Pre-Feasibility Analysis to Establish Logistics Facilities in Zamiin Uud, Mongolia

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<table>
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<th>Abbreviation</th>
<th>Full Form</th>
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<tr>
<td>ADB</td>
<td>Asian Development Bank</td>
</tr>
<tr>
<td>BOO</td>
<td>Build-Own-Operate</td>
</tr>
<tr>
<td>BOT</td>
<td>Build-Operate-Transfer</td>
</tr>
<tr>
<td>EIRR</td>
<td>Economic Internal Rate of Return</td>
</tr>
<tr>
<td>EPRC</td>
<td>Economic Policy Reform and Competitiveness Project</td>
</tr>
<tr>
<td>GoM</td>
<td>Government of Mongolia</td>
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<tr>
<td>KPI</td>
<td>Key Performance Indicator</td>
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<tr>
<td>MRA</td>
<td>Mongolian Railway Authority</td>
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<tr>
<td>MRTT</td>
<td>Ministry of Roads, Transport and Tourism</td>
</tr>
<tr>
<td>MTZ</td>
<td>Mongolian Railway</td>
</tr>
<tr>
<td>NCTTF</td>
<td>National Committee on Trade and Transport Facilitation</td>
</tr>
<tr>
<td>PRC</td>
<td>People’s Republic of China</td>
</tr>
<tr>
<td>PRCRR</td>
<td>Chinese railroad</td>
</tr>
<tr>
<td>PPP</td>
<td>Public-Private Partnership</td>
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<tr>
<td>SEW</td>
<td>Single Electronic Window</td>
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<tr>
<td>SSIA</td>
<td>Specialized State Inspection Agency</td>
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<tr>
<td>UBTZ</td>
<td>Ulaanbaatar Railway</td>
</tr>
<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
</tr>
<tr>
<td>VOC</td>
<td>Vehicle Operating Costs</td>
</tr>
<tr>
<td>WACC</td>
<td>Weighted Average Cost of Capital</td>
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SECTION I: INTRODUCTION

In the globalized economy of the 21st century, accessibility to inputs and to finished products as well as access to external markets are essential. Every nation is dependent upon transport connectivity.

Land-locked states face greater transport challenges, particularly when the separation from the sea is substantial, the situation that confronts Mongolia. On the other hand, Mongolia stands to benefit by its position as the logical land-bridge between two of the world’s most rapidly growing economies. Thus, Mongolia has the imperative to establish the most efficient transport chain for the good of its own consumers and producers along with the best possible border linkages in order that Mongolia can promote and benefit from the growing transit trade.

Obviously not every element of the transport corridor is within the control of the land-locked state, but Mongolia can strive to maximize the performance of those components that fall within its boundaries. This is highly beneficial in its own right. It also adds credibility when negotiating with the neighboring states that must be traversed. Mongolia’s initiatives that simultaneously improve the transit corridor for neighbors can be used as an argument for reciprocal actions to facilitate transit of Mongolian trade.

Within the existing transport framework, whether for Mongolia’s own trade flows with China or via China’s Port of Tianjin or for transit trade between PRC and Russia, the primary obstacle to the relatively smooth flow of goods appears to be capacity constraints at Zamiin Uud, the border trans-shipment point. The Government of Mongolia (GoM) is fully cognizant of this shortcoming which has recently reached crisis proportions due to congestion-induced paralysis of trade flows. Budgetary allocations have been made, and Mongolian Customs and the Ministry of Roads, Transport & Tourism are spearheading a stakeholder drive for major upgrades of facilities.

USAID, through its Economic Policy Reform and Competitiveness (EPRC) Project, agreed to sponsor this pre-feasibility assessment of a possible package of logistics improvements. In addition, the analysis considers the prospects for Public-Private Partnership (PPP) in implementation and operations of selected initiatives.

The pursuit of improved logistics can include a broad range of measures ranging from inter-agency communication to cross-border cooperation. Many of these facets are already being addressed in the Mongolian context. The present assessment is focused on enhanced physical facilities.

This report consists of three major sections:

- Existing Situation
- Proposed Projects
- Implementation Strategies
SECTION II: EXISTING SITUATION

In the middle of the Gobi Desert, the village of Zamiin Uud on Mongolia’s frontier with the People’s Republic of China constitutes a crucial intercontinental intermodal transport node (Exhibit 1). Here, high volumes of freight must undergo either rail-to-rail or road-to-rail trans-shipment.

Rail-to-rail transfers are necessitated by the fact that the Chinese railway operates on a different gauge (track width) than do Mongolia’s Ulaan Bataar Railway (UBTZ) and the Russian Railway. Therefore, freight must be transferred from one railway’s wagons to those of the other. Rail tracks of both gauges cross the border itself as far as the adjoining rail yard. The agreement between the two railways is that the physical transfer occurs in the receiving country, i.e., northbound traffic in Zamiin Uud and southbound traffic in Erlian (Erenhot).

Road transport is used on the PRC side for an estimated 50 percent of cross-border freight when the Chinese origin is relatively near the border or when there is a shortage of rail wagons due to the priority that China Railways gives to domestic PRC freight. North of the border, however, due to high vehicle operating costs (VOC) resulting from distance and road conditions, rail remains the dominant mode. Therefore, road-to-rail trans-shipment is a second major activity at Zamiin Uud.

In name and in function, Zamiin Uud is Mongolia’s southern “gateway” for both road and rail traffic. Unfortunately, despite its economic and geopolitical importance, it has received little attention or resources. Increased demand for imports by the Mongolian economy coupled with growing Chinese transit trade overland to Russia and Europe has overwhelmed the trans-shipment system. This became evident in mid-2007 when lorries were forced to wait for weeks to transfer goods. Ultimately, the PRC closed the border for ten days due to the length of the queue of lorries. In the very early days of the 2008 shipping season, congestion is already again evident and growing.

The PRC, on the other hand, has transformed Erlian (Zamiin Uud’s counterpart city across the border) into a thriving hub for trade and trans-shipment to and from Mongolia and beyond (Exhibit 2). In Erlian, some 10 square kilometers (1000 ha) is devoted to well-laid out rail yards, rail-to-rail trans-shipment, lorry loading and associated storage, logistics and value-added functions. There, the public sector, state-owned-enterprises and the private sector are all actively involved. Although the scale differs since the PRC also imports large volumes of raw materials from Mongolia and Russia, Erlian provides a useful model for Zamiin Uud.

Exhibit 3 illustrates the current process flow for northbound traffic through Zamiin Uud. Exhibit 4 depicts the relative geographic positions of the principal cargo clearance and handling centers.

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1 In its feasibility study for new 428 km Zamiin Uud – Choyr road, to be completed 2010, the Asian Development Bank assumed that approximately 95 percent of freight would continue to rely on rail along this segment of the corridor.
Exhibit 1

TRANS-ASIAN RAILWAY NORTHERN CORRIDOR
Exhibit 2

Zamiin Uud

Border

Erlian
Exhibit 3

**ENTER BY ROAD**

- Weigh Scale
- Mixed Loads
- Manual inspection
- Overland by road
  - Road-Rail transfer
  - Overland by rail
  - Scanner inspection
  - Document check
  - Final GOM clearances

**ENTER BY RAIL**

- Homogenous Loads
- Preliminary GOM clearances
- Rail-Rail transfer
  - Discharge from PRCRR
  - Load to UBTZ
  - Final GOM clearance

**PRC to UB**

- Load to UBTZ
- Final GOM clearance

Pre-Feasibility Analysis to Establish Logistics Facilities in Zamiin Uud, Mongolia
The relevant components include:

- Government of Mongolia clearances at border with PRC\(^2\);
- Physical transfer of goods: rail-to-rail and road-to-rail;
- Rail carriage to UB and beyond (UBTZ).

All need upgrading.\(^3\)

Constraints for the efficient handling of imports and increased revenues from transit are, in decreasing order of importance:

1. Insufficient number of locomotives and rolling stock of UBTZ, *an issue being addressed by others*\(^4\) so outside the scope of the present analysis;
2. Inadequate road-to-rail trans-shipment facilities and management; and
3. Congested physical facilities for border clearance.

Significant improvements are required at each step (particularly items 1 and 2 above) or investments intended to address specific bottlenecks will merely shift the problem to the next choke point.

Failure to respond holds the following downside for Mongolia:

- Short – term: Higher costs and longer waiting times for all imported goods;
- Short / Long – term: Pressure to outsource trans-shipment function to Erlian resulting in loss of jobs and revenue; and

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\(^2\) Immigration; Specialized State Inspections Agency (quality and standards); Customs.

\(^3\) The Japanese funded rail to rail trans-shipment facility is well designed and appears to function well. There will, however, be a need in the future for expanded capacity.

\(^4\) Millennium Challenge Corporation is working with MRA/MTZ to add rolling stock.
Exhibit 5

Existing rail-to-rail trans-shipment

Existing road-to-rail trans-shipment
As noted, the primary cause of congestion, insufficient UBTZ rolling stock, is being addressed by others, and the rail-to-rail trans-shipment facility is not an immediate impediment. This leaves two operational areas to be addressed:

- The Government of Mongolia border clearance locations; and
- The road-to-rail trans-shipment terminal.

The major strategic objective of the two interventions outlined below is to turn Zamiin Uud into a modern gateway to Mongolia and beyond. Operational objectives of the interventions are, *inter alia*, to:

- Reduce aggregate transaction costs—i.e., improve efficiency and effectiveness—of clearing and trans-shipment of goods;
- Facilitate control and improve operational transparency; and
- Provide opportunities for commercial and value-added activities for the benefit of trade and the economy of Mongolia.

### A. Government of Mongolia Clearance Services at Zamiin Uud

#### A.1. Components

The proposed project targets expanding the capacity and improving the efficiency of the involved Government of Mongolia agencies and consists of a number of interrelated elements. These include:

- Segregating freight from passenger traffic;
- Expanding physical facilities for inspections with improved layout;
- Computerization and linkage of Specialized State Inspection Agency (SSIA) with Customs, consistent with requirements of the Single Electronic Window (SEW) for trade facilitation project;
- Implementation of risk management systems and joint Customs-SSIA inspections.

Specific physical infrastructure components include:

- New cross-border entry road reserved for lorries;
- Second weigh scale for lorries;
- Expanded and reorganized parking / inspection area (from existing 6 ha to total of 14 hectares);
- Platforms for laying out and inspecting freight;
- Rerouted traffic flow with designated lanes, including escape lanes;
- Dedicated internal road corridor to scanner facility; and
- Perhaps not initially but as traffic grows over time, introduction of a second scanner.

Exhibit 6 illustrates current conditions and Exhibit 7 shows the sites of many of these improvements.
A.2. Implementing Party
Due to the nature of activities conducted at the expanded facility, it is presumed that this project would be fully a public sector undertaking led by GoM Customs. Accordingly, economic analyses have been performed but no financial feasibility assessment.

A.3. Cost Estimate
Initial order-of-magnitude capital cost estimates are US$150,000 for acquisition and installation of a new weigh scale and possible relocation of the existing scale. Approximately $2,465,000 is estimated for expanding the inspection yard complete with inspection platforms.

A.4. Economic Feasibility
The anticipated economic benefits of this project consist of savings in inventory costs of goods and savings in vehicle operating costs due to reduced time sitting idle while awaiting weighing and inspection.

The economic feasibility is presented in Annex A and summarized below. The resulting Economic Internal Rates of Return (EIRR) are highly positive for the two components assessed: one new weigh scale plus expanded clearance yard.

**Results of Economic Analyses: GoM Clearance investments**

<table>
<thead>
<tr>
<th>Project</th>
<th>Capital</th>
<th>Benefits</th>
<th>EIRR$^6$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weigh scale</td>
<td>$150,000</td>
<td>Average 2 hours time saving / lorry</td>
<td>&gt;200%</td>
</tr>
<tr>
<td>Expanded inspection</td>
<td>$2,465,000</td>
<td>Average 4 hours saving / lorry to 2015, 6 hours to 2020, 8 hours to 2025</td>
<td>22%</td>
</tr>
<tr>
<td>Yard Sensitivity 1</td>
<td>Time saving / lorry remains constant at 4 hours 2010 – 2025</td>
<td>16%</td>
<td></td>
</tr>
<tr>
<td>Yard Sensitivity 2</td>
<td>All costs increase by 20% + all benefits decrease by 20%</td>
<td>14%</td>
<td></td>
</tr>
</tbody>
</table>

A.5. Social Impacts
Although they have no been quantified for the economic evaluation, social benefits can also be anticipated. The expanded inspection yard and segregation of traffic will enable GoM inspectors to carry out their duties more effectively. Whereas now inspectors have little space for proper examination, in the future rapid but thorough inspection can occur. As a result, a reduction in contraband can be expected along with enhanced food and product safety.

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$^5$ Alternatively, one or both sets of inspections could be outsourced through contracts with competent private sector organizations. The present analysis, however, presumes that both Customs and SSIA in Mongolia will remain public functions.

$^6$ Multilateral Development Banks ordinarily set 12% as minimum acceptable EIRR.
Exhibit 6 Current Conditions
Existing queue for weigh scale (PRC border in background)

Existing Zamiin Uud customs clearance yard
Exhibit 7 Full inspection expansions and clearance yard expansion area

- Expansion area
- Inspector area expansion
- New lorry road to PRC
- New internal road to Scanner
- Possible new scanner
- Existing scanner
B. New Logistics and Road-to-Rail Trans-shipment Facilities

B.1. Project Components

To rationalize and expand the capacity for trans-shipment of goods once these are cleared and inspected at the border, the immediate need is for new Road-to-Rail trans-shipment facilities. Once these begin operations, the site now being used for this purpose can be used to expand the current Rail-to-Rail trans-shipment facility.

This will require, at a minimum, the following:

- Formal reservation of site for phased long-term development (+/-170 hectares recommended);
- High capacity road corridor linking site to new ZU – UB highway;
- Expandable network of rail sidings with associated loading platforms for road – rail transfers;
- Full range of transfer equipment from bridge cranes to forklifts;
- Efficient internal road circulation network designed for heavy lorry traffic;
- Space for open storage and for warehouses with lorry load / discharge platforms and cross-dock road-to-rail capability (could build on spec and / or build to suit); and
- Customs bonded areas / designation.

In addition, EPRC strongly recommends that the railways, through their pricing programs, promote palletization and other unit-load packaging to facilitate physical interchanges.

Exhibits 8 and 9 illustrate the overall logistics / road-to-rail project concept at full development and at an intermediate stage. The proposed site is adjacent to an existing rail siding approximately 5.5 kilometres north of the existing road-to-rail trans-shipment location and some nine kilometers north of the border.

B.2. Implementing Parties

Given the range of stakeholders, it is recommended that this initiative be undertaken as a Public – Private Partnership (PPP). This is addressed in more detail in Section IV, Implementation.

B.3. Cost Estimate

Order of magnitude capital cost estimate for the road-to-rail trans-shipment facilities only are +/-US$5,000,000 in the initial stage and approximately $4,000,000 in subsequent investments.

It is important to recognize that the foregoing relatively modest sums relate solely to the immediate crisis point: road-to-rail trans-shipment. The larger opportunity of establishing logistics and value-added facilities could entail investments of as much as $100,000,000 by the time the proposed site is fully developed. For example, an area of 64 ha is reserved for such functions in the initial concept outline. If one half of this area (320,000 m2) were built up as structures at $250 / m2, the investment would be $80,000,000. Paving the other half (320,000 m2) for internal parking, circulation and open storage at $35 / m2 would add another $11,000,000. Additional investment would go into internal equipment and information systems. This is no small project.
B.4. Economic Feasibility

The anticipated economic benefits of the trans-shipment component of this project consist of savings in inventory costs of goods and savings in vehicle operating costs due to reduced time sitting idle while awaiting the opportunity to offload. The warehousing and value-added logistics are commercial activities to be decided upon by interested private sector investors. The economic feasibility of the road-to-rail trans-shipment component (roadway and railway investments) is presented in Annex B and summarized below. The analysis reveals a highly robust project from an economic perspective.

Results of Economic Analyses: Road-to-Rail Trans-shipment Facility

<table>
<thead>
<tr>
<th>Project</th>
<th>Capital</th>
<th>Benefits</th>
<th>EIRR 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Trans-shipment facility</td>
<td>2009: $5,000,000 2014: $4,000,000</td>
<td>Average 24 hours time saving / lorry</td>
<td>43%</td>
</tr>
<tr>
<td>Sensitivity 1</td>
<td>Lorry traffic reduced by 20 %</td>
<td></td>
<td>32%</td>
</tr>
<tr>
<td>Sensitivity 2</td>
<td>Average time saving / lorry only 8 hours</td>
<td></td>
<td>21%</td>
</tr>
<tr>
<td>Sensitivity 3</td>
<td>Combine sensitivity 1 and 2</td>
<td></td>
<td>13%</td>
</tr>
<tr>
<td>Sensitivity 4</td>
<td>All costs double</td>
<td></td>
<td>18%</td>
</tr>
</tbody>
</table>

B.5. Social Impacts

The proposed logistics and road-to-rail trans-shipment facility will be a significant catalyst for regional economic development. As the warehousing and logistics enterprises develop, they will generate substantially expanded employment opportunities at Zamiin Uud.

In addition, as the road-to-rail transfer services become more efficient the temptation to offer “speed money” to advance in the queue will greatly diminish. Faster, better organized and more reliable service will result in more orderly and patient behavior on the part of all involved.

7 Multilateral Development Banks ordinarily set 12% as minimum acceptable EIRR.
CONCEPT PLAN: ZAMIIN UUD LOGISTICS FACILITY
FULL DEVELOPMENT

Warehousing/Logistics/Distribution: 450*1800 = 81 ha

Entry/Perimeter Road
400*400m
16ha
(Can be subdivided)

Road – Rail transfer yard: 500*1800 = 90 ha

Total area: 950m*1800m = 171 ha

Exhibit 8
CONCEPT PLAN: ZAMIIN UUD LOGISTICS FACILITY
INTERMEDIATE DEVELOPMENT

Warehousing/Logistics/Distribution 450*900 = ± 40ha

Entry/Perimeter Road
400*400m

16ha
(Can be subdivided)

4ha
1ha

Open storage

Road – Rail transfer yard 350*900 = ± 32ha

Total area: 800m*900m = ± 72ha
Reserve area: 99ha

Exhibit 9
SECTION IV: IMPLEMENTATION STRATEGIES

A. Government of Mongolia Clearance Services at Zamiin Uud

A.1. Implementing Agency

As already noted, it is expected that the clearance functions will remain with entities of the Government of Mongolia so that the various components of the facilities enhancement project will be funded with public resources. It is presumed that Customs will serve as the executing agency.

A.2. Proposed Schedule

Indicative schedule of actions for this intervention would be as follows:

May 2008:
- NCTTF and Customs will decide how they wish to proceed;
- EPRC will, if GoM desires, commission planner / designer to design civil works and draft tender documents for inspection yard; and
- EPRC will assist SSIA with IT network design at ZU inspection station and offer recommendations to prepare for interface with Customs and SEW.

June 2008:
- Design for expanded border crossing / inspection yard will be submitted to GoM.

July 2008:
- GoM will tender and award civil works contract for border clearance facilities.

B. New Logistics and Road-to-Rail Trans-shipment Facilities

B.1. Implementing Agency

The proposed logistics and road-to-rail trans-shipment facility project is:
- extensive (ultimately absorbing +/-170 hectares),
- multi-faceted (rail; road; storage / distribution / value-added), and
- costly.

Furthermore, it contains:
- elements of public policy and regulation (allocation of land and resources; economic and regional development; customs bonded activities) along with
- a range of purely commercial opportunities (both support to existing core businesses as well as new self-contained business ventures) assuming costs, particularly start-up costs, can be contained.

The mixture of perspectives and of stakeholder objectives inherent in such an initiative suggest that successful implementation of this project may best be accomplished through a Public – Private Partnership (PPP). In short, if all stakeholders collaborate and cooperate, each can achieve its own ends while the project output can be optimized. Exhibit 10 illustrates conceptually a PPP framework for the proposed Zamiin Uud Logistics and Road-to-Rail Trans-shipment Facility.8

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8 Exhibit 10 is intended only to illustrate the PPP concept and does not purport to recommend share allocations.
Exhibit 10

Zamiin Uud
Proposed New Road-to-Rail Trans-shipment Facility

Note: Graphic represents possible PPP participants but is not intended to represent relative shares.
B.2. Prospective PPP Participants

The public sector is involved through its control over the requisite lands as well as through Customs. Public infrastructure, including the road link to the new ADB-financed national highway, will be required. The Municipality will be particularly interested since a development of this nature and magnitude can be expected to alter dramatically land use and growth patterns.\(^9\)

The Mongolia Railway Authority (MRA) is involved as a regulator since at least one-half of the development area will constitute a major multi-user intermodal rail yard. Both the new Mongolia Railway operating company (MTZ) and the existing UBTZ will have high stakes as they will be users and possible financiers / installers\(^10\) of the rail lines within the site. They may also be providing at least part of the trans-shipment services through handling equipment which they may purchase. (Alternatively, provision of such services and equipment may be contracted out to an independent third party operator.)

The private sector, as owners or owners’ representatives of the freight will be the consumers of the trans-shipment services and will therefore, be expected to pay for those services, either directly or within the overall trucking and rail freight charges. Where demurrage charges are encountered, e.g., for freight containers, the private sector will also bear any such burden of inefficient services.

Furthermore, from the private sector will come the parties who seek to generate revenues from storage and distribution services and from value-added logistics initiatives.

B.3. Proposed PPP Structure

The PPP concept envisages a development / management consortium of all interested stakeholders from the foregoing sectors. The private sector is envisaged to generate, over time, the bulk of investments and activities on the full 170 hectares. For this reason, it is recommended that commercial (i.e., private sector) management and majority control be built into the PPP from the outset. The public interest can be protected during the formation of the PPP through performance standards and Key Performance Indicators (KPI) and through careful and reasoned regulation by contract.

Issues of regulation include but are not limited to equitable pricing and access to services, freedom of entry for future investors / operators, returns on investment (for public service concessions), etc. These considerations must be carefully debated and developed in dialogue with all stakeholders (whether or not they choose to be candidates for ultimate inclusion in a development / operating consortium) in shaping the PPP contract.

In light of the various and differing objectives of prospective PPP members as well as the fact that not all stakeholders may ultimately opt to enlist in the PPP, it is worthwhile to consider recruitment of an independent third-party manager (and possible investor). This could be a domestic enterprise or one created and spun off from domestic PPP participants or it could be foreign.

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\(^9\) It is recommended that, if the project is to proceed, the Municipality should simultaneously embark on a detailed land use and circulation plan and zoning study for the vicinity. Until this planning effort is completed, a moratorium on further land allocation surrounding the new Trans-shipment Facility site is recommended in order to avoid speculative acquisition. With the land use plan in place the Municipality can anticipate more orderly development and the Government can maximize its returns.

\(^10\) It is recommended that any rail lines within the site that are not developed directly through the consortium be, at most, a Build-Operate-Transfer (BOT) basis rather than Build-Own-Operate (BOO).
As one example only, Jebel Ali Free Zone International (JAFZI), the external arm of the highly successful Free Zone developer/operator in Dubai, seeks out appropriate investment opportunities in the logistics sector abroad. Just as in Dubai, JAFZI functions solely as an investor/manager and scrupulously avoids opening enterprises for its own account so as to not enter into competition with its locators.

Other foreign investors/operators may be attracted because, like their Mongolian counterparts, they seek opportunities within their core businesses as well as the role of overall site developer/manager. Again, for illustration only, the very large Kuwaiti logistics service provider Agility\(^{11}\) manages logistics parks where it is both the developer/landlord and an investor/operator of some of the internal enterprises.

For the protection of all investors, but particularly if foreign participants are to be invited, a careful legal due diligence is essential, and establishment of a transparent and supportive legal and regulatory environment is strongly advised. Annex C presents an initial assessment of legal/regulatory issues relevant to creation of a PPP in Mongolia.

**B.4. Proposed Schedule**

The critical immediate bottleneck of road-to-rail trans-shipment is already being addressed through construction, under UBTZ leadership, of the initial new rail sidings and transfer platforms. These will be operational by June of this year.

With this important initiative already undertaken, there is time for a deliberate and well-considered approach to the market discretionary aspects of the project: the logistics facilities and the PPP approach. “Deliberate” as used herein is meant to imply orderly and inclusive, not slow. Indicative schedule of actions for this intervention would be:

**May / June 2008:**
- GoM and Zamiin Uud Municipality reserve minimum 170 hectare plot (approximately 950m*1800m).
- Prime Minister issues decree to establish a small Working Group composed of high-level representatives from, for example, the Ministry of Roads, Transport and Tourism (MRTT), railway interests (MRA, MTZ, UBTZ), freight forwarding companies, and Customs (and possibly Zamiin Uud Municipality) — the main stakeholders for the road-to-rail trans-shipment and logistics facility.
- EPRC can assist stakeholders by engaging site planning expertise to commence drafting a phased physical development Master Plan, incorporating UBTZ work already underway, and cost estimates in dialogue with stakeholders.
- EPRC will, if stakeholders desire, commission PPP / logistics specialists and supporting legal and financial expertise to commence drafting a business plan (including sources of finance) in dialogue with stakeholders with the objective of forming a consortium of interested stakeholders.
- Stakeholders agree in principle on the business model approach, potentially a separate joint-stock company patterned along a Public-Private Partnership (PPP) model and co-development of the site.
- Detailed review of legal and regulatory environment and draft the necessary laws or amendments to facilitate the PPP.

**August 2008:**
- Presentation to stakeholders findings and recommendations of physical planner and PPP team.

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\(^{11}\) Formerly Public Warehousing Company (PWC).
August / October 2008:
- Formation of the PPP legal entity.
- Phase-1 design and tender documents (with potential EPRC assistance if desired)
- Enact enabling legislation as deemed necessary (GoM)
- Secure financing (by consortium, with potential EPRC assistance if desired)

October 2008 / September 2009
- Tender and construct (by consortium)

October 2009
- Operation (by consortium)
ANNEX A: ECONOMIC ANALYSIS: EXPANDED GoM CLEARANCE FACILITIES
ANNEX A: ECONOMIC ANALYSIS: EXPANDED GoM CLEARANCE FACILITIES

A. Economic Benefits

An economic analysis measures the broad costs and benefits to society and to the economy of a proposed project. It differs from a financial analysis in that it is not directly concerned with revenues, profits, payback and financial feasibility.

The economic analysis of the proposed expansion of GoM clearance facilities addresses two separate initiatives. These are:

- Addition of a new (second) weigh scale to reduce the average wait to be weighed for all lorries crossing into Mongolia from PRC from four hours to two hours; and
- Expansion of the GoM clearance yard for all lorries carrying mixed loads, thereby requiring manual inspection, to reduce the average waiting time from eight hours to no more than four hours.

The time saving benefits are assumed to be net, i.e., they actually serve to reduce the vehicle’s round trip by the estimated amount rather than simply shift the waiting time to the next congestion point. This net saving, therefore, is dependent upon improved efficiencies throughout the system rather than simply at a single choke point. Since all aspects of congestion at Zamii Uud are currently being addressed (GoM clearance and road-to-rail trans-shipment under this analysis and additional rolling stock by others), this assumption of net time saving is considered valid.

A.1. Savings in Vehicle Operating Costs

Benefit measurement is based upon the detailed assessment carried out under Asian Development Bank auspices for the new road currently under construction linking Zamii Uud to Choyr. The ADB projected the following number of northbound lorries would enter Mongolia at Zamii Uud in each target year:

- 2010: 65,000 lorries (>170 / day);
- 2015: 76,000 lorries (>200 / day);
- 2020: 95,000 lorries (>260 / day);
- 2025: 120,000 lorries (>320 / day).

The ADB further projected the fleet mix of lorries divided into categories of Medium, Heavy, and Tractor-Trailer. ADB foresaw a gradual shift of ratios of the three with the share of Medium vehicles slowly growing and that of Tractor-Trailers diminishing slightly over time. For ease of analysis, rather than reflect ADB’s yearly fleet evolution, the current assessment adopts the fleet mix forecast for 2021 of 25/40/35 for M/H/TT proportions respectively. This is a conservative approach since the more costly larger categories have higher shares in the earlier project years.

ADB calculated Vehicle Operating Costs (VOC) for the various lorry sizes. When applied to the 2021 fleet mix these costs (at 2003 levels) average for each lorry US$30.85 / hour. If one

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12 It is anticipated that in the future, as traffic grows, a third project will be introduction of a new (second) x-ray scanner, but this is not included in the package under assessment herein.
13 50 percent of lorries entering Mongolia are assumed to be carrying mixed loads.
14 The stated time savings are based upon current times in queue. In the absence of improved facilities all delays will lengthen, and, for the yard expansion component, this has been reflected by expanding time savings over the “no project” case in 2015 and again in 2020.
15 ADB RRP: MON 35377, June 2004. The ADB feasibility study used 2003 data; the benefit figures extracted from that analysis have not been escalated herein so are considered highly conservative.
very conservatively assumes that only ten percent (10%) of VOC are fixed costs, i.e., reflecting, e.g., capital / insurance / driver costs, and 90 percent (90%) are variable, i.e., fuel / lubrication / tires / wear and tear requiring repair and maintenance / etc., the average fixed cost is approximately US$3.085 per hour or $37.02 per day if lorries operate 12 hours per day. These fixed costs represent the costs incurred by lorry owners during periods of inactivity or delay. All costs are presumed to be passed on to the freight owners through the haulage charges and are ultimately reflected in the market cost of goods in Ulaanbaatar.

**A.2. Savings in Freight Inventory Costs**

The second cost of delay is the value of the lorry freight and the cost of holding inventory longer than required. Again ADB addressed this cost and calculated an average freight value of $500 / ton. Applying the Weighted Average Cost of Capital (WACC), ADB then calculated an inventory cost of $0.16 / ton / day.

Lorries crossing the weigh scale at the Zamiin Uud clearance station carry loads ranging from 20 tons to 80 tons. The new ZU – Choyr road is being constructed to Asian Highway Class 3 Standards designed for loads up to 60 tons. If it is assumed that Medium sized lorries average 20 ton loads, Large lorries 40 tons and Tractor-Trailers 60 tons, at the fleet mix of 25/40/35 the average lorry load is 42 tons.

The value of an average lorry load at $500 / ton is, therefore, $21,000. At $0.16 / ton / day, a 42-ton lorry-load inventory cost is $6.72 per day or $0.28 / hour since, in this case, a 24-hour day should be considered. This cost is a cost to the freight owner and can be expected to be passed on to the ultimate consumer.

**A.3. Total Benefits**

Consolidating the foregoing shows the following savings to be achieved by reducing time spent in the GoM clearance process:

- Per hour saved: $3.085 VOC + $0.28 inventory = $3.365 / hour;
- Per day saved: $37.02 VOC + $6.72 inventory = $43.74 / day.

**B. Costs**

**B.1. Financial Costs**

This is an economic rather than a financial assessment. Therefore, as with quantification of benefits, cost estimates at this stage are simple and conservative. For the two proposed interventions at the GoM clearance facilities costs are as shown in the following table.

<table>
<thead>
<tr>
<th>Project</th>
<th>Capital Cost</th>
<th>Maintenance</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>New weigh scale</td>
<td>$150,000</td>
<td>15% of capital p.a. due to equipment component</td>
<td></td>
</tr>
<tr>
<td>Expanded inspection yard</td>
<td>$2,465,000</td>
<td>3% of capital p.a. since only civil works</td>
<td>$35/sqm heavy duty paving and 85% coverage of 8 ha; 1000m of raised inspection platforms at $85,000/km; no cost for land.</td>
</tr>
</tbody>
</table>
B.2. Economic Costs

Because this is an economic analysis it is necessary to take cognizance of shadow costs or the variances between financial costs and opportunity costs within the Mongolian economy. The ADB road assessment has already identified the shadow cost factors below, and these are also used herein.

### ADB Shadow Cost Factors for Mongolia

<table>
<thead>
<tr>
<th>Input</th>
<th>Conversion Factor</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tradable materials</td>
<td>1.07</td>
<td>Capital costs for scale increase by 6% since mostly tradable imports; offset slightly by low shadow cost of local labor.</td>
</tr>
<tr>
<td>(cement, steel, etc.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-tradable materials</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>(gravel, sand, etc.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skilled labor</td>
<td>1.00</td>
<td>Capital costs for inspection yard increase by 4% since cement imported but other inputs local.</td>
</tr>
<tr>
<td>Unskilled labor</td>
<td>0.70</td>
<td></td>
</tr>
<tr>
<td>Tradable equipment</td>
<td>1.07</td>
<td></td>
</tr>
<tr>
<td>Non-tradable equipment</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Land</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

As a result of the foregoing, the economic capital costs of the two projects are as listed below. The O&M percentages remain the same since parts and materials are also largely imported.

- Weigh scale: \[150,000 \times 1.06 = 159,000\]
- Inspection Yard: \[2,465,000 \times 1.04 = 2,564,000\]

C. Benefit / Cost Assessments

Tables A1 and A2 depict the results of the economic assessments. The project time frame assumes construction in 2009. Operational benefits are then measured for the following 16 years, 2010 through 2025.\(^{16}\)

Given the relatively low investment and the large number of beneficiaries (every entering lorry must be weighed), introduction of a second weigh scale shows immense economic benefits. Even when time savings are assumed to be no more than two hours per vehicle for the entire project period, a highly positive Economic Internal Rate of Return (EIRR) exceeding 200 percent is indicated. Greater savings are anticipated in reality. (Multilateral Development Banks typically set an EIRR benchmark of 12 percent.) Given the extremely positive outcome it was not necessary to run additional sensitivity analyses.

For the expanded and reorganized inspection yard project the results are also positive. Only one half of all lorries are assumed to benefit from the improved yard (the remainder going directly from the scale to the scanner for inspection and clearance). Nevertheless, assuming time savings for this contingent of four hours (2010-2014), six hours (2015-2019) and eight hours (2020-2025) results in an EIRR of 22 percent.

Sensitivity analyses were also run for the yard improvement initiative. If time savings do not grow, i.e., remain constant at four hours from 2010 through 2025, the EIRR remains very favorable at 16 percent.

If, compared to the Base Case, all costs escalate by 20 percent plus traffic is 20 percent lower than forecast, the EIRR still remains acceptable at 14 percent.

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\(^{16}\) For economic evaluations, all values are kept constant with no escalation for inflation, etc.
Table A1: Benefit / Cost Assessment of New Weigh Scale

<table>
<thead>
<tr>
<th>Year</th>
<th>Net bound lorrys</th>
<th>VOC savings</th>
<th>Inventory savings</th>
<th>Total savings</th>
<th>Capital Maintenance and Operations</th>
<th>Total cost</th>
<th>Net Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>159,000</td>
<td></td>
<td></td>
<td></td>
<td>159,000</td>
<td>-159,000</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>66,248</td>
<td>408,747</td>
<td>37,099</td>
<td>445,846</td>
<td>23,850</td>
<td>23,850</td>
<td>421,996</td>
</tr>
<tr>
<td>2011</td>
<td>68,438</td>
<td>422,259</td>
<td>38,325</td>
<td>460,584</td>
<td>23,850</td>
<td>23,850</td>
<td>436,734</td>
</tr>
<tr>
<td>2012</td>
<td>70,810</td>
<td>436,898</td>
<td>39,654</td>
<td>476,551</td>
<td>23,850</td>
<td>23,850</td>
<td>452,701</td>
</tr>
<tr>
<td>2013</td>
<td>73,548</td>
<td>453,788</td>
<td>41,187</td>
<td>494,975</td>
<td>23,850</td>
<td>23,850</td>
<td>471,125</td>
</tr>
<tr>
<td>2014</td>
<td>76,285</td>
<td>470,678</td>
<td>42,720</td>
<td>513,398</td>
<td>23,850</td>
<td>23,850</td>
<td>489,548</td>
</tr>
<tr>
<td>2015</td>
<td>79,205</td>
<td>488,695</td>
<td>44,355</td>
<td>533,050</td>
<td>23,850</td>
<td>23,850</td>
<td>509,200</td>
</tr>
<tr>
<td>2016</td>
<td>82,308</td>
<td>507,837</td>
<td>46,092</td>
<td>553,929</td>
<td>23,850</td>
<td>23,850</td>
<td>530,079</td>
</tr>
<tr>
<td>2017</td>
<td>85,958</td>
<td>530,358</td>
<td>48,136</td>
<td>578,494</td>
<td>23,850</td>
<td>23,850</td>
<td>554,644</td>
</tr>
<tr>
<td>2018</td>
<td>89,608</td>
<td>552,878</td>
<td>50,180</td>
<td>603,058</td>
<td>23,850</td>
<td>23,850</td>
<td>579,208</td>
</tr>
<tr>
<td>2019</td>
<td>93,623</td>
<td>577,651</td>
<td>52,429</td>
<td>630,079</td>
<td>23,850</td>
<td>23,850</td>
<td>606,229</td>
</tr>
<tr>
<td>2020</td>
<td>98,003</td>
<td>604,675</td>
<td>54,881</td>
<td>659,557</td>
<td>23,850</td>
<td>23,850</td>
<td>635,707</td>
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<tr>
<td>2021</td>
<td>102,748</td>
<td>633,952</td>
<td>57,539</td>
<td>691,491</td>
<td>23,850</td>
<td>23,850</td>
<td>667,641</td>
</tr>
<tr>
<td>2022</td>
<td>107,310</td>
<td>662,103</td>
<td>60,094</td>
<td>722,196</td>
<td>23,850</td>
<td>23,850</td>
<td>698,346</td>
</tr>
<tr>
<td>2023</td>
<td>111,873</td>
<td>690,253</td>
<td>62,649</td>
<td>752,902</td>
<td>23,850</td>
<td>23,850</td>
<td>729,052</td>
</tr>
<tr>
<td>2024</td>
<td>117,165</td>
<td>722,908</td>
<td>65,612</td>
<td>788,520</td>
<td>23,850</td>
<td>23,850</td>
<td>764,670</td>
</tr>
<tr>
<td>2025</td>
<td>122,823</td>
<td>757,815</td>
<td>68,781</td>
<td>826,595</td>
<td>23,850</td>
<td>23,850</td>
<td>802,745</td>
</tr>
</tbody>
</table>

NPV 12% 3,147,475
EIRR 269%
### Table A2: Benefit / Cost Assessment of Expanded Inspection Yard

<table>
<thead>
<tr>
<th></th>
<th>Net bound lorries</th>
<th>VOC savings</th>
<th>Inventory savings</th>
<th>Total savings</th>
<th>Capital Maintenance and Operations</th>
<th>Total cost</th>
<th>Net Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>2,564,000</td>
<td>2,564,000</td>
<td>-2,564,000</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2010</td>
<td>33,124</td>
<td>408,747</td>
<td>37,099</td>
<td>445,846</td>
<td>76,920</td>
<td>76,920</td>
<td>368,926</td>
</tr>
<tr>
<td>2011</td>
<td>34,219</td>
<td>422,259</td>
<td>38,325</td>
<td>460,584</td>
<td>76,920</td>
<td>76,920</td>
<td>383,664</td>
</tr>
<tr>
<td>2012</td>
<td>35,405</td>
<td>436,898</td>
<td>39,654</td>
<td>476,551</td>
<td>76,920</td>
<td>76,920</td>
<td>399,631</td>
</tr>
<tr>
<td>2013</td>
<td>36,774</td>
<td>453,788</td>
<td>41,187</td>
<td>494,975</td>
<td>76,920</td>
<td>76,920</td>
<td>418,055</td>
</tr>
<tr>
<td>2014</td>
<td>38,143</td>
<td>470,678</td>
<td>42,720</td>
<td>513,398</td>
<td>76,920</td>
<td>76,920</td>
<td>436,478</td>
</tr>
<tr>
<td>2015</td>
<td>39,603</td>
<td>733,042</td>
<td>66,532</td>
<td>800,574</td>
<td>76,920</td>
<td>76,920</td>
<td>722,654</td>
</tr>
<tr>
<td>2016</td>
<td>41,154</td>
<td>761,756</td>
<td>69,138</td>
<td>830,894</td>
<td>76,920</td>
<td>76,920</td>
<td>753,974</td>
</tr>
<tr>
<td>2017</td>
<td>42,979</td>
<td>795,537</td>
<td>72,204</td>
<td>867,741</td>
<td>76,920</td>
<td>76,920</td>
<td>790,821</td>
</tr>
<tr>
<td>2018</td>
<td>44,804</td>
<td>829,317</td>
<td>75,270</td>
<td>904,588</td>
<td>76,920</td>
<td>76,920</td>
<td>827,668</td>
</tr>
<tr>
<td>2019</td>
<td>46,811</td>
<td>866,476</td>
<td>78,643</td>
<td>945,119</td>
<td>76,920</td>
<td>76,920</td>
<td>868,199</td>
</tr>
<tr>
<td>2020</td>
<td>49,001</td>
<td>1,209,351</td>
<td>109,763</td>
<td>1,319,114</td>
<td>76,920</td>
<td>76,920</td>
<td>1,242,194</td>
</tr>
<tr>
<td>2021</td>
<td>51,374</td>
<td>1,267,904</td>
<td>115,077</td>
<td>1,382,981</td>
<td>76,920</td>
<td>76,920</td>
<td>1,306,061</td>
</tr>
<tr>
<td>2022</td>
<td>53,655</td>
<td>1,324,205</td>
<td>120,187</td>
<td>1,444,393</td>
<td>76,920</td>
<td>76,920</td>
<td>1,367,473</td>
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<tr>
<td>2023</td>
<td>55,936</td>
<td>1,380,507</td>
<td>125,297</td>
<td>1,505,804</td>
<td>76,920</td>
<td>76,920</td>
<td>1,428,884</td>
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<tr>
<td>2024</td>
<td>58,583</td>
<td>1,445,816</td>
<td>131,225</td>
<td>1,577,041</td>
<td>76,920</td>
<td>76,920</td>
<td>1,500,121</td>
</tr>
<tr>
<td>2025</td>
<td>61,411</td>
<td>1,515,630</td>
<td>137,561</td>
<td>1,653,191</td>
<td>76,920</td>
<td>76,920</td>
<td>1,576,271</td>
</tr>
</tbody>
</table>

Assumes 50% lorries go to scanner; 50% to inspection yard

<table>
<thead>
<tr>
<th></th>
<th>NPV</th>
<th>EIRR</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>2,056,184</td>
<td>12%</td>
</tr>
<tr>
<td>2025</td>
<td>1,472,194</td>
<td>22%</td>
</tr>
</tbody>
</table>
ANNEX B: ECONOMIC ANALYSIS: NEW ROAD-TO-RAIL TRANS-SHIPMENT FACILITY
ANNEX B: ECONOMIC ANALYSIS: NEW ROAD-TO-RAIL TRANS-SHIPMENT FACILITY

A. Economic Benefits

An economic analysis measures the broad costs and benefits to society and to the economy of a proposed project. It differs from a financial analysis in that it is not directly concerned with revenues, profits, payback and financial feasibility.

The economic analysis of the proposed new road-to-rail trans-shipment facility addresses only the investments necessary for trans-shipment. The additional project facilities suggested at the same location, such as for warehousing and distribution, value-added logistics activities, etc., are not included herein since these are seen as purely commercial ventures to be taken up by private investors only as and when they identify specific market opportunities.

As with the proposed improvements to GoM clearance facilities, benefits are measured on savings in Vehicle Operating Costs (VOC) and freight inventory costs (The discussion of these benefits in Annex A is repeated below.). Again, the time saving benefits are assumed to be net, i.e., they actually serve to reduce the vehicle’s round trip by the estimated amount rather than simply shift the waiting time to the next congestion point. This net saving, therefore, is dependent upon improved efficiencies throughout the system rather than simply at a single choke point. Since all aspects of congestion at Zamii Uud are currently being addressed (GoM clearance and road-to-rail trans-shipment under this analysis and additional rolling stock by others), this assumption of net time saving is considered valid.

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ADB calculated VOC for the various lorry sizes. When applied to the 2021 fleet mix these costs (at 2003 levels) average for each lorry US$30.85 / hour. If one very conservatively assumes that only ten percent (10%) of VOC are fixed costs, i.e., reflecting, e.g., capital / insurance / driver costs, and 90 percent (90%) are variable, i.e., fuel / lubrication / tires / wear and tear requiring repair and maintenance / etc., the average fixed cost is approximately US$3.085 per hour or $37.02 per day if

17 ADB RRP: MON 35377, June 2004. The ADB feasibility study used 2003 data; the figures extracted from that analysis have not been escalated herein so are considered highly conservative.
18 The ADB figures indicate their expectation that 94 – 95% of these lorries would trans-ship their loads to rail at Zamii Uud. This is the portion that will benefit from the proposed improvements.
lorries operate 12 hours per day. These fixed costs represent the costs incurred by lorry owners during periods of inactivity or delay. All costs are presumed to be passed on to the freight owners through the haulage charges and are ultimately reflected in the market cost of goods in Ulaanbaatar.

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The value of an average lorry load at $500 / ton is, therefore, $21,000. At $0.16 / ton / day, a 42-ton lorry-load inventory cost is $6.72 per day or $0.28 / hour since, in this case, a 24-hour day should be considered. This cost is a cost to the freight owner and can be expected to be passed on to the ultimate consumer.

A.3. Total Benefits

Consolidating the foregoing shows the following savings to be achieved by reducing time spent in the GoM clearance process:

- Per hour saved: $3.085 VOC + $0.28 inventory = $3.365 / hour;
- Per day saved: $37.02 VOC + $6.72 inventory = $43.74 / day.

There are anecdotal tales of lorries waiting weeks after Customs clearance before being able to trans-ship their loads to rail. It is assumed that most of this delay is while awaiting rail wagons but that a portion results from the congestion at the current transfer facility. The economic analysis very conservatively assumes that the new facility will be directly responsible for saving, on average, one (1) full day per lorry, a benefit of $43.74 for every lorry.
B. Costs

B.1. Financial Costs

This is an economic rather than a financial assessment. Therefore, as with quantification of benefits, cost estimates at this stage are simple and conservative. For the proposed new road-to-rail trans-shipment facilities, costs are as shown in the following table. The phasing shows a simplified two-stage approach that is generally consistent with the projected growth in traffic.

**Estimated Financial Costs: New ZU Road-to-Rail Trans-Shipement Facility**

(all current 2008 costs)

<table>
<thead>
<tr>
<th>Project</th>
<th>Capital Cost</th>
<th>Maintenance</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stage 1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009: rail lines</td>
<td>$1,250,000</td>
<td>9% of capital p.a.</td>
<td>Capital cost based on $250,000 / kilometer of rail and installation of 5 km at first stage; no cost for value of land</td>
</tr>
<tr>
<td>2009: loading platforms</td>
<td>$170,000</td>
<td>1% of capital p.a.</td>
<td>Capital cost of $85,000 / kilometer and installation of 2 km at first stage</td>
</tr>
<tr>
<td>2009: roadway</td>
<td>$1,200,000</td>
<td>3% of capital p.a.</td>
<td>Capital cost based on $240,000 / km heavy duty paving cost for 4 kilometers inside facility at first stage plus one kilometer link to new national highway; no cost for value of land</td>
</tr>
<tr>
<td>2009: handling equipment</td>
<td>$1,500,000</td>
<td>10% of capital p.a.</td>
<td>Lump sum estimate</td>
</tr>
<tr>
<td>2009 subtotal</td>
<td>$4,120,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009: miscellaneous</td>
<td>$880,000</td>
<td>5% of capital</td>
<td>+/- 20% of subtotal</td>
</tr>
<tr>
<td><strong>Stage 1 total for planning</strong></td>
<td><strong>$5,000,000</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project</td>
<td>Capital Cost</td>
<td>Maintenance</td>
<td>Comments</td>
</tr>
<tr>
<td>----------------------</td>
<td>--------------</td>
<td>-------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>2014: rail lines</td>
<td>$750,000</td>
<td>9% of capital p.a.</td>
<td>Additional 3 kilometers rail inside facility at second stage; no cost for value of land</td>
</tr>
<tr>
<td>2014: loading platforms</td>
<td>$85,000</td>
<td>1% of capital p.a.</td>
<td>Additional 1 km at second stage</td>
</tr>
<tr>
<td>2019: roadway</td>
<td>$960,000</td>
<td>3% of capital p.a.</td>
<td>Additional 4 kilometers road inside facility at second stage; no cost for value of land</td>
</tr>
<tr>
<td>2014: handling equipment</td>
<td>$1,500,000</td>
<td>10% of capital p.a.</td>
<td>Lump sum estimate</td>
</tr>
<tr>
<td>2014 subtotal</td>
<td>$3,295,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2014: miscellaneous</td>
<td>$705,000</td>
<td>5% of capital p.a.</td>
<td>+/-20% of subtotal</td>
</tr>
<tr>
<td>Stage 2 total for planning</td>
<td>$4,000,000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

B.2. Economic Costs

Because this is an economic analysis it is necessary to take cognizance of shadow costs or the variances between financial costs and opportunity costs within the Mongolian economy. The ADB road assessment has already identified the shadow cost factors below, and these are also used herein.

**ADB Shadow Cost Factors for Mongolia**

<table>
<thead>
<tr>
<th>Input</th>
<th>Conversion Factor</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tradable materials (cement, steel, etc.)</td>
<td>1.07</td>
<td>Capital costs for rails increase by 6% since mostly tradable imports; offset slightly by low shadow cost of local labor.</td>
</tr>
<tr>
<td>Non-tradable materials (gravel, sand, etc.)</td>
<td>1.00</td>
<td>Capital costs for platforms &amp; roadways increase by 4% since cement imported but other inputs local.</td>
</tr>
<tr>
<td>Skilled labor</td>
<td>1.00</td>
<td>Capital costs for equipment increase by 7%.</td>
</tr>
<tr>
<td>Unskilled labor</td>
<td>0.70</td>
<td></td>
</tr>
<tr>
<td>Tradable equipment</td>
<td>1.07</td>
<td></td>
</tr>
<tr>
<td>Non-tradable equipment</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Land</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

As a result of the foregoing, the economic capital costs of the road-to-rail trans-shipment project are as listed below. The O&M percentages remain the same.

- **Railway:** $250,000/km * 1.06 = $265,000 / km
  ($1,325,000 in first stage and $795,000 in second stage)
- **Platforms:** $85,000/km * 1.04 = $88,400 / km
  ($177,000 in first stage and $88,000 in second stage)
- **Roadway:** $240,000/km * 1.04 = $250,000 / km
  ($1,250,000 in first stage and $1,000,000 in second)
Economic Policy Reform and Competitiveness Project

Equipment: \$1,500,000 \times 1.07 = \$1,605,000 in each stage.\(^{19}\)

C. Benefit / Cost Assessments

Table B1 depicts the results of the economic assessment. The project time frame assumes initial construction in 2009 with the second stage in 2014. Operational benefits are then measured for the 16 year period, 2010 through 2025. Due to the large number of lorries to be handled and the significant benefit of over $40 / lorry, the economic outcome is very positive. With only a one day saving, the Economic Internal Rate of Return (EIRR) is 43 percent compared to the usual Development Bank cut-off of 12 percent. Thus, the project represents a very substantial benefit for the economy of Mongolia.

Several sensitivity analyses were conducted to test the implications of changing one benefit measure or another. For example, if lorry traffic through the facility were 20 percent lower than projected the EIRR would reduce only to 32 percent. If average time saved per lorry were reduced from one full day to only eight hours, the EIRR would still be 21 percent. Even if these two factors are combined (20% lower traffic plus time savings of only eight hours) the EIRR would be acceptable at 13 percent.

Other sensitivity tests kept benefits constant but altered the cost inputs. At the most extreme, even if all capital and maintenance costs were to double, the project would still exhibit a positive EIRR of 18 percent. Clearly, the project is very robust from an economic perspective.

\(^{19}\) For economic evaluations, all values are kept constant with no escalation for inflation, etc.
### Table B1: Benefit / Cost Assessment of New Road-to-Rail Trans-shipment Facility

<table>
<thead>
<tr>
<th>Net bound lorries</th>
<th>VOC savings</th>
<th>Inventory savings</th>
<th>Total savings</th>
<th>Capital</th>
<th>Maintenance and Operations</th>
<th>Total cost</th>
<th>Net Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td></td>
<td></td>
<td></td>
<td>5,237,000</td>
<td>5,237,000</td>
<td>-5,237,000</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>62,935</td>
<td>2,329,858</td>
<td>422,924</td>
<td>2,752,782</td>
<td>366,560</td>
<td>366,560</td>
<td>2,386,222</td>
</tr>
<tr>
<td>2011</td>
<td>65,016</td>
<td>2,406,878</td>
<td>436,905</td>
<td>2,843,783</td>
<td>366,560</td>
<td>366,560</td>
<td>2,477,223</td>
</tr>
<tr>
<td>2012</td>
<td>67,270</td>
<td>2,490,317</td>
<td>452,051</td>
<td>2,942,368</td>
<td>366,560</td>
<td>366,560</td>
<td>2,575,808</td>
</tr>
<tr>
<td>2013</td>
<td>69,870</td>
<td>2,586,592</td>
<td>469,527</td>
<td>3,056,119</td>
<td>366,560</td>
<td>366,560</td>
<td>2,689,559</td>
</tr>
<tr>
<td>2014</td>
<td>72,471</td>
<td>2,682,867</td>
<td>487,003</td>
<td>3,169,871</td>
<td>366,560</td>
<td>4,559,560</td>
<td>-1,389,689</td>
</tr>
<tr>
<td>2015</td>
<td>75,245</td>
<td>2,785,561</td>
<td>505,645</td>
<td>3,291,205</td>
<td>666,250</td>
<td>666,250</td>
<td>2,624,955</td>
</tr>
<tr>
<td>2016</td>
<td>78,192</td>
<td>2,894,672</td>
<td>525,451</td>
<td>3,420,124</td>
<td>666,250</td>
<td>666,250</td>
<td>2,753,874</td>
</tr>
<tr>
<td>2017</td>
<td>81,660</td>
<td>3,023,039</td>
<td>548,753</td>
<td>3,571,792</td>
<td>666,250</td>
<td>666,250</td>
<td>2,905,542</td>
</tr>
<tr>
<td>2018</td>
<td>85,127</td>
<td>3,151,406</td>
<td>572,054</td>
<td>3,723,460</td>
<td>666,250</td>
<td>666,250</td>
<td>3,057,210</td>
</tr>
<tr>
<td>2019</td>
<td>88,941</td>
<td>3,292,610</td>
<td>597,686</td>
<td>3,890,296</td>
<td>666,250</td>
<td>666,250</td>
<td>3,224,046</td>
</tr>
<tr>
<td>2020</td>
<td>93,102</td>
<td>3,446,650</td>
<td>625,648</td>
<td>4,072,298</td>
<td>666,250</td>
<td>666,250</td>
<td>3,406,048</td>
</tr>
<tr>
<td>2021</td>
<td>97,610</td>
<td>3,613,527</td>
<td>655,940</td>
<td>4,269,467</td>
<td>666,250</td>
<td>666,250</td>
<td>3,603,217</td>
</tr>
<tr>
<td>2022</td>
<td>101,945</td>
<td>3,773,395</td>
<td>685,067</td>
<td>4,459,052</td>
<td>666,250</td>
<td>666,250</td>
<td>3,792,802</td>
</tr>
<tr>
<td>2023</td>
<td>106,279</td>
<td>3,934,444</td>
<td>714,194</td>
<td>4,648,638</td>
<td>666,250</td>
<td>666,250</td>
<td>3,982,388</td>
</tr>
<tr>
<td>2024</td>
<td>111,307</td>
<td>4,120,576</td>
<td>747,981</td>
<td>4,868,557</td>
<td>666,250</td>
<td>666,250</td>
<td>4,202,307</td>
</tr>
<tr>
<td>2025</td>
<td>116,681</td>
<td>4,319,545</td>
<td>784,099</td>
<td>5,103,643</td>
<td>666,250</td>
<td>666,250</td>
<td>4,437,393</td>
</tr>
</tbody>
</table>

assumes 95% northbound lorries trans-ship road-to-rail

NPV 12% 11,242,682 EIRR 43%
ANNEX C: LEGAL OPINION ON MONGOLIAN LEGISLATION REGARDING THE
ESTABLISHMENT OF PUBLIC-PRIVATE PARTNERSHIP (PPP)
A. Current legal environment

The legal environment in Mongolia for establishing and creating public-private partnerships (PPP) is not highly developed in comparison with other countries. Although post-socialist countries with transition similar to that of Mongolia managed to privatize various infrastructure and communication systems to corporate entities or enter into PPP (Best Practices for Private Sector Investment in Railways: Final Report, Tera International 2006), the Mongolian government did not undertake proactive steps as to follow the same development strategy. The Mongolian legislative framework addresses the issues of partnering with or transferring state owned assets to the private sector in several laws and regulations.

1. The Law of Mongolia on Companies (1999) states in Article 12.5 that the state may become a shareholder in the establishment of a company on the following grounds and thus provides the basis for initial consideration of a PPP:

   12.5. The state and its agencies may be a founder and a shareholder of:
   12.5.1. a company that is created through privatization of an enterprise owned by the state or local administration;
   12.5.2. a state owned company that is established by the reorganization of a state-owned enterprise;
   12.5.3. a company that is deemed to be bankrupt in accordance with applicable laws, and whose shares the state has acquired in exchange for debts owed to the State by such company. In such case the state must sell such shares within a period of three years;
   12.5.4. a company that is created jointly with a foreign legal person;
   12.5.5. other companies as permitted under the law.

2. The Law of Mongolia on State and Regional Property (1996) stipulates the following:

   27. Ownership and utilization of state owned assets by non-state entities
   27.1. State owned assets may be transferred into ownership and utilization by other parties free of charge according to the decision of an authorized institution based on concession or leasing contracts, where permitted by the law.
   27.2. Matters of transferring immovable property as state owned land or subterranean by a concession contract shall be subject to regulation through a special law. (This measure would presumably be required for establishment of a PPP logistics facility at Zamiin Uud.)

The foregoing provisions provide only an allusion to the possibility of introducing a PPP arrangement in the Mongolian infrastructure, trade and transport facilitation. The complexity of commencing such projects with state and private sector involvement suggests that decision makers should adopt a definitive policy on launching legislative actions for regulation of PPP. It is evident that institutionalization of PPP into the Mongolian legislation will require adopting new laws and amendments into the existing act. The international best practices in PPP suggest that the state and the private sector should enter into a contract of partnership and establish a joint special purpose vehicle for effective cooperation. The Mongolian legislation on corporate forms allows the creation of special purpose vehicles.

Therefore, provided that the legislature stipulates provisions on concessions and elaborate the principles of cooperation and interaction with the private sector, foreign and domestic corporations may engage in PPP by establishing special purpose vehicles solely intended for the specific item of their potential contracts.
B. Prospects of PPP in Mongolia

The prospective legislation allowing the use of PPP in a wide array of infrastructure, including trade and transportation, must precisely adapt into the existing legal environment of Mongolia. Moreover, the international practice recommends that present regulation should be removed or altered as to provide maximum adaptability and coherence of the PPP legislation. In other words, the new act and current governmental and ministerial regulations need to conform to each other or, where necessary, the latter may be subject to annulment by the relevant authorities. Once a contract of PPP enters into force, the private sector assumes the responsibility for financing and delivering the contractually obligated services, the state institution must make preparations for overseeing the removal or alteration of hindering regulations, observing the monopoly stance of the given service and managing the reduction of expenditures.

As was mentioned earlier, the private sector and the state authority may enter into a contract of PPP by forming a special purpose vehicle (SPV) to maximize the advancement of the target services. In addition to the Law of Mongolia on Companies, the prospective PPP legislation has to provide legal foundation of such SPV or other possible approaches.

C. Conclusion

The concept of PPP is new to Mongolia. The legislation of the country has not addressed the necessary legal platform on which PPP may be developed. Thus, making PPP work in the Mongolian context in the areas of infrastructure and communications is a task that will have to be started, particularly to provide a level of certainty for prospective investors.

The draft of a new law concessions is an important step towards positive collaboration of the state and the private corporate sector. However, the government should also consider a broader revision of various legislative acts for the purposes of enabling the effective maintenance of PPP in this country.