Environmental Impact Assessment (2nd Draft)

Project Number: 41193
September 2013

MON: Western Regional Roads Corridor Investment Program Tranche 2

Prepared by Ministry of Roads and Transportation for the Asian Development Bank. This is an updated version of the draft originally posted in August 2013 available on http://www.adb.org/projects/41193-019/documents.

NOTE

On 1 August 2013 the draft EIA for Western Regional Roads Corridor Investment Program Tranches 2 and 3 was uploaded to the ADB website. Originally, Tranche 2 was planned to be financed in 2013 and Tranche 3 was to be financed in 2014. In August 2013, the project team was informed that in response to the request from the Government of Mongolia, additional funds had been allocated to finance Tranche 3 in 2013. The ADB management decided to combine Tranche 2 and Tranche 3 into a single tranche, Tranche 2. The project team revised the draft EIA (this version of the draft EIA) to reflect that the components previously under Tranche 2 and Tranche 3 will be financed and implemented under a single tranche. There is no change in the findings of the draft EIA.

CURRENCY EQUIVALENTS

(as of 24 June 2013)

Currency unit	–	Mongolian Tughrik (MNT)
MNT1.00	=	$0.0007
$1.00	=	MNT1,438

ABBREVIATIONS

ADB	–	Asian Development Bank
AP	–	Affected Person
CAREC	–	Central Asia Regional Economic Cooperation
CBD	–	Convention on Biological Diversity
CITES	–	Convention on International Trade in Endangered Species of Fauna and Flora
COMO	–	Community Outreach and Monitoring Officers
CSC	–	Construction Supervision Company
DOR	–	Department of Road Policy Implementation and Coordination
EIA	–	Environmental Impact Assessment
EMP	–	Environmental Management Plan
EMS	–	Environmental Monitoring Specialist
GHG	–	Greenhouse Gas
GOM	–	Government of Mongolia
GRM	–	Grievance Redress Mechanism
HSES	–	Household Social Economic Survey
IWRMP	–	Integrated Water Resource Management Plan
MFF	–	Multitranche Financing Facility
MNET	–	Ministry of Nature, Environment And Tourism
MRT	–	Ministry of Roads and Transportation
NO2	–	Nitrogen Dioxide
PCC	–	Public Complaints Center
PIU	–	Project Implementation Unit
PM	–	Particulate Matter
POP	–	Persistent Organic Pollutants
PRC	–	People's Republic of China
RCAG	–	Research Center of Astronomy and Geophysics of the Mongolian Academy of Sciences
SE	–	Supervising Engineer
SOx	–	Sulphur Oxides
SO2	–	Sulphur Dioxide
SPS	–	ADB Safeguard Policy Statement
UNCCD	–	UN Convention on Combating Desertification
UNESCAP	–	UN Economic and Social Commission for Asia and the Pacific
UNESCO	–	United Nations Educational, Scientific and Cultural Organization
UNFCCC	–	United National Framework Convention on Climate Change

WCS	–	World Conservation Society
WFPF	–	Water Financing Partnership Facility
WHO	–	World Health Organisation
WRRCIP	–	Western Region Regional Road Corridor Investment Program
WRRDP	–	Western Regional Roads Development Project
WWF	–	World Wildlife Fund

WEIGHTS AND MEASURES

^{o}C	–	degree celsius
dB	–	decibel
km	–	kilometer
LAeq	–	Equivalent Continuous Level 'A weighting' - 'A'-weighting = correction by factors that weight sound to correlate with the sensitivity of the human ear to sounds at different frequencies
m	–	meter

NOTES

In the report, "$" refers to US dollars; *aimag* - provincial country division; soum – sub-district division; bagh – sub-division of soum; and davaa – a mountain pass.

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Date 23 July 2013
Ref. 6/139

To: Tyrrell Duncan
Director
East Asia Transport and
Communication Division
Asian Development Bank

Dear Mr.Duncan,

Sub: Western Road Corridor Development Project,
Western Regional Road Corridor Investment Program; Tranches 2 and 3

The consolidated Environmental Impact Assessment (EIA) and Environment Management Plan (EMP) for Tranches 2 and 3 of the captioned investment program were prepared based on the domestic environmental impact assessment reports prepared for the investment program by Eco-Altai Ltd.

The reports have been approved by the relevant government authorities of Mongolia, including the Ministry of Nature and Green Development and reviewed by the Ministry of Roads and Transportation.

This is to formally advise you that there is no objection to these documents being posted on the ADB website according to ADB disclosure procedures.

We will implement all the required actions as set out in the EIA and EMP during project processing and implementation and accept ADB's supervision and inspection of EMP implementation.

We look forward to our cooperation during the project implementation.

Yours sincerely,

Onon Rentsendorj
Gineral director, Road Policy
Implementation
Coordination Department

I. EXECUTIVE SUMMARY

A. Introduction and Purpose

1. This Environmental Impact Assessment (EIA) has been prepared for Tranche 2 of the Western Regional Roads Corridor Investment Program (WRRCIP). WRRCIP aims to promote growth and development in the currently remote and difficult to access Western Region of Mongolia.

2. The general objectives of this EIA are to:

(i) Provide necessary baseline data for the project;
(ii) Provide understanding on potential impacts of the project;
(iii) Provide information on potential mitigation measures to minimize negative impacts and associated costs;
(iv) Provide information on the consultations undertaken, and the project level Grievance Redress Mechanism (GRM) established; and
(v) Provide an EMP including mitigation and monitoring measures, definition of institutional responsibilities, capacity building and training plans and associated budgets.

3. In 2007, the Western Regional Roads Development Project (WRRDP) was proposed as a two phase loan for the development of a 748.4km two lane road corridor running north-south from Mongolia's border with the Russian Federation at Ulaanbaishint to its border with the People's Republic of China (PRC) at Yarant. Because of cost underestimates the scope proposed through Phase I of this loan could not be completed and in October 2011, the project was restructured as the Western Region Regional Road Corridor Investment Program (WRRCIP) Multitranche Financing Facility (MFF).

4. Tranche 1 of the MFF provided additional financing to complete the 103.3km section of road from Baga Ulaan Pass to Mankhan which was originally proposed as part of Phase I. The remaining sections of Phase I are being financed by the Mongolian and PRC Governments. The draft EIA for Tranche 1 was disclosed in July 2011 and updated in September 2011 prior to board approval of the MFF. Civil works for Tranche 1 commenced in April 2013.

5. The road is part of the Asian Highway route 4 (AH4, 6,024 km) and is a designated Central Asia Regional Economic Cooperation (CAREC) Corridor 4a, which links Russia (Novosibirsk) with Pakistan (Karachi). The road network aims to increase connectivity, create linkages with Europe and develop trade across Asia. The road is therefore significant to the development of the region and Mongolia.

6. The roads being developed under the WRRCIP are all located within the existing road corridor which stretches from Ulaanbaishint to Yarant (approx. 750km). The existing road corridor is characterised by multi tracked earth roads.

7. This EIA has been prepared for the following components of Tranche 2.

(i) **Component 1:** Road Construction work comprising the following sub-components:

- (**1a) Khovd-Tolbo *soum*** total 163.9 km. Construction of a two lane highway

Includeing bridges and culverts for permanent and ephemeral water streams in accordance with Mongolian Road Design Standards

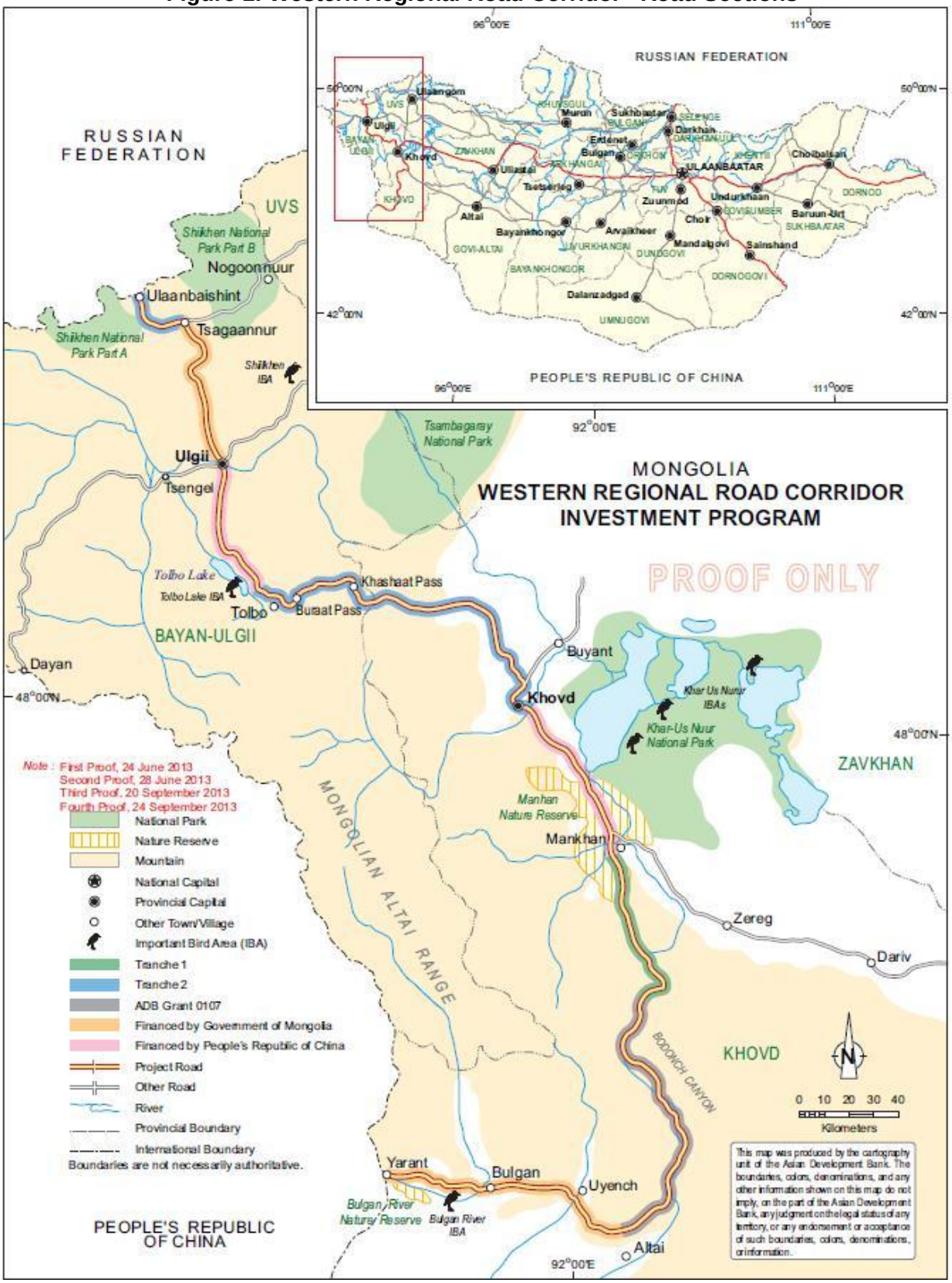
- **(1b) Ulaanbaishint to Tsagaannuur** (25.8km) Construction of a two lane highway in accordance with Mongolian Road Design Standards to reach the Russian border.

(ii) **Component 2:** Road Rehabilitation work comprising the following sub-components:

- **(2a) Rehabilitation of three bridges - two in Khovd** (0.304 km) **and one in Olgii** (0.18 km). Rehabilitation of current two lane structures which cross streams and are considered beyond repair.
- **(2b) Internal roads inside Khovd and Olgiy** (10 km and 4.9 km) Rehabilitation of road sections which are necessary to allow access to the highway and *aimag* centre facilities.

8. The location of Tranche 2 (the project area) in the context of the WRRCIP is shown in **Figure 1**.

Figure 1: Western Regional Road Corridor– Road Sections



Source: ADB

B. Key Findings

9. **Environmental Policies**. Mongolia has a comprehensive policy and legal framework for environmental assessment and management. It has policies, legislation and strategies in place to manage the protected areas such as national parks, to satisfy its international obligations, and to protect the quality of the environment for the health and well-being of its citizens[1.]

10. The EIA requirements of Mongolia are regulated by the Law on EIA (1998, amended 2002[2] and amended 2012). The terms of the law apply to all new projects, as well as rehabilitation and expansion of existing industrial, service or construction activities and projects that use natural resources.

11. The purpose of the EIA law is environmental protection, the prevention of ecological imbalance, the regulation of natural resource use, the assessment of environmental impacts of projects and procedures for decision-making regarding the implementation of projects. Under this law, the entire WRRDP corridor was subject to a domestic EIA which was approved by the Ministry of Nature, Environment and Tourism in 2009. This domestic EIA remains valid for Tranche 2 of the WRRCIP.

12. **Baseline Environmental Conditions**. The physical, biological, socioeconomic, and cultural resources in the project area have been examined and the baseline environmental conditions determined. This allows assessment of the direct, indirect, cumulative and induced environmental impacts on and risks to these resources. The environmental baseline conditions in the project area are:

13. **Topography**. The project area is located within the Altai Sayan Eco-Region that includes Mongolia, China, Russia and Kazakhstan. The Altai Mountains in Mongolia's Western Region stretch approximately 1,500 km. The region is relatively high altitude, with the project area elevations ranging from 1,400 m to 2,600 m. The area is characterised by dry steppe and steppe. The proposed project alignment will primarily follow existing roads that pass through mountain areas, hills, valleys, and plains which are largely dry with sparse vegetation.

14. **Erosion and soil.** Erosion is a feature along much of the project area, with gullying visible on the mountains and slopes. Eroded soil along the road alignment is increased through vehicles using a series of unpaved tracks in areas which are not currently improved. The earth tracks are liable to erosion from vehicles, wind, rain and snow melt.

15. **Permafrost.** Permafrost is characterized by negative temperatures of soils/rocks and occurrence or possible occurrence of underground ice. An active layer is subject to seasonal thawing/freezing, beneath which is permanently frozen ground. In the context of the project, permafrost creates engineering challenges as permafrost degradation can cause substantial change in water hydrology, damage infrastructure and affect ecosystems.

16. **Precipitation**. Monthly mean precipitation and snow cover data for the project area shows that the area is relatively dry and that winter snow is at its deepest in January for both *aimags* covered by the project. This demonstrates the limited construction period available to the contractors for Tranche 2 as the months without snow cover are limited (on average May to October in Olgii and June to September in Khovd).

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[1] UNDP. 2008. Institutional Structures for Environmental Management in Mongolia. Ulaanbaatar and Wellington.

[2] Law of Mongolia on Environmental Impact Assessments (1998, amended in 2002). Unofficial translation available from http://cdm-mongolia.com.

17. Because of climate change, it is anticipated that winter will become milder with more snow. Snow cover plays an important role in the biophysical environment. It prevents deep soil freezing, acts as a water source for herdsmen, wild and domestic animals during the winter, and causes spring floods in the rivers and streams. The date of stable snow cover formation varies from the middle of November to the beginning of December, with snow cover completely clearing in March. However, the date of the disappearance of stable snow cover is showing a tendency to shift to one month earlier than expected[3].

18. **Water Resources**. The surface water resources in the project area are characterised by rivers, streams, springs and lakes. Significant surface hydrological features in the Tranche 2 area include:

(i) Permanent surface streams and rivers;
(ii) Permanent lakes / ponds; and
(iii) Ephemeral streams which are seen during periods of intense rainfall or snow melt.

19. A complex area of lakes, marshes and ponds is in the project area (Olon-Nuuruud lakes). The road design has been given particular consideration in this area as the wet conditions, marshes, springs, surface water and presence of permafrost provide a number of engineering challenges.

20. **Drinking Water**. During development of this EIA, a number of consultations were undertaken along the Tranche 2 corridor. The consultations confirmed that the majority of people take drinking water from the nearest surface water source, such as a stream. Livestock also use the same water source.

21. **Livestock grazing**. A significant land use in the corridor is for grazing livestock. The livestock in the Tranche 2 area are dominated by large herds of goat and sheep as well as cattle and camels. The herds are moved out of pens close to either permanent or seasonal dwellings in order to graze in the morning and are returned in the evening. The vegetation on which the livestock graze includes sparse grassland close to water bodies.

22. **Cultural Resources**. The Tranche 2 road alignment (as is the case with the existing road corridor) passes through an area which has evidence of settlement from the Palaeolithic and Neolithic eras. The key cultural resources in the area are: (i) Sangiin Kherem Manchu wall; (ii) Deer stones; (iii) Ovoo; (iv) Petroglyphs; and (v) Khirigsuur.

23. **Critical and Natural Habitats**. The Project corridor for Tranche 2 is primarily within the existing road corridor the surrounding habitat of which has been highly modified and degraded by human activity, not least by the by the existing multi-track earth road network. Sparse natural vegetation near the road corridor is heavily grazed by livestock. The project area does not encroach upon any recognised critical habitat or legally protected area but does come within 2 km of an Important Bird Area (IBA) at Tolbo Lake and within 4 km of Sylkhemyn Nuruu National Park and 11 km from Tsambagarav National Park.

(i) Tolbo Lake IBA is important for two globally threatened species: Pallas's Fish-eagle (*Haliaeetus leucoryphus*) and Saker Falcon (*Falco cherrug*). Under the IUCN Red List of Threatened Species™, these species are categorised as

[3] Mongolia 2nd National Communication under UNFCCC.

Vulnerable and Endangered respectively.

(ii) Sylkhemyn Nuruu National Park is separated into two parts, approximately 20 km apart. The project alignment passes between the two sections of national park in which the Argali sheep (*Ovis ammon*) is present; it is categorised as 'near endangered' according to the IUCN Red List.

24. With the exception of the Olon-Nuuruud Lake area, the proposed alignment follows the existing road corridor. It is not anticipated that the proposed project road will exert any more of an influence on critical habitats, flora and fauna than the existing road.

(i) Wildlife movement monitoring. This is proposed as a two phase monitoring exercise to confirm and update the existing information on migration routes and to determine whether or not the new paved road and its embankments affects wildlife movements. If any additional measures are considered necessary to facilitate wildlife movements across the paved road they will be implemented by the Contractor during the defects and liability period. In addition, the monitoring will result in supplementing and fine tuning existing information on key locations for wildlife reflectors and signs to warn drivers to expect wildlife crossings.

25. **Socio-Economic Conditions**. Rural poor people are scattered, isolated and highly mobile in the project area. Bayan-Olgii is one of the five *aimags* with the highest numbers of rural poor in Mongolia. Most rural poor people are herders. However, whilst livestock production is still the principal source of livelihood for rural people, the number of livestock per herder is decreasing dramatically.

26. The project area is poorly served by transport networks. The project corridor encompasses the existing road between Olgii and Khovd which by and large comprises multi earth tracks. For this reason most of the vehicles travelling between the two *aimags* need to be jeep style vehicles rather than cheaper and more fuel efficient regular cars. Public transport is provided by public share jeeps or minivans which generally only leave when they are full. Consultations held with herders along the project corridor indicated that old jeeps and motorbikes were common forms of private transport but breakdowns are frequent and maintenance costs high because of the poor road conditions. Flights can be taken between Olgii, Khovd and Ulaanbaatar but for most residents in the project area air tickets are unaffordable.

C. Anticipated Environmental Impacts and Mitigation

27. **Positive Impacts—Beneficiaries**. The Project will directly benefit the residents of the Khovd and Bayan-Olgii *aimags*, a population of 190,400 (2009). The residents of these *aimags* in particular will benefit both socially and economically from the project. The current road is difficult to use in winter, of poor quality and causes significant damage to vehicles. Expensive jeep type vehicles are needed and travel times can be long. The communities are currently very remote and their access in winter is significantly reduced. Improving road transport will bring particular benefits including:

(i) **Access to Services.** The Project will help people access education and healthcare services more easily.

(ii) **Economic Development.** The Project will benefit residents in the region through improved economic development and trade opportunities. The current inaccessibility and high transportation costs hinder development.

(iii) **Community Health & Safety**. Currently the residents and other road users are subject to high levels of dust from unpaved roads. This can have detrimental impacts on health, particularly for children and people with respiratory disorders. High dust levels also significantly reduce the visibility of other road users increasing the likelihood of road accidents.

28. **Impacts and Mitigation during construction.** The key potential impacts during construction are summarised below along with proposed mitigation measures to reduce the impacts to acceptable levels.

(i) **Impacts on surface water**. During construction over rivers, streams and adjacent to lakes or springs the primary impact is anticipated to be a temporary reduction in water quality because of increased turbidity and suspended sediment from uncontrolled run-off from the construction site. Surface water is the main source of drinking water for both local communities and livestock in the project area. Mitigation measures include: i) protection of water bodies through site drainage provisions to ensure silt laden run-off does not enter water courses, and ii) soil erosion prevention during bridge construction. In addition, monitoring of water quality at key locations will be undertaken throughout the construction phase to check the effectiveness of mitigation measures and indicate where improvements are required. Along with water quality monitoring, consultations with local residents will be undertaken to obtain their views on the acceptability of any changes in water quality during construction. Where local residents identify unacceptable water quality related to the works, the contractor will be required to take corrective action to reduce impacts to an acceptable level.

(ii) **Dust**. Whilst the area is already subject to dust storms, dust will be generated and mobilised by construction activities. Dust generation will mostly affect people living close to the construction sites. Mitigation measures include primarily i) use of water sprays on construction roads and in works areas close to sensitive receptors to suppress dust arising from vehicle movements and materials handling; ii) covering and/or dampening down of spoil mounds where close to sensitive receptors and iii) ensuring construction materials/spoil being transported by truck are effectively covered by a tarpaulin.

(iii) **Flora and Fauna and Critical Habitats**. It is unlikely that construction of the new road within the existing road corridor will exert any significant additional impact on the existing flora and fauna in the project area over and above the current situation. This includes the nearby critical habitats of Tolbo Lake IBA (2 km from nearest point to project area) and the legally protected Sylkemyn Nuuru National Park (4 km from nearest point to project area). However, as a precautionary measure there will be an embargo on construction activities within 5 km of Tolbo Lake IBA during the breeding season (April to June)

(iv) **Accessibility**. The herders in the project area require access to their pasture lands and will need to cross the road in order to graze their livestock. Construction activities may interfere with livestock grazing requirements. The key mitigation activity will be the need for contractors to consult with herders living along the road corridor to arrange suitable crossing points and related measures to facilitate herders grazing requirements.

(v) **Permafrost**. Permafrost may cause engineering challenges and potential changes to local hydrology if melting occurs. DOR will implement their standard approach as used elsewhere in Mongolia for assessing and addressing permafrost issues in road design and construction.

29. **Impact during operation.** Potential impacts during operation including proposed mitigation measures are summarised below.

(i) **Risk to migrating wildlife**. The road will operate largely within the existing road corridor therefore overall impacts on biological resources because of operation of the road are not expected to be significantly different from the existing situation. Wildlife migration routes that cross the existing road corridor have been identified at a number of points along the road alignment. The new road within the existing corridor will give rise to increased traffic frequency and higher traffic speed that could result in increased risk to migrating wildlife at such crossing points. Mitigation measures to reduce the risk to wildlife at these locations include: i) installation of road signage and wildlife warning reflectors to warn drivers of potential wildlife crossing points; ii) traffic speed restrictions; iii) provision of at-grade or reduced road embankment grades near the known crossing points to facilitate wildlife crossing. On-going maintenance of these provisions will be the responsibility of the Department of Roads (DOR). Implementation of the mitigation measures will ensure the risk to migrating wildlife is acceptable.

(ii) **Waste disposal from road users**. Rubbish bins are to be placed in rest stops with signs to encourage their use. The bins will need to be serviced when full and repaired or replaced as necessary. The maintenance activities will be the responsibility of the DOR during road operation.

(iii) **Greenhouse gas emissions.** The project components, as part of the WRRCIP will help to increase the economic development of the western region. Whilst the improvement of the riding quality of the road will reduce unit fuel consumption by vehicles, it will also result in increased traffic. Based on traffic forecasts modelled over 20 years, overall vehicle emissions are expected to increase. Overall, the project (Yarant – Tsanganur) will directly generate 138,000 tons of CO_2 (construction and maintenance over 20 years) and indirectly cause an increase in vehicle emissions of 370,000 tons of CO_2 during a 20 years evaluation period. This is deemed to be an acceptable impact for the project as the economic and social benefits are considerable particularly for the 190,000 residents of the Khovd and Bayan-Olgii *aimag*s.

D. Environmental Management Plan

30. The environmental management plan (EMP) for Tranche 2 defines mitigation and monitoring measures and describes the institutions and mechanisms to monitor and ensure compliance. Such institutions and mechanisms will seek to ensure continuous improvement of environmental protection activities during preconstruction, construction, and operation of the project in order to prevent, reduce, or mitigate adverse impacts. The EMP will be updated in light of any recommendations arising from the proposed ecological and wildlife movement monitoring studies noted above.

31. The EMP defines the following key roles and responsibilities. For Tranche 2 this includes:

(i) **Executing Agency**. Ministry of Roads and Transportation (MRT) will be the Executing Agency for the Project and is ultimately responsible for ensuring the implementation of the EMP;

(ii) **Implementation Agency**. The Project Implementation Unit (PIU) will reside within the Department of Roads (DOR) which is the Implementation Agency. The

PIU will engage an Environmental Monitoring Specialist (PIU-EMS) to monitor implementation of the EMP;

(iii) **PIU-EMS.** The PIU-EMS will facilitate the implementation of the EMP and the grievance redress mechanism (GRM), have regular contact with the PIU and Supervising Engineer and prepare environmental progress and monitoring reports;

(iv) **Supervising Engineer (SE).** The SE will supervise the site environmental management system of the contractors, provide corrective instructions, and assist the contractors to implement the EMP;

(v) ***Soum* based Community Outreach and Monitoring Officers (COMO)**. The COMOs will be the key entry point for the GRM. Three COMOs will be engaged for each Tranche to ensure the GRM is disseminated and implemented at a local level, as well as undertaking consultations with residents to check EMP implementation;

(vi) **Contractor.** The civil works contract will include prescribed activities to protect the environment as defined in the EMP. The contractor will implement the EMP, develop and implement the management plans required in the pre-construction phase, collaborate with any environmental inspections required and provide regular progress reports.

32. The EMP specifies a monitoring schedule which includes;

(i) Monthly water quality testing;
(ii) Monthly consultations with local residents on community health and safety issues, water quality or other aspects of the project which may affect them;
(iii) Weekly checks on EMP implementation at project construction sites and construction camps ensuring mitigation measures such as waste management, soil and water protection are in place; and
(iv) Regular air quality and noise monitoring at sensitive receptors near construction sites.

33. The anticipated costs of the environmental mitigation and monitoring measures for Tranche 2 are provided in **Table 1**

Table 1: Environmental Mitigation and Monitoring Measures – Budget Tranche 2

Mitigation	Timeframe	Estimated Cost $USD
Study: Wildlife movement monitoring	During Construction (Phase 1) Post Construction (Phase 2)	$ 10,000
Consultant: Social, HIV/AIDS and Human Trafficking Prevention Monitoring Specialist (24 pm)	During Construction	$ 48,000
Consultant: Environmental Monitoring Specialist in PIU (24 pm)	During Construction	$ 60,000
Consultant: Three Soum Level Community Outreach and Monitoring Officers (24 pm)	During Construction	$ 48,000
Monitoring: Water Quality	Pre-construction and during construction	$ 10,000
Installation of measures to reduce the likelihood of wild animals being killed on the road	During Construction	$12,000
Road safety awareness – material production.	During Construction	$ 5,000
Installation of snow fencing	During Construction	$ 6,000

Mitigation	Timeframe	Estimated Cost $USD
Environmental Training	During Construction	$ 5,000
Installation, maintenance and servicing of litter bins and signage maintenance	During Operation	$ 12,000
Maintenance of measures to reduce the likelihood of wild animals being killed on the road	During Operation	$ 8,000
Road Safety Signage Maintenance and Upgrade	During Operation	$ 4,000
	Total	$ 228,000

Source: ADB Study Team

E. Conclusion

34. The project roads and associated components being developed under the WRRCIP are situated within an existing road corridor which stretches from Ulaanbaishint to Yarant (approx. 750km). The existing road corridor is located in the very remote and sparsely populated Western Region of Mongolia and is characterised by multi tracked earth roads. Most of the surrounding population are nomadic herders who move along the project corridor. The surrounding habitat has been well grazed by livestock despite it being a dry environment which is covered with snow for six to seven months per year.

35. The Tranche 2 project area does not encroach upon any recognised critical habitat. In following the alignment of the existing road, the project does come within 2 km of an Important Bird Area (IBA) at Tolbo lake and within 4 km of Sylkhemyn Nuruu National Park. and 11 km from Tsambagarav National Park. However, construction and operation of the project is not expected to give rise to any significant impact on these areas.

36. This EIA shows that there is a clear need for the project as the WRRCIP will generate significant benefits to the area which is currently limited by lack of an adequate road network. The assessment also shows that Tranche 2 will not have any significant, long term or irreversible impacts on the physical, biological or socio-economic environment. This is for the most part because of the fact that the project is being developed within an existing road corridor.

37. It is anticipated that the project will have short term impacts during construction which can be mitigated to an acceptable level through mitigation measures which seek to reduce the potential for harm to the environment and human health. The project will implement a robust Grievance Redress Mechanism and will engage independent community based outreach officers to ensure that any negative or positive impacts from the project are captured and dealt with appropriately. The stakeholder and community consultation during the development of the EIA demonstrated that the project has local support as it will result in significant benefits in terms of accessibility to services, improved connectivity between communities particularly in winter, and importantly, the economic development prospects of the area will be increased.

38. This EIA recommends two complementary ecological data gathering and wildlife movement monitoring activities the objectives of which are to enhance site specific ecological data and to improve ecological outcomes for the project. Findings from these monitoring studies where applicable, will be integrated into an updated EIA and EMP.

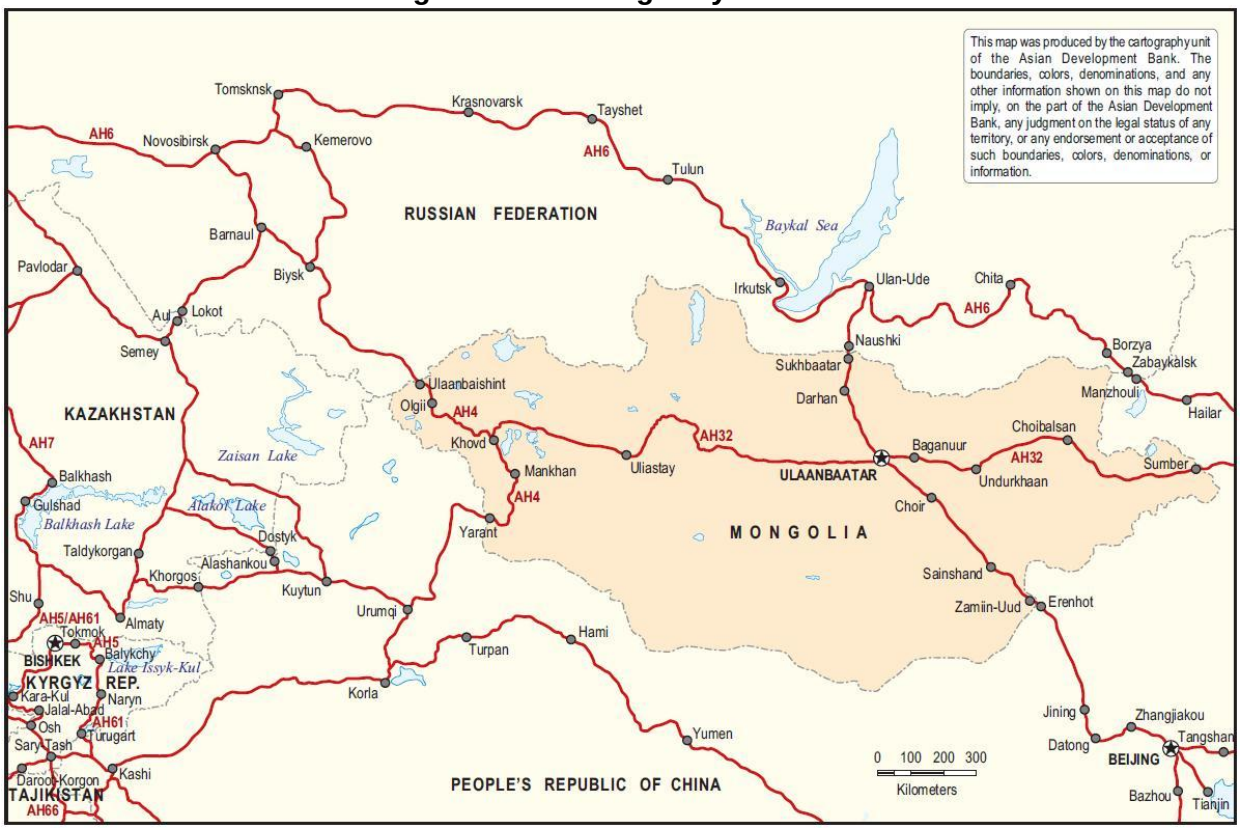
II. INTRODUCTION

A. Background

39. In 2007, the Western Regional Roads Development Project (WRRDP) was proposed as a two phase loan for the development of a 748.4km two lane road corridor running north-south from Mongolia's border with the Russian Federation at Ulaanbaishint to its border with the People's Republic of China (PRC) at Yarant.

40. The road is part of the Asian Highway network, Route 4 (AH4, 6,024 km), as shown in **Figure 2**, and is a designated Central Asia Regional Economic Cooperation (CAREC) Corridor 4a, which links Russia (Novosibirsk) with Pakistan (Karachi). The Asian Highway project is a network of 141,000 kilometres of standardized roads across 32 Asian countries with linkages to Europe. The road network aims to increase connectivity and develop trade across Asia. UN Economic and Social Commission for Asia and the Pacific (UNESCAP) secretariat works with its member countries to identify financial sources for the development of the road network to improve transport capacity and efficiency. UNESCAP provides a framework for the co-ordinated development of these critical Asian highways.

Figure 2: Asian Highway Network



Source: ADB

41. ADB classified the WRRDP as Environment Category A, the Environmental Impact

Assessment (EIA) for Phase I (432.1km Yarant to Khovd) was disclosed in August 2007[4] and the EIA for Phase II (147.9km Khovd to Buraatin Davaa) was disclosed in August 2010[5].

42. The first package (110.8km Temeen Khuzuu Hill to Baga Ulaan Pass) of Phase I is being implemented under Grant 0107 and civil works were approximately 35% complete at the end of the construction season in 2012. Because of cost underestimates the scope proposed through Phase I could not be completed and in October 2011, the project was restructured as the Western Region Regional Road Corridor Investment Program (WRRCIP) Multitranche Financing Facility (MFF). Tranche 1 of the MFF provided additional financing to complete the 103.3km section of road from Baga Ulaan Pass to Mankhan which was originally proposed as part of Phase I. The remaining sections of Phase I are being financed by the Mongolian and PRC Governments, as shown in **Figure 2**. The draft EIA for Tranche 1 was disclosed in July 2011 and updated in September 2011 prior to board approval of the MFF[6]. Civil works for Tranche 1 commenced in April 2013.

B. Introduction and Purpose

43. This Environmental Impact Assessment (EIA) has been prepared for Tranche 2 of the WRRCIP. WRRCIP aims to promote growth and development in the currently remote and difficult to access Western Region of Mongolia.

44. The general objectives of this EIA are to:

(i) Provide necessary baseline data for the project;
(ii) Provide understanding on potential impacts of the project;
(iii) Provide information on potential mitigation measures to minimize negative impacts and associated costs;
(iv) Provide information on the consultations undertaken and the project level Grievance Redress Mechanism (GRM) established; and
(v) Provide EMP including mitigation and monitoring measures, definition of institutional responsibilities, capacity building and training plans and associated budgets.

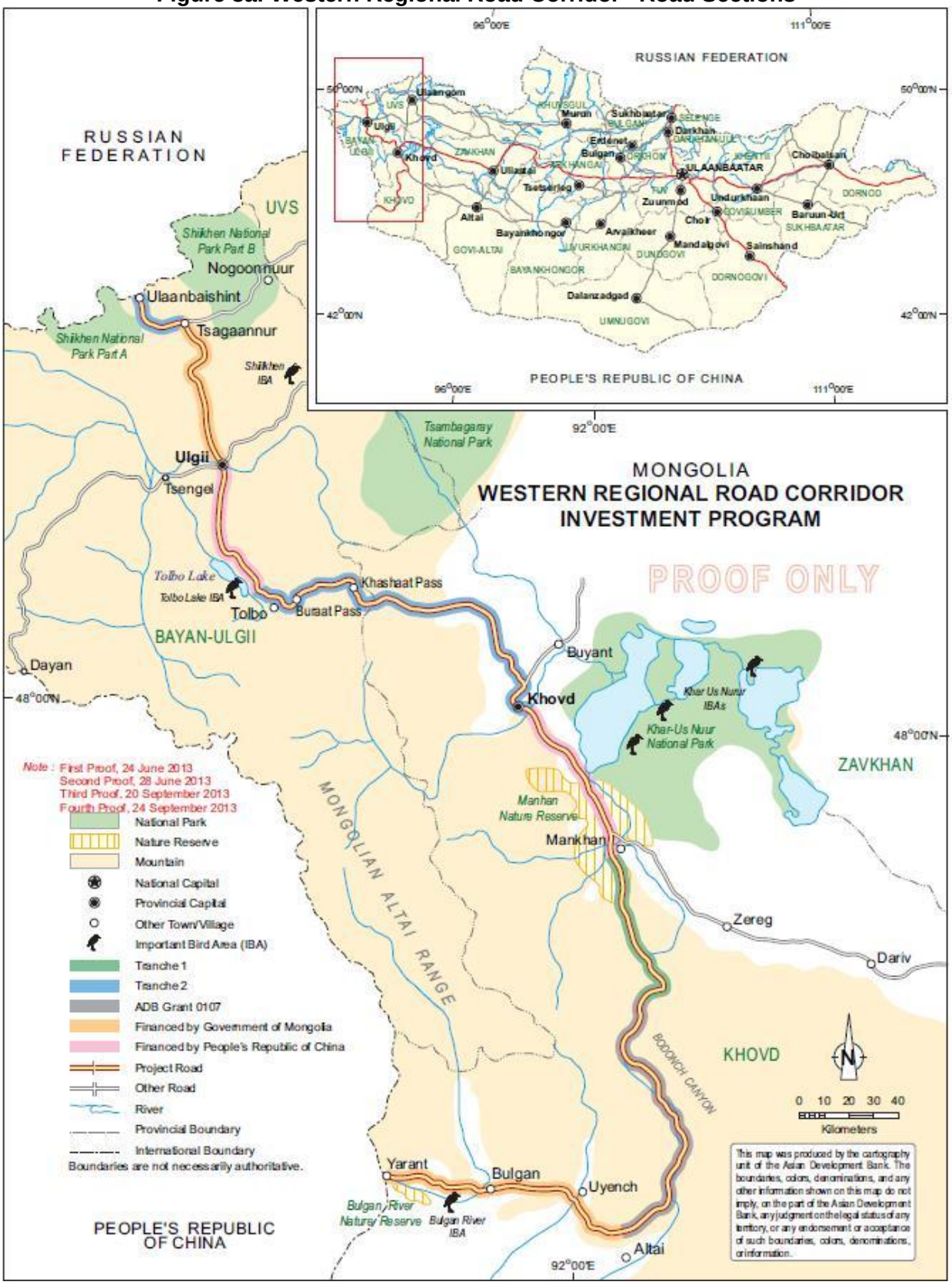
45. **Multitranche Financing Facility:** WRRCIP is implemented in two Tranches under a Multitranche Financing Facility (MFF). The entire corridor is funded through a number of different mechanisms, with ADB's MFF funding Tranches 1 and 2. Tranche 1 has already been started with contractors mobilised across several sections of the route. **Figure 3**a shows the various sections of the corridor and their funding mechanisms and **Figure 3b** shows the Tranche 1 and 2 sections and components.

[4] MON: Western Regional Road Corridor Development Project – Phase I Summary Environmental Impact Assessment (August, 2007) http://www.adb.org/projects/documents/western-regional-road-corridor-development-project-phase-i-2

[5] MON: Western Regional Roads Development Project Phase II Environmental Impact Assessment (August, 2010) http://www.adb.org/projects/documents/western-regional-roads-development-project-phase-ii

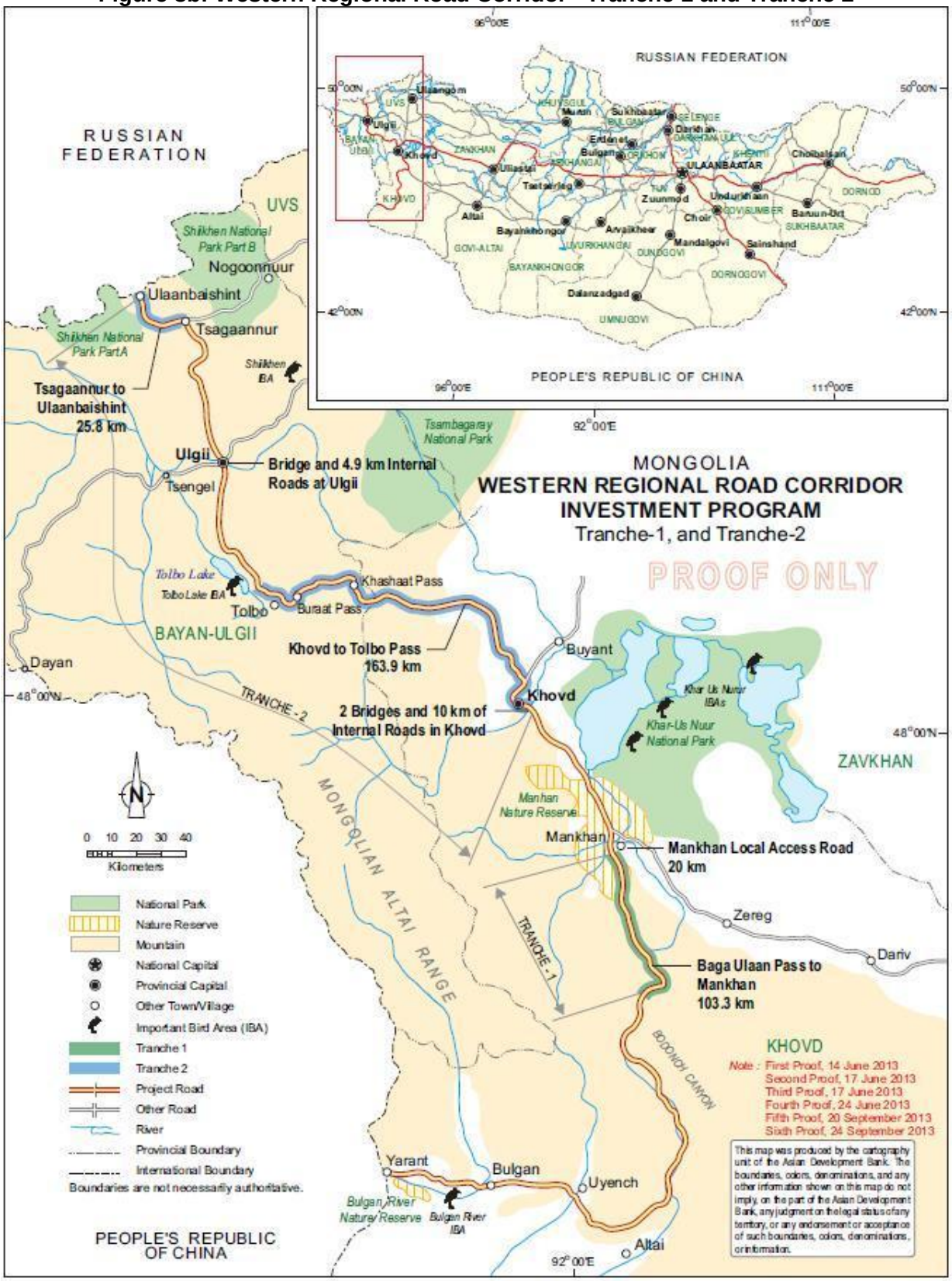
[6] MON: Western Regional Road Corridor Development Program – Tranche 1 http://www.adb.org/projects/documents/western-regional-road-corridor-investment-program-tranche-1

Figure 3a: Western Regional Road Corridor– Road Sections



Source: ADB

Figure 3b: Western Regional Road Corridor– Tranche 1 and Tranche 2



Source: ADB

46. **Project components.** Tranche 2 investment is for the following components:

(i) **Component 1:** Road Construction work comprising the following sub-components:

- (**1a) Khovd-Tolbo *soum*** total 163.9 km. Construction of a two lane highway including bridges and culverts for permanent and ephemeral water streams in accordance with Mongolian Road Design Standards.
- **(1b) Ulaanbaishint to Tsagaannuur** (25.8km) Construction of a two lane highway in accordance with Mongolian Road Design Standards to reach the Russian border.

(ii) **Component 2:** Road Rehabilitation work comprising the following sub-components:

- **(2a) Rehabilitation of three bridges - two in Khovd** (0.304 km) **and one in Olgii** (0.18 km). Rehabilitation of current two lane bridges which cross streams and are considered beyond repair.
- **(2b) Internal roads inside Khovd and Olgii** (10 km and 4.9 km) Rehabilitation of road sections which are necessary to allow access to the highway and *aimag* centre facilities.

(iii) **Component 3:** Two Road Maintenance Units and Equipment for the maintenance of the new highway including equipment for winter maintenance such as snow clearing.

(iv) **Component 4:** Resources for project management, consulting services support (including Construction Supervision and Environment, Social and HIV/AIDS Monitoring) and institutional development.

47. This EIA is focused on those components of Tranche 2 that are considered likely to interact with environmental receptors and therefore excludes Component 4 which relates only to consulting services.

C. ADB and Domestic Environmental Due Diligence

48. **Environmental categorization.** Based on ADB's Rapid Environmental Assessment checklists, Tranche 2 has been classified as environmental category "A", requiring an EIA. This updated EIA report is prepared in accordance with ADB's Safeguard Policy Statement (2009) to cover Tranche 2.

49. The road sections covered by Tranche 2 were subject to an EIA as required by ADB in 2007 and 2010. Because of changes in project implementation and funding, a Tranche 2 specific EIA was required, therefore this document is able to build on and update the previous EIA documents written for the WRRDP.

50. The Mongolian EIA process is set out in local law. The domestic EIA covers the entire corridor; a general EIA for the corridor was submitted to Ministry of Nature Environment and

Tourism (MNET) in 2007 and a detailed EIA was approved in 2009.[7] The Department of Roads (DOR) has confirmed that the domestic EIA remains valid for Tranche 2.

D. Structure of This Report

51. This EIA report is structured as follows:

(i) Executive Summary – outlines important facts, major findings, and recommended actions of this EIA.
(ii) Policy, Legal, and Administrative Framework – presents the national and local legal and institutional framework within which the environmental assessment is carried out. It describes the environmental categorization by ADB and MNET based on an environmental screening.
(iii) Description of the Project – provides a justification of the project based on a sector analysis; a detailed description of the project, including project location and components.
(iv) Description of the Environment (Baseline Data) – relevant physical, biological, and socioeconomic conditions within the project area. ADB SPS (2009) requires environmental assessments to address induced impacts and risks to (i) physical (ii) biological (iii) socioeconomic (including impacts on livelihood through environmental media, health and safety, vulnerable groups, and gender issues) (iv) physical cultural resources in the context of the project's area of influence[8]; and (v) potential transboundary and global impacts, including climate change.
(v) Anticipated Environmental Impacts and Mitigation Measures – predicts and assesses the project's likely positive and negative direct and indirect impacts to physical, biological, socioeconomic, and physical cultural resources in the project's area of influence; identifies mitigation measures and any residual negative impacts that cannot be mitigated.
(vi) Analysis of Alternatives – examines alternatives to the proposed project site, technology, design, and operation, including the no project alternative.
(vii) Information Disclosure, Consultation, and Participation – the process undertaken during project design and preparation for engaging stakeholders, including information disclosure and consultation with affected people and other stakeholders and addressing the comments raised in consultation.
(viii) Grievance Redress Mechanism – presents the GRM established to handle grievances and complaints arising during project implementation. It defines GRM entry points, timeframe and institutional responsibilities of the GRM.
(ix) Environmental Management Plan – presents the EMP defined for Tranche 2. The EMP defines the mitigation measures, performance indicators, environmental monitoring requirements, institutional responsibilities, training activities related to environmental management, reporting requirements, and a mechanism for feedback and adjustment.

[7] Facility Administration Manual: Mongolia: Proposed Multitranche Financing Facility for the Western Regional Road Corridor Investment Program. June 2013

[8] Project's area of influence as defined in SPS 2009: (i) the primary project site(s) and related facilities that the borrower/client develops or controls; (ii) associated facilities that are not funded as part of the project (funding may be provided separately by the borrower/client or by third parties), and whose viability and existence depend exclusively on the project and whose goods or services are essential for successful operation of the project; (iii) areas and communities potentially affected by cumulative impacts from further planned development of the project, other sources of similar impacts; and (iv) areas and communities potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location. The area of influence does not include potential impacts that might occur without the project or independently of the project.

(x) Conclusion and Recommendation – summarizes the major environmental impacts and mitigation measures and concludes on the environmental soundness of the project.

(xi) Appendices – includes Terms of References for Ecological Data Enhancement and Wildlife Movement Monitoring surveys, and an Environmental Management Plan.

III. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

A. Mongolia's Environmental Policy

52. Mongolia has enacted a comprehensive policy and legal framework for environmental assessment and management. It has policies, legislation and strategies in place to manage the protected areas such as national parks, to satisfy its international obligations, and to protect the quality of the environment for the health and well-being of its citizens. The hierarchy of policies and legislative provisions for environmental management in Mongolia comprises the Constitution, international treaties and environment and resource protection laws[9].

53. The main policy documents are the National Environmental Action Plan of 1996, the State Environmental Policy of 1997, the National Plan of Action to Combat Desertification, the Biodiversity Conservation Action Plan, and the National Plan of Action for Protected Areas, all developed under the MNET auspices, as well as the Mongolian Action Program for the 21st Century. The National Environmental Action Plan was updated in 2000 and the National Action Plan for Climate Change was added in the same year. Several program documents (e.g. National Water Program, National Forestry Program, Program of Protection of Air, Environmental Education, Special Protected Areas, and Protection of Ozone Layer) were also completed in 2000/2001. State policy on EIA was in place in 1998. In addition, other guidance documents with important environmental repercussions were developed under the auspices of other ministries and these include the Roads Master Plan, the Power Sector Master Plan, the Tourism Master Plan, and the Renewable Energy Master Plan. Other documents, such as the annual Human Development Reports have increasingly incorporated environmental aspects.

54. A fundamental principle of the Mongolian state environmental policy is that economic development must be in harmony with the extraction and utilization of natural resources and that air, water and soil pollution will be controlled. In April 1996, Mongolia's National Council for Sustainable Development was established to manage and organize activities related to sustainable development in the country. The country's strategy is designed for environmentally friendly, economically stable and socially wealthy development, which emphasizes people as the determining factor for long-term sustainable development.

55. The health of Mongolia's natural ecosystems and populations of wild species is of both national and global importance. The country forms an important part of the global ecosystem where the ecoregions of the Siberian taiga, the Central Asian steppe, the high Altai Sayan, and the Gobi desert converge. The Project area is in the Altai Sayan ecoregion. In recognition of its global responsibilities, Mongolia has acceded to a number of international environmental conventions and the key ones are tabulated below (**Table 2**).

56. Each of these conventions places obligations on signatory governments ranging from the provision of a legislative basis for implementation, to adherence to the requirements and conditions of each convention, to monitoring implementation performance on a regular basis, to reporting on a regular basis to the conference of parties.

[9] UNDP. 2008. Institutional Structures for Environmental Management in Mongolia. Ulaanbaatar and Wellington.

Table 2: International Environmental Conventions Signed by Mongolia

Convention	Year of Accession
Convention on Biological Diversity (CBD)	1993
UN Framework Convention on Climate Change (UNFCCC)	1994
Kyoto Protocol	1999
UN Convention on Combating Desertification (UNCCD)	1996
Convention on the Protection of Wetlands of International Importance (Ramsar)	1998
Vienna Convention for the Protection of the Ozone Layer	1996
Montreal Protocol (regulating substances that deplete the ozone layer)	1996
Convention on International Trade in Endan*ger*ed Species of Fauna and Flora (CITES)	1996
Convention on the Transboundary Movement of Hazardous Waste (Basel)	1997
Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade	2000
Stockholm Convention on Persistent Organic Pollutants (POPs)	2004
World Heritage Convention	1990

57. The Government of Mongolia undertook a major environmental law reform in 1990 including the law of land, protected areas, water, forest, wildlife, and native flora resources. The legislation base is extensive as evidenced by the following table of key environmental legislation (**Table 2**).

Table 3: National Environmental Laws

Name of the Law	Year Adopted
The Constitution of Mongolia	1992
Law on Environmental Protection	1995, 2006, 2008
Law of Land	2002
Law on Land Cadastre and Mapping	1999
Law on Land Fees	1997
Law on Land Possession	2002
Law on Special Protected Areas	1994
Law on Buffer Zones	1997
Law on Water	2004
Law on Water and Mineral Water Resource Fee	1995
Law on Forests	1995
Law on Prevention of Steppe and Forest Fires	1996
Law on Reinvestment of Natural Resource Use Fees for Conservation	2000
Law on Natural Plants	1995
Law on Protection of Plants	1996
Law on Fauna	2000
Law on regulation of export and import of endan*ger*ed species (flora, fauna)	2002
Law on Underground Resources	1994
Law on Mineral Resources	1997, 2006
Law on Petroleum	1991
Law on Air	1995
Law on Hydrometeorology	1997
Law on Protection from Toxic Chemicals	1995
Law on Environmental Impact Assessment	1998, 2002
Law on Tourism	1998
Law on Solid Waste	2003
Law on prohibiting export and transportation of Hazardous Waste	2000

B. Environmental Impact Assessment Requirements

58. The project is subject to the environmental requirements of both Mongolia and ADB.

These requirements are defined in the next two sections.

1. Environmental Assessment Requirements of ADB

59. Safeguard requirements for all projects funded by ADB are defined in ADB SPS (2009). SPS 2009 establishes an environmental review process to ensure that projects undertaken as part of programs funded through ADB loans are environmentally sound, are designed to operate in compliance with applicable regulatory requirements, and are not likely to cause significant environmental, health, or safety hazards. SPS 2009 is underpinned by the ADB Operations Manual, Bank Policy (OM F1, 2010). The policy promotes international good practice as reflected in internationally recognized standards such as the *World Bank Group's Environmental, Health and Safety Guidelines*[10].

60. SPS 2009 environmental assessment requirements specify that:

(i) At an early stage of project preparation, the borrower/client will identify potential direct, indirect, cumulative and induced environmental impacts on and risks to physical, biological, socioeconomic, and cultural resources and determine their significance and scope, in consultation with stakeholders, including affected people and concerned NGOs. If potentially adverse environmental impacts and risks are identified, the borrower/client will undertake an environmental assessment as early as possible in the project cycle. For projects with potentially significant adverse impacts that are diverse, irreversible, or unprecedented, the borrower/client will examine alternatives to the project's location, design, technology, and components that would avoid, and, if avoidance is not possible, minimize adverse environmental impacts and risks;
(ii) The assessment process will be based on current information, including an accurate project description, and appropriate environmental and social baseline data;
(iii) Impacts and risks will be analyzed in the context of the project's area of influence;
(iv) Environmental impacts and risks will be analyzed for all relevant stages of the project cycle, including preconstruction, construction, operations, decommissioning, and post-closure activities such as rehabilitation or restoration;
(v) The assessment will identify potential trans-boundary effects as well as global impacts; and
(vi) Depending on the significance of project impacts and risks, the assessment may comprise a full-scale environmental impact assessment (EIA) for category A projects, an initial environmental examination or equivalent process for category B projects, or a desk review.

61. Other key requirements of SPS 2009 include:

(i) *Environmental Management Plan.* The borrower/client will prepare an environmental management plan (EMP) that addresses the potential impacts and risks identified by the environmental assessment.
(ii) *Consultation and Participation.* The borrower/client will carry out meaningful consultation with affected people and other concerned stakeholders, including

[10] New Version of the "World Bank Group Environmental, Health, and Safety Guidelines", April 30, 2007, Washington, USA. http://www.ifc.org/ifcext/enviro.nsf/Content/EnvironmentalGuidelines

civil society, and facilitate their informed participation.

(iii) *Information disclosure.* The borrower/client will submit to ADB the following documents for disclosure on ADB's website: (i) a draft full EIA (including the draft EMP) at least 120 days prior to ADB Board consideration; (ii) the final EIA; (iii) a new or updated EIA and corrective action plan prepared during project implementation, if any; and (iv) semi-annual environmental monitoring reports.

(iv) *Grievance Redress Mechanism.* The borrower/client will establish a mechanism to receive and facilitate resolution of affected people's concerns, complaints, and grievances about the project's environmental performance.

(v) *Monitoring.* The borrower/client will monitor and measure the progress of implementation of the EMP.

62. This EIA is intended to meet SPS 2009 requirements.

2. Environmental Assessment Requirements of Mongolia

63. The EIA requirements of Mongolia are regulated by the Law on EIA (1998, amended 2002[11] and amended 2012). The terms of the law apply to all new projects, as well as rehabilitation and expansion of existing industrial, service or construction activities and projects that use natural resources.

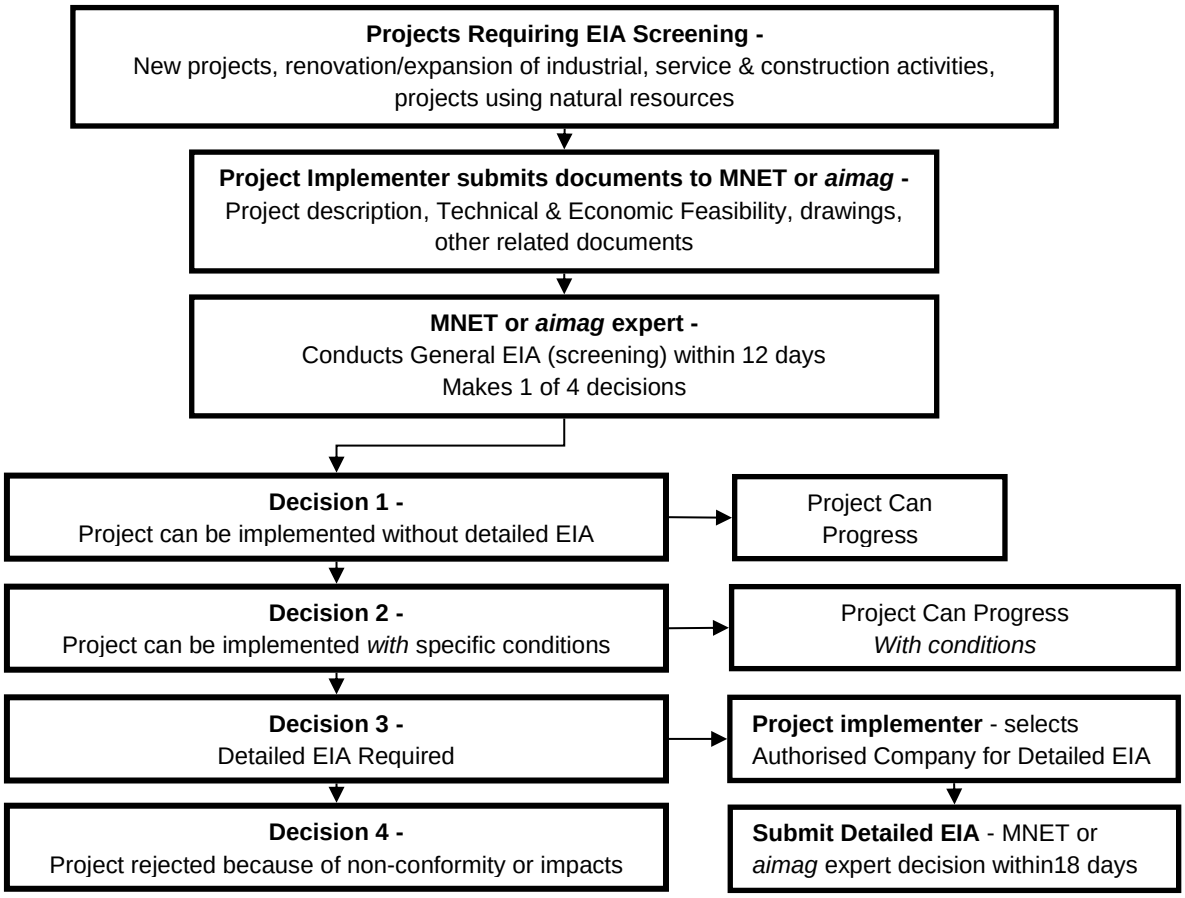
64. The most recent amendment to the law was adopted in 2012 and will be brought into force in 2013, implemented through a new Environmental Impact Assessment Regulation[12]. The 2012 amendment introduces a requirement for Strategic Environmental Assessment for policy documents, and increases emphasis on public participation during a general EIA.

65. The purpose of the EIA law is environmental protection, the prevention of ecological imbalance, the regulation of natural resource use, the assessment of environmental impacts of projects and procedures for decision-making regarding the implementation of projects. The EIA process in Mongolia is summarized in **Figure 4**

[11] Law of Mongolia on Environmental Impact Assessments (1998, amended in 2002). Unofficial translation available from http://cdm-mongolia.com.

[12] The new EIA Regulation revokes 2 Regulations and 1 Guideline document which do not meet the requirements of the EIA Law. The revoked legislation is: Regulation on the Environmental Impact Assessment Committee (2006); Guidelines on Formulating EPPs and EMPs (2000); and Regulation on Detailed EIA Appraisal (2006). These regulations are superseded by the EIA Law.

Figure 4: EIA Process in Mongolia



Source: Adapted from Vol. 1 (2001) Compendium of Laws: A Mongolian Citizens Reference Book

66. The type and size of the planned activity define responsibility as either MNET or *aimag* (provincial) government. There are two types of EIAs defined in the Law:

(i) **General EIA (screening)** - to initiate a General EIA, the project implementer submits to MNET (or *aimag* government) a brief description of the project including feasibility study, technical details, drawings, and other information. The General EIA may lead to one of four conclusions: (i) no detailed EIA is necessary, (ii) the project may be completed pursuant to specific conditions, (iii) a Detailed EIA is necessary, or (iv) project cancellation. The General EIA is free and usually takes up to 12 days.

(ii) **Detailed EIA** – the scope is defined by the General EIA. The Detailed EIA report must be produced by a Mongolian company which is authorized by the MNET by means of a special procedure. The developer of the Detailed EIA should submit it to the MNET (or *aimag* government). An expert of the organization who was involved in conducting General EIA should make a review of the Detailed EIA within 18 days and present it to MNET (or *aimag* government). Based on the conclusion of the expert, the MNET (or *aimag* government) takes a decision about approval or disapproval of the project.

(iii) The Detailed EIA must contain the following chapters: (i) Environmental baseline data; (ii) Project alternatives; (iii) Recommendations for minimizing, mitigation and elimination of impacts; (iv) Analysis of extent and distribution of adverse

impacts and their consequences; (v) Risk assessment; (vi) Environmental Protection Plan; (vii) Environmental Monitoring Program; and (viii) Opinions of residents on whether the project should be implemented.

67. The WRRCIP has been subject to a Detailed EIA in accordance with Mongolian law, submitted in 2007. MNET approved the EIA and the DOR has confirmed that the EIA remains valid for Tranche 2.

C. Environmental Standards

68. **Ambient Water Quality**. Mongolia has national standards for a range of environmental parameters including water quality, noise and air quality. **Table 4** shows the Mongolian standard for ambient water quality.

Table 4: Mongolian Standard for Ambient Water Quality

pH	SS [mg/l]	DO [mg/l]	BOD [mg/l]	NH_4^+ [mg/l]	PO_4^{-3} [mg/l]	SO_4^{-2} [mg/l]
6.5-8.5	-	6.4	3.0	0.5	0.1	100

Source: Altansukh O. 2008. Surface Water Quality Assessment and Modeling. A case study in the Tuul River, Ulaanbaatar City, Mongolia. Master Thesis. International Institute for Geo-information Science and Earth Observation. Enschede, The Netherlands.

69. **Potable Water**. The National Center of Standardization and Metrology has a number of standards relating to potable water. Potable water characteristics are assessed qualitatively for taste, smell and color and against Mg/l for turbidity. **Table 5** provides standards on characteristics and chemical composition of potable water.

Table 5: Mongolian Standard for Chemical Composition of Potable Water

	Composition	Unit	Acceptable Concentration
1	Molybdenum (Mo)	mg/l	0.07
2	Barium (Ba)	mg/l	0.7
3	Boron (B)	mg/l	0.5
4	Copper (Cu)	mg/l	1.0
5	Calcium ion ($Ca^{2+)}$	mg/l	100.0
6	Magnesium ion (Mg^{2+})	mg/l	30.0
7	Manganese (Mn)	mg/l	0.1
8	Sodium (Na)	mg/l	200.0
9	Phosphate ion (PO_4^{2+})	mg/l	3.5
10	Flourine (F)	mg/l	0.7-1.5
11	pH	-	6.5-8.5
12	Selenium (Se)	mg/l	0.01
13	Strontium (Sr)	mg/l	2.0
14	Sulphate oxide ion SO_4^{2+}	mg/l	500.0
15	Hardness	mg.eq/l	7.0
16	Chlorine ion (Cl^-)	mg/l	350.0
17	Arsenic (As)	mg/l	0.01
18	Hydrogen Sulfide (H_2S)	mg/l	0.1
19	Chromium (Cr)	mg/l	0.05
20	Dehydrated remaining	mg/l	1000.0
21	Uranium (U)	mg/l	0.015

Source: National Center of Standardization and Metrology.

70. Mongolia has a network of air quality monitoring stations which analyze air quality data for comparison with national and international standards. The standards for Mongolia and WHO

are in **Table 6**.

Table 6: Mongolian Standard (24 hr mean) for Air Quality

	SO_2 [µg/m^3]	NO_2 [µg/m^3]	CO [mg/m^3]	PM_{10} [µg/m^3]
Mongolian Standard (24 hr mean)	**20**	**40**	**3**	**100**
WHO	**20**	**40 (annual mean)**	**10 (8 hrs)**	**50**

Source: MNET and WHO[13]

71. Mongolian National Noise Standards set an allowable limit for noise in daytime at 60 dB, and night at 45 dB, with night being 10pm-6am according to the Act on Labor. These standards can be compared to the more detailed WHO guidelines which recommend that indoor noise levels should not exceed 30 dB (average equivalent over 8 hours LA_{eq}) and 45 dB (maximum for an individual noise event), and outdoor sound levels should not exceed 50 dB LA_{eq}.

D. Climate Change Policy

72. Mongolia has joined 14 environment-related UN Conventions and Treaties, including the UN Framework Convention on Climate Change (UNFCCC). Nationally, the Mongolian Action Programme for the 21st Century (MAP 21) includes considerations and recommendations related to climate change adaptation and the mitigation of Greenhouse gas (GHG) emissions.

73. In order to comply with the obligations and commitments under the UNFCCC as well as to address challenges relevant to climate change, Mongolia has developed its National Action Programme on Climate Change, which received Government approval in 2000 and was updated in 2010. The action programme includes the national policy and strategy to tackle impacts of climate change and to mitigate GHG emissions. It also sets priorities for action and to integrate climate change concerns into other national and sectoral development plans. In order to fulfil the requirements of the National Programme on Climate Change, an inter-disciplinary and inter-sectoral National Climate Committee has been established by the government and is led by MNET. The Committee coordinates and guides national activities and measures aimed at adapting to climate change and mitigating GHG emissions.

74. Regarding climate change mitigation, the government has undertaken to mitigate GHG emissions through a range of strategies for sustainable development covering different sectors. In the transportation sector, the strategy is 'Efficient management of transportation'. The policies and measures to implement this are: i) Enhancement of national transportation system (railway enhancement and electrification; setting up transit logistics centers) and ii) Eco-transport strategy (efficient traffic management; expansion of public transportation; and promotion of fuel efficient cars)[14].

75. Regarding climate change adaptation, the government has outlined strategies relating to the following sectors: animal husbandry, arable farming, water resource, human health, and forestry. Each sector has a number of strategies and policies and measures relating to the

[13] WHO air quality guidelines, for all parameters except carbon monoxide, available at http://www.who.int/mediacentre/factsheets/fs313/en/index.html; WHO, UNEP and ILO, Environmental Health Criteria 213 carbon monoxide (second edition) for carbon monoxide, available at http://whqlibdoc.who.int/ehc/WHO_EHC_213.pdf

[14] Mongolia's Second National Communication on Climate Change

strategy. In the water resource sector, one of the strategies is 'improved water resource management' and the measure to implement it is 'developing and implementing integrated river basin management policy and plans in the river basins and at national level, coping with desertification'. There is no specific strategy relating to transport, however the range of measures relating to protection of water supplies, such as ''Improved water resource management'' are relevant to the project as the WRRCIP traverses an area in which surface waters in particular are relied upon by both people and livestock.

76. ADB Guidelines for Climate Proofing Investment in the Transport Sector state that climate proofing options can be either engineering (structural) options (subsurface conditions, material specifications, cross section and standard dimensions, drainage and erosion, and protective engineering structures), and/or non-engineering options (maintenance planning and early warning, alignment, master planning and land use planning, and environmental management). In relation to the climate change related vulnerabilities presented in **Table 20** (Chapter IV. Description of the Environment), the risk of ''permafrost retreat'' is the most relevant concern to a transport project.

E. Specially Protected Areas

77. **Specially Protected Areas.** In 1994, the protected area system was consolidated and formalized through the Law on Special Protected Areas. Under this law, Mongolia has a national system of protected areas, called Special Protected Areas, covering 22 million hectares, equivalent to almost 14% of the country. The Law on Special Protected Areas provides for four categories of protected areas: Strictly Protected Areas; National Parks; Nature Reserves; and National Monuments.

78. Nature Reserves are further classified into four sub-categories: Ecological Reserves; Biological Reserves; Paleontological Reserves; and Geological Reserves. In addition, the Law on Buffer Zones requires the establishment of Buffer Zones outside Strictly Protected Areas. In addition, local *soum* authorities may establish Buffer Zones around Nature Reserves and Natural Monuments.[15]

79. **Important Bird Areas (IBA).** Important Bird Areas (IBAs) constitute key sites for conservation identified by the IBA Program of BirdLife International. Often IBAs may be part of a protected-area network, but are not necessarily protected under domestic law. An example of this is the Tolbo Lake IBA which is situated within 2km of the project area. Tolbo Lake IBA is not covered by the Law on Special Protected Areas and therefore does not have legal protection status.

F. Mongolia's Occupational Health and Safety Standards

80. Article 16 of the National Constitution of Mongolia states that every employee has the right to 'suitable conditions of work'. The government adopted a National Program for Occupational Safety and Health Improvement in 2001 and national standards are also adopted such as the National Standard on Occupational Health and Safety MNS 5002:2000.

G. Strategic Transport Policy

81. The Government of Mongolia (GOM) in conjunction with external supporting

[15] UNDP Project Document: Strengthening of the Protected Area Network in Mongolia (SPAN) (2010).

organizations such as ADB have created a number of strategies and policies for the transport sector which focus on long term goals and estimated budgets. Such strategy documents include the National Development Strategy 2007-2021, the National Transport Strategy for Mongolia, "Transit Mongolia" program, and the Mongolian Road Master Plan 2008-2020.[16]

82. **Transit Mongolia**. The national program "Transit Mongolia" has been prepared by the National Transport and Trade Facilitation Committee and approved by the Mongolian Government on May 2008. The Program includes the following projects[17:]

(i) Construction of a secondary railway line
(ii) Railway electrification project
(iii) Construction Asian Highway Routes in Mongolia
(iv) Facilitation Transit transport through Mongolian territory

83. Under the Transit Mongolia program, the Mongolian government is planning to construct transport and trade logistics terminals in a number of towns and border towns including Tsagaannuur.[18] This will facilitate the Government's plans to further Mongolia's position as a trade route in the region.

84. **Millennium Road Project**. The Millennium Road project was started in 2000 and is being implemented with a plan to construct paved roads of 7,546 km long connecting Mongolia's east to west horizontally (2653 km) and five parallel vertical axes from the Russian Federation to PRC by 2016, and Ulaanbaatar will be connected to all *aimag* centers by paved roads, in order to improve transport access of residents living in rural and suburban areas. **Figure 5** shows the Millennium Roads, of which Route 1 is in the Tranche 2 corridor.

[16] Ministry of Road, Transport, Construction and Urban Development presentation ''Road, Transport Sector Mongolia'' Presentation to UNESCAP for Operationalization of international intermodal transport corridors in North-East and Central Asia, Bishkek Meeting. See http://www.unescap.org/ttdw/common/TIS/CorridorStudy/EGM_Bishkek/7-Mongolia.pdf

[17] Mongolia Country Paper to UNESCAP for Operationalization of international intermodal transport corridors in North-East and Central Asia (2009): Recent Progress, Status of Development and Operation of Resent Progress, Status of Development and Operation of the International Intermodal Transport Corridors in Mongolia. Prepared by Mr. A.Togosbold, Senior officer, Mongolian Ministry of Road, Transport, Construction and Urban Development. See http://www.unescap.org/ttdw/common/TIS/CorridorStudy/EGM_files/Mongolia_CountryPaper.pdf

[18] Mongolia Country Paper to UNESCAP for Operationalization of international intermodal transport corridors in North-East and Central Asia (2009): Recent Progress, Status of Development and Operation of Resent Progress, Status of Development and Operation of the International Intermodal Transport Corridors in Mongolia. Prepared by Mr. A.Togosbold, Senior officer, Mongolian Ministry of Road, Transport, Construction and Urban Development. See http://www.unescap.org/ttdw/common/TIS/CorridorStudy/EGM_files/Mongolia_CountryPaper.pdf

Figure 5: Millennium Road Project, Mongolia

Source: Road Transport and Tourism of Mongolia presentation by Ministry of Road, Transport and Tourism of Mongolia (2005)[19]

85. As of 2010, under the Millennium Roads Project, 2,597 km long paved road, 1,961 km gravel road, and 1,902 km of improved road have been built. In support of the improved road network, the Mongolian Government is creating a legal framework that can attract investment from private sector to road construction, with an aim to plan road construction investment efficiently.[20]

86. **Asian Highway.** The Asian Highway project was initiated in 1959. Intergovernmental Agreement on the Asian Highway Network was adopted on 18 November 2003 and is an important tool to facilitate international trade and tourism, promote regional integration and enhance international cooperation. The Government of Mongolia signed the Agreement in 2004. The WRRCIP road is part of the Asian Highway route 4, part of network of 141,000 km of standardized roads across Asia The purpose of the network is to increase connectivity and develop trade across Asia.

H. Integrated Water Resource Management Plan

87. The Government of Mongolia has given a priority to water issues and legalized a basin wide water management approach by revising Mongolian Law on Water. This law states that a "Basin Council consisting of representatives of water users and consumers, government, non-governmental, and specialized or professional organizations will be established for the implementation of the approach". In accordance with the law, Khovd and Buyant River Basin Councils were established in 2009. These are the key rivers in the Tranche 2 area which is in the Khar lake-Khovd river basin, a sub-basin of the Great Lakes' Depression.

88. The Khar lake-Khovd river basin Integrated Water Resource Management Plan

[19] See reference: http://www.tumenprogramme.org/data/upload/download/Mongolia%20Session/Road%20Transport%20and%20Tourism%20of%20Mongolia.pdf

[20] MNET (2010) Mongolia National Report On Sustainable Development For The 18th Session Of The Commission on SD. See: http://www.un.org/esa/dsd/dsd_aofw_ni/ni_pdfs/NationalReports/mongolia/Full_text.pdf

(IWRMP) has been designed specifically for the river basin, facilitated by WWF Mongolia. The management plan was approved by an order of the Minister for Nature, Environment and Tourism in September 2010 and will be implemented in two phases.

89. The IWRMP should be used as a guiding policy for activities in the Project area which may impact on water resources. Discussions with WWF in Khovd confirmed that the Khovd and Buyant River Basin Councils are not yet fully active but they are anticipated to be within the project lifetime and they should be engaged with the project. The main objectives of the IWRMP are:

(i) Ensure sustainable use, protection and restoration of natural resources of the basin with participation of local communities.
(ii) Ensure sustainable development of socio-economic sectors consistent with water resources, water quality conservation and utilization norms.
(iii) Create a legal and regulatory framework for the conservation and sustainable use of water resources of the basin and build institutional capacity.
(iv) Expand scientifically based information sharing platform and public awareness measures on water resource conservation and sustainable use.

90. The activities associated with these objectives which may interact with the project include:

(i) Renew and update technologies and equipment/apparatus of water treatment plants in Olgii and Khovd towns.
(ii) Improve waste management in Khovd and Olgii towns and other settled areas.
(iii) Support and encourage the initiatives and efforts to restore and build livestock enclosures around sources of natural springs.
(iv) Improve monitoring network on permafrost and glaciers.

91. The IWRMP states that all short term projects, plans, regulations, standards and procedures of the *aimags* and *soums* in the basin will be developed in consistency with the management plan.

IV. DESCRIPTION OF THE PROJECT

A. Justification and Rationale

1. Infrastructure Needs Addressed by the Project

92. **Limited Current Infrastructure.** Mongolia is a sparsely populated country located between the PRC to the south, and the Russian Federation to the north. The population density[21] is considered very low at 1.8 per km^2, as compared to neighbouring PRC with 139.8 per km^2 and the Russian Federation at 8.4 per km^2. Because of the large land area and severe weather conditions during winter, surface transportation in Mongolia is difficult. The route of the proposed western regional road corridor, which is part of Asian Highway 4 and is designated CAREC Corridor 4a, runs north–south from Mongolia's border with the Russian Federation at Ulaanbaishint to its border with the PRC at Yarant, a total distance of about 743 km.

93. Mongolia's western region suffers from slow development because of its remoteness from the country's political and economic centers and its inadequate transport network. Roads to and within the region are mostly unpaved and impose heavy travel costs on residents and visitors. As a result, the region lacks adequate access to jobs, markets, and social services, and is significantly poorer than other parts of Mongolia. Gross domestic product per capita in the western region is only 75% of the national average. The poverty incidence was 48% in 2008, compared with the national average of 34%. Because of their proximity to PRC and the Russian Federation, Bayan-Olgii and Khovd provinces import about 75% of their energy, food, consumer goods, and construction materials from these countries.

94. **Lack of Paved Roads**. Mongolia lacks adequate road infrastructure with over 87% of the road network being earth tracks, using 2009 data[22]:

(i) Total Road Network: 49,250 km
(ii) Earth Tracks: 42,710 km
(iii) Paved Roads: 2,680 km

95. Lack of paved roads results in high transport costs and long travel times. The WRRCIP is the government's top priority road investment following the ADB-financed Regional Road Development Project.

96. **Improved Social Development**. A functioning paved road network will help Mongolia to link together its large and poorly connected territory to promote social and economic development. While the western region is sparsely populated, it is home to 185,000 people, currently without paved road access to regional cities and towns. The investment program will provide a vital link to economic opportunities and social services such as education and health care, reduce the high costs of imports, and improve the competitiveness of the region's export products.

97. **Cross-border Transport**. Mongolia's western regional road corridor can also serve as a direct and convenient transit route between the Xinjiang Uygur Autonomous Region of PRC and the Russian Federation, reducing transport costs and facilitating trade, tourism, and other economic activities. Rising incomes will increase the demand for imports from neighbouring countries, which are now constrained because of extremely high transport costs. Efficient cross-

[21] UN Data Country Profiles for Mongolia, PRC and Russian Federation.
[22] ADB, Manila (2011). Mongolia Road Sector Development to 2016

border transport will be essential for the western regional road to deliver the envisioned benefits. ADB is assisting PRC to improve cross-border transport in the region through the Xinjiang Altay Urban Infrastructure and Environment Improvement Project, which includes infrastructure improvements at the Takeshiken land port on the PRC side of the border near Yarant.

98. The entire Western Regional Road corridor is being funded through a combination of financing from ADB, the Government of Mongolia and PRC. It is important to note in respect to the context of this EIA that the entire WRRCIP is being developed within an existing road corridor.

2. Impact and Outcome

99. In order to address the challenges and issues with the road infrastructure in the Western Region of Mongolia, a comprehensive program that includes investments in road infrastructure improvement combined with road maintenance to improve the sustainability of the road is required. The investment program represents an expansion of over 20% of the entire paved road network in Mongolia, which will require a medium- to long term commitment by ADB to assist the government in completing the road corridor.

100. As stated in the WRRCIP Report and Recommendation of the President to the Board of Directors and Design Monitoring Framework the key impact and outcome of the investment program will be:

(i) **Impact**: inclusive economic growth promoted by enhanced local and regional connectivity and competitiveness in the remote western region.
(ii) **Outcome**: improved transport accessibility within the project area and between countries leading to increased access to markets, health and education facilities.

101. On a local level, key benefits arising from the road connectivity have been confirmed through consultations along the corridor where road improvements have already started (Tranche 1). The existing and anticipated benefits presented by the residents consulted include:

(i) Improved access to social services such as healthcare;
(ii) Reduced travel time which benefits students travelling to education facilities;
(iii) Improved connectivity between communities and families particular in winter when household can become isolated;
(iv) Improved access to markets for buying and selling commodities; and
(v) Lower household expenditure on transport through reduced costs of fuel, vehicle maintenance and an ability to buy cheaper and smaller vehicles.

B. Tranche 2 Project Components and Subcomponents

102. This EIA is for the second tranche of funding for the WRRCIP. Tranche 2 investment includes the following components:

103. **Component 1a: Khovd to Tolbo *soum* (163.9 km).** Construction of a two lane highway in accordance with Mongolian Road Design Standards. The design includes bridges and culverts for permanent and ephemeral water streams. As much as possible the design alignment follows the existing road alignment. The existing alignment comprises significant sections of multi-track earth road which are much wider than the proposed design alignment.

104. The improvements proposed for the project road section are identified as follows:

(i) Two lanes and a cross section consisting of carriageway widths of 7 meters and shoulder widths of 1.5 – 2 meters;
(ii) The road pavement edge shall be designed 0.6 m above the expected level of snow cover as required for Category III roads;
(iii) Widening the formation in existing earth road sections, retaining the existing alignment and profile wherever possible;
(iv) New earth formations along the currently unformed sections, with geometric characteristics that conform to Mongolian Road Design Standards;
(v) Rehabilitating or maintaining existing bridges and culverts that are suitable to be retained; reconstructing structures that are unfit to be retained and constructing new bridges and culverts where necessary; and providing drains and slope stability measures.

105. The Project has been designed according to Mongolian Road Design Standards, at the recommendation of the Mongolian government. According to Mongolian standards, the Western Regional Road is classified as a Category III Road, as shown in **Table 7**. The Category III classification is determined by the level of traffic.

Table 7: Road Category According to Mongolian Standards

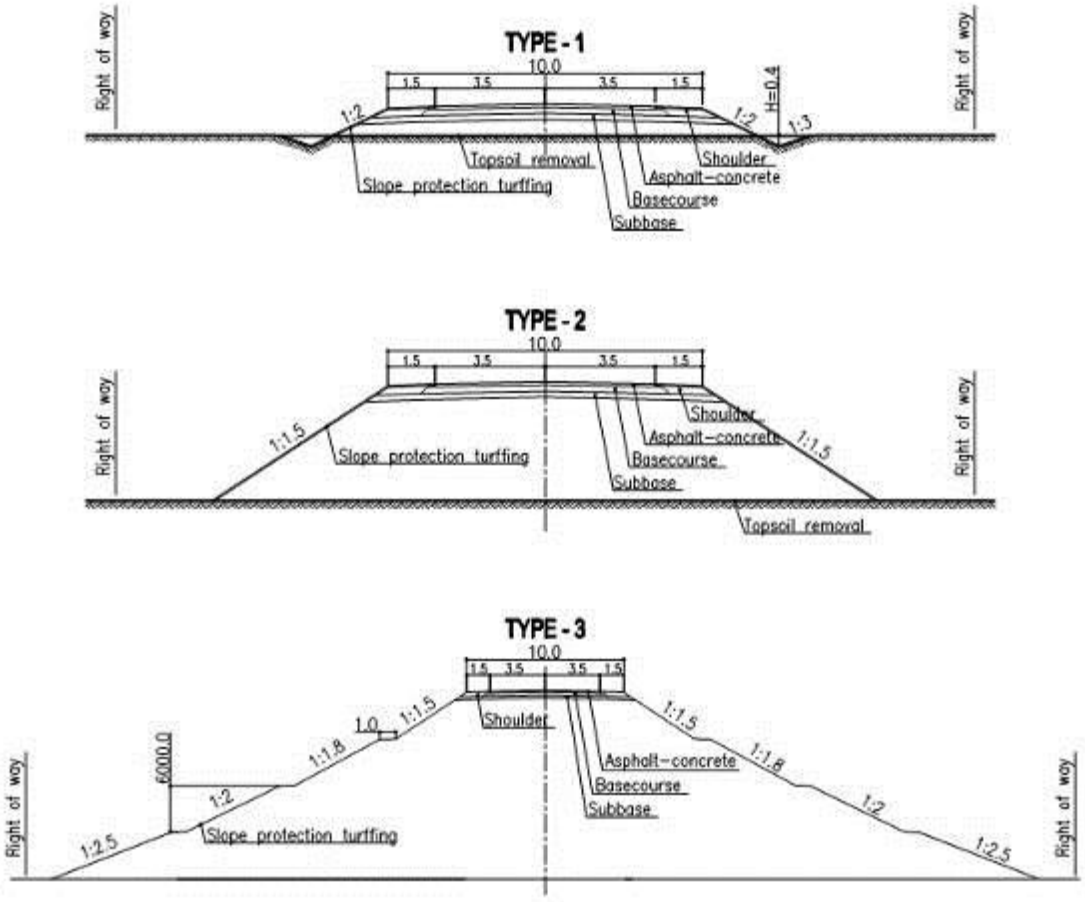
Road type	Road category	No. of lanes	Functional classification	AADT Equivalent Passenger cars per day or Level of service	Divided or Undivided
Freeways		Multi-Lane Highway	Arterial	B	Divided
Expressways			Arterial, regional	B	Divided
Conventional highways	I			C	Divided/undivided
	II			C	Undivided
	III	Two-lane roads	Arterial, regional & local roads	C	Undivided
	IV		Regional & local roads	400-2000	Undivided
Low volume roads		1-2 lane	Local roads	<200 Mixed traffic	Undivided

Note: Level of Service: A – Highest; B – High; C – Average; D – Low; E – Very Low
Source: Road Design Standard CNR 21-01-00.

106. The main road is proposed to have a design life of 15-19 years, with traffic volumes expected to reach 3,855 – 5,015 vehicles per day by 2032. Design, drawings and Technical Specifications have already been prepared by the Design Consultant and approved by the State Expert. However, there are some changes at the Km79+600 to Km83+740 section between Buraatin and Khashaat pass in order to reduce the quantity of fill and earthworks by reducing the width of the formation by eliminating one or both overtaking lanes. Currently, the design is being reviewed by the MRT.

107. **Figure 6** shows examples of the proposed typical cross sections for the road. The design shows that the road will remain within the existing right of way and the height of the embankment will be determined by issues such as permafrost conditions and topography.

Figure 6: Proposed Example Cross Sections



Source: Department of Roads. 2008. Detailed Design for Road section from Khovd to Olgii. Ulaanbaatar.

108. The location and proposed road alignment is shown in **Figure 7** and **Figure 8**. The road runs to the north west of Khovd after an intial section to the north east, which is the preferred alignment in order to protect a cultural monument (a protective wall near Khovd town from the Manchurian period) in Khovd *aimag* centre. The road follows the existing tracks and alignment and crosses two significant passes, Khashaat davaa and Buraatin davaa. The longitudinal profile of the road alignment from Khovd to Tolbo soum is shown in **Figure 16** which gives the altitude of Khashaat davaa and Buraatin davaa to be approximately 2,600 m and 2,700 m, respectively.

Figure 7: Component 1a Location

Source: ADB Study Team

Figure 8: Component 1a Proposed Alignment

Source: ADB Study Team

109. **Bridges and Culverts.** Along the project road section, a total of 161 bridges and culverts were identified from the detailed design.[23] Of the culverts, 123 are pipe culverts and 32 are box culverts. There are 18 single box culverts, 9 twin box culverts and 5 triple box culverts. Four of the six bridges in the detailed design are located between Khovd and Khashaat pass while the other two are in the section Khashaat davaa to Buraatin davaa. See component 1b regarding three bridges in Khovd and Olgii *aimag* centres. The 6 bridges are planned to cross more than 20 m width water courses. The type of bridges are pre-stressed concrete, simple beam concrete bridges. All bridges are less than 50 m long.

110. **Component 1b Ulaanbaishint to Tsagaanuur (25.8 km)**. Using the same design standards as Component 1a (Khovd-Tolbo *soum*), the proposed alignment is within the existing right of way. The existing road has been improved to some extent by the Government of Mongolia na dlinks Tsagaanuur with Ulaanbaishint which is the border control town to the Russian Federation. The location and alignment of Component 1b is shown in **Figure 9** and **Figure 10**. This section of road contains two bridges crossing streams which are not proposed to be replaced.[24]

Figure 9: Component 1b Location

Source: ADB Study Team

[23] Department of Roads. 2008. Detailed Design for Road section from Khovd to Olgii.
[24] PPTA (2010) Volume 1 Engineering Review.

Figure 10: Component 1b Alignment

Source: ADB Study Team

111. **Component 2a: Rehabilitation of three bridges – two inside Khovd** (0.304 km) **and one inside Olgii** (0.18 km). Rehabilitation of current two lane structures which cross streams and are considered beyond repair.

112. The two bridges at Khovd cross the Buyant river to the north west of the *aimag* centre. The bridges are currently for a two lane road and it is expected that the width of the bridges will be the same. The PPTA report recommended that further consideration is given to embankment protection as some bank protection will be required or the alignment of the road can be adjusted to turn the alignment to a northerly direction.

113. The location of the Khovd bridges is shown in **Figure 11** and the current condition and design of the bridge nearest Khovd is shown in **Figure 12**, showing the two piers placed in the river bed and river bank.

Figure 11: Component 2a Location of two bridges in Khovd

Source: ADB Study Team

Figure 12: Component 2a Existing Bridge in Khovd

Source: ADB Study Team

114. The bridge at Olgii crosses the Khovd River to the west of the *aimag* centre. The current structure is considered beyond repair and is estimated to be 30-40 years old. The bridge

currently accommodates a two lane road and it is expected that the width of the bridge will be the same. The location of the bridge is shown in **Figure 13** and the current condition and design of the bridge is shown in **Figure 14.**

Figure 13: Component 2a and 2b Olgii Bridge & Internal Roads Location

Source: ADB Study Team

Figure 14: Component 2a Olgii Bridge condition

Source: ADB Study Team

115. **Component 2b: Internal Roads Inside Khovd and Olgii**. In Khovd, sections of internal roads totaling 10km will be repaved to allow access to the highway and Khovd *aimag* centre facilities. The roads are currently poorly paved and the project will upgrade the pavement, curbstones and surface water drainage of roads in the *aimag* centre.

116. In Olgii, sections of internal roads totalling 4.9 km will be repaved to ensure the quality of the new highway is maintained as it passes through the town. The road is currently poorly paved and the project will upgrade the pavement, curbstones and surface water drainage of road sections in the *aimag* centre.

117. **Component 3: Road Maintenance Units and Equipment**. Two units will be established for the maintenance of the new highway, including equipment for winter maintenance such as snow clearing. The current road maintenance capability in the Project area is inadequate to cover the requirements for proper servicing of the new road. To remedy this, road maintenance centers will be established along the proposed road in order to fulfil the following requirements:

(i) Routine maintenance including pothole repair and crack patching;
(ii) Removal of litter from roadside stopping areas and other locations; and
(iii) Emergency response activities such as accidents and snow removal to allow access.

118. **Component 4:** Resources for project management, consulting services support (including Construction Supervision and Environment, Social and HIV/AIDS Monitoring) and institutional development. This Component is not considered further in this EIA in terms of its environmental impacts.

C. Climate Change

119. **Climate Change Adaptation**. The Project roads will be constructed according to Mongolian design standards which estimate the road life to be 15 years. Road life is limited by the extremes of temperatures in Mongolia (+30 to -40°C). Such extremes diminish the relevance of climate change. Therefore in terms of pavement options, design for climate change adaptation is not considered a significant issue.

120. **Surface Water Flow.** The bridges and culverts in the road and the road alignment itself are more long term and therefore should consider climate change adaptation in their design in particular regarding capacity to manage predicted changes in water volumes/flow rates. Based on appropriate climate models for Mongolia (HadCM3 model of the HADLEY center) results show that the annual precipitation will generally increase. However, there will be a small decline in the summer season between 2011-2030 according to specific[25] emission scenarios. Precipitation in the summer season will increase by less than 10 percent, which is smaller than the rise in winter precipitation compared to the normal climate. Because of climate change, it is anticipated that winter is becoming milder and more snowy, while summer is becoming hotter and drier even though there will be a slight increase of precipitation based on overall climate change assessment. A recent trend of increasing frequency of extreme precipitation events is likely to continue.

121. In the project area, the following surface water trends are observed as shown in **Table 8**.

Table 8: Current changes in annual and seasonal runoff of rivers

Rivers Group	Trend
Rivers draining from the glaciers of the Altai mountain range, rivers of continuous permafrost catchment of the Khuvsgul Mts. and Bogd river raising from the Otgontenger glacier in the Khangai Mts.	Annual and seasonal flows show an increasing trend (in flow volume)

Source: Mongolia 2nd National Communication under UN Framework Convention on Climate Change

122. **Permafrost**. Currently, the permafrost extends to 63 percent of the country's territory. The permafrost area commonly extends and continuous permafrost prevails in the northern part of Mongolia and includes the northern part of the western region. Over the past 30 years, a seasonal thawing in the active soil layer in the permafrost regions has increased by 0.1-0.6 cm in the Khentii and Khangai Mountains and by 0.6- 1.6 cm in the Khuvsgul Mountains. The seasonal freezing depth in the active layer has been decreasing by 10-20 cm in the eastern part of Mongolia during the last 30 years. Permafrost phenomena such as thermokarst, solifluction, thermoerosion[26] and icing have intensified over the last 50 years.

123. Future projections of changes in permafrost have been assessed[27] and the results show that continuous permafrost extent in the Altai, Khangai and Khuvsgul Mountains will be changed into discontinuous, common patchy and rare patchy in the 2040-2099 and 2070-2099 periods. That will lead to a 3 times reduction in permafrost extension and the non-permafrost area will be increased by 2 times.

124. All glaciers are distributed in the Altai Mountain except Otgontenger glacier in the Khangai Mountains and the Munkhsaridag glacier in the Khuvsgul Mountains. Fifty to seventy percent of the annual flow in the rivers draining the Altai Mountains is from snow and ice melt. Significant glacial retreat has been observed since the 1940s meaning increased ice melt could lead to increased river flows in the project area.

[25] In global climate change projections, three GHG scenarios (A2, A1B and B1) have been used, based on 24 climate models developed by 17 World Centers as cited in the Fourth Assessment Report of IPCC.

[26] Thermokarst: A form of topography which has irregular surfaces of marshy hollows and small hummocks formed as ice-rich permafrost thaws; Solifluction: The flow of water saturated debris over impermeable material; Thermoerosion Also known as Thermal Erosion is the result of melting and weakening permafrost because of moving water. It can occur both along rivers and at the coast.

[27] Assessment based on the ratio of average air temperature in the coldest and warmest months using SRES A2 and B2 GHG emission scenarios. See Mongolia 2nd Communication under UNFCCC.

125. The Mongolian design standards and the design used for bridges and culverts in Tranche 2 should therefore consider the changes in precipitation and run off and the increased capacity that may be required. It is noted that as a result of floods in 2012 the Executing Agency (EA) requested design changes for bridges and culverts to address increased hydraulic capacity needs.

126. The design should also consider permafrost and the implications not only for the engineering design in the current climate, but for the likelihood of a reduction in permafrost and a deeper active layer[28]. The project designs consider the need for embankments rather than cutting, to raise the road above the snow line, as required by Mongolian design standards and to reduce the amount of interference with the permafrost layers.[29]

127. The Project Implementation Unit (PIU) for Tranche 1 confirmed that the road alignment and engineers are aware of and have used the national maps of permafrost distribution available in Mongolia and this will be the case for Tranche 2.

D. Associated Facilities

128. **WRRCIP.** The entire Western Regional Roads Corridor (as shown in **Figure 2**) can be considered an associated facility. The entire corridor was subject to approval in a domestic EIA.

129. **Quarries and Borrow Pits.** Extraction of the materials required during road construction is generally from quarries and borrow pits in the construction area if material is available. Eleven quarries and borrow pits have been identified for Tranche 2. Borrow pits have not yet been identified for Component 1b (Ulaanbaishint to Tsagaannuur (25.8km) as this section of the road corridor has recently been added to the scope of Tranche 2.

130. The location of quarries and borrow pits identified in the Project area to date are shown in **Table 9** and in **Figure 15.**

Table 9: Khovd to Tolbo Borrow Pit and Quarry Locations

Ref.**	Location of borrow pit/quarry	Kilometers	Distance from road alignment	Location	Material Quarried
BQ-1	Near Khovd city	417.3km	0.1km	Modon ovoo pass	Sand
BQ-2	Near the Shurag bridge	470.25km	3km	Har Usuur hill	Fine sand with coarse graded gravel
BQ-3	Near the Hongoi bridge	499.85	0.1km	Hongio (food and petrol) service point	Fine sand with coarse graded gravel
BQ-4	Barzgar pass	513.15km	0.3km	Near the beginning of Hashaat narrow valley	Sandy gravel soil
BQ-5	Huh bugshiin am narrow valley	513.85km	0.15km	Near the beginning of Hashaat narrow valley	Sandy gravel soil
BQ-6	Khashaat pass area	529.15	0.15km east side	Near the top of Hashaat pass (0.7 km from here to the top Hashaat pass)	Sandy gravel soil
BQ-7	Holvoo lake's area	537.65	0.03km	At the Holvoo lake	Silty sand

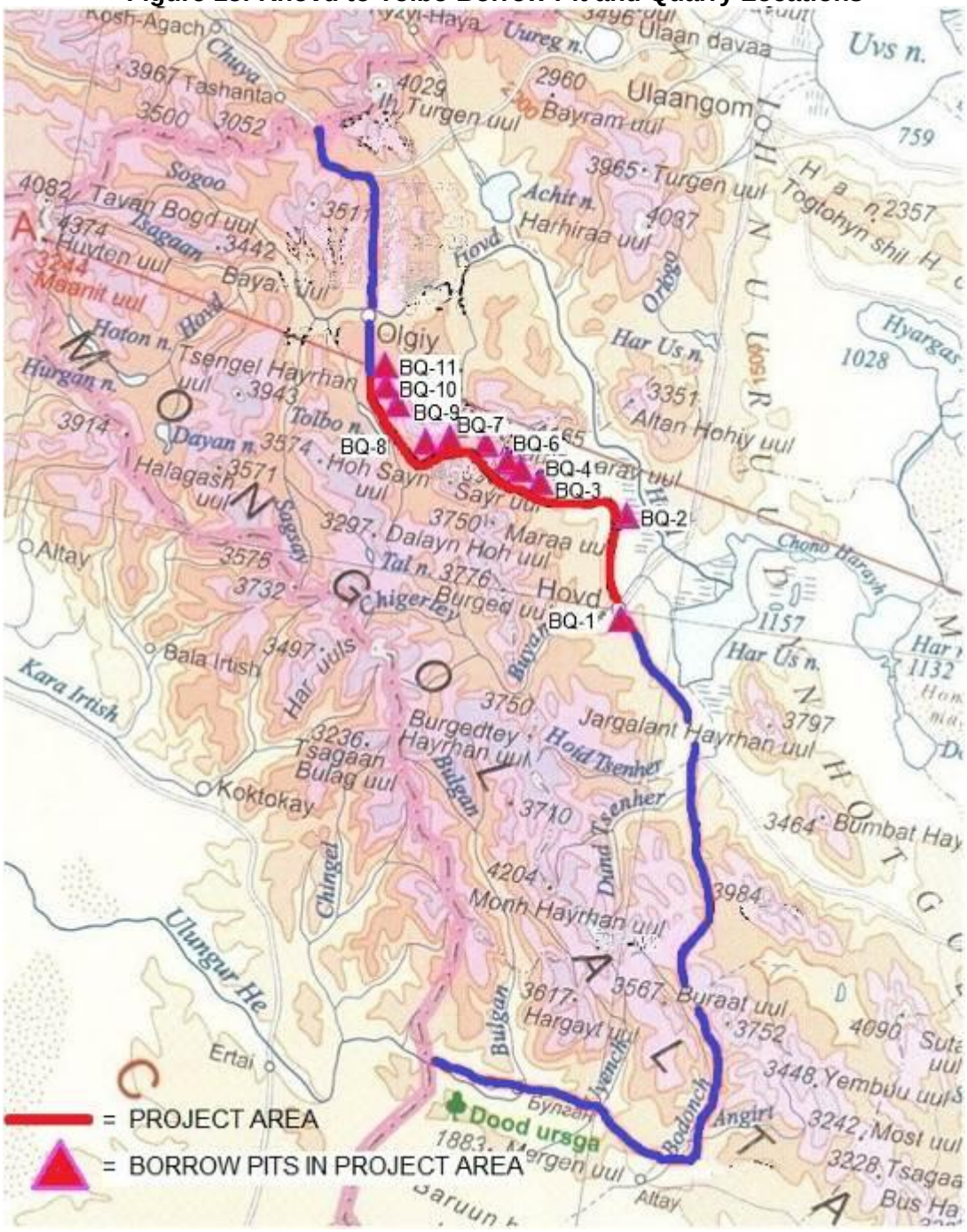
[28] Active Layer: The layer of soil which seasonally thaws and freezes in a permafrost environment.

[29] Mongolian design standards for addressing permafrost are considered acceptable for this project by ADB. However, ADB considers that in the broader context of climate change adaptation in the roads sector a study addressing the issues associated with permafrost would be useful for informing future ADB transport sector investments in permafrost areas.

BQ-8	Buraatin pass area	554.0	to west side 0.4km	Near the top of Buraatin pass	Gravelly fine sand
BQ-9	Near the Shar lake	590.35km	0.1km to east side		Sand-gravel mixture
BQ-10	Near the Shar lake	600.25km	1km to east side		Sand-gravel mixture
BQ-11	Near the Shar lake	605.75km	0.25km to east	Shar lake	Sand

Notes: Excludes Component 1b (Ulaanbaishint to Tsagaannuur). ** BQ is abbreviation for Borrow Pits & Quarries.
Source: TA Consultant's Report. TA 7449-MON, Regional Transport Development Project Component -1 Preparing the Western Regional Road II Project. Ulaanbaatar.

Figure 15: Khovd to Tolbo Borrow Pit and Quarry Locations



Source: Government of Mongolia. 2007. Feasibility Study EIA. Ulaanbaatar.

131. **Traffic Projections**. Most road improvement projects result in an increase in traffic flow. Feasibility Study forecasts of traffic have been undertaken for the entire Western Regional Road corridor, measured in vehicles per day. Traffic projections for the Tranche 2 and 3 project area as presented in **Table 10** show that within the next two decades, the average annual daily traffic volumes for the "with project" case will be almost double that projected for the "without project" case. This is an indicator of the success of the project which aims to increase traffic to yield

socio-economic benefits for the region.

Table 10: Summary of Average Daily Traffic Projections

Average Annual Daily Traffic (AADT)	Baseline 2010	Without Project case 2020	Without Project case 2030	With Project case 2020	With Project case 2030
Ulaanbaishint -Olgiy	76	146	261	248	488
Olgiy-Khovd	144	300	590	436	1,012

Source: ADB Staff Estimates[30]

3. Implementation Schedule

132. The final implementation schedule for the project will be based on the following considerations:

- Asphalt pavement work is limited to 5 months of the year (May to September) and earthworks are limited to 6 months of the year (May to October) because of cold weather; and
- Stockpiling of aggregates, pre-cast concrete structures and other preparatory works are conducted throughout the year.

133. An implementation schedule for Tranche 2 from the Facilities Administration Manual (FAM) are reproduced below in **Table 11.**

Table 11: Tranche 2 Implementation Schedule

ID	Task Name	2013		2014				2015				2016				2017				2018			
		3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1.	Bid Preparation and Procurement																						
2.	Civil Works Implementation																						
3.	Equipment or System Installation																						
4.	Training and Capacity Development																						
5.	Final Acceptance																						

Source: FAM Mongolia: Proposed Multitranche Financing Facility for the Western Regional Road Corridor Investment Program (June 2013)

[30] Mongolia: Western Regional Road Corridor Investment Program –Tranche 1 Environmental Impact Assessment (2011)

V. DESCRIPTION OF THE ENVIRONMENT

A. Project Area of Influence

134. The project sites were visited in June 2013 for the preparation of this updated EIA, with particular attention paid to:

- Sensitive natural environmental receptors such as water bodies and wildlife habitats;
- Sensitive human receptors;
- Cultural and heritage sites; and
- Potential access issues for both humans and wildlife.

135. According to SPS 2009 the project area of influence is defined as follows:

(i) **Primary project site(s) and related facilities**. This is the corridor alignment of Tranche 2 which is within the existing right of way which in Mongolia extends to 70 m either side of the road curb. This also includes the bridges and internal roads proposed for construction.

(ii) **Associated facilities that are not funded as part of the project**. This means the entire western region road corridor. The remaining sections of the corridor not funded by ADB are being funded by the Mongolian Government and PRC. This entire corridor has been subject to a domestic EIA which has been approved and remains valid. The Government of Mongolia approved the initial environmental assessment for the entire corridor in 2007 and the detailed EIA was approved in 2009.

(iii) **Areas and communities potentially affected by cumulative impacts from further planned development of the project**. The communities around the project area are principally those concentrated in the main towns along the Tranche 2 project area. This includes the *aimag* centres of Khovd and Olgi. In addition nomadic herders move around the project area depending on the time of year. Regarding further planned development of the project and its potential impacts, the project, when completed, will not require further development in this corridor but the road will require maintenance which will be carried out by the Government of Mongolia.

(iv) **Areas and communities potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location**. It is anticipated that if successful, the WRRCIP will be a catalyst for development along the corridor. Predictable developments associated with improving the socio-economic situation along the corridor include the development of business activities in *aimag* and *soum* centres as well as potentially along the road side. Major industrial development associated with the road corridor is not anticipated.

B. Geography, Topography and Geology

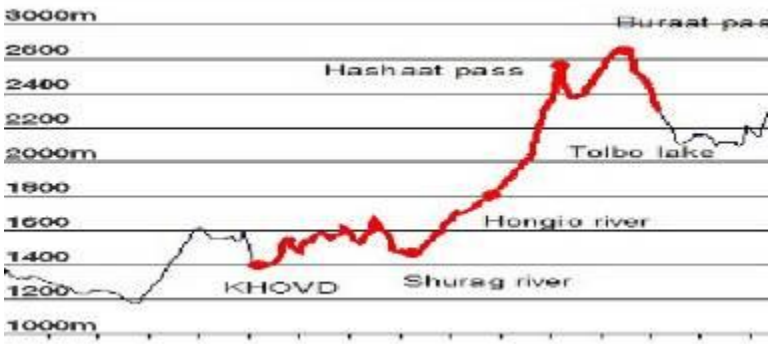
136. **Administration.** Administratively, Mongolia is divided into 21 *aimags* (provinces) and the capital city Ulaanbaatar. *aimags* are divided into *soums* which are further divided into *baghs*. The proposed road section traverses through two *aimags*, Khovd and Bayan-Olgii with a combined population of approximately 190,400 (2009). The *soums* within the project area include:

- Khovd *aimag*: Erdeneburen, Khovd, Buyant;
- Bayan-Olgii *aimag*: Tolbo.

137. The project area is located within the Altai Sayan Eco-Region that includes Mongolia, China, Russia and Kazakhstan. The Altai Mountains in Mongolia's Western Region stretch approximately 1,500 km. The average altitude of Khovd province is 2,230 m with the lowest point at 1,350 m in Bayannuur *soum*, and the highest being the peak of the Altai Tavan Bogd Mountain at 4,650 m.

138. The proposed project alignment will primarily follow existing roads that pass through mountain areas, hills, canyons, valleys, and plains with elevations ranging from 1,400 m to 2,600 m. **Figure 16** shows the elevation for Tranche 2, excluding Component 1b (Ulaanbaishint to Tsagaannuur).

Figure 16: Elevation of Road Alignment



Source: Government of Mongolia. 2007. Feasibility Study EIA. Ulaanbaatar.

139. The topographic features along the project corridor vary substantially. From Khovd to Buraatin Davaa, the road passes largely through dry steppe and steppe, as well as high mountain areas running in north-west direction. The landscape surrounding Khovd is primarily meadow landscape on saline soils with sedges on river valley bottom. The road ascends through mountain dry steppe with forbs[31], grasses and feather steppe grasses[32]. It crosses two mountain passes (Khashaat 48°26'40.39"N, 90°46'33.83"E and Buraatin 48°25'49.18"N, 90°24'11.61"E) in mountain meadow landscape with alpine-vegetation and descends to forbs–feather grass steppe near Tolbo Lake.

140. From Ulaanbaishint to Tsagaannuur the road passes through dry steppe with the alignment running along the valley floor, part of which runs parallel to a stream with an area of small lakes to the east of the alignment at 49°30'25.85"N, 89°31'51.70"E, and mountains to the west.

141. **Erosion.** Erosion is a feature along much of the project corridor, with gullying visible on the mountains and slopes. Eroded soil along the road alignment is increased through vehicles using a series of unpaved tracks in areas which are not currently improved. The earth tracks are liable to erosion from vehicles, wind, rain and snow melt.

142. **Geology.** The project area is situated in the Mongol Altai high mountainous area which began to form in the Cambrian Period, when the rocks were folded and faulted.

[31] A term for herbaceous flowering plants used in the context of grassland ecology.
[32] Government of Mongolia. 2007. EIA. Ulaanbaatar.

143. According to the geo-morphological map of Mongolia, the terrain in the Tranche 2 area includes extensive rolling ranges, medium rolling ranges and mountains, slight rolling ranges of sloped structure, mountainous ravines, semi-level surfaces of mountain skirts, glacial valleys, mountains with sharp ridged peaks, alluvial lake valleys, delluvial - prolluvial and mountain river valleys.[33] **Figure 17** gives an example of folded rocks to the east of the valley bottom along which Component 1b road (Ulaanbaishint to Tsagaannuur) lies.

Figure 17: Example of Geology, Component 1b

Source: ADB Study Team

144. **Soil**. Soil characteristics vary within the project area with the following types present:

- High mountain steppe-raw humic soils are widespread in high altitudes sections between Khovd and Olgii and spots of high mountain tundra occur largely between Khovd and Buraatin Davaa.
- Gobi brown soil dominates near Khovd and Olgii.

145. The soils observed in the project corridor along the road alignment are generally dry and friable with prevalent rocks and gravels. Examples of soil types in the project area are shown in **Figure 18**. The susceptibility to erosion of these soils indicates that adequate compaction of embankments and earthworks will be essential to ensure that the soils and structures built on them are not eroded.

Figure 18: Examples of Soils, Component 1a

Left: Soil from road around Tolbo soum. Right: soil adjacent to current road at 48°25'54.62"N, 90°24'39.54"E.

[33] Government of Mongolia. 2007. EIA. Ulaanbaatar.

Source: ADB Study Team

146. **Permafrost.** Permafrost is characterized by negative temperatures of soils/rocks and occurrence or possible occurrence of underground ice. An active layer is subject to seasonal thawing/freezing, beneath which is permanently frozen ground. Global warming and anthropogenic impacts intensify permafrost warming and thawing. Permafrost degradation can cause substantial change in water hydrology, damage infrastructure and affect ecosystems. Thermokarst is an uneven/hummocky terrain created by thawing permafrost. An example is shown in Khovd town, at the start of Tranche 2 in **Figure 19**.

Figure 19: Example of Thermokarst, Component 1a (48° 1'52.99"N, 91°39'11.63"E)

Source: ADB Study Team

147. Bayan-Olgii and Khovd *aimags* are located in the Altai Mountain region, where permafrost is divided into five zones that depend on altitude: (i) continuous, (ii) discontinuous, (iii) widespread island, (iv) rare spread island, and (v) sporadic:

- Continuous permafrost lies predominantly in mountain areas with altitude of more than 3,000 m above sea level. The temperature of the permafrost ranges between -1.5 °C and -2.5 °C and its thickness is between 80 and 150 m. The minimum temperature of the permafrost drops to -4 °C, and in some locations, permafrost thickness reaches 200-500 m.
- Discontinuous permafrost is widespread in the Western part of the Mongol-Altai Range and in some upper reaches of the Khovd River. The temperature of the permafrost ranges between -0.8 °C and -1.5 °C, with a thickness between 40 and 80 m. The maximum thickness of permafrost is 200 m.
- Widespread island permafrost is located in areas with elevations between 2,500 and 2,800 m above sea level. The temperature of the permafrost is between -0.2 °C and -0.8 °C with a thickness ranging from 15 to 40 m. The maximum thickness of the permafrost is 100 m.
- Rare spread island permafrost occurs throughout valleys of rivers and lakes with elevations of 2,000-2,500 m above sea level. The temperature of the permafrost is between -0.1 °C and -0.2 °C and the thickness between 5 and 15 m.
- Sporadic permafrost occurs in the muddy soil of springs. The average temperature of the permafrost is between -0.0 °C and -0.1 °C with an average thickness between 0.5 m and 5.0 m.

148. The minimum temperature of soil surface is one of the parameters that will influence road construction engineering. The absolute maximum of soil surface temperature ranged between 16 ºC and 32 ºC and absolute minimum value between -40 and -47 °C. The monthly absolute minimum value of soil surface minimum temperature is highest (around 0 °C) in June or August and the lowest is in February.[34]

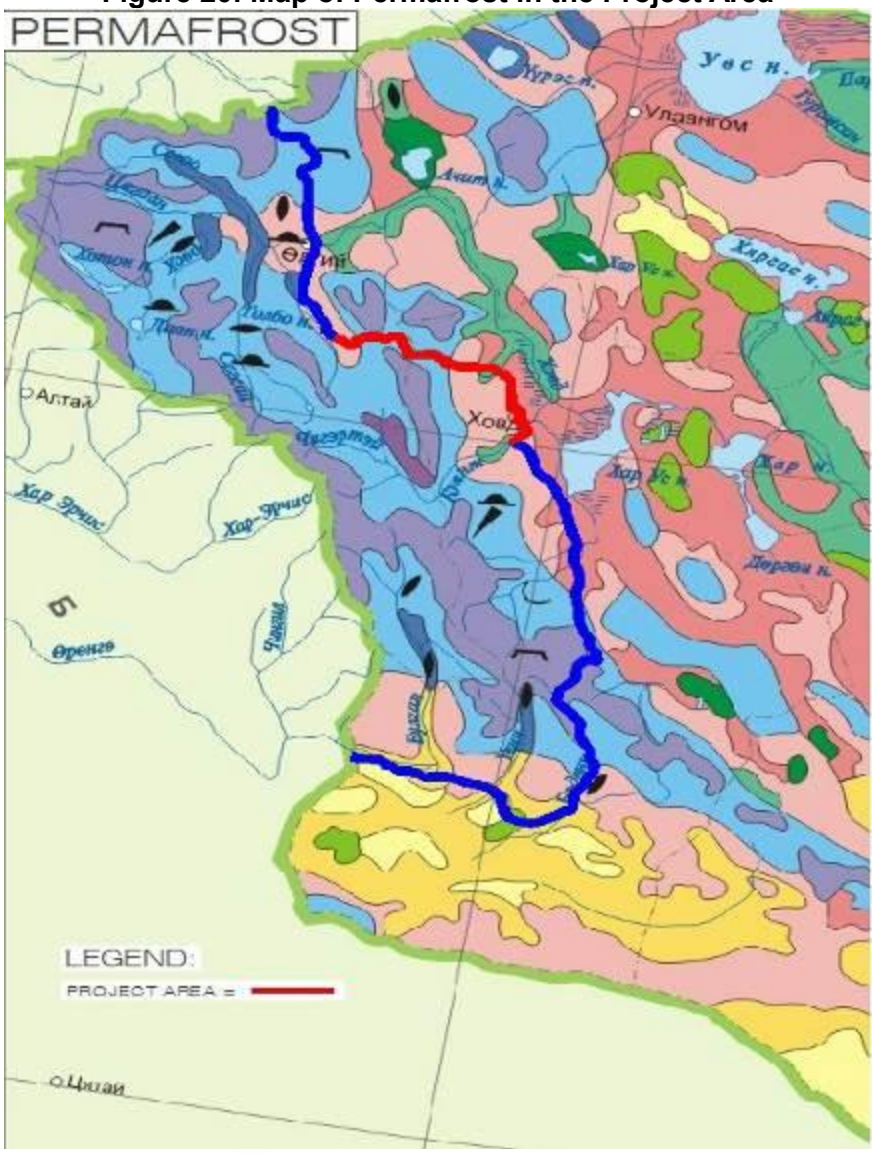
149. Various types of permafrost occur within the project area. Rare spread island permafrost is widespread around Olgii, but is not common close to Khovd town and the lower reaches of the Khovd River. From Khovd town to Buraatin Davaa continuous, discontinuous, widespread island, and rare spread permafrost have been reported.

150. **Figure 20** shows a map of permafrost in the project area. It shows that in particular in the high altitude parts of corridor between Khovd and Buraatin Davaa there is perennially frozen soil with the annual temperature of soil of 0 to -5 °C and active layer of 1.0-4.5 m.

151. In Oloonuur area between Khovd and Olgii, areas with degraded permafrost were noticed with permanent change of landscape and location of thermokarst lakes.

[34] Government of Mongolia 2007. EIA. Ulaanbaatar.

Figure 20: Map of Permafrost in the Project Area



MULTI YEAR PERMAFROST

Water-parting, Mountain side	Bottom of Concave	Annual Average Temperature	Prevalent Thickness	Prevalent depth of melting, m	
				Water-parting, Mountain side	Bottom of Concave
		-2 - -5	Greater than- 100	1.0 - 3.5	1.3 - 2.5
		0 - -2	Lower than -100	1.5 - 4.5	1.5 - 4.0
		0 - -1	Lower than- 50		1.7 - 3.0
		0 - +2	Greater than- 100	3.0 - 4.5	2.5 - 5.0
		0 - +3	Lower than -100	2.5 - 4.5	2.2 - 5.0
		+2 - +5	Lower than- 50	2.0 - 4.1	1.6 - 4.5

Permafrost process, phenomenon

- Multiyear permafrost buurug
- Bank
- Heat hundiil
- Permafrost slide
- Soil slide
- Permafrost flattening

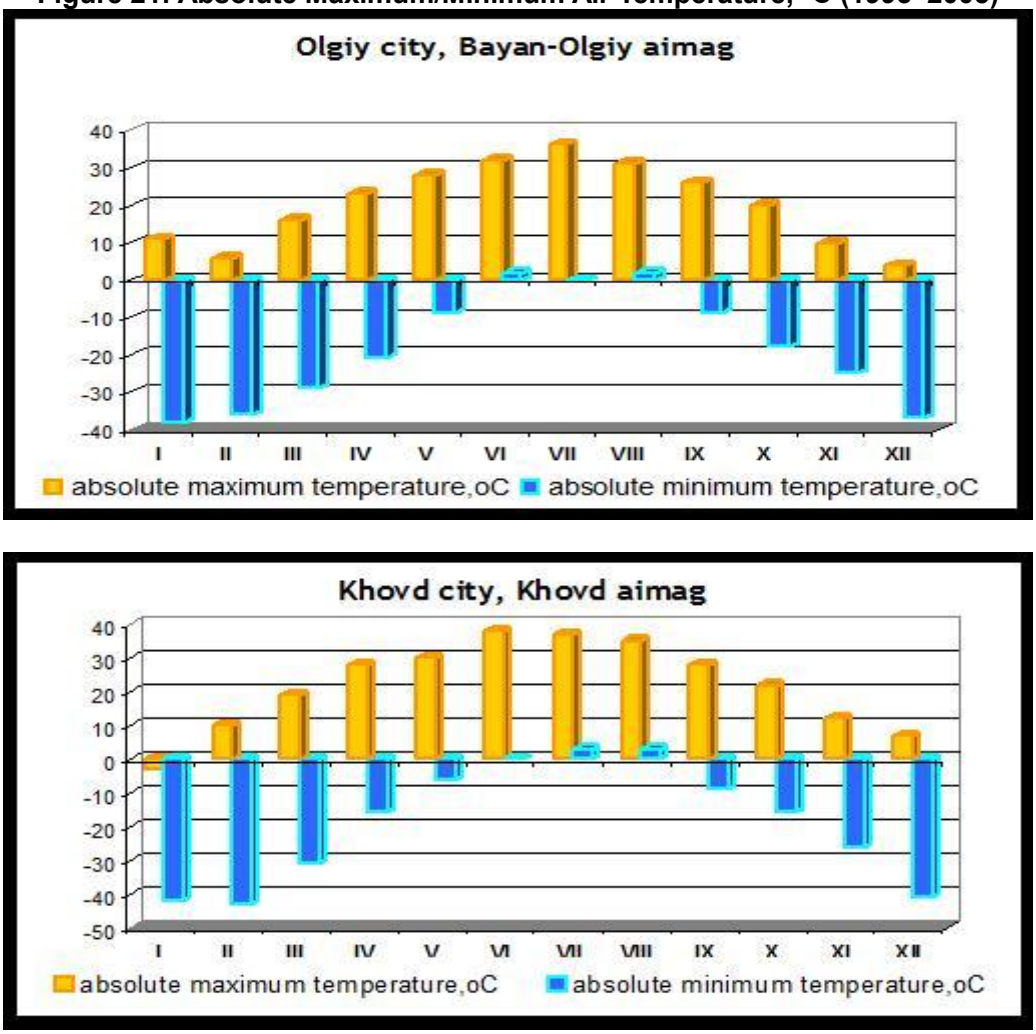
Source: Administration of Land Affairs. 2004. Geodesy and Cartography. Geographic Atlas of Mongolia. Ulaanbaatar.

C. Meteorology and Climate

152. **Temperature**. Mongolia has a severe continental climate, with temperatures ranging from approximately -30 ^{0}C to +25 ^{0}C. The country is also prone to severe winters, known as *zud* which means any condition that stops livestock getting to pasture. Three consecutive winters from 1999 to 2002 were *zud* years, which resulted in the deaths of more than 25% of the livestock population. The annual mean temperature in Altai, Khangai, Khentii, and Khuvsgul mountainous regions is lower than –4 °C , and between the mountains and the basins of large rivers, the average temperature is lower than –6 to -8 °C[35].

153. The mean annual air temperature over the 10 years from 1995 to 2005 ranges from 0.2 °C to 1.3 °C in the Western Region The data for both Olgii and Khovd show a large range of around 70 degrees (see **Figure 21**). During the 10 years from 1995 to 2005, the absolute maximum air temperature reached 38 °C in Khovd *aimag* and the absolute minimum air temperature was -44 °C at Manhan *soum*.

Figure 21: Absolute Maximum/Minimum Air Temperature, ^{0}C (1995–2005)

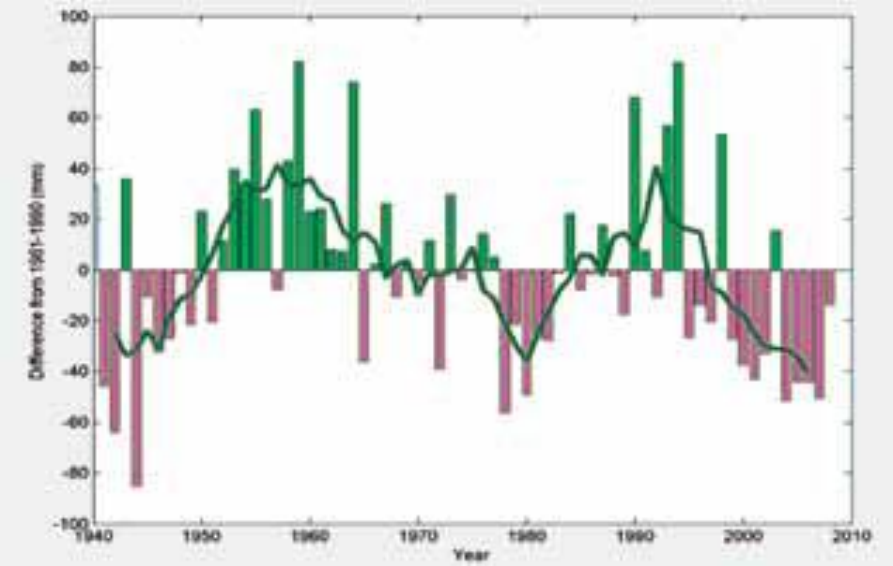


Source: Government of Mongolia. 2007. Feasibility Study EIA. Ulaanbaatar.

[35] Mongolia 2nd National Communication for UN Framework Convention on Climate Change.

154. **Precipitation.** Precipitation patterns in Mongolia and the western region are showing evidence of change. There is an increasing trend of winter precipitation and a decreasing incidence of summer rainfall giving rise to an anomaly trend of annual precipitation from the mean for the period of 1961-1990 as shown in **Figure 22**.[36]

Figure 22: Annual Precipitation Anomaly from the Mean 1961-1990

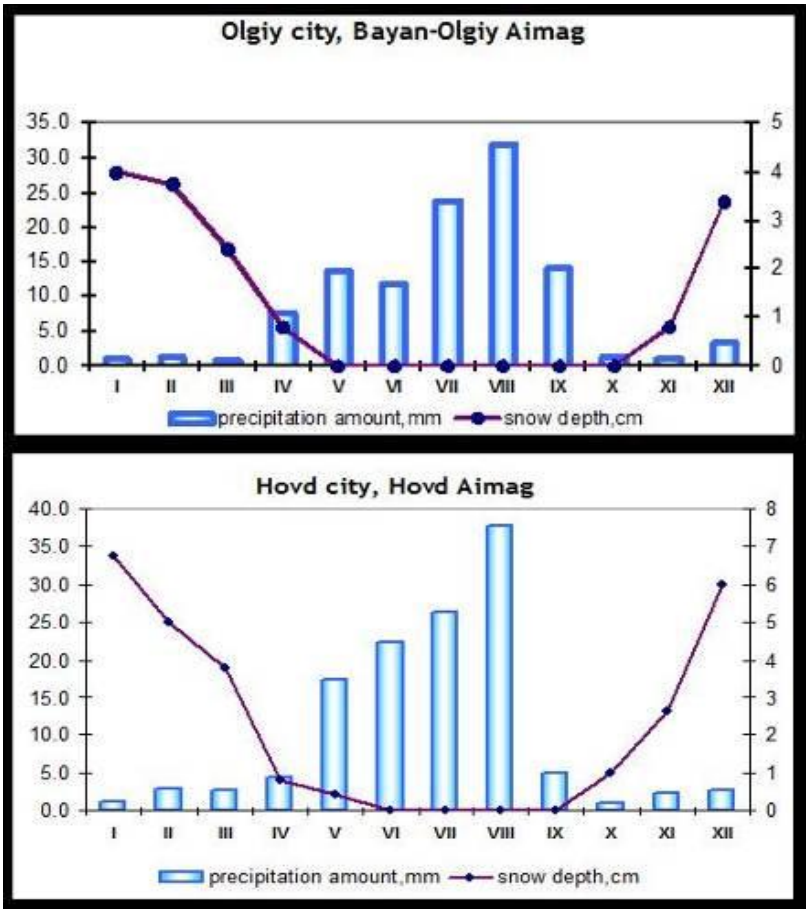


Source: Mongolia 2nd National Communication under UNFCCC

155. **Figure 23** shows the monthly mean precipitation and snow cover in Olgii and Khovd. The figures indicate that in general the Tranche 2 and 3 project area is relatively dry and that winter snow is at its deepest in January for both *aimags*. This demonstrates the limited construction period available to the contractors for Tranche 2 as the months without snow cover are limited (on average May to October in Olgii and June to September in Khovd).

[36] Ibid.

Figure 23: Monthly Mean Precipitation and Snow Cover



Source: Government of Mongolia. 2007. Feasibility Study EIA. Ulaanbaatar.

156. Owing to climate change, it is anticipated that winter will become milder with more snow. Snow cover plays an important role in the biophysical environment. It prevents deep soil freezing, acts as a water source for herdsmen, wild and domestic animals during the winter, and causes spring floods in the rivers and streams. The timing of stable snow cover formation varies from the middle of November to the beginning of December, with snow cover completely clearing in March. However the timing of the disappearance of stable snow cover is showing a tendency to shift to one month earlier than expected[37].

157. **Wind**. The dominant wind direction is from the west and northwest, with maximum wind speed of up to 28 m/s in the project area. When wind speed exceeds 12 m/s, dust storms, snowstorms, or other severe weather phenomena are generally observed. The number of days with strong wind (wind speed greater than 16 m/s) and dust/snow storms (wind speed greater than 12 m/s and visibility less than 1,000m) is seen in **Table 12.**

[37] Mongolia 2nd National Communication under UNFCCC

Table 12: Number of Days with Strong Wind and Snow, Dust Storms, (1995–2005) Tranche 2

aimag	*soum*	Phenomena	1995 – 2001	2002	2003	2004	2005	Total
Khovd	Khovd city	strong wind	4	2	4	4	3	17
		snow & dust storm	3		2	1	1	7
	Manhan	strong wind				1	1	2
		snow & dust storm	2		1	1	1	5
Bayan-Olgii	Olgii city	strong wind	4	5	13	15	11	48
		snow & dust storm	4	2	11	6	4	27
	Tolbo	strong wind		1		1	5	7
		snow & dust storm	2	1			1	4

Source: Government of Mongolia. 2007. EIA. Ulaanbaatar.

D. Hydrology, Surface Water Quality

158. Surface water resources in the project area include rivers, streams, springs and lakes. The project area is located within the Central Asian Internal Drainage basin and is on the far western edge of the Great Lakes Depression[38]. Unlike water hydrological regimes in the North and East of Mongolia which drain to the ocean, the project area is in an internal drainage basin where surface waters drain to inland terminal locations where the water evaporates or seeps into the ground.

159. Specifically the project area is in the Khar lake-Khovd river basin, a sub-basin of the Great Lakes' Depression and is considered unique not only in Mongolia, but also in the world with its high mountains distributed by glaciers and permanent snow cover, canyons, valleys, and ecological zones such as forest steppe, steppe, gobi and desert regions. The basin area is 86,120.8 sq. km and is divided into three water balance units: Khovd river, Buyant river and Khar Us-Durgun lake basins according to the hydrological network. The Kovd river passes through Olgii and the Buyant river through Khovd. **Table 13** summarizes the surface water resources of Khovd and Bayan-Olgii *aimags*.

Table 13: Rivers, Springs and Lakes in Khovd and Bayan-Olgii *aimags*

Name of Province	Rivers		Springs		Mineral water		Lakes	
	Total	Dried	Total	Dried	Total	Dried	Total	Dried
Bayan-Olgii	293	17	736	42	13		1180	217
Khovd	214	7	468	10	9		201	4

Source: Government of Mongolia. 2007. EIA. Ulaanbaatar.

160. Significant surface hydrological features in the Tranche 2 area include:

- Permanent surface streams and rivers
- Permanent lakes / ponds
- Ephemeral streams which are seen during periods of intense rainfall or snow melt.

161. **Buyant River.** The Buyant River is 171 km long, originating in the Mongol-Altai

[38] Batnasan N., (2003). Freshwater issues in Mongolia, Proceedings of the National Seminar on IRBM in Mongolia, 24- 25 Sept. 2003, Ulaanbaatar, p.53-61

Mountains and Huh Serkhiyn Mountain and runs through the northern part of Khovd town. It is a tributary of the Khovd River, which flows into the Khar Us Lake. When the discharge of the river is less than 6 m^3/s, the river's waters will not reach Khovd River.

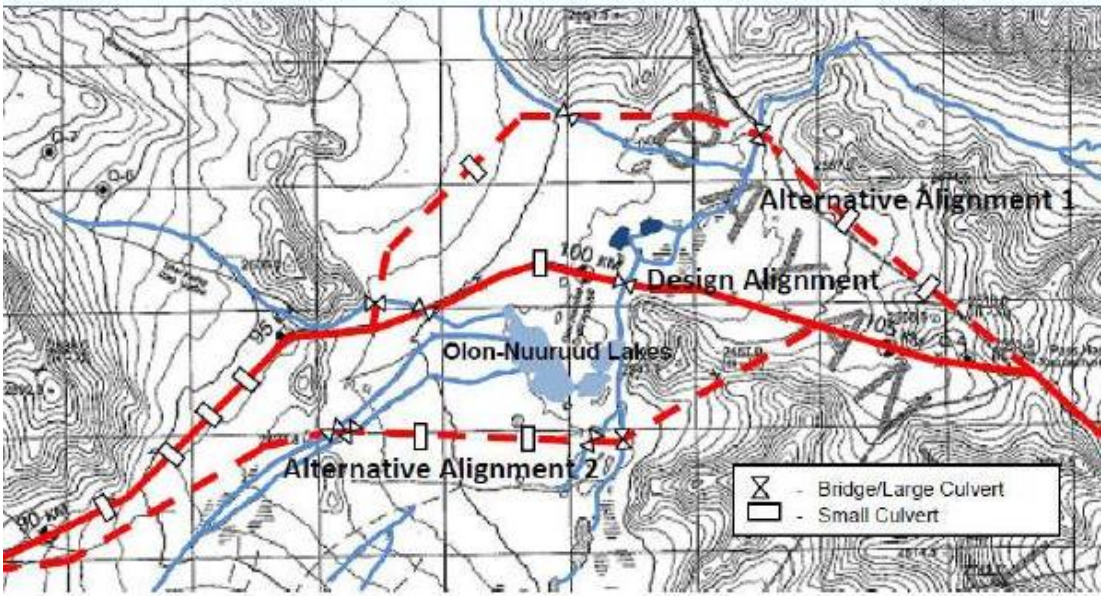
162. **Khovd River.** The Khovd river is 516 km long, originating from the south-east glacier of Tavan Bogd, the highest peak of Mongol-Altai mountain range, and runs through Olgii town. The dominant source of river flow is glacial ice and snow melt. Within the Khovd watershed area of 58,000 km^2, the tributary rivers include the Tsagaan, Sogoot, Sagsai, and further downstream the Buyant River. The main lakes, which discharge their excess water into Khovd River are the Tolbo, Dayan, and Achit. The mean annual discharge of the river is 60.1 m^3/s in its upper reach (at Olgii), 63 m^3/s in the middle reach (at Bayannuur), and 90 m^3/s at its inflow into the Khar-Us Lake (at Miyangad).

163. **Lakes and Ponds.** At the northern end of Component 1a the road runs within 2 km of Tolbo Lake. It is one of the largest freshwater lakes of Bayan-Olgii *aimag*. At an elevation of 2,049 m above sea level, it covers an area of 84.0 km². It is 21 km long, 7 km wide and 12.6 m deep. Its major tributaries are the Tolbo and Buraatin rivers, which originate from Mongol-Altai Mountain and its only outlet is the Umnu River. The lake is generally frozen from the end of October to the beginning of May.

164. A complex area of lakes, marshes and ponds known as Olon-Nuuruud lakes, are located near Khashaat davaa at 48°29'42.94"N, 90°37'10.46"E. The road design has been given particular consideration in this area as the wet conditions and presence of permafrost provide a number of engineering challenges.

165. **Figure 24** shows the location and distribution of these lakes and marshes. The alternative road alignments shown on the map are discussed in Section V.

Figure 24: Olon Nuuruud Lakes and Marshes



Source: PPTA Volume 1 Engineering Review.

166. Approximately 12.4 km from Ulaanbaishint (49°30'25.85"N, 89°31'51.70"E) a small lake is present at the bottom of a valley. The edge of the lake is about 150 m from the project corridor (Component 1b).The lake appears to be fed by surrounding permanent and ephemeral streams

in the valley.

167. **Drinking Water.** During development of this EIA, a number of consultations were undertaken along the Tranche 2 road corridor. The consultations confirmed that the majority of people take drinking water from the nearest surface water source, such as a stream. Livestock also use the same water source. One family consulted mentioned that some people also use water from springs, but no-one who was consulted drinks from springs.

168. **Seasonal flooding.** The rivers in the project area flow from the Altai Mountains. Spring floods in these rivers generally start in the middle of April, with peak flow occurring in late June and continuing for 110–150 days. The spring flood flow is 60–90 percent of total annual flow of Altai Mountain Rivers and the main source of water is from melting snow and glaciers. Summer flow is significant because rainfall run off combines with the spring flood waters from the Altai Mountain Rivers. **Table 14** presents the maximum/minimum and average flow rates for major rivers in the project area.

Table 14: Flow Rates of Rivers in the Project Area (cm^3/s)

	2001			2002			2003			2004			2005		
	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min
Khovd-Olgii	66.4	260	7.1	56.4	284	5	49.9	204	5	43.5	143	5.1	53.2	249	3.4
Buyant-Olgii	6.56	25.2	1.9	5.1	19.7	0	6.27	18.4	0	5.1	17.5	0	6.69	2.7	0

Avg – Average; Max – Maximum; Min – Minimum
Source: Government of Mongolia. 2007. EIA. Ulaanbaatar.

169. **Groundwater**. Groundwater resources are limited and its distribution uneven in the Khar lake-Khovd river basin. Within the basin, groundwater generally accumulates close to tributaries of rivers and around lake depressions[39]. Groundwater in the Altai mountainous region is known to exhibit mineralization and hardness characteristics of 640 mg/l and 4.8 mg-eqv/l respectively, and the water for the region is salty and fluorinated[40]

170. Groundwater resources in the project area are shown in **Table 15**.

Table 15: Groundwater Resources in the Project Area

	Khovd river basin	Buyant river basin
Volume million m^3	786	139
Ground water use as % of total by 2021	0.67%	2.9%

Source: Integrated Water Resource Management Plan for Khar Lake–Khovd River Basin (2011)

171. The IWRMP projections show that the project area river basins have adequate groundwater resources given current and projected (up to 2021) demands. However, it is clear from measures proposed in the river basin IWRMP that groundwater is considered a resource which requires conservation, particularly in urban areas, where it is noted that groundwater is used wastefully. Therefore the IWRMP proposes addressing the overuse of groundwater by installing water meters in *aimag* centres and restricting the use of groundwater. Groundwater vulnerability is seen throughout Mongolia where overuse of groundwater resources and climate change has led to lowering of the groundwater table, which has caused some springs, lakes and

[39] Khovd Buyant River Basin Council. Integrated Water Resource Management Plan For Khar Lake–Khovd River Basin. Phase I: 2011-2015; Phase II: 2016-2021
[40] Chuluunkhuyag, S. The Impact of Climate Change and Human Activity on Mongolian Water Resources

their associated ecosystems to dry up.[41]

172. **Water Quality Monitoring**. The water quality of all the rivers and lakes of the project area was assessed as "very clean" and "clean" as reported by the Environmental Laboratory, NAMHEM in 2005.[42] **Table 16** shows water quality of the various water bodies in the project area. An expert from the Environmental Laboratory said that water quality in this region is very stable and does not change much. The sole exception was one year when the concentration of ammonium in the Buyant River at the monitoring station in Khovd temporarily exceeded the maximum acceptable concentration.

173. In Khovd and Bayan-Olgii *aimags*, water quality monitoring is conducted at 14 stations located at 9 rivers and 1 lake. Of these, Khovd and Buyant, are located in or close to the project area.

174. The parameters monitored include: pH, Ca^{2+} (calcium), Mg^{2+} (magnesium), Na^{+} (sodium), K^{+} (potassium), HCO^{3-} (sodium bicarbonate), SO_4^{2}- (sulfate), Cl^{-} (chlorine), dissolved gases – CO_2 (carbon dioxide), O_2 (oxygen), biological/chemical oxygen demand, and toxic elements such as Fe(iron), Cr^{6+} (hexavalent chromium) and Cu (copper).

Table 16: Water Quality of Water Bodies in Project Area in 2005

No.	River/Lake (monitoring post)	Pollution index	Water quality	
			Level	Class
1	Khovd River (Olgi)i	0.15	I	Very clean
2	Khovd River (Bayannuur)	0.23	I	Very clean
3	Khovd River (Miyangad)	0.30	I	Very clean
4	Buyant River (Sagsai)	0.20	I	Very clean
5	Buyant River (Deluun)	0.43	II	Clean
6	Buyant River (Khovd)	0.66	II	Clean

Source: Government of Mongolia. 2000. *EIA*. Ulaanbaatar.

175. **Table 17** presents a comparison with the Mongolian standards for ambient water quality as per monitoring in 2006. The data show the water meets the Mongolian standards.

Table 17: Selected Ambient Water Quality Standards and Current Situation (2006)

	Contents	Unit	Acceptable concentration	Olgii	Khovd
1	pH		6.5-8.5	7.46	8.08
2	Dissolved O_2	mgO/l	More than 6.4		9.90
3	Biochemical oxygen demand	mgO/l	3		2.60
4	Chemical oxygen demand-Mn	mgO/l	10	1.40	2.10
5	Ammonium NH_4 -N	mgN/l	0.5	0.04	0.07
6	Nitrite NO_2 -N	mgN/l	0.02	0.01	0.02
7	Nitrate NO_3 -N	mgN/l	9.0	0.43	0.15
8	Phosphorus – PO_4-P	mgP/l	0.1	0.01	0.02
9	Sulfur oxide SO_4	mg/l	100	9.80	21.50

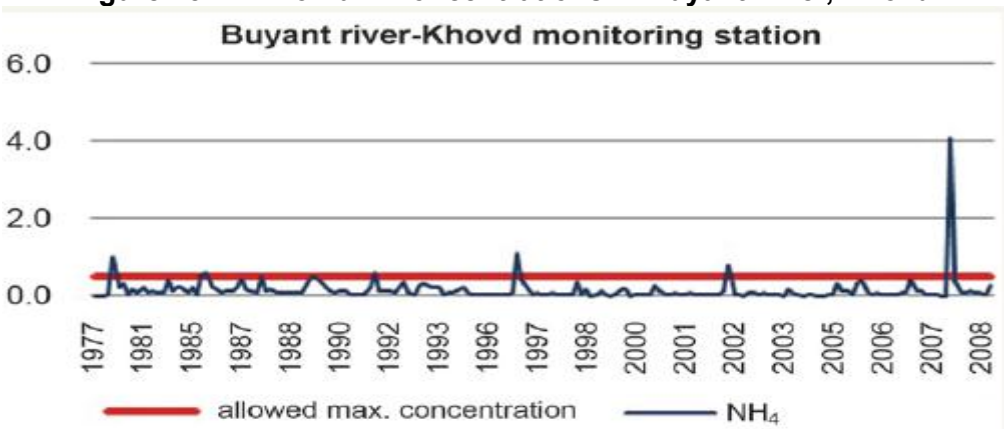
Source: Government of Mongolia. 2007. *EIA*. Ulaanbaatar.

176. Alternative data are presented in the IWRMP which shows in particular that levels of ammonium (NH_4) exceed the maximum allowable concentrations in rivers in the project area, as

[41] UNFAO AquaStat Mongolia. See http://www.fao.org/nr/water/aquastat/countries_regions/MNG/CP_MNG.pdf
[42] Government of Mongolia. 2007. EIA. Mongolia.

shown in **Figure 25**.

Figure 25: Ammonium Concentrations in Buyant River, Khovd



Source: Integrated Water Resource Management Plan for Khar Lake–Khovd River Basin (2011)

177. This potential difference in interpretation of water quality data show the importance of sound water quality monitoring before, during and after the project completion.

E. Land Use

178. The sparse and nomadic population along the Tranche 2 corridor means that a small proportion of the land in the corridor is occupied by settlements. The project area contains the key settlements of Olgii and Khovd, as well as the smaller centres of Tolbo, Tsagaannuur and Ulaanbaishint, however, the remainder of the corridor remains undeveloped, so the two main land uses are road access and grazing.

179. **Road corridor**. The Tranche 2 road corridor includes sections of road which are primarily dirt multi-track routes as shown in **Figure 26**. The area over which there are parallel multi-track roads can be extensive, covering several hundred meters in width. This is shown in the lower photograph which reveals the predominance of multi-track routes approaching Khovd from the south, as seen from the air.

Figure 26: Multi track road, Khovd –Khashaatin davaa (top) and South of Khovd (bottom)

Source: ADB Study Team

180. **Livestock grazing.** A significant land use along the project road corridor is for livestock grazing. The livestock typically comprises large herds of goat and sheep as well as cattle and camels. At night, herds are kept in pens close to either permanent or seasonal dwellings and are let out during the day to graze. The vegetation grazed by livestock comprises mainly sparse grassland close to water bodies, such as the Buraatin river near Buraatin Pass (Component 1a, 48°25'49.18"N, 90°24'11.61"E) or close to Tvanguur (Component 1b, 49°30'42.07"N, 89°41'33.19"E), see **Figure 27**. Away from water bodies, sparse scrub vegetation replaces grasses, but are still considered valued areas of pasture.

Figure 27: Grazing land Component 1a (left) and Component 1b (right)

Source: ADB Study Team

F. Air Quality

181. Air quality data are available for the main population centres in Tranche 2, including Khovd and Olgii. The air quality and SO_2 and NO_2 concentrations are monitored at stations in each *aimag* center. The monitoring data from 2003 to 2005 (**Table 18**) "indicates" that air quality met the national air quality standards (**Table 19**) and meets the WHO standards for 24 hour mean of SO_2 (0.02 mg/m^3) and NO_2 (0.04 mg/m^3)[43].

Table 18: Annual Mean of SO_2 and NO_2, mg/m^3 (2003-2005)

Year	Bayan-Olgii		Khovd	
	Sulfur dioxide SO_2	Nitrogen dioxide NO_2	Sulfur dioxide SO_2	Nitrogen dioxide NO_2
2003	0.002	0.006	0.002	0.020
2004	0.001	0.006	0.002	0.028
2005	0.000	0.002	0.004	0.034

Source: Ministry of Nature Environment and Tourism, State of Environment 2003, 2005.

Table 19: National Air Quality Standards

Category	Concentration, mg/ m^3			
	Dust	SO_2	CO	NO_2
24 hour mean	0.15	0.05	3.0	0.04
Maximum value	0.5	0.5	5.0	0.085

Source: Ministry of Nature, Environment and Tourism, State of Environment 2003, 2005.

182. The air quality at locations away from the *aimag* centres is expected to be better than in the centres which have higher concentrations of pollutant sources such as vehicles and domestic and centralised heating. However, outside the towns where there are no paved roads, the key receptors (people) will be subject to higher levels of airborne dust.

G. Noise

183. Noise can affect sensitive receptors such as humans. Mongolian standards on noise are discussed in Chapter III, C. Environmental Standards. Given the remote nature of the Tranche 2 corridor, no specific noise monitoring data was available to inform this study, however,

[43] 24hr mean and annual mean are the only data available, therefore the text emphasizes that the data ''indicate'' that the standards are met, rather than 'it does' meet the standards.

background noise in the area is not anticipated to be an issue. Noise will be generated through construction and therefore will be monitored during project implementation.

H. Climate Change

184. In 2007, Mongolia was ranked 96th in the list of CO_2 emitting countries, contributing around 0.04% to global emissions.[44] UNEP[45] states that in Mongolia, the energy sector (including stationary energy, transportation and fugitive emissions) was the largest source of greenhouse gas (GHG) emissions comprising 65.4% of total emissions. The second largest source of GHG emissions was the agricultural sector (41.4%). The report also states that total CO_2 removal was more than total CO_2 emissions in 2006 because of an increase in the area of abandoned lands and a reduction in newly cultivated land. However, by 2020, it is predicted that Mongolia's GHG emissions will be more than five times levels in 2006.

185. Climate modelling for Mongolia is projecting changes which include increased air temperatures, increased precipitation in some areas and a reduction of water resources in other areas.[46]. Potential evapo-transpiration increase would be higher than precipitation increase. This is supported by Mongolia's Second National Communication on Climate Change.[47] The climate analyses in the National Communication shows where Mongolia is vulnerable to climate change and what the changes may be, as shown in **Table 20**.

Table 20: Climate Change Vulnerabilities

Vulnerability	Impact
Ecosystem	In 2080, forest-steppe and steppe areas will decrease, as a result of a decrease in rainfall and an increase in temperature in the growing season
Rangeland	The pasture biomass will decrease in almost all areas
Desertification	Future temperature increases during the growing season, the increase of potential evapotranspiration, a precipitation decrease in most areas
Water Resources	The projected increase in evaporation from open surface water will exceed the increase in runoff by much higher rates in different basins, leading to dryer conditions; and Increased tendency to flooding
Cryosphere	The area of stable snow cover will be decreased in future periods; and Permafrost will retreat in mountainous areas, and eventually the higher geographical classes of permafrost will be replaced with lower ones

Source: Mongolia's Second National Communication on Climate Change

186. The report notes that the reasons for hydrological changes are complex and include climate factors such as the effects of melting glaciers and permafrost as well as anthropogenic influences such as watershed management. The most vulnerable areas for the country are in the agricultural, livestock, land use, water resources, energy, tourism and residential sectors. This indicates that future climate changes are expected to negatively impact Mongolia meaning that climate change adaptation is a significant issue for the country.

[44] United Nations Statistics Division, Millennium Development Goals Indicators. Available at http://mdgs.un.org/unsd/mdg/SeriesDetail.aspx?srid=749&crid=
[45] United Nations Environment Program (2009) Mongolia: Assessment Report on Climate Change 2009.
[46] United Nations Environment Program (2009) Mongolia: Assessment Report on Climate Change 2009.
[47] MNET (2010) Mongolia's Second National Communication on Climate Change; Under the United Nations Framework Convention on Climate Change (UNFCCC).

I. Natural Disasters

187. Mongolia is susceptible to a number of natural disasters. *Zud* conditions mean an extremely cold winter when livestock cannot graze and reach fodder. This condition can be caused by a variety of factors including: i) a layer of ice formed after a warm thaw in winter; ii) a lack of snow in the waterless regions; iii) too much snow; or iv) the trampling of pasture in areas where stock density is too high.

188. The character of natural hazards in the project area is defined by topography and geology, climatic conditions, and the hydrologic regime of rivers. Potential natural hazards in the project area therefore include rock falls, flash floods and winter storms. Flash floods (mudflows) are a distinctive feature of the flood regime of the Mongolian mountain streams and rivers, and rock falls are likely to be more widespread at high altitude sections of the road. However, there is no evidence for the occurrence of avalanches or landslides in the project area. **Table 21** provides an overview of potential natural disasters within the Project alignment including potential mitigation measures.

Table 21: Potential Natural Disasters and Mitigation

Type of natural hazard	Location	Length	Mitigation measure
Blowing and drifting snow	Buraatin and Khashaat passes	500m	earthen fence
Flash floods	Khovd-Shurga *bagh*	2x2m	box culvert
	Shurga bridge-entrance of Hongio canyon	2.5x2m	box culvert
	Shurga bridge-entrance of Hongio canyon	2x2m	box culvert
	Shurga bridge-entrance of Hongio canyon	3x3m	box culvert
	Shurga bridge-entrance of Hongio canyon	2x2m	box culvert
	Khashaat pass	2.5x2m	box culvert
	Buraatin pass	2x2m	box culvert

Source: Government of Mongolia. 2007. *EIA.* Ulaanbaatar.

189. **Earthquakes**. The Research Center of Astronomy and Geophysics of the Mongolian Academy of Sciences (RCAG) has partnered with the French organization 'Département Analyse, Surveillance, Environnement' (DASE) in order to assess the seismic hazard in Mongolia and Ulaanbaatar (on-going). The results of the RCAG and DASE assessment[48] were derived through a full review of Mongolia's seismic activity, and attenuation laws were redefined. The results so far show previously unknown active faults around Ulaanbaatar.

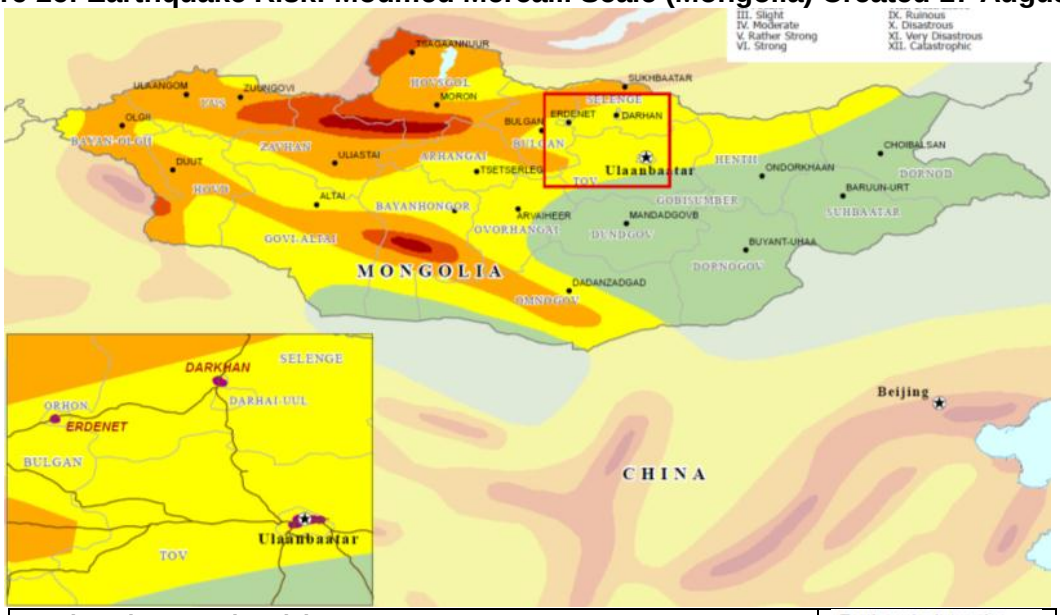
190. **Figure 28** illustrates seismic hazard in terms of macro-seismic intensity[49], using the

[48] http://www-dase.cea.fr/public/dossiers_thematiques/evaluation_de_l_alea_sismique/description_en.html

[49] Intensity may be related directly to peak ground acceleration and peak ground velocity through empirical relationships. The former measure is an international standard hazard metric currently adopted by many countries for presenting national seismic hazard assessments; ground velocity however is often considered a more representative measure of a location's ground motion hazard than ground acceleration. Peak ground velocity is closely related to the energy flux between ground and building. Seismic hazard may be forecast using ground velocity as an alternative measure to intensity, such that intensity may be determined as a function of peak ground velocity. Earthquake damage statistics often give a much closer correlation with peak ground velocity than with peak ground acceleration, particularly at higher intensity values. Both however are more meaningful than using

Modified Mercalli Scale which is an alternative hazard metric to the older peak ground acceleration measure. Intensity is a generic bounded damage scale used to relate observed (or expected/forecasted) damage to the earth and built environment directly to earthquake magnitude. Macro-seismic intensity is a subjective scale requiring a personal interpretation of damage experienced by buildings after an earthquake, and is largely based on post-earthquake field surveys of building and site damage. **Figure 28** shows the Tranche 2 components to be in a zone of intensity VII hazard signifying light structural building damage in buildings of good design and construction, slight to moderate structural damage in ordinarily built structures, and considerable damage in poorly built or badly designed structures.

Figure 28: Earthquake Risk: Modified Mercalli Scale (Mongolia) Created 17 August 2010



Earthquake Intensity Risk Zones

This map shows earthquake intensity zones in accordance with the 1956 version of the Modified Mercalli Scale (MM), describing the effects of an earthquake on the surface of the earth and integrating numerous parameters such as ground acceleration, duration of an earthquake, and subsoil effects. It also includes historical earthquake reports. The Zones indicate where there is a probability of 20 percent that degrees of intensity shown on the map will be exceeded in 50 years. This probability figure varies with time; i.e., it is lower for shorter periods and higher for longer periods.

I. Instrumental	VII. Very Strong
II. Feeble	VIII. Destructive
III. Slight	IX. Ruinous
IV. Moderate	X. Disastrous
V. Rather Strong	XI. Very Disastrous
VI. Strong	XII. Catastrophic

OCHA Regional Office for Asia-Pacific

Earthquake Intensity
Modified Mercalli Scale
- Degree I-V
- Degree VI
- Degree VII
- Degree VIII
- Degree IX-XII
- Town
- Province
- Urban Area
- Primary Road

Map Doc Name: MNG_Earthquake Risk_v1_100816
Creation Date: 17 August 2010
Projection/Datum: GCS MONREF 1997
Web Resources: http://ochaonline.un.org/roap

0 250 500 Kilometers

Map data source(s): Pacific Disaster Center (PDC), Natural Hazard Assessment Network (NATHAN) by the Munich Reinsurance Company, UNEP/GRID, UN Cartographic Section, FAO-GAUL

Disclaimers: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

Source: http://www.preventionweb.net/files/15692_mngearthquakeriskv1100816.pdf

magnitude in isolation when specifying engineering seismic loading design criteria. *Source: Dr J Bayliss, Independent Advisor, UK. Pers. Comm. December 2012.*

191. The project is in the Mongol Altai zone for seismic activity and this zone includes the Mongol Altai mountain range. The largest recorded earthquake in this zone occurred near the Munhhairhan Mountain in 1931 with a magnitude of over 8.0. Since then, no earthquake with a Magnitude of 7.0 or greater has been recorded in this zone.

J. Physical Cultural Resources

192. The Tranche 2 road alignment passes through an area which has evidence of settlement from the Palaeolithic and Neolithic eras. The key cultural resources in the area are: (i) Sangiin Kherem Manchu wall; (ii) Deer stones; (iii) ovoo; and (iv) Petroglyphs and (v) Khirigsuur

193. **Sangiin Kherem** (Manchu ruins) at 48° 0'42.57"N, 91°38'28.40"E. In Khovd town the wall was built around 1762 by the Manchu Qing dynasty warlords. The walled compound once contained temples and homes but a partial wall is all that remains. The site is to the north of the town, adjacent to the main existing route through the town. The road alignment for Component 1a has been amended to retain and protect this feature. The historic wall is approximately 500 m from one of the bridges which are to be upgraded in Khovd (Component 2a).

194. **Deer Stones**. A significant collection of Deer Stones are located at Khashaat Pass to the east of the existing road alignment at 48°23'8.07"N, 90°49'1.89"E (Component 1a). These are ancient megaliths carved with symbols, the purpose of which is unknown and are estimated to be erected in the bronze age, around 1000 BC.

195. **Ovoo**. Ovoo are piles of rocks found frequently at mountain passes, that are places to give offerings to spirits and therefore are sites of cultural significance. An ovoo is found at the side of the road approximately 3 km from Khovd town. Throughout the Tranche 2 corridor, smaller piles of stones, up to around 1m high are found at various locations.

196. **Figure 29** shows the cultural resources in the project area.

Figure 29: Manchu Ruins Kovd, Deer Stones Khashaat Pass, Ovoo Khovd

Source: ADB Study Team

197. **Pettroglyphs and Khirigsuur**. These were not observed in the Tranche 2 corridor but evidence suggests that they may be present. Khirigsuur is a bronze age stone mound which can be found in the western region of Mongolia. Petroglyphs are found on the east bank of Tolbo Lake (near Component 1a) and in the mountains around Khovd town. Prior to construction, an archaeological survey is recommended in order to identify significant cultural sites including consultation with local residents on culturally significant issues.

K. Ecological Resources

198. **Context.** The Project road alignment for Tranche 2 is primarily within an existing road

corridor the surrounding habitat of which has been highly modified and degraded by human activity not least by the existing multi-track earth road network. Moreover, sparse natural vegetation near the road corridor is heavily grazed by livestock, mainly goat and sheep herds, which are the dominant fauna in the project area. The proposed road will be within a 70 m wide corridor, which is generally narrower than the existing width of the area covered by the multi-track earth roads. It is anticipated that the earth roads will no longer be used when the road is complete and vegetation will naturally begin to encroach on the tracks in locations where vegetation is present.

199. **Flora**. The project area of Bayan-Olgii and Khovd *aimags* comprises high mountain, mountain steppe, dry steppe, desert-steppe, stepped desert, grasses – undershrub desert, undershrub and shrub desert, and hammad vegetation[50]. **Table 22** presents the dominant species of flora in the project area.

Table 22: Dominant Flora in the Project Area

Zone Names	Dominant Species
High mountain	*Cerastium lithospermifolium, Dryadanthe tetrandra, Parrya exscapa, Kobresia belardii, Carex melanatha, Carex orbicularis*
Mountain steppe	*Festuca lenensis, Oxytropis oligantha, Potentilla nivea, Stellaria pulvinata, Artemisia argyrophylla, Kobresia filifolia*
Dry steppe	*Festuca lenensis, Helictotrichon desertorum, Festuca valesiaca, Poa attenuate, Silene repens, Arenaria capillaries, Onosma arenaria, Spiraea hypericifoloa, Agropyron cristatum, Carex pedifopmis, Galium verum*
Desert steppe	*Festuca lenensis, Agropyron cristatum, Krylovia eremophylla, Peucedanum histrix, Allium edaurdii, Potentilla sericea*
Grasses – undershrub desert	*Caragana bundei, Caragana pugmaea, Stipa krylovii, S.kirghisorum, Festuca valesiaca, Agropyron cristatum, Artemicia dolosa, Melandrium viscosum, Saussuea pricei*
Undershrub and shrub desert	*Stipa gobica, Agropyron nevskii, Agropyron cristatum, Artemisia frigida, Arenaria capillaries, Caragana leucophloea, Eurotia ceratoides*
Hamad	*Stipa glareosa, S.sibirica, Agropyron cristatum, Cleistogenes squarrosa, Allium equardii, Artemisia rutifolia, Caragana bundei, Lophanthus chinensis*
	Nanophyton grubovii, Eurotia ceratoides, Stipa glareosa, Artemisia gracilescens, Reamurea songorica
	Anabasis brevifolia, Stipa glareosa, Arthemisia xerophytica, A.hanthochroa, Ajania fruticosa, Zygophyllum pterocarpum, Ephedra sinica
	Euratia certoides, Reamurea songorica, Haloxylon ammodendron, Artemisia terrae-albae, Anabasis salsa, A. truncata
	Haloxylon ammodendron, Anabasis brevifolia, Zygophyllum xanthoxylon, Reamurea songorica,
	Achnathuerum splendens, Leymus, Iris lacteal, Carex enervis, Kalidium foliatum, Reamurea songorica, Phragmites communis, Tamarix ramosissima, Haloxylon ammodendron, Popolus diversifolia

Source: Government of Mongolia. 2007. EIA. Ulaanbaatar.

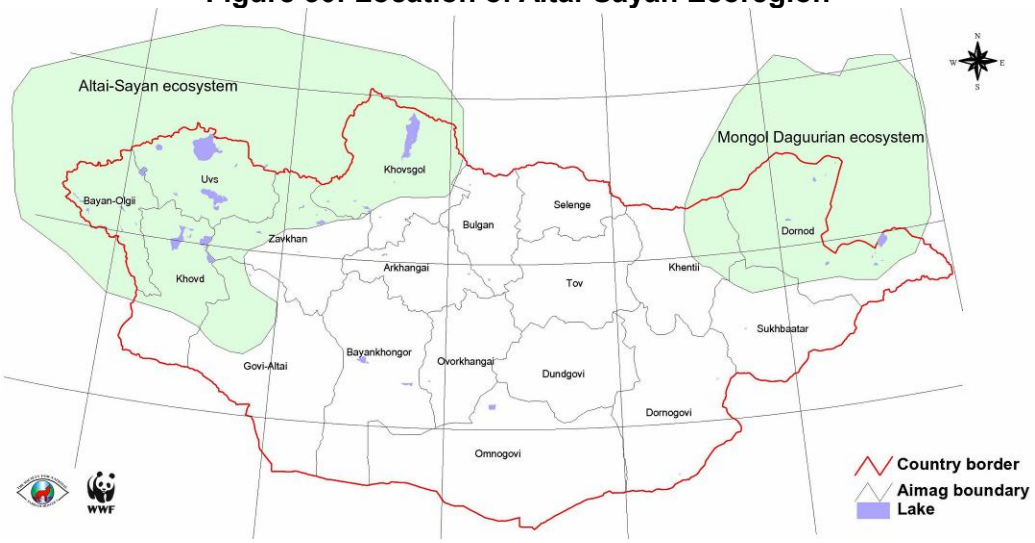
200. Over 80 species of plants listed in the Mongolian Red Book can be found in Khovd *aimag*. However field surveys and consultations with experts result in the conclusion that no Red Book species are located within the road alignment corridor[51]

201. **Forest**. Forested areas are present in Bayan-Olgii and Khovd *aimag*s. However, there are no forests within the project area. The nearest forest to the project alignment is at least 100 km away in Bayan-Olgii *aimag*.

[50] Vegetation tolerant of high temperatures and saline conditions.
[51] Government of Mongolia. 2007. EIA. Ulaanbaatar.

202. **Fauna**. The project area is entirely located within the Altai–Sayan Eco-region, shown in **Figure 30**. The eco-region is characterized by rich faunal biodiversity ranging from mountain tundra of Mongolian Altai to Gobi Desert. Within the eco-region there are 360 species of vertebrates, including 90 species of mammals, more than 250 species of birds, 11 species of reptiles, 8 species of fishes, and 1 species of amphibian.[52]

Figure 30: Location of Altai-Sayan Ecoregion



Source: WWF

203. The Mongolian Altai - Sayan contains rare and endangered mammals such as Snow Leopard (*Uncia uncia*), Wild Sheep (*Ovis ammon*) or Argal, Siberian Ibex (*Capra sibirica*), Mongolian Saiga (*Saiga tatarica mongolica*), Musk Deer (*Moschus moschiferus*) Pallas' cat (*Felis manul*) or Manul, Black Tailed Gazelle (*Gazelle subgutturosa*), Wild Boar (*Sus scrofa nigipes*), Stone Martin (*Martes foina*), Marbeled Polecat (*Vormela peregusna*), Elk (*Cervus elaphus*) or Red Deer. It is also a habitat for steppe and semi-desert fauna such as wolves, foxes, martens, weasels, marmots, corsac foxes, manul cats, and marbled polecat.

204. There are 44 species of small mammals, including mice, squirrels, hamsters, voles, shrews, jerboas, rabbits, and badgers that are distributed throughout the Altai-Sayan Eco-region, depending on the type of habitat present.

205. **Amphibia and Reptiles**. Four families and six species of reptiles including Toad-headed Agama (*Phrynocephalus versicolor*), Mongolian Agama (*Laudakia stoliczkana*), Multi-cellated Racerunner (*Eremias multiocellata*), Gobi Racerunner (*Eremias przewalskii*), Pallas's Coluber (*Elephe dione*), and Central Asian Viper (*Aqkistrodon halys*) have been reported in the Mongolian Altai-Sayan eco-region. In 1987, sand lizards (*Lacerta agilis*) were first discovered in Bayangol of the Altai Mountain range in Khovd *aimag*.[53]

206. **Birds.** There are 258 bird species found in the western region. The majority of these birds are migratory and few are local inhabitants. There are a number of rare and endangered species of birds, including Snowcock (*Tetraogallus altaicus*) or Altain ular, Cenereous Vulture (*Aegypius monachus*), Golden Eagle (*Aquila chrysaetos*), Lammergeyer (*Gypaetus barbatus*), Spoonbills (*Platalea Leucorodia*), Dalmatian Pelican (*Pelecanus crispus*), Great White Egrets

[52] WWF. 2001. *Altai-Sayan Ecoregion: Ecoregion Climate Change Biodiversity Decline.*
[53] Government of Mongolia 2007. EIA. Ulaanbaatar.

(*Egretta alba*), Whooper Swans (*Cygnus cygnus*), Greet Blackheaded Gulls (*Larus ichthyatus*), Black Storks (*Ciconia nigra*) and Swan Goose (*Anser cygnoides*).

207. **Fish.** Seventy six native fish species are reliably recorded in Mongolia, of which five species are new to science and unnamed.[54] The project area is located on the edge of the Great Lakes watershed formed from a number of closed inland depressions. Ten fish species are reported to inhabit the water bodies and courses of the watershed including endemic genus *Oreoleuciscus (O.potanini, O.humilis, O.angusticephalus, O.dsapchynensis,*[55] Mongolian grayling (Thymallus brevirostris), Siberian grayling (*Thymallus arcticus*), and Stone loach (*Barbatula toni*).

208. **Insects**. The dominant species are steppe and semi-dessert insects of *Orthoptera* orders (includes grasshoppers and crickets) and *Coleoptera* orders (beetles).

209. **Critical and Natural Habitats**. The existing road corridor in which the Tranche 2 project road will be constructed does not encroach upon any known critical habitat. However, the Component 1a road corridor passes at its nearest point, within 2 km of Tolbo Lake which is identified by Birdlife International as an Important Bird Area (IBA) as shown in **Figure 31**.

Figure 31: Location of Tolbo Lake and Tranche 2

Source: ADB Study Team

210. Tolbo Lake covers an area of 16,334 ha. The Tolbo Lake IBA is important for two globally threatened species: Pallas's Fish-eagle (*Haliaeetus leucoryphus*) and Saker Falcon (*Falco cherrug).*[56] Under the IUCN Red List of Threatened Species™, these species are

[54] Government of Mongolia. 2007. EIA. Ulaanbaatar.
[55] Government of Mongolia. 2007. EIA. Ulaanbaatar
[56] Birdlife International. http://www.birdlife.org/datazone/sitefactsheet.php?id=16319

categorised as Vulnerable and Endangered respectively.[57]

211. In addition, the lake also supports at least 1% of the fly away populations of the following congregatory waterbird species: Great Cormorant (*Phalacrocorax carbo*), Whooper Swan (*Cygnus Cygnus*), Bar-headed Goose (*Anser indicus*), Ruddy Shelduck (*Tadorna ferruginea*), Common Goldeneye (*Bucephala clangula*), and Northern Lapwing (*Vanellus vanellus*)[58].

212. The road near the edge of the lake runs through a dry flat valley bottom of sand and gravel which has little vegetation. This environment continues to the edge of the lake, as typified by **Figure 32** which shows the Component 1a road setting, and the environment at the eastern edge of the lake, approximately 3 km north of the end of Component 1a.

Figure 32: Component 1a and Environment Adjacent to Tolbo Lake

213. Given the distance between the edge of the lake and the Component 1a road alignment and the fact that the project is within the existing road corridor, it is not anticipated that the project will result in any significant impact on the IBA over and above the current situation. However, given the proximity of the IBA to the project it is considered useful and good practice to conduct a survey to find out what the current status of the IBA is in terms of species present (numbers, migration and breeding patterns), habitat quality etc., and whether or not the project could add some value to enhance the protection of the IBA. Such a study will be undertaken prior to finalization of the EIA report (see below).

214. **Rare and Endangered Species & Habitat Fragmentation**. The Mongolian Red Book (1997) lists 30 species of mammals, 30 species of birds, 5 species of reptiles, 4 species of amphibians, 6 species of fish, 19 insects, 2 crustaceans, and 4 mollusc species as endangered, vulnerable, or rare. A number of rare and endangered species occur in the Mongolian Altai-Sayan Eco-region and in the Bayan-Olgii and Khovd *aimag*s.

215. In 2011, the Government of Mongolia approved a National Program for very rare and rare wildlife. The program aims to protect and restore critical habitats for species such as the Mongolian Saiga and Argali sheep.

[57] The Red List categorisation provides taxonomic, conservation status and distribution information on plants and animals which have been globally evaluated using the IUCN Red List Categories and Criteria. This system is designed to determine the relative risk of extinction, and the main purpose of the IUCN Red List is to catalogue and highlight flora and fauna which are facing a high risk of global extinction (i.e. those listed as Critically Endangered, Endangered and Vulnerable).

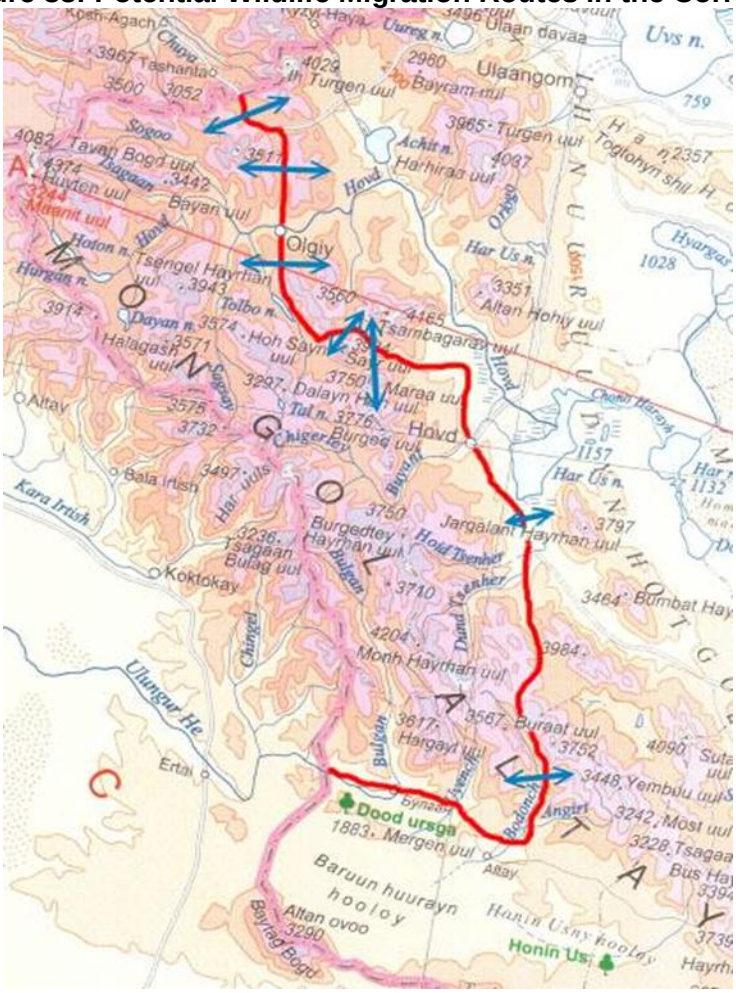
[58] Wildlife Science and Conservation Centre in Mongolia. Directory of Important Bird Areas in Mongolia. See http://www.wscc.org.mn/

216. The IUCN listing for Mongolian Saiga gives its Red List Category as 'Critically Endangered.[59] Within Mongolia, IUCN's range/distribution map confirms the Mongolian Saiga is not present in the Tranche 2 project area.

217. The IUCN listing for Argali sheep gives its Red List Category as 'Near Endangered'. Within Mongolia, Argali are distributed widely, but patchily across a large portion of the country, including the Tranche 2 project area.[60]

218. With the exception of the Argali sheep, within the project area there are no habitats where rare or very rare species of mammals, birds and reptiles have been reported. However, the possibility of wildlife crossing the road section at some locations is indicated in **Figure 33** which shows likely migration routes for fauna along the western regional road corridor. Potential migration routes are present in the Tranche 2 area.

Figure 33: Potential Wildlife Migration Routes in the Corridor



Source: Government of Mongolia EIA 2007, based on consultations with Administrations of Special Protected Areas and WWF

[59] http://www.iucnredlist.org/details/19832/0
[60] http://www.iucnredlist.org/details/15733/0

219. These potential migration routes and wildlife crossing zones were identified by experts from the Specially Protected Area Administration Department in Bayan-Olgiy, World Conservation Society (WCS) and the WWF Mongolia Program Office. Most animal species tend to follow established patterns in their daily and seasonal movement patterns. A road blocking a wildlife corridor can result in the corridor no longer being used because animals are reluctant to cross the road, an increase in mortality because of collisions, or a delay in migration. However, the proposed road follows the existing alignment with the exception of a short section in the Olon-Nuuruud Lake area. Therefore, it is not anticipated that habitat fragmentation will be worsened by the development of the project.

220. A wildlife migration monitoring program is proposed to be undertaken for the overall WRRCIP road alignment between Yarant and Ulaanbaishint during the construction and post-construction stages of the project. The objective of the monitoring program is to i) confirm and update the existing information on wildlife migration routes across the road corridor and ii) determine whether or not the new paved road including embankments affects wildlife movements. It is intended that information obtained during the monitoring program will inform the location of any additional site specific enhancement measures to facilitate wildlife movement across the new road (see below).

221. **Specially Protected Areas.** The existing road corridor in which the Tranche 2 project road will be constructed does not encroach upon any legally protected area. The nearest protected area to the Project is Sylkhemyn Nuruu National Park (See **Figure 2**). The National Park consists of two parts (A and B), covering approximately 14,080 hectares. Component 1b (Ulaanbaishint to Tsagaannuur) runs between Part A to the west and Part B to the east. It was designated as a national park in 2000 to protect the area's resources and the habitat of the wild mountain sheep (argali, *Ovis ammon*). This is one of the target species for conservation under WWF Mongolia's activities.

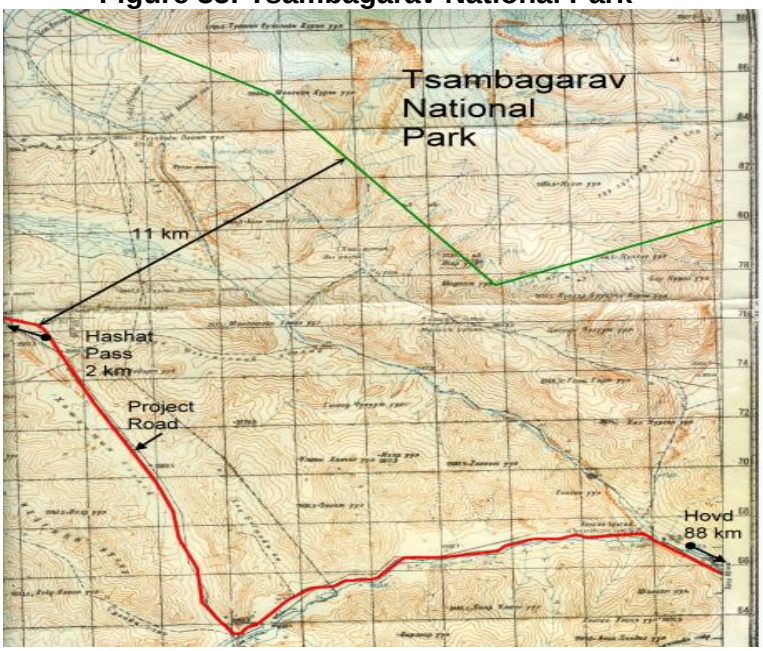
222. The park boundary at its nearest is located approximately 4km from the road alignment. (**Figure 34**). Given the distance it is not anticipated that the road project will impact on the habitat quality in the national park. Argali sheep are found in both parts A and B of the Sylkhemyn Nuruu National Park. Since the project road will follow the current road alignment, the influence of the project road on its wildlife migrations is not anticipated to be significantly different from that of the existing road.

Figure 34: Sylkhemyn Nuruu National Park Boundary in relation to Tranche 2: Component 1b project road

Source: ADB Study Team

223. Tsambagarav National Park is located 11 km away from the road alignment near Khashaat Pass (Component 1a) as shown in **Figure 35**. It is not anticipated that the project will impact negatively on this protected area given the distance from the road.

Figure 35: Tsambagarav National Park



Source: Government of Mongolia. 2007. EIA. Ulaanbaatar.

224. **Hunting and Poaching.** Consultations with WWF in Khovd and with residents along the road corridor indicated that there are concerns regarding contractors hunting either for themselves or on behalf of local residents on other sections of the Western Region Road Corridor. The discussion with WWF confirmed that Khovd and Olgii *aimags* generate income

from the controlled sale of licences for hunting therefore this income and the wildlife should be protected.

L. Socio-Economic Conditions

225. **Economic Conditions.** In Khovd *aimag*, the gross domestic product (GDP) of Khovd *aimag* amounted to 44,033.6 million MNT (476,500 MNT or $331 USD per capita) in 2005 as shown in **Table 23**. The most important sectors were agriculture, hunting and forestry (76.0%), transport and communication (5.1%), and education (5.1%). This compares to the GDP per capita of Mongolia as a whole in 2011[61] estimated at $4,800 USD.

Table 23: Gross Domestic Product of Khovd *aimag* in 2005

Item	GDP, mln. tug	%
Agriculture, hunting and forestry	33,460.7	76.0
Mining and quarrying	1.5	0.0
Manufacturing	-7.2	0.0
Electricity, gas & water supply	1,361.5	3.1
Construction	1,795.0	4.1
Wholesale & retail trade; repair of motor vehicle, motorcycle & personal & household goods	345.0	0.8
Hotels & restaurants	212.2	0.5
Transport & communication	2,250.0	5.1
Financial intermediation.	940.1	2.1
Real estate, renting & other business activities	131.7	0.3
Public administration & defense; compulsory social security	1,288.3	2.9
Education	2,260.8	5.1
Health & social work	888.3	2.0
Other community, social & personal service activities	49.8	0.1
FISIM[62]	-944.1	-2.1
GDP	**44,033.6**	**100**

Source: Statistical Division of Bayan-Olgii aimag.

226. **Economic Conditions**. In Bayan-Olgii *aimag*, the gross domestic product (GDP) of Bayan-Olgii *aimag* amounted to 36,000 million MNT (375,000 MNT or $260 USD per capita) in 2005 as shown in Table 26. The most important sectors were agriculture, hunting and forestry (71.7%), education (6.5%), financial intermediation (5.8%), and trade (4.5%).

Table 24: Gross Domestic Product of Bayan-Olgii *aimag* in 2005

Item	GDP, mil. Tug	%
Agriculture, hunting and forestry	24,588.0	71.7
Mining and quarrying	180.0	0.6
Manufacturing	288.0	1.3
Electricity, gas & water supply	432.0	0.7
Construction	288.0	0.4
Wholesale & retail trade; repair of motor vehicle, motorcycle & personal & household goods	2,448.0	4.5
Hotels & restaurants	216.0	0.2
Transport & communication	2,952.0	1.7
Financial intermediation.	576.0	5.8
Real estate, renting & other business activities	144.0	0.5
Public administration & defense; compulsory social security	1,188.0	2.8
Education	2,664.0	6.5
Health & social work	1,152.0	2.7

[61] CIA Fact book. https://www.cia.gov/library/publications/the-world-factbook/geos/mg.html

[62] FISIM: Financial Intermediation Services Indirectly Measured. In the System of National Accounts it is an estimate of the value of the services provided by financial intermediaries, such as banks, for which no explicit charges are made; instead these services are paid for as part of the margin between rates applied to savers and borrowers.

Item	GDP, mil. Tug	%
Other community, social & personal service activities	180.0	0.6
FISIM[63]	-1,296.0	0.0
GDP	**36,000.0**	**100**

Source: Statistical Division of Bayan-Olgii *aimag*.

227. **Livelihood and Economic Activities**. Animal breeding is the main economic activity in Khovd and Bayan-Olgii *aimags*. The contribution of the sector amounts to 76.0% of *aimag* GDP or 33.4 billion MNT in Khovd *aimag*, and 68.3% of GDP or 24.6 billion MNT in Bayan-Olgii *aimag*. The number of livestock in both *aimag*s is constantly increasing. **Table 25** illustrates the amount of livestock in the project area. This demonstrates the importance of maintaining grazing land in the project area and the significance that areas of pasture have for the economy of the project area.

Table 25: Livestock in the project area (2006)

	Total	Camel	Horse	Cattle	Sheep	Goat
Khovd	2,293,700	17,602	85,368	105,220	818,624	1,266,981
Bayan-Olgii	1,470,300	4,255	61,830	88,804	603,011	713,353

Source: Statistical Division of Khovd and Bayan-Olgii *aimags*.

228. **Poverty**. In April 2012, revised poverty numbers were released for Mongolia according to the World Bank methodology based on the 2011 Household Social Economic Survey (HSES) conducted by the Mongolian National Statistics Office. According to the joint estimation, poverty headcount index in Mongolia stands at 29.8 percent which is 9.4 percentage points less than in 2010, poverty depth amounts to 7.6 percent which represents a drop of 3.7 percentage points, poverty severity is at 2.8 percent which is 1.8 percentage points less than in 2010. By regions, the poverty headcount index shows that the Western region's headcount index is 30.2 percent, compared to Ulaanbaatar city at 23.5 percent. The data show that for the country as a whole, there is more poverty in rural areas than urban.

229. Rural poor people are scattered, isolated and highly mobile and Bayan-Olgii is identified as one of the five *aimag*s with the highest numbers of rural poor in Mongolia. Within the *aimag*s, poverty is most deeply entrenched in rural *soum* centres. Most rural poor people are herders and although livestock production is still the principal source of livelihood for rural people, the number of livestock per herder is decreasing dramatically. It shrank by more than half between 1990 and 2000. In that decade the number of herders swelled from about 150,000 in 1990 to about 420,000 in 1999, an increase of more than 180 percent. This means herders are among the poorest of the poor in Mongolia.[64] Therefore because of a rural subsistence lifestyle, unemployment rates in the project area appear very low, with unemployment rates at 1.6–2.33% of total population in Khovd and Bayan-Olgii *aimag*s.[65.]

230. **Transport**. The project area is poorly served by transport networks. The project corridor is along the main road between Olgii and Khovd which is of varying quality depending on whether it has been improved or not. Therefore most of the vehicles travelling between the two *aimag*s need to be robust jeep style vehicles rather than cheaper and more fuel efficient regular town cars. Public transport is provided by public share jeeps or minivans which generally leave from the markets in Khovd and Olgii when they are full. Flights can be taken between Olgii,

[63] FISIM: Financial Intermediation Services Indirectly Measured. In the System of National Accounts it is an estimate of the value of the services provided by financial intermediaries, such as banks, for which no explicit charges are made; instead these services are paid for as part of the margin between rates applied to savers and borrowers

[64] IFAD and Rural Poverty Portal. See http://www.ruralpovertyportal.org/country/home/tags/mongolia

[65] Government of Mongolia. 2007. EIA. Ulaanbaatar.

Khovd and Ulaanbaatar, but tickets are not affordable for most residents in the project area. Consultations held with herders along the project corridor indicated that old jeeps and motorbikes were common forms of private transport but it appeared that breakdowns are frequent and maintenance costs high because of the road conditions.

231. **Infrastructure - Water Supply**. The water supply system in Khovd[66] provides centralized drinking water distribution to office buildings and urban residential areas. Daily water supply is 4,600 m^3 of water from nine groundwater wells. Ger[67] dwellings in Khovd are supplied with water from eight water distribution stations, four deep wells and three hand water pumps. The water consumption is 388,300 m^3 of water per day. Surface water is the main source of water for livestock.

232. **Infrastructure - Waste Management**. Discussions with residents and Khovd *aimag* Governor's Office[68] confirmed that *soum*s and the *aimag* centres have a centralized dump site for solid household waste, waste is either collected or it can be taken to the dump site by residents. Given the descriptions of the sites, it is not expected that they are engineered for environmental protection. In Khovd *aimag*, the dump site has a bulldozer for moving waste which is managed by the Urban Services Division. The site is currently being fenced off in order to improve its management. Hazardous solid or liquid waste is not treated separately, however medical waste is dealt with in-house by hospitals and clinics. The Khovd *aimag* Governor's Office confirmed that Khovd *aimag* would be willing to discuss accepting waste from construction camps, as happens in Tranche 1 in Altai *soum*.

233. **Infrastructure – Sewage Management**. Khovd *aimag* has a limited mains sewerage system for the central part of the city. The remainder of the town, such as in *ger* areas, use pit latrines. The current sewage treatment facilities are limited to a series of evaporation ponds which are excavated when necessary. The town is currently developing plans to install a modern sewage treatment works.

234. **Education**. The availability of educational facilities and personnel in the project area in comparison to the country as a whole is quite favorable. In school year 2007–2008, the ratio of pupils to teachers and the numbers of schools compared favorably to national averages given the population of the project area as a proportion of the national population. Participation rates for children aged 4–19 in the educational system in the project area are higher than the national rate.

Table 26: Selected Education Indicators

Indicators (2006-2008)	Mongolia			Bayan Olgii			Khovd		
No. of general education schools 2006-07	754			41			24		
Average No. pupils per teacher in general education school 2007-08	30.9			27.2			33.1		
No. teachers in general education schools 2007-08	537,500			1,127			881		
General education Gross Enrolment Ratio 2007-08	M	F	T	M	F	T	M	F	T
	93.3	97.6	95.4	94.7	94.8	94.7	96.9	98.7	97.8

M= Male, F= Female T = Total for both sexes
Source: Mongolia Yearbook 2007. Ulaanbaatar. 2008.

[66] MON: Western Regional Roads Development Project Phase II Environmental Impact Assessment (August, 2010) http://www.adb.org/projects/documents/western-regional-roads-development-project-phase-ii
[67] Ger is a traditional circular nomadic dwelling.
[68] Mr Surenjav, Economics and Planning Office.r

235. In sparsely populated areas such as the Project corridor, schools can be widely scattered and lack a range of facilities and services. The need for travel to school to population centres was highlighted during consultations with herders for the preparation of this EIA.

236. **Health**. Health service provision indicators for the project area show that the population of Olgii and Khovd is poorly served compared to the national average as indicated by the following measures: number of persons per physician and the number of persons per nurse. **Table 27** shows the distribution of physicians per 10,000 people.

Table 27: Selected Health Service Indicators

aimag	Physicians	No. of Persons/ Physicians	No. of Persons/Nurse
Bayan-Olgii	141	709	453
Khovd	127	692	379
National	6,788	375	317
Project Area as a % of national	3.9	53.3	70.0

Source: Mongolian Statistical Yearbook. 2005. P-309; 311; 312.

237. Most of the health providers and the facilities and services are concentrated in urban areas therefore the remote rural populations in the project areas have access to fewer health services. However, a positive sign of improvement is shown by certain indicators as in higher percentage of infants being immunized and lower mortality rate in the project area compared to national average.

238. **Economic Displacement and Land Acquisition**. Economic displacement and land acquisition will be covered by the existing Resettlement Framework for WRRCIP in accordance with ADB's SPS 2009.

239. **Occupational Health and Safety**. Occupational safety considerations are currently a low priority in Mongolia, given observations on construction sites. Construction workers and maintenance staff can be observed operating without Personal Protective Equipment (PPE) to reduce the likelihood of an injury at work on construction sites in the western region. Article 16 of the National Constitution of Mongolia states that every employee has the right to 'suitable conditions of work'. The government adopted a National Program for Occupational Safety and Health Improvement in 2001 and national standards are also adopted such as the National Standard on Occupational Health and Safety MNS 5002:2000.

240. **Community Safety related to Construction and Operation**. The remote nature of the project area means that along large stretches of road, there will be no human receptors and therefore community health and safety will not be an issue throughout the project area. However because of the nomadic movements of herdsmen, the population can move and therefore all construction sites along the project road should be prepared for managing community health and safety, even if no population appear to be present when construction starts.

241. Consultations with a number of households along the Tranche 2 corridor indicated that the residents do not consider the increased numbers or speed of vehicles to be a concern. This was only mentioned by one householder who needs to cross the road with his livestock twice per day. Dust during construction was considered a potential issue for some households. Also given the poor noise insulation of nomadic Ger dwellings, noise may become a source of nuisance for the community during construction. A consultation with a household in Buraatin Pass confirmed that around the pass, traffic accidents in winter are common. Road safety risk is

exacerbated in winter due to drifting snow across the road.

VI. ALTERNATIVE ANALYSIS

242. Under ADB's SPS 2009 there is a requirement to examine alternatives to the project's location, design, technology, and components and their potential environmental and social impacts and consider the no project alternative.

A. No Action Alternative

243. **The "No Action Alternative**" addresses the likely consequences of not undertaking the proposed action. For this project, the failure to develop the road sections proposed through Tranche 2 from Khovd to Tolbo *soum* and from Ulaanbaishint to Tsagaannuur would be an impediment to travel and transportation of people along the Western Regional Road. Although there would still be improved accessibility for local traffic, it would reduce the effectiveness of existing road improvements currently being undertaken for Tranche 1 of this project, south of Khovd, and along other sections of the road corridor.

244. Failure to develop these sections of road would mean the Asian Highway route 4 and CAREC Corridor 4a would not be completed, which would have implications for cross border trade and development in the region. Therefore, it can be determined that the "No Action Alternative" is not a reasonable option if the overall poverty and socio-economic situation in the western region is to be improved.

B. Location Alternatives

245. In general the project alignment follows the existing right of way and where several earth tracks are currently used, the alignment is within or adjacent to the tracked area. However at a number of points along the alignment, a number of alternative routes are discussed in the PPTA Engineering Review.

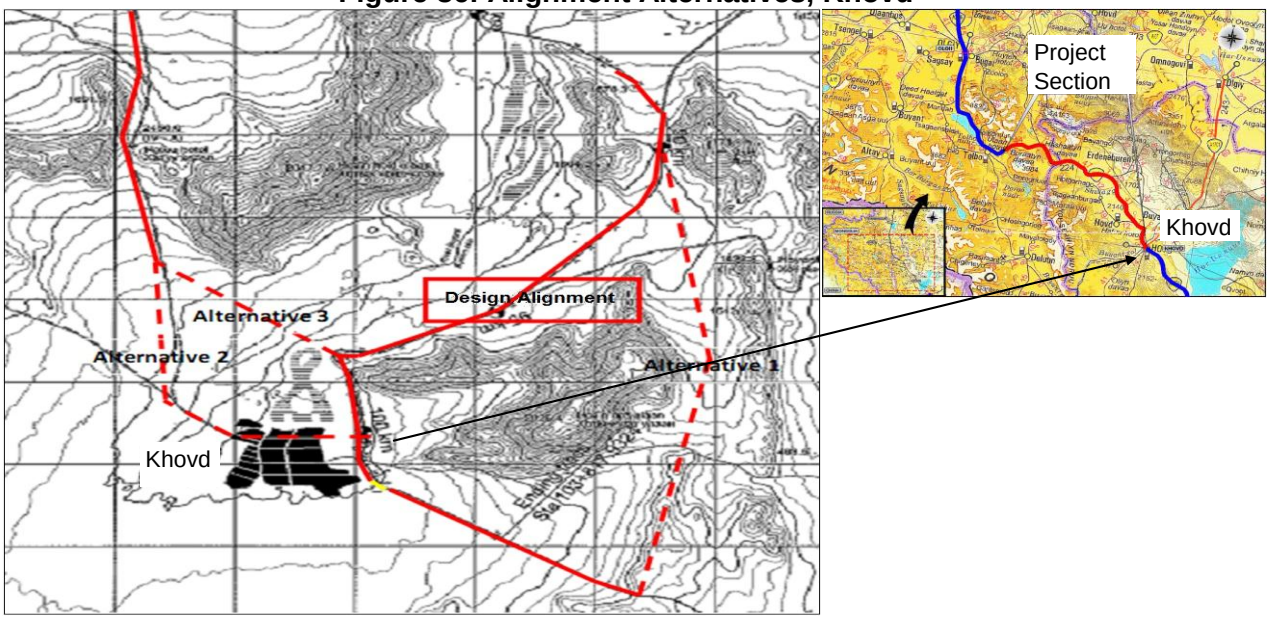
246. **Khovd Area**. Three location alternatives as well as the proposed design alignment were considered for the Khovd area. The design alignment utilizes the existing asphalt road leading north from Khovd towards Uvs a*imag* and deviates onto a new alignment after approximately 10 km. The existing road requires widening and reconstruction and improvement of a sharp curve at km 98+100. The construction of 2 new bridges is required on the Buyant River where currently the existing tracks cross the river bed without bridges.

(i) Alternative 1: begins at Dorolj Hill, proceeds over Hoyor Hill, crosses the asphalt road to Uvs. This alignment bypasses Khovd city by approximately 8 km. The crossing of Buyant River will be required, as per the proposed design alignment above.
(ii) Alternative 2: follows the existing road through Khovd city and over the two existing reinforced concrete bridges on the Buyant River which are to be replaced under Component 2a.
(iii) Alternative 3: follows the design alignment from Khovd to km 98+000 then deviates from the design alignment heading in a westerly direction over a marshy/permafrost susceptible area to connect with the second alternative alignment. The construction of a new bridge (or bridges) would be required over the Buyant River.

247. **Figure 36** shows the three alternatives and the design alignment while the environmental, socio-economic and engineering comparison of the three alternatives and the

design alignment is presented in **Table 28**.

Figure 36: Alignment Alternatives, Khovd



Source: TA Consultant's Report. TA 7449-MON: Regional Transport Development Project Component -1 Preparing the Western Regional Road II Project. Ulaanbaatar.

Table 28: Alternatives Comparison, Khovd

Item	Design Alignment	Alternative 1	Alternative 2	Alternative 3	Comparison
Location	bypasses the town	bypasses the town about 8 km to east	traverses through the town	bypasses the town through the marsh area.	Design alignment preferred
Environment:					
Air - Impact on public	no impact	no impact	during construction and operation	no impact	Design alignment or alternatives 1 & 3 preferred
Water - Impact on surface water	minor impact during construction	minor impact during construction	no impact	major impact during construction	Design alignment or alternatives 1 & 2 preferred
Noise - Impact on sensitive locations	no impact	no impact	during construction	no impact	Design alignment or alternatives 1 & 3 preferred
Permafrost - Degradation	no impact	no impact	no impact	Significant	Design alignment or alternatives 1 & 2 preferred
Ecosystems - Degradation	no impact	no impact	no impact	during construction	Design alignment or alternatives 1 & 2 preferred
Fauna –Loss of habitat	no impact	no impact	no impact	during construction	Design alignment or alternatives 1 & 2 preferred
Flora – Loss of habitat	no impact	no impact	no impact	during construction	Alternative 3 least preferred
Forests - clearing	no impact	minor impact	no impact	minor impact	Design alignment & alternative 2 preferred
Socio-economic:					
Land take - Area within right of way	similar	increase in land take	similar	increase in land take	Design alignment & alternative 2 preferred
Land acquisition during construction	no loss	no loss	significant	no loss	Design alignment or alternatives 1 & 3 preferred
Utilities – service interruption	no interruption	no interruption	significant	no interruption	Design alignment or alternatives 1 & 3 preferred
Historical/cultural resources - damage	no damage	no damage	Significant Next to the Qing Dynasty City wall	no damage	Design alignment or alternatives 1 & 3 preferred
Income - level	increase	no increase	increase	increase	Design alignment or alternatives 2 & 3 preferred
Engineering:					
Cost -	no increase	increase	increase	increase	Design

Item	Design Alignment	Alternative 1	Alternative 2	Alternative 3	Comparison
escalation					alignment preferred
Material - quantity	no increase	increase	no increase	increase	Design alignment & alternative 2 preferred
Cut and fill - area	similar	increase	similar	similar	Design alignment or alternatives 2 & 3 preferred

Source: TA Consultant's Report. *TA 7449-MON: Regional Transport Development Project Component -1 Preparing the Western Regional Road II Project.* Ulaanbaatar.

248. **Table 28** shows that except for the design alignment all the other three alternatives have more than one adverse impact; some of them significant. Thus, the design alternative appears most preferable with the least environmental, economic and engineering cost.

249. **Olon-Nuuruud lake area**, (48°29'42.94"N, 90°37'10.46"E) The design alternative passes through interspersed lakes in the area along the alignment. Alternatives were considered because the Governor and Local Government Officials of Olgii a*imag* stated that the design alignment would have an adverse impact on the lakes, which were said to be habitats for endemic fish species. During the 2010 EIA preparation in public consultations at Hongor Ulun bagh (located in close proximity to the lakes) the community and the Governor of the bagh were in agreement that the design alignment should be changed, as it would adversely affect the lakes. In later research conducted by the Consultant during the 2010 EIA preparation the fish species were reported as Mongolian Grayling (*Thymallus brevirostris*)[69] The species is found in landlocked basins in Europe and Asia, Russia and Mongolia[70] therefore cannot be considered endemic to the Olon-Nuuruud lake area or Mongolia and it is not endangered, although Mongolia does have an endangered and endemic grayling; Hovsgol grayling (*Thymallus nigrescens*) which is endemic to Lake Hovsgol, 700 km from the project area[71.,] The alternatives considered were:

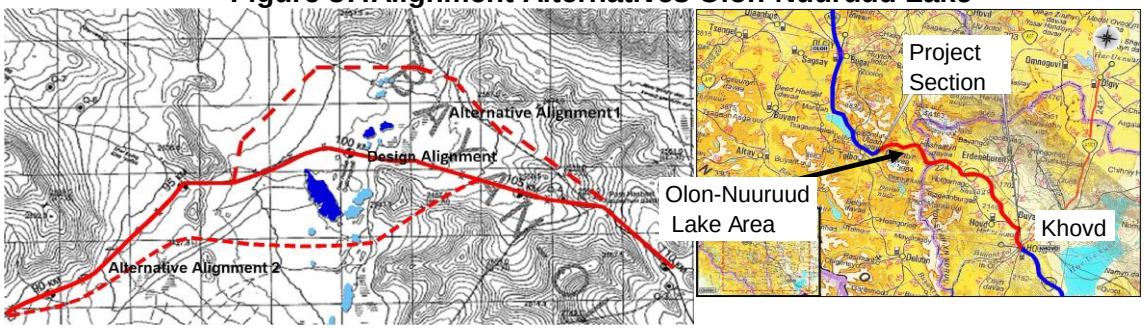
(i) Alternative 1: This alternative was proposed by ADB and the PPTA consultant team to avoid adverse environmental impacts on the lakes by detouring the alignment to the north. In the public consultation, however, participants were of the opinion that Alternative 1, too, was not suitable as it traverses through marshy areas and close to two springs which they considered could dry up because of the road.

(ii) Alternative 2: This alternative was proposed by Ms. Kh. Sau Alesh, Governor, Tolbo *Soum* and Mr. Kh. Bahythan, State Environment Inspector based in Tolbo *Soum*. The proposed alternative also bypasses the lakes and cuts across a hilly area to the south of the design alignment.

250. **Figure 37** shows the alternative alignments and the proposed design alignment. The environmental, socio-economic and engineering comparison of the design alignment with the two alternative alignments is presented in **Table 29** below.

[69] Personal communication with Ms. Kh. Saulesh, Governor, Tolbo *soum* and Mr. Kh. Bahythan, State Environment Inspector based in Tolbo *soum* during 2010 Draft EIA preparation.
[70] http://www.fishbase.org
[71] Tyler D. Ahrenstorff et al (2011) Abundance, spatial distribution, and diet of endangered Hovsgol grayling (*Thymallus nigrescens*). *Environ Biol Fish* DOI 10.1007/s10641-011-9961-5

Figure 37:Alignment Alternatives Olon-Nuuruud Lake



Source: TA Consultant's Report. TA 7449-MON: Regional Transport Development Project Component -1 Preparing the Western Regional Road II Project. Ulaanbaatar.

Table 29: Alternatives Comparison, Olon-Nuuruud Lake

Item	Design Alignment	Alternative 1	Alternative 2	Comparison
Location	traverses between lakes	to the North of the lakes	to the South of the lakes	Alternative 1 or 2 preferred
Environment:				
Air - Impact on public	No impact	No impact	No impact	
Water - Impact on surface water	Minor temporary impact	Impacts on marsh and springs	Minor temporary impact	Design Alignment or Alternative 2 preferred
Noise - Impact on sensitive locations	Possible impact	Possible impact	Possible impact	
Permafrost - Degradation	Potential impacts on the lakes	Minor impacts	Minor impacts	Alternative 1 or 2 preferred
Ecosystems - Degradation	Minor impacts	No Impacts	Less Impacts than Design Alignment	Alternative 1 preferred
Fauna –Loss of habitat	Minor impacts on Fish	Minor impacts	Minor impacts	Alternative 1 or 2 preferred
Flora – Loss of habitat	No impact	No impact	No impact	
Forests - clearing	No impact	No impact	No impact	
Socio-economic:				
Land take - Area within right of way		slight increase	slight decrease	Design Alignment or Alternative 2 preferred
Land acquisition during construction	No impact	No impact	No impact	
Utilities – service interruption	No impact	No impact	No impact	
Historical/cultural resources - damage	No impact	damage to springs	No impact	Design Alignment or Alternative 2 preferred
Income - level				
Engineering:	none	minor	minor	Design Alignment preferred
Cost - escalation	no increase	slight increase	slight increase	Design Alignment preferred
Material - quantity	no increase	increase	significant increase	Design Alignment preferred
Cut and fill - area	traverses between lakes	to the North of the lakes	to the South of the lakes	Alternative 1 or 2 preferred

Source: TA Consultant's Report. TA 7449-MON: Regional Transport Development Project Component -1 Preparing the Western Regional Road II Project. Ulaanbaatar.

251. Alternative 1 is not preferred because it will affect the springs used as a drinking water source by the community. The Design alignment seems the economical option considering the

terrain. All three options have the same level of impacts on surface water during construction and operation. The design alignment is clearly the least cost option without additional environmental protection costs for the lake, should it be required. Therefore the Design Alignment may be adopted with adequate protection measures for surface water protection, without losing the economic advantage against Alternative 2. Alternative 2 is therefore discounted as it is more expensive to implement than the Design Alignment and the cost cannot be justified given the acceptability of the Design Alignment.

252. Alternative alignments for Component 1b Ulaanbaishint to Tsagaannuur (25.8km) were not considered as the design alignment was considered satisfactory both technically and environmentally. The road alignment has no significant embankments or angles/bends in the road which could cause concern from a technical perspective. Also the environment through which the road travels is not particularly sensitive and therefore it was not deemed necessary to consider any alternatives for this alignment.

C. Technological Alternatives

253. **Pavement Alternatives**. In Mongolia, pavements are subject to failure not just through excessive traffic loading but also because of a number of additional problems that are only found in cold climates. For the asphalt bound material, these include: (i) Thermal contraction or fracture; (ii) Fatigue cracking; (iii) Rapid crack deterioration; (vi) Rutting of high penetration grade asphalt; and (v) aging.

254. Given the projected traffic flow, sub-grade strength, and extreme climate conditions, two initial surfacing alternatives are possible: double bituminous surface treatment (DBST) or asphalt concrete. For DBST a 30 cm base course and 20 cm granular sub-base supported with a 20 cm non-frost sub grade could be used while for the asphalt concrete a minimum 20 cm base with 20 cm granular sub-base supported with a 20 cm non-frost sub grade would be employed.

255. The pavement surfaces in Mongolia typically consist of hot mix and cold mix asphalts. Bituminous surface treatments are rarely used, even though these are widely used in other cold climate countries. The 2010 PPTA Engineering Review identified that a set of draft cold climate pavement design standards has been developed in Mongolia for national highways, although given that no design standard changes have been made since the 2010 EIA, it appears that these standards have yet to be implemented nationally.

256. Research into cold climate surfacing[72] suggests that low volume roads in cold climate regions typically tend to use bitumen surfacing or DBST, however DBST is not widely used or available in Mongolia. Where asphalts are used for pavement surfacing internationally in cold regions, Soft Asphalt Binders are used, however analysis needs to be undertaken based on summer conditions to ensure bleeding and flushing of the surface does not occur if this were considered.

257. Asphalt concrete pavement has the advantage of strength and durability, with a longer design life. DBST pavement is less strong and durable and its application generally has a design life of up to 15 years with appropriate maintenance. DBST pavement is vulnerable to the progressive loss of cover aggregate and the deepening and expansion of potholes. Accordingly, the maintenance costs for DBST will be higher than asphalt concrete pavement,

[72] PPTA Report Volume 1 Engineering Review (2010).

however the initial costs during construction would be significantly less than for DBST.

258. **Sub layer design and permafrost**. For the base, sub base and subgrade layers issues associated with extreme cold weather include: (i) Volume change of these layers because of frost heave; (ii) Loss of bearing capacity because of spring thaw; and (iii) Thaw consolidation of frozen soils in permafrost regions. The design life horizon for the proposed project roads is 15-19 years, therefore they will be subject to these extreme conditions however it is not anticipated, given this relatively short time scale, that the impacts of climate change causing permafrost melting will be a consideration. However as major maintenance activities for the road are prepared it is anticipated that changes in permafrost coverage and rates of melting will need to be factored into the design. Currently the main consideration in the design for permafrost is the limitation of cutting leading to larger embankments.

259. The PPTA team conducted a survey of roads constructed or proposed to be constructed in western Mongolia. There does not appear to be a standard design, in particular, the use of a non-frost subgrade. In some cases a non-frost layer is added and other times it is not. Although the use of a non-frost susceptible subgrade layer is dependent on the frost susceptibility of the subgrade, it is unclear whether this has been the basis for the use of a non-frost susceptible subgrade layer. The design for Component 1b (25.8 km) includes a non-frost subgrade provision whereas the PPTA Engineering Review could find no apparent cold region provisions within the other components of Tranche 2.

260. In order to identify the most appropriate pavement and sub base solutions, the PPTA Engineering Review recommended that the Project appoints a recognized cold regions pavement specialist to provide a design that is suitable for the climatic conditions. DBST has since been selected as the preferred pavement choice to be used for the Project, given its significant initial cost savings. Also it is a proven technology in cold climates for example the Alaska Highway has a DBST pavement, chosen for its ease of application and that it is a flexible surface which is beneficial in an unstable terrain and one which thaws and softens in spring and summer. DBST will be adequate for the road surface if it is applied well and the road is constructed to a high technical standard; this will prolong the life of the road structure and pavement.

VII. ANTICIPATED IMPACTS AND MITIGATION MEASURES

A. Environmental Impact Screening

261. The following discussion on environmental impacts screens the potential impacts according to the following factors and recommends mitigating activities on this basis:

- **"Receptor"**: the resource (human/natural environment/economic/social) which is potentially going to receive and have to cope with an impact.
- **"Sensitivity"**: ability to cope with an impact and/or its importance to the country of Mongolia. It is generally accepted that human health is always a high sensitivity receptor, however in terms of environmental/natural resources, the sensitivity varies according to the receptor e.g. scrubland with no significant biodiversity is considered less sensitive than a mature forest which supports ecosystems and livelihoods.
- **"Magnitude"**: the size of the potential impact. Impacts may be short term and considered low magnitude (e.g. noise or temporary reduction of income during a short construction project) or high magnitude (e.g. the disposal of large quantities of hazardous waste into a water course).

262. Where an impact may occur, if there is no receptor which is potentially going to receive the impact, then mitigating actions will not be required. This follows the source-pathway-receptor model, whereby in order for there to be an impact, the pollutant or issue (source) needs to be present, the pathway to a receptor is needed (such as fissures in rocks, or water for human consumption) and a receptor must be present to receive the impact, such as humans, flora or fauna.

B. Positive Impact and Environmental Benefits

263. **Beneficiaries**. The Project will directly benefit the residents of the Khovd and Bayan-Olgii *aimag*s, a population of 190,400 (2009). The residents of these *aimag*s in particular will benefit both socially and economically from the project. The current road is difficult to access in winter, it is poor quality causing significant damage to vehicles, expensive jeep type vehicles are needed for long journeys and travel times can be long. The communities are currently very remote and their access to each other in winter is significantly reduced.

264. **Access to Services**. The Project will help people to access services such as education and healthcare providers more easily. It will contribute to household savings on transport as the road will no longer require such expensive cars and it is anticipated that the costs of fuel and vehicle maintenance per journey are likely to reduce when the road quality improves.

265. **Economic Development**. The Project will further indirectly benefit residents in the region through improved economic development and trade opportunities. The current inaccessibility and high transportation costs hinder development. The Project road corridor is part of the Asian Highway network being developed to improve international trade between Mongolia and its neighboring countries of PRC and the Russian Federation.

266. **Health and Community Health & Safety**. A benefit from the road will be a reduction in dust as vehicles will no longer be travelling on earth roads. Currently the residents and other road users are subject to high levels of airborne dust when a vehicle passes at speed. This can have detrimental impacts on health, particularly for children and people with respiratory

disorders. High dust levels also significantly reduce the visibility of other road users which have to stop or slow until visibility improves, increasing the likelihood of road accidents. By paving the road, the dust arising from vehicles will reduce and the road safety will increase as visibility will no longer be impaired from dust caused by other vehicles.

267. **Climate Change and Greenhouse Gas Emission Impacts**. The construction of the entire road corridor between Yarant and Tsagaanuur will impact Mongolia's CO_2 emissions as follows:

(i) Emissions during construction include fuel burnt for transportation, powering construction machines, and materials preparation. A standard ratio of 200 tons of CO_2 emissions per km of secondary road construction is used[73]. For all the works included under the program (total 633 km), construction emissions are estimated to reach 126,600 tons of CO_2

(ii) Emissions during maintenance are mainly linked to the periodic resurfacing of the road. A standard ratio for roads is that maintenance emissions are about 10% of construction emissions meaning total emissions are 12,600 tons of CO_2[74]. In the without case, the government would also maintain the current gravel roads or dirt tracks, for an average cost of about 10% of the with case. Without case maintenance emissions are estimated to reach 1,200 tons of CO_2. The net emissions during maintenance are 11,400 tons of CO_2.

(iii) Emissions during operation are linked to the fuel used by the vehicles using the road, and to the CO_2 embedded in the vehicles. The improvement of the riding quality of the road will reduce unit fuel consumption by vehicles. However, the shorter and cheaper travel will also lead to an increase in vehicle ownership and travel frequency. Vehicle emissions are projected using the project's traffic forecasts over 20 years of operation, and HDM-IV modeling of unit emissions (based on standard emission factors by vehicle types). Overall vehicle emissions are projected to increase. Vehicle emissions in the with-project case reach 1,061,000 tons of CO_2. Vehicle emissions in the without project case reach 724,000 tons of CO_2. The net balance is 337,000 tons of CO_2. CO_2 emissions embedded in vehicles are about 10% of total emissions. The net emissions during operation reach then 371,000 tons of CO_2.

268. Overall, the project will directly generate 138,000 tons of CO_2 and indirectly cause an increase in vehicle emissions of 370,000 tons of CO_2 during a 20 years evaluation period. Total net project emissions during the evaluation period reach 508,000 tons of CO_2. A detailed breakdown of emissions by road section is in **Table 30**.

[73] ADB, 2012 (unpublished working draft) Cost-Benefit Analysis of Sustainable Transport Projects - Guidance for ADB Practice. Appendix 7.

[74] Ibid.

Table 30: CO_2 Emissions WRRCIP

	Works length	Construction Emissions	Without Project Case			Without Project Case			Net Emissions			Total
			Maintenance	Vehicle Emissions	Embedded in Vehicles	Maintenance	Vehicle Emissions	Embedded in Vehicles	Maintenance	Vehicle Emissions	Embedded in Vehicles	
Ulaanbaishint- Tsaaganur	26	5,160	50	15,330	1,530	520	35,700	3,570	460	20,360	2,040	28,020
Olgiy- Ulaanbaishint	40	8,000	80	33,650	3,370	800	56,710	5,670	720	23,050	2,310	34,080
Khashaat Pass- Olgiy	60	12,000	120	104,770	10,480	1,200	154,010	15,400	1,080	49,240	4,920	67,240
Hovd- Khashaat Pass	148	29,580	300	230,230	23,020	2,960	330,030	33,000	2,660	99,800	9,980	142,030
Mankhan- Hovd	85	17,060	170	155,710	15,570	1,710	208,600	20,860	1,540	52,890	5,290	76,770
Bulgan- Manhkan	214	42,820	430	155,040	15,500	4,280	233,900	23,390	3,850	78,860	7,890	133,420
Yarant- Bulgan	60	12,000	120	29,370	2,940	1,200	42,190	4,220	1,080	12,820	1,280	27,180
Total	**633**	**126,620**	**1,270**	**724,100**	**72,410**	**12,660**	**1,061,120**	**106,110**	**11,400**	**337,020**	**33,700**	**508,740**

269. This estimate does not include the following additional emissions, because these are uncertain and cannot be fully attributed to the project:

(i) Emissions during operation after 20 years. The government will very likely continue to maintain and operate the road after the end of the evaluation period. Assuming that traffic remains constant after 2030 and that vehicles keep a similar fuel performance, additional net emissions between 2030 and 2050 would reach 556,000 tons of CO_2.

(ii) Induced emissions because of economic development. The road will have a developmental impact on Western Mongolia. To obtain an order of magnitude, it is assumed that GDP growth of the Khovd and Bayan-Ulgii *aimag*s will be 20% faster for 5 years because of the project completion and that GDP's CO_2 intensity in Mongolia will reach $1000 / ton of CO_2 by project completion (currently $600). Total induced emissions over 40 years would then reach 950,000 tons of CO_2.

C. Impacts Associated with Project Location, Planning and Design

270. Impacts associated with the project location and design focus on the following key areas:

(i) Component 1a and 1b (road construction components). Design to allow access for humans, livestock and wildlife.

(ii) Component 1a and 1b (road construction components). Design to accommodate permafrost engineering requirements.

(iii) Component 1a and 1b (road construction components). Potential wildlife migration routes and accessibility across the road alignment.

(iv) Component 1a and 1b (road construction components). Potential impacts on ecology (flora and fauna) along the road alignment.

(v) Component 2a (bridge construction components). Water quality particularly during the construction of bridges across the Khovd and Olgii river.

(vi) Component 1a (road construction component): Olon Nuuruud lake area at 48°29'42.94"N, 90°37'10.46"E. Impacts related to potential interference with the lakes and a reduction in water quality and habitat for flora and fauna; and

(vii) Component 1a (road construction component): Chainage Km79+600 to Km83+740 section between Buraatin and Khashaat pass, where there is a potentially significant embankment proposed.

271. **Mitigation Measures and Actions during Pre-construction**. The mitigation of impacts from these design issues includes the provision of alternatives for the alignment for Component 1a which allows increased protection of Olon Nuuruud lakes and a reduction in the size of embankment and alignment proposed for the pass, leading to a reduction in the fill materials

and earthworks needed. A number of designs have been considered and the environmental impacts associated with them are discussed in Section VI Alternative Analysis.

272. A number of actions will be implemented in the pre-construction phase to ensure the project's environment management readiness. These include:

(i) Appointment of one environmental monitoring specialist within the DOR in order to ensure implementation of the project EMP;
(ii) Water quality monitoring to give an environmental baseline which can also be shared with residents who, during consultations, confirmed they have never had the quality of their drinking water tested, therefore parameters such as micro-organisms (bacteria) which can have impacts on health will be included in the test;
(iii) Contracting a specialist environmental monitoring regime for water quality;
(iv) Conducting consultations along the corridor with residents to determine common access routes and herding patterns in order to ensure embankments are passable for herders and livestock;
(v) Ensuring bridge designs include water pollution control measures which ensure that surface water drainage from the road pavement does not directly drain into the water course.
(vi) Road designs for the internal roads in Khovd and Olgii (Component 2b) include adequate drainage to ensure localized pooling of surface water and flooding does not occur.
(vii) Updating the EMP mitigation measures defined in this based on final technical design; and
(viii) Tender and contract documents to include EMP requirements.

273. Before the construction starts, the Contractor will prepare a number of mitigation plans and method statements consistent with the EMP for review and approval by MRT and/or MNET as appropriate. Approval will be required one month prior to construction commencing. Contract documents shall explicitly indicate the requirement of these plans that construction cannot start until all documents are approved and also state that all environmental protection measures should be included in the bid price. These management plans are needed in order to address the following issues:

(i) **Soil Erosion Management Plan** will include measures to be taken during earthworks to avoid/mitigate erosion arising from cut and fill, stockpiling, and stabilization.
(ii) **Aggregate, Borrow Pits and Spoil Management Plan** will describe work activities; technology, potential environmental impacts, and mitigation measures for aggregate/borrow pits. It should specify that borrow pits and quarries should not be in a protected area. Contractors will ensure that (i) borrow areas will be located outside the road corridor avoiding valuable pasture/grazing land, (ii) After use borrow pit areas will be graded to ensure drainage and visual uniformity, (iii) borrow pit restoration will follow the completion of works in full compliance with all applicable standards and specifications, and (vi) topsoil from borrow pits will be saved and used during restoration.
(v) **Spill Management Plan** will document the specific requirements, protocols, responsibilities, and materials necessary to implement an emergency spill response following an incident.
(vi) **Construction Camp Management Plan** will propose preventive/mitigation

measures for environmental impacts of construction camp and work sites including fuel storage, filling station and vehicle washing sites.

(vii) **Waste Management Plan** for operation of construction camp and work sites will provide procedures for management of household type waste, hazardous waste, and sewage. It will evaluate the type and quantities of waste matter, as well as detail arrangements for storage and transportation of the waste to its disposal point. It will include agreements with the *aimag* authorities for management of waste from the construction camps.

(viii) **Cultural Heritage Management Plan** will deal with archeological sites that might be discovered during construction and will be prepared by the Contractor. It should contain emergency measures to be adopted in the event of unexpected discoveries, on-site training of construction staff in relation to cultural heritage, and communication procedures for response to cultural heritage issues. It will also include a **Site Condition Survey** for the Manchurian wall including photographic evidence of its pre-construction condition, at Component 2a (Khovd bridge, 500m from the Manchurian wall).

(ix) **Water Use and Management Plan** will detail the predicted water requirements for the construction camp and construction sites. It will include relevant permissions from *soum* authorities for water extraction and water conservation measures which will be implemented at construction sites and for domestic water use in construction camps.

(x) **Bridge Construction Method Statements** will describe the proposed methodology for bridge construction over major rivers and the proposed measures for the avoidance of surface water pollution.

(xi) **Health and Safety Management Plan (HSMP).** For management of Occupational Health and Safety, the contractor will prepare a HSMP for the construction workers based on the EMP. It will be submitted to the DOR for review. The detailed HSMP will include the following provisions:

a) *Clean water.* Provide a clean and sufficient supply of fresh water, for construction and for all houses, camps, offices, laboratories and workshops.

b) *Sewage and wastewater.* Provide an adequate number of latrines and other sanitary arrangements at the site and work areas, and ensure that they are cleaned and maintained in a hygienic state.

c) *Solid waste.* Provide garbage receptacles at construction site and camps, which will be periodically cleared.

d) *Liquid chemical waste.* Provide receptacles in suitably bunded areas for the storage of liquid chemical waste prior to disposal. Include clear warnings with health risks.

e) *Personal protection.* Provide personal protection equipment (PPE), such as safety boots, helmets, gloves, protective clothing, goggles, and ear protection, in accordance with relevant health and safety regulations, for workers.

f) *Emergency Preparedness and Response.* An emergency response plan to take actions on accidents and emergencies, including public health emergencies associated with hazardous material spills and similar events will be prepared. Emergency phone contacts with hospitals in the nearest *soum* or *aimag* will be established. A fully equipped first-aid base in each construction camp will be organized.

g) *Records Management.* A Records Management System that will store

and maintain easily retrievable records protected against loss or damage should be established. It will include documenting and reporting occupational accidents, diseases, and incidents. The records will be reviewed during compliance monitoring and audits.

h) *Safety communication.* Ensure that safety, rescue and health matters are given a high degree of publicity to all persons regularly or occasionally at active construction sites. Posters in Mongolian and any other language appropriate for the contractors drawing attention to relevant health regulations will be made or obtained from the appropriate sources and will be displayed prominently at the site.

i) *Training, awareness and competence.* Train all construction workers in basic sanitation and health care issues, general health and safety matters, and on the specific hazards of their work. Implement HIV/AIDS and other communicable diseases awareness and prevention program to target the local community and construction workers.

D. Environmental Impact and Mitigation Measures during Construction

1. Impact on Physical Resources

274. **Air Quality.** Moderate temporary air quality impacts during the construction stage of the project could be anticipated because of fugitive dust generation along road sections and construction sites for bridges and construction-related activities such as asphalt plants. Minor increases in the level of nitrogen oxides (NO_x) and sulphur oxides (SO_x) from construction plants and machinery are expected. Air quality impacts during construction are likely to result from the following sources:

(i) Emissions from construction machinery and equipment, movement of haulage trucks;
(ii) Asphalt paving will produce fumes containing small quantities of toxic and hazardous chemicals such as volatile organic compounds (VOC) and poly-aromatic hydrocarbons (PAH);
(iii) Fugitive dust from stripping of pavement during internal road rehabilitation in Khovd and Olgii (Component 2b);
(iv) Fugitive dust from earthworks such as establishment and use of borrow pits, creation of embankments and cutting and filling activities;
(v) Fugitive dust from loading, unloading and haulage of spoil for disposal and construction materials from borrow pits particularly in areas where receptors (people) are present such as in Khovd and Olgii *aimag* centres during bridge reconstruction and road rehabilitation;
(vi) Fugitive dust from concrete batching plants; and
(vii) Dust created from unprotected surfaces by wind.

275. The key receptor for air quality impacts is people, who would need to be near the construction works before an impact will occur as the impacts will be localized. Air quality issues could affect nearby residential areas in the *aimag* centres and interspersed nomadic populations along the road corridor.

276. **Mitigation Measures**. The mitigation measures to protect sensitive receptors from air quality issues are:

(i) **Asphalt plants and concrete batching plants** to be located at least 500m downwind from the nearest dwellings in order to reduce the impact of fumes on humans and to be fitted with necessary equipment such as bag house filters to reduce fugitive dust emissions.

(ii) **Stockpiles** must be managed to reduce dust emissions. The location of the stockpile must be downwind of sensitive receptors. The stockpile must be sprayed with water before material is moved. If the stockpile is within 300m of dwellings additional precautions must be taken including using a reusable stockpile cover and fencing to form a high barrier and prevent wind lifting and dispersing.

(iii) **Construction site management.** Water will be sprayed on construction sites and material handling routes where fugitive dust is generated. Where haul roads are within 300m of sensitive receptors, they will be sprayed with water before vehicle movements begin.

(iv) **Transport of materials.** Trucks carrying earth, sand or stone will be covered with tarpaulins or other suitable cover. Construction vehicles and machinery will be maintained to a high standard to minimize emissions (note that local standards do not exist for vehicle emissions)

(v) **Air quality monitoring.** Will be undertaken at the nearest dwelling for bridge construction and internal road rehabilitation in Khovd and Olgii and along road construction sites to confirm impact of project in accordance with the environmental monitoring plan which states who will undertake monitoring and when.

(vi) **Clean up.** During road rehabilitation and bridge reconstruction in *Aimag* centers (Components 2a and 2b) the contractors will immediately clean up any mud or dusty materials which are on or around public roads.

277. Road construction is along a linear route. When a road section is constructed and paved, the construction activities move on and away from nearby sensitive receptors which may have been subject to impacts. Therefore potential sensitive receptors will be exposed to short term impacts. With the above mitigation measures in place, potential air quality impacts during the construction stage are anticipated to be acceptable.

278. **Noise**. The major sources of noise pollution near to the main residential areas in the project area are removal and replacement of existing surface materials for road rehabilitation and bridge removal and replacement (Components 2a and 2b). These components will require the use of piling machinery for bridge construction, and vibratory road rollers for compacting subgrade and pavement. Also the general movement of construction vehicles, the haulage of construction materials to the construction sites and the use of generators will create noise.

279. Construction activities are expected to produce noise levels up to 90 dB(A) within 5m of the machinery as shown in **Table 31** which indicates noise levels for construction machinery. For the project, no receptors other than construction workers will be this close to the machinery, and construction workers will use appropriate PPE. Component 2b (Khovd and Oglii internal roads) have receptors (residential areas and businesses) along the roads which may be rehabilitated, approximately between 10-50m from the road edge. Therefore these are the key locations for noise and may be expected to be subject to noise outside in the region of 80 db(A).

Table 31: Construction Machinery Noise

Machine Type	Distance to Machinery									
	5 m	10 m	20 m	40 m	60 m	80 m	100 m	150 m	200 m	300 m
Loader	90	84	78	72	68.5	66	64	60.5	58	54.5
Vibratory Road Roller	86	80	74	68	64.5	62	60	56.5	54	50.5
Bulldozer	86	80	74	68	64.5	62	60	56.5	54	50.5
Land Scraper	90	84	78	72	68.5	66	64	60.5	58	54.5
Excavator	84	78	72	66	62.5	60	58	54.5	52	48.8
Roller	87	81	75	69	65.5	63	61	57.5	55	51.5
Mixing Equipment	87	81	75	69	65.5	63	61	57.5	55	51.5

Source: Government of Mongolia. 2011. Initial Environmental Examination (IEE) of the proposed Regional Logistics Development Project.

280. The major works will be carried out during the daytime. The noise produced during construction will have an impact on the existing ambient noise levels given the remote nature of the project location. However the elevated noise levels will be temporary and localized.

281. **Construction noise mitigation**. The potential noise impacts will be mitigated through a number of activities defined in the EMP, which will be incorporated in the bid documents and construction contracts:

(i) Source control: Maintain all exhaust systems in good working order; undertake regular equipment maintenance;
(ii) Locate sites for concrete-mixing and similar activities at least 500m away from sensitive areas;
(iii) Consider the use of mobile noise barriers if nomadic ger dwellers establish their summer residence near to construction sites;
(iv) Operate between 8am-6pm only and reach an agreement with nearby residents regarding the timing of heavy machinery work, to avoid any unnecessary disturbances;
(v) Provide advance warning to the community on timing of noisy activities. Seek suggestions from community members to reduce noise annoyance. Public notification of construction operations will incorporate noise considerations; information procedure of handling complaints through the Grievance Redress Mechanism will be disseminated.
(vi) Ensure noise monitoring is undertaken near sensitive receptors, particularly dwellings.

282. Potential sensitive receptors will be exposed to short term impacts. With the above mitigation measures in place, potential noise quality impacts during the construction stage are anticipated to be acceptable.

283. **Water Quality**. The project may impact on surface water quality through accidental contamination and increased sedimentation of water courses during i) road construction (Component 1a and 1b), particularly in the sections where the roads run adjacent to rivers, or culverts are needed to cross permanent or ephemeral water courses and ii) bridge construction (Component 2a).

284. Construction projects have potential to contaminate groundwater if accidental spills

occur in areas of high water table and there are wells or ground water drinking sources in the area. As no groundwater depth information in the project area was available during EIA preparation, measures to protect ground water will be included, primarily in relation to spills from hazardous materials.

285. **Mitigation of impacts on surface and groundwater**. The impacts on surface and groundwater will be mitigated through a number of activities defined in the EMP, and which will be incorporated in the bid documents and construction contracts:

(i) Sensitive water receptors which may be accidentally damaged during construction (particularly lake/marshes and springs) will be identified in advance of construction and demarcated to ensure machinery does not encroach on them.
(ii) To limit the spill of materials into water bodies during bridge construction, no materials will be stored within 50 m of a water course, including soil, spoil, aggregates, chemicals or other materials used during construction.
(iii) Temporary drainage provision will be provided during construction to ensure that any storm water running off construction areas will be controlled. This will ensure that potentially contaminated water does not impact on sensitive receptors. Contaminated water will be removed off-site for disposal in the facilities identified in the Construction Camp Management Plan
(iv) Enclosed drainage around chemical storage areas on construction sites and storage will be on hard standing.
(v) Develop and implement contingency plans for control of spills of oil and other hazardous substances (Spill Management Plan);
(vi) Fuel storage, maintenance shop and vehicle cleaning areas must be stationed at least 300m away from the nearest water body and will include enclosed drainage to ensure contaminated water does not cause pollution and storage, maintenance and cleaning activities will be on hard standing;
(vii) Construction wastes and materials (e.g. fuel) will be properly contained during construction on hard standing and fuel tanks will be located in a bunded area which has a capacity of 110% of the fuel tank. Wastes will be stored in a hard standing area which is protected from rain and wind and waste removed from site and taken to approved disposal facilities;
(viii) Water collection basins and sediment traps will be installed in all areas where construction equipment is washed. Contaminated water will be removed off-site for disposal in the facilities identified in the Construction Camp Management Plan; and
(ix) Effective septic treatment and disposal systems will be installed at construction camps or arrangements for adequate off-site disposal made.

286. Potential sensitive human receptors will be exposed to short term impacts arising from a potential increase in turbidity of surface water during construction. With appropriate mitigation and consultation with affected residents to ensure that drinking water supplies are maintained, the impacts on water quality are anticipated to be acceptable.

287. **Solid waste management.** Minimizing waste conserves valuable natural resources. Disposal of construction wastes could have adverse impacts on the soil, water and health of contractors and the community. Waste streams will include inert construction wastes (e.g. soil, spoil, debris, concrete) and municipal type wastes (construction workers' food and packaging wastes from construction consumables) and hazardous wastes from construction (e.g. fuel

containers, oil filters, oily rags).

288. **Mitigation of impacts from solid and liquid waste.** The potential impacts arising from solid and liquid waste production and disposal will be mitigated through a number of activities defined in the EMP, and which will be incorporated in the bid documents and construction contracts.

(i) **Waste Hierarchy.** Construction will be subject to the waste hierarchy to ensure efficient use and management of resources. The preference is for prevention of waste at source. This means the effective management of materials on site through good house-keeping and work planning, in order to generate less waste. Procurement options will play a role in waste prevention as the procurement of materials which have less packaging for example, would be preferable. Waste minimization is the second preferred option. Reuse or recycling options should be considered prior to disposal. The recyclables market in the Western Region does not appear to be well developed however this can be explored when the Contractor's Site Waste Management Plan is developed as the waste streams generated will be identified at that stage. Disposal of waste which cannot be reused or recycled shall take place at sites authorized by the *aimag* authorities.

(ii) **Storage and containment**: Provide appropriate waste storage containers for worker's construction and hazardous liquid wastes; Install confined storage points of solid and liquid wastes away from sensitive receptors, regularly haul to an approved disposal facility;

(iii) **Use of contractors**: Use a contractor approved by the *aimag* authorities to remove all wastes from construction camps; Hold contractors responsible for proper removal and disposal of any significant residual materials, wastes and contaminated soils prior to construction camp site handover;

(iv) **Spoil management**. Spoil will be disposed only in sites which are approved by MRT in accordance with the Aggregate, Borrow Pit and Spoil Management Plan; spoil will not be disposed of on slopes or near pasture land where it may impact on vegetation; Rehabilitate and restore spoil disposal sites in accordance with the agreed plan.

(v) **Management**: Prohibit burning of waste at all times.

289. Waste will inevitably be generated by the project and in a region without sound waste disposal facilities. However, with good procurement practice combined with good housekeeping on construction sites and camps, impacts from waste management are not anticipated to be significant for the project.

290. **Impacts on Soil Resources.** Three types of potential impacts on soil are anticipated, including: (i) soil erosion; (ii) soil contamination; and (iii) inappropriate management of borrow pits.

(i) **Soil erosion.** May be caused by cut and fill operations, for culverts and borrow pits, stockpiles and spoils from earthworks during rehabilitation of roads, road grading and construction camp construction. The factors that are expected to contribute to accelerated erosion in the project area are winds and peak water flows from late June to September. The project area is subject to dust storms therefore mitigation to reduce soil erosion will contribute to lessening dust mobilization and dispersal during high winds.

(ii) **Soil contamination.** Contamination of soil in the construction phase may result

from the inappropriate transfer, storage, and disposal of petroleum products, lubricants, chemicals, hazardous materials, liquids and solid waste. These impacts are particularly associated with construction camps where the majority of potentially contaminating chemicals are stored, and during refueling of plant and equipment.

(iii) **Borrow pits and spoil disposal.** Borrow pits and quarries will be needed to provide fill particularly for road earthworks associated with Component 1a (Khovd to Tolbo *soum*) and 1b (Ulaanbaishint to Tsagaannuur).

291. **Mitigation of impacts on soil.** The impacts on soil will be mitigated through a number of measures which are defined in the EMP, and which will be incorporated in the bid documents and construction contracts. A summary of the mitigation activities recommended in the EMP is as follows:

(i) **Soil erosion:** (a) Soil erosion management plan to be prepared by the contractor and to be approved by MRT before construction starts; (b) Minimizing the area of soil clearance; (c) Maintaining slope stability at cut faces by implementing erosion protection measures; (d) Construction in erosion and flood-prone areas should be mainly restricted to the dry season where possible. The peak surface water flow (combined melt water and rain water) lasts for up to 150 days from late June therefore the EMP recognizes that working when the rivers are in low flow is difficult given the short construction season; (e) Control silt runoff particularly around the Khovd and Olgii bridges Component 2a); (f) Cover soil stockpiles; (g) Use a geotextile membrane where needed; (h) Properly stabilize slopes and re-vegetate disturbed surfaces; and (i) Protect slopes on both sides of any culverts to prevent soil loss; (j) use of temporary berms or other appropriate temporary drainage provisions at construction sites to prevent water eroding cut faces, stockpiles and other exposed areas of soil.

(ii) **Soil contamination**: (a) Store chemicals/hazardous products and waste on impermeable surfaces in secure, covered areas with clear labeling of containers and with a tray or bund to contain leaks; (b) Regularly remove all construction wastes from the site to approved waste disposal sites; (c) Establish emergency preparedness and response plan (Spill Management Plan); (d) Provide spill cleanup measures and equipment at each construction site; (e) Conduct training in emergency spill response procedures (f) ensure fuel is stored in a bunded tank and vehicle refueling takes place on hard standing away from sensitive receptors, such as surface water.

(iii) **Borrow pits**: (a) Site borrow pits far from residential areas and cultural heritage sites; (b) Develop borrow pits and restoration plans, to be approved by MRT and MNET prior to the start of construction; (c) Pit restoration will follow the completion of works in full compliance with the Aggregate, Borrow Pit and Spoil Management Plan and will be required before final acceptance and payment under the terms of contracts.

292. It is anticipated that the mitigation activities in the EMP and discussed above will mean that the impacts of the project on soils in the Tranche 2 area will be mitigated to an acceptable level.

293. **Permafrost Degradation**. Tranche 2 components are in areas in which permafrost is present. The key impact on the permafrost will arise from the cutting and filling activities associated with road construction (Component 1a and 1b). Preventative measures will be

adopted to avoid permafrost degradation where possible; importantly the avoidance of permafrost will mean less risk to sustainability of the road as construction on permafrost is known to be difficult.

(i) **Avoidance of permafrost**. Where possible, construction will avoid areas with poor cryogenic conditions such as slopes prone to solifluction and areas of thermokarst in order to reduce potential adverse impacts on the permafrost and hydrological regime. However it is recognised that this will not always be possible.

(ii) **Use of geotextile membranes**. Where appropriate geotextile membranes may be used in the sub-grade and embankments to minimise permafrost effects.

2. Impact on Biological Resources

294. **Context.** The potential impact of construction activities on biological resources is largely mitigated by the fact that the construction works for Tranche 2 will be undertaken primarily within the existing road corridor which consists of a highly modified and degraded habitat. Natural habitat near the road corridor has also been highly modified by grazing livestock.

295. **Flora.** The project is not anticipated to have any adverse impacts on flora given the fact that the project is within an existing multi-track road corridor comprising a highly disturbed habitat of low ecological value. However, for completeness an ecological survey will be undertaken in the pre-construction phase to provide specific information on the habitat that will be affected in the short section where the new road alignment deviates from the existing alignment near Olon Nuuruud Lakes. Should any additional mitigation measures be required in this short section in respect of biodiversity protection during construction, they will be identified and integrated into the Final EIA and EMP. Thus, the project will ensure all appropriate mitigation measures identified for protection of flora are implemented during construction. The Terms of Reference for the ecological survey are presented in Appendix 1.

296. **Fauna**. The existing road corridor currently bisects wildlife migration routes for some species that have been identified by Mongolian and international wildlife experts, namely Argali Sheep, Siberian Ibex, Goitered Gazelle, and Saiga Antelope, in decreasing order of most affected (See Section K and **Figure 33**). These animals mostly live high in the mountains and descend when the snow gets too deep, and then return when the snow starts to melt. Given this behavior, the main migrating time across the road is likely to be when the road is closed with only a small amount of overlap between migration and open road season. Construction activities will be largely confined to the open road season. Thus, it is not anticipated that construction of the roads will significantly impact on wildlife migration routes over and above the current situation.

297. The existing road corridor passes within 2 km of Tolbo Lake IBA. Consultations with WWF have indicated that Tolbo Lake is used as a bird breeding habitat between April to June by the 'Vulnerable' Pallas's Fish-eagle and 'Endangered' Saker Falcon[75] and congregatory water bird species such as the Great Cormorant are also supported by the lake and may be disturbed by noise. WWF also suggested that illegal hunting may be an issue when large numbers of overseas contractors are engaged who do not know local hunting regulations and laws.

298. To ensure that road construction activities will have no significant impact on the Tolbo

[75] Endangered and Vulnerable are IUCN Red List classifications for threatened species.

Lake IBA and other fauna the following mitigation measures are proposed for inclusion in the EMP:

(i) **Construction embargo.** No construction April to June within 5 km of Tolbo Lake IBA, Component 1a.
(ii) **Wildlife Reporting.** Establish a contractor reporting system for observations of key faunal species including argali sheep, if observed during construction WWF to be informed.
(iii) **Contractor Awareness to Prevent Poaching.** Raise awareness of contractors on wildlife, hunting laws and penalties associated with poaching both in terms of domestic law and penalties imposed by the employer (contracting company).
(iv) **Consultation.** Discussions with residents along the road corridor regarding hunting and poaching to ensure no additional hunting is occurring.

299. There is a lake located within 70 m of the existing road alignment at 49°30'25.85"N, 89°31'51.70"E (approximately 12.4 km from Ulaanbaishint) of which the ecological value/significance is not definitively established other than the fact that it is currently disturbed habitat by virtue of its proximity to the existing road. The implementation of standard construction mitigation measures related to erosion and sediment runoff, spoil management and waste management control, would ensure temporary construction impacts on the lake are reduced to acceptable levels. However, as a precautionary measure in the interest of good environmental practice, an ecological survey of the lake area within the project corridor focusing on bird life will be undertaken to establish the ecological status of the area and inform on whether any additional site specific mitigation measures should be implemented during construction. The results of the survey will be integrated into an updated EIA and EMP. The Terms of Reference for the ecological survey are provided in Appendix 1.

300. **Specially Protected Areas**. Component 1b (Ulaanbaishint to Tsagaannuur) passes within 4 km of Sylkhemyn Nuruu National Park. Construction activities within the existing road corridor are not expected to give rise to any significant impact on the National Park over and above the current road situation. However, wildlife signage to warn drivers of potential wildlife crossing the road in the area close to Sylkhemyn Nuruu National Park will be installed.

301. In the interests of good practice and taking account of the proximity of Tolbo Lake IBA and Sylkhemyn Nuruu National Park it is proposed to i) conduct an ecological survey of the current status of the Tolbo Lake IBA with a view to identifying opportunities for the project to enhance the IBA's protection and ii) conduct a survey of the current status of the biodiversity in the area between the road alignment and the nearest boundary (4km separation) of Sylkemyn Nuuru National Park with a view to identifying opportunities for the project to enhance the protection of the Park's biodiversity. The Terms of Reference for the ecological survey are provided in Appendix 1.

3. Impact on Socio-economic Resources

302. **Cultural Resources**. Component 1a and 1b road sections will pass through areas in which deer stones and ovoo are present. Also Component 2a includes a new bridge located 500m from a Manchu wall. In order to reduce the likelihood of negative impacts on these cultural heritage sites, the following mitigation measures are proposed:

(i) **Cultural Heritage Site Identification and Consultation.** In consultation with local residents, local sites of cultural significance will be identified along the road

corridor and will be delineated with high visibility fencing throughout construction phase. If any modern yet spiritually significant artifacts, such as ovoo, require relocation, this will be done in accordance with the *Soum* Governor and in consultation with residents. It is not anticipated that deer stones will be relocated.

(ii) **Contractor Training.** Contractors will be given awareness training on the Cultural Heritage Management Plan so that they are aware of what to do if a site is discovered during construction and what culturally significant sites look like in Mongolia, as the construction workers may be from outside Mongolia. Construction workers will be made aware of the penalties for interfering with artefacts of cultural heritage under Mongolian law and that this may lead to dismissal.

303. **Pasture Land**. As an economic resource, pasture land is valuable in the project area. Components 1a and 1b pass through pasture land used by herders. The following mitigation measures to protect pasture land are proposed:

(i) **Spoil Disposal**. Spoil is to be disposed of only in areas delineated in the Aggregate, Borrow Pit and Spoil Management plan which should avoid productive pasture land.

(ii) **Borrow Pit Location**. Borrow pits are to be located only in areas delineated in the Aggregate, Borrow Pit and Spoil Management plan which should avoid productive pasture land.

(iii) **Pasture Identification.** Consultation with herders will be undertaken in advance of starting a new area of construction to identify any locally valuable grazing areas which may be affected by construction activities.

304. **HIV/AIDS and Social Issues**. The construction labour associated with the project in such a sparsely populated area will mean the likely influx of outside labour to the region as has happened with Chinese contractors in Tranche 1 of WRRCIP. In order to ensure that the social impacts of this temporary influx are managed, the following specialist support roles are proposed:

(i) **Social, HIV/AIDS and Human Trafficking Prevention Monitoring Specialist.** A specialist will be engaged for 24 months (6 person months per year for a 4 year period) to (i) assess HIV and human trafficking risks (ii) refine activities such as local employment, public consultation, road safety awareness, social and cultural awareness of local needs and requirements (iii) Coordinate the functions of the three *soum* level community outreach and monitoring officers. The specialist will be responsible for monitoring both Tranches 1 and 2.

(ii) ***Soum* Level Community Outreach and Monitoring Officers**. The officers will be posted in *soum* centres near the project corridor to provide a direct point of contact for local people potentially affected by the program. They will serve as key contacts for the grievance redress mechanism and Social Development Action Plan implementation.

(iii) **Social Development Action Plan**. This plan has been prepared and agreed with DOR as part of the program intervention in accordance with ADB's Operations Manual (OM Section C3). It incorporates poverty reduction strategies and measures, will be treated as an integral part of the Project and will be implemented by the PIU.

305. **Community Health and Safety.** Potential impacts may arise from road safety issues and health and safety of the public around construction activities. These can be mitigated as follows:

(i) **Road Safety Awareness**. As part of the Social Development Action Plan, road safety awareness will be conducted along the road corridor with residents and road users. This will include the development of awareness raising materials and putting road safety signage at key points along the Tranche 2 road construction corridor.

(ii) **Winter Road Safety**. Drifting snow at Khashaat Pass and Buraatin Pass will be mitigated through the erection of snow fencing, which can be earth mounds, to protect the road from snow drifts.

(iii) **Construction Safety**. Clear signs will be placed at construction sites in view of the public, warning people of potential dangers such as moving vehicles, hazardous materials and excavation and raising awareness on safety issues. Heavy machinery will not be used after day light and all such equipment will be returned to its overnight storage area/position before night. All sites will be made secure, discouraging access by members of the public through fencing or security personnel, whenever appropriate.

306. Following the implementation of these mitigation measures, it is anticipated that adverse impacts on community health and safety will not be significant, the construction of a reliable and sound paved road surface is likely to improve the safety of road users.

307. **Occupational Health and Safety.** The civil works contractors will implement adequate precautions to protect the health and safety of construction workers. The occupational health and safety risks will be managed by applying measures in the following order of preference: avoiding, controlling, minimizing hazards, and providing adequate protective equipment. The contractors will undertake the following activities:

(i) **Environment Health and Safety Officer.** An Environment Health and Safety Officer (EHSO) will be nominated to develop, implement and supervise a Health and Safety Management Plan (HSMP), as well as ensure that the requirements of the EMP are implemented.

(ii) **Implementation of HSMP**. The EHSO will ensure that the HSMP, submitted to DOR prior to construction, is approved and implemented. This includes recording and reporting any occupational health and safety incidents, and reviewing the distribution and use of appropriate PPE.

308. **Utilities Provision**. It is not anticipated that the project will disrupt utilities or any municipal services during construction.

E. Environmental Impact and Mitigation Measures during Operation

1. Impact on Physical Resources

309. The negative impacts during operation will be limited as the road is already operational and the key changes will be positive impacts as the improved road surface will reduce vehicle noise, reduce dust (air quality) and improve road safety. However, if successful in stimulating economic development, the development of the western region corridor will lead to an increase in emissions, in particular with respect to increased vehicle ownership and use as well as the

inherent carbon emissions generated during construction and maintenance. This impact is considered to be acceptable for the project.

310. **Water Quality**. The Project includes the reconstruction of three bridges, (two in Khovd and one in Olgii - Component 2a). During operation there is potential for run-off from the bridge surface to the water courses. Also the road crosses a number of water courses for which box culverts will be used and crosses existing bridges which are not planned to be replaced. The run-off may contain a build-up of hydrocarbons and debris from vehicles, particularly during the first rain after a period without rain. Also there is potential for significant spillage into the water should an accident occur on the bridge. Therefore the mitigation measure is as follows:

- **Run-off pollution control measures.** The bridges will have drainage controls which will direct run off to land instead of to the water course.

311. **Waste Management.** In Mongolia there is not a strong culture of retaining waste for disposal at the end of a journey, instead it is disposed of during the journey at the roadside. In order to mitigate, as far as possible, the impacts of roadside litter, the following measures are specified in the EMP:

(i) **Litter Bins.** For Component 1a and 1b the rest stops along the new sections of road will have litter bins which will be emptied by the DOR road maintenance crews during road operation.
(ii) **Signage.** Signs will be installed near litter bins to encourage road users to use the bins.

2. Impact on Biological Resources

312. **Context** The potential impact of operation of the road on biological resources is mitigated by the fact that the road will operate largely within the existing road corridor. Therefore impacts on biological resources because of operation of the road are not expected to be significantly different from the existing situation. Nevertheless, potential impacts are identified below including appropriate mitigation measures to ensure such impacts are minimised and acceptable.

313. **Flora.** There are no anticipated adverse impacts on flora associated with the operation of the roads or bridge components in Tranche 2. The new road will be within a 70 m wide corridor, which is generally narrower than the existing width of the area covered by the multi-track earth roads. It is anticipated that the earth roads will no longer be used when the road is complete and vegetation will naturally begin to encroach on the tracks, in locations where vegetation is present.

314. **Fauna.** The key potential impact on fauna during the operation of the road is the risk of wildlife being to be hit by road traffic. As noted Section D.2, wildlife migration routes of key species that could cross the road have been identified by wildlife experts. Available information suggests that these animals mostly live high in the mountains and descend when the snow gets too deep, and then return when the snow starts to melt. Given this behaviour, the main migrating time across the road is likely to be when the road is closed with only a small amount of overlap between migration and open road season. However, traffic volume and speed are expected to be higher with the new road relative to the existing road and road embankments will be present where they have not been previously. To reduce the risk of wildlife being hit by traffic, the following mitigation measures will be implemented and specified in the EMP.

- **Implementation & Maintenance of Wildlife Warning Signage.** Wildlife warning reflectors and wildlife crossing signs to warn drivers will be installed at known wildlife crossing points such as those identified in **Figure 33.** Traffic speed restrictions will also be imposed at these locations. Such road furniture will need to be maintained throughout operation of the road. This may include replacing reflectors which are damaged or replacing signs as required and moving reflectors or signage according to changing animal behavioural patterns. Additional and / or changed wildlife crossing areas may be identified as a result of the proposed wildlife movement monitoring surveys to be undertaken during the construction stage and immediately after construction. In this regard DOR will be advised of such areas so that the warning reflectors and crossing signs are appropriately located.
- **Provision of at grade crossing points.** At grade or reduced embankment grade crossing points are recommended to be installed at known wildlife crossing points (as above) in conjunction with warning signage to ensure migrating wildlife have similar visual conditions for road crossing as under the pre-project situation. As above, additional or changed wildlife crossing areas identified during the wildlife movement monitoring surveys will be advised to DOR in order that road embankments can be reduced where required. Any adjustments will need to be made during the post-construction defects and liability stage so as to be implementable under the construction contracts. Terms of reference for the proposed wildlife movement monitoring survey are provided in Appendix 1.

315. **Critical Habitats and Specially Protected Areas**. As with the existing road alignment the Tranche 2 project road does not encroach upon any critical habitat or legally protected area but will pass within 2 km of Tolbo Lake IBA, within 4 km of Sylkhemyn Nuruu National Park and within 11km of Tsambagarav. National Park (see **Figure 34 and Figure 35**).

316. It is not anticipated that Tolbo Lake IBA or the habitat in either of the national parks will be impacted by the project during operation. However, implementation and maintenance of wildlife signage as described above will be provided along the road near the national parks to ensure motorists are made aware that wildlife crossing can be expected in these areas.

3. Impact on Socio-economic Resources

317. No significant negative impact is anticipated on cultural resources, accessibility, community health and safety and pasture land if the mitigation measures specified in the EMP during the pre-construction and construction phases are implemented. This includes ensuring road crossings for herder access are installed during construction and road safety signage is in place. The mitigation measure that is required, as specified in the EMP is:

Road Safety Signage Maintenance and Upgrade. During road operation, DOR is responsible for maintaining the road safety signs and installing new ones as necessary, for example if an unforeseen accident hotspot develops.

F. Cumulative and Indirect Impacts

318. Indirect, induced and cumulative impacts will be mainly positive. The full scale of positive indirect impacts will be achieved once all tranches of the MFF program are implemented. These positive impacts are discussed in Section VI B of this EIA, including:

(i) Improved access to social services and connectivity;
(ii) Contribution to poverty reduction through economic development; and
(iii) Improved health and health and safety.

319. **Potential negative induced and cumulative impacts - Construction.** Given the remote nature of the project area and that no other major projects are foreseen or planned in the area, cumulative impacts during construction are not anticipated to be significant**.** Should this situation change during the life of the construction project, a robust GRM which has been disseminated to residents will assist in mitigating potential cumulative impacts.

320. **Potential negative induced and cumulative impacts - Operation.** When the road is operational, the Asian Highway Route 4 will be considered a success if it encourages economic development and trade in the region. However, this may also have a number of potentially negative impacts:

(i) **Tourism**. Tourists can bring income to a region such as the remote Western Region however if tourism grows without appropriate control and regulation and before the infrastructure is prepared, then issues such as waste disposal and sewage can become problematic. However it is anticipated that tourism will grow slowly in the region as current tourism activities and accommodation is very limited.
(ii) **Resource Exploitation**. There are natural resources in the area which are currently being exploited, such as tungsten mines near Bayan-Olgii. It is possible that with improved road access to the area, further mining may be encouraged. This may have environmental consequences which would need careful management and monitoring by the Government of Mongolia.
(iii) **Induced Traffic and Vehicle Emissions**. Section VI B (Climate Change and Greenhouse Gas Emission Impacts) shows that the project is likely to induce additional vehicle ownership and related emissions. This is inevitable with a road designed to improve the economic situation of the region, and therefore its use is a measure of its success. Given the remote nature of the road, and lack of industrial development in the region, the additional vehicle emissions induced by the project are not considered to be locally significant, however, they will contribute to global emissions. The OECD International Transport Forum 2009 notes that much of the low-cost global GHG abatement potential for the transport sector arises in the developing world and in particular from improvements to traditional internal combustion engine (ICE) efficiency. Bearing this in mind it is recommended that the GOM promote such a strategy as part of its commitment under the UNFCCC.

G. Unanticipated Impacts during Construction and Operation

321. If any unanticipated impacts become apparent during project implementation, the borrower will (i) inform and seek ADB's advice; (ii) assess the significance of such unanticipated impacts; (iii) evaluate the options available to address them; and (iv) prepare or update the EIA and EMP.

VIII. INFORMATION DISCLOSURE AND PUBLIC CONSULTATIONS

A. Public Consultations during Project Preparation

322. Consultations have been undertaken during all phases of EIA preparation along the WWRDP corridor. This includes consultation for the EIA for Phase I (432.1km Yarant to Khovd) which was disclosed in August 2007[76] and the EIA for Phase II (147.9km Khovd to Buraatin Davaa) which was disclosed in August 2010[77]. Further consultation was undertaken with residents and specialists during the preparation of this updated EIA in 2013.

1. Stakeholder Workshops

323. Two rounds of public consultations were held for the entire road corridor of the Western Regional Roads Project during the preparation of the EIA in 2007[78]. These consultations were conducted for the full 748.4 km length Western Regional Road corridor. These were held mainly in Khovd and Oligii and included members of the public from the project affected area of the present project (proposed through Tranche 2) from Khovd to Buraatin Davaa. The details of these early rounds of public consultations as documented in the 2007 EIA, are given below.

324. The first round of consultations was organized in Khovd and Bayan-Olgii *aimags* on 24 and 27 March 2007, respectively. Approximately 40 participants were present at the workshop including representatives from the local administration, environmental authorities, representatives of specially protected areas, NGOs, international organizations, environmental inspectors, and other concerned individuals. The participants provided a number of useful recommendations and additional published and unpublished sources on biophysical and socio-economic resources.

325. The second round of consultations was organized in Khovd and Bayan-Olgii *aimags* from 26 to 30 May 2007 (Bulgan – May 26, Most – May 28, Mankham – May 28, Khovd – May 29, Olgii – May 31, and Tsagaannuur – May 30) after draft versions of EIA[79] reports were prepared and a summary EIA report was distributed to the stakeholders in Khovd and Olgii. Approximately 280 participants were present at the workshop including representatives from the local administration, environmental authorities, representatives of protected areas, NGOs, international organizations, and other concerned individuals. The participants provided their comments on the EIA document.

326. **Khovd Workshop Round 1**. Approximately 25 participants attended the Khovd workshop, representing local government officials, Government environmental, infrastructure and inspection organizations, NGO's, Khovd University and the general public. Discussions took place on a range of issues associated with the type of EIA, and the alternative alignment for Khovd town.

327. **Written Responses from Khovd Workshop**. There were 13 written responses from the participants. Of these, seven were comments on environmental and socio-economic benefits of

[76] MON: Western Regional Road Corridor Development Project – Phase I Summary Environmental Impact Assessment (August, 2007) http://www.adb.org/projects/documents/western-regional-road-corridor-development-project-phase-i-2

[77] MON: Western Regional Roads Development Project Phase II Environmental Impact Assessment (August, 2010) http://www.adb.org/projects/documents/western-regional-roads-development-project-phase-ii

[78] Government of Mongolia. 2007. *EIA*. Ulaanbaatar.

[79] Ibid.

the road in this remote region and on improvement of trade and cooperation with neighboring countries. The development of the *aimag* is highly dependent on infrastructure development. Two proposals were recommendations to assess a population of Mongolian Saiga that are not in the Tranche 2 and 3 project area.

328. Concern was expressed on the general lack of road project information and information on whether the proposed road would run through Khovd town. The opinion was that if the road will pass through the town, resettlement will pose a serious issue. A few people mentioned some negative environmental and social impacts related to poaching and increasing number of crimes, and recommended protection and prevention measures to be taken.

329. **Olgii Workshop Round 1**. Approximately 16 participants attended the workshop, representing government officials, government environmental and inspection organizations, and NGOs. Discussions took place on a range of issues associated with the proposed road alignment, alternatives and their lengths, construction priority of the road sections, EIA, current condition of quarries and their rehabilitation, special protected areas along the road, and migratory routes of ibex and wild sheep.

330. **Written Responses from Olgii Workshop.** 13 written responses were received from participants. Of these, eight were comments on environmental issues, namely concern over land quality degradation, and socio-economic issues, regarding reduction of unemployment, reduction in money and time associated with road use, development of tourism and other infrastructure benefits of the road in the *aimag*.

331. Since the road crosses potential migratory routes of animals inhabiting national parks, the major issue raised was the location of the road near Tsambagarav National Park (Component 1a) 11 km from the road alignment, and between Siilkhem National Park areas (A) and (B) (Component 1b). Four provided recommendations on mitigation measures such as constructing embankments on the same level as the land surface or designing underpasses, providing information and warning signs at the entrance and exit of the buffer zone of the national parks, and avoiding rest areas in buffer zone of national parks.

332. **Consultation with Government Officers and Experts**. The participants expressed their concern about current usage of construction materials by road construction companies, desertification and land degradation. Several participants proposed that trees and bushes be planted along the road. Also a participant suggested that the civil works contractors use construction practices in proximity to environmentally sensitive areas which are flexible enough to not to have adverse impacts on fauna. For instance, the construction of the road near Tolbo Lake should not be planned from April to June, because this is a period of bird breeding near the lake.

333. **Consultation with Environmental Specialists**. A separate series of consultations was organized for MNET, the local administration of specially protected areas, experts of local and Ulaanbaatar office of Altai Sayan Eco-region project, local environmental authorities, specialists of WWF and WCS in Mongolia, and local scientists. Sensitivity of ecological resources, possible migration routes of wildlife and correspondent prevention/mitigation measures were discussed. Maps of the existing and planned protected areas were provided to the environmental team of the Project.

334. Local governors and environmental inspectors were consulted at every *soum* along the road. Baseline information on flora, fauna and archeological findings as well as other comments

on potential environmental impacts of the road during design, construction and operational phases were recorded

335. Additionally, 38 local people were interviewed along the road. First-hand information about wildlife, its habitats and migration routes, archeological and cultural heritage and other environmental resources was obtained. All the local residents consulted at this time supported the construction of the road.

336. **Khovd Workshop Consultations Round 2**. Approximately 18 participants attended the second round of workshops in Khovd, representing local government officials, government environmental, infrastructure and inspection organizations, NGO's such as WWF and Altai-Sayan Eco-region project, and Khovd University. The topics raised during workshop discussions were related to socio-economic benefits of the road, access roads, environmental impacts and mitigation, archeological and historical sites.

337. Eleven written responses were received from the participants, echoing those provided in the first round of consultations. Five comments related to the socio-economic benefits of the road and on improvement of trade and cooperation with neighboring countries, noting that the development of the *aimag* is highly dependent on infrastructure development. Four recommendations were given regarding conduct of a more detailed survey to minimize impacts on endangered species in the project area. There were also suggestions regarding employment of local workers, meeting the highway standards, payment of royalties for construction materials, and requirements of domestic EIAs that have to be done before commencement of civil works.

338. Discussions were also focused on archeological sites and an archeology lecturer of Khovd University indicated that the amount of archeological data in Khovd *aimag* is not sufficient; registration of cultural and historical sites in Khovd *aimag* only started in 2005. Further discussions took place regarding fauna outside the Tranche 2 project area. Residents from Tsangaannuur (Component 1b) expressed concern that their drinking water sources may be affected during construction; that the hydrological conditions may be modified as a result of construction activities and amount and quality of water will decrease.

339. **Olgii Workshop Consultations Round 2.** Approximately 16 participants attended the workshop, representing government officials, government environmental and inspection organizations, and NGOs. Discussions took place on a range of issues associated with the draft EIA report, including the responsibility of monitoring and supervision of organizations, current condition of quarries and their rehabilitation, and waste management.

340. Eight written responses were received from the participants, of which four related to socio-economic issues, namely reduction of unemployment, money and time savings from an improved road, development of tourism and other infrastructure benefits of the road in the *aimag*. They indicated the need to increase the number of rangers in national parks, to involve the local protected area specialists in detailed EIA study, and to provide more precise and professional equipment such as binoculars with night vision, professional digital photo and video camera, for monitoring the animal migratory routes. Some recommendations were provided regarding the lakes area between Khashaat Pass and Buraatin Pass (Component 1a), which were discussed in Section V Alternative Analysis and to facilitate drainage along the road within Olgii town.

341. **Consultation with Border Officials**. During the meetings with Mongolian/Russian

Federation border staff, the custom officers were asked to share their opinion about illegal poaching and trade, capacity to detect endangered species such as saiga horn and whether they need training to increase their capacity and skills. The customs officials said that cases of poaching and illegal trade have not been registered over the last several years.

B. Public Consultations during 2010 EIA Preparation

342. During the preparation of the 2010 EIA the consultants conducted public consultations and discussions with government authorities and members of the public. Public meetings were conducted in Khovd and Olgii *aimags* while officials from both *aimags*, *soums* and *baghs* in Olgii were also consulted.

343. On 2 June 2010, the Governor of Khovd *aimag* was shown the design alignment and his views were taken into consideration. He was also consulted on the three alternatives to the proposed design alignment in the area. The representatives of relevant Departments in Khovd *aimag* were consulted (03 June 2010) with regard to planning and implementation of road projects.

344. The Governor of Khovd was of the view that the proposed design alignment did not have major impacts and would benefit Khovd *aimag*. However, during the field visit three other alternative alignments were inspected to assess whether there were other suitable alignments. The general view after the field visit was that of all the considered alignments the proposed design alignment was preferred.

345. During the discussion with Khovd *aimag* government department representatives, the representatives were of the view that apart from contributing to social and economic development, other development would follow the road development and therefore beneficial impacts would be significant. They also expected the road corridor to play an important role not only in domestic but also foreign relations and cooperation in regard to exports, as well as tourism.

346. On 3 June 2010, a community in a *ger* camp in Khovd area was consulted in regard to impacts of the road. The community members were given the details of the road alignment and potential impacts of construction works. All of the *ger* community present considered the development of the road as very important and considered the impact on air and water as insignificant. They maintained that it would facilitate their animal husbandry and obtaining vegetables. It would also assist their access to medical facilities at the Provincial center 25 km away. Even though the community had few vehicles, they expected that public transport would be available subsequent to development of the road. They were also willing to participate in construction work of the road. They requested that crossings be provided to assist their herds to cross the road.

347. Community members in Hongor Ulun *bagh* and the Governors of Hongor Ulun *bagh*, and Tolobo *soum* were consulted along with State Environmental Inspector of Tolbo *soum* (20 June 2010) in regard to alternative alignments in the lake area. The community members and the officials were provided with details of the alignment traversing the lake area. All community members who participated in the meeting were in agreement/understanding that there was a need for change of alignment in the lake area and were of the opinion that the proposed design alignment may negatively affect the lakes.

348. After the meeting the *soum* and *bagh* Governors and State Environment Inspector based

in the Tolbo *soum* and the community made an inspection of the alternative alignment (Alternative 1) and a newly identified alignment (Alternative 2). Local authorities and local community members explained that Alternative 1 which bypasses the lake area on the northern side crosses swampy areas and is close to two springs. They believed that the springs could dry up. The general view of the community and the officials was that Alignment alternative 2 would be preferable.

349. Tolbo *soum* Governor, Ms.Kh.Saulesh, also presented an official letter containing the wish of the local authorities and people to change the existing design alignment to the new alignment (Alternative 2) identified by them.

350. Given the technical, economic and environmental considerations, the intention is to proceed with the design alignment. Appropriate mitigation measures will be put in place to protect the surface water quality and no evidence is found during the preparation of this EIA or the previous EIA documents for this road section to indicate that springs will dry up as a result of the road construction. The project team will ensure regular consultation with residents in this area through the *Soum* level Community Outreach and Monitoring Officers and Environmental Monitoring Specialist.

C. Public Consultations during 2013 EIA Preparation

351. The consultations for the preparation of this EIA included:

(i) Residents along Tranche 2 project corridor (3 households)
(ii) Residents along Tranche 1 corridor in order to understand potential issues which may be applicable to Tranche 2 (3 household members);
(iii) WWF specialist, Khovd;
(iv) Khovd *Aimag* Governors office representative; and
(v) Department of Roads.

352. **Consultation with Residents.** The findings of the consultation echo those of the previous rounds of consultation with members of the public, and are used to inform this EIA. The key issues / discussion topics raised by residents included:

(i) The residents strongly agreed with the road development and welcome the development of the area. Benefits mentioned specifically included:

a) Reduction of time, fuel costs and vehicle maintenance costs when the road is complete
b) Less likely to be cut off during winter, particularly for residents of Buraatin Pass.
c) It will be quicker and easier to take children to school at the local *soum* centres

(ii) Potential issues discussed which may arise during construction include:

a) Dust will be generated but will be tolerated as the road is already dusty when vehicles pass.
b) The road construction may generate noise but again will be tolerated given the benefits arising from it.

(iii) Other issues arising included:

a) The main drinking water sources are rivers for both humans and livestock;
b) Where construction has already started (Bodonch canyon) residents say the water is turbid from the river diversion during bridge construction, but they adapt to this by collecting water very early in the morning.
c) Only one resident expressed concern over moving his livestock across the road
d) When prompted, residents said they have no concerns regarding road safety, and access to grazing opportunities has not been limited where construction has already started.
e) Where construction has started, residents are suspicious of the foreign contractors who are constructing the road. This indicates a need for increased communication with the residents.

353. **Consultation with WWF, Khovd.** The head of WWF Khovd Ms Baigalmaa was consulted and whilst WWF is not active in the Tranche 2 area, useful information was obtained:

(i) WWF consider that the road will not have a major impact as the existing route is followed.
(ii) The main impact may arise from borrow pits, which should remain within designated areas.
(iii) Regarding access for wildlife, it was indicated that overpasses and underpasses do not usually work, instead if access is not possible over the road, it is likely that the animals will relocate, however this is not anticipated to be an issue in the Tranche 2 project area.
(iv) An example was cited of a mining road constructed in the western region in a canyon to which animals have returned to drink from the river in the canyon post-construction. WWF confirmed that this demonstrates the significance of construction impacts, rather than operational impacts.
(v) There is evidence to suggest on some newly constructed roads in the western region with foreign contractors, that local residents barter with local residents and exchange rare animal carcasses for meat and construction materials.
(vi) Regarding water quality, the Buyant River Committee will be a useful consultee when the organization becomes more active as currently it appears to be dormant.

354. **Consultation with Khovd *Aimag* Governor's Office.** Mr Surenjav, Economics and Planning Officer was consulted regarding issues and impacts for Khovd resulting from the project with a focus on the waste management facilities which may be available to the contractors. The findings were:

(i) Khovd town has a centralized sewage dump site which uses lagoons for evaporation and the resultant sludge is scraped out and removed to another site for disposal. This is soon to be upgraded as a new treatment plant is under construction
(ii) Solid waste is collected centrally and taken to a dump site which is not engineered. It is managed by the urban services department which has limited machinery (one bulldozer). The site is currently being fenced off in order to improve its management.

(iii) Hospitals manage their own waste and it does not go to the central dump site.
(iv) Hazardous waste is not segregated.
(v) The *aimag* governor's office will support the project and will make a place available for waste arising from contractor's camps if the relevant discussions and agreements are in place.

355. **Consultation with Department of Roads.** The DOR representative consulted during this EIA is currently the head of PIU for the Tranche 1 project. He was able to provide up to date advice on technical aspects of the design, confirming where information in the previous EIAs is to be updated and that the domestic EIA remains valid for the duration of the Tranche 2 project implementation.

356. **Integration of Consultation Information**. Where appropriate, the recommendations provided during the consultation meetings are integrated into the mitigation measures in this EIA. This includes mitigation measures associated with road drainage, wildlife hunting, protection of wildlife on the road and the protection of critical habitats for bird breeding.

D. Future Stakeholder and Public Consultation Program

357. Following the disclosure of this EIA, further stakeholder and public consultation will take place at key locations along the project corridor, such as Tolbo *soum*, Tsagaannuur, Olgii and Khovd as these are places which will be affected by the positive and potentially adverse impacts of the road and bridge construction components associated with Tranche 2. During the consultation meeting a presentation on the findings of this updated EIA will be made and residents and specialists will be consulted on the mitigation activities proposed.

E. Information Disclosure

358. Environmental information on the project was and will be disclosed as follows:

(i) The domestic and previous EIA reports are available for review in the IA's office;
(ii) This current EIA will be disclosed on ADB's website (www.adb.org) for 120 days prior to Management consideration of the periodic financing requests for Tranche 2.
(iii) Copies of the project EIA reports will be made available upon request; and
(iv) During implementation, semi-annual monitoring reports on compliance with the Environmental Management Plan will be disclosed on ADB's website (www.adb.org).

IX. GRIEVANCE REDRESS MECHANISM

A. Grievance Redress Mechanism Objective

359. A grievance redress mechanism (GRM), consistent with the requirements of the ADB Safeguard Policy Statement (2009) will be established to prevent and address community concerns, reduce risks, and assist the project to maximize environmental and social benefits. In addition to serving as a platform to resolve grievances, the GRM has been designed to help achieve the following objectives: (i) open channels for effective communication, including the identification of new environmental issues of concern arising from the project; (ii) demonstrate concerns about community members and their environmental well-being; and (iii) prevent and mitigate any adverse environmental impacts on communities caused by project implementation and operations. The GRM is accessible to all members of the community.

1. Proposed Grievance Redress System

360. The proposed GRM follows the approach taken for Tranche 1 of this MFF project and will be applied to Tranche 2. This ensures consistency in its application.

361. In its capacity as the IA, DOR will in consultation with the MRT (EA), establish *soum* based Public Complaints Centres (PCC) in conjunction with local government. The PCC will be established, within the PIU of the DOR, prior to construction to deal with complaints from affected people (AP) throughout implementation of the Project. PCCs will be established in each site office for Tranche 2.

362. S*oum* based Community Outreach and Monitoring Officers (COMO) will be responsible for ensuring the implementation of the GRM at a local level and will staff the PCC. They will be the key contact point for residents who want information about the project or who have an issue they would like to discuss. The PIU and *soum* based COMO will issue public notices to inform the public within the project area of the Grievance Redress Mechanism. The PCC's phone number, fax, address, email address will be disseminated to the people through displays at the respective offices of the *bagh*, *soum* and *aimag* government administrations and public places.

363. The s*oum* based COMO will have facilities to maintain a complaints database and communicate with Environmental Monitoring Specialist (EMS) in the PIU, Site Engineers, Supervising Engineer, PIU, Governors of *aimags, soums,* and *baghs.*

2. GRM Steps and Timeframe.

364. Procedures and timeframes for the grievance redress process are as follows and shown in **Figure 38**.

- **Stage 1: Direct Resolution.** If a concern arises, the affected person may resolve the issue of concern directly with the contractor/operator and the project manager. If the issue is successfully resolved, the concern and resolution approach should be documented but no further follow-up is required;
- **Stage 2: Official Complaint and Investigation**. If no solution is found, the affected people will submit an oral or written complaint to the PCC or through GRM entry points (the Soum based COMO, bagh, soum or aimag local governments; the EA/IA; or the contractor/operator). For an oral complaint the

PCC must make a written record. For each complaint, the PCC must investigate the complaint, assess its eligibility, and identify an appropriate solution. It will provide a clear reply within five working days to the complainant, MTRCUD, DOR and contractors. The PCC will, as necessary, through the Supervising Engineer; instruct the Contractor to take corrective actions. The PCC will review the Contractor's response and undertake additional monitoring. During the complaint investigation, the PCC will work in close consultation with the Soum based COMO, Environmental Monitoring Specialist in the PIU, Contractors, and the Supervising Engineer (for construction) and with the DOR/operator (for operation). The contractors during construction and the IAs/operators during operation should implement the redress solution and convey the outcome to the PCC within seven working days;

- **Stage 3: Multi-stakeholder Meeting.** If no solution can be identified by the PPC or if the complainant is not satisfied with the suggested solution under Stage 2, the PCC will organize, within two weeks, a multi-stakeholder meeting under the auspices of the head of DOR, where all relevant stakeholders (i.e., the complainant, DOR, contractor/operator, relevant local government offices, Soum based COMO, PIU's EMS) will be invited. The meeting should result in a solution acceptable to all, and identify responsibilities and an action plan. The contractors during construction and the IAs/operators during operation should implement the agreed-upon redress solution and convey the outcome to the PCC within seven working days;
- **Stage 4: ADB Special Mission.** If the multi-stakeholder hearing process is not successful, the PCC will inform ADB and a special mission will be initiated to resolve the issue. Note that if the APs are still not satisfied with the outcome in Stage 4, they can go through local judicial proceedings.

365. **Reporting**. The PCC will record the complaint, investigation, and subsequent actions and results and provide this information to the PIU-EMS who will include it in the monthly Environmental Management Plan progress reports. In the construction period and the initial operational period covered by loan covenants the EA will periodically report complaints and their resolution to ADB in the quarterly project progress reports and semi-annual environmental monitoring reports.

366. **Responsibilities of the PCC**. The responsibilities of the PCC are implemented by the s*oum* based COMO as follows:

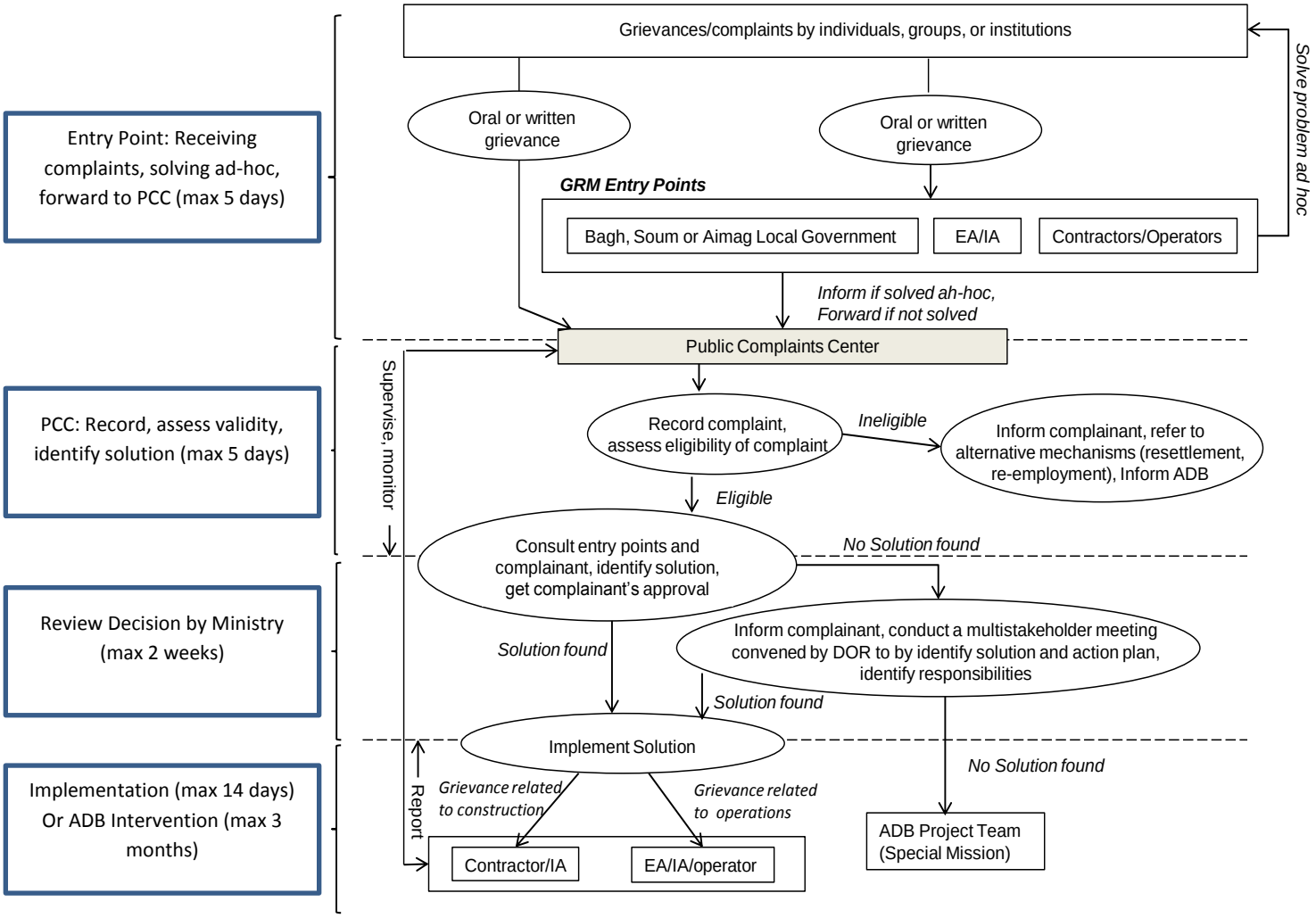
- The PCC will instruct contractors and construction supervisors to refer any complaints that they have received directly to the PCC. Similarly, the PCC will coordinate with local government "capture" complaints made directly to them.
- The PCC will log complaints and date of receipt onto the complaint database and inform the Environmental Monitoring Specialist in the PIU (PIU-EMS), Supervising Engineer and the Contractor.
- The PCC, with the Supervising Engineer and the Contractor, will investigate the complaint to determine its validity, and to assess whether the source of the problem is because of project activities, and identify appropriate corrective measures. In order to assess the validity of the complaint, the Supervising Engineer, Contractor and PIU-EMS will be consulted as required. If corrective measures are necessary the PCC, through the Supervising Engineer, will instruct the Contractor to take necessary action.
- The PCC will inform the Complainant of investigation results and the action

taken.

- If a complaint is transferred from local government agencies, the PCC will submit an interim report to local government agencies on status of the complaint investigation and follow-up action within the time frame assigned by the above agencies.
- The PCC will review the Contractors response to the identified corrective measures, and the updated situation.
- The PCC will undertake additional monitoring, as necessary, to verify as well as review that any valid reason for complaint does not reoccur.
- During the complaint investigation, the PCC should work together with the Soum based COMO, PIU-EMS, Contractors and the Supervising Engineer. If mitigation measures are identified in the investigation, the Contractors will promptly carry out the mitigation. The Supervising Engineer will ensure that the measures have been carried out by the Contractors.

367. The tracking and documenting of grievance resolution within the PCC and/or PIU will include the following elements: (i) tracking forms and procedures for gathering information from project personnel and complainant(s); (ii) dedicated staff to update the database routinely; (iii) systems with the capacity to analyse information so as to recognize grievance patterns, identify any systemic causes of grievances, promote transparency, publicize how complaints are being handled, and periodically evaluate the overall functioning of the mechanism; (iv) processes for informing stakeholders about the status of a case; and (v) procedures to retrieve data for reporting purposes, including the periodic reports to the EA and ADB.

Figure 38: Proposed Project GRM Tranche 2



X. ENVIRONMENTAL MANAGEMENT PLAN

A. Objectives

368. The environmental management plan (EMP) for Tranche 2 is presented in Appendix 2. The EMP defines mitigation and monitoring measures and describes the institutions and mechanisms to monitor and ensure compliance. Such institutions and mechanisms will seek to ensure continuous improvement of environmental protection activities during preconstruction, construction, and operation of the project in order to prevent, reduce, or mitigate adverse impacts. The EMP draws on the domestic EIA and on discussions and agreements made with the relevant government agencies. The EMP will be reviewed and updated if there are any changes to the detailed design. The final EIA and EMP will be disclosed on ADB's website following any required updates.

369. This environmental management plan (EMP) has been prepared in line with ADB's SPS 2009. Specific measures are developed in relation to the design, construction and operation of each project component and the impacts identified in relation to physical, biological, cultural and socio-economic resources, as discussed in Section VI. Anticipated Impacts and Mitigation Measure.

B. Organizational Structure for EMP Implementation

370. **Steering Committee**. The Steering Committee will include representatives of different Ministries and Agencies such as Ministry of Finance, Ministry of Health, MNET, and the Ministry of Roads and Transportation (MRT). The Chairperson of the Steering Committee is the State Secretary of MRT. Reports on EMP implementation will be provided to the Steering Committee by DOR.

371. **Executing Agency**. MRT will be the Executing Agency for the Project. As the Executing Agency it will have overall responsibility for the project and therefore is ultimately responsible for ensuring the implementation of the mitigation in the EMP.

372. **Implementation Agency**. The PIU will reside within the DOR which is the Implementation Agency. The PIU will engage an Environmental Monitoring Specialist (PIU-EMS) to monitor implementation of the EMP.

373. **Role of** PIU-EMS. The Terms of Reference for the PIU-EMS is provided in Appendix 1. In summary, the PIU-EMS will:

- Facilitate the implementation of the EMP and ensure the grievance redress mechanism functions effectively by supervising the *soum* based community outreach officers;
- Liaise with PIU and the Supervising Engineer to identify if there are any changes in the project design or baseline environmental conditions and review and update the EMP accordingly;
- Review and update tender and contractor documents to ensure all required environmental specifications are included;
- Prepare monthly (for EA/PIU), quarterly (for ADB Project Progress Report) and semi-annual Environmental Monitoring Reports (for ADB). The reports should review progress with project implementation, environmental performance and

compliance, report results of environmental audits and monitoring, identify problems encountered, actions taken/or proposed to be taken to resolve problems and activities programmed for next monitoring period;
- Monitor the implementation of the mitigation and monitoring measures as set out in the environmental management plan
- Provision of EMP specific training for contractors, PIU and soum based community outreach and monitoring officer.

374. A Supervising Engineer (SE) will be engaged. The SE will:

- Supervise site environmental management system of the contractors, and provide corrective instructions;
- Review the EMP implementation by the contractors;
- Advise the PIU of any changes in design or contractor method statements in order for the PIU-EMS to revise the EMP if necessary;
- Undertake inspections to ensure the requirements of the EMP are implemented and take immediate corrective action if needed; and
- Report all corrective actions to PIU-EMS.

375. DOR will ensure that this EMP is made part of the contract documents. Bidding documents and detailed design contracts will be prepared and managed by DOR. Contract documents shall explicitly indicate the requirement of these documents and plans and also state that all environmental protection measures should be included in the bid price unless otherwise specified.

376. **The Contractor.** In the technical specification for the civil works contract, activities to protect the environment will be prescribed in the EMP. During construction, contractors will strictly implement the EMP and will develop and implement the management plans required in the pre-construction phase:

(i) Soil Erosion Management Plan
(ii) Aggregate, Borrow Pits and Spoil Management Plan
(iii) Spill Management Plan
(iv) Construction Camp Management Plan
(v) Waste Management Plan
(vi) Cultural Heritage Management Plan
(vii) Water Use and Management Plan
(viii) Site Condition Survey for the Manchurian wall, Khovd bridge (Component 2a).
(ix) Bridge Construction Method Statements.
(x) Health and Safety Management Plan (HSMP)

377. The contractor will also fully cooperate with the external environmental inspections and provide information including reports, monitoring results or other information relating to EMP implementation as requested by the PIU, PIU-EMS or SE.

C. Performance Indicators

378. **Table 32** presents the Readiness Indicators which provide a measure of whether environmental commitments are being carried out and environmental management systems are in place before pre-construction.

Table 32: Readiness Indicators Pre-Construction

Indicator	Measurement Methods	Measurement	
Public involvement effectiveness	• Appropriate rounds of public consultation completed.	Yes	No
	• GRM established with contact points.	Yes	No
Surface water quality baseline monitoring	• Monitoring completed by Khovd *Aimag* Center of Meteorology, Hydrology and Environment	Yes	No
Environmental Supervision in place	• Environmental Monitoring Specialist engaged by DOR and in position for construction season	Yes	No
Bidding documents and contracts with environmental safeguards	• Bidding documents and contracts incorporate the environmental loan assurances	Yes	No
	• Bidding documents and contracts incorporate the EMP mitigation and monitoring requirements	Yes	No
EMP financial support	• The fund from ADB and/or the Government of Mongolia is in place to support the EMP implementation.	Yes	No
Contract documents	• Environmental requirements of EMP included in contract documents for civil works construction contractors.	Yes	No

Source: ADB Study Team

379. Mitigation measures are defined to minimise potential adverse impacts on the environment to acceptable levels. Performance indicators for monitoring environmental performance in relation to key project risks and impacts are set out in **Table 33**.

Table 33: Performance Indicators During Construction

Indicator	Measurement Methods	Measurement	
Stakeholder Interviews	• Weekly structured interview with stakeholders in project area, submitted to DOR by PIU-EMS and / or *Soum* based community outreach and monitoring officers	Yes	No
Water Monitoring	• Daily measurements weekly submitted to DOR	Yes	No
Health & Safety Reporting	• Weekly reports submitted to DOR	Yes	No
EMP Implementation	• PIU-EMS monitors mitigation implementation and confirms compliance, reporting monthly to PIU	Yes	No

Source: ADB Study Team

D. Environmental Training Requirements

380. The Terms of Reference for the PIU-EMS state that they will be responsible for providing EMP specific training during the project. The focus will be on the newly engaged *soum* based COMO, supervision engineers and the contractors. However although the PIU staff will be familiar with EMP implementation and the environmental concerns along the corridor from Tranche 1, they will be provided with training on specific issues associated with Tranche 2 as shown in **Table 34**:

Table 34: Training Requirements

Training Participant	Topic	Timescale	Cost
Community Outreach and Monitoring Officers	- Project GRM & consultation process - Introduction to EMP and Implementation	On contract commencement	$500
Contractors	- EMP: Purpose, Scope, and Contractor Responsibilities - Wildlife, hunting laws and penalties	On arrival On arrival	$500
PIU	- EMP: Purpose, Scope, and Contractor Responsibilities - Purpose and implication of EMP updates or revisions	Pre-construction As needed	$1000
Others as required	EMP Training for *bagh*, *soum* or *aimag* representatives if it is required / requested	As needed	$500
Total (costs per Tranche for 1 year)			$2,500

Source: ADB Study Team

381. A nominal cost has been given for training. The training provider (PIU-EMS) and the participants are all within the project therefore minimal additional funds will be needed to cover any materials which may be produced and distributed.

382. Additional awareness raising will be provided for the contractors by the EHSO from the contracted company in order to ensure construction contractors are aware of the management plans which are to be adhered to during the construction.

E. Environmental Monitoring and Reporting

383. The project monitoring requirements for Tranche 2 are set out in **Table 35**.

Table 35: Project Monitoring Requirements Tranche 2

Environmental Media/Issue	Location, Parameters, Monitoring Technique	Responsibility & Frequency
Pre-Construction Phase		
Project readiness	• **Method:** Review of Project Readiness based on indicators in Table 32 • **Parameters:** Table 32	MRT
Noise	• **Method, Location:** Establish baseline noise data at sensitive receptors for: • Component 1a (Khovd-Tolbo *soum*) along road alignment at receptors such as dwellings near Khashaat Pass and at Tolbo Lake IBA • Component 1b (Ulaanbaishint to Tsagaanuur) dwellings along the road and at Sylkhemyn Nuruu National Park • Component 2a (Khovd and Olgii bridges) at nearby dwellings • Component 2c (roads inside Khovd and Olgii towns) dwellings and businesses along the road • At construction camp site (s) • **Parameters:** Db(A) at receptors (dwellings) outside and inside.	Contractor Once before construction

Environmental Media/Issue	Location, Parameters, Monitoring Technique	Responsibility & Frequency
Air Quality	• **Method, Location:** Baseline air quality data for: Component 1a and 1b (along road alignment at receptors such as dwellings near Khashaat Pass, Buraatin Pass and Ulaanbaishint ; Component 2a at Khovd and Olgii bridge locations; Component 2b inside Khovd and Olgii towns. • **Parameters:** SOx NOx	Contractor Once
Surface water quality	• **Method, Location:** Establish baseline water quality in Buyant River, Khovd River, Olon Nuuruud Lakes and other water crossings as appropriate. • **Parameters:** Temperature, Suspended particles pH, Dissolved oxygen, Chemical oxygen demand, Biological Oxygen Demand, Hydrocarbon, Micro-organisms such as faecal coliforms and parasites	Khovd *Aimag* Center of Meteorology, Hydrology and Environment Once
Construction Phase		
Soil erosion contamination and borrow pits	• **Method, Location:** Visual inspection of all active construction sites. • **Parameters:** (i) adequacy of soil erosion prevention measures; (ii) adequacy of soil contamination prevention techniques; (iii) location of borrow pits according to Aggregate/Borrow Pits and Spoil Management Plan (vi) adherence to Spill Management Plan and Soil Management Plan	PIU-EMS – Weekly
Solid and liquid waste management	• **Method, Location:** Visual inspection of all active construction sites. • **Parameters:** Adherence to Site Waste Management Plan and Construction Camp Management Plan.	PIU-EMS – Weekly
Occupational health and safety	• **Method, Location:** Visual inspection and interviews with construction workers and contractors at active construction sites • **Parameters:** (i) adherence to the approved Environmental, Health and Safety Management Plan (EHSMP); (ii) performance of the EHSO; (iii) worker complaints and concerns and recorded incidents.	EHSO - Weekly
Community health and safety	• **Method, Location:** Visual inspection of all active construction sites, informal interviews with nearby residents within reason given the possible distances between sites. • **Parameters:** (i) availability of information on GRM; (ii) adequacy of construction site signage and fencing; (iii) adequacy of temporary noise mitigation measures; (iv) accidents involving public and workers; (v) emergencies and responses; (v) public complaints about issues such as noise, air pollution, construction site safety, localized flooding;	COMO – Monthly
Surface water quality	• **Method, Location:** As per pre-construction phase • **Parameters:** As per pre-construction phase	Khovd *Aimag* Center of Meteorology, Hydrology and Environment Monthly during construction as per TOR
Air quality	• **Method, Location:** As per pre-construction phase • **Parameters:** As per pre-construction phase	Contractor – Monthly During construction
Air Quality –	• **Method, Location:** Visual observation of dust at	PIU-EMS – Twice monthly

Environmental Media/Issue	Location, Parameters, Monitoring Technique	Responsibility & Frequency
dust	dwellings near construction sites. Observations to record if dust generated by construction activities crosses property boundaries. • **Parameters:** Fugitive dust emissions	During Construction
Noise	• **Method, Location:** As per pre-construction phase • **Parameters:** As per pre-construction phase	Contractor – Monthly During construction
Interview with APs	• **Method, Location**: Interview with potentially affected people (AP) adjacent to construction sites. • **Parameters:** Discussion on environmental and socio-economic issues.	PIU-EMS - Monthly COMO - Monthly
Cultural Heritage	• **Method, Location:** Dependent on findings during construction • **Parameters:** As per Cultural Heritage Management Plan	PIU-EMS - Monthly
EMP Compliance Monitoring	• **Method, Location:** Review of project's adherence with EMP and loan covenants • **Parameters:** EMP and loan covenants	MRT – Semi-Annually
Construction Completion		
Post-construction site inspection	• **Method, Location:** Visual inspection, post-construction environmental condition assessment at each construction site. • **Parameters:** Performance checked against the management plans submitted before construction for specific aspects such as aggregate, borrow pit and spoil management plan.	PIU-EMS – twice: two weeks before completion of construction activities, once after completion

384. Reporting requirements for Tranche 2 are set out in **Table 36**

Table 36: Project Reporting Requirements

Report From	Report To	Purpose	Frequency
Contractor EHSO	Contractor & Supervising Engineer	Health and Safety Issues	Weekly
Contractor EHSO	Supervising Engineer	Progress/Issues with EMP Implementation	Monthly
Supervising Engineer	DOR	Progress/Issues with EMP Implementation	Monthly
PIU-EMS	DOR	Progress with EMP Implementation	Monthly
DOR	ADB through MRT	Progress Report and Issues Arising	Quarterly
MRT	ADB	Environmental Monitoring Report	Semi-Annual

385. **Feedback and Adjustment Mechanism**. During project implementation a mechanism for feedback and adjustment of the EMP is required. This will be done through the reporting process for non-urgent issues. This includes issues which will not have an immediate adverse impact on human health or the environment. For urgent issues which may have an immediate

impact on health and safety or environmental resources, the Supervising Engineer will directly contact DOR in order to discuss the issue.

386. PIU will disseminate monthly progress reports as appropriate and should DOR, MRT, ADB or other stakeholders identify an area of concern, the EMP will be adjusted accordingly.

F. Budget

387. The environmental mitigation measures, which will require a specific budget outside the civil works contract and the budget allocated for PIU staff for Tranche 2 is shown in **Table 37.**

Table 37: Environmental Mitigation and Monitoring Measures Budget - Tranche 2

Mitigation	Timeframe	Estimated Cost $USD
Study: Wildlife movement routes	During construction (Phase 1), Post-Construction (Phase 2)	$ 10,000
Consultant: Social, HIV/AIDS and Human Trafficking Prevention Monitoring Specialist (24 pm)	During Construction	$ 48,000
Consultant: Environmental Monitoring Specialist in PIU (24 pm)	During Construction	$ 60,000
Consultant: Three *Soum* Level Community Outreach and Monitoring Officers (24 pm)	During Construction	$ 48,000
Monitoring: Water Quality	Pre-construction and during construction	$ 10,000
Installation of measures to reduce the likelihood of wild animals being killed on the road	During Construction	$ 12,000
Road safety awareness – material production.	During construction	$ 5,000
Installation of snow fencing	During construction	$ 6,000
Environmental Training	During Construction	$ 5,000
Installation, maintenance and servicing of litter bins and signage maintenance	During Operation	$ 12,000
Maintenance of measures to reduce the likelihood of wild animals being killed on the road	During Operation	$ 8,000
Road Safety Signage Maintenance and Upgrade	During Operation	$ 4,000
	Total	$ 228,000

Source: ADB Study Team

V. CONCLUSIONS

A. Project Context

388. The project expected outcome and impact from the Western Regional Road Corridor Investment Program is:

- **Impact**: inclusive economic growth promoted by enhanced local and regional connectivity and competitiveness in the remote western region.
- **Outcome**: improved transport accessibility within the project area and between countries leading to increased access to markets, health and education facilities.

389. The project is in a remote area of Mongolia and the proposed road construction is part of the Asian Highway route 4 and is Central Asia Regional Economic Cooperation Corridor 4a. These regional road networks aim to increase connectivity and develop trade across Asia.

390. Currently the project area suffers from limited infrastructure including a lack of paved roads. This has limited economic and social development of the area as transport costs are high and travel times are long.

B. Major Environmental Impacts and Mitigation Measures

391. **Alternative Analysis**. Alternatives are examined which relate to the project's location, design, technology, and components and their potential environmental and social impacts and consider the no project alternative. The "No Action Alternative" is also considered, addressing the likely consequences of not undertaking the proposed intervention. The Alternative Analysis considered that failure to develop the sections of road in Tranche 2 would mean the Asian Highway route 4 and CAREC Corridor 4a would not be completed, which would have implications for cross border trade and development in the region.

392. Location and technical alternatives are also considered. In two locations, alternatives to the design alignment are proposed. In Khovd, three location alternatives as well as the proposed design alignment are considered. In Olon-Nuuruud lake area, two location alternatives and the proposed design are considered. Alternatives are also considered regarding the pavement and sub-layer design for permafrost. The final decision for the road alignment and the technological alternatives was made based on technical, economic and environmental considerations.

393. **Impacts during construction.** Without mitigation, the principal impacts during construction will be on water bodies particularly during construction over rivers, streams and adjacent to lakes; surface water is the main drinking water source for both humans and livestock in the project area. Therefore water quality will be measured regularly throughout the construction phase and emphasis will be placed on local consultations with residents to ensure their water quality is not impacted on to an unacceptable degree.

394. The dust generated and mobilised by construction activities is likely to impact on residents close to the project construction sites. This may be exacerbated by the dry desert-steppe conditions and the scale of earthworks proposed. However dust suppression measures are clearly specified and will seek to manage dust to acceptable levels.

395. It is unlikely that construction of the new road within the existing road corridor will exert any significant additional impact on the existing flora and fauna in the project area over and above the current situation. This includes the nearby Tolbo Lake IBA (2 km from nearest point to project area) and the legally protected Sylkemyn Nuuru National Park (4 km from nearest point to project area). However, as a precautionary measure there will be an embargo on construction activities within 5 km of Tolbo Lake IBA during the breeding season (April to June).

396. In the interests of good practice and taking account of the proximity of Tolbo Lake IBA and Sylkhemyn Nuruu National Park it is proposed to i) conduct an ecological survey of the current status of the Tolbo Lake IBA with a view to identifying opportunities for the project to enhance the IBA's protection and ii) conduct a survey of the current status of the biodiversity in the area between the road alignment and the nearest boundary (4km separation) of Sylkhemyn Nuuru National Park with a view to identifying opportunities for the project to enhance the protection of the Park's biodiversity.

397. The issue of accessibility is important as construction activities may potentially separate herders from their grazing areas and may make crossing the road difficult and hazardous for livestock and people. Therefore emphasis is placed on consulting herders living along the road corridor during construction in order to accommodate suitable crossing points.

398. **Impact during operation.** This EIA indicates that the main potential impact during operation will be the increased traffic volume and higher speed that could result in increased risk to migrating wildlife crossing the road. The risk will be reduced to acceptable levels through installation of road signage and wildlife warning reflectors at known crossing points. This will include speed restrictions, and where necessary, the provision of at grade or reduced embankment grades at known crossing points to facilitate wildlife crossing.

399. The project will also have an impact on greenhouse gas emissions. The WRRCIP will help to increase the economic development of the western region and result in increased traffic. This will lead to higher levels of greenhouse gas emissions. This is deemed to be an acceptable impact for the project as the economic and social benefits are considerable.

400. **Indirect, induced and cumulative impacts.** These impacts will be mainly positive. The full scale of positive indirect impacts will be achieved once the Western Regional Road corridor is completed. These benefits include improved access to education, social, health and community services and improved economic development opportunities.

401. Potential negative induced and cumulative impacts in the construction phase are not anticipated to be significant given the remote nature of the project area and as no other major projects are foreseen or planned in the area at present. During operation, negative impacts may include: (i) impacts from increased tourism such as environmental degradation from solid waste generation; (ii) resource exploitation; (iii) induced vehicle traffic and emissions. These impacts are associated with economic development and therefore would need to be carefully managed and monitored by the Government of Mongolia and would be subject to domestic EIA procedures.

C. Overall Conclusion

402. The findings of this EIA show that Tranche 2 of the WRRCIP will not have any significant, long term or irreversible impacts on the physical, biological or socio-economic environment. The project will have short term impacts during construction which can be

mitigated to an acceptable level through mitigation measures which seek to reduce the potential for harm to the environment and human health. These measures relate primarily to implementing good construction practice as well as meeting the particular needs of the project area in terms of wildlife and accessibility. Good practice and responsible design will also contribute significantly to reducing the operational impacts of the project. Measures such as the use of wildlife reflectors and warning signs will mean impacts on wildlife are managed and basic measures such as providing and maintaining litter bins will help to manage waste from road users.

403. The project will implement a robust Grievance Redress Mechanism and will engage independent community based outreach officers in order to ensure that any negative or positive impacts from the project are captured and dealt with appropriately. The outreach officers will become known to the residents in the project area and will bridge the gap between the project team and local communities.

404. The stakeholder and community consultation during the development of the EIA demonstrated that the project has local support as it will result in significant benefits in terms of accessibility to services, improved connectivity between communities particularly in winter and importantly the economic development prospects of the area will be greatly increased. This EIA and the detailed design of Tranche 2 have been informed by stakeholder and public consultation and on-going consultation is proposed during implementation.

APPENDIX 1: TERMS OF REFERENCE FOR FURTHER STUDIES

A. Wildlife Movement Monitoring

1. **Background.** The Mongolian Altai region is characterized by its rich fauna diversity. There are 360 species of vertebrates, including 90 species of mammals, more than 250 species of birds, 11 species of reptiles, 123 species of insects, 10 species of fishes, and 1 species of amphibian. Some of the rare and endangered mammals that occur in the corridor are the Mongolian Saiga Antelope *(Saiga tatarica mongolica*) in Manhan Area (especially Khar Us Nurr National Park, Sharga Nature Reserve and Mankhan Nature Reserve), Argal Sheep (*Ovis ammon)* in Hohserh Mountain area, Siberian Ibex (*Capra siberica*) in Bodonch area and Goitred Gazelle (*Gazella subgutturosa*) in Yarant cross-border area. The proposed road corridor for the Western Regional Road Corridor Investment Program (WRRCIP) passes through the Mankhan Nature Reserve.

2. The Western Regional Road Corridor is under various stages of construction and planning. The sections and status of each is below:

Section	Construction Timetable	Financed by
Yarant – Temeen Huzuu	Near completion	Government of Mongolia
Temeen Huzuu – Baga Ulaan Davaa	2011-2014	ADB – Grant 0107
Baga Ulaan Davaa – Mankhan	2012-2015	ADB Tranche 1
Mankhan – Khovd	2010-2013	Government of PRC
Khovd – Khashaatin Davaa	Not yet started (2014-2017)	ADB Tranche 2
Khashaatin Davaa – Tolbo	Not yet started (2015-2018)	ADB Tranche 2
Tolbo – Ulgii	2011-2014	Government of PRC
Ulgii – Tsanganuur	Near completion	Government of Mongolia
Tsagaannuur – Ulaanbaishint	Not yet started (2015-2018)	ADB Tranche 2

3. During preparation of the Government of Mongolia's EIA for the WRRCIP in 2007 consultations with experts from the Specially Protected Area Administration Department in Bayan-Ogliy, World Conservation Society (WCS) and WWF Mongolia Office were undertaken. The results of the consultations led to the identification of potential wildlife migration crossing points along the length of Western Regional Road Corridor as shown on **Figure 33** of this EIA.

4. The impact of habitat fragmentation because of the WRRCIP has been considered in the various EIAs undertaken by the GOM and ADB for the project. Because the project road is largely within an existing road corridor it is not anticipated that habitat fragmentation in respect of wildlife migration patterns will be significantly affected by the project provided mitigation measures are implemented near the known wildlife crossing points. Such mitigation measures will include: i) installation of road signage and reflectors to warn drivers of potential wildlife crossing points; ii) traffic speed restrictions; and iii) provision of at-grade or reduced road embankment grades near the known crossing points to facilitate wildlife crossing by increasing their cross road visibility.

5. A wildlife movement monitoring study is proposed for the length of the WRRCP between Yarant to Ulaanbaishint during project implementation.

6. **Objectives.** The objectives of the wildlife movement monitoring study are to:

- Confirm and update the existing information on wildlife migration routes / crossing points along the WRRCP corridor between Yarant and Ulaanbaishint in respect of migratory ungulates such as: Mongolian saiga (*Saiga tatarica*

mogolica), Argali sheep (*Ovis ammon ammon*), Goitred Gazelle (*Gazella subgutturosa*) and Siberian Ibex (*Capra siberica*);

- Determine whether or not, and to what extent, the new paved road and its embankments affect wildlife movements across the road corridor; and
- Based on information gathered above, provide specific recommendations for any mitigation measures that could be implemented along the new road to facilitate wildlife movements across the road.

7. **Tasks of the assignment**. The monitoring will be undertaken by an appropriately qualified and experienced wildlife ecologist, preferably a recognized expert on the ecology of the Central Asian region. The Consultant shall undertake the monitoring survey in two phases comprising a total of 6 monitoring events as follows:

- Phase 1 – twice in the year, spring and autumn 2014
- Phase 2 – twice per year, spring and autumn 2015 and 2016

8. The actual timing of each monitoring event will be agreed between the Consultant and ADB and take account of expected times when migratory wildlife are likely to be crossing or near the road corridor.

9. Phase 1 monitoring shall focus on sections of road where construction has not yet commenced or is in the early stages of construction. Phase 2 monitoring will focus on road sections that have been recently completed (within the previous 6 months).

10. The detailed tasks include:

(i) Developing a study approach and methodology for review and approval by ADB for each section of the WRRCIP identifying critical wildlife known to migrate and move in and around the project corridor.

(ii) Reviewing available information on migratory wildlife populations and patterns of movement for key species within the broader project area. Such species shall include but not be limited to Mongolian saiga (*Saiga tatarica mogolica*), Argali sheep (*Ovis ammon ammon*), Goitred Gazelle (*Gazella subgutturosa*) and Siberian Ibex (*Capra siberica*). Information shall include: seasonal movements, locations, corridors and their biological and ecological justifications (eg water supply, food chain, accessibilities, reproductive and breeding sites) within the road corridor

(iii) Developing a survey protocol.

(iv) Conducting a wildlife movement survey during peak migrations (Spring (April/May) and Autumn (September/October)). Monitoring activities shall include consultations with WWF and similar organizations, interviews with local herdsmen, residents and contractors and field observations including actual sightings, scat and other signs.

(v) Delineating wildlife crossing corridors along the road corridor and update existing information as shown on **Figure 33** of this EIA.

(vi) Determining whether or not, and to what extent, the new paved road and its embankments have affected wildlife movements across the road corridor.

(vii) Delineating critical wildlife crossing areas including any additional mitigation measures required to reduce any effects the new road is found to have on migratory wildlife. Such measures may include reducing road embankment grades, providing additional wildlife warning signage, increasing number of reflectors, implementing speed restrictions or other practical measures.

(viii) Preparing and submitting a monitoring report to ADB within one month after each monitoring event (total of 6 monitoring reports). Each report shall provide interim results and recommendations, and shall compare and contrast results of the previous reports

11. The proposed monitoring program (Phase 1) will start during spring of 2014.

B. Ecological Study

12. **Background.** In 2007, the Western Regional Roads Development Project (WRRDP) was proposed as a two phase loan for the development of a 748.4km two lane road corridor running north-south from Mongolia's border with the Russian Federation at Ulaanbaishint to its border with the People's Republic of China (PRC) at Yarant. The entire corridor development is being funded in different sections by ADB, the Government of Mongolia, and the Government of PRC. ADB is financing sections of the WRRDP through a grant and a multitranche financing facility (MFF) for the Western Regional Road Corridor Investment Program (WRRCIP). Tranche 1 began construction in September 2012 and Tranche 2 and Tranche 3 are expected to start in April 2014 and April 2015, respectively.

13. The Western Regional Road Corridor is an existing road comprising a multi-track earth road network that is in the process of being upgraded into a two lane sealed road under the WRRCIP. The corridor runs through the Altai-Sayan eco-region. This is an eco-region known for its diversity in flora and fauna, containing over 90 species of mammals, more than 250 species of birds, 11 species of reptiles, 123 species of insects, 10 species of fish, and 1 species of amphibian. Some of the important, rare and endangered mammals that occur in the corridor are the Goitred Gazelle, (*Gazella subgutturosa*) Mongolian Saiga Antelope (*Saiga tatarica mongolica*), Argali Sheep (*Ovis ammon*), Siberian Ibex (*Capra siberica*) and Snow Leopard (*Uncia uncia*). The alignment for the road will largely remain the same with a few deviations from the existing corridor.

14. Two EIAs have been prepared and approved by ADB (August 2007 and November 2010) for Grant 0107 and Tranche 1. The draft EIA for Tranche 2 and 3 was prepared in July 2013 and will be updated with the findings of this study.

15. **Objective.** The objective of the ecological data enhancement study is to obtain site specific information on selected ecological aspects in four specific locations adjacent to the alignment of the Tranche 3 project road. This information will be used to identify opportunities where the project could facilitate improvements to the existing degraded habitats and reduced biodiversity and/or ensure any necessary protection measures during construction. Thus, the study aims to enhance the benefits of the project in respect of biodiversity protection, recognizing that the project itself is unlikely to lead to any unacceptable impacts on the existing biodiversity resources.

16. **Study Locations**. Ecological studies will be undertaken in the following four locations:

- Section of proposed new road alignment that deviates from the existing alignment near Olon Nuuruud Lakes;
- Tolbo Lake Important Bird Area (IBA)
- Intervening area between the proposed road alignment and the nearest boundary (approx. 4 km separation) of Sylkemyn Nuuru National Park
- the lake of unknown name that is close to the existing road corridor at 49°30'25.85"N, 89°31'51.70"E approximately 12.4 km south of Ulaanbaishint

17. **Outline tasks and output.** The consultant shall coordinate with the Project Implementation Unit (PIU) staff and the PIU's Environmental Monitoring Specialist (PIU-EMS) and report directly to ADB.

18. **Data collection.** The Consultant shall undertake a field survey of the four specified sections of the project corridor and consult relevant specialists and available recent reports, where appropriate.

19. **Outputs**. The consultant shall provide a report detailing the flora and fauna found in each of the study locations including mammals, birds, fish, reptiles and insects. For each study location the output will include:

(i) Mapping of main habitat features including ecological classification
(ii) Determining distribution and occurrence of wildlife and plant species within the 70 m road corridor
(iii) Assessing status of the species found, such as IUCN red list or other relevant protection status
(iv) Assessing quality of the habitat for the species found (for example is the habitat pristine, degraded, polluted)
(v) Identifying any additional mitigation measures the project could implement to reduce existing impacts of road on the flora and fauna including habitat enhancement measures.

20. Specific tasks for some locations include:

(i) Tolbo Lake IBA
- Location of breeding habitat in Tolbo lake
- Indication of species and populations which breed in the lake
- Key breeding and migratory seasons/months for breeding and migration to / from the lake

(ii) Lake of unknown name 49°30'25.85"N, 89°31'51.70"E (approximately 12.4 km south of Ulaanbaishint):
- Location of any bird breeding habitat in the lake
- Indication of bird species and populations which breed in the lake
- Key seasons/months for breeding and migration to / from the lake

21. **Detailed tasks.** The detailed tasks include:

(i) Developing a study approach, protocol and methodology for review and approval by ADB
(ii) Delineating of the study area based on the definition of the project area and previous studies of flora and fauna in or near the project area.
(iii) Conducting field survey at the specified locations in September when snow will not be present.
(iv) Conducting meetings and a desk study to obtain site specific information from specialists and published information sources. The information will be:
  a) Specific to the four locations of the road corridor as specified in this terms of reference
  b) Scientifically sound and verifiable.
(v) Preparing a draft report for peer review and comment by ADB.
(vi) Preparing a final report with detailed assessment of flora and fauna in the project area and recommended additional mitigation and enhancement measures that if implemented could facilitate improvements to the existing degraded habitats and reduced biodiversity during project construction and operation.

22. **Implementation arrangements and location**. A qualified Mongolian research institute, an environmental NGO or an independent ecological consultant or researcher with appropriate qualifications and experience in conduction ecological surveys will be contracted to design and conduct the flora and fauna survey.

C. Water Quality Monitoring – Institute of Meteorology, Hydrology and Environment

23. **Background**. The Government of Mongolia, with financial support from Asian Development Bank (ADB) is upgrading the internal transport network in the western region to improve trade and transit links between Mongolia and neighboring countries. The outcome of the Project will be an efficient and safe regional transport route that links Xinjiang Uygur Autonomous Region in the People's Republic of China and Siberia in the Russian Federation through western Mongolia.

24. The Western Regional Road Corridor is under various stages of construction and planning. The sections and status of each is below:

Section	Construction Timetable	Financed by
Yarant – Temeen Huzuu	Near completion	Government of Mongolia
Temeen Huzuu – Baga Ulaan Davaa	2011-2014	ADB – Grant 0107
Baga Ulaan Davaa – Mankhan	2012-2015	ADB Tranche 1
Mankhan – Khovd	2010-2013	Government of PRC
Khovd – Khashaatin Davaa	Not yet started (2014-2017)	ADB Tranche 2
Khashaatin Davaa – Tolbo	Not yet started (2015-2018)	ADB Tranche 2
Tolbo – Ulgii	2011-2014	Government of PRC
Ulgii – Tsanganuur	Near completion	Government of Mongolia
Tsagaannuur – Ulaanbaishint	Not yet started (2015-2018)	ADB Tranche 2

25. **Objective**. The primary objective of the assignment is to provide water quality monitoring support to the Project Implementation Unit (PIU) and Project Environmental Monitoring Consultant (PEMC) in the implementation of project environmental management and monitoring requirements during the construction of the project.

26. The main concern for water quality is for temporary increases in turbidity during construction, and accidental contamination from oil, grease, fuel, and other toxic materials associated with construction equipment. Water quality monitoring will be required at key points in important streams that cross the corridor in the project area. This work is related to the environmental requirements in ADB's Safeguards Policy Statement (2009) and the consultant should know these environmental requirements provided by Employer according to Environmental Assessment Guidelines and environmental safeguard policy of the ADB, and Environmental Impact Assessment Law of Mongolia. This monitoring will include basic parameters (e.g., temperature, suspended particles, pH, dissolved oxygen content, COD, BOD, hydrocarbon (oil, grease, fuels)).

27. **Tasks of the assignment**. The consultant shall work closely with the PIU staff and PEMC, and report directly to the project coordinator of the PIU. The consultant shall monitor and evaluate implementation of the water quality monitoring which required at key points in important streams that cross the corridor in the project area according to EIA, SEIA and EMP/EMOP through regular site audits, consultation with civil work's contractors, consultants and PEMC, and monitoring of agreed parameters for water quality. The tasks of the Water Quality Monitoring Consultant include, but are not limited to:

(i) Review EIA/IEE/SEIA reports prepared for the project to understand the environmental issues associated with the project area and the mitigation and monitoring requirements;
(ii) Review the EMP and EMOP for inclusion of all site specific issues related to water quality and make necessary amendments if any issues are not covered

and ensure that the location and timing of monitoring and water quality parameters are appropriate, and consult with PEMC;

(iii) Identify sensitive areas in terms of water pollution and water resources depletion along the road alignment, based on the review findings of DEIA report, EMP and EMOP;

(iv) Develop a detailed water monitoring plan in line with the revised EMOP, including monitoring protocol with monitoring points, sampling frequency, parameter to be monitored, analytical methods, monitoring schedule and reporting requirements;

(v) Agree the detailed monitoring plan along with the monitoring protocol for review and approval by PIU and PEMC for construction packages;

(vi) Regularly monitor water quality and check contamination through basic parameters for temperature, suspended particles, pH, dissolved oxygen content, COD,BOD and hydrocarbon (oil, grease and fuels) in accordance with the monitoring plan and report them to PIU and PEMC. Result of checking all parameters for water quality shall be included in the report;

(vii) Prepare or review (if already existing) and agree reporting formats for monthly, quarterly and semi-annual monitoring reports for water quality monitoring at the construction site;

(viii) Where necessary, request EA/Supervision Consultants to organize technical training workshops and undertake site-based 'tool-box' talks (briefings) to enhance the field level staff's understanding on water quality monitoring significances and issues. Topics may include, but not are limited to the following:

a) Typical water quality monitoring issues related to road construction
b) Environment friendly road construction techniques and their benefits
c) How to use drinking and water for construction during the road construction
d) Methods for measurements of water quality parameters;

(ix) Check the water contamination from oil, grease, fuel, and other toxic materials associated with road construction equipment in every month within the assigned period and record the result of checking for inclusion into the related reports;

(x) Check the storm water drainage and retention basins which should be constructed, and siltation fence (where a river/stream is nearby) prior to commencement of construction. Record the result of checking and submit to PIU and PEMC, if these are not constructed prior to road construction;

(xi) Take the relevant measures to construct storm water drainage, retention basins and siltation fence in consultation with PIU and PEMC during the construction period, if these were not constructed prior to road construction;

(xii) Monitor the implementation of Spill Management Plan developed by the Contractors and update this plan, or submit the comments, if necessary;

(xiii) Agree process and resolution of water issues identified during site audits or through the grievance redress mechanism and report in mid-term and final water monitoring report;

(xiv) Conduct on the job or site based practical training for the contractors where necessary while implementing the water quality monitoring;

(xv) Prepare Inception (for EA/PIU), Mid-term (for ADB Project Progress Report) and Final Water Quality Monitoring Reports (for ADB). The reports should review progress with project implementation, report results of audits and monitoring, identify problems encountered, actions taken/or proposed to be taken to resolve problems and activities programmed for next monitoring period;

(xvi) Consult with local relevant agencies and experts to interpret outcomes of water monitoring, if required;

(xvii) Include water quality test analyses and discussion of results in the monitoring reports and advise/support the contractor in taking remedial actions if any of the test results are not within the required limits;
(xviii) Facilitate public consultation and liaison with statutory agencies, where necessary;
(xix) Facilitate implementation of Grievance Redress Mechanism and maintain proper records of all water quality related grievances and details of how they were addressed; and
(xx) Maintain a copy of all water quality monitoring related statutory clearances required for implementation of the project and EMP.

28. The following reports shall be submitted by consultant/specialist to PIU/Employer and ADB:

(i) Inception Report on Activities, within 1 month after mobilization with recommendations for actions to improve water quality in line with EMP/EMOP, as required.
(ii) Special Reports on workshops and Seminars, as appropriate, within 1 week of event
(iii) Mid-term report on the implementation of Water Quality Monitoring for quarterly Project Progress Report for EA and ADB
(iv) Final water quality monitoring report for inclusion into semi-annual report of EA to ADB6 Final report includes conclusions, recommendations and appendices with all monitoring findings and data in MS Word/Excel or other acceptable format.

29. The proposed study should start as soon as possible with recommendations for sections under construction (Temeen Huzuu to Hovd) by 1 October 2013. Recommendations for sections which will start construction in 2014 (Hovd to Ulgii and Tsangaannuur to Ulaanbaishint) should be provided by 1 October 2014.

D. Environmental Monitoring Specialist (under PIU) (National 24 months)

30. The specialist will have a minimum of 10 years practical experience in the implementation of construction EMPs and environmental monitoring, ability to work with a multidisciplinary team and dealing with all aspects of site-related environmental issues, and excellent communication skills. Previous experience as a National Environment Specialist for at least one ADB or World Bank funded road project in Mongolia is desirable. The EMP implementation is formally under the Supervision Consultants contract. However, the monitoring specialist will facilitate the implementation of the EMP and ensure the grievance redress mechanism functions effectively. The expert will perform the following with respect to environmental monitoring:

(i) Review all EIAs and EMPs prepared for Phase 1-Package 1, Project 1 and Phase 1-Package 3, and Project 2 and Project 3 when available, to understand the environmental issues associated with the project area.
(ii) Consult with PIU to identify if there are any changes in the project alignment/sites or baseline environmental conditions. Assess impacts of any changes and update EMP. Review the EMP and ensure that the location and timing of monitoring and environmental parameters are appropriate.
(iii) Assist the PIU in obtaining all necessary domestic environmental approvals to allow the projects to proceed, as required.
(iv) Review Tender and Contractor Documents to ensure all required environmental specifications have been included, update as required.
(v) Prepare or review (if already existing) environmental audit checklists for daily, weekly and monthly monitoring of implementation of the EMP by the contractor.
(vi) Prepare monthly (for EA/PIU), quarterly (for ADB Project Progress Report) and biannual Environmental Monitoring Reports (for ADB). The reports should review progress with project implementation, report results of audits and monitoring, identify problems encountered, actions taken/or proposed to be taken to resolve problems and activities programmed for next monitoring period.
(vii) Conduct training workshops for field level implementing government agencies and contractors and supervision consultant engineers on the requirements and implementation of the EMP. The training workshops must cover:
    a) Key requirements and components of the EMP
    b) Contents and use of monitoring checklists
    c) Institutional set up for implementation and monitoring of the EMP
    d) Roles and responsibilities of the government, supervision consultants, contractor and other relevant agencies.

    The key outcome of the workshop must be to prepare the field staff of the implementing agency, supervision consultants and the contractor in implementing the EMP and monitoring the EMP including site audit, completion of checklists and other associated paperwork.
(viii) Monitor the implementation of the mitigation measures and monitoring requirements of the environmental management plan.
(ix) Review the plans for water quality monitoring and monitor implementation of the water quality monitoring program.
(x) Review the plans for the wildlife survey and monitor implementation of the survey.
(xi) Include water quality sampling results from the Water Quality Monitoring Consultant and discussion of results in the monitoring reports and advise/support

the contractor in taking remedial actions if any of the test results are not within the required limits.

(xii) Facilitate implementation of Grievance Redress Mechanism and maintain proper records of all environment related grievances and details of how they were addressed.

(xiii) Maintain a copy of all environment related statutory clearances required for implementation of the project and EMP.

(xiv) Facilitate consultation between the contractor and local herdsmen with respect construction scheduling, and proposed mitigation measures to control dust, and to minimize disruption to local traffic.

(xv) Facilitate consultation between the contractor and local government, Mankhan Nature Reserve Administration, NGOs, and local herdsmen with respect to:

a) The siting, quantities to be removed from, operation, and restoration of borrow areas;

b) The sources and amount of water withdrawals and from surface water and groundwater;

c) The local design and construction of livestock crossings; and

d) The design of wildlife crossings.

(xvi) Coordinate with the PIU staff responsible for the Grievance Redress Mechanism with respect to identification, investigation, and resolution of environmental and social complaints.

(xvii) Conduct regular site visits to the project area during the construction period.

31. The consultant will report directly to the PIU.

E. Community Outreach Officer – Soum level (under PIU) (National – 3 positions, total 24 person months)

32. The community outreach monitoring officers will be posted in soum centers near the project corridor to provide a direct point of contact for local people potentially affected by the program. They will serve as key contacts for the grievance redress mechanism and help to implement the SDAP. The officers will:

(i) Assist the DOR in implementing various activities outlined in the SDAP within the respective soum.
(ii) To prepare a detailed work plan on how to engage with community and households living or likely to settle along the corridor.
(iii) Use various participatory techniques to reach out to communities and households to ensure their participation in project.
(iv) Undertake Information dissemination campaign about the project, construction activities and social development strategy.
(v) Undertake focus group discussion, household survey to understand their need and priorities so as to plan realistic income generation activities.
(vi) To develop the project information material like pamphlets, brochures etc. in local language and distribute these to the households.
(vii) To facilitate PIU in setting up information dissemination bureau at soum level.
(viii) To organize skill up gradation training for HH, with special focus on women and vulnerable households.
(ix) To help HH in establishing credit linkages.
(x) To assist families to set up new enterprise like café, garage etc along the corridor.
(xi) To encourage women to set up new enterprise.
(xii) To assist the local health offices through the facilitation of the Ministry of health in carrying out a public awareness campaign and behavioral change of high-risk groups. The awareness raising will be carried out at two levels: (a) at community level; and (b) to high-risk groups (truck drivers/helpers, roadside communities and roadside amenities).
(xiii) To assist the Ministry of labour and social welfare to conduct of the community awareness campaign on human trafficking.
(xiv) To work as a liaison between the households and the PIU.
(xv) To prepare yearly work plan and submit the same to PIU.
(xvi) To submit quarterly progress reports to PIU.

33. **Qualifications and experience**. At least two years of working experiences in similar tasks with international development projects. Coordinators should have sound knowledge of local conditions in the Project areas and the needs of participatory development. Knowledge and skills in designing of instruments for data collection, especially at the community level are desired.

F. Social, HIV/AIDS and Human Trafficking Prevention Monitoring Specialist (National – 24 person-months)

34. The specialist will have a minimum of 10 years experience in monitoring social safeguards, and social development. The monitoring specialist will refine the SDAP and coordinate and facilitate its implementation and ensure the grievance redress mechanism functions effectively. The consultant will report directly to the PIU. The expert will perform the following with respect to social development monitoring:

(i) In consultation with local communities and other stakeholders (NGOs and local government agencies) within the project impact zone refine the activities such as local employment, public consultation, HIV/AIDS and Human Trafficking Prevention, Road Safety awareness, social and cultural awareness building, under the SDAP to meet the local needs and requirements;
(ii) Develop modalities for implementation of SDAP including developing strategy for liaison and coordination between various line agencies, identification and availability of budgetary sources, and developing a coordination between these agencies and the EA;
(iii) Coordinate the functions of the 3 soum level community outreach and monitoring officers. Based on the ToR, get a functional work plan developed for each soum outreach officer to ensure effective implementation of SDAP measures. Monitor progress of the working of the soum outreach officers;
(iv) Establish social, poverty monitoring procedures (including baseline surveys as required);
(v) Coordinate with the PIU staff responsible for the Grievance Redress Mechanism with respect to identification, investigation, and resolution of environmental and social complaints;
(vi) Conduct site visits to the project area during the construction period;
(vii) Prepare monthly reports on the implementation of SDAP; and
(viii) Coordinate implementation of SDAP and monitor progress.

35. On HIV/AIDS/STI and Human Trafficking risks:

(i) Assist the DOR in planning and managing the HIV/AIDS/STI and HTP Program.
(ii) Review the outputs of the ADB TA 4364-MON and assess which components can be adopted as component of Program interventions.
(iii) Assist the DOR to coordinate with the local offices of the Ministry of Health in the utilization of the training and information materials developed by TA 4364 for field application.
(iv) Assist the DOR in carrying out a public awareness campaign and behavioral modification among high-risk target population. The awareness campaign will be undertaken at two levels: (i) among the general public through public media and IEC materials and (ii) to high risk groups (truck drivers/helpers, sex workers, road side communities and road side construction workers (not related to the Project) at key spots like the border crossing, rest areas, bars, schools, hospitals and clinics.
(v) Assist the DOR to coordinate with the Ministry of Labor and Social Welfare in the design and delivery of awareness campaign on human trafficking prevention and to identify local staff responsible for its implementation.
(vi) Assist in training community monitors who will help the MLSW identify cases of HT and report these to concerned authorities.

(vii) Assist in establishing the monitoring and reporting system on HT.

36. Road safety awareness:

(i) Assist the DOR to develop a road safety awareness program for the local communities along the corridor including developing publicity and awareness building information material;
(ii) Assist the DOR to develop road safety signage (preferably symbolic signage) and in consultation with the local communities especially herdsmen, ensure these are located at appropriate locations;
(iii) Develop a plan to train community focal points on road safety awareness and through community outreach officers ensure implementation of the plan

37. Social and cultural awareness building:

(i) Assist the DOR to develop a social and cultural awareness building plan to deal with the increased arrival of outsiders/visitors such as construction workers, tourists, truck drivers
(ii) Consult with local communities to ensure that the plan is culturally and linguistically appropriate
(iii) Assist the DOR in developing culturally and linguistically appropriate information material on social and cultural awareness building
(iv) Assist the DOR to develop a dissemination strategy and monitor implementation.

38. Community based monitoring of SDAP activities: develop a mechanism for the community to monitor the implementation of activities outlined under the SDAP and establish strategies to address the suggestions/concerns in the implementation process.

39. Prepare appropriate documents to report the outcomes of various activities.

40. **Qualifications and experience**. The national Social, Environmental, and HIV/AIDS Monitoring Specialist, will have a university degree in the social sciences and at least 5 years experience of monitoring internationally financed development projects in Mongolia.

APPENDIX 2: ENVIRONMENTAL MANAGEMENT PLAN

Environmental Management Plan Tranche 2: Mitigation Measures

Note:
Tr. = Tranche
C. = Component

Issue	Location/Component	Mitigation	Timeframe	Estimated Cost $ USD	Implemented by:	Supervised/ Approved by:
Pre-Construction						
EMP & GRM Implementation	All	Appointment of one **environmental monitoring specialis**t within PIU	Pre-construction	$60,000	PIU	MRT
EMP & GRM Implementation	All	Appointment of **three** soum based **Community Outreach Monitoring Officers** within PIU	Pre-construction	$48,000	PIU	MRT
Accessibility	1a Khovd – Tolbo soum 1b Ulaanbaishint to Tsagaannuurs	**Conducting consultations** along the corridor with residents to determine common access routes and herding patterns in order to ensure embankments are passable for herders and livestock	Pre-construction, after design finalized	Included in PIU staff costs	PIU-EMS	MRT
EMP contractual obligations	All	Tender and contract documents to include EMP obligations	Tender Preparation	No additional cost	MRT	ADB
Localised Flooding	2b Khovd, Olgii internal roads	Design to include adequate drainage to ensure localized pooling of surface water and flooding does not occur	Pre-Construction	Included in contractor costs	Contractor	SE / PIU
Soil	All	**Soil Erosion Management Plan** to be submitted and approved pre-construction	Pre-construction Approval 1 month before construction commences	Included in contractor costs	Contractor	MRT
Soil and land use	All	**Aggregate/Borrow Pits and Spoil Management Plan** to be submitted and approved pre-construction	Pre-construction Approval 1 month before construction commences	Included in contractor costs	Contractor	MRT and MNET
Soil and Water Quality	All	**Spill Management Plan** **Construction Camp Management Plan** **Site Waste Management Plan** **Water Use and Management Plan** All to be submitted and approved pre-construction	Pre-construction Approval 1 month before construction commences	Included in contractor costs	Contractor	MRT
Cultural Heritage	All	**Cultural Heritage Management Plan** To be submitted and approved pre-	Pre-construction Approval 1 month	Included in contractor	Contractor	MRT

Issue	Location/Component	Mitigation	Timeframe	Estimated Cost $ USD	Implemented by:	Supervised/ Approved by:
		construction	before construction commences	costs		
Water Quality	2a Khovd, Olgii bridges	**Bridge Construction Method Statements** To be submitted and approved pre-construction	Pre-construction Approval 1 month before construction commences	Included in contractor costs	Contractor	MRT

Issue	Location/Component	Mitigation	Timeframe	Estimated Cost $USD	Implemented by:	Supervised/ Approved by:
Construction Phase: Physical Resources						
Air Quality – dust	All construction sites	Construction Site Good Practice: - Manage stockpile areas to avoid mobilisation of fine material, cover with tarpaulin and/or spray with water. - Do not overload trucks transporting earth materials. - Equip trucks transporting earth materials with covers or tarpaulin to cover loads during transport. - Install wheel washing equipment or conduct wheel washing manually at each exit of the works area to prevent trucks from carrying mud onto public roads. - Immediately clean up all mud on public roads. - Frequent watering of unpaved areas, backfill areas and any haul roads to suppress dust. - Adjust practices as necessary to increase dust suppression if nomadic herders relocate to be near construction sites, such as more frequent watering of stockpiles and roads.	Throughout construction	No additional cost	Contractor	PIU /MRT

Issue	Location/Component	Mitigation	Timeframe	Estimated Cost $USD	Implemented by:	Supervised/ Approved by:
Construction Phase: Physical Resources						
Air Quality – dust	2a Khovd and Olgii bridges 2b Khovd and Olgii internal roads	- Particular attention to dust suppression near sensitive receptors such as residential areas when construction work occurs in aimag centers. - Limit the speed of construction vehicles to 10 kph in these areas to reduce dust generation.	Throughout construction	No additional cost	Contractor	PIU /MRT
Fumes and particular matter from asphalt mixing plant, concrete batching plant and other equipment and machinery	All construction areas	- Locate asphalt plants and mixers at least 500m downwind from residential areas and all dwellings - Aggregate material should be delivered in a damp condition - Water sprays or a dust suppression agent should be correctly applied to reduce dust emissions and reduce water usage - Any raw material spills should be removed promptly - A fabric filter should be installed on each cement storage silo. - Fabric filters should be serviced and maintained in accordance with the manufacturer's recommendations. - Regularly inspect and certify vehicle and equipment emissions and maintain to a high standard.	Throughout construction	No additional cost	Contractor	PIU /MRT
Noise	All components	- Schedule construction activities, avoid noisy equipment working concurrently. - Avoid construction works, particularly noisy activities such as the use of crushers and compaction equipment from 2200hrs to 0600hrs. - If night time construction needed, consult nearby residents beforehand for their consensus. - If nomadic herders have moved within 200m of a construction area, consult them and if necessary, set up temporary noise barriers. - Ensure regular maintenance of vehicles	Throughout construction	No additional cost	Contractor	PIU /MRT

Issue	Location/Component	Mitigation	Timeframe	Estimated Cost $USD	Implemented by:	Supervised/ Approved by:
Construction Phase: Physical Resources						
		and machinery - Locate sites for rock crushing, concrete mixing and other noisy activities at least 500m away from sensitive noise receptors which are present at the time of set-up. - On public roads, minimize the use of whistles and horns.				
Noise	2a Khovd and Olgii bridges 2b Khovd and Olgii internal roads	As above, but additionally: - Limit the speed of construction vehicles in these areas to reduce engine noise				
Water Quality	Management of works in and adjacent to watercourses	- Prepare for bridge construction during the period of peak flow for surface waters (peak flow: late June – end September) to allow maximum dilution and dispersion of any sediments disturbed during construction - Erect berms or sandbags during bridge foundation works if necessary to prevent runoff polluting the rivers. - Maintain adequate flood flow during the peak flow season - Around water crossings, control of water flow speed by means of rip-rap and dissipation structures - All camps, fuel storage, re-fuelling and maintenance areas to be located at least 500m from watercourses and on hard standing. - Fuel storage on hard standing in bunded area with 100% capacity of fuel tank - Prevent construction materials and waste from entering drains in *aimag* centres and all water bodies. - Temporary drainage provision during construction, to ensure storm water running off construction areas is controlled. - Storm water drainage and retention	Pre-construction & during construction	No additional cost	Contractor	PIU /MRT

Issue	Location/Component	Mitigation	Timeframe	Estimated Cost $USD	Implemented by:	Supervised/ Approved by:
Construction Phase: Physical Resources						
		basins constructed and a siltation fence (where a river/stream is nearby) installed prior to commencement of construction at a site. - Enclosed drainage around chemical storage areas - Develop and implement Spill Management Plan. - Water collection basins and sediment traps will be installed in all areas where construction equipment is washed - Camp Waste Management plan to include management of sewage and contaminated water.				
Water Quality	All sites	- Consultation with residents during construction to confirm key drinking water sources - Give 1 week advanced warning before any construction which may increase water turbidity to allow water collection regimes to be adjusted.	During construction	Included in PIU staff costs	PIU–EMS	PIU
Water Quality	1a Khovd – Tolbo soum – Olon Nuuruud Lake	- Erect high visibility fencing around marshes and lakes to ensure construction traffic is kept at least 200m from sensitive receptors - Ensure high levels of dust suppression to ensure dust does not enter the water lake or marshes	Pre-construction and during construction	Included in contractors costs	Contractor	PIU /MRT
Water Quality	All sites	Demarcate springs and wells discovered near the construction sites to prevent unnecessary encroachment by construction traffic and contactors.	Pre-construction and during construction	Included in contractors costs	Contractor	PIU /MRT
Waste Management	All sites	- Waste Hierarchy to be the guiding principal in the Site Waste Management Plan, Construction Camp Management Plan and Aggregate, Borrow Pit and Spoil management plan - Provide appropriate covered waste storage containers for all wastes and adequately segregate hazardous and	Pre-construction and during construction	Included in contractors costs	Contractor	PIU /MRT

Issue	Location/Component	Mitigation	Timeframe	Estimated Cost $USD	Implemented by:	Supervised/ Approved by:
Construction Phase: Physical Resources						
		non-hazardous waste streams - Install confined storage points of solid and liquid wastes away from sensitive receptors, - Regularly haul wastes to an approved disposal facility as agreed with *aimag* authorities if appropriate - If waste is removed by a third party, ensure the contractor is approved by the *aimag* authorities - Contractors to be responsible for proper removal and disposal of any significant residual materials, wastes and contaminated soils prior to construction camp site handover; - Spoil will be disposed on only in sites which are approved by MRT in accordance with the Aggregate, Borrow Pit and Spoil Management Plan; - Spoil will not be disposed of on slopes or near pasture land where it may impact on vegetation; - Rehabilitate and restore spoil disposal sites in accordance with the agreed plan. - Prohibit burning of waste at all times.				
Soil Resources - Erosion	All	- Ensure contractors aware of all soil erosion vulnerabilities (areas requiring particular attention) and Aggregate/Borrow Pits Management Plan and Soil Erosion Management Plan - Step embankments over 6 m Less erodible and friable materials should be selected and good compaction, placement of gabions and riprap particularly around bridges and culverts. - If necessary, construct berms to direct rainwater runoff away from exposed soil surfaces. - Install drainage ditches and sedimentation tanks in temporary	During construction	Included in contractors costs	Contractor	PIU /MRT

Issue	Location/Component	Mitigation	Timeframe	Estimated Cost $USD	Implemented by:	Supervised/ Approved by:
Construction Phase: Physical Resources						
		construction areas to prevent soil erosion and to manage run-off. - Completion of discharge zones from drainage structures with riprap to reduce erosion when required. - Down drains/chutes lined with rip-rap/masonry or concrete to prevent erosion - Stabilise all cut slopes, embankments and other erosion prone working areas while works are on going. - Implement permanent stabilisation measures as soon as possible, at least within 30 days. - In areas where vegetation cover on soil has been disturbed, re-seed to re-vegetate with appropriate species of local provenance. - Pay close attention to drainage provision and establishment of vegetation cover on backfilled areas to prevent soil erosion. - Ensure adequate aftercare to maximise survival of any re-vegetated surfaces. - Separate topsoil from subsoil during the excavation works, store and reuse during restoration; - During restoration reshape the slope surface by notching, blazing and pocking to enhance seedling survivability				
Soil Resources – Erosion	Near water sources and pasture / grass – All components	- Use geotextile membranes where erosion risk is considered high because of local conditions such as slope gradient.	During construction	Included in contractor's costs	Contractor	PIU/ MRT
Soil Resources – Erosion	2a Khovd and Olgii bridges	- Consider placement of gabions and riprap particularly around bridges to prevent scour	During construction	Included in contractor's costs	Contractor	PIU/ MRT
Soil Resources – Contamination	All sites	- Ensure contractors aware of requirements in Spill Management Plan. - Properly store hazardous chemicals and	During construction	Included in contractor's costs	Contractor	PIU/ MRT

Issue	Location/Component	Mitigation	Timeframe	Estimated Cost $USD	Implemented by:	Supervised/ Approved by:
Construction Phase: Physical Resources						
		wastes on hard standing with containment tray or bunding. - Keep a stock of absorbent materials (e.g. sand, earth or commercial products) onsite to deal with spillages and train staff in their use. - Ensure wastes from spill management are suitably disposed of. - Record any spill events and actions taken in environmental monitoring logs and report to PIU-EMS. - Store fuel in a bunded tank and ensure refuelling of vehicles takes place on hard standing - Remove all construction waste from the site to approved waste disposal sites.				
Soil Resources – Borrow pits	All sites – borrow pits	- Pit restoration will follow the completion of works in full compliance with the agreed Borrow Pit Management Plan - Appropriate restoration of borrow areas required before final acceptance and payment under the terms of contracts; - Borrow pit areas will be graded to ensure drainage and visual uniformity; - Topsoil from borrow pit areas will be saved and reused in re-vegetating the pits; and - Additional borrow pits will not be opened without the restoration of those areas no longer in use	During construction	Included in contractor's costs	Contractor	PIU/ MRT
Permafrost degradation	Sites at which DOR identifies permafrost to be present	- Construction practices in accordance with DOR's design with regards to engineering in a permafrost environment..	During construction	Included in contractor's costs	Contractor	PIU/ MRT
Construction Phase: Biological Resources						
Fauna – bird habitat	1a Khovd – Tolbo soum	- No construction between April to June within 5km of Tolbo Lake IBA because of potential bird breeding.	During Construction	None	Contractor	PIU / MRT
Fauna – road crossings	1a Khovd – Tolbo soum 1b Ulaanbaishint to	- As much as practicable reduce road embankment grades along alignment	During Construction	$12,000	Contractor	PIU / MRT

Issue	Location/Component	Mitigation	Timeframe	Estimated Cost $USD	Implemented by:	Supervised/ Approved by:
Construction Phase: Physical Resources						
	Tsagaanuur	sections that have been identified in the EIA as potential wildlife crossing points (see Figure 33 of EIA). Establish a reporting system for observations of key faunal species, including argali sheep, during construction. PIU & WWF to be informed.				
Fauna – hunting	1a Khovd – Tolbo soum 1b Ulaanbaishint to Tsagaanuur	- Raise awareness of contractors on wildlife, hunting laws and penalties - Contractors found hunting will immediately be dismissed and subject to domestic law including prosecution. - Consultation with residents on hunting to ensure no additional hunting is occurring	During Construction	Included in PIU staff costs	PIU-EMS	PIU / MRT
Construction Phase: Socio-economic Resources						
Cultural Heritage	All sites	- In consultation with local residents, the local sites of cultural significance will be identified along the road corridor and will be delineated with high visibility fencing throughout construction phase - Awareness raising for contractors on the Cultural Heritage Management Plan - Contractors found interfering with cultural heritage sites will be dismissed and subject to domestic laws	During Construction	Included in PIU staff costs Included in contractor costs	PIU-EMS Contractor	PIU / MRT PIU / MRT
Pasture Land – Economic Resource	1a Khovd – Tolbo soum 1b Ulaanbaishint to Tsagaanuur	- Spoil is to be disposed of only in areas delineated in the Aggregate, Borrow Pit and Spoil Management plan which should avoid productive pasture land. - Borrow pits are to be only in areas delineated in the Aggregate, Borrow Pit and Spoil Management plan which should avoid productive pasture land.	During Construction	Included in contractor costs	Contractor	PIU / MRT
Pasture Land – Economic Resource	1a Khovd – Tolbo soum 1b Ulaanbaishint to Tsagaanuur	- Pasture Identification. Consultation with herders will be undertaken in advance of starting a new area of construction to identify any locally valuable grazing areas which may be affected by construction activities.	During Construction	Included in PIU staff costs	PIU-EMS	PIU / MRT
HIV/AIDS &	All sites	- Social, HIV/AIDS and Human Trafficking	During Construction	$48,000 (24	PIU	MRT

Issue	Location/Component	Mitigation	Timeframe	Estimated Cost $USD	Implemented by:	Supervised/ Approved by:
Construction Phase: Physical Resources						
Social Issues		Prevention Monitoring Specialist will be engaged for 24 months. - Soum Level Community Outreach and Monitoring Officers will be engaged. The officers will be posted in soum centres near the project corridor during construction (8 months, 3 officers)	During Construction	pm)	PIU	MRT
Community Health and Safety	All sites	- Road safety awareness will be included in the Social Development Action Plan.	During construction	$5,000 for material production	PIU	MRT
Community Health and Safety	1a Khovd – Tolbo soum	- Installation of snow fencing.	During construction	$6,000	Contractor	PIU/MRT
Community Health and Safety	All construction sites and construction camps	Construction site safety. - Clear signs placed at construction sites in view of the public, warning people of potential dangers such as moving vehicles, hazardous materials and excavation and raising awareness on safety issues. - Heavy machinery will not be used after day light and all such equipment will be returned to its overnight storage area/position before night. - All sites will be made secure, discouraging access by members of the public through fencing or security personnel, whenever appropriate	During construction	Included in contractor's costs	Contractor	PIU/ MRT
Occupational Health and Safety	All sites	- A Health and Safety Officer (HSO) will be hired or nominated to implement and supervise a Health and Safety Management Plan (HSMP). - HSMP implementation will be monitored by the HSO and all incidents recorded and report with corrective actions identified.	During construction	Included in Contractors costs	Contractor	PIU/ MRT
Operation Phase: Physical Resources						
Water Quality	2a Khovd and Olgii bridges	- Bridge design will have drainage controls which will direct run off to land instead of to the water course.	During operation	Included in construction costs	Contractor	MRT

Issue	Location/Component	Mitigation	Timeframe	Estimated Cost $USD	Implemented by:	Supervised/ Approved by:
Construction Phase: Physical Resources						
Waste Management	1a Khovd – Tolbo soum 1b Ulaanbaishint to Tsagaanuur	- Install, service and maintain litter bins in rest stops along the new sections of road - Waste to be disposed of in *aimag* authority approved disposal site. - Signage regarding litter disposal installed and maintained near all litter bins	During Operation	$12,000*	DOR	MRT
Operation Phase: Biological Resources						
Fauna	1a Khovd – Tolbo soum 1b Ulaanbaishint to Tsagaanuur	- Implementation & maintenance of road signage, reduced speed and wildlife reflectors i) for road users at known wildlife crossing points as indicated in WWF wildlife migration map Figure 33 of EIA - Replacing reflectors which are damaged or replacing signs as required - Amend location of or install further, reduced embankment grade sections, road signage, reduced speed and wildlife reflectors for road users at any additional or changed wildlife migration / crossing routes as identified during wildlife movement survey.	During Operation	$8,000*	DOR	MRT
Operation Phase: Socio-economic Resources						
Community Health and Safety	1a Khovd – Tolbo soum	- Road Safety Signage Maintenance and Upgrade	During Operation	$4,000*	DOR	MRT

*An estimate of costs for proposed operational environmental maintenance measures for one year is provided but should be incorporated into DOR budgets.

Environmental Management Plan Tranche 2: Monitoring Measures

Environmental Media/Issue	Location, Parameters, Monitoring Technique	Responsibility & Frequency
Pre-Construction Phase		
Noise	• Method, Location: Establish baseline noise data at sensitive receptors for: • Component 1a (Khovd-Tolbo soum) along road alignment at receptors such as dwellings near Khashaat Pass, Buraatin Pass and Tolbo Lake IBA • Component 1b (Ulaanbaishint to Tsagaannuur) dwellings along the road and at Sylkhemyn Nuruu national park • Component 2a (Khovd and Olgii bridges) at nearby dwellings • Component 2b (roads inside Khovd and Olgii town) dwellings and businesses along the road • At construction camp site • Parameters: Db(A) at receptors (dwellings) outside and inside.	Contractor Once before construction
Air Quality	• Method, Location: Baseline air quality data for Component 1a (along road alignment at receptors such as dwellings near Khashaat Pass and Buraatin Pass) Component 1b, dwellings at Ulaanbaishint) Component 2a at Khovd and Olgii bridge locations, Component 2b inside Khovd and Olgii towns. • Parameters: SOx NOx	Contractor Once
Surface water quality	• Method, Location: Establish baseline water quality in Buyant River, Khovd River, Olon Nuuruud Lake and other water crossings as appropriate. • Parameters: Temperature, Suspended particles pH, Dissolved oxygen, Chemical oxygen demand, Biological Oxygen Demand, Hydrocarbon, Micro-organisms such as faecal coliforms and parasites	Khovd *Aimag* Center of Meteorology, Hydrology and Environment Once
Construction Phase		
Soil erosion contamination and borrow pits	• Method, Location: Visual inspection of all active construction sites. • Parameters: (i) adequacy of soil erosion prevention measures; (ii) adequacy of soil contamination prevention techniques; (iii) location of borrow pits according to Aggregate/Borrow Pits and Spoil Management Plan (vi) adherence to Spill Management Plan and Soil Management Plan	PIU-EMS – Weekly
Solid and liquid waste management	• Method, Location: Visual inspection of all active construction sites. • Parameters: Adherence to Site Waste Management Plan and Construction Camp Management Plan.	PIU-EMS – Weekly
Occupational health and safety	• Method, Location: Visual inspection and interviews with construction workers and contractors at active construction sites • Parameters: (i) adherence to the approved Environmental, Health and Safety Management Plan (EHSMP); (ii) performance of the EHSO; (iii) worker complaints and concerns and recorded incidents.	EHSO - Weekly

Environmental Media/Issue	Location, Parameters, Monitoring Technique	Responsibility & Frequency
Community health and safety	• Method, Location: Visual inspection of all active construction sites, informal interviews with nearby residents within reason given the possible distances between sites. • Parameters: (i) availability of information on GRM; (ii) adequacy of construction site signage and fencing; (iii) adequacy of temporary noise mitigation measures; (iv) accidents involving public and workers; (v) emergencies and responses; (v) public complaints about issues such as noise, air pollution, construction site safety, localized flooding;	COMO – Monthly
Surface water quality	• Method, Location: As per pre-construction phase • Parameters: As per pre-construction phase	Khovd A*imag* Center of Meteorology, Hydrology and Environment Monthly during construction as per TOR
Air quality	• Method, Location: As per pre-construction phase • Parameters: As per pre-construction phase	Contractor – Monthly During construction
Air Quality – dust	• **Method, Location:** Visual observation of dust at dwellings near construction sites. Observations to record if dust generated by construction activities crosses property boundaries. • **Parameters:** Fugitive dust emissions	PIU-EMS – Twice monthly During Construction
Noise	• Method, Location: As per pre-construction phase • Parameters: As per pre-construction phase	Contractor – Monthly During construction
Wildlife Movement Monitoring	• Method, two times per year in first year of construction – Phase 1 (Spring and Autumn) and two times per year in 4th and 5th year of construction Phase 2 (Spring and Autumn) with methodology and actual timing of monitoring events to be confirmed by Wildlife Movement Monitoring Specialist.) Key activities likely to be a mix of consultations with WWF, interviews with local herdsmen, residents and contractors and field observations including actual sightings, scat and signs.	Wildlife Movement Specialist Six events covering three full seasonal cycles during construction/post construction period
Interview with APs	• Method, Location: Interview with potentially affected people (AP) adjacent to construction sites. • Parameters: Discussion on environmental and socio-economic issues.	PIU-EMS - Monthly COMO - Monthly
Cultural Heritage	• Method, Location: Dependent on findings during construction • Parameters: As per Cultural Heritage Management Plan	PIU-EMS - Monthly
EMP Compliance Monitoring	• Method, Location: Review of project's adherence with EMP and loan covenants • Parameters: EMP and loan covenants	MRT – Semi-Annually
Construction Completion		
Post-construction site inspection	• Method, Location: Visual inspection, post-construction environmental condition assessment at each construction site. • Parameters: Performance checked against the management plans submitted before	PIU-EMS – twice: two weeks before completion of construction activities, once after completion

Environmental Media/Issue	Location, Parameters, Monitoring Technique	Responsibility & Frequency
	construction for specific aspects such as aggregate, borrow pit and spoil management plan.	