Jiangxi Chenming Paper Company Ltd.

Environmental Assessment Summary
Jiangxi Chenming LWC Project

March 19, 2004

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1. Background

This Environmental Assessment Summary (EAS) is intended to summarize in a non-technical manner the results of the environmental and social assessment of the Jiangxi Chenming Light Weight Coated (LWC) paper project ("the project") currently being constructed by the Jiangxi Chenming Paper Company Ltd ("Jiangxi Chenming") as a green-field paper mill, located in the Changbei Economic Development Zone ("the Zone"), outside Nanchang, Jiangxi Province, China. The Changbei economic zone is a newly developed industrial zone situated to the north of the Gangjiang river and due north of Nanchang, in the Jiangxi Province of China. The project will provide employment for around 1,000 to 2,000 people during its 18 months construction phase, and for around 680 people during normal operation.

Source documents from which this summary draws are:

- the Environmental Impact Report ("the EIR") for the project, dated October 2003, prepared by the Environmental Protection Scientific Research Institute of Jiangxi Province;
- an update to the EIR describing differences between the project as anticipated in the EIR and the project now under development;
- a Resettlement Action Plan (RAP) dated March 18, 2004, which describes a program of action to be followed by Jiangxi Chenming in mitigating the effects of resettlement that was necessary to develop the Jiangxi Chenming project site; and
- other data provided by Jiangxi Chenming and its consultants.

2. Project Description

2.1 Site Description

The project site before project construction started was essentially level farmland, though the site did contain a small hill (since removed). Topsoil is alluvial deposits from the river, below which are found sand and clay, at depths from 3.6 to 10.1 m, beneath which are sand, gravel, screen and sandstone. There are no known geographical faults in the project area.

The Jiangxi Chenming site occupies an area of some 153 hectares, located as shown on the map, figure 1. The east of the site abuts the Ganjiang River, where a dock serving the industrial estate will be established. A railway siding will run from west to east through the site. The production buildings will be located to the north of the siding. Raw materials will be stored to the east of the site, feeding the pulping line, then the paper machine buildings. The south of the site will hold the boiler plant, and the waste water treatment plant, while office buildings and worker accommodation will be at the west of the site.

2.2 Project Scope

On completion, Jiangxi Chenming will manufacture:

- 350,000 tonnes/year of LWC paper;
- 187,000 tonnes/year of bleached chemically treated mechanical pulp (BCTMP); and
- 136,000 tonnes/year of de-inked pulp (DIP).

There will be one production line for each type of pulp, and one paper machine. Paper and pulp manufacturing machinery is being bought from leading Western European suppliers and is considered to be state-of-the art.

The project scope also includes construction of all necessary utility equipment to support papermaking activities. This includes:

- two 240 tonnes/hour coal-fired circulating fluidized bed steam boilers, each adopting limestone injection for SO_2 control and equipped with a 99.9% efficient electrostatic precipitator;
- two 50 MW_e back-pressure and condensing turbines, for power generation;
- an additional 90 MW_e capacity electrical supply from the Chinese grid;
- a 50,000 m^3/day capacity process water treatment plant;
- a 40,000 m^3/day waste water treatment plant which includes anaerobic and aerobic digestion, with methane produced in the anaerobic stage used as boiler fuel;
- an LPG storage facility; and
- an air compressor station.

3. Pre-Project Baseline Conditions

3.1 Economic Activity

The acquisition of land for the Chenming LWC project required the resettlement of 2300 persons (480 households) from two natural villages, Cao Jia and Liu Jia, governed by the administrative village Gang Kou. The livelihoods of both villages were based predominantly on agricultural activities while some villagers worked in nearby enterprises during the slack season in farming.

The average annual per capita income in Gang Kou village was reported as 2,350 Yuan ($US 287) in 2003. This compares to the rural average annual per capita net income for Nanchang of 2,664 Yuan ($US 325) and for all China of 2,476 Yuan ($US 302) in 2002. Some "grey" income, derived from unofficial dry land farming, contributed approximately an additional 1,000 Yuan ($US 122) per capital to the total net income.

3.2 Ambient Air Quality

Ambient air quality, measured at the monitoring station most representative of the project's airshed shows that the pre-project airshed can be defined as "moderately degraded" according to World Bank Group (WBG) guidelines, because of the concentration of PM_{10} particulates. PM_{10} is particulate matter released by combustion, as opposed to dust.

3.3 Surface Water Quality

Any effluent discharged by the project will, after treatment, enter the Ganjiang River downstream of the city of Nanchang. Water quality of the river was measured at five monitoring points and is considered to be relatively good, though cloudy. The Ganjiang is the cleanest river in Jiangxi Province.

4. Policy and Legislative Framework

4.1 Chinese Requirements

Sections 1.2, 1.3 and 1.4 of the EIR list Chinese laws, regulations and specifications with which the project must comply. The EIR is disclosed with this summary; therefore, the list is not repeated here.

4.2 IFC Requirements

IFC's environmental and social policies and guidelines that apply to this project are as follows:

Environmental and Social Policies

- Operational Policy 4.01, Environmental Assessment, dated October 1998;
- Operational Directive 4.30, Involuntary Resettlement, dated June 1990;
- Operational Policy 4.36, Forests, dated November 2002;
- IFC Policy Statement on Forced Labor and Harmful Child Labor, dated March 1998.

Environmental and Social Guidelines

- WBG Pollution Prevention and Abatement Handbook (PPAH) General Environmental Guidelines, dated July 1998;
- WBG PPAH Guidelines on Pulp and Paper Mills, dated July 1998;
- IFC's Environmental and Social Guidelines for Occupational Health and Safety, dated June 2003;
- IFC's Hazardous Materials Management Guidelines, dated December 2002;
- WBG PPAH Guidelines on New Thermal Power Plants, dated July 1998.

5. Environmental and Social Impacts of the Project

This section of the EAS discusses the expected positive and potential negative environmental and social impacts of the project. The measures proposed to mitigate the potential negative environmental and social impacts of the project are described. Reasons are given for choices made, and alternatives that were rejected in the course of the project development process are discussed.

5.1 Economic Development

The total estimated cost to develop the Jiangxi Chenming LWC project is in the order of US$460 million, of which 30% will be spent locally during the project's construction phase.

When full production capacity is reached, annual sales of the company are expected to be 2,400 million RMB. Of this sum, 160 million RMB will be spent on wood sourced from Jiangxi Province, and an additional 380 million RMB will be spent in Nanchang on supplies to the project and salaries.

For its first 8 years of operation, the project will enjoy a tax holiday, in the 9th and 10^{th} years half taxes will be waived, but from year 11 the project is expected to contribute some 630 million RMB of tax revenues to Nanchang and Jiangxi Province authorities.

5.2 Site Selection

The project site chosen, to the North and East of Nanchang and close to the Ganjiang river, has advantages in that the area can use river transport facilities; is located such that a siding from the Beijing to Hong Kong railway can be constructed relatively easily; and is also close to roads and the local airport. The project's effluent discharge point is some 4 km downstream of the water intake point for Nanchang and so will not affect the city's water supply. Site location close to a large river ensures a plentiful supply of water which can be treated for use in the project, and a suitable receiving body for adequately treated process effluent.

Disadvantages of the location include the resettlement that resulted from site development and the upwind location of project site from the city of Nanchang. Therefore, air emissions will affect air quality in the city.

The project has been relocated once following public consultation meetings. Meeting participants raised concerns that the original site was close to a local university campus and that the odor from the plant would impact the students and faculty. The site was then moved to its current location.

5.3 Involuntary Resettlement

The provision of the site for the Jiangxi Chenming project required the acquisition of 153 hectares (ha) of land from two natural villages, Cao Jia and Liu Jia, that fell under the administration of Gang Kou village. Land was acquired from the village, for the formation of the Bai Shui Hu Industrial Park, (in which the Jiangxi Chenming's site is situated) before the project started. Total land acquisition was 357 ha, of which 153 has been used for the project. Land acquisition for the Chenming LWC project site took place in June 2003. This land acquisition has required the physical displacement of 2,300 people (480 households) from the project site.

The Zone administration is responsible under local law and regulations for carrying out the resettlement. Individual households receive compensation for their houses, attached structures, crops, and graves. Compensation could then be used to purchase a new detached house or apartment in one of the resettlement sites. The project affected people also receive allowances for the relocation, temporary accommodations in the intermediate resettlement site, and for resettlement. The latter is a payment made based on the potential earnings from crops over 4 to 6

years, which gives the household, in effect, income on which it can live for a few years while they finds alternative livelihoods.

Compensation for the land goes to the administrative village collective, in this case the Village Council of Gang Kou ("the Village Council"). This structure of payment reflects the idea that the village collective owns the land, while individual households own their houses. Some of this land compensation money is passed on to individual households, in particular to pay for the standing crops. But it can be used for a number of other purposes, particularly for developing enterprises that will benefit the village. Thus, the Village Council plays a crucial role in restoring the livelihood of the villagers.

A Resettlement Action Plan (RAP) was prepared as part of Jiangxi Chenming's commitment to ensuring that resettlement is undertaken in a socially responsible manner and in accordance with IFC's Safeguard Policy on Involuntary Resettlement (OD 4.30). IFC requires that villagers be consulted on their preferences, receive replacement cost for their lost assets, be assisted in their move, and be given the opportunity to have their livelihood improved or at least restored. The RAP presented a mechanism for cooperation among the Zone, the township, and village council currently to ensure that resettlement is conducted in accordance with World Bank standards. The RAP presents information on project resettlement impacts, compensation entitlements, mitigation measures, resettlement procedures and organization.

The Jiangxi Chenming resettlement is to be planned in accordance with OD 4.30, *Involuntary Resettlement*, as well as the PRC National Law of Land Administration (effective 1 January 1999). Local regulations governing specific compensation rates were finalized after extensive consultation and negotiation between the Village Council and villagers. During the preparation of the RAP, meetings were held with resettlement officers from the Zone and the Jiao Qiao Township. At those meetings the World Bank resettlement requirements were presented and discussed.

The main conclusions and recommendations of the RAP are summarized in the sections that follow:

5.3.1 Summary of Project Impacts

Key resettlement impacts of the project on villagers can be summarized as follows:

- Loss of village houses, house plots and related attachments;
- Requirement for 2,300 people to physically resettle;
- Loss of cultivated land;
- Loss of other production assets (e.g., livestock pens, vegetable yard and the like);
- Loss of community assets and utilities;
- Impacts on cultural property;
- Loss or impairment of livelihood affecting approximately 1,100 workers.

5.3.2 Impacts on Houses and Attachments

All residential plots acquired for the Jiangxi Chenming project are in the two aforementioned natural villages. Three hundred and thirty-four registered structures were demolished, with some structures built after the cut off date for compensation in the Zone. Compensation was calculated based on the criteria established in the *interim method on physical relocation in the Nanchang Economic and Technology Development Zone* published in April 2002.

All households with house ownership certificates were eligible for compensation for lost houses and other assets. Villagers who lost certificated houses and house plots were entitled to replacement house plots and houses purchased at lower than construction cost at the resettlement sites.

Mitigation Measures

Compensation for people affected by the loss of house and/or house plots reflect combinations of houses and house plots on the following basis:

- Cash compensation for houses and attachments at published rates.
- Options for cash compensation or replacement of house plots.

(i) Option One: Cash compensation for house and house plot lost to the project in accordance with the following schedule of rates from the notification of physical relocation in Gang Kou village issued by the Jiao Qiao Township on 1 June 2003.

Households who received this cash compensation payment waived their entitlement to a detached house, but are entitled to purchase an apartment in the replacement village. The socio-economic survey with 100 households conducted in February 2004 indicated that no respondent took this option.

Cash Compensation Rate for House and House Plot

House Type	Cash compensation for house and house plot
Frame structured house	600 RMB/m^2
Concrete and brick structure	400 RMB/m^2
Brick and wood	300 RMB/m^2
Wooden structure	——
Simple temporary house	150 RMB/m^2

The purchase price for an apartment is scheduled at 400 Yuan per square meter, which is less than the construction cost of 450~500 Yuan per square meter as indicated by the Zone and village council members. The apartment area ranged from 80~120 square meters.

(ii) Option Two: Cash compensation for house and a replacement house plot in one of the two replacement sites. Third party contractors would then build a new house on the replacement plot. Cash compensation rates are scheduled in line with house structure.

Cash Compensation for House (Yuan/m^2)

Type of structure	Compensation rate	Bonus for timely relocation	Received rate
Framed structure	350	20	**370**
Concrete and brick (>=2 storey)	300	50	**350**

Concrete and brick (1 storey)	220	50	**270**
Brick and wood (>=2 storey)	200	70	**270**
Brick and wood (1 storey)	120	100	**220**
Wood structure	30~60	6~12	**36~72**

Village households entitled to select this option will be eligible to purchase a detached house in one of the two replacement sites, once those sites are developed. The purchase price for a detached house is 350 Yuan per square meter. This price was set lower than the construction cost of 400~450 Yuan per square meter as indicated by the Zone and Village Council members. The detached house floor area ranges from 180 to380 square meters. Any shortfall or excess in the ground area between original compared with the replacement will be subject to a 100-Yuan per square meter payment from the Zone to the households or verse vice.

The cash allowance and bonus to assist with physical relocation is set out below. All households are eligible.

Relocation Allowance and House Dismantling

Compensation Type	Compensation Standard
Compensation for demolishing own house	2~6 Yuan per square meter
Relocation bonus	500 Yuan per household
Relocation allowance	200 Yuan per household
Compensation for labor cost to move	100 Yuan per household member

Compensation for "illegal" houses

During the physical measurement of houses and structures, it was noted that there were 76 residential buildings in the category of "illegal" structures. Owners of these buildings were not entitled to any compensation, since they were all established after the cut-off date, issued in October 2001 by the Zone. A series of public consultations were held by the Zone to discuss issues related to possible measures. The final outcome was to compensate for the construction material at 230 Yuan per square meter. All houses built after the cut off date were eligible for this compensation.

Current Status

The household compensation for the loss of houses and structure has been signed, and the disbursement of individual compensation payable has been received at the published rate.

During the public consultation and socio-economic survey conducted in February 2004 by the independent resettlement team, the villagers brought up the issue of the affordability of replacement house compared with the compensation they had been paid. The replacement cost of the former houses was therefore considered an issue. The existing definition of replacement cost is *"for houses and other structures, it is the market cost of the materials to build a replacement structure with an area and quality similar to or better than those of the affected structure, plus the cost of any labor and contractors' fees, plus the cost of any registration and transfer taxes."* Rural residential houses cannot be sold in China, and so the fair market value cannot be a basis for

replacement cost. A consultation with a cross-section of villagers indicated that villagers are in general satisfied with the compensation rate for their demolished house and unit cost of the replacement house. The result of this consultation indicated a fair compensation rate relative to the replacement rate.

It was also recognized that the larger and better serviced replacement houses will, once completed, have the potential to generate long-term income from rent, but will also have short-term impacts on household cash flow at the time of purchase. Mitigation measures were draw up to include but not be limited to:

- Option provided in terms of range of housing size in relocation sites, making detached houses cheaper, which is part of an ongoing dialog between Chenming and the Zone;
- Interest free loans offered to vulnerable groups in purchasing replacement houses;
- Free accommodation at the replacement site provided to the very poor households identified by the Village Council;
- Assistance provided by the Zone for bank loans; and
- Livelihood restoration to generate income, which can be used to supplement cash in purchasing replacement housing.

5.3.3 Resettlement

Mitigation measures for resettlement were as follows:

- A transitional site was prepared to accommodate villagers before the replacement villages are built and serviced. This site is next to the Chenming LWC construction site.
- A building allowance of 3000 Yuan per household to assist with building temporary houses together with other assistance;
- Mitigation measures and actions plan to overcome hardships in terms of the village access road, drainage system, and water supply system (under progress);
- Replacement housing with larger size and better service will be provided in the village replacement sites to take advantage of faster economic growth in the Zone (being/to be constructed);
- Replacement dwellings provided at construction cost or less to replace original house;
- Land to develop non-agricultural activities to replace land lost for cultivated land;
- Replace village community facilities and services;
- Disbursement of resettlement allowance (balance to be paid); and
- Assistance with livelihood restoration .

Current Status

Phase I relocation has been completed (moved from original village site). Villagers are in the transitional period before phase II, when they will be resettled in the replacement village.

Support, in the form of building allowance and a transitional site, was given to project affected people to build temporary houses, together with an option of cash allowance for renting elsewhere. Ninety percent of relocators built temporary houses with their building allowance and currently reside at the transitional site. A series of hardships in the transitional period were recognized and corrective actions are in the process of being implemented, which include but are not limited to the following:

- Constructing a village access road in the transitional site;
- Building a village drainage system before the rainy season;
- Providing a water supply system and safety training for use of water; and
- Forming comprehensive grievance system formed by representatives from the Zone, the Jiao Qiao Township, with the village council to address proactively the hardships and concerns of relocators throughout the relocation process (to be implemented).

5.3.4 Loss of Cultivated Land and Other Productive Assets

The Chenming project acquired mainly residential land, hilly land and some irrigated land. Villagers and the Village Council indicated that a great amount of hilly land was developed into dry land farming. Cultivated land losses for the project are summarized in the following table.

In China, cultivated land is owned by the administrative village collective, but is allotted by the natural village on a per capita basis to households to enable them to grow crops. In the case of the Cao Jia and Liu Jia villages, villagers have been allotted 2.55 Mu (about 1700 square meters) of agricultural land per person. Village households would physically work their land; there is no case of villager employing others to work on the land.

Summary of Cultivated Land and Productive Assets Acquired for the Project

	Irrigated land	**Dry land & Hilly land**	**Ponds**	**Total**
Land acquisition	33 hectare	53 hectare	11 hectare	**97 hectare**

[Source: Village council of Gang Kou in February 2004.]

In addition to the loss of cultivated land, villagers lost other productive assets such as in-ground crops, fruit trees and vegetable yards.

Mitigation measures

Mitigation measures for loss of cultivated land included the following:

- For cultivated land and other land, cash compensation payable as a lump sum to the village collective to cover all losses except houses and house attachments;
- Compensation for in-group crops (payable to the individuals at a fixed rate);
- Allowance for resettlement (for finding new income sources); and
- Land for non-agricultural development within the Zone to develop alternative income sources to offset lost livelihoods from land.

Compensation for land acquisition is stated as a lump sum in the compensation agreement between the Zone and Gang Kou village. The lump sum was based on the total land acquired (a combination of cultivated land and non-cultivated land), based on 20,000

Yuan per mu, and covered compensation for land, green crops, and resettlement allowance. The Village Council disbursed compensation for green crops and resettlement allowance to individuals based on a fixed rate of 1000 Yuan per Mu for green crops and 3000 Yuan per Mu for resettlement allowance on the basis of average cultivated land holding per capital of 2.55 Mu. The Village Council has the remaining compensation to spend later on the village collective interests.

Current Status

Nineteen percent of the total land compensation was received by the village council, who then disbursed it as compensation for green crops to individuals. The Zone has withheld the remainder as a development fund to be drawn upon at any time by the village for any need that fulfils the criteria of village development. The criteria set for evaluating proposed development include proposed investment into replacement infrastructure development, industrial land development, and a pension scheme.

5.3.5 Loss of Community Assets and Utilities

Community assets have been identified by the township land bureau survey. Such assets include a primary school (200 pupils), village council buildings, village infrastructures and public utilities (electricity, roads). Replacement facilities will be constructed at the village replacement site. The relocation site will also be fully serviced with reticulated electricity, water, fuel and telephone, with the Village Council paying for the new connections.

5.3.6 Impacts on Cultural Property

Cultural properties affected by the project included 5,000 graves, a shrine and four stone lions given by the emperor Qian Long in the Qing Dynasty (DC 1750) to Cao Jia.

Compensation at a published rate of 100 Yuan per grave was paid to individual households to move these graves to a hilly site that still belongs to the village of Gang Kou.

5.3.7 Loss of Livelihood

Based on the figures from a census of the workforce conducted by Jiao Qiao Township Personal and Labor Bureau on July 2003, the total workforce in the Gang Kou village is 1,115, among whom 605 are male and 510 are female.

The socio-economic survey indicated that Gang Kou villagers were reliant on agriculture for most of their income. These income sources were lost as a result of the land acquisition for the project. Furthermore, households lost subsistence crops (mainly rice, vegetable, peanuts) and domestic livestock (mainly chicken, eggs, pig) that form part of their staple diet.

As there is no available replacement land for agricultural, alternative livelihood and income sources will be developed for project-affected households. As part of their compensation package, villagers received a resettlement allowance (4~6 times of average annual outputs of the land prior to land acquisition) to financially assist their seeking other income resources and to cover the transitional period until replacement employment is found. Alternative employment will need to be found for over 1000 rural workers.

The village council and the Zone indicated that women over 40 and men over 45 whom previously engaged in agriculture are the most difficult age groups for whom employment should be found.

Mitigation measures

- Cash compensation used to acquire industrial land to be used to create alternative measures for income generation for affected villagers;
- Cash resettlement allowance provided to help the project affected people with their own efforts in finding new income resources;
- A proposed pension scheme for women over 55 and men over 60;
- Training opportunities provided to youth along with job recruitment.

General Principles

Livelihood planning is clearly needed for the 1,115 workers who will lose their agricultural livelihood as a result of the project. This planning must undertake simultaneous actions to assist rural population in transferring to an urban lifestyle and in seeking job opportunities to replace lost agricultural income.

A key thrust of the livelihood restoration strategy is to equip and position the project-affected workers to take advantage of employment and self-employment opportunities arising from the project and other projects in the Zone. This strategy will be achieved through provision of training, village compensation funds and industrial land.

Major drivers for affected workers' employment and income will be local enterprise development. For this reason it is important that there is flexibility in the livelihood restoration program for responsiveness to real market demands and conditions.

Goal

The goal of the livelihood restoration program is:

To assist project affected people to restore or enhance their livelihoods to at least pre-project levels.

Strategies

The over-all strategy is to replace project-affected villagers' agricultural income, lost as a result of the project, with waged employment, self-employment and revenue streams from collectively held industrial land.

Strategies that have been adopted to achieve this are as follows:

- Transferring worker registration from rural to urban status to enable workers to seek full time, legitimate urban employment.
- Requiring affected villages to invest cash compensation received for village land acquisition to create employment and income-earning opportunities for project affected people.
- Providing industrial land to the affected villages and assisting them in attracting downstream industries both to provide jobs and a revenue stream (through leases) for village purposes.
- Constructing 'shops' (e.g., along the street in the replacement village) and constructing markets in replacement villages to encourage villagers to set up small businesses.

- Planning and developing industrial land to ensure employment opportunities and economic benefits accrue to local people.
- Creating a register of project-affected workers to receive priority in placement for employment, particularly for opportunities that arise directly or indirectly from the Chenming LWC project.
- Facilitating the flow of information to the affected village councils of any contract opportunities being opened with the project.
- Providing basic training and skills development programs to assist project-affected villagers to take advantages of employment opportunities arising from project construction and third party suppliers.
- Providing preferential opportunities for project affected workers to fill positions in the project construction workforce to give them skills and experience that will enable them to work in future downstream construction.
- Providing preferential employment opportunities for resettlers in Jiangxi Chenming's operational phase.
- Providing technical assistance to project-affected workers who want to establish small and medium enterprises and to assist them in positioning themselves to bid for service opportunities arising from the project.
- Establish a pension fund for villagers post-land acquisition.
- Monitoring performance of employment and livelihood creation opportunities for project affected people and feeding back this information to high and mid level officials so strategies can be adjusted to changing circumstances.

Characteristics of Affected Workforce

The number of project affected registered workers is 1,115. Of these, 569 (51 percent) will require replacement employment following physical relocation. It should be noted that all older workers, whom the Labour Bureau has identified as more difficult to place in alternative employment, have been impacted by the project.

Most of the workers are agricultural workers, 20 percent of household heads have had some non-agricultural work experience. They will need to be provided with replacement employment opportunities.

Vulnerable Workers

About 546 workers affected by acquisition of the land, are over 40 years old in the case of women and over 45 in the case of men. The Zone Administration Office has indicated that this group may experience much greater difficulty in obtaining replacement employment in the market place.

This group will join the pension of Zone and get pension100 RMB/person/month after reaching the age of 60 for men and 55 for woman.

Livelihood Restoration Plan - Zone and Township

The Zone and township have overall responsibility for livelihood restoration. Responsibilities, which include:

- Planning and physical development of the industrial park to enable the Zone (and the affected villages) to capture downstream industries arising from the Chenming LWC project.
- Allocation of industrial land within the Zone to Gang Kou village.
- Coordinating through a livelihood restoration working group, which would Zone and Township agencies as well as the Village Councils, initiatives to provide training, employment and income-creating opportunities for the project affected villagers.
- Coordinating with Chenming and other potential investors to identify resettler employment candidates and identify training needs.
- Coordinating with Chenming on overall training program requirements and to ascertain those training needs that can best be met with Zone resources, and those that should be met by Zone investors.
- Assisting villages in negotiating with potential investors to establish enterprises on village land.
- Establishing a pension scheme.
- Monitoring of effectiveness of livelihood restoration measures.

Livelihood Restoration Plan - Village and Village Team Initiatives

The Village Council plays a key role in attracting and developing enterprise opportunities for its villages. By attracting industrial investors to establish operations on village land, villages receive a steady income stream through leases, and also a source of employment for villagers. From their compensation money, villages can also extend finance or purposely build premises for long-term lease by industrial operators. This model has been used extensively to enable villages to benefit from industrial expansion.

Given the scale of the industry development in the Zone, the strong potential for local economic development, and the fact that the villagers will be given strategically located industrial zoned land, this model is appraised as having a high potential to succeed for Gang Kou village. Based on the expectations of the village that lease revenues and employment opportunities will potentially replacement most of the villagers income from agricultural activities.

Village will receive support from Zone in terms of: (i) introduction to potential investors to set up on their village land; and, (ii) assistance to negotiate agreements and financial terms with incoming developers.

The following is a summary of village council initiatives for livelihood restoration:

- Investing a portion of land compensation to create employment and income earning opportunities for their villagers
- Promoting villager involvement in the shops and market place in the replacement villages once completed for establishment of small family enterprises.
- Maintaining a register of unemployed resettlers, to identify employment opportunities and facilitate any associated training.
- Developing the 10 hectares of industrial land that the village will receive as part of their livelihood restoration strategy to facilitate income generating and employment

activities. The locations are yet to be finalized, but current planning is that the land will be in the Zone.

- Village Councils, with Zone Administration office support, identifying potential developers and seeking to reach agreement with them to establish on the village industrial land.
- Village teams and village councils monitoring for any cases of hardship and where necessary, extending village services, labour or funds to support vulnerable families or others less well positioned to take advantage of employment opportunities.

Livelihood Restoration Plan - Zone and Township – Jiangxi Chenming Initiatives

Jiangxi Chenming is responsible for the integration of IFC's resettlement policies into its project and implementation of the agreed measures during both the period of construction and of operation. It has recognized that the long-term income replacement for these affected people can become crucial with respect to urbanization and the entirely changing lifestyle. It was estimated that there would be a total of 10,000 job opportunities created by the Jiangxi Chenming project.

Jiangxi Chenming has committed to providing local employment opportunities, with the priority going to project affected people; to improving the skills of the local workforce to take advantage of the development of the Zone; and to offering technical assistant to the development of the village industrial land.

A summary of the action plan for Jiangxi Chenming is as follows:

- Work with the government to provide training appropriate to their human resource needs. Ensure that project affected people have preference for entering that training and any entry-level employee training that they may provide. Guarantee preferential hiring for all project-affected people who successfully complete the training program
- Find tenants from among their suppliers for the facilities to be constructed on Gang Kou village industrial land
- Set up an executive program that would send managers and other workers to assist Gang Kou village in developing their business
- Track employment of project affected people in their company in their subcontractors and supplier companies
- Explore the interest for a specialist agency in providing assistance for developing a small and medium enterprises support program for project-affected people.

Vulnerable Groups

Village council discussions held during the study revealed that there are over 50 very poor people in the Gang Kou administrative village. All poor people receive financial assistance, either long-term or periodically, varying from 200~400 Yuan ($24 - 48) per person per year. Many of them are elderly or disabled people. The village council indicated that a household formed by these very poor people would not be able to afford replacement houses. The Zone has committed to a loan package for the very poorest that will provide interest free loans without a specified repayment period. The package will allow these vulnerable households to purchase apartments.

5.4 Resource Consumption

The EIR concludes that project design has taken account of Cleaner Production issues. The major manufacturing machinery is of "advanced international level": it is in fact sourced from leading western European manufacturers.

The BCTMP pulping process adopted has lower specific consumption of wood, heat and water than competing processes, though electricity use is relatively high – to drive the refiner. Electricity however will be generated in the project's power plant. The design specific consumptions of water, steam and electricity of the paper-making element of the project are in line with international best practice, and better than typical figures in the Chinese paper making industry.

5.5 Emissions to Water

5.5.1 Process Effluent

A two-stage waste water treatment plant (WWTP) shall be installed to treat process and sanitary waste water arising from the project. The WWTP shall include an anaerobic reactor, and a secondary aeration system. In addition, an emergency storage facility for 12 hours' effluent production will be installed, to prevent discharge of untreated effluent in the event of failure of the WWTP.

The following table compares the project's effluent with IFC and Chinese standards, which are fully satisfied.

Waste Water Treatment Standards

Item	Units	Jiangxi Chenming	Chinese Standard	IFC Standard
Biological oxygen demand (BOD),	mg/l	<30	68	50
Chemical oxygen demand (COD)	mg/l	<300	332	300
Total suspended solids (TSS)	mg/l	<40	100	50

In addition to consideration of effluent quality, analysis of the effect of the project's effluent on the receiving water is also a Chinese requirement. This analysis is summarized in the following table which shows that the Chinese requirements in this respect are satisfied.

Effect of paper projects on Ganjiang River Quality

Item	BOD (mg/l)	COD (mg/l)	TSS (mg/l)
Ganjiang River	1	15	10
Increment from Jiangxi Chenming project	0.4	2.1	not calculated
Resulting river quality	1.4	17.1	not calculated
Chinese Limits	6	30	150

5.5.2 Storm Water Drainage

Storm water run-off from the wood yard will be discharged to the river via the second, aerobic section of the WWTP, thus treating potential COD and solids in this water.

Storm water run-off from other areas of the site will be directed to the river without treatment. However, secondary containment will be built around chemical storage tanks to mitigate the risk that leaking contents could contaminate storm water.

5.6 Emissions to Air

The EIR identified the following potential emissions to air from the project:

- boiler flue gases;
- odor from the waste water treatment plant;
- odor deriving from the pulp & paper making processes, in particular the mechanical pulping ("grinding") operation;
- dust, arising from storage and handling of coal and ash.

Measures to mitigate these potential emissions are now described.

5.6.1 Boiler flue gases.

The project has selected coal-fired circulating fluidized bed (CFB) boilers. Natural gas is not available in Nanchang, leaving the fuel choice between coal and oil. Coal was chosen because it is readily available at low cost, being mined in Jiangxi Province. Oil would be imported and would be more expensive. Coal fuel will be supplemented by burning bark and WWTP sludge, and methane produced by the anaerobic section of the WWTP.

The CFB technology chosen is considered to be "clean coal" technology, and is widely adopted in large modern boilers. In this technology, limestone is added to the fuel, and reacts with a proportion of the sulfur dioxide produced by burning sulfur contained within the fuel to produce calcium sulfate ($CaSO_4$). This chemical reaction to produce $CaSO_4$ will be enhanced by the addition of atomized water to the later stages of the boiler.

Particulate emissions from the boiler will be controlled by passing flue gases through an electrostatic precipitator which will remove 99.9% of the particulates carried in these flue gases.

These measures will reduce the concentrations of sulfur dioxide and particulates in boiler flue gases below Chinese and IFC standards. Nitrogen oxide emissions will also be within these limits. The table compares anticipated flue gas emissions with Chinese and IFC standards.

Air Emission Comparison

Item	Units	Jiangxi Chenming	Chinese Limit	IFC Limit
SO_2 concentration	mg/Nm^3	300	1,200	2,000
SO_2 per unit of power	Tpd/MW_e	0.040		0.20
Particulate concentration	mg/Nm^3	22.8	100	50
NO_x concentration	mg/Nm^3	650		750

In addition to consideration emissions in boiler flue gases, the overall effect of these emissions to air has also been calculated. These results, summarized in the next table show that the incremental annual average concentration of sulfur dioxide, nitrogen oxides and PM10 particulates will be less than 5μg/m3, the resulting air quality will remain

"moderately degraded" according to WBG definitions and will meet Chinese requirements

Annual Average Air Quality Parameters.

Item	SO2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)
Pre-project air quality	29	19	80
Increment from Jiangxi Chenming Project	1.94	3.87	0.32
Resulting annual means.	30.94	22.87	80.32
WB threshold for "poor" air quality	100	200	100
Chinese Limit	150	None	150

The Jiangxi Chenming project is the only heavy industrial enterprise anticipated for its immediate surroundings, given the sensitivity of the Chinese environmental authorities to air quality in Nanchang, downwind of the project site. Chenming expects its future neighbors to be a steel fabrication company and high-technology enterprises such as electronics companies.

Jiangxi Chenming may expand its manufacturing processes, adding second and third pulping lines and paper machines from around 2008. These expansions may require the installation of a third power boiler. If the manufacturing capacity of the factory were to be expanded, then the Chinese authorities and IFC would require additional environmental assessment and mitigation of air emissions and other potential environmental and social impacts such that the project would remain compliant with relevant IFC and Chinese standards after expansion.

5.6.2 Waste Water Treatment Plant Odor

The EIR identifies the potential for odors to be released from the WWTP, in particular from the sludge storage and handling facilities. Different treatment processes have different odor-concentrations: the aerated lagoon proposed for the second stage of water treatment creates lower odor concentrations than other technologies. The odor issue will be dealt with in part by directing gases produced by the anaerobic stage of the WWTP to the boiler, and by distance. Table 5.2.6 of the EIR shows that the nearest (external) sensitive point to the WWTP is the proposed dock, which will be 300m from the WWTP, and sufficiently distant for any odor to be greatly diminished.

Sludge handling will be within ventilated buildings exhaust from which will be water-scrubbed before discharge. A screw press will be used for dehydrating sewage sludge, and bamboos and trees shall be planted around the WWTP.

5.6.3 Odor from pulp and papermaking

Process-derived odor was identified as a potential environmental effect of the project. However, Table 6.1.3 of the EIR does state that mechanical pulping and hydrogen peroxide bleaching of pulp, processes to be adopted at Jiangxi Chenming, are not associated with odor problems, because the mechanical pulping process does not produce reduced sulfur compounds.

5.6.4 Coal and Ash Dust

The coal yard will be partly covered, a water spraying system for dust control will be established, and the south (i.e. downwind) side of the coal store shall be walled. Closed

conveyors will be used for coal transport; extraction air from these will be filtered. Ash will be transported to the block-making plant by air conveyor.

5.7 Noise

The EIR identifies four categories of noise generation by the project, from:

- boiler steam venting;
- production machinery;
- road transport;
- rail transport.

Boiler steam venting should be rare, since the boilers' control system should limit the production of steam to steam demand. In addition, vents will be equipped with silencers which will reduce the noise by 30 dB(A) with the result that the noise from a steam discharge will be acceptably low (i.e. 41.5 dB(A)) a distance of 150 m from the vent point, and still within the boundaries of Jiangxi Chenming.

Pulp making, paper making, sewage treatment systems and thermal power generation plant will be housed within closed buildings. Particularly noisy machinery shall be equipped with anti-vibration mountings, sound deadening casings and silencers as appropriate.

The EIR states that the addition to neighborhood noise attributable to the project will be up to 2.1 dB(A) during the day and up to 2.8 dB(A) at night. These figures comply with IFC's requirement that ambient noise is increased by less than 3 dB(A).

Total noise generation is estimated at 41-57 dB(A) during the day and 36-49 dB(A) at night, within the Chinese standard of 60 dB(A) in the day and 50 dB(A) at night. The IFC standard is that noise should be less than 70 dB(A).

Road traffic generated by the project is estimated at 20 vehicles/hour. The EIR concludes that there will be slight noise influence to the surrounding environment.

Two trains per day are anticipated. Noise will be limited by a prohibition on use of the engines' whistle within the plant.

5.8 Production of Solid Waste

Solid waste arising from this project is primarily bark arising from the log de-barking operations, sludge from the WWTP and fly ash and coal sludge arising from operations of the coal-fired boilers.

Bark and pressed and dried WWTP sludge will be directed to the power boilers and burnt, thereby both disposing of these solid waste materials and replacing a proportion of fuel coal.

A plant will be constructed to use the fly ash and coal sludge as raw material in the production of hollow blocks which can be used in place of clay bricks for construction purposes. This ash disposal technique is adopted at the Chenming Paper Company's other manufacturing sites.

A small degree of hazardous waste, such as waste oils and greases will be produced by Jiangxi Chenming. These will be collected by Chenming and removed from site by a specialized contractor.

5.9 Storage of Liquefied Petroleum Gas (LPG)

The project will consumes almost 8,000 tonnes/year of LPG in a drying section of the paper machine. LPG will be stored in liquid form in 4 x 100 m^3 tanks. This is a potentially hazardous

fuel, which has a low boiling point, high volatility, is heavier than air, has an explosive range of 2-9% in air, and a low ignition temperature.

Safety precautions in LPG storage documented in the EIR include:

- use of high-quality welding, in tank and pipe construction, use of high-tensile strength bolts and metal rather than asbestos, rubber or other seals in bolted connections;
- use of impervious fire screens to contain the contents of each individual tank;
- installing LPG storage tanks on modestly sloping ground, so that any leaking LPG can be drained to an emergency system, rather than collecting around the tanks creating an explosion hazard;
- a sprinkler system, spraying water over the tanks' external surfaces in the event of fire, to limit temperature and pressure accumulation within the tanks;
- automatic tank pressure control;
- provision of an emergency isolation valve and automatic shut-off fittings to tanks, which will close automatically in the event of a leak;
- assignment and training of dedicated staff to the LPG storage facility;
- provision of fire hoses in the LPG storage area;
- provision of foam fire fighting equipment in the LPG storage area;
- remote TV monitoring, leakage detection and alarm, and excess pressure monitoring and alarms;
- provision of multiple sets of non-static protective equipment, including protective helmet, gloves, clothing and respirator;
- thermal insulation of pipelines and valves in the lower part of the LPG storage tanks.

5.10 Fire Protection

More general arrangements for fire protection are summarized as follows.

Buildings and pulp and waste paper storage areas are separated according to activity to provide fire breaks within the site. Each production building will be surrounded by a fire lane of at least 4m width, to provide access for fire engines, which should be able to access any building from at least two directions. Fire escape route from buildings will be established and clearly indicated.

The main production building will be designed in accordance with Chinese fire protection requirements. This includes compartmentation, by use of fire-resistant walls and doors and a water curtain will isolate the warehouse from production areas. The thermal power plant building will have fire walls to separate the turbine hall, coal transportation system, boiler room, and control room.

A fire-fighting ring main will be established throughout the site, to be driven by dedicated fire pumps. Fire hydrants will be provided at intervals around the mill's roads and outside buildings. The main production buildings, thermal power plant and raw material and finished goods stores will be equipped with internal fire hydrants and fire hose reels, supplemented by fire extinguishers as required. The paper machine hall and the warehouse will be equipped with automatic sprinklers.

5.11 Hazardous Materials Management

In addition to LPG discussed above, Jiangxi Chenming will also use sodium hydroxide, sulfuric acid, sodium sulfite, hydrogen peroxide, and agents such as antibacterial agents and dyes, all of which are considered to be hazardous materials.

Before the delivery of hazardous materials to site, Jiangxi Chenming will develop a hazardous materials management program, incorporating a hazardous materials risk management plan, meeting the requirements of appropriate Chinese regulations and IFC guidelines.

5.12 Forest Resources

On completion the Jiangxi Chenming project will annually consume some 460,000 m^3 of pine wood annually. Jiangxi Chenming and the Nanchang and Jiangxi Provincial Environmental Protection Bureaux have confirmed that there are plentiful plantation forest resources in Jiangxi Province, and that for this reason, together with abundant water supply it is logical for the paper industry to locate in Jiangxi. There is very strict control over, and severe penalties for illegal logging.

The sustainable annual harvest from Jiangxi Province's plantations is some 4.1 million m^3, of which some 1.1 million m^3 is pine suitable for use in Jiangxi Chenming. Jiangxi Chenming currently expects, at least in the projects early years to buy logs and wood chips from up to 100 harvesting companies within the province. It is Chenming's longer term objective however to develop its own plantation resources to meet a substantial proportion of the whole company's wood needs from company-controlled sources, either wholly owned and operated or contracted tree-farming operations.

Jiangxi Chenming has undertaken to develop processes to certify timber supplied from Jiangxi Chenming-controlled plantations to FSC standards or equivalent. The first stage of this process will be a scoping audit to determine existing forest management practices; this will be followed by development and implementation of a time-bound action plan to achieve forest certification. Jiangxi Chenming will also work with its timber suppliers to encourage their adoption of sustainable forest management practices.

6. Environmental & Social Management

Given the scale of the project, and its thermal power plant and process and waste water treatment station, in order to comply with Chinese state requirements, Jiangxi Chenming is required to establish comprehensive environmental monitoring and management controls.

6.1 Environmental Management

An Environmental Division of fourteen full-time staff has been established at Jiangxi Chenming: this unit has both and environmental management unit and an environmental supervision unit. The Environmental Division reports to the site's most senior manager and he has ultimate responsibility for the environmental performance of the plant. The EIR defines the activities to be undertaken by the Environmental Division as follows:

1. To take charge of communication and liaison with the provincial, municipal and district administration of environmental protection in an effort to have a smooth access to the policy information from the respective administrative organizations.
2. To establish environmental protection indices. Specific regulations concerning waste water, gas and solid waste residue noise pollution control shall be formulated. Furthermore, measures of water saving , electricity and energy saving as well as the equipment repairing and maintenance shall be presented.
3. To be in charge of the organizational training. All levels of company personnel shall be made aware of and trained in their responsibilities with respect to the law, policies and regulations of the various administrative organizations of environmental protection.
4. To formulate the regulation of inspection and monitoring on a regular basis, which shall include a regular examination of the production equipment and pollution control devices, and regular inspections of the performance of the technical procedures.
5. To establish emergency treatment system for pollution when pollution incident occurs.
6. To establish the performance targets which will reward good and penalize the poor results.

Comprehensive written records shall be kept to document these activities.

The EIR also requires, among other measures:

1. management of water saving and water recycling, and of the operation of the WWTP;
2. management of solid waste materials;
3. training in operation and maintenance issues necessary for effective facilities management;
4. development of emergency response plans, which should be in place before the start of manufacturing operations;
5. addition environmental monitoring as defined in the next section of this EAS.

Three of the Chenming Paper Company's other manufacturing sites in China have received ISO 14001 certification of their environmental management systems. Jiangxi Chenming will also obtain such certification.

6.2 Social Management

Jiangxi Chenming will establish an office which will have responsibility to ensure that the company fully discharges its responsibilities under the terms of the Resettlement Action Plan, the main issues relating to which were summarized earlier in this EAS and are described fully in the RAP. This office will be staffed by three full time equivalent personnel.

7. Monitoring

7.1 Environmental Monitoring

The EIR states that there shall be continuous monitoring of the outlet of the WWTP, to provide continuous feedback on the status of treatment, and to enable government and the public to know the quality of discharged effluent.

The EIR also requires continuous monitoring of the concentration of particulates and sulfur dioxide in boiler flue gases.

Specific monitoring requirements are defined in the EIR as follows:

During Construction

Random, twice annually sampling for dust arising from construction activities, and one location within the factory and at a second location downwind from the construction site

During Operation

Boiler Flue Gases

Continuous monitoring of smoke, particulates and sulfur dioxide emissions.

Noise

Twice annual monitoring, at the factory's office building, and one meter beyond the project boundary, for one day each time.

Waste Water

Weekly monitoring of pH, BOD, COD & TSS at the entrance and exit of the WWTP by the company, with four random annual inspections on behalf of the environmental protection bureau.

Online monitoring of pH, volume and COD at the exit of the WWTP.

IFC shall also require monitoring and annual reporting of additional parameters such as indoor air quality and accident/incident statistics.

7.2 Resettlement Monitoring

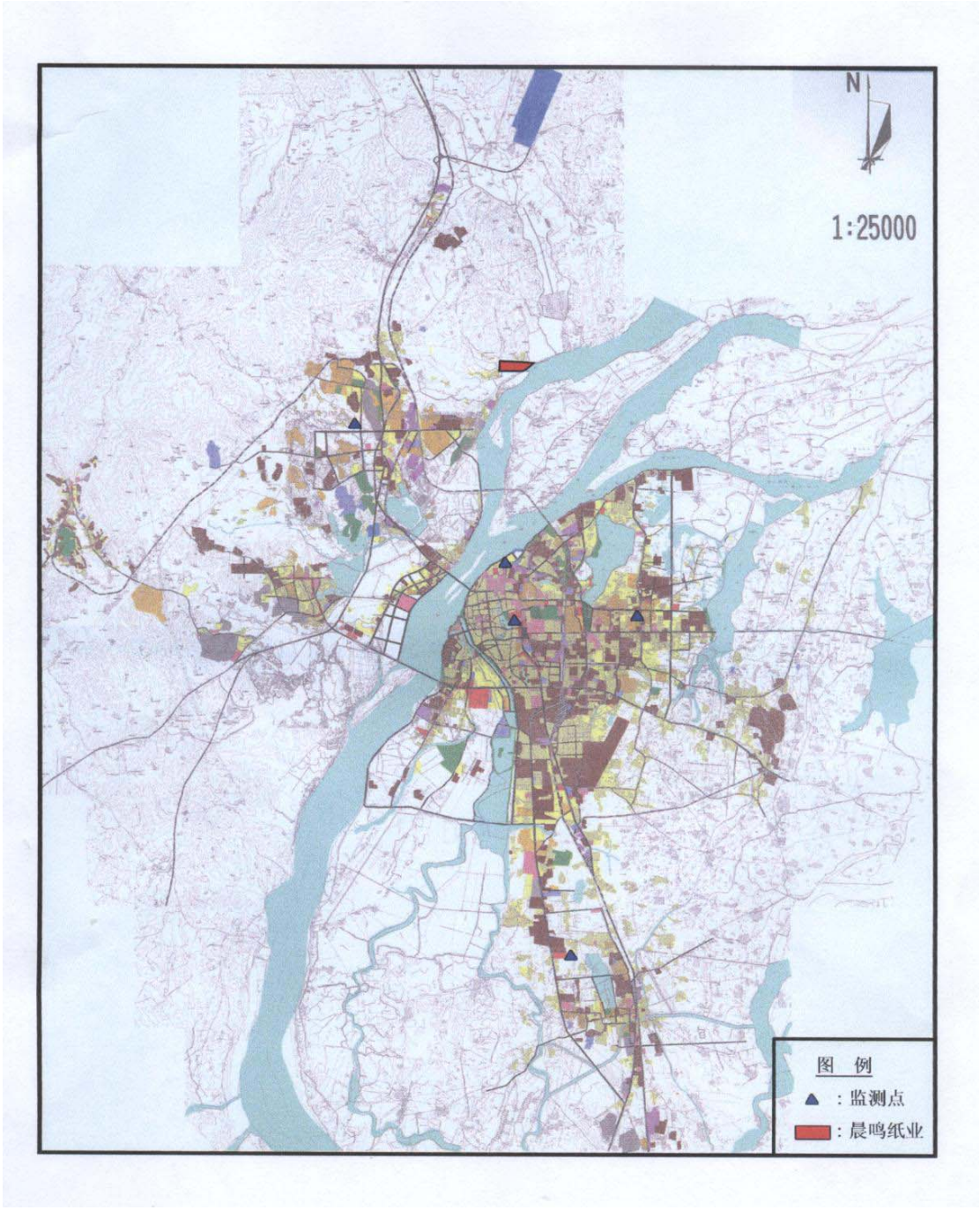
The aim of resettlement monitoring is to ensure: timely and effective completion of physical resettlement; disbursement of compensation in accordance with agreements; successful training and re-employment of project affected workers; successful enterprise development; pre-project living standards and income levels are sustainably restored; grievances expressed by project affected people are followed up and, where necessary, corrective action is implemented; and, cases of hardship are identified and, where necessary, additional support is provided.

For the project, primary responsibility for monitoring will rest with the implementing agency. The Zone, Township and village council will undertake continuous monitoring of project-affected people from preparation stages through physical resettlement and livelihood restoration. Any required corrective actions will be undertaken by the Village Council, Township, Zone or Chenming itself.

The monitoring framework for the Chenming LWC project will include: monitoring by the implementing agency – Zone and Township; monitoring through Chenming coordinating office; and third party external monitoring supported by Chenming. Monitoring by the Zone and township will include: performance against Resettlement Action Plan (RAP); restoration of living standards; restoration of income and livelihood; levels of PAP satisfaction; and consultation and

grievances. The role of Chenming Coordinating Office is to facilitate the flow of information between the resettlement implementing agency (Zone) and Chenming LWC. Part of this role will include monitoring progress of resettlement and compliance with IFC standards. The Chenming LWC will engage a third party consultant to undertake six monthly reviews of project until the resettlement is considered complete. The third party independent verification will reassure international lenders that the Resettlement Action Plan is being complied with and carried out in accordance with IFC standards.

Figure 1: Map Showing Project Site



Note: ▲ Monitoring Points JiangXi ChenMing