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Ministry of Electric Power

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全国基幹送変電設備整備事業
(環境社会配慮)
【有償勘定技術支援】
初期環境影響評価レビュー報告書

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初期環境影響評価報告書 要約

ミャンマーは電力不足や長時間にわたる停電が頻発しており、その結果として、電力に依存する同国の経済、市民の生活水準、その他における発展が阻害されている。

電力省は電力不足を克服するため、海外の金融機関や開発パートナーと共に、新たな水力発電の発電源、送電線・変電所の新設、既存施設の更新、持続可能で再生可能なエネルギーの開発、その他利用可能なエネルギーについて検討し、発電、送電、配電の開発を加速させようとしている。

500kV の送電線及び変電所の建設はミャンマーの電力網設備の強化のために不可欠であり、ミャンマーの電力需要を満たすため重要な役割を果たす。

プロジェクト概要

500kV 送電線の調査範囲はバゴー管区のパヤジー変電所からヤンゴン管区にあるラインタヤ変電所までである。送電線はバゴー管区にある3つの群区とヤンゴン管区にある1つの群区にまたがる。95kmの送電線は219基の様々タイプの鉄塔により構成され、平均スパンは450m (0.27マイル) である。送電線の大部分はプランテーションや劣化した森林、下草の生えた土地や農地を通過する。

プロジェクトは受送電を行う4つの変電所を建設する。変電所の建設地はメティラ、タンゲー、パヤジーそしてラインタヤが提案されている。

プロジェクトエリアの自然環境

変電所及び送電線のプロジェクトエリアは主に農地であり、所々熱帯雨林も含まれる。バゴー川及びライン川が水生生物の主な生息地である。

すでに開発はかなり進んでおり、環境や景観への影響がある。地形は平地と丘が混在している。低木林は一般的な半常緑樹の再生林で確認された。プロジェクトエリアの開発はかなり進んでおり、生物多様性は低く、生息環境は悪化している。アジアゾウやビルマメダマガメのような絶滅の危機に瀕した種がこの地域に生息する可能性はある、頻繁ではない。

Moeyungyi 湿地野生生物保護区はパヤジー変電所から約10.7kmのところにある。Kyetthauk 野生生物保護区はバゴー管区内バゴーヨマ丘陵の下に位置するタンゲー変電所から南西に3.2kmの所にあるが、ミャンマーでは保護区としては正式に登録されていない。ヤンゴン管区にあるHlawga 野生生物公園は、至近の送電線から7.5km東のところに位置し、保護区のリストには野生動物公園として登録されている。プロジェクトの性質及び距離から、保護区への影響与えないと考えられる。

ヤンゴン及びバゴー管区は熱帯モンスーン気候である。5月から10月までの長い雨季に年間の降雨量の大部分が降る。11月から4月までの乾季はほとんど雨の降らない。ヤンゴンにある気象水文局によるとバゴー管区周辺の平均気温は26.9℃そして平均降雨量は3260mm (128インチ) である。ヤンゴン管区周辺の平均気温は27.4℃そして平均降雨量は2787mm (109インチ) である。

メティラ郡区は中央ミャンマーの乾燥地域に位置しており、熱帯の乾燥した気候である。4月が最も暑く平均気温が31.1℃、12月が最も寒く平均気温が21.4℃である。メティラ郡区の年間の降雨量は809mm (32インチ) である。

メティラ、タングーの地質は中新世から漸新世にかけて形成された上部ペグー層群及びイラワジ層の堆積物で構成されている。

上部ペグー層は青灰色頁岩、黄色がかかった茶色がかかった砂岩や砂石灰岩で構成されている。イラワジ層は粘土と豊富な木材化石が特徴である。上部ペグー層群はイラワジ層に覆われている。

プロジェクトエリアの社会環境

計画された送電線はバゴー管区のバゴー及びヤンゴン管区の北ヤンゴンを通り、バゴー、レグー、フモウビー、タンダビンの4つの郡区にまたがる。

マンダレー管区メティラにある変電所は北ミャンマーに位置しており、バゴー管区やヤンゴン管区と異なる気候、地形的特徴がある。

プロジェクトエリアの人種はビルマ族、カレン族、モン族そしてチン族である。大部分がビルマ族（86.4%）であり、それにカレン族（11.6%）が続く。プロジェクトエリアの宗教は仏教が89.1%、キリスト教が10.5%で続く。

主要産業は農業であり、プロジェクトエリアのほとんどの世帯が農業を主な収入源としている。

調査結果及び予想される影響

初期環境影響評価報告書（Initial Environmental Examination : IEE）は利用可能なデータの調査、ステークホルダーへのヒアリングそして現地調査により行なわれた。ミャンマー国政府、国際機関、そしてその他技術団体により承認された保護地域はプロジェクトエリアになく、環境的に優先度の高い地域ではない。さらにIUCNのレッドリストに掲載された絶滅危惧種、貴重種、地域で絶滅の危機に瀕した植動物も確認されなかった。プロジェクトエリアは水田、商業用のプランテーション、二次林や低木林や住宅地の中にある。

生態系に関しては、重大な負の影響は予測されず、予測される軽微な負の影響も対策を講じることにより、回避または最小化できる。想定される主な負の影響は建設活動によるものであり、一時的で、限定された地域への影響である。

送電線の敷地権（Right of Way : ROW）と変電所は24の村にある土地に影響を与える。これらの24の村は、送電線の建設により145世帯が、変電所の建設により54世帯が影響を受ける。表A及び表Bに送電線及び変電所により影響を受ける世帯数に示す。

表 A 送電線により影響を受ける世帯

No.	郡区	村	影響を受ける世帯
1	Bago	Hlaw Kar	9
		Sit Pin Seik	9
		Baw Net Kye	4
2	Hlegu	Kyar Inn Ah Shae	11
		Nante	12
		Sar BuTaung	3
		Gwe Tauk Eain	8
		Min Kone	6

3	Hmawbi	Min Yower	4
		War Pa Taw	4
		Bant Bawe Kone	6
		Inn Gyin Kone	8
		Hle Ngote Chaung	8
		Hla Pa Dar	4
		Let Pan Tan Su	9
		Ye Paw The	11
		Moe Kyo Pyit	5
4	Htantabin	Htantabin	11
		Deik Kone	4
		War TaYar	3
		Pauk Tan	4
		Ka Lain	1
合計		145	

表 B 送電線により影響を受ける世帯

No.	変電所	村	影響を受ける世帯
1	Meikhtilar	KanKoung	4
2	Taungoo	Kutthit	26
3	Hpayargyi	Baw Net Kye	13
4	Hlaingthayar	Pauk Tan	11
合計			54

住民移転を可能な限り行なわないという方針の元、送電線の代替ルートも検討の上、送電線と変電所の位置が慎重に選択された。現在の設計では送電線のコリドーには、住宅はない。しかし、タングー変電所の位置にある2世帯の移転は回避できなかった。また、鉄塔の基礎及び変電所のための農地の使用は避けられなかった。鉄塔の基礎の建設のために26.0ha（64.2エーカー）及び送電線の建設のために126.5ha（312.6エーカー）の土地を取得しなければならない。送電線の建設のための移転は想定されないが、タングー変電所にある2世帯は移転しなければならない。



**INITIAL ENVIRONMENTAL EXAMINATION
FOR**

**National Power Transmission Network
Development Project**

July 2015

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LIST OF ACRONYMS

CEMMP	Construction Environmental Management and Monitoring Plan
CFMC	Central Farmland Management Committee
DFMC	District Farmland Management Committee
ECC	Environmental Compliance Certificate
ECD	Environmental Conservation Department
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMMP	Environmental Management and Monitoring Plan
GDP	Gross Domestic Product
GFP	Grievance Focal Person
GMC	Grievance Management Committee
GRS	Grievance Redress System
IEE	Initial Environmental Examination
INGO	International Non-Governmental Organization
JICA	Japan International Cooperation Agency
kV	Kilo Voltage
MDY	Mandalay
MEPE	Myanmar Electric Power Enterprise
MOAI	Ministry of Agriculture and Irrigation
MOECAF	Ministry of Environmental Conservation and Forestry
MOEP	Ministry of Electric Power
PAP	Project Affected People
PMU	Project Management Unit
RAP	Resettlement Action Plan
REM	Resource and Environment Myanmar
ROW	Right of Way
SLRD	Settling and Land Record Department
TFMC	Township Farmland management Committee
TL	Transmission Line
TLRD	Township Land Record Department
TOR	Term of Reference
UNICEF	United Nation Children's Fund
YGN	Yangon

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အစီရင်ခံစာအကျဉ်းချုပ်

မြန်မာနိုင်ငံသည် လျှပ်စစ်ဓါတ်အား လုံလောက်အောင် ထုတ်လုပ်နိုင်စွမ်း မရှိခဲ့ခြင်းကြောင့် မကြာခဏ လျှပ်စစ်ပြတ်တောက်မှုများ၊ ကာလရှည်ကြာစွာ လျှပ်စစ် ဖြတ်တောက်ခံရမှုများကို ကြုံတွေ့နေခဲ့ရသည်မှာ နှစ်ပေါင်း အတော်ကြာပြီ ဖြစ်ပါသည်။ အကျိုးဆက်အားဖြင့် တိုင်းပြည်၏ စီးပွားရေးကဏ္ဍများ တိုးတက်မှု၊ နိုင်ငံသားတို့၏ လူနေမှုဘဝ အဆင့်အတန်းနှင့် အခြားသောကဏ္ဍများ တိုးတက်မှုတို့အတွက် ကြီးစွာသော အဟန့်အတား ဖြစ်စေခဲ့ပါသည်။

ထိုသို့ လျှပ်စစ်ဓါတ်အား မလုံလောက်မှု အခက်အခဲကို ကျော်လွှားနိုင်ရန်အတွက် လျှပ်စစ်စွမ်းအား ဝန်ကြီးဌာန အနေဖြင့် နိုင်ငံရပ်ခြား ငွေကြေးဆိုင်ရာ အဖွဲ့အစည်းများ၊ စီမံကိန်း ဆောင်ရွက်သူများနှင့် တိုင်ပင်ညှိနှိုင်း၍ လျှပ်စစ်ဓါတ်အား ထုတ်လုပ်ခြင်း၊ ပေးပို့သွယ်တန်းခြင်း၊ ပြန်လည်ဖြန့်ဖြူးခြင်း၊ ရှိရင်းစွဲ ဓါတ်အားပေး စက်ရုံများမှ ဓါတ်အားလှိုင်းများကို အဆင့်မြှင့်တင်ခြင်း၊ ပြန်လည်ပြည့်ဖြိုးမြဲ စွမ်းအင်ရင်းမြစ်များ ရှာဖွေခြင်းနှင့် အခြားသော လျှပ်စစ်စွမ်းအား ရင်းမြစ်များရှာဖွေခြင်းတို့ကို စီမံဆောင်ရွက်လျက်ရှိပါသည်။

ဤ ၅၀၀ကေစီမဟာဓါတ်အားလှိုင်းနှင့် ဓါတ်အားခွဲရုံများ တည်ဆောက်ရေးစီမံကိန်းကို နိုင်ငံ၏ မဟာ ဓါတ်အားလှိုင်း စွမ်းရည်မြှင့်တင်ရန် ရည်ရွယ်ချက်များအရ အရေးပါလှသော အခြေခံစီမံကိန်းအဖြစ် ရွေးချယ်ခဲ့ ပါသည်။ ထို့အပြင် ဤစီမံကိန်းသည် မြန်မာနိုင်ငံ၏ အမြောက်အများ လိုအပ်နေသော လျှပ်စစ်ဓါတ်အားများကို ဖြည့်တင်းပေးရန် အဓိကအခန်းကဏ္ဍမှ ပါဝင်မည်ဖြစ်ပါသည်။

စီမံကိန်းအကျဉ်း

ယခုလေ့လာတင်ပြထားသော ၅၀၀ကေစီ မဟာဓါတ်အားလှိုင်းစီမံကိန်းသည် ပဲခူးတိုင်း ဘုရားကြီး၌ အသစ် တည်ဆောက်မည့် ဓါတ်အားခွဲရုံမှ ရန်ကုန်တိုင်း လှိုင်သာယာ၌ အသစ်တည်ဆောက်မည့် ဓါတ်အားခွဲရုံအထိ သွယ်တန်း ဖောက်လုပ်မည့် စီမံကိန်းဖြစ်ပါသည်။ မဟာဓါတ်အားလှိုင်းသည် ပဲခူးတိုင်း အတွင်းရှိ မြို့နယ် တစ်ခုနှင့် ရန်ကုန်တိုင်း အတွင်းရှိ မြို့နယ် (၃)ခုကို ဖြတ်သန်းသွားမည် ဖြစ်ပါသည်။

စုစုပေါင်း ၉၅ ကီလိုမီတာရှည်လျားသော မဟာဓါတ်အားလှိုင်းသည် တစ်တိုင်နှင့်တစ်တိုင် မီတာ ၄၅၀ ခန့် (၀.၂၇ မိုင်) ကွာဝေးသော အမျိုးအစားစုံ တာဝါတိုင်ပေါင်း ၂၁၉ တိုင် ပါဝင်မည် ဖြစ်ပါသည်။ မဟာ ဓါတ်အားလှိုင်း ဖြတ်သန်းသွားရာ မြို့နယ်(၄)ခုအတွင်းရှိ လယ်ယာစိုက်ပျိုးမြေများ၊ စီးပွားဖြစ် နှစ်ရှည်စိုက်ခင်း များနှင့် ခြံနွယ်ပိတ်ပေါင်းများ လွှမ်းခြုံထားသော သစ်တောအကြွင်းအကျန်များကို အဓိကအားဖြင့် ဖြတ်သန်း သွားမည် ဖြစ်ပါသည်။

ဤပင်မစီမံကိန်းတွင် ဓါတ်အားများရယူခြင်းနှင့် ပြန်လည်ပို့ဆောင်ဖြန့်ဖြူးခြင်းအတွက် ဓါတ်အားခွဲရုံ (၄)ခု တည်ဆောက်ခြင်းလည်း ပါဝင်ပါသည်။ ၎င်းဓါတ်အားခွဲရုံများကို မိတ္ထီလာ၊ တောင်ငူ၊ ဘုရားကြီး(ပဲခူး)နှင့် လှိုင်သာယာ (ထန်းတပင်) ဒေသများတွင် တည်ဆောက်သွားမည် ဖြစ်ပါသည်။

ဒေသအတွင်းရှိ ပတ်ဝန်းကျင်ဆိုင်ရာအခြေအနေ

မဟာဓါတ်အားလှိုင်းဖြတ်သန်းရာ နယ်မြေများတွင် အဓိကအားဖြင့် လယ်ယာစိုက်ပျိုးမြေများနှင့် မုတ်သုန် သစ်တောအကြွင်းအကျန်တို့ တည်ရှိနေပါသည်။ စီမံကိန်းဒေသအတွင်းရှိ ပဲခူးမြစ်နှင့် လှိုင်မြစ်တို့သည် ရေနေသတ္တဝါများအတွက် အဓိက အဓိသဟဲပြုရာ ပတ်ဝန်းကျင်ဖြစ်ပါသည်။

ဒေသ၏ မြေမျက်နှာသွင်ပြင်နှင့် ရုပ်ပိုင်းဆိုင်ရာ ပတ်ဝန်းကျင်အနေအထားတို့သည် မူလကတည်းက အတော်အတန် ယိုယွင်း ပျက်စီးနေသော အနေအထားကို တွေ့မြင်ရပါသည်။ မြေမျက်နှာသွင်ပြင် ဖွဲ့စည်းမှုမှာ အဓိကအားဖြင့် အနိမ့်ပိုင်း မြေပြန့်ဒေသနှင့် တောင်ကုန်းမြင့်တို့ ရောယှက်နေလျက် ရှိပါသည်။ ဒေသအတွင်း ခုတ်ပြီး ပြန်လည်ရှင်သန်နေသော သစ်ပင်အချို့ပေါက်ရောက်နေသည့် ခြံနွယ်ပိတ်ပေါင်းသစ်တောသည် တစ်ပိုင်းတစ်စ အမြဲစိမ်းသစ်တောတစ်မျိုးသာဖြစ်ကြောင်းတွေ့ရှိရပါသည်။

ကွင်းဆင်းလေ့လာခဲ့သော စီမံကိန်းဒေသသည် နှစ်ပေါင်းများစွာ လူသားတို့အခြေချနေထိုင်ခဲ့ခြင်းကြောင့် မူလဇီဝမျိုးကွဲများ ရှင်သန်ကျက်စားရာ ပတ်ဝန်းကျင်များ ပျောက်ကွယ်ကုန်ပြီး အဆင့်နိမ့် ဇီဝမျိုးကွဲများသာ ကျန်ရှိကြောင်း လေ့လာတွေ့ရှိခဲ့ရပါသည်။ မျိုးတုံးရန် အလားလာရှိသော အာရှဆင်နှင့် Burmese Eyed လိပ်အမျိုးအစားများ ရှိနိုင်ခြေရှိသော်လည်း ထိုဒေသအတွင်း အမြဲတမ်း တည်ရှိနေထိုင်ခြင်း မရှိကြောင်း တွေ့ရှိရပါသည်။

စီမံကိန်းဒေသပတ်ဝန်းကျင်ဖြစ်သော ပဲခူးတိုင်းဒေသကြီးအတွင်း ဥပဒေအရ ကာကွယ်စောင့်ရှောက်ရန် သတ်မှတ် ထားသော မိုးယွန်းကြီးအင်း ဘေးမဲ့တောသည် ဘုရားကြီး ဓါတ်အားခွဲရုံ အရှေ့ဘက် ၁၀.၇ ကီလိုမီတာ အကွာတွင် တည်ရှိပြီး ဥပဒေအရ ကာကွယ်စောင့်ရှောက်ရန် သတ်မှတ်ထားခြင်း မရှိသေးသော ရှင်ပင်ကြိုက်သောက် ဘေးမဲ့တောသည် တောင်ငူဓါတ်အားခွဲရုံနှင့် ၃.၂ ကီလိုမီတာခန့်မျှ ပဲခူးရိုးမ တောင်ခြေတွင် တည်ရှိနေပါသည်။ ထို့အတူ စီမံကိန်းဒေသတစ်ခုဖြစ်သော ရန်ကုန်တိုင်းဒေသကြီးတွင် ဥပဒေအရ ကာကွယ်စောင့်ရှောက်ရန် သတ်မှတ်ထားရှိသည့် လှော်ကားဘေးမဲ့တောသည် ၅၀၀ကေစီ မဟာဓါတ်အားလှိုင်း မှ ၇.၅ ကီလိုမီတာ အကွာတွင် တည်ရှိနေပါသည်။ သို့ရာတွင် စီမံကိန်းဆိုင်ရာ သက်ဝင်လှုပ်ရှားမှုနှင့် အကွာအဝေးအရ စီမံကိန်းကြောင့် အဆိုပါ ဘေးမဲ့တောများအား ထိခိုက်နိုင်သည့် အခြေအနေ မရှိသည်ကို လေ့လာ တွေ့ရှိရပါသည်။

ရန်ကုန်နှင့် ပဲခူးဒေသများသည် အပူပိုင်းမုတ်သုန်ရာသီဥတု ကြုံတွေ့နေရသော နေရာများဖြစ်ပါသည်။ ၎င်းဒေသများသည် နှစ်စဉ် မိုးရာသီဖြစ်သော မေလမှ အောက်တိုဘာလ အတွင်း မိုးများစွာ ရွာသွန်းလေ့ရှိပြီး ခြောက်သွေ့ရာသီဖြစ်သော နိုဝင်ဘာလမှ ဧပြီလအတွင်း မိုးရွာသွန်းမှု အလွန်နည်းပါးပါသည်။ မိုးလေဝသနှင့် ဇလဗေဒဦးစီးဌာန (ရန်ကုန်)၏ မှတ်တမ်းများအရ ပဲခူးတိုင်းဒေသကြီး၏ ပျမ်းမျှအပူချိန်မှာ (၂၆.၈၇)ဒီဂရီ ဆဲလ်စီးရပ် ရှိပြီး နှစ်စဉ် မိုးရေချိန် ၃၂၆၀ မီလီမီတာ (၁၂၈ လက်မ)ခန့် ရွာသွန်းလေ့ရှိပါသည်။ ရန်ကုန်တိုင်း ဒေသကြီး၏ ပျမ်းမျှအပူချိန်မှာ (၂၇.၄) ဒီဂရီဆဲလ်စီးရပ်ရှိပြီး နှစ်စဉ် မိုးရေချိန် ၂၇၈၇ မီလီမီတာ (၁၀၉ လက်မ) ခန့် ရှိပါသည်။

မိတ္ထီလာဒေသသည် မြန်မာပြည်အလယ်ပိုင်းဒေသတွင် တည်ရှိပြီး အပူပိုင်းဇုန်တွင် ကျရောက်သောကြောင့် ပူအိုက်ခြောက်သွေ့သော ရာသီဥတုရရှိသည့်ဒေသဖြစ်ပါသည်။ ဧပြီလသည် အပူဆုံးလဖြစ်ပြီး ပျမ်းမျှအပူချိန် (၃၁.၁)ဒီဂရီ ဆဲလ်စီးရပ်ခန့်ရှိပြီး အအေးဆုံးလဖြစ်သော ဒီဇင်ဘာလတွင် ပျမ်းမျှအပူချိန်မှာ (၂၁.၄)ဒီဂရီ ဆဲလ်စီးရပ်ခန့်ရှိပါသည်။ ဤဒေသ၏ နှစ်စဉ် မိုးရေချိန်မှာ ၈၀၈.၇၄ မီလီမီတာ (၃၂ လက်မ) ဖြစ်ပါသည်။

မိတ္ထီလာနှင့် တောင်ငူဒေသတွင် တွေ့ရှိရသော ကျောက်များမှာ တတိယကပ် သက်တမ်းရှိ ရေတိမ်ပိုင်းကျ အနယ်လွှာများဖြစ်ပါသည်။ နိုင်ငံတကာ အခေါ်အပေါ်အားဖြင့် ပဲခူးကျောက်လွှာစုပေါင်းနှင့် ဧရာဝတီ ကျောက်လွှာစုတို့ဖြစ်ပြီး မိုင်အိုဆင်းမှ ပလိုင်အိုဆင်း အကုယုဂ် သက်တမ်း ရှိပါသည်။

ပဲခူးကျောက်လွှာစုပေါင်းအပေါ်ပိုင်းသည် မီးခိုးပြာရောင် ယေလကျောက် (ရွံ့ကျောက်)များ၊ အဝါနှင့်အညိုရောင် သဲကျောက်များနှင့် သဲဆန်သော ထုံးကျောက်များဖြင့် ဖွဲ့စည်းထားပြီး ဧရာဝတီ ကျောက်လွှာစုမှာ ရွံ့ဆန်သော သဲကျောက်များနှင့် အင်ကြင်းကျောက်များဖြင့် ဖွဲ့စည်းထားပါသည်။ ဧရာဝတီ ကျောက်လွှာစုသည် ပဲခူးကျောက်လွှာအပေါ်ပိုင်းကို လွှာစဉ်ဆက်ပြတ်ဖြင့် ဖုံးအုပ်ထားပါသည်။

ဒေသအတွင်း လူမှုစီးပွားအခြေအနေ

၅၀၀ကေစီ မဟာဓါတ်အားလိုင်းသည် ပဲခူးတိုင်းဒေသကြီးနှင့် ရန်ကုန်တိုင်းဒေသကြီးအတွင်းရှိ ပဲခူး၊ လှည်းကူး၊ မှော်ဘီနှင့် ထန်းတပင်မြို့နယ်များကို ဖြတ်သန်းသွားမည် ဖြစ်ပါသည်။ မဟာဓါတ်အားလိုင်းနှင့် ဆက်စပ်မှုရှိသည့် လျှပ်စစ်ဓါတ်အားခွဲရုံတစ်ခုဖြစ်သော မြန်မာပြည်အလယ်ပိုင်း မန္တလေးတိုင်းဒေသကြီး အတွင်းရှိ မိတ္ထီလာမြို့နယ်အတွင်းတွင် တည်ဆောက်မည်ဖြစ်ပြီး ထိုဒေသသည် အခြား ဓါတ်အားခွဲရုံများ တည်ရှိရာ ဒေသများနှင့် ကွဲပြားခြားနားသည့် ရာသီဥတုနှင့် ဘူမိရုပ်သွင်တည်ရှိသော နေရာဖြစ်ပါသည်။ ပဲခူးတိုင်းဒေသကြီးအတွင်း ဓါတ်အားခွဲရုံ နှစ်ခုတည်ဆောက်ရန် လျာထားပြီး စတုတ္ထမြောက် ဓါတ်အားခွဲရုံသည် ရန်ကုန်တိုင်းဒေသကြီးအတွင်းတွင် တည်ဆောက်မည်ဖြစ်ပါသည်။

စီမံကိန်းဒေသအတွင်း တိုင်းရင်းသားလူမျိုးစုများအနေဖြင့် မြန်မာ၊ ကရင်၊ မွန်နှင့် ချင်းလူမျိုးများ နေထိုင် ကြပါသည်။ လူတွေ့စစ်တမ်းကောက်ယူမှုများအရ မြန်မာလူမျိုးအများစုဖြစ်ပြီး ရာခိုင်နှုန်းအားဖြင့် ၈၇% ဖြစ်ပါသည်။ ဒုတိယအများဆုံးနေထိုင်သူများမှာ ကရင်လူမျိုးများ ဖြစ်ပြီး ရာခိုင်နှုန်းအားဖြင့် ၁၁.၅၄% ရှိပါသည်။ ဗုဒ္ဓဘာသာကိုးကွယ်မှုမှာ အများဆုံးဖြစ်ပြီး လေ့လာစစ်တမ်းကောက်ယူခဲ့သူ စုစုပေါင်းဦးရေ၏ ၈၉% သည် ဗုဒ္ဓဘာသာကိုးကွယ်သူများဖြစ်ပြီး ခရစ်ယာန်ဘာသာ ကိုးကွယ်သူ အချိုးအစားမှာ ၁၀% ဖြစ်ကြောင်း တွေ့ရှိရပါသည်။

စိုက်ပျိုးရေးလုပ်ငန်းသည် အဓိကစီးပွားရေးလုပ်ငန်းဖြစ်ပြီး လူများစု၏ ပင်မဝင်ငွေမှာ စိုက်ပျိုးရေးလုပ်ငန်းမှ ရရှိပါသည်။

ကွင်းဆင်းစစ်တမ်းကောက်ယူမှုနှင့် ဖြစ်နိုင်ခြေရှိသော ထိခိုက်မှုများကို ဆန်းစစ်ခြင်းရလဒ်

ပတ်ဝန်းကျင်ဆိုင်ရာ ကနဦး ဆန်းစစ်ခြင်း စစ်တမ်း (IEE) ကို ယခင်ရှိရင်းစွဲအချက်အလက်များ၊ စီမံကိန်းနှင့် သက်ဆိုင်သူ စိတ်ဝင်စားသူများနှင့် တွေ့ဆုံမှု၊ ကိုယ်တိုင်ကိုယ်ကျ ကွင်းဆင်းလေ့လာတွေ့ရှိမှုများကို အခြေခံ၍ ပြုစုခဲ့ပါသည်။ စစ်ဆေးတွေ့ရှိချက်များအရ စီမံကိန်းဒေသအတွင်း ဥပဒေအရ အကာကွယ်ပေးထားသော သစ်တောဧရိယာမရှိခြင်း၊ IUCN နှင့် အခြားသော စံနှုန်းများအရ ရှားပါးသတ္တဝါ (သို့မဟုတ်) အပင်ဟု သတ်မှတ်ထားသော ဇီဝမျိုးစိပ်များ မတွေ့ရှိရခြင်းတို့ကြောင့် စီမံကိန်းဒေသအတွင်းရှိ ပတ်ဝန်းကျင် အခြေအနေသည် အရေးပါသော အနေအထားတွင်မရှိကြောင်း သုံးသပ်ရပါသည်။ စီမံကိန်းဒေသအတွင်း အများစုတွေ့ရှိရသည်မှာ သာမန်လယ်ကွင်းများ၊ စီးပွားဖြစ် သစ်တောစိုက်ခင်းမြေများ၊ အသစ်တဖန် ဖြစ်ထွန်းသော သစ်တောများ၊ ခြံနွယ်ပိတ်ပေါင်းများနှင့် လူနေထိုင်ရာ အရပ်များ ပါဝင်ပါသည်။

ထိုအချက်များအား ထောက်ထား၍ ဂေဟစနစ်တန်ဖိုးအရ စီမံကိန်းကြောင့် ဤဒေသအတွင်းတွင် သိသာထင်ရှားသော ပတ်ဝန်းကျင်ဆိုင်ရာ ထိခိုက်သက်ရောက်မှု မရှိနိုင်ကြောင်း လေ့လာသုံးသပ်ရပါသည်။ ပတ်ဝန်းကျင်ဆိုင်ရာ ထိခိုက်သက်ရောက်မှုပမာဏ အနည်းငယ်ရှိနိုင်သော ကိစ္စရပ်များကိုလည်း ရေတိုရေရှည် ပြန်လည်ကုစားသောနည်းလမ်းများ ကျင့်သုံးခြင်းအားဖြင့် ပိုမို လျော့ပါး သို့မဟုတ် ပပျောက်သွားနိုင်ကြောင်း ခန့်မှန်းရပါသည်။ ဖြစ်နိုင်ခြေရှိသော ပတ်ဝန်းကျင်ထိခိုက်သက်ရောက်မှု ဖြစ်စဉ်အများစုမှာလည်း ကာလတို မျှသာဖြစ်ပြီး အဓိကအားဖြင့် စီမံကိန်းတည်ဆောက်နေစဉ်ကာလအတွင်း ဖြစ်နိုင်ခြေရှိကြောင်း တွက်ချက် တွေ့ရှိရပါသည်။

မဟာဓါတ်အားလှိုင်းနယ်နိမိတ် (Right of Way) နှင့် ဓါတ်အားခွဲရုံများတည်ဆောက်ခြင်းကြောင့် ကျေးရွာပေါင်း (၂၄)ရွာ နယ်နိမိတ်အတွင်းရှိ မြေယာများကို ထိခိုက်နိုင်ပါသည်။ စီမံကိန်းဒေသအတွင်းရှိ ကျေးရွာပေါင်း (၂၄)ရွာအတွင်း အိမ်ထောင်စု (၁၄၅) စုမှာ မဟာဓါတ်အားလှိုင်း သွယ်တန်းမှုကြောင့်၎င်း၊ အိမ်ထောင်စု (၃၆) စုမှာ ဓာတ်အားခွဲရုံတည်ဆောက်မှုကြောင့်၎င်း၊ မြေယာနှင့်ပတ်သက်၍ တိုက်ရိုက်ထိခိုက်နစ်နာမှုများ ရှိနိုင် ပါသည်။ ထိခိုက်နိုင်ခြေရှိ အိမ်ထောင်စုစာရင်းနှင့် သက်ဆိုင်ရာ ကျေးရွာများကို အောက်ဖော်ပြပါဇယား(က)နှင့် (ခ)တွင် ဖော်ပြထားပါသည်။

မဟာဂါတ်အားလှိုင်းတည်ဆောက်ခြင်းကြောင့် ထိခိုက်နစ်နာဖွယ် အိမ်ထောင်စုစာရင်းပြဇယား (က)

စဉ်	မြို့နယ်	ကျေးရွာ	ထိခိုက်နိုင်ဖွယ်အိမ်ထောင်စု အရေအတွက်
၁	ပဲခူး	လှော်ကား	၉
		စစ်ပင်ဆိပ်	၉
		ဘောနက်ကြီး	၄
၂	လှည်းကူး	ကြာအင်းအရှေ့	၁၁
		နွန့်	၁၂
		စာပူးတောင်း	၃
		ငွေတောင်အိုင်	၈
		မင်းကုန်း	၆
၃	မော်ဘီ	မင်းရွာ	၄
		ဝါးပတော	၄
		ဘန်ဘွေးကုန်း	၆
		အင်ကြင်းကုန်း	၈
		လှည်းငုတ်ချောင်း	၈
		လှပဒါး	၄
		လက်ပံတန်းစု	၉
		ရေပေါ်သဲ့	၁၁
		မိုးကြိုးပစ်	၅
၄	ထန်းတပင်	ထိန်နှစ်ပင်	၁၁
		ဒိုက်ကုန်း	၄
		ဝါးတရာ	၃
		ပေါက်တန်း	၄
		ကလိန်	၁
စုစုပေါင်း			၁၄၅

ဂါတ်အားခွဲရှုံ့တည်ဆောက်ခြင်းကြောင့် ထိခိုက်နစ်နာဖွယ် အိမ်ထောင်စုစာရင်းပြဇယား (ခ)

စဉ်	မြို့နယ်	ကျေးရွာ	ထိခိုက်နိုင်ဖွယ်အိမ်ထောင်စု အရေအတွက်
၁	မိတ္ထီလာ	ကံကုန်း	၄
၂	တောင်ငူ	ကွက်သစ်	၂၆
၃	ဘုရားကြီး	ဘောနက်ကြီး	၁၃
၄	လှိုင်သာယာ (ထန်းတပင်)	ပေါက်တန်း	၁၁
စုစုပေါင်း			၅၄

မဟာဓါတ်အားလှိုင်းတည်ဆောက်မည့်မြေနေရာနှင့် ဓါတ်အားခွဲရုံတည်ဆောက်မည့် နေရာများကို ရွေးချယ်ရာ တွင် လူနေအိမ်များရွှေ့ပြောင်းရမှု မဖြစ်ပေါ်ရေးဟူသော မူဝါဒကို အခြေခံ၍ လူနေအိမ်ခြေများနှင့် ကင်းလွတ် ရာနေရာများကို အဓိကထား၍ ရွေးချယ်ခဲ့ပါသည်။ ထို့အပြင် မဟာဓါတ်အားလှိုင်း သွယ်တန်းရန် လမ်းကြောင်း ရှာဖွေရာတွင် ဖြစ်နိုင်ခြေ လမ်းကြောင်းအမျိုးမျိုးကို ရှာဖွေသုံးသပ်ခဲ့ပါသည်။ ထိုသို့ပြုလုပ်ခဲ့ခြင်းကြောင့် မဟာဓါတ်အားလှိုင်း သွယ်တန်းရာ နေရာတစ်လျှောက်တွင် မလွတ်ကင်းသော လူနေအိမ်များ ဖယ်ရှားရမှု လုံးဝမရှိပါ။ သို့ရာတွင် တောင်ငူဒေသတွင် တည်ဆောက်မည့် ဓါတ်အားခွဲရုံအတွက် စီမံကိန်းနှင့် မလွတ်ကင်းသော လူနေအိမ်နှစ်အိမ်မှာ မလွဲမရှောင်သာ ရွှေ့ပြောင်းရမည် ဖြစ်ပါသည်။

ထို့အပြင် မဟာဓါတ်အားလှိုင်း တာဝါတိုင်တည်ဆောက်ခြင်းနှင့် ဓါတ်အားခွဲရုံများ တည်ဆောက်ခြင်း တို့အတွက် ပုဂ္ဂလိကပိုင် စိုက်ပျိုးမြေယာများနှင့် စိုက်ခင်းများကို အပြည့်အဝ ရှောင်လွှဲနိုင်ခဲ့ခြင်းမရှိပါ။ တာဝါတိုင်များ တည်ဆောက်ရန်အတွက် ပုဂ္ဂလိကပိုင်မြေ ၂၀.၃ ဟက်တာ (၅၀.၂ ဧက) လိုအပ်မည်ဖြစ်ပြီး ဓါတ်အားခွဲရုံများ အတွက် ပုဂ္ဂလိကပိုင်မြေ ၉၅.၇ ဟက်တာ (၂၃၆.၅ ဧက) လိုအပ်မည်ဖြစ်ပါသည်။

အချုပ်အားဖြင့်ဆိုသော် မဟာဓါတ်အားလှိုင်းတည်ဆောက်ခြင်းကြောင့် လူနေအိမ်ခြေများရွှေ့ပြောင်းရမှု မရှိနိုင်သော်လည်း ဓါတ်အားခွဲရုံတည်ဆောက်ခြင်းအတွက် တောင်ငူဒေသတွင် လူနေအိမ် နှစ်အိမ် ရွှေ့ပြောင်း ရမည်ဖြစ်ပါသည်။

Executive Summary

Myanmar has been suffering frequent electrical shortages and lengthy blackouts for many years due to insufficient electrical power supply. Consequently development of country's economic sector, living standards of citizens and other sectors, which totally rely on power supply, has been hardly hampered.

In order to overcome the current power deficiency crisis, Ministry of Electric Power has been planning to accelerate the development of power generation, transmission and distribution facilities including exploring additional hydropower sources, construction of new power grid and substation, upgrading existing systems, seeking sustainable and renewable energy development and other available means of energy sources in consultation with oversea financial institutions and development partners.

As a result, this 500 kV power transmission line (TL) and substation (SS) project was operated as an essential infrastructure with intention of boosting the capacity of country's power grid facility, which will play vital role to meet the substantial needs of electrical power supply in Myanmar.

Brief Project Description

The study area of Proposed 500 kV TL alignment will originate in Hpayargyi Substation located in Bago Region and terminate in Hlaingthayar Substation in Yangon Region.

The TL route will span one township in Bago Region and three townships in Yangon. The 95 km transmission line composing of 219 towers in various types will have average span length of 450 m (0.27 mile). The Major sections of TL route will pass through the plantation area, degraded forestland mixed with undergrowth and active agriculture lands within four townships.

The project includes construction of four new substations in different locations for power receiving and transmission purpose. The proposed locations for the substations are situated in Meikhtilar, Taungoo, Hpayargyi (Bago) and Hlaingthayar area.

Environmental condition in project area

The substations and 500 kV transmission line area is mainly agricultural area with patches of rain forest. The Bago and Hlaing River is the main habitat for aquatic life in the area.

The landscape and physical environment were found to be seriously disturbed. The land form of the area was a combination of flat land and hill range. The scrub forest is found in the area with some re-growth trees, which represent the semi-evergreen forest. Low biodiversity value was observed in the project area because the area has been seriously disturbed and the habitats have been degraded. Some threatened wildlife species like Asian Elephant and Burmese Eyed Turtle are expected to occur in the areas, but not in frequent manner.

There is Moeyungyi Wetland Wildlife Sanctuary which is 10.7 km far from Hpayargyi Substation. Shinpin Kyetthauk Wildlife Sanctuary has not officially been listed in the Protect Area of Myanmar yet. It is also located 3.2 km to the south-west of Taungoo Substation at the bottom of Bago Yoma (Mountain range) in Bago Region. Another protect area is Hlawga Wildlife Park situated in Yangon Region about 7.5 km to the east of nearest proposed transmission line. It is a designated wildlife park in the list of protected area.

Owing to the nature of work activities and distance, it is unlikely to have effect on the protected area.

Yangon and Bago Regions have a tropical Monsoon climate. Those Regions feature a lengthy rainy season from May through October where a substantial amount of rainfall is received and a dry season from November through April, where little rainfall is seen. According to the meteorological data from Meteorology and Hydrology Department, Yangon the mean temperature around Bago Region is 26.87 °C and the average rainfall is 3260.12 mm (128 inches). The mean temperature around Yangon Region is 27.4 °C and the average rainfall is 2787 mm (109 inches).

Meikhtilar Township, is situated in the Dry Zone of Central Myanmar and hence it experiences a tropical dry climate. April was the hottest month with average mean temperature of 31.11 °C and December was the coldest month with average mean temperature of 21.42°C. During the same period, the average annual rainfall of Meikhtilar Township was 808.74 mm (32 inches).

The rocks encountered in the Meikhtilar and Taungoo areas are mainly composed of Tertiary mollassic sediments of upper Pegu Group and Irrawaddy Formation, during Miocene to Pliocene in age.

Upper Pegu Group is composed of bluish gray shale, yellowish and brownish sandstone and sandy limestone, whereas the Irrawaddy Formation is characterized with subordinate amount of clays and abundant fossil woods. Irrawaddy Formation overlies the upper Pegu Group with an unconformity

Social Condition in project area

The proposed transmission line will transverse through Bago district located in Bago

Region and Northern Yangon District in Yangon Region and covers four townships namely Bago, Hlegu, Hmawbi and Htantapin.

One substation associated transmission line with is separately located in Meikhtilar area of Mandalay Region, Upper Myanmar which has different climate and geographical characteristics in comparison with the regions of Bago and Yangon. Bago Region embraces two substations, Hpayargyi and Taungoo and the rest is located in Yangon Region.

Ethnicity in the project area includes Bamar, Kayin, Mon and Chin. Majority of people are Bamar 86.4% followed by Karen 11.6% and Buddhists 89.1% followed by Christian 10.5%.

Agriculture is main business and it is understood that the majority of household within the project area obtain their income mainly from agricultural industry

Result of Survey and Anticipated Impact

The IEE was conducted in examining available data, hearing from stakeholders and carrying out site reconnaissance. According to the result of the IEE the area is environmentally not in the priority area as it is free from the approved conservation areas by Myanmar Government, International Organizations, and other technical groups. Also there observed no endangered or rare species listed in IUCN Red List or other lists of locally threatened species both for flora and fauna. The area has been in common with paddy fields, commercial plantations, secondary forests, scrub land and human habitation areas.

Consequently, in term of ecological concerns it was concluded that no significant negative impact was predicted and the predicted minor impacts could be avoided or minimized in applying countermeasures. The majority of negative impacts include temporary and site specific pollution due to construction activities in the construction phase.

The ROW and Substations will affect land within the village boundaries of 24 villages. Within these 24 villages, 145 households will be directly affected by construction of the transmission line and 54 households will be affected by construction of the substations. Table A and Table B represents the number of household affected by transmission line and substation construction .

Table A No of affected household in project area by Transmission Line.

No.	Township	Name of Village	Affected Households
1	Bago	Hlaw Kar	9
		Sit Pin Seik	9
		Baw Net Kye	4
2	Hlegu	Kyar Inn Ah Shae	11

		Nante	12
		Sar BuTaung	3
		Gwe Tauk Eain	8
		Min Kone	6
3	Hmawbi	Min Yower	4
		War Pa Taw	4
		Bant Bawe Kone	6
		Inn Gyin Kone	8
		Hle Ngote Chaung	8
		Hla Pa Dar	4
		Let Pan Tan Su	9
		Ye Paw The	11
		Moe Kyo Pyit	5
4	Htantabin	Htantabin	11
		Deik Kone	4
		War TaYar	3
		Pauk Tan	4
		Ka Lain	1
Total			145

Table B No of affected household in project area by substation

No.	Substation	Name of Village	Affected Households
1	Meikhtilar	KanKoung	4
2	Taungoo	Kutthit	26
3	Hpayargyi	Baw Net Kye	13
4	Hlaingthayar	Pauk Tan	11
Total			54

The area in which transmission line and substations location are carefully selected with the principle of avoiding relocation as possible as it can be. Serious attentions have been paid in considering the alternatives options of transmission line. As a result, there is no household fall within the transmission line corridor as per current proposed transmission line design. However, it is unavoidable in the case of Taungoo Substation as two households are located in the proposed site.

In addition, it is impossible to avoid the use of tower base and substation in private land mainly agricultural class. 26.0 hectare (64.2 acre) of land for tower base construction and 126.5 hectares (312.6 acre) of land for substation shall be acquired permanently.

Though there is no relocation is expected from the construction of transmission line, two households at the Taungoo substation need to be relocated during the construction of Taungoo substation

1. Project Description

1.1 Background

Myanmar has been suffering frequent electrical shortages and lengthy blackouts for many years due to insufficient electrical power supply. Consequently development of country's economic sector, living standards of citizens and other sectors which totally rely on power supply has been hardly hampered.

Since newly elected government has introduced a democracy reform in both political and economic processes, the demand of power supply has been dramatically increasing more and more by booming industrial sectors and increasing population. Power shortage still remains a critical challenge and government has been trying to tackle it in various ways. Due to reliability on a few sources of electrical power generations and having obsolete power generation capacity, transmission and distribution system with low operating capacity, the electrical power demand has become a pressing issue.

It is obvious that securing sufficient electrical supply is an essential tool to boost the country's economic growth, to alleviate the poverty, to bring a better social security system including education, health and welfare and to stabilize and promote the living standard of citizens across the country.

In order to overcome the current power deficiency crisis, Ministry of Electric Power has been planning to accelerate the development of power generation, transmission and distribution facilities including exploring additional hydropower sources, construction of new power grid and substation, upgrading existing systems, seeking sustainable and renewable energy development and other available means of energy sources in consultation with oversea financial institutions and development partners.

As a result, this 500 kV power transmission line and substation project was opted as an essential infrastructure with intention of boosting the capacity of country's power grid facility which will play vital role to meet the substantial needs of electrical power supply in Myanmar.

1.2 Project Details

In order to boost the energy supply, Ministry of Electric Power (hereinafter referred to as MOEP) has planned to bring the 500 KV transmission line with associated substation system into energy sector which is subject to has been the first highest voltage power grid ever since .

The transmission line will run from Meikhtilar to Hlaingthayar (Yangon Area) where portion between Meikhtilar and Taungoo will be financially assisted by Serbia. The

section of Taungoo- Hpayargyi is to be financed by Korea financial organization. The rest of Hpayargyi (Bago Region) - Hlaingthayar (Yangon Region) portion with distance of 95 km (59.0 mile) is to be constructed with the financial assistance of JICA. In addition, all four substations associated with proposed project transmission lines shall also be financially provided by JICA.

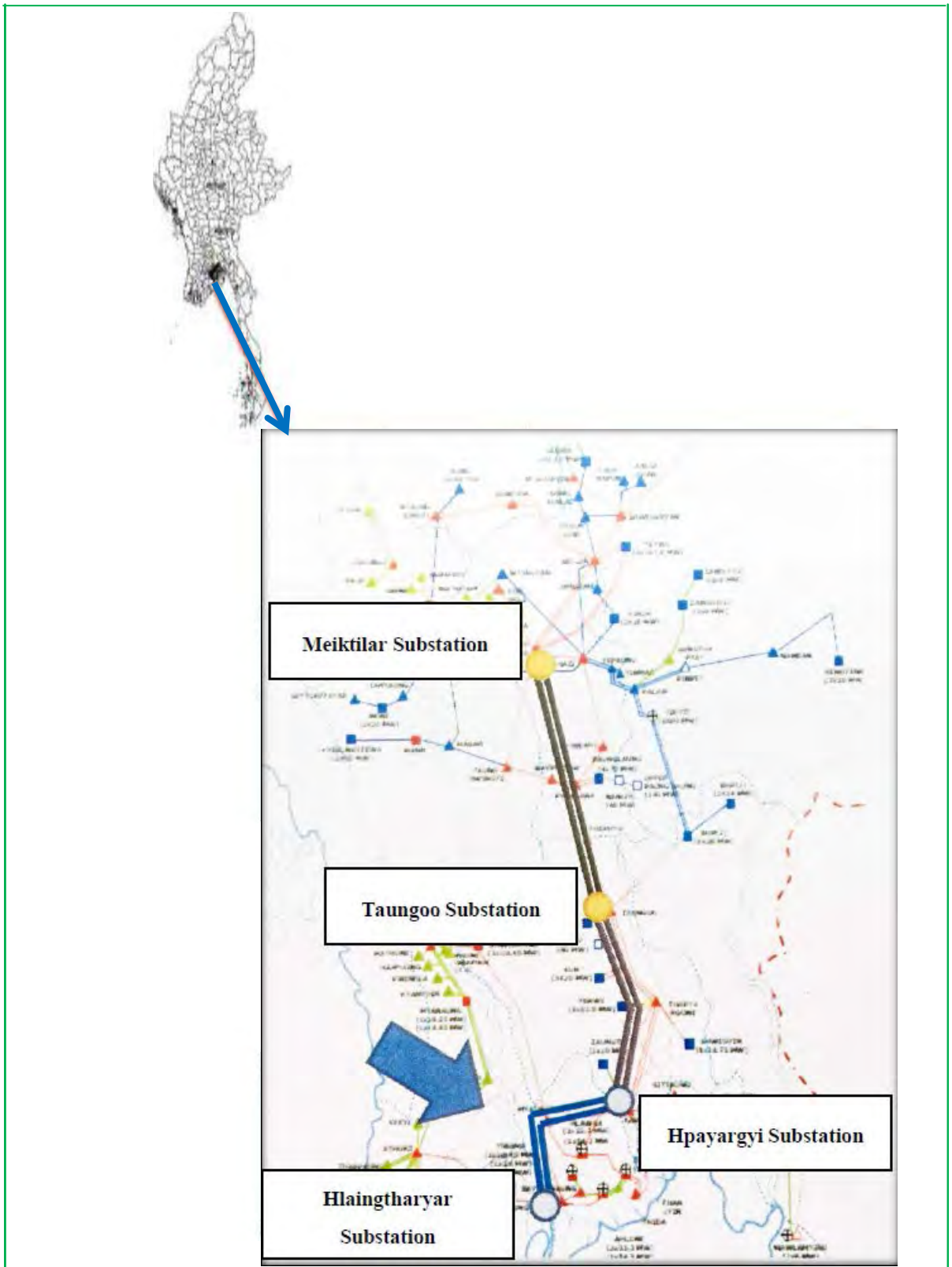
1.2.1 Location of Transmission Line and Design

The study area of Proposed 500 kV TL alignment will originate in Hpayargyi Substation located in Bago Region and terminate in Hlaingthayar Substation in Yangon Area.

The TL route will span one township in Bago Region and three townships in Yangon. The 95 km transmission line composing of 219 towers in various types will have average span length of 450 m (0.27 mile).

Originally the route will run roughly in parallel with Yangon -Mandalay Expressway keeping minimum distance of 700 m (0.43 mile) apart from it till it reaches to Tower Number 63. The TL route will cross the existing YGN-MDY Express highway three times, once at the outgoing portion of Hpayargyi Substation , next at Tower Number 63 and finally at Tower Number 79. The line will also cross over the Hlaing River at Tower Number 190 and then enter the Hlaingthayar Substation in Htantabin Township.

The Major sections of TL route will pass through the plantation area, degraded forest land mixed with undergrowth and active agriculture lands within four townships. Figure 1.1 and Table 1.1 describes the areas where transmission line passes through and adherent designs in preliminary stage respectively.



Source: REM

Figure 1.1 Transmission Line Route

Table 1.1 Transmission Line Design

Line Design Features	500kV Transmission Line between Hpayargyi - Hlaingthayar
Line Length	95km(59.0 miles)
Type	Galvanized steel towers with concrete foundations
Number of Towers	219
Average Span Between	450 meters(0.27 miles)
Tower Height	65m(213.3 feet) - 110m (360.89 feet) (average 70m)
Tower Land Area	625m ² - 1,600m ²
Right of Way (ROW)	50 meters(164 feet) (25m either side of line)

Source: JICA Study Team



Source: JICA Study Team, MEPE

Figure 1.2 Crossing Point of Yangon - Mandalay Express Way



Source: JICA Study Team
Figure 1.3 Paddy Field near Proposed TL



Source: Resource Environment Myanmar (REM)
Figure 1.4 Existing river crossing section



Source: REM

Figure 1.5 Typical Commercial Plantation near TL route

1.2.2 Location of Substation and Design

The project includes construction of four new substations in different locations for power receiving and transmission purpose.

An overview of location, size and design of each substation are described in the respective tables and figures.

Meikhtilar Substation

Table 1.2 Meikhtilar Substation Design

Location	Meikhtilar Township, Mandalay Division
Distance from major town	10.5 km to the North West of Meikhtilar
Coordinate	Lat - 20.931528°, Long - 95.810693°
Total Area(Ha)	26.1 ha (64.7 acre)
Main Component	2 banks of 500/230kV Transformer 500MVA 2 banks of 500kV Reactor 100MVA 4 circuits of 500kV transmission line bay 5 circuits of 230kV transmission line bay



Source: MEPE
Figure 1.6 Cadastral Map of Meikhtilar Substation



Source: MEPE data on Google earth
Figure 1.7 Location Map of Meikhtilar Substation



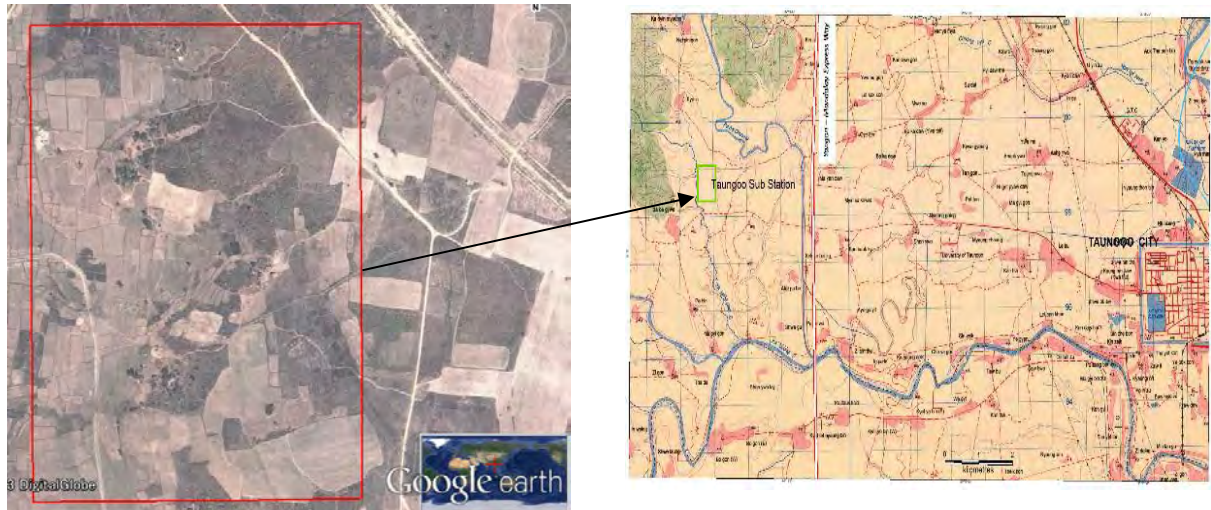
Source: JICA Study team

Figure 1.8 Representative photo of Meikhtilar Substation

Taungoo Substation

Table 1.3 Taungoo Substation Design

Location	Taungoo Township, Bago Region
Distance from major town	11 km to the North of Taungoo
Coordinate	Lat - 18.964905° Long - 96.369887°
Total Area(Ha)	40.5ha (100.0 acre)
Main Component	1 bank of 500/230kV Transformer 500MVA 4 banks of 500kV Reactor 100MVA 4 circuits of 500kV transmission line bay 6 circuits of 230kV transmission line bay



Source: MEPE data on 1:50000 scale UTM Map of Myanmar (2004)

Figure 1.9 Location Map of Taungoo Substation

Hpayargyi Substation

Table 1.4 Hpayargyi Substation Design

Location	Taungoo Township, Bago Region
Distance from major town	16.5km to the NWW of Bago ,6.5 km to the west of Hpayargyi
Coordinate	Lat -17.475351°, Long - 96.453573°
Total Area(Ha)	24.1ha (59.5acre)
Main Component	2 banks of 500/230kV Transformer 500MVA 2 banks of 500kV Reactor 100MVA 6 circuits of 500kV transmission line bay 6 circuits of 230kV transmission line bay



Source: MEPE on 1:250000 UTM Map of Myanmar (2004)
 Figure 1.10 Location Map of Hpayargyi Substation

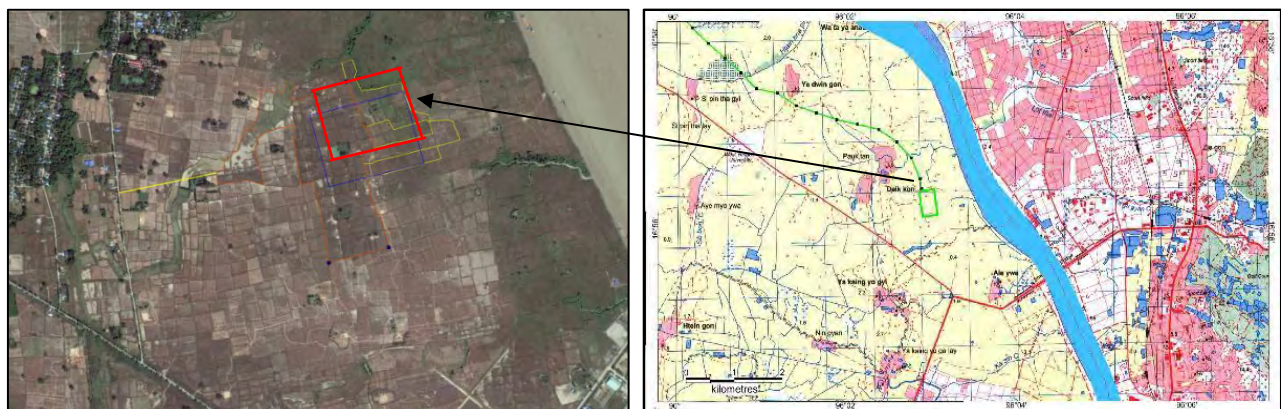


Source: JICA Study Team
 Figure 1.11 Proposed Site of Hpayargyi Substation

Hlaingthayar Substation

Table 1.5 Hlaingthayar Substation Design

Location	Hlaingthayar Township, Yangon Region
Distance from major town	1 Km from Shwelinban Industrial Complex(Hlaingthayar Township)
Coordinate	Lat - 16.935874° Long - 96.054929°
Total Area(Ha)	33.6ha (83.0acre)
Main Component	2 banks of 500/230kV Transformer 500MVA 2 banks of 500kV Reactor 100MVA 4circuits of 500kV transmission line bay 6 circuits of 230kV transmission line bay



Source: MEPE on 1:50000 UTM Map of Myanmar (2004)
Figure 1.12 Location Map of Hlaingthayar Substation



Source: JICA Study Team
Figure 1.13 Proposed Site of Hlaingthayar Substation

1.2.3 Tower Design

A total of 219 towers will be used in this project. Different designs and size of towers including suspension tower, river crossing suspension tower, and tension tower shall be other components. Table 1.6 details the type and quantity of towers designed for the transmission line project.

Table 1.6 Description of Towers in proposed 500 kV Transmission Line

Type	Size	Design	Quantity
Suspension Tower	25mX25m	Horizontal Angle: 0-5 degrees	126
River Crossing Suspension Tower	30mX30m	-	2
Tension Tower	30mX30m	Horizontal Angle: 0-15 degrees	54
Tension Tower	40mX40m	Horizontal Angle: More than 15 degrees	33
Deed End Tower	40mX40m	-	4
Total			219

Source: JICA Study Team

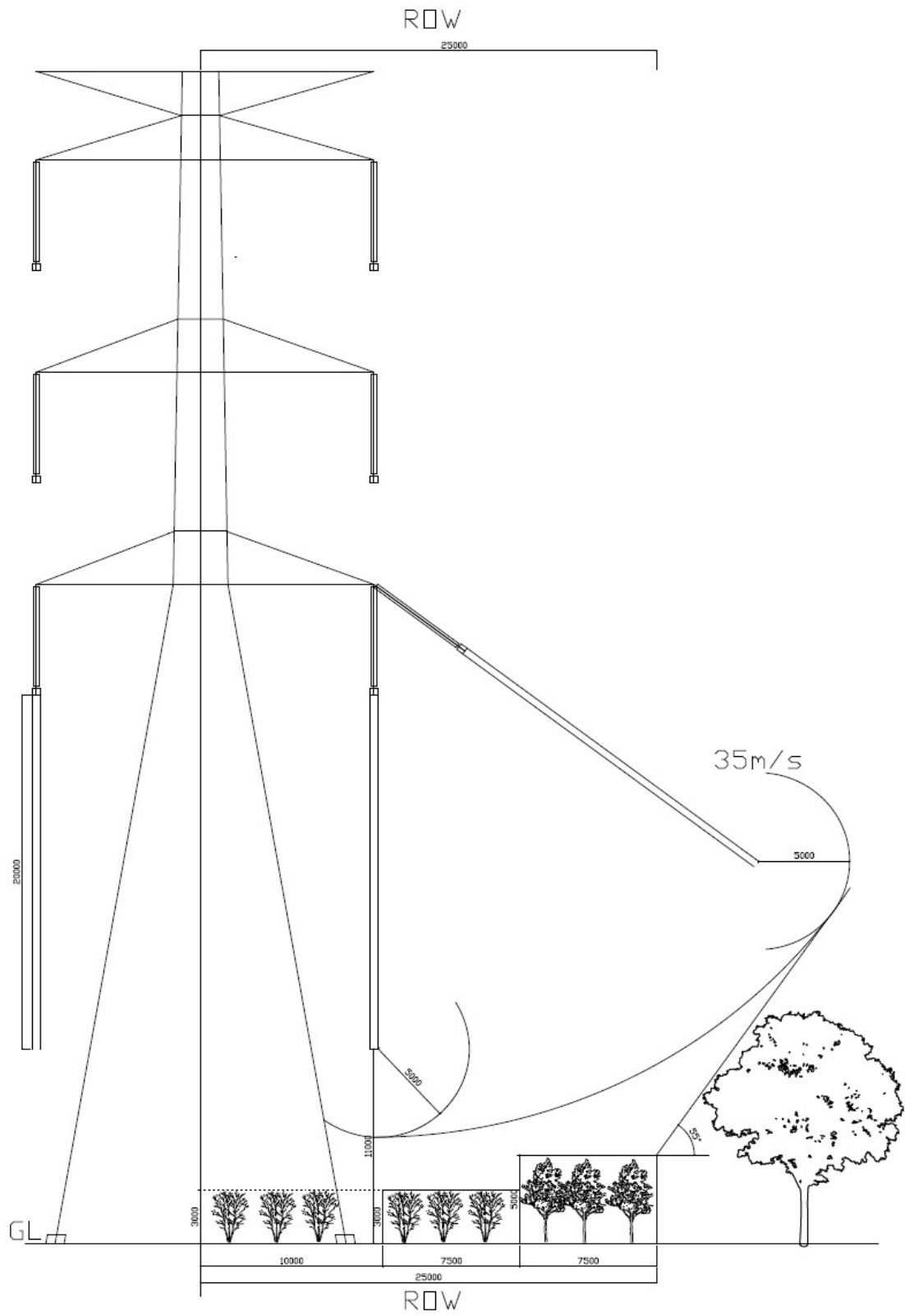
1.2.4 Right of Way

Right of Way (ROW) of proposed transmission line shall be 50 m width (25 m from center of TL route). Tall trees and vegetation growing or planting within ROW area shall be trimmed or chopped down to obtain the safe clearance of 5m from the lowest conductor. Tree cutting will mainly occur within 100m of center area in 450m average TL tower distance in between where maximum conductor sagging and minimum ground - conductor clearance exist.

As per ROW clearance design (Figure 1.14), the maximum height of tree from the 17.5 m of center line shall be not kept more than 3 m. Allowable height of tree between 17.5 m and 25 m from center line is 5m.

The trees and vegetation growing within 17.5m from the tower base along the line are expected to be unnecessary to cut down due to enough conductor height as long as 5 m safe clearance from lowest conductor is maintained. Figure 1.14 presents the ROW clearance design and maximum allowable height of tree.

Detailed design is required such as tower and conductor height between (tower zone and center zone) to calculate the allowable tree height in order to avoid unnecessary tree clearance.



Source: JICA Study Team
 Figure 1.14 Design of ROW Clearance

2. Purpose of the Initial Environmental Examination

The purpose of this study is

- To inquiry the existing baseline data that describe all relevant physical, biological, social, cultural and economic characteristics of the potential project affected area through second source reviews and field investigation
- To evaluate the significance of potential adverse and beneficial impacts which could affect to the proposed project area by project activities of transmission line and substations construction and operation of the project
- To understand the past and current history of lands to be acquired and identify the loss of assets by projects activities
- To adopt effective mitigation measures that could avoid or mitigate the potential impacts to a level deemed as acceptable
- To define the appropriate environmental and social management and monitoring mechanism to be implemented throughout the life of project cycle

3. Present condition in the project area

3.1 Natural Environment

3.1.1 Topography

The proposed 500 kV transmission line passes through the Bago Yoma (mountain range) and flat land topography. Within the area, there are hills which slope with a gentle inclination to the east in some places has scarp slopes. Flood plains are mostly situated at the east of Bago city and in there are hill terrains.

The main stream within the study area is the Bago River. The stream has four main tributaries. They are Thebyu, Mazin, Ploabe, and Tagubyin. The direction of the Bago river is nearly north-south and other tributaries are flowing generally NNW-SSE. The Bago River and its tributaries altogether appear to form a dendritic pattern. The dendritic pattern indicates the homogeneity of the soils.

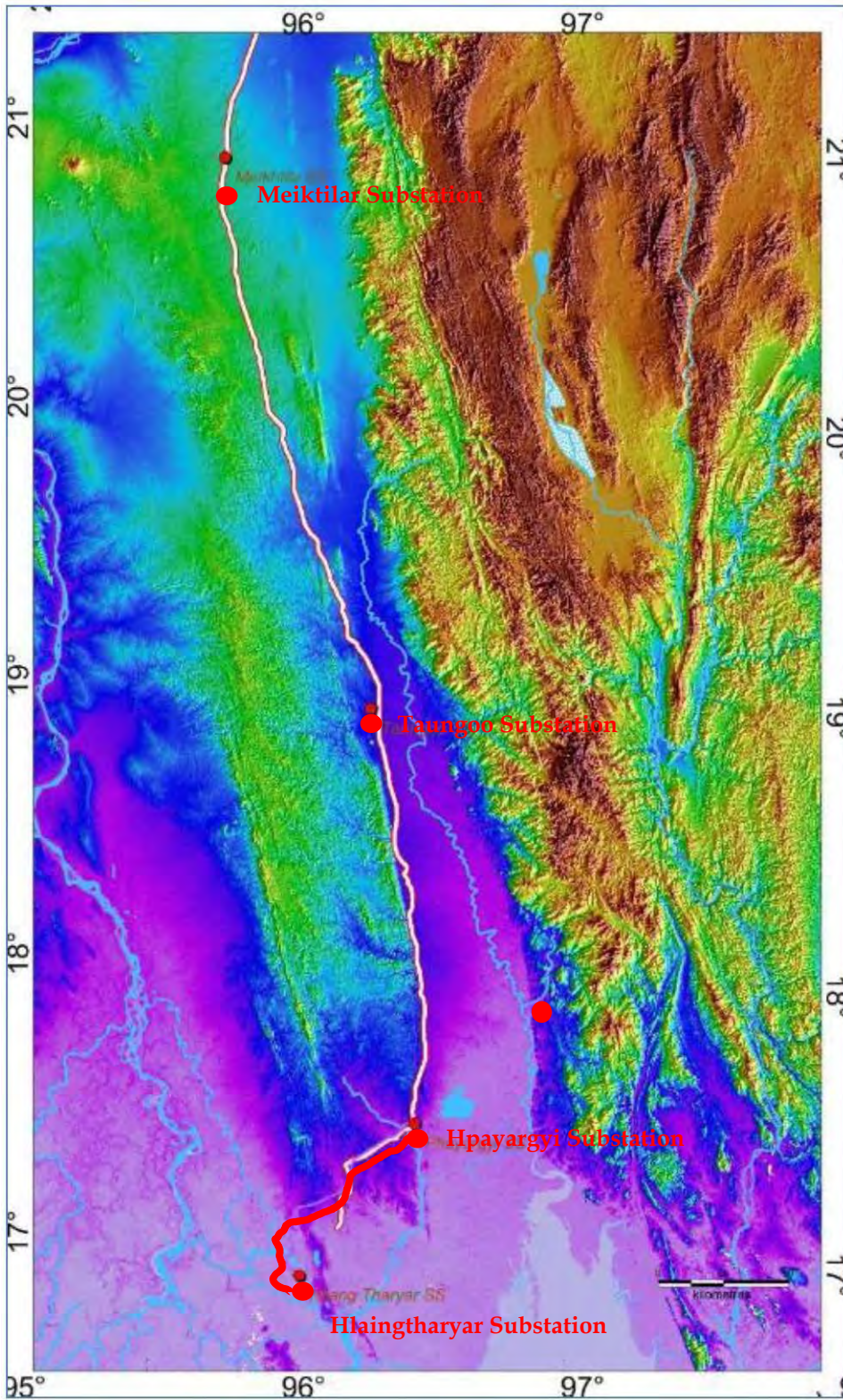
The general transmission line trend is from northeast to southwest and south with distance of approximately 95 km. The power transmission line passes through the rolling mountain hill which is the southern continuation of Bago Yoma (Mountain Range) in the Bago Region. The administrative divisions and townships of the transmission line crossing are provided in Table 3.1.

Table 3.1 Administrative Divisions of the 500 kV Transmission Line Crossing

Township	Division/Region	Length (km)
Bago	Bago	28.78
Hlegu	Yangon	31.65
Hmawbi	Yangon	28.64
Htantabin	Yangon	11.39
TOTAL		94.46

Source: REM

In Yangon Region, mostly Hlegu and Hmawbi Region the transmission line transverses the flat land area. The power transmission line crosses the Hlaing River between Hmawbi and Htantabin Region. A large delta swamp plain occurs in the east side of Hlaing River and west bank of Hlaing River to proposed Hlaingthayar substation. The proposed transmission line route is located in topographic map as shown Figure 3.1.



Source: REM

Figure 3.1 Location of 500 kV TL and four substations
(pink line in the middle is YGN- MDY Express Way)

Climate

Yangon and Bago Regions have a tropical Monsoon climate under the Köppen climate classification system. Those Regions feature a lengthy rainy season from May through October where a substantial amount of rainfall is received and a dry season from November through April, where little rainfall is seen. It is primarily due to the heavy precipitation received during the rainy season that Yangon falls under the tropical monsoon climate category. During the course of the year, average temperatures show little variance, with average highs ranging from 29 to 36 °C (84 to 97 °F) and average lows ranging from 18 to 25 °C (64 to 77 °F). Monthly rainfall and mean, maximum, minimum temperature in Bago Township and Yangon city are shown in Table 3.2 and Table 3.3 respectively.

Table 3.2 Normal Monthly Rainfall and Mean, Maximum, Minimum Temperature of Bago Township (1974 to 2009)

Temp/ Rainfall	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average / Total
Mean Maximum Temperature (°C)	31.5	33.7	36.4	37.5	34.8	30.5	29.9	29.4	30.8	32.1	32.1	30.7	32.45
Mean Temperature (°C)	23.7	25.3	28.4	30.5	29.5	27	26.4	26.7	27.2	27.6	26.5	23.7	26.875
Mean Minimum Temperature(°C)	16	16.9	20.5	23.5	24.3	23.5	23.6	23.5	23.7	23.1	20.9	16.7	21.35
Rainfall (mm)	5.08	7.11	7.67	38.86	319.53	631.7	738.08	756.7	497.84	195.58	52.57	9.4	3260.12

Source: Meteorology and Hydrology Department, Yangon.

Table 3.3 Monthly Average Maximum, Minimum, Mean Temperatures and Rainfall of Kaba Aye Station in Yangon City (1981-2010)

Temp/Rainfall	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average /Total
Max Temp(°C)	33.2	35.2	36.8	37.5	34.1	30.8	30.3	30	31	32.2	33.1	32.5	33.1
Min Temp(°C)	16.7	18.3	21.1	23.8	24.3	23.6	23.2	23.3	23.2	23.1	21.3	17.7	21.6
MeanTemp(°C)	25	26.8	29	30.7	29.2	27.2	26.8	26.7	27.1	27.7	27.2	25.1	27.4
Rainfall (mm)	1	4	12	38	325	566	608	571	393	201	61	7	2787

Source: Meteorology and Hydrology Department, Kabaaye Station, Yangon

According to the meteorological data from Meteorology and Hydrology Department, Yangon the mean temperature around Bago Region is 26.87 °C and the average rainfall is

3260.12 mm (Table 3.2). The mean temperature around Yangon Region is 27.4 °C and the average rainfall is 2787 mm (Table 3.3).

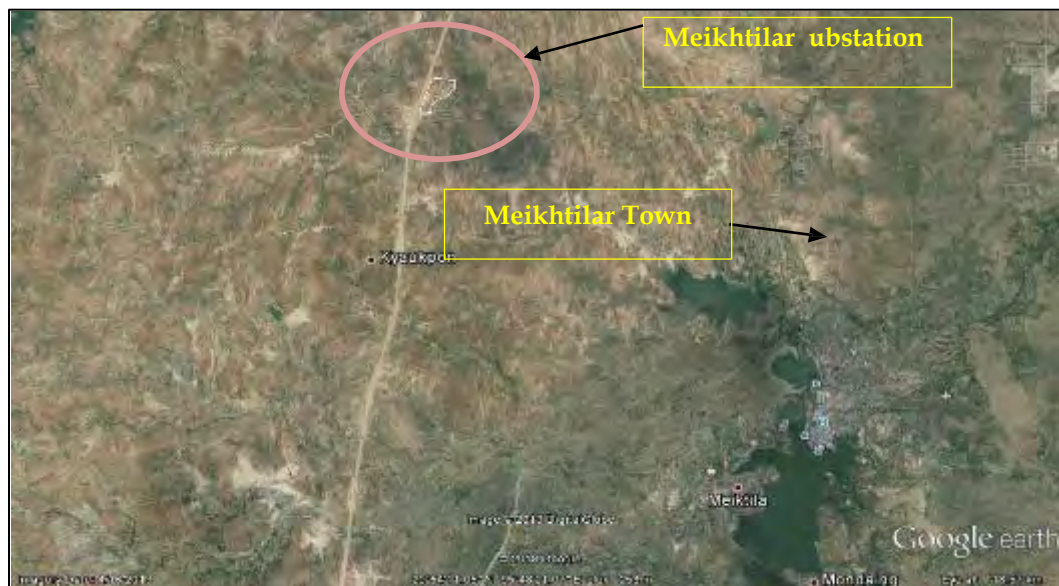
Meikhtilar Substation

The proposed Meikhtilar substation is located 10.5 km northeast of Meikhtilar City and lies beside the new Yangon Mandalay Highway Road. It lies in the Central Basin of Myanmar, its relief is not flat. Generally, the relief of the area is 255 meter above mean sea level. The area is the continuation of the spurs of northern Bago Yoma and has north-south alignment. The area is characterized by undulating land surface is the result of gullies erosion and isolated low hills.

Climate

The proposed substation is located in the Meikhtilar Township, is situated in the Dry Zone of Central Myanmar and hence it experiences a tropical dry climate. Climate controls type of soils, agriculture and variety of cultivated crops which are indirectly related to market economy.

Average temperature of the coldest month, December is 21.39 °C and annual rainfall is less than 2.54 mm. Meikhtilar Township has a tropical steppe type of climate (BSh) according to Koppen's classification. The location of Meikhtilar Substation is shown in Figure 3.2.



Source: MEPE data on Google Earth

Figure 3.2 Location of Meikhtilar Substation

During the 40 year- period from 1970 to 2009, monthly mean average maximum, mean and minimum temperatures were 34.08 °C, 27.02°C and 19.96°C respectively. April was the hottest month with average mean temperature of 31.11 °C and December was the coldest month with average mean temperature of 21.42°C. During the same period, the average annual rainfall of Meikhtilar Township was 808.74 mm. During this 40 year- period, the noted maximum rainfall was in 1973 with total rainfall of 1172.72 mm.

The least rainfall was 390.14 mm in 1979. Meikhtilar Township has three seasons namely summer (from March to Middle of May), Rainy (from Mid-May to October) and winter (from November to February).

Meikhtilar Township has a good drainage. The distinctive natural drainage patterns are Mondaing Stream, Chaunggauk Stream and their tributaries. Other artificial drainage patterns are Meikhtilar Lake, Mondaing Dam and some smaller ponds and weirs. The drainage pattern of the township is dendritic.

Taungoo Substation

The proposed Taungoo substation is located 13.7 km west of Taungoo City and lies 3 km west of the new Yangon Mandalay Highway Road. It also lies in the Central Basin of Myanmar, its relief is generally flat. The average elevation of the area is about 75 meter above mean sea level. The area is characterized by undulating land surface is the result of gullies erosion. The western part of the area is slightly lower than the eastern part. The location of Taungoo substation is presented in Figure 3.3.



Source: MEPE data on Google Earth
Figure 3.3 Location of Taungoo Substation

Climate

Geographically, the proposed Taungoo substation is situated in Taungoo Township. As the Latitudinal limit of Taungoo Township is between 18° 56' N and 19° 10' N, it falls within the Humid Tropical zone having the Tropical Savanna climate (Koppen's climate classification). It has relatively hot summer and moderate cool seasons, as well as it has well-marked wet and dry seasons. The main source of precipitation is from southwest monsoon wind. The raining season (i.e., wet, humid season) normally starts from middle of May, sometime it starts earlier from the month of April, until end of October. Dry season can be divided into two: Hot Dry season (i.e., from middle of March to middle of May) and Cool Dry season (i.e., from November to February) respectively.

The annual average temperature is 26.37 °C (79.5°F), its hottest month's average temperature is 31.42°C (88.6°F) in April and the coolest month's average temperature occurred in December with 20.85°C (69.5°F).

From 1950 to 2005, the total average annual perception is 1,574.2 mm (61.98 inches). The highest rainfall of Taungoo Township was 2,573 mm (101.3 inches) recorded in 1999 and the lowest rainfall of township was 1,363 mm (53.66 inches) recorded in 1998. During 1950 to 2005 amount of annual rainfall varied through time. Five Year Running Mean shows fluctuation of rainfall. Its standard deviation was 254 mm (10 inches) and 95.45 % of studied years from 1950 to 2005 (55 years) in other word 52 years have rainfall ranged from 1,456 mm (57.32 inches) to 2,474 mm (97.40 inches).

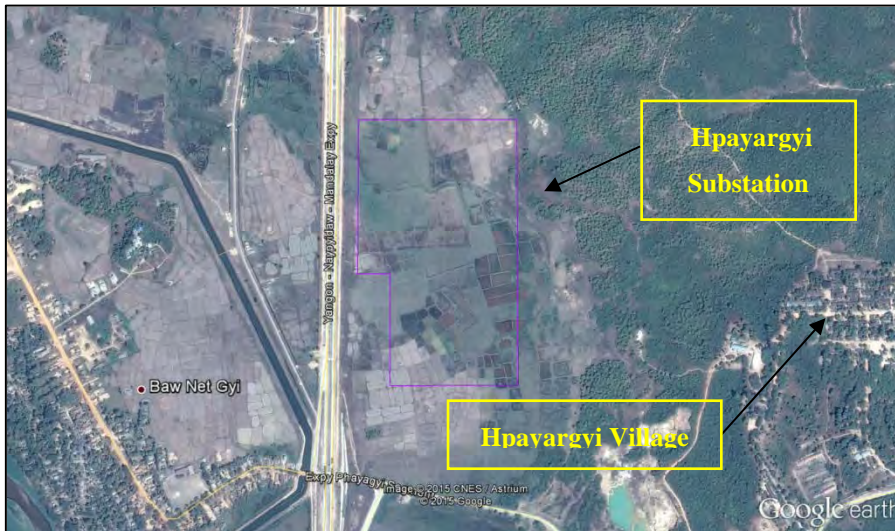
Precipitation distributes unevenly through the year. Most of precipitation falls during May and October. It means that 96.7 % of total rainfall occurs in 6 months from May to October. June, July and August receive highest rainfall and December, January, February and March have little or no rain. But during last 15 years (1990-2005) rainfall distributes more in pre-monsoon period (April and May) it can be assumed that rainfall pattern has changed. It depends on the monsoon wind and cyclones forming in the bay of Bengal. Since cultivation has depended on the precipitation, changes in the rainfall pattern should be taken into consideration in the pursuit of agriculture such as kinds of crop, methods of agriculture practices.

Hpayargyi Substation

The proposed Hpayargyi substation is located 7.3 km west of Hpayargyi village and lies 0.25 km east of new Yangon-Naypyidaw Highway Road. Physiography of the substation area is low and flat in the west and with a general elevation of about 20 meters above sea level and rolling hill occupied by the eastern part of the area.

The climate condition of the substation area and surrounding especially Bago City is receiving high temperature throughout the year (Over 23.89°C) is attributable to its

latitudinal location. Annual rainfall also is abundant owing to its proximity to the sea. Annual average temperature is 80°F. April is the hottest month with 26° C and January is the coolest month with 23.89°C. As it is only 92.65 km away from the sea. The total annual rainfall is about 3302 mm and highly (over 88 percent of total annual) concentrated during the period from May to October, the rainy season. Figure 3.4 illustrates the location of Hpayargyi substation.



Source: MEPE data on Google Earth
Figure 3.4 Location of Hpayargyi Substation

Climate

Hpayargyi substation is located in Bago Region. Bago has a tropical monsoon climate under the Köppen climate classification system. The city features a lengthy rainy season from April through November where a substantial amount of rainfall is received and a relatively short, dry season from December through March, where little rainfall is seen.

It's primarily due to the heavy precipitation received during the rainy season that Yangon falls under the tropical monsoon climate category. During the course of the year, average temperatures show little variance, with average highs ranging from 29 to 36 °C (84 to 97 °F) and average lows ranging from 18 to 25 °C (64 to 77 °F). The hottest time of year in Yangon is in April when it is 30.65°C (87.2°F) on average, but could get up to 37°C (98.6°F) maximum. On the other hand, the coldest time of year is in January when it is 25.05°C (77.1°F) on average, but could get down to 17.9°C (77.1°F) minimum.

According to the meteorological data by Department of Meteorology and Hydrology, the mean annual temperature is 27.4°C (81.32°F). The mean monthly temperature is highest in April with 30.4°C (86.72°F) and lowest in January with 25.0°C (77°F). Except December

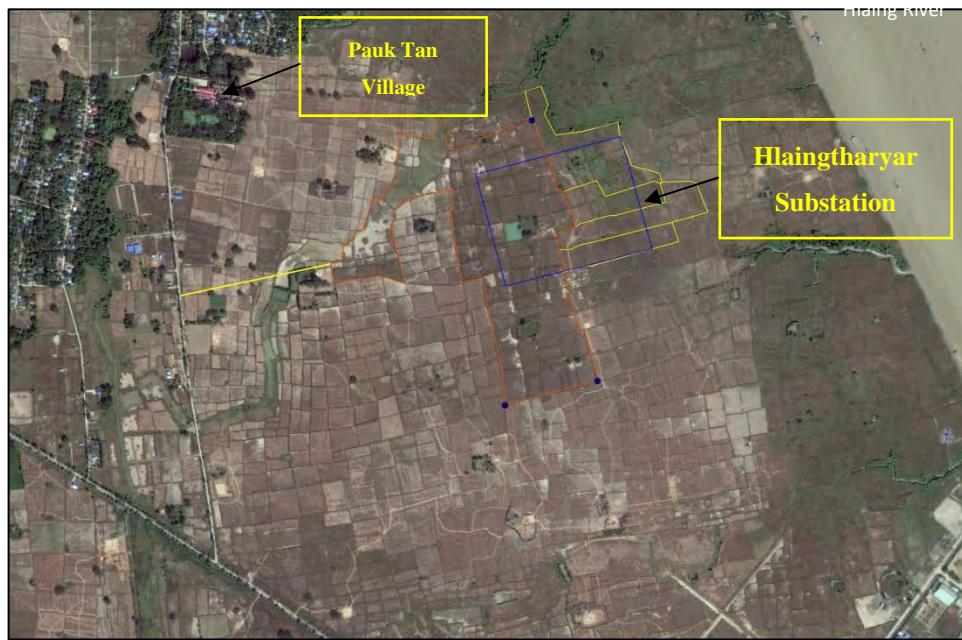
and January, the monthly temperatures are above 25.0°C (77°F). The annual range of temperature is fairly small with 5.7°C (42.26°F). There is very little or no difference in climatic conditions within the study area.

The southwest monsoon wind is the main source of rain and the study area receives rain during the period from May to October. The mean annual amount of rainfall is 2787 mm (109.72 inches). The rain sharply decreases from November onwards and it is almost nil from December to March. According to Koppen's Climatic classification, the type of climate is Tropical Monsoon (Am), characterized by alternate wet and dry seasons.

Hlaingthayar Substation

Proposed substation is located 1.7 km west of Shwepyithar Industrial zone and lies 1 km west of the Hlaing River. Physiography of the substation area is low and flat with a general elevation of about 5 meters above sea level. The area along the western bank of Hlaing River is relatively lower and liable to inundation in the rainy season. Tidal action affects areas near sea level that are more or less plains. Thus, tidal channels collectively form a special drainage pattern known as tidal flat.

The main streams of the Township are the Hlaing and Panhlaing rivers. The Hlaing River serves as the eastern boundary for about 13.72km (8.53mile). The river is the southern continuation of the Myitmakha River and it flows south as the Yangon River into the Gulf of Mottama. Kasin, Shwelinpan, Sulatan, Tharyargon and Nyaungchaung creeks flow from the west into the Hlaing River. In response to seasonal rain, the depth and velocity change markedly between the wet and dry seasons in the river. Figure 3.5 represents the location of Hlaingthayar Substation.



Source: MEPE Data on Google earth
 Figure 3.5 Location of Hlaingtharyar Substation

Climate

Hlaingtharyar substation is located in Yangon Region. Yangon has a tropical monsoon climate under the Köppen climate classification system. The city features a lengthy rainy season from April through November where a substantial amount of rainfall is received and a relatively short, dry season from December through March, where little rainfall is seen. It's primarily due to the heavy precipitation received during the rainy season that Yangon falls under the tropical monsoon climate category. During the course of the year, average temperatures show little variance, with average highs ranging from 29 to 36 °C (84 to 97 °F) and average lows ranging from 18 to 25 °C (64 to 77 °F). The hottest time of year in Yangon is in April when it is 30.65°C (87.2°F) on average, but could get up to 37°C (98.6°F) maximum. On the other hand, the coldest time of year in Yangon is in January when it is 25.05°C (77.1°F) on average, but could get down to 17.9°C (77.1°F) minimum.

According to the meteorological data from Kaba Aye station, the mean annual temperature is 27.4°C (81.32°F). The mean monthly temperature is highest in April with 30.4°C (86.72°F) and lowest in January with 25.0°C (77°F). Except December and January, the monthly temperatures are above 25.0°C (77°F). The annual range of temperature is fairly small with 5.7°C (42.26°F). There is very little or no difference in climatic conditions within the study area.

The southwest monsoon wind is the main source of rain and the study area receives rain during the period from May to October. The mean annual amount of rainfall is 2787 mm

(109.72 inches). The rain sharply decreases from November onwards and it is almost nil from December to March. According to Koppen's Climatic classification, the type of climate is Tropical Monsoon (Am), characterized by alternate wet and dry seasons.

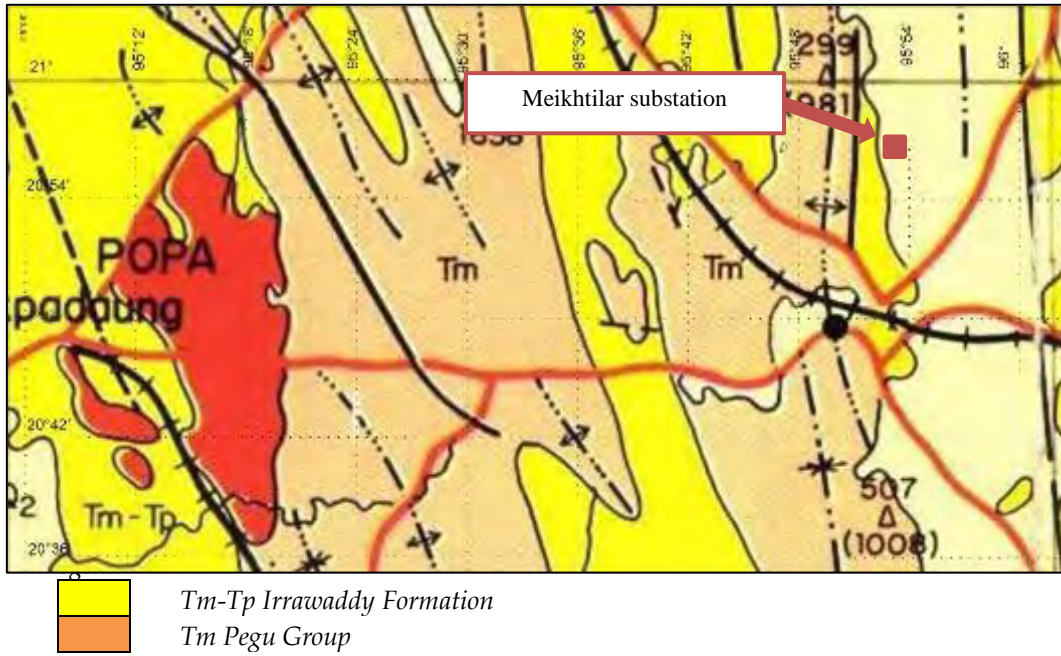
Geologic Setting of Substations and 500 kV Transmission Line

Myanmar can be subdivided into three main north-south trending linear geotectonic provinces, namely (from east to west) the Shan Plateau, the Central Cenozoic Belt (Myanmar Central Basin) and the Western Ranges (Indo - Burma Ranges).

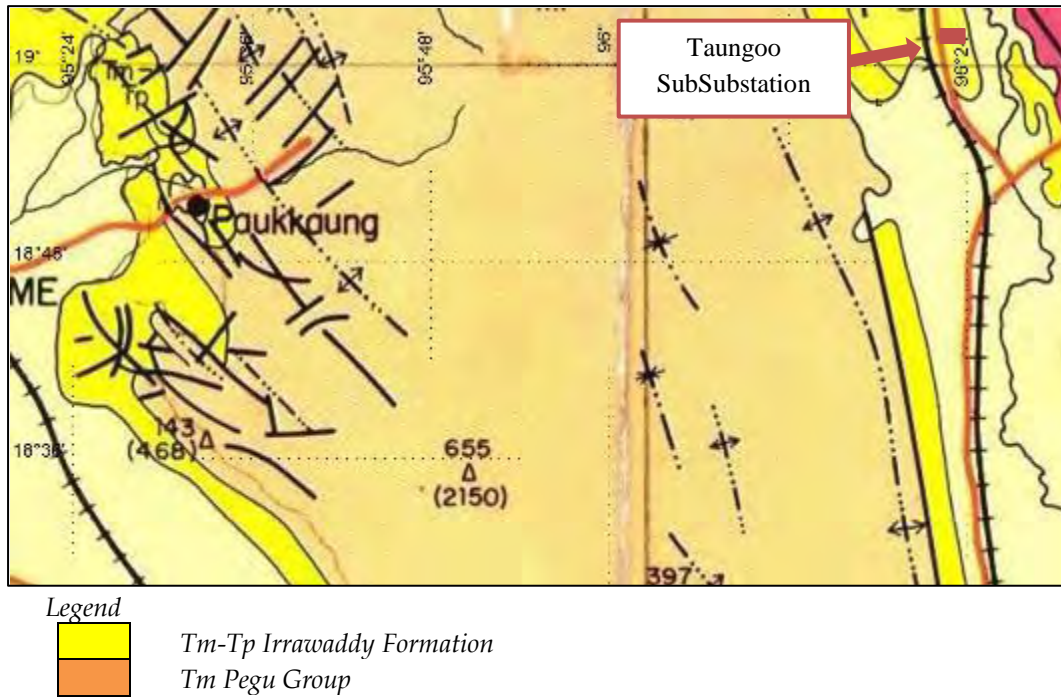
The central Cenozoic Belt is relatively low lying province situated in Central Myanmar. The Myanmar Central Basin is NS elongated and composed of en-echelon several sub-basins, such as Ayeyarwaddy, Pyay, Salin (Minbu), Shwebo and Hukaung basins from south to north respectively. The strata within the basin are dominantly thick westward and the western part of the basin is bounded by the Indo-Burma ranges.

The Myanmar Central Basin is interpreted to be a fore arc basin for northeastward seduction (to the west) of the Bengal oceanic crust beneath Myanmar (Win Swe, 1981a). No subduction related volcanism, however, has been documented in central Myanmar, except for the Mount Popa volcano, located in the central part of the Basin. The East of the Basin is bounded by the Shan plateau is a topographic high, with an average elevation of about 1000 m and mostly composed of Paleozoic and continental Mesozoic sedimentary rocks. The rocks encountered in the Meikhtilar and Taungoo areas are mainly composed of Tertiary mollassic sediments of upper Pegu Group and Irrawaddy Formation, during Miocene to Pliocene in age.

Upper Pegu Group is composed of bluish gray shale, yellowish and brownish sandstone and sandy limestone, whereas the Irrawaddy Formation is characterized with subordinate amount of clays and abundant fossil woods. Irrawaddy Formation overlies the upper Pegu Group with an unconformity. The regional geology of Meikhtilar and Taungoo substation areas and their environments are shown in Figure 3.6 and Figure 3.7 respectively. The figures are reproduced from the Geological Map of the Union of Myanmar (1977).

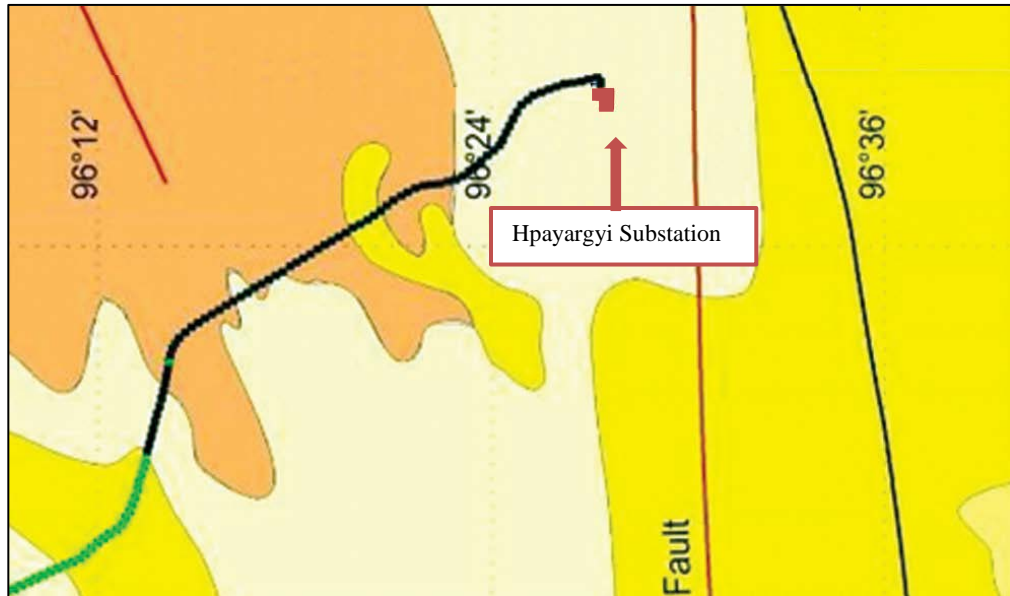




Source: REM on 1:1000000 Scales Geological Map of Myanmar, 1997
 Figure 3.6 Geological Condition of Meikhtilar Substation



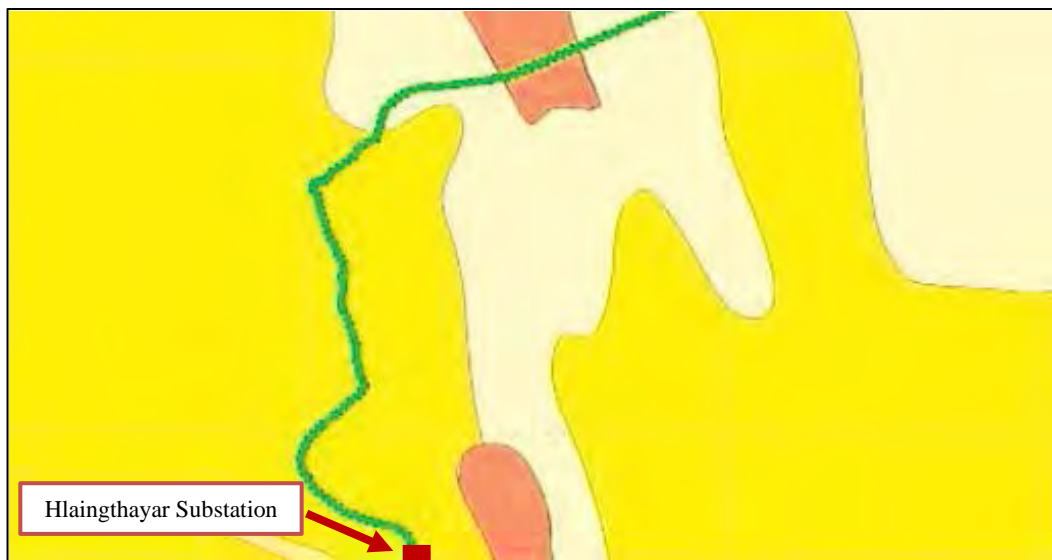
Source: REM on 1:1000000 Scales Geological Map of Myanmar, 1997
 Figure 3.7 Geological Condition of Taungoo Substation



Maps representing the geological conditions of Hpayargyi and Hlaingthayar Substations are described in Figure 3.8 and Figure 3.9 respectively.



Legend
 Tm-Tp Irrawaddy Formation
 Tm Pegu Group

Source: REM on 1:1000000 Scale Geological Map of Myanmar, 1997
Figure 3.8 Geological Condition of Hpayargyi Substation



Legend
 Tm-Tp Irrawaddy Formation
 Tm Pegu Group

Source: REM on 1:1000000 Scale Geological Map of Myanmar, 1997
Figure 3.9 Geological Condition of Hlaingthayar Substation

3.2 Pollution Control

3.2.1 Air Quality

The air quality of the area was not measured during the study and there are no secondary data available for the area. There are no major sources of air pollution in the area. Some minor air pollution sources are mostly mobile sources car, motorbike in village tracks, highway road and emissions from boat and ships in the Bago River and the Hlaing River.

3.2.2 Water Quality

Existing groundwater quality was not measured during the study and there are no secondary data available for the area. The main water bodies along the transmission line between Hpayargyi and Hlaingthayar Substation are Bago River and Hlaing River. Transportation purpose is the main activity of both rivers. The main source of water pollution in the rivers are discharges of municipal sewage and surface runoff from cities and surrounding agricultural area as well as ships and boats operating in the both Rivers.

3.2.3 Terrestrial and Aquatic Environment

The substations and 500 kV transmission line area is mainly agricultural area with patches of rain forest. The Bago and Hlaing River is the main habitat for aquatic life in the area. Biodiversity survey of the local terrestrial and aquatic flora and fauna was not carried out during the study and secondary information specifically for the project area is not available.

A general description of the terrestrial and aquatic environment of the Taungoo and Bago, which the project area is part of, is provided here. Three major habitat types were observed namely (1) mixed vegetation with scattered trees, (2) rice field and rubber plantation and (3) aquatic habitat. According to the literature survey, there is no threatened plant and animal species in the proposed substations and along the 500kV transmission line area and the overall habitat value is assumed to be moderate.

3.3 Social Environment

3.3.1 Social Setting

The proposed transmission line will pass through two regions namely Bago and Yangon. Yangon City has the largest population in Myanmar with 5.9 million people in 2014 growing 2.2% annually. Yangon City, the highly urbanized city, is located 34 km (21 miles) in lands from the mouth of Yangon River and a part of Yangon Region. The City municipal areas have about 599.92 km² which consists of 33 townships. There is huge expansion of new towns in the vicinity of Yangon. The City is with 14.3% of national population of 51,419,420 and over 50% of GDP. Geographically, Bago is one of the cities and the capital of Bago Region. It is located 80 km (about 50 miles) from Yangon and between the forested Bago Mountains (West) and the Sittaung River (east). Total population in Bago City is about 0.28 millions.

The proposed transmission line will transverse through Bago district located in Bago Region and Northern Yangon District in Yangon Region and covers four townships which are Bago, Hlegu, Hmawbi and Htantabin Townships.

One substation associated transmission line with is located in Meikhtilar area of Mandalay Region, Upper Myanmar which has different climate and geographical characteristics in comparison with the regions of Bago and Yangon. Bago Region embraces two substations (Hpayargyi and Taungoo) and the rest is located in Yangon Region.

3.3.2 Affected Population

The ROW and Substations will affect land within the village boundaries of 24 villages. Within these 24 villages, 145 households will be directly affected by construction of the transmission line and 54 households will be affected by construction of the substations. Table 3.4 and Table 3.5 describe the number of affected households identified during the initial social survey in October 2013 and March 2015.

Table 3.4 Affected Households by the proposed line

No.	Township	Name of Village	Affected Households
1	Bago	Hlaw Kar	9
		Sit Pin Seik	9
		Baw Net Kye	4
2	Hlegu	Kyar Inn Ah Shae	11
		Nante	12
		Sar Bu Taung	3
		Gwe Tauk Eain	8
		Min Kone	6

3	Hmawbi	Min Yower	4
		War Pa Taw	4

No.	Township	Name of Village	Affected Households
		Bant Bawe Kone	6
		Inn Gyin Kone	8
		Hle Ngote Chaung	8
		Hla Pa Dar	4
		Let Pan Tan Su	9
		Ye Paw The	11
		Moe Kyo Pyit	5
4	Htantabin	Htain na	11
		Deik Kone	4
		War Ta Yar	3
		Pauk Tan	4
		Ka Lain	1
Total			145

Source: Field Survey, October 2013 and March 2015.

Table 3.5 Affected Households by the proposed substations

No.	Substation	Name of Village	Affected Households
1	Meikhtilar	Kan Koun	4
2	Taungoo	Kutthit	26
3	Hpayargyi	Baw Net Kye	13
4	Hlaingthayar	Pauk Tan	11
Total			54

Source: Field Survey, October 2013 and March 2015

The average household size for the project affected villages is 4.4 persons per household. War Pa Taw village, Hmawbi Township and War Ta Yar Village, Htantabin Township of 6.37 and 6.19 persons per household are the highest average household size in all affected villages.

3.3.3 Ethnicity, Religion and Cultural Heritage

Myanmar identifies eight major national ethnic races (which comprise 135 "prominent" ethnic groups), which include the Bamar (68%), Shan (9%), Kayin (7%), Rakhine (4%), Mon (2%), Kayah, and Kachin. However, the government classification system is flawed, because it groups ethnic groups under ethnic races by geography, rather than by linguistic or genetic similarity (e.g. the Kokang are under the Shan ethnic race, although they are ethnic Chinese).

Unrecognized ethnic groups include Burmese Indians and Burmese Chinese, who form 2% and 3% of the population respectively. The remaining 5% of the population belong to small ethnic groups such as the remnants of the Anglo-Burmese and Anglo-Indian communities, as well as the Lisu, Rawang, Naga, Padaung, Moken, and many minorities across Shan State.

Ethnicity in the project area include Bamar, Kayin, Mon and Chin. Majority of people are Bamar (86.4%) followed by Karen people (11.6%). Population of Buddhists (89.1%) followed by Christian (10.5%). Table 3.6 details the ethnicity and religion in project.

Table 3.6 Main Ethnicity and Religion by villages in affected area

No.	Township	Name of Village	Ethnicity (%)				Religion (%)	
			Bamar	Karen	Mon	Chin	Buddhist	Christian
1	Bago	Hlaw Kar	87.9	7.4	2.5	0	87.9	7.4
		Sit Pin Seik	97.2	0	2.4	0.3	100	0
		Baw Net Kye	95.9	2.25	1.6	0	98	2
2	Hlegu	Kyar Inn Ah Shae	99.5	0.52	0	0	99	1
		Nante	90	0.07	0	0	100	0
		Sar BuTaung	63.4	36.4	0	0.58	64	36
		Gwe Tauk Eain	90	6.4	0	0	90	7
		Min Kone	96.2	1.5	0.7	1.3	98	2
3	Hmawbi	Min Yower	57.1	42.8	0	0	57	43
		War Pa Taw	98.2	1.7	0	0	98	2
		Bant Bawe Kone	99.2	0.55	0.1	0	99	1
		Inn Gyin Kone	87.2	9.43	0	0	90	10
		Hle Ngote Chaung	88.8	11.33	0	0	88	12
		Hla Pa Dar	87.4	12.6	0	0	88	12
		Let Pan Tan Su	84	2.57	0	0.31	97	3
		Ye Paw The	54	46	0	0	54	46
		Moe Kyo Pyit	61	39	0	0	60	40
4	Htantapin	Htantabin	93	7	0	0	93	7
		Deik Kone	100	0	0	0	100	0
		War TaYar	100	0	0	0	100	0
		Pauk Tan	100	0	0	0	100	0
		Ka Lain	71	27	1	0	97	0.02

Source: Field Survey, March 2015

3.3.4 Total Village Land Use in Project Area

Project area is comprised with various types of land. The collected data from the 24 villages which include in the project area under consideration shows that Hlegu township has the largest village land with 58,827 acres followed by Hlegu region with a total of 11,281 acres. Table 3.7 indicates the various land distribution status of each village within project area.

Table 3.7 Land Use

No	Township	Name of Village	Type of land (Use) (Ha)										Total
			Residential	Public	Religious	Agriculture	Protected Forest	Protected Forest	Tree Plantation	Community land	Dams	Others	
1	Bago	Hlaw Kar	1018	3	3	1300	0	0	0	7	0	0	2331
		Sit Pin Seik	19	1	8	1001	0	0	0	5	0	0	1034
		Baw Net Gyi	42	15	1724	413	0	0	0	52	0	0	2246
2	Hlegu	Kyar Inn Ah Shae	17	3	205	950	0	0	0	50	21	0	1246
		Nante	4371	1	41	790	0	0	0	7	42	7	5259
		Sar Bu Taung	119	1	20	968	0	0	0	50	120	0	1278
		Gwe Tauk Eain	101	2	19	450	0	0	0	93	81	0	746
		Mine Kone	600	12	16	50	0	0	0	15	0	0	693
3	Hmawbi	Min Yower	650	3	5	719	0	0	0	101	0	0	1478
		War Pa Taw	100	22	10	600	0	0	0	60	0	0	792
		Bant Bawe Kone	120	2	6	513	0	0	0	30	0	0	671
		Inn Gyin Kone	433	1	4	521	0	0	0	41	0	0	1000
		Hle Ngote Chaung	92	8	6	780	0	0	0	34	0	0	920
		Hla Pa Dar	170	2	12	510	0	0	0	10	0	0	704
		Let Pan Tan Su	700	2	10	1998	0	0	0	14	0	0	2724
		Ye Paw The	220	5	3	590	0	0	0	12	0	0	830
		Moe Kyo Pyit	17	3	4	360	0	0	0	14	0	0	398
4	Htantapin	Htantabin	900	0	8	2	0	0	0	2	0	0	912
		Deik Kone	18	2	0	1185	0	0	0	3	0	0	1208
		War Ta Yar	243	2	3	290	0	0	0	5	0	0	543
		Pauk Tan	18	4	4	542	0	0	0	2	0	0	570
		Ka Lain	28	5	2	268	0	0	0	2	0	0	305
Substations													
5	Meikhtilar	Kan Koung	20	0	1	607	0	0	0	0	0	0	628
6	Taungoo	Sabaloo Kwithit	10	0	0	48	0	1	0	0	0	0	59
7	Hpayargyi	Baw Net Kye	42	15	1724	413	0	0	0	52	0	0	2246
8	Hlaingtharyar	Pauk Tan	18	6	4	542	0	0	0	0	0	0	570

Source: Field Survey, March 2015

3.3.5 Average Agriculture Land by Household

Average agriculture land owned by individual household is mentioned in Table 3.8.

Table 3.8 Average Agriculture Land by HH

No.	Township	Village	Farmland (ha)	Garden (ha)
1	Bago	Hlaw Kar	1.2	-
		Sit Pin Seik	3.46	-
		Baw Net Kye	1.2	-
2	Hlegu	Kyar Inn Ah Shae	0.4	-
		Nante	3.23	-
		Sar BuTaung	0.4	-
		Gwe Tauk Eain	2.83	-
		Min Kone	3.64	-
3	Hmawbi	Min Yower	207	-
		War Pa Taw	0.4	-
		Bant Bawe Kone	2	-
		Inn Gyin Kone	0.4	-
		Hle Ngote Chaung	0.4	-
		Hla Pa Dar	0.4	-
		Let Pan Tan Su	4	-
		Ye Paw The	2	-
4	Htantabin	Moe Kyo Pyit	5	-
		Htantabin	1.2	-
		Deik Kone	3	-
		War TaYar	2.63	-
		Pauk Tan	2.34	-
		Ka Lain	0.28	0.08

Source: Field survey, March,2015

3.3.6 Vulnerable households

Selection of vulnerability in the project area is considered based on the following factors

1. Single woman headed family
2. Disabled or elderly headed family
3. Poor household who's annual income is below the poverty line as per National Planning department

The number of household which meets the criterion for requiring to be valuable household are described in Table 3.9.

Table 3.9 Vulnerable Household in project area

No.	Township	Village	Project Name	Organization	Type of Project
Transmission Line					
1	Bago	Hlaw Kar	100	90	40
		Sit Pin Seik	10	20	3
		Baw Net Kye	70	50	20
2	Hlegu	Kyar Inn Ah Shae	50	250	60
		Nante	318	100	150
		Sar BuTaung	250	200	10
		Gwe Tauk Eain	200	50	20
		Min Kone	-	350	80
3	Hmawbi	Min Yower	100	50	40
		War Pa Taw	50	60	50
		Bant Bawe Kone	50	20	10
		Inn Gyin Kone	-	69	-
		Hle Ngote Chaung	150	45	50
		Hla Pa Dar	40	60	50
		Let Pan Tan Su	300	50	50
		Ye Paw The	100	60	40
		Moe Kyo Pyit	50	35	6
4	Htantabin	Htain na pin	70	200	20
		Deik Kone	30	15	10
		War TaYar	60	15	-
		Pauk Tan	40	50	15
		Ka Lain	20	25	6
Substation					
5	Meikhtilar	Kan Koung	46	15	14
6	Taungoo	Sapaloo Kwitthit	15	2	15
7	Hpayargyi	Baw Net Kye	70	50	20
8	Hlaingtharyar	Pauk Tan	40	50	15

Source: Field Survey, March 2015

3.3.7 Main Income Source

It is understood that the majority of household within the project area obtain their income mainly from agricultural industry. Table 3.10 indicates the various income sources for the people living in the project area.

Table 3.10 Main Income Source

No.	Township	Village	Agriculture %	Vegetation %	Plantation work %	Shops %	Laboring %	Government Service %	Transport %	Factory work %	Handicraft %	Agriculture (NTFP) %	Collection of NTFPs %
Transmission Line													
1	Bago	Hlaw Kar	75	5	-	10	5	5	-	-	-	-	-
		Sit Pin Seik	60	5	-	10	15	4	1	5	-	-	-
		Baw Net Kye	59	9	1	9	9	6	3	4	-	-	-
2	Hlegu	Kyar Inn Ah Shae	50	10	-	7	15	9	1	5	2	-	-
		Nan Tee	40	8	-	7	30	3	2	5	5	-	-
		Sar Bu Taung	40	5	-	5	15	10	5	10	10	-	-
		Gwe Tauk Eain	50	10	-	3	12	4	4	15	2	-	-
		Min Kone	50	10	-	4	16	5	5	7	3	-	-
3	Mhaw Bi	War Pa Taw	70	5	0	5	5	5	2	5	2	0	-
		MinnYower	60	10	0	5	10	5	3	4	3	0	0
		Bant Bwe Kone	50	5	0	10	10	5	5	10	5	0	0
		Inn Gyin Kone	60	10	0	8	8	4	0	7	3	0	0
		Hle Ngote Chaung	40	10	0	23	7	5	5	5	5	0	0
		Hla Pa Dar	64	8	0	8	4	3	2	7	3	0	0
		Let Pan Tan Su	70	10	0	5	3	5	2	3	2	0	0
		Ye Paw The	68	5	0	3	5	5	7	5	2	0	0
		Moe Gyo Pyit	65	5	0	2	3	5	5	10	5	0	0
4	Htantabin	Htainnapin	50	5	-	12	10	3	8	12	-	-	-
		Deik Kone	63	2	-	2	20	5	3	5	-	-	-
		Ye Twin Kone	36	2	-	4	18	10	10	20	-	-	-

No.	Township	Village	Agriculture %	Vegetation %	Plantation work %	Shops %	Laboring %	Government Service %	Transport %	Factory work %	Handicraft %	Agriculture (NTFP) %	Collection of NTFPs %
		Pauk Tan	55	2	-	3	20	10	10	-	-	-	-
		Ka Lain	70	5	-	3	-	7	5	10	-	-	-
Substation													
5	Meikhtilar	Kan Koung	80	-	-	10	5	5	-	-	-	-	-
6	Taungoo	Sapaloo Kwitthit	100	-	-	-	-	-	-	-	-	-	-
7	Hpayargyi	Baw Net Kye	60	10	1	7	9	5	3	5	-	-	-
8	Hlaingtharyar	Pauk Tan	55	2	-	3	20	10	10	-	-	-	-

Source: Field survey, March,2015

3.3.8 Agricultural production

Table 3.11 details the estimated rice production rate of the agricultural land of project area.

Table 3.11 Agricultural Production

No.	Township	Name of Village	Total Agriculture Land(ha)	Monsoon Rice(ha)	Yield (tin-Bucket)	Summer Rice(ha)	Yield (tin-Bucket)
Transmission Line							
1	Bago	Hlaw Kar	467	342	50	125	70
		Sit Pin Seik	1033	714	55	319	85
		Baw Net Kye	413	364	45	121	40
2	Hlegu	Kyar Inn Ah Shae	105	66	40	38	35
		Nan Tee	986	789	50	196	40
		Sar Bu Taung	1154	95	45	200	60
		Gwe Tauk Eain	488	456	40	32	50
		Min Kone	380	380	40	0	40
3	Hmawbi	War Pa Taw	920	718	30	202	30
		Minn Yower	1184	1004	45	0	40
		Bant Bwe Kone	396	396	20	0	-
		Inn Gyin Kone	479	479	35	0	-

No.	Township	Name of Village	Total Agriculture Land(ha)	Monsoon Rice(ha)	Yield (tin-Bucket)	Summer Rice(ha)	Yield (tin-Bucket)
		Hle Ngote Chaung	801	780	45	21	-
		Hla Pa Dar	540	540	45	0	-
		Let Pan Tan Su	1336	526.3	40	809	-
		Ye Paw The	-	-	60	-	30
		Moe Kyo Pyit	957	957	40	0	40
4	Htantabin	Htainnapin	1274	516	45	758	100
		Daik Kone	363	363	30	-	-
		War Ta Yar	209	209	35	-	-
		Pauk Tan	542	542	30	-	-
		Ka Lain	96	84	50	12	100
Substation							
5	Meikhtilar	Kan Koung	202	202	20	-	-
6	Taungoo	Sabaloo Kwithit	75	48	50	40	40
7	Hpayargyi	Baw Net Kye	413	364	40	121	40
8	Hlaingtharyar	Pauk Tan	542	542	30	-	-

Note: one Tin (bucket) is equivalent to 46 Kg

Source: Field survey, March,2015

3.3.9 Level of Rice Supply

Even though major stable food in the study region is rice and primary industry is indicated as agriculture, the survey area has voiced that rice yield area is not enough for their consumption. Table 3.12 shows the level of rice supply in the study area.

Table 3.12 Level of Rice Supply

No.	Township	Village	Rice Enough (%)	Not Enough(%)			
				Yearly (%)	9-12 Month (%)	6 Month (%)	3 Month (%)
Transmission Line							
1	Bago	Hlaw Kar	50	50	-	-	-
		Sit Pin Seik	35	65	-	-	-
		Baw Net Kye	30	70	-	-	-

No.	Township	Village	Rice Enough (%)	Not Enough(%)			
				Yearly (%)	9-12 Month (%)	6 Month (%)	3 Month (%)
2	Hlegu	Kyar Inn Ah Shae	30	70	-	-	-
		Nante	20	80	-	-	-
		Sar BuTaung	50	50	-	-	-
		Gwe Tauk Eain	30	70	-	-	-
		Min Kone	20	80	-	-	-
3	Hmawbi	Min Yower	5	60	15	10	10
		War Pa Taw	30	70	-	-	-
		Bant Bawe Kone	-	100	-	-	-
		Inn Gyin Kone	10	30	35	15	10
		Hlengote Chaung	40	60	-	-	-
		Hla Pa Dar	30	70	-	-	-
		Let Pan Tan Su	5	20	5	40	30
		Ye Paw The	50	50	-	-	-
		Moe Kyo Pyit	5	15	10	40	30
4	Htantabin	Htantabin	10	40	10	10	30
		Deik Kone	5	35	22	25	13
		War TaYar	10	60	10	10	10
		Pauk Tan	2	23	20	35	20
		Ka Lain	10	90	-	-	-
Substation							
5	Meikhtilar	Kan Koung	0	100	-	-	-
6	Taungoo	Sabaloo Kwitthit	2	98	-	-	-
7	Hpayargyi	Baw Net Kye	30	70	-	-	-
8	Hlaingtharyar	Pauk Tan	2	23	20	35	20

Source: Field survey, March,2015

3.3.10 Type of Tree Planted

According to the Table 3.13 the most planted trees in the areas is rubber which mainly dominants in Bago and Hlegu area. It is followed by cashew net plantation in same townships.

Table 3.13 Type of Tree Planted

No	Township	Village	Rubber (ha)	Eucalyptus (ha)	Teak (ha)	Cashew Nut (ha)	Oil Palm (ha)	Mango (ha)	Others (ha)
Transmission Line									
1	Bago	Hlaw Kar	-	-	-	-	-	-	-
		Sit Pin Seik	3267	-	-	-	-	100	-
		Baw Net Kye	647	1.2	0.4	2.02	-	40.46	-
2	Hlegu	Kyar Inn Ah Shae	-	-	-	-	-	-	-
		Nante	80.93	-	-	-	-	-	-
		Sar BuTaung	202	-	-	-	-	-	-
		Gwe Tauk Eain	920	-	-	920	-	-	-
		Min Kone	1012	-	-	283	-	-	-
3	Hmawbi	Min Yower	-	-	-	-	-	-	-
		War Pa Taw	-	-	-	-	-	-	-
		Bant Bawe Kone	-	-	-	-	-	-	-
		Inn Gyin Kone	-	-	-	-	-	-	4.86
		Hle Ngote Chaung	-	-	-	-	-	-	-
		Hla Pa Dar	-	-	-	-	-	-	4.04
		Let Pan Tan Su	40.46	-	-	-	-	-	-
		Ye Paw The	-	-	-	-	-	-	-
		Moe Kyo Pyit	-	-	-	-	-	-	-
4	Htantabin	Htain na pin	-	-	-	-	-	-	-
		Deik Kone	-	-	-	-	-	2.02	-
		War TaYar	-	-	-	-	-	-	-
		Pauk Tan	-	-	-	-	-	-	-
		Ka Lain	-	-	-	-	-	-	-
Substation									
5	Meikhtilar	Kan Koung	-	-	-	-	-	-	-
6	Taungoo	Sabaloo Kwitih	-	-	-	-	-	-	-
7	Hpayargyi	Baw Net Kye	647	1.2	0.4	2.02	-	40.46	-
8	Hlaingtharyar	Pauk Tan	-	-	-	-	-	-	-

Source: Field survey, March,2015

3.3.11 Main Livestock

Livestock is one of the major incomes of the people living in rural area .Common livestock such as cow, buffalo, pig, sheep and poultry have been raised within their limited control.

Table 3.14shows the numbers of livestock found in the each villages.

Table 3.14 Main Live Stock

No.	Township	Village	Buffalo	Cow	Goat	Pigs	Poultry	Others
Transmission Line								
1	Bago	Hlaw Kar	112	252	200	250	4270	-
		Sit Pin Seik	130	252	100	300	1500	-
		Baw Net Kye	30	20	150	300	500	-
2	Hlegu	Kyar Inn Ah Shae	231	125	15	120	652	-
		Nante	228	220	20	42	105	-
		Sar Bu Taung	150	250	500	700	1200	-
		Gwe Tauk Eain	15	100	-	50	250	-
		Min Kone	20	328	10	50	3200	-
3	Mhaw Bi	Min Yower	20	264	-	450	2000	-
		War Pa Taw	300	86	-	400	11000	-
		Bant Bawe Kone	10	30	-	10	50	-
		Inn Gyin Kone	142	248	20	40	1178	-
		Hle Ngote Chaung	50	120	30	250	1600	-
		Hla Pa Dar	-	70	-	200	1000	300(duck)
		Let Pan Tan Su	-	50	-	100	800	-
		Ye Paw The	20	40	-	100	300	200(duck)
		Moe Kyo Pyit	20	100	-	250	600	-
4	Htan Ta Pin	Htainnapin	34	229	100	260	995	-
		Deik Kone	30	80	10	10	50	50(duck)
		War Ta Yar	5	150	-	5	100	-
		Pauk Tan	43	103	10	15	250	40(duck)
		Ka Lain	-	15	-	100	1000	-

No.	Township	Village	Buffalo	Cow	Goat	Pigs	Poultry	Others
Substation								
5	Meikhtilar	Kan Koun	-	200	500	20	100	300(sheep)
6	Taungoo	Sapaloo Kwitthit	-	10	-	10	50	
7	Hpayargyi	Baw Net Kye	30	20	150	300	500	-
8	Hlaingtharyar	Pauk Tan	43	103	10	15	250	40(duck)

Source: Field survey, March,2015

3.3.12 Market Price of Agriculture Land

Price of agriculture land in the study area varies depending on the location. The land close to road or express way within comfortable assess demands higher price than the land of inner location. Table3.15 details the estimated current market price of land in different township.

Table 3.15 Market Price of Agriculture Land

No.	Township	Village	Near Road Price (MMK)/acre	Inner Land Price (MMK)/acre	Residential Land Price (MMK) (40' x 60')
Transmission Line					
1	Bago	Hlaw Kar	400L	250L	250L
		Sit Pin Seik	280L	125L	150L
		Baw Net Gyi	250L	170L	200L
2	Hlegu	Kyar Inn Ah Shae	350L	150L	200L
		Nante	180L	80L	180L
		Sar Bu Taung	150L	80L	80L
		Gwe Tauk Eain	150L	80L	80L
		Mine Kone	50L	20L	150L
3	Hmawbi	Min Yower	200L	120L	150L
		War Pa Taw	400L	100L -120L	200L
		Bant Bawe Kone	180L	100L	150L
		Inn Gyin Kone	180L	100L	150L
		Hle Ngote Chaung	300L	300L	250L

No.	Township	Village	Near Road Price (MMK)/acre	Inner Land Price (MMK)/acre	Residential Land Price (MMK) (40' x 60')
		Hla Pa Dar	400L	250L	450L
		Let Pan Tan Su	180L	110L	220L
		Ye Paw The	200L	120L	180L
		Moe Kyo Pyit	180L	110L	175L
4	Htantabin	Htainnapin	600L	350L	350L
		DeikKone	650L	370L	350L
		War TaYar	500-800L	350L	350L
		Pauk Tan	540L	350L	350L
		Ka Lain	250L	180L	200L
Substation					
5	Meikhtilar	KanKoung	150L *	20L*	500L
6	Taungoo	Sapaloo Kwithit	35L *	15L*	350L
7	Hpayargyi	Baw Net Gyi	250L	170L	200L
8	Hlaingthayar	Pauk Tan	540L	350L	350L

*Data from REM field survey, Oct,2013

Source: Information from Real Estate, March, 2015

3.3.13 Level of Education

According to Table 3.16 provided below, the highest number of student has attended primary school and male student % has higher schooling rate in comparison with female.

Table 3.16 Level of Education

No.	Township p	Name of Village	College/U university (%)		Finish High School (%)		Finish Middle School (%)		Finish Primary School (%)		Primary (part) (%)		No School	
			Total	Female	Total	Female	Total	Female	Total	Female	Total	Female	Total	Female
Transmission line														
1	Bago	Hlaw Kar	3	1	0	0	40	25	80	50	90	60	30	25
		Sit Pin Seik	25	15	30	20	50	30	80	50	40	25	1	-
		Baw Net Kye	15	7	10	7	30	10	70	40	90	70	15	10

No.	Township p	Name of Village	College/U university (%)		Finish High School (%)		Finish Middle School (%)		Finish Primary School (%)		Primary (part) (%)		No School	
			Total	Female	Total	Female	Total	Female	Total	Female	Total	Female	Total	Female
2	Hlegu	Kyar Inn Ah Shae	2	0.2	0.5	0.25	3	1.5	3	1	15	7	10	6
		Nante	2	0.6	26	5	14	5	30	15	20	10	10	5
		Sar BuTaung	10	1	30	15	50	20	70	50	80	50	10	5
		Gwe Tauk Eain	9	5	15	10	25	15	50	30	80	55	-	-
		Min Kone	40	28	40	28	20	16	10	5	11	7	-	-
3	Hmawbi	Min Yower	4	2	60	50	20	15	50	40	80	75	10	6
		War Pa Taw	30	20	30	20	50	30	100	60	50	30	10	5
		Bant Bawe Kone	40	25	30	15	15	5	5	2	5	2	5	2
		Inn Gyin Kone	0.2	0.1	25	15	20	10	75	35	8.3	4.4	-	-
		Hle Ngote Chaung	0.11	0.7	1	0.7	50	30	100	70	30	26	1	1
		Hla Pa Dar	30	20	30	20	50	30	100	70	50	30	20	10
		Let Pan Tan Su	20	10	30	25	50	40	90	80	100	80	-	-
		Ye Paw The	10	7	10	5	50	40	100	50	4	2	-	-
		Moe Kyo Pyit	20	20	30	20	60	50	90	70	80	70	-	-
4	Htantabin	Htantabin	20	10	15	10	70	50	90	60	20	10	-	-
		Deik Kone	5	5	10	5	50	40	50	30	20	12	10	5
		War TaYar	30	20	70	50	80	60	100	60	40	15	-	-
		Pauk Tan	5	4	15	12	50	40	5	5	20	15	5	3
		Ka Lain	5	2	15	10	70	60	10	5	10	5	-	-
Substation														
5	Meikhtilar	Kan Koung	2	70	10	50	10	25	50	25	20	50	10	20
6	Taungoo	Sapaloo Kwitthit	2	70	2	30	5	30	63	20	10	50	30	30
7	Hpayargyi	Baw Net Kye	10	7	10	7	30	10	70	40	90	70	15	10
8	Hlaingtharyar	Pauk Tan	5	4	15	12	50	40	5	5	20	15	5	3

Source: Field survey, March,2015

3.3.14 Existing Education Infrastructure

In term of education structure 21 villages out of 24 have their own primary school at least one with more in most villages. One government technical university locates in Hmawbi Township. Table 3.17 indicates the existing education system observed in project area.

Table 3.17 Existing Education System

No.	Township	Name of Village	Primary School	Primary School (affiliated)	Middle School	High School (affiliated)	High School	Technical
Transmission Line								
1	Bago	Hlaw Kar	0	0	0	1	0	0
		Sit Pin Seik	1	0	0	0	0	0
		Baw Net Kye	1	-	-	1	-	-
2	Hlegu	Kyar Inn Ah Shae	5	0	0	0	0	0
		Nante	2	1	1	0	0	0
		Sar BuTaung	10		0	0	0	0
		Gwe Tauk Eain	4	1	0	0	0	0
		Min Kone	3	0	0	1	1	0
3	Hmawbi	Min Yower	2	0	0	0	0	0
		War Pa Taw	4	0	0	0	0	0
		Bant Bawe Kone	1	0	0	0	0	0
		Inn Gyin Kone	2	0	0	0	0	0
		Hle Ngote Chaung	4	3	0	0	0	1
		Hla Pa Dar	0	0	0	0	0	0
		Let Pan Tan Su	1	0	0	0		0
		Ye Paw The	1	1	0	0	0	0
		Moe Kyo Pyit	2	0	0	0	0	0
4	Htantabin	Htantabin	4	-	1	-	-	-
		Deik Kone	-	-	1	-	-	-
		War TaYar	-	-	-	-	1	-

No.	Township	Name of Village	Primary School	Primary School (affiliated)	Middle School	High School (affiliated)	High School	Technical
		Pauk Tan	-	-	1	-	-	-
		Ka Lain	1	-	-	-	-	-
Substation								
5	Meikhtilar	Kan Koung	1	-	-	-	-	-
6	Taungoo	Sapaaloo Kwithit	-	-	-	-	-	-
7	Hpayargyi	Baw Net Kye	1	-	-	1	-	-
8	Hlaingtharyar	Pauk Tan	-	-	1	-	-	-

Source: Field survey, March, 2015

3.3.15 Existing Health Infrastructure

Only ten rural health centers exist in the surveyed area. Most of the villages do not have the health care service provided by government. In addition to that there is no clinic facility facilitated in the area. Table 3.18 illustrates the existing health care facilities in area.

Table 3.18 Existing Health Infrastructure

No	Township	Name of Village	Rural Health Center	Clinics	Nurse	Midwife
Transmission Line						
1	Bago	Hlaw Kar	-	-	-	-
		Sit Pin Seik	2	-	-	-
		Baw Net Kye	-	-	-	-
2	Hlegu	Kyar Inn Ah Shae	5	-	-	-
		Nante	2	1	1	-
		Sar BuTaung	1	-	-	-
		Gwe Tauk Eain	4	1	-	-

No	Township	Name of Village	Rural Health Center	Clinics	Nurse	Midwife
		Min Kone	3	-	-	1
3	Hmawbi	Min Yower	2	-	-	-
		War Pa Taw	4	-	-	-
		Bant Bawe Kone	1	-	-	-
		Inn Gyin Kone	2	-	-	-
		Hle Ngote Chaung	4	3	-	-
		Hla Pa Dar	-	-	-	-
		Let Pan Tan Su	1	-	-	-
		Ye Paw The	1	1	-	-
		Moe Kyo Pyit	2	-	-	-
		4	Htantabin	Htantabin	-	-
Deik Kone	-			-	-	-
War TaYar	-			-	-	-
Pauk Tan	-			-	-	1
Ka Lain	-			-	-	-
Substation						
5	Meikhtilar	Kan Koung	-	-	-	1
6	Htantabin	Sapaloo Kwitthit	-	-	-	1
7	Hpayargyi	Baw Net Kye	-	-	1	-
8	Hlaingtharyar	Pauk Tan	-	-	-	1

Source: Field survey, March, 2015

3.3.16 ElectrificationRate

In the project area, 14 villages in Hlegu, Hmawbi and Htantabin are accessible to power grid and the rest of villages do not have electricity supply. Even in the villages where electricity supply is available, over 50% of villages connected to the grid. Electricity connection of each village varies from 15% to 100 %. The rest of villages totally rely on the battery and candle for lighting purpose. Table 3.19 describes the electrical rating in the study area.

Table 3.19 Electrification Rate

No.	Township	Village	Connect to grid (%)	Generator (%)	Others (%) (Battery, candle)
Transmission Line					
1	Bago	Hlaw Kar	-	20	80
		Sit Pin Seik	-	8	92
		Baw Net Kye	-	2	98
2	Hlegu	Kyar Inn Ah Shae	40	5	55
		Nante	40	-	60
		Sar BuTaung	50	-	50
		Gwe Tauk Eain	15	-	85
		Min Kone	40	-	60
3	Hmawbi	Min Yower	8	-	92
		War Pa Taw	70	-	30
		Bant Bawe Kone	75	-	25
		Inn Gyin Kone	15	85	
		Hle Ngote Chaung	90	-	10
		Hla Pa Dar	60	10	30
		Let Pan Tan Su	-	5	95
		Ye Paw The	-	10	90
		Moe Kyo Pyit	-	5	95
4	Htantabin	Htantabin	30	-	70
		Deik Kone	100	-	-
		War TaYar	-	95	5
		Pauk Tan	100	-	-
		Ka Lain	-	-	100
Substation					
5	Meikhtilar	Kan Koung	-	40	60
6	Taungoo	Sapal Oo Kwat Thit	-	-	100
7	Hpayargyi	Baw Net Kye	-	2	98
8	Hlaingtharyar	Pauk Tan	100	-	-

Source: Field survey, March, 2015

3.3.17 Main Source of Cooking

Very few people use electricity and charcoal for cooking purpose and use of gas is very rare for cooking. The major fuel source for cooking use is locally available fire wood. Table 3.20 indicates the level of main source for cooking.

Table 3.20 Main Source of Cooking

No	Township	Village	Electricity (%)	Wood (%)	Charcoal (%)	Gas (%)	Others (%)
Transmission Line							
1	Bago	Hlaw Kar	-	90	10	-	-
		Sit Pin Seik	-	50	50	-	-
		Baw Net Kye	-	80	20	-	-
2	Hlegu	Kyar Inn Ah Shae	-	90	10	-	-
		Nante	10	90	-	-	-
		Sar BuTaung	30	50	20	-	-
		Gwe Tauk Eain	-	85	15	-	-
		Min Kone	40	60	-	-	-
3	Hmawbi	Min Yower	8	92	-	-	-
		War Pa Taw	30	40	30	-	-
		Bant Bawe Kone	60	25	15	-	-
		Inn Gyin Kone	15	85	-	-	-
		Hle Ngote Chaung	70	25	5	-	-
		Hla Pa Dar	30	40	30	-	-
		Let Pan Tan Su	-	100	-	-	-
		Ye Paw The	-	100	-	-	-
		Moe Kyo Pyit	-	100	-	-	-
4	Htantabin	Htain na pin	30	40	30	-	-
		Deik Kone	70	19.5	10	0.5	-
		War TaYar	-	96	4	-	-
		Pauk Tan	75	10	10	5	-
		Ka Lain	-	100	-	-	-

No	Township	Village	Electricity (%)	Wood (%)	Charcoal (%)	Gas (%)	Others (%)
Substation							
5	Meikhtilar	Kan Koung	-	100	-	-	-
6	Taungoo	Sapaloo Kwatthit	-	100	-	-	-
7	Hpayargyi	Baw Net Kye	-	80	20	-	-
8	Hlaingtharyar	Pauk Tan	75	10	10	5	-

Source: Field survey, March, 2015

3.3.18 Water Supply

The availability of water resources is shown in Table 3.21. Majority of people living in the project area rely on well for water use. It is obvious that there is no facility or distribution network of supply water in the area. Only a few people use river water and rain water sources.

Table 3.21 Water Supply

No.	Township	Village	Tap water (%)	Well (%)	Mountain source (%)	River or stream (%)	Rain (%)
Transmission Line							
1	Bago	Hlaw Kar	-	100	-	-	-
		Sit Pin Seik	-	100	-	-	-
		Baw Net Kye	-	100	-	-	-
2	Hlegu	Kyar Inn Ah Shae		100	0	0	0
		Nante		100	0	0	0
		Sar BuTaung		100	0	0	0
		Gwe Tauk Eain		90	0	10	0
		Min Kone		100	0	0	0
3	Hmawbi	Min Yower	-	100	0	0	0
		War Pa Taw	-	100	0	0	0
		Bant Bawe Kone	-	100	0	0	0
		Inn Gyin Kone	-	100	0	0	0
		Hle Ngote Chaung	-	100	0	0	0
		Hla Pa Dar	-	100	0	0	0

No.	Township	Village	Tap water (%)	Well (%)	Mountain source (%)	River or stream (%)	Rain (%)
		Let Pan Tan Su	-	100	0	0	0
		Ye Paw The	-	100	0	0	0
		Moe Kyo Pyit	-	100	0	0	0
4	Htantabin	Htantabin	-	70	-	20	10
		Deik Kone	-	100	-	-	-
		War TaYar	-	100	-	-	-
		Pauk Tan	-	55	-	-	45
		Ka Lain	-	-	-	50	50
Substation							
5	Meikhtilar	Kan Koung	-	100	-	-	-
6	Taungoo	Sapaloo Kwitthit	-	100	-	-	-
7	Hpayargyi	Baw Net Kye	-	100	-	-	-
8	Hlaingtharyar	Pauk Tan	-	55	-	-	45

Source: Field survey, March, 2015

3.3.19 Community Assistance

INGO such as world vision and UNICEF has supported the community designing education and health programs to the consideration portion of population in all villages but villages in Bago region . Table 3.22 shows the INGO supported project distribution in the project area.

Table 3.22 Community Assistance

No.	Township	Village	Project Name	Organization	Type of Project
Transmission Line					
1	Bago	Hlaw Kar	-	-	-
		Sit Pin Seik	-	-	-
		Baw Net Kye	-	-	-
2	Hlegu	Kyar Inn Ah Shae	-	-	-
		Nante	Education Program	World Vision	Education

No.	Township	Village	Project Name	Organization	Type of Project
		Sar BuTaung	Education Program	World Vision	Education Program
		Gwe Tauk Eain	-	-	-
		Min Kone	-	World Vision	Health
3	Hmawbi	Min Yower	-	-	-
		War Pa Taw	Child Program	World Vision	Development
		Bant Bawe Kone	-	-	-
		Inn Gyin Kone	-	World Vision	Water Supply
		Hle Ngote Chaung	-	-	-
		Hla Pa Dar	Rural Development	World Vision	Education
		Let Pan Tan Su	-	-	-
		Ye Paw The	Child Program	World Vision	Education & Transportation
		Moe Kyo Pyit	Child Program	World Vision	Development
4	Htantabin	Htantabin	-	-	-
		Deik Kone	-	-	-
		War TaYar	-	-	-
		Pauk Tan	-	-	-
		Ka Lain	-	-	-
Substation					
5	Meikhtilar	Kan Koung	Child Program	UNICEF	Health
6	Taungoo	Sapaloo Kwitthit	Child program	UNICEF	Health
7	Hpayargyi	Baw Net Kye	-	-	-
8	Hlaingtharyar	Pauk Tan	-	-	-

Source: Field survey, October, 2013

4. Legal and Administrative Framework

4.1 Laws and Regulations in Myanmar

Table 4.1 shows the list of laws and regulations related to the environmental assessment and land acquisition/resettlement relevant to proposed project.

Table 4.1 Legal Framework on Environmental and Social Considerations

No	Law/Regulation	Year	Key Contents
1	National Environmental Policy	1994	To establish sound environmental policies in utilization of water, land, forest, mineral resources, and other natural resources in order to conserve the environment and to preserve it degradation.
2	Constitution	2008	States the responsibility of all organizations and citizens to protect the natural environment and natural resources of the state
3	Environmental Protection Law	2012	The law lays down the path forward to focus government efforts to accomplish sustainable development and provide basic principles and give guidance for systematic integration of environmental issues in sustainable development
4	The Water Power Act	1927	License requirement of using public water
5	The Underground Water Act	1930	the requirement for systematic use of ground water toward sustainable purpose
6	The Forest law	1996	Implementation of forest policy and environmental conservation policy , to promote the sector of public in implementing these policies, to develop the economy of state, to prevent destruction of forest and biodiversity, to carry out simultaneously conservation of natural forests and establishment of forest plantation and to contribute to the fuel requirement of the country
7	The protection of wildlife ,wild plant and Conservation of Natural Area Law	1994	In order to protect and conserve wild life, wild plants and natural area in accordance with international protocol, Union Government Policy.
8	The protection of preservation of Cultural Heritage Region Law	1998	protecting and preserving the cultural heritage regions and the cultural heritage therein so as not to deteriorate due to natural disaster or man-made destruction

No	Law/Regulation	Year	Key Contents
9	Myanmar Investment Commission Notification	2013	List of projects requiring EIA and IEE report
10	Foreign Investment Rule	2013	Requirement for the comments made by MOECAAF for environmental considerations, requirement for providing health and safety measures
11	The Conservation of Water Resources and River Law	2006	Protection and maintenance of river bank and river water quality by defining the river bank area and forbidding the substance that can harm river water quality
12	Conservation of Water Resources and River Rule	2006	Specification on role and responsibility for maintaining river, permission process for the activities that can damage river resources
13	Environmental Conservation Law	2012	The law lays down the path forward to focus government efforts to accomplish sustainable development and provide basic principles and give guidance for systematic integration of environmental issues in sustainable development
14	The Social Security Law	2012	The employers and workers shall co-ordinate with the Social Security Board or insurance agency in respect of keeping plans for safety and health in order to prevent employment injury, contracting disease and decease owing to occupation and in addition to safety and educational work of the workers and accident at the establishment.
15	EIA Procedure	2014	Contents in EIA, IEE, Project categorization for EIA, IEE requirement and process of ECC.
16	Environmental Conservation Rules	2014	The Ministry shall form the EIA Report Review Body with the experts from the relevant Government departments, organizations and may assign duty to the Department to scrutinize the report of EIA prepared and submitted by any organization or person relating to EIA and report through the EIA Report Review Body, and then may approve and reply on the EIA report or IEE or EMP with the guidance of the Committee

4.2 Environmental Considerations

4.2.1 Environmental Assessment Procedures

EIA/IEE procedures which was prepared by Environmental Conservation Department of MOECFAF in consultation with international experts, NGO, civil societies and environmental representative so fall ministries of Myanmar is come out into effect in 2014. The Environmental Conservation rule categorizes the proposed projects considering their size and other characteristics into three different schedules project required IEE, and project required full EIA and environmentally sensitive areas. In the rule, EIA is defined a tool which includes social impact assessment, environmental management and monitoring plan.

In the review and approval section of EIA, it says that every project proponent who is required to carry out an environmental impact assessment in respect of a proposed project shall prepare an EIA Report detailing every stage of the environmental impact assessment process and its conclusion in a format and within a timeframe as may be prescribed by the Ministry (here Ministry is referred to Ministry of Environmental Conservation and Forestry).

Upon receipt of the IEE/EIA report and the EMP from the project proponent, the Ministry shall invite the relevant agencies, institutions, civil society organizations, and project affected persons, as appropriate, to provide comments and suggestions on the report.

The Ministry shall within a timeframe as may be prescribed, review and evaluate the IEE/EIA report and the EMP, on the basis of prescribed guidelines and the approved terms of reference.

Ministry has the powers and functions relating to the scoping such as to provide guidelines for and approve the terms of reference for the investigation of environmental impacts and for the development of the EIA Report, including the EMP.

If it is determined by the Ministry that any of these documents do not fulfill the requirements as prescribed by the guidelines and the specific terms of reference, then the project proponent shall be called upon to undertake the necessary amendment in accordance with the directives issued by the Ministry. The Ministry on the recommendations of the EIA Committee shall approve the IEE/EIA report as a basis for environmental clearance for implementation of the proposed project either as proposed, or subject to any conditions as maybe prescribed; or refuse to issue environmental clearance for the proposed project and cite reasons for doing so.

If the project has received the environmental clearance, the Ministry shall issue a certificate to the project proponent conferring the environmental clearance and specifying the terms and conditions of implementation and operation of the project, as well as advising the Myanmar Investment Commission or other relevant agencies of the decision and publicizing the decision in appropriate media.

Upon receiving the ECC issued by the Ministry, the project proponent will include the said certificate in submitting any application to the Myanmar Investment Commission or the relevant

authority for a permit to proceed with implementation of the project. When the Myanmar Investment Commission or the relevant authority has given approval to a project for which a certificate of environmental clearance has been issued, it shall communicate such approval to the Ministry.

Upon receipt of the approval by the Myanmar Investment Commission or the relevant authority, the project proponent shall commence implementation of the project according to the conditions attached to the environmental clearance certificate including the EMP within the time as may be prescribed by the Ministry. Following Figure 4.1 represents the necessary processes from preparation of EIA and IEE to the final approval.

According to the Environmental Conservation Rule, the Project is fallen into the category of the project require EIA as "17; Electrical power line project (transmission lines and power station) which the capacity is more than 230 kV (National Grid) with all size of transmission line" and "18; High voltage transformer substation with more than 10ha". Accordingly, after the EIA Rules enacted, MEPE need to conduct EIA in complies with the EIA Rules.

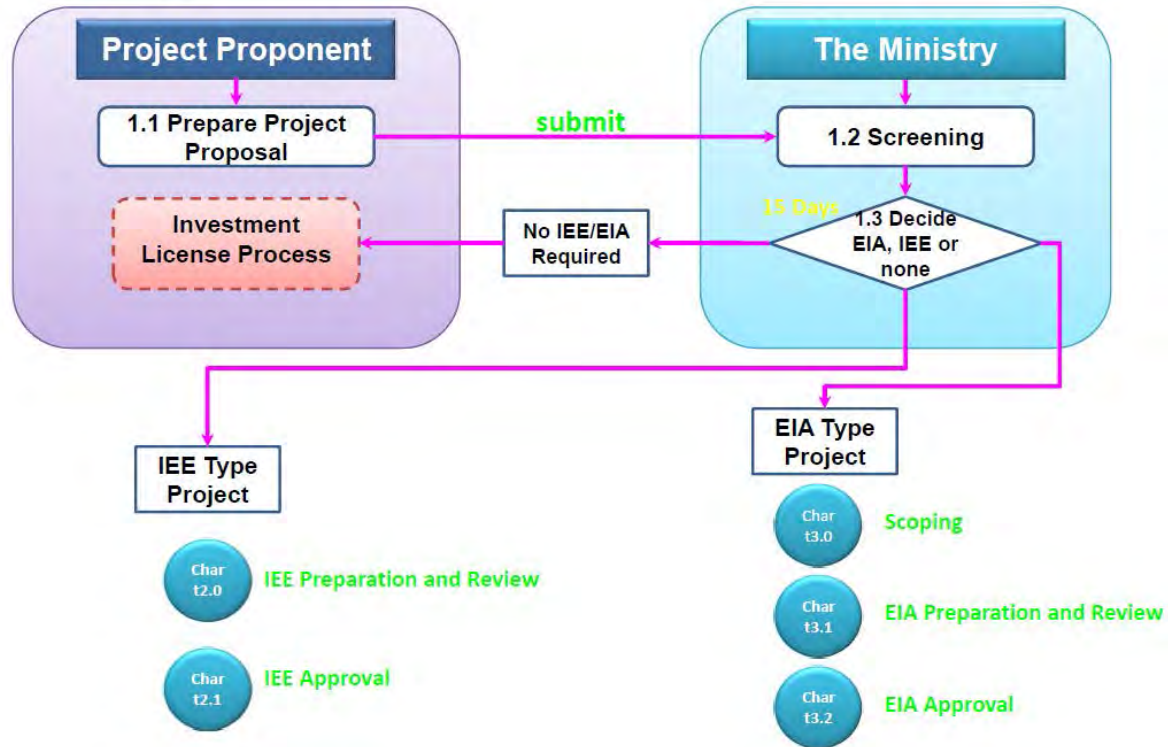
However as a result of consultation with MOECA/ECDF the Project can apply for IEE, since it is an urgent national project and it also fits in the category of Poverty Alleviation Initiatives Since 2010. Poverty Alleviation Initiatives Since 2010 is a Guideline for Rural Development and Poverty Alleviation which Myanmar put priority for development.

Refer to Appendix 7 for Approval Letter for IEE Application.

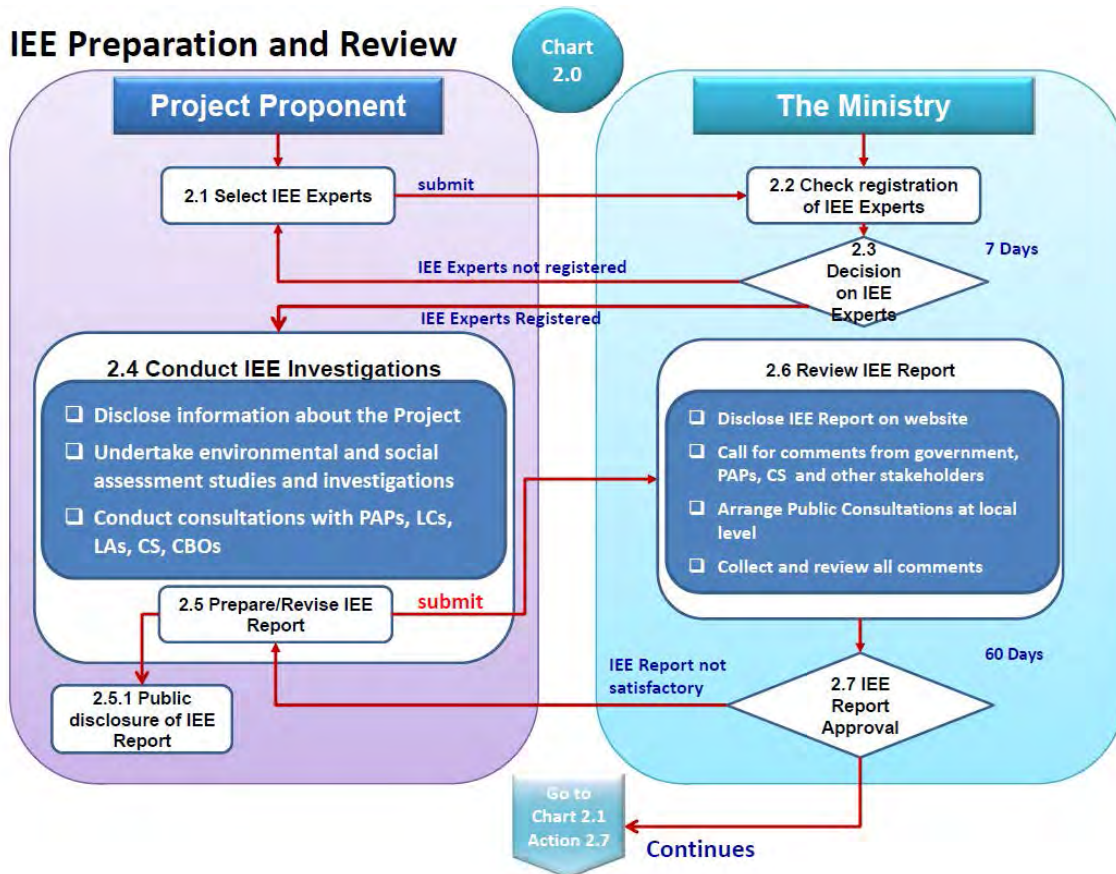
Poverty Alleviation Initiatives Since 2010

1. Development of agricultural production sector
2. Development of rural productivity and cottage industries
3. Development of micro saving and credit enterprises
4. Development of rural cooperative tasks
5. Development of rural socio economy
6. Development of rural energy
7. Environmental conservation

Screening

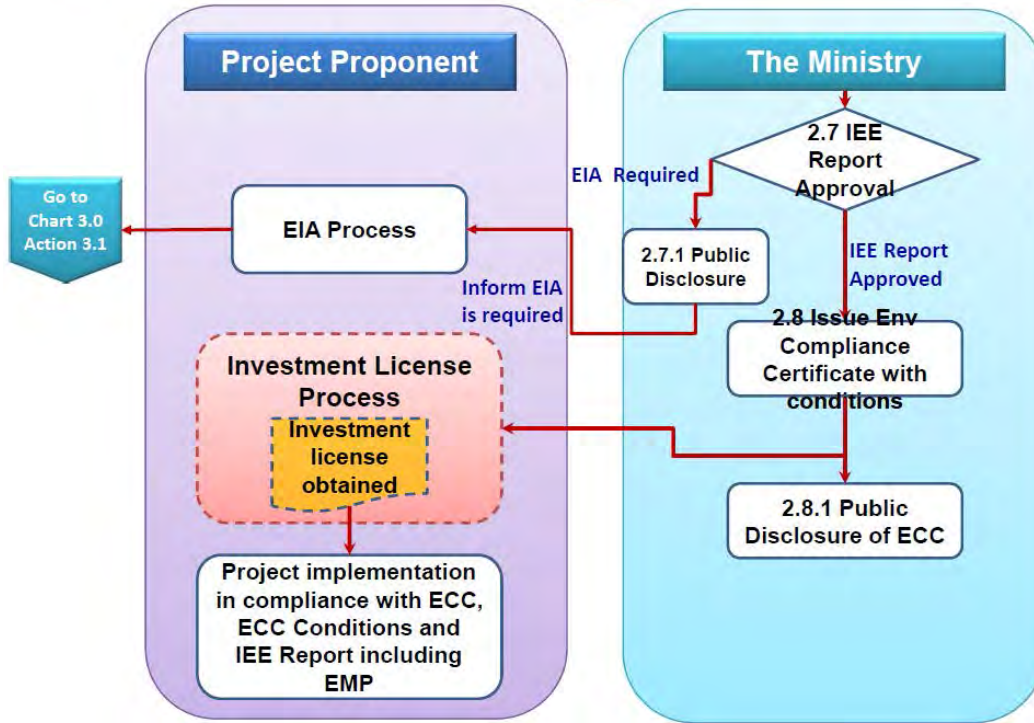


IEE Preparation and Review



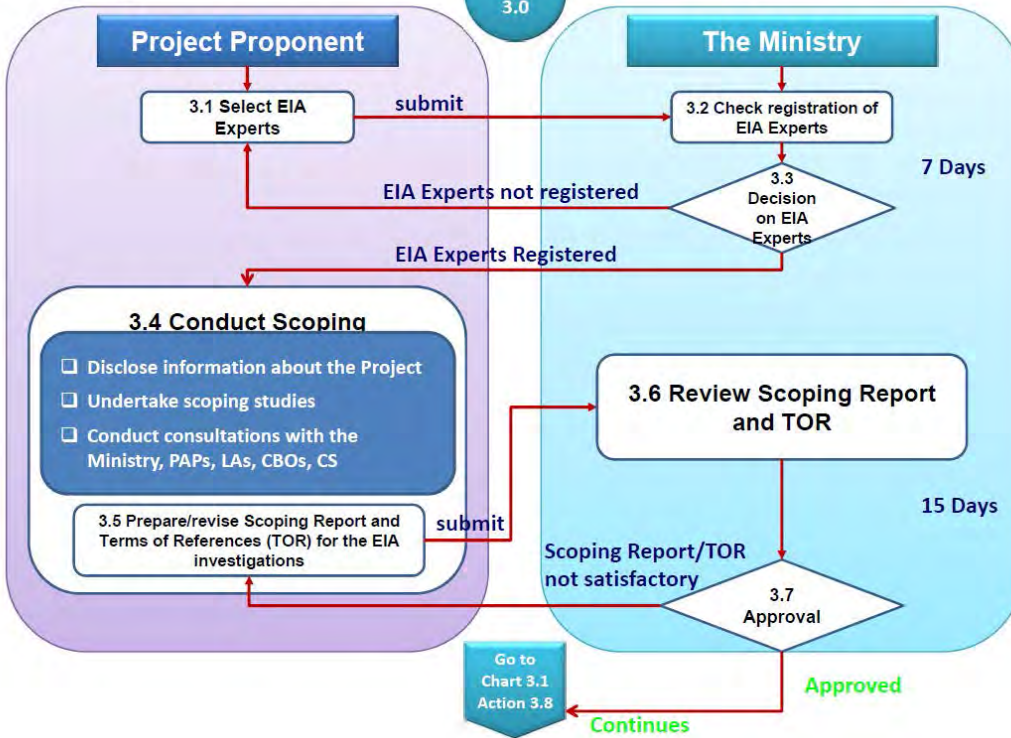
IEE Approval

Chart 2.1



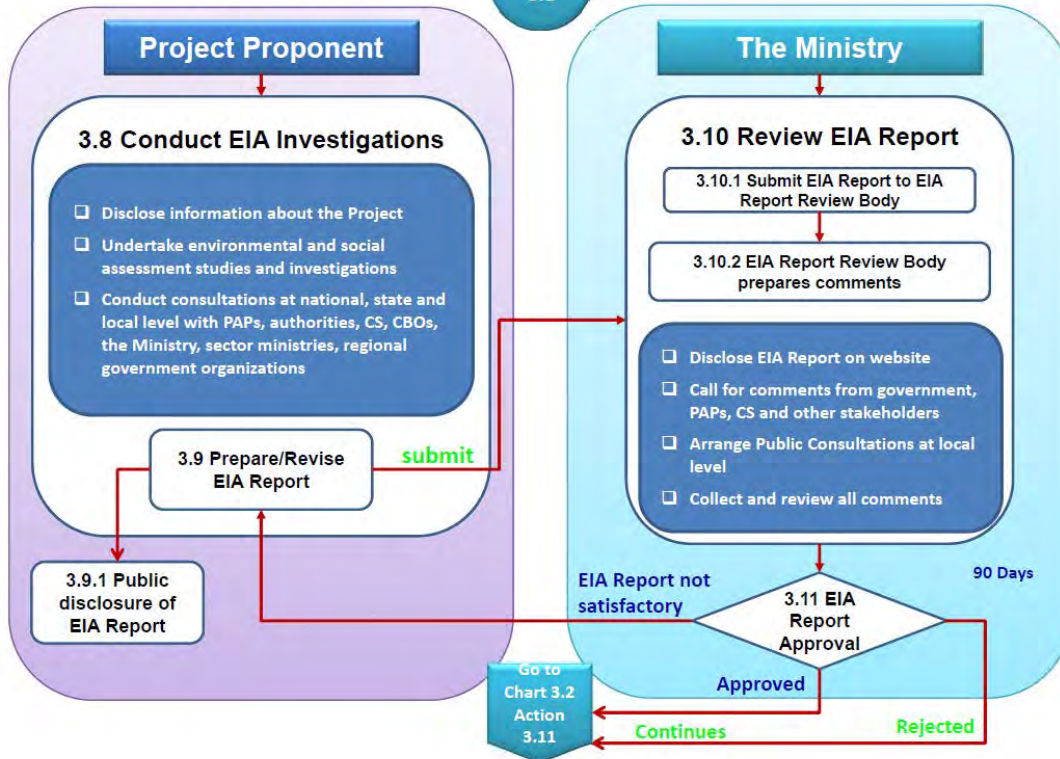
Scoping

Chart 3.0



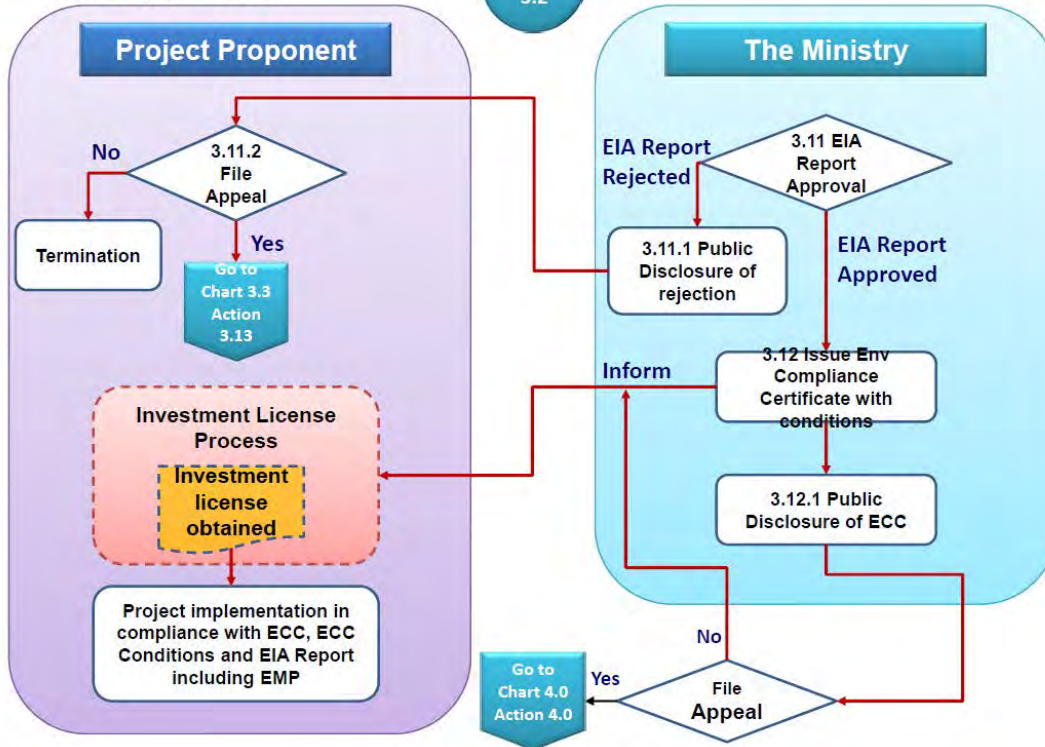
EIA Preparation and Review

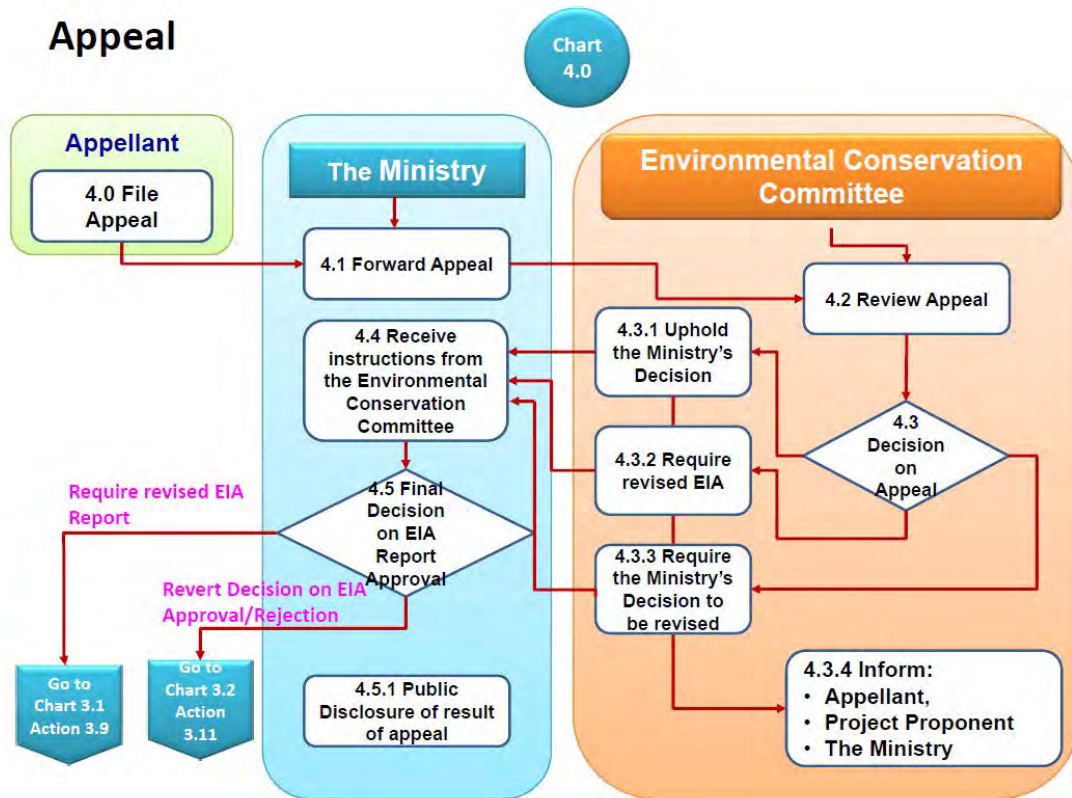
Chart 3.1



EIA Approval

Chart 3.2





Source: ECD, MOECAP
 Figure 4.1 IEE and EIA Process

4.2.2 Environmental Safeguard by JICA

As for the Yen-loan financed project, the project is required to comply with the JICA guidelines for environmental and social considerations (hereinafter referred as “the Guidelines”).

Based on the Guidelines, the project was classified as a Category B project. It is stipulated that “generally the proposed projects are site-specific, few if any are irreversible; and in most cases, normal mitigation measures can be designed more readily”.¹ As for the Category B project, environmental and social considerations studies requires the IEE level including mitigation measures to avoid, minimize or compensate for adverse impact, a monitoring plan and institutional arrangement. It also needs to analyze alternatives covering “without project” situations. Consultations with local stakeholders on the result of the environmental and social considerations studies are conducted for all Category A projects and for Category B projects as needs.

4.3 Social Considerations

4.3.1 Land acquisition and Resettlement Procedures

It was confirmed that the most of lands to be acquired for the Project are categorized as agricultural land. In order to acquire agricultural land to use for public purpose, two main

steps are required. First, the project owner has to get approval from land record department at relevant township for conversion of land from agricultural land to other purposes. Secondly, the project owner has to set compensation price in consulting with compensation committee organized by general administrated department at relevant township. The following is the summery of these procedures.

Conversion of Agricultural Land

According to the Article 29 - 30 in Chapter X of the Farmland law, 2012, application for use of farmlands by other means are permitted for the sake of long-term national interests and planning projects as proposed by Nay Pyi Taw Council or region / state governments or by concerned Union Ministries. The application must be submitted to Union Government with comments given by Central Farmland Management Committee. Only when the approval is received from the Union Government, the project shall be implemented accordingly. The detailed requirements and regulations are shown in Articles 78 - 94 of Chapter IX in Farmland Rules, 2012.

As stated in the Article 80, in case of that if farmlands are required to be used for construction projects which are necessarily related to rural and urban development, such as schools, hospital, dispensary, library, street, bridge, rural market, religious building, cemetery and other necessary buildings, the following requirements should be met with application of the use of lands by other means.

- (a) If it is for school, the approval of Union education ministry and availability of fund.
- (b) If it is for healthcare unit such as hospital or dispensary, the approval of union health ministry and availability of fund.
- (c) If it is for religious building, the approval of union ministry of religious affairs, and availability of fund.
- (d) If it is for other matters, the approval of concerned union ministry and availability fund.

The procedures and steps of the application as shown in the Articles 82 - 90 of the Farmland Rules (2012) are here presented in Table 4.2 for more clarification.

¹2.2 Categorization, JICA Guidelines for Environmental and Social Considerations, 2010

Table 4.2 Procedure and steps of the application of the Farmland Rules (2012)

Step No.	Procedures	Concerning Department	Process	Further Action	Time Taken
1.	<i>Application with Form -14</i>	Township LandRecords Department (TLRD)	Open the dossier for using farmlands by other means on the application	Scrutinizing the requirements as listed in the Article 84 of the Rules	Within 30 days starting from the acceptance date of application
2.	<i>Submitting the application to Township Farmland Management Committee with the comments given by TLRD</i>	Township Farmland Management Committee (TFMC)	Scrutinizing the requirements as listed in the Article 86 of the Rules	the application shall be submitted to Region / State Farmland Management Committee through the District Farmland Management Committee with the comments	Within 15 days starting from the acceptance date of the application in TLRD
3.	If the application of farmlands by other means is for Paddy land (Le)	Region / State Farmland Management Committee (R/S - FMC)	Scrutinizing the application	Continued Submission of the application to Central Farmland Management Committee with the comments given by the Region / State Farmland Management Committee	Within 30 days
4.	If the application of farmlands by other means is except Paddy land	Region / State Farmland Management Committee	Scrutinizing the application which has been passed by step by step	Continued submission of the application to Region / State Government with the comment given by Region / State Farmland Management Committee	Within 30 days
5.	<i>Issuing Form - 15 Approved Permit shall be issued for the Paddy lands</i>	Central Farmland Management Committee(CFMC)	If the application is met with the requirements, the approval shall be issued regarding to the Article 87 (a)	-	-
6.	<i>Issuing Form - 15 A Approved Permit shall be issued for the except Paddy lands which are to be used by other means</i>	Region / State Farmland Management Committee	If the application is met with the requirements, the approval shall be issued regarding to the Article 87 (b)	-	-

Step No.	Procedures	Concerning Department	Process	Further Action	Time Taken
Total time taken for the whole application process until the approval for the use of farmlands by					105 days
7.	Form - 16 Inspection Report on condition of implementations in the granted farmlands for other means, The report is to be submitted in every 6-months basis to Central Farmland Management Committee	Region / State Farmland Management Committee	Field inspections shall be done by DFMC and TFMC into the granted farmlands by using other means. The inspection reports with the photo documents shall be presented to R/S-FMC	If the DFMC and TFMC find that the granted lands is not yet started utilizing by other means or the proposed project is not yet implemented within 6 months from the date of approval, the case shall be opened as a separate dossier, then the report shall be submitted with photo evidences to Region / State Farmland Management Committee	Within 6 months
8.	Presenting the case to Central Farmland Management Committee for necessary actions to be taken	CFMC	Upon receiving the case, CFMC shall analyze and scrutinize the case	After scrutinizing the case, the necessary actions shall be taken as shown in the Article 93.	-
9.	Confiscate the land	Central Farmland Management Committee (CFMC)	CFMC shall confiscate the land as it is revoked under rule (93) (a) or the land revoked by Region / State Government as	-	-

Source: REM

Setting-Up Compensation Price

After obtaining the approval of conversion for the proposed project land from the land record department at relevant township the project owner draft compensation price for the land in consulting with relevant village heads and affected peoples. Then the project owner makes a request to general administrated department at relevant township for organizing a compensation committee in order to scrutinize the drafted compensation price. In general, compensation committee is comprised of project owner, land record department, police officer, agriculture and irrigation department, conservation environment and forestry department and general

administrated department at the relevant township. After the compensation price was finalized at compensation committee, the project owner shall pay the compensation to affected peoples. In case affected people is not satisfied the compensation price, he/she can appeal to the compensation committee to reconsider the price.

Policy Gap between the Government of Myanmar and JICA

Policy gap between Government of Myanmar and JICA are mentioned in Table 4.3.

Table 4.3 Policy Gap between Myanmar and JICA

No.	JICA Guidelines	Legislations of Myanmar	Gap between JICA Guidelines and Laws of Myanmar	Gap filling measures for the Project
1.	Involuntary resettlement and loss of means of livelihood are to be avoided when feasible by exploring all viable alternatives (JICA Guidelines: JICA GL)	Any specific legislations yet to be enacted	-	Alternatives are to be considered in order to avoid involuntary resettlement during project design phase.
2.	When population displacement is unavoidable, effective measures to minimize impact and to compensate for losses should be taken (JICA GL)	Legislations regarding land acquisition are stipulated in the following legislations; 1. 5A (3), Part II in Land Acquisition Act(1894), 2. Article 26 in Farm Land Law and, 3. Article 66 in Farm Land Rules	1. It recognizes the entitlement for claiming an interest in compensation for the acquired land under the Land Acquisition Act. 2. It address the person who has the ownership to use the farmland is to be given compensation in case the land is confiscated for interests of the State or the public interests. 3. It is stipulated that the responsibility of giving indemnity and compensation by the central government in case the farmland is to be confiscated for the interests of nation.	There is not significant gap.

No.	JICA Guidelines	Legislations of Myanmar	Gap between JICA Guidelines and Laws of Myanmar	Gap filling measures for the Project
3.	People who must be resettled involuntarily and people whose means of livelihood will be hindered or lost must be sufficiently compensated and supported, so that they can improve or at least restore their standard of living, income opportunities and production levels to pre-project levels. (JICA GL)	Legislations regarding compensation due to land acquisition are stipulated in the following legislations; 1. Article 23 in Land Acquisition Act(1894), 2. Article 26 in Farm Land Law and, 3. Article 67 in Farm Land Rules	Stipulations on compensation are addressed in the following legislations, however, the needs of support for restoring the standard of living, income opportunities or production levels to pre- project levels are not mentioned. 1. It is stipulated that compensation shall be calculated based on the market value of the land at the date of the publication of the notification. It defines the land, crops, tress and moveable/immoveable property as objects of compensation. It requests that reasonable expenses shall be paid for relocation or change of business location. 2. It address the person who has the ownership to use the farmland is to be given compensation in case the land is confiscated for interests of the State or the public interests. 3. It addresses indemnity (crop and structure) and compensation (land) calculation form for the agricultural land.	Compensation and support will be prepared taking account of restoring affected people's standard of living, to pre-project levels.

No.	JICA Guidelines	Legislations of Myanmar	Gap between JICA Guidelines and Laws of Myanmar	Gap filling measures for the Project
4.	Compensation must be based on the full replacement cost as much as possible. (JICA GL)	1. Article 23 in Land Acquisition Act (1894) 2. Article 67 in Farm Land Rules	There is no stipulation referring full replacement cost in present legislations. In the following legislations, it is stipulated that compensation shall be calculated based on market value. 1. It is stipulated that compensation shall be calculated based on the market value of the land at the date of the publication of the notification. 2. It is stipulated that indemnity of crop, structure and compensation of land shall be calculated based on the current market price.	There is not significant gap.
5.	Compensation and other kinds of assistance must be provided prior to displacement. (JICA GL)	1. Article 34 in Land Acquisition Act (1894)	There is no stipulation referring needs of providing compensation or other kinds of assistance before displacement, however, Land Acquisition Act imposes 6% of annual interest on the amount of compensation in case the compensation is not paid before acquiring land.	Compensation and other kinds of assistance will be provided prior to displacement.
6.	For projects that entail large-scale involuntary resettlement, resettlement action plans must be prepared and made available to the public. (JICA GL)	Any specific legislations yet to be enacted	-	Resettlement plan will be prepared and disclosed to the public.
7.	In preparing a resettlement action plan, consultations must be held with the affected people and their communities based on sufficient information made available to them in advance. (JICA GL)	Any specific legislations yet to be enacted	-	Information on the project will be disclosed to affected people during preparation of resettlement action plan
8.	When consultations are held, explanations must be given in a form, manner, and language that are understandable to the affected people. (JICA GL)	Any specific legislations yet to be enacted	-	Consultation will be implemented in a comprehensive manner to the affected people.

No.	JICA Guidelines	Legislations of Myanmar	Gap between JICA Guidelines and Laws of Myanmar	Gap filling measures for the Project
9.	Appropriate participation of affected people must be promoted in planning, implementation and monitoring of resettlement action plans. (JICA GL)	Any specific legislations yet to be enacted	-	Involvement of affected people will be practiced by consultations in timely manner.
10.	Appropriate and accessible grievance mechanisms must be established for the affected people and their communities. (JICA GL)	1. Article 5A and Article 18 in Land Acquisition Act (1894) 2. Article 68 in Farm Land Rules	The grievance mechanisms are prepared based on the following legislations. 1. It is stipulated that the objection to acquisition of land is to be heard by the collector within thirty day of the notification. Objection on the amount of the compensation, the persons to whom it is payable or the apportionment of the compensation among the persons interested are submitted to the Court within six weeks of the notice from the Collector or within six months from the date of the Collector's award whichever period shall first expire. 2. It is stipulated that concerned region/state farmland management body shall manage the complaints and central farmland management body shall monitor and negotiate as appropriate.	Based on legislations, grievance mechanism will be prepared.

No.	JICA Guidelines	Legislations of Myanmar	Gap between JICA Guidelines and Laws of Myanmar	Gap filling measures for the Project
11.	Affected people are to be identified and recorded as early as possible in order to establish their eligibility through an initial baseline survey (including population census that serves as an eligibility cut-off date, asset inventory, and socioeconomic survey), preferable at the project identification stage, to prevent a subsequent influx of encroachers of others who wish to take advance of such benefits. (World Bank OP4.12 Para 6)	Any specific legislations yet to be enacted	-	Population census and asset inventory survey will be implemented to identify affected people.
12.	Eligibility of benefits includes, the PAPs who have formal legal rights to land (including customary and traditional land rights recognized under law), the PAPs who don't have formal legal rights to land at the time of census but have a claim to such lands or assets and the PAPs who have no recognizable legal right to the land they are occupying. (World Bank OP4.12 Para 11)	Any specific legislations yet to be enacted	-	Eligibility of the project will be prepared for all households whose income sources or assets are confirmed as affected due to project.
13.	Preference should be given to land-based resettlement strategies for displaced persons whose livelihoods are land-based. (World Bank OP4.12 Para 11)	Any specific legislations yet to be enacted	-	Measures will be prepared to PAPs in carrying out consultation.

No.	JICA Guidelines	Legislations of Myanmar	Gap between JICA Guidelines and Laws of Myanmar	Gap filling measures for the Project
14.	Provide support for the transition period (between displacement and livelihood restoration). (World Bank OP4.12 Para6)	Any specific legislations yet to be enacted	-	Sufficient support for the transition period will be provided as
15.	Particular attention must be paid to the needs of the vulnerable groups among those displaced, especially those below the poverty line, landless, elderly, women and children, ethnic minorities etc. (World Bank OP4.12 Para 8)	Any specific legislations yet to be enacted	-	Additional support for the vulnerable groups will be prepared as appropriate.
16.	For projects that entail land acquisition or involuntary resettlement of fewer than 200 people, abbreviated resettlement plan is to be prepared. (World Bank OP4.12 Para 25)	Any specific legislations yet to be enacted	-	Abbreviated resettlement plan will be provided since the entail land acquisition or involuntary resettlement of fewer than 200 people.

Source: JICA Study Team

4.4 Institutional Framework

The followings are relevant institutions with regard to environmental administration this project.

Ministry of Natural Conservation and Forestry (MOECAF)

Since country had initiated to start moving onto the path of democracy, new civil government was elected in 2010. After the selected government, Ministry of Forestry was reformed as Ministry of Environmental Conservation and Forest (MOECAF) in 2011 as a national level agency to coordinate and handle environmental related issues and matters including the implementation of international environmental agreements signed by government, law enforcements and information dissemination. Hence, MOECAF has been acting as focal coordinating body for country's overall environmental management and environmental matters.

Five departments and an enterprise under the MOEFAF has been organized, namely,

1. Planning and Statistics Department

2. Forest Department
3. Dry zone Greening Department
4. Environmental Conservation Department
5. Survey Department
6. Myanmar Timber Enterprise

Environmental Conservation Department (ECD) was newly created in October 11, 2012 as one of the institution of MOECAF to take responsibility for the effective implementation of environmental conservation and management in Myanmar.

The objectives of forming ECD are,

- To implement the national environment policy
- To develop short, medium and long term strategy, policy and planning for the integration of environmental consideration into the sustainable development process
- To manage natural resources conservation and sustainable utilization
- To manage the pollution control on water, air and land for environmental sustainability
- To cooperate with government organization, civil societies, private and international organizations for the environmental affairs.

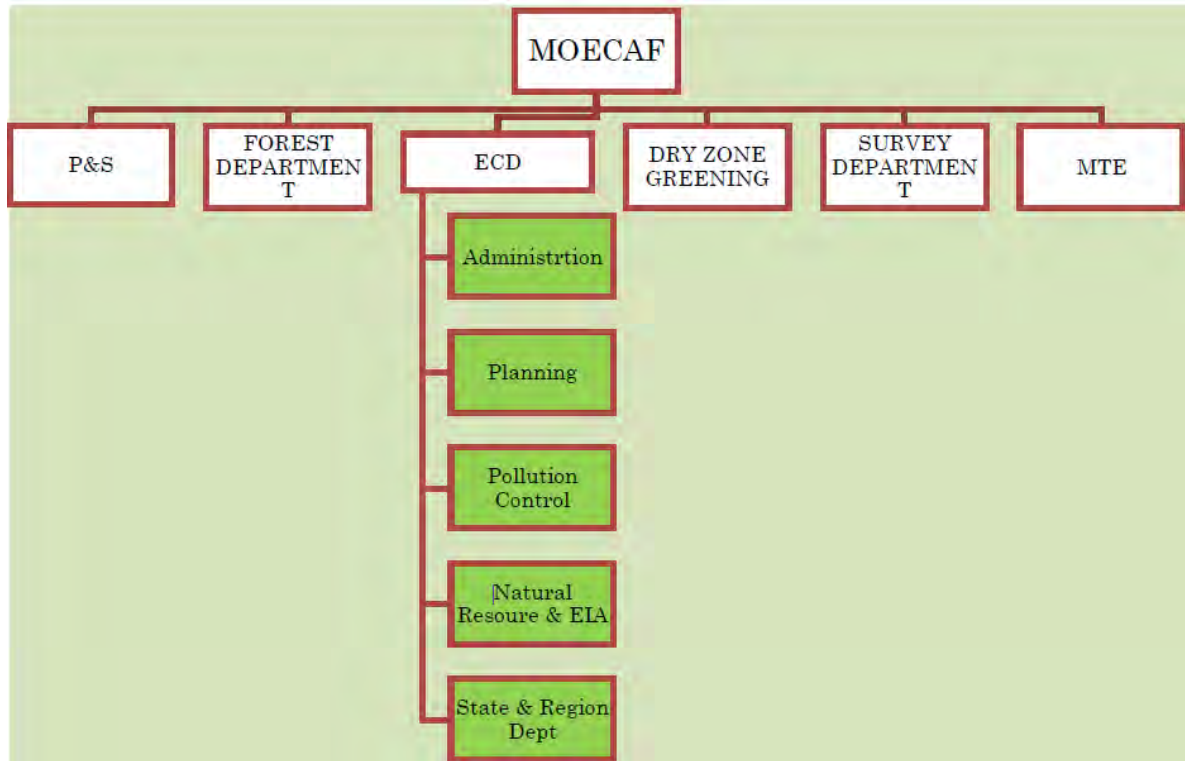
Currently, Environmental Conservation Department has been hosting various environmental and sustainable related workshops and meetings in an effort to fulfill the country's most demanding human resource, knowledge and technical expertise in environmental sector by technical transferring and knowledge sharing from international consultants.

On the other hand, in collaboration with international financial institutions and United Nations organizations, MOECAF has also been carrying out the activities of preparing environmental regulations such as EIA rules, environmental quality standards and other environmental related issues.

MOCAF has also being planned to organize sub divisions under ECD and extend the man power in near future with the aim of effectively implement and manage the environmental regulations and resources in country wide .This newly organized environmental divisions include

- Administration
- Planning & Internal relation
- Pollution control
- Natural resource and EIA
- State and Region departments.

Currently over 50 staff are working under the ECD. The sub divisions are still being organized and not in a fully functional position yet. As the job allocation and staffing within the department are in progress, detailed functions and responsibilities given to individual department remain still unknown in the time of this report. Organization of MOECAF and ECD are shown in Figure 4.2.



Source: REM

Figure 4.2 Organization Chart of MOECAF and ECD

Myanmar Electricity Power Enterprise (MEPE)

MEPE is one of the institutions under Ministry of Electric Power (MOEP) and responsible for the sectors of power system operation and maintenance, construction and operation of power transmission lines and substations, control of national power grid, generation and maintenance of gas turbines and combined cycle.

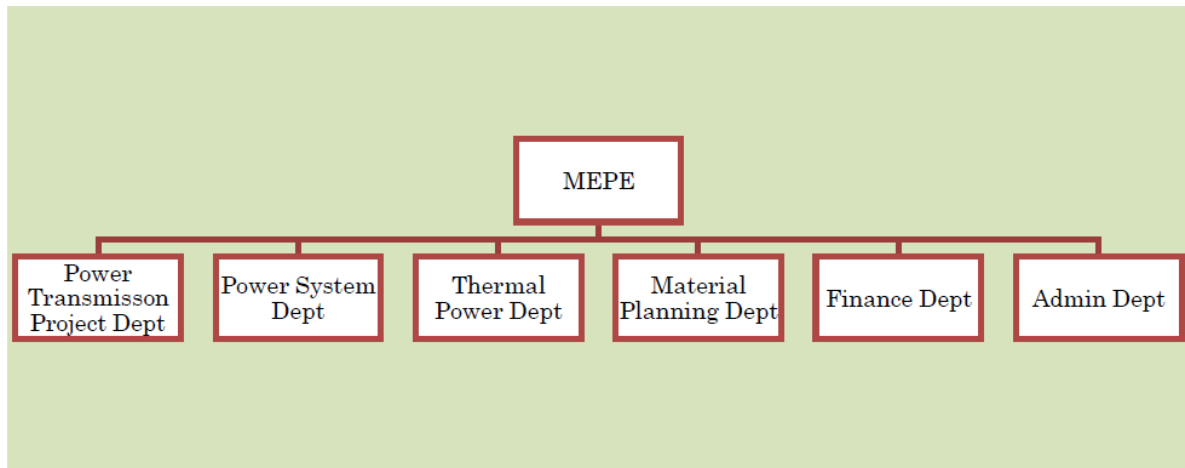
One of the environmental representative has temporary been assigned as additional task to his primary duty by Power Transmission Project Department to coordinate and facilitate in the process of environmental and social studies and assist in data collection purpose in this project.

In this purpose, Head of Power Transmission Project Department is fully responsible for the development and implementation and maintenance of environmental management plan of proposed project.

Head of Power Transmission Department is fully responsible for the effective and efficient implementation of environmental management plan conforming to applicable legal requirements and meet the other requirements described in this plan.

In addition to those, Head of Power Transmission Department shall address the specific responsibilities for project entities ensuring construction and operation works for this project being performed in safe and environmental friendly manner in accordance with requirements stipulated in the management plan.

Head of Administration Department shall have responsibilities ensuring that execution of land acquisition and compensation scheme to affected peoples are done in accordance with the international accepted practices specified in this document. He is also to make ensure that recommended social mitigation measures are practiced throughout the project life. The structure of MEPE is described in Figure 4.3.



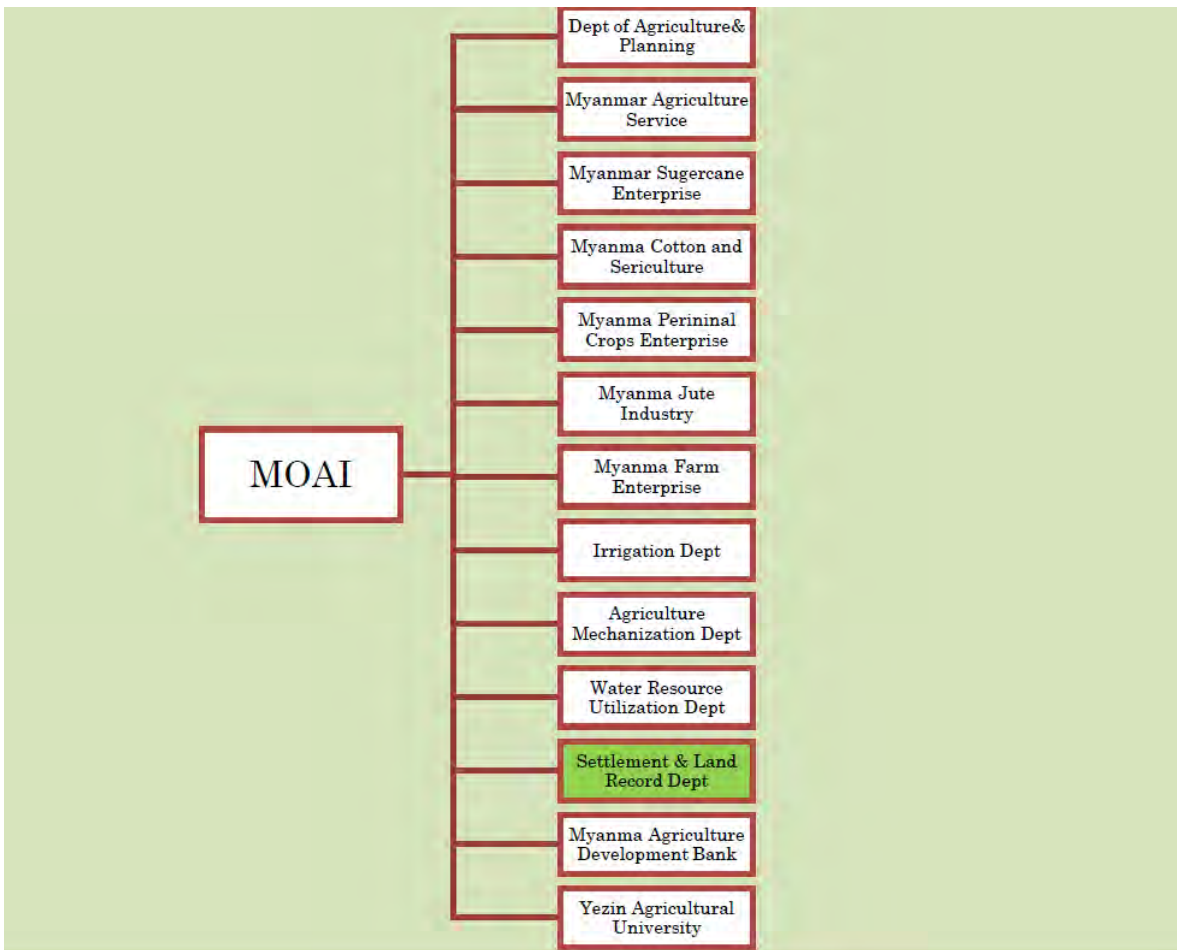
Source: REM

Figure 4.3 Organization Chart of MEPE

Ministry of Agriculture and Irrigation (MOAI)

Prime responsibility of the MOAI includes promoting the agriculture and irrigation sectors of Union of Myanmar.

At present, the MOAI is formed with 13 institutions as described in organization chart illustrated in Figure 4.4.



Source: REM

Figure 4.4 Organization Chart of MOAI

Amongst these institutions, The Settlement and Land Record's responsibility (SLRD) is mainly jurisdiction of land administration.

The SLRD's predominant activities are as follows:

Settlement work

Settlement works deal with measures for fixation of land revenue rates

Collection of Agricultural Statistic

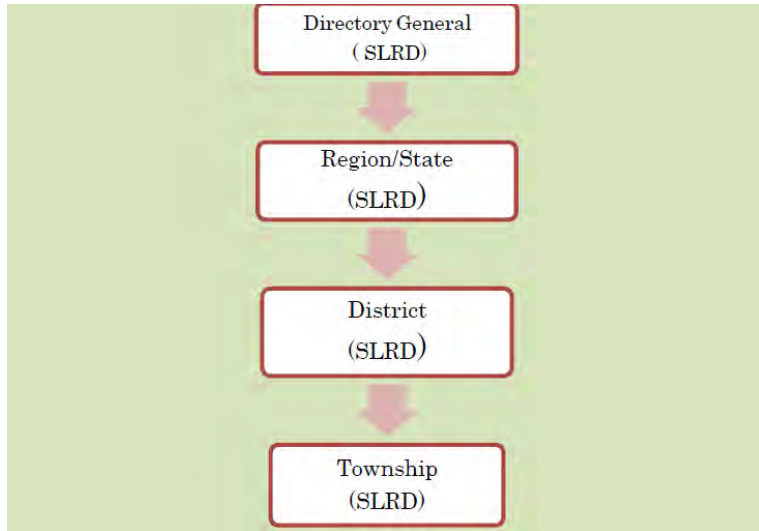
Activities for collection of agricultural statistics include (i) monitoring the progress of land preparation for cropping and condition a weather and crops production,(ii) carrying out periodic crop surveys, (iii) compiling data on farmer and farm, (iv) participating is taking of annual inventory of agricultural machineries and implements for the whole country, (v) compiling annual seasonal and crop reports, which comprise statistics on rainfall, land use, irrigation and flood protection, crop acreage, yield per acre and production.

Annual Assessment of land Revenue and Land Rent

Land Revenue has been levied since the time of Myanmar kings Taxation is customarily based on extent of land and type of crop SLRD undertakes annual assessment of land revenue and land rent.

Registration of deeds Agricultural Land administration

It deals with the registration of documents including deeds that must be compulsorily registered such as those of transferring the rights of immovable properties. Organization Chart of SLRD is representative in Figure 4.5.



Source: <http://www.myanmargeneva.org>

Figure 4.5 Organization Chart of SLRD in MOAI

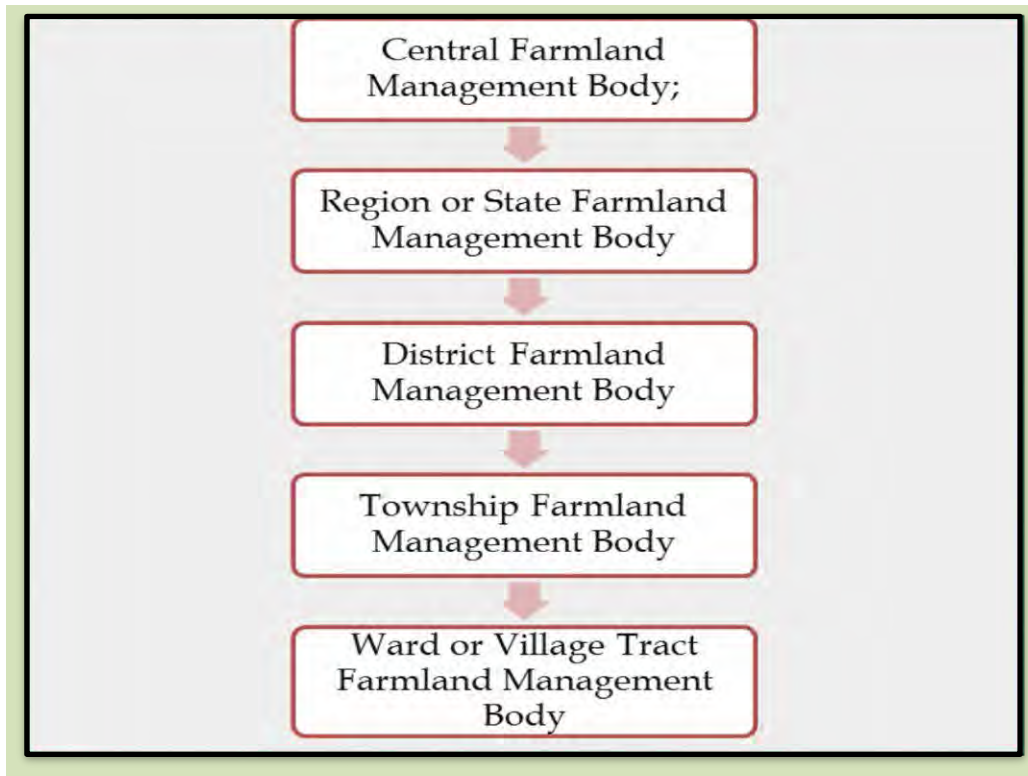
Farmland Management Bodies

In accordance with article 11 of Farmland Law (2012), in order to scrutinize all cases of registering, transferring, recording, deciding land disputes and other farmland related matters prescribed in the law, Farmland Management Committees are formed in various levels of government administrative bodies constituted.

The central Farmland Management Committee is formed in line with the law as follows

- Union Minister of Agriculture and Irrigation (Chairman)
- Deputy Minister of Agriculture and Irrigation (Vice Chairman)
- Director General of SLRD (Secretary)
- Relevant Government Department Official

Organization chart for the different administrative levels of Farmland Management bodies are described in Figure 4.6.



Source: REM

Figure 4.6 Level of Farmland Management Bodies

Duties and authority of the farmland management bodies at various levels, constituted by this law are prescribed as follows:

Central Committee for the Management of Vacant, Fallow and Virgin Lands

Central Committee is formed by President of Union of Myanmar in order to ensure that management task concerning the use of Vacant, Fallow and Virgin Lands for State Economic Development in relation to commercial agriculture, livestock breeding, mining, and government allowable other purposes and oversee the enforcement activities being applied in conformity with law.

The committee is chaired by Union Minister of Agriculture and Irrigation. Director General of SLRD is assigned as secretary with suitable persons of concern government department playing member roles.

Regional/State Level Administrative Body

The Regional/State Farmland Committee headed by Regional /State Prime Minister and organized with concern government departments such as

- Regional/State Minister of Agriculture and Irrigation
- Regional /State Minister of Environmental Conservation and Forestry

- Regional/State Head of SLRD
- Other concern department

District/Township/ Village Track Administrative Body

The District and Farmland Administrative Bodies are chaired by heads of respective administrative Department and include concerned governmental departments similar to Regional/State FMB

- District /Township Head of Administration Dept. (Chairman)
- Representative of SLRD
- Representative of Environmental Conservation and Forestry Department
- Representative of other concern Dept. as required

Separately, in Hlegu Township, One of the committees is organized to tackle the land related issues including dispute and compensation and it is most possibly because of high rate of increasing land grabbers during the half decade.

5. Alternatives

Without project case:

Without project, generated electricity from hydropower plants in northern region will not be distributed to the southern region. Similarly, generated electricity from thermal power plants in southern region will not be distributed to the northern region without project. Consequently, potential electricity users are not able to afford electricity from grid connection but have to rely on the electricity from diesel generator, which is more costly.

Project design: Location of substations:

The Hpayargyi substation was planned to construct in the site of alternative 1, however, the accessibility is not suitable for bring heavy-weighted equipment such as transformer from main road through unpaved road and entire land is belonged to individual, the location of alternative 2 considered because of its convenient accessibility and less private land to be acquired. However the Government did not agreed to provide the land in alternative 2. So alternative 3 was selected because of convenient accessibility and availability of land. The summary of three alternatives is shown in Table 5.1.

Table 5.1 Alternative Consideration for Substations

	Alternative 1	Rating	Alternative 2	Rating	Alternative 3	Rating
Location	Proposed site is located	(-) Unpaved narrow road is not fit to bring heavy weighted equipment such as transformer.	Project site is located 100m from national highway.	(+) Closeness of the national high way road is convenient for bringing heavy-weighted equipment into the construction site.	Project site is located 100m from national highway.	(+) Closeness of the national high way road is convenient for bringing heavy-weighted equipment into the construction site.

	Alternative 1	Rating	Alternative 2	Rating	Alternative 3	Rating
Land Ownership	100%(24ha) Private land	(-) It is necessary to acquire land from private owner.	16% (6.5ha) Private land 84%	(+) Most of the land belongs to government. Land acquisition is necessary but smaller than Alternative 1.	100% (24ha) Private land	(-) It is necessary to acquire land from private owner.
Resettlement	0	(+) There is no resettlement.	0	(+) There is no resettlement.	0	(+) There is no resettlement.

Note: (+)advantage, (-)Disadvantage

Transmission line route:

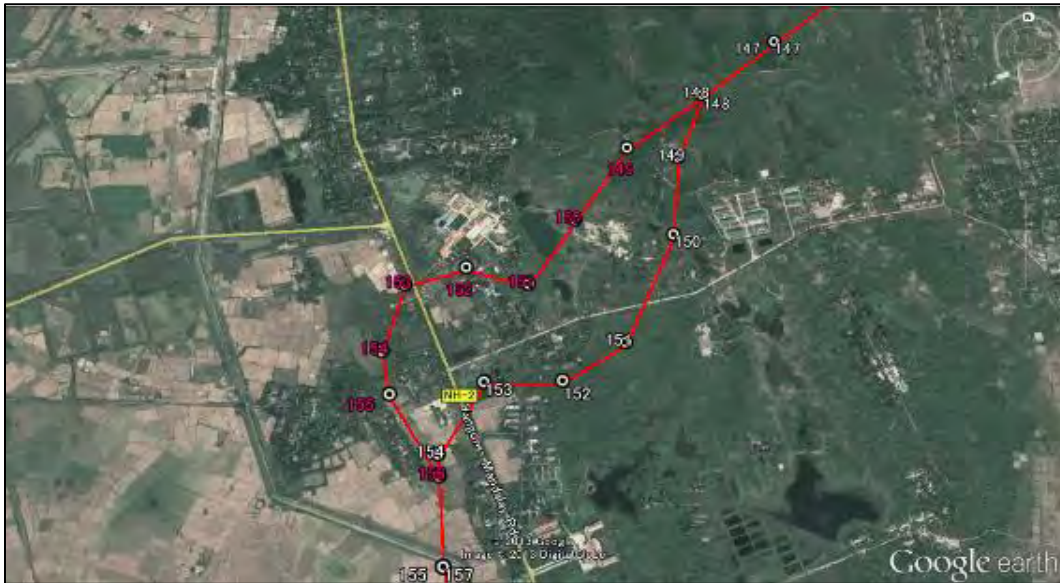
In the process of finalizing the transmission line route, many alternatives were considered in order to minimize natural and social impacts. At the end of examination for the line alignment, two alternatives were left. Although the distance of transmission line is longer with two extra transmission tower, Alternative 2 was selected in order to avoid school building to be relocated. The summary of two alternatives is shown in Table 5.2 and location of the alternatives is shown in Figure 5.1.

Table 5.2 Alternative Consideration for Transmission Line

	Alternative 1	Rating	Alternative 2	Rating
Location	Between tower No.148 and No.155	(-) There are two houses and one school building within the ROW between the transmission tower No.152 and No.153.	Between tower No.148 and No.157	(+) There is no immovable assets within the ROW between the transmission tower No.148 and No.157.
Length of Alignment	2.7km	(+) Shorter	3km	(-) Longer

	Alternative 1	Rating	Alternative 2	Rating
Number of Transmission Tower	8	(+) Less costly	10	(-) Cost for two additional tower needed
Land Ownership for the Tower Base	Private Agricultural Land	(-) Compensation needs to be paid for using some part of the land in order to construct 8 transmission tower.	Private Agricultural Land	(-) Compensation needs to be paid for using some part of the land in order to construct 10 transmission tower base.
Resettlement	0	(-) In order to avoid resettlement of two houses, school building need to be relocated.	0	(+) There is no resettlement.

Note: (+) advantage, (-) Disadvantage



Note: Alternative 1 route with tower number in white, Alternative 2 route with tower number in Pink
Source: Google

Figure 5.1 Alternative Route Consideration

6. Scoping

The 'scoping' process of an IEE is aimed at gaining an early understanding of a project and its social and environmental setting, in order that the likely environmental and social impacts that may arise from the project can be highlighted early and examined appropriately in more detail in the IEE.

For the scoping purpose, the project was reviewed carefully and potential impacts have been identified in light of the Project's environmental and social considerations against with foreseeable project activities during construction and operation periods. The outcome of scoping has been summarized in the Table 6.1 below.

Table 6.1 Scoping

No.	Impacts	Rating		Brief Description
		Pre-Construction/Construction	Operation	
1. Anti-Pollution				
1.1	Air Pollution	C		Construction: Air pollution such as exhaust fumes from earthmoving equipment as well as construction vehicle associated with the tower and substation construction is anticipated Operation: No activity that will cause air pollution is expected.
1.2	Water Pollution	C	-	Construction: Temporary water pollution due to concrete mixing, aggregate collection and excavation is expected. In addition, temporally water pollution from contractor employ's camp/office is expected. Operation: No activity that will cause water pollution is expected.
1.3	Waste	B	U	Construction: Construction waste soil will be generated mainly from substation construction site. Vegetable debris will be generated at the time of land clearance for the land of substation and transmission right of way. Also, waste such as kitchen scraps and human waste will be generated from contractor employ's camps and construction office. Operation: Information of waste generation during operation of proposed project need to be collected.
1.4	Soil Contamination	-	C	Construction: No soil contamination is predicted. Operation: Inappropriate management of transformer will cause oil leakage. Consequently, it will contaminate soil.
1.5	Noise and Vibration	C	C	Construction: Noise and vibration resulting from construction activities is expected.

No.	Impacts	Rating		Brief Description
		Pre-Construction/Construction	Operation	
				Operation: Noise from the substation will affect residents along substation area.
1.6	Ground Subsidence	-	-	Construction/Operation: No activity that will cause ground subsidence is expected.
1.7	Offensive Odor	-	-	Construction/Operation: No activity that will cause offensive odor is expected.
1.8	Bottom Sediment	-	-	Construction/Operation: No activity that will affect bottom sediment is expected.
2. Natural Environment				
2.1	Protected Area	U	U	Construction/Operation: It is necessary to confirm with relevant administrative body if the protected area is located within the project area.
2.2	Flora, Fauna and Biodiversity	U	U	Construction/Operation: Some impacts on existing habitats will be expected due to changing land use patterns. It is necessary to confirm with relevant administrative body if the habitat of endangered species is located within the project area.
2.3	Hydrological Situation	U	-	Construction: It is necessary to confirm the hydrological situation, especially at the sites of four substations. Operation: No activity that will affect negative impact on hydrological situation is expected.
2.4	Topography and Geographical Features	C	-	Construction: Topography and geographical features will be affected due to constructing substations. Operation: No activity that will affect negative impact on topography and geographical features is expected.
3. Social Environment				
3.1	Involuntary Resettlement	U	-	Construction: Construction of transmission tower and substation may cause involuntary resettlement. Operation: No activity that will cause involuntary resettlement is expected.
3.2	Vulnerable (poor households, female-headed households etc)	U	-	Construction: Vulnerability on affected people needs to be confirmed in conducting hearings from relevant administrative bodies and affected people. Operation: No activity that will affect vulnerable is expected.

No.	Impacts	Rating		Brief Description
		Pre-Construction/Construction	Operation	
3.3	Indigenous and Ethnic Minority	U	-	Construction: Indigenous and ethnic minority in project area needs to be confirmed. Operation: No activity that will affect indigenous and ethnic minority is expected.
3.4	Local Economy, Employment, Livelihood	C+	-	Construction: Positive impact such as creation of local employment is predicted. Operation: No activity that will affect local economy, employment and livelihood is expected.
3.5	Land Use and Utilization of Local Resources	U	-	Construction: Information on usage of proposed project area need to be collected. Operation: No activity that will impact on land use or change of local resources is predicted.
3.6	Water Usage or Water Rights of Common	-	-	No activity will give negative impact on water usage or water rights of commons is predicted.
3.7	Existing Social Infrastructures and Services	B	-	Construction: Due to construction activities, social infrastructures such as road and bridges will be affected due to construction vehicles carrying heavy weighted machinery and materials. Operation: No activity that will affect existing social infrastructures and services is expected.
3.8	Social Institutions and Local Decision-Making	-	-	No activity that will affect social institutions and local decision-making is expected.
3.9	Mis-distribution of Benefit and Damage	-	-	No activity that will cause misdistribution of benefit and damage is expected.
3.10	Local Conflict of Interest	-	-	No activity that will cause local conflict of interest is expected.
3.11	Cultural Heritage	U	-	Construction: It is necessary to confirm if cultural heritage is located within the project area. Operation: No activity that will affect cultural heritage is expected.

No.	Impacts	Rating		Brief Description
		Pre-Construction/Construction	Operation	
3.12	Landscape	C	-	Construction: Construction of transmission towers and substations will change the scenery. Operation: No activity that will affect landscape is expected.
3.13	Gender	C	-	Construction: Fair involvement in the process of land acquisition will be disturbed due to gender bias. Operation: No activity that will cause gender issues is expected.
3.14	Children's Rights	-	-	No activity that will affect children's rights is expected.
3.15	Communicable diseases such as HIV/AIDS	C	-	Construction: Inflow of construction workers from construction worker's camp to local communities will raise risks on communicable diseases. Operation: No activities raising the risk of communicable diseases in the local communities are expected.
3.16	Working Environment (includes work safety)	C	-	Construction: Inappropriate management of working environment will raise the risk of accident and decease. Operation: No activities raising the risk of working environment is expected.
4. Others				
4.1	Accidents	C	C	Construction: The effect of construction vehicles to the local community is expected. Operation: Risk of electric shock due to entering TL tower area or substation is predicted.
4.2	Global Warming	-	-	Construction: CO2 emission from construction vehicles is not significant. Operation: No activities that will affect global warming is expected.

Rating

- A: Serious impact is expected,
- B: Some impact is expected,
- C: Small impact is expected,
- +: Positive impact is expected,
- U: Extent of impact is unknown and examination is needed, Impact may become clear as study progresses,
- : No impact is expected

As for positive impacts, the creation of local employment will contribute to the local economy especially during construction phase.

Table 6.2 shows a Terms of Reference on the IEE, which was prepared based on the scoping outcome.

Table 6.2 Terms of Reference for Initial Environmental Examination

No.	Impacts	Item for Study	Methodology
1. Anti-Pollution			
	Air Pollution	<ul style="list-style-type: none"> ①Collect information on present air quality ②Confirm present condition in the project area ③Impacts during a construction phase ④Impacts during an operation phase 	<ul style="list-style-type: none"> ①Collect existing information ②Hearing from relevant authorities, collect information on similar project ③Confirm content, method, period, location, area on construction works and access road for construction vehicles etc ④Confirm present environmental management system on transmission line and substation
	Water Pollution	<ul style="list-style-type: none"> ①Collect information on present water management ②Confirm present condition in the project area ③Impacts during a construction phase 	<ul style="list-style-type: none"> ①Collect existing information ②Hearing from relevant authorities, collect information on similar project ③Confirm content, method, period, location, area on construction works and access road for construction vehicles etc.
	Waste	<ul style="list-style-type: none"> ①Collect information on present water management ②Confirm present condition in the project area ③Impacts during a construction phase 	<ul style="list-style-type: none"> ①Collect existing information ②Hearing from relevant authorities, collect information on similar project ③Confirm content, method, period, location, area on construction works and location of construction worker's camp/office
	Soil Contamination	<ul style="list-style-type: none"> ①Collect information on present management against soil contamination ②Impacts during an operation Phase 	<ul style="list-style-type: none"> ①Hearing from relevant authorities, collect information on similar project ②Confirm present environmental management system on substation
	Noise and Vibration	<ul style="list-style-type: none"> ①Confirm ambient noise standard in Myanmar ②Confirm present condition in the project area 	<ul style="list-style-type: none"> ①Collect existing information ②Hearing from relevant authorities, collect information on similar project
2. Natural Environment			
	Protected Area	<ul style="list-style-type: none"> ①Collect information on protected area in the project area 	<ul style="list-style-type: none"> ①Hearing from relevant authorities
	Flora, Fauna and Biodiversity	<ul style="list-style-type: none"> ①Collect information in the project Area 	<ul style="list-style-type: none"> ①Hearing from relevant authorities, conduct field survey
	Hydrological Situation	<ul style="list-style-type: none"> ①Collect information in the project Area 	<ul style="list-style-type: none"> ①Hearing from relevant authorities, conduct field survey
	Topography and Geographical Features	<ul style="list-style-type: none"> ①Collect information in the project area ②Impacts during a construction Phase 	<ul style="list-style-type: none"> ①Hearing from relevant authorities, conduct field survey ②Confirm content, method, period, location, area on construction works and access road for construction vehicles etc.

No.	Impacts	Item for Study	Methodology
3. Social Environment			
	Involuntary Resettlement	①Confirm scale of land acquisition and resettlement ②Prepare Resettlement Action Plan (RAP) in case of acquiring land or resettling assets and/or people resulting from the project	①Collect legislations relevant to land acquisition and resettlement, conducting field survey to confirm the condition such as land usage and type of assets within ROW and proposed substation area and hearing from relevant authorities. ②Prepare RAP in complying with legislations in Myanmar as well as JICA guidelines
	Vulnerable(poor households, femaleheaded households etc)	①Confirm vulnerability of affected people	①Collect legislations relevant to the vulnerability of affected people, collect information on similar project, conduct hearing from relevant authorities and affected people.
	Indigenous and Ethnic Minority	①Collect information on indigenous and ethnic minority	①Collect legislations relevant to the indigenous and ethnic minority, conduct hearing from relevant authorities and affected people.
	Land Use and Utilization of Local Resources	①Collect information on land usage in the project area	①Collect information on land usage from relevant authorities
	Existing Social Infrastructures and Services	①Impact during a construction phase	①Confirm content, method, period, location, area on construction works and access road for construction vehicles etc.
	Cultural Heritage	①Collect information on cultural heritage in project area	①Hearing from relevant authority, conduct field survey
	Landscape	①Impact during a construction phase	①Confirm content, method, period, location, area on construction works
	Gender	① Collect information on the land acquisition procedures relevant to gender issues ② Confirm gender issues in the project area	① Collect information on the similar project in the past ② Collect information on gender issues at administrative body in the project area
	Communicable Diseases such as HIV/AIDS	①Impact during a construction phase	①Confirm information on similar Project
	Working Environment (includes work safety)	①Confirm legislations on working environment in Myanmar	①Collect relevant legislations, confirm information on similar project
4. Others			
	Accidents	①Impact during a construction	①Confirm access road for construction vehicles and conditions around the area

No.	Impacts	Item for Study	Methodology
	Stakeholder Meeting	①Implement at the beginning and after drafting IEE report and RAP	①Meeting type: At the beginning: Individual basis with relevant authorities and affected people After drafting IEE report and RAP: Organize public consulting meeting at Division level (and at Central level as appropriate) Target : At Division Level: Local administrative bodies (division of BAGO, Mandalay and Yangon), MEPE and village head At Central Level: MOECAAF, MEPE and Local administrative bodies (regions) as appropriate

7. Result of Survey, Anticipated Impact and Mitigation Measures

7.1 Summary of the Result

The IEE was conducted in examining available data, hearing from stakeholders and carrying out site reconnaissance. According to the result of the IEE, the area is environmentally not in the priority area as it is free from the approved conservation areas by Myanmar Government, International Organizations, and other technical groups. Also there observed no endangered or rare species listed in IUCN Red List or other lists of locally threatened species both for flora and fauna. The area has been in common with paddy fields, commercial plantations, secondary forests, scrub land and human habitation areas.

Consequently, it was concluded that no significant negative impact was predicted and the expected minor impacts could be avoided or minimized in applying countermeasures. The majority of negative impacts include temporary and site specific pollution due to construction activities in the construction phase. The summary of the IEE result with its mitigation measures is shown together with the scoping result in Table 7.1. Based on the IEE result, the JICA Environmental Checklist is attached in Appendix 1. The detail of the IEE result as well as the suggested mitigation measures are described the following section.

Table 7.1 Result of Scoping and IEE

No.	Impacts	Rating		Rating based on IEE result		Brief Description and Proposed Mitigation Measures
		PC/C	O	PC/C	O	
1. Anti Pollution						
1.1	Air Pollution	C	-	C	-	<p>Construction:</p> <p><i>Result:</i> Air pollution such as exhaust fumes from earthmoving equipment as well as construction vehicle associated with the tower and substation construction is anticipated. Considering the scale of construction, the negative impact from the construction works will be limited.</p> <p><i>Mitigation Measures:</i> Apply preventive maintenance system, optimizing construction schedule to minimize time that vehicles are in operation, apply dust control measures such as water spraying on the unpaved load, etc.</p> <p>Operation: No activity that will cause air pollution is expected.</p>
1.2	Water Pollution	C	-	C	-	<p>Construction:</p> <p><i>Result:</i> Temporary water pollution due to concrete mixing, aggregate collection and excavation is expected. In addition, temporarily water pollution from contractor's employ's camp/office is expected. Considering the scale of construction, the negative impact from the construction works will be limited.</p> <p><i>Mitigation Measures:</i> Apply sediment traps, silt traps, develop fuel handling procedure, proper sewage system, etc.</p> <p>Operation: No activity that will cause water pollution is expected.</p>
1.3	Waste	B	-	B	C	<p>Construction:</p> <p><i>Result:</i> Construction waste soil will be generated mainly from substation construction site. Vegetable debris will be generated at the time of land clearance for the land of substation and transmission right of way. Also, waste such as kitchen scraps and human waste will be generated from worker's camps and construction office. However, it can be avoided or minimized applying provision on waste.</p> <p><i>Mitigation Measures:</i> Secure sites for disposing of construction wastes, vegetable debris, installing garbage bins. The used oil will be kept in the designated place and then recycled and reused.</p> <p>Operation: Industrial waste is expected to be produced for some extent through maintenance activity.</p> <p><i>Mitigation Measures:</i> Industrial waste such as waste oil and sludge will be treated and disposed by the waste disposal facility owned by Town Development Committee. MEPE and the contractor will confirm where the waster will be disposed.</p>
1.4	Soil Contamination	-	C	-	C	<p>Construction: No soil contamination is predicted.</p> <p>Operation:</p> <p><i>Result:</i> Inappropriate management of transformer will cause oil leakage. Consequently, it will contaminate soil. However</p>

No.	Impacts	Rating		Rating based on IEE result		Brief Description and Proposed Mitigation Measures
		PC/C	O	PC/C	O	
						potential soil contamination is avoidable with appropriate mitigation measures. <i>Mitigation Measures:</i> Implement visual inspection on the presence of oil leakage frequently and provide appropriate spill kits properly.
1.5	Noise and Vibration	C	C	C	C	Construction: <i>Result:</i> Noise and vibration resulting from construction activities is expected. <i>Mitigation Measures:</i> Kept distance from the residential area when operating noise emitting equipments, apply periodical inspection of the equipments, limit night work, etc. Operation: <i>Result:</i> Noise from the substation will affect residents along substation area In order to avoid this foreseeable interruption, locations of substation are carefully selected away from environmentally and socially sensitive areas. <i>Mitigation Measures:</i> Engineer design, install noise insulator as appropriate
1.6	Ground Subsidence	-	-	-	-	Construction/Operation: No activity that will cause ground subsidence is expected.
1.7	Offensive Odor	-	-	-	-	Construction/Operation: No activity that will cause offensive odor is expected.
1.8	Bottom Sediment	-	-	-	-	Construction/Operation: No activity that will affect bottom sediment is expected.
2. Natural Environment						
2.1	Protected Area	U	U	U	-	Construction/Operation: Biodiversity survey indicates that no protected area is located in the immediate surroundings.
2.2	Flora, Fauna and Biodiversity	U	U	C	-	Construction: <i>Result:</i> Flora and fauna site investigation was conducted. Both literature view and site observation, no flora and fauna species of environmental concerns exists or stay permanently in the project area. Low biodiversity value was observed in the project area because the area has been seriously disturbed and the habitats have been degraded since years due to human encroachment in the area. Operation: <i>Result:</i> No sufficient information is available about the presence of migratory bird route in the project area in the time of initial survey. However JICA's project site between Hpayargyi and Hlaingtharyar is located more than 9 km away from Moeyungyi Wetland Wildlife Sanctuary. Transmission line is planned to be constructed southeast from the Sanctuary, and its route is designed to be further from the Sanctuary. Impact to the migratory birds is not expected hence mitigation measures are not necessary. This matter was consulted with ECD on 14 May, 2015 and agreed.

No.	Impacts	Rating		Rating based on IEE result		Brief Description and Proposed Mitigation Measures
		PC/C	O	PC/C	O	
2.3	Hydrological Situation	U	-	C	-	<p>Construction:</p> <p><i>Result:</i> Southern Central Myanmar region where proposed 500 kV transmission line with two Substations are located is high-rain fall area with soft ground and high water table. Streams across or nearby are permanent (all-season) with water throughout. Construction activities such as erecting transmission tower may use drilling mud, concrete or cement material and there occur potential impact on disturbance in surface and groundwater flow.</p> <p><i>Mitigation Measures:</i> Control the usage of drilling mud, concrete and cement pumping near the river bank or stream channels and avoidance to disposal of construction waste in local water bodies.</p> <p>Operation: No activity that will affect negative impact on hydrological situation is expected.</p>
2.4	Topography and Geographical Features	C	-	C	-	<p>Construction:</p> <p><i>Result:</i> Topography and geographical features will be affected due to constructing substations. Topographic features including mountains, hillocks, river banks that are in natural equilibrium could be disturbed by routing of power line and substations. It would lead to the landslides and reducing aesthetic values.</p> <p><i>Mitigation Measures:</i> Avoid unnecessary excavation and digging works</p> <p>Operation: No activity that will affect negative impact on topography and geographical features is expected.</p>
3. Social Environment						
3.1	Involuntary Resettlement	U	-	B	-	<p>Construction:</p> <p><i>Result:</i> As for the proposed site for constructing transmission line, no resettlement is needed since line route is avoided residential area. As for the proposed substation sites, two households at Taungoo substation need to be relocated. Due to constructing 219 tower base and four substations 94.9 ha of land will be acquired.</p> <p><i>Mitigation Measures:</i> Apply appropriate compensation and assistances</p> <p>Operation: No activity that will cause involuntary resettlement is expected.</p>
3.2	Vulnerable (poor households, female-headed households etc)	U	-	C	-	<p>Construction:</p> <p><i>Result:</i> Vulnerability on affected people in the project areas has been confirmed in conducting hearings from relevant administrative bodies and affected people. There recorded 5 single-headed families among the potentially affected households along the Power Transmission Line Route and 3 families with less than 1,000,000 Kyats annual income.</p> <p><i>Mitigation Measures:</i> Apply appropriate assistances</p> <p>Operation: No activity that will affect vulnerable is expected.</p>
3.3	Indigenous and Ethnic Minority	U	-	-	-	<p>Construction:</p> <p><i>Result:</i> According to the hearing result from relevant administrative bodies and affected people, the indigenous and/or ethnic minority were not confirmed within the project</p>

No.	Impacts	Rating		Rating based on IEE result		Brief Description and Proposed Mitigation Measures
		PC/C	O	PC/C	O	
						area. Operation: No activity that will affect indigenous and ethnic minority is expected.
3.4	Local Economy, Employment, Livelihood	C+	-	C+	-	Construction: <i>Result:</i> Positive impact such as creation of local employment is predicted. Operation: No activity that will affect local economy, employment and livelihood is expected.
3.5	Land Use and Utilization of Local Resources	C	-	C	-	Construction: <i>Result:</i> Due to project a total of about 160, ha of land will be converted from agricultural and forest plantation to project use. <i>Mitigation Measures:</i> Apply proper compensation for permanent land acquisition. Rehabilitate the land temporary occupied for construction activities. Operation: No activity that will impact on land use or change of local resources is predicted.
3.6	Water Usage or Water Rights of Common	-	-	-	-	No activity will give negative impact on water usage or water rights of commons are predicted.
3.7	Existing Social Infrastructures and Services	B	-	B	-	Construction: <i>Result:</i> Due to construction activities, social infrastructures such as road and bridges will be affected due to construction vehicles carrying heavy weighted machinery and materials. During the conductor stringing works, there could be some event of blocking the public roads when working at road crossing. This road closure will be temporary. <i>Mitigation Measures:</i> Apply appropriate logistics system for transportation with heavy load, establishing of road maintenance crews for immediate repair, provision of detours and road safety precaution. Operation: No activity that will affect existing social infrastructures and services is expected.
3.8	Social Institutions and Local Decision-Making	-	-	-	-	No activity that will affect social institutions and local decision-making is expected.
3.9	Misdistribution of Benefit and Damage	-	-	-	-	No activity that will cause misdistribution of benefit and damage is expected.
3.10	Local Conflict of Interest	-	-	-	-	No activity that will cause local conflict of interest is expected.
3.11	Cultural Heritage	U	-	-	-	Construction: <i>Result:</i> The probability of existence of invaluable cultural heritage site within the project affected area have been identified by literature views, aerial map search, interview with location

No.	Impacts	Rating		Rating based on IEE result		Brief Description and Proposed Mitigation Measures
		PC/C	O	PC/C	O	
						<p>authority, local community and site observation at potential locations. It is believed that no major cultural or religious sites are identified through in the time of investigation.</p> <p><i>Mitigation Measures:</i> Report and stop the works in case of unidentified artifact or fossil found during details ground check works and excavation for tower footages and substations.</p> <p>Operation: No activity that will affect cultural heritage is expected.</p>
3.12	Landscape	C	C	C	-	<p>Construction:</p> <p><i>Result:</i> Construction of transmission towers and substations will change the scenery.</p> <p><i>Mitigation Measures:</i> Avoid of leaving borrow pit and cut area, reinstate the damage with vegetation coverage, minimize SS layout, apply a soil stabilization and embankment planting strategy and selection of colors</p> <p>Operation: No activity that will affect landscape is expected.</p>
3.13	Gender	C	-	-	-	<p>Construction:</p> <p><i>Result:</i> Fair involvement in the process of land acquisition will be disturbed due to gender bias. However judging on the basis of current social status and women's role, it is anticipated that land acquisition process of the project do not practice the gender basis and no gender concerns is taking place.</p> <p>Operation: No activity that will cause gender issues is expected.</p>
3.14	Children's Rights	-	-	-	-	No activity that will affect children's rights is expected.
3.15	Communicable Diseases such as HIV/AIDS	C	-	C	-	<p>Construction:</p> <p><i>Result:</i> Inflow of construction workers from construction worker's camp to local communities will raise risks on communicable diseases.</p> <p><i>Mitigation Measures:</i> Develop a health awareness program, prepare medical surveillance, improve hygiene at worker's camp and employ local people as much as possible outside workers.</p> <p>Operation: No activities raising the risk of communicable diseases in the local communities are expected.</p>
3.16	Working Environment (includes work safety)	C	-	C	-	<p>Construction:</p> <p><i>Result:</i> Inappropriate management of working environment will raise the risk of accident and decease.</p> <p><i>Mitigation Measures:</i> Apply safe working practice</p> <p>Operation: No activities raising the risk of working environment is expected.</p>
4. Others						
4.1	Accidents	C	C	C	C	<p>Construction: The effect of construction vehicles to the local community is expected.</p> <p><i>Mitigation Measures:</i> Prepare road safety management plan, apply seat belt policy, limit driving speed, limit night time travelling</p> <p>Operation:</p>

No.	Impacts	Rating		Rating based on IEE result		Brief Description and Proposed Mitigation Measures
		PC/C	O	PC/C	O	
						<i>Result:</i> Electric shock hazards will be expected due to improper management of ROW clearing or lack of information provided to public. <i>Mitigation Measures:</i> Manage ROW properly; install security fences around grid substations and warning signs at each transmission tower.
4.2	Global Warming	-	-	-	-	Construction: <i>Result:</i> CO2 emission from construction vehicles is not significant. Operation: No activities that will affect global warming are expected.

Note: PC – Pre Construction; C – Construction; O – Operation

Rating

- A: Serious impact is expected,
- B: Some impact is expected,
- C: Small impact is expected,
- +: Positive impact is expected,
- U: Extent of impact is unknown and examination is needed, Impact may become clear as study progresses,
- : No impact is expected

7.2 Anti-Pollution

Air Pollution (Construction)

The potential aspects of the air pollution arising from construction activities of transmission line can be exhausted gas and dust coming out from construction vehicles on the unpaved road, diesel power -driven earth movers, clearance of ROW, working area, access road construction, conductor string equipment such as crane, and operation of stationary plants such as generator.

Considering the scale of the impact induced by the vehicle and equipment, the scale of impact is small and enables to be minimized by adopting following mitigation measures which are subject to incorporate into Environmental Management and Monitoring Plan (EMMP).

- Applying preventive maintenance system
- Checking vehicle and equipment inspection daily
- Stopping dust generating activities in high wind
- Applying good site practice and house keeping
- Turning off the engine while not in use
- Optimizing construction schedule to minimize time that vehicles are in operation
- Applying appropriate dust control measures such as water spraying on the dusty unpaved road and open area
- Covering load-carrying platform properly when carrying earth/sand

Water Pollution (Construction)

Temporary water pollution due to concrete mixing, aggregate collection and excavation is expected.

Another source of water pollution can be of the spill of fuel used for construction equipment and generators. The operation of facility will involve transportation, handling, storage and transferring the fuel potential spill could be raised due to the leakage of fuel tank, drum, and equipment failure. Oil leakage can contaminate ground water and surface water degrading their water quality through lack of secondary containment and improper control. Spill and leaks are nature of unplanned event and can be avoidable to zero incident by applying in place control measures.

- Applying sediment traps, silt traps as appropriate
- Developing fuel handling procedure
- Install spill kits on site
- Designating area for fuel filling

Another potential source of water contamination can be of the domestic waste water from construction contractor's camp. Domestic wastewater from kitchen, toilets, and washing facilities will be generated by the workers on-site during construction period. Surface runoff following the heavy rain brings the sediment load and other impurities including contaminated substances down into the nearby creek degrading the water quality. Therefore it is essential to adopt the following mitigation measures.

- Preparing proper sewage system
- Covering unprotected soil stock pile with plastic sheet and secure from wind blowing
- Enduring the effective operation by inspecting and maintaining surface drainage systems, erosion control and silt removal facilities regularly

Waste (Construction)

Construction waste soil will be excavated mainly from site formation and leveling work at substation construction sites. Large volume of excavated material are expected for the construction of four substations which occupies the area of approximately (94.3 ha) in total. Site formation and Construction of 216 tower bases will also create the excavated soil.

Vegetable debris will be generated at the time of land clearance for the land of substation and transmission right of way.

Moreover, waste such as kitchen scraps and human waste will be generated from worker's temporary camps and construction office. Other possible debris associated with construction sites are packing material, cardboards. Used oil is also a kind of hazardous waste coming from the regular maintenance of construction vehicles and equipment. The used oil shall be kept in designated place and then to be sold for recycling. Except the used oil, generation of hazardous waste is not expected.

In combination of different kinds of waste generated from construction works, impact caused by generation of waste is expected to having some potential impact and mitigation measures are proposed for further reduction of the impact.

- Reusing excavated soils for vegetation purpose as much as possible
- Minimize land clearing in needed basis
- Securing designated soil disposal area
- Collecting, handling and transporting all wastes as per construction waste management procedure
- Installing enough dust bins in the places where waste generated
- Disposing of all waste including human waste properly and environmental friendly manner at designated local municipal waste disposal site
- Prohibiting burning the solid waste
- Practicing waste management based on the hierarchy of reduces, reuse and recycle principle

Waste (Operation)

Industrial waste, such as waste oil and sludge, and vegetable debris is expected to be produced for some extent through maintenance activity.

Moreover, waste such as kitchen scraps and human waste will be generated from the office. Other possible debris associated with construction sites are packing material, cardboards. Used oil is also a kind of hazardous waste coming from the maintenance of transformer etc. The used oil shall be kept in designated place and then recycled and reused. Except the used oil, generation of hazardous waste is not expected.

Impact caused by generation of waste is expected to having some potential impact and mitigation measures are proposed for further reduction of the impact.

- Collecting, handling and transporting all wastes as per operation waste management procedure
- Securing designated place to storage industrial waste including waste transformer oil (concrete floor with shed and sign)
- Disposing of all waste including human waste properly and environmental friendly manner at designated local municipal waste disposal site
- Prohibiting burning the solid waste
- Practicing waste management based on the hierarchy of reduces, reuse and recycle principle

Soil Contamination (Operation)

The possible source of soil degradation during the operational phase is oil leakage from transformer at substation. This can be caused by inappropriate management and maintenance. In order to overcome this potential impact, management should consider practicing the visual inspection and conducting transformer leak test on a regular basis. Necessary spill accessories shall be provided at the transformer location.

It is recommended to apply following measures in order to reduce the risk of oil leakage

to a level of negligible

- Implementing visual Inspection at potential leak source
- Installing spill kits

Noise and Vibration (Construction)

Noise resulting in during the construction of transmission line and substation can be from the movement of vehicle and equipment, generator running, concrete mixer and chainsaw used for cutting trees in ROW clearance.

In Myanmar, there is no regulatory procedure or technical standard defining the ambient noise level to be controlled. It is recommended to use World Bank Environmental Health and Safety Guidelines limiting noise level within 55dB during day time and evening time (6:00-22:00)

- Ensuring all noise emitting activities to be kept distance from the residential area
- Inspecting all noise emitting equipment on a daily basis
- Shutting down all engines while not in use
- Limiting night work including transportation of material
- Maintaining ambient noise level below 55 dBA
- Considering a schedule of on-site activities for reducing the potential for the simultaneous occurrence/overlap of especially noisy activities

Noise and Vibration (Operation)

Owing to the nature and size of substation, consideration should be made for the noise level of the noise production equipment. Main components of a substation include capacitor bank and transformer which have potential of emitting noise to somewhat level and that could cause nuisance to the surrounding socially or environmentally sensitive areas during night time if precaution is not addressed systematically.

In this project, locations of four substations are carefully chosen based on the criteria such as keeping reasonable distance from villages and residential area, avoidance of environmental sensitive areas in regards to physical disturbance.

Additional mitigation measures to attenuate noise level are set out below.

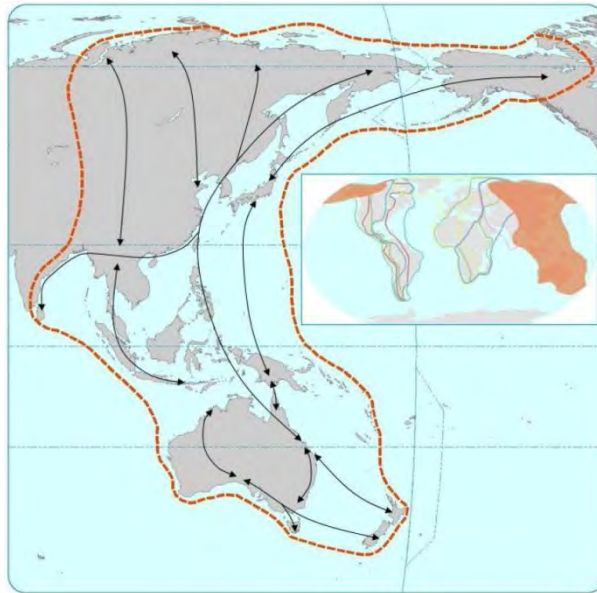
- Integrating engineering noise control concept into the detailed design stage of substation
- Installing noise barrier as appropriate
- Carrying out periodical noise monitoring plan to understand the actual noise level from substation. Noise monitoring at night time from the nearest residential should be included
- Avoid residential area and environmentally sensitive area when locating contractor employ's camps

Provided that recommended mitigation measures are fully adhered and effective noise impact on the residential areas during construction and operation phases are reduced to an acceptable level.

7.3 Natural Environment

Protected Area (Construction & Operation)

Moeyungyi Wetland Wildlife Sanctuary in Bago region. It is approximately 10.7 km east from Hpayargyi SS. The area of the Sanctuary is 10,000 ha (40 square miles) and covers areas of Bago and Waw Townships. It is a one of the rest stops for birds with migrate along the East Asia- Australian Flyway. The wetland hosts over 20,000 migratory waterbirds from October to March. These include the threatened birds such as Baer’s Pochard *Aythya baeri*, Baer’s Pochard *Grus Antigone*, Greater Spotted Eagle *Aquila clanga* and Northern Pintail *Anas acuta*. Burmese Eyed Turtle *Morenia ocellata* also exists in this wetland. It became Ramsar Site in March 2005, also designated as Important Bird Area and protected wetlands under Myanmar’s National Biodiversity Strategy and Action Plan (NBSAP).



Source: BirdLife International

Figure 7.1. East Asia- Australian Flyway.

Table 7.2 Threaten Birds and Turtles recorded in Moeyungyi Wetland Wildlife Sanctuary

No.	Scientific name	Common name	Family	IUCN Red List Status
1	<i>Aythya baeri</i>	Baer’s Pochard	Anatidae	CE
2	<i>Grus Antigone</i>	Sarus Crane	Gruidae	VU
3	<i>Aquila clanga</i>	Greater Spotted Eagle	Accipitridae	VU
4	<i>Anas acuta</i>	Northern Pintail	Anatidae	LC
5	<i>Morenia ocellata</i>	Burmese Eyed Turtle	Geoemydidae	VU

CE- Critically Endangered, VU- Vulnerable, LC- Least Concern

Source: Information Sheet on Ramsar Wetlands (RIS) – 2009-2014 version

Shinpin Kyetthauk Wildlife Sanctuary (which is still in the proposed list) located in Bago Region. This is about 3.2 km to the south-west of Taungoo Substation at the bottom of Bago Yoma (Mountain range). Status of the PA is “proposed” in 2009. Hence it has not officially been listed in the Protect Area of Myanmar yet.

Another protect area is Hlawga Wildlife Park situated in Yangon Region about 7.5 km to the east of nearest proposed transmission line. It is a designated wildlife park in the list of protected area.

Owing to the nature of work activities and distance, it is unlikely to have effect on the protected area.

Consequently, it can be concluded that no impact is predicted in regards to the protected area by the existing and activities of proposed project option.

Flora, Fauna and Biodiversity (Construction)

The landscape and physical environment were found to be seriously disturbed. The landform of the area was a combination of flat-land and hill range. This factor supports the various types of vegetation and cultivated plants.

The transmission line passes a large area of the Bago Yoma Hill range. The scrub forest is found in the area with some re-growth trees which represent the semi-evergreen forest. Most hilly parts are covered with greatly degraded moist semi-evergreen forest. Plantation area includes rubber and Cashew nut (Thiho) plantation areas. Rice is cultivated in the low and flat lands of the project area.

Wildlife habitat is important for the survival of the wildlife animals in terrestrial ecosystem. The wild animals are now threatened by habitat degradation and habitat loss caused by misconduct of human being. The habitats of the areas which will be passed by the proposed transmission line are found in low value, but still supporting the existence of some flora and fauna species.

Low biodiversity value was observed in the project area because the area has been seriously disturbed and the habitats have been degraded. Some threatened wildlife species like Asian Elephant *Elephas maximus* and Burmese Eyed Turtle *Morenia ocellata* are expected to occur in the areas, but not in frequent manner. List of plant species, plantation species and bird species observed in the proposed project area are shown in Table 7.3, Table 7.4 and Table 7.5 respectively.

Table 7.3 List of plant species observed in the proposed project area

No.	Scientific Name	Family Name	Myanmar Name	Habit
1	<i>Acacia auriculiformis</i>	Mimosaceae	Malaysia padauk	T
2	<i>Acmella calva</i>	Asteraceae	Shadon-po, Sein-nagat	H
3	<i>Ageratum conyzoides</i>	Asteraceae	Khwe-thay-pan	H
4	<i>Ailanthus triphysa</i>	Simaroubaceae	O-dein	T
5	<i>Albizia myriophylla</i>	Mimosaceae	Suboke nwecho	S, ST
6	<i>Albizia procera</i>	Mimosaceae	Sit-pin	T
7	<i>Alternanthera sessilis</i>	Amaranthaceae	Pazun-sar	H
8	<i>Antidesma bunius</i>	Euphorbiaceae	Kinbalin	ST
9	<i>Aporusa villosa</i>	Euphorbiaceae	Ye-main	T
10	<i>Artocarpus heterophyllus</i>	Moraceae	Pein -hne	T
11	<i>Azadirachta indica</i>	Meliaceae	Tama	T
12	<i>Bridelia retusa</i>	Euphorbiaceae	Seik-chay	ST
13	<i>Carallia brachiata</i>	Rhizophoraceae	Mani-awga	T
14	<i>Chromolaena odorata</i>	Asteraceae	Bizat	S
15	<i>Commelina diffusa</i>	Commelinaceae	Myet kyut	H
16	<i>Congea tomentosa</i>	Verbenaceae	Thamaga-hmwezoke	Cl
17	<i>Dactyloctenium aegyptium</i>	Poaceae	Myet-lay-gwa	G
18	<i>Dillenia pentagyna</i>	Dilleniaceae	Zin-pyun	T
19	<i>Dioscorea birmanica</i>	Dioscoreaceae	Khat-cho	Cl
20	<i>Eleusine indica</i>	Poaceae	Sin ngo myet	G
21	<i>Embllica officinalis</i>	Euphorbiaceae	Zee-phyu	T
22	<i>Ficus rumphii</i>	Moraceae	Nyaung	T
23	<i>Getonia floribunda</i>	Combretaceae	Kywet nwe	Cl
24	<i>Ipomoea sagittata</i>	Convolvulaceae	Kone kazun	Cl
25	<i>Lagerstroemia speciosa</i>	Lythraceae	Pyinma	T
26	<i>Lannea coromandelica</i>	Anacardiaceae	Nabe	T
27	<i>Mangifera indica</i>	Anacardiaceae	Tha-yet	T
28	<i>Microcos paniculata</i>	Tiliaceae	Mya-ya	T
29	<i>Mimosa pudica</i>	Mimosaceae	Hti-ka-yone	H
30	<i>Mitragyna parvifolia</i>	Rubiaceae	Hetin	T

31	<i>Musa sp.</i>	Musaceae	Taw nget pyaw	T
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No.	Scientific Name	Family Name	Myanmar Name	Habit
32	<i>Ricinus communis</i>	Euphorbiaceae	Kyetsu	S
33	<i>Samanea saman</i>	Mimosaceae	Kokko	T
34	<i>Senna siamea</i>	Caesalpiniaceae	Mezali	T
35	<i>Sida acuta</i>	Malvaceae	Wet-chay-pane	S
36	<i>Smilax macrophylla</i>	Smilacaceae	Sein nabaw	Cl
37	<i>Strychnos nux-blanda</i>	Loganiaceae	Kha baung	T
38	<i>Syzygium cumini</i>	Myrtaceae	Tha bye	T
39	<i>Tadehagi triquetrum</i>	Fabaceae	Lauk-thay	S
40	<i>Tectona grandis</i>	Verbenaceae	Kyun	T
41	<i>Terminalia bellerica</i>	Combretaceae	Thit seint	T
42	<i>Terminalia catappa</i> .	Combretaceae	Banda	T
43	<i>Thespesia lampas</i>	Malvaceae	Taw-wah	S
44	<i>Urena lobata</i>	Malvaceae	Katsene	S
45	<i>Xylia xylocarpa</i>	Mimosaceae	Pyinka do	T
46	<i>Ziziphus jujuba</i>	Rhamnaceae	Zee pin	ST
47	<i>Oryza sp.</i>	Poaceae	Rice	G

T-Tree; ST-Small Tree; S-Shrbb; H-Hurb; G-Grass; Cl-Climber

Table 7.4 List of plantation species in the proposed project area

No.	Scientific Name	Family Name	Myanmar Name	Habit
1	<i>Anacardium occidentale</i>	Anacardiaceae	Thiho	T
2	<i>Hevea brasiliensis</i>	Euphorbiaceae	Rubber	T

Table 7.5 Birds Species recorded in teh proposed project area

No.	Scientific name	Common name	Family	IUCN Red List Status
1	<i>Acridotheres tristis</i>	Common myna	Sturnidae	NL
2	<i>Microcarbo niger</i>	Little Cormorant	Phalacrocoracidae	NL
3	<i>Milvus migrans</i>	Black Kite	Accipitridae	NL

No.	Scientific name	Common name	Family	IUCN Red List Status
4	<i>Accipiter badius</i>	Shikra	Accipitridae	NL
5	<i>Sterptopelia chinensis</i>	Spotted Dove	Columbidae	NL
6	<i>Halcyon smyrnensis</i>	White-throated Kingfisher	Alcedinidae	NL
7	<i>Merops orientalis</i>	Green Bee-eater	Meropidae	NL
8	<i>Aegithina tiphia</i>	Common Iora	Aegithinidae	NL
9	<i>Lanius cristatus</i>	Brown Shrike	Laniidae	NL
10	<i>Oriolus tenuirostris</i>	Slender-billed Oriole	Oriolidae	NL
11	<i>Dicrurus macrocercus</i>	Black Drongo	Dicruridae	NL
12	<i>Dicrurus leucophaeus</i>	Ashy Drongo	Dicruridae	NL
13	<i>Rhipidura aureola</i>	White-browed Fantail	Rhipiduridae	NL
14	<i>Pycnonotus cafer</i>	Redvented Bulbul	Pycnonotidae	NL
15	<i>Orthotomus sutorius</i>	Common Tailorbird	Cisticolidae	NL
16	<i>Copsychus saularis</i>	Oriental Magpie-Robin	Muscicapidae	NL

NL- Not Listed

Construction of transmission line includes clearance of ROW with 25m of each side from the center line. Vegetation clearance including trees can have loss of habitation that supports the basis need of life such as food, shelter to the wildlife of the area. Survey results indicate the absence flora and fauna species of ecological and environmental concern or sensitive. Protected species such as wild elephants some time pay temporary visit the area in Hlegu Section during the winter and summer in search of food.

The predicated potential associated with construction of transmission could be habitat destruction to the low graded fauna of the project area.

During the initial phase of project, selection of four substations has been carefully considered with avoidance of environmental sensitive area. The location of proposed substations consists of agriculture land mixed with shrub in some area.

Following mitigation measures are suggested with the intention of preserving the existing natural environment as much as possible and avoiding unnecessary damage by project activities though the study area has been already degraded.

- Minimizing vegetation Clearance of ROW as much as possible and ensuring the clearance not beyond designated area
- Leaving ground vegetation and shrub within the ROW unless disturbance to access
- Carrying out all vegetation clearance in consultation with Department of Forest
- Disposing of chopped trees in accordance with Forest Department Guidance
- Rehabilitating borrowed pit or stock pile areas after completion of construction
- Prohibiting hunting activities by contractor employees
- Prohibiting forest resource extraction by contractor employees

- Prohibiting introduction of exotic species
- Prohibit using herbicide for clearing vegetation
- Releasing into natural habitat shall be done in consultation with Forest Department in case of evidencing Burmese Eyed Turtle which may be present sometime

Flora, Fauna and Biodiversity (Operation)

During the initial survey, there is no sufficient information about the pattern of migratory birds, their status and route in the project area. However JICA's project site between Hpayargyi and Hlaingtharyar is located more than 9 km away from Moeyungyi Wetland Wildlife Sanctuary. Transmission line is planned to be constructed southeast from the Sanctuary, and its route is designed to be further from the Sanctuary. Impact to the migratory birds is not expected hence mitigation measures are not necessary. This matter was consulted with ECD on 14 May, 2015 and agreed.

Hydrological Situation (Construction)

Southern Central Myanmar region where proposed 500 kV transmission line with two Substations are located is high-rain fall area with soft ground and high water table. Streams across or nearby are permanent (all-season) with water throughout. Piling operation for erecting transmission tower may use drilling mud, concrete or cement material and there occur potential impact on disturbance in surface and groundwater flow. Followings are mitigation measures for minimizing hydrological impacts because of power line construction.

- Strictly controlling usage of drilling mud, concrete and cement pumping near the river bank or stream channels by MEPE personnel and environmental section/ person of contractor
- Prohibiting flowing construction material or disposal of construction waste into river channels

Geographical Features (Construction)

Topographic features including mountains, hillocks, river banks that are in natural equilibrium could be disturbed by routing of power line and substations. It would lead to the landslides and reducing aesthetic values. Contractors of the MEPE have to avoid unnecessary excavation or digging the earth.

Proposed Taungoo substation lies on the top of Sagging fault area, which is considered as major active fault in Myanmar. The fault had ruptured in 1930 developing an earthquake with magnitude of 7.3 in Bago area. The fault is composed of several segments with different sizes. Thus, it is envisaged that Taungoo substation has potential of earthquake risks. Therefore, it is recommended to construct the Taungoo Substation with aseismic design.

7.4 Social Environment

Social impact on community is generally reflection of both actual and perceived impact.

In order to outline the key social issues related to proposed project, a series of activities were carried out including site inspection and scoping. The methodology approached to collect necessary information for assessing the severity of impact involves the review of both primary and secondary data resource.

Preliminary survey has been carried out using three set of key questionnaire form namely, village level, ROW and Social Economic during the observation. The social concerns identified in scoping section of social environment are furthermore focused during the evaluation of impact process and required data collection was made from primary sources.

Involuntary Resettlement (Construction)

The area in which transmission line and substations location are carefully selected with the principle of avoiding relocation as possible as it can be. Serious attentions are paid in considering the alternatives options of transmission line. As a result, there is no household fall within the transmission line corridor as per current proposed transmission line design. However, it is unavoidable in the case of Taungoo Substation as two households are located in the proposed site.

In addition, it is impossible to avoid the use of tower base and substation in private land mainly agricultural class. A total of 18.8 hectare of private land for tower base construction and 122.4 hectares of private land for substation shall be acquired permanently.

Though there is no relocation is expected from the construction of transmission line, two households at the Taungoo substation need to be relocated during the construction of Taungoo substation.

Detailed information about land acquisition process is mentioned in Resettlement Action Plan which is reported in separate document.

Vulnerable (Construction)

The 95 km long transmission line and construction of 4 substations will potentially affect to 24 villages which lie in the transmission corridors and adjacent to substations. It is estimated based on the village survey that potential numbers of households which would have direct impact by either loss of land or crop/plantation removal or both is 181 households.

1. Single headed Family
2. Elderly or disable headed Family
3. Poor Family (less than 1,000,000 annual income)

There recorded 5 single-headed families among the potentially affected households along the Power Transmission Line Route and 7 families with less than 1,000,000 Kyats annual income.

Indigenous and Ethnic Minority

Myanmar is a country with diverse ethnicity. Myanmar population is composed with as

many as 135 ethnic groups.

Amongst seven ethnic groups known as Myanmar, Mon, Rakhine, Kachin, Karen, Shan and Kayah are regarded major ethnicity. Myanmar has the largest population constituting about 68% and the remaining belongs to diverse ethnic groups.

Social search undertaken during Mid-October 2013 and March 2015 along the transmission line corridor and substation surroundings area indicates that majority of population residing in the project affected area are Myanmar. A total of 199 affected household in the project affected villages along the transmission line as well as substation sites were cooperated for socio-eco surveying purpose and accordingly a series of interviews had been carried out.

Survey results indicate that Bamar people living in that area reach to 86.4% of total population followed by 11.6% of ethnic Karen group.

It is obvious that Hmawbi and Hlegu Township belong to more diverse ethnic groups other than that of areas. Table 7.6 shows the main ethnicity and religion by villages in the affected area.

Table 7.6 Main Ethnicity and Religion by villages in the affected area

No.	Township	Name of Village	Ethnicity (%)				Religion (%)	
			Bamar	Karen	Mon	Chin	Buddhist	Christian
1	Bago	Hlaw Kar	87.9	7.4	2.5	0	90	7.4
		Sit Pin Seik	97.2	0	2.4	0.3	100	0
		Baw Net Kye	95.9	2.25	1.6	0	98	2
2	Hlegu	Kyar Inn Ah Shae	99.5	0.52	0	0	99	1
		Nante	90	0.07	0	0	100	0
		Sar BuTaung	63.4	36.4	0	0.58	64	36
		Gwe Tauk Eain	90	6.4	0	0	90	7
		Min Kone	96.2	1.5	0.7	1.3	98	2
3	Hmawbi	Min Yower	57.1	42.8	0	0	57	43
		War Pa Taw	98.2	1.7	0	0	98	2
		Bant Bawe Kone	99.2	0.55	0.1	0	99	1
		Inn Gyin Kone	87.2	9.43	0	0	90	10
		Hle Ngote	88.8	11.33	0	0	88	12
		Hla Pa Dar	87.4	12.6	0	0	88	12
		Let Pan Tan Su	84	2.57	0	0.31	97	3
		Ye Paw The	54	46	0	0	54	46
Moe Kyo Pyit	61	39	0	0	60	40		
4	Htantapin	Htain na pin	93	7	0	0	93	7
		Deik Kone	100	0	0	0	100	0
		War TaYar	100	0	0	0	100	0
		Pauk Tan	100	0	0	0	100	0
		Ka Lain	71	27	1	0	97	0.02

Source: Field Survey, March 2015

It is understood that all ethnic minorities in the project area have already conditioned by the main stream Myanmar Society for years, speaking Myanmar Language as native language and practicing Myanmar culture as well.

Such findings indicate that potential influence on the ethnic minority in the way of changing culture and livelihood by project is unexpected.

Local Economy, Employment, Livelihood

It have been found out through both field observation and secondary source information, agriculture and plantation is the largest and predominant industry in the study area including transmission corridor and substation sites as majority of the affected community rely their livelihood on the agriculture.

According to the income survey conducted in the four townships in which transmission line transverses for 52 households, over 83.36% their main income from agriculture business. Average income of affected households and main business in transmission line area and substation area are shown in Table 7.7 and Table 7.8 respectively.

Table 7.7 Average income of affected household and main business in Transmission Line Area

Township	No. of Household Survey	Average Income	Main Income			
			Agriculture (%)	Shop (%)	Government Service (%)	Other (%)
Hmawbi	34	5,032,353	76.76	3.82	4.11	15.3
Bago	7	3,214,285	100.00	-	-	-
Hlegu	5	11,720,000	78.00	22.00	-	-
Htantapin	6	2,500,000	86.66	3.33	-	10
Mean Average	13	5,616,659	85.36	7.29	1.03	6.33

Source: Field Survey, March 2015

Table 7.8 Average income of affected household and main business in Substation Area

Township	No. of Household Survey	Average Income	Main Income			
			Agriculture (%)	Shop (%)	Government Service (%)	Other (%)
Meikhtilar	4	2,500,000	73.33	26.67	-	-
Taungoo	12	4,183,333	98.33	-	-	1.67
Bago	10	6,068,000	100.00	-	-	-
Htantapin	7	5,470,000	100.00	-	-	-
Mean Average	10	4,555,333	92.92	6.67	-	0.42

Source: Field Survey, March 2015

It can be concluded that the economy of the study area of 500KV power transmission line (Hmawbi, Bago, Hlegu and Htantabin Township) is predominantly based on agriculture which is followed by shop business.

Similarly the potential affected household residing in the substation locations mainly relies on the agriculture business as about 92.92% of income of individual household comes from agriculture.

The project will have notable impact on employment especially during the construction period of transmission line and substations. It is expected that local workforce will be mainly sourced for the construction activities. Majority of workforce shall be used in construction of substations.

The prospect of an increased income and greater autonomy is likely to cause an increase in the aspirations of local communities both those involved with the project and, to a lesser extent, those from other working individually. This is a direct positive effect with a moderate extent though it is short term. As consequence, it is considered as a major beneficial impact resulted from the project on the local community.

It is expected that construction contractor will provide awareness and critical training necessary to its employees. It is perceived that capacity building will foster the perception of local community and regards as one of the beneficial effects as well.

There is some probability that the workforce will patronize local retail services, such as food outlets, which would be beneficial to the economy at the local scale.

On the project side, it is certain that some materials required for the project use could be locally available and due to the easy accessibility, there might be greater consumption for local market and increase business opportunity for local business.

With intention of having improved in local economy' development, constructive measures which could enhance the economic status of local community and livelihood are suggested.

- Investigating the possible procurement needs of the project that can be sourced locally
- Investigating the possible employment needs of the project that can be sourced locally
- Identifying the range of skill required for the labor force and conduct a gap analysis against skills availability
- Providing information to local people of job openings through local advertising, information center, project notice boards
- Developing and implementing a local employment policy for the people of affected communities
- Practicing careful management about the expectation of local people in regard to the employment to avoid any disputes

Land Use and Utilization of Local Resources (Construction)

Calculation of land utilization for the construction of transmission line is based on the

design of tower base and number of tower to be erected to support conductors and worldview map. Accordingly, transmission line will pass through various types of land inclusive of agricultural land, plantation, forest land, government land and other.

Owing to the construction of tower structure, 26.0 ha of land is designed to be acquired permanently.

Establishment of four substations will affect 126.5 ha of land which is also to be acquired permanently.

Land utilization for transmission line and substation is unavoidable and will occur permanently during construction period. Land use information is detailed in Table 7.9.

Additional measures for the land use are described in Resettlement Action Plan which is prepared separately.

Table 7.9 Land Use

Item	Transmission Line		Substation		Total
	Unit		Unit		
Affected Land Area (Permanent)	ha	26.0	ha	126.5	152.5
ROW Clearance Affected Area*	ha	118.7			

*Tree higher than 3m needs to be cut-down or trimmed within average about 25% of ROW in between transmission towers

Existing Social Infrastructures and Services (Construction)

Predicted potential impact on the existing local infrastructure is use of public road and village roads and bridges for the transportation of materials, workers, food and other necessities for use of construction works. Truck carrying excessive loads and heavy equipment can contribute the damage of public roads and bridge which can lead to the local community dissatisfaction.

Transmission line will cross over a numbers of public access including two major high ways (4 times), two railways, and other villages’ access roads.

During the conductor stringing works, there could be some event of blocking the public roads when working at road crossing .This road closure will be temporary.

In order to minimize the degree of impact occurred on the infrastructure, following mitigation measures are proposed.

- Arranging careful logistics management with understanding of the bearing capacity of road and bridge to be utilized
- Dispatching road maintained crew to the area where access roads are damaged by construction activities in consultation with relevant authorities
- Delivering prior notification to local authority and public for the temporary road closure
- Constructing alternative routes by contractor in case of using the village access for long
- Providing road signs, safety barriers

Cultural Heritage (Construction)

One of the principles adopted during this study is to avoid the area of cultural significances so as not to affect the cultural believes and aesthetics of local community by construction activities of the project. Consideration is made to include small shrines built by local villages as those are important figures for local people in term of religion belief. The probability of existence of invaluable cultural heritage site within the project affected area have been identified by literature views, aerial map search, interview with location authority, local community and site observation at potential locations. It is confirmed that no major cultural or religious sites are identified through in the time of investigation.

Based on the information provided above, it is anticipated that it is unlikely to have cultural impact by the construction and existence of project.

However, following additional protective measures are adopted to implement s in case of unidentified artifact or fossil found during details ground check works and excavation for tower footages and substations.

- Suspending the work activities in the places where archeological remains or artifacts or old graveyard inclusion of tombs and other forms of subjects tend to be cultural concerns are found
- Reporting to the authority concerns for further action

Landscape (Construction)

During the construction stage, there is likely to have changing of landscape pattern by the earthwork, installation of transmission line and substations construction as selected location is mostly in unpopulated area with the absence of existing structures.

The construction activities include sequential activities and each activity can result in landscape variation. The tall transmission towers of 500 KV power grids can also pose a virtual intrusion permanently.

Substations are allocated in the paddy field area, fallow land and area surrounded by bamboo forests. The existence of these facilities on the adjacent environmental can post a visual intrusion.

Visual impact associated with project activities can be reduced to somewhat extent by applying following mitigation strategies.

- Avoiding of leaving borrow pit and cut area without filling back or re-vegetation
- Selecting the area for components stockpile free of thick vegetation
- Introducing rehabilitation program to reinstate the damage vegetation coverage immediately upon the completion of construction
- Developing a soil stabilization and embankment planting strategy during the detailed design phase to ensure that land affected by slope excavation can be replanted
- Selecting colors for the substations to match or indifference the surrounding area.
- Lighter colors may be utilized where technically feasible to reduce the visibility

of the substations

Gender

The constitution of Myanmar has granted the equal right for every person regardless of color, gender, age, religious belief and race. In Myanmar, 80% of the population are Buddhism which does not encourage differentiating between men and women. Traditionally, respect is ranked to men as they are the leading the livelihood of family with full responsibility of earning income. In these days it is obvious that women becomes speaker of household in some cases.

Judging on the basis of current social status and women's role, it is anticipated that land acquisition process of the project do not practice the gender basis and no gender concerns is taking place.

- Avoiding of treating gender discrimination
- Taking into account women's suggestion and opinions with careful and cautious consideration prior to commence the land acquisition scheme

Communicable Diseases such as HIV/AIDS (Construction)

Transmission line will pass through some villages and towns territory. Substations are also located adjacent to local community. Temporary construction contractor employee's camps are typically set up within easily reachable distance from the local residential area. Though a proportion of construction workforces are to be recruited from the local areas and live locally, some numbers of workforces are to be sourced outside of the community area. Those include skilled labor and technical experts.

It is anticipated the relationship between workforce and local community will be increased from time to time. Consequently, potential health issues within the local community from the 500 KV power grid and substations project are foreseeable to some extent. The source of communicable disease could be in- migration as a result of project development who can introduce and spread the disease to local population.

Communicable diseases, such as malaria, TB and HIV/AIDS, are known to follow transport corridors and locations where there in an influx of migrants mostly in temporary construction camps for substation facilities.

Health facilities including local clinics and hospitals can be accessible within driving distances for the construction of Substations in the area of Meikhtilar, Taungoo, Hpayargyi and Hlaingthayar Township. However issues becomes obvious for the construction of transmission tower and transmission line owing to their remote location and proper health service can be a major issues for treating illness and occupational related injuries.

In order to mitigate and prevent the possible introduction of communicable disease, following measure is suggested.

- Developing health awareness programs within Construction Health and Safety Plan focused on raising awareness of diseases prevalent in the area

- Carrying out medical surveillance including medical checkup to immigrant workers that will include testing HIV, Tuberculosis, Malaria and Hepatitis as a basis requirement.
- Recruiting local workforce as much as possible

Working Environment (Construction)

During the scoping phase, it has been identified that inappropriate management of working environment will raise a series of risks that can lead to accident and disease to both work operatives and local community both in construction and operation periods of project.

Due to absence or inadequate legislative framework and standard for the control of occupation health and safety in Myanmar, it is strongly recommended to adopt internally accepted industrial practice to management the occupational health and safety issues at construction work sites.

The nature of construction itself is a risk based industry with having potential of occupational related health and safety concerns if appropriate control fails. The installation activities of transmission line and construction of substations could pose inherent risk of injuries to its workers. The predicted risky areas associated with construction works for the proposed project are

- Working at Height
- Equipment and Equipment Movement
- Lifting
- Fire Hazard
- Chemical Handling
- Slip , trip and fall
- Electrical hazards
- Scaffolding
- Sanitation
- Road Safety

Adequate occupational health and safety management plan is required to develop, implement and maintain as required through the construction phase and incorporated into the construction management plan.

Following measures are suggested to address in the construction safety management plan.

- Preparing occupational health and safety management plan for construction in contractual agreement.
- Developing risk assessment prior to the commence of construction works
- Providing safety orientation for all workforces including management and supervisor level
- Providing the provision of personal protective equipment to all working forces

- Providing specific procedure, training and provision of safety harness for working at height more than 1.8 m.
- Designating person for scaffolding works
- Preparing safety working procedure for movement of equipment
- Providing with the provision of safety drinking water sufficiently
- Ensuring good sanitation including kitchens and latrines and install good drainage
- Developing of emergency response plan in close collaboration and consultation with relevant local authority and potential affected community
- Providing firefighting equipment such as potable extinguishers at the potential fire hazard areas.

With the development and implementation of construction health and safety management system, occupational risks can be minimized.

Others

Road Accident (Construction)

It is envisaged that a number of construction and utility vehicles will use the public road and village access during construction period for various purposes. Having used the public road, anticipation is high for occurring road accident in which local community may be involved. Precautionary measures are essential to avoid or mitigate the potential road incidents. Suggestions are made to improve the contractor's road management plan as below.

- Developing road safety management plan
- Preparing preventive maintenance system on vehicle and truck
- Setting speed limit based on the locations.
- Confirming all driver possess valid driving licenses
- Limiting night travelling or transportation

Accident (Operation)

It is anticipated that electrical shock hazard can pose a threat to ROW and transmission line maintenance workers and community if appropriate safe practice and lack of providing sufficient information to public during the operation. However, these potential risks can be avoidable by adopting appropriate safety management, installation of security fence around grid substations and warning sign with proper designs at each tower.

8. Environmental Management

The effective Environment Management contributes the minimization of environment impact predicted in the assessment process and fully incorporates the environmental protection into project management system.

The objective of environmental management plan is to ensure the contractor engaged in necessary control and mitigation measures set out in this plan and develop management strategies to minimize or mitigated the potential adverse impacts.

Project contractor under the close supervisor of project proponent (in this project case MEPE) are responsible for the implementation of any additional mitigation measures found in the ongoing process of impact identification in addition to adhering contractual agreement described in this plan.

8.1 Institutional Arrangement

The roles and responsibilities of institutions concerned for the Project's environmental management in a construction and operation phases are summarized in Table 8.1.

Table 8.1 Roles and Responsibilities for Institutions concerned

Institution	Roles and Responsibilities
Pre-Construction/Construction Phase	
Power Transmission Project Department(PTP) in MEPE	<ul style="list-style-type: none"> - Supervise tasks implemented by the Project Management Unit (PMU) - Assign a staff dealing with environmental and social issues in Project Management Unit (PMU)
Project Management Unit, PTP (PMU)	<ul style="list-style-type: none"> - Support the environmental staff assigned by the MEPE as appropriate
Administration Department in MEPE	<ul style="list-style-type: none"> - Finalize compensation price with affected people and disburse compensation/ assistance to project affected peoples
Compensation Committee (SLRD, Police officer, Agriculture and Irrigation Department and General Administrated Department at the relevant township and project owner: MEPE)	<ul style="list-style-type: none"> - Set compensation standards / assistances
Environmental and Social Staff in PMU (Assigned from PTP to work for PMU)	<ul style="list-style-type: none"> - Develop the Construction Environmental Management Plan (CEMP) for project contractors. - Supervise the mitigation measured implemented by the construction contractor addressed in the Environmental and Social Management Plan (EMP) - Open windows for project affected peoples
Environmental Division (Established in construction contractor)	<ul style="list-style-type: none"> - Deal with environmental and social issues - Ensure the implementation of the CEMP in all construction site
Operation Phase	

Power System Department in MEPE	- Implement operation and maintenance of transmission and substation including environmental management
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(1) Construction Phase

Mitigation measures during the construction phase will be implemented by the construction contractor with the close supervisor of Power Transmission Line Project Department of MEPE. The environmental division needs to be established within the construction contractor in order to carry out the mitigation measures addressed in the construction environmental management and monitoring plan (CEMMP), which will be prepared based on the environmental management and monitoring plan (EMMP) during the detailed design phase.

The mitigation measures implemented by the construction contractor will be monitored by the environmental division in the construction contractor. The project management unit (PMU) which will be established in the MEPE during the construction phase will assign an environmental and social staff or environmental team to monitor and inspect and audit as required the contractor’s performance on mitigation activities throughout the execution of project phase in accordance with the requirements stipulated in this document and other additional studies.

(2) Operation Phase

After completion of construction works the project area will be managed together with existing facilities in the MEPE. Accordingly, the division of at the Transmission Line Project Department in the MEPE will take responsibility on the implementation and maintenance of EMMP in the operation phase in collaboration with Power System Department which normally controlling the activities of substations.

8.2 Mitigation Measures and Monitoring Plan

Based on the IEE result, the mitigation measures are prepared for each environmental impact. The responsibility of implementing the mitigation measures, parameter for monitoring, measurement of monitoring frequency, responsibility of implementing the monitoring in the construction and operation phases is shown in Table 8.2. The proposed monitoring form is attached in Appendix 2. The EMMP will be reviewed and finalized during the detailed design phase. Construction Environmental Management and Monitoring Plan (CEMMP) will be prepared based on the EMMP in order for the construction contractor to implement environmental mitigation measures. The CEMMP will be prepared by the construction contractor as a part of tender document.

Table 8.2 Environmental Management and Monitoring Plan

Potential Impact	Proposed Mitigation Measure	Parameter to be Monitored	Measurement and Frequency	Institutional Responsibility	Implementation Schedule
Construction					
Anti- Pollution					
Air Pollution	<ul style="list-style-type: none"> • Development of Preventive Maintenance System for vehicle and equipment • Daily vehicle and equipment Inspection to be carried out • Dust generating activities shall be stopped in high wind • Good Site management and housekeeping practice • Turn off the engine while not in use • Appropriate dust control measures such as water spraying on the dusty unpaved road and dusty area especially in dry season • Optimize construction schedule to minimize time that vehicles are in operation 	Vehicle inspection checklist No of water Spraying	Daily, Visual Inspection	Mitigation measures implemented by Contractor Monitored by Environmental and Social Staff in PMU,MEPE	During the Construction

Potential Impact	Proposed Mitigation Measure	Parameter to be Monitored	Measurement and Frequency	Institutional Responsibility	Implementation Schedule
Water Pollution	<ul style="list-style-type: none"> Fuel handling procedure to be developed Spill kits are available on site Designated area for fuel filling Proper disposal of sewage shall be planned Prior to the commencement of site preparation, silt trap/ silt removal shall be installed The surface runoff shall be collected by the on-site drainage system and discharged into storm drains after the removal of silt in silt removal facilities Unprotected soil stock pile shall be temporary covered with plastic sheet and secure from wind blowing Surface drainage systems, erosion control and silt removal facilities will be regularly inspected and maintained to ensure their effective operation particularly following rainstorms 	No of fuel Leakage	<p>Monthly Site Inspection,</p> <p>Inspection following the storm, heavy rain,</p>	<p>Mitigation measures implemented by Contractor</p> <p>Monitored by Environmental and Social Staff in PMU,MEPE</p>	During the Construction

Potential Impact	Proposed Mitigation Measure	Parameter to be Monitored	Measurement and Frequency	Institutional Responsibility	Implementation Schedule
Construction					
Waste	<ul style="list-style-type: none"> • Excavated soils shall be reused for vegetation purpose as much as possible • Reinstatement works shall be considered for borrowing pit • Land shall be cleared only needed basis • Designated soil disposal area shall be provided • All wastes are to be collected , handled and transported as per construction waste management procedure • Enough dust bins are to be located in the places where waste generated. • All waste including human waste shall be disposed of properly and environmental friendly manner at local municipal waste disposal area • Burning the solid waste shall be not being permitted. • Waste management practices should be based on the hierarchy of reduces, reuse and recycle principle 	<p>Site Inspection</p> <p>Types of the waste, amount, disposal method</p>	Monthly Work site and camp inspection	<p>Mitigation measures implemented by Contractor</p> <p>Monitored by Environmental and Social Staff in PMU,MEPE</p>	During Construction

Potential Impact	Proposed Mitigation Measure	Parameter to be Monitored	Measurement and Frequency	Institutional Responsibility	Implementation Schedule
Noise and Vibration	<ul style="list-style-type: none"> • All noise emitting equipment shall be ensure that working activities should be kept distance from the residential area • All noise emitting equipment are to be inspected on a daily basis • All engines have to be shut down while not in use • Night work including transportation of material shall be limited • Ambient noise level shall be maintained below 55dB during daytime and evening time • Schedule on-site activities to reduce the potential for the simultaneous occurrence/overlap of noise 	<p>Vehicle Inspection Checklist</p> <p>Noise measurement</p>	<p>Daily visual Inspection</p> <p>Monthly</p>	<p>Mitigation measures implemented by Contractor</p> <p>Monitored by Environmental and Social Staff in PMU,MEPE</p>	During Construction

Potential Impact	Proposed Mitigation Measure	Parameter to be Monitored	Measurement and Frequency	Institutional Responsibility	Implementation Schedule
Natural Environment					
Flora , Fauna and Biodiversity	<ul style="list-style-type: none"> • Vegetation Clearance of ROW shall be minimized as much as possible ensuring vegetation is not cleared beyond designated area • Ground vegetation and Shrub within the ROW shall be left unless disturbance to access • All vegetation clearance shall be carried out in consultation with Department of Forest • Chopped trees shall be disposed of in accordance with Forest Department Guidance. • Re-vegetation shall be considered for the borrowed pit or stock pile areas • No hunting is allowed by construction workers. • No forest resource extraction is allowed by construction workers • • Introduction of exotic species are banned • No herbicide shall be used for clearing vegetation. • In case of evidencing Burmese Eyed Turtle which may be present sometime, releasing into natural habitat shall be done in consultation with Forest Department. 		Monthly site inspection	<p>Mitigation measures implemented by Contractor</p> <p>Monitored by Environmental and Social Staff in PMU,MEPE</p>	Prior to commencement of construction and during construction

Potential Impact	Proposed Mitigation Measure	Parameter to be Monitored	Measurement and Frequency	Institutional Responsibility	Implementation Schedule
Social Environment					
Involuntary Resettlement	Improper Compensation	Site inspection	Monthly inspection	Contractor and Environmental and Social Staff in PMU,MEPE	Prior to commencement of construction
Vulnerable	Improper Assistance	Number of complain	Monthly inspection	Environmental and Social Staff in PMU,MEPE	Prior to commencement of construction
Existing Social Infrastructures and Services	<ul style="list-style-type: none"> Careful logistics management shall be arranged with understanding of the bearing capacity of road and bridge to be utilized Road maintained crew shall be immediately dispatched to the area where access roads are damaged by construction activities in consultation with relevant authorities Prior notification shall be delivered to local authority and public for the temporary road closure Alternative routes shall be constructed by contractor in case of using the village access for long. Road signs, safety barriers are to be provided 	Site inspection	Monthly inspection	<p>Mitigation measures implemented by Contractor</p> <p>Monitored by Environmental and Social Staff in PMU,MEPE</p>	During Construction
Cultural Heritage	<ul style="list-style-type: none"> Stop the work activities in the places where archeological remains or artifacts or old graveyard inclusion of tombs and other forms of subjects tend to be cultural concerns are found. Information to the authority concerns for further action Consider other available alternative options to proceed construction works 	Identification of cultural heritage	As required	<p>Mitigation measures implemented by Contractor</p> <p>Monitored by Environmental and Social Staff in PMU,MEPE</p>	During Construction

Potential Impact	Proposed Mitigation Measure	Parameter to be Monitored	Measurement and Frequency	Institutional Responsibility	Implementation Schedule
Landscape	<ul style="list-style-type: none"> • Avoidance of leaving borrow pit and cut area without filling back or re-vegetation • In selection the lay down area of components stockpile, try to find the area free of thick vegetation • Rehabilitation program shall be introduced to reinstate the damage vegetation coverage immediately upon the completion of construction 	Visual site observation	Visual site observation	<p>Mitigation measures implemented by Contractor</p> <p>Monitored by Environmental and Social Staff in PMU,MEPE</p>	Prior to commencement of construction/ End of construction activities
Communicable Diseases such as HIV/AIDS	<ul style="list-style-type: none"> • Develop health awareness programs within Construction Health and Safety Plan focused on raising awareness of diseases prevalent in the area, 	Number of awareness programs	Whenever open new camp site	<p>Mitigation measures implemented by Contractor</p> <p>Monitored by Environmental and Social Staff in PMU,MEPE</p>	Prior to open new camp

Potential Impact	Proposed Mitigation Measure	Parameter to be Monitored	Measurement and Frequency	Institutional Responsibility	Implementation Schedule
Working Environment, Health and Safety	<ul style="list-style-type: none"> Requirement of occupational health and safety management plan for construction in contractual agreement. Safety orientation for all workforces including management and supervisor level Provide for the provision of Personal Protective Equipment to all working forces Safety working procedure for movement of equipment Ensure good sanitation including kitchens and mess are installed good drainage Development of emergency response plan in close collaboration and consultation with relevant local authority and potential affected community Firefighting equipment such as potable extinguishers is to be provided at the potential fire hazard areas. 	<p>Emergency Response plan,</p> <p>No of safety induction training</p> <p>Visual site inspection</p>	<p>Every 6 month</p> <p>Daily</p> <p>Monthly</p>	<p>Mitigation measures implemented by Contractor</p> <p>Monitored by Environmental and Social Staff in PMU,MEPE</p>	During Construction
Others					
Material for reclaim fill	<ul style="list-style-type: none"> Ensure that material for reclaim fill is supplied from quarries which have necessary Permit. 	Check supplier's Permit	Before purchasing material	<p>Mitigation measures implemented by Contractor</p> <p>Monitored by Environmental and Social Staff in PMU,MEPE</p>	During Construction

Potential Impact	Proposed Mitigation Measure	Parameter to be Monitored	Measurement and Frequency	Institutional Responsibility	Implementation Schedule
Road Accident	<ul style="list-style-type: none"> • Road Safety Management Plan shall be developed • Share information on safety drive and traffic regulations • Speed limit will be assigned based on the locations. • All driver must process valid driving licenses • Night travelling or transportation is limited 	Number of training	Every 6 months	<p>Mitigation measures implemented by Contractor</p> <p>Monitored by Environmental and Social Staff in PMU,MEPE</p>	During Construction
Operation					
Anti -Pollution					
Soil Contamination	<ul style="list-style-type: none"> • Visual Inspection at potential leak source • Spill kits to be installed 	Visual inspection	Monthly	Power System Department in MEPE	During Operation
Waste	<ul style="list-style-type: none"> • All wastes are to be collected , handled and transported as per operational waste management procedure • Designate a place to storage industrial waste including waste transformer oil (concrete floor with shed and sign) • All waste including human waste shall be disposed of properly and environmental friendly manner at local municipal waste disposal area • Burning the solid waste shall be not being permitted. • Waste management practices should be based on the hierarchy of reduces, reuse and recycle principle 	<p>Site Inspection</p> <p>Types of the waste, amount, disposal method</p>	Monthly Sub Station	Power System Department in MEPE	During Operation

Potential Impact	Proposed Mitigation Measure	Parameter to be Monitored	Measurement and Frequency	Institutional Responsibility	Implementation Schedule
Noise and Vibration	<ul style="list-style-type: none"> • Engineering noise control concept is to be integrated in to the detailed design stage of substation • When purchasing noise creating device, ensure that noise operating level is within standard • Considering designed noise barrier installation • Noise monitoring plan shall be established to understand the actual noise level from substation. Noise monitoring at Power System Department in MEPE night time from the nearest residential should be included. 	Frequency of Monitoring and records	As required	Power System Department in MEPE	During Operation
Natural Environment					
Occupational Accident	<ul style="list-style-type: none"> • Adopting appropriate safety management • Installation of security fence around grid substations • Installation of warning sign (High Voltage) with proper designs at each tower 	No of accident No of warning sign and security fence	Every 6 months	Power System Department in MEPE	During Operation

8.3 Monitoring Method

The monitoring will be implemented periodically based on the EMMP and RAP on monthly basis. MEPE will send the environmental and social staff to the Project site once a month to consult with the environmental staff in construction contractor, participate in field work and conduct interview with the Project affected villagers/affected village representatives. In every three month, the progress of EMMP and RAP activities will be reviewed and report to MOCAF and JICA. The EMMP and RAP will be evaluated in every six month and modify as appropriate.

8.4 Monitoring Cost Estimates

The following is the monitoring cost estimate of implementing EMMP and RAP as shown in Table 8.3.

Table 8.3 Monitoring Cost Estimate

Monitoring Cost for Meikhtilar Substation and Taungoo Station

Item	Person/Unit	Day	Unit Price (USD)	Total (USD)
Environmental and Social Staff	1	180 (30 months x 2 days)	180	10,800
Driver	1	180 (30 months x 2 days)	20	1,200
Transportation/Petrol	1	180 (30 months x 2 days)	100	6,000
Total				18,000

Monitoring Cost for Hpayargyi Substation and Hlaingthayar Substation

Item	Unit	Day	Unit Price (USD)	Total (USD)
Environmental and Social Staff	1	60 (30 months x 2 days)	180	10,800
Driver	1	60 (30 months x 2 days)	20	1,200
Transportation/Petrol	1	60 (30 months x 2 days)	100	6,000
Total				18,000

Monitoring Cost for 500kV Transmission Line

Item	Person/Unit	Day	Unit Price (USD)	Total (USD)
Environmental and Social Staff	1	64 (32 months x 2 days)	180	11,520
Driver	1	64 (32 months x 2 days)	20	1,280
Transportation/Petrol	1	64 (32 months x 2 days)	100	6,400
Total				19,200

(Note)

One monitoring mission requires comprised of 3 staff and one driver as one unit and 1 day to cover the project site for one substation and 2 days to cover the project site for project site of transmission.

Based on the implementation schedule of the project, the total month for implementing EMMP/RAP is 30 months for substations and 32 months for transmission line.

The budgets estimation is one of basic requirement, the actual practice is largely dependence on the real implementation in the field and monitoring schedule's frequency may be reduced or increased in order to meet the EMMP/RAP requirements at the time. Environmental and Social staff of PMU in MEPE will make a detail action plan for field monitoring at D/D phase.

The assumption of timeframes for the EMMP/RAP "54 months" for substation and transmission line here covers until the end of construction phase. In practice, most of the RAP requirement is completed before the commencement of construction phase, especially for the case of substation site. As for the transmission line tower construction, the construction sites gradually move from one place to the other along the route. Accordingly, it requires more long time range for the RAP implementation. It is difficult to assume exact period of RAP at this stage, the period is used just for the estimation. Thus, the total period to complete the RAP requirement is most likely to be shortened.

The monitoring requirement of RAP is overlapped with EMMP up to the commencement of construction activities. However, the monitoring activities based on EMMP are continued until end of operation phase

8.5 Grievance Redress System

Grievance Redress System is an effective instrument to tackle the various complaints receiving from the PAP and community in such a way that elevate the process of finding solution to reach the satisfaction and mutual agreement in a timely fashion and transparent manner.

The framework for grievance redress mechanism for the projects has been established to address the complaints and concerns that must be raised by PAP about project activities or performance during the construction and operation period .That shall act as a tool for execution within a set time period, purpose and detail out a systematic process against several documents.

The site specific procedure shall be developed for receiving complaints, logging in the GRS log book for recording and registering purpose, investigation, analysis and responding to the PAP.

Grievance Focal Person (GFC)

Grievance focal person shall be Administrator Office of Village Track to implement the GRS procedure effectively. The nominated person for role should have sound and broad experience within the social region and acting within such a role previous.

The roles shall function as the primary resources for interface on issues relevant to RAP.

He will receive the complaints in verbal or with letter from the PAP through site construction team or village head or PAP himself. The complaint shall be recorded and registered accordingly and deliver the message to Site Grievance Redress Team promptly.

Site Grievance Redress Team (SGRT)

Site based grievance redress team should be formed with Site Manager of each Substations of MEPE, Administrative officer of village track and sub-contractor. SGRT will review the any complaint and concerns and find a solution to ease the degree of complaints, which will be agreed and accepted by the PAP. SGRT shall address the issue within (14) days. In this stage, many issues shall be resolved as possible locally.

If the case is not addressed to the satisfaction of PAP within the given time frame, SGRT shall proceed to submit the issue to Grievance Redress Committee for further review.

Grievance Management Committee (GRMC)

GRMC is the highest authority to make final decision within project specific Grievance Redress System on the received issues which SGRT cannot sort it out alone. Grievance Management Committee (GRMC) will be led by Deputy Chief Engineer and members as other officials concerned for Finance and Technical Team.

Unsolved Issue

If the case is still not resolved by GRMC, PAP can proceed through juridical system such as appealing on court for final resolution starting from tow ship level jurisdiction.

8.6 Implementation Schedule

Tentative implementation schedule on environmental management is provided in Table 8.4 below.

Year (per calendar year)	2015	2016	2017	2018	2019	2020
Pre-Construction Stage						
MEPE submit a letter to conduct IEE instead of EIA to MoECaF	■					
MEPE disclose IEE report to public	■					
MEPE finalize the report and apply of IEE approval.		■				
Obtain Environmental Compliance Certificate from MoECaF			■			
Construction Stage						
Environmental monitoring by environmental and social staff in the Project Management Unit in MEPE						
Meikhtilar and Taungoo SS				■	■	■
Hlaingthayar, Hpayargyi and Transmission Line				■	■	■
Operation Stage						
Environmental monitoring by environmental and social staff in the Project Management Unit in MEPE						
Meikhtilar and Taungoo SS					■	■
Hlaingthayar, Hpayargyi and Transmission Line					■	■

Table 8.4 Implementation Schedule

9. TOR for EIA Investigation

As per Annex of drafted EIA procedure (2013) the proposed project falls into categorization of project requiring EIA as it is over 230 kV and the length of TL is more than 50 km.

Article 42 of Drafted EIA procedure (2013) requires project proponent to prepare scoping report and TOR for EIA preparation. The article states “Based on the Scoping, the Project Proponent shall prepare the Terms of Reference for the EIA investigations in accordance with applicable guidelines issued or adopted by the Ministry.”

Study team has prepared this IEE report of the proposed transmission line project in line with JICA guideline. Further step is to proceed EIA study by project proponent in accordance with drafted EIA procedure and applicable guideline issued by the Ministry.

In order to proceed EIA investigation, project proponent (here MEPE acts as project proponent) shall submit the completed IEE Report and Terms of Reference to the Ministry for review and approval.

EIA investigation shall consider

- All biological, physical, social, economic, health, cultural and visual components of the environment, together with all pertinent legal matters relating to the environment (including land use, resources use, and ownership of land rights to land and other resources)
- All necessary data collection, technical studies, modeling, field surveys, field sampling, laboratory analysis, engineering designs and calculations, and consultations to determine and document an analysis of Alternatives with description of each Alternative, and an assessment and comparison of the adverse impacts, required mitigation measures and residual impacts of the alternatives
- 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 should include the results of public consultations and negotiations with the affected populations on the environmental and social issues. Public concerns should also be taken into account in assessing impacts, designing mitigation measures, and selecting monitoring parameters
- Consultation process in line with drafted EIA procedure

10. Stakeholder Meeting

Throughout the IEE process formal and informal consultations were undertaken with key stakeholders, including Central and local government officials and affected persons and communities in the Project area. The primary objectives of stakeholder consultation are to provide information on the Project such as Purpose of the project, Layout of the project, Schedule and method of construction and likely environmental and social impacts of the project construction and operation. In addition throughout meeting environmental and social information on the project area and public concerns about the project are to be collected.

Consultation with stakeholders took the following form,

- Formal meetings with concerned departments of the Central Government
- Interviews with village heads
- Households surveys and interviews with heads of households, which their land or built assets likely to be directly impacted by the Project

The outcomes of the stakeholder meetings are shown in Table 10.1

Table 10.1 Outcome of Stakeholder Meeting

Category	Stakeholder	Main Topic	Remarks
Administrative Body	Ministry of Environmental Conservation and Forestry	EA Procedure	Information on the environmental assessment procedure on the Project
Households Survey	Affected Households -Meikhtilar Township - Taungoo Township - Bago Township - Hlegu Township - Hmawbi Township - Htantapin Township	Census, Loss Assets Inventory Survey, Socio-Economic Survey	Information on population, income and its source, inventory of assets, etc. was collected.
Public Consultation Meeting	Affected Households -Meikhtilar Township - Taungoo Township - Bago Township - Hlegu Township - Hmawbi Township - Htantapin Township	Result of IEE and drafted RAP	Opinions and recommendation on the project was collected