

Environmental Assessment and Review Framework

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Myanmar: Irrigated Agriculture Inclusive Development Project

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CURRENCY EQUIVALENTS

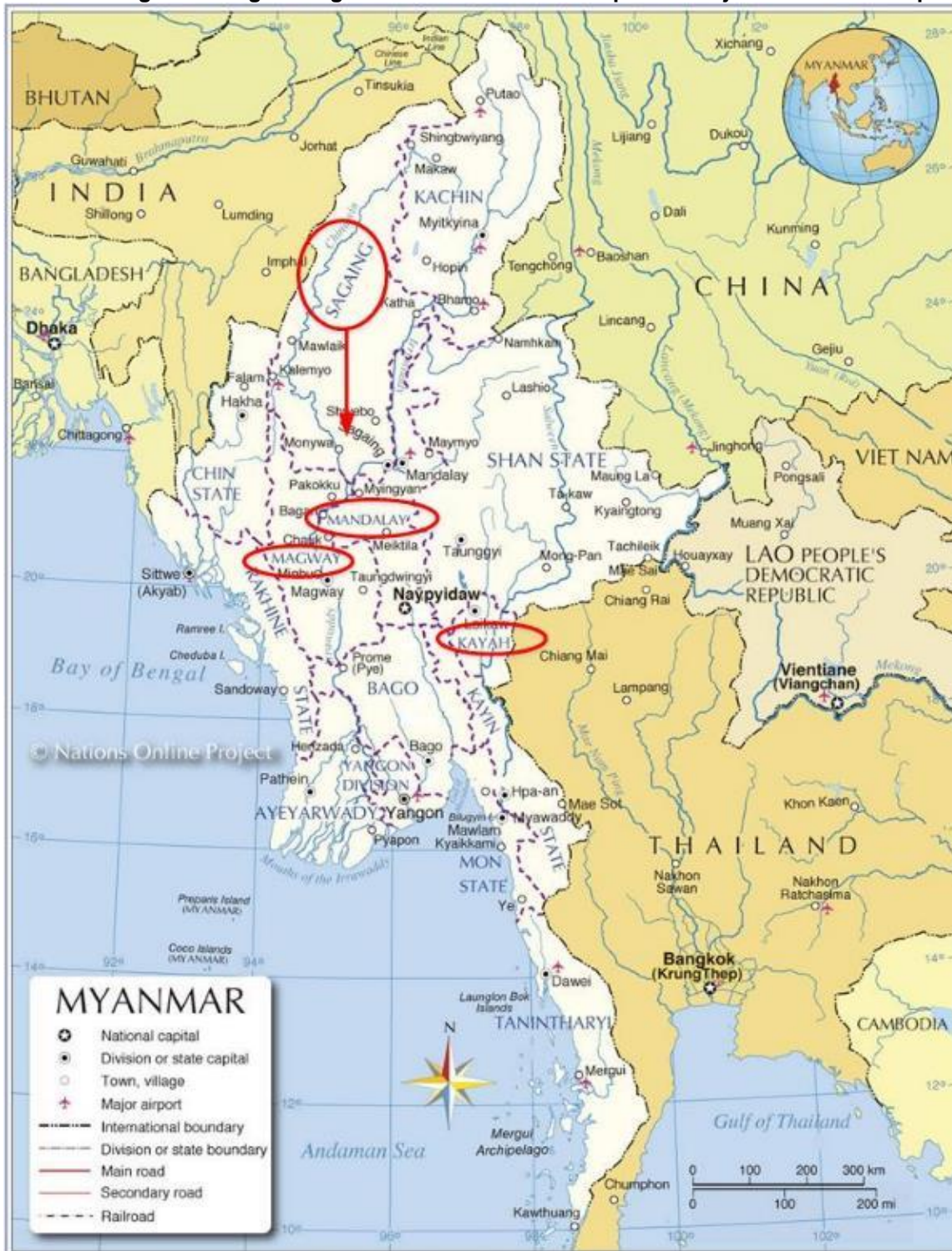
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Currency unit	–	Myanmar Kyats
Kyats 1.00	=	US \$0.0007855
US \$1.00	=	MMK 1,273

ABBREVIATIONS

ACC	–	agricultural coordination center
ADB	–	Asian Development Bank
AP	–	affected people
CDZ	–	Central Dry Zone
CO ₂	–	Carbon dioxide
DOA	–	Department of Agriculture, MOALI
EA	–	Executing Agency
EARF	–	Environmental Assessment and Review Framework
ECD	–	Environmental Conservation Department, MOECAP
EHSO	–	Environment, Health and Safety Officer
EIA	–	Environmental Impact Assessment
EMP	–	Environmental Management Plan
FESR	–	Framework for Economic and Social Reforms
FGD	–	focus group discussion
GEF	–	Global Environment Facility
GHG	–	greenhouse gas
GRM	–	Grievance Redress Mechanism
ha	–	hectare
IEE	–	Initial Environmental Examination
IA	–	Implementing Agency
IAIDP	–	Irrigated Agriculture Inclusive Development Project
IWUMD	–	Irrigation and Water Utilization Management Department, MOALI
LIEC	–	Loan Implementation Environmental Consultant
LISC	–	Loan Implementation Social Consultant
mm	–	millimeter
MOALI	–	Ministry of Agriculture, Livestock, and Irrigation
MOECAP	–	Ministry of Environmental Conservation and Forestry
NAPA	–	National Adaptation Programme of Action
NECC	–	National Environmental Conservation Coordination Committee
PAP	–	project affected person
PCU	–	public complaints unit
PMU	–	project management unit
PPTA	–	project preparatory technical assistance
PSC	–	project steering committee
REA	–	rapid environmental assessment checklist
SPS	–	Safeguard Policy Statement 2009 of ADB
WUG	–	water user group

Figure 1: Irrigated Agriculture Inclusive Development Project – Location Map



Irrigated Agriculture Inclusive Development Project – Location Map

Figure 2: Irrigated Agriculture Inclusive Development Project – Central Dry Zone Pipeline Projects

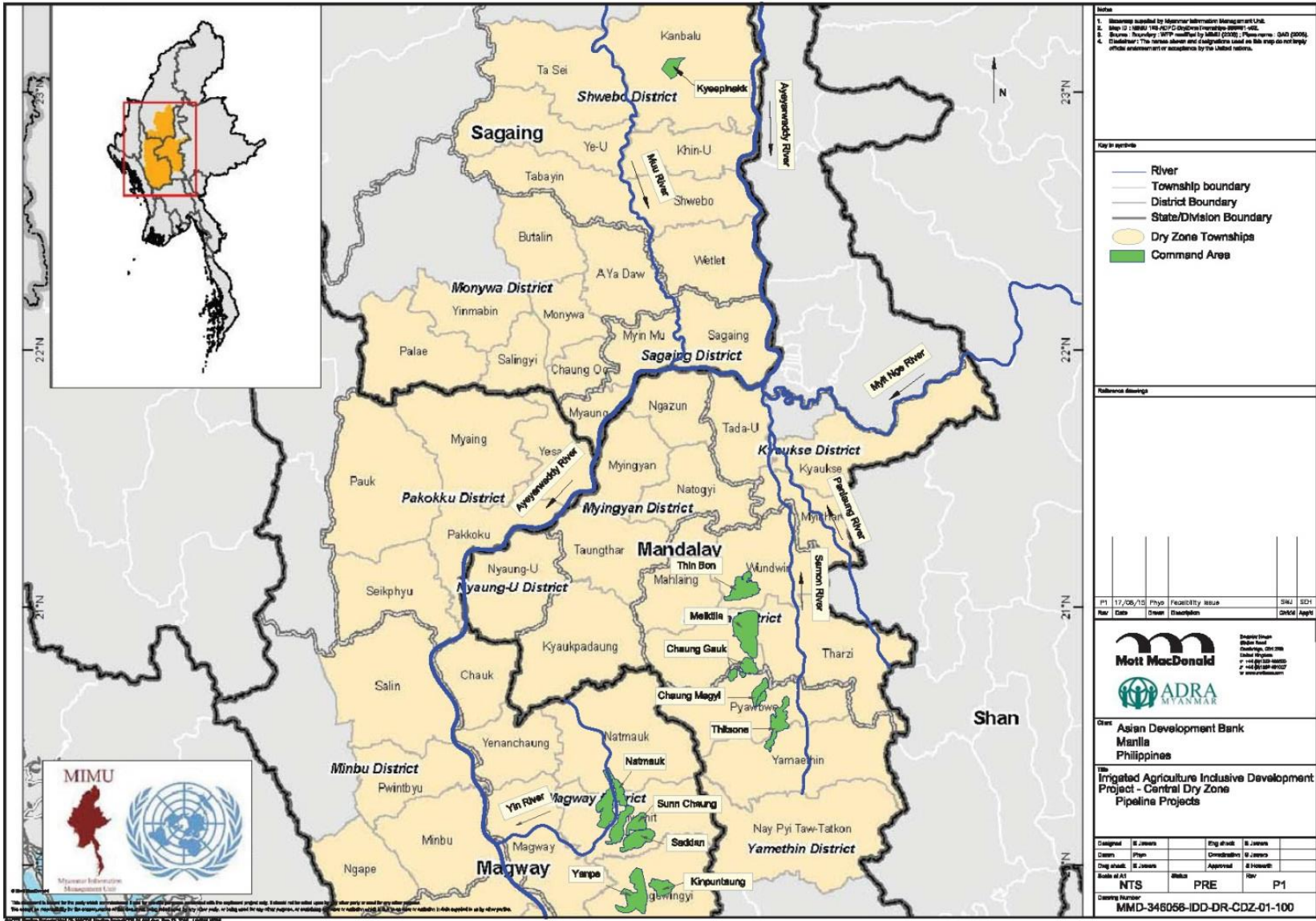
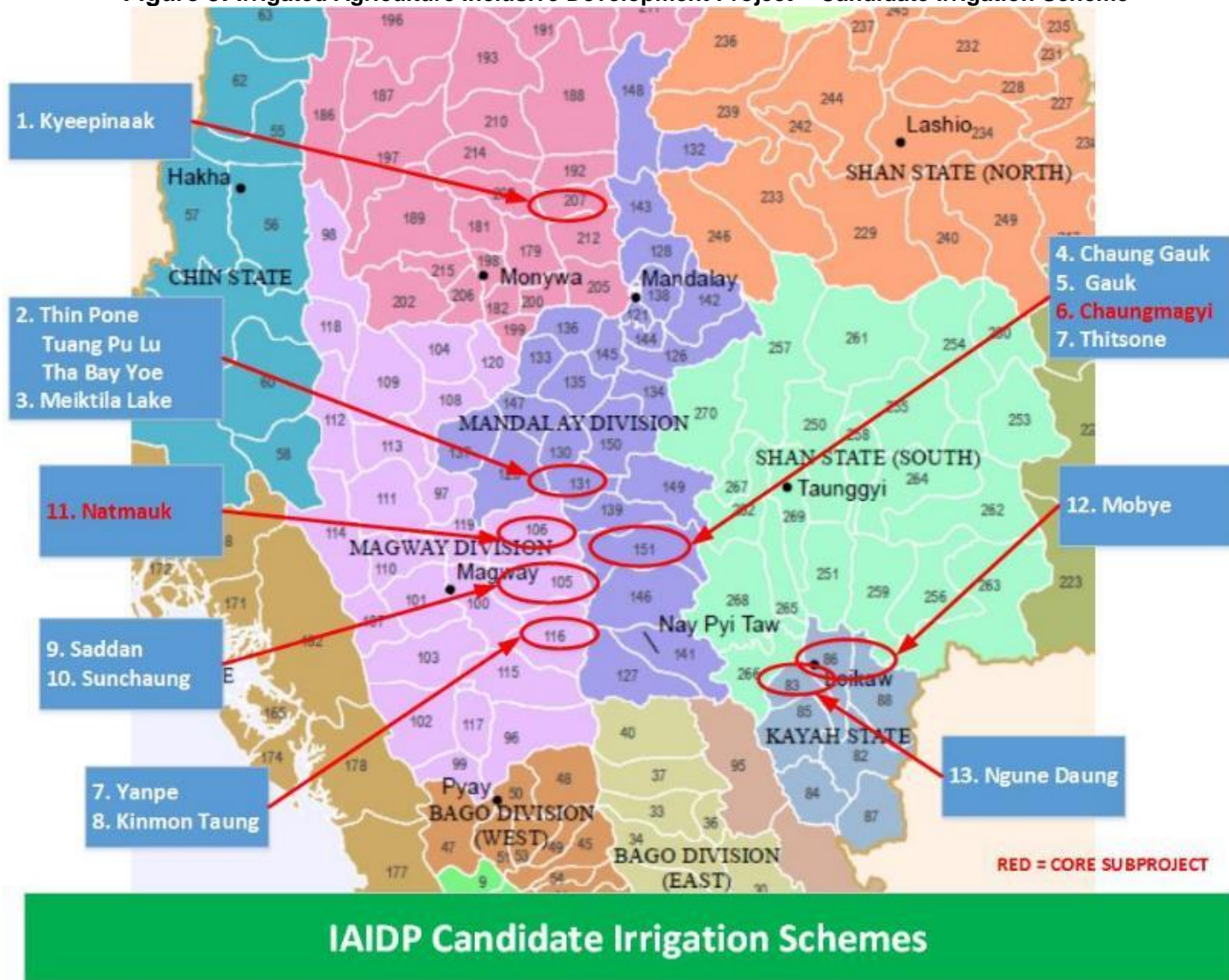


Figure 3: Irrigated Agriculture Inclusive Development Project – Candidate Irrigation Scheme



IAIDP Candidate Irrigation Schemes

Figure 4: Map of Central Dry Zone Myanmar



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I. INTRODUCTION

A. Background

1. Emerging from a long period of isolation, Myanmar is undergoing a major economic, social and political transformation. Government's 'Framework for Economic and Social Reforms' (FESR)¹ refers to the country being labelled as a pariah state as recently as 2011. The new civilian government began a series of liberalizing measures in 2011 followed by further reforms in May 2012 which were compared by the Organization for Economic Co-operation and Development to the dramatic changes in Eastern and Central Europe in the 1990s as well as the opening of both China and Viet Nam.

2. In focusing on people-centered development, the Republic of the Union of Myanmar (the Government) is focusing on directly addressing the poverty situation and the need for improved human development as well as on the broader measures needed to maintain macro-economic stability and accelerate inclusive economic growth. The Government sees agricultural growth as critical for inclusive development and aims to ensure that food security is achieved throughout the country, and is developing strategies that will channel benefits of reforms and growth strategies towards helping improve the welfare and income of farmers, farm laborers and their dependent families.² Improving food security and agriculture growth is also seen as important bold step for uplifting the rural poor from the poverty line. This is to be done through boosting agriculture productivity with the increased farmer's access to extension service, government loan, agriculture inputs such as quality seed, fertilizer and pesticide, while removing barriers throughout the supply chain and promoting demand-oriented market support mechanisms, which will pave the way for long-term structural and institutional reforms needed in the sector.

3. The FESR fully recognizes both the urgency and historic scale of reforms required in Myanmar, involving the development of market mechanisms, changes in economic decision making and the correction of policy distortions inherited from the previous period. Given the depth and breadth of the required transformation, it is impossible for the Government to implement all the programs of reform in one government term, so FESR proposes a phased implementation strategy.³

4. This reform process has resulted in fundamental changes which must be accommodated in the project design and the reform process is far from complete, so substantial changes will occur during the implementation phase and over the life of the project. Therefore, the project considers the present and prospective reforms rather than simply describing present conditions. Reforms will influence project design in ways which will be explicitly set out in the Interim and Draft Final Reports, as well as environmental reports.

5. The Irrigated Agriculture Inclusive Development Project (IAIDP) area is in the Central Dry Zone (CDZ) region, straddling large parts of Mandalay, Magway and lower Sagaing divisions, one of the most food-insecure, water-stressed, climate-sensitive and natural resource-poor regions in Myanmar. [see maps in the introduction] The CDZ region has the second highest population density in Myanmar but remains one of the least developed. Access and availability of water resources are key determinants of rural poverty with livelihoods largely

¹ Framework for Economic and Social Reforms: Policy Priorities for 2012-2015 towards the Long-Term Goals of the National Comprehensive Development Plan; Ministry of National Planning and Economic Development, 2012.

² FESR Chapter 1 para 11 and Chapter 12 para 132 respectively.

³ FESR, Chapter 12, para 131.

dependent on the southwest monsoon. The CDZ It comprises about 10% of the country with about 18% of the total population. The area is prone to erratic rainfall and prolonged dry spells that are a regular threat to rural livelihoods. Temperatures range from 12° C in January to a maximum of about 42° C in April.

6. Although there are potentially ample water resources in the Ayeyarwady and Chindwin rivers, most water resources cannot be accessed by gravity and the smaller tributary rivers are mostly seasonal with very low dry season flows. The CDZ is characterized by clay and sandy soils with a high risk of water and wind erosion leading to land degradation and declining agricultural production. The main agricultural constraints for farming households were reported to be drought, the cost and quality of agricultural inputs, the cost of labor, plant diseases and floods.

7. Rice cultivation depends on irrigation, even during the monsoon season. Seasonal water shortages caused by low and erratic annual rainfall patterns together with sandy and fragile soils that are at high risk of water and wind erosion limit paddy rice cultivation, render rainfed agriculture a high risk endeavor, and contribute to low agricultural production. Under such uncertain climatic and rainfall conditions, the provision of functional and well-managed canal irrigation systems is critical to safeguarding crops.

8. The annual rainfall varies from 500-1,000 millimeter (mm) in the project area, about 80% occurring during the monsoon season (May to October) and 20% in the dry season (November to April). There is often a pronounced precipitation dip in the middle of the rainy season around July. There is a high variability in rainfall variability which has a significant impact on rain-fed crop production. There may also be prolonged periods in the monsoon with reduced or no rainfall, which will have negative impacts on rain-fed production and thus on the livelihoods of people living within the area.

B. IAIDP Project Overview

10. The Government has prioritized irrigation investments to enhance agricultural production and improve water utilization constructing many dams, weirs, pumping stations and tube wells, focused primarily in the CDZ. Many of these irrigation schemes have been built in the last 20 years but others are much older. These schemes need to be rehabilitated, modernized and upgraded to meet changing demands and uses. The IAIDP will result in increased agricultural productivity and incomes through the provision and improved management of irrigated agriculture in the CDZ region. The IAIDP will rehabilitate and modernize irrigation infrastructure in the CDZ and strengthen institutional capacities for improved irrigation management from the national level down to irrigation water users at the tertiary canal level.

11. In late 2014, the Government proposed that the area be extended outside the CDZ to include Kayah State and ADB agreed during its Inception Mission. This changes the project area from a distinct area to a collection of three regions and one state.

12. The proposed IAIDP will involve the following proposed project components (i) agricultural value chains in oilseeds, pulses, and horticultural crops promoted and enhanced; (ii) reliability of agricultural water supplies improved; and (iii) capacity for integrated water resources management strengthened.

13. Prefeasibility studies provided approximate estimates of the economic internal rate of return of each subproject and served to determine whether or not feasibility studies are justified.

Results were as precise as possible within the time and resources available and the decisions needed will divide the candidate systems into three broad groups:

- (i) Systems which are unlikely to meet a minimum 12% economic internal rate of return - as rehabilitation of existing systems it is quite possible that no systems will fall into this category and, if any do, then additional analysis will be undertaken to confirm or reject the exclusion;
- (ii) Systems which are marginal and expected to achieve 12% but not be much higher, say up to 15%, can be included in the initial pipeline for further analysis and feasibility study during implementation; and
- (iii) Systems which appear to be strongly and robustly viable so will be included in the pipeline and form a shortlist from which two core sub-projects were chosen for initial implementation. Criteria will include the economic analysis but also social and political considerations as well as whether a feasibility study can realistically be completed given available time and resources.

12. Table 1 presents a summary of the potential IAIDP infrastructure components and the two selected for initial implementation are in red and became the main focus of the IAIDP Initial Environmental Evaluation (IEE). The remaining IAIDP components will be placed in a project pipeline for future implementation, including Environmental Assessment and Review Framework (EARF) reviews.

Table 1: Proposed Project Component Summary

Region / State	System	Storage volume (acre-ft.)	Net command area (acre)	Storage per unit command area (feet)	Average Water Use (acre-ft.)		Cropping Intensity (%)	
					avg	dry year	avg	dry year
Kayah	Moby	580,000	17,917	32.37			85	
Kayah	Ngwe Daung		6,291		28,568	17,847	119	
Magway	Natmauk	88,400 (1)	25,380	3.48	140,255	102,664	119	101
Magway	Sun Chaung	24,576	7,125	3.45	25,212	14,906	130	121
Magway	Saddan	18,000	10,500	1.71	28,956	16,414	115	110
Magway	Yanpe	35,140	10,845	3.24	24,437	1,625	108	103
Magway	Kinpuntaung	10,520	5,190	2.03	13,882	6,651	111	99
Mandalay	Thin Pone	13,059	8,728	1.50			96	79
Mandalay	Meiktila	17,209	26,297	0.65	17,549	10,506	10	7
Mandalay	Chaung Gauk	3,250	6,614	0.49	12,909	8,635	64	51
Mandalay	Chaungmagyi	33,200 (1)	7,255	4.58	30,534	21,909	129	97
Mandalay	Thitsone	39,965	12,345	3.24	27,134	13,569	73	30
Sagaing	Kyeepinakk	38,700	5,458	7.09	36,075	22,739	118	64

(1) Numbers being refined during feasibility work and may differ slightly in other reports.

13. The 13 IAIDP candidate irrigation systems were built at various dates between 1960 and 2005, apart from Meiktila which has evolved from a historic tank which has gradually been expanded over the years. They all extract water from small streams which have been dammed to provide some storage to smooth out short term fluctuations in flow and to enable some summer cropping. [Note that 'summer season' for irrigation involves the hot/dry months prior to calendar summer monsoon.]

14. The dams are generally reported to be in good condition, but have not been inspected or reviewed as part of the IAIDP. Most canals are unlined, but some brick lining has been provided in vulnerable sections. Maintenance is undertaken by the Irrigation and Water Utilization

Management Department (IWUMD) down to the outlets from distributary/minor canals and owing to limitations of budget and other resources has not been undertaken comprehensively. Some parts of the systems are in good condition, and others are more severely degraded. The older schemes (mainly in Mandalay) are often in worse condition than the newer schemes (Magway) although some areas have been upgraded resulting in considerable variation in the condition within individual schemes. In general, the ends of the systems are in relatively poor condition, a fact compounded by the relatively sparse canal density and flatter topography and resulting in poor cropping. The command areas of some have been delineated and partially developed beyond the limits of reliable water availability.

15. With one exception, the schemes are in the head reaches of small ungauged catchments (upstream catchment areas ranging from 20 to 450 square miles), with stream flows being estimated from reservoir water balances. Sedimentation is believed to be high and thus depth storage curves may be inaccurate, which would affect the streamflow estimates. Improved measurement of reservoir outflows is proposed as part of the project to be used in conjunction with reservoir storage data to increase the accuracy of water resource estimates. The Moby scheme in Kayah is on a much larger river draining Shan State, where there is a large reservoir mainly used hydropower reservoir (over 90% of the water is released for that purpose).

16. Rainfall data is available at the dam sites since construction started, and there are meteorological stations in representative townships. Rainfall is very variable and rainfall in the reservoir catchments may differ (and possibly be higher) than at the dam site or townships.

17. The schemes are generally small (less than 25,000 acres) with reasonably well-structured canal layouts: main canals, distributary canals and minor canals (managed by the Irrigation Department), supplying water via outlets to watercourses, field channels and individual farms. There are, however, a large number of direct outlets from the main canals which tend to receive a disproportionate amount of water resulting in relative shortages further down the system. Most distributary canals are quite small, but those towards the tail of the larger systems may cover substantial areas resulting in relative difficulties in managing water supplies to those areas. Generally such tail-end areas only receive water in the monsoon and the limited water availability would make summer cultivation impractical even if infrastructure were improved.

18. There is not usually a constructed drainage system as the topography and natural drainage channels largely suffice, particularly since rice is the dominant crop. Drainage may need to be improved in some areas to enable diversification. However, there are significant problems of flood damage to contour canals during the monsoon in some locations. Protection of the main canals is a pre-requisite for any form of irrigation.

19. The IAIDP concept envisages crop diversification in both 'summer' season (February to June) and the monsoon season (July to November). It is likely that rice will remain the dominant crop, particularly given the soil surveys undertaken in the 1990s on some sub-project which indicate that much of the land is only suitable for paddy cultivation. There are alternatives which could give greater returns to water and to labor (which are or will be key limiting resources), but diversification is constrained by multiple factors, including the nature and condition of infrastructure and the way it is managed.

20. There is a need to ensure that the infrastructure can provide the flexibility for mixed cropping but also to improve management, as flexibility on its own creates opportunities for greater misuse of the system, increasing risks of water theft and conflict. A simple irrigation

system gives low outputs but is easy to manage and is relatively resilient in the face of mismanagement. A more flexible, modern system takes more management skill, has the potential to increase productivity (for both individuals and as a whole) but is less robust. The rural economy in the dry zone is likely to change rapidly in the near future and thus the infrastructure and corresponding system of management needs to be adaptable.

21. The project preparatory technical assistance (PPTA) team assessed these candidate potential project irrigation schemes and two core subprojects were selected, Chaungmagyi and Natmauk. These core component projects are the subject of the IAIDP IEE. This EARF provides some background materials for the core component project IEE and illustrates requirements for future environmental assessment for pipeline projects following the initial core project implementation. The environmental team has prepared detailed ADB Rapid Environmental Checklists for these core component projects as part of IEE screening in the initial IEE. Similar checklists will be required for future subprojects under the IAIDP.

22. **Linked Global Environment Facility (GEF) Project.** The IAIDP is also linked with the GEF project "Mitigation Focused Rural Productivity and Ecosystems Services Enhanced in Central Dry Zone Forest Reserves." The GEF project is being implemented by the Ministry of Environmental Conservation and Forestry (MOECAF) in the Mae-nyo-taung Forest Reserve which is in the catchment area of the Thinpone sub-project in Mandalay region. The overall project consists of four "cascading" series of interventions. The first is the Regional Technical Assistance (TA) 8564 on Promoting Ecosystem Services and Forest Carbon Financing (ADB TA 8564) which seeks to support the protection and management of large scale ecosystems by building knowledge, partnerships and capacity for the assessments and valuation of ecosystem services, and by strengthening planning and project level decision making (ADB, 2013). Under this TA, a pilot project will focus on the Mae-nyo-taung Forest Reserve and the agricultural land and settlements surrounding the reserve in the Central Dry Zone (CDZ). The pilot project, the outputs of which will be available by July 2016, can serve as a model for understanding the relationship between dryland forests and agricultural productivity and livelihoods and inform the sustainable rehabilitation and restoration of degraded reserved forests across the CDZ.

23. The second initiative will be the proposed GEF project, building on the ecosystems valuation pilot to strengthen soil and water conservation through mitigation-focused management practices, enhance livelihoods of forest dependent communities, improve forest biodiversity and ecosystems services, and strengthen knowledge management to support adoption of best practice in and around the Mae-nyo-taung forest reserve and surrounding communities, as well as replication and scaling up to other forest reserve and relevant settlements in the CDZ.

24. Third, there is the linkage to the IAIDP which supports technical assistance, loans and investments in the CDZ region. The project impact will be improved household incomes in the project area. It is hoped that the pilot work of the GEF demonstration project can help in the detailed design of the IAIDP relative to upstream forest improvement and reduced sedimentation in canal systems. The pilot area is not upstream of the core subprojects but is in the catchment of a pipeline project. For purposes of this IEE, a review of the results of the pilot work will be added to the Environmental Management Plan (EMP) in the detailed design phase of the IAIDP.

25. The fourth initiative is another planned ADB "Climate-Friendly Agribusiness Value Chain Sector Project" in Myanmar. This proposed loan/investment project will aim to increase rural productivity and household incomes, and promote more efficient resource utilization and climate

resilience for competitive and inclusive agribusiness in project areas. At the output level, the project will support (i) improved and climate resilient critical infrastructure for agribusiness value chains, such as roads, water use and storage systems, processing centers, etc; (ii) expanded use of bio- energy and sustainable biomass management, including use of agricultural waste and off-grid clean energy systems; (iii) strengthened agribusiness support services; and (iv) increased knowledge, mainstreamed into climate change adaptation policies and climate-smart smallholder agriculture. Project areas and crop varieties are yet to be determined, however rice, pulses and high value horticultural products will be considered. One project area is expected to be established in the CDZ.

26. Detailed design of the core subprojects as well as project development of future subprojects under the IAIDP will benefit from the lessons learned in the GEF pilot program relative to improved water availability, watershed management and reduced sedimentation. These lessons will be integrated into the design of all IAIDP rehabilitation activities, as well as the agriculture component.

C. Project Impact, Outcome and Impacts

27. The impact of a district-wide, sector project approach will be improved welfare and income of farmers, farm laborers and their dependent families in the CDZ. The indicator proposed at this stage in preparation is an increase in household income as a consequence of increased agricultural productivity. The outcome will be *“Increased income and welfare gains for farmers and rural populations in the Project areas”* which will contribute to national economic development and also be a contributor to the impact of improved household incomes. The increase in the value of production has been added as a necessary indicator linking physical agricultural improvements to the improved financial condition of the beneficiary households. Value based indicators will be developed in the context of both the household survey and design of the agricultural development component. Quantifiable physical indicators which will be carried forward include cropping intensity, yields and labor productivity. These will be refined to include indicators specific to both core subprojects and more general for the pipeline.

28. To support the outcomes the project will include three outputs: (i) agricultural value chains in oilseeds, pulses, and horticultural crops promoted and enhanced; (ii) reliability of agricultural water supplies improved; and (iii) capacity for integrated water resources management strengthened.

29. **Output 1: Agricultural Value Chains in Oilseeds, Pulses, and Horticultural Crops Promoted and Enhanced.** Support will be provided to farming, landless communities and the other key participants in selected townships within Magway District (Magway Region) and Yamethin District (Mandalay Region) within the CDZ through value chain and private sector development.⁴ Key interventions will include: (i) improved seed supply, extension of good agricultural practices⁵ and assistance to improved post-harvest operations; and (ii) support to broad-based, cross-cutting value chain and private sector development interventions, including the establishment of frontline centers (FCs) and support of ACCs at the district and township/irrigation systems levels. The FCs will serve as a ‘one stop shop’ resource center for information and training for the farming community, especially landless and women farmers, and will support private sector partnerships, including value-chain support starting from input supply, through crop production, post-harvest operations to marketing.

⁴ Initial districts will include Magway District (Magway Region) and Yamethin District (Mandalay Region).

⁵ <http://www.fao.org/prods/gap/>

30. **Output 2: Reliability of Agricultural Water Supplies Improved.** This output is the main focus of this EARF and core subproject IEE. The Project will support rehabilitation, modernization, and improved management of about ten irrigation systems to improve the reliability of water supplies on about 36,400 ha within Magway and Yamethin Districts. It will: (i) improve the capacity of cross drainage, strengthen and protect canal banks and remove sediment in the main and distributary canals; (ii) improve water control along the main and distributary canals; (iii) increase the capacity of drainage works to cope with climate change; (iv) improve infrastructure in selected tertiary units; and (v) include pilot demonstration of drip irrigation. It will improve irrigation management at district, main system and tertiary level through: (i) capacity building of the IWUMD and the ACCs and their subsidiary committees, including asset management, reservoir operations, agricultural planning, irrigation scheduling and performance monitoring; (ii) improved reservoir management; (iii) developing existing farmer-led management arrangements based on 'myaunggaungs' (canal leaders), leading to establishment of water user groups (WUGs); (d) ensuring active participation by water users in the design of infrastructure; and (iv) providing gender-inclusive training to water users and WUGs on operation and maintenance of canals, water management, group management and governance, working closely with ACCs under Output 1.

31. **Output 3: Capacity for Integrated Water Resources Management Strengthened.** The project will support national and regional initiatives to address climate change and sustainable irrigation management through promotion of: (i) national and regional initiatives to address integrated water resource management,⁶ climate change, sustainable agricultural water management, and good agricultural practices; (ii) strengthening land management capacity within the Project areas; and (iii) promoting sustainable irrigation system operation and maintenance at the system and on-farm level, including formation of WUGs and asset management. A piggybacked capacity development technical assistance for Rural Productivity and Ecosystems Services in CDZ Forest Reserves is also proposed for GEF grant financing to enhance soil, water and forest conservation practices in forest reserves within the CDZ.

D. Rationale for Environmental Assessment and Review Framework

32. The IEE is currently being finalized for the two core subprojects. In this regard, this EARF guides in conducting environmental screening, assessment, review, and compliance monitoring of future subprojects following implementation of the initial two core subprojects. The EARF is prepared following the requirements of the Safeguard Policy Statement (SPS) 2009 of ADB, and Myanmar National Law on Environmental Conservation 2012, Environment Conservation Rules 2014. Draft 2015 Myanmar Environmental Impact Assessment (EIA) Procedures of the Government are expected to be finalized and implemented during the lifetime of the IAIDP and the requirements of these new EIA procedures should be followed in review of future pipeline subprojects.

33. The purpose of this EARF is in general to describe requirements for sub-projects. The EARF guides the screening and categorization, level of impact assessment, required institutional arrangements, and processes to be followed for components or sub-projects that will be selected during project implementation which includes:

- (i) describe the proposed activities to be financed under the project;
- (ii) specify the requirements that will be followed in relation to project screening and

⁶ The Project will focus on the Samon river basin within the CDZ as a 'pilot' for implementing integrated water resource management.

- categorization, environmental assessment including provisions for meaningful consultation with stakeholders and information disclosure requirements and, where applicable, safeguard and environmental criteria that are to be used in selecting subprojects and/or components;
- (iii) specify implementation procedures;
 - (iv) specify monitoring and reporting requirements;
 - (v) describe the responsibilities of the clients and of ADB in relation to the preparation, implementation, and progress review of safeguard documents of subprojects; and
 - (vi) review the technical capacity of the client to implement ADB safeguard requirements with details of training needs for ensuring implementation of safeguards.

34. Environmental review of activities and/or components will be in accordance with the criteria outlined in this EARF. The EARF shall serve as guide to ensure compliance with the environmental assessment requirements under the 2009 ADB's SPS as well as the environmental requirements of the Republic of the Union of Myanmar.

E. Generic Issues on IAIDP Component Projects

35. **General Issues for All Candidate IAIDP Schemes.** The schemes are on small ungauged catchments (catchment area ranging from 20 to 450 square miles), but stream flows have been estimated from the daily change in reservoir storage. As noted in para 15, streamflow estimates will be improved by better gauging of reservoir outflows. Rainfall data is available at the dam sites since construction started, and there are meteorological stations in representative townships. Rainfall is very variable: in Taungdwingyi the long term annual average is 38" (1,150 mm) but ranges from 15" (450 mm) to 50" (1,500 mm). In Meiktila the average is slightly less 32" (1,000 mm) but a similar degree of variability. Rainfall in the reservoir catchments may differ (and possibly be higher) than at the dam site or townships. Climate models have conflicting predictions in regard to potential changes in rainfall in the CDZ from warming, and there has been a large annual variation in recent years. Refer to the following discussion as well as the Climate Change section of the EARF.

36. The priority for the irrigation system is to adequately convey available water resources from the head of the system to the tail. In order to achieve this, adequately sized canal prisms are required to be bounded by continuous embankments offering adequate freeboard and stability on all channels. Where natural drainage streams cross the canal alignments, infrastructure is required to ensure such drainage flows bypass the canal and prevent damage to the canal architecture which can compromise the basic conveyance function of the system. The existing infrastructure within the core subprojects (and other future IAIDP subprojects) does not presently fulfil this requirement, with low and dis-continuous embankments that have been damaged by surface drainage flows.

37. Management of sediment throughout the system is also required to prevent sedimentation of canals which leads to a reduction in the conveyance capacity of the system and incurs recurrent maintenance expenditure in its removal. Sediment management techniques include management at sources and management throughout the system. The latter requires consideration of canal flow velocities. High velocities result in erosive flows which erode canal banks and increase the sediment load which is carried to the tail of the system where it may be deposited. Conversely, low flow velocities shall lead to sedimentation of any particles carried in suspension by the upstream canal.

38. In order to ensure efficient and equitable distribution of irrigation supplies, it is vital that the management of flow throughout the system is reactive to both the available water resources (supply) and the temporal irrigation requirements at a field level (demand). To achieve this it is necessary to provide water control infrastructure with inbuilt flexibility (such as adjustable gates) to ensure flow management techniques proposed as part of the irrigation management component can be implemented. Flow measurement infrastructure is also required to enable accurate and equitable division on available water resources.

39. It is probable that some command areas are larger than can be justified by the available water. The area irrigable in the summer season is quite small (typically less than 30%) and irrigation in the monsoon is largely protective and supplementary. However, the nature of the layouts of some systems means that losses at the head are captured and reused further down the system – the nominal efficiency thus increases, but with a time lag so that the start of the season may be delayed or there may be dry periods during the season as the monsoon rainfall pattern is bimodal.

40. Although there is a common perception that rainfall has declined recently and that the onset of the monsoon has been delayed, this is not supported by the limited data or IWMI's analysis (2012). Climate change models have not been downscaled, but the global models generally indicate higher temperatures and higher rainfall in this century (2012 Myanmar "National Adaptation Programme of Action (NAPA)"). The available storage will smooth out the impact of greater variability in the timing of rainfall; the projected increase in rainfall would be beneficial but there may be risk of a delayed onset to the monsoon which might affect project performance. The risk of this should be mitigated by improved management of the reservoirs which are sufficiently large to store water during the monsoon so that some water can be released in the following dry season whilst leaving sufficient water to enable a timely start to the monsoon crop. This will be verified in feasibility studies. Higher temperatures may affect crop choice in the longer term (after 2080), but are not believed to be a constraint before then.

41. Higher atmospheric carbon dioxide (CO₂) will reduce stomatal opening and increase photosynthetic efficiency (conversion of sunlight into carbohydrates). The net effect is reported to be up to a 30% increase in water productivity per 100 ppm CO₂ increase (Monji and Bugbee, 1998) although this effect has not been allowed for in project design, and is offset by the increase in evapotranspiration due to higher temperatures.

42. Many main canals do not receive their design discharge all the time, even during the monsoon and are not operated at full discharge in the summer season. In the monsoon this is partly due to water shortage but also to localised sedimentation in canals and low demand due to rainfall. Water shortage is the limiting factor in the summer season. It is only possible to command offtakes in this situation if there are cross regulators to raise the water level at times of low flow. However, many cross regulators are in poor condition or are not operable. Many rely on stoplogs rather than gates. Whilst this is acceptable for small canals, provided stoplogs can be kept available on site, the large canals need gated regulators. Conversely, low level offtakes may take more than their share of water, even when the main canal flow is low. As there are many such offtakes, most of which are un-gated, there is a risk of very inequitable distribution of water – governed more by local topography and outlet configuration than as a result of planned operation. All direct outlets on main and distributary canals should be gated.

43. There is not usually a constructed drainage system as the topography and natural drainage channels largely suffice, particularly since rice is the dominant crop. Drainage may

need to be improved in some areas to enable diversification. However, there are significant problems of flood damage to contour canals during the monsoon. High flows from the streams draining the hills to the east and west of the project area are intercepted by the main canals for Natmauk and Yanpe and there is inadequate provision for cross drainage, resulting in the canal banks being severely damaged in several locations. Protection of the main canals is a pre-requisite for any form of irrigation. The IAIDP project area suffers from damages due to inadequate cross drainage, poor embankment construction – which will be addressed in rehabilitation plans (detailed designs will take account of best estimates of flood flows at an appropriate rate of return). The increase in risk of flood damage due to climate change is probably small in comparison to the existing risk due to inadequate original design and poor quality construction – but both will be addressed in detailed design. The redesign and refurbishment of the schemes offers many opportunities to correct this, and to provide robust structures for future flooding. Appropriate return periods and safety factors to allow for climate change will be incorporated in detailed design, and good quality construction will be ensured.

44. Most canals are earthen and unlined, presumably resulting in significant losses although no data is available either of the magnitude of conveyance losses or of their relative importance as compared to other losses. Some lining (brick or concrete) has been provided in critical locations typically close to roads. There is considerable weed growth in some canals as well as sedimentation. Scouring of the bed or slumping of the canal banks are also common problems. Inadequate scour protection downstream of control structures contributes to bank instability as well as undermining structures. All systems need a combination of cleaning, sediment removal, canal re-sectioning and possibly lining.

45. The formal network extends down to minor level; these canals typically command 50 to 500 acres through a number of ungated outlets. Outlet command areas are of the order of 50 acres, but the lack of gates on the outlets makes it difficult even to manage the secondary canals effectively. Irrigation downstream of the outlet is managed entirely by the farmers through informal cooperation arrangements. There are generally some field channels but the extent and quality of the channels is very variable so much irrigation is field to field. In the case of non-rice crops which cannot be flooded, small temporary channels may be dug along field boundaries to convey water to downstream plots.

46. Roads are generally in poor condition, with even main canal inspection roads often being of low quality. Some tarmac roads cross the sub-project areas, linking townships, but most other roads are earthen and more suited to bullock carts and tractors. Access during the monsoon is thus particularly problematic.

47. The concept note envisages some crop diversification in both seasons. It is likely that rice will remain the dominant crop, but there are alternatives which could give greater returns to water and to labour (which are or will be key limiting resources). However, diversification is constrained by multiple factors, including the nature and condition of infrastructure and the way it is managed. There is a need to ensure that the infrastructure can provide the flexibility for mixed cropping but also to improve management, as flexibility on its own creates opportunities for greater misuse of the system, increasing risks of water theft and conflict. A simple irrigation system gives low outputs but is easy to manage and is relatively resilient in the face of mismanagement. A more flexible, modern system takes more management skill, has the potential to increase productivity (for both individuals and as a whole) but is less robust. The rural economy in the dry zone is likely to change rapidly in the near future and thus the infrastructure and corresponding system of management needs to be adaptable.

48. **Generic Rehabilitation Schemes.** Rehabilitation refers to restoring the system to its

original state. This is not always sufficient as there may be a need for completion, improvement or modernization to make effective. Many systems are dysfunctional not so much because of poor maintenance but due to incomplete construction or out of date or inappropriate designs which do not meet current requirements. These problems then become manifest in poor standards of maintenance, particularly at the tail of the system where they cannot be operated effectively and are damaged by dissatisfied farmers. Simple rehabilitation is not sufficient in such situations.

49. **Main systems.** The subprojects will include improvement and rehabilitation of irrigation and drainage infrastructure at the primary and secondary distribution levels. Works would include improvement of conveyance systems (canal prisms and embankments), additional drainage infrastructure, flow regulation structures, flow measurement structures and sediment management systems. Works would also include the replacement of all tertiary outlets with gate controlled outlets, and the selection of a DY canal as a pilot for installation of proportional control tertiary outlets. The aim of all interventions would be to improve the reliability, efficiency, flexibility and equity of water distribution throughout the system. Works will also support and enhance rural connectivity through construction of dedicated access infrastructure and incorporation of access features in canal regulation infrastructure.

50. **Tertiary Systems.** The subprojects will support the improvement of farmer-owned water management infrastructure. Development of tertiary systems, through the extension of watercourse and field ditches (within the perimeter of the existing command areas) will be undertaken in areas where crop diversification is anticipated. This will allow the replacement of traditional field to field (and plot to plot) water distribution with delivery of irrigation supplies directly from channel to field, providing individual farmers with increased flexibility in irrigation methods and timing.

51. Infrastructure to support improved regulation of tertiary canal supplies will be provided where summer cropping is anticipated in order to ensure more efficient distribution of the limited water resources during this season. In addition, infrastructure to support improved drainage and rural access shall be provided, especially where the proposed extension of water courses and field ditches may intersect existing drainage and access routes. The specific infrastructure rehabilitation will be determined on the basis of participatory studies during project implementation.

52. The types of rehabilitation activities proposed under the IAIDP are a fairly standard suite of physical and management improvements. As such, the IEE prepared for the core subprojects will provide a definitive guide to the future environmental assessments of the "pipeline" irrigation system improvements and the IAIDP environmental management plan, including mitigation measures, monitoring requirements, public consultation, and grievance redress mechanism can easily be copied into the future environmental documents.

53. The rehabilitation activities will generally involve the following types of improvement of all types of structure and specifically to: (i) improve water control within irrigation systems, so that it can be made available in a planned manner throughout the command area, particularly at low flows, for which new types of gated regulator may be needed; (ii) enable systematic control of flows into outlets, by provision of gated check structures and gates to outlets so that they can be closed at times of low demand or during rotations, or provision of modular intakes which can without adjustment deliver a planned amount of water regardless of the upstream water level; (iii) control sediment at intakes, which can otherwise significantly reduce flows in main canals; (iv) canal re-sectioning and stabilizing (to reduce problems of bank instability); (v) provide cross

drainage to reduce flood damage which can curtail irrigation at critical times, and reduce water losses through canal lining; (vi) provide flow measurement so performance can be monitored and used as a basis for management, combined with the ability to control flows at these points; and (vii) improve access within the irrigated areas to link farms to the main road network and markets.

54. **Change in Irrigated Areas.** Water supply is a major limiting constraint for agriculture. No significant change to the total volume of water can be expected, and large annual fluctuations are inevitable. There is some scope to improve the utilization of water and thereby increase the cropped area. There is also scope to diversify crops which would enable a larger area with the same volume of water. Both would require different and better standards of management and willingness to change, which should increase the overall agricultural output. The changes will result from:

- (i) Improved command levels, enabling irrigation to relatively high land at low flows, thus reducing losses direct to drains;
- (ii) Ability to control flows into outlets systematically – resulting in less loss to drains and less conflict between outlets;
- (iii) More responsive management of dams at times of rain, to make more effective use of the rainfall;
- (iv) Improved management of tertiary canals so that a variety of crops can be grown within the same area, with less loss to drains; and
- (v) Reduced flood damage which can curtail irrigation at critical times.

55. The impact of these changes would be to: (i) save water in the monsoon so that it can be stored for use in the following dry season; and (ii) use the additional water and manage the total volume of water better to increase crop area in the summer season.

56. Analysis of the increase in areas that should be achievable was made on the following assumptions:

- (i) Greater efficiency in dam operations and water use in the monsoon should reduce the amount used in the monsoon and hence increase the volume stored for the subsequent summer season. It has been assumed that 60% of rainfall would be effective and that overall efficiency should be increased from 42% to 48% through improvements in application and operational efficiency as a result of better infrastructure enabling better control of water; and
- (ii) Even in the monsoon there is some land not irrigated. The reasons for this are partly due to the infrastructure – for example the large areas at the tail of Natmauk, where the canal system is sparsely developed and control is inadequate. Improved operation should enable increased area subject to the same improve in operational efficiency. It should be noted that these areas are partly irrigated by drainage from upstream areas. The increase in operation and application efficiencies will reduce these flows, but that reduction will be offset by deliveries from the canals which will be timelier and will reduce over-irrigation.

II. MYANMAR LEGAL FRAMEWORK ON ENVIRONMENT

A. National Environment Policy and Legal Framework

57. **Policy Framework.** The Government's National Environment Policy was issued in

5 December 1994⁷ to establish sound environment policies, utilization of water, land, forests, mineral, marine resources, and other natural resources in order to conserve the environment and prevent its degradation. The objective of Myanmar's environmental policy is aimed at achieving harmony and balance through the integration of environmental considerations into the development process to enhance the quality of the life of all its citizens.

58. The development of the environmental policy was followed by the drafting of "Myanmar Agenda 21" in 1997, which followed a UN framework for a multi-pronged approach to sustainable development. Myanmar Agenda 21 calls for integrated management of natural resources and provides a blueprint for achieving sustainable development and recognizes the need for EIA.

B. Environmental Provisions in the 2008 Constitution

59. Under the 2008 Constitution, the government "shall protect and conserve the natural environment" (Chapter 1, Section 45). The national legislature can, but does not need to, enact laws to protect the environment and help restore areas degraded or damaged by mining and forestry activities or those that have experienced destruction of plants, wildlife, and habitat (Chapter 4, Section 96). State and Division Legislatures also have the power to regulate environmental protection, but within the boundaries of legislation passed by the National Legislature (Chapter 4, Section 196). In addition, every citizen has the duty to "assist" the government in carrying out environmental conservation (Chapter 8, Section 390).

C. National Law on Environmental Management

60. The Pyidaungsu Hluttaw Law No. 9/2012, also known as the Environmental Conservation Law, was enacted in 30 March 2012 to facilitate (i) implementation of the country's National Environmental Policy; (ii) systematic integration of environmental conservation in the sustainable development process; (iii) healthy and clean environment and conservation of natural and cultural heritage; (iv) reclamation of degenerated and disappearing ecosystems; (v) management of natural resources for sustainable use; (vi) public awareness, (vii) international, regional and bilateral cooperation; and (viii) collaboration within different government departments and organizations, and with non-government organizations, and other stakeholders.

61. The National Environmental Conservation Coordination Committee was formed for effective coordination among stakeholders with the senior officials from various agencies while Environmental Conservation Department (ECD) was also newly created to regulate environmental situation in the country. Environmental quality standards are to be set up by government for monitoring the environmental performance and management throughout the country. It may require for new investment and development projects to conduct the environmental social impact assessment as well.

D. Other Environmental Laws, Regulations and Rules

62. In June 2014, the Government issued the Environmental Conservation Rules, MOECAF, Notification No. 50/2014, the 8th Waxing Day of Nayon, 1376 M.E., (5th June, 2014)). Specific measures for the implementation of the national policy and national law on environmental management were included.

⁷ Proclaimed through a gazette in accordance with Notification No.26/94.

63. The updated 2012 Environmental Conservation Law and 2014 Rules, empowers MOECFAF to act as a “gate keeper” for business activities. It confers powers on MOECFAF to regulate and to establish a “prior permission scheme”⁸ for a range of business activities that “may cause impact on environmental quality”. Other Government departments authorized to approve business activities may do so only after the relevant permission from MOECFAF. The Myanmar Investment Commission Notification No. 1 sets out the list of economic activities that require an ESIA and approval by MOECFAF that includes the exploration, drilling and production of oil and gas, although the EIA Procedures under the Environmental Conservation Law will refine these. In addition, there are basic provisions in this law, as there are in the Foreign Direct Investment Law that requires basic pollution control.

64. The draft 2015 Environmental Impact Assessment Procedure and local environment quality standards have also been developing with technical support from ADB and the EIA Procedure to be completed by the end of 2015. The draft rule is included as Appendix 2. This new EIA procedure and environmental quality standards have yet to be adopted by the ECD of MOECFAF. Given the lack of environmental standards yet promulgated by ECD, this IEE utilizes international best practices such as the International Finance Corporation Environmental Performance Standards and the World Bank Environmental Health Standards for assessment of impacts and potential mitigation measures. ECD is also drafting environmental quality guidelines that also may be in effect during lifetime of IAIDP.

65. There is no coordinating body responsible for the overall management of water resources in Myanmar and there are no overarching laws or policies governing water resources management, although these are under development. Irrigation is still guided by the Burma Canal Act of 1905, which defines the responsibilities for the key individuals in the Public Works Department (now IWUMD). It also defines the role of the myaunggaung, who are local individuals responsible for water course repairs.

66. The Conservation of Water Resources and River Law of 2006 is primarily concerned with navigable rivers, including provisions for transportation and the regulation of river fishing and sewage discharge. It authorizes the Directorate of Water Resources and Improvement of River Systems to determine dangerous water levels for towns; give assistance to relevant government departments and organizations on the use of river water for domestic and agricultural use. The law prohibits water pollution; prescribes terms and conditions for the monitoring and prevention of water pollution; and specifies penalties for those who pollute river water (but does not set down required standards).

67. The 1994 Protection of Wildlife and Natural Areas Conservation Law specifies penalties for water pollution within natural areas (National Parks, Nature Reserves, etc). It also contains the legal provision for protecting rare and endangered flora and fauna species in Myanmar. The list of permanently and temporarily protected species requires updating in accordance with the list of species identified by CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora). Also, there is no provision for water quality and protected fish species and there is no law on aquatic ecology. The Forest law (1902) was amended in 1992 and controls the management, utilization and conservation of existing forest land in Myanmar. The 1930 Underground Water Act relates to the use of deep groundwater in urban areas, but there is no law covering the use of groundwater for agriculture or the quality of groundwater.

⁸ Article 26.

68. Myanmar is a signatory of a large number of international agreements relevant to environment protection. Those with direct application to the project, along with the date of signing by the Myanmar, include:

- *Kyoto Protocol to the United Nations Framework Convention on Climate Change*, 23 February 2005. To further reduce greenhouse gas emissions by enhancing the national programs of developed countries aimed at this goal and by establishing percentage reduction targets for the developed countries;
- *Montreal Protocol on Substances That Deplete the Ozone Layer*, 1 January 1989. To protect the ozone layer by controlling emissions of substances that deplete it.
- *United Nations Framework Convention on Climate Change*, 21 March 1994. To achieve stabilization of greenhouse gas concentrations in the atmosphere at a low enough level to prevent dangerous anthropogenic interference with the climate system.
- *UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage*, 1985. To integrate the practice of heritage conservation in Myanmar with that being done around the world.
- Plant Protection Agreement for the South-East Asia and the Pacific Region, Rome, 1956 (1959)
- Treaty Banning Nuclear Weapons Test in the Atmosphere in Outer Space and Under Water, Moscow, 1963 (1963)
- Treaty on the Prohibition of the Emplacement of Nuclear Weapons and other Weapons of Mass Destruction on the Sea-Bed and Ocean Floor and in the Subsoil thereof, London, Moscow, Washington, 1971
- Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons, and on their Destruction, London, Moscow, Washington, 1972
- International Convention for the Prevention of Pollution from Ships, London, 1973.
- Protocol of 1978 Relating to the International Convention for the Prevention of Pollution from Ships, London, 1973 (1988)
- United Nations Convention on the Law of the Sea, Montego Bay, 1982 (1996)
- Convention on Biological Diversity, Rio de Janeiro, 1992 (1994)
- Treaty on the Non-Proliferation of Nuclear Weapons, London, Moscow, Washington, 1968 (1992)
- Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and their Destruction, Paris, 1993 (1993)
- International Tropical Timber Agreement (ITTA), Geneva, 1994 (1996)
- Vienna Convention for the Protection of the Ozone Layer, Vienna, 1985 (1993)
- Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal, 1987 (1993)
- ICAO Annex 16 Annex to the Convention on International Civil Aviation Environmental Protection Vol. 1 Aircraft Noise
- ICAO Annex 16 Annex to the Convention on International Civil Aviation Environmental Protection Vol. II Aircraft Engine Emission
- Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space Including the Moon and Other Celestial Bodies (Outer Space Treaty), London, Moscow, Washington, 1967 (1970)
- Agreement on the Networks of Aquaculture Centers in Asia and the Pacific, Bangkok, 1988 (1990)

- South East Asia Nuclear Weapon Free Zone Treaty, Bangkok, 1995 (1996)
- United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and / or Desertification, Particularly in Africa, Paris, 1994 (UNCCD)(1997)
- Convention on International Trade in Endangered Species of Wild Fauna and Flora, Washington, D.C., 1973; and this convention as amended in Bonn, Germany, 1979 (CITES) (1997)
- Agreement Relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982, New York, 1994 (2006)
- Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas, Rome, 1973(1994)
- ASEAN Agreement on the Conservation of Nature and Nature Resources, Kuala Lumpur, 1985 (1997)
- Cartagena Protocol on Biosafety, Cartagena, 2000 (2008)
- ASEAN Agreement on Transboundary Haze Pollution (1997)
- International Treaty on Plant Genetic Resources for Food and Agriculture, 2001(2004)
- Declaration on ASEAN Heritage Parks(2003)
- Stockholm Convention on Persistent Organic Pollutants (POPs), 2001 (2004)
- The Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat, 1971 as amended in 1982 and 1987(2004)
- Establishment of ASEAN Regional Centre for Biodiversity (2005)
- Copenhagen Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, Copenhagen, 1992 (2009)
- International Tropical Timber Agreement (ITTA), Geneva, 2006 (2011)
- Montreal Amendment, 1997 and Beijing Amendment, 1999 to the Montreal Protocol on Substances that Deplete the Ozone Layer, 1997 (2012)
- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, Basel, 1989 (2015)

69. There is also concern in Myanmar with regard to Climate Change. As Myanmar is signatory to the United Nations Convention on Climate Change (UNFCCC), Myanmar had prepared first national communication report submittal to UNFCCC. Attempts were also made by government for not only estimating the greenhouse gas emission from various sources but also developing measures related to climate mitigation and adaptation. In responding to mitigation aspect, abatement strategy to reduce emission from its main sources such as deforestation, land use land cover change and paddy field were evaluated and there are no changes as a result of this project. Since methyl emission from irrigation reservoir and increased cultivation of paddy can be responsible for greenhouse gas (GHG) emission, it is noted that the IAIDP project will not involve new reservoirs and cause a very small increase in irrigation area and no increase and possibly a decrease in GHG emissions.

70. The National Framework for Biosafety was also drafted in 2008 by Department of Agriculture Planning under MOALI in accordance with the Cartagena Protocol on Biosafety, Cartagena, 2000. Therefore, if importing genetically modified seed for agriculture development is intended, it may require following the procedure and guidelines of biosafety framework procedures. If hybrid seeds and plant materials are to be imported, it also requires following to the procedure and guideline set up by The Plant Pest Quarantine Law (1993 revised in 2011), and The Seed Law (2011). Seeds are not included in the IAIDP.

71. For those fertilizers that are to be used in irrigated area as part of agriculture development, verification is required to see if they are officially licensed, imported, transported and stored according to 'The Pesticide Law (1990)' as well as to the international best practices. The current problem encountered in rural township is that there are illegally imported pesticides across the border and how pesticide law could be effectively enforced on ground level. The same is applied to the case of fertilizer imported from neighboring countries. Any fertilizer that are imported and used should be in conformity with 'The Fertilizer Law' enacted in 2002. However, this is not currently the case in the project area and the IAIDP does not address this problem.

72. There are also some regulations related to irrigation and drainage work that might be also relevant to dam safety and environmental and social safeguard of the proposed IAIDP, including the Canal Act, 1905 (Amendment in 1998); the Myanmar Embankment Act, 1909 (Amendment in 1998), and the Myanmar Irrigation Manual, 1945 (Revised & Edited). However a review of these documents finds no reference to social or environmental safeguards.

73. A number of laws and policies concern the management of urban water resources. 'The Canal Act (1905, last amended in 1998)' regulates the allocation of water for public purposes, water supply and drainage works. The Act permits all water in all rivers and streams flowing in natural channels as well as lakes and other national still water bodies to be used and controlled for public purposes. The 'Myanmar Embankment Act (1909, last amended in 1998)' requires every owner or occupier of immovable property in the vicinity of an embankment to help maintain the embankment or to provide a laborer who can. The Act authorizes an embankment officer to enter into any immovable property in the vicinity of an embankment and take possession of, appropriate or remove and use any relevant materials for the purpose of such work.

74. The 'Underground Water Act (1930)' deals with the conservation and protection of underground sources of water supply in Myanmar.

75. **Ethnic Minorities.** According to Chapter 1, Clause 22 of the 2008 Constitution of Myanmar, the Government is committed to assisting in developing and improving the education, health, language, literature, arts, and culture of Myanmar's "national races." The constitution provides equal rights to the various ethnic groups included in the national races and a number of laws and regulations aim to preserve their cultures and traditions. This includes the establishment of the University for the Development of the National Races of the Union which was promulgated in 1991 to, among other things, preserve and understand the culture, customs and traditions of the national races of the Union, and strengthen the Union spirit in the national races of the Union while residing in a friendly atmosphere and pursuing education at the University.

76. **Land Acquisition.** The legal framework in Myanmar is evolving. Myanmar does not have a unitary land law but has several laws for different categories of land. All land belongs to the state under the current legal system, and land users receive certificates from the Settlement Land Records Department. The 'Land Acquisition Act (1894)' provides certificates. When private land is acquired or private assets such as trees and standing crops are lost under public or private projects, compensation is paid at market value. The Act also provides that affected people with complaints can bring the case to court. A new 'Farmland Law' was recently adopted which introduced various reforms such as the recognition that farmland owners are able to sell, mortgage, lease, exchange, inherit or donate all or part of their farmland. There is also the requirement that compensation be paid for both land and buildings attached to it.

III. ASSESSMENT OF LEGAL FRAMEWORK AND INSTITUTIONAL CAPACITY

A. Safeguard Policy Statement 2009 of ADB (SPS)

77. The SPS guides environmental screening, categorization, assessment and monitoring of projects, and preparation of EARF. The Asian Development Bank (ADB) uses a project classification system for environment to reflect the significance of a project's or subproject's potential environmental impacts. Projects are categorized based on significance of impacts, including type of impact (direct or indirect); level (high, medium, low); extent (local, regional, or trans-boundary), reversibility (reversible or irreversible); cumulative; and induced impacts in the project's area of influence. The SPS classification of projects as shown in Table 2:

Table 2: Environment Category

Environmental Category	Impact	Requirement
A	Likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented, and covers wider than project area.	EIA is required
B	Potential environmental impacts are less adverse than those of category A projects. They are site-specific, few are irreversible and can be mitigated more readily than Category A projects.	IEE is required
C	Likely to have minimal or no adverse environmental impacts	Environmental assessment not required, but environmental implications needs to be assessed.
FI	Involves investment of ADB funds to or through a financial intermediary.	Environmental and Social Management System is to be prepared for Environment Category A and B projects.

78. All safeguard-related activities in IAIDP will be guided by the SPS and the Government's requirements. The core subprojects selected based on feasibility study have had a Category B IEE prepared while 'future pipeline projects' will follow from this EARF and the standard procedures and EMP of the core subproject IEE. Additional IEEs may be required for pipeline projects during implementation.

B. Project Institutional Capacity

79. **Executing Agency (EA).** MOALI will be the EA for the project and will oversee overall project implementation and management activities to ensure smooth and timely implementation and completion of project activities. The EA has overall responsibility for the project and therefore is ultimately responsible for ensuring the implementation of the mitigation in the EMP and for ensuring compliance with loan covenants. The EA will guide and coordinate closely with other government agencies and the ADB for the timely resolution of any issue and completion of the project within the target dates, expediting the procurement process, and organizing and chairing the Project Steering Committee (PSC) meetings. The EA will designate a project management unit (PMU) Director to oversee the day-to-day management of the project and liaise with all relevant government offices. The EA will also designate a Chairman of PSC that will provide overall supervision to project implementation.

80. **Project Steering Committee (PSC).** The PSC will be chaired by the designated official from the EA and composed of senior government officials. The PSC will meet at least biannually to (i) approve annual budgets and plans for the project; (ii) review and assess project implementation progress; (iii) provide advice on policy matters related to the project; and (iv) make the final decision on subproject investments and subproject approval.

81. **Project Management Unit (PMU).** The PMU will be established at MOALI in Naypyitaw. The PMU will assume day-to-day management of the project and will be responsible for coordinating and implementing project activities, including procurement, recruitment, disbursement, contract administration, monitoring and reporting. The PMU will be headed by a Project Manager and will comprise full-time core staff, with direct ongoing environmental and social support of a Loan Implementation Environmental Consultant, a Loan Implementation Social Consultant (LISC), and Gender and Social Specialist. The PMU Director will guide and supervise the work of the PMU. The PMU consultants will be recruited under the guidance of the EA and ADB. The EA will provide a furnished, air conditioned/heated office space with communication and other support facilities as in-kind contribution for project implementation and management.

82. **Implementing Agency (IA).** The IWUMD and the Department of Agriculture (DOA) will be the implementing agencies, and be responsible for the project outputs associated with their core missions.

83. **Loan Implementation Environment Consultant (LIEC).** The Project will procure the services of a LIEC to provide support in (i) project implementation including updating the project EMP; (ii) training; (iii) coordinating the conduct of regular environmental compliance monitoring (air and noise) in compliance with the monitoring plan; (iv) annual project EMP progress reporting; and (v) identifying environment-related implementation issues and necessary corrective actions. The Terms of Reference for the LIEC is attached to the core subproject EMP.

84. **Civil works contractors** will be required to formulate contractor EMPs with management systems for adverse impacts, e.g., dust control, noise control, traffic management, addressing as minimum the requirements of this EMP and the IEE. The contractor EMPs will be renewed on a yearly basis, submitted to PMU and LIEC for review, and to ECD for approval. Each civil work contractor will appoint an environment, health and safety officer (EHSO) to coordinate contractor EMP implementation.

C. Assessment of Legal Framework and Institutional Capacity

85. Currently, ADB is assisting Myanmar to strengthen its EIA capability through TA 7566-REG: Strengthening and Use of Country Safeguards Systems (Capacity Building for Implementing Environment and Social Safeguards in Myanmar.) This capacity building regarding EIA knowledge for the staff of MOECAAF ECD was completed in the middle of 2014 and the TA is continuing capacity development in 2015 for the Applicable ADB and Myanmar Policies and Assessment Categories staffs of Ministry of Construction now. The current work involves development of environmental standards for Myanmar as well as sectoral environmental standards for various line ministries. Based on an interview with ECD staff, it appears that the current ADB TA assistance is greatly improving the environmental systems and competence of the ECD to manage the environmental assessment process in Myanmar. Once the sector standards are in place, overall environmental assessment training will be required for line ministries such as the MOALI. The MOALI has not implemented an ADB loan project and has little familiarity with ADB or international environmental procedures.

86. The IAs are familiar with certain environmental construction and operation improved practices, there is very little current capacity for environmental management in the IAs so significant training is required to improve their capacity for environmental management for the implementation of the core subproject IEE and EMP, as well as managing the environmental review process for future subprojects under the IAIDP. As such, it is not possible to develop an environmental capacity “acceptability assessment” (including capacity, track record, and practice of executing and implementing agencies) for the IAIDP since there is no previous experience. In fact, there is little previous experience in the IAs with basic contracting of services, as recent work has been done in house.

87. The most logical place to start with this training will be at the Project Management Unit (PMU) once in place for the IAIDP. The project PMU staffing includes a LIEC on an intermittent basis and one of the first tasks of the LIEC will be training the PMU and IAs in ADB Safeguards. This work will initially focus on the implementation of the core subproject EMP, and expanded to the screening and management of future subprojects under the EARF. It is likely that the new ECD systems and standards being developed with ADB support will be finalized and put into place during the life of the IAIDP. As such, training will be expanded to include national systems as well as ADB environmental management and safeguard systems as they become operational. The training strategy will include a “cascade” approach using a “training of trainers” with first training the PMU by the LIEC, then the PMU and LIEC training of the IAs, and finally the IAs training the construction contractors with assistance by the LIEC.

88. **Training.** Training materials will be translated into the national language. In doing so, a set of teaching materials and a cadre of trainers is left behind. This will provide the basic capital necessary to undertake training but does not provide for the operating funds. Financial resources to deliver the training programs are provided for in the PMU budget. The PPTA team has prepared a translated version of the EMP requirements as a starting point for the future training program. The EA, PMU, IAs and contractors will receive training in environmental management, environmental monitoring and supervision, mitigation planning, emergency response, public consultation and Grievance Redress Mechanism, occupational and community health and safety, and other environmental management techniques. The training topics, methods, and estimated costs for IAIDP are described in Table 3. Training will be managed by the LIEC with support of other experts under the loan implementation consultant services. Additional training of contractors working on future subprojects under the IAIDP will be required.

Table 3: Training Program

Training Topic	Targeted Agencies	Timing/Trainers	Duration, Costs
Workshop by LIEC on ADB Safeguards - implementing core subproject EMP as well as screening under EARF. <ul style="list-style-type: none"> Complete review of ADB safeguard requirements, from design to construction to operations. IAIDP Core Subproject EMP discussed in detail and requirements for inclusion in bidding documents. 	PMU	Mobilization of PMU. Conducted by LIEC	1 X 1 day, \$1,000

Training Topic	Targeted Agencies	Timing/Trainers	Duration, Costs
<p>EMP Implementation:</p> <ul style="list-style-type: none"> • ADB SPS 2009 requirements • Myanmar new environmental requirements with MOECAAF. • Construction Phase Mitigation • Roles and Responsibilities, Monitoring, Supervision and Reporting Procedures. • Public consultation • Grievance Redress Mechanism: Roles and Responsibilities, Procedures • Occupational and Community Health and Safety, Emergency Preparedness and Response • Contractor Engagement and Management, including EMP Enforcement • Reporting requirements. <p>Screening of Subprojects With EARF:</p> <ul style="list-style-type: none"> • Preparation of rapid environmental assessments along with pre-feasibility studies • Determination of whether subproject requires an IEE or can be managed under EARF. 	IAs	<p>Prior to implementation and during project implementation.</p> <p>Conducted by PMU and LIEC</p>	2 x 1 day, \$2,000
<p>Contractor requirements:</p> <ul style="list-style-type: none"> • Preparation of contractor EMP (C-EMP) for each project area complying with project IEE/EMP. • Provision of Environmental Health and Safety Officer (EHSO) • Pollution Control and Environmental Monitoring, Inspection and Reporting including required mitigations of EMP. • GRM requirements 	Contractors and their identified EHSOs	<p>Prior to implementation and during project implementation.</p> <p>Conducted by IAs with assistance from the LIEC</p>	2 x 1 day, \$2,000

IV. ANTICIPATED ENVIRONMENTAL IMPACTS

A. Potential Impacts and Mitigation Measures

89. **Direct project beneficiaries.** The implementation of the Project and the development of IAIDP is expected to generate benefits in the form of increased agricultural production in the subproject areas as a result of an increased intensity of cultivation on irrigated land, and increased yields (as a result of both irrigation and agriculture components).

90. Primary beneficiaries will be the farming and landless communities (individual farmers, farmer groups, cooperatives) in the irrigation systems in the CDZ, plus the important private sector agribusinesses which are key part of the value chains, especially those involved in input supply, post-harvest operations and marketing. It is important to note that the poor, landless and women will be particularly targeted.

91. Secondary beneficiaries are the Government staff involved in extension, DOA, Agriculture Mechanization Department and Department of Agriculture Research, especially those working in the irrigation systems. Tertiary beneficiaries will be the other players in the

various value chains through an improved market information system and greater awareness of the issues as regards to the development of irrigated agriculture.

92. **Positive Impacts.** With proper design and commitment, the proposed project can have positive impacts on food security, household income, health conditions, rural employment; and flood control. It should have multiplier effects on local economic development and water governance. In some places, leakage from irrigation systems can also assist with supplying water for domestic or horticultural use via local shallow well systems.

93. **Economic Benefits.** The IAIDP subprojects will be implemented soundly and in line with good international industry technical practices, so benefits should be felt widely. These benefits may be moderate magnitude but of high significance because they will be felt most by poor farmers. Positive economic impacts for the farming households will flow from increased agricultural productivity and some new employment opportunities, and there will be potential for other long-term economic benefits. These would include improved agricultural production on a larger scale and the potential for creating new economic activities through other allied development measures.

94. **Social and Environmental Benefits.** The Project will rehabilitate dilapidated irrigation infrastructure and provide direct and indirect environmental benefits. Dangerous and non-functional infrastructure will be repaired or replaced. This will include adjacent roads and bridges which will provide safer access to nearby homes and villages. The direct benefits will include improved irrigation water management and significant training to improve the use of fertilizers and pesticides in the project area. Monitoring of potential waterlogging and other drainage issues will improve the areas downstream of the irrigation perimeters, although there are few existing problems with waterlogging or salinization. The improved cross drainage systems will eliminate localized flood risks and canal failures, as well as convey storm water safely from nearby residents.

95. **Poverty and social benefits.** The Project, by its nature of improving environment and public services, is classified as general intervention regarding poverty reduction impact. The Project will not entail disparities and inequalities between the poor and non-poor for their access to the project outputs and the access to the resultant social and economic benefits. Poverty incidence in rural areas is significantly higher than in urban areas, with 85% of the poor living in rural areas. Most poor households are engaged in agricultural activities and/or have members employed as casual laborers. The major causes of poverty in rural areas include lack of technological progress in agriculture, little value added from exports, fragmentation of farm land and lower farm incomes, small return on physical assets as a result of the low level of agricultural productivity, inadequate infrastructure support, price disincentives, and lack of diversified sources of income because of limited economic opportunities. Agriculture and rural development are essential in reducing poverty in Myanmar as most of the poor live in rural areas and depend on agriculture for their livelihood. Agricultural growth will increase the income of the rural poor both directly, through increased production and additional demand for farm labor, and indirectly, through linkages with non-farm productive activities in the rural areas. The project will address these constraints by improving irrigation infrastructure and irrigation management, and agricultural support services to increase productivity and value for agricultural products.

96. **Gender benefits.** There will be employment in construction of irrigation infrastructure and farm roads. The target will be at least 30% women laborer to be recruited for construction work in irrigation and frontline centers with receiving training on construction. Both male and

female laborers will receive equal wages for work of equal value, have access to water and sanitation facilities in all construction sites, and receive occupational safety measures and training. Poor and disadvantaged women and men will be prioritized to get employment. Women will comprise at least 40% of total participants in consultations related to irrigation system planning, design and implementation. Separate women farmers' meetings will be held to assess their prioritized needs related to location, alignment and access to irrigation infrastructure. At least 25% skilled and 75% unskilled job opportunities for construction of canals, structures and roads will be filled by local people. Irrigation management reforms will specifically target improved access for female-headed households and will include appropriate mechanisms for involvement of women in decision-making.

97. **Direct Impacts.** The IAIDP subprojects can potentially cause environmental impacts during implementation due to their location, design, construction, and operation and maintenance. Some of the works will generate temporary and localized known construction impacts related primarily to air pollution/dust, noise, vibration, and access restriction; improper disposal of construction related waste; temporary pollution of soil and surface waters due to accidental spillage of fuel from construction activities; safety hazards including worker safety; damage to natural habitats, aquatic fauna, or existing vegetation, and impacts to physical cultural resources. Most of these impacts are related to construction activities. However, these can be prevented or reduced to acceptable levels by applying good international construction practices and planning. It is noted that the proposed project improvements relate primarily if not exclusively to rehabilitation of existing facilities, so the aspects of siting and location are not necessarily relevant.

98. From the IAIDP IEE, some of the potential beneficial and adverse environmental impacts at different stages of the subprojects' (design, construction, and operation and maintenance) are presented in Table 4 along with annotations in italics relative to IAIDP. 'In EMP' indicates it is included in core subproject EMP, while 'for detailed design' means principles are within in EMP but implementation details will be determined during detailed design stage. "Completed" refers to completion for the core subproject IEE. This is a generic table based on irrigation in general, and issues have varying degrees of relevance to the IAIDP. All of the potential impacts are relatively minor in scale and duration.

Table 4: Potential Adverse Impacts and Proposed Mitigation Measures

Potential Negative Impacts of Subprojects	Relevant Mitigation Measures
<i>Pre-Construction Stage</i>	
Encroachment in to critical habitat or sensitive receptors and high value areas	Avoid critical habitat, sensitive receptors and high value areas while locating irrigation structures during project design. <i>[Rehabilitation of existing facilities primarily]</i>
Conflict with downstream water use right	Assess water use carefully and ensure that the downstream water use rights are ensured, and international water rights are not violated. <i>[Return flows to same rivers and no international issues]</i>
Potential social conflicts and environmental impacts missed by project design.	Meaningful consultation with the stakeholders and potentially affected people (AP) will be undertaken on the potential environmental and social impacts. Special consultations with the residential community members, villagers, local water management authorities and experts will be held with regard to the possible impacts of proposed infrastructure. <i>[Local</i>

Potential Negative Impacts of Subprojects	Relevant Mitigation Measures
	consultation held in subproject areas and no issues of concern raised with project Additional consultation prescribed in each unit during detailed design.
Lack of appropriate sizing or scale of proposed infrastructure or not meeting environmental objectives	The project scope has been carefully reviewed and optimized during PPTA based on thorough demand analyzes to make best use of natural resources, especially water and minimize other resource use and environmental impacts: [Completed]
Construction Stage	
Physical Environment	
Change in land use and loss of agricultural land, forest area, and settlement areas	Minimize use of fertile land, forest, private properties, and settlement areas. Subprojects with involuntary resettlement will not be eligible for funding. [Rehabilitation means minimal new land involved, but RP need to be assessed during detailed design.]
Soil erosion or contamination, and differential compaction by canal and road construction; stockpiles and spoils from earthwork during construction.	To mitigate soil erosion, contractors should prepare and implement a Site Drainage and Soil Erosion Management Plan as part of the contractor site specific EMP. [In EMP]
Soil contamination may result from inappropriate transfer, storage, and disposal of petroleum products, chemicals, hazardous materials, liquids and solid waste.	The EMP should include proper transport and storage requirements for such materials. Measures such as settling ponds, silt fences and screens to prevent sediment transport should be included in the EMP as well as interception ditches, weather limitations, and sediment transport barriers. Spill containment plans should be part of the contractor site specific EMP. [In EMP but locations for detailed design]
Cutting of slope, exposure of surface, and haphazard spoil disposal	Adopt cut slope angle depending upon the soil type, cover exposed areas against rain by mulching, apply bio engineering, restrict spoil disposal on slopes, drainages, agri-fields and forest areas, and manage spoil appropriately. [In EMP but locations for detailed design]
Recover topsoil	Recover topsoil and store for future use in landscaping, covering spoil area or recovery of degraded agriculture land. [In EMP but locations for detailed design]
Quarry and borrow area operation	Proper selection and management of quarry sites as approved by Engineer, rehabilitation, and vegetation of quarry / borrow area after completion of work. [In EMP but locations for detailed design]
Storage of material causing drainage blockage, dust and water pollution, and safety risk	Cover material in stockpile; stockpile at safe area with drainage so as to avoid water pollution; hazardous materials will be stored at safe areas under proper fencing; oil and lubricants will be stored on impervious surface and properly disposed; recover topsoil for future use before using area for stockpiling. [In EMP but locations for detailed design]
Dust from exposed surface, from construction equipment and vehicles	Use of face mask by workers while working in dust prone areas, cover material to avoid dust generation by wind, sprinkle water where necessary, cover or wet material during transportation. [In EMP but locations for detailed design]
Increase in noise level	Restrict horn near school, health posts, settlement, and forest areas. Locate crusher plant away from such areas. Provide ear

Potential Negative Impacts of Subprojects	Relevant Mitigation Measures
	plugs to workers working in high noise area. Use noise reduction devices on heavy equipment. Restrict time of construction. [In EMP but locations for detailed design]
Construction waste disposal	Proper management of construction waste, prevention of leakage, and spills of construction chemicals. [In EMP but locations for detailed design]
Sediment disposal from canals and structures	Ensure that sediments do not contain toxic substances (when suspected only) and dispose in approved locations and according to approved disposal plan. [In EMP but locations for detailed design]
Campsite location	Locate campsite away from productive land and forest area, use local labor and local houses as camp, sign and make lease or rental payments to land owner of camp area, proper storage of chemical and materials, and proper disposal of solid waste and wastewater. [For detailed design]
Crusher plant and batching plant location	Locate site away from farm/forest area, away from settlement and sensitive habitat; do not operate at night; water sprinkling to reduce dust; provide compensation to households directly affected by noise and dust of plant. [For detailed design]
Biological Environment	
Cutting of trees	Cutting only essential trees, replacement of local species of tree at 1:25 ratio for every tree cleared from forest area and 1:1 for tree cleared from private land. Responsibility of guarding and raising the seedlings planted on public land will be the responsibility of village. [For detailed design]
Working in or near forest areas disturbing wildlife	Work only in day time; do not disturb wildlife; make workers aware workers of the need to protect wildlife. [In EMP]
Cutting of tree for cooking and heating	Supply oil for cooking and heating for labors; use local laborers to avoid requiring accommodation, promote improved stoves and bio-gas in project area, and awareness generation. [For detailed design]
Disturbance to endangered and protected wildlife	Compensatory plantation, protect wildlife; do not use horn in forest area, do not work at night in forest areas, and restrict construction crew to harm or kill wildlife. [In EMP]
Socio-Economic Environment	
Loss of agriculture land	Minimize productive land acquisition through alignment and work site selection. Increase productivity and production by agriculture extension, crop diversification and commercialization. [For detailed design]
Loss of private property and displacement of people	Subprojects with no resettlement or involuntary land acquisition will be prioritized. [For detailed design]
Loss/damage of community infrastructure	Restoration or relocation of affected infrastructures in consultation with the local stakeholders without causing hardship to the users. [For detailed design]
Risks of accidents, health risks, injuries / emergency situations, unsanitary camp environment	Prepare occupational health and safety plan. Detailed list of requirements of plan in EMP and establishing and health and safety officer by contractors. [In EMP but locations for detailed design]
Potential conflicts with local communities, increase in consumption of alcohol, prostitution, gambling and crime.	Vigilance, motivation, awareness training to construction workers and local people; provide entertainment facilities to construction workers within camps where necessary; maintain good personal relations with local communities and; respect local culture. Use local laborers to extent possible to minimize need for camps.

Potential Negative Impacts of Subprojects	Relevant Mitigation Measures
	<i>[For detailed design]</i>
Operation Stage	
Physical Environment	
Soil erosion and slides	Regular maintenance of slope protection structures, appropriate upland farming techniques <i>[described in EMP]</i>
Water logging	Regular maintenance of drainage <i>[described in EMP]</i>
Risk of accidents	Proper safety arrangements are provided in settlement areas; fencing of major canal structure <i>[In EMP but locations for detailed design]</i>
Sedimentation of canal	Annual cleaning of canal; proper management of removed sediments <i>[described in EMP]</i>
Soil fertility degradation	Use right type and amount of fertilizer and pesticide, use organic soil conditioner <i>[described in EMP]</i>
Biological Environment	
Increase in population resulting into accelerated logging and encroachments	Enforcement of law, vigilance and monitoring, promote bio-gas, LPG, and solar energy. <i>[For detailed design]</i>
Low flow in river affecting aquatic vegetation and fish population	Release of minimum environmental flow in river, and restrict illegal fishing. <i>[Not applicable]</i>
Disturbance to wildlife movement pathway due to canal operation in wildlife corridors	Awareness generation to farmers on importance of co-existence with wildlife, and provide wildlife crossings. <i>[In EMP]</i>
Socio-Economic Environment	
Agriculture productivity	Link WUGs with improved agricultural practices. Support farmers with access to improved seed, agriculture inputs and markets. Increase productivity by judicious use of water by enhancing efficiency through on farm water management practices. <i>[In Agriculture component]</i>
Institutionalization of water management groups	Support WUG to perform their function as per their requirements; assist them in their emerging legal status and in evolving to multifunction. <i>[In Irrigation Management component]</i>
Reduction of river flows for downstream users	No increase in total water consumption is anticipated. Irrigation losses will continue to return to the same river system and be available to downstream users
Encroachment of right of way of canal	Awareness program, enforcement of property lines, plant trees in right of way. <i>[For detailed design]</i>
Difficulty in movement of people and separation of community	Provide culverts or bridges as required in consultation with communities <i>[For detailed design]</i>
Safety	Use proper safety measures to prevent accidents at risky locations. Fence dangerous areas of canal. <i>[For detailed design]</i>

99. **Long Term and Indirect Impacts.** Typical generic long term impacts from operation of irrigation activities may include those related to low flow regime (declining flows for downstream users if irrigation efficiency is increased); flood risk if cross-drainage works are not adequately maintained; GHG emissions if paddy area increases; soil salinity and decline of soil fertility if irrigation is mismanaged; soil erosion and water logging; stream morphology changes; sedimentation; and increase of pests and weeds (all risks which may increase if irrigation is mismanaged). These impacts may occur under the present regime with old poorly-performing irrigation systems. An objective of the project is to reduce these risks. When irrigation area is increased by a proposed project, some loss of summer grazing on stubble could occur. The

project can promote using irrigated or rainfed land to produce fodder, which can be used for pen-fed feeding of livestock. Excessive use of pesticide by farmers is a safety issue for the farmers and may have an impact on the natural environment through selection of pesticides, methods of application and disposal of waste. It may also impact the quality of water that drains from agriculture field to adjacent natural watercourses or the groundwater impacting long term drinking water sources located in the project sites. These issues are addressed in the training included under the IAIDP Agriculture component. There is not a current low flow regime in the systems to be protected.

100. A potential long term environmental impact is the possible raising of groundwater levels, a known effect of increased irrigation after rehabilitation and increased system utilization. This could be a benefit as it might supply additional source water for irrigation or other uses. Further, a potential indirect impact of the rehabilitated scheme could be on drinking water quality for villages that might use wells around the irrigation sites.

B. Climate Change Impacts

101. **Greenhouse Gas Emissions.** Net greenhouse gas emissions from the project will derive from GHGs emitted by agricultural activities – in particular methane (CH₄), nitrogen oxide (N₂O), and CO₂ emissions from rice paddy flooding and cultivation. However, there will not be any significant increase in paddy cultivation and agricultural diversification will be promoted. In any case, based on the size of the IAIDP subproject areas, the total GHG emissions will be well below the threshold of 100,000 tons/annum of the ADB SPS 2009. No detailed assessment was performed and no further monitoring is required.

102. **Climate.** The climate of the CDZ can be divided into two periods—the wet season and the dry season. The wet season coincides with the southwest monsoon and lasts from May to October. The dry season is divided into “winter” (November to February) and “summer” (March to April). Mean annual rainfall in the CDZ is lower than in the rest of the country, ranging from 500 to 1000 mm. The CDZ also typically experiences a brief dry spell during the wet season in June/July. The CDZ is characterized by erratic rainfall. Both streamflow and food production are highly susceptible to rainfall variability. It is anticipated that climate change, in conjunction with increased population, may aggravate the imbalance between water demand and supply. However, currently, there is little understanding of how rainfall is spatially distributed within the CDZ and how rainfall patterns have changed or are changing over time.

103. **Local Hydrology.** As noted earlier, water resources available to both the Chaungmagyi and Natmawk core project areas comprise rainfall, releases from the upstream reservoirs and runoff from the unregulated catchments between the dam and the diversion weirs. For rainfall, there is a clearly-defined wet season of duration about 6 months, building to a peak in October. The average annual rainfall is 750 mm. There is substantial inter-annual variability in inflows. The very low average inflows from December to April reflect the almost complete lack of rainfall in those months.

104. **Flooding and Extreme Weather Events.** Flooding is a regular phenomenon in Myanmar. Hydro-meteorological hazards have impacted food security of many provinces in Myanmar in the past, and are probably the main triggers. Many of the major floods were coastal in nature from tropical storms, but the CDZ is also impacted. Most of the food insecure zones have rated drought as the major agricultural production problem in the CDZ assessment carried out by WFP (2011).

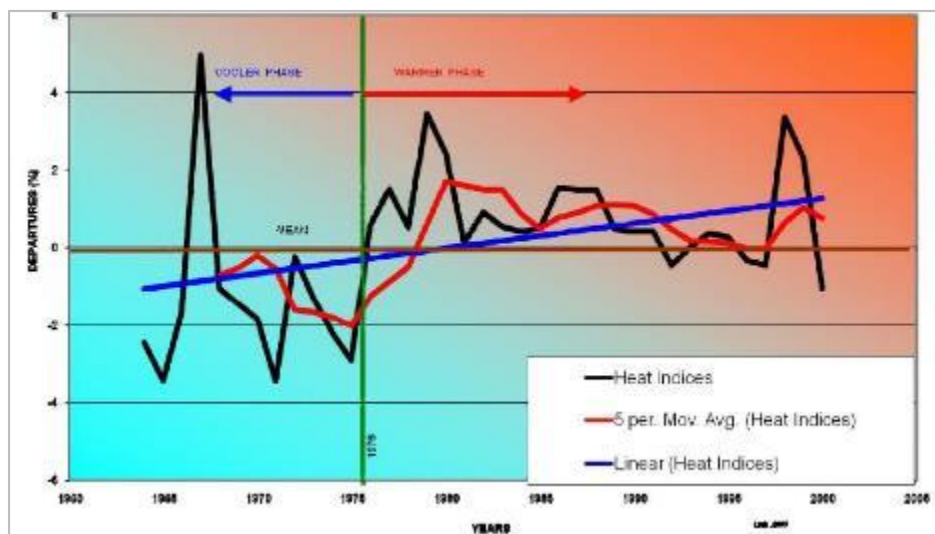
105. Myanmar is exposed to the threats of cyclones and associated surge in the sea-water which cause damage to the coastal areas. The damages were particularly severe in case of Cyclone Nargis. Based on historical records, only about 6.4% (ADPC, 2009) of the cyclones that form in the Bay of Bengal reach or cross the Myanmar coast. Evidences of changes in the long-term cyclone frequencies are unclear at present, but any increase in frequency can also impact the CDZ. Severe damages were experienced in Myanmar during 2015.

106. **Climate variability, projected climatic changes.** In 2012, Myanmar prepared the “National Adaptation Programme of Action (NAPA)” report giving a country-wide assessment of the risks of climate change and proposed action programs and projects. Myanmar’s NAPA therefore specifies **32 priority activities (referred to as Priority Adaptation Projects)** for effective climate change adaptation for eight main sectors/themes (i.e. four Project Options per sector/theme), namely: (i) Agriculture; (ii) Early Warning Systems; (iii) Forest; (iv) Public Health; (v) Water Resources; (vi) Coastal Zone; (vii) Energy, and Industry; and (viii) Biodiversity.

107. NAPA noted that over the last six decades (1951 to 2007), the temperature in Myanmar has increased on average by $\sim 0.08^{\circ}\text{C}$ per decade. This has been reflected by fewer cold days and more frequent hot days. Despite overall trends of increasing temperatures, five Regions have experienced decreases. Appreciable decreases include Magway (-0.23°C per decade) and Bago (-0.16°C per decade). The highest warming ($\sim 0.32^{\circ}\text{C}$ per decade) has been experienced in the Kayin State. From 1951 to 2000, ~ 15 heat waves occurred per year. The most extensive heat wave (covering up to 60% of the country) occurred in 1998 during a El Niño Southern Oscillation year. The following Figure 5 provides a summary of temperature increase predictions by NAPA.

Figure 5: Average Summary of Temperature Increases

[Departure from the mean temperature over the period 1960 to 2005 (Heat Index-black line) indicating:
 (i) more frequent hot years since 1976; and
 (ii) a linear increase in temperature over the time period (Linear– Blueline).]



108. **Hydrology.** Surface water in the Dry Zone is dominated by the Irrawaddy River and its tributaries. The Irrawaddy River, which originates in the north of Myanmar in Kachin state, flows through the Dry Zone, from the north-east to the south. In the north it effectively forms the eastern boundary of the Dry Zone, before flowing west-southwest from Mandalay and then

resuming its southerly flow at Bagan. The Chindwin a major tributary enters the Dry Zone to the north of Monywa and flows south to its confluence with the Irrawaddy to the north-west of Pakokku, almost in the center of the Dry Zone. There are several other large tributaries, including the Mu, Shweli and Myitnge. Some of these rivers flow all year but many are seasonal.

109. **Flooding.** Flooding is a frequent phenomenon in Myanmar. Hydro-meteorological hazards have impacted food security of many provinces in Myanmar in the past. There is however no dedicated database or information to archive the impacts of these extreme events at provincial and village levels. The global databases such as the CRED EM-DAT are designed to catch only the major events that are significant at global or national scales

110. There is no significant historical record of flooding in the CDZ but there was one flood in 2002. According to informal information from Meiktila General Administration Department, this flood caused damage to local communities in Meiktila and Wundwin Townships. About five people from Meiktila and nine from Wundwin, the neighboring township, were killed by this flood and a small area of farmland was slightly damaged. Families of Thetaw village under the Mongtaing Dam in Meiktila Township were later relocated to a new area due to this flood. Flooding also occurred during 2015 in parts of the CDZ.

111. Flooding in the core subproject areas is mitigated by the upstream dams which give some protection to downstream irrigation infrastructure and villages. Most of the damage from flooding in these areas has been caused by inadequate cross drainage, a situation being mitigated by the improved infrastructure. [This will likely be similar in future subprojects.]

112. **Droughts.** Drought years with moderate intensity were frequent in the 1980s and the 1990s. Extended dry seasons and increased temperatures have however caused an increase in the prevalence of drought since then, and severe droughts increased in frequency from 1990. In 2010, severe drought diminished village water sources across the country and destroyed agricultural yields of many crops including peas, sugar cane, tomato, and rice. Although the following years had more favorable rainfall, the conditions in 2015 are comparable to those in 2010.

113. **Increase in extreme high temperatures.** There has been a general increase in temperatures across Myanmar over the last six decades. This has resulted in an increase in extreme high temperature days and thus the prevalence of heat-related disorders. During summer 2010, 1,482 heat-related disorders were reported and 260 heat-related deaths occurred across Myanmar.

114. **Climate variability and change adaptation measures.** The potential for the IAIDP to be affected by future climate change was considered during the IAIDP PPTA IEE preparation through the use of the ADB approved AWARE screening tool. The results of this screening assigned the project with a “medium” climate change risk category and identified the risk of flooding as the most severe potential concern. Other risks of lower concern identified were reduced precipitation (lower dry season rainfall of particular concern as well as delays in onset of monsoon), offshore storms, and changes in available solar radiation. Increased rainfall could require a change in cropping while reduced or more erratic rainfall can make crops more vulnerable and less productive.

115. Relative to the potential impacts to IAIDP infrastructure, this screening focuses on **drought, increased temperature** and **floods** as the key risk areas for siting/design, maintenance and performance. Droughts were identified as affecting water availability and

requiring irrigation planning and careful calculation of crop water needs as a response. Floods were identified as dangers to canal walls and structures, which will need to be designed to withstand them. It is noted that irrigation infrastructure by its nature provides some adaptation to climatic variations and are designed to buffer soil moisture deficits and reduce the agricultural production risk both in farming systems. Climate change would have a greater impact in these respects if the project were not implemented.

116. **Adaptation.** The Project will continue to use all available water, except during floods – other things being equal this might result in a reduction in crop areas in some years, but the project aims to improve management and hence increase crop area. The IAIDP project area suffers from damages due to inadequate cross drainage, poor embankment construction – which will be addressed in rehabilitation plans (detailed designs will take account of best estimates of flood flows at an appropriate rate of return).

117. The increase in risk of flood damage due to climate change is probably small in comparison to the existing risk due to inadequate original design and poor quality construction – but both will be addressed in detailed design. The redesign and refurbishment of the schemes offers many opportunities to correct this, and to provide robust structures for future flooding. Appropriate return periods and safety factors to allow for climate change will be incorporated in detailed design, and good quality construction will be ensured.

118. The IAIDP is actually designed to mitigate some of these risks that already occur in the subproject areas and performs on its own merits as a mitigatory measure. For the most part irrigation is an adaptation to a very variable climate and thus needs to be flexible to cope with uncertainty. The projected future changes are small compared to existing annual variability in key parameters over the lifetime of the project. Climate variability may increase, but the greater flexibility built into the system through modernization of infrastructure and better management will address this variability.

119. If there is a delay in the onset in monsoon (currently perceived but not verified) then reservoir operations might need to be adjusted to ensure storage at the end of the dry season. These gains in irrigation efficiency will be important adaptation measures against future drought and higher water demand conditions caused by climate change. Operational plans and operating practices for water allocations and drainage will be prepared by the PMU during implementation, and will be adopted by ID before completion of works on main canals.

120. The impact of watershed management on water availability, and potential reduction of sedimentation will be investigated by the connected GEF pilot program and results incorporated into the detailed design of core subprojects and subsequent subprojects.

121. There is insufficient information currently to determine if cropping may need to be modified in the CDZ based on projected increased temperatures or rainfall. There is no indication that crop patterns will need to change for climatic reason, but the project is designed to cope with diversified cropping. Paddy is the most resilient crop for anticipated rainfall and temperature patterns.

122. Refer to the IEE for the core subprojects on how climate change was assessed for these locations.

V. CONTENT OF IEE AND EMP

A. Initial Environmental Examination

123. The IAIDP has an initial categorization of Environment Category B, and this was confirmed during the PPTA. Accordingly, the core subprojects to be implemented under the IAIDP are addressed in the project IEE in conjunction with the feasibility report preparation. In the future, subprojects for which IEEs have identified significant social and environmental impacts will not be selected for implementation, which is considered unlikely based on the rehabilitation nature of the physical interventions. This EARF provides requirements for future environmental assessment requirements of the pipeline projects, following the core subproject implementation. Additional IEEs may be required during implementation.

124. The environmental assessment of subprojects must comply with the requirements of ADB, as prescribed in their SPS; and the EPA and Draft Myanmar EA Procedure 2014 of the Government. The draft EIA procedure is said to be close to adoption, but there is no experience at ECD in implementation of the EIA Procedure. It is currently unclear if there will be local approval required of the IAIDP IEE prior to submission and approval by ADB. This is not in place at ECD for core subprojects but may be in place for future subprojects.

125. The IAIDP will use a proven and simplified system for IEE preparation. As much of the IAIDP involves only rehabilitation of existing systems, adverse environmental impacts are often negligible. Rather, the proposed interventions contribute to the improvement of environment by construction of efficient intakes, irrigation structures and canals which help control erosion and seepage and regulate canal flow. Also, since the construction scale is small, impacts from construction activities should be minimal.

126. The proposed system includes the following steps for subproject preparation and environmental assessment:

- (i) Scheme verification;
- (ii) Walkthrough survey;
- (iii) Prepare IEE and EMP to include with feasibility report; and
- (iv) Approval of IEE report by ADB (Government approval needed in future).

127. **Feasibility Studies.** The feasibility study of the component projects will determine the technical needs, social viability and agriculture potential. This includes an assessment of (i) water availability; (ii) present irrigation coverage, quality of irrigation service, and condition of the existing irrigation infrastructure; (iii) socio-economic situation in subproject area including ethnic composition of beneficiary group and distribution of land holdings; (iv) present cropping patterns; and (v) outline designs for irrigation systems, etc. The Rapid Environment Assessment checklist (REA) (see Appendix 1) will be used for preliminary environmental assessment for determining environment category of the subprojects, as well as future pipeline subprojects during implementation.

128. **Walkthrough Survey.** During core subproject preparation, a joint walkthrough survey will be carried out with participation of ID staff and representatives of the farmers, to identify the system details and problem areas. All problems identified during the walkthrough survey will be geo-referenced and mapped with a description of the problem. In addition, photographic evidence of the major problems will be provided. During the walkthrough, current arrangements of water rights and water distribution within the system will be also discussed and recorded. Other key field investigations conducted in parallel with the joint walkthrough survey include

(i) water availability; (ii) identification of other water users; (iii) surveys and site investigations for structures; (iv) present and future agriculture data; and (v) data on agriculture production cost, yields, agriculture income, other sources of income, etc.

129. **Environmental Assessment.** An IEE will be prepared covering all selected subprojects, in accordance with ADB's SPS 2009. Mitigation measures for any possible impacts are proposed in the IEE Report. An EMP is also prepared for implementation and monitoring of the proposed mitigation measures. The IEE and the EMP are prepared as part of the feasibility reports, using typical impacts and mitigation measures.

130. The environmental assessment (IEE) procedure of the subprojects will follow the following normal procedures of ADB for IEE preparation. It is important to note that the process will also comply additional requirements of environment protection draft regulation of the Government for conducting an IEE.

131. **IEE Assessment Process.** An outline of the activities for conducting IEE study is presented below:

- (i) **Environmental Screening.** Rapid Environment Assessment checklist (REA) will be completed during the preliminary walk through survey of the system.
- (ii) **Desk Study.** Environmental assessment needs to be based on current information, including an accurate project description and appropriate environmental and social baseline data. Secondary information will be collected from official publications, maps, and reports.
- (iii) **Stakeholder Consultations.** Local level stakeholders and government agencies will be consulted by means of Focus Group Discussions (FGD) or meetings. ADB requires meaningful consultation that begins early in the subproject preparation stage and continues throughout the subproject cycle. Consultations details are collected and annexed to the IEE report.
- (iv) **Field Assessment and Baseline Data Collection.** Existing environmental status of the subproject area will be collected covering physical, biological, socio-economic and cultural environment. The baseline data will be collected by using various survey tools such as consultation, focus group discussion, household survey, and interview. The collected data will be tabulated and analyzed to identify potential environmental impacts.
- (v) **Consideration of Alternatives.** The environmental implications of different alternatives will be assessed, particularly focusing on no action alternative, project alternative, construction method, construction materials and their source, and schedule of construction.
- (vi) **Identification of Environmental Impacts and Mitigation Measures.** These will be identified for design, construction and operation stages.
- (vii) **Design of Environmental Management Plan.** The EMP will be developed as part of the IEE report. The EMP will include monitoring requirements for potential environmental impacts and their mitigation measures. The mitigation measures will be based on "no significant harm to third parties" principle. The EMP will include mitigation measures, indicators, frequency and location of undertaking monitoring and reporting, cost for undertaking mitigation measures, and responsible agencies. Emergency response procedures, related institutional arrangements, capacity development and training measures will also be included in the EMP. The EMP will categorize environmental mitigation measures to be implemented during different stages of the subproject, for example design,

construction, and operation and maintenance stages. The EMP will be responsive to changes in project design, such as changes in canal alignment, technology, unforeseen events, and monitoring results. Provision will be made for uncertainties and unanticipated impacts. The EMP will be updated and made site-specific for each contract referring to the detailed engineering design.

- (viii) **Information Disclosure.** The subproject preparation team will disseminate information about the project and subproject to the general public, affected communities, non-government organizations, civil society and other related stakeholders beginning early in the subproject cycle and continue throughout the subproject. Draft IEE reports will be kept open for public review and comments. Softcopy of the final IEE reports will be submitted to ADB for disclosure on ADB's website.
- (ix) **Grievance Redress Mechanism.** The concerned ID will form and implement a grievance redress mechanism with formal Public Complaints Unit (PCU).

132. **IEE Report.** IEE report will be prepared following the template given in Table 5:

Table 5: Outline of an IEE report

No.	Section
1	Executive Summary
2	Policy, Legal, and Administrative Framework
3	Description of the Project (with salient feature)
4	Description of the Environment (Baseline Data) <ul style="list-style-type: none"> a. Physical environment b. Biological environment
5	Socio-economic and cultural environment
6	Anticipated Environmental Impacts and Mitigation Measures
7	Impact Assessment <ul style="list-style-type: none"> a. Beneficial impacts b. Adverse impacts, construction and operation
8	Analysis of Alternatives
9	Information Disclosure, Consultation, and Participation
10	Grievance Redress Mechanism
11	Environmental Management Plan
12	Conclusion and Recommendations
	Environmental Management Plan

133. Draft of the IEE report will be distributed to the local agencies and kept open for public review as a measure of disclosure.

B. Environmental Criteria for Subproject Review

134. Core subprojects selected during prefeasibility as well as the pipeline of future subprojects were based essentially on economic performance. The following environmental criteria will be adopted, in general, for feasibility assessments of future irrigation subprojects under the IAIDP:

- (i) subprojects must have a sufficiently reliable water supply for the proposed investment, and should consider the impacts of future climate change;
- (ii) subprojects must have no unresolved conflicts regarding water rights, and must not have adverse impacts on downstream users of the same source or ecosystem;

- (iii) water resource use will not cause any international water right issues;
- (iv) subprojects will avoid areas prone to instability, frequent landslides or riverbank erosion that may require high operation and maintenance costs;
- (v) subproject area must have soils suitable to irrigation and should not lead to drainage congestion, salinization, or water logging; and
- (vi) subproject must avoid environmentally critical habitat areas, and should not incur any measurable adverse impacts or likelihood of such. The environmentally critical area includes national parks, wildlife reserves, conservation areas, wetland areas, world heritage sites, and other areas such as known religious and archeological sites (Draft Myanmar EIA Procedures 2014) and those defined by the SPS of ADB. *[It is noted that the project involves rehabilitation of existing irrigation infrastructure so that avoidance of new critical areas will not likely be a concern.]*

VI. CONSULTATION, INFORMATION DISCLOSURE, AND GRIEVANCE REDRESS MECHANISM

135. Relevant provisions in the Environmental Protection Law of Myanmar and the Regulations on the Administration of Construction Project Environmental Protection (Order of the State Council, No. 253) require that domestic environmental impact assessments shall solicit the opinions of units concerned and inhabitants of a proposed project construction site. Myanmar National Development and Reform Commission issued a requirement for “Social Risk Assessment of Large Investment Projects” in August 2012, which emphasizes the importance of public consultation in an effective manner, and requires that the results of public consultation are clearly summarized in the domestic safeguards reports, including the dates of consultations, number of stakeholders, who the stakeholders are, and the comments received.

136. ADB’s Safeguard Policy Statement (2009) also has detailed and strict requirements on meaningful participation, consultation and information disclosure. The consultation process for this project therefore followed both the Myanmar requirements and the ADB requirements.

137. For the core subprojects, one round of public consultation for the proposed IAIDP was conducted in July and August of 2015 by the PPTA local environmental consultant. Public consultation meetings with concerned departments were held at the township level at the meeting halls of the GAD offices in Pyawbwe Township (Chaungmagyi system) and Myothit Township (Natmawk system). FGDs were conducted for the IAIDP in 22 villages, 11 in each core subproject area based on accessibility, and coverage of irrigation perimeters including all main canals. At total of 759 participants (540 men, 219 women) discussed their views on the proposed IAIDP interventions.

138. No participants at core subproject public consultation meetings and FGDs were worried about potential negative impacts (construction or operation) of the proposed intervention activities and they did not think proposed project activities would seriously affect their farmland usage and environment. In fact, they believed it would positively affect socioeconomic condition of the communities in the target project area by upgrading the irrigated structures and agricultural practices. Proposed project IAIDP activities of renovating canals and other rehabilitation activities, as well as activities related to improving agricultural crop production practices were warmly welcomed by the farmers. In addition, some villages requested help in getting quality paddy seeds and other better yield varieties with affordable prices in a timely manner. Furthermore, farmers requested that they need capacity building trainings such as effective utility of irrigated water and systematic allocation of water, best practices for crop

production, etc. The public consultation indicated that the majority of the potential APs supported the project and project components and believed they would benefit the local economy, raise residents' living quality, improve local environmental conditions, and effectively protect the local environment.

139. For future subprojects, a similar meaningful public consultation will be carried out starting from early stages of subproject preparation and continued until the end of the project cycle to address any environmental impacts affecting local communities. The stakeholder communities, beneficiaries, and affected people are being consulted during baseline data survey, and informed about the likely potential impacts of the subproject and proposed mitigation measures. Response and suggestions of the stakeholders will be documented in the IEE report, and will be taken into account during subproject feasibility design. Information on the subprojects will be disclosed in a form and at a location easily accessed by local stakeholders. Information will be disseminated in local language. When approved by ADB, the IEE report will be uploaded in the EA web site and a softcopy to ADB website.

140. The approach adopted for the IAIDP ensures that all subprojects are community driven. Steps involved in public participation are outlined in detailed subproject implementation procedures and include: (i) initial confirmation of genuine subproject demand; (ii) participatory, comprehensive and accurate subproject preparation; (iii) strengthened farmer organizations; (iv) committed participation by farmers in subproject implementation; (v) effective and transparent communication between supporting agencies and farmers; and (vi) efficient use of financial resources.

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

142. The proposed GRM follows the existing approach taken for managing complaints about local issues by members of the public in Myanmar. Residents' complaints or concerns are generally taken to local government (village and township level) representatives for resolution, therefore this system is proposed for the GRM. The GRM approach also fits with the existing approach to managing complaints for the public, which is focused on taking complaints to local government. The local governments confirmed their support for the approach presented in this IEE.

143. In their capacity as IAs, the IWUMD and DOA will establish a PCU within the PMU prior to construction to deal with complaints from affected people throughout implementation of the project. PMU staff (in particular the LIEC, the LISC, and the Gender and Social Specialist), and the contractor's land negotiator will have roles to play in explaining and helping community members use the GRM.

144. The PMU will be responsible for ensuring the setting up and coordination of the GRM at a local level and will staff the PCU. The LIEC and LISC will coordinate its set up and the Gender

and Social Specialist will be responsible for the day to day PCU activities: maintaining the grievance register, organizing investigations, acknowledging and communicating results to the affected person, and monitoring for the closing out of the issue. The PMU will be the key contact point for local government representatives who may require information about the Project or who have an issue they would like to discuss. The PMU will issue public notices to inform the people and organizations within the project area of the GRM. The PCU's phone number, fax, address, email address will be disseminated.

145. The PMU will have facilities to maintain a complaints database and communicate with contractors, supervision engineers, the environmental inspectors of ECD and representatives of affected local governments.

146. Procedures and timeframes for the grievance redress process are as follows and shown in schematic in Figure 2:

- (i) **Stage 1: Access to GRM.** If a concern arises, the affected people may resolve the issue of concern directly with the contractor, or make his/her complaint known to either the PCU directly, or through the local government, whichever level of authority he/she is most comfortable with;
- (ii) **Stage 2: Official Complaint to PCU.** If a complaint is filed at local government level, the government representative will submit an oral or written complaint to the PCU. For an oral complaint the PCU must make a written record. For each complaint, the PCU must assess its eligibility. If the complaint is not eligible, for instance if it is determined that an issue is outside the scope of the project, the PCU will provide a clear reply within five working days to the affected people;
- (iii) **Stage 3: PCU Complaint Resolution.** The PCU will register the eligible complaint informing the respective local and district government, the PMU, contractors, and ADB. The PCU, with support of the LIEC or the LISC (depending on the issue), will take steps to investigate and resolve the issue. This may involve instructing the contractor to take corrective actions. Within seven days of the redress solution being agreed upon, the contractor should implement the redress solution and convey the outcome to the PCU;
- (iv) **Stage 4: Stakeholder Meeting.** If no solution can be identified by the PCU or if the affected person is not satisfied with the suggested solution under Stage 3, within 2 weeks of the end of Stage 3, the PCU will organize a multi-stakeholder meeting under the auspices of the head of local government, where all relevant stakeholders will be invited. The meeting should result in a solution acceptable to all, and identify responsibilities and an action plan. The contractor should implement the agreed redress solution and convey the outcome to the PCU within seven working days. The invitees to this meeting will depend on the nature of the complaint. For example if the complaints relate to health, land disputes, or labor issues, the appropriate specialist in this field will be invited to the stakeholder meeting. This may include officers from the Department of Agricultural Land Management and Statistics (land rights issues), Myanmar Chamber of Commerce (business/commercial issues), various non-government organizations (gender or equity issues), Ministry of Health (health issues), MOECAAF (environmental issues), and Ministry of Labor (labor issues).
- (v) **Stage 5: District Administration Officer Resolution.** If the multi-stakeholder

meeting cannot resolve the problem, and the affected people remains unsatisfied, the PCU will set up a meeting with the District Administration Officer to identify a solution.

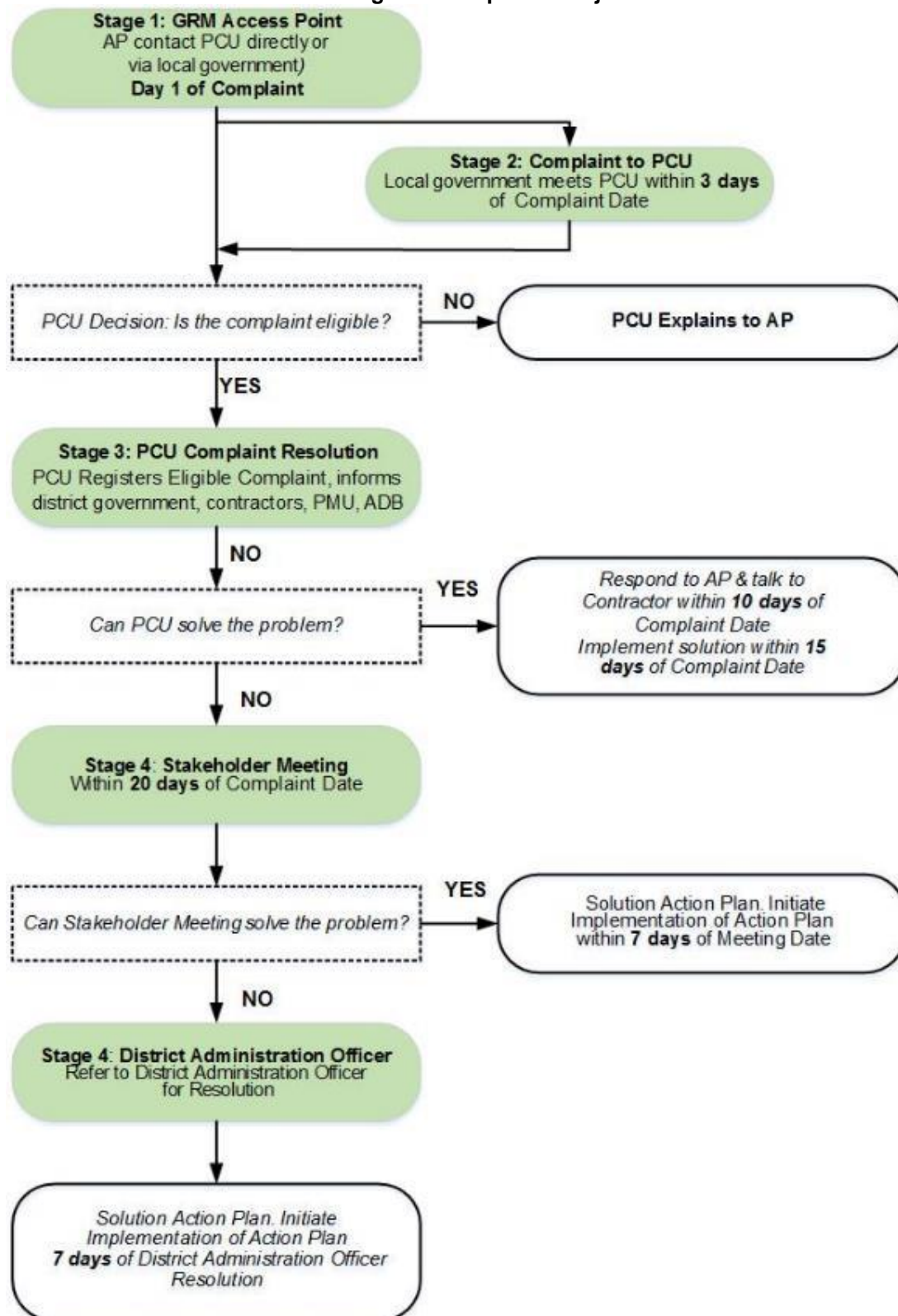
147. The PCU will record the complaint, investigation, and subsequent actions and results. The PMU will include this information in the quarterly EMP progress reports. In the construction period and the initial operational period covered by loan covenants the EA will periodically report complaints and their resolution to ADB in the quarterly project progress reports and annual environmental monitoring reports.

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

149. **Members and Responsibilities of the PCU.** The responsibilities of the PCU are implemented by the PMU, who is the PCU focal point. In addition to the PMU, the members of the PCU will be those in a position to resolve complaints and besides PMU will include representatives of: (i) regional government; and (iii) relevant local government representatives. The responsibilities of the PCU are as follows:

- (i) The PCU will instruct contractors and construction supervisors to refer any complaints that they have received directly to the PCU. Similarly, the PCU will coordinate with local government departments capture complaints made directly to them;
- (ii) The PMU, as the focal point of the PCU, will log complaints and date of receipt onto a complaints database and inform the IA and the Contractor.
- (iii) The PCU will investigate the complaint to determine its validity and to assess whether the source of the problem is because of project activities, and identify appropriate corrective measures and responsible persons;
- (iv) The PCU will inform the affected people of investigation results and the action taken;
- (v) If a complaint is transferred from local government agencies, the PMU will submit an interim report to local government agencies on status of the complaint investigation and follow-up action within the time frame assigned by the above agencies;
- (vi) The PCU will review the contractor's response to the identified corrective measures, and the updated situation;
- (vii) The PCU will undertake additional monitoring, as necessary, to verify as well as review that any valid reason for complaint does not reoccur.

Figure 6: Proposed Project GRM



Source: ADB Study Team

150. Affected persons, if not satisfied with the GRM results, always have legal recourse to judicial processes as a last resort.

151. If efforts to resolve disputes using the GRM remain unresolved or unsatisfactory, AHs also have the right to directly discuss their concerns or problems with the ADB Environment, Natural Resources and Agriculture Division, Southeast Asia Department at ADB Headquarters through the Philippines Country Office.

152. As well, ADB's Accountability Mechanism allows people affected by ADB-supported Projects to submit complaints to ADB. This is a separate resolution mechanism from the GRM described above. The Accountability Mechanism provides an independent forum that allows people to voice their problems and seek resolution, and report alleged violations of ADB's operational policies and procedures.

153. The Accountability Mechanism has two separate but related phases. First is problem solving, led by ADB's special Project facilitator, to assist Project-affected people in finding solutions to their problems. Second is compliance review led by a three-member panel that investigates alleged violations of ADB's operational policies and procedures, including safeguard policies, that have already resulted in, or are likely to result in, direct adverse and material harm to Project-affected people. It recommends how to ensure Project compliance with these policies and procedures.

VII. INSTITUTIONAL ARRANGEMENT AND RESPONSIBILITIES

A. Environmental Institutions

154. The Ministry of Environmental Conservation and Forestry (MOECAF) is the focal agency for overall environmental management in Myanmar. MOECAF's predecessor, the Ministry of Forestry created in 1992, had been gradually taking over the coordination of environmental protection in Myanmar. In 2005, the Ministry of Forestry absorbed the 1990 National Commission for Environmental Affairs, the main environmental authority at the time, composed by nineteen heads of departments from various sectoral ministries. In 2012, the National Commission for Environmental Affairs became one of the six departments under the MOECAF, the ECD, whose main objectives include: (i) implementing National Environmental Policy, strategy, framework, planning and action plan for the integration of environmental consideration into the national sustainable development process; (ii) managing natural resources conservation and sustainable utilization, the pollution control on water, air and land for the sustainable environment; and (iii) cooperating with other government organizations, civil society, private sectors and international organizations concerning with environmental management.

155. The Government established in 2004 the National Environmental Conservation Committee aimed at consolidating the environmental conservation activities at local and national levels. National Environmental Conservation Committee, chaired by the Ministry of Forestry, was reformed in April 2011 to include 21 members from 19 ministries. The National Environmental Conservation Coordination Committee is divided in four subcommittees, one of which aims at addressing the environmental problems in rivers and wetland areas.

156. MOECAF priority actions include creating: (i) guidelines for environmental quality standards and pollution control; (ii) EIA procedures and guidelines as well as review and monitoring institutions; (iii) Environmental related Water Management Master Plans; (iv) Climate

Change strategy and Emergency Risk Management Plan; (v) Green Economy Strategy for low carbon development; and (vi) Environmental Monitoring programs and inspections rules and regulations. The principal constraints identified by MOECAF include: (i) lack of information; (ii) lack of technical expertise; (iii) lack of financial resources and sustainability; (iv) lack of coordination both within and between government institutions and well as national and local entities; (v) lack of experience with public participation and grievance mechanisms; and (vi) time limits.

B. Institutional Arrangement of the Project

157. **Executing Agency (EA).** MOALI will be the EA for the project and will oversee overall project implementation and management activities to ensure smooth and timely implementation and completion of project activities. The EA has overall responsibility for the project and therefore is ultimately responsible for ensuring the implementation of the mitigation in the EMP and for ensuring compliance with loan covenants. The EA will guide and coordinate closely with other government agencies and the ADB for the timely resolution of any issue and completion of the project within the target dates, expediting the procurement process, and organizing and chairing the PSC meetings. The EA will designate a PMU Director to oversee the day-to-day management of the project and liaise with all relevant government offices. The EA will also designate a Chairman of PSC that will provide overall supervision to project implementation.

158. **Project Steering Committee (PSC).** The PSC will be chaired by the designated official from the EA and composed of senior officials of the government. The PSC will meet at least biannually to (i) approve annual budgets and plans for the project; (ii) review and assess project implementation progress; (iii) provide advice on policy matters related to the project; and (iv) make the final decision on subproject investments and subproject approval.

159. **Project Management Unit (PMU).** The PMU will be established at MOALI in Naypyitaw. The PMU will assume day-to-day management of the project and will be responsible for coordinating and implementing project activities, including procurement, recruitment, disbursement, contract administration, monitoring and reporting. The PMU will be headed by a Project Manager and will comprise full-time core staff, including environmental management staff. The PMU Director will guide and supervise the work of the PMU. The PMU consultants will be recruited under the guidance of the EA and ADB. The EA will provide a furnished, air conditioned/heated office space with communication and other support facilities as in-kind contribution for project implementation and management.

160. **Implementing Agency (IA).** The IWUMD and DOA will be the implementing agencies.

161. **LIEC.** The Project will procure the services of a loan implementation environment consultant (LIEC) to provide support in (i) project preparation including updating the project EMP; (ii) training; (iii) coordinating the conduct of regular environmental compliance monitoring (air and noise) in compliance with the monitoring plan; (iv) annual project EMP progress reporting; and (v) identifying environment-related implementation issues and necessary corrective actions. The Terms of Reference for the LIEC is attached to the EMP. The LIEC will coordinate efforts with LISC and Gender and Social Coordinator, particularly in regards to the GRM. The LIEC will also work closely with the Monitoring and Evaluation Specialist based in the PMU with regards to environmental monitoring processes, activities and indicators.

162. Civil works contractors will be required to formulate contractor EMPs with management systems for adverse impacts, e.g., dust control, noise control, traffic management, addressing

as minimum the requirements of this EMP and the IEE. The contractor EMPs will be renewed on a yearly basis, submitted to PMU and LIEC for review, and to ECD for approval. Each civil work contractor will appoint an EHSO to coordinate contractor EMP implementation.

C. Environmental Roles and Responsibilities

163. The environmental roles and responsibilities for ensuring environmental safeguards in the Project are summarized in Table 6.

164. The core subproject IEE provides a good reference for the impacts and mitigation program in matrix format. It is not repeated here but should be referred to when putting together subsequent IAIDP IEEs.

Table 6: Environmental Roles and Responsibilities

Institution	Role	Responsibility in the Project	Remark
Ministry of Environmental Conservation and Forestry (MOECAF)	Mandated to formulate and implement environmental policies, plans and programs at national level; and to approve scoping document, terms of reference and EIA reports.	<ul style="list-style-type: none"> • Facilitate when needed on environmental safeguards; and • Review EIA Scoping document, TOR and EIA Report, and give approval. 	EIA procedures or standards are drafted but not finalized or promulgated
Executing Agency: Ministry of Agriculture, Livestock and Irrigation (MOALI)	<p>MOALI is responsible to execute irrigation infrastructure projects.</p> <p>MOALI to assume overall responsibility for environmental and social safeguards matters in the department operation. Responsible to guide the department to implement climate change adaption plan and climate resilient infrastructure in all the departmental plan, program and projects.</p>	<ul style="list-style-type: none"> • Prepare a standard IEE report format for uniformity and quality to be followed by all IDD. • Develop technical guidelines for environmental safeguard during full project cycle and organize training to MOALI staff including all project staff • MOALI to assign responsibility of reviewing of IEE reports prepared • MOALI to designate a focal point for IAIDP • Timely review of IEE reports submitted by IAs and reply back comments/up-dated report within 5 days of receipt. • Periodic monitoring of EMP implementation (during construction period), and ensure corrective actions are taken; • Document and report the findings of their monitoring, prepare annual environmental monitoring report for public disclosure • Alert IAs to fill in data in the automated safeguard monitoring system at the end of every month • Keep close network with ECD of MOECAF. 	<p>EA</p> <p>Develop safeguard monitoring system developed for routine EMP compliance monitoring. Implementation consultants will provide support to the Section in fulfilling the above functions. The project will provide funds for Implementation consultants to travel to subproject sites, with visits to each subproject site per EMP during construction phase.</p>
Implementing Agencies (IAs) IWUMD and DOA (along with Implementation Consultants)	Implement subprojects	<ul style="list-style-type: none"> • Conduct walkthrough survey and fill in REA checklist • Environmental categorization of subproject as per findings of REA checklist • Discard subproject if it is Category A. Prepare IEE report if it is Category B, and DDR if the subproject is Category C • Conduct IEE Study, Public Consultation, and prepare IEE Report with EMP and submit for review and approval to ADB if it is prepared as per ADB requirement only. Submit IEE to MOI after prior approval of ADB, if the report is prepared as per Draft Myanmar EA Regulation requirements • Submit the IEE report for review by ECD • Submit IEE report to CPMO after review by ECD 	<p>IAs responsible for work but contract to Implementation Consultants for day to day monitoring and reporting activities</p> <p>Responsibilities include both core subprojects and future pipeline subprojects. Items 1-8 on core subprojects are being done under PPTA.</p>

Institution	Role	Responsibility in the Project	Remark
		<ul style="list-style-type: none"> • Receive comments from ADB and ECD, and update accordingly. Get final approval of IEE report from ADB/ECD as necessary • Prepare EMP and ensure EMP costs are included in the subproject design and costing • Include environmental management cost in separate BOQ in the contract • Compliance monitoring of works • Organize regular meetings to discuss safeguard compliance status and agree on corrective measures • Ensure that data and information is fed into an automated safeguard monitoring system • Documentation and reporting 	
PMU	Unit for coordination and management of the overall project activities, including environmental safeguards under all the subprojects.	<ul style="list-style-type: none"> • Support and coordinate all activities of the IAIDP including environmental safeguard activities. • Ensure that mitigation measures as mentioned in the IEE report are incorporated in the final engineering design of the subprojects. 	

ADB = Asian Development Bank, **BOQ = xxx**, **CPMO = xxx**, DDR = due diligence report, EA = Executing Agency, EARF = Environmental Assessment and Review Framework, ECD = Environmental Conservation Department, EIA = Environmental Impact Assessment, EMP = Environmental Management Plan, IA = Implementing Agency, IAIDP = Irrigated Agriculture Inclusive Development Projects, IWUMD = Irrigation and Water Utilization Department, **IDD = xxx**, IEE = Initial Environmental Examination, **MOI = xxx**, PPTA = project preparatory technical assistance, REA = Rapid Environmental Assessment, TOR = Terms of Reference

D. Project Readiness

165. **Assessment of project readiness.** Before construction, the LIEC and IAs will assess the project's readiness in terms of environmental management based on a set of indicators (Table 7), and report it to ADB and the PMU. This assessment will demonstrate that environmental commitments are being carried out and environmental management systems are in place before construction starts, or suggest corrective actions to ensure that all requirements are met.

Table 7: Project Readiness Assessment Indicators

Indicator	Criteria	Assessment	
Environmental assessment approvals	<ul style="list-style-type: none"> The IEE is approved ADB and by ECD (if requested), IEE is validated to conform with the Myanmar environmental requirements 	Yes	No
Land details to help contractors bid with an understanding of land needs	<ul style="list-style-type: none"> Resettlement checklist and due diligence report completed Land amounts estimated and preferred site works locations identified (ing detailed design) and implemented 	Yes	No
Land agreements completed	<ul style="list-style-type: none"> Training on REGF provided to contractors' 	Yes	No
EMP update	<ul style="list-style-type: none"> The EMP was updated after detailed design, and approved by ADB and ECD (if required at that time) 	Yes	No
Compliance with loan covenants	<ul style="list-style-type: none"> The borrower complies with loan covenants related to project design and environmental management planning 	Yes	No
Public involvement effectiveness	<ul style="list-style-type: none"> Meaningful additional consultation completed in affected areas. GRM established with entry points 	Yes	No
Environmental Supervision in place	<ul style="list-style-type: none"> LIEC is in place 	Yes	No
Bidding documents and contracts with environmental safeguards	<ul style="list-style-type: none"> Bidding documents and contracts incorporating the environmental activities and safeguards listed as loan assurances Bidding documents and contracts incorporating the impact mitigation and environmental management provisions of the EMP 	Yes	No
Environmental training has been implemented to PMU, IAs and contractors	<ul style="list-style-type: none"> Training completed to PMU and IAs Training completed to contractors 	Yes	No
Contractor readiness	<ul style="list-style-type: none"> Contractor EMP (C-EMP) has been prepared 	Yes	No
	<ul style="list-style-type: none"> Health and Safety Management Plan (HSMP) established for construction sites 	Yes	No
	<ul style="list-style-type: none"> Environment, Health and Safety Officers (EHSO) appointed 	Yes	No
	<ul style="list-style-type: none"> Assessment of potential disruption to utilities services conducted 	Yes	No
	<ul style="list-style-type: none"> Stakeholder interviews to confirm issues if services are disrupted 	Yes	No
EMP financial support	<ul style="list-style-type: none"> The required funds have been set aside to support the EMP implementation according to financial plan. 	Yes	No

Source: Study Team

VIII. MONITORING AND REPORTING

166. Environmental monitoring and inspection will consist of: (i) environmental impact monitoring; and (ii) EMP performance verification. Environmental impact monitoring will cover ambient air quality and noise, surface water quality and community health and safety prior to construction and during construction; and workers health and safety during construction. EMP performance verification will monitor and verify the performance of the Design Consultant, Contractor, Operator, and PMU in complying with, or adhering to, the C-EMP and EMP. The Environmental Monitoring and Inspection Plan is presented as Table 8.

Table 8: Environmental Monitoring and Inspection Plan

Environmental Media/Issue	Location, Parameters, Monitoring Technique	Responsibility & Frequency
Pre-Construction Phase		
Project readiness	<ul style="list-style-type: none"> • Method: Review of PMU's and contractor's readiness to implement all component projects based on assessment of Project Readiness Indicators • Parameters: Readiness indicators 	LIEC – once before construction
Construction Phase		
Soil erosion and contamination	<ul style="list-style-type: none"> • Method, Location: Visual inspection of all component projects • Parameters: (i) adequacy of soil erosion prevention measures; (ii) adequacy of soil contamination prevention techniques; and (iii) evidence of excessive soil erosion or soil contamination 	EHSO - daily PMU – bi-weekly LIEC - yearly
Solid and liquid waste management	<ul style="list-style-type: none"> • Method, Location: Visual inspection of all component projects • Parameters: (i) adequacy of solid and liquid waste management, storage and containment system; and (ii) presence of solid waste dumps, waste fires 	EHSO - daily PMU – bi-weekly LIEC - yearly
Construction site health and safety	<ul style="list-style-type: none"> • Method, Location: Visual inspection and interviews with construction workers and contractors at all component projects • Parameters: (i) adherence to the approved Health and Safety Management Plan (HSMP); (ii) performance of the EHSO; and (iii) worker complaints and concerns. 	EHSO - daily PMU – bi-weekly LIEC - yearly
Community health and safety	<ul style="list-style-type: none"> • Method, Location: Visual inspection of all component projects, informal interviews with nearby residents • Parameters: (i) adherence to approved temporary traffic management plan; (ii) adequacy of construction site signage and fencing; (iii) adequacy of temporary noise mitigation measures; (iv) accidents involving public and workers; (v) emergencies and responses; and (vi) public complaints about noise, air pollution, construction site safety, localized flooding, etc. 	PMU – bi-weekly LIEC - yearly

Environmental Media/Issue	Location, Parameters, Monitoring Technique	Responsibility & Frequency
Induced traffic disturbance	<ul style="list-style-type: none"> • Method, Location: Visual inspection at all component projects, informal interviews with affected people, consultation of local traffic police • Parameters: (i) adequacy of, and compliance with, the approved temporary traffic control and operation plan; and (ii) satisfaction of affected people. 	PMU – bi-weekly LIEC - yearly
Air quality	<ul style="list-style-type: none"> • Method, Location: Air quality monitoring adjacent to all component projects' site boundaries, inside boundaries of sensitive receptors if available • Parameters: Dust, [PM₁₀, PM_{2.5} if qualified entity located for monitoring] 	Licensed entity if available or LIEC if not – quarterly
Noise	<ul style="list-style-type: none"> • Method, Location: Noise monitoring, on pavements adjacent to all component projects, inside sensitive receptors if available • Parameters: dB(A) sound levels 	Licensed entity if available or LIEC if not – quarterly
Groundwater Monitoring For Pesticides	<ul style="list-style-type: none"> • Method, Location: Groundwater monitoring for pesticides at beginning of project and quarterly thereafter. • Parameters: Many pesticides are highly unlikely to leach to groundwater and the analysis of water samples for pesticides is extremely expensive. As a result the detailed design team will choose which pesticides to include in water sample analysis. To be included, the pesticide must be used in the locality, it must have environmental fate characteristics that could result in groundwater impacts and it must have a laboratory analytical method that is possible to undertake physically, chemically and financially. 	Licensed entity if available or LIEC if not – quarterly
EMP Compliance Monitoring	<ul style="list-style-type: none"> • Method, Location: Review of project's adherence with EMP and loan covenants • Parameters: EMP and loan covenants 	PMU, LIEC - yearly
Construction Completion and Operation Phase		
Post-construction site inspection	<ul style="list-style-type: none"> • Method, Location: Visual inspection, post-construction environmental condition assessment at all component projects • Parameters: Post Construction Environmental Condition 	IAs – twice: one week before completion, once after completion
Vegetation	<ul style="list-style-type: none"> • Method, Location: Visual inspection of all component projects' revegetation • Parameters: Grass growth and health 	IAs – 4 times during first year of operation
Interview with AP	<ul style="list-style-type: none"> • Method, Location: Interview with potentially affected people adjacent to all component 	IAs– twice during first

Environmental Media/Issue	Location, Parameters, Monitoring Technique	Responsibility & Frequency
	projects; • Parameters: (i) Overall satisfaction with project outputs; (ii) concerns and complaints.	year of operation

Source: Study Team

167. **Quarterly environmental monitoring reports.** The licensed entity (if available by time of implementation, or LIEC if not) will prepare concise reports presenting the results of the monitoring of air and noise, with a short assessment of compliance/non-compliance with World Bank Environmental, Health and Safety standards and Myanmar ambient environmental air and noise standards, when finalized.

168. **Yearly environmental progress reports.** To ensure proper and timely implementation of the EMP and adherence to the agreed environmental covenants, the PMU shall submit to ADB yearly environmental progress reports, based on quarterly progress reports of the PMU and the quarterly reports of the licensed laboratory. The LIEC will support the PMU in developing the annual reports. The report should confirm the project's compliance with the EMP, local legislation such as EIA requirements, and identify any environment related implementation issues and necessary corrective actions, and reflect these in a corrective action plan. The performance of the contractors will also be reported on with respect to environmental protection and impact mitigation. The operation and performance of the project GRM, environmental institutional strengthening and training will also be included in the quarterly environmental performance report. Table 9 summarizes the reporting requirements.

Table 9: Reporting Requirements

Report	Frequency	Purpose	From	To
Contractor's Progress Report	Monthly	Satisfy EMP	Contractor	PMU
Environmental Monitoring Report	Quarterly	Monitoring of air, noise and pesticides in groundwater	Licensed laboratory	PMU
Annual Environmental Progress Report	Annually	Adherence to Environmental Covenants and EMP	PMU , LIEC	ADB

169. Appendix 4 contains suggestions for contents of monitoring reports.

IX. REFERENCES

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ADB Operations Manual, Bank Policy (OM F1, 2010)

ADB, Guidelines for Climate Proofing Investment in Agriculture, Rural Development, and Food Security ADB 2012

Baseline Environment Data Sources:

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2. Biannual Progressive Report of General Administration Department, Pyawbwe Township, 2014-2015 Fiscal Year.
3. Departmental works completion report of Forest Department, Pyawbwe Township, 2014.
4. Forest Management Plan of Magway District, 2005-2015.
5. Checklist of Pre-feasibility survey of Natmawk System, February 2015.
6. Checklist of Prefeasibility survey of Chaungmaygyi System, February 2015.
7. Soil types and characteristics in Myanmar, Land Use Division, Department of Agriculture, January 2015.
8. Seismic zone map of Myanmar revised by Myanmar Earthquake Committee, December 2005.
9. Findings of Public consultation meetings in Myothit Township, July 2015.
10. Findings of Public consultation meetings in Pyawbwe Township, August 2015.
11. Annual Climatic Data of Meteorology and Hydrology Department, Mandalay Region 2014-2015.
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National Comprehensive Development Plan 2011-2031 (NCDP)

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Republic of the Union of Myanmar, National Environment Policy was issued in 5 December 1994

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LIFT (2013), Livelihoods and Food Security Trust Fund (various)

Monji and Bugbee, 1998 Adaptation to high CO₂ concentration in an optimal environment: Radiation capture, canopy quantum yield and carbon use efficiency. Plant Cell and Environment
"Myanmar Agenda 21" in 1997

Myanmar National Adaptation Programme of Action (NAPA) Report 2012

(SMEC, 1984). Feasibility Study for Natmauk Irrigation Project

WFP (2011).

World Bank Group's Environmental, Health and Safety Guidelines

Appendix 1: Rapid Environmental Assessment (REA) Checklist

[Complete REA and Climate change screening form completed in IEE for core subprojects]

Instructions:

- (i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to the Environment and Safeguards Division (RSES) for endorsement by the Director, RSES and for approval by the Chief Compliance Officer.
- (ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.
- (iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title: MYA (8583): Irrigated Agriculture Inclusive Development Project

Sector Division: SEER

Screening Questions	Yes	No	Remarks
A. Project Siting			
Is the Project area adjacent to or within any of the following environmentally sensitive areas?			
▪ Protected Area			
▪ Wetland			
▪ Mangrove			
▪ Estuarin			
▪ Buffer zone of protected area			
▪ Special area for protecting biodiversity			
B. Potential Environmental Impacts			
Will the Project cause...			
▪ loss of precious ecological values (e.g. result of encroachment into forests/swamplands or historical/cultural buildings/areas, disruption of hydrology of natural waterways, regional flooding, and drainage hazards)?			
▪ conflicts in water supply rights and related social conflicts?			
▪ Impediments to movements of people and animals?			
▪ potential ecological problems due to increased soil erosion and siltation, leading to decreased stream capacity?			

Screening Questions	Yes	No	Remarks
▪ Insufficient drainage leading to salinity intrusion?			
▪ over pumping of groundwater, leading to salinization and ground subsidence?			
▪ impairment of downstream water quality and therefore, impairment of downstream beneficial uses of water?			
▪ dislocation or involuntary resettlement of people?			
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?			
▪ potential social conflicts arising from land tenure and land use issues?			
▪ soil erosion before compaction and lining of canals?			
▪ Noise from construction equipment?			
▪ Dust during construction?			
▪ Water logging and soil salinization due to inadequate drainage and farm management?			
▪ leaching of soil nutrients and changes in soil characteristics due to excessive application of irrigation water?			
▪ reduction of downstream water supply during peak seasons?			
▪ soil pollution, polluted farm runoff and groundwater, and public health risks due to excessive application of fertilizers and pesticides?			
▪ soil erosion (furrow, surface)?			
▪ scouring of canals?			
▪ clogging of canals by sediments?			
▪ clogging of canals by weeds?			
▪ seawater intrusion into downstream freshwater systems?			
▪ introduction of increase in incidence of waterborne or water related diseases?			
▪ dangers to a safe and healthy working environment due to physical, chemical and biological hazards during project construction and operation?			
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?			
▪ social conflicts if workers from other regions or countries are hired?			
▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?			

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none">▪ community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., irrigation dams) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?			

A Checklist for Preliminary Climate Risk Screening

Country/Project Title: Myanmar: Irrigated Agriculture Inclusive Development Project
Sector : Agriculture, natural resources and rural development
Subsector: Water-based natural resources management
Division/Department: SEER/SERD

Screening Questions		Score	Remarks ⁹
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather related events such as floods, droughts, storms, landslides?		
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc)?		
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?		
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s)?		
Performance of project outputs	Would weather/climate conditions and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?		

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

Responses when added that provide a score of 0 will be considered low risk project. If adding all responses will result to a score of 1-4 and that no score of 2 was given to any single response, the project will be assigned a medium risk category. A total score of 5 or more (which include providing a score of 1 in all responses) or a 2 in any single response, will be categorized as high risk project.

Result of Initial Screening (Low, Medium, High):

Other Comments: _____

Prepared by: _____

⁹ If possible, provide details on the sensitivity of project components to climate conditions, such as how climate parameters are considered in design standards for infrastructure components, how changes in key climate parameters and sea level might affect the siting/routing of project, the selection of construction material and/or scheduling, performances and/or the maintenance cost/scheduling of project outputs.

Appendix 2: Draft Myanmar Environmental Assessment Rules

[Latest draft as of June 2015]

ENVIRONMENTAL IMPACT ASSESSMENT PROCEDURE

The Government of the Republic of the Union of Myanmar

Ministry of Environmental Conservation and Forestry

Notification No. _____ / 2015

Nay Pyi Taw, the _____ Day of _____, 1374 M.E.

(_____, 2015)

The Ministry of Environmental Conservation and Forestry, in exercise of the power conferred by sub-section (b) of Section 42 of the Environmental Conservation Law, hereby issues the following Procedure.

CHAPTER I. Title and Definitions

1. This Procedure shall be called the **Environmental Impact Assessment (EIA) Procedure**.
 2. The expressions contained in this Procedure shall have the same meanings as are assigned to them under the Environmental Conservation Law and Rules. In addition thereto, the following expressions shall have the meanings given hereunder:
 - (a) **Project** means any commercial, economic, agricultural, social, academic, scientific, political or other project, activity, program, business, service or undertaking, whether regarded individually or in the aggregate, the performance of which requires any approval or is licensed, restricted, or otherwise regulated to any extent by any part of the Union Government and which may have an Adverse Impact.
 - (b) **EIA Type Project** means a Project judged by the Ministry as being likely to have potential for Adverse Impacts.
 - (c) **IEE Type Project** means a Project judged by the Ministry to have some Adverse Impacts, but of lesser degree and/or significance than those for EIA Type Projects.
 - (d) **Complex Project** refers to an investment Project that has substantial impacts on the environment and society, which may include impacts beyond the borders of the jurisdiction under consideration, or a cumulative impact on other investment projects, or in which complex technology is applied.
 - (e) **Project Affected Person** or **PAP** means a natural person, legal entity, or organization that is, or is likely to be, directly or indirectly affected by a Project or a proposed Project, including without limitation effects in the nature of legal expropriation of land or real property, changes of land category, and impacts on the ecological and environmental systems in the settlement areas of such person, entity or organization.
- Adverse Impact** means any adverse environmental, social, socio-economic, health, cultural, occupational safety or health, and community health and safety effect suffered or borne by any entity, natural person, ecosystem, or natural resource,

including, but not limited to, the environment, flora and fauna, where such effect is attributable in any degree or extent to, or arises in any manner from, any action or omission on the part of the Project Proponent, or from the design, development, construction, implementation, maintenance, operation, or decommissioning of the Project or any activities related thereto.

(f) **Environmental Impact** means the probable effects or consequence on the natural and built environment, and people and communities of a proposed Project or businesses or activities or undertaking. Impacts can be direct or indirect, cumulative, and positive or adverse or both. For purposes of this Procedure, Environmental Impacts include occupational, social, cultural, socio-economical, public and community health, and safety issues. Social impacts that are in the nature of Involuntary Resettlement or which relate to Indigenous People, however, shall be dealt with in accordance with Article 7.

(g) **Cumulative Impact** in relation to a Project means the impact or impacts of a Project that in itself or themselves may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse Projects or undertakings in the same geographic area or region.

(h) **Best Available Techniques** or **BAT** means the most effective and advanced stage in the development of activities and their methods of operation which indicate the practical suitability of particular techniques for providing in principle avoidance, prevention, reduction, mitigation and compensation as the basis for Emission Limit Values designed to prevent and, where that is not practicable, generally to reduce emissions and the impact on the environment as a whole, where:

‘**Best**’ shall mean most effective in achieving a high general level of protection of the environment as a whole;

‘**Available**’ techniques shall mean those developed on a scale which allow implementation in the relevant industrial sector, under economically and technically viable conditions taking into consideration the cost and advantages, as long as they are reasonably accessible to the operator; and

‘**Techniques**’ shall include both the technology used and the way in which the installation is designed, built, maintained, operated and decommissioned.

(i) **Good Practice** means that practice which is recognized by a consensus of relevant stakeholders (including without limitation government, industry, labour, financiers, and academia) as having been adopted by leading, reputable companies of international standard, which is capable of being adhered to within the Republic of the Union of Myanmar, and which, when carried out by or in respect of the Project, can be expected further to reduce the Adverse Impacts arising from the Project and activities related thereto.

(j) **Alternatives** in relation to a proposed Project, means different realistic and feasible means of meeting the general purpose and requirements of the Project, which may include lower-impact alternatives to:

- 1) the property on which or location where it is proposed to undertake the Project,
- 2) the type of Project to be undertaken,
- 3) the design or layout of the Project,
- 4) the technology to be used in the Project,

- 5) the operational aspects of the Project, and
- 6) any other substantive characteristic or aspect of the Project as deemed necessary or appropriate by the Ministry.

(k) **Biodiversity** means the variability among living organisms from all sources including, inter alia, terrestrial, atmospheric, and marine and other aquatic ecosystems and the ecological complexes of which any such ecosystem is a part; this includes diversity within species, between species, and of ecosystems.

(l) **Emission** means the direct or indirect release of any substance, radiation, vibration, heat or noise from individual or diffuse sources into the air, water, land or any subterranean area. Emissions include emissions of solid waste, effluent, gas, noise, odor, light, radiation, vibration or heat.

(m) **Emission Limit Values** or **ELV** is a figure specifying the concentration or load of a pollutant allowed to be emitted or discharged to the environment from a specific installation in a given period of time or per unit of production.

(n) **IEE Report** means a report on an IEE Type Economic Activity prepared in accordance with the requirements stipulated in Article 32 and having a focus on: (i) systematic identification and assessment of potential Adverse Impacts including cumulative impacts of the proposed Project, business, service or activity; (ii) systematic assessment of feasible Project alternatives, and (iii) determination of appropriate measures to mitigate potential Adverse Impacts. The form, content and structure of the report shall be in accordance with the Ministry's requirements and guidelines and international best practice, and shall include the EMP.

(o) **EIA Report** means a report on an EIA Type Economic Activity prepared in accordance with the requirements stipulated in Article 63 and having a focus on: (i) systematic identification and assessment of potential Adverse Impacts including cumulative impacts of the proposed Project, business, service or activity; (ii) systematic assessment of feasible Project alternatives; and (iii) determination of appropriate measures to mitigate potential Adverse Impacts. The form, content and structure of the report shall be in accordance with the Ministry's requirements and guidelines and international best practice, and shall include the EMP.

(p) **EIA Report Review Body** means that body to be formed by the Ministry in accordance with Article 58 of the Environmental Conservation Rules, comprising technical experts from relevant government departments, government organizations, technical organizations and civil society responsible to review and provide comments and recommendations on an EIA Report.

EMP means a project document prepared in accord with the requirements, guidance of the Ministry to avoid, protect, mitigate and monitor Adverse Impacts caused by designing, construction, implementation, operation, maintenance, termination, closure of a project or business or activity; or after its closure, or by any other cause. Such plan includes manner to manage, work programs to implement, work programs to monitor the change of environmental situation and environmental conservation and protection, measures for environmental emergency, to avoid, protect and mitigate Environmental Impacts caused by a Project, business or activity or caused by any part of a Project, business or activity.

(q) **Construction Phase EMP** means a detailed and comprehensive Environmental Management Plan (EMP) for the construction phase of a Project. Such plan shall present all relevant commitments, Emission Limit Values, Environmental Quality Standards and other environmental requirements. The plan shall include a

description of the construction works, installations, and infrastructure, and shall present an overview of Adverse Impacts, present mitigation measures and monitoring programs together with time schedules, projected budget use, overview maps, images, aerial photos, satellite images, site layout plans, cross-sections, transects, environmental management and monitoring sub-plans for each construction site, thematic sub-plans, and management procedures, as appropriate.

(r) **Operational Phase EMP** means a detailed and comprehensive EMP for the operational phase of a Project. Such plan shall present all relevant commitments, Emission Limit Values, Environmental Quality Standards and other environmental requirements. The plan shall include a description of the Project operations, installations, and infrastructure, and shall present an overview of Adverse Impacts, present mitigation measures together with time schedules, projected budget use, overview maps, images, aerial photos, satellite images, site layout plans, cross-sections, transects, environmental management and monitoring sub-plans for each Project site, thematic sub-plans, and management procedures, as appropriate.

(s) **Environmental Compliance Certificate** or **ECC** is a document having legal effect, through which the Ministry approves an Initial Environmental Examination (IEE) Report, an EIA Report, or an EMP.

(t) **Indigenous People** means people with a social or cultural identity distinct from the dominant or mainstream society, which makes them vulnerable to being disadvantaged in the processes of development.

(u) **Involuntary Resettlement** means the mandatory physical displacement of a Project Affected Person from the PAP's home arising from a Project, or the unavoidable loss by a PAP of productive or income-generating assets occasioned by a Project.

(v) **Law** means the Environmental Conservation Law and future amendments of the Law.

(w) **Ministry** means the Ministry of Environmental Conservation and Forestry and, where the context requires, includes as relevant its Departments and/or offices at union, regional, state, district, township and/or municipal levels.

(x) **Department** means the Environmental Conservation Department of the Ministry.

(aa) **Committee** means the Environmental Conservation Committee formed by the Union Government under Article 4 of the Law.

(bb) **Project Proponent** means any natural person, legal entity, or organization, from the public or private sector, intending to undertake, or having commenced to undertake, as relevant, a Project or any aspect of a Project (including study, survey, design, development, pre-construction, construction, operation, decommissioning, closure, and post-closure) within the territorial borders of the Republic of the Union of Myanmar, and during the period of such undertaking which has an ownership interest

(legal or equitable) in the Project, or which intends (or could reasonably be expected to intend) to derive financial or other benefits from the Project of the sort which an owner would ordinarily derive.

(cc) **Project Proposal** means a written document, in form, content and structure in accordance with the Ministry's requirements and guidelines, accurately setting forth the key aspects and relevant details (including, inter alia, the nature and size of all known or foreseeable Adverse Impacts) of a Project or Project Expansion, as the case may be, which a Project Proponent wishes to undertake, or having commenced to undertake.

(dd) **Expansion** or **Project Expansion** means any proposed or actual increase in the size or production of a Project.

(ee) **Rules** means the Environmental Conservation Rules.

(ff) **Residual Impacts** means predicted or actual Environmental Impacts that remain after mitigating measures have been applied, including after Project closure.

(gg) **Scoping** means the process contemplated in Chapter V of this Procedure for determining the scope of the EIA (i.e., the data that need to be collected and analyzed to assess the potential Adverse Impacts of a Project) and producing a terms of reference (TOR) for preparation of an EIA Report.

(hh) **Screening** means the initial assessment by the Department that is made pursuant to Chapter III of this Procedure to determine whether an IEE or an EIA is required to be carried out.

(ii) **Prior Permission** means the permission issued by the Ministry in respect of Projects listed in Annex 1 'Categorization of Economic Activities for Assessment Purposes', setting forth environmental conservation terms and conditions in accordance with Section 24 of the Law.

(jj) **Strategic Environmental Assessment** refers to a range of analytical and participatory approaches that aim to integrate environmental into policies, plans and programs and evaluate the inter-linkages with economic and social considerations. The principle is to integrate environment, alongside economic and social concerns, into a holistic sustainability assessment.

CHAPTER II.

Establishment of the Environmental Impact Assessment Process

3. Pursuant to Section 21 of the Law and Articles 52, 53 and 55 of the Rules, all Projects and Project Expansions undertaken by any ministry, government department, organization, corporation, board, development committee, local government or authority, company, cooperative, institution, enterprise, firm, partnership or individual (and/or all Projects, field sites, factories and businesses including Expansions of such Projects, field sites, factories and businesses identified by the Ministry, which may cause impact on environmental quality and are required to get Prior Permission in accordance with Section 21 of the Law, and Article 62 of the Rules and Annex 1 'Categorization of Economic Activities for Assessment Purposes') having the potential to cause Adverse Impacts, are required to undertake IEE or EIA

or, subject to Articles 8, 9, 10 and 11, to develop an EMP, and to obtain an ECC in accordance with this Procedure.

4. Any Project, field site, factory or business which is identified by Section 21 of the Law and Article 62 of the Rules, requires Prior Permission, including those which exist prior to the issuance of this Procedure.
5. In accordance with Article 68 of the Rules, small-scale Projects, field sites, factories or businesses which are not identified by Section 21 of the Law or Article 62 of the Rules, and which are also not included in Annex 1 'Categorization of Economic Activities for Assessment Purposes', shall obtain the recommendation of the Department as to whether or not such Project has environmental impacts and shall comply with the terms and conditions prescribed by the Department before applying for a permit or license from the relevant Ministry or governmental organization.
6. The ECC shall reflect any terms and conditions that were contained in any relevant Prior Permission.
7. Projects that involve Involuntary Resettlement or which may potentially have an Adverse Impact on Indigenous People shall comply with specific procedures separately issued by the responsible ministries. Prior to the issuance of such specific procedures, all such Projects shall adhere to international good practice (as accepted by international financial institutions including the World Bank Group and Asian Development Bank) on Involuntary Resettlement and Indigenous Peoples.
8. Any Project already in existence prior to the issuance of the Rules, or the construction of which has already commenced prior to the issuance of the Rules, and which, in either case, would have been required to carry out an IEE or EIA in accordance with this Procedure had this Procedure been applied to such Project prior to its coming into existence or commencing construction, shall be required to undertake, within the timeframe prescribed by the Department, an environmental and/or social compliance audit, including on-site assessment, to identify past and/or present concerns related to that Project's Environmental Impacts, and to:
 - a) develop an EMP;
 - b) obtain an ECC; and
 - c) take appropriate actions to mitigate Adverse Impacts in accordance with the Law, the Rules, and other applicable laws.
9. Any Project already in existence prior to the issuance of the Rules, or the construction of which has already commenced prior to the issuance of the Rules, shall be required to carry out an IEE or EIA in accordance with this Procedure in respect of any proposed extension or Expansion of such Project which would increase the Project size or production or would necessitate additional construction, renovation, installation or other extension or Expansion related activities, if the nature and scale of such extension or Expansion are such that, regarded as an independent Project without reference to the nature or scale of the Project already in existence or under construction, they would have been subject to the requirement to carry out an IEE or EIA. If no IEE or EIA is required to be carried out in respect of such Project extension or Expansion, then the EMP and ECC for such Project shall be revised as necessary within the timeframe prescribed by the Department to take into consideration such extension or Expansion.
10. Projects funded with external aid and which have been approved by the Parliament, and Projects implemented by any Ministry or government organization, shall, if

construction has already commenced prior to the issuance of the Rules, comply with Article 8 or shall, if construction has not yet commenced prior to the issuance of the Rules, be required to carry out an IEE or EIA as this Procedure may require and within the timeframe prescribed by the Department, and shall obtain the relevant ECC prior to the submission of such Project to the cabinet.

11. Any Expansion in respect of a Project implemented after the issuance of the Rules and which does not require an IEE or EIA (as the case may be), but such Expansion, when considered together with the Project implemented after the issuance of the Rules as a single combined Project, would cause that Project to require an IEE or EIA (as the case may be), then the Department shall determine whether an IEE or EIA (as the case may be) of the Project implemented after the issuance of the Rules plus the proposed Expansion of that Project shall be required and/or whether an updated, revised EMP shall be required.
12. For any preliminary activities to be carried out by or on behalf of a proponent of a project or activity before the Ministry has determined whether the project or activity is obliged to carry out an IEE or EIA, the Ministry shall have the right to establish and impose requirements with respect to those preliminary activities, which the project or activity proponent shall be obliged to comply with as a prior condition to engaging in those preliminary activities.
13. The Project Proponent shall arrange for appropriate public consultation through all phases of the IEE and EIA process as required by Articles 30, 46, and 57 of this Procedure, and shall timely disclose to the public all relevant Project-related information in accordance with this Procedure except that which may relate to National Security concerns as informed by the Ministry.
14. The Ministry shall be responsible for the application and interpretation of this Procedure.
15. The Ministry has the power and exclusive authority to:
 - 1) define Project screening criteria;
 - 2) approve technical guidelines for IEE and EIA;
 - 3) review and approve IEE Reports;
 - 4) provide guidelines for, and approve the TOR of, EIA;
 - 5) review and approve EIA Reports;
 - 6) review and approve EMP, Construction Phase EMP and Operational Phase EMP;
 - 7) determine and impose Environmental Impact related conditions which will be applicable to any Ministry approval of an IEE, EIA or EMP and/or the issuance by the Ministry of any ECC;
 - 8) monitor and enforce compliance with the conditions set forth in the ECC and monitor and enforce the implementation of the EMP, including any amendments thereof occasioned once the detailed design of the proposed Project has been finalized or by or on account of experience during implementation of the Project;
 - 9) require any Project to update its EMP and to submit such updated EMP to the Ministry for review and approval according to a schedule defined by the Ministry;

- 10) identify and notify the registration conditions and/or procedures for the third person or organization who wishes to prepare EIA; and
 - 11) perform other duties and functions relating to IEE/EIA as stipulated by the Union Government.
16. The EIA Report Review Body shall have the following responsibilities:
- 1) When requested by the Ministry, to review the EIA of any Project.
 - 2) Within the timeframe prescribed by the Ministry, to prepare an EIA Review Report in regard to an EIA Report.
 - 3) The Ministry may, in each case, prescribe the scope and content of the EIA Review Report. Such scope and content may include, among other things, assessments of the following questions:
 - (i) Does the EIA Report comply with this Procedure (EIA Report structure, content, study methodology, public participation process, etc.)?
 - (ii) Does the EIA Report comply with the Scoping Report and the TOR for the EIA?
 - (iii) Does the EIA Report comply with explicit guidelines, standards, timing and criteria for review?
 - (iv) Does the EIA Report recognize and consider the views of stakeholders?
 - (v) Is the EIA Report complete? Does it contain sufficient, suitable and reliable information?
 - (vi) Have all applicable environmental and social requirements been adequately identified, addressed, referred to and fully complied with in the preparation and content of the EIA Report?
 - (vii) Have all foreseeable Adverse Impacts been identified and addressed in the preparation and content of the EIA Report?
 - (viii) Is it likely that the measures to prevent, mitigate or minimize Adverse Impacts of the Project specified in the EIA Report will ensure that the environmental requirements will be fully complied with?
 - (ix) Are the measures to prevent or minimize pollution from the Project effective and based on Best Available Techniques and Good Practice?
 - (x) Are there any measures or procedures which are non-compliant, or which risk leading to non-compliance, with environmental requirements?
 - (xi) Can the Project as described and presented in the EIA Report be constructed and operated without causing unacceptable Adverse Impacts?
 - 4) The EIA Review Report shall identify any defects in the EIA investigations or in the EIA Report and shall give recommendations as to which further studies, investigations, consultations or assessments the Project Proponent must undertake and report.
 - 5) The EIA Review Report shall, where relevant, give recommendations on

conditions of the ECC.

- 6) If requested, the EIA Report Review Body shall present its findings at a meeting.

Requirements concerning third party organizations or persons undertaking EIA

17. (a) If specific terms, conditions and/or registration procedures have not been separately issued by the Ministry, any third party organization or person, whether foreign or domestic, who wishes to prepare an EIA shall first apply to the Department together with the information and supporting evidence indicated below, to complete such registration. Such application shall include:
 - 1) the name, contact address and profile of the organization or individual,
 - 2) relevant experience of the organization or individual, and
 - 3) for key personnel, an outline of each person's experience in the field of environmental assessment, academic credentials, relevant certificates and accreditations.
- (b) If specific terms, conditions and/or registration procedures have been separately issued by the Ministry, any third party organization or person who wishes to prepare an EIA shall first apply to the Department in accordance with the terms, conditions and/or procedures for such registration.
- (c) The registration applicant shall be required to make payment of any fees and charges that may be required by the Department in connection with the application submission.
18. Registration, once completed, shall be valid for a period of three (3) years. Three (3) months prior to expiration of registration, the applicant may apply to the Department for an extension.
19. The Department will review the materials submitted by applicants seeking to be registered in accordance with Article 15, in order to determine each applicant's suitability to carry out such assessments. Based upon the materials submitted by the applicant, the Department may register any applicant deemed to be suitable and may refuse to register any applicant deemed to be unsuitable. Any applicant whose registration application has been rejected may re-apply for registration after the applicant has resolved or corrected the defect(s).
20. With the guidance of the Ministry, the Department may suspend or cancel the registration of any organization or person who has been registered in accordance with Article 16 or any prior requirements, and may impose such other corrective or punitive measures as may be lawfully available to it, if the Department determines that such organization or person has violated any provision of Republic of the Union of Myanmar law, or if the assessments of such organization or person contain significant errors or are materially misleading or have not been prepared in accordance with recognized standards generally applicable to such work and

services and/or relevant provisions of the Law, the Rules, this Procedure or other applicable Republic of the Union of Myanmar laws. A notification of suspension or termination of registration shall be issued.

21. No organization or person who has not been registered by the Department shall prepare, submit or allow the submission to the Ministry of any EIA Report contemplated in this Procedure. Organizations and persons who are in the process of preparing an EIA Report contemplated in this Procedure prior to the issuance of this Procedure are required to complete registration before submitting such EIA Report in accordance with Article 60.
22. The Department shall maintain and publish from time to time a list of all organizations and persons who have been registered by the Department for the preparation of EIA Reports, IEE Reports and EMP assessments.

CHAPTER III. Screening

23. The Project Proponent shall submit the Project Proposal to the Department for Screening. For the avoidance of doubt, the submission of the Project Proposal for Screening is the same as the submission of the application for Prior Permission. Following the preliminary Screening and verification that the Project Proposal contains all required documents and related materials, subject to Articles 8, 9, 10, 11, 26 and 27 the Department shall make a determination in accordance with Annex 1 'Categorization of Economic Activities for Assessment Purposes', taking into account Article 25 and the additional factors listed in Article 28 in order to designate the Project as one of the following, in accordance with Ministry guidelines:
 - 1) an EIA Type Project, or
 - 2) an IEE Type Project, or
 - 3) neither an EIA Type Project nor an IEE Type Project, and therefore not required to undertake any environmental assessment.

The Department shall also make a determination whether an EMP shall be required in respect of any Project so designated.

Projects and activities requiring an IEE are generally those which: (i) are limited in scope or size; (ii) have well known environmental and social impacts that for the most part are temporary, local and reversible; or (iii) have impacts which can be mitigated and managed by well-proven and available technologies and practices but with respect to which specific controls, measures and alternatives must be assessed, designed and implemented. Projects and activities requiring an EIA are generally those which: (i) involve multiple components and many or varied pollution sources and/or pollutant types, requiring integrated EMP to be tailored specifically to mitigate such pollution; (ii) are characterized by a high risk of significant, adverse environmental or social impact; (iii) are of a type or size for which there is a lack of prior knowledge and experience as to what the potential adverse impacts may be and their size or significance; or (iv) where the significance of the potential environmental or social impacts or the sensitivity/vulnerability of the recipients of those impacts requires a high level of environmental and social management expertise and skills, and continued strict control and supervision throughout the life of the project or activity.

24. An EIA is required in all cases where the project or activity will be located in or will have

- foreseeable adverse effects on any legally protected national, regional or state area, including without limitation: (i) a forest conservation area (including biodiversity reserved area); (ii) a public forest; (iii) a park (including marine parks); (iv) a mangrove swamp; (v) any other sensitive coastal area; (vi) a wildlife sanctuary; (vii) a scientific reserve; (viii) a nature reserve; (ix) a geophysically significant reserve; (x) any other nature reserve nominated by the Minister; (xi) a protected cultural heritage area; and (xii) a protected archeological area or area of historical significance.
25. Notwithstanding any categorization set forth in Annex 1 'Categorization of Economic Activities for Assessment Purposes', the Department reserves the right, if the Department determines that special circumstances so warrant: (i) to require a project or activity that would otherwise be required to complete and submit an IEE to complete and submit an EIA instead, (ii) to allow a project or activity that would otherwise be required to complete and submit an EIA to complete and submit an IEE instead, and (iii) to exempt from completing any IEE or EIA assessment a project or activity that would otherwise be required to complete and submit such an assessment.
26. For purposes of the Screening, the Department may in its discretion elect to treat projects or activities that are logically or economically linked, or which have the same or related proponents, or which are sequential in time, as a single project or activity. Components of basic infrastructure (such as an access road, transmission tower or waste disposal facility) that are required for a larger project (such as a mine or a power plant) shall be considered to be part of that larger project. In such circumstances, the Ministry may determine whether an IEE or an EIA will be required for the projects or activities that are treated as a single project or activity.
27. In accordance with Article 23, in making its determination as to the type of environmental assessment a Project or Project Expansion will require, the Department shall in addition to the provisions in Article 25 and the type and size categorization in Annex 1 'Categorization of Economic Activities for Assessment Purposes' consider the following factors in accordance with Ministry guidelines:
- 1) the need for the Project to deal with an emergency situation;
 - 2) the interest of public health and safety;
 - 3) the interest of national security;
 - 4) the lifespan of the Project;
 - 5) protection of cultural and religious norms, and historical and religious heritage;
 - 6) protection of areas having a fragile ecosystem;
 - 7) areas affected by cyclones, strong storms, flooding, earthquake (including the Sagaing Fault) and areas vulnerable to natural disaster;
 - 8) protection of water resources (lakes, reservoirs, rivers, groundwater aquifers) that serve or may in the future serve as primary sources of public drinking water;
 - 9) recreation zones and pearl production areas;
 - 10) conservation and protection of biodiversity;
 - 11) introduction of exotic or alien species;
 - 12) adoption of new technologies;

- 13) population density;
 - 14) national, regional and global climate change conditions;
 - 15) likely transboundary impacts;
 - 16) likely residual impacts or effects occurring some years after Project closure; and
 - 17) other factors as the Ministry may determine.
28. Within fifteen (15) working days of receiving the complete Project Proposal, the Department shall determine the type of environmental assessment (EIA, IEE, or none) which the Project will require, and the Department shall inform the Project Proponent in writing as to such determination in accordance with the Ministry guidelines.
29. The Ministry shall periodically review and, as it may deem necessary, revise Annex 1 'Categorization of Economic Activities for Assessment Purposes'.

CHAPTER IV. Initial Environmental Examination

30. The IEE process is outlined in the diagram set forth in Annex 2 'Environmental Assessment Procedure Flowchart'.
31. Prior to commencement of an IEE, the Project Proponent shall inform the Department in writing as to the identity of the organization(s) and/or person(s), if any, who will undertake the IEE and reporting. The Project Proponent may carry out the IEE and reporting by itself or may appoint a registered Consultant to do so.
32. Within seven (7) working days of its receipt of information about the identity of any proposed organization(s) and/or person(s) selected by the Project Proponent to undertake the IEE, the Department will confirm whether such organization(s) and/or person(s) is/are in good standing with the Department.
33. The Project Proponent shall undertake the following public consultation process in regard to an IEE Type Project:
- 1) Immediately upon commencement of the IEE, disclose relevant information about the proposed Project to the public and civil society through the Ministry and/or Department website(s) and local media, including by means of the prominent posting of legible sign boards at the Project site which are visible to the public, and comply with technical guidelines issued by the Ministry; and
 - 2) arrange the required complement of consultation meetings as advised by the Ministry, with local communities, potential PAPs, local authorities, community based organizations, and civil society, and provide appropriate and timely explanations in press conferences and media interviews.

IEE Report Requirements

34. The Project Proponent shall issue a letter of endorsement in a format prescribed by the Ministry. Such letter shall be submitted to the Department together with the IEE Report prepared either in the Myanmar language, or in the English language with an accompanying, accurate summary in the Myanmar language, and confirming:
- a) the accuracy and completeness of the IEE,
 - b) that the IEE has been prepared in strict compliance with applicable laws

including this Procedure, and

- c) that the Project will at all times comply fully with the commitments, mitigation measures, and plans in the IEE Report.

35. The IEE Report shall contain the following:

- a) Project description in reasonable detail with description of the project size, installations, technology, infrastructure, production processes, use of materials and resources, generation of waste, emissions and disturbances together with overview maps and site layout maps (using aerial photos and satellite images in proper scale) for each project phase and, where relevant, project alternatives for each project phase;
- b) identification of the Project Proponent including (where the Project Proponent is not a natural person but a company or other juridical entity) the identification of the owners, directors (if any) and day to day management and officers of the Project Proponent;
- c) identification of the IEE experts, including which expert is responsible for which part of the IEE Report;
- d) description of applicable laws, decrees, regulations, standards, guidelines and corporate policies related to environmental and social matters of the Project together with the relevant government agencies involved and their roles and responsibilities vis-à-vis the Project.
- e) description of the surrounding environmental and social conditions of the Project including maps of all relevant physical, biological, social, socio- economic and cultural features;
- f) identification and assessment of potential Environmental Impacts including assessment and description of Adverse Impacts and Residual Impacts with presentation of the spatial and temporal characteristics of the impacts using maps, images, aerial photos and satellite images;
- g) results of the public consultation and public participation processes, recommendations received from the public, and the Project Proponent's written responses to comments received during that process;
- h) the environmental protection measures of the Project which are intended to mitigate Adverse Impacts clearly presented together with applicable environmental and social requirements and any Residual Impacts;
- i) the EMP; and
- j) the Persons, Organizations and Budgets needed for implementation of the EMP.

Submission of IEE Report

- 36. After completing all investigations and public consultation and participation processes required for IEE Type Projects, the Project Proponent shall submit the IEE Report for the Project to the Department in both digital form and complete paper copies, together with the required service fee as prescribed by the Department.
- 37. Not later than fifteen (15) days after submission of the IEE Report to the Department, the Project Proponent shall disclose the IEE Report to civil society, PAPs, local communities and other concerned stakeholders: (i) by means of local media (i.e.

newspapers); (ii) at public meeting places (e.g. libraries, community halls); and (iii) at the offices of the Project Proponent.

Review and Approval Process for IEEs

38. Upon receipt of the IEE Report from the Project Proponent, the Department shall:
 - a) disclose the IEE Report to the public on the Ministry and/or Department website(s), and/or through other appropriate media;
 - b) invite comments and suggestions on the IEE Report from all relevant parties including relevant government organizations, institutions, civil society organizations, and PAPs, as appropriate;
 - c) arrange public consultation meetings at the local level, at which the Project Proponent shall present the IEE Report; and
 - d) collect and review all comments and recommendations received, and forward the same to the Ministry to enable it to make a final decision on approval of the IEE Report.
39. If it is determined by the Ministry that the IEE Report does not satisfy requirements, then the Project Proponent shall be called upon by the Department to undertake necessary amendments and/or to provide supplementary information as directed by the Ministry.
40. Upon completion of its review of the IEE Report, the Ministry shall:
 - a) approve the IEE Report, subject to any conditions it may prescribe, and issue an ECC; or
 - b) require that the Project carry out an EIA, citing the reasons for this decision and informing the Project Proponent of its decision;
 and, in either case,
 - c) publicly disclose its decision.
41. The Department shall deliver the final decision of the Ministry within sixty (60) working days of receipt of an IEE Report. If the Ministry requires an IEE Report to be amended, then the due date for delivery of the Ministry's decision shall be extended accordingly.
42. All costs incurred in completing the IEE Report disclosure and review, including the public consultation process, shall be borne by the Project Proponent.

CHAPTER V. Environmental Impact Assessment

EIA Process

43. The EIA process is outlined in the diagram in Annex 2.
44. The Project Proponent must appoint a registered Consultant to carry out the EIA investigation and reporting. Prior to commencement of the EIA, the Project Proponent shall inform the Department in writing as to the identity of the duly registered organization(s) and/or person(s) it has selected to undertake the EIA investigation and reporting.

45. Within seven (7) working days of its receipt of information about the identity of any proposed third party organization(s) and/or person(s) selected by the Project Proponent to undertake the EIA, the Department will confirm whether such organization(s) and/or person(s) is/are in good standing with the Department.

Scoping

46. All EIA Type Projects shall undergo Scoping.
47. The Project Proponent shall be responsible to ensure that the Scoping and the preparation of the TOR for the EIA Report are undertaken in a professional manner and in accordance with this Procedure and any applicable guidelines issued or adopted by the Ministry.
48. The Scoping of the proposed Project shall:
 - a) define the study area, area of influence, time boundaries, Project phases, and potential stakeholders;
 - b) start the process of understanding the applicable regulations and standards, and their context for Project design and completion of the EIA;
 - c) make a provisional identification of Environmental, Social and, if any, Health Impacts, focusing in particular on the environmental, social and health issues that need to be addressed in subsequent EIA studies;
 - d) provide an indication of the depth and breadth of the subsequent EIA investigations including what baseline data and information are required, what further studies and investigations must be carried out, and how such data collection, studies and investigations shall be undertaken;
 - e) provide an opportunity for consultants, relevant authorities, project developers, and interested and affected parties to express their views and concerns regarding the proposal before an EIA proceeds;
 - f) enable an efficient and comprehensive assessment process that saves time, resources, and costs and avoids delays; and
 - g) identify potentially affected communities and other stakeholders with an interest in the Project.
49. As part of the Scoping, the Project Proponent shall ensure that the following public consultation and participation process is carried out:
 - disclose information about the proposed Project to the public and civil society through local media, including by means of the prominent posting of legible sign boards and advertising boards at the Project site which are visible to the public; and
 - a) arrange the required complement of consultation meetings as advised by the Ministry, with local communities, potential PAPs, local authorities, community based organizations, and civil society, and provide appropriate and timely explanations in press conferences and media interviews.
50. The Project Proponent shall prepare a Scoping Report either in the Myanmar language, or in the English language with an accompanying, accurate summary in the Myanmar language, with the following content:
 - a) Executive Summary

- b) Context of the Project
 - c) Overview of the Policy, Legal and Institutional Framework
 - d) Project Description and Alternatives
 - e) Description of the Environment together with maps in proper scale indicating all relevant features, images, aerial photos and satellite images
 - f) Key Potential Environmental Impacts and Mitigation Measures
 - g) Public Consultation and Disclosure
 - h) Conclusions and Recommendations.
51. Based on the Scoping, the Project Proponent shall prepare the TOR for the EIA investigations in accordance with applicable guidelines issued or adopted by the Ministry.
 52. The Project Proponent shall submit the completed Scoping Report and TOR to the Department for review and approval.
 53. Within fifteen (15) working days of receiving the complete Scoping Report and TOR, the Department, in accordance with Ministry guidelines, shall either
 - a) approve the Scoping Report and TOR with or without conditions, or
 - b) require the Project Proponent to revise the Scoping Report and/or TOR in accordance with comments of the Department.

EIA Investigation

54. The Project Proponent shall ensure that the EIA investigation properly addresses all Adverse Impacts and is undertaken in accordance with the TOR as approved by the Department.
55. The EIA investigation shall consider all biological, physical, social, economic, health, cultural and visual components of the study area, together with all pertinent legal matters relating to the environment, people and communities (including land use, resources use, and ownership of and rights to land and other resources) that may be affected by the Project during all project phases including pre-construction, construction, operation, decommissioning, closure, and post-closure, and shall identify and assess all Adverse Impacts, risks, Cumulative Impacts and Residual Impacts for environment, social and, if relevant, health that potentially could arise from the Project.
56. The investigations shall include all necessary data collection, technical studies, modeling, field surveys, field sampling, laboratory analysis, engineering designs and calculations, and consultations to determine and document that all feasible measures are taken to ensure that all Residual Impacts are within applicable limits and are acceptable to the Ministry and interested and affected persons.
57. The investigation shall also include an analysis of Alternatives. Such analysis shall include a description of each Alternative, and an assessment and comparison of the Adverse Impacts, required mitigation measures and Residual Impacts of the Alternatives.
58. The Project Proponent is obliged to use, comply with and refer to applicable national and international standards adopted by the Union Government and/or the Ministry, or, in the absence of relevant national or adopted international standards, such standards as may be agreed with the Ministry.

59. The EIA shall consider the views, concerns, and perceptions of stakeholders, communities and individuals that could be affected by the Project or who otherwise have an interest in the Project. The EIA shall include the results of consultations with the public, affected populations and other stakeholders on the environmental and social issues. The concerns raised during such consultations shall be considered in assessing impacts, designing mitigation measures, and in the development of management and monitoring plans.
60. As part of the EIA investigations, the Project Proponent shall undertake the following consultation process:
 - a) timely disclosure of all relevant information about the proposed Project and its likely Adverse Impacts to the public and civil society through local and national media, the website of the Project Proponent, at public places such as libraries and community halls, and on sign boards at the Project site visible to the public, and provide appropriate and timely explanations in press conferences and media interviews;
 - b) arrange consultation meetings at national, State/Regional/Nay Pyi Taw Union Territory and local levels, with PAPs, authorities, community based organizations and civil society;
 - c) consultations with concerned government organizations including the Ministry, the concerned sector ministry, regional government authorities and others; and
 - d) field visits for the Ministry and concerned government organizations.

EIA Report Requirements

61. The Project Proponent shall issue a letter of endorsement in a format prescribed by the Ministry. Such letter shall be submitted to the Department together with the EIA Report prepared either in the Myanmar language, or in the English language with an accompanying, accurate summary in the Myanmar language, confirming:
 - a) the accuracy and completeness of the EIA;
 - b) that the EIA has been prepared in strict compliance with applicable laws including this Procedure and with the TOR for the EIA; and
 - c) that the Project will at all times comply fully with the commitments, mitigation measures, and plans in the EIA Report.
62. The Project Proponent is responsible for the preparation of an EIA Report which shall contain the following:

1.0 Executive Summary

2.0 Introduction

- 2.1 Presentation of the Project Proponent
- 2.2 Presentation of the Environmental and Social Experts
- 2.3 Presentation of the Health Experts for Projects with Health Impacts

3.0 Policy, Legal and Institutional Framework

- 3.1 Corporate Environmental and Social Policies (if applicable)

- 3.2 Policy and Legal Framework, including existing applicable laws and rules, International Conventions, Treaties and Agreements, and national and international standards and guidelines
- 3.3 Contractual and other commitments
- 3.4 Institutional Framework
- 3.5 Project's Environmental and Social Standards
- 3.6 Health Standards for Projects with Health Impacts

4.0 Project Description and Alternative Selection

- 4.1 Project Background
- 4.2 Project Location, overview map and site layout maps
- 4.3 Project development and implementation time schedules
- 4.4 Description of the project size, installations, technology, infrastructure, production processes, use of materials and resources and generation of waste, emissions and disturbances, including the devices and measures to control emissions and disturbances, all together with overview maps and site layout maps and design drawings for each project phase (pre- construction, construction, operation, decommissioning, closure and post- closure)
- 4.5 Description of the selected Alternative(s) by project phase (pre- construction, construction, operation, decommissioning, closure and post- closure)
- 4.6 Comparison and Selection of the preferred Alternatives

5.0 Description of the Surrounding Environment

- 5.1 Setting the Study Limits
- 5.2 Methodology and Objectives
Public Administration and Planning: Identification and summary of the main relevant elements in socioeconomic development plans, spatial plans, and sector plans at Union Government, State or Region, City and Township levels
- 5.3 Legally protected national, regional or state areas, including without limitation: (i) forest conservation areas (including biodiversity reserved areas); (ii) public forests; (iii) parks (including marine parks); (iv) mangrove swamps; (v) any other sensitive coastal areas; (vi) wildlife sanctuaries; (vii) scientific reserves; (viii) nature reserves; (ix) a geophysically significant reserves; (x) any other nature reserve nominated by the Minister; (xi) protected cultural heritage areas; and (xii) protected archeological areas or areas of historical significance.
- 5.4 Physical Components: Description with data and maps of (i) topography; (ii) water resources; (iii) geology and soils, hydrology/hydrogeology; (iv) environmental quality; (v) climate; (vi) vegetation cover; and (vii) natural hazards including earthquakes, tsunamis, extreme weather events, flooding, drought, wildfires and others
- 5.5 Biological Components: Descriptions and maps on fauna and flora including abundance, spatial distribution of rare, endangered and vulnerable species, and species of economic and health/nutritional values, and maps and description of valued or sensitive environmental areas and habitats

- 5.6 Infrastructure and Services: Location and size or capacity of transport infrastructure, public utilities and services
- 5.7 Socio-Economic Components: Income and livelihoods, living conditions and access to public services and natural resources, land use maps, population distribution maps, maps and charts of other socio-economic indicators such as poverty, employment and education
- 5.8 Public Health Components: Mortality and morbidity, occurrence of diseases, accidents and injuries, and social health determinants
- 5.9 Cultural Components: Description and maps of cultural, historical, and religious sites, structures and objects, and objects with high aesthetic value; description of traditional knowledge and beliefs, and cultural practices
- 5.10 Visual Components including where applicable landscape, city scape and sea scape using three dimensional models

6.0 Impact and Risk Assessment and Mitigation Measures

- 6.1 Impact and Risk Assessment Methodology
- 6.2 Impact and Risk Identification, Assessment and Mitigation. For each Project phase (pre-construction, construction, operation, decommissioning, closure, and post-closure):
 - 6.2.1 Identification and assessment of potential Environmental and Social Impacts including (i) physical, biological, social, socio-economic, health, cultural, and visual impacts; (ii) potential impacts on climate change such as greenhouse gas emissions and loss of carbon sinks or stocks; and (iii) identification of impacts of climate change on the Project based on available climate change predictions from designated national authorities or international scientific research bodies
 - 6.2.2 Identification and assessment of the likelihood and severity of natural and industrial hazards relevant to the Project
 - 6.2.3 The design, layout, functioning, management and implementation of appropriate impact and risk mitigation measures
 - 6.2.4 Characterization and assessment of any Residual Impacts and risks and comparison with applicable regulations, standards and guidelines
 - 6.2.5 Comprehensive monitoring plan
- 6.3 Relevant maps, aerial photos, satellite images in proper scale clearly indicating the location of sources of Adverse Impacts, the spatial and temporal distribution of such impacts and with reference to the Description of the Surrounding Environment, the components that are likely to be impacted and the nature of the impacts

7.0 Cumulative Impact Assessment

- 7.1 Methodology and Approach
- 7.2 Cumulative Impact Assessment
 - 7.2.1 Brief description and map of relevant existing and future private and public projects and developments

- 7.2.2 Identification and assessment of the potential cumulative impacts on the components in the surrounding environment and the Project's contribution to such impacts
- 7.2.3 Determination of the leverage and influence that the Project may have over the significant and project related cumulative impacts
- 7.2.4 Description of measures to mitigate the Project's contribution to the cumulative impacts

8.0 Environmental Management Plan

- 8.1 Project Description by Project Phase (pre-construction, construction, operation, decommissioning, closure and post-closure)
- 8.2 Project's Environmental, Socio-economic and, where relevant, Health Policies and Commitments, legal requirements and institutional arrangements
- 8.3 Summary of Impacts and Mitigation Measures
- 8.4 Overall budget for implementation of the EMP
- 8.5 Management and Monitoring Sub-Plans by Project Phase (pre-construction, construction, operation, decommissioning, closure and post-closure); the Management and Monitoring Sub-Plans shall address and satisfy all relevant environmental and social management and monitoring issues such as but not limited to noise, vibrations, waste, hazardous waste, wastewater and storm water, air quality, odor, chemicals, water quality, erosion and sedimentation, biodiversity, occupational and community health and safety, cultural heritage, employment and training, and emergency response
- 8.6 Content of each Sub-Plan
 - 8.6.1 Objectives
 - 8.6.2 Legal Requirements
 - 8.6.3 Overview maps and site layout maps, images, aerial photos, satellite images
 - 8.6.4 Implementation Schedule
 - 8.6.5 Management Actions
 - 8.6.6 Monitoring Plans
 - 8.6.7 Projected Budgets and Responsibilities

9.0 Public Consultation and Disclosure

- 9.1 Methodology and Approach
- 9.2 Summary of consultations and activities undertaken
- 9.3 Results of Consultations
- 9.4 Further ongoing Consultations
- 9.5 Disclosure

Submission of EIA Report

- 63. After completing all investigations and public consultation and participation processes

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required for EIA Type Projects, the Project Proponent shall submit the EIA Report to the Department in both digital form and complete paper copies, together with the required service fee as prescribed by the Department.

64. Not later than fifteen (15) days after submission of the EIA Report to the Department, the Project Proponent shall disclose the EIA Report to civil society, PAPs, local communities and other concerned stakeholders: (i) by means of national media (i.e. newspapers); (ii) the website of the Project Proponent; (iii) at public meeting places (e.g. libraries, community halls); and (iv) at the offices of the Project Proponent.
65. Upon receipt of the EIA Report, the Department will make the EIA Report publicly available.

Review and Approval Process for EIA Report

66. Upon receipt of the EIA Report from the Project Proponent, the Department shall:
 - a) submit the EIA Report to the EIA Report Review Body for comment and recommendations;
 - b) invite comments and suggestions on the EIA Report from all relevant parties including involved government organizations, institutions, civil society organizations, and PAPs, as appropriate;
 - d) arrange public consultation meetings at national and State/Regional/Nay Pyi Taw Union Territory and local levels where the Project Proponent shall present the EIA Report; and
 - e) collect and review all comments and recommendations received, including those of the EIA Report Review Body, and forward the same to the Ministry to enable it to make a final decision on approval of the EIA Report.
67. If it is determined by the Ministry that the EIA Report does not satisfy requirements, then the Project Proponent shall be called upon by the Department to undertake the necessary amendments as directed by the Ministry. The Ministry shall deliver its final decision within ninety (90) working days of receipt of the EIA Report. In case of complex projects, or if the Ministry requires the EIA Report to be amended, then the timeline will be extended accordingly.
68. All costs incurred in completing the EIA Report disclosure and review, including the public consultation process, shall be borne by the Project Proponent.
69. Upon completion of its review of the EIA Report, the Ministry shall;
 - a) approve the EIA Report with the guidance of the Committee, subject to any conditions as may be prescribed, and issue an ECC; or
 - b) inform the Project Proponent of its decision to reject the EIA Report and cite reasons for doing so (grounds for rejection of an EIA Report shall be in accordance with guidelines to be issued by the Ministry);and, in either case,
 - c) publicly and timely disclose its decision by appropriate means.

CHAPTER VI. Appeal Process

70. Within thirty (30) days of public disclosure that the EIA Report has been approved or rejected by the Ministry, any Project Proponent, Person or organization which submitted the EIA Report in accordance with this Procedure, and any other Person or organization potentially affected by any Adverse Impacts of the Project, shall have the right to file an appeal to the Committee through the Ministry with respect to the Ministry decision to reject or approve such EIA Report, provided, however, that:
- a) no appeal of a decision by the Ministry to reject an EIA Report shall be allowed, except where the appellant has specifically alleged that such rejection was not duly made in accordance with this Procedure or that such rejection was based upon an unsubstantiated or unjustified decision by the Ministry;
 - b) not more than one (1) appeal on the same case shall be allowed with respect to a decision by the Ministry; and
 - c) no condition prescribed by the Ministry shall be subject to appeal by a Project Proponent.
71. With respect to any appeals allowed to be filed under this Procedure that are received by the Ministry within the appeal submission period, the Ministry shall, within fifteen (15) days of receipt of such appeals, forward the appeals to the Committee for consideration.
72. The Committee shall, within thirty (30) working days of its receipt of a forwarded appeal from the Ministry, consider that appeal and make a decision to:
- a) uphold the decision of the Ministry, or
 - b) instruct the Ministry to require the Project Proponent to revise and resubmit the EIA Report to the Ministry, or
 - c) instruct the Ministry to alter, revise or cancel its decision on the EIA Report and cite its grounds for such instruction.
73. The decision of the Committee decision shall be final.
74. The Ministry shall inform the Committee decision to the Appellant and the Project Proponent. Upon receipt of the decision from the Committee, the Ministry shall publicly disclose any reversal or modification of its decision concerning an EIA Report.

CHAPTER VII. Environmental Consideration in Project Approval

Project Approval Requirements

75. For Projects that require an IEE or EIA, before any permit is granted or issued by any ministry, or any other competent authority in respect of any application to proceed with implementation of such Projects, an ECC shall first have been duly issued by the Ministry in accordance with this Procedure.
76. All projects and activities, whether categorized in Annex 1 'Categorization of Economic Activities for Assessment Purposes' as requiring an IEE, an EIA, nor neither: (i) are obliged to obtain all required authorizations, permits, licenses and approvals and to comply with all applicable laws, regulations, procedures, ministerial directives, zoning, planning requirements, and other governmental requirements, and

- 76 Appendix 2
(ii) shall remain subject to any environmental and/or social conditions which the Ministry may impose as a condition to the commencement or continuation of construction or operation of that project or activity.
77. Any proposed project or activity which has been determined not to require an EIA or IEE (whether because it is below the indicated IEE threshold or is not listed in the categorization below) shall nonetheless be subject to the imposition of any conditions deemed appropriate by the Ministry as part of the review, approval and permitting procedure of the Government.
78. When the relevant authority has given approval to a Project for which an ECC has been issued, it shall notify the Ministry of such approval.

Environmental Compliance Certificate, Conditions and Revisions to Conditions

79. Upon receipt of the written approval from the relevant authority, the Project Proponent shall commence implementation of the Project strictly in accordance with the conditions attached to the ECC and including the EMP, within such time as may be prescribed by the Ministry.
80. The ECC issued by the Ministry shall be valid for a period of five (5) years from the date of issuance, and may be renewed thereafter in increments of five (5) years, in either case subject to compliance with any revised conditions.
81. The Project Proponent shall commence substantial implementation of the Project within the first two (2) years after the issuance of the ECC, and not later than thirty (30) days after such commencement shall notify the Department in writing of the date of commencement, and identify the activities constituting substantial implementation of the Project.
82. The Project Proponent shall be required to carry out and submit for the Ministry's approval a new assessment (IEE or EIA, as the case may be) if substantial Project commencement has not occurred within two (2) years after obtaining the ECC, unless the Project Proponent has applied in writing providing reasons why it has not been able to commence substantial implementation of the Project, indicating what further period of time is needed before substantial commencement of the Project can take place, and the Ministry has in its discretion granted an extension.
83. An ECC is granted in respect of a specific, clearly identified Project and constitutes a site-specific environmental approval, which is not valid in respect of any different site. The ECC must clearly specify:
- 1) the registered name and registered office address of the Project Proponent to whom the ECC is issued;
 - 2) the documentation (EIA Report/IEE Report) that the Project Proponent submitted to the Ministry and on the basis of which the ECC has been issued;
 - 3) a map, images, aerial photos and satellite images showing the geographic location(s) of the Project and each of its components;
 - 4) the Project type and layout with an overview of activities, installations, operations, production capacity, production methods, and waste generation; and
 - 5) Project phases and timing (the commencement and conclusion dates of each).
84. The Ministry may prescribe conditions of an ECC. Such conditions may encompass any or

all of:

- 1) General management: (i) procedures and management systems to identify, control, prevent or minimize all Adverse Impacts; (ii) procedures to ensure compliance with all environmental and social commitments; (iii) procedures to implement the measures described in the EMP, Construction Phase EMP, and/or Operational Phase EMP, as the case may be; (iv) procedures to improve the environmental and social performance of the Project; (v) organization with qualified environmental and social personnel; and (v) documentation, reporting and information disclosure procedures;
- 2) Emissions: (i) Emissions not allowed, (ii) Emission Limit Values in terms of types, substances, loads, concentrations, rates, timing, duration, frequency, seasons, and Project phase, (iii) Emission points, (iv) form and media, (v) recipients, (vi) contribution to Environmental Quality Standards, and (vii) statistical methods for determining compliance;
- 3) Use of energy and natural resources: amounts, type, origin of resource, rates, effectiveness of use, and waste generation;
Pollution Prevention: Effectiveness of production or construction methods or waste storage and treatment facilities to prevent or, where this is not practicable, to minimize pollution, and to prevent or minimize the risk of pollution;
- 4) Nature conservation and management: (i) protection and rehabilitation of sites, environments or species; (ii) effectiveness of environmental measures to prevent or minimize Adverse Impacts on certain environments or species; and (iii) biodiversity offsets;
- 5) Cultural resources: (i) protection of cultural heritage sites, structures and objects; and (ii) procedures for dealing with archeological finds;
- 6) Hazardous or toxic materials including waste: (i) limits to the types, categories, and amounts; and (ii) methods and systems of collection, storage, handling, transport, treatment and disposal;
- 7) Waste management: (i) limits to the types, categories, and amounts of waste (liquid, solid, atmospheric) generated; (ii) methods and systems of collection, storage, handling, transport, treatment and disposal; and (iii) recycling or reuse of wastes;
- 8) Transport and access: (i) access points; (ii) means of transport of materials and people to and from the Project; (iii) transport routes for products, materials or waste; and (iv) access control measures;
- 9) Decommissioning, rehabilitation, clean up and closure: (i) sites, areas/ environments and facilities; (ii) objectives and standards; (iii) site conditions and after use; (iv) timing; and (v) controls and monitoring;
- 10) Control measures: (i) prevention of accidents and responses to emergency conditions; (ii) measures and procedures in case of accidents, incidents, and operational irregularities; (iii) control and maintenance of pollution prevention/ minimization measures; and (iv) safety zones;
- 11) Monitoring: (i) parameters; (ii) methods; (iii) sampling and analyses; (iv) point of monitoring; (v) frequency; (vi) timing; (vii) data management; (viii) maintenance and control of monitoring equipment; and (ix) documentation and reporting;

- 12) Documentation and reporting: (i) parameters and issues that must be documented and reported; (ii) types and methods; (iii) frequency and timing; (iv) quality controls; and (v) recipients;
 - 13) Financial guarantee: (i) type of guarantee; (ii) amount; (iii) timing; (iv) application; and (v) type and financial capacity of guarantor;
 - 14) Funding of inspection by the Ministry: (i) amounts; (ii) payment procedure; and (iii) timing and frequency; and
 - 15) Contributions to the Environmental Management Fund in accordance with Article 30 of the Rules: (i) pollution charges (emissions, waste), and (ii) charges on the use of natural resources and benefits from ecosystem services.
85. The Ministry may, upon joint application of a Project Proponent and a proposed transferee, transfer to the proposed transferee an ECC or any part of an ECC.
86. The Ministry may unilaterally modify conditions in the ECC and/or require the Project Proponent to revise and resubmit the EMP to the Ministry for review and approval, if at any time the Ministry determines that:
- a) the mitigation measures are insufficient or inadequate to mitigate the actual or likely impacts of the Project;
 - b) new information becomes known as to how harmful the Adverse Impacts of the Project are, or are likely to be or become;
 - c) the Project has Adverse Impacts which could not be foreseen at the time the originally approved IEE Report / EIA Report and EMP were approved;
 - d) the Adverse Impacts of the Project are greater than those anticipated impacts that formed the basis for the preparation, submission, and approvals of the original IEE Report/EIA Report and EMP and the issuance of the ECC and Conditions therein;
 - e) new techniques conforming to the definition of Best Available Techniques are available which would significantly reduce the Adverse Impacts of the Project;
 - f) the Adverse Impacts of the Project can be reduced through adherence to Good Practice without commercially significant extra cost to the Project; or
 - g) the measures/conditions are unnecessary to mitigate the Adverse Impacts.
87. In case of major changes in size, scope, location, layout, technology, risk associated with foreseeable Adverse Impacts, production methods or pollution prevention/ mitigation measures of the Project, or an Expansion or second phase development is proposed, the Project Proponent shall notify the Ministry and provide supporting documentation of such changes within the timeframe as may be prescribed.
88. The Ministry shall, upon consideration of the supplemental documentation, if any, make a decision on modifications to the conditions in the ECC or require that a new EIA, IEE or EMP, as the case may be, shall be prepared and submitted.
89. For EIA Type Projects with comprehensive construction works, the Ministry may include as a condition in the ECC that the Project Proponent shall prepare and submit to the Department a detailed Construction Phase EMP for review and approval prior to the intended start of construction works of the Project.

90. For EIA Type Projects, the Ministry may include as a condition in the ECC that the Project Proponent shall prepare and submit to the Department a detailed Operational Phase EMP for review and approval prior to the intended start of operations of the Project.
91. The Department may require that a Construction Phase EMP or Operational Phase EMP, as the case may be, shall be periodically updated and resubmitted to the Department in accordance with Ministry guidelines for its review and approval.
92. The Project Proponent shall incorporate all relevant environmental commitments and requirements set forth in the EIA Report, Construction Phase EMP and/or Operational Phase EMP as the case may be, and in the ECC, applicable Emission Limit Values and Environmental Quality Standards, into detailed designs, construction contract specifications, and contracts on Project operations related to any part of the Project.
In case the Department finds that changes to the Project, the Project site or Adverse Impacts of the Project warrant revisions to the EMP, Construction Phase EMP, or Operational Phase EMP as the case may be, then the Department may require the Project Proponent to prepare and submit a revised EMP, Construction Phase EMP, or Operational Phase EMP, as the case may be to the Department for review and approval.

Responsibility for all Adverse Impacts

93. The Project Proponent shall bear full legal and financial responsibility for PAPs until they have achieved socio-economic stability at a level not lower than that in effect prior to the commencement of the Project, and shall support programs for livelihood restoration and resettlement in consultation with the PAPs, related government agencies, and organizations and other concerned persons for all Adverse Impacts and all of the Project Proponent's actions and omissions and those of its contractors, subcontractors, officers, employees, agents, representatives, and consultants employed, hired, or authorized by the Project acting for or on behalf of the Project, in carrying out work on the Project.
94. The Project Proponent shall fully implement the EMP, all Project commitments, and Conditions, and is liable to ensure that all contractors and subcontractors of the Project comply fully with all applicable Laws, the Rules, this Procedure, the EMP, Project commitments and Conditions when providing services to the Project.
95. The Project Proponent shall be responsible for, and shall fully and effectively implement, all requirements set forth in the ECC, applicable Laws, the Rules, this Procedure and standards.
96. The Project Proponent shall timely notify and identify in writing to the Ministry, providing detailed information as to the proposed Project's potential Adverse Impacts.

CHAPTER VIII. Monitoring

97. The Project Proponent shall, during all phases of the Project (pre-construction, construction, operation, decommissioning, closure and post-closure), engage in continuous, pro-active and comprehensive self-monitoring of the Project and activities related thereto, all Adverse Impacts, and compliance with applicable laws, the Rules, this Procedure, standards, the ECC, and the EMP.
98. The Project Proponent shall notify and identify in writing to the Ministry any breaches of its obligations or other performance failures or violations of the ECC and the EMP as soon as

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reasonably possible and in any event, in respect of any breach which would have a serious impact or where the urgent attention of the Ministry is or may be required, within not later than twenty-four (24) hours, and in all other cases within seven (7) days of the Project Proponent becoming aware of such incident.

99. The Project Proponent shall submit monitoring reports to the Ministry not less frequently than every six (6) months, as provided in a schedule in the EMP, or periodically as prescribed by the Ministry.

100. The monitoring reports shall include:

- a) documentation of compliance with all Conditions;
- b) progress made to date on implementation of the EMP against the submitted implementation schedule;
- c) difficulties encountered in implementing the EMP and recommendations for remedying those difficulties and steps proposed to prevent or avoid similar future difficulties;
- d) number and type of non-compliance with the EMP and proposed remedial measures and timelines for completion of remediation;
- e) accidents or incidents relating to the occupational and community health and safety, and the environment; and
- f) monitoring data of environmental parameters and conditions as committed in the EMP or otherwise required.

101. Within ten (10) days of completing a monitoring report as contemplated in Article 97 and Article 98 in accordance with the EMP schedule, the Project Proponent shall make such report (except as may relate to National Security concerns) publicly available on the Project's website, at public meeting places (e.g. libraries, community halls) and at the Project offices. Any organization or person may request a digital copy of a monitoring report and the Project shall, within ten (10) days of receiving such request, submit a digital copy via email or as may otherwise be agreed upon with the requestor.

Monitoring and Inspection of the Ministry

102. The Ministry has the right, using its own officers at national, regional, state, Nay Pyi Taw Union Territory and/or local offices, the services of any consultant, or both, to conduct monitoring and inspections of a Project and activities related thereto in order to control and determine compliance by the Project with all applicable environmental and socio-economical requirements and, where possible, to prevent violations of the Project's obligations. The Ministry may also, for the implementation of monitoring and inspections, enlist the assistance of other relevant government departments and organizations.

103. If, upon inspection, the Ministry identifies any non-compliance with the EMP or Conditions in the ECC, the Ministry may require the Project Proponent to undertake remedial measures and/or may impose penalties as provided for in this Procedure.

104. For purposes of monitoring and inspection, the Project Proponent shall grant to the Ministry and/or its representatives, at any time during normal working hours and from time to time as and when the Ministry may reasonably require, access to the Project's offices and to the Project site and any other location at which the Project activities or activities related to the Project are performed.

105. In carrying out any inspection, the Ministry may take photographs and make other audio and video recordings of any type, take soil, sediment, water, and air samples, and examine computers, copy documents including digital files, interview persons, and carry out any other investigation which the Ministry believes to be necessary or appropriate. The Ministry, as it deems necessary, may carry out such inspection in coordination with any other ministries.
106. In the event of an emergency, or where, in the opinion of the Ministry, there is or may exist a violation or risk of violation of the compliance by the Project with all applicable environmental and social requirements, the Project shall grant full and immediate access to the Ministry at any time as may be required by the Ministry, including outside normal working hours.
107. The Ministry's inspections may include without limitation sites, facilities, vehicles, computers, archives, documents and all other forms and types of media and information storage, and persons.
108. The Project Proponent shall further ensure that the Ministry's rights of access hereunder shall extend to access by the Ministry to the Project's contractors and subcontractors.
109. Where, in the opinion of the Ministry, the Project is not in compliance with its obligations, the Ministry shall promptly inform the Project.
110. The Ministry may recommend and warn the Project to strictly implement its obligations. The Ministry reserves the right to post any warning on the Ministry and/or Department websites or to require the Project to post and retain such warning on the Project's website, or both, or to effect disclosure to the public in other appropriate ways.
111. The Ministry shall indicate the manner in which environmental obligations are not being complied with by the Project Proponent, and shall give the Project a specified time period (determined by the Ministry to be reasonable under the circumstances) within which to bring the Project into compliance.
112. Where, in the opinion of the Ministry, the Project Proponent is not in compliance with, or is likely not to comply with, its environmental obligations, the Ministry may take such enforcement actions as the Ministry thinks appropriate as are set out in any applicable law, including without limitation the right to suspend the Project operation, and the right of the Ministry to employ any qualified third party to correct such non-compliance at the Project Proponent's sole expense.
113. All costs of the Ministry to conduct inspection and monitoring of the Project shall be borne by the Project Proponent. Such costs shall not exceed that which is necessary to ensure the Project's compliance with the Project commitments as set out in the EMP and in the ECC.

CHAPTER IX.

Strategic Environmental Assessment

114. To ensure the achievement of a generally high level of environmental and social protection with respect to Projects and other economic activities in and throughout the Republic of the Union of Myanmar and its political and geographic subdivisions, and to facilitate the prompt and effective integration of relevant environmental and social considerations into public policy and planning, the Ministry may require that policies, strategies, development plans, frameworks and programs that are prepared or

contemplated by Union Ministries, the governments and authorities of States, Regions, Self-Administered Zones, Self-Administered Divisions, the Nay Pyi Taw Union Territory, Cities and Townships, shall be screened for potential environmental and social impacts in accordance with strategic environmental assessment guidelines issued by the Ministry.

Where such screening indicates that any such policy, strategy, development plan, framework or program may have a significant environmental or social impact, the Ministry may require the authority responsible for such policy, strategy, development plan, framework or program to undertake a properly scoped study to identify and assess the potential environmental and social impacts, and to prepare and incorporate into such policy, strategy, development plan, framework or program an environmental and social management and monitoring framework comprehensively addressing such impacts.

115. The Ministry may require that Projects and other economic activities that derive from such policy, strategy, development plan, framework or program and which have been required to undertake a study to identify and assess the potential environmental and social impacts (as stipulated above) shall be developed and implemented (sited, designed, constructed and operated) in accordance with the environmental and social management and monitoring framework of such policy, strategy, development plan, framework or program.

CHAPTER X. Administrative Punishment

116. The Ministry shall have the right to impose penalties on a Project for any breach by the Project, the Project Proponent, or any contractor or subcontractor of the Project or any other Person acting on behalf of the Project, of commitments as set forth in the Prior Permission.
117. Penalties and the risk of their incurrence are intended to provide meaningful incentive for the Project promptly and fully to remedy any breaches or performance defects with respect to the Project's commitments, and to encourage the Project proactively to address and effectively to resolve the underlying causes of such breaches or performance defects to avoid future recurrences.
118. The imposition of such penalties on the Project shall be subject to:
- a) with respect to the first occurrence of any such breach, violation or performance failure, receipt by the Project Proponent of prior written notice and expiration of a reasonable cure period not exceeding sixty (60) days.
 - b) the Project Proponent shall not be entitled under (a) to receive any warning or receive the benefit of any cure period with respect to the recurrence of any such breach, violation or performance failure that occurs within five (5) years from the date of the initial breach, violation or performance failure prior to the imposition of applicable penalties by the Ministry.
119. Penalties are imposed and required to be paid in addition to any costs of remediation, clean up, and compensation that may be incurred by the Ministry. Penalties imposed pursuant to this Procedure are in addition to any penalties that may be imposed under any other applicable law or regulation, the Rules or this Procedure.
120. The payment of penalties by the Project Proponent shall not relieve the Project of liability, if any, for claims that may be asserted against the Project by third parties with

respect to damage incurred and/or injury suffered arising out of the Project's performance or any breaches or performance defects by the Project.

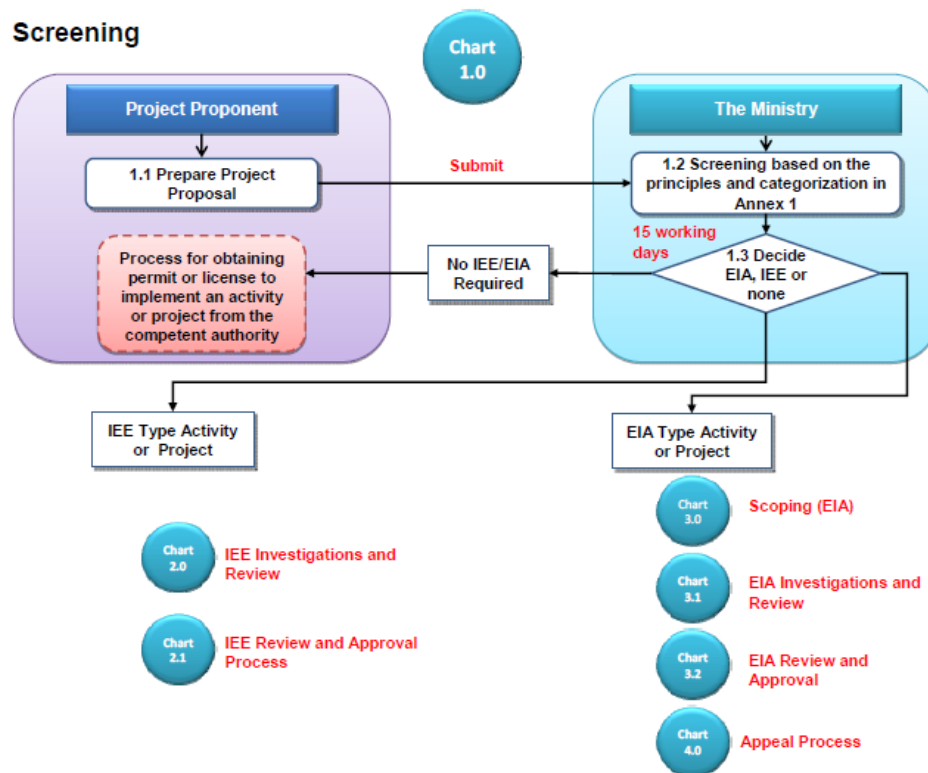
- 121. Penalties payable to the Ministry under this Procedure are as set forth in Annex 3 'Prescribed Penalties Under Procedure' hereto.
- 122. The Department shall prepare and submit to the Ministry the list of administrative punishments applicable to projects.
- 123. With respect to Projects which continue to be non-compliant with this Procedure after the imposition of administrative punishment, the Ministry shall inform the relevant government departments and organizations having authority to issue licenses, permits or registrations, to take necessary action.

(Win Tun)

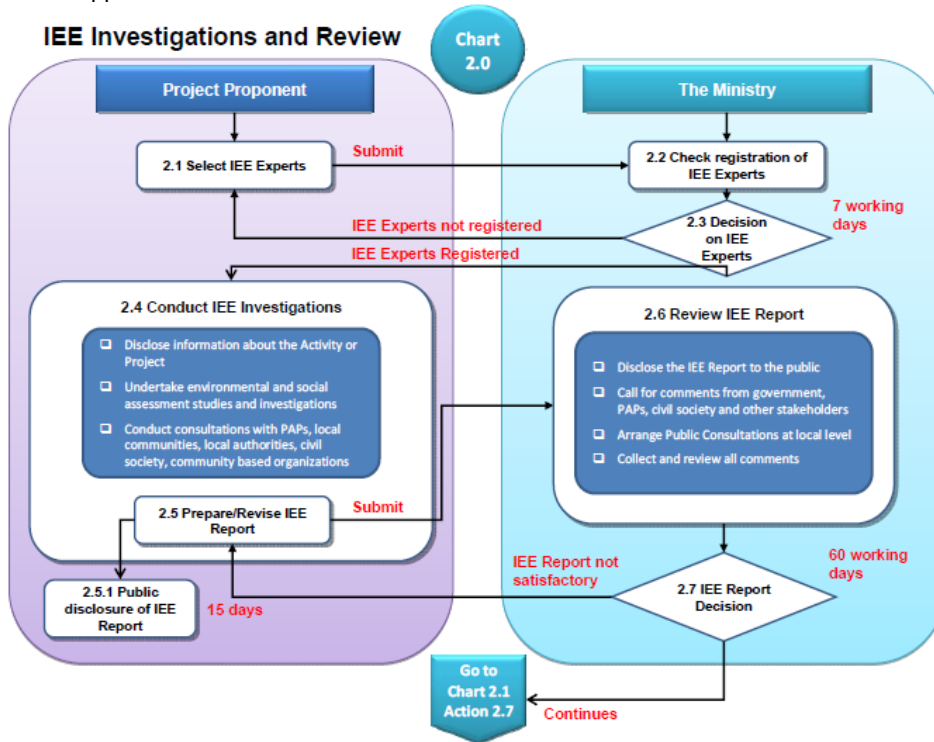
Union Minister

Annex 1: Tables outlining IEE versus EIA requirements for various types of sector projects.

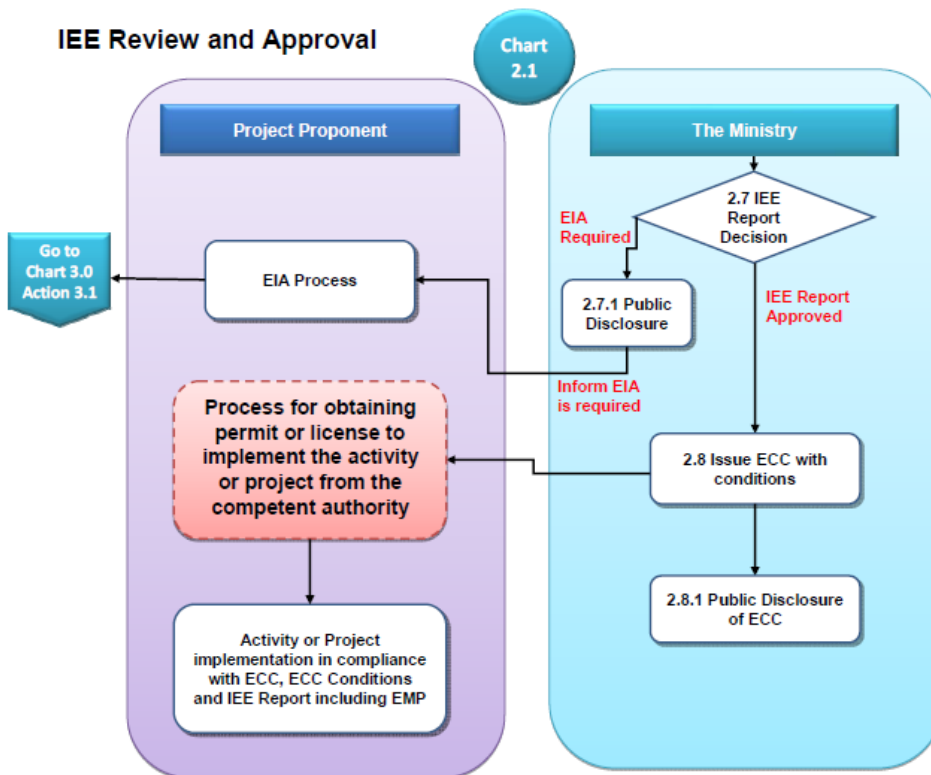
Annex 2: Environmental Assessment Procedure Flowchart

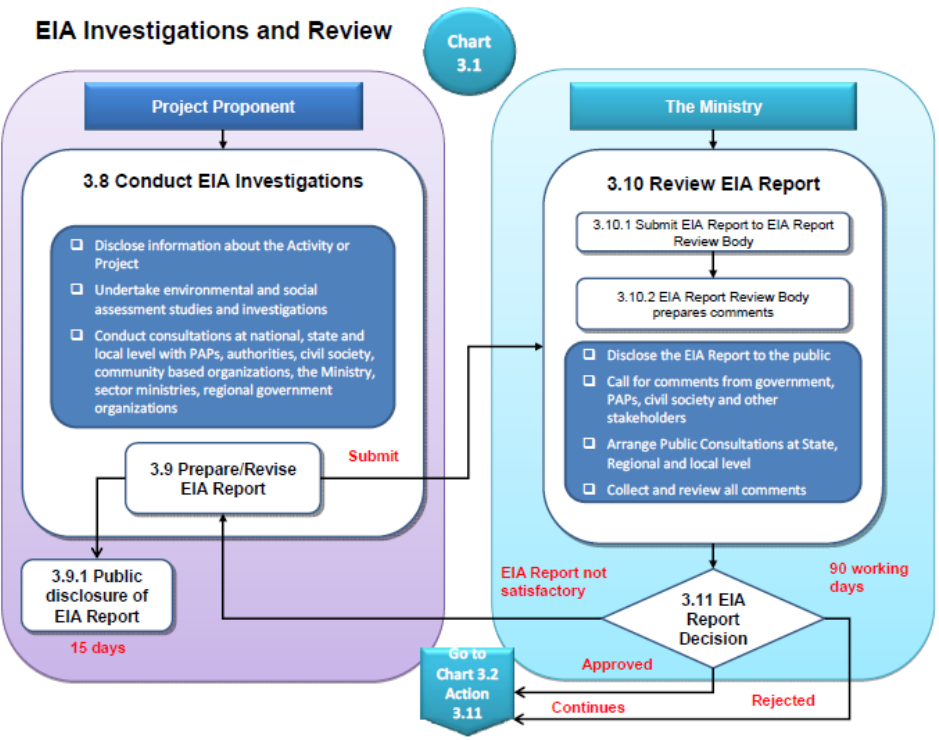
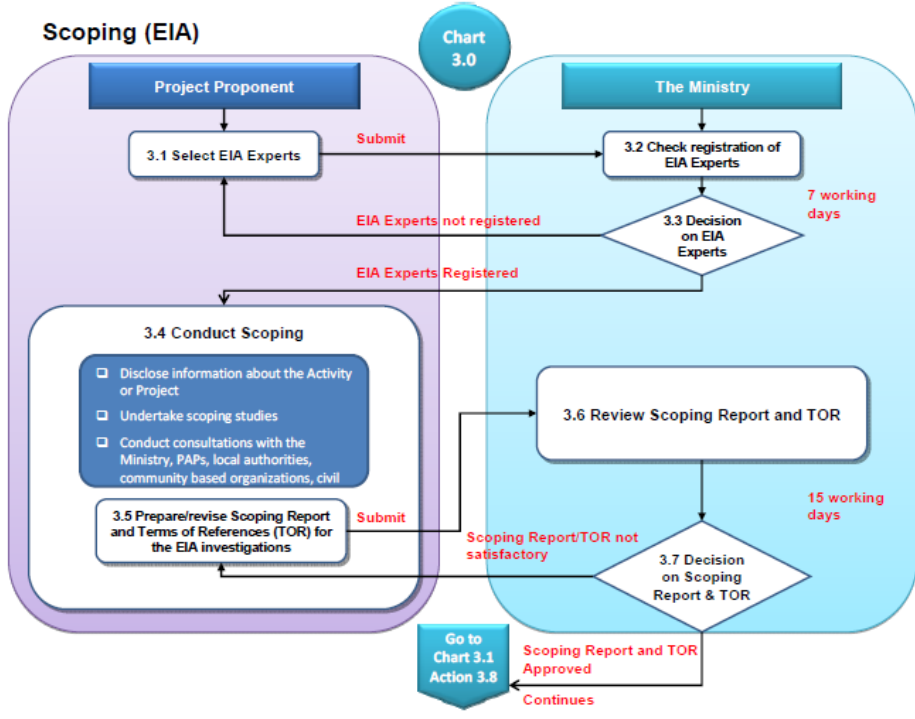


IEE Investigations and Review

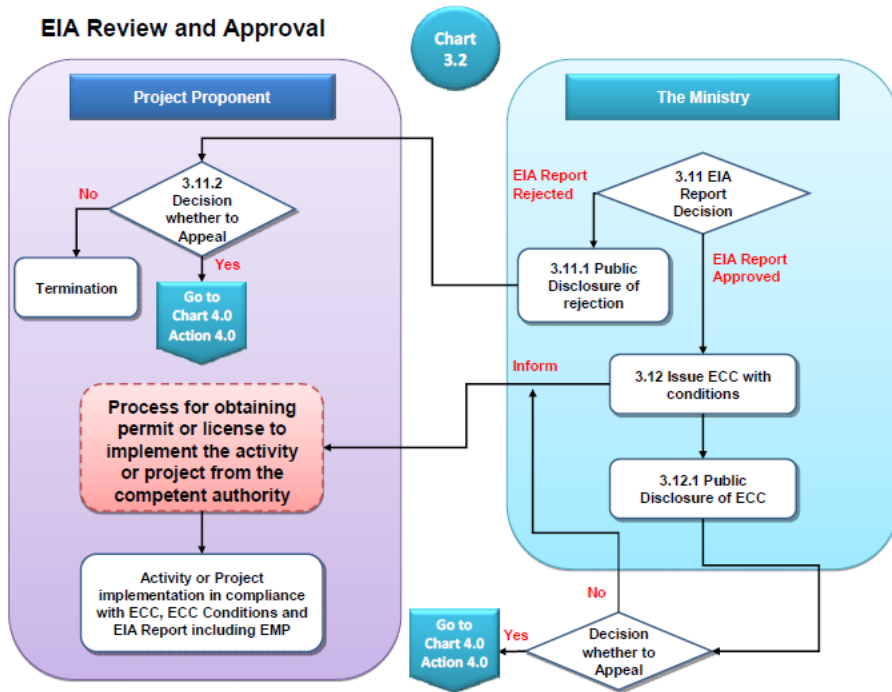


IEE Review and Approval

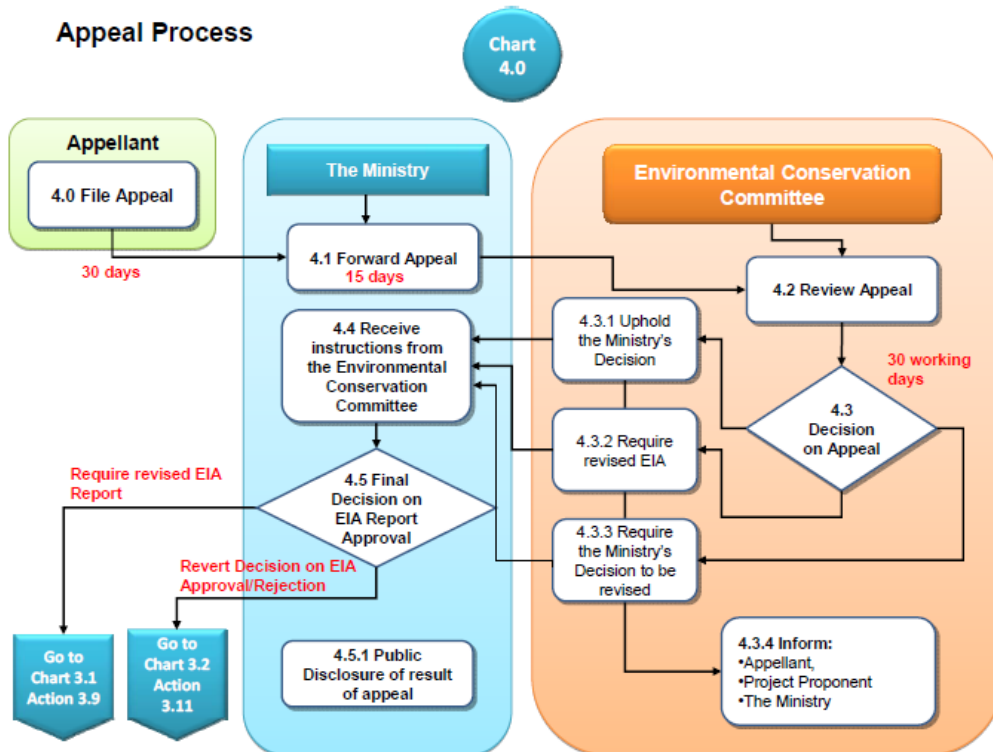




EIA Review and Approval



Appeal Process



Annex 3 – Prescribed Penalties

Appendix 3: Environments, Hazards and Climate Changes

Environment	Natural Hazards and Climate Change	Example Impact on Irrigation Systems
Arid/Semi- arid & desert environments	Low erratic rainfall of up to 500 mm rainfall per annum with periodic droughts and high rainfall variability. Low vegetative cover. Resilient ecosystems & complex pastoral and systems, but medium certainty that 10–20% of drylands degraded; 10- 30% projected decrease in water availability in next 40 years; projected increase in drought duration and severity under climate change. Increased mobilization of sand dunes and other soils as vegetation cover declines; likely overall decrease in agricultural productivity, with rain-fed agriculture yield reduced by 30% or more by 2020. Earthquakes and other geophysical hazards may also occur in these environments.	In cases where water availability may decrease due to reduced precipitation, increased water use may be unsustainable
Humid and sub-humid plains, foothills and hill country	More than 500 mm precipitation/yr. Resilient ecosystems & complex human pastoral and cropping systems. 10-30% projected decrease in water availability in next 40 years; projected increase in droughts, heat waves and floods; increased erosion of loess-mantled landscapes by wind and water; increased gully erosion; landslides likely on steeper slopes. Likely overall decrease in agricultural productivity & compromised food production from variability, with rain-fed agriculture yield reduced by 30% or more by 2020. Increased incidence of forest and agriculture-based insect infestations. Earthquakes and other geophysical hazards may also occur in these environments.	In many cases, climate change is expected to result in more intense but less frequent rainfall events and longer dry seasons and water capture systems may not be designed to accommodate these changes.
River valleys/ deltas and estuaries and other low-lying coastal areas	River basins, deltas and estuaries in low-lying areas are vulnerable to riverine floods, storm surges associated with tropical cyclones/typhoons and sea level rise; natural (and human-induced) subsidence resulting from sediment compaction and ground water extraction; liquefaction of soft sediments as result of earthquake ground shaking. Tsunami possible/likely on some coasts. Lowland agri-business and subsistence farming in these regions at significant risk.	As temperature increases, the spread of vector and water borne diseases may spread, standing water created by irrigation systems may promote their spread by creating habitats for their transmission.
Small islands	Small islands generally have land areas of less than 10,000km ² in area, though Papua New Guinea and Timor with much larger land areas are commonly included in lists of small island developing states. Low-lying islands are especially vulnerable to storm surge, tsunami and sea-level rise and, frequently, coastal erosion, with coral reefs threatened by ocean warming in some areas. Sea level rise is likely to threaten the limited ground water resources. High islands often experience high rainfall intensities, frequent landslides and tectonic environments in which landslides and earthquakes are not uncommon with (occasional) volcanic eruptions. Small islands may have low adaptive capacity and high adaptation costs relative to GDP.	Areas previously suitable for agriculture may become less so as sea-level rise causes salt water intrusion and soil salinity. Planned agricultural areas may no longer be viable and therefore irrigation systems that feed them.

Environment	Natural Hazards and Climate Change	Example Impact on Irrigation Systems
Mountain ecosystems	Accelerated glacial melting, rock falls/landslides and glacial lake outburst floods, leading to increased debris flows, river bank erosion and floods and more extensive outwash plains and, possibly, more frequent wind erosion in intermountain valleys. Enhanced snow melt and fluctuating stream flows may produce seasonal floods and droughts. Melting of permafrost in some environments. Faunal and floral species migration. Earthquakes, landslides and other geophysical hazards may also occur in these environments.	Irrigation infrastructure may be damaged and blocked by glacial lake outbursts and mudflows. Water resources supplied by mountain systems may increase or diminish as rates of glacial melt change.
Volcanic environments	Recently active volcanoes (erupted in last 10,000 years – see www.volcano.si.edu). Often fertile soils with intensive agriculture and landslides on steep slopes. Subject to earthquakes and volcanic eruptions including pyroclastic flows and mudflows/lahars and/or gas emissions and occasionally widespread ash fall.	Irrigation infrastructure may be lost during volcanic eruptions.

Appendix 4: Template for Monitoring Report

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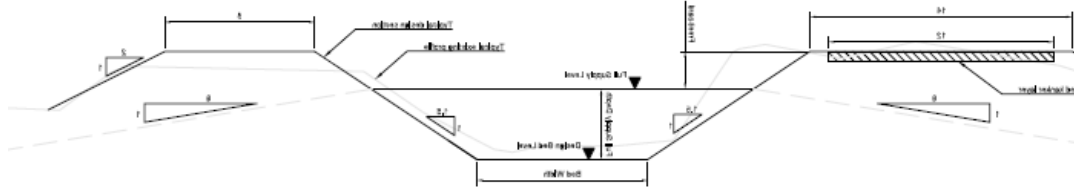
- (i) **Guidelines:** Following requirements of the ADB Safeguard Policy Statement (2009) and the *Operations Manual* section on safeguard policy (OM F1), borrowers/clients are required to establish and maintain procedures to monitor the status of implementation of safeguard plans and ensure progress is made toward the desired outcomes. Borrowers/clients are required to submit the following monitoring reports for ADB review:


Project Category	Frequency of Reports
Environment category A	<ul style="list-style-type: none"> • Semi-annual monitoring reports during project construction • Annual monitoring reports during project operation
Environment category B	<ul style="list-style-type: none"> • Periodic monitoring reports as deemed appropriate
Involuntary resettlement category A and B	<ul style="list-style-type: none"> • Semiannual monitoring reports
Indigenous peoples category A and B	<ul style="list-style-type: none"> • Semiannual monitoring reports
Highly complex and sensitive deemed by ADB	<ul style="list-style-type: none"> • Quarterly monitoring reports


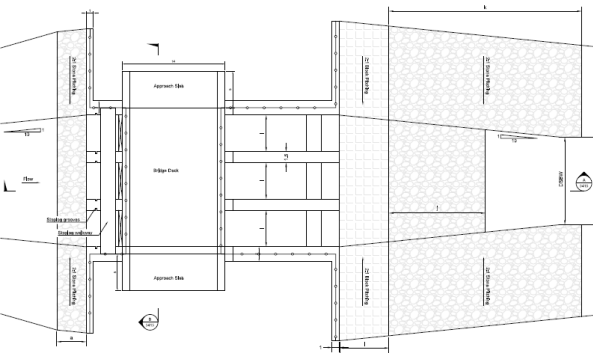
The level of detail and comprehensiveness of a monitoring report is commensurate with the complexity and significance of social and environmental impacts. A safeguard monitoring report may include the following elements:


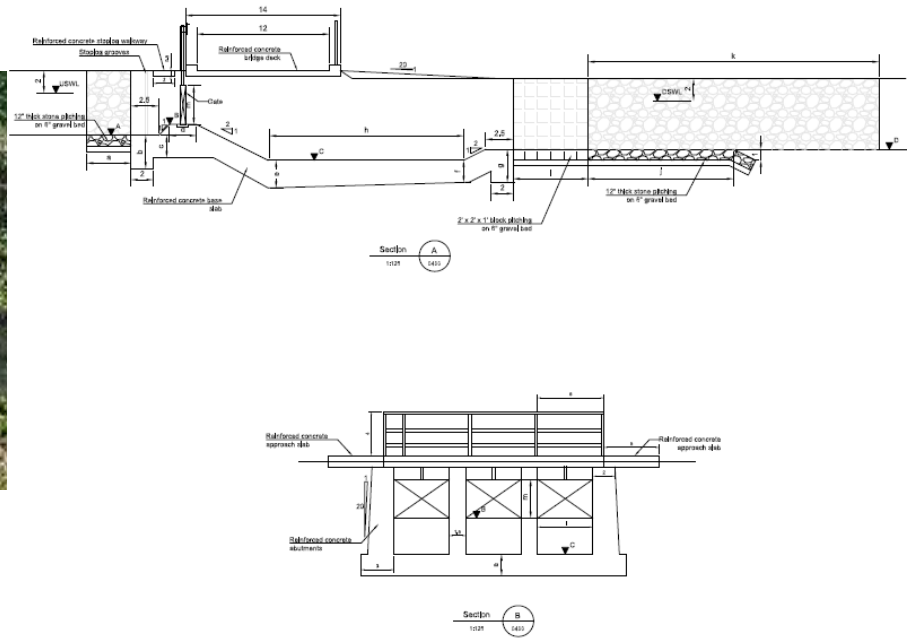

- Background/context of the monitoring report (adequate information on the project, including physical progress of project activities, scope of monitoring report, reporting period, and the monitoring requirements including frequency of submission as agreed upon);
- Changes in project scope and adjusted safeguard measures, if applicable;
- Qualitative and quantitative monitoring data;
- Monitoring parameters/indicators and methods based on the monitoring plan/program previously agreed upon with ADB;
- Monitoring results compared against previously established benchmarks and compliance status (e.g., national environmental emission and ambient standards and/or standards set out in the WB's EHS guidelines; timeliness and adequacy of environmental mitigation measures; IR compensation rates and timeliness of payments, adequacy and timeliness of IR rehabilitation measures including serviced housing sites, house reconstruction, livelihood support measures, and training; budget for implementing EMP, RP, or IPP, timeliness and adequacy of capacity building, etc.);
- Monitoring results compared against the objectives of safeguards or desired outcomes documented (e.g. IR impacts avoided or minimized; livelihood restored or enhanced; IP's identity, human right, livelihood systems and cultural uniqueness fully respected; IP not suffer adverse impacts, environmental impacts avoided or minimized, etc.);
- If noncompliance or any major gaps identified, include a corrective action plan;
- Records on disclosure of monitoring information to affected communities;
- Identification of key issues, or complaints from affected people, or recommendations for improvement;
- Monitoring adjustment measures recommended based on monitoring experience/trends and stakeholders response;
- Information about actual institutional arrangement for implementing the monitoring program/plan provided or adjusted, as may be required;
- Proposed items of focus for the next report and due date.

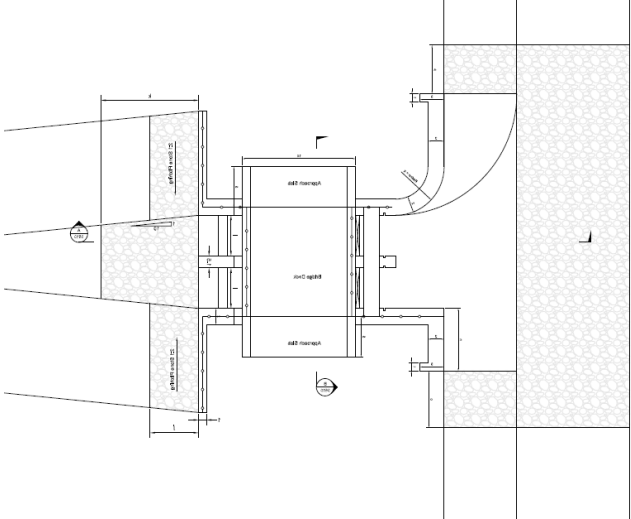

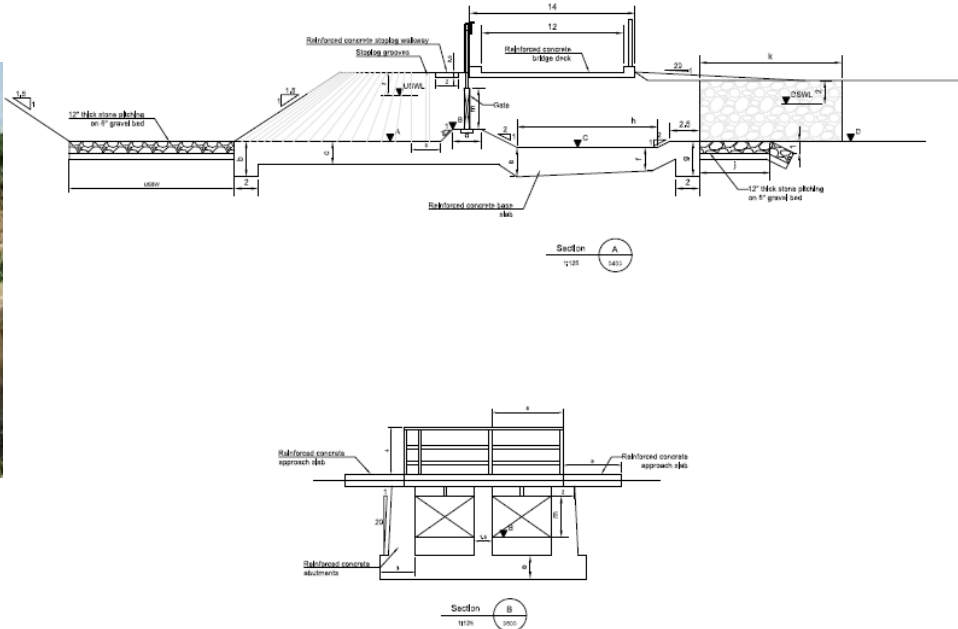
Appendix 5: Photos of Example Rehabilitation Needs and Proposed Measures


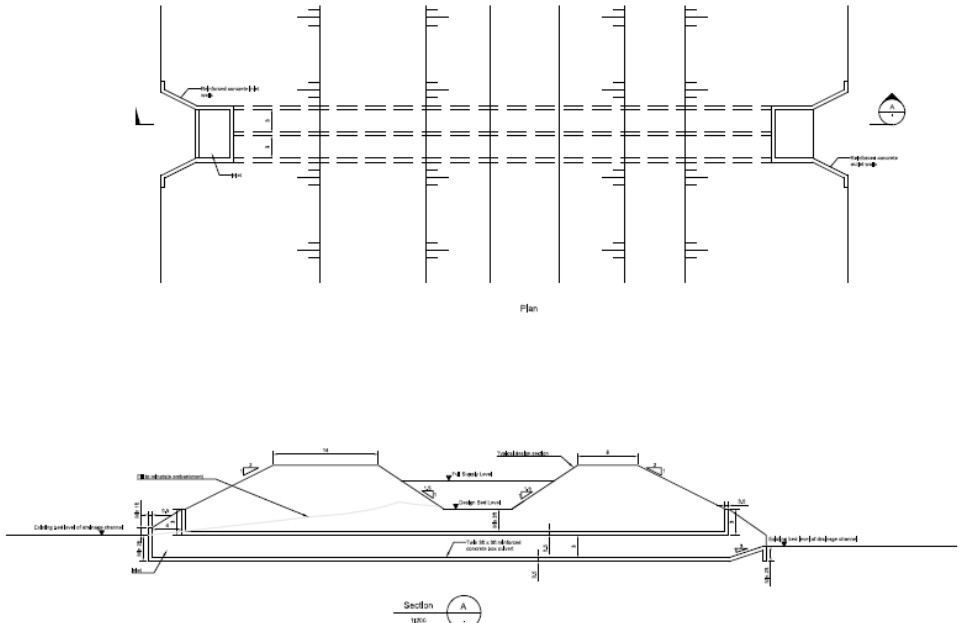
Photograph of existing rehabilitation need	Standard detail drawing of rehabilitation measure
<p data-bbox="191 358 674 391">Sedimentation in NM RMC(RD 23450')</p> 	<p data-bbox="863 358 1283 480">MMD-346056-IDD-DR-NM-01-0230 Main and DY Canals Unlined Canal Typical Cross-Section</p> 


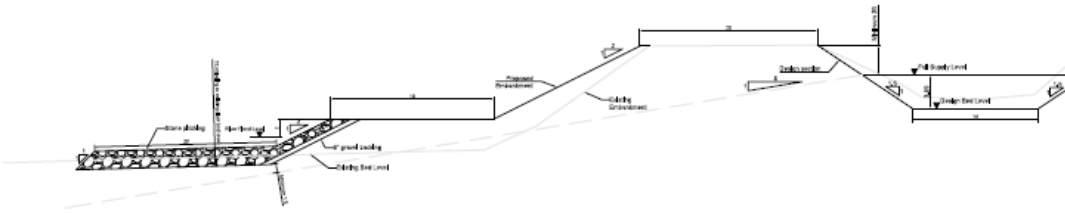

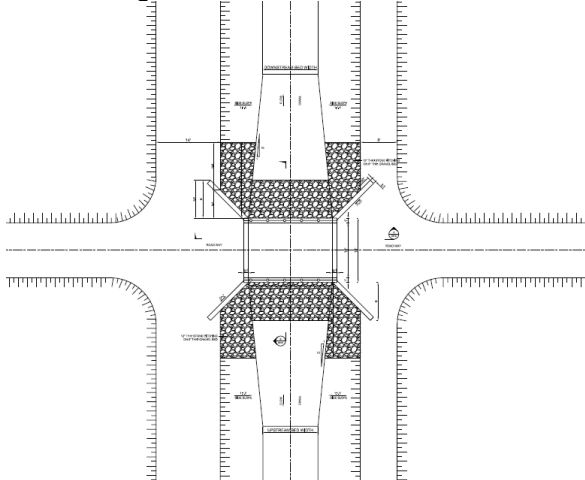
Photograph of existing rehabilitation need	Standard detail drawing of rehabilitation measure
<p data-bbox="184 256 735 324">Very Steep and Sandy Unlined Canal in NM RMC(RD 24000-26000')</p> 	<p data-bbox="863 256 1291 381">MMD-346056-IDD-DR-NM-01-0240 Main and DY Canals lined Canal Typical Cross-Section</p>

Photograph of existing rehabilitation need	Standard detail drawing of rehabilitation measure
<p data-bbox="178 251 609 292">NM RMC Check-Drop (RD 9224')</p> 	<p data-bbox="861 251 1365 292">MMD-346056-IDD-DR-NM-01-0400 (Plan)</p> <p data-bbox="861 292 1008 316">Main Canal</p> <p data-bbox="861 316 1386 357">MMD-346056-IDD-DR-NM-01-0410 (Section)</p> <p data-bbox="861 357 1008 381">Main Canal</p> 

Photograph of existing rehabilitation need	Standard detail drawing of rehabilitation measure
<p data-bbox="178 251 483 292">CMG LMC Check-Drop</p> 	 <p data-bbox="861 251 1764 885"> The drawing shows a cross-section of a check-drop structure. Section A (top) shows a 14' wide structure with a 12' wide bridge deck. It includes a gate, a 2.5' high concrete base, and a 2.5' high concrete approach slab. The structure is supported by a 2 x 2 x 1' block on a 6" gravel bed. Section B (bottom) shows a plan view of the structure with a 20' wide base and a 12' wide concrete approach slab. The drawing also shows a 12' high stone pile on a 6" gravel bed. </p>
<p data-bbox="178 925 630 966">NM RMC HR (RD44796' DY2 HR)</p> 	<p data-bbox="861 925 1417 1023"> MMD-346056-IDD-DR-NM-01-0500 (Plan) MMD-346056-IDD-DR-NM-01-0510 (Sections) DY and Minor Head Regulators </p>

Photograph of existing rehabilitation need	Standard detail drawing of rehabilitation measure
	
<p>CMG LMC HR</p> 	

Photograph of existing rehabilitation need	Standard detail drawing of rehabilitation measure
<p data-bbox="184 256 777 324">Cross Drainage damage to Natmauk RMC (RD 6000')</p> 	<p data-bbox="863 256 1291 381">MMD-346056-IDD-DR-NM-01-0600 Main and DY Canals Cross-Drainage Culvert Typical Plan and Section</p> 

Photograph of existing rehabilitation need	Standard detail drawing of rehabilitation measure
<p data-bbox="197 256 632 289">Natmauk RMC River Yin Protection</p> 	<p data-bbox="865 256 1285 345">MMD-346056-IDD-DR-NM-01-0250 Right Main Canal Protection to Left Embankment</p> 
<p data-bbox="191 760 478 792">NM Bridge (RD 11467')</p> 	<p data-bbox="865 760 1409 849">MMD-346056-IDD-DR-NM-01-0800 (Plan) MMD-346056-IDD-DR-NM-01-0810 (Section) Main and DY Canals, Cart Bridge</p> 

Photograph of existing rehabilitation need

CM Bridge (RD 7373')



Standard detail drawing of rehabilitation measure

