China: Harbin-Jiamusi Railway Project

Environmental Assessment
Executive Summary

November, 2010
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1. INTRODUCTION

Background

This document summarizes the environment impact assessment of the Harbin-Jiamusi (HaJia hereafter) Railway Project in China, highlighting the main issues and conclusions of the Environment Impact Assessment (EIA) and Environment Management Plan (EMP) of the project. According to both Chinese Environmental Impact Assessment laws and regulations and the World Bank’s Operational Policy 4.01 Environmental Assessment, the proposed project is Category A for environmental assessment purposes, due to the scale and significance of potential environmental and social impacts and the sensitivity of the project areas. Therefore, a full environmental assessment report was required.

The Ministry of Railways (MOR) retained China Railway Third Survey and Design Institute (TSDI) for EA preparation. TSDI holds Class A environmental impact assessment accreditation from the Ministry of Environmental Protection (MEP), and was the EA consultant for a number of previous World Bank and Asian Development Bank funded railway projects in China. An EIA and an EMP were prepared following relevant provisions specified in Chinese EIA laws/regulations and technical guidelines as well as World Bank safeguard policies. This Executive Summary is based on these reports, as well as feasibility studies, design and relevant survey carried out for the project.

The EIA and EMP reports cover the railway line alignment, tunnels, terminals, and all construction related infrastructure such as access roads, workers’ camps, borrow pits and disposal sites. The EA reports and EMP were submitted to the World Bank for review and they conform fully to Bank policy guidelines regarding environmental and social issues. All above reports have been made available in China and in the Public Information Center (INFOSHOP) of the World Bank.

As designed, the project (i) incorporated effective analysis of alternatives and engineering measures (51% of the line as large or medium bridges/viaducts) to maximize project benefits and minimize negative impacts that would have occurred; (ii) will not adversely affect or convert any critical natural habitats; (ii) will not adversely affect resources of high cultural value; (iii) will have minimized the need for resettlement and will provide adequate and just compensation and income restoration for affected peoples; and (iv) includes a management plan for addressing environmental and social issues during construction and operation of the project.

Project Development Objectives

The development objective of the proposed project is to respond to existing and anticipated transport demand along the Harbin-Jiamusi corridor by providing increased capacity, faster travels time and increased frequency of services for passengers, and increased capacity for freight.

Environmental Assessment Process and Legal Framework

A full Environmental Assessment (EA) was carried out following the Chinese environmental assessment laws/regulations as well as the World Bank safeguards policies. Of the ten safeguards policies, the following two triggered: (1) Environmental Assessment and (2) Involuntary Resettlement, as summarized in Table 1. The project is also in compliance with environmental policies, regulations and technical guidelines as summarized in Table 2. A summary of regulations regarding railway environmental protection is shown in Table 3.
Table 1 - Compliance World Bank Safeguards Policies

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<th>Safeguard Policies</th>
<th>Actions</th>
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| **Environmental Assessment (OP/BP 4.01)**     | - Category A project. Full EIA and EMP have been prepared.  
- Impacts associated with temporary facilities, e.g. access roads, that are left to Contractors to design will be assessed and mitigated though an Environmental Management Framework (EMF). |
| **Involuntary Resettlement (OP/BP 4.12)**     | - Resettlement Action Plan has been prepared.  
- Impacts associated with temporary facilities; e.g. access roads, that are left to Contractors to design will be assessed and mitigated through a Resettlement Policy Framework (RPF) |
| **Consultation**                               | - A combination of opinion surveys and public meetings were held in the township government, village committee and affected villagers’ homes during preparation of the EIA and Resettlement Action Plan. |

Table 2 - Compliance with Chinese Regulations

<table>
<thead>
<tr>
<th>China Laws and Regulations</th>
<th>Project Compliance</th>
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| **Environmental Protection Law** | EIA is prepared according to relevant laws/regulations and technical guidelines.  
Mitigation measures are developed in EMP and incorporated into project design, and are to be implemented and supervised during construction.  
Final acceptance inspection will be carried out before commissioning. |
| **Environmental Impact Assessment Law** | Full EIA report is prepared, and approved by Ministry of Environmental Protection.  
A dedicated Water and Soil Conservation Plan is developed and approved by water resources authorities. |
| **Notice on Strengthening EIA Management for Construction Projects Funded by Loans from International Financial Institutions** | EIA and EMP are prepared in compliance with World Bank OP4.01. |
| **Environmental Protection Management Regulations for Transport Project** | Mitigation measures are developed in EMP and incorporated into project design, and are to be implemented and supervised during construction.  
Final acceptance inspection will be carried out by MEP before commissioning. |
| **Solid Waste Pollution Prevention and Control Law** | A Water and Soil Conservation Plan (namely, a soil erosion control plan) is developed and incorporated into EMP and contracts for implementation.  
All waste spoils will be reused or properly disposed of in preselected and approved disposal sites with re-vegetation plan. |
| **Water Pollution Prevention and Control Law** | Mitigation measures are built into EMP.  
The alignment chosen to avoid drinking water resource protection areas. |
| **Forestry Law** | The alignment is designed to avoid protected forests. Sound engineering of tunnel-bridge-tunnel scheme will minimize clearance of woodlands. As per the Forestry Law, necessary approvals for woodland clearance will be obtained during construction. A comprehensive restoration plan is developed. |
| **Wildlife Protection Law** | Alignment chosen to avoid protected natural habitats.  
Extensive bridge/viaduct scheme is adopted to minimize segmentation impact.  
Potential impact is thoroughly addressed in EIA, and necessary mitigation measures developed in EMP. |
| **Wild Plants Protection Regulations** | Alignment chosen to avoid protected natural reserves. |
| **Nature Reserve Protection Regulations** | Alignment chosen to avoid protected natural reserves.  
Other necessary measures are developed in EMP. |
China Laws and Regulations | Project Compliance
---|---
Scenic Area Management Regulations | Alignment is carefully chosen to avoid scenic areas as much as possible. Greening plan and special design of stations are developed to be harmonious with the landscape.
Water and Soil Conservation Law | A Water and Soil Conservation Plan, namely a soil erosion control plan, is developed, and incorporated into EMP and contracts for implementation.
Urban Old and Famous Trees Management Method | Alternative alignment is studied to avoid old and famous trees to the extent possible.
Notice on Strengthening National Green Corridor Construction by State Council | Extensive greening plan is designed along the railway line following relevant technical guidelines.
Cultural Property Law | Cultural property survey along the whole line has been conducted by licensed archeological institutes. Alignment is fine-tuned to avoid existing cultural relics sites. Chance-find procedure will be strictly followed.
Notice on Strengthening Noise Pollution Control of Railway | Noise impact is thoroughly assessed following EIA technical guidelines. Noise mitigation measures (noise barriers, sound-insulation windows, seamless rail, noise damping system etc.) are designed to mitigate noise impact.

<table>
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<tr>
<th>Regulations</th>
<th>Contents</th>
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| Environmental Protection Regulations for Railway (Railway Planning [1997] No.46) | ▪ Environmental supervision and management. Defining environmental protection objective, establishing environmental institutions and their responsibilities, integrating environmental protection into railway development planning and budget, enforcing EIA, environmental monitoring and supervision, promoting clean production, environmental statistics, international cooperation and public communication.
▪ Pollution control during production and operation. Resource saving, clean production and control of emission of noise, wastewater, solid waste and waste gas.
▪ Prevention of pollution. Alignment and site selection based on avoiding impact to environment and sensitive areas to the extent possible, minimizing land acquisition, visual impacts, soil erosion and social impact, and timely restoration after construction, strengthening environmental supervision.
▪ Reward for good environmental performance and punishment for bad.
| Environmental Supervision Regulations for Railway (1995-08-30) | The Guidelines defines functions of railway environmental supervision department as supervising (i) enforcement of environmental laws and regulations, (ii) pollution discharge and treatment, (iii) budget usage, (iv) implementation of EIA and ‘3 simultaneous’, (v) clean production, (vi) environmental audit and correction of pollution accidents. It also requires appointment of dedicated environmental supervision staff and their certification management. It also defines environmental supervision staff’s responsibilities and authorities.
| Guidelines for Managing Railway Environmental Protection Plan (Railway Planning [1995] No.158) | Environmental protection plan is an integral part of railway development plan. The plan should be prepared jointly by railway planning and environmental management departments. Mid/long-term protection plan should define strategic objective for railway environmental protection. Annual railway protection plan should cover planning for pollution treatment, resources recovery, control of pollutants emission, pollution source audit, EIA and ‘3 simultaneous’ plan, etc. A key implementing instrument of the protection plan is the ‘Commitment Paper for Environmental
<table>
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<th>Regulations</th>
<th>Contents</th>
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<td>Protection Objective’, which include objectives, main indicators, measures and performance review and reward/punishment criteria committed by head manager at each level. Environmental indicator review should be strengthened to quantitatively describe environmental protection performance and ensure sound implementation of the protection plan. Staff, regular training and statistics are necessary. Regularly review and reporting of the protection plan. Reward and punishment mechanism.</td>
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**Design Code for Environmental Protection for Railway Projects (TB10501-98)**

- **Ecological protection.** Principle for alignment and site selection, water and soil erosion conservation, and land acquisition and resettlement, compatible design of railway works with local architecture, etc.
- **Noise and vibration.** Proper design including alignment and site selection, adoption of buffer zone, civil structures that cause low noise and vibration, isolation wall, locating noise sensitive objects out of protection distance, proper noise management in construction field and explosive operation, etc.
- **Electromagnetic.** Protection distance requirements for alignment between dedicated antenna such as airport radio beacon and television.
- **Air pollution control.** Site selection principle for pollution sources such as boiler, control of fumes, dust and waste gas.
- **Water pollution control.** General specifications for water usage and recycling, wastewater treatment and discharge, principles for treatment of oil containing, freight train washing, and domestic wastewater, etc.
- **Solid waste control.** Principles of site selection for landfill, disposal of industrial and domestic waste.

**Environment and Hygiene Standards for Construction Site (JGJ146-2004)**

- **General.** Construction site should be enclosed, posters for safe operation, environmental protection, disease prevention, environmental and hygiene institutional arrangement, training, etc.
- **Specifications.** Control measures for air, water and soil, noise pollution, temporary facilities, hygiene and epidemic prevention at construction site

**Environmental Acceptance Rules for Railway Project Completion Inspection**

Environmental administrative agency which approved railway project EIA will be responsible for environmental acceptance of project completion based on project EIA, environmental protection engineering documents, and regulations and standards that are used for project design. Qualified completion must also meet various criteria including restoring impacted environment, establishing complete environmental management and monitoring institution, staff and equipment, qualified environmental protection facilities and discharging/emission standards.

**Guidelines for Managing ‘3 Simultaneous’ for Railway Construction Projects (Railway Planning [1995] No.84)**

Designs of railway projects must take into account environmental protection design codes and recommendations provided by EIA. Land acquisition should be minimized to extent possible. During construction, environmental protection measures for key component/area should be integrated into bidding negotiation and decision. Environmental supervision, including progress, quality and budget, must be integrated into overall engineering supervision. Upon completion, impacted environment should be restored. Acceptance inspection must include environmental protection works and facilities.
Project Description

This project includes the construction of a new double track, electrified, passenger dedicated high-speed railway line of about 342 km and related stations between the cities of Harbin and Jiamusi. The project is located in the Heilongjiang province in north-east China. Eight new stations will be constructed along the line. The East Jiamusi station will be reconstructed and the existing Jiamusi station will be upgraded on site. About 30 km of line will be rehabilitated along the main line and several auxiliary project components are included to connect HaJia Railway to the major stations at Harbin and Jiamusi. The project includes the related civil works, goods, land acquisition and resettlement, rolling stock, and consulting services.

The loan will finance part of the goods required for the construction of the line, for its electrification, signaling, and communication systems as well as operation and maintenance equipment. In addition to the physical construction of the HaJia line, MOR may require technical assistance on policy aspects from the Bank loan. The scope of such technical assistance (consultant services, training, and study tours) (if any) will be identified during implementation.

With the building of this new line the rail distance for passengers between Harbin and Jiamusi would be reduced by approximately 161 km, from the existing 503 to 342 km. The new line would offer a rapid link between cities in north-east Heilongjiang and Harbin and from the railway hub in Harbin connect to the core Chinese high speed railway network. The travel time for passenger trains would be reduced from the current average of 8 hours (or 6 hours by day express train) to about 1.5 hours and frequency would also be greatly improved.

The existing mixed-use (freight and passenger) double track railway line between Harbin and Jiamusi takes an indirect northerly route following an old alignment that was primarily built to service the coal produced in the region. The highway distance is 393 km and the road journey by bus takes about 4.5 hours during summer time. Road traffic can be disrupted in winter months by heavy snow. The existing line would be used primarily for freight traffic with only a few local passenger trains. As the majority of passenger trains will transfer to the proposed HaJia line, the existing line will be able to offer additional capacity for anticipated growth of freight traffic. Thus the capacity and service standards of both market segments will be enhanced and enable railways to compete effectively with passenger services offered by highways.

The construction of the HaJia line is planned to start in 2011 with commissioning expected by December 2015.
The proposed Harbin-Jiamusi (HaJia Line hereafter) Railway Project is a new 342 km double track railway line starting from the city of Harbin, running through Bing County, Fangzheng County, Yilan County, and ending at the city of Jiamusi. The Project is located in Heilongjiang Province, and the south of the Songhua River, in the northeast China.

Current railway transport between Harbin and Jiamusi uses existing Bin-Bei line and Sui-Jia line, both of which were originally built in 1920~1940’s. Travelling through this route takes 8 hours. There are several major highways linking Harbin and Jiamusi, including HaJia Expressway, YiHa Expressway (Harbin to Suihua), national highway G221 and G222. A major river Songhua River goes through the two cities.

The salient technical features of the line are:
- Maximum speed 250 km/h
- Distance in center line of two tracks: 4.6 m
- Minimum curve radius: 4,000m, may be reduced at junction stations
- Maximum grade: 20 in 1000
- Effective length of departure track: 650m
- Traction: Electric 25kV 50 Hz
- Train type: Electric Multiple Units, 8 or 16 cars (409t and 818t)
- Train operation control: Automatic (CTC 2)
- Traffic management control: Centralized Traffic Control
- Minimum headway between trains: 4 minutes
- Axle load: 17 tonnes
- Track structure Ballastless
2. ANALYSIS OF ALTERNATIVES

Without Project Scenario

At present, there is no direct railway between the Harbin and Jiamusi. The traveling distance from Harbin to Jiamusi is 503 km through existing BinBei Line and SuiJia Line. The time required for travel is 8 hours. Highway plays a crucial role in the project regional transportation, including HaJia Expressway, YiHa Expressway, national highway G221 and G222. Without the proposed HaJia Railway Project, the increasing passenger and freight transportation demand would have to be met through expansion of the existing highway network and construction of new high-grade highway, which will have larger environmental footprint and social impact given its wider ROW. Furthermore, vehicles will have higher emission of air pollutants and green house gases, compared to the railway for equivalent transportation capacity of passenger and freight, and poses higher risk of traffic safety.

This proposed HaJia Railway project will reduce the operational distance between Harbin and Jiamusi by 161 km from the current to 503 km (32%) and reduce the travel time of passenger trains from the current 8 hours to 1.5 hours. Though the project has the potential for adverse environmental and social impacts, these impacts can be avoided, minimized, mitigated or otherwise adequately compensated through careful alignment selection to avoid environmentally and social sensitive sites and implementation of comprehensive mitigation plans. In general, the proposed HaJia Line is a rational option to achieve the overall project development objective of providing increased capacity, faster travel time and increased frequency of services for passengers, and increased capacity for freight.

General Alignment Selection

During the project proposal and feasibility study, four general alignments (Figure 2) were studied, namely Songhua River South (red line), Songhua River North(purple), Songhua River North Existing Passage (green line), and Songhua River North Straightening (blue line) Scheme. Comparative analyses of these 4 general alignments were carried out considering regional development planning, economics, technical, environmental and social aspects. As the HaJia Line is a relatively short passenger dedicated line (DPL) with inter-city fast train function. This comparison is the most crucial stage of alternative analysis. In summary the Songhua River South scheme is selected mainly due to environmental considerations, because this scheme does not cross the Songhua River or ecologically sensitive areas such as nature reserve, forest parks, scenic areas, etc., while the rest three alternatives do both. This scheme traverses a well developed transport corridor, parallel to the Songhua River. The area has a dense road network and is crossed by many electrical transmission corridors. Urban areas and agricultural areas are prevalent throughout the entire corridor. As such, the area of the project presents moderate to low sensitivity from an ecological perspective. However, due to the necessity to access Yilan County and restrictions on alignment curve, this alignment will have to run through the Class II Zone of Yilan County Drinking Water Source Area. Careful analysis has been made to assess the impact on this area and mitigation measures developed accordingly.

Alternative Alignment by Sections

Within the selected general alignment, i.e. South Songhua River line, alternative alignments for two sections have been studied to choose the optimal scheme in terms of environmental and social impact, technical feasibility and financial and economic benefits. Consultation with local governments and relevant authorities in charge of environmental sensitive areas were conducted and fully incorporated into the alternative selection process. Considerable effort has been made to avoid ecological sensitive areas, geological unstable zones, floodplains and wetlands, relocation of houses, cultivated lands, and cultural resources in order to ensure the environmental feasibility of the alignment. The final alignment thus minimizes environmental and social impacts, avoids natural hazards, and connects the economic hubs in the region.
3. ENVIRONMENTAL SETTING

A necessary and important element of the EA was the baseline research that describes the physical, ecological, and social characteristics of the project area. A detailed environmental baseline was needed to highlight locations of highest potential impact. The HaJia Railway line will mainly traverse alluvial plain, low mountains and rolling hills. Urban areas and agricultural areas are prevalent throughout the entire corridor. Therefore careful planning and supervision to manage social impacts during construction and operation are the main issues to the project.

Physical Setting

Landforms: The line will traverse three major geological landforms including hilly areas, middle/low mountains and alluvial plains of the Pearl River water system.

Water Systems: The railway line crosses Songhua River system, which is a major water transport course in northeast China. At the south of Songhua River, large include Mudanjiang River, Woken River, Mayi River, Daluomi River, Xiaoluomi River, Demoli River and Feiketu River. The project has either avoided these areas or designed adequate engineering structures and measures to cross them.
Sensitive Areas

Reserves, Parks, Scenic Areas, and Water Sources: Field surveys were conducted along the corridor to identify environmental sensitive areas. During the stage of alignment alternative analysis, several environmentally sensitive areas i.e. nature reserves, scenic areas, forest parks, water source protected areas) were identified along project corridors. Extensive effort has been made for alternative alignment selection in order to avoid environmental and ecological sensitive areas; however, the proposed final alignment will inevitably pass through Yilan County Drinking Source Area through its Class II Zone via embankment due to the necessity to access the Yilan County and restriction on railway curve requirement. It is worth noting that according to Chinese laws and regulations, the definition of these sensitive areas are slightly different from many other countries. Table 4 summarizes these definitions and restrictions for infrastructure construction.

Table 4 - Definition of Sensitive Areas in China

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<th>Protected Area</th>
<th>Description and Restrictions</th>
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| Nature Reserve                  | - Nature Reserve is legally protected land, surface water body or sea area which features typical natural ecological system, natural concentrated habitats for rare or endangered wildlife, or natural relics with special meaning.”  
- Nature reserves are classified into three zones: Core Zone, Buffer Zone, and Experimental Zone. No one is allowed to enter the Core Zone without approval. For the Buffer Zone, only scientific research and observation activities are allowed. The periphery of the Buffer Zone is an Experimental Zone. Scientific experiments, teaching training, visit and observation, tourism and taming and breeding rare and endangered wild animals and plants and other activities are allowed.  
- Road and railway projects within Experimental Zone are allowed, subject to approval of the nature reserve management authority. |
| Forest Park                     | - Forest park is an area with beautiful forest view, concentrated natural view and human cultural landscape designed for the purpose of tourism, rest, or science, cultural or education activities.”  
- There are three levels of forest park, i.e. national, provincial and city/county level, whose establishment shall be approved by national, provincial and municipal forest bureau respectively.  
- Railway project is allowed, subject to agreement of forest park management authority and approval of corresponding level of government. |
| Scenic Area                     | - Scenic area is an area with view, cultural or scientific value, features concentrated natural or human landscape and beautiful environment, and serves the purpose of tourism, scientific or cultural activities.”  
- Construction projects within scenic area should be consistent with area planning and compatible with landscape. Railways are allowed subject to approval of the scenic area management authority. |
| Water Resource Protection Area   | - Water resource protection area is a certain area of water body and land designated for prevention of pollution on drinking water sources and protection of environmental quality of the area.”  
- Surface water resource protection area normally includes Class 1 protection area and Class 2 protection area. The boundary of the protection areas is determined by local governments. The general guideline is, for water intake in normal rivers, Class 1 protection area includes river section between at least 1000m upstream and 100 m downstream, and river bank within no less than 50 m; Class 2 protection area include river section extending 2000m upstream and 200 m downstream from the border of Class 1 area. A semi-protection area can be determined outside the Class 2 protection boundary.  
- Railway project is allowed in Class 2 protection area and semi-protection area. |

Rare Plants and Fauna Species of Concern: Detailed field ecological survey concluded that the vegetation along project corridor belongs to temperate grassland and coniferous and broad leaf forests regions. But the natural vegetation has most been gradually replaced by secondary forest including natural bristle tooth oak, *populous davidiana*, *betula davurica*, and planted dry land willow (*Salix matsudana*), poplar, elm, larch,
etc., due to intensive human activities ever. It is concluded that the surface vegetation of the project alignment area features few plant species, mostly secondary and man-planted woods and agricultural system, with relatively low value for biodiversity.

Based on ecological survey, it is found that there are 3 protected plant species, all at Class II national level, (there are 51 flora species under Class I and 203 under Class II national level protection stipulated by National Forestry Administration) within the assessment scope. However, they are mainly distributed in the forest farms of Zhuanshan, Dalazi and Zhushan, which the alignment has avoided. Therefore, little or no disturbance is anticipated to these protected plant distribution areas. For the other sections along the line, no concentrated distribution of protected plants is identified. There are no ancient or famous trees under special protection in China identified along the alignment.

Fauna resources were analyzed based on existing data from research institutes, nature reserve management authorities and other relevant local governments, as well as consultation with local villagers, forest guards, animal protection organizations and herb medicine collectors during field surveys. Due to intensive human activities, and the Tongsan Expressway, G211 highway, the fauna resources along the alignment are deficient. According to scientific investigation reports for the sensitive sites along railway line, there are no national level protected mammals identified; protected fauna in the project region are mainly birds, including 20 at Class II national level and 6 at the provincial level, for example, *Accipiter gentilis, Accipiter gularis*, etc. The key protected aquatic life is mainly distributed in the fishing sites along Songhua River and Mudanjiang River. In conclusion, the project does not pose any potential risk for endangered fauna species.

**Socioeconomic Setting**

The project will be constructed in the cities of Harbin and Jiamusi. The project areas are mainly rural and urban, with a GDP per capita RMB 24,768 and RMB 20,259 respectively in the two cities. Although the alignment passes primarily through rural areas, it will also cross major urban areas in Harbin and Jiamusi. In Harbin, the total agricultural population amounts to 2.4 million, with farmland 1.8 million hectares. While in Jiamusi, total agricultural population amounts to 1.3 million, with farmland 0.9 million hectares. The project area is one of the important commodity grains bases in China. Main products include rice, soybean, wheat, corn, tobacco, flax and beet.

**Physical Cultural Resources**

A cultural resources survey was conducted for all project sites, led by local archeological institutes, in combination with consultation with local cultural property management authorities and the general public. 4 cultural resource sites were identified, including Qinghua Relics, Chang’an Ancient Town, Sino-Japan Friendship Forest and Qiaonan Relics. The former 3 sites are located 3 km from the alignment while the latter 200m.

**4. ASSESSMENT OF IMPACTS AND MITIGATION**

As all transportation projects, the HaJia railway project is anticipated to have positive benefits in terms of mobility and accessibility in the project region, facilitation of passenger and freight market and regional economic and social development. Due to the large scale of civil works and project characteristics, the project has the potential to cause substantial social and environmental impacts, which have been thoroughly assessed and can be adequately avoided, minimized and/or mitigated with measures developed in the project EMP and RAP. Manageable adverse impacts are primarily related to: (i) crossing sensitive sites such as water resource protection area etc.; (ii) community impacts such as land acquisition and resettlement; (iii) noise, dust, soil erosion and social disturbance during construction; (iv) noise, safety and community connectivity during operation.

The project has implemented a three-fold approach to minimize environmental and social impacts:
Avoidance. Alternative analysis has been carefully conducted to avoid the environmental and social sensitive areas to the extent possible, as one of the most important mitigation measures to minimize potential adverse environmental and social impact. The selected alignment led to reduced house and structure demolition, especially in urban area, and has avoided a number of sensitive sites including nature reserves and cultural heritage sites.

Sound Engineering. The project has been designed with state-of-the-art engineering. Bridge-tunnel-bridge schemes are adopted for more than 55% of the whole alignment (about 51% for large and medium bridges and 4% for tunnels) will minimize the land acquisition and ecological footprint.

Comprehensive Mitigation Plans. Detailed environmental design plans (green corridors and landscaping), environmental management plans, resettlement action plans have been prepared in order to minimize and/or compensate unavoidable impacts from the project.

Crossing Sensitive Areas

There are more than several environmentally sensitive sites identified along the project corridors during alternative analysis stage. The project alignment has been carefully selected to avoid most of them. However, due to the necessity to access to Yilan County and restriction on railway alignment curve requirements, the railway will traverse Class II zone of Yilan County Drinking Water Source Area. Site specific analysis has been conducted to the site. Close consultations with relevant authorities have been conducted as per law requirement, and legal approvals have been granted by these authorities.

Figure 5 Railway Alignment and Yilan Drinking Water Source Area
The Yilan Drinking Source Water Protection has 11 wells with intake depth between 120m~ and 130m (see Figure 5). The railway will cross the Class II zone of the area through embankment, with the shortest distance to a well of 155m. According to the ground water survey carried out during the project preparation, the stable water table is at altitude 115m, while the embankment will be at 135m. The difference between the two is more than 20. As a result, the excavation of the embankment will not affect the aquifer or impact the water quality of the ground water.

**Physical Cultural Resources:** As noted above, no cultural resource impacts are found in the alignment corridor. Impact on cultural resources is negligible. However, chance-find procedure will apply during project implementation.

**Community Impacts**

Community impacts are mainly related with (i) land acquisition, relocation of houses, and livelihood impacts; (ii) impacts on ethnic minorities; (iii) impacts on community infrastructure; (iv) noise and vibration impacts; and (v) safety and connectivity especially in rural areas; and (iv) nuisances from construction.

**Social Impacts:** The project will affect land and households in 6 counties/districts and two cities. A total of 1180 households, with 5707 persons will be relocated. Around 21,244 mu (1,416 ha) land will be permanently acquired and 9,972 mu (665 ha) land will be temporarily acquired for the project construction. A total of 23 enterprises will be affected. The total affected population will be 11,569.

Project preparation included a Social Assessment (SA) and Indigenous Population (IP) screening along the project. It concluded that there is no minority village/community along the project corridor. It first determined a corridor of 5km width on each side along the railway alignment as the study area on IP, and then screened minority people in each village/community within the corridor. The reports concluded that while there are nine villages with minority households or individuals, there is no minority village/community. Based on the finding of the SA, OP 4.10 is not triggered.

The Harbin Rail Station is being upgraded starting as of June 2010 through a separate project. The upgrade will use 835 mu of land, and include the demolition of 14 enterprises and 33,508 square meter houses. Among these impacts, only 83 mu of land, 9 enterprises and 5500 square meter houses do not belong to MOR. The resettlement impact is limited. If the project is linked, then it has to comply with WB resettlement policy. A statement to this respect is needed here.

**Noise and Vibration Impacts:** The construction and operation of the HaJia line have the potential to increase noise and ground-borne vibration in nearby sensitive land uses. Such increases can cause undesirable effects on people, animals, and structures. The principal source of existing noise in urban areas is vehicular traffic. In the rural areas of most of the corridor, adjacent land uses are exposed to very low to moderate noise levels.

Chinese specified models (TJH 2006, No. 44 Document) for noise and vibration impact criteria were used to assess impacts at sensitive sites near the proposed alignments. The assessment identified 139 noise sensitive receptors and 88 vibration sensitive receptors. Current noise level monitoring and noise/vibration modeling have been conducted for all sensitive sites to predict pollution level. It is found that currently most of those sensitive receptors were impacted by municipal noise and/or existing railway noises which surpasses relevant standards up to 16 db. The predication shows that the future noise impacts will be reduced by 5db thanks to decreasing of freight trains mainly. In terms of vibration, current monitoring and prediction shows up to 5 db surpass to the relevant standards, mainly during nighttime.

Noise and vibration pollution control measures (noise barriers, encasing bridges, strengthening of glass windows, etc.) have been identified in all critical sensitive points along the line. These measures will be complemented with Right-of-Way zoning restrictions which will be enforced by townships and cities.
These measures have been incorporated in project design and budget.

Under the basis of laying jointless tracks, the assessment report proposes to lay resilient sleepers at vibration sensitive point with vibration forecast value exceeding 80dB, which can reduce railway vibration more than 3dB. The forecast value of railway vibration at all sensitive point shall be kept less than 80dB.

**Safety and Community Severance:** Urban master plans as well as environmental protection plans for all cities and counties were carefully studied to determine the railway alignment. For Harbin, Fangzheng, Bin County, Yilan and Jiamusi City, alternatives were thoroughly compared in terms of compatibility with existing urban planning. In addition, intensive consultation with local governments was carried out thus the final selection and determination of alignment and station locations are fully compatible with urban planning and supported by local governments.

Safety is a concern for the operation of high-speed railway line. In this regards, the HaJia railway line will be fully fenced to restrict random access of pedestrians, animals, or vehicles to the railway tracks. This will effectively minimize the potential accidents of random railway crossing.

Impacts from a fully-fenced operation of the line -cross traffic and social severance- were considered during project design. All local road crossings are designed with interchanges to provide access for local communities. As a result, 51% of the line is viaduct/bridge, and there are a total of 294 culverts (with consideration of pedestrian/agricultural vehicles as appropriate) are designed, in close consultation with local communities. With these designs, the impact on local traffic, community severance, and agricultural irrigation systems will be effectively minimized.

**Construction Impacts**

Construction of the HaJia Line will cause temporary impacts to the surrounding environment. Typical short-term construction impacts include noise, vibration, air quality, and water quality. If properly planned, construction impacts to neighborhoods, businesses, and the natural environment can be minimized. Several aspects of construction have been received special attention such as access roads, disposal of excess material from tunnel construction, and management of camps. A comprehensive Soil Erosion Control Plan, as required by Chinese regulations, has been prepared and will address all erosion, stability and restoration issues associated with earth cuts, disposal sites, embankments and affected areas in general.

**Access Roads:** Access roads will be required to provide access to the construction sites, tunnel entrances and exits, borrow pits, construction camps, waste disposal areas, mix plants, casting yards, etc. Great effort has been made to minimize temporary land acquisition caused by these works. For access roads, priority is given to using existing rural road networks, particularly in the vicinity of sensitive areas. In total, around 202km-long access roads are needed, mostly existing roads that will be upgraded with appropriate improvement. When needed, new access roads will require careful design and construction in order to avoid typical impacts such as soil erosion, slope stability problems, pedestrian safety, among many others. The EIA report includes an analysis of necessary access roads to key points such as tunnel portal shafts. The Design Institutes has developed design and construction specifications for such roads to ensure that they are environmentally sound. These specifications will be part of the Construction Contract documents.

An Environmental Management Framework (EMF) for dealing with new access roads and other temporary works will be followed during construction. The EMF includes procedures and decision making criteria regarding new access roads that are identified during construction. Basic elements of EMF include:

- Contractors shall use existing roads as much as possible. Existing roads will be rehabilitated to meet MOR design standards, including erosion control, slope stabilization.
- After construction, all roads will be rehabilitated for community use. No new access roads will be approved in or through protected areas.
- Any new access road proposed by contractors will have to be reviewed and approved by the Environmental Supervision Engineer.
Borrow Pits and Disposal Sites: The project will generate significant amounts of excess material from tunnel construction even after using portions for construction purposes (embankment, base and sub-base). A total of 12 borrow pits and 45 disposal sites have already been identified. All sites were screened for environmental and social issues (not in protected areas, not in scenic areas, not on flood plains, unstable areas) and mitigation measures identified. These criteria will be strictly enforced during construction. All sites will be enclosed with retaining wall, proper drainage and re-vegetated.

Tunnel Works: 9 tunnels totaling 14 km will be constructed. Construction of tunnels will entail destruction of vegetation due to excavation of tunnel portals, large amounts of spoils, tunnel dewatering. The potential impact from each tunnel has been assessed and mitigation and monitoring programs have been designed.

Camps Locations and Management: There will be 117 camps built along the alignment. Criteria for camp location have been identified and will be strictly enforced (scenic areas, sensitive areas, near vulnerable minority groups). Camp specifications include the type of facilities (adequate accommodations, water supply and sanitation, cooking facilities.) and the need for education and sensitivity programs on natural habitats and health.

Cumulative and Induced Impacts

Induced land use development around the railway stations and related environmental issues were analyzed during EA process. The region where HaJia Line traverses has many economic hubs with intensive and economic activities. Most of these activities are small-scale and in-city or involve localized construction projects, which would not have obvious cumulative impacts with the newly proposed HaJia Railway Project. However, the project will construct 8 new stations in small towns between Harbin and Jiamusi. Most of these stations will be built in undeveloped rural areas. In total, the 8 stations will occupy around 150 hm2 of farmland. However, it is anticipated that, with the development of these new stations and supporting infrastructure, such as road, station square, indirect and cumulative impacts will be exerted in these areas. This may include larger land acquisition and resettlement, community disturbance, dust and noise during construction and larger noise impact during operation. In addition, traffic on the existing road network, loss of vegetation, civil air-borne dust, waste generation, community disturbance and safety will occur. The main impacts will be those occur during construction stag. These construction related impacts could be effectively managed by adopting proper mitigation measures, including, possible road and borrow/disposal site sharing, enforcement of good construction management to minimize dust, noise and waste generation; education of construction workers to minimize social disturbance and cultural conflict; provision of temporary access to local traffic; proper maintenance of the access roads and timely restoration/strengthening upon completion. With effective implementation of good construction management measures, these common construction-related cumulative impacts can be adequately mitigated to acceptable level. Perhaps the most important issue related to land use changes around railway stations will be addressed by the cities and township’s own land use and development plans. The locations of the stations are fully compatible with these plans and were approved by planning agencies.

5. ENVIRONMENTAL MANAGEMENT PLAN

A detailed Environmental Management Plan (EMP) addressing all issues identified in the EIA (i) organizes all measures to mitigate environmental impacts during the construction and operation; and (ii) establishes an organizational structure, procedures, institutional responsibilities for implementation, and a budget and source of financing for each activity. The EMP also includes an environmental management framework (EMF) specifically for the environmental management of temporary works that are left for contractor to design, and environmental monitoring and capacity building programs. Main components of the EMP are:

- Environmental protection measures in design stage: mitigation measures have been incorporated in project design: slope stabilization, noise reduction, landscaping, and special design
of terminals.

- **Environmental protection measures during construction**: these include: additional surveys (cultural resources), environmental specifications for construction, camp management, restoration of affected areas, access roads and disposal sites.
- **Environmental protection measures during operation**: mainly monitoring programs.

In addition to the project-specific mitigation measures included in the EIA and EMP, project design and construction of the HaJia line are also subject to a wide range of domestic laws, regulation, technical guidelines and codes of practice in China, which by default are legal requirement for project design and construction management. These include (i) *Environmental Protection Regulations for Railway;* (ii) *Environmental Supervision Regulations for Railway, Implementation;* (iii) *Guidelines for Environmental Protection Plan for Railway;* and (iv) a wide range of standard and codes such as *Design Code for Environmental Protection in Railway Projects* (TB10501-98), *Environment and Hygiene Standards for Construction Site* (JGJ146-2004), *Management Regulations for Construction Sites, Safety Rules for Construction Projects, Environmental Acceptance Rules for Railway Project Completion Inspection.*

**Management Organization and Responsibilities:** Environment management responsibilities have been defined. Environmental management during construction involves the Project Office of HaJia Railway Corporation, Contractors and Environmental Supervision Engineers (Figure 6). During operation, environmental management responsibilities will rest with HaJia Railway Corporation.

**Environmental Monitoring:** Comprehensive environmental monitoring programs have been designed for both construction and operation phases. Monitoring includes water quality, noise, hydrology, construction dust and noise, as well as soil erosion and vegetation restoration. The Project Office will entrust environmental monitoring stations to carry out these plans. During operation, environmental monitoring will be carried out by provincial and prefecture (municipal) environmental protection bureaus, forestry bureaus, and water conservancy bureaus, which will be responsible for submitting the annual report on environmental management and for compiling the reports of environmental monitoring.

All personnel of the Project Office Environment Protection Section and construction workers will receive environmental training at least one time before commencement of construction. Key environmental administrative and monitoring personnel will also go through technical training provided by the project.
**Environmental Supervision:** During construction, environmental supervision shall be carried out by qualified supervision unit reporting to the Project Office of the HaJia Railway Corporation. Each Supervision Engineer company will be required by contract to assign at least one Environmental Supervision Engineer. The Environmental Supervision Engineers will:

- Review and assess on behalf of the Project Office whether the construction design meets the requirements of the mitigation and management measures of the EIA and EMP,
- Supervise site environmental management system of contractors including their performance, experience and handling of site environmental issues, and provide corrective instructions;
- Review the EMP implementation by the contractors and subcontractors, verify and confirm environmental supervision procedures, parameters, monitoring locations, equipment and results;
- Report EMP implementation status to Project Office and prepare the environmental supervision statement during the construction period; and
- Approve invoices or payments.

**Independent Environmental Consultant (IEC):** The Project Office of the HaJia Railway Corporation will recruit an Independent Environmental Consultant (IEC) to conduct independent supervision on implementation of EMP. The lead IEC shall be a person who can independently and professionally examine records, procedures and processes. He/she may require a small team to assist him/her with checking the site (i.e. the IEC team). The IEC shall have extensive knowledge and experience in environmental monitoring and auditing to provide independent, objective and professional advice on the environmental performance of the project (at least 5 years experience is required). The IEC shall familiarize himself with the project works through review of the reports, including the project EMP. In particular, the IEC is expected to perform the following duties:

- Review and audit in an independent, objective and professional manner in all aspects of the EMP;
- Validate and confirm the accuracy of monitoring results, monitoring equipment, monitoring locations, monitoring procedures and locations of sensitive receivers;
- Conduct random site inspection;
- Audit the EIA recommendations and requirement against the status of implementation of environmental protection measures;
- Review the effectiveness of environmental mitigation measures and project environmental performance;
- On a need basis, verify and certify the environmental acceptability of the construction methodology (both temporary and permanent works), relevant design plans and submissions. Where necessary, the IEC shall seek the least impact alternative in consultation with the designer, the Contractor(s), and Project Office;
- Verify the investigation results of any non-compliance of the environmental
- Quality performance and the effectiveness of corrective measures; and
- Feedback audit results to Project Office and ESE team according to EMP procedures of non-compliance in the EMP, and provide Supervision Engineer (SE) suggests on actions of penalty, suspension or other punishment;
- Provide environmental training to the Contractors, Environmental Supervision Engineers (ESE) and the Project Office staff prior to and during construction;
- Prepare semi-annual progress report to the Project Office, MOR and the World Bank.

**EMP budget:** All mitigation measures have been budgeted and fully incorporated in project costs including monitoring and supervision. A summary of the budget is shown on Table 5

### Table 5 - Investment Estimate of Environmental Protection Measures

<table>
<thead>
<tr>
<th>Item</th>
<th>Measure</th>
<th>Budget (10^4) Yuan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil Erosion Control</td>
<td>Engineering Measures 42389.55</td>
<td>53468.35</td>
</tr>
<tr>
<td></td>
<td>Vegetation Measures 7776.16</td>
<td></td>
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<tr>
<td></td>
<td>Temporary Works 3432.5</td>
<td></td>
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<tr>
<td></td>
<td>Independent Cost 928.29</td>
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</tr>
<tr>
<td></td>
<td>Static Total Investment 54526.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Contingency 651.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Compensation for soil erosion facilities 384.4</td>
<td></td>
</tr>
<tr>
<td>Noise control</td>
<td>Sound insulation window 107550 m²</td>
<td>27018.7</td>
</tr>
<tr>
<td></td>
<td>Sound barrier 3.15m height 15380 m</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sound barrier 3.0m height 12096 m</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sound barrier 7m height 380 m</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Resettlement 1194 households</td>
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</tr>
<tr>
<td>Vibration control</td>
<td>Resettlement 438 households</td>
<td>Included in the noise control</td>
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<tr>
<td>Electromagnetic environment</td>
<td>Compensation interference compensation 1438 households</td>
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<tr>
<td>Ambient air</td>
<td>Boiler 15 unit</td>
<td>380</td>
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<tr>
<td>Water environment</td>
<td>Wastewater treatment facilities</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
<td>81166.25</td>
</tr>
</tbody>
</table>

6. **PUBLIC CONSULTATION AND DISCLOSURE**

A combination of opinion surveys and public meetings in the townships, village committee and affected villagers’ homes have been implemented during preparation of the EA and Resettlement Action Plan. Each mitigation measure was determined by suggestions from both experts and public. Most of the concerns have been incorporated either in project design or in the environmental management plan or resettlement plan. Two rounds of consultation and disclosure were conducted to meet World Bank Policy OP4.01.

A brief edition of the EA for this project was made accessible on the website of Environmental Impact Public Participation Website ([http://www.acee.org.cn/public/viewtopic.php?f=3&t=25188](http://www.acee.org.cn/public/viewtopic.php?f=3&t=25188)) with newspaper announcement on Heilong Daily, to collect opinions, suggestions and concerns from communities along the line and public in general. Suggestions were provided via telephone, fax and e-mail. After the first draft of Environmental Impact Report was completed, a summary was published in website of on July 30, 2010.

The second public consultation and disclosure was conducted in August-September, 2010. Meanwhile, the content of the report is accessible to all interested parties in the Environment Protection Bureaus of each city, and the HaJia DPL Company. MOR announced the disclosure of the final EA and RAP in the August, 2010 on the Heilongjiang Daily and as such, the documents are easily accessible to the general public.

Environmental Assessment and Resettlement Action Plan have also been sent formally to the World Bank’s INFOSHOP in Washington, DC.