INTERNATIONAL CONSULTANCY FOR THE DEVELOPMENT AND INSTALLATION OF A COMPUTERIZED MYANMAR MINING CADASTRE SYSTEM IN MYANMAR (PHASE II)

BACKGROUND

The Extractive Industries Transparency Initiative (EITI) is a global Standard to promote an open and accountable management of natural resources. It seeks to strengthen government and company systems, inform public debates and enhance trust. In each implementing country it is supported by a coalition of governments, companies and civil society organizations working together.

Myanmar joined EITI upon instructions from its President at the end of 2012. Myanmar submitted its application to become an 'EITI Candidate' country to the EITI Board in May 2014. At its 27th meeting in Mexico in early July 2014, the EITI Board approved Myanmar's candidacy application. In January 2016 Myanmar produced its first EITI Report which reconciled government's revenue flows from oil, gas and mining operations (including gems). Myanmar will publish its second EITI Report in March 2018, after which time Myanmar's compliance with EITI requirements will be validated.

One of the key requirements of EITI is to maintain a publicly available Mineral Cadastral System.

The first Myanmar EITI report noted that Myanmar's current Mineral Cadastral System has important weaknesses:

- No consolidated list of mineral and gem licenses exists
- Existing licenses contain a number of incorrect datasets or miss essential information
- The mineral cadaster system is not available online
- Allocation and transfers of mineral rights are not computerized
- Intensive manual manipulation is required to extract the list of licenses
- Licenses are not systematically pre-numbered

Additionally, the EITI report recommended that:

- The Mineral Cadastre should ensure that all records are computerized and kept up to date.
- An online cadastral system should be installed. The system should include information on coordinates of concessions and transfers of mineral rights as well as fees paid and other performance obligations. The ministry of mines should have official on-line cadastre maps with details of licenses.

In October 2016, a World Bank mission to Myanmar reported the actual situation of Myanmar Mining Cadastre System. Main conclusions of this mission were:

- The current ministry in charge of managing mineral resources is the Ministry of Natural Resources and Environmental Conservation (MONREC). Before March 2016 this role

was undertaken by the Ministry of Mines, now the line agencies, Department of Mines and Department of Geological Surveys and Exploration are fully integrated in MONREC (in the following referred to as MINES).

- In relation to mining in Myanmar there are two different laws, one for Gemstone mining and one for any other mining. (*Note- Oil and gas permits are managed by Ministry of Energy and Electric Power and they are not included in this work*)

- The Mining Law was revised in 2015 and new Mining Regulations were promulgated in February 2018. Amendments to the Myanmar Gemstone Law are currently being reviewed by parliament.

- Gemstone permits are managed by the state-owned Myanmar Gem Enterprise (MGE) MGE is reporting to MINES.

- Other mining permits are managed by MINES directly.

- To date there is no relation between the gemstone permits system and mining permits system. They are independent processes.

- Gem permits are managed in a paper-based system, and they use local coordinates systems.

- Mining permits are also managed in a paper-based system, they use Lambert coordinates (British Maps dated on 1945) and they have an Excel File with permits.

- Official Myanmar coordinates system is UTM- Myanmar 2000.

- Mapping authority of Myanmar is the Survey Department (MONREC). This Department has a digital cartography 1: 50000 (year 2000), procedures for conversion between coordinate systems. The Survey Department also maintains a geodetic network.

- MINES has some capabilities in relation to GIS

- Myanmar has sufficient elements to build a Cadastral System as per EITI requirements

More recently, between 2017 and 2018, a diagnostic study was carried out in order to (i) establish the main deficiencies in the licensing methodology, (ii) to propose the required solutions and (iii) to prepare the roadmap for implementation of a new licensing methodology and a modern cadastre in Myanmar, consistent with the best international practice ("Phase 1"). The present Terms of Reference are based on this diagnostic study and constitute "Phase 2", focused on data compilation, design, installation and training of local staff in the management of the computerized Myanmar Mining Cadastre System.

The objective of the present project is to implement an automated modern rules-based and web enabled mining registry and cadastral system and provide training for the MONREC staff. The project will finance the supervision, design, installation and start-up of a fully computerized mining registry and cadastre system, including the design of the cadastre and procedural guidelines. The cadastre will record, and provide reliable information about, the precise location of exploration and mining rights, selected tracts for gems and artisanal or small-scale mining, as well as protected areas and special needs areas in the

country. The cadastral rules and procedures will be transparent, public, non-discretionary, of general application, and will limit discretionary decision making of the authorities in the allocation of rights and will preserve the priority of the "first come first serve" principle in the allocation of mineral rights.

Under this technical description, specialized Consulting Companies or institutions are requested to present proposals to assist the MONREC in the design and the implementation of the new cadastre procedures and computerization. The Consultant executing the works described in this document will be supported by a local team of experts to work under the supervision of the International Consultant in the design and the implementation of the new cadastre procedures and computerization. After the full testing and hand-over of the system, the local team should be fully familiar with the system and be responsible for the on-going maintenance of the system for routine operations, software upgrades and database management, and system expansion.

It is foreseen that cadastre implementation will be developed in two phases, the first being the development of the union level cadastre, and the second being decentralization of cadastral operations to states and regions. The present TOR apply exclusively to the Phase I.

PRESENT SITUATION OF THE MINERAL RIGHTS IN MYANMAR

The standard mineral licenses and gemstone permits are managed under different legal regimes and follow different licensing procedures and will therefore be described separately.

In relation to the standard mineral licenses, as it shown in Table I, there were as of November 2017 in Myanmar 1,245 permits for standard minerals, 24 for "large scale exploration", 368 for "small scale exploration", 153 for large-scale mining, 633 for small scale mining, 39 for subsistence (artisanal mining) and 28 for feasibility study. The cadastral information is properly stored and maintained, the documents are clean and well maintained, although the present methodology for codification and filing needs significant improvement. The level of computerization is very low and extremely irregular. The information digitally stored is scattered between several computers placed in different departments, not linked by network or intranet, and using different software and formats, making integration in a unified and single database impossible.

License	Type	Number	%
Prospection		0	0,0
Exploration	Large scale	24	1,9
Exploration	Small scale	368	29,6
Mining	Large scale	153	12,3
Mining	Small scale	633	50,8
Mining	Subsistence	39	3,1
Mining	Feasibility	28	2,2
Total Standard Minerals		**1,245**	**100,0**

Table I[1]

[1] Information in Tables I to IV has been provided by DGSE, DOM and MGE

In relation to the gemstone permits, the level of activity for exploration and mining of precious minerals (gems and jade) is very high, with more than 15,000 permits, most of which are owned by private titleholders (97,6 %, see Table II).

License	Type	Number	%
Gemstone	Private	15,016	97.6
	Joint venture	364	2.4
Total Gems		**15,380**	**100.0**

Table II

Almost all of these permits are located inside the "tracts" reserved exclusively for this type of activity. Table III details the number of blocks handled by private or by Joint Ventures in each area, separating the blocks devoted to exploration and mining.

Area	Granted Blocks		Exploration Blocks		TOTAL	TOTAL JV	TOTAL PRIVATE
	JV	Private	JV	Private			
Lone Khin, Phar Kant	224	5,070	123	900	6,317	347	5,970
Nant Yar Sate		17		12	29	0	29
Khan Dee		2,058		75	2,133	0	2,133
Maw Luu, Maw Han (Moe Nhyin)		3,547		191	3,738	0	3,738
Moegok	10	1,808	5	953	2,776	15	2,761
Mine Shu	1	235	1	150	387	2	385
TOTAL	**235**	**12,735**	**129**	**2,281**	**15,380**	**364**	**15,016**

Table III

Additionally, Table IV details the sizes of the areas devoted to mining and exploration of gems, highlighting the fact that, in spite of the high number of granted mineral rights, the area covered by the existing permits is actually small due to the small size of the granted permits.

Area	Acres		Total acres	Total Km2
	Granted	Exploration		
Lone Khin, Phar Kant	13,743	5,881	19,624	79.4
Nant Yar Sate	17	12	29	0.1
Khan Dee	2,058	75	2,133	8.6
Maw Luu, Maw Han (Moe Nhyin)	3,547	191	3,738	15.1
Moegok	2,107	1,053	3,160	12.8
Mine Shu	253	168	421	1.,7
TOTAL	**21,725**	**7,380**	**29,223**	**117.8**

Table IV

OPERATIONAL AND CONCEPTUAL BASES FOR THE NEW MYANMAR MINING CADASTRE SYSTEM

Successful mining law reforms in countries that have managed to attract substantial private investment always include the reform of the titling procedures. These changes are aimed at minimizing corruption, reducing the processing time by eliminating discretion in the implementation of the mining law and improving transparency. To develop and promote solid minerals concessions under a system which facilitates state ownership of mineral resources and private sector development, it is necessary to establish a robust and efficient computer based cadastre system for application, titling and issuing of the mining permits, as well as create and organize institutional capacity and responsibility for the management of the titling procedures.

Nonetheless, it should be noted that the "real" Mineral Rights Cadastre is legitimized by an appropriate regulatory framework and supported by the paper documents, and thus the computerized cadastre files should be consistent with this regulatory framework (including both legislation, for gemstones and standard minerals) and contain exactly the same information as registered in the paper documents. In this way, the computerized system should serve as a user-friendly management tool, supporting the ministry's decisions in the application and awarding of licenses by automating the access to accurate information, screening applications, deadlines and dates, and routine procedures consistent with the law, and limiting discretionary decision making.

From the graphical point of view, the computerized Myanmar Mining Cadastre System (MMCS) must provide a) the correct positioning of the mining titles on the official cadastral maps, b) the management capacity of the administrative information associated with mineral rights and the storage of the historical records of the mining titles granted and c) be able to handle simultaneously the present irregular geometry of the mineral rights and the "cadastral unit" or other geometric rules based on UTM metric coordinates that could be implemented in the future.

Moreover, the MMCS should not be limited to the standard GIS applications and should include the computerization of all the procedures associated with the administration of the application and granting of mining titles. The MGCS should be a custom-built application specifically focused on the specific needs of the mining cadastral management unit, and, while based on, should be well differentiated from, the standard GIS applications for land or natural resources management. The most relevant of the operational functions to be developed for the MGCS should be able to:

- Store, access and process all the information required for cadastral procedures, in a quick, easy and user-friendly way.

- Facilitate the management of the titles by automatic control of the duration and the delay of each step in the cadastral procedure: the payment of fees, the duration of the permits and any other requirements provided in the Mining Regulations.

- Facilitate the accounting and management of the annual rental fees and application fees, including future projections.

- Edit and print cadastral documents and maps, including official forms, standard letters, graphic documents and data lists.

- Block and avoid the violation of the priority order or any other forbidden cadastral operation, prompting alert messages.

- To facilitate the daily cadastral works by automatic reminder messages to alert about pending actions and obligations by permit holders and the regulator.

- Provide investors (and the public) access to the updated cadastral data initially for the entire Myanmar territory in the central office of Nay Pyi Taw, and in the longer-term, through internet access, to the District offices and any place where the cadastre website will be accessible.

- Guarantee the security of the information by systematic and automatic application of back-up routines and procedures.

- Provide security tools to preserve the confidentiality, the stability and the inviolability of the information against human errors and unforeseen circumstances. Different levels of authorization and access to the data should be introduced.

- Facilitate the statistical analysis of the mining title data and systematize the evolution of the cadastral situation, leading to the production of standard reports, including the economic reports and projections of incomes.

- Automatically generate a historical file and audit trail of the information concerning cancelled or expired licenses and concessions.

- Treat simultaneously and interactively the graphic and alphanumeric information by means of specific GIS applications. Additionally, in order to facilitate the use of geo-referenced satellite images, the GIS software should be able to display (jointly with the cadastre vector files) these satellite images referred to in the national map coordinate system.

- Ensure the security of the information by implementation of password for access at different levels and introducing routines for generation of back-up copies. Furthermore, the system should be able to automatically save the historical files.

- Measure and report the aggregate surface occupied by valid existing licenses in each district, for each type of license, holder and mineral.

- Guarantee the present property rights, as well as minimize the risks for the title holders and the administration, during the transition from the current methodology to the new system.

The computerized cadastre system should be conceived as an independent and autonomous system. Nevertheless, it should be able to interchange (export and import) data with other computerized systems of the Myanmar Administration, especially between the MONREC departments. Moreover, the system should have a robust and simple configuration, be "user friendly", and be based on use of:

- Architecture based on PC computers and servers.

- Standard off-the-shelf and readily supported relational data base and commercial software.

- Standard formats compatible with the other systems used within the MONREC and other public institutions, permitting the data exchange.

In addition to the capacities and features described above, the computerized cadastre system should be able to deal with the specific geometric characteristics of the Myanmar cadastre:

- Licensing procedures are different for gemstones and standard minerals, being ruled under separate legal regimes.

- Presently there are no restrictions on the geometry and orientation of the cadastral polygons. However, it is advisable to introduce such restrictions in the new licensing procedures and consequently, the system must be able to handle simultaneously both types of restricted and unrestricted geometries, as well as the differences between the gemstone licenses, artisanal mining licenses and small-scale licenses (restricted in reserve areas or tracts) and large / medium scale licenses.

Finally, the system should allow flexible adaptation to future changes in the legal or regulatory framework, and also modifications in licensing procedures without requiring additional reprogramming work.

OBJECTIVES OF THE PROJECT

The principal objective of the assignment is the design, installation and testing of a new modern computerized Myanmar Mining Cadastre to automate the management of the application and granting of mining titles, guarantee the transparency, efficiency and performance of the process, as well as ensure the security of tenure and protection of mining titles. The new cadastral system will be based in the MONREC central office in Nay Pyi Taw, having also units in the states and regions where the decentralized licensing activities take place. It will improve governance and investment climate of the mining sector, provide easy access to minerals by private investors, and improve transparency and public accountability. The Myanmar Mining Cadastre System will be required to:

- Provide a robust and transparent system for the management of mineral and gemstones licenses consistent with the Myanmar Mining and Gemstone Laws.

- Provide guidelines for appropriately formatted data, maps and reports for internal and external clients.

- Provide various levels of security and access to the information, reflecting the various functional roles in license administration.

- Provide reports and statistics for internal use and external dissemination.

- Provide systems for dealing with issues of non-compliance and notices to companies for minor breaches.

- Provide a client-focused and user-friendly interface with the investing community.

ON-GOING ACTIVITIES

Following the recommendations suggested in the diagnostic report produced during the "Phase 1", MONREC is presently executing three different activities as preparation for the execution of "Phase 2" and preconditions to the implementation of the computerized Myanmar Mining Cadastre System:

a) To update and to modernize the MONREC institutional organization by creation of a Myanmar Mining Cadastre Department as the unit exclusively responsible for licensing activities.

b) To revise, simplify and optimize the present licensing procedures, speeding-up the duration and establishing separated and different procedures for exploration and mining rights.

c) To create the cadastre (alphanumeric and graphic) database, designed to be directly exported to the new computerized Myanmar Mining Cadastre System.

It is understood that these activities will be completed before the consultant responsible for implementation of the computerized Myanmar Mining Cadastre System will start his activities.

SCOPE OF SERVICES

The scope of services will include but need not be limited to:

a) Review implementation of the Phase I Report, recommendations and action plan including regulatory reforms;

b) Validation of existing licensing data;

c) Design, installation, testing and commissioning of the computerized system and the identification, delivery and upgrading of computer facilities and network;

d) Design of a modern web portal for diffusion of cadastral information; and

e) Professional training.

a) Review implementation of the Phase I Report, recommendations and action plan to ensure the requirement of institutional reform.

(a) To review and report to MONREC on the implementation of the Myanmar Mining Cadastre Action Plan developed in Phase 1 of the project.

(b) Facilitate quarterly meetings to update and give necessary advice to MONREC implementation of the Action Plan.

(c) Review existing legal & institutional framework to advise on the institutional function of cadaster unit in relation to other departments with MOREC.

b) Pre – computerization cadastral activities.

During this phase of the project the Consultant will support the local team to conclude the required preparatory activities to clean cadastral data and to prepare the complete pre-cadastre database, including the following activities:

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(a) Quality control of the inventory of the existing mineral rights and pre-cadastre database, verifying the consistency between the paper files, the alphanumeric information and the graphic files.

(b) Quality control of the new codification methodology and recodification procedure.

(c) Quality control of the linking between the alphanumeric database and graphic information within the GIS

(d) Monitoring and evaluation of proposed solutions for the detected conflicts and overlaps.

In addition, the Consultant will advise the drafting new cadastral procedures (guidelines), establishing the steps that can be automated or need slight modifications in order to be adapted to the computerized Myanmar Mining Cadastre System, although always consistent to the enacted legislation and the best international practice. These guidelines (licensing procedures) will be based on the present diagnostic and fully consistent with the enacted legal framework (laws and regulations), while introducing improvements for reception, approval, rejection and administration of applications and tenements, as well as renewals, transfers, mortgages, revocations and expirations.

In parallel, this task must include the revision of the administrative forms and other cadastral documents required for digital treatment, editing or printing in the context of the computerized procedures.

c) <u>Design and installation of the MMCS (Myanmar Mining Cadastre System) system at central level</u>

The design of the new computerized cadastral system shall be developed in distinct steps.

- ***First step***. Development of a prototype that should be able to:

(a) Handle the computerization of the cadastral procedures in full conformity with the enacted legal framework, as well as the conceptual basis defined in the present Terms of Reference. Moreover, programming of the prototype shall include all the functions and options provided for the final system, including a simulation of the website functioning and updating routines. The only limitations (with respect to the final version) of the prototype will be the number of users and the data transfer facilities with other computers in the system.

(b) Provide both training and on-the-job capacity development to graphically integrate the scanned topographic (referred to the national cartographic system) maps with the cadastral information with the Pre-cadastre Working Group under MONREC. In addition, this integration shall provide also the capacity for measuring the surface occupied by valid existing licenses in each district, in order to calculate automatically the amounts of license fees and rental generated by each administration unit. During this phase, the architecture and configuration of the final system will be also proposed for review and acceptance by MONREC.

(c) Although the computerized system will be installed only at central level during this phase, in the short term, the system will be expanded to the decentralized level, and consequently the design must provide all the required features and operational procedures for such decentralization.

- ***Second step***. Based on the characteristics of the revised prototype and the results of a functionality test, the Consultant will present to MONREC the final design for approval. The design will include:

  a. The technical specifications and quantities of the equipment to be integrated into the system (hardware and software). These specifications must include the design of the cadastre local area network, including the server and the web server, as well as the equipment required for the implementation of the decentralized cadastral offices.

  b. The technical specifications of the computing equipment and peripherals to be acquired. The Consultant will assist the acquisition in the evaluation of the offers, the selection of the tender, and delivery and installation of the equipment assigned to the Pre-cadaster Working Group (or its successor), detailing;

     - The list of the equipment to be acquired taking into consideration the needs of the Myanmar Mining Cadastre web site or portal (web server) and local area network.

     - The suggestions for rehabilitation of the Myanmar Mining Cadastre System offices (public walk-in and service centers).

     The obligation to recommend specifications for computing equipment does not include any responsibility for purchasing such equipment, and the selected equipment will be acquired separately by MONREC. As a consequence, the cost of computer equipment and expenses associated with its purchase should be not included in the budget for execution of the works included in this technical description.

  c. The security measures (user type definitions and access levels) and back–up routines.

  d. The planning of the training activities for the Myanmar Mining Cadastre team.

  e. The technical specifications for the data transfer and update of the cadastral information in the website.

  f. The strategy for implementation, including decentralized offices and the Myanmar Mining Cadastre web site.

  Although the system should be conceived and dimensioned proportionally to the current situation of the Myanmar mining sector, the equipment configuration must have sufficient flexibility to absorb (in the short-term) the foreseeable increase in the activity level. Moreover, the architecture of the system should permit the future expansion of the system, when the potential growth of interest in Myanmar mining opportunities materializes.

- ***Third step***. System implementation at central level.

  After approval of the final design by MONREC, the installation of the system, will include the implementation of the equipment (hardware and software), the capture and the loading of information in the system and the verification of the functionality, including:

  - *The purchase and installation of the equipment.* Based on the design and the technical specifications approved by MONREC and after the purchase of all the equipment components,

the Consultant will be responsible for supervising the delivery and installation of the equipment, issuing a compliance certificate or making the required recommendations for the replacement of the defective components or those which do not correspond to the approved specifications. Where off-the shelf software is installed, this will have to be adapted and to be consistent with the functionality required for the Myanmar MGCS.

- *The capture and loading of information.* The Consultant will be responsible for the capture and loading of information in the new system. This activity will include the migration of the data from the existing databases and formats to the formats required by the new system. Additionally, the Consultant will validate (cross – checking) the information loaded in the system. This phase will include also the operational implementation of the Myanmar Mining Cadastre web portal.

- *Test of functionality.* After the installation, and after loading the information, the Consultant will carry out the tests of functionality of the system, which will include (among others):

  - Data retrieval by single or combined criteria (alphabetical, numerical or geographic).
  - The visualization of graphic and geographic data.
  - Automatic calculation of the distribution of license fees, rentals and other payments to be submitted towards each local administration unit (if the new legal framework includes this obligation).
  - The editing and printing of the cadastral documents, including the cadastral maps.
  - The timing control for all the procedural steps.
  - The control and accounting of the payments, in total and individualized per license type, per district, per holder type and per mineral.
  - Filtering the entry of erroneous information and undesirable manoeuvres.
  - The generation of statistical data and the production of standard reports.
  - The projection of the future revenues to be generated
  - The data updating in the website.
  - The accessibility of the website.
  - Security testing.

d) <u>Design of a modern web for diffusion of cadastral information</u>

To design and to implement a specific website or portal for the Mineral and Gemstone Cadastre, accessible to the internal uses by intranet and making available the cadastral information to the public through Internet. This website must provide at least the following capacities:

- Access to the alphanumeric information related to the existing licenses and pending applications, including the name of the titleholder, the date of application and if it is the case the dates of granting and expiration.

- The cartographic information (interactive cartographic site) of the existing licenses and pending applications for any type of mineral right, including the reserved areas, natural parks and other areas where mining activity is forbidden.

- The status of each pending cadastral procedure, to allow applicants to verify the situation or step for any procedure related to the application for a new granting, renewal, transfer, enlargement, division, etc. of any license, including payments of fees.

- The public information corresponding to the beneficial owners of the mineral rights.

e) Professional Training

Throughout project execution, the Consultant will be responsible for the training of the MONREC counterparts. The Consultant will prepare a detailed training plan and schedule and offer a training program for each one of the activities described in this document, providing for the effective transition of both new and existing staff to their new functions. New personnel to be engaged in the Myanmar Mining Cadastre will have to be completely familiarized with the operation of the system and its maintenance. Training and formation activities should be focused on Myanmar Mining Cadastre responsibilities, activities, techniques or functions, and shall include but not be limited to:

- Training of a local technician to support the maintenance of the system for routine operations.

- Legal aspects for the management of the mining titles. Personnel of the Myanmar Mining Cadastre must (in addition to the technical aspects) have a good practical knowledge of the legal aspects related to the application of the legal framework (Mining and Gemstone Acts and associated Regulations) and corresponding procedures or guidelines. Appropriate legal and administrative training must be included in the training plan for the cadastre personnel to support their new administrative functions.

The training will be carried out through on the job activities, with the assistance of the experts of the Consultant and also by study tours (such study tours should not be factored into the financial proposal of the Consultant). For each type of training, the Consultant will take part (conjointly with MONREC) in the selection of the candidates who will participate in the training activities. It should be noted that training on the job should be addressed mainly to the technical staff responsible for the cadastral duties.

However, in the study tours, it would be advisable to include also high level MONREC staff, in order to improve their understanding and perception of the cadastral issues. In this respect, a specific workshop explaining the conceptual and operational basis of cadastre, addressed to high level staff in MONREC and decentralized administration would be advisable.

The training plan and programmed activities will be one of the more important items in the evaluation of the Consultant. The Consultant should therefore present in the offer the details on training and technical support, specifying in the budget the costs of the training activities. Some provisions for unforeseen expenses should also be included to satisfy specific needs which could be identified during project implementation.

f) Maintenance

The final product will not be delivered to the Customer until all the tests of functionality have been passed. Subject to availability of funds, the Consultant may be requested to provide training, technical support and supervision of functionality for a duration of six to 12 months.

STAFF REQUIREMENTS AND EXPERIENCE

The Consultant selected for the implementation of the computerized cadastre must have recognized international experience in the practical application of data processing techniques (particularly in database design and GIS applications) for the mining industry in general and the Mineral Cadastre in particular.

The consultant shall demonstrate extensive relevant international experience in mineral licensing administration, including the codification and registry of licenses as well as the design and implementation of cadastral procedures.

Experience in computerization of a Mineral Rights Cadastre, in the design and implementation of computerized systems for the management of mineral and gemstone licenses and in the training of counterparts as the future users of the system.

Additionally, experience in projects for the institutional reform of the mining sector will be evaluated favorably. The estimated dedication of the key personnel required from the Consultant is summarized in the Table V.

Expert	**Months**
Head of the project	8
Expert in mining cadastre database	12
Expert in cadastre GIS applications	12
Internet expert	6
TOTAL	**38**

Table V

It should be noted that values shown in Table V are only estimated and indicative, and the Consultant will have the freedom to propose the number of man-months that are considered necessary for the realization of the activities, as well as a different team composition. In this case, the Consultant will be responsible for its own estimation.

Table VI

ACTIVITY	RESPONSIBILITY OF	2019												2020											
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Central Cadastre Implementation																									
Review the implementation of Phase I Report & Action Plan	Consultant Firm & Myanmar Myanmar Mining Cadastre Unit			■																					
Quarterly meetings with MONREC to update progress & advise on next steps.							■			■			■			■			■			■			■
Review existing legal & institutional framework to advise on the institutional function of cadaster unit in relation to other departments with MOREC.				■	■	■																			
Drafting licensing procedures				■	■	■	■	■																	
Manual Cadastre									■	■															
Development of the prototype										■	■	■	■												
Approval of the prototype	MONREC Minister													■	■										
Portal website design	Consultant Firm & Myanmar Mining Cadastre Unit													■	■										
Equipment acquisition and installation												■	■	■	■										
Data import																■									
Functionality test																■									
Central computerized cadastre																■	■	■							
Training and Formation			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■						
Monitoring and Maintenance																			■			■			■

ORGANIZATION OF WORK

The services must be completed by December 31, 2020 and require a level of effort of about 38 staff months, beginning in March 2019. Additional technical support for supervision and technical support of the system after the final installation of the system may be negotiated separately. An estimated chronogram of the activities to be developed for implementation of the Myanmar Mining Cadastre System is included in Table VI.

H. DELIVERABLES AND REPORTS

The Consultant will present the following reports:

a) ***Inception Report***- Analysis of the present licensing situation (Minerals Law of Myanmar and other related laws or regulations, present operational mining titling procedures and guidelines, pre-cadastre database and situation of the cadastral information, GIS applications, codification system and any other item affecting the licensing), as well as the proposed planning for implementation.

b) ***Progress Report***- Quarterly progress reports describing the advance of the project, listing the activities carried out and detailing the participation of the experts. These reports should also compare the project development with the proposed planning, justifying (if necessary) any deviations from the initial plan. Additionally, these reports will contain the suggestions and the recommendations for the project development during the next quarter.

c) ***Specific reports:***

Pre – computerization cadastral activities
Description of the developed activities and the results obtained in the final steps of the pre-cadastre phase. Description of the revised guidelines and procedures, the adopted codification, the structure and content of the new cadastre database and the conceptual design of the new system.

Prototype System Design
Presentation and description of the prototype for the computerized system.

Design and the installation of the centralized cadastral system
It should include:

- Presentation and description of the complete design for the final computerized system based on the prototype. It should include the technical specifications of the system as well as their complete configuration and the required software.

- The description of the loading and validation of the information inside the system, as well as the results of the tests of functionality.

- The handbook for the utilization of the system.

a) Final report:

Completion report describing the general results obtained during the project development, the instructions for the routine operation of the system and those related to the future maintenance, development and updating of the system.

All reports must be submitted in English.

REQUIRED EXPERTS

- *Head of project:* Minimum experience of 10 years in planning, coordination and implementation of multidisciplinary projects at international level. A minimum of three years of this experience should be in developing countries. He/ She is required to have a good knowledge of the modern techniques for the management of the mining titles and practical experience in the Mineral Rights Cadastre implementation, including development of cadastral procedures. Moreover, the head of the project must have a complete knowledge about the application of GIS technology to the Earth's Sciences in general and to the Mineral Rights Cadastre in particular. The head of the project must have university degree in mines, geology, geography or geodesy.

- *Expert in mining cadastre database:* Minimum experience of 10 years in design and configuration of computerized applications based on PC platforms and local area networks, with data base applications integrated with data banks and geographical information system (GIS). Experience in programming of macros and software applications related to the integrated treatment of alphanumeric and graphic data for mining or earth sciences in a GIS.

- *Expert in cadastre GIS applications:* University degree in earth sciences or geography. Minimum experience of 10 years in large-scale GIS applications. Participation in the design and installation of computerized mining cadastral systems, with equivalent dimensions to the Myanmar Mineral Rights Cadastre. The knowledge of the mining sector and the earth's sciences in general is required.

- *Expert in the Internet portal and website design:* University degree and minimum experience of 5 years in the design of web pages and data-processing applications on the Internet. Basic knowledge of the mining sector and the earth sciences is required.

All the experts proposed by the Consultant must have a good knowledge of English language.