Chapter 1
Context of the project

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1. Introduction

Sino-Lao Aluminum Corporation Limited (SLACO) is proposing to develop a bauxite mine, alumina processing plant and aluminum smelting plant on the Bolaven Plateau in Champasack Province in the southern region of the Lao People’s Democratic Republic (Lao PDR), hereafter referred to as the SLACO Bauxite Project. SLACO is a joint venture between Italian-Thai Development Public Company Limited (ITD), REIGNWOOD Group (REIGNWOOD) and Laos Service Joint Co., Ltd (LSI). SLACO has a board of directors which includes a chairman and ten directors.

The SLACO Bauxite Project has three components; the first component is the bauxite mining project (SLACO Mining Project); the second component is the alumina processing plant (SLACONAR Project); and the third component is the aluminum smelting project (SLACO Aluminum Smelter Project, as shown in Figure 1-1.

![Figure 1-1 Components and key activities of the SLACO Bauxite Project after Step 1 in Phase I](image)

As recently confirmed by SLACO, the project will be developed in two phases; Phase I (which has two steps) and Phase II. The key components (including actives and products) are described below:

- **Phase I - Step 1:**
  - SLACO Mining Project with the capacity of 1500 kilotonnes per annum (kt/a) washed bauxite ore as the raw material for the SLACONAR Project
  - SLACONAR Project with the capacity of 500 kt/a metallurgical grade alumina as the final project product for export

- **Phase I - Step 2:**
  - SLACO Mining Project with the capacity of 1500 kt/a washed bauxite ore as the raw material for the SLACONAR Project
  - SLACONAR Project with the capacity of 500 kt/a metallurgical grade alumina as the raw material for the SLACO Aluminum Smelter Project
  - SLACO Aluminum Smelter Project with the capacity of 250 kt/a aluminum remelt ingot as the final project product for export
Phase II: Doubly increase product capacity from Phase I - Step 2:

- SLACO Mining Project with the capacity of 2 x 1500 kt/a washed bauxite ore as the raw material for the SLACONAR Project
- SLACONAR Project with the capacity of 2 x 500 kt/a metallurgical grade alumina as the raw material for the SLACO Aluminum Smelter Project
- SLACO Aluminum Smelter Project with the capacity of 2 x 250 kt/a aluminum remelt ingot. 22.5 kg aluminum remelt ingot is the final project product

Phase I - Step 1. The development of SLACO Bauxite Project would commence with two main components; SLACO Mining Project and SLACO New Alumina Refinery Project (or called “SLACONAR Project”). The SLACO Mining Project in Phase I is designed to mine the bauxite mineral on the Bolaven Plateau by adopting the open-pit mining method and processing the exploited bauxite ore by wet-washing the bauxite ore. The SLACO Mining Project has a design capacity of approximately 1500 kt/a as the input raw material for the SLACONAR Project. The bauxite ore processing or milling used in the SLACO Mining Project is designed to use the affiliated ore washing workshop which will be located in the area of mining project site on the Bolaven Plateau.

The SLACONAR Project includes two successive key activities as transporting the washed bauxite ore by truck from the bauxite ore washing workshop to the alumina refinery and refining the bauxite ore into the alumina by low temperature Bayer process method. In Phase I - Step 1, the alumina product, with the design product capacity of 500 kt/a, will be exported to China.

Phase I - Step 2. It is planned that, if the electrical power supply and other corresponding factors in the project region, are favorable after several years of SLACO Bauxite Project operation, Phase I - Step 2 of the SLACO Bauxite Project would then proceed. This step would be to add an aluminum smelter to the project. The smelter would process the alumina product into 22.5 kg aluminum remelt ingots using of energy-saving SY400 electrolytic cell technology with the product capacity of 250 kt/a for export.

Phase II. If the SLACO Bauxite Project expands in the future, this will be as Phase II of the project. This phase of the project will have three main components (as shown in Figure 1-1). It will have an additional production line with the total product capacity twice that of the Phase I - Step 2.

In Phase II of SLACO Bauxite Project, the washed bauxite ore product produced from the SLACO Mining Project will be input material for the SLACONAR Project and the alumina product produced from the SLACONAR Project will be input material for the SLACO Aluminum Smelter Project for producing 500 kt/a aluminum remelt ingot for export. All components of the SLACO Aluminum Smelter Project will be constructed within the demarcated areas of the SLACONAR Project.

This environmental and social impact assessment (ESIA) covers the development of the SLACONAR Project. The key activities covered by the ESIA are shown in the green boxes of the lower line in Figure 1-1.

As required by Lao PDR legislation, a separate ESIA for the SLACO Mining Project is currently being prepared (updating previously prepared (2009) environmental impact assessment (EIA) and a social impact assessment (SIA) reports).

The activities of the SLACO Aluminum Smelter, which are shown in the orange boxes in Figure 1-1, will be covered by further ESIA to be prepared at a later date.
The New SLACO Concession Area for Alumina Refinery

SLACO Concession Area for Bauxite Mining and Processing

Bauxite lump ore transportation route

Previously proposed area for Alumina Refinery

Figure 1-2 Project location map
As noted below in section 1.1 and sub-section 1.2.3, the project feasibility was revised and updated by Shenyang Aluminum & Magnesium Engineering & Research Institute Co., Ltd (SAMI). As the conceptual project design for Phase I - Step 1 described in SAMI’s interim feasibility study report remains largely unchanged from the 2018 Feasibility Report, this ESIA report therefore refers to some technical features and figures prescribed in the Feasibility Report 2018 where there is insufficient information available in the Interim Feasibility Report 2018.

1.1 Background to ESIA

SLACO completed an initial feasibility study for the SLACO Bauxite Project in 2008. The feasibility study included the mining and refining of bauxite ore to produce alumina (aluminum oxide powder), and the smelting of the alumina to produce aluminum ingot. The company entered into a Mining Agreement with the Government of Lao (GoL) and a Mining License was granted in December 2008.

In 2009, Earth Systems Lao completed an Environmental Impact Assessment (EIA) and Social Impact Assessment (SIA) for the mine and a separate EIA and SIA for the refinery and smelter (Earth Systems Lao 2009a, 2009b, 2009c, 2009d). Environmental compliance certificates (ECCs) were obtained in December 2009.

SLACO subsequently determined that the originally proposed site for the processing plant (in the Xe Kong valley, south of the Bolaven Plateau, in Attapeu Province) was prone to inundation in extreme weather conditions. A new site for the plant was identified, located on the plateau approximately 15 km north of the mine.

In 2012, ESL Sole (ESL, formerly Earth Systems Lao) submitted a Scoping Report and Terms of Reference (ToR) for an ESIA and an Environmental and Social Management and Monitoring Plan (ESMMP) for the new location of the refinery. The Scoping Report and ToR were approved by the Ministry of Natural Resources and Environment (MoNRE).

In 2014, SLACO decided to proceed with the preparation of an updated feasibility study for the SLACONAR Project. The company engaged ESL, supported by Accent Environmental (Accent), to: undertake the required ESIA investigations; facilitate a program of public consultation; and prepare the documentation required to obtain project approval.

The Feasibility Study Report was completed by China Aluminum International Engineering Corporation Limited (CHALIECO) in October 2015. The SLACONAR Project comprises the production of 1.0 million tonnes of alumina per annum for export. The development of a smelter to produce aluminum ingot may be undertaken at a later date, but is not part of the current project.

ESL commenced the ESIA for SLACONAR Project in late 2015. However, delays in the project has meant that ESL was waiting for notification from the project developer before continuing with the ESIA.

In August 2017, the amended Feasibility Report for SLACONAR Project was completed by CHALIECO. This amended Feasibility Report changed the project design by reducing the project product from 1.0 million tonnes of alumina per annum (1 Mt/a) to 0.5 Mt/a and considered the possibility of project expansion several years into the project commissioning by adding the aluminum smelter with an installed product capacity of 0.25 Mt/a aluminum ingot for export.

Based on the new amended Feasibility Report (2017), ESL continued to revise the ESIA for SLACONAR Project. In revising this ESIA, ESL conducted a new field survey in late 2017 and, based on the results of this
survey, has revised the social environmental baseline data by finding the suitable fund. This social environmental baseline data revision focused on updating the data of affected communities within 5 km surrounding the project area and has paid particular attention to the land and housing located within the demarcated SLACONAR Project development area.

In early 2018, SLACO solely engaged Shenyang Aluminum & Magnesium Engineering & Research Institute Co., Ltd (SAMI) to reinvestigate and revise the earlier Feasibility Report. This Feasibility Report 2018 covers the Phase I of the SLACO Bauxite Project.

1.2 Presentation of the Project

The SLACONAR Project comprises the transportation of washed bauxite ore from SLACO Mining Project site to the Alumina Refinery (or refinery) of SLACONAR Project and the processing of transported washed bauxite ore at the refinery to produce alumina (aluminum oxide powder).

The SLACO Mining Project is located approximately 14 km to the south of the refinery. In Phase I of SLACONAR Project, milled and washed bauxite ore in an average wet mass of 1.5 million tonnes per annum (kt/a) will be trucked to the refinery along a 41.24 km long road (Figure 1-2).

Figure 1-3 shows the location of the refinery and associated facilities. The refinery will process the bauxite ore using the low temperature Bayer process. The main waste product of the Bayer Process is fine-grained tailing known as red mud. The refinery will comprise an alumina production line, including auxiliary production system, red mud storage facility, ash storage facility and other production and management facilities.

Based on the Interim Feasibility Report (SAMI 2018), alumina production will require high-pressure steam (approx. 535 kt/a), low-pressure steam (approx. 357 kt/a) and electrical power (approx. 193.1 GW.h/a) while SLACO Mining Project will require approx. 23.7 GW.h/a of electrical power. SLACO has therefore planned to install a system of two high-temperature and high-pressure circulating fluidized bed boilers (Q=170 t/h, P=9.81 MPa, t=54 °C) each equipped with a 2 x 18 MW (C12-8.83/1.27) condensing generator unit and a 2 x 18 MW (B12-8.83/1.27) back pressure generator unit for supplying steam for SLACONAR Project and for supplying electrical power for both SLACONAR Project and SLACO Mining Project. This 36 MW power station will be fueled by 263 kt/a of coal supply. Additionally, SLACONAR Project will require the gas of coal which will be produced by a coal gas station consisting 10 gas generators (8 operational, 2 standby) that will require a further 263 kt/a of coal.

The fresh water consumption of this project is 7,852 m³/d. The amount of fresh water for production is 7,758 m³/d (Alumina Refinery is 3,947 m³/d, Captive Thermal Power Plant is 2,501 m³/d and Gas Station is 1,310 m³/d), the amount of fresh water for domestic water use is 94 m³/d. The amount of circulating water is 224,794 m³/d and recycled water is 2,299.5 m³/d (the water recycled rate is about 96.6%). The required fresh water is planned to be mainly supplied through the newly-constructed reservoir to be built on the Houay Toon located within the SLACONAR concession area. More information on water use is presented in Chapter 3, sub-section 3.1.8.

The concession for the refinery and associated facilities (Figure 1-3) is currently 709 ha in area, although may be reduced in size during project permitting. The refinery, power station, ash storage facility, red mud storage facility, workforce accommodation, pipeline for transporting of red mud and freshwater will all be located within the final refinery concession.
Figure 1-3 Processing site location map
During Phase I - Step 1 the project will export alumina powder and, on the completion of Phase I - Step 1, alumina packaging by truck to Thailand via Road 16 to Pakse, and to the Thai border. The project product continuous transport to Oubon Ratchathani train station by truck and then project product will shift to the train and going to Rayong port (Thailand).

The design service life of the refinery facilities is 50 years.

1.2.1 Project Objectives

Commercial Objectives

The commercial objective of the SLACONAR Project is to profit from the processing of bauxite ore to produce alumina oxide powder in early phase of the project and remelt aluminum ingot after Step 1 of Phase I of the project. The operation of the SLACONAR Project will be undertaken in accordance with industry best practice and will comply with the conditions and standards prescribed by GoL.

Further, the operation will be undertaken according to the environmental, socio-economic and sustainability objectives presented in this ESIA, as set out below.

Environmental Objectives

The environmental objectives of the SLACONAR Project are to identify and mitigate any potentially negative environmental impacts that may result from the project. Detrimental environmental impacts will be minimized through the use of industry best practice and adherence to GoL and international environmental standards and regulations.

Socio-Economic Objectives

The socio-economic objectives of the SLACONAR Project are to contribute to the generation of sustainable development and activity within the region. To achieve this, the project will be developed in such a way as to maximize beneficial socio-economic impacts and to minimize potentially negative impacts.

Sustainability Objectives

SLACO will promote environmental and socio-economic sustainability by undertaking the following measures:

- The project will take all practical measures to minimize potential impacts on ecological systems, and to protect and enhance existing livelihoods.
- The project will not proceed unless it will improve the material wellbeing of investors and other stakeholders, including local communities.

1.2.2 Project costs and schedule

The total investment cost for the SLACONAR Project, including SLACO Mining Project, is estimated at USD 338.47 million. It is planned that if construction permission and ECC for the project would be issued within 2018 the preparation for construction and construction of the Step 1 of Phase 1 of SLACONAR Project will begin in early 2019 and will take approximately 2 years. Operations are expected to begin at the start of 2021 after a three-month commissioning period.

If, at the completion of Phase I - Step 1, the electricity capacity and reliability of the EDL grid in the project region corresponds to the project requirements and other corresponding factors, SLACO will proceed with the development of the second step of Phase I of SLACO Bauxite Project (Phase I - Step 2).
If, after several years of operation of Phase I - Step 2, the project is meeting operational targets and requirements, SLACO will then proceed with the development of the Phase II of the SLACO Bauxite Project.

1.2.3 Project History

The history of the project is as follows:

- Surveying of the Bolaven plateau by the Department of Geology, Ministry of Industry and Mines, Lao PDR (prior to 2005).
- LSI commissioned the China Aluminum International Engineering Corporation Limited (CHALIECO) and the School of Geosciences and Environmental Engineering of Central South University to estimate the potential of bauxite and value of the resource. Following the study, a Report on Evaluation of Potential Bauxite Resource in Paksong District of Champasak Province, Lao PDR was prepared (2005 to 2006).
- ITD began conducting geological exploration in the Bolaven Plateau and produced a report, Proposal for Developing of an Aluminum Industry in Lao PDR, estimating the quantity of the bauxite resource as 135 million tonnes of washed bauxite ore. ITD also estimated that the average grade of bauxite ore comprises 46.9% Al2O3 and less than 10% SiO2 (2007).
- SLACO commissioned relevant professional experts from its companies and SAMI of CHALIECO to survey the Area for the development of the Project with the purpose of fixing project construction conditions (including plant site, water supply, power supply, transportation) and completed the Project feasibility study by December 2007.
- After completion of the Feasibility study in December 2007, Aluminum Corporation of China Limited (CHALCO) joined SLACO as the majority shareholder which subsequently is comprised of: CHALCO – 51%, RCI / ITD – 39% and LSI – 10%.
- After completion of the Feasibility study in December 2007, SLACO entered into a Mining Agreement with GoL in September 2008 and Mining License was granted in December 2008.
- In June 2009, an ESIA on the Bauxite Project was finalized by Earth Systems Lao and the ECC was subsequently obtained in December 2009. The ESIA covered the Bauxite Mining, the Aluminum Refinery, and the Aluminum Smelter.
- In mid-2009, CHALCO decided to terminate their engagement in the project. Later in early 2011, SLACO invited Yunnan Al Stock Corporation Ltd (YALICO), the largest of aluminum producer in Southern China, to join and develop the project as major stakeholder.
- Between May and September of 2011, YALICO collaborated with SLACO to review the December 2007 feasibility study. It was decided to move the refinery to a new location on the Bolaven Plateau, closer to the SLACO Mining Project.
- YALICO carried out due diligence of the development of the project in 2012 in the form of shareholding of YALICO – 51%, ITD – 29% and LSI – 20%.
- In November 2014, ESL was engaged by SLACO to undertake the preparation of environmental and social approvals documentation for the SLACONAR Project at the new refinery site.
• CHALIECO completed the first Feasibility Study Report for the SLACONAR Project in October 2015 (CHALIECO 2015) and completed the amended Feasibility Report in August 2017 before their decision to terminate their engagement in the project in late 2017.

• In early 2018, SLACO engaged SAMI to revise the Feasibility Report for SLACO Bauxite Project. The Interim Feasibility Report for SLACO Bauxite Project was completed in February 2018. The concept of project design for SLACONAR Project in the Feasibility Study conducted by SAMI remains largely unchanged from that which was conducted by CHALIECO in 2017, particularly the project scale of 500 Kt/a in Step 1 of Phase I of SLACONAR Project.

• YALICO decided to terminate their engagement in the project.

1.3 Related Projects and Developments

The SLACONAR Project is reliant on the successful construction and operation of the SLACO Mining Project, which will supply the refinery with washed bauxite ore. The SLACO Mining Project obtained an ECC in 2009 following completion of an EIA and SIA. SLACO will proceed with the construction of the mining project once an ECC has been obtained for the SLACONAR Project.

A number of development projects by other parties are located in the eastern Bolaven Plateau in the general vicinity of the SLACONAR Project. These include two major hydropower projects:

• The Xe-Pian Xe-Namnoy Hydroelectric Power Project with 410 MW installed capacity is being constructed approximately 8 km to the southeast of the SLACONAR Project. The reservoir of the Xe-Pian Xe-Namnoy Project is located partly within SLACO’s mining concession and the transportation of mined bauxite ore to the SLACONAR Project refinery will use a section of the Xe-Pian Xe-Namnoy Project access road.

• The Houay Ho hydropower plant with 150 MW installed capacity has been built approximately 20 km to the southeast of the SLACONAR Project concession area and its 230 kV transmission line is located approximately 2 km to the west of the refinery concession.

A number of smaller hydropower projects and developments such as vineyards and tourist attractions are located in the general vicinity of the SLACONAR Project.

The cumulative impacts of the SLACONAR Project and other developments in the area are assessed in the Chapter 08 (Cumulative Impact Assessment).

1.4 Project Justification

1.4.1 Lao PDR Context

Lao PDR is a land-locked, mountainous country located in the middle of mainland South-east Asia. Laos has a population of just 6.5 million people (NSC 2013). The human development index (HDI) of Lao PDR in 2015 ranks it on 141st of 188 countries in the world in terms of development; it is one of the four countries in South East Asia having HDI just above the low human development category (United Nations Development Program (UNDP), 2015). However, the country is rich in natural resources and surrounded by industrializing countries including Thailand, Vietnam and China.

Lao PDR has had limited opportunities to boost its socio-economic development in sustainable ways. These opportunities have included the development of mineral resources, extraction and export of timber,
development of hydropower plants and improving the tourism industry. However, tourism is only in the early stages of development, and the recent developments in the hydropower sector generally require long-term periods before investment is returned and it needs mutual developments in co-sectors. In the period of 2011 and 2015, the value of mineral export was over USD 4 million which contributes about 60% of total export of the country (National Economic Research Institute, 2015).

The Seventh Five-year National Socio-Economic Development Plan (NSEDP) (2011-2015) prepared by GoL sets out a plan to build a primary foundation for the future industrialization and modernization of the country, and to move Lao PDR from its Least Developed Country (LDC) status. The industrial sector, mainly hydropower and mineral resources development, is targeted to grow at 15% annually to form 38% of the GDP by the end of 2015 (Ministry of Planning and Investment, 2011).

An evaluation of potential bauxite resources in the Paksong region, undertaken by the China Non-ferrous Mining Group Corporation Limited and the Central South University (CHALIECO, 2017), showed Lao PDR boasts relatively rich resources of bauxite. Such research conclusions show that availability of high-quality bauxite reaches 160 million tonnes in Paksong region, with potential reserves amounting to 400 million tonnes.

The increasing global demand for saleable alumina, the extensive bauxite ore resources of the Bolaven Plateau, and the favorable geographic location of Lao PDR for the export of alumina, provide a competitive advantage for Laos compared with other countries seeking to develop bauxite mining industries.

1.4.2 Expected Benefits of Project

The SLACONAR Project has the potential to make a substantial contribution to the economy of Lao PDR. With an estimated 500 kilotonnes/year of alumina exported each year, valued at approximately USD225 million per year, the project will be one of Lao PDR’s biggest exporters.

SLACO estimates that it will invest USD486 million dollars during the construction of 2 year of the SLACONAR Project (CHALIECO, 2018). Much of this is for the purchase of equipment and materials, largely from outside of Laos. However, an estimated in about 20% - 30% will be spent in Laos.

During operations, wage and welfare payments to the refinery workforce are expected to be worth over USD6.37 million annually. Resource tax payments to GoL are estimated to be approximately USD6.675 million annually (CHALIECO, 2018). Other benefits will accrue through the purchase of local goods and services and the flow on effects of economic stimulation at local, regional and national scales.

Revenues to GoL from the SLACONAR Project are expected to contribute to GoL’s National Growth and Poverty Eradication Strategy (NGPES) by:

- Expanding and improving health, education and other social services;
- Improving transport, communications, water supply, electrification and other infrastructure; and
- Increasing the resources of GoL's environmental agencies to improve the effectiveness of their environmental protection programs.

Further benefits resulting from the SLACONAR Project are likely to include:

- **Employment.** There is potential for direct employment of up to 506 people during the refinery construction phase and an estimated 535 people during the operation phase of the project. SLACO will prioritize employment of local people living in the vicinity of the project area. An additional 994
and 371 people will be directly employed during the construction and operation of the SLACO Mining Project, respectively.

- **Direct project investment.** Direct investment by SLACO in the project area will boost the local economy and create employment opportunities during the construction and operation of the project facilities and through procurement of goods and services from local providers during project operations.

- **Improvement in the Lao PDR national economy.** The flow on economic benefits from the project will create additional employment, and increase small business and other economic opportunities. This will be particularly beneficial in rural and undeveloped areas, such as Champasack Province, where the local people currently rely on unsustainable agricultural practices, forest resource collection and fishing practices for income.

- **Improvement of workforce skills levels.** Lasting legacy workforce skills will be improved. SLACO is committed to training and skills development of Lao workers employed by the project and proposes to establish a technical college in Paksong to support and develop the project’s workforce.

- **Improved infrastructure.** The project will also provide substantial benefit for Champasak Province and southern Lao PDR in general by improving access to a relatively remote area and constructing and upgrading roads. The ore transportation route between the mine site and the refinery will require the improvement road.

- **Community development.** Through SLACO’s Community Development Fund to be established for the project, villages within the project impact area will also benefit from investment in community infrastructure, such as schools and health facilities.

Therefore, the SLACONAR Project will allow Lao PDR to generate revenue while helping meet the world market demand for alumina. Natural resources will be sustainably utilized to promote socio-economic development in Lao PDR and support the Seventh Five Year NSEDP (2011-2015).

## 1.5 Presentation of the Project Developer and the ESIA Consultants

### 1.5.1 Project Developer

SLACO, the owner of the SLACO Bauxite Project, was established in September 2008 as a joint venture between ITD, Reignwood and LSI. SLACO has a Board of Directors whose members a chairman and ten directors. The chairman of the board is Dr. Chanchai Ruayrungruang. Investment in the project is held by ITD (34%), RCI (33%) and LSI (33%).

ITD was established in 1958 and registered as a listed company in March, 1994. ITD is the largest Thai civil and infrastructure construction contracting firm having completed 1,300 projects in Thailand and across South East Asia. The firm has extensive experience in Lao PDR including its role as contractor on the USD 1,200 million 681 MW Nam Theun II dam and hydroelectric power project in Khammouane province. The firm was established in 1958 and now has a registered capital of approximately USD 122 million and a staff of over 22,077 employees including 1,102 qualified engineers.

Reignwood was founded in Thailand in 1984 by Dr. Chanchai Ruayrungruang. It is now headquartered in Beijing, China. Reignwood is a multinational investment corporation, active in a diversified range of industries including beverages, sports, cultural industry, tourism, recreation, real estate, property...
management, mineral resources, iron and steel and international trade. Reignwood has developed rapidly in the 30 years since its foundation all over the world with branches in Singapore, Canada, USA, UK, Germany and Switzerland. In 1995, Reignwood began to invest in China, and by the end of 2004 the company’s Chinese investment had reached RMB 15 billion.

LSI is the local company who is the present shareholder of SLACO.

The contact information for SLACO is as follows:
Address: c/o Italianthai Tower, 42nd floor, 2034/132-161 New Petchburi Road, Bangkapi, Huaykwang, Bangkok 10320, Thailand
E-mail: prayotec@hotmail.com
Attention: Mr. Prayote Chinpinyokul
Title: Chief Executive Officer

1.5.2 ESIA Consultants

This ESIA for the SLACONAR Project has been jointly prepared by ESL (formerly Earth Systems Lao) and Accent in cooperation with SLACO.

ESL is a fully Lao-owned multidisciplinary consulting company specializing in environmental and socio-economic studies, monitoring and management. ESL also undertakes policy and project evaluation and provides training, research, and project management services in the environmental and social disciplines. ESL has additional expertise in geo-spatial analyses using advanced GIS and satellite image analyses.

Accent is a consulting firm that provides environmental and social impact assessment and management services and strategic advice to the mining, oil and gas, industrial, energy, water and waste sectors. Accent is based in Melbourne, Australia, but has extensive experience in Lao PDR and has worked with ESL on a number of resource development projects.

The contact details for these companies are as follows:

<table>
<thead>
<tr>
<th>ESL Sole Co., Ltd</th>
<th>Accent Environmental Pty Ltd</th>
</tr>
</thead>
<tbody>
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<td>Web: <a href="http://www.esllao.com">www.esllao.com</a></td>
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Throughout the preparation of this ESIA, ESL engaged additional specialists and sub-consultants from Lao PDR and international organizations to undertake the technical studies shown in Table 1-1 for the assessment of potential environmental impacts of the Project.
Table 1-1 Studies commissioned as part of the ESIA.

<table>
<thead>
<tr>
<th>Study Title</th>
<th>Company or lead specialist</th>
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<td>Archaeology and cultural heritage</td>
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<td>Inventory of loss (IOL)</td>
<td>ESL</td>
</tr>
<tr>
<td>Terrestrial biodiversity</td>
<td>Pheng Phengsintham</td>
</tr>
<tr>
<td>Aquatic biodiversity and fisheries</td>
<td>Phouvin Phousavanh</td>
</tr>
<tr>
<td>Water quality assessment</td>
<td>ESL</td>
</tr>
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<td>Sediment quality assessment</td>
<td>ESL</td>
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<td>Hydrology and sediment transport</td>
<td>ESL</td>
</tr>
<tr>
<td>Air quality and noise baseline</td>
<td>United Analyst and Engineering Consultant Co. Ltd / Innogreen Engineering</td>
</tr>
<tr>
<td>Air quality modelling</td>
<td>ESL</td>
</tr>
<tr>
<td>Transportation</td>
<td>ESL</td>
</tr>
<tr>
<td>Red mud storage and management</td>
<td>Accent</td>
</tr>
<tr>
<td>Water and sediment sample analysis</td>
<td>ALS Hong Kong (accredited under Hong Kong Laboratory Accreditation Scheme (HOKLAS))</td>
</tr>
</tbody>
</table>

1.5.2.1 **ESIA Specialists**

Throughout the preparation of the ESIA, ESL and Accent have engaged additional specialists and/or experts from both Lao PDR and over sea to form full ESIA teams both field investigations teams and ESIA reports preparation team for the project. The core members of the ESIA team for this project are listed in the Table 1-2 below.

Table 1-2 List of core members of the ESIA team for the project.

<table>
<thead>
<tr>
<th>No</th>
<th>Name of Specialist</th>
<th>Responsibility to ESIA Sections</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Michael Cramer</td>
<td>ESIA advisor and technical review, red mud management</td>
</tr>
<tr>
<td>2</td>
<td>Phatmany Southammavong</td>
<td>ESIA and ESMMP primary author</td>
</tr>
<tr>
<td>3</td>
<td>Vongvilay Khotpathoum</td>
<td>Socio-economic specialist</td>
</tr>
<tr>
<td>4</td>
<td>Jethro Stern</td>
<td>Socio-economic specialist and resettlement advice</td>
</tr>
<tr>
<td>5</td>
<td>Bouavong Luangkhot</td>
<td>Land and water resource use specialan</td>
</tr>
<tr>
<td>6</td>
<td>Khammanh Siphanhxay</td>
<td>Cultural heritage and archaeology specialist</td>
</tr>
<tr>
<td>7</td>
<td>Pheng Phengsintham</td>
<td>Terrestrial biodiversity and wildlife specialist</td>
</tr>
<tr>
<td>8</td>
<td>Phetnakhone Xaixongdeth</td>
<td>Water quality specialist</td>
</tr>
<tr>
<td>9</td>
<td>Vongdalone Vongsikeo</td>
<td>Hydrology and sediment specialist, air quality modelling</td>
</tr>
<tr>
<td>10</td>
<td>Phouvin Phousavanh</td>
<td>Aquatic and fishery specialist</td>
</tr>
</tbody>
</table>
1.6 Project Developer’s Endorsement of ESIA

SLACO hereto states its endorsement of this ESIA and its acceptance of responsibility for the accuracy, completeness and soundness of the data, information, assessments, mitigation measures and budget allocations presented in the ESIA Report. SLACO fully commits to implementing all measures outlined in the ESIA, including the provision of necessary funds and human resources.

The full terms and conditions of SLACO’s endorsement of the ESIA is made in the form of an Endorsement Letter as attached in Appendix to this report.

1.7 Structure of the ESIA Report

The environmental and social approvals documentation for this report comprises four volumes:

i. ESIA Executive Summary
ii. ESIA Main Report (this report)
iii. Environmental and Social Management and Monitoring Plan (ESMMP)

The ESIA Main Report comprises 12 chapters as follows:

- Chapter 1: Context of the project
- Chapter 2: Policy, legal and institutional framework
- Chapter 3: Project description and alternatives
- Chapter 4: Description of the natural environment
- Chapter 5: Description of the social environment
- Chapter 6: Environmental Impact assessment and mitigation measures
- Chapter 7: Risks assessment
- Chapter 8: Cumulative impact assessment
- Chapter 9: Summary of environmental management and monitoring plan
- Chapter 10: Public Consultation and Disclosure
- Chapter 11: Summary of Resettlement and Ethnic Minority Development Plan
- Chapter 12: References
- Appendices: Technical Study reports

Chapter 1 – Context of the Project – provides overview and brief description of the project, presents the project developer and ESIA consulting firms, contains the project developer’s endorsement of the ESIA and presents the structure of the ESIA report.

Chapter 2 – Policy, Legal and Institutional Framework – sets out the Lao policy and legal framework, international obligations, environmental and social guidelines and standards, and corporate policies.

Chapter 3 – Project Description – describes the project including project setting, design features and alternatives considered.
Chapter 4 – Description of Natural Environment – describes the existing conditions of the natural environment in the project area and surrounds, including physical, biological, and visual components.

Chapter 5 – Description of Social Environment - describes existing conditions of the social environment, including socio-economic, health and cultural components.

Chapter 6 – Environmental Impact Assessment and Mitigation Measures – assesses the potential environmental and social impacts of the project and sets out proposed mitigation measures.

Chapter 7 – Risk Assessment – assesses the environmental and social risks of the project.

Chapter 8 – Cumulative Impact Assessment – assesses the cumulative impacts of the project in combination with other development activities.

Chapter 9 – Environmental Management and Monitoring Plan – summarizes the management and monitoring plan from the ESMMP volume.

Chapter 10 – Public Consultation and Disclosure – describes public involvement in the ESIA process, the outcomes of public consultation, and proposals for further consultation.

Chapter 11 – Summary of Development Plans – provides summary of the volume 4 of the ESIA (the RAP).

Chapter 12 – References – lists the references used in the ESIA report.