style-type: none"> Maintain the fume purification device in good working order and ensure removal rate no less than 60%. 	Operator	LE GAGA, Project Company, local EPB
	Impact on noise	Equipment noise	<ul style="list-style-type: none"> Maintain all pumps in good working order. 	Operator	LE GAGA, Project Company, local EPB
	Solid waste	Improper solid waste disposal	<ul style="list-style-type: none"> The municipal solid wastes should be collected and transported by sanitation department timely. Rotten leaves will be used for composting The waste container and bags of pesticide and fertilizer 	Operator	LE GAGA, Project Company, local EPB

Item	Impact Factor	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Implementing Agency	Supervising Agency
			will be retrieved by suppliers		
Occupational and community health and safety			<ul style="list-style-type: none"> • Post safety instructions in each workshop regarding the storage, transport, handling of pesticides; • Provide MSDS onsite and provide training to the workers on how to use them; • Provide the necessary PPEs for pesticide application, equipment cleaning, or spill cleanups ; • Ensure that employees are adequately trained; • Provide guidelines to limit the exposure time of employees who apply, mix or handle pesticides; • Assure that employees receive required medical surveillance; • Distribute the internal agribusiness manual covering proper fertilizer use and pesticide management to all relevant workers. 	Operator	LE GAGA, Project Company, local health and safety authority

EPB=environmental protection bureau;

88. Those that are temporary measures particularly during the construction stage, such as dust suppression, use of quiet / low noise powered mechanical equipment will need to be included in the tender documents, otherwise they are not budgeted by the contractor and they won't be done.

89. Those that will permanently become part of the infrastructure such as noise reduction materials for production base will need to be included in the design, otherwise they won't be built. Environmental investments are listed in Table VIII-2. The environmental investment is 560,000 CNY, accounting for 0.56% of the total investment.

Table VIII-2: Environmental Investment for the production base

Aspects	Facility
Air	Cooking fume treatment
Water	Integrated wastewater treatment facility+oil separation tank+septic tank
Noise	Noise insulation and absorption facilities
Solid waste	Collection and storage

C. Environmental Inspection, Monitoring and Reporting

90. Table VIII-3 shows the environmental monitoring program specifically designed for this project, defining the requirements on the scope, location, parameter, duration and frequency of monitoring during operational stages.

91. During construction and operation, the E&S manager of the Project Company will undertake daily inspection on the implementation of environmental mitigation measures.

92. Monitoring will also be periodically conducted by the local environmental authorities in the framework of their legal mandate to check compliance with applicable environmental regulations. They will be responsible for undertaking regular and random environmental monitoring and inspection activities before, during, and after construction as well as in the event of emergencies.

Table VIII-3: Environment Monitoring Plan

Type	Monitoring Location	Monitoring Items	Monitoring Frequency
During Construction			
Air	at the construction boundary that on downwind direction	TSP	Once during construction peak
Noise	Boundaries of construction sites	Equivalent continuous A sound level	2 (1 in daytime, 1 in night time) samples at each boundary; (include sampling point in the nearest village) once per month during construction period
Soil erosion	Construction site	Check the implementation of soil erosion protection measures defined in Table VIII -1.	Quarterly during construction
During Operation			
Air	Canteen cooking fume	Cooking Fume	Annually
Noise	1m outside of production base	Equivalent continuous A sound level	2 (1 in daytime, 1 in night time) samples at each boundary quarterly (include sampling point in the dormitory)
Wastewater	Outlet of the integrated wastewater treatment system	COD _{cr} , BOD ₅ , SS, NH ₃ -N, oil	Annually

93. Environmental acceptance monitoring and reporting. Within three months after construction completion, or no later than 1 year with permission of the local EPB, environmental acceptance monitoring and audit report of completion of project shall be: (i) prepared by a licensed environmental monitoring institute in accordance with the PRC Regulation on Project Completion Environmental Audit (MEP, 2001), and (ii) reviewed for approval of the official commence of individual component operation by environmental authorities. The environmental acceptance reports will indicate the timing, extent, effectiveness of completed mitigation and of maintenance, and the needs for additional mitigation measures and monitoring during operations.

Table VIII-4: Proposed Project "Three-Simultaneity" Environmental Protection Inspection Checklist

Type	Treatment	Requirements
Wastewater	<ul style="list-style-type: none"> i) Municipal wastewater is treated by integrated wastewater treatment system. The effluent is reused for agriculture irrigation; ii) Install oil separation tank for the canteen wastewater; iii) Strictly control use of pesticides. High toxic pesticides are banned. 	Effluent shall comply with Irrigation Water Quality Standards (GB 5084-2005)
Air	<ul style="list-style-type: none"> i) Install cooking fume purification facility 	Comply with Cooking Fume Emission Standard (GB 18483-2001): The removal rate shall be 60% at least; Maximum allowable emission: 2.0 mg/m ³
Noise	<ul style="list-style-type: none"> i) Use of low noise equipment and various noise reduction practices; ii) Maintain the pumps in good condition; iii) No operation during nighttime; 	Noise at boundary shall comply with Emission Standard of Environment Noise for Boundary of Construction Site (GB12348-2008) Class I standard.
Solid Waste	Waste collection classification, collection and transportation by local sanitation agency	Removal rate shall be 100%
	The pesticide and fertilizer suppliers will retrieve the waste bags and containers	

94. **EMP compliance reporting.** Le Gaga will report to ADB the environmental and social compliance of the project through annual environmental and social performance report, including the implementation of EMP.

IX. CONCLUSION

95. During the preparation of domestic EIA and project IEE, potential environmental impacts were carefully assessed and addressed. The domestic EIA was prepared by Nanjing Kehong Environmental Technology Limited Company in 2014 and reviewed and approved by Licheng District EPB on 19th December 2014.

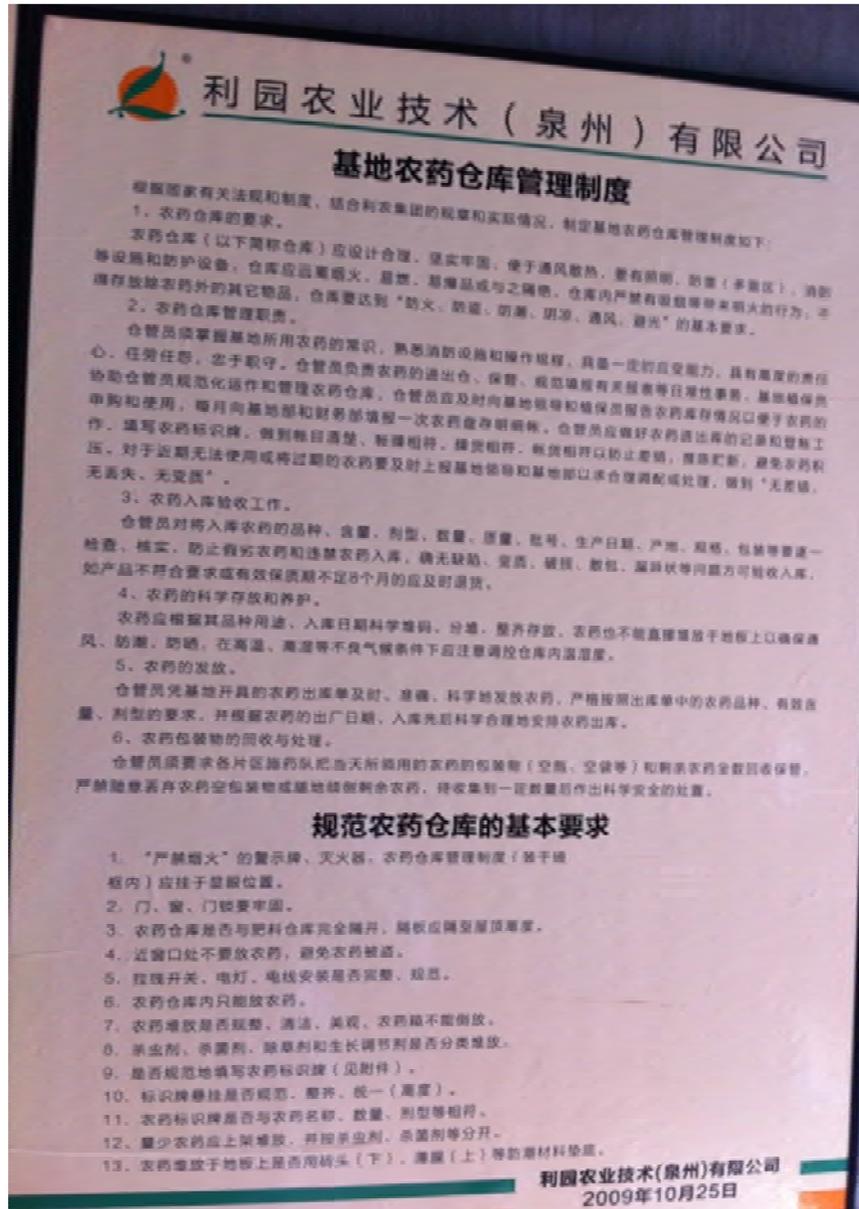
96. Potential safeguards issues during construction include significant earthwork and soil erosion, noise pollution, air pollution, surface water pollution, inadequate construction waste management, and occupational and community health and safety. Overall, construction-related impacts are localized, short term, and can be effectively mitigated through the application of good construction and housekeeping practices and implementation of construction phase community and occupational health and safety plans. Appropriate mitigation measures and monitoring programs have been developed to address these issues.

97. The main potential adverse impacts during operation of the project facilities include improper operation of wastewater treatment facilities, solid waste disposal, especially pesticide and fertilizer bags and containers, storage of pesticide, noise from pump operation, occupational health and safety related to application of pesticide.

98. Mitigation measures and a monitoring program are defined for all identified impacts, and are included in the EMP of the project IEE. The EMP sets out the procedures and plans to carry out mitigation measures and monitoring during sequential stages of the project including design, construction and operation. For each impact, appropriate mitigation measures are described. Monitoring and supervision will be undertaken to ensure that environmental impacts will be minimized to acceptable levels.

99. The project IEE concludes that as long as the environmental mitigation and management measures defined in the EMP are properly implemented, all adverse environmental impacts associated with the project will be prevented, eliminated, or minimized to an acceptable level. The project is feasible from an environment safeguards point of view.

Attachment 1: Le Gaga Internal Pesticide Management Procedures and Requirements





利园农业技术（泉州）有限公司

蔬菜基地安全用药管理制度

为进一步贯彻执行国家《农药管理条例》和《无公害农产品产地认定与产地标志使用管理办法》，于2004年6月1日制定《基地植物保护管理制度》。

一、建立一支稳定的植保队伍

植保队伍由基地植保员、技术员、植保员组成，植保员应具备与基地作物相应的专业知识和操作技能，对《基地植物保护管理制度》的执行负有直接责任，并负责基地主要病虫害的防治。植保员的选聘、农药的安全科学使用（使用配方由植保员、技术员共同制定），用药的剂量掌握，农药的施药记录（附卡法），实施植保新技术试验和生产全过程的使用情况记录中的规范操作，记录。

二、农药采购管理

1. 植保员的采购计划时，必须根据基地作物动态和基地不同蔬菜，如：季节发生情况，参照植保员植保员和天气气象变化趋势，明确主要病虫害，进行危害预测（同时并发的虫害或病害，同一药剂的不同药剂组合使用），最后根据有针对性品种特性确定该品种和数量，数量不得超过3个月实际可能使用量，原则上先施先用。

2. 采购农药时必须具有合法经营资质的经销商，同时必须选择有标准化包装种类、质量高、有效成分、生产日期、保质期、生产厂家信息的，严禁采购无三证、登记和资料不全的农药品种，不得采购国家和地方农药禁止使用的，违规操作者，发生安全和事故由此产生的后果的法律责任，发生事故的三证信息，通知植保员和植保员，不得采购国家和地方农药禁止使用的，违规操作者，发生安全和事故由此产生的后果的法律责任。

3. 农药使用必须严格按照说明书，严格按照七定原则，即：定时间、定地点、定浓度、定方法、定人员、定工具、定记录。

4. 植保员的品种生产计划采购、使用，凡过期的农药由植保员自行负责处理并列入成本。

三、农药的科学安全使用

1. 实行农药减量增效，有效机制，植保员应根据基地领导与技术人员的集中研究农药使用的方法，农药施用前必须参考上级配方制定新配方，必须以安全、有效、经济为目的，对植保员进行技术培训，建立植保员责任制，以确保植保员；同时，应严格植保员记录，以便分析使用。

2. 蔬菜生长期前，同一种农药使用次数不得超过《农药管理条例》规定的次数，同时必须轮换使用，生产出口产品必须按照出口标准的农药与农药和配药技术规范实施。

3. 农药配药时，必须由植保员负责，植保员不得将一种农药与另一种农药混合使用，禁止“中药”式的使用，避免增加农药残留量，凡混用产品为混配剂时，必须向植保员与另一种农药的混用，禁止将农药与不同剂型农药混用或不同剂型农药之间混用，不得超过三种，同时，必须严格操作并注意安全间隔，对植保员的操作进行监督，给予通报、罚款、警告等方式处理。

4. 产施农药的安全处理措施，植保员的包装、包装必须安全无害化处理，不得随意丢弃，药剂必须洗净，剩余农药必须安全处理，严禁随意倾倒或丢弃，应回收或无害化处理，植保员必须及时处理。

四、农药的监督管理

1. 生产全过程必须严格执行安全生产制度，执行农药使用通知制度，每一种蔬菜的植保员必须建立植保档案，包括植保员、农药名称、使用药剂名称（混配剂与单独自配药剂）。

2. 严禁在蔬菜上市前，必须建立农药使用档案和自配档案，植保员必须按照国家和地方的农药安全使用和管理，必须按照《农药管理条例》及《农药管理条例》的规定，植保员必须按照国家和地方的农药安全使用和管理，必须按照《农药管理条例》及《农药管理条例》的规定，植保员必须按照国家和地方的农药安全使用和管理。

3. 植保员必须按照国家和地方的农药安全使用和管理，必须按照《农药管理条例》及《农药管理条例》的规定，植保员必须按照国家和地方的农药安全使用和管理，必须按照《农药管理条例》及《农药管理条例》的规定，植保员必须按照国家和地方的农药安全使用和管理。

五、农药的保管与使用

1. 建立农药专用仓库，植保员必须按照国家和地方的农药安全使用和管理，必须按照《农药管理条例》及《农药管理条例》的规定，植保员必须按照国家和地方的农药安全使用和管理，必须按照《农药管理条例》及《农药管理条例》的规定，植保员必须按照国家和地方的农药安全使用和管理。

2. 植保员必须按照国家和地方的农药安全使用和管理，必须按照《农药管理条例》及《农药管理条例》的规定，植保员必须按照国家和地方的农药安全使用和管理，必须按照《农药管理条例》及《农药管理条例》的规定，植保员必须按照国家和地方的农药安全使用和管理。

3. 植保员必须按照国家和地方的农药安全使用和管理，必须按照《农药管理条例》及《农药管理条例》的规定，植保员必须按照国家和地方的农药安全使用和管理，必须按照《农药管理条例》及《农药管理条例》的规定，植保员必须按照国家和地方的农药安全使用和管理。

六、植保员考核制度

植保员考核由植保员、基地总经理参加的考核小组，对植保员和技术员进行量化考核，考核内容为：①对两个《制度》执行情况，②对植保员的管理水平和植保员工作规范操作水平；③植保员操作技能与事故处理；④工作效率与执行生产任务完成情况。

植保员考核考核标准：

1. 操作不规范，一定程度的不规范，现场实施，安全防护不到位，违反操作规程规定者每次扣0.5-2.0分。
2. 违规操作，违规使用，不遵守安全间隔期，不执行产品上市前农药检测者每次扣1.5-3.0分。
3. 责任心不强，不执行植保员岗位职责，应急处置能力不强，药剂、施用方法和浓度不符，违规操作知情不报者每次扣2.5-3.5分。
4. 植保员考核不合格，对植保员考核不合格，不规范的，不及时和弄虚作假行为者每次扣2.0-4.0分。
5. 考核行为：不遵守《植保员管理制度》，没有及时发现问题和及时处理不力，造成一定程度损失者（重大损失者另行处理）每次扣3.0-5.0分。

七、基地综合考评

1. 工作态度，工作责任心，敬业精神（最高分9分）。

2. 业务水平，科技知识，敬业精神，工作效率（最高分12分）。

3. 团队合作精神（最高分8分）。

4. 创新有实效（新技术、新方法、新发现）（最高分13分）。

Attachment 2: Minutes of Environmental and Social Public Consultation

Project Title	Le Gaga Holdings Limited Greenhouse Agricultural Development Project-Beigao Production Base
Subject	Environmental and social impact public consultation
Data of workshop	16 th March 2015
Location	Village hall of Shanqian Village, Licheng District Putian, PRC
Attendees	<p>Chenhang-Le Gaga ESMS manager</p> <p>Yan Shengren- ESMS manager of Le Gaga (Putian) Branch</p> <p>Wu Can-Manager of Beigao Production Base</p> <hr/> <p>Villagers of Shanqian Village:</p> <p>-Cai Liming</p> <p>-Huang Jinhua</p> <p>-Chen Fan</p> <p>-Chen Yudi</p>
Main content	<ol style="list-style-type: none"> 1. Le Gaga briefly introduced the proposed project to the villagers; 2. Consultant introduced the anticipated potential environmental and social impacts of the proposed project; 3. Consultant explained Le Gaga's GRM to the villagers; <p>The villagers expressed welcome to Le Gaga to invest in Beigao as the project will bring additional income for the villagers and promote local economic development without sacrifice of environmental benefits. All villagers consulted were supportive to the project.</p>