THE LOCAL ROAD IMPROVEMENT PROGRAM IN INNER MONGOLIA
FINANCED BY WORLD BANK LOAN

# INITIAL ENVIRONMENTAL EVALUATION REPORT

# AND

# ENVIRONMENTAL ACTION PLAN

INNER MONGOLIA ENVIRONMENTAL SCIENCES ACADEMY
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Accepting Unit: Inner Mongolia Environmental Sciences Academy

The Director: Du Junfeng

Responsible Person: Lu Qianzhong Senior Engineer Certificate number: A14010012

Compiler: Lu Qianzhong Senior Engineer Certificate number: A14010012

Li Xiaoxia Engineer Certificate number: A14010007

Liu Dongmei Senior Engineer Certificate number: A14010011

Taoli Senior Engineer Certificate number: A14010004

Zhang Yugang Senior Engineer Certificate number: B14070005

Du Qianggeng Engineer Certificate number: B14070001

Zhao Jiaming Engineer Certificate number: B14070186

Check: Du Junfeng Zhang Shuli

Co-operator: Hulunbeier City Environmental Monitoring Station

The Director: Wu Shuozhu

# PART1 INITIAL ENVIRONMENTAL EVALUATION REPORT

## 1. BRIEF INTRODUCTION OF THE PROJECT

### 1.1 Project Components And Description

Communication is an important infrastructure and basic industry of civil economy, as well as basic conditions of improving social development. Expediting infrastructure construction, which is a main measurement of the strategy developing the west part of China, plays a very important role in improving economic development of jumping-off and depressed area, production and consumption environment of countryside and pasturing areas, and living conditions of farmers as well.

The highway possessed by Inner Mongolia is fairly less. The length of highway per million square kilometers is only 1/3 of national average level, even much lower in needy areas. Inner Mongolia "The Local Road Improvement Program" ( LRIP ) will be constructed in terms with the following standards:

- To improve local economic development of needy areas
- To promote local products commerce of needy areas
- To solve the problems of education and medical treatment for the local residents of needy areas
- To improve communication in port areas

Considering above principles, IMCD and Hulunbeier city selected 12 roads, which needed to be improved. Through screening, five roads about 431.4 km long are given the priority to be this "The Local Road Improvement Program" (LRIP).

The project area is a needy banner of state level and autonomy region level. Accomplishing the project will be significant to quicken the local economy, improve the production and living environment of farmers.

This report is oriented to the LRIP financed by the World Bank, the LRIP consisting of 5 components, which are separately described as follows:

- Dayangshu-Baihuapai Highway
- Zhalainuoer-Heishantou Highway
- Honghuaerji-Handagai Highway
- Alatanemule-Arihashate Highway
- Amugulang-Ebuduge Highway

The following is a brief of the above mentioned 5 road upgrading components.

1. Dayangshu-Baihuapai Highway

Dayangshu-Baihuapai Highway project is located in the Elunchun Autonomous Banner, Hulunbeier City, Inner Mongolia Autonomous Region of China. Total of the road length is 70.5 km. The starting spot of the highway is at Dayangshu Town, with the main control spots along the route as: Wulubutie Town, Naerkeqi Township, and the terminal at the farm Baihuapai in the Jiagedaqi area.

The highway will be constructed to match the standards of Class II on the basic of existing road of Class III in mountainous/seriously rolling areas. The subgrade is 8.5m wide, the surface is 7.0m wide, and the speed is designed to be 40km/h.

2. Zhalainuoer-Heishantou Highway

Zhalainuoer-Heishantou Highway□located in Inner Mongolia, passes through Hulunbeier City, Manzhouli City□Xinbaerhu Left Banner□Chenbarerhu Benner and Eerguna City, with a total length 158km. The highway starts at Zhalainuoer Mineral Area and ends at Town Heishantou□going through Cuogang Farmland, Quanhe□Hulieyetu Fishfarm and Badaguan meadow.

The highway will be constructed to match the standards of Class III on the basic of existing natural road on grassland. The subgrade is 7.5m wide and the surface is 6.0m wide.

3. Honghuaerji-Handagai Highway

Honghuaerji-Handagai Highway□located in Ewenke Autonomous Banner of Hulunbeier City, Inner Mongolia, starts at Town Honghuaerji and ends at Handagai Farmland with a total length 99km, no other township along the highway.

The highway will be constructed to match the standards of Class III on the basic of existing natural road on grassland. The subgrade is 7.5m wide and the surface is 6.0m wide.

4. Alatanemule-Arihashate Highway

Alatanemule-Arihashate Highway□located in Xinbaerhu Right Bannerof Hulunbeier City, Inner Mongolia□starts at Town Alatanemule of Xinbaerhu Right Banner and ends at Arihashate Port, with a total length 82.5km, passes through Huretingbeijiawu Vanadium.

The highway will be constructed to match the standards of Class III on the basic of existing road of Class IV. The subgrade is 7.5m wide and the surface is 6.0m wide.

5. Amugulang-Ebuduge Highway

Amugulang-Ebuduge Highway□located in Xinbaerhu left banner of Hulunbeier City, Inner Mongolia, starts at Town Amugulang of Xinbaerhu left banner and ends at Ebuduge Port, with a total length 21.4 km.

The highway will be constructed to match the standards of Class III on the basic of existing natural road on grassland. The subgrade is 8.5m wide and the surface is 7.0m wide.

Technical grades and cost estimates of these road segments are shown in Table 1.1-1 and Table 1.1-2.

Table1.1-1 Summary of Road Upgrading Components

| No. | Name | Length (km) | Existing Highway | | | | | Upgrading Standard | | | | Total Cost □10⁴RMB□ | Construction Period |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Grade | Traffic Volume (2003 year) | Subgrade Width (m) | Surface Width (m) | Type of Surface | Grade | Subgrade Width (m) | Surface Width (m) | Type of Surface | | |
| 1 | Dayangshu-Baihuapai Highway | 70.5 | III | 1022 | 8 | 6.5 | arenaceous | Mountain area II | 8.5 | 7 | Asphalt | 18947 | 2005-2006 |
| 2 | Zhalainuoer-Heishantou Highway | 158 | No Grade | 366 | | | | III | 7.5 | 6 | Asphalt | 22059 | 2005-2006 |
| 3 | Honghuaerji-Handagai Highway | 99 | No Grade | 378 | | | | Mountain area III | 7.5 | 6 | Asphalt | 16785 | 2006-2007 |
| 4 | Alatanemule-Arihashate Highway | 82.5 | IV | 292 | 6.5 | 3.5 | arenaceous | III | 7.5 | 6 | Asphalt | 6467.9 | 2005-2006 |
| 5 | Amugulang-Ebuduge Highway | 21.4 | No Grade | 298 | | | | III | 8.5 | 7 | Asphalt | 2771.9 | 2005-2006 |
| Total | | 431.4 | | | | | | | | | | 67030.8 | |

Remarks: Class II: Speed 80-40km/h, average daily traffic: 2000-5000, width of roadbed: 12-8.5m, width of road surface: 9-7 m.
Class III: Speed 60-30km/h, average daily traffic: less than 2000, width of roadbed: 8.5-7.5m, width of road surface: 7-6 m.
Class IV: Speed 40-20km/h, average daily traffic: less than 200, width of roadbed: 4.5-6.5m, width of road surface: 3-5 m.

Table 1.1-2 Summary of main engineering technical indicators for all segments

| No. | Indicators | | Unit | Road name | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Dayangshu-Baihuapai Highway | Zhalainuoer-Heishantou Highway | Honghuaerji-Handagai Highway | Amugulang- buduge Highway | Alatanemule-Arihashate Highway |
| 1 | Occupied land permanently | forestry | ha | 124.78 | | 14 | | |
| | | Grassland | ha | | 221.2 | 124.6 | | 20.27 |
| | | Cultivated | ha | 108.87 | | | | |
| 2 | Temporary land ( Grassland ) | | ha | 13 (wilderness) | 3.53 | 14 | 4 | 2.33 |
| 3 | Removal building | | $m^2$ | 0 | 0 | 0 | 0 | 0 |
| 4 | Removal power supply wires | | Place | 0 | 0 | 0 | 0 | 0 |
| 5 | Heightening communication wires | | Place | 0 | 2 | 0 | 0 | 1 |
| 6 | Earthwork | | $10^3m^3$ | 1147.757 | 1672.455 | 1109.76 | 95.459 | 163.699 |
| 7 | Stone work | | $10^3m^3$ | 201.318 | 2.1 | 0 | 0 | 0 |
| 8 | Big, medium bridge(≥20m) | | m/set | 102/2 | 0 | 67.5/1 | 0 | 0 |
| 9 | Small bridge | | m/set | 124/8 | 126/8 | 78/3 | 0 | 21.5/2 |
| 10 | Plane intersection | | place | 19 | 5 | 5 | 0 | 2 |
| 11 | Design vehicle speed | | Km/h | 40 | 60 | 30 | 60 | 60 |

## 1.2 The Features of The Project

### 1.2.1 Reconstruction Standard

5 components of the LRIP are all located in rural areas. All components are widening subgrades and improving surfaces in order to increase the technical grade and capacity of existing roads.

All 5 segments are improved on the basis of original roads, of which Dayangshu-Baihuapai Highway improved from Class III to Class II; Alatanemule-Arihashate Highwayimproved from Class IV to Class III; others improved from natural road on grassland to Class III.

### 1.2.2 Vehicle Volume Forecast

The vehicle volume is predicted in table 1.1-3.

Table 1.1-3 Vehicle Volume Forecast (Vehicle /D)

| No. | Project name | Vehicle Volume Forecast | | |
|---|---|---|---|---|
| | | 2007 year | 2010 year | 2015 year |
| 1 | Dayangshu-Baihuapai Highway | 1806 | 2454 | 3593 |
| 2 | Zhalainuoer-Heishantou Highway | 601 | 822 | 1223 |
| 3 | Honghuaerji-Handagai Highway | 717 | 981 | 1653 |
| 4 | Alatanemule-Arihashate Highway | 427 | 609 | 929 |
| 5 | Amugulang-Ebuduge Highway | 611 | 870 | 1500 |

## 1.3 Temporary used land

To choose the temporary land used for taking soil, machinery, materials, construction camp, etc. considering the following:

1. Not to occupy farmland, with less vegetation and wild animals and plants in them,
2. Far away from atmosphere sensitive points,
3. Far away from residents and schools so that decreasing effect to local people's life.

After the construction, land restoration will be taken in these places, so no negative effect will take place to the environment.

## 1.4 Project Schedule

Honghuaerji-Handagai Highway will be constructed in 2006 and put into operation in 2007, so the construction period is 2 years.

Other 4 highways will be constructed in 2005 and put into operation in 2006, so the construction period is 2 years as well.

# 2. ENVIRONMENTAL SETTING

## 2.1 Natural Environment

### 2.1.1 Geographical Location

The LRIP is located in Hulunbeier city of Inner Mongolia Autonomous Region. Hulunbeier city is situated in the northeast part of Inner Mongolia Autonomous Region with an area of $25.3\times10^4 km^2$.

Dayangshu-Baihuapai Highway□The geographic coordinates of the starting spot Dayangshu town are at 124□35'E and 49□50'N , and the ending spot Baihuapai farm are at 124□12'E and50□14'N.

Zhalainuoer-Heishantou Highway□The geographic coordinates of the starting spot Zhalainuoer are at 117□45'E and 49□31'N , and the ending spot Heishantou town are at 119□30'E and50□13'N.

Honghuaerji-Handagai Highway□The geographic coordinates of the starting spot Honghuaerji town are at 119□58'E and 48□17'N , and the ending spot Handagai are at 118□23'E and 47□28'N.

Alatanemule-Arihashate Highway□The geographic coordinates of the starting spot Alatanemule town are at 116□49'E and 48□02'N , and the ending spot Arihashate are at 115□53'E and 48□07'N.

Amugulang to Ebuduge Highway□The geographic coordinates of the starting spot Amugulang town are at 118□16'E and 48□12'N , and the ending spot Ebuduge are at 118□16'E and 48□03'N.

### 2.1.2 Dayangshu-Baihuapai Highway

1.Geomorphic landform

The area the line running through is in a low mountainous-rolling area, its low mountains with relatively low elevation slopes being mild and long, hills' slope inclination being 13°□30°,the max. inclination 35°.

2. Climate along the line

Area along the line are of the temperate/cold temperate zone with a continental monsoon climate, dry and windy in spring, with sufficient sunshine; with short duration warm/cold and rainy climate in summer; sudden and serious temperature drops in autumn, with early frosts; long winter with mild wind, frequent movement of cold airs, deep snow accumulated in long period. The year average temperature is –0.3□, the min. temperature in winter -42□, the extreme max. temperature 36□, and the extremely min. -42□.

3.Hydrogen

The area the line going through is rich in water resources. Within the area, there is a densely distributed river net, sufficient make-up ground water source, smooth runoffs, with large water volume, good water quality ,shallowly buried, and easy for wells dug.

The highway passes through Kabute River, Chunyane River and Eergeqi River□but they are all small rivers with little flux.

4. Distribution of cities and towns along the line

The Dayangshu-Baihuapai highway starts at Dayangshu Town, passing Wulubutie Town and Naerkeqi Township ,and ends in Baihuapai farm. Village and towns spread shatteringly in the area along the line. The route goes through rather few cities, town or villages. In the vicinity of the intended highway there is no environmental sensitive spot such as schools or hospitals.

At the site K1935+780 of the highway, there is a clinic 100m away from it.

**2.1.3 Zhalainuoer-Heishantou Highway**

1. Geomorphic landform

The project area is mainly hilly, river and grassland. The alignment is basically closed to Eerguna River.

2. Climate along the line

The project area belongs to medium temperate zone and Frigid Zone of continental climate. The general feature is the temperature difference from the northeast to southwest is big, the calorific capacity is not sufficient, the average temperature is below 0□, the frost free period is short, the sunshine is sufficient, the time of sunshine is long, radiation capacity is sufficient, the winter is frigid, long and dry. The temperature in spring is raised very fast; there are many days of gale weather. The re is little rainfall and is variable. The summer is short, warm and there are many rainfalls. In autumn, the temperature is reduced very fast and the first frost comes early. The average frost-free period is 81-91days, the average rainfall annually is 358.6m, the average temperature annually is –3.1□, the lowest temperature is –51□, the highest temperature is 36.6□, the maximum depth of frozen is over 3m.

3. Hydrogen

There is only one big river along the highway which is Eerguna River. The alignment is basically closed to the River, but the river is not involved in the construction of the highway.

4. Distribution of cities and towns along the line

The project is located at the border area of china, there is only two towns at the beginning and end of the section, the population is comparably concentrated. The population is scattered in other parts of the section. The highway section passes Chagang farm, Quanhe, Hulieyetu and Badaguan. The project areas are all grassland.

In the vicinity of the intended highway there is no environmental sensitive spot such as schools or hospitals.

**2.1.4 Honghuaerji-Handagai Highway**

1. Geomorphic landform

The highway Honghuaerji-Handagai has mild elevation from the starting point to the terminal. Area along the line is mainly grassland and forest, its landform mainly taking wave-type high plain and somewhat broken hills, also with some high valley-terrace, ancient river bed ruins of torso mountains.

The areas along the highway are the middle part of low mountain-hill composition.

2. Climate along the line

Being in the medium high latitude, the area along the line is with the continental climate, with long and cold winter, temperate and short summer, having rather concentrated precipitation. Over the years the average rainfall is 350.9mm, yearly average evaporation 1261.3mm, the max .temperature 37.0□,the min.-46.6□, yearly average 2.4□-2.2□; the deepest frozen depth over 3m, yearly snow cover depth up to 26cm; the dominant wind direction being South.

3. Hydrogen

Ground water along he line is rather abundant. Only one river named Huihe River is available along the highway.

4. Distribution of cities and towns along the line

The Honghuaerji-Handagai Highway passes Honghuaerji Town and Handagai Forest Farm, where people populating are rather concentrated, and both sides of most road parts without residents.

In the vicinity of the intended highway there is no environmental sensitive spot such as schools or hospitals.

**2.1.5 Alatanemule-Arihashate Highway**

1. Geomorphic landform

The alignment is locate in the southwest of Xinbaerhu right banner, the terrain is in flat rolling area, the underground water is lower, there is scare plain, and no water and soil erosion.

2. Climate along the line

The areas along the highway is belong to continental dry climate, it is windy and little rain in spring, short and warm in summer, and cool and dry in autumn with little rainfall. The depth of frozen is 3.34 m. It is cold in winter, the frozen time would be November to May next year; The average temperature in the previous years is 2.5□, the highest temperature is 8.8□, and the lowest is -26□; The sunshine period yearly is 2729.6 hours; The frost free period is 172 days; The rainfall amount yearly is 593.4 mm, the maximum depth of frozen is 3.34 m; The frozen period is from November of every year to May next year.

3. Hydrogen

Rivers are not involved in the highway.

4. Distribution of cities and towns along the line

Alatanemule—Arihashate port highway passes through Alatanemule, Jiawula mine, Arihashate port. The project area is a scarily populated area and no cultivated land. There are a few places of animal husbandry.

In the vicinity of the intended highway there is no environmental sensitive spot such as schools or hospitals.

**2.1.6 Amugulang-Ebuduge Highway**

1. Geomorphic landform

Most of the terrain along the highway is grassland, and the road is comparable plain. The geology of this districts is controlled by the new Huaxia 3rd subsided zone west of Hailaer basin, it is in the fold of Xingan Mountain Eerguna anticline and the geography is belongs to Hulunbeier crack sink basin, the hills is continuously, there are many volcano rocks of the Mesozoic Era. It is the typical dry volcano rock geography.

2. Climate along the line

The areas along the highway is belong to the weather of medium temperature zone of continental monsoon climate, it is windy in spring and the rain is concentrated in summer, the temperature in autumn is reduced rapidly, average frost-free period is 90-100days, winter is long and cold. The average rainfall volume is 270 mm, average temperature is –0.5□. There are about 40 days of fresh gale all the year round, accumulated snow period is about 170 days, the maximum depth of frost is 2.8 m, the maximum depth of accumulated snow is 25 mm.

3. Hydrogen

Rivers are not involved in the highway.

4. Distribution of cities and towns along the line

Most of the districts along the highway is grassland, there is no residents in most of the sections, the highway passes one diary cattle village and frontier defense team, the alignment detour the village and the frontier defense.
In the vicinity of the intended highway there is no environmental sensitive spot such as schools or hospitals.

## 2.2 Social and Economic Environment of Hulunbeier City

### 2.2.1 Present Status of Society and Economy

LRIP is located in the territory of Hulunbeier City. Most of areas passed by the highway are needy counties and countries, which are underdeveloped. Hulunbeier City is situated in the northeast part of Inner Mongolia Autonomous Region, stretching 700km N-S and 630km W-E in a total area 253000km$^2$, consisting of 13 counties and banners. The city has a total population of 2714000 people, 35 nationalities, of which minority nationality accounting of 15.9%, the population density being 10.85 persons per square kilometer. But the distribution of the density varies greatly, with 2.05 person/pasturing area, 7.75 person/forest and2626 person/farmland.

Hulunbeier City has rich natural resources, with many categories, large quantities, concentrated distribution, easy for unified planning made and for development by large scale. Particularly rich are its resources of grassland, forests, farmland, waters, coal and nonferrous metals, with many of their occupation amount per capita higher than the national average occupation level.

Mineral products, especially of coal resource of the city are rich. By the end of 1999, the proven reserves of coal reach 30.7 billion tons; mostly slight-brown coal, the brown coal reserves account for 98% of the total, with a small part the jet coal. The coal is good at its medium/low ash content, with advantages of low phosphorous and low sulphur, which are high quality thermal coal and domestic coal.

Furthermore, inside the territory there are mines of gold, silver and other nonferrous metals with rich reserves, reserves of gold 32t, of high grade and high purity, easy for mining, and also considerable reserves of silver with total reserves over 4000t.

Hulunbeier City, reputed as a "Natural Museum of Wild Plants", has more than 500 varieties of plants of fiber, starch and edible plants, about 400 kinds of wild animals, according for over 70% of the IMAR total, of them there are more than 30 kinds listed as the protected categories of the state and the province, some being rare and precious animal and fowls, mainly distributed in the forest zone of the Great Xing'an Mountains and Hulunbeier Steppe.

Here are tourist resources with the potential for expiration, lots of natural landscape of lakes, chains of mountains, grassland, immense forests, and so forth, also historic cultural relics with unique ethnic flavors and interests.

During the years of 1990-2001, the national economy's overall actual strength of the city had made obvious increase. In the year of 2001, GDP reached 16.78 billion yuan, increased by 6.1% compared with the former year. The proportion of the tertiary industries changed from 27.7:26.1:46.2 to 23.9:27.5:48.6, with the foundation industries enriched and strengthened, and the infrastructure facilities comparatively greatly bettered.

The LRIP involves 7 banners and cities, which are Elunchun Autonomous Benner, Manzhouli City, Xinbaerhu Left Banner, Chenbarerhu Benner, Eerguna City, Ewenke Autonomous Benner and Xinbaerhu Right Banner.

1. Elunchun Autonomous Banner

Elunchun Autonomous Banner is situated in the northeast part of Hulunbeier City, Inner Mongolia Autonomous Region, between 48°50' –50°25'N and 121°55'-126°10'E, with total area of 59880 $km^2$, taking 23.6% of the total territory of Hulunbeier City, listed as the largest banner of the city. Within the banner there are 21 ethnic groups of nationalities, Elunchun, Ewenke, Dawoer, Mongolia, Han, Hui, Korea and so on, with a total population of 317000 persons.

The northeast part of the banner has continuous chains of mountains with dense forests; its southeast part is rolling hills with fertile soil, with luxurious grass and rich water. The mountainous area has an average elevation 700-800m above the latitude. Its forest coverage percentage reaches 48%, with trees of larch, *pinups sylvestris var. mongolica*, *poplar*, and white birch as the main varieties. In the vast forest there are multiple dwelling kinds of rare and precious fowls and animals in the forest slashes, there are thick shrubs with more than 300 kinds, of Chinese medicinal herbs growing, as well as extremely rich resources of green foods. Under the ground there are rich mineral resources contained, more than 21 kinds already found as gold, silver, copper, iron, lead, zinc, altar-mud, oil shale, cann, dines, coal, etc.

At present, the banner has cultivated land more than 533000ha and uncultivated land about 200000ha for farming, proper for growing soybean, wheat, tuber crops, as a base for production of unique-feature farming, which has been listed as the second-term agriculture development plan of IMAR.

The banner is rich in water resource, with 7 rivers as Ganhe River and Nominhe River as the main, all being tributaries of Nenjiang Rivers, which has a big potentiality for hydraulic power development.

(1) Town Dayangshu

Town Dayangshu is in the southeast of Elunchun Autonomous Banner, 114 km from Town Alihe, with the area 4200$km^2$ and 85900 people.

The town is the greatest town taking farming as its principal industry. Rise and fall of farming directly influences the advance process of rural area economy development, so for raising rural area's economic beneficial results, it must closely rely on science and technology to use great efforts to upgrade the levels of specialization, standardization and unique-feature transportation farming,

and actively develop high quality and efficient farming as well as export-oriented type and foreign exchange earning farming.

(2) Jiagedaqi Region

Jiagedaqi Region is in NW part of Heilingjiang Province, on the S piedmont of the Yilehuli Mountains with total area 1587km$^2$, governing 6 districts and 2 townships, 1,500,000 people.

Within the territory of Jiagedaqi Region, there are dense and flourishing forests, with pine, birch, oak and so on trees distributing all over gullies, with numerous wild fruits as persimmon, rose hip, blueberry, etc. growing in forests and shrubs, abound in numerous, Juda's ears, bear's-head and others, also hundreds astragal, Fritillaries thun-bergli growing in forests there.

In its dense forests are also dwelling rare and precious animals such as pterosaur, roe deer, boar, and so forth. Rivers fun intertwining among hills and mountains along their gullies and valleys, and forests are interspersed with lakes like stars, with unpolluted natural pure water quality, abound in brachymystax, lenok, crusian carp, taimen and so on, with delicious tastes, renowned far and near.
Jiagedaqi Region is abundant in tourist resources, especially the original forests being a very famous tour sites.

2. Manzhouli City

Manzhouli City is one city of Hulunbeier City in the north border of Inner Mongolia Autonomous Region, and is the biggest inland port in northen part of China. Manzhouli City was constructed due to Middleeast Railway originally 100 years ago. It became the main port of cargo shipment between China and Russia after liberation of China. By the end of 2000, there are 149,670 population of the city, the GDP value is 742.77million yuan (price of 2000). The trade value of import and export is USD 2.1billion.

This project starts from Zhalainuoer Mining Area, which is east longitude 117° and north latitude 49°, governed by Manzhouli City. The total area is 279.5km$^2$.

Zhalainuoer Mining Area is the main hinterland to support the Manzhouli City, the storage transfer of cargos, holiday services, tourism and the terminal market of large size are gradually moved to Zhalainuoer area which have bigger space.

Zhalainuoer Mining Area is abundant in mineral resources, mainly coal whose storage volume has reached 10.1 billion ton. Another resources is precious fishery resource which is unique. Lake Hulun (Dalai Lake) located at 18 km away south part of the Manzhouli City is the fifth biggest fresh water lake in China, with 93km long, 6.5 deep, 32km wide averagely and 2339 km$^2$ of total area. There are over 30 kinds of fish, mainly common carp, crucian carp, silver car, red fin, pile, catfish, etc.

3. Xinbaerhu Left Banner

Xinbaerhu Left Banner is located at the south west of Hulunbeier City, 47°10'-49°47' north latitudes and 117° 33'-120°12' east longitudes. The banner is 309km long, 165km wide and 22000 km$^2$ of total area, of which 1.7800 km$^2$ of grassland, 1850 km$^2$ of forest and 4734 km$^2$ of water body.
The banner consists of 2 towns, 36 counties, 56 countries, 1 horseland and 4 farmlands. The population is 40000 people, with 13 minority nationalities, of which Meng nationality is the majority of it. The density of population is 1.82 person/km.

The area of grassland is 1.94 million hectares including the efficient area of 1.786 million hectares. The capacity for livestock is 1.693 million sheep units theoretically. The banner is regarded as big banner of animal husbandry, which is the main industry, reaching 1.44 million cattle in 2002. The total production value for meat has reached 1069t, the yield of fresh milk 16073t. The net income of herdsman reached 2194 yuan. The total grass for feeding reached 3.09 billion kg.

The land resource is abundant, with 56.5 ha per capita of the land, higher than the average level of China. In the south of the banner is the low mountain with big areas of black earth of about 230000ha, and abundant rainfall. This area is about the 11% of the total area of the banner. The plantation area is 27000ha in 1997, and the taxes are about 60% of the financial income of the banner. This could be the basis for developing the agriculture resources.

The mineral resources in Xinbaerhu Left Banner are abundant, more than 15 kinds. The mineral places discovered are more than 40 places. There are fireclay, coal, oil, natural gas, lake salt, saltpeter, natural soda and mirabilite, etc. In addition, there are perlite, lignite, and construction sand as well. The north and south parts belong to mineral area of nonferrious metal and the precious metals, and copper, silver, aluminum, zinc and perlite founded in Baertu District.

The banner relies on animal husbandry, with GDP value of 500 million yuan in 2002, of which the first industry has increased to 248 million yuan, the second industry increased to 100 million yuna, the third industry increased to 155 million yuan. The percentage of the industrial structure is adjust has adjusted to be 50:20:30. GDP per capita reached 12000yuan, the financial income completed 23.1 million yuan, the net income of herdsmen reached 2194yuan, and the allocated income of the residents in the towns and cities reached 4149yuan in 2002.

4. Chenbaerhu Banner

Chenbaerhu Banner is located in the northwest part of Hulunbeier City, one of 4 famous pasturing areas, 125km long, 172km wind and total area of 21192 $km^2$.

The natural resources in the banner is abundant, crossing the two zone of forestry grassland and dry grassland with the total area of 1763000ha. In the east region there are about 67000ha island shape forestry, the herbaceous plantation covers most of the sections. The natural grassland resource is rich with the total area of 1648000ha, which is 93.46% of the banner. This part is an important component of Hulunbeier Grassland, and the main material foundation for the development of the animal husbandry of Chenbaerhu Banner.

GDP value is 521.39 million yuan in 2001, of which primary industry 183.74 million, secondary industry 137.2 million, and 200.45 million for tertiary industry. The percentage of eh industries in the national economic structure are 35.2%, 26.3%, and 38.5%.

5. Eerguna City

Eerguna City is situated in the west of Xingan Mountain, north of Hulunbeier Grassland, right bank of Eerguna River, 600km long, 50km wide and the total area of 28445 $km^2$.

There are 6 towns and 4 villages, which are Labudalin Town, Heishantow Town, Shiwei Town, Sanhe Town, Moerdaoga Town, Enhehada Town, Shanghuli Village, Enhe Russia Nationality Village, Suqin Hui Nationality Village and Qiqian Village.

The natural resources in Eerguna City is abundant and unique, the larch is grown in the primeval forests in the north of Xingan Mountain. There are many kinds of trees living in this area such as birch, camphor tree, black birch, etc. There are also a variety of plantations, the wild berry mainly Yue Orange and Masi Yue Orange and other 20 kinds of plantation such as water grape grass Sandingzi, Couliziong, thorn rose, etc. and more than 110 kinds of wild mushroom for food. Most precious species are Zhongbai mushroom, Hedgehog Hydnum mushroom and Black tree mushroom. In addition, there are over 400 kinds plants for medicine use. 44 kinds of that are very popularly distributed with high value.

The mineral resources are rich as well. The sand gold is the very famous one in Eerguna River valley with the reputation of “Golden Trim”. Labudalin Coal Mine is located in the south of Genhe, and the category of coal belongs to soft coal with high content of coke, beneficial for industry. Additionally, there are fluorite, iron, copper, lead, zinc, molybdenum, and tin distributed in some places. More than 140000ha cultivate land is available with fertile soil in Eerguna City. The crops are mainly

wheat, tape, soybean, etc. listed as the base of state commercial grain already and big county of grain production. The agriculture is stressed on the machinery work in big area, the production volume of wheat in 1999 has reached 257600t. The primeval forest is in good conditions with total area of 2.4 million ha, of 67% of the total area. There are above 400000ha non-pollution good quality grassland. The total amount of livestock of the city is 97900, and purchase milk quantity is 27300t.

GDP is 678.10 million yuan in 1999, of which the primary industry 332.03 million, the secondary industry 172.03 million, and the tertiary industry 17.04 million yuan.

6. Ewenke Autonomous Region

Ewenke Autonomous Region is seated in the south east part of Hulunbeier Steppe, consisting of 3 towns, 1 county of minority nationality, 7 villages and 1 mining district, with the population of 146100 people and the area of 19111 $km^2$.

That banner is in a grassland zone, flat and vast, with luxuriant grass and waters, richly producing good wild forage grass, of which the main kind is hseep fescue, the remainder varieties being onions, houseleek, erect Astragalus mongolica, eryneck, Dawulia Astragalus mongolica, Scabrous cleislogenes, alfalfa, vetch and so on, total wild plants for 621 species, 28 genera and 72 families. In 1998, its forage grass storage amount was about 4.65 billion kg, and its theoretical stock capacity was 1.4 million sheep unit. It is a natural base for development of stock raising indeed.

The soil and vegetative cover of the banner can be varied as conifer forest-brown Taiga earth zone, forest/grassland and meadow-changing grassland black earth zone, and arid grassland chestnut earth zone. It possesses steppe area 1289 thousand ha. (including slash/forest edge 634 thousand ha.) for 68.9% of the total area, of which usable meadow 1192 thousand ha. The forest area is 1100 thousand ha. The main plants are dahurian larch, pinus Sylvester's var, mongolica, white birch, Populous tremula van davidiana, willow, elm, etc. the total amount 27680 thousand $m^3$. On under-forestland and interment valley land are growing dense curbs, the marshy indeed richly endowed forest-grassland. In Honhuaerji the zone of pinus Sylvester's var. mongolica stretches continuously for more than 200km, with an area about 300 thousand ha., being the state highest base of reserve-seed tree forest.

Ewenke Autonomous Region has very abundant mineral resources, especially coal, and lignite as dominance, and a certain amount of jet coal, bituminous coal as well. The proven geological reserve of coal accounts for over 10.6 billion tons, taking 32% of the whole League. Due to various factors and conditions for coal forming, varieties and different kinds of coal has been formed, mainly distributed in places of Dayan Coal Field, Yimin Coal Field, Wumuchang Coal Field and Honghuaerji Coal Field.

In 2001, GDP reached 1.17 billion yuan, of which the primary industry 260 million, the secondary industry 570 million, and 342 million for the tertiary industry. The percentage of eh industries in the national economic structure are 22.0%, 48.8%, and 29.2%.

7. Xinbaerhu Right Banner

Xinbaerhu Right Banner is situated in the west of Inner Mongolia, 47°36'-49°50' north latitudes and 115° 31'-117°43' east longitude, with the country boundary of 515.4 km, 168.3km long from east to west, 245km wide from north to south and the total area of 25200 $km^2$. Of which the water area occupy 2217.4 $km^2$, 8.8% of the total.

There are 1 town, 11 counties, 56 villages and 4 residential committee. Alatanemole Town is the central of economic, political and culture of the banner, also the capital of it, 220 km far from Hailaer City in the east. The total population is 32290 people of the whole banner, of which 25305 mongolia nationality, 78.4%; 6065 han nationality, 18.8%; and other nationalities of Dawuer, Ewenke, Elunchun, Eerkezi, Xibo, Hui, Man, Zang, etc. The density of the population is 1.28 person/ $km^2$.

Arihashate Port, located at the northwest part of Xinbaerhu Right Banner, 82.5km away from Alatanemole Town, is a seasonal port of national Class I. Since its open in 1992, the amount of entry and exit people reached 90185 by 2002 aggressively, cargo of 60235t, and the entry and exit vehicles of 21858 each time. The remote town has developed into the second largest distribution center of export between China and Mongolia.

Since the opening of Ariashate Port 14 years ago, the enterprises of various aspects have developed in fast speed. The investment for basic infrastructures as transportation, communication, power supply have completed 9.231 million yuan in the banner. The investment environment has improved. At the meantime, the traditional concept of the herdsmen has changed from then on. Their marketing sense has strengthened and the local residents have been provided more opportunities of choosing jobs.

### 2.2.2 Economic Structure and Industrial pattern

The economy is stock raising mainly in the project area. The primary industry is dominant in national economy. In the period of the ninth five-year-plan, economic system and economic increasing method have been transferred basically to improve resources advantages of stock raising, tourism and mineral explore. The tertiary industry has developed rapidly in recent years, while the primary and the secondary industry have developed steadily.

Industrial pattern in the project area is basically planed to quicken stock raising industrialization; strengthen development of livestock products and mineral resources; improve tourism; and implement intergradations of cities and township, leading to form dominant industry of regional model, combined with national developing emphasis to solve poverty reduction, in terms of natural resources, geographic location and transportation conditions.

### 2.2.3 Living Standards

The living standards of the areas along the highways are very low. The worker's average wage is lower then the average level of the region. The net income per capita of the peasants and herdsmen, the total volume per capita of retail sales of social consumer goods and the bank saving balance per capita of town and country people are all lower than the average level of the whole region.

### 2.2.4 Employment

Herdsmen is most in employees which means stock raising is the dominant industry of local economy.

### 2.2.5 Education, Culture and Sanitation

All school-aged children have been educated in 2000 in project area, but equipment and education level are fairly lower than advanced provinces, even lower in Inner Mongolia.

Education, culture and sanitation have improved to some extent, but still rather drop behind.

### 2.2.6 Tourism

There are too many resources for tourism along the highway. Hulunbeier Giant Grassland is a very famous scenic spot in summer, with vast grassland, pure and unique scenery. Along with improvement of communication and transportation, tourism will become a new developing industry in this area.

### 2.2.7 Culture Relics

According to the regulations of "State Culture Relics Protection Law", Hulunbeier Communication Bureau entrusted Hulunbeier Culture Relic Management Committee to investigate the relative areas of LRIP on culture relics.

Almost all culture relics in Hulunbeier City has been surveyed during the period 1988-1996 by Inner Mongolia Archeology Institute, Hulunbeier Culture Relics Management Station and local agencies together. So they know the distribution of all culture relics.

Hulunbeier Culture Relics Management Committee studied the route of LRIP according to the survey they have done, and they found no culture relics of state and province level involved in the project.

## 2.3 Present Condition of Ecological Environment

### 2.3.1 Dayangshu-Baihuapai Highway

1.The type of landscape ecology in catchment

Ecological landscape along the highway consists of agriculture artificial buildings, grassland landscape and forest landscape.

Agriculture landscape takes a big part, mainly drought agriculture; artificial building landscape are Town Dayangshu and residential site in villages; grassland landscape is meadow vegetation, which is not much; forest landscape is contributed in highland.

2.The type of vegetation

*Corylus heterophylla-Lespedeza bicolor* brush is distributed mainly in highland, whose constructive species is about 1.5m, dominant *Lespedeza bicolor Turcz* is similar with *Corylus heterophylla□Betula ovalifolia Suk.* and *Quercus Mongolica Fish*. are growing on sunshiny slopes of highland. Herbage plants are *Vicia Crecca*, *Sanguisorba officinalis*, *Thalictrum Squarrosum*, etc. There are meadow vegetation and swamp vegetation as well.

3.Propagation resources

Wild propagation has lot of varieties along the highway.

The highway is improved and reconstructed on the basic of existing road, so wild propagation protection is not involved in.

4.Soil types

Main soil types are dark brown earth, brown forest soil, black earth, meadow soil, and swamp soil.

5.Soil utility

As to soil utility, the area of Elunchun Banner is $5.988\times10^4 km^2$□of which farmland $5.14\times10^4$ha□woodland $292.6\times10^4$ha□range $126.05\times10^4$ha□water area $0.65\times10^4$ha□wilderness $80.7\times10^4$ha□others $11.76\times10^4$ha. Each person occupies land of 20.53ha.

### 2.3.2 Zhalainuoer-Heishantou Highway

1. The type of landscape ecology in catchment

Within 300m along the both sides of the highway, ecological landscape consists of agriculture landscape, artificial buildings, grassland landscape wetland landscape, sandlot landscape and forest landscape. Of which, the biggest one is grassland landscape which is the basic and composed of typical steppe and meadow grassland, distributing in highland and plautue. Wetland is fairly big, formed by rivers, lakes and swamps. Sandlot landscape is located in southwest fringe of swamp belt. Africulture landscape is drought agriculture at the joint of Eerguna cityand Chenbarerhu benner sparsly. artificial buildings is Zhalainuoer Mining Area, Town Heishantou and original natural roads and some villages.

2. The type of vegetation

Grassland vegetation type are meadow grassland in highland meadow steppe (main plants, *Festnca ovima, Spiraea salicifolia, S. baicalensis, Aneurolepidium Chinense, A. Anethifolia, and Sanguisorba officinalis*, etc.), typical steppe□(main plants *A. Anethifolia, Stipa grandis, Cleistogenes sqearrosa, Scutellaria regeliana, an dPocockia ruthenica, etc.*), swamp meadow steppe□( main plants *P. simonii Carr., C, caespitosa, Sanguisorba officinalis,* etc. ), lowland meadow steppe□(main plants *A. Anethifolia, P. distans, Aneruolepidium Chinense, Sanguisorba officinalis, Taraxacum mongolicum,* etc. ). Covering rate is 50-85□□vegetation height is in the range of 15-75cm, and there are 15-20 species per square kilometers.

3.Propagation resources

Wild propagation has lot of varieties along the highway. There are varois vegetation for eating, feeding and medicine.

The highway is improved and reconstructed on the basic of existing road, so wild propagation protection is not involved in.

4.Soil types

Main soil types are chestnut soil, solonchak soil, chernozem earth, sand soil, black meadow soil and swamp soil. Chestnut soil is the zone soil, and black meadow soil, swamp soil, solonchak soil and sand soil are the non-zone soil. Chernozem earth is available in the northeast part.

5.Soil utility

As to soil utility, the area of Manzhouli cityis $7.27\times10^4$ha□of which farmland $0.23\times10^4$ha□garden 100ha□woodland 3400ha□range $5.17\times10^4$ha□ residential area and mining area 5800ha□transportation area 1000ha□water area 1400ha□salina area 500ha□wilderness 1000ha□others $11.76\times10^4$ha. Each person occupies land of 0.52ha□

The area of Eerguna cityis $2.84\times10^4$km$^2$□of which woodland $201\times10^4$ha□ 70.3%; farmland $8.6\times10^4$ha, 2.96%; range $62.97\times10^4$ha□ 21.69%; wilderness $11.96\times10^4$ha□ 4.2%. Each person occupies land of 1.29ha□

### 2.3.3 Honghuaerji-Handagai Highway

1. The type of landscape ecology in catchment

Ecological landscape consists of agriculture landscape, artificial buildings, grassland landscape, sandlot landscape and forest landscape. Of which, the biggest one is forest landscape which is *Pinus syvestris L. var. Mongolica Litvinov* landscape. Wetland is fairly big, formed by rivers, lakes and swamps. Sandlot landscape is located sparsly and as well as grassland landscape. Africulture landscape is drought agriculture. Artificial buildings are Town Honghuaerji and some villages.

2. The type of vegetation

The zone vegetation are mainly forest vegetation and grassland vegetation as well as meadow vegetation and swamp vegetation. The most important species of forest vegetation is *Pinus syvestris L. var. Mongolica Litvinov* and a small volume of *Populus davidiana Dode*. The dominant herbage plants are *Aneurobepedium Chinense, Festuca ovima, O.myriophylla and Lespedeza bicolor Turcz*, etc. The covering rate of Town Honghuaerji is highest. Coverage of *Pinus syvestris L. var. Mongolica Litvinov* is over 95□. Forest steppe vegetation is made of ruderal and grass, with main constructive species of *Vicia cracca, Artemisia annua and Sanguisorba officinalis*.

3.Propagation resources

Wild propagation has lot of varieties along the highway. There are varois vegetation for eating, feeding and medicine.

The highway is improved and reconstructed on the basic of existing road, so wild propagation protection is not involved in .

4.Soil types

Main soil types are fixed sand soil, chestnut soil, chernozem earth and swamp soil.

5.Soil utility

As to soil utility, the area of Ewenke Autonomous Benner is $1.91\times10^4 km^2$□7.6% of whole Hulunbeier City, mainly forest and grassland. Each person occupies land of 14.44ha. Of which forest 3.71ha per person, grassland 9.94ha□and others 0.79ha per person.

The area of Xinbaerhu Left Banner is $2.2\times10^4 km^2$ with grassland $175.87\times10^4$ha. Each person occupies land of 53.9ha.

**2.3.4 Alatanemule -Arihashate Highway**

1.The type of landscape ecology in catchment

Within 300m along the both sides of the highway, ecological landscape consists of artificial buildings, grassland landscape wetland landscape and sandlot landscape. Of which, the biggest one is grassland landscape which is the basic and composed of typical steppe. The character of that is the steppe is distributed continuously with a big area. Sandlot landscape is located sparsly with a small area. Artificial buildings are Town Alatanemule and original natural roads.

2. The type of vegetation

Typical steppe is the zone vegetation□distributed in the catchment abroadly with such plants of *Stipa grandis, Aneurolepicium Chinense, Cleistogenes sqiarrosa, Memarrhena asphodeloides*, etc.

Salt vegetation is distributed in dishing lowland with plants of *I. Lactea, A.Anethifolia*, etc.

sand land vegetation is distributed sparsely.

Vegetation coverage is 50-60□□vegetation height is 15-35 cm□and there are 12-18 species of plants per square meters.

3.Propagation resources

Wild propagation has lot of varieties along the highway.

The highway is improved and reconstructed on the basic of existing road, so wild propagation protection is not involved in.

4.Soil types

Main soil types are chestnut soil of the zone soil; and a little meadow soil, swamp soil, solonchak soil and sand soil of the non-zone soil.

5.Soil utility

The area has a sparse population and no farmland, only $2.52\times10^4km^2$ grassland in Xinbaerhu Right Banner.

**2.3.5 Amugulang -Ebuduge Highway**

1. The type of landscape ecology in catchment

Within 300m along the both sides of the highway, ecological landscape consists of artificial buildings, grassland landscape and sandlot landscape. Of which, the biggest one is grassland landscape which is the basic and composed of typical steppe. Sandlot landscape is located sparsly with a small area. Artificial buildings are Town Xinbaerhu Left Banner and the original natural road from Amugulang to Ebuduge Port.

2. The type of vegetation

Typical steppe vegetation is distributed in the catchment, and edificatory species is mainly xerophyte. Meanwhile, there are meadow vegetation, sand land vegetation, salt vegetation, and swamp vegetation as well. Covering rate of vegetation is 30-55□, vegetation height is 10-35 cm□and there are 12-18 species of plants per square meters.

3. Propagation resources

The highway is improved and reconstructed on the basic of existing road, so wild propagation protection is not involved in.

4.Soil types

Main soil types are chestnut soil, meadow soil, swamp soil, solonchak soil and sand soil. Chestnut soil is the zone soil, and meadow soil, swamp soil, solonchak soil and sand soil are the non-zone soil.

5.Soil utility

As to soil utility, the area of Xinbaerhu left banner is $2.2\times10^4km^2$□of which forest $1.78\times10^4km^2$.Each person occupies land of 53.9ha.

## 2.4 Natural Conservation Area

1.Honghuaerji-Handagai Highway

(1) Location of natural conservation area

There is a natural conservation area of state level in Town Honghuaerji-- Honghuaerji *Pinus syvestris L. var. Mongolica Litvinov* Natural Conservation Area.

In order to identify the exact location of Honghuaerji-Handagai Highway and the natural conservation area and the relationship of them, representatives of assessment agency, the design agency and local EPB have investigated in the field, and calculated accurately. The results is as following table 2.4-1□

Table 2.4-1 The coordinates of the highway and natural conservation area

| NO. | Chainage | Highway points accordingly | Natural conservation area |
|---|---|---|---|
| 1 | K0+000 | E119°58′,N48°16.4′ | E119°58′,N48°05′ |
| 2 | K10+000 | E119°52.5′,N48°13.4′ | E120°03′,N48°14′ |
| 3 | K20+000 | E119°48′,N48°09′ | E119°59′,N48°09′ |
| 4 | K30+000 | E119°47′,N48°04.2′ | No. |

The closest distance between the highway and Natural Conservation Area is 6.5km□seen in map 2.4-1.

The highway doesn't pass by Honghuaerji *Pinus syvestris L. var. Mongolica Litvinov* Natural Conservation Area.

(2) General discription of the area

Honghuaerji *Pinus syvestris L. var. Mongolica Litvinov* Natural Conservation Area is situated in Ewenke Autonomous Banner of Hulunbeier City, planned the area 7403.3ha. The rare plant is *Pinus syvestris L. var. Mongolica Litvinov*. Discription of Honghuaerji *Pinus syvestris L. var. Mongolica Litvinov* Natural Conservation Area is in the following table 2.4-2.

Table 2.4-2 Honghuaerji *Pinus syvestris L. var. Mongolica Litvinov* Natural Conservation Area

| Name | Grade | Location | Area (ha) | Protected target | Supervisor |
|---|---|---|---|---|---|
| Honghuaerji *Pinus syvestris L. var. Mongolica Litvinov* Natural Conservation Area | State level | Ewenke Banner | 6167 | *Pinus syvestris L. var. Mongolica Litvinov* | Forest Ministry |

(3) Conclusion

The closest distance between the highway and Natural Conservation Area is 6.5km□which means the highway doesn't pass by Honghuaerji *Pinus syvestris L. var. Mongolica Litvinov* Natural Conservation Area.

2.Other highways of LRIP

As to other 4 highways of LRIP, we have inspected according to “Chinese Biology Eco-biodiversity Investigation” issued by WWF and “Asian Wetland Index” issued by IUCN, that there is no important natural conservation areas involved in.

## 2.5 Noise Environment

### 2.5.1 Noise Source

The reconstruction Highway passes through areas of rural, pastoral and sand dune area with rather disperse population. Within the assessed area of the whole Highway route, there is no fixed pollution source with higher leveled noise. The main noise source is the traffic noise of the road.

### 2.5.2 Noise Monitoring

Via on-the-spot survey, no noise sensitive spots is within the inside the 150 m limits on both sides along the highway route such as the villages, towns, schools and clinics.

The monitoring was carried out in the last ten days of October to the first ten days of November, 2003, with continuous monitoring for 1 day made by each monitoring spot.

For the existing circumstances of noise environment monitoring, “Urban Area Environment Noise Monitoring Technique” was obeyed.

### 2.5.3 Monitoring Result

1. Villages and Towns

The monitoring statistic result of the monitoring spots along the Highways route is listed in Table 2.5-1 to Table 2.5-5.

The assessment standard is carried out the class 2 standard in "Urban Area Environment Noise Standard" (GB 3096-93), i.e.: 60 dB (A) for day and 50 dB (A) for night.

By monitoring result compared with the assessment standard it may be seen: along the reconstruction Highway route, the equivalent noise level of day and night environmental noise at the monitoring spots are all lower than the class 2 standard limit value, declaring that the existing noise environment all of the regions along Highway is comparatively good.

Table 2.5-1 Monitoring statistical results of Dayangshu-Baihuapai Highway Unit: dB (A)

| No. | Monitoring Point Name | Marker | Day time | | Night time | |
|---|---|---|---|---|---|---|
| | | | Leq | δ | Leq | δ |
| 1 | Dayangshu | K1879+500 | 55.7 | 4.2 | 41.2 | 2.9 |
| 2 | Chunlin village | K1900+850 | 51.6 | 3.5 | 40.1 | 3.1 |
| 3 | Wulubutie | K1900+500 | 55.1 | 4.1 | 41.9 | 3.2 |
| 4 | Power supply station | K1900+850 | 52.7 | 3.3 | 42.8 | 3.1 |
| 5 | Maojiapu | K1908+000 | 56.8 | 3.9 | 42.5 | 3.0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 6 | Naerkeqi | K1931+100 | 54.4 | 3.9 | 42.1 | 3.1 |
| 7 | Baihuapai | K1951+000 | 56.9 | 4.3 | 43.5 | 3.9 |

Table 2.5-2 Monitoring statistical results of Zhalainuoer-Heishantou Highway Unit: dB (A)

| No. | Monitoring Point Name | Marker | Day time | | Night time | |
|---|---|---|---|---|---|---|
| | | | Leq | δ | Leq | δ |
| 1 | Zhalainuoer | K0+000 | 55.6 | 3.8 | 43.5 | 3.3 |
| 2 | Chagang meadow 11 group | K12+600 | 53.7 | 3.3 | 42.3 | 3.2 |
| 3 | Quanhe | K31+500 | 53.8 | 3.9 | 41.9 | 3.0 |
| 4 | Hulieyetu | K75+900 | 55.8 | 3.7 | 42.3 | 2.9 |
| 5 | Badaguan horseland | K120+500 | 54.4 | 3.2 | 41.1 | 2.8 |
| 6 | Badaguan meadow | K130+800 | 55.1 | 3.5 | 41.5 | 3.1 |
| 7 | Heishantou | K158+000 | 56.9 | 3.9 | 42.2 | 2.9 |

Table 2.5-3 Monitoring statistical results of Honghuaerji-Handagai Highway Unit: dB (A)

| No. | Monitoring Point Name | Marker | Day time | | Night time | |
|---|---|---|---|---|---|---|
| | | | Leq | δ | Leq | δ |
| 1 | Honghuaerji | K0+000 | 56.4 | 4.2 | 42.3 | 3.3 |
| 2 | Bateer forestry center | K57+100 | 53.2 | 3.1 | 41.2 | 2.9 |
| 3 | Handagai | K99+000 | 55.6 | 3.9 | 42.4 | 3.2 |

Table 2.5-4 Monitoring statistical results of Alatanemule-Arihashate Highway Unit: dB (A)

| No. | Monitoring Point Name | Marker | Day time | | Night time | |
|---|---|---|---|---|---|---|
| | | | Leq | δ | Leq | δ |
| 1 | Alatanemule | K0+000 | 55.2 | 3.9 | 42.6 | 3.2 |
| 2 | Huzheyanpaixing | K13+700 | 53.6 | 3.8 | 41.4 | 3.1 |
| 3 | Arihashate | K82+500 | 55.3 | 3.3 | 41.1 | 3.0 |

Table 2.5-5 Monitoring statistical results of Amugulang-Ebuduge Highway Unit: dB (A)

| No. | Monitoring Point Name | Marker | Day time | | Night time | |
|---|---|---|---|---|---|---|
| | | | Leq | δ | Leq | δ |
| 1 | Amugulang | K0+000 | 55.8 | 3.8 | 42.4 | 3.3 |
| 2 | Ebuduge | K19+300 | 54.3 | 3.6 | 43.1 | 3.2 |

2. Schools and Hospitals

No schools distribute within 150m along both sides of the highway.

Only one clinic was found within 150m along both sides of the highway (at K1935+780 of Dayangshu-Baihuapai Highway, 100m away from it). Monitoring statistics is seen in the table 2.5-6.

Table 2.5-6 Noise Monitoring results of clinic Unit: dB(A)

| Highway Name | Monitoring Point Name | Distance away from road (m) | Marker | Day time | | Night time | |
|---|---|---|---|---|---|---|---|
| | | | | Leq | δ | Leq | δ |
| Dayangshu-Baihuapai Highway | Hospital | 100 | K1935+780 | 52.1 | 2.6 | 41.3 | 2.8 |

The results shows the value of the clinic in day time and night time all are lower than "City Environmental Noise Standards" (GB3096-93) Class I(day time 55dB(A) and night time45dB(A)).

## 2.6 Air Environment Quality

### 2.6.1 Monitoring

1. Monitoring spot arrangement

Atmosphere monitoring sampling spots were arranged on the overall Highway routes, the specific condition of respective spots seen in Table 2.6-1.

Table 2.6-1 Elemental conditions about air monitoring points

| Project name | Monitoring Point Name | Remark |
|---|---|---|
| Dayangshu-Baihuapai Highway | Dayangshu | Highway starting spot |
| | Wulubutie | Residential area |
| | Baihuapai | Highway end point |
| Zhalainuoer-Heishantou Highway | Zhalainuoer | Highway starting spot |
| | Hulieyetu | Residential area |
| | Badaguan meadow | Residential area |
| | Heishantou | Highway end point |
| Honghuaerji-Handagai Highway | Honghuaerji | Highway starting spot |
| | Bateer forestry center | Residential area |
| | Handagai | Highway end point |
| Alatanemule-Arihashate Highway | Alatanemule | Highway starting spot |
| | Huzheyanpaixing | Residential area |
| | Arihashate | Highway end point |
| Amugulang-Ebuduge Highway | Amugulang | Highway starting spot |
| | Ebuduge | Highway end point |

2. Monitoring time and frequency

The existing atmospheric circumstances monitoring along the Highway route was monitoring for 5 continuous days, from the last ten days of October to the first ten days of November, 2003, 4 times every day, specific time every day respectively: 8:00, 11:00, 15:00 and 18: 00, each time making in-step monitoring of wind direction, wind speed, temperatures and such substantial meteorological elementary value.

3.Monitoring key elements

Items for existing atmospheric circumstances monitoring is total suspension particles (TSP) of air, carbon monoxide ( CO) , nitrogen oxide (NOx), three in all.

4. Monitoring Result

Based on the data of existing environment circumstances monitoring, the statistic results are seen in Table 2.6-2, Table2.6-3, andTable2.6-4.

Table 2.6-2 Air environmental CO monitoring results Unit: $mg/m^3$

| Project name | Monitoring Point Name | Instantaneous | | | | Daily average | | | | Total Average |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Min. | Max. | standard | Above standard % | Min. | Max. | standard | Above standard % | |
| Dayangshu-Baihuapai Highway | Dayangshu | 0.85 | 1.96 | 10 | 0 | 0.95 | 1.68 | 4 | 0 | 1.41 |
| | Wulubutie | 0.72 | 2.23 | 10 | 0 | 0.98 | 1.73 | 4 | 0 | 1.57 |
| | Baihuapai | 0.61 | 2.15 | 10 | 0 | 0.91 | 1.64 | 4 | 0 | 1.49 |
| Zhalainuoer-Heishantou Highway | Zhalainuoer | 0.83 | 2.32 | 10 | 0 | 1.12 | 1.75 | 4 | 0 | 1.54 |
| | Hulieyetu | 0.59 | 1.48 | 10 | 0 | 0.71 | 1.22 | 4 | 0 | 0.96 |
| | Badaguan meadow | 0.46 | 0.94 | 10 | 0 | 0.59 | 0.88 | 4 | 0 | 0.73 |
| | Heishantou | 0.77 | 2.21 | 10 | 0 | 0.93 | 1.68 | 4 | 0 | 1.35 |
| Honghuaerji-Handagai Highway | Honghuaerji | 0.47 | 2.02 | 10 | 0 | 0.71 | 1.46 | 4 | 0 | 1.02 |
| | Bateer forestry center | 0.41 | 1.11 | 10 | 0 | 0.67 | 1.03 | 4 | 0 | 0.80 |
| | Handagai | 0.52 | 1.34 | 10 | 0 | 0.68 | 1.13 | 4 | 0 | 0.87 |
| Alatanemule-Arihashate Highway | Alatanemule | 0.76 | 2.33 | 10 | 0 | 0.96 | 1.71 | 4 | 0 | 1.41 |
| | Huzheyanpaixing | 0.59 | 1.37 | 10 | 0 | 0.72 | 1.20 | 4 | 0 | 0.95 |
| | Arihashate | 0.68 | 1.25 | 10 | 0 | 0.79 | 1.08 | 4 | 0 | 0.91 |
| Amugulang-Ebuduge Highway | Amugulang | 0.89 | 2.63 | 10 | 0 | 1.03 | 2.39 | 4 | 0 | 1.75 |
| | Ebuduge | 0.61 | 1.52 | 10 | 0 | 0.88 | 1.37 | 4 | 0 | 1.14 |

Table2.6-3 Air environmental NOx monitoring results Unit: $mg/m^3$

| Project name | Monitoring Point Name | Instantaneous | | | | Daily average | | | | Total Average |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Min. | Max. | standard | Above standard % | Min. | Max. | standard | Above standard % | |
| Dayangshu-Baihuapai Highway | Dayangshu | 0.005 | 0.019 | 0.24 | 0 | 0.006 | 0.015 | 0.12 | 0 | 0.010 |
| | Wulubutie | 0.005 | 0.024 | 0.24 | 0 | 0.008 | 0.017 | 0.12 | 0 | 0.012 |
| | Baihuapai | 0.005 | 0.015 | 0.24 | 0 | 0.005 | 0.010 | 0.12 | 0 | 0.007 |
| Zhalainuoer-Heishantou Highway | Zhalainuoer | 0.005 | 0.041 | 0.24 | 0 | 0.005 | 0.013 | 0.12 | 0 | 0.008 |
| | Hulieyetu | 0.005 | 0.034 | 0.24 | 0 | 0.005 | 0.029 | 0.12 | 0 | 0.011 |
| | Badaguan meadow | 0.005 | 0.052 | 0.24 | 0 | 0.005 | 0.031 | 0.12 | 0 | 0.014 |
| | Heishantou | 0.005 | 0.022 | 0.24 | 0 | 0.005 | 0.015 | 0.12 | 0 | 0.09 |
| Honghuaerji-Handagai Highway | Honghuaerji | 0.005 | 0.041 | 0.24 | 0 | 0.005 | 0.013 | 0.12 | 0 | 0.008 |
| | Bateer forestry center | 0.005 | 0.034 | 0.24 | 0 | 0.005 | 0.029 | 0.12 | 0 | 0.011 |
| | Handagai | 0.005 | 0.042 | 0.24 | 0 | 0.007 | 0.023 | 0.12 | 0 | 0.013 |
| Alatanemule-Arihashate Highway | Alatanemule | 0.005 | 0.038 | 0.24 | 0 | 0.013 | 0.027 | 0.12 | 0 | 0.021 |
| | Huzheyanpaixing | 0.005 | 0.019 | 0.24 | 0 | 0.008 | 0.016 | 0.12 | 0 | 0.014 |
| | Arihashate | 0.005 | 0.032 | 0.24 | 0 | 0.008 | 0.022 | 0.12 | 0 | 0.016 |
| Amugulang-Ebuduge Highway | Amugulang | 0.005 | 0.026 | 0.24 | 0 | 0.06 | 0.021 | 0.12 | 0 | 0.014 |
| | Ebuduge | 0.005 | 0.092 | 0.24 | 0 | 0.026 | 0.073 | 0.12 | 0 | 0.057 |

Table 2.6-4 Air environmental TSP monitoring results Unit: $mg/m^3$

| Project name | Monitoring Point Name | Instantaneous | | Daily average | | | | Total Average |
|---|---|---|---|---|---|---|---|---|
| | | Min. | Max. | Min. | Max. | standard | Above standard % | |
| Dayangshu-Baihuapai Highway | Dayangshu | 0.096 | 0.632 | 0.143 | 0.432 | 0.30 | 40 | 0.294 |
| | Wulubutie | 0.042 | 0.514 | 0.115 | 0.311 | 0.30 | 20 | 0.217 |
| | Baihuapai | 0.053 | 0.489 | 0.104 | 0.318 | 0.30 | 20 | 0.232 |
| Zhalainuoer-Heishantou Highway | Zhalainuoer | 0.044 | 0.531 | 0.089 | 0.397 | 0.30 | 40 | 0.286 |
| | Hulieyetu | 0.041 | 0.356 | 0.078 | 0.279 | 0.30 | 0 | 0.212 |
| | Badaguan meadow | 0.045 | 0.411 | 0.081 | 0.294 | 0.30 | 0 | 0.213 |
| | Heishantou | 0.057 | 0.519 | 0.123 | 0.387 | 0.30 | 40 | 0.288 |
| Honghuaerji-Handagai Highway | Honghuaerji | 0.031 | 0.389 | 0.109 | 0.287 | 0.30 | 0 | 0.221 |
| | Bateer forestry center | 0.038 | 0.335 | 0.099 | 0.242 | 0.30 | 0 | 0.189 |
| | Handagai | 0.042 | 0.419 | 0.097 | 0.297 | 0.30 | 0 | 0.245 |
| Alatanemule-Arihashate Highway | Alatanemule | 0.055 | 0.529 | 0.137 | 0.364 | 0.30 | 40 | 0.276 |
| | Huzheyanpaixing | 0.034 | 0.418 | 0.093 | 0.295 | 0.30 | 0 | 0.241 |
| | Arihashate | 0.047 | 0.464 | 0.138 | 0.321 | 0.30 | 20 | 0.257 |
| Amugulang-Ebuduge Highway | Amugulang | 0.054 | 0.567 | 0.135 | 0.352 | 0.30 | 40 | 0.289 |
| | Ebuduge | 0.045 | 0.443 | 0.123 | 0.309 | 0.30 | 20 | 0.217 |

### 2.6.2 Existing Environmental Air Quality Assessment

1. Assessment Standard

Assessment Standard is level II in the air quality standard ( GB3095-1996 Grade II), seen in Table 2.6-5.

Table 2.6-5 Air environmental quality standards Unit□$mg/m^3$

| Pollutant | Instantaneous | Daily average |
|---|---|---|
| $NO_x$ | 0.15 | 0.10 |
| TSP | —— | 0.30 |
| CO | 10.00 | 4.00 |

2.Conclusion of Existing Circumstances Assessment

In air environmental monitoring spots of 5 highways, the concentration of $NO_X$ and CO are small, which don't exceed the standards. That means environment content of $NO_X$ and CO is fairly big.

Because monitoring time of TSP was in winter, vegetation scorched and wind was strong, which caused dust a lot. So the values exceeded the standards.

In the region along the reconstruction Highways, all the quality of other items has a rather clean level.

## 2.7 Surface water Environment status quo

### 2.7.1 Distribution of surface water

There are two highways passing through surface water body in LRIP. The condition is in the table 2.7-1.

Table 2.7-1 Rivers passed by highways

| No. | Project name | Marker | River name |
|---|---|---|---|
| 1 | Dayangshu-Baihuapai Highway | K1882+650 | Kabute river |
| | | K1885+100 | Chunyane river |
| | | K1950+000 | Eergeqi river |
| 2 | Zhalainuoer-Heishantou Highway | - | - |
| 3 | Honghuaerji-Handagai Highway | K47+300 | Hui river |
| 4 | Alatanemule-Arihashate Highway | - | - |
| 5 | Amugulang-Ebuduge Highway | - | - |

### 2.7.2 monitoring time and frequency

The monitoring of current status of surface water was carried out from October 25-26, 2003.

### 2.7.3 Monitoring items and analysis methods

Surface Water Monitoring items and analysis methods see table2.7-2.

Table2.7-2 Surface Water Monitoring items and analysis methods

| Monitoring item | Analysis method | Based on |
|---|---|---|
| PH | Glass electrode method | GB6920-86 |
| CODcr | Potassium dichromate method | GB11914-89 |
| Oil | Infrared spectrotometry method | GB/T16488-1996 |
| SS | Filter membrane method | |
| $BOD_5$ | Dilution inoculation method | |

### 2.7.4 Surface Water Monitoring Result

The result of surface water monitoring was list in detail in table 2.7-2□

Table 2.7-2 Surface Water Monitoring Result Unit□ mg/l

| River name | Marker | PH | $BOD_5$ | CODcr | Oil | SS |
|---|---|---|---|---|---|---|
| Kabute river | K1882+650 | 7.32 | 2.1 | 12.4 | 0.024 | 26 |
| Chunyane river | K1885+100 | 7.35 | 1.9 | 11.3 | 0.031 | 37 |
| Eergeqi river | K1950+000 | 7.43 | 1.6 | 16.9 | 0.026 | 18 |
| Hui river | K47+300 | 7.28 | 2.3 | 17.1 | 0.018 | 42 |
| The Class III standard of *Surface Water Environmental Quality Standards* | | 6-9 | 4 | 20 | 0.05 | - |

The table indicates the concentration of pollutant of rivers are all lower than "Surface Water Environmental Quality Standards"(GB3838-2002) Class III, which means the water quality is pretty good.

## 2.8 Environmental Sensitive Spots

According to social and natural environment situations, important environmental sensitive spots are listed in the table 2.9-1.

Table 2.9-1 Main Environmental Sensitive Spots

| Highway name | Environmental sensitive spot | Marker | Relation with the highway | Main sensitive environment |
|---|---|---|---|---|
| Dayangshu-Baihuapai Highway | Wangyou | K1887+900 | About 48 m to the right of the highway□1 households, 6 people□ | Noise and air environment |
| | Liuqing | K1892+100 | About 57 m to the right of the highway□1 households, 4 people□ | |
| | Wulubutie | K1900+100 | About 30 m to the right of the highway□45 people□ | |
| | Farmers | K1900+650 | About 20 m to the right of the highway□2 households, 8 people□ | |
| | Farmers | K1920+250 | Road side □2 households, 8 people□ | |
| | Farmers | K1927+130 | About 10 m to the left of the highway□3 households, 12 people□ | |
| | Villages | K1931+100 | Within 20 m on both sides□ 18 households, 90 people□ | |
| | Xingfa | K1932+850 | About 20 m to the right of the highway□18 households, 90 people□ | |
| | Naerkeqi | K1934+400□K1935+950 | About 30 m to the right of the highway□40 households, 200 people□ | |
| | Farmers | K1944+500 | About 40 m to the left of the highway□2 households, 8 people□ | |
| | Maintaining workers'camp | K1945+100□K1945+500 | Within 30 m on both sides□ 11 households, 40 people□ | |
| | Clinic | K1935+780 | About 100m to the left of the highway | |
| | Trees | Road side | On the highway both sides | Trees |
| | Kabute river | K1882+650 | Crossed by the highway bridge | Surface water environment |
| | Chunyane river | K1885+100 | Crossed by the highway bridge | |
| | Eergeqi river | K1950+000 | Crossed by the highway bridge | |
| Zhalainuoer-Heishantou Highway | Qianhe | K31+500 | Within 30 m on both sides□ 10 households, 50 people□ | Noise and air environment |
| | Mengkexili | K47+900 | About 40 m to the left of the highway□15 households, 60 people□ | |
| | Hulieyetu | K64+600 | Within 30 m on both sides□ 20 households, 100 people□ | |
| | Badaguan horseland | K113+700 | Within 50 m on both sides□ 10 households, 50 people□ | |
| | Badaguan meadow | K120+300 | About 20 m to the right of the highway□20 households, 100 people□ | |
| | Heishantou | K158+000 | Within 30 m on both sides□ 120 households, 500 people□ | |
| | Communication wire | K83+600 | Road side | Heightening communication wire |
| | Communication wire | K86+300 | Road side | |
| Honghuaerji-Handagai Highway | Honghuaerji | K0+000 | Within 30 m on both sides□100 households, 500 people□ | Noise and air environment |
| | Bateer forestry center | K57+100 | Within 50 m on both sides□ 20 households, 80 people□ | |
| | Baritu | K77+800 | About 20 m to the right of the highway□30 households, 120 people□ | |
| | Hui river | K39+250 | Crossed by the highway bridge | Surface water environment |
| | Tree | Road side | On the highway both sides | Trees |
| Alatanemule-Arihashate Highway | Patrolin company | K0+000 | About 20 m to the right of the highway□20 people□ | Noise and air environment |
| | Huzheyanpaixing | K13+700 | Within 60 m on both sides□ 20 households, 80 people□ | |
| | Herdsmen | K81+200 | About 40 m to the right of the highway□2 households, 8 people□ | |
| | herdsmen | K81+500 | About 30 m to the right of the highway□5 households, 20 people□ | |
| | Arihashate port | K82+100 | About 15 m to the left of the highway□50 households, 40 people□ | |
| Amugulang-Ebuduge Highway | Amugulang | K0+000 | Within 40 m on both sides□ 150 households, 600 people□ | Noise and air environment |
| | Ebuduge | K20+900 | Within 3 m on both sides□ 5 households, 20 people□ | |
| | Communication wire | K16+300 | | Heightening communication wire |

| Highay name | Environmental sensitive spot | Marker | Relation with the highway | Main sensitive environment |
|---|---|---|---|---|
| Dayangshu-Baihuapai Highway | Dayangshu | K1879+500 | Within 60 m on both sides□ 10 housholds, 40 people□ | Noise and air environment |
| | Chunlin village | K1900+850 | Within 40 m on both sides□ 15 housholds, 60 people□ | |
| | Wulubutie | K1900+500 | About 30 m to the right of the highway□10 housholds, 45 people□ | |
| | Power supply station | K1900+850 | About 30 m to the right of the highway□10 housholds, 35 people□ | |
| | Maojiapu | K1908+000 | Within 30 m on both sides□ 10 housholds, 30 people□ | |
| | Naerkeqi | K1931+100 | Within 40 m on both sides□ 50 housholds, 160 people□ | |
| | Clinic | K1935+780 | About 100m to the left of the highway | |
| | Trees | | On the highway both sides | Trees |
| | Kabute river | K1882+650 | Crossed by the highway bridge | Surface water environment |
| | Chunyane river | K1885+100 | Crossed by the highway bridge | |
| | Eergeqi river | K1950+000 | Crossed by the highway bridge | |
| Zhalainuoer-Heishantou Highway | Chagang meadow 11 group | K12+600 | Within 60m on both sides□ 10 housholds, 40 people□ | Noise and air environment |
| | Quanhe | K31+500 | Within 50 m on both sides□ 6 housholds, 20 people□ | |
| | Hulieyetu | K75+900 | Within 60 m on both sides□ 10 housholds, 50 people□ | |
| | Badaguan horseland | K120+500 | Within 70 m on both sides□ 5 housholds, 30 people□ | |
| | Badaguan meadow | K130+800 | Within 50 m on both sides□ 10 housholds, 50 people□ | |
| | Heishantou | K158+000 | Within 40 m on both sides□ 120 housholds, 500 people□ | |
| | Communication wire | K83+600 | | Heightening communication wire |
| | Ccommunication wire | K86+300 | | |
| Honghuaerji-Handagai Highway | Honghuaerji | K0+000 | Within 40 m on both sides□ 100 housholds, 500 people□ | Noise and air environment |
| | Bateer forestry center | K57+100 | Within 50 m on both sides□ 20 housholds, 80 people□ | |
| | Handagai | K99+000 | Within 40 m on both sides□ 30 housholds, 100 people□ | |
| | Hui river | K47+300 | Crossed by the highway bridge | Surface water environment |
| | Tree | | On the highway both sides | |
| Alatanemule-Arihashate Highway | Alatanemule | K0+000 | Within 30 m on both sides□ 150 housholds, 600 people□ | Noise and air environment |
| | Huzheyanpaixing | K13+700 | Within 40 m on both sides□ 20 housholds, 80 people□ | |
| | Arihashate | K82+500 | Within 30 m on both sides□ 50 housholds, 200 people□ | |
| Amugulang-Ebuduge Highway | Amugulang | K0+000 | Within 40 m on both sides□ 150 housholds, 600 people□ | Noise and air environment |
| | Ebuduge | K19+300 | Within 50 m on both sides□ 10 housholds, 50 people□ | |

| | | | | |
|---|---|---|---|---|
| Highway | Communication wire | K16+300 | | Heightening communication wire |

# 3. Environmental Impact Assessment

## 3.1 Social-Economic Impact Assessment

### 3.1.1 Social Impact Assessment

1. Population

The direct project-effected region of The LRIP are about: Elunchun autonomous benner, Manzhouli city, Xinbaerhu left banner, Chenbarerhu banner, Eerguna city, Ewenke autonomous banner and Xinbaerhu right banner.

Population of the direct project-effected region is about 823 thousands persons.

Along with the project construction and its being put into service, a certain effect on the population distribution along the Highway route will be brought about. Except for the floating population of people increase following the constructing teams movement for the time being, not much change of population of various townships will be resulted in.

After the Highway built up and put into service, due to the expedient communication, the development of tourism and the appearance of more commercial trades, food-beverage networks and spots, in the vicinity of the region along the Highway route, there will be faster increase of persons from outside, the distribution and density of population will also increase.

2.Removement

The 5 project components are all oriented to subgrade upgrading, surface widening and improving, so not involving any resettlement, none of the components will cause by resettlement-related environmental impacts.

3. Effect of acquisition land

Acquisition land is as following table 3.1-1.

Table 3.1-1 Acquisition land of LRIP

| No. | Project name | | Acquisition land (ha) | | | | Total |
|---|---|---|---|---|---|---|---|
| | | | Forest land | Grassland | Cultivated land | wilderness | |
| 1 | Dayangshu-Baihuapai Highway | Occupied permanently | 124.78 | | 108.87 | | 233.65 |
| | | Occupied temporarily | | | | 13 | 13 |
| 2 | Zhalainuoer-Heishantou Highway | Occupied permanently | | 221.2 | | | 221.2 |
| | | Occupied temporarily | | 3.53 | | | 3.53 |
| 3 | Honghuaerji-Handagai Highway | Occupied permanently | 14 | 124.6 | | | 138.6 |
| | | Occupied temporarily | | 14 | | | 14 |
| 4 | Alatanemule-Arihashate Highway | Occupied permanently | | | | | |
| | | Occupied temporarily | | 4 | | | 4 |
| 5 | Amugulang-Ebuduge Highway | Occupied permanently | | 20.27 | | | 20.27 |
| | | Occupied temporarily | | 2.33 | | | 2.33 |

The table shows only Dayangshu-Baihuapai Highway needs 108.87ha of farmland□and no farmland is involved in other 4 highway in LRIP.

1)Dayangshu-Baihuapai Highway

Dayangshu-Baihuapai Highway acquires farmland 108.87 ha.

As to the issue of acquisition land, special agency and personnel was set up, cooperated with local government and other relative agencies, to arrange in terms of according implementation plan. In accordance with relative documents and regulation for compensating reasonablely removement household. The record of requirement is needed for each removement family and try to satisfy them.

Due to abundant soil resources, the area of acquisition land is small. The living conditions are not affected a lot for removement families because of reasonable compensation.

2) Other section

Other 4 highway sections go through grassland, so acquisition land is not necessary. Furthermore, the reconstruction highways are on the basic of original roads.

3.Public Facilities

1) Traffic and transport

In the combination transport system of the project influenced area, highway traffic takes an important place. As a traffic building item, this project can make best improvement of the existing highway transport circumstances of this region, reducing traffic accidents, raising vehicle running speed and greatly promoting the service level of the highway.

The project completed will make extremely great promoting action on improving investment environment and tourism resource conditions.

2) Disturbance on public facilities

All highways need to be upgraded. In the reconstruction, Zhalainuoer-Heishantou Highway needs to raise 2 telecom poles, and Amugulang-Ebuduge Highway 1 telecom pole, but nothing for others, as following table 3.1-2.

Table 3.1-2 Raised Telecom Pole

| No. | Project name | Marker | Heightening communication wires (Place) |
|---|---|---|---|
| 1 | Dayangshu-Baihuapai Highway | | |
| 2 | Zhalainuoer-Heishantou Highway | K83+600 | 1 |
| | | K86+300 | 1 |
| 3 | Honghuaerji-Handagai Highway | | |
| 4 | Alatanemule-Arihashate Highway | | |
| 5 | Amugulang-Ebuduge Highway | K16+300 | 1 |

There are 3 telecom poles needed to raise in LRIP.

According to Chinese usual practice, the building units need first to consult with electric power and communication departments, fixing substitution lines for the lines along the route to be removed before the removal of the original line. So this will not bring about effect on using public facilities.

4. Social Security

1) Social stability

The project area is a region of ethnic groups of minority nationalities with Mongolians as the mainstay and people of the Han nationality as the majority. Via over 40 years' construction, its economy and social appearance have greatly developed and changed, the minority nationalities having huge development in various fields of economy, culture, education, hygiene and so on. The people of various nationalities are getting along with one another in ethnic harmony, harvesting social stability. But the socioeconomic development of the area along the route still lags far behind

the developed areas. The causes of such backwardness may be summed up as: the first its bad natural environments, the second the lagging behind of traffic and transport and the third its inaccessible socioeconomic status. The completion of this project will promote the unity and progress all of the various nationalities, offering weighty significance to keeping the social stability.

2) Influence of foreign building workers on local residents

The construction period of the project will be 2 years. Apart from local personnel, the construction team needs a great quantity of foreign persons. So the management of construction team must be reinforced so as not to exert effect on the life of local inhabitants.

5. Road Separating Analysis

The reconstruction road is without enclosure screening on both sides, besides the roadbed of the road passing through town streets being basically not higher than both sides, doesn't produce much influence on the natural contacts of the people on both sides of the highway and on their farming or industrial production.

6. Traffic Safety

1) In construction phase

In construction period, in order to reduce the traffic accidents near village and small town along the route, the crosswalk will be paved there, while two crosswalks at big village and small town, one at the 1/3 of it, the other at the 2/3; one crosswalk at small village, which being in the center of it.

A fulltime person will be charge of each crosswalk, and some obstruction and sign brands will be set up on both sides of every one. The function of obstruction and sign brands is to remind drivers to slower speeds.

2) In operation phase

At some sections, accidents possibly occur near villages and towns as traffic speed can increase on the improved roads. Signs can be posted and publicizing can be commonly used for the reduction of accidents.

7. Employment

The construction of this project can add the following employment of persons:
1) Building the road can add great quantities of employment of persons.
2) Persons for direct service of that building project.
3) The completion of the project will quicken the development of economy, thus the transport volume will be greatly increased with a great quantity of persons getting employment.
4) Indirect increase of employment resulted from the quickening of regional economic development.
5) Lots of road building materials will be purchased locally during the construction period so as to promote the development of trades concerned in the area along the Route, thus increasing persons will be benefited from employment.

From the above it may see the building of the project will directly or indirectly increase employment for people.

### 3.1.2 Economic Impact

1. Regional Socioeconomic Development

The car traffic is the main transport form in LRIP areas, playing a leading part in communications. The LRIP is acting as a very important role in the regional economic development and material exchange.

The completion of the road network reconstruction project possesses very important effects on accelerating and driving ahead the economic construction of Hulunbeier City, particularly on the economic construction of the area along the highway route.

Building this project will bring about long term and weighty influence on the regional economy.

2. Demand Level

Demand level of residents along the route will directly or indirectly increase the employment volume by large quantities, not only benefiting employees but also greatly benefiting the people of this region. Based on the public intention investigation made along the route, most of the investigates hope the fastest implementation of the project, indicating a very high demand level for the project cherished by the people along the route.

3. Incomes and Distribution

The areas along the reconstruction roads are the remote border districts with ethnic groups of minority nationalities living in, their economy undeveloped, their income per capita very low, their living standards poor, having rather backward facilities for economic information, communications, etc.

The construction of the reconstruction highways will give significant influence on boosting the commodity circulation of the districts along the route and energetically help the people of the area along the route increase their income, shake off poverty to afford a much better life.

The accelerating development of regional economy facilitated by the construction of this project will make long-run advantageous effect on narrowing the poor-rich gab between border land and inland and raising the overall local living standards.

### 3.1.3 Cultural Relics and Historical Sites

According to the initial investigation, along the reconstruction project route, there are no cultural relics found in the construction. If any cultural relics found in the construction, the building work must be interrupted with the cultural relics control departments noticed. The building work must not continue until the excavation and arrangement are completed.

In the active coordination of the highways building department and the relics protection department, action in accordance with the national laws for protecting cultural relics, the project construction will not produce effects on the cultural relics concerned along the route.

## 3.2 Ecological Environment impact assessment

### 3.2.1 Analysis of impacts on Animal and Plant Resources

1. In Construction phase

Impacts on plant resources in construction stage are mainly the damage of the surface vegetation along the route.

With the field investigation by Inner Mongolia Environmental Sciences Institute, consulting local EPB and information, there are no protection animals and plants species of state and province levels along the route and no important species habitat as well. So there is no negative effect on animals and plants resources along the highway.

2. In Operation phase

When highways put into cooperation, afforestation should been taken on both sides of the highway to improve ecological environment.

### 3.2.2 Land Use Impact Assessment

In the construction phase, there is some land temporarily used, including construction shortcuts, temporary work sheds, houses, stock grounds and so on. Land temporarily taken up for the time being changes the land use way, causing some temporary effects on food, forage and other production in the area along the routes.

To choose the temporary land using for taking soil, machinery, materials, construction camp, etc. considering the following:

1. Not to occupy farmland, with less vegetation and wild animals and plants in them,
2. Far away from atmosphere sensitive points,
3. Far away from residents and schools so that decreasing effect to local people's life.

After the construction, land restoration will be taken in these places, so no negative effect will take place to the environment.

Even if the highways construction occupies some land, the value of the land along the highways will increase after constructed and the land use prices as well so as to improve the economy development of whole area.

### 3.2.3 Soil and Vegetation Impacts Analysis

In the course of the roadbed construction, many cubic meters of earth must be excavated and filled, thus removing huge amounts of fertile surface earth with the subsoil turned up, lowering the nutrient content of the soil, meanwhile damaging the vegetative coverage of the borrowing spots and spoil grounds, and the soil on both sides of the road sections with earthwork of digging and filling also suffering various extents of damage.

Generally, within the 10m scope on both sides of the road sections, the vegetation suffers more serious damage, the vegetative coverage rate decreasing more than 60% compared with the normal sections, such effects being more serious in sandy area sections. In the area beyond 10m to 50m from the road, the vegetative coverage rate suffers a lighter decrease from lighter damage.

After the completion of the highways, green making work on both sides of the road must be carried out in time, with trees and grass planted. Earth borrowing spots and spoil grounds must be leveled in time with vegetation built and recovered. Such will be favorable for soil vegetation protection and recovery.

### 3.2.4 Soil Erosion Impact Analysis

The main source of soil erosion being solid discards and earth dreg discards from the highways construction, the volume accounting for about 99% of such soil erosion. Other forms of soil erosion are little, not over 1%.

After the highways project completed, the protecting programs for the embankment, the through cuts and cut slopes are completed at the same time. Via 2□3 years vegetation growing period of the highway greening programs and other programs for vegetation recovery, the ground surface vegetation recovers, with the soil erosion on both sides of the route basically controlled.

Therefore, after the highways built, so long as the harnessing measures can keep pace with the need, the soil erosion caused by the highway construction will more be lessened.

### 3.2.5 Ecological Environment impact

Due to bad conditions of existing roads, lots of vehicles pass through grassland freely around the highway by makeshift bypaths for convenience to form some parallel natural paths along the highway, sometimes even 5 or 6 in some sections. The temporary transportation occupied a lot of area of the steppe so as to decrease the area of grassland. In addition, the occupied areas could hardly be restored and changed into bare land, even sandlot partly, after the vegetation had destroyed heavily. Hence the ecological environment has been damaged, which strengthens degradation and desertification process and affects the local industry of stock raising to some extend.

After implementation of the project, due to the improvement of the road conditions, the highway has the normal capacity of transportation, resulting in avoiding destruction of grassland and ecological environment.

## 3.3 Noise Environmental Impact Assessment

### 3.3.1 Noise Impact in Construction Phase

1. Noise Source Intensity
During the construction phase of the Highway, usually used construction work mechanics are power generators, excavators, bulldozers, land levelers, road rollers, paves, cranes and so forth. Analog monitoring result of such main construction Machines is seen in Table 3.3-1.

Table 3.3-1 Main Construction Machines Noise Source Intensity

| № | Construction Machine | Monitoring Position | Noise Level (dB) |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 1 | Power generator | 1.0 | 89.4 |
| 2 | Road roller | 1.0 | 85.3 |
| 3 | Land leveler | 5.0 | 90.0 |
| 4 | Stowage | 5.0 | 89.0 |
| 5 | Pave | 1.0 | 87.0 |
| 6 | Bulldozer | 1.0 | 90.0 |
| 7 | Excavator | 1.0 | 91.4 |
| 8 | Crane | 1.0 | 80.1 |
| 9 | Shovel | 1.0 | 82.1 |

2. Impact Analysis

The effect of construction mechanical noise on the environment during the construction course is estimated with the following formula adopted:

$$L = L_o + 20\lg(\frac{r_o}{r})$$

Where in the formula:
L□— Construction Machines noise source intensity
r□ —Distance from the noise source during L□Determined
r —Distance from the noise source to the forecast spot
L — Forecast spot noise value

Along with the progressive increase of the relative distance from the construction Machine, its noise level presented progressively decreases. Noise levels at different distances of the main construction Machines are seen in table 3.3-2.

Table 3.3-2 Noise levels of the main construction Machines

| № | Construction Machine | 10m | 30m | 50m | 100m | 150m | 200m |
|---|---|---|---|---|---|---|---|
| 1 | power generator | 69.4 | 59.9 | 55.4 | 49.4 | 45.9 | 43.4 |
| 2 | road roller | 65.3 | 55.8 | 51.3 | 45.3 | 41.8 | 39.3 |
| 3 | land leveler | 84.0 | 74.4 | 70.0 | 64.0 | 60.5 | 58.0 |
| 4 | Stowage | 83.0 | 73.4 | 69.0 | 63.0 | 59.5 | 57.0 |
| 5 | Pave | 67.0 | 57.5 | 53.0 | 47.0 | 43.5 | 41.0 |
| 6 | bulldozer | 70.0 | 60.5 | 56.0 | 50.0 | 46.5 | 44.0 |
| 7 | Excavator | 71.4 | 61.9 | 57.4 | 51.4 | 47.9 | 45.4 |
| 8 | Crane | 60.1 | 50.6 | 46.1 | 40.1 | 36.6 | 34.1 |
| 9 | Shovel | 62.1 | 52.6 | 48.1 | 42.1 | 38.6 | 36.1 |

By the comparison of the estimate with the standard it may be seen, day effecting scopes of various kinds of construction Machines are all within the 50 m. limit, and the noise estimate values outside the 50 m. limit are under 70 dB (A), and that outside the 100 m. limit under 60 dB (A).

At night construction, the Machinery effecting scope is larger. Most construction Machines cannot reach 55 dB (A) until at a distance about 100 m., and those Machines of strong noise intensity as paves, shovel loaders and such only at a distance about 300 m. can their noise reach 55 dB (A).

Construction noise effect is limited in the construction work course. After the completion of the construction, such effect disappears, and construction noise has the features of intermittence and sporadic (such as rammers). If night construction work is inhibited, such construction noise effect on the environment is not serious.

### 3.3.2 Traffic Noise impact In Operation Phase

1.Dayangshu-Baihuapai Highway

The predicted traffic value of 2010 vehicles is 2454 per day and 3593 per day in 2015. Noise prediction was referred to the approaches of "Environmental Impact Assessment Regulation of Highway Construction Projects " issued by State Communication Ministry.

The results shows when the highway is put into service, the noise will not exceed the standards on environmental sensitive spots on both sides due to the small traffic volume.

2.Zhalainuoer-Heishantou Highway

The predicted traffic value of 1223 vehicles per day in 2015. Noise prediction was referred to the approaches of "Environmental Impact Assessment Regulation of Highway Construction Projects " issued by State Communication Ministry.

The results shows when the highway is put into service, the noise will not exceed the standards on environmental sensitive spots on both sides due to the small traffic volume.

3.Honghuaerji-Handagai Highway

The predicted traffic value of 2015 is 1653 vehicles per day. Noise prediction was referred to the approaches of "Environmental Impact Assessment Regulation of Highway Construction Projects " issued by State Communication Ministry.

The results shows when the highway is put into service, the noise will not exceed the standards on environmental sensitive spots on both sides due to the small traffic volume.

4.Alatanemule-Arihashate Highway

The predicted traffic value of 2015 is 929 vehicles per day. Noise prediction was referred to the approaches of "Environmental Impact Assessment Regulation of Highway Construction Projects " issued by State Communication Ministry.

The results shows when the highway is put into service, the noise will not exceed the standards on environmental sensitive spots on both sides due to the small traffic volume.

5.Amugulang-Ebuduge Highway

The predicted traffic value of 2015 is 1500 vehicles per day. Noise prediction was referred to the approaches of "Environmental Impact Assessment Regulation of Highway Construction Projects " issued by State Communication Ministry.

The results shows when the highway is put into service, the noise will not exceed the standards on environmental sensitive spots on both sides due to the small traffic volume.

6.Schools and Clinics

Only one clinic was passed by Dayangshu-Baihuapai Highway at K1935+780, 100m away from it.

The predicted traffic value of 2010 vehicles is 2454 per day and 3593 per day in 2015.
The value at the point K1935+780 will not exceed the standards.

## 3.4 Atmosphere Environmental Impact Assessment

### 3.4.1 In Construction Phase

During the construction period of the reconstruction Highways, the atmospheric pollution matters come from asphalt smoke and raising dust caused by lime soil mixing and material transportation.

1. The blown dust caused by lime soil mixing
During the Highways construction, there are two types of lime soil mixing: road mix and station mix. The road mix is mixing up at the construction site while the foundation construction is proceeding along the new-built Highway. The station mix is mixing up at the station yard according to the Highway construction job specification and then the mixed lime soil will be directly sent to the construction site by vehicles. The environmental influences caused by the two types of mixing up are different. The pollution of road mix moves with the construction sites and it will affect a larger region. The station mix is a concentrated type of mixing up, so its influence of dust raised is relatively concentrated. However, since the mixed lime soil is sent to the construction sites, it will increase the pollution of raised dust. Considering the features of these road sections, we suggest that the road scattered mix be used at the road sections where the density of population is small and the concentrated station mix be used at the road sections near cities or towns. The proper positions should be chosen when the station mix proceeds.

2. The raising dust caused by material transportation

The raising dust caused by transportation or building materials is related to the following factors: vehicle speeds, loading, contact area between tires and road, looseness and density of the road surface, and relative temperature, etc. If the vehicles run on a makeshift road, the blown dust will be serious, especially in the dry days of spring or summer. Monitoring results of the blown dust during the Highway construction, on construction conditions are similar, Results shows that the blown dust is rather serious and the region influenced is large. TSP concentration is above 10 $mg/m^3$ until downwind 100 m. So, it is necessary to spray water on the makeshift road.

3.Impacts of asphalt smoke

Asphalt concrete mixes up at the station and mixing is under seal conditions, so no asphalt smoke occurs.

From the previous analyses, during the construction the influences on atmospheric environment mainly come from the raising dust caused by lime soil mixing and vehicle transport. It is necessary to strengthen the management and arrange the proper mixing place to minimize the dust pollution.

### 3.4.2 Material Transport Impact Analysis

There are rather many social vehicles along the highways. The transportation of the road building materials may be mainly carried out by means of social commercial transportation.

Trucks transport stone stuff, lime, cement, steels, and timber. The roads for transportation are basically village roads. During the construction of the roadbed, for the longitudinal disposition of the earth, road scrapers, using 8t dump trucks for the long distance conveying of the earth, carry out the short distance conveying. The roads on which the earth-carrying trucks drive are village roads or temporary earth roads.

During the construction of the roadbed, when the earth is transported longitudinally, the dust on the road surface may be raised a lot because the roads are basically village roads or temporary roads. And the environmental problems caused by this should be paid special attention to.

The rather big freight volume of the road building materials may increase the volume of the traffic flow along the transportation line, and in addition, the roads for the transportation are relatively narrow, which may possibly lead to traffic jams even traffic accidents.

In order to control the dust raised up during the transportation of the road building materials and avoid and decrease the traffic jams or traffic accidents, this assessment puts toward the following countermeasure advices:

1. Often sprinkle water on the section of the road used for transporting the earth for the roadbed by dump trucks, and do it at least four times a day in normal conditions; water should also be often sprinkled during the piling construction of the roadbed.

2. Stones and lime-grit mixture should be piled up neatly during loading in order to narrow the wind-blown area and reduce the dust raised up by wind during the transportation. Sprinkling on the surface of the grit is also needed in the transportation in order to reduce the dust raised up during the transportation.

3. Any vehicle carrying toxic, harmful, flammable, explosive and volatile among any other dangerous things should have permissions issued by public security, fire and communications departments;

4. In case of windy, snowy, foggy and freezing days, vehicles should be driven at limited speed, or sections of the road should be closed as appropriate;

5. Dynamic management and monitoring of vehicles driving on the road should be enhanced such that any abnormal condition would be promptly reported;

6. In case of any explosion and fire, fire departments should be promptly informed and the road section involved should be closed before such event is properly treated;

7. In case of any traffic pollution event, emergency remedies should be provided as required, and responsible environmental agencies at different levels should be immediately informed such that corresponding measures can be taken as appropriate.

### 3.4.3 In Operation Phase

For atmosphere environment in operation phase, the polluting resource is exhaust gas of vehicles with main pollutant of $NO_X$ and CO.

The predicted exhaust gas discharge value will not affect a lot on sensitive spots along the highway in terms of the small traffic volume of 929-3593 vehicles per day in 2015. The prediction was referred to the approaches of “Environmental Impact Assessment Regulation of Highway Construction Projects ” issued by State Communication Ministry.

## 3.5 Surface Water Environmental Impact Analysis

Highway construction can be divided into the Construction Phase and Operation Phase. In the construction Phase the water environmental pollution is mainly from sewage discharge of

constructors and the SS nearby the construction site of bridges construction. In the Operation Phase, the pollution of the rivers is mainly caused by rain runoff on the highway.

### 3.5.1Water Environmental impact in Construction Phase

The following impacts can be produced on river downstream water quality from bridge construction:

(1) Digging sediment and washing construction materials to construct bridges will make the water turbid.

(2) The construction machineries contain oily wastewater that may yield oil pollution of rivers when it is discharged in to the rivers.

(3) The sewage and garbage from constructors can be directly discharged into the rivers and pollute the river water if the management is not strengthened.

(4) The construction materials such as bitumen, oil and chemicals can pollute the water after being washed by the rainfall if not properly managed.

The effect on water body is in a short term during construction phase. Sufficient management will minimize the effect.

### 3.5.2 Water Environmental impact in Operation Phase

The rainfall in the region is concentrated from June to August, accounting for 70% of the total annual transpiration. This belongs to high water period with larger water flow. The discharge of initial rainfall into the water body can have some impact on the water quality. The impact should stop as the rain stops therefore belonging to short-term impact.

## 3.6 Analyses for Accident Risks

The Local Road Improvement Program passes through the plain-gentle-hilly areas, from analyses of geological information, there are low possibilities of mud-rock flow, landslide, land sink which can make serious geological hazard to the Highway.

At the design stage of the Highway, the basic earthquake intensity along the Highway has been checked. For bridge culverts they are earthquake- proof. If any earthquake occurs, these, measures will minimize the influence of earthquake on the Highway.

After the Highway puts into operation, the high car speed may induce traffic accidents. For the vehicles, which transport harmful, poisonous, combustible or explosive cargoes, once an accident occurs, the harmful substances will make a big shock to the environment. Since the risks for danger cargoes are at the sudden traffic accidents, we can take preventive measures through the management means. It is necessary to establish firefighting organs to control any possible accidents in time, with necessary arrangement for specialized persons equipped and have monitoring means

provided in order to eliminate and control pollution. For the transportation of danger cargoes, the transport unit should strictly comply with the national or professional norm to operate. For the vehicles, which transport the danger cargoes, it is sure, to have preventive measures and necessary equipment, and those vehicles must have signs of normalization. The specialized persons must be trained and the education on traffic safety for drivers needs to be strengthened. If any traffic accidents of the vehicles, which carry danger cargoes, occur, we will immediately inform the local fire-fighting organs and the department of environment protection. For the potential big pollution failure induced by traffic accidents, we will report step by step. After we take these measures, we think that the risks from transportation of danger cargoes will be lessened.

# 4. Assessment Conclusion

1. The Local Road Improvement Program will improve local transportation conditions, bringing considerable social and economic benefits for these areas, also playing important roles in promoting exploitation of the local resources, making the overall economy in these areas rapidly develop, enhancing the unity among the nationalities in the minority area and making the society stable, increasing income for the people living in the poor areas along the highway and reducing the poor population, as well as developing local tourism cause.

2. A screening process has been taken from the viewpoints of air pollution, noise, water pollution, ecological environment, cultural relics, road safety, etc. to identify potential significant issues that would need to be addressed in the EA. It was confirmed that there were no new construction of roads; all sub projects were improvement of existing alignments. General assessments have also been conducted on social and economical impact, ecological impact, noise, and air pollution. As the results of those processes, it was concluded that all sub-projects might create a few minor and easily recognizable environmental problems, but no significant ones. Accordingly, full EA has not been conducted for them; however Environmental Action Plans were made for each sub-project. The guideline for public consultation was applied.

# PART 2 ENVIRONMENTAL ACTION PLAN

# 5. ENVIRONMENTAL ACTION PLAN

## 5.1 Laws, Regulations, standards and Target of Environment Protection

### 5.1.1 Environmental Laws and Regulations

1. "Management Methods for Construction Project Environment Protection"

2. "Some Opinions on Construction Project Environment Protection"

3. “Management Methods for Traffic Building Project Environment Protection"

4. "Notice concerning Strengthening Management Work of International Financial Organization Credit Project Environmental Impact Assessment."

5. "Inner Mongolia Autonomous Region Environment Protection Rules".

6. "Implementation Detailed Rules of Inner Mongolian Autonomous Region building Project Environment Protection Management Methods"

7. "World Bank Work Guides for Environment Protection"

8. "Guiding Principles 4.01 of World Bank and Attached Articles"

### 5.1.2 Assessment Standard

On the Basis of the ideas of Hulunbeier city Environment Protection Bureau, the standard for the assessment of this project is:

1. Atmosphere: The Class B standards of “Environmental Air Quality Standards” GB3085-1996 are carried out, seen in Table 5-1.

Table 5-1 Atmospheric Standard Values Unit: $mg/m^3$

| Item | Daily average | Hour average |
|---|---|---|
| TSP | 0.30 | |
| Nox | 0.10 | 0.15 |
| CO | 4.0 | 10.0 |

2. Noise: "Environmental Noise Standards of Urban Areas "GB 3096- 93 is carried out (Inhabitants: Class 4, Schools: Class 1). Seen in Table 5-2.

Table 5-2 Environmental Noise Standards Values Unit: dB(A)

| Item | Day | Night |
|---|---|---|
| Inhabitants | 70 | 55 |
| Schools | 55 | 45 |

### 5.1.3 Target of Environment Protection

Protection targets of assessment are such along the route: inhabitant areas, preventing soil erosion (The reconstruction Highway have no business with cultural relics and historic sites).

## 5.2 Environmental Mitigation Measures

### 5.2.1 design phase Mitigation Measures

**5.2.1.1** Social Environment Mitigation Measures

1. The lines avoid passing major environmental sensitive sites:

(1) Dayangshu-Baihuapai Highway
Chunlin village (K1900+850), Wulubutie (K1900+500), Maojiapu (K1908+000), Naerkeqi (K1931+100)

(2) Zhalainuoer-Heishantou Highway
Chagang meadow 11 group (K12+600), Quanhe(K31+500), Hulieyetu (K75+900), Badaguan horseland (K120+500), Badaguan meadow (K130+800)

(3) Honghuaerji-Handagai Highway
Bateer forestry center (K57+100)

(4) Alatanemule-Arihashate Highway
Huzheyanpaixing (K13+700)

(5) Amugulang-Ebuduge Highway
No environmental sensitive spot

2.Cut off irrigation and drainage system.

The areas passes by Dayangshu-Baihuapai Highway are mostly farmland whose irrigation and drainage system might be cut off by construction. Designing agency and local personnel should coordinate sufficiently and take proper measures to reconstruction.

#### 5.2.1.2 Ecological Environmental Mitigation Measures

1. In the engineering design, the balance of earth and stone should be reached as far as possible, the mountain areas should be selected as waste earth yards, and occupation of grasslands should be avoided. The earth borrowing yards shall occupy grasslands of high yields as less as possible. And the protection embankments shall be built in the grassland areas to reduce the land occupation.

2. To project the grassland tourism resources, it is suggested that the earth borrowing yards and waste earth yards should not be allocated within the filed of vision along the lines and should be allocated on the mountain rear sides, and that soil should be extracted as level as possibly and, then, the recovery measures should be taken and grass should be planted.

3. The protection engineering of the road bases and the drainage engineering of the highway should be rationally designed to prevent soil erosion and water and soil loss.

#### 5.2.1.3 Water and Soil Conservancy

1. Aiming at the features of the different sections where water and soil loss caused by the highways, the damage to the existing facilities for water and soil conservation shall be as less as possible during the design and construction.

2. Earth borrowing fields and stone quarries shall be set up on wasteland in the design. When fetching sand from riverbeds, the flood carrying safety should not be influenced and the local water administrations should be consulted.

3. In the design of the roadbed, the drainage facilities as well as protective works should be given more attention to and the design of the drainage for pavements should be strengthened to protect the embankment from soil erosion. For the earthwork-excavated section, the drainage design of side ditches should be considered to reduce the water and soil losses.

### 5.2.2 Construction Phase Mitigation Measures

#### 5.2.1.1 Social Environment Mitigation Measures

1. To telecom poles, construction agencies should coordinate with relative departments in advance, then make an alternative plan for the wire before removement.

2. Construction of Bridge & Culvert

- Any waste material resulting from bridge/culvert construction should not be let into the river channel to avoid any impact on the flood discharge capacity or original functions of the river;
- Not to destroy any of the river dykes and not to affect the flood discharge capacity;
- To not narrow the original river channel.

3. During the construction, cultural relics protection laws should be energetically popularized. Newly found cultural relics should be informed for protection department concerned to identify, and construction should be stopped until finishing identification.

4. In densely populated areas, construction should be arranged as short as possible so as to reduce effects on inhabitants.

5. Construction completed, work sites should be cleared up in time.

**5.2.1.2 Ecological Mitigation Measures**

1.Temporary Acquisition Land

(1) To maximize use of wasteland or poor land, and to minimize rangeland;
(2) To properly compensate for any temporary use of rangeland according to the duration of such occupation;
(3) Upon completion of construction activities, to clean the land for temporary use and to recover it;
(4) To minimize land areas for temporary use.

2. Recultivate and restoration of vegetation

(1) Strengthen management during construction phase to decrease destroy of vegetation.
(2) Carry out recultivation and restoration of vegetation after construction to acquisition land.

3. Soil spoil and Soil Borrowing measures

(1) To properly arrange longitudinal allocation of subgrade soil work;
(2)To borrow soil from highland in case of inadequacy of embankment, but to control the excavation depth, with consideration to use of solid industrial waste materials nearby;
(3)To pave excavation materials in low-lying areas and to borrow soil from highland for facilitating future restoration;
(4)To temporarily put aside the cropped soil wherever it is necessary to borrow soil from farmland or to place excavation material in farmland, to level and to place back the cropped soil for farmland recovery.

4.Afforestation

There are two highways in LRIP which need to log woods□Dayangshu-Baihuapai Highway for 26236□poplar, diameter lower than 10cm□□Honghuaerji-Handagai Highway for 1790 pine trees.

**Mitigation measures□**
(1) Compasation
Dayangshu- Baihuapai Highway for 26236 poplar□3 yuan for each□the total 78708 yuan.
Honghuaerji-Handagai Highway of 1790 pine tree□the same 3 yuan for each, the total 5370 yuan.
The composation will be 84078 yuan totally for LRIP.

(2) Planting on both sides of the highway
On both sides of Dayangshu-Baihuapai Highway and Honghuaerji-Handagai Highway: Dayangshu-Baihuapai Highway 127680 poplar, Honghuaerji-Handagai Highway 52000 pine tree.

The cost of planting is 1.39million yuan, of which Dayangshu-Baihuapai Highway, 766000 yuan; Honghuaerji-Handagai Highway, 624000 yuan.

**5.2.2.3 Air environmental Mitigation Measures**

1. In sections with rather low population density, lime- earth mixing will be shatteringly carried out by the road side, while in sections close to cities and towns, the centralized mixing way is used.

2. Lime-earth mixing fields and bitulith-mixing fields should be located in downwind places 200m beyond the sensitive areas.

3. Vehicles transporting building materials should be covered and spills should be made as less as possible. The fly ash should be wet transported. The general storehouse and store yards, especially fly ash, should be covered.

4. On road for transporting building materials and in construction sites, proper watering measures should be taken, especially places near lime-earth mixing stations, the road surface should be promptly cleaned to prevent secondary dust raising.

5. When vehicles conveying building materials pass through densely inhabited areas or sensitive spots, running speed should be reduced to lessen the influence of dust raising, moreover, in sensitive areas vehicles passing through, rate- limiting signs should be set up.

6.To centrally mix asphalt concrete in enclosed places, and avoid to discharge asphalt smoke.

7.To locate asphalt concrete batching plants in leeward of residential sites with 200m away.

**5.2.2.4 noise Mitigation Measures**

1. High-noise equipment shall be stationed 150 m away from sensitive points. If high-noise equipment is less than 50 m away from residential area, night-work (22:00-6:00) is prohibited.

2. The constructors should pay attention to maintenance for the machines and properly operate. The workers should minimize noise of the road building machines.

**5.2.1.5 Surface water environment**

1. Bridge and Culvert Engineering

There are a few rivers along the highways lines to be construction. The construction in the cofferdam method should be adapted to effectively prevent turbid water quality produced by the construction, and construction refuse from falling to the rivers to pollute water bodies.

2. Machine Work

(1) Sewage from construction machines which contains oil should be collected and then treated (collected into waste plastic tanks and then transferred out for treating), and should not be discharged into the water bodies.

(2) The stack sites for the construction materials, such as bitumen, oil materials chemical substances, etc., should be located outside the riverbeds and equipped with canvas for temporarily covering purpose.

3. Construction Camping Grounds

(1) The construction camping sites should not be located beside the water bodies. The domestic sewage produced from the construction camping sites should be centrally treaded, and excrement and urine may be compost-treated and then become a fertilizer for grasslands. It should be absolutely prohibited that they are randomly flooded or discharged into rivers without management.

(2) The sanitation and anti-epidemic work should be enhanced in the construction camping sites during the rain season to prevent disease spreading.

(3) It should be prohibited that the waste stuff and construction materials are discarded and stacked beside water bodies to prevent pollution and block of the water bodies.

### 5.2.3 Operation Phase Mitigation Measures

#### 5.2.3.1 Social Environment Mitigation Measures

1. Traffic safety

(1) Separating facilities will be provided at residential sites, hospital and schools where there are frequent human activities, and pedestrian crossings will be provided for the purpose of personal safety;

(2) To forbidden overload of vehicles strictly.

2. Dangerous goods management

Trucks carrying any toxic, harmful and dangerous goods will be accompanied by permits issued by public security and highway administration authorities, and every possible measure will be taken for the avoidance of traffic accidents.

#### 5.2.3.2Eco-environmental Mitigation Measure

The routine management work for vegetation recovery along the lines should be undertaken: periodically going on a tour of inspection of vegetation recovery and adapting corresponding remedial measures for the sections with bad recovery situation.

#### 5.2.3.3 Noise Mitigation Measures

1. Horning will be forbidden in sensitive sites, with marks to this effect provided 100m in front of such sites; Lamps instead of horns will be used for overtaking purposes in night times; Driving speed will be limited, as necessary, at sensitive sites.

- Sensitive sites:

(1)Dayangshu-Baihuapai Highway
Chunlin village(K1900+850), Wulubutie(K1900+500), Maojiapu(K1908+000), Naerkeqi(K1931+100)
(2)Zhalainuoer-Heishantou Highway
Chagang meadow 11 group(K12+600), Quanhe(K31+500), Hulieyetu(K75+900), Badaguan horseland(K120+500), Badaguan meadow(K130+800)
(3)Honghuaerji-Handagai Highway
Bateer forestry center(K57+100)
(4)Alatanemule-Arihashate Highway
Huzheyanpaixing(K13+700)

2. Strengthen maintenance for the Highway and make the road surface maintained at the best conditions.

#### 5.2.3.4 Air Mitigation Measures

1. Considering during the service period in the whole highway line NOx and CO exhausted by the vehicle tail gas will usually not exceed the standard, so strengthening the management and control to make running vehicles on the highway over noise standard would be the main precautions needed.

2. It is suggested not to build new schools and hospitals within 150 m limits on both sides of the Highway.

### 5.2.4 Water and Soil Conservancy

1. Design phase
1) Aiming at the features of the different sections where water and soil loss caused by the highways, the damage to the existing facilities for water and soil conservation shall be as less as possible during the design and construction.

2) Earth borrowing fields and stone quarries shall be set up on wasteland in the design. When fetching sand from riverbeds, the flood carrying safety should not be influenced and the local water administrations should be consulted.

3) In the design of the roadbed, the drainage facilities as well as protective works should be given more attention to and the design of the drainage for pavements should be strengthened to protect the embankment from soil erosion. For the earthwork-excavated section, the drainage design of side ditches should be considered to reduce the water and soil losses.

2. Construction Phase

1) The refuse, earth and stones discarded during the construction shall be filled into the pits nearby and buried up. It is not allowed to discard them in the open at will. The earth and stones should not be heaped up on the upper sloping sides of the cutting or in the filled gullies or valleys so as to avoid severe water and soil loss in case of heavy rains.

2) Measures for water and soil conservation on both side of the highway
(1) Grass planting on side slopes of the roadbed

The filled embankment is subject to water and soil loss because of loose soil on the side slops. When the fill is low, the side slopes can be directly seeded with plants so that the big root system of the plants can provide the protection for its soil mass. When the fill is high, anti-wash grids can be built up. For this purpose, stones can be laid up or wicker be pressed into a square with the side length of 1-1.5m. The side of the grid is at dip angles of 45 degrees to the horizontal line.

Bushes normally are planted in spring and grass seeds sowed well distributed on the slopes before summer. The density of bush planting is one per square meter and the quantity of the grass seeds is 8 to 109 per square meter.

(2) Protective works for the roadbed

In order to prevent the side slopes of the roadbed from soil erosion and from being washed, the roadbed shall be protected with laid stones or provided with water retaining walls.

(3) Measures for protection of cuttings

They mainly include excavating catch drains on the upper slope of the cutting to decrease the slope runoffs into the excavated slope, in case such runoffs resulting in the erosion of side slopes.

(4) In order to prevent the built-up water on the pavement from carrying away the soil from the roadbed and the primary surface of it, the drainage system shall be built up for the pavement and the roadbed. The drainage ditches should be designed longer so that no water and soil loss would be increased at local place due to the surface soil washout by the drained water.

3. Operation Phase
During the service stage of the highway, the works or measures, which have been taken, should be maintained. In sections where soil erosion is caused by build-up of water on the pavement or by

improper preventive measures, remedial actions shall be taken immediately. And also timely watering, fertilization and weed eliminating to ensure the proper growth of the plants shall carefully tend the biological measures. The under grown plants shall be reseeded in time and the causes shall be found out.

## 5.3 Environmental Management Plan And Monitoring Plan

### 5.3.1 Environmental Management Plan

Environmental protection management agencies, personnel and environmental management networks for construction and operation phase of the LRIP are illustrated in Figure 5-1 and 5-2.

IMCD: Inner Mongolia Communications Department

EPA: Environmental Protection Agency

PO: Project Office

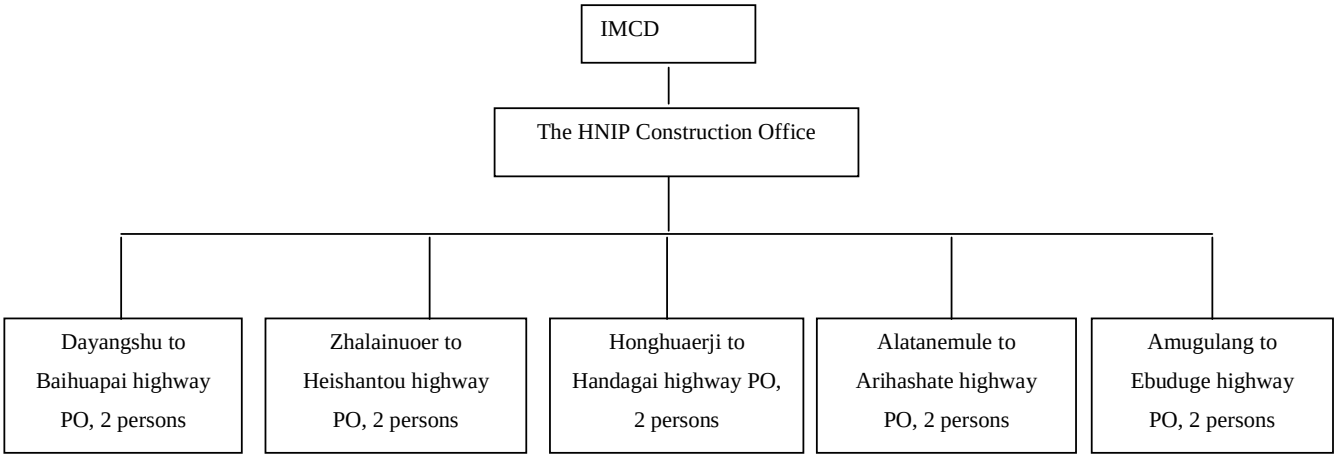



Figure 5-1 Environmental management, agencies and personnel network in construction phase

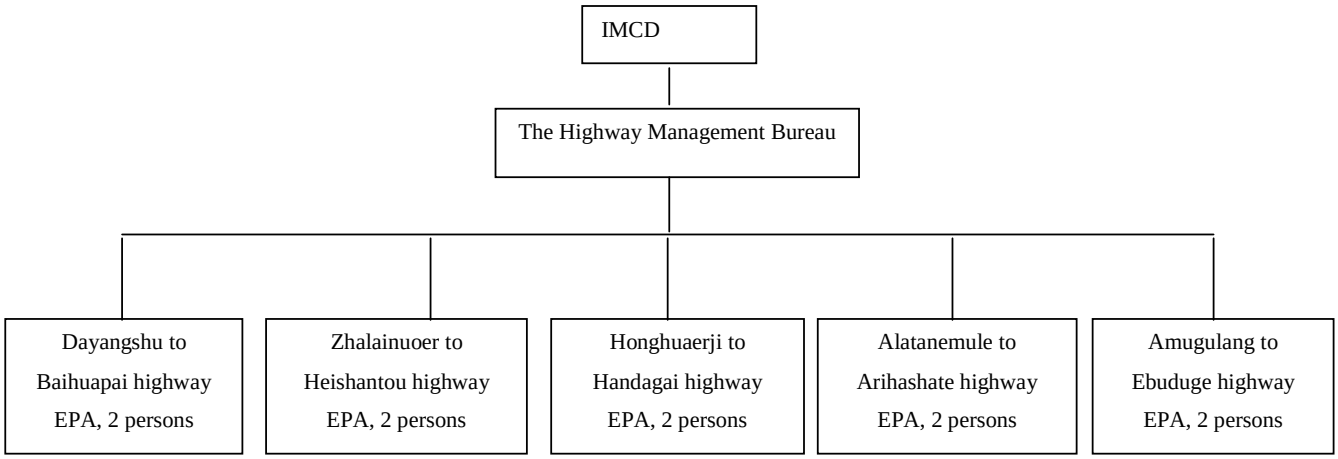



Figure 5-2 Environmental management, agencies and personnel network in operation phase

In construction phase, the LRIP Construction Office under Inner Mongolia Communications Department (IMCD) will be administrated environmental management. Five Environmental

Protection Agencies for each highway have already been set up with a staff of 2 persons.

The environmental terms of reference of these agencies includes:

- To develop environmental work plans and to be in charge of implementation surveillance and routine management of environmental measures exercised in construction activities of highways;
- To distribute environmental monitoring assignments devoted to construction and operation periods of highways;
- To investigate and deal with any traffic pollution events occurring on highways;
- To undertake environmental management of highways;
- To deal with public charges and accept the surveillance of local environmental protection agencies.

In construction phase□Dayangshu-Baihuapai Highway Project office, Zhalainuoer-Heishantou Highway Project office, Honghuaerji-Handagai Highway Project office, Alatanemule-Arihashate Highway Project office and Amugulang-Ebuduge Highway Project office are set up, including environmental protection sector and full time personnel, which are responsible daily management and survey the implementation of mitigation measures.

After construction period, Dayangshu-Baihuapai Highway Project office, Zhalainuoer-Heishantou Highway Project office, Honghuaerji-Handagai Highway Project office, Alatanemule-Arihashate Highway Project office and Amugulang-Ebuduge Highway Project office will all changed into highway management agencies, but reserve environmental protection sector and relative personnel, who will perform environmental protection in operation phase under Inner Monglia administration Bureau.

Suggest each contractor to appoint a full time person engaged in environmental protection.

### 5.3.2 Environmental Monitoring Program

Environmental monitoring plan is seen Table 5.3-1, Table 5.3-2 and Table 5.3-3□

Table5.3-1 Environmental Monitoring Plan (Social and Ecological)

| Environmental Element | Item | | Major Technical Demand | Institutions | Sponsor |
|---|---|---|---|---|---|
| Social Environments | Construction | Traffic situations | 1. content: To investigate the traffic situations in mainly sections of highways<br>2. Frequency : random. | Project Office | Local Traffic Bureau |
| | | Cleaning up the work sites | 1. Content: after construction, to check environmental restoration of work sites completely<br>2. Monitoring time: after construction | Project Office | Local environmental protection bureau |
| Ecological Environment | Soil and Vegetation Restoration | | 1. Construction Phase□to check environmental mitigation measures implemented<br>2. after construction :<br>1) Content:□Investigation of vegetative restoration<br>2□Monitoring Elements□land restoration rate, coverage rate<br>3□Frequency □within 3 years after construction, 2/year. | Project Office, Local environmental monitoring station | Local environmental protection bureau |
| | Afforestation | | 1. Construction Phase: to check each afforestation engineering<br>2. Construction completed:<br>1) Content: growth situations<br>2)Monitoring Elements: survival rate, amount of growth<br>3) Frequency: within 3 years after planted, 2/ year | Project Office, construction units | Local environmental protection bureau |
| | Water-Soil conservancy | | 1.Construction Phase: to check the Water-soil conservancy measures<br>2. After construction : Water-soil conservancy effect | Project Office | Local environmental protection bureau |

Table 5.3-2 Environmental Monitoring Plan ( Noise )

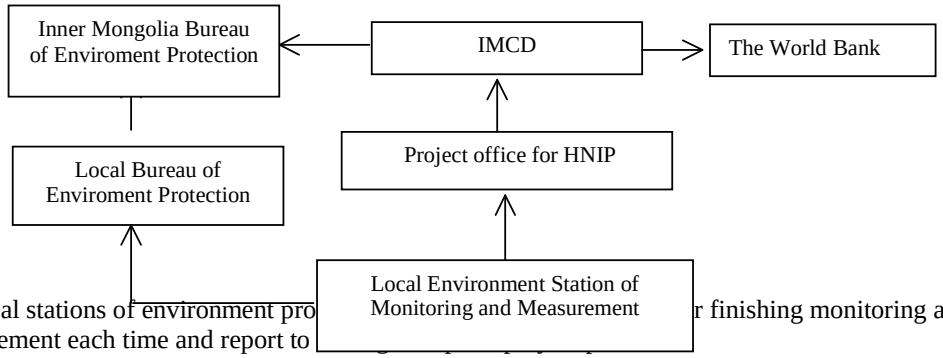
| Phase | Road | Monitoring Location | Items | Frequency | Duration | Sampling time | Institutions | Sponsor |
|---|---|---|---|---|---|---|---|---|
| Construction Phase | Dayangshu-Baihuapai Highway | Dayangshu (K1879+500), Chunlin village (K1900+850), Wulubutie (K1900+500), power supply station (K1900+850), Maojiapu (K1908+000), Naerkeqi (K1931+100), Baihuapai (K1951+000) | Noise | 1/month | 1 day | 2/d | Monitoring Stations | Project Office |
| | Zhalainuoer-Heishantou Highway | Zhalainuoer (K0+000), Chagang meadow 11 group (K12+600), Quanhe (K31+500), Hulieyetu (K75+900), Badaguan horseland (K120+500), Badaguan meadow (K130+800), Heishantou (K158+000) | | | | | | |
| | Honghuaerji-Handagai Highway | Honghuaerji(K0+000), Bateer forestry center( K57+100), Handagai (K99+000) | | | | | | |
| | Alatanemule-Arihashate Highway | Alatanemule (K0+000), Huzheyanpaixing (K13+700), Handagai (K82+500) | | | | | | |
| | Amugulang to Ebuduge | Amugulang (K0+000), Ebuduge (K19+300) | | | | | | |
| Operation Phase | Dayangshu - Baihuapai Highway | Chunlin village (K1900+850), Wulubutie (K1900+500), Maojiapu (K1908+000), Naerkeqi (K1931+100), | Environmental Noise | 2□Year | 1d | Each in day and nighttime | Monitoring Stations | Provincial Roads & Highways Bureau |
| | Zhalainuoer-Heishantou Highway | Chagang meadow 11 group (K12+600), Quanhe (K31+500), Hulieyetu (K75+900), Badaguan horseland (K120+500), Badaguan meadow (K130+800) | | | | | | |
| | Honghuaerji-Handagai Highway | Bateer forestry center (K57+100) | | | | | | |
| | Alatanemule-Arihashate Highway | Huzheyanpaixing (K13+700) | | | | | | |

Table 5.3-3 Environmental Monitoring Plan (Air quality)

| Phase | Road | Monitoring Location | Items | Frequency | Duration | Sampling time | Institutions | Sponsor |
|---|---|---|---|---|---|---|---|---|
| Construction Phase | Dayangshu-Baihuapai Highway | Dayangshu(K1879+500)<br>Chunlin village(K1900+850)<br>Wulubutie(K1900+500)<br>Powersupplystation (K1900+850)<br>Maojiapu(K1908+000)<br>Naerkeqi(K1931+100)<br>Baihuapai(K1951+000) | TSP | 1/month | 1 day | Construction | Monitoring Stations | Project Office |
| | Zhalainuoer-Heishantou Highway | Zhalainuoer(K0+000)<br>Chagang meadow 11 group (K12+600)<br>Quanhe(K31+500)<br>Hulieyetu(K75+900)<br>Badaguan horseland(K120+500)<br>Badaguan meadow(K130+800)<br>Heishantou(K158+000) | | | | | | |
| | Honghuaerji - Handagai Highway | Honghuaerji(K0+000)<br>Bateer forestry center (K57+100)<br>Handagai(K99+000) | | | | | | |
| | Alatanemule -Arihashate Highway | Alatanemule(K0+000),<br>Huzheyanpaixing (K13+700),<br>Handagai(K82+500) | | | | | | |
| | Amugulang -Ebuduge | Amugulang(K0+000),<br>Ebuduge(K19+300) | | | | | | |
| Operation Phase | Dayangshu - Baihuapai | Wulubutie(K1900+500),<br>Naerkeqi(K1931+100) | NOx<br>CO | Two times a year ( in January & July) | 5 days | 7:00<br>10:00<br>14:00<br>18:00 | Environmental Monitoring Stations | Provincial Roads & Highways Bureau |
| | Zhalainuoer -Heishantou | Hulieyetu(K75+900),<br>Badaguan(K130+800) | | | | | | |
| | Honghuaerji -Handagai | Bateer forestry center(K57+100) | | | | | | |
| | Alatanemule -Arihashate | Huzheyanpaixing(K13+700) | | | | | | |
| | Amugulang -Ebuduge | Amugulang(K19+300) | | | | | | |

### 5.3.3 Report System for Monitoring

Diagram is shown in the following block.




The local stations of environment pro r finishing monitoring and measurement each time and report to

Every February, Inner Mongolia Communications Department provides the Annual Environment Monitoring Report to World Bank.

## 5.4 Environmental Cost Estimate

Environmental facilities investment estimation is seen as table 5.4-1.

To ensure implementation of those environmental facilities, we suggest:

1. At the bid of the project, mitigation measures should be contained in the content of bid document.
2. Specify the content of mitigation measures in the contract.

Table 5.4□1 Environmental Facilities Investment Estimation Table (unit□×$10^4$ yuan)

| No | Mitigation Measures | Project name | | | | |
|---|---|---|---|---|---|---|
| | | Dayangshu-Baihuapai Highway | Zhalainuoer- Heishantou Highway | Honghuaerji-Handagai Highway | Alatanemule - Arihashate Highway | Amugulang-Ebuduge Highway |
| 1 | Water and soil conservation measures | 211.5(3/km) | 474(3/km) | 297(3/km) | 247.5(3/km) | 57.9(3/km) |
| 2 | Soil restoration | 84.6(1.2/km) | 126.4(0.8/km) | 79.2(0.8/km) | 66(0.8/km) | 15.4(0.8/km) |
| 3 | Afforestation | 105.75(1.5/km) | 158(1.0/km) | 99(1.0/km) | 82.5(1.0/km) | 19.3(1/km) |
| 4 | Monitoring in construction phase | 26 | 32 | 22 | 20 | 10 |
| 5 | Training cost | 2(1×2 person) | 2(1×2 person) | 2(1×2 person) | 2(1×2 person) | 2(1×2 person) |
| 6 | Total | 429.85 | 79.4 | 499.2 | 421 | 94.6 |

### 5.5 Personnel Training

1. The full-time environmental protection administrators should be organized by the Traffic Department under The government of Inner Mongolia Autonomous Region to receive centralized training. This training is mainly held in our country, selecting a province or city with well-developed traffic for learning its advanced knowledge and experiences in the respect of environmental protection for the highway construction and management. After passing the training, they will be given a post qualification each.

2. The part-time environment protection administrators during the construction course will receive the centralized training organized by the Inner Mongolia Highway Bureau. They major in the management and supervision of the environment protection during the construction.

3. Before construction, project office will organize to train parttimer engaged in environmental protection.

4.Before construction, all workers will be trained for environmental protection by project office.

# 6. Public Participation

### 6.1 Scope and Ways of Public Participation

In October 2003 and February 2004, after screening environmental factors and finishing draft IEE Inner Mongolia Environmental Science Institute has done social investigation and pulic participation

twice.

On October 18-30, 2003, after environmental screening, the EA group held public consultation meetings in Elunchun autonomous benner, Xinbaerhu left banner, Chenbarerhu benner, Eerguna city, Ewenke autonomous benner and Xinbaerhu right banner, with 13, 15, 11, 13 and 12 persons respectively. Most of them are local people. On the last ten days of October to the first ten days of November, 2004, 500 questionnaires were distributed with 486 feedback.

On January 28 to February 4, 2004, after draft IEE, the EA group held public consultaion meetings again in Elunchun autonomous benner, Xinbaerhu left banner, Chenbarerhu benner, Eerguna city, Ewenke autonomous benner and Xinbaerhu right banner, with 9, 14, 18, 16 and 15 persons respectively. Most of them are also local people. On the last ten-day of January, 2004, 500 questionnaires were distributed with 483 feedback.

Besides local people, the participations of consultation meetings were from the Council representatives, local governors and NOGs along the alignment and we also consulted the following departments: agriculture, forestry, water conservancy and communications about environmental protection.

1000 questionnaires distributed totally were collected 969. Investigation results can be seen in table 6.3-3.

## 6.2 Publicizing and Information Disclosure

In October 2003 and January 2004, the EIA team involving 9 persons publicized basic circumstances of the project along the route with such contents as: 1) Highway location; 2) Possible noise impact; 3) Possible influence from highway construction etc. The publicizing was carried out by two methods as door-by-door introduction and material sending. All the participants gave out their opinions actively, which shows a positive attitude to the highway constructions.

In the last ten days of January 2004, on the basis of the initial draft of the EA, we had face-to-face investigations with 46 persons at impacted areas. All the contents publicized and realized contain the following: 1) Adverse impacts of the highway; 2) EP measures to be taken; 3) public views on our measures. They all paid great attention to the project construction because they are closely related to their own interests.

In addition, an advertisement for EIA information disclosure was put on the Hulunbeier Daily (a local newspaper) on February 3, 2004 in order to let affected groups, local NGOs and individuals know the public consultations and information disclosure.

## 6.3 Questionnaire Findings and Analysis

Questionnaires were distributed among the local residents and persons concerned in the last ten days of October to in the last ten days of January, 2004. For being informed of what the local people think of the reconstruction of the road and environmental protection related the road, 1000 questionnaires (every road 200 questionnaires ) were distributed. Out of the 969 feedback questionnaires (the rate is 96.9%), 832 were contributed by farmers and herders, 104 by workers and 33 by others (including officials and teachers). Seen Table 6.3-1 for professional constitution of the interviewees.

Table 6.3-1 Professional Constitution of Interviewees

| Profession | Farmers and Herders | Workers | Other |
|---|---|---|---|
| % | 85.9 | 10.7 | 3.4 |

Table 6.3-2 includes education level of the interviewees.

Table 6.3-2 Education Level of Interviewees

| Education | Higher than Polytechnic school | Senior middle school | Junior middle school | Primary school |
|---|---|---|---|---|
| % | 1.6 | 51.8 | 40.9 | 4.1 |

As seen from Table 6.3-1 and Table 6.3-2, such constitution as investigated appropriately reflects the fact, as well as the education level. Generally, the interviewees are representative.

Detailed statistics retrieved from these questionnaires are shown in Table 6.3-3.

Table 6.3-3 Statistics Retrieved from Questionnaires

| Question | Answer | Percentage (%) |
|---|---|---|
| Degree of understanding of environmental protection | Understand well | 4.9 |
| | Understand | 26.7 |
| | Understand little | 59.5 |
| | Not understand | 8.9 |
| Degree of satisfaction to the current communications situation | Very satisfied | 0 |
| | Satisfied | 1.3 |
| | Not satisfied | 98.7 |
| Environment impacts of the road | Major | 0 |
| | Minor | 41.3 |
| | Slight | 30.1 |
| | Not know | 28.6 |
| Economic development promotion by the road | Major | 98.8 |
| | Minor | 1.2 |
| | Slight | 0 |
| | Not promotion | 0 |
| Promotion of living standard and amenities by the road | Somewhat improved | 93.9 |
| | Not improved | 6.1 |
| | Degraded | 0 |
| Attitude to reconstruction | Early construction | 99.2 |
| | Late construction | 0.8 |
| | Without construction | 0.0 |

## 6.4 Summary of Public Participation

The investigation indicates that 99.2% of the masses agree on the construction as soon as possible; 98.7% of the masses expressed the dissatisfaction to the traffic status; 93.9% of the masses think that the proposed highway is good for improving their living standards. They all support the project.

The concerns of the public are summarized as follow:

1. To use as less good farmland as possible for temporary land use during construction, and compensate for the farmland used properly.
2. Strengthen environmental protection management in constructive stage: reduce the areas of vegetation destroy; control the vehicles to avoid destroying grassland; taking restoration measures of vegetation at borrowing sites and discarding sites.
3. Ecological environment is fairly good, so ecological environment protection should be done.

Summary Of Environmental Mitigation Measures For Design Phase

| No. | Environmental Issue | Mitigation Measures | Implementer | Supervisor |
|---|---|---|---|---|
| 1 | The lines avoid passing major environmental sensitive sites: | The lines avoid passing major environmental sensitive sites: (1)Dayangshu-Baihuapai Highway:Chunlin village(K1900+850), Wulubutie(K1900+500), Maojiapu(K1908+000), Naerkeqi(K1931+100); (2) Zhalainuoer-Heishantou Highway: Chagang meadow 11 group (K12+600), Quanhe (K31+500), Hulieyetu (K75+900), Badaguan horseland (K120+500), Badaguan meadow (K130+800); (3) Honghuaerji-Handagai Highway: Bateer forestry center (K57+100); (4) Alatanemule-Arihashate Highway: Huzheyanpaixing (K13+700) | Design Institute | Project Office |
| 2 | Present irrigating or draining systems cut across or damaged | Ought to be rebuilt or reformed in proper way through sufficient consultation with local persons concerned. | Design Institute, Contractors | Project Office |
| 3 | Ecological Environmental Mitigation Measures | 1. In the engineering design, the balance of earth and stone should be reached as far as possible, the mountain areas should be selected as waste earth yards, and occupation of grasslands should be avoided. The earth borrowing yards shall occupy grasslands of high yields as less as possible. And the protection embankments shall be built in the grassland areas to reduce the land occupation.<br>2. To project the grassland tourism resources, it is suggested that the earth borrowing yards and waste earth yards should not be allocated within the fields of vision along the lines and should be allocated on the mountain rear sides, and that soil should be extracted as level as possibly and, then, the recovery measures should be taken and grass should be planted.<br>3. The protection engineering of the road bases and the drainage engineering of the highway should be rationally designed to prevent soil erosion and water and soil loss. | Design Institute, Contractors | |
| 4 | Water And Soil Conservancy | 1. Aiming at the features of the different sections where water and soil loss caused by the highways, the damage to the existing facilities for water and soil conservation shall be as less as possible during the design and construction.<br>2. Earth borrowing fields and stone quarries shall be set up on wasteland in the design. When fetching sand from riverbeds, the flood carrying safety should not be influenced and the local water administrations should be consulted.<br>3. In the design of the roadbed, the drainage facilities as well as protective works should be given more attention to and the design of the drainage for pavements should be strengthened to protect the embankment from soil erosion. For the earthwork-excavated section, the drainage design of side ditches should be considered to reduce the water and soil losses. | Design Institute | Project Office |

Summary Of Environmental Mitigation Measures For Construction Phase

| No. | Environmental Issue | Mitigation Measures | Implementer | Supervisor |
|---|---|---|---|---|
| 5 | Heightening communication wires | The building units need first to consult with communication departments, fixing substitution lines for the lines along the route to be removed before the removal of the original line. | Design Institute, Contractors | Project Office |
| 6 | Construction of Bridge & Culvert | 1.Any waste material resulting from bridge/culvert construction should not be let into the river channel to avoid any impact on the flood discharge capacity or original functions of the river;<br>2.Not to destroy any of the river dykes and not to affect the flood discharge capacity;<br>3.To not narrow the original river channel. | Design Institute, Contractors | Project Office |
| 7 | Underground Cultural Relics to Be Discovered in Construction | 1.To suspend work for the purpose of protecting any discovered cultural relics;<br>2.To report to archaeological departments;<br>3.To provide cooperation and assistance in archaeological salvation;<br>4.To resume work when archaeological excavation is completed and the archaeological department allows work resumption. | Contractors | Project Office |
| 8 | Temporary Use Land | 1.To maximize use of wasteland or poor land, and to minimize rangeland;<br>2.To properly compensate for any temporary use of rangeland according to the duration of such occupation;<br>3.Upon completion of construction activities, to clean the land for temporary use and to recover it;<br>4.To minimize land areas for temporary use. | Contractors | Project Office |
| 9 | Subgrade soil spoil & soil Borrowing | 1.To properly arrange longitudinal allocation of subgrade soil work;<br>2.To borrow soil from highland in case of inadequacy of embankment, but to control the excavation depth , with consideration to use of solid industrial waste materials nearby;<br>3.To Pave excavation materials in low-lying areas and to borrow soil from highland for facilitating future restoration;<br>4.To temporarily put aside the cropped soil wherever it is necessary to borrow soil from farmland or to place excavation material in farmland, to level and to place back the cropped soil for farmland recovery.<br>5.To put aside the cropped soil temporarily wherever it is necessary to borrow soil from farmland or to place excavation material in farmland, to level and to place back the cropped soil for farmland recovery. | Design Institute, Contractors | Project Office |

Summary Of Environmental Mitigation Measures For Construction Phase

| No. | Environmental Issue | Mitigation Measures | Implementer | Supervisor |
|---|---|---|---|---|
| 10 | Domestic Sewage from Construction workers | 1.To bury the dejecta at suitable sites.<br>2. Sewege of constructive camp should be used for afforestration.<br>3.To stockpile domestic trash and bury. | Contractors | Project Office |
| 11 | Blown Dust due to Lime Soil Mixing | 1. To centrally mix lime and soil materials;<br>2.To locate lime and soil mixing plants more than 200m leeward of residential sites. | Design Institute, Contractors | Project Office |
| 12 | Blown Dust Arising from Building Material Transportation | 1.To water the surface of the transportation route at least twice in the morning and twice in the afternoon (especially in the summer) so as to reduce blown dust;<br>2.To water and cover the surface of fly ash (or other solid industrial waste) and soil being transported;<br>3.To cover the surface of cement and lime being transported. | Contractors | Project Office |
| 13 | Construction Material Stockpiling | 1.Construction material should be stockpiled beyond 200m leeward of any village (or residential site) rather than at windward of any villages;<br>2.To cover the stockpile in case of rainy, snowy and windy days.<br>3. Both banks of main rivers cannot stack constructive materials. | Contractors | Project Office |
| 14 | Asphalt Smoke | 1.To centrally mix asphalt concrete in enclosed places, and avoid to discharge asphalt smoke.<br>2.To locate asphalt concrete batching plants in leeward of residential sites with 200m away. | Design Institute, Contractors | Project Office |
| 15 | Construction Noise | 1.High-noise equipment shall be stationed 150 m away from sensitive points. If high-noise equipment is less than 50 m away from residential area, night-work (22:00-6:00) is prohibited.<br>2. The constructors should pay attention to maintenance for the machines and properly operate. The workers should minimize noise of the road building machines. | Contractors | Project Office |

Summary Of Environmental Mitigation Measures For Construction Phase

| No. | Environmental Issue | Mitigation Measures | Implementer | supervisor |
|---|---|---|---|---|
| 16 | Bridge and Culvert Engineering | There are a few rivers along the highways lines to be construction. The construction in the cofferdam method should be adapted to effectively prevent turbid water quality produced by the construction, and construction refuse from falling to the rivers to pollute water bodies. | Contractors | Project Office |
| 17 | Machine Work | 1. Sewage from construction machines which contains oil should be collected and then treated (collected into waste plastic tanks and then transferred out for treating), and should not be discharged into the water bodies.<br>2. The stack sites for the construction materials, such as bitumen, oil materials chemical substances, etc., should be located outside the riverbeds and equipped with canvas for temporarily covering purpose. | Contractors | Project Office |
| 18 | Construction Camping Grounds | 1. The construction camping sites should not be located beside the water bodies. The domestic sewage produced from the construction camping sites should be centrally treaded, and excrement and urine may be compost-treated and then become a fertilizer for grasslands. It should be absolutely prohibited that they are randomly flooded or discharged into rivers without management.<br>2. The sanitation and anti-epidemic work should be enhanced in the construction camping sites during the rain season to prevent disease spreading.<br>3. It should be prohibited that the waste stuff and construction materials are discarded and stacked beside water bodies to prevent pollution and block of the water bodies. | Contractors | Project Office |
| 19 | Water-Soil Erosion | To adopt water-soil conservancy measures are roadside slope protection, cut- slope protection, Highway shelterbelts making, land restoration and water-soil conservancy measures for both side slope surfaces of the Highway. | Design Institute, Contractors | Project Office |
| 20 | Afforestation | 1.Dayangshu-Baihuapai Highway planting on both sides□poplar□127680,<br>2.Honghuaerji-Handagai Highway planting on both sides□pine tree□52000. | Contractors | Project Office |

Summary Of Environmental Mitigation Measures For Operation Phase

| No. | Environmental Issue | Mitigation Measures | Implementer | supervisor |
|---|---|---|---|---|
| 21 | Traffic Safety | 1. Separating facilities will be provided at residential sites, hospital and schools where there are frequent human activities, and pedestrian crossings will be provided for the purpose of personal safety;<br>2. To forbidden overload of vehicles strictly. | County Highway Administration and traffic police authorities | County transport, public security and environment protection authorities |
| 22 | Dangerous goods management | Trucks carrying any toxic, harmful and dangerous matters will be accompanied by permits issued by public security and highway administration authorities, and every possible measure will be taken for the avoidance of traffic accidents. | County Highway Administration and traffic police authorities | County transport, public security and environment protection authorities |
| 23 | Traffic Noise | 1. Horning will be forbidden in sensitive sites, with marks to this effect provided 100m in front of such sites;. Lamps instead of horns will be used for overtaking purposes in night times; Driving speed will be limited, as necessary, at sensitive sites□1)Dayangshu-Baihuapai Highway: Chunlin village (K1900+850), Wulubutie (K1900+500), Maojiapu (K1908+000), Naerkeqi (K1931+100); 2) Zhalainuoer-Heishantou Highway: Chagang meadow 11 group (K12+600), Quanhe (K31+500), Hulieyetu (K75+900), Badaguan horseland (K120+500), Badaguan meadow (K130+800); 3) Honghuaerji-Handagai Highway: Bateer forestry center (K57+100); 4) Alatanemule-Arihashate Highway; Huzheyanpaixing (K13+700)<br>2. Strengthen maintenance for the Highway and make the road surface maintained at the best conditions. | Contractors | County transport, public security and environment protection authorities |
| 24 | Vehicle Exhaust | 1. Exhaust discharge monitoring will be strengthened, and any vehicle failing the applicable national standard will not be allowed on the road;<br>2. It is inadvisable for any new residential site, school, hospital and any other sensitive site to be built in the range of 200 on both sides; | County Highway Administration and traffic police authorities | County transport, public security and environment protection authorities |
| 25 | Eco-environment | The routine management work for vegetation recovery along the lines should be undertaken: periodically going on a tour of inspection of vegetation recovery and adapting corresponding remedial measures for the sections with bad recovery situation. | County Highway Administration authorities | County environment protection authorities |

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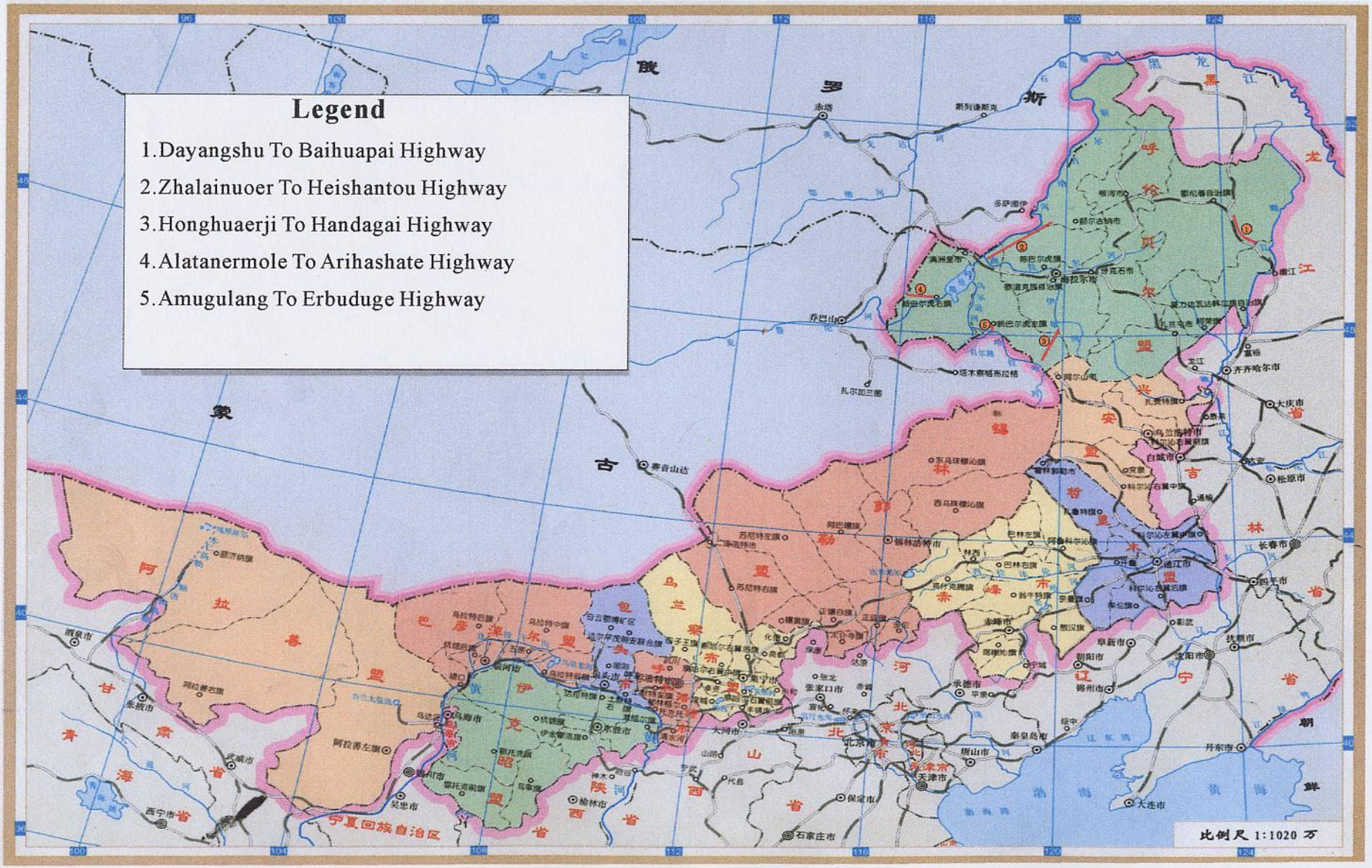
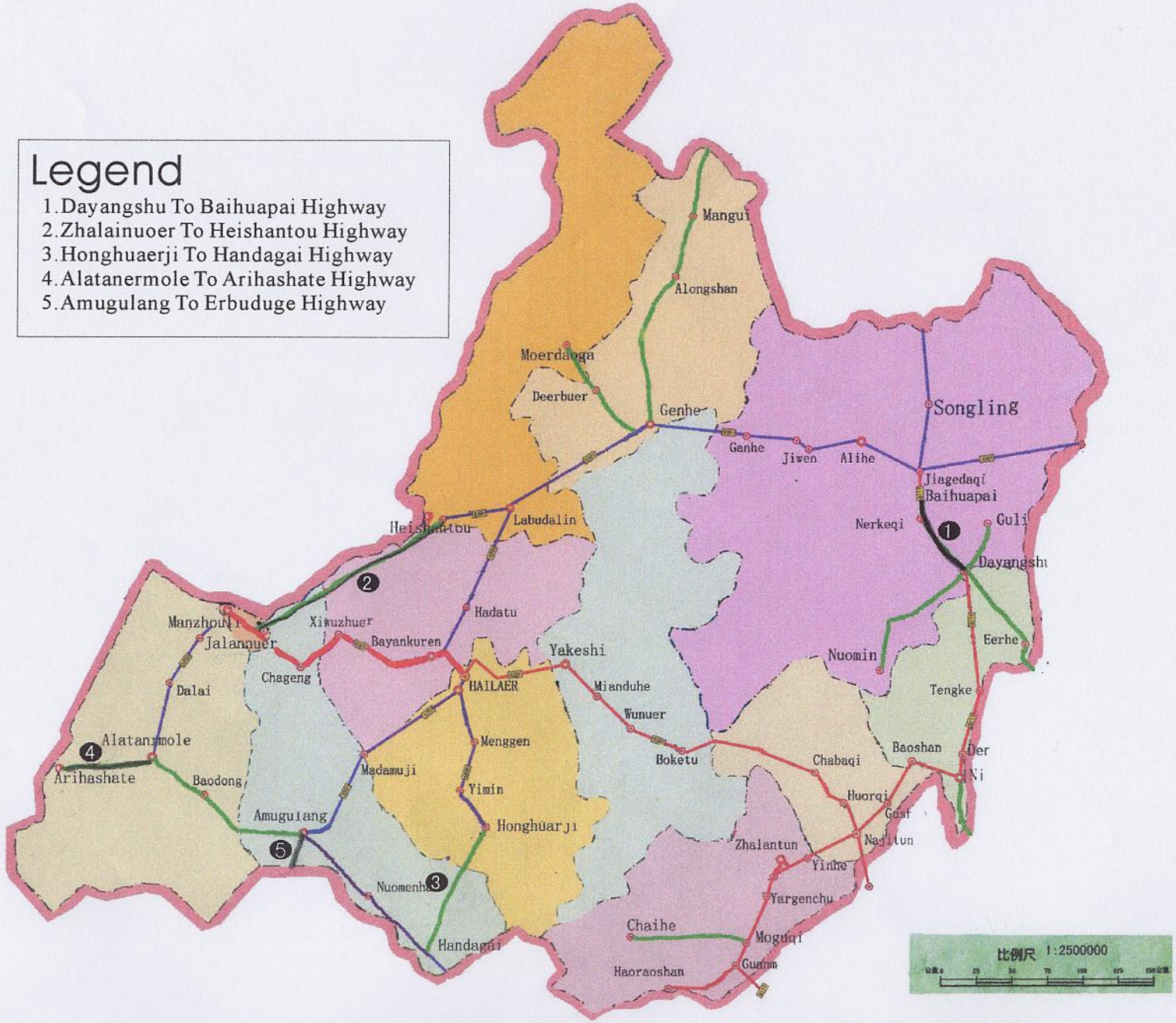
## PART1 INITIAL ENVIRONMENTAL EVALUATION REPORT

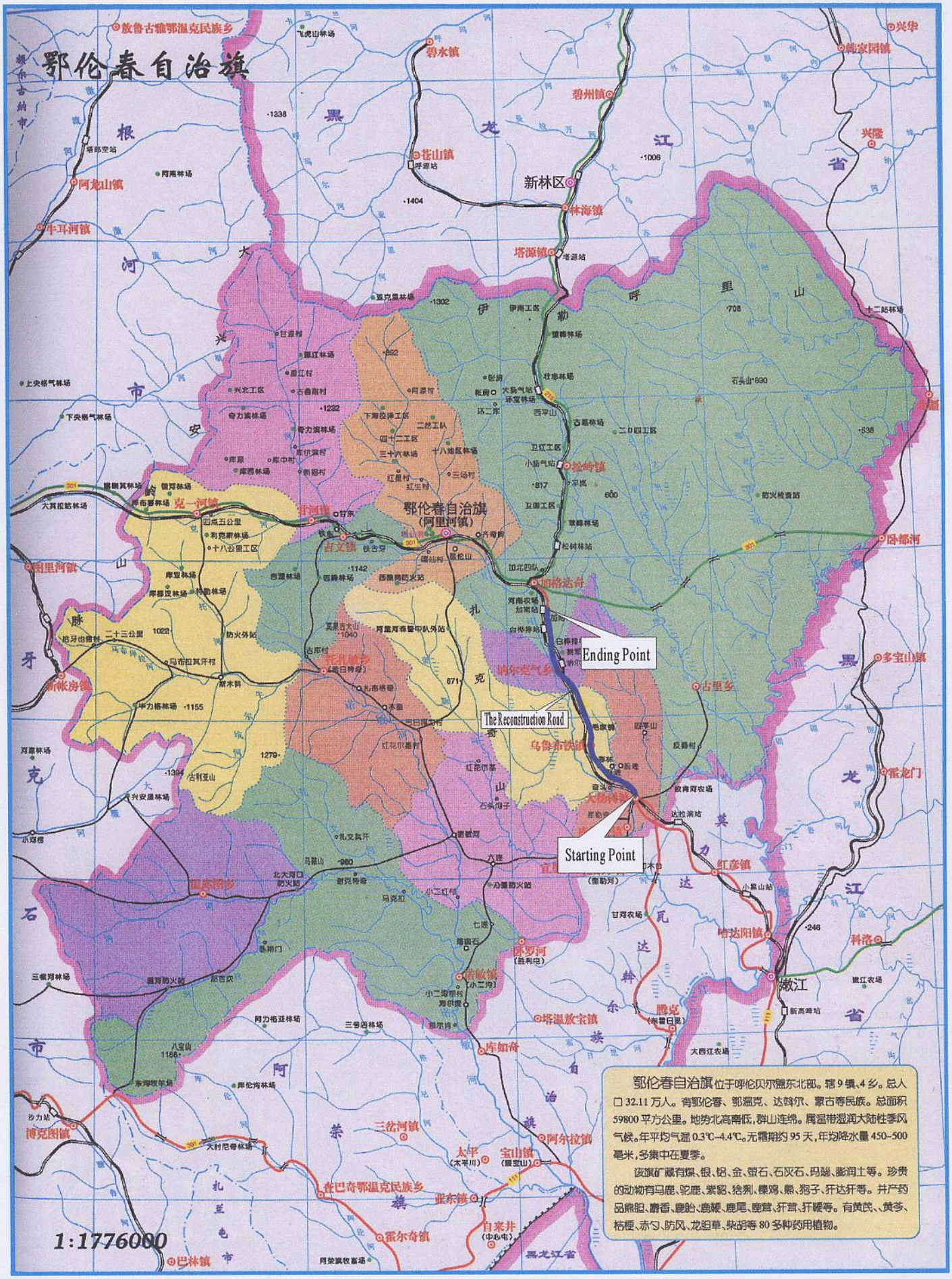
# PART 2 ENVIRONMENTAL ACTION PLAN



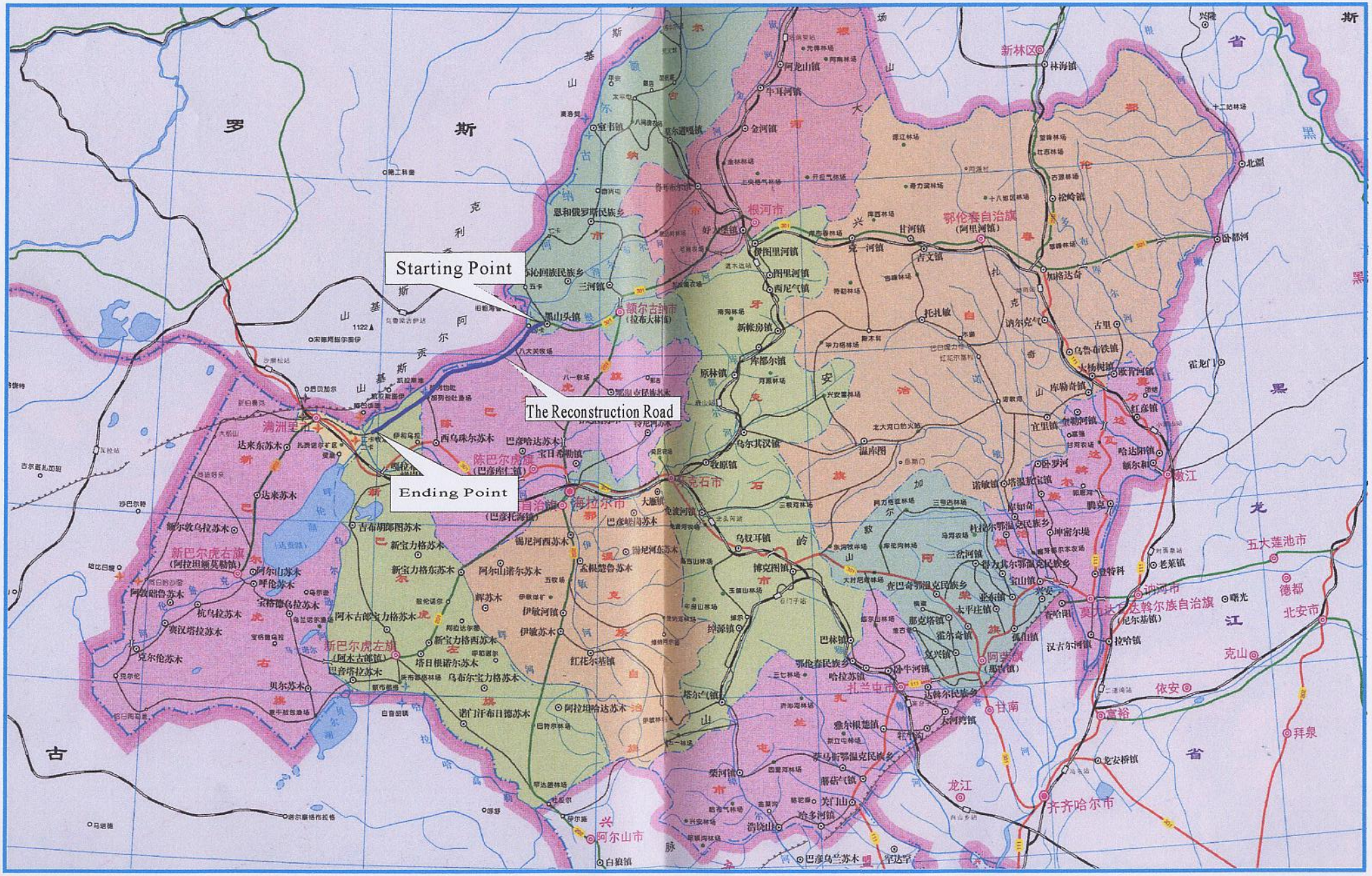

Map1 Geographic Location Map of HNIP



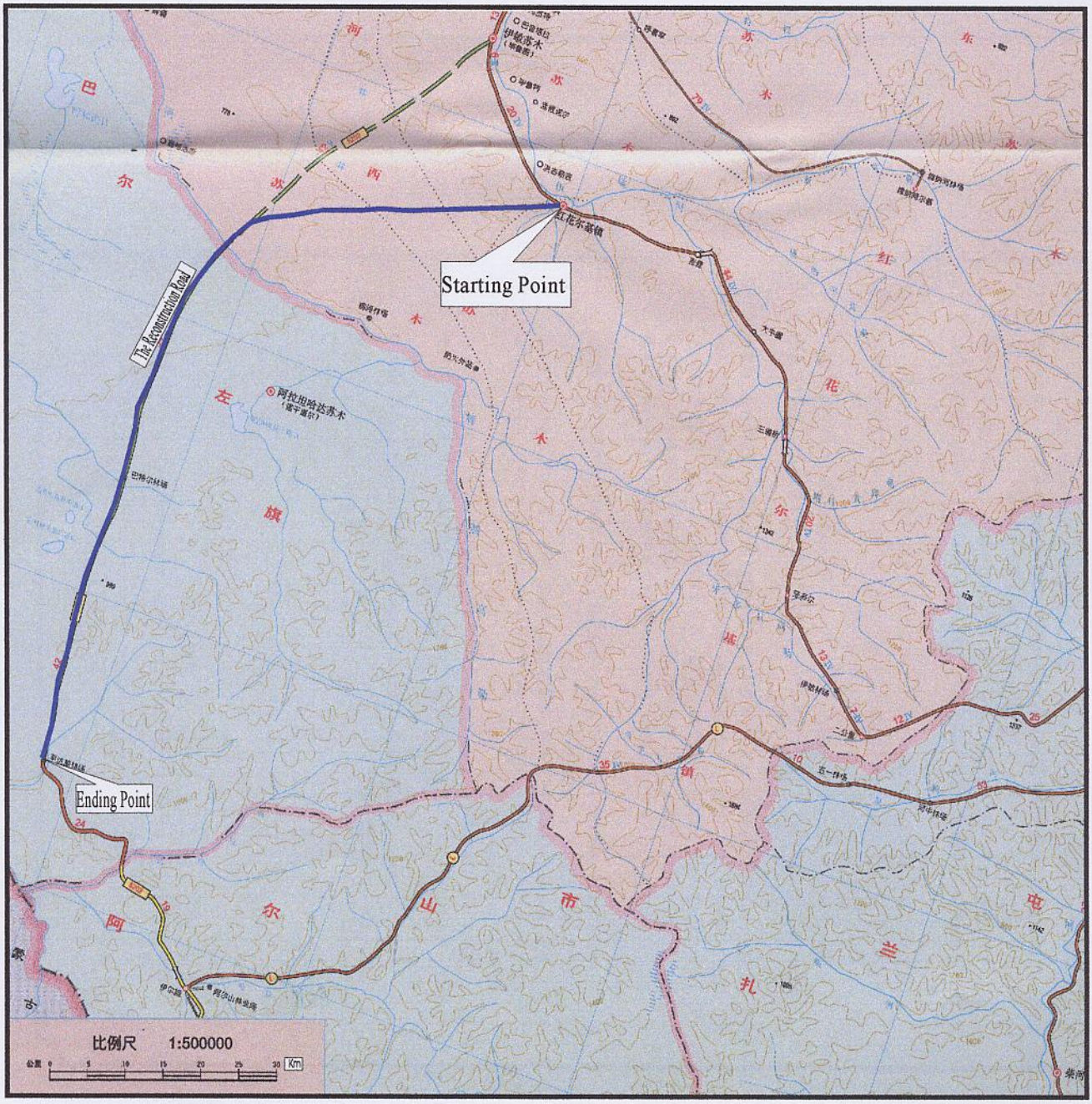

Map2 Geographic Location map of HNIP in Hulunbeier City



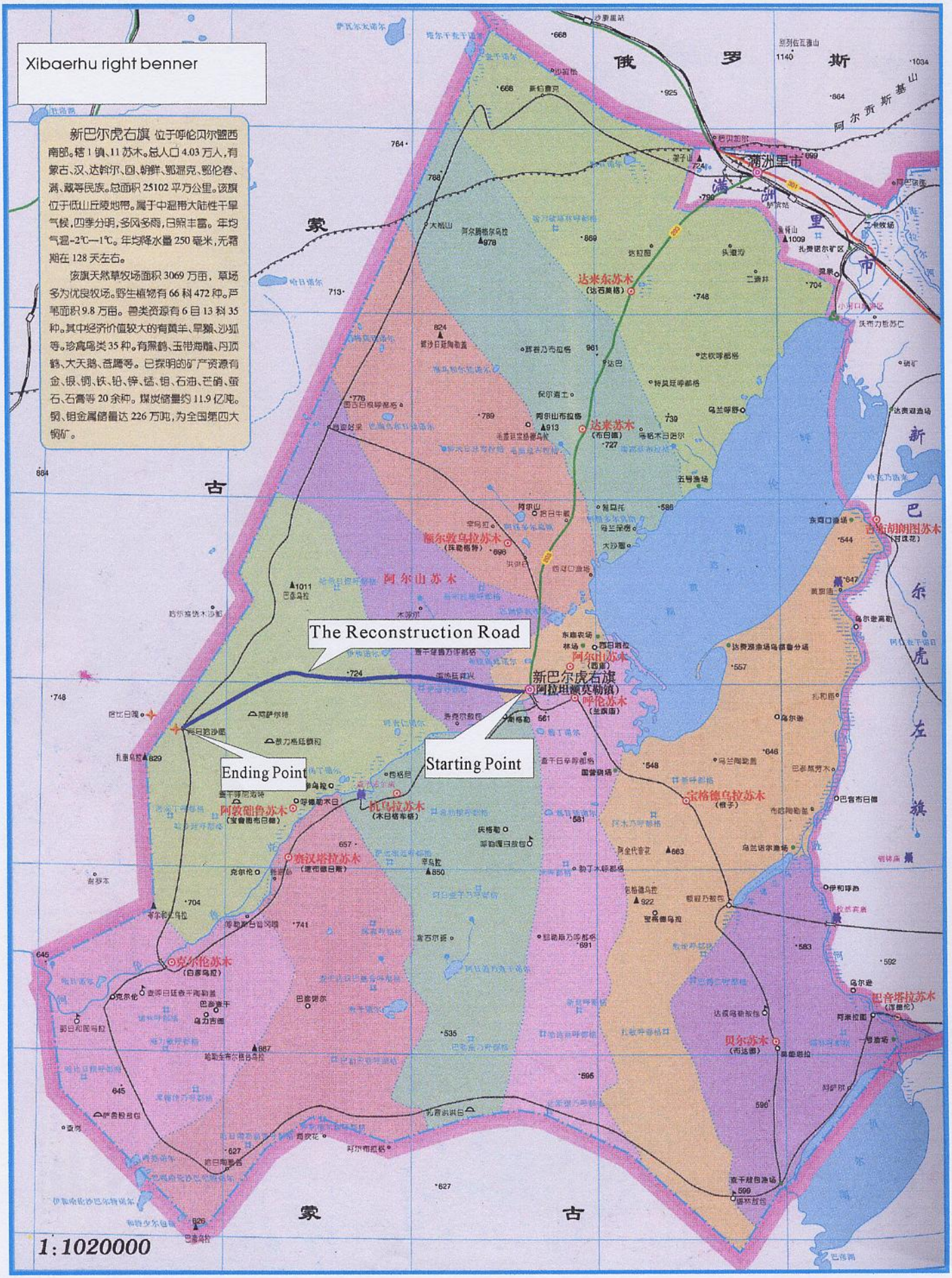

Map3 Dayangshu to Baihuapai Highway Route



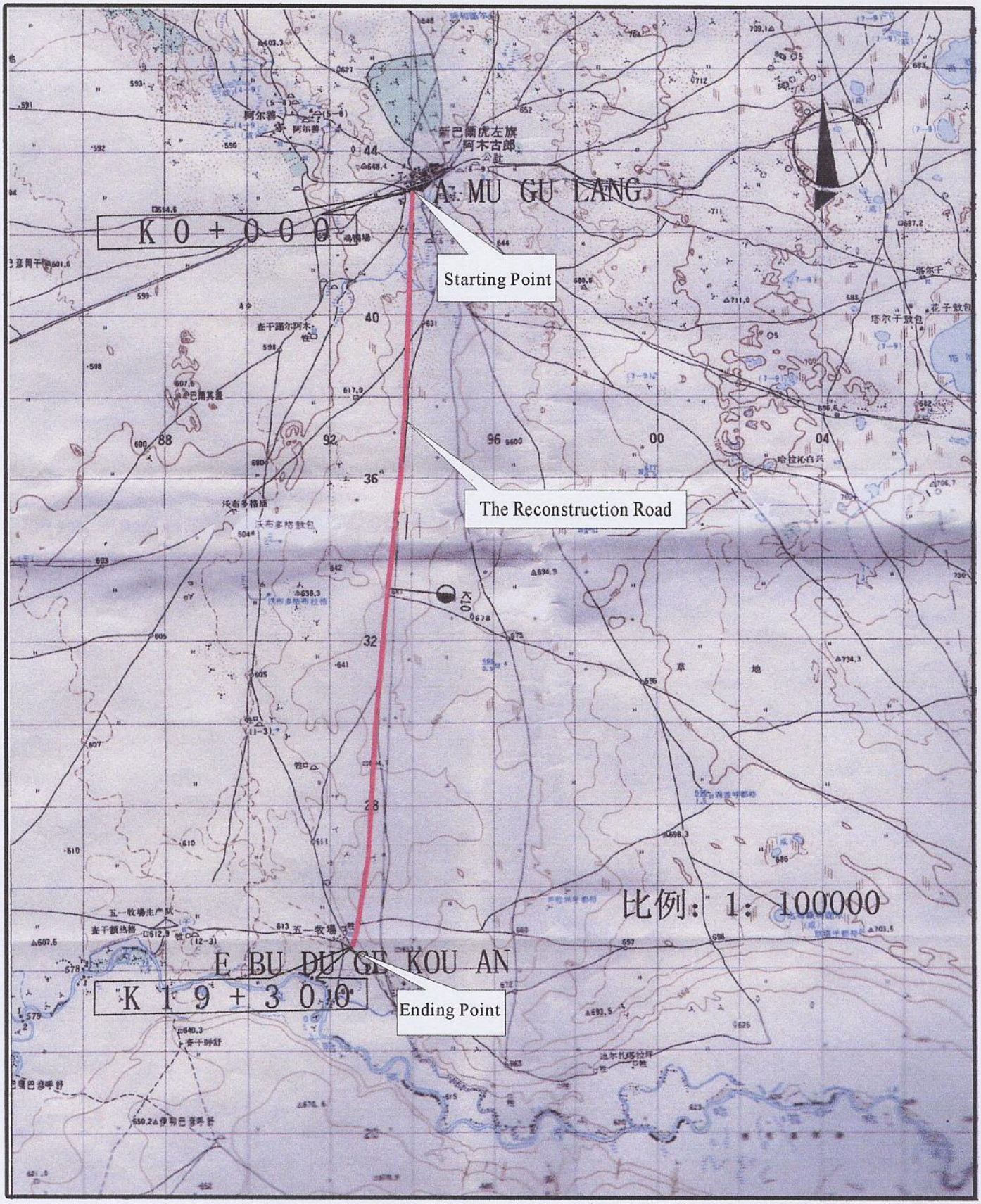

Map4 Zhalainuoer to Heishantou Highway Route




Map 5 Honghuaerji to Haidagai Highway Route




Map6 Alatanemole to Aerhashate Route




Map7 Amugulang to Ebuduge Highway Route