

**SCOPING REPORT OF  
ENVIRONMENTAL IMPACT ASSESSMENT (EIA) FOR  
HEINDA MINE BEING INVESTED BY  
MYANMAR PONGPIPAT MINING CO., LTD.**



**Reported by**



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## ၁။ အနုပညာအစီရင်ခံစာ

## ၁-၁။ နိဒါန်း

Myanmar Pongpipat Company Limited မှ တနင်္သာရီတိုင်းဒေသကြီး၊ ထားဝယ်မြို့နယ်အနီး၊ မေတ္တာကျေးရွာအုပ်စု၊ ဟိန္ဒူကျေးရွာအနီးတွင် ဟိန္ဒူသတ္တုတွင်းအား တည်ဆောက်လုပ်ကိုင်လျက်ရှိပါသည်။ ဟိန္ဒူသတ္တုတွင်းသည် ဟင်းလင်းဖွင့်သတ္တုတူးဖော်သည့်နည်းစနစ် (Surface Mining Method) တစ်ခုဖြစ်ပြီး ခဲမဖြူ (Tin) သတ္တုအား အဓိကထားထုတ်လုပ်လျက်ရှိပါသည်။ အဆိုပါသတ္တုတွင်းသည် ရှေးယခင်နှစ်ပေါင်းများစွာကတည်းက သတ္တုတွင်းဝန်ကြီးဌာန၊ အမှတ် (၂)သတ္တု တွင်းဦးစီးဌာနလက်အောက်တွင် လည်ပတ်ခဲ့ခြင်းဖြစ်သော်လည်း ယခုအခါ ထိုင်းနိုင်ငံမှ ကုမ္ပဏီတစ်ခုဖြစ်သော Myanmar Pongpipat ကုမ္ပဏီ နှင့် အမှတ် (၂) သတ္တုတွင်းလုပ်ငန်းဦးစီးဌာနတို့ ထုတ်လုပ်မှုခွင့်အတွက် အချိုးအရ အကျိုးတူ ခွင့်လုပ်ကိုင်ကြခြင်းဖြစ်ပါသည်။ ယခုအခါ ဟိန္ဒူသတ္တုတွင်းသည် မြန်မာနိုင်ငံပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဥပဒေ (၂၀၁၅) အရ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း (Environmental Impact Assessment- EIA) အားလုပ်ဆောင်ရမည်ဖြစ်ပါသည်။ ထိုသို့လုပ်ဆောင်နိုင်ရေးအတွက် ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းလုပ်ငန်းများ လုပ်ဆောင်လျက်ရှိသည့် တတိယအဖွဲ့အစည်း တစ်ခုဖြစ်သော Ever Green Tech Environmental Services and Training Co., Ltd. (EGTEST) အား အပ်နှံဆောင်ရွက်ခဲ့ပါသည်။

## ၁-၂။ စီမံကိန်းတည်နေရာ

အဆိုပြုစီမံကိန်းသည် တနင်္သာရီတိုင်းဒေသကြီး၊ ထားဝယ်မြို့နယ်အနီး၊ မေတ္တာကျေးရွာအုပ်စု၊ ဟိန္ဒူကျေးရွာအနီး မြောက်လတ္တီကျု (၁၄° ၈' ၃၉.၁၈" ) နှင့်အရှေ့လောင်ဂျီကျု (၉၈° ၂၆' ၂၄.၇၀") တွင် တည်ရှိပါသည်။





### စီမံကိန်းတည်နေရာ

#### ၁-၃။ စီမံကိန်းအဆိုပြုသူ အကျဉ်းဖော်ပြချက်အကျဉ်း

စီမံကိန်းအဆိုပြုသူ အကျဉ်းအား အောက်ပါဇယားတွင်ဖော်ပြထားရှိပါသည်။

စီမံကိန်းအဆိုပြုသူ	Myanmar Pongpipat Company Limited
စီမံကိန်းအမျိုးအစား	ခဲမဖြူသတ္တုတူးဖော်သန့်စင်ခြင်း
စီမံကိန်းတည်နေရာ	တနင်္သာရီတိုင်းဒေသကြီး၊ထားဝယ်မြို့နယ်အနီး၊ မေတ္တာကျေးရွာအုပ်စု၊ ဟိန္ဒူးကျေးရွာ
ဆက်သွယ်ရန်ပုဂ္ဂိုလ်	ဦးခိုင်စွမ် မန်နေဂျာ ၀၉-၈၇၄၂၆၈၂

## ၁-၄။ စီမံကိန်းအကောင်အထည်ဖော်ဆောင်မည့်တတိယအဖွဲ့အစည်းအကျဉ်း

ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းလုပ်ဆောင်မည့် Ever Green Tech Environmental Services and Training Co., Ltd. နှင့် သက်ဆိုင်သောအချက်များမှာ အောက်ပါအတိုင်းဖြစ်ပါသည်။

Ever Green Tech Environmental Services & Training Co., Ltd.		
ပါဝင်လုပ်ဆောင် မည့်ပညာရှင်များ	Dr. Kyaw Swar Tint Dr. Thein Tun Dr. Myo Min Tun Dr. Kyaw Soe Dr. Kyaw Zay Moe Dr. Ko Myint Dr. Khon Aung U Min Aung Ms. Thazin Htwe Ma Nandar Nwe Mg Myat Thu Kyaw (Environmental Engineering and Management) Ma May Thet Zaw	Ph.D. (Mining) Ph.D. (Metallurgy) Ph.D. (Metallurgy) Ph.D. (Metallurgy) Ph.D. (Botany) Ph.D. (Zoology) M.B.B.S (Ygn) M.Sc. (Chemistry) BE (IT), Dip. in EIA/EMS, M.S. in EAM B.E.(IT); Dip. in EIA/EMS, M.S. in EAM B.Sc. (Forestry), M.Sc. M.E. (Civil)
Company မှတ်ပုံတင်အမှတ်	3344/2015-2016 (Ygn)	
ဆက်သွယ်ရန် လိပ်စာ	တိုက်အမှတ် (၁၄)၊ သီရိမြိုင် (ခ)လမ်း၊ ၁၃ ရပ်ကွက်၊ လှိုင်မြို့နယ်၊ ရန်ကုန်မြို့။	
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## ၁-၅။ စီမံကိန်းအကြောင်းအရာအကျဉ်းဖော်ပြချက်

စီမံကိန်းအကျဉ်းအား အောက်ပါဇယားတွင်ဖော်ပြထားရှိပါသည်။

အကြောင်းအရာ	ဖော်ပြချက်
<b>သတ္တုတူးဖော်ခြင်း</b>	
အဓိကရှာဖွေသည့်သတ္တုရိုင်း	ခဲမဖြူ နှင့်ရောရာ သတ္တုများ
သတ္တုရိုင်းတွင် ပါဝင်နှုန်း	ခဲမဖြူပါဝင်နှုန်း (၁၀-၂၀%)
သတ္တုရိုင်း အမျိုးအစား	Alluvial Deposit
သတ္တုတူးဖော်သည့်နည်းစနစ်	ဟင်းလင်းဖွင့် (Open Cut) စနစ်
မြေတူးစက်	၃ စီး
မြေသယ်ယာဉ်	၆ စီး
<b>သတ္တုသန့်စင်ခြင်း</b>	
အဓိကထုတ်ကုန်	Gravity concentration နည်းစနစ်အား အသုံးပြုပြီး ခဲမဖြူ ၆၅% ရရှိအောင်သန့်စင်ထုတ်လုပ်ခြင်း
သန့်စင်သည့်နည်းစနစ်	Hydraulic mining with sluicing
ထုတ်လုပ်မှု	တစ်ရက် ၀.၅ တန်
ရေသုံးစွဲမှု	Side B သန့်စင်စက်ရုံ (တစ်နေ့ ဂါလံ ၃၀၀၀ခန့်.) Side C သန့်စင်စက်ရုံ (တစ်နေ့ ဂါလံ ၂၀၀၀ခန့်.)
သုံးစွဲသည့်ရေအရင်းအမြစ်	ဘဝပင်ချောင်းရေ
သတ္တုရိုင်းသယ်ယူပို့ဆောင်ခြင်း	သတ္တုသန့်စင်စက်ရုံ လိုအပ်သည့် ပမာဏအတိုင်း စက်ရုံသို့ မြေသယ်ကားများဖြင့် ပို့ဆောင်ခြင်း
အလုပ်သမားများအား ပို့ဆောင်ခြင်း	သီးသန့်ပို့ဆောင်ပေးရန် မလိုအပ်ပါ။ အလုပ်သမားများသည် ကိုယ့်နည်းကိုယ့်ဟန်ဖြင့်လုပ်ငန်းခွင်သို့သွားရောက်ကြပါသည်။



စွန့်ပစ်သည့်နည်းစနစ်	
အစိုင်အခဲ စွန့်ပစ်ပစ္စည်း	ပြန်လည် အသုံးပြုနိုင်သော လုပ်ငန်းသုံးအမှိုက်များနှင့် အိမ်သုံးအမှိုက်များ ပြန်လည်အသုံးပြုသွားမည်ဖြစ်ပါသည်။ အိမ်သုံးအမှိုက်များအား အမျိုးအစားခွဲခြားစွန့်ပစ်ပြီး စည်ပင်သာယာရေး ကော်မတီ၏ လမ်းညွှန်ချက်နှင့်အညီစွန့်ပစ်သွားမည်ဖြစ်ပါသည်။ စက်သုံးဆီ ရောနှောပါဝင်နေသည့် လုပ်ငန်းသုံးစွန့်ပစ်ပစ္စည်းများ အား စွန့်ပစ်ခြင်းမပြုပဲပြန်လည် အသုံးပြုနိုင်ရေး စီစဉ်ဆောင်ရွက်သွားမည်ဖြစ်ပါသည်။
စွန့်ပစ်ရေ	နွေရာသီနှင့်ဆောင်းရာသီကာလများတွင် လုပ်ငန်းသုံးစွန့်ပစ်ရေများအား စက်ရုံသို့ပြန်လည်ပို့ဆောင်ပြီး သန့်စင်ကာ လုပ်ငန်းတွင် ပြန်လည် အသုံးပြုပါသည်။ မိုးရာသီကာလတွင် သန့်စင်ကန်အဆင့်ဆင့်တွင် သန့်စင်ပြီး မြောင်းပြို ချောင်းအတွင်းသို့ပို့လွှတ်ပါသည်။
အခြေခံအဆောက်အအုံများ	
ရုံး နှင့်လုပ်ငန်းဆိုင်ရာများ	ရုံးအဆောက်အအုံများ၊ ရုံးသုံးပစ္စည်းများ၊ ရေ၊ မီး၊ သတ္တုသန့်စင်သည့်စက်ပစ္စည်းများ
နေထိုင်ရာ အဆောက်အအုံ	ရေ၊ မီးစုံ ပါဝင်၍ လူဦးရေ ၃၀ ခန့် (အလုပ်သမား နှင့် ဧည့်သည်) နေထိုင်နိုင်သည့် အဆောက်အအုံ
ဆက်သွယ်မှုလမ်း အမျိုးအစား	ထားဝယ်- ဟိန္ဒူ ကားလမ်းမကြီးနှင့် ဆက်သွယ်ထားသည့် မြေသားလမ်း
အလုပ်သမား ခန့်ထားနိုင်မှု	အနီးအနားဒေသမှ အလုပ်သမား ၃၅၀ ခန့်အား အမြဲတမ်း

	အလုပ်သမားအဖြစ်ခန့်အပ်ထားနိုင်မည်ဖြစ်ပါသည်။ထိုင်းနိုင်ငံမှကျွမ်းကျင်ပညာရှင် ၅ ဦးနှင့် ပြည်တွင်းမှ ၅ ဦးခန့်ထားပါသည်။
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### ၁-၆။ စီမံကိန်းတည်ဆောက်ရသည့်ရည်ရွယ်ချက်အကျဉ်း

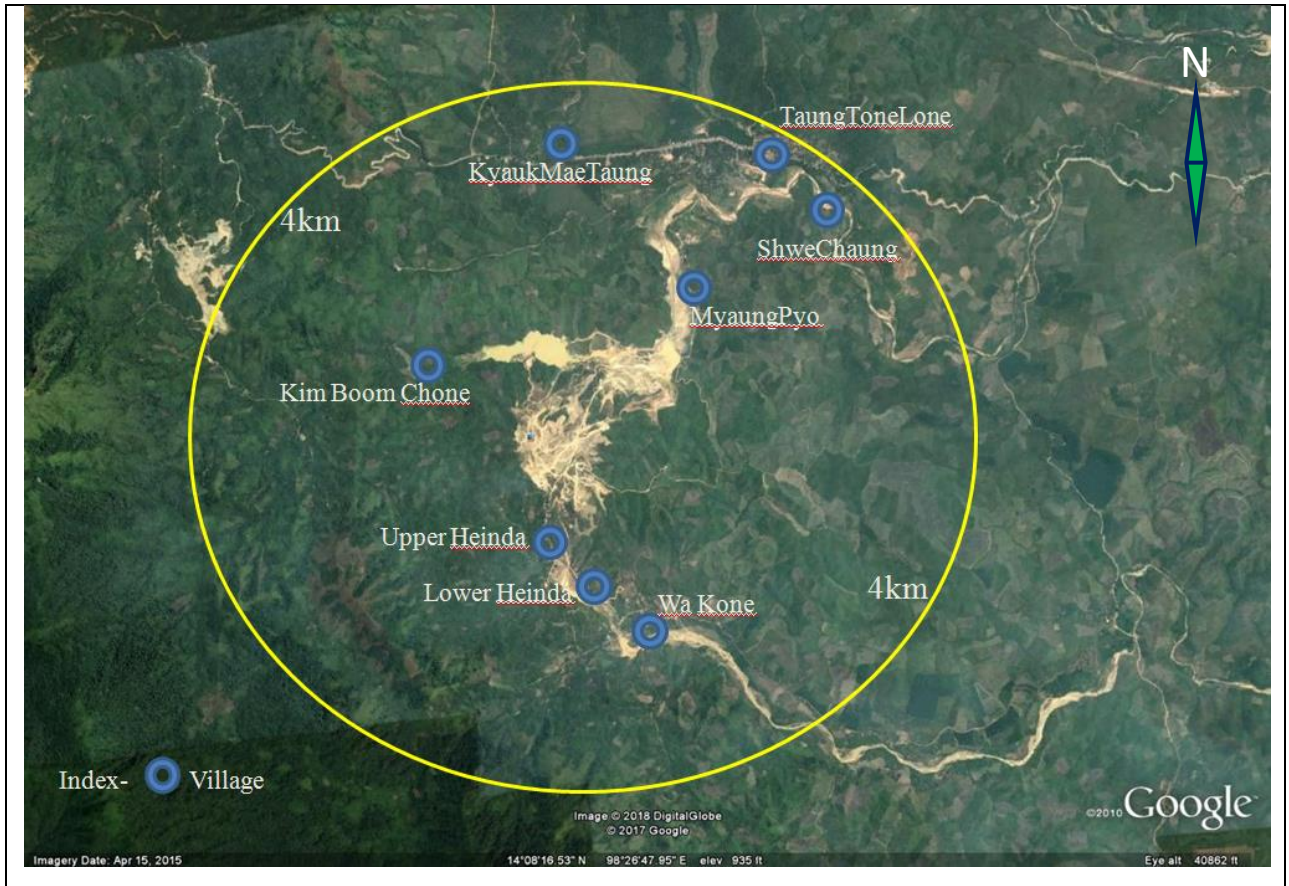
ဟိန္ဒူးသတ္တုတွင်းအား အောက်ဖော်ပြပါ ရည်ရွယ်ချက်များဖြင့် လုပ်ဆောင်လည်ပတ်လျက်ရှိပါသည်။

(က) ဒေသခံလုပ်အားကို အသုံးပြု အရည်အသွေးမြင့် ခဲမဖြူ ( ၆၅% သန့်စင်ပြီး ) အား ထုတ်လုပ်ရောင်းချနိုင်ရန်

(ခ)သတ္တုရိုင်းများအားနိုင်ငံတစ်ကာသို့တင်ပို့ခြင်းဖြင့်နိုင်ငံခြားဝင်ငွေရရှိစေရန်၊ဒေသခံပြည်သူများအလုပ်အကိုင်အခွင့်အလမ်းရရှိစေရန်၊နိုင်ငံတော်အစိုးရနှင့်အကျိုးတူတွဲဖက်လုပ်ကိုင်ခြင်းကြောင့် နိုင်ငံတော်အခွန်အခရရှိစေရန်၊

### ၁-၇။ ထိခိုက်မှုဆန်းစစ်လုပ်ဆောင်သွားမည့် နယ်နိမိတ်သတ်မှတ်ချက်

ပတ်ဝန်းကျင်နှင့်လူမှုဝန်းကျင်ထိခိုက်မှုလေ့လာဆန်းစစ်ခြင်းအား အချင်း(၄)ကီလိုမီတာအား သတ်မှတ်လုပ်ဆောင်သွားမည်ဖြစ်ပါသည်။ အချင်း (၄) ကီလိုမီတာ သတ်မှတ်လုပ်ဆောင်ရခြင်းမှာ စီမံကိန်းသည် သတ္တုတွင်းပိုင်နယ်မြေအတွင်းဖြစ်သော်လည်း အသုံးပြုမည့်သတ္တုသန့်စင်သည့်နည်းစနစ်သည် ရေဖြင့် အသုံးပြုသန့်စင်သည့် Gravity Concentration Method ဖြစ်သောကြောင့်စွန့်ပစ်ရေတွင် မြေသားများ ပါဝင်လာမည်ဖြစ်သည့်အတွက် စွန့်ပစ်ရေစီးဆင်းရာ လမ်းတစ်လျှောက်ရှိ လူနေကျေးရွာများ အနေဖြင့် စွန့်ပစ်ရေများစိုက်ခင်းများအတွင်းသို့ဝင်ရောက်နိုင်ခြေရှိခြင်းကြောင့်အဆိုပါထိခိုက်မှုရှိနိုင်သည့် ကျေးရွာများအားလုံး ပါဝင်မှုရှိစေရေးအတွက် ထိခိုက်မှုပမာဏအား(၄)ကီလိုမီတာအချင်း သတ်မှတ်လုပ်ဆောင်ခြင်း ဖြစ်ပါသည်။



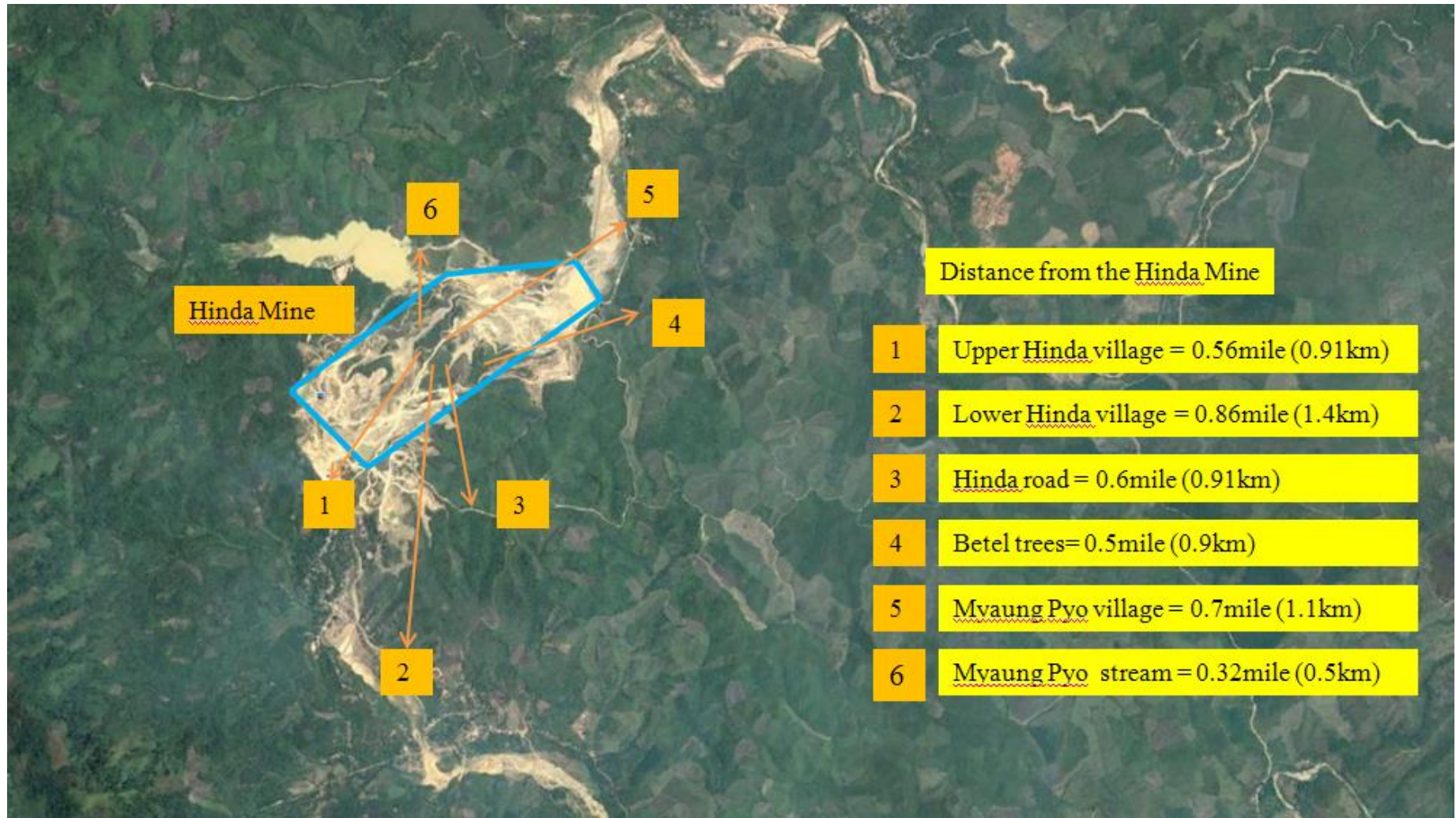
၄ ကီလိုမီတာ အဝန်းဝိုင်းအတွင်းကျရောက်သည့် လူနေရပ်ကွက်များ

### ၁-၈။ စီမံကိန်းအနီးပတ်ဝန်းကျင်

စီမံကိန်းအနီးအနားတွင် ထိခိုက်မှုရှိနိုင်သည့် အရာများအား အောက်ပါဇယားတွင်ဖော်ပြထားရှိပါသည်။

စဉ်	အကြောင်းအရာ	ဖော်ပြချက်	အကွာအဝေး (ကီလိုမီတာ)
၁။	အနီးဆုံးလူနေရပ်ကွက်	ဟိန္ဒားကျေးရွာ	၀.၉
၂။	အနီးဆုံး မျက်နှာပြင်ရေထု	မြောင်းပြိုချောင်း	၀.၅
၃။	အနီးဆုံးလူနေအထူထပ်ဆုံးနေရာ	ဟိန္ဒားကျေးရွာ	၀.၉
၄။	အနီးဆုံးလမ်း	ထာဝယ်-ဟိန္ဒား ကားလမ်း	၀.၉
၅။	အနီးဆုံးစိုက်ခင်း	ကွမ်းခြံ	၀.၉





စီမံကိန်းအနီးရှိအရာများ

**၁-၉။ စီမံကိန်းအနီးပတ်ဝန်းကျင်ရှိထိခိုက်မှုရှိနိုင်သည့်အရာများ****(က) အနီးအနားရှိလူနေရပ်ကွက်/ကျေးရွာများ**

အနီးဆုံးလူနေရပ်ကွက်များအနေဖြင့် ဟိန္ဒူးကျေးရွာအုပ်စုနှင့် မြောင်းပြိုကျေးရွာတို့ တည်ရှိမည် ဖြစ်ပါသည်။ ဟိန္ဒူးကျေးရွာအနေဖြင့် စီမံကိန်းမှအသုံးပြုသောယာဉ်များ ဝင်ထွက်သွားလာခြင်းကြောင့် ဖုန်ထခြင်းနှင့်လမ်းများပျက်စီးခြင်းအစရှိသည့် ထိခိုက်မှုများအားခံစားရမည်ဖြစ်ပြီး မြောင်းပြို ကျေးရွာ အနေဖြင့် စီမံကိန်းမှထုတ်လွှတ်လိုက်သည့် မြေသားပါရှိသော ရေများစီးဆင်းရာ မြောင်းပြိုချောင်း ဘေးဘက်တွင် တည်ရှိသောကြောင့် မတော်တဆရေကြီးရေလျှံမှုများဖြစ်ပါက အနီးရှိ လယ်မြေ များအတွင်းသို့မြေသားပါရှိသောရေများဝင်ရောက်ပြီး စိုက်ခင်းများပျက်စီးခြင်း၊ လူနေရပ်ကွက်များအထိ ဝင်ရောက်ပါက လူနေအိမ်များ ပျက်စီးခြင်း အစရှိသည့်ထိခိုက်မှုများနှင့် တွေ့ကြုံရမည်ဖြစ်ပါသည်။

**(ခ) အနီးဆုံးရှိ မြစ်ချောင်းများ**

စီမံကိန်းနှင့် ကပ်လျက်တွင် မြောင်းပြိုချောင်း တည်ရှိပြီးစီမံကိန်းမှ စွန့်ပစ်လိုက်သော ရေများသည် အဆိုပါ မြောင်းပြိုချောင်းအတွင်းသို့စီးဝင်ခြင်းကြောင့် စီမံကိန်းမှစွန့်ပစ်လိုက်သော မြေသားတွင် ပါဝင်လာမည့် မြေများအား အနယ်ထိုင်သန့်စင်ခြင်း (အနယ်ထိုင်ကန်များဖြင့်သန့်စင်ခြင်း) မရှိပါက အဆိုပါချောင်းအတွင်း အနယ်ထိုင်မှုများပြားပြီးမြစ်ချောင်းတိမ်ကောခြင်းဖြစ်ပေါ်ကာ ရေကြီးရေလျှံခြင်း ဖြစ်ပေါ်နိုင်သဖြင့် အဆိုပါ ထိခိုက်မှုအား အထူးသတိပြု ရမည်ဖြစ်ပါသည်။

**(ဂ) စီမံကိန်းအနီးအနားရှိစိုက်ခင်းများ**

စီမံကိန်းအနီးအနားရှိစိုက်ခင်းများ(ကွမ်းသီးခြံ)များသည်မြောင်းပြိုချောင်းအတွင်းမှ ရေများရေကြီးရေလျှံ ခြင်းဖြစ်ပေါ်ပါက စိုက်ခင်းများအတွင်းသို့ မြေသားပါသောရေများဝင်ရောက်ပြီး မြေသားများသည် အမြစ်များအားဖုံးအုပ်ကာ အမြစ်များပုပ်ပြီးကွမ်းပင်များသေမည်ဖြစ်သောကြောင့် အဆိုပါထိခိုက်နိုင်မှု အား စနစ်တကျရှောင်လွှဲရမည်ဖြစ်ပါသည်။

## ၁-၁၀။ မူဝါဒ၊ ဥပဒေဆိုင်ရာနှင့် အဖွဲ့အစည်းဆိုင်ရာလိုက်နာဆောင်ရွက်ချက်

မြန်မာနိုင်ငံတွင် ပြဌာန်းထားရှိပြီးသောအဆိုပြုစီမံကိန်းနှင့်သက်ဆိုင်သည့် မူဝါဒ၊ဥပဒေဆိုင်ရာ နှင့် အဖွဲ့အစည်းဆိုင်ရာ လိုက်နာဆောင်ရွက်ရမည့်ဥပဒေများအကျဉ်းချုပ်မှာအောက်ပါအတိုင်းဖြစ်ပါသည်။

Laws and Regulations	Year
Constitution of the Republic of the Union of Myanmar (Articles 24,45,349,359)	2008
Environmental Conservation Law (Law No.7(o), 14,15,24,25,29)	2012
Environmental Conservation Rules (Rule 55, 69 (a), (b))	2014
EIA Procedures (Article 102 to 110, 113, 115, 117)	2015
National Environmental Quality (Emission) Guidelines	2015
Myanmar Investment Law (Law No. 50(d), 51, 73)	2016
Labour Organization Law, (Law No. 1,7 to 11)	2011
The Settlement of Labour Dispute Law, (Law No. 38, 39, 40, 51)	2012
Employment and Skill Development Law, (Law No. 5, 14, 30(a,b))	2013
The Leave and Holiday Act, 1951 (Law Amended July, 2014)	2014
Minimum Wages Law (Law No. 12, 13 (a to g)	2013
Payment of Wages Act (Law No. 3,4, 5, 14, 8 with 7,10)	2016
The Myanmar Insurance Law (Law No. 15, 16)	1993
The Social Security Law (Law No. 11(a), 15(a), 18(b), 48, 49, 75)	2012
Workman Compensation Act	1951



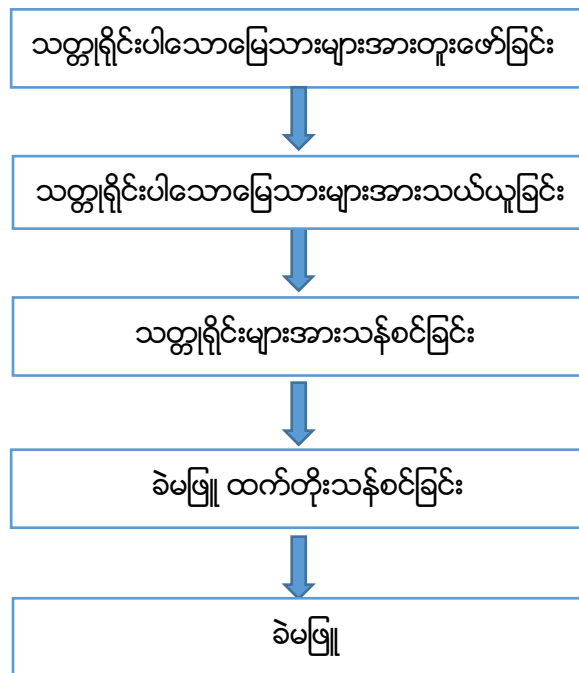
Law Amending the Factories Act 1951 (Pyidaungsu Hluttaw Law No. 12/2016)	2016
Public Health Law (Law No. 3, 5)	1972
Pesticide Law (Pyidaungsu Hluttaw Law No. 14/2016)	2016
Private Industrial Enterprise Law	1990
Forest Law	1992
Protection of Wildlife and Wild Plants and Conservation of Natural Areas Law	1994
Protection and Preservation of Cultural Heritage Regions Laws (Law No. 15, 16)	1998
Prevention and Control of Communicable Diseases Law (Law No. 3, 4, 9, 11)	1995
The Control of Smoking and Consumption of Tobacco Product Law (Law No. 9)	2006
Conservation of Water Resources and Rivers Law (Law No. 8, 11(a), 13, 19, 24(b), 30)	2006
Environmental Conservation Law	2012
Agricultural Land Law	2012
The Protection and Preservation of Antique Objects Law (Law No. 12,15 20)	2015
The Protection and Preservation of Ancient Monuments Law (Law No. 12,15 20)	2015
The Prevention of Hazard from Chemical and Related Substances Rules (Law No. 8,15,16,17, 20, 22, 23, 27)	2013

The Freshwater Fisheries Law (Law No. 36,40,41)	1991
Myanmar Petroleum and Petroleum Products Law (Article 32, 33)	2017
Automobile Law (Pyidaungsu Hluttaw Law No. 55/2015)	2015
The Myanmar Engineering Council Law (Law No. 20,24,25, 31(a), 37)	2013
Myanmar Mining Law	2018
Myanmar Mining Rule	2018
Tanintharyi Region Environmental Conservation and Cleaning Law	2018

### ၁-၁၁။ စီမံကိန်းနှင့်ပတ်သက်ပြီးဖော်ပြချက်များ

#### စီမံကိန်းလုပ်ငန်းစဉ်များ

အဆိုပြုစီမံကိန်းသည်ယခင်ကတည်းက တည်ဆောက်လည်ပတ်ခဲ့ခြင်းဖြစ်ခြင်းကြောင့်အဆောက်အအုံများတည်ဆောက်ခြင်းလုပ်ငန်းစဉ်များပါဝင်ခြင်းမရှိပဲသတ္တုတွင်းတူးဖော်ထုတ်လုပ်ခြင်းလုပ်ငန်းစဉ်များအားသာလျှင်ဖော်ပြသွားမည်ဖြစ်ပါသည်။လည်ပတ်ခြင်းလုပ်ငန်းစဉ်တွင်သတ္တုများထုတ်ယူနိုင်ရေးအတွက်အပေါ်ယံမြေသားများအားဖယ်ရှားခြင်း၊အပေါ်ယံမြေသားများအားစုပုံခြင်း၊သတ္တုပါသောမြေသားများအားသန့်စင်သည့်နေရာသို့သယ်ယူခြင်း၊ သတ္တုရိုင်း(ခဲမဖြူ)များအား Gravity နည်းဖြင့်သန့်စင်ခြင်းစသည်တို့ဖြစ်ပါသည်။လည်ပတ်ခြင်းအကျဉ်းချုပ်အား အောက်ပါပုံတွင် တွေ့ရှိနိုင်ပါသည်။



သတ္တုတူးဖော်သန့်စင်ခြင်းလုပ်ငန်းစဉ်အဆင့်ဆင့်

#### သတ္တုရိုင်းပါသောမြေသားများအားတူးဖော်ခြင်း

သတ္တုရိုင်းပါသော မြေသားများအား မြေထိုးကော်စက် (Back Hoe) များဖြင့် တူးဖော်ပြီး မြေသယ်ယာဉ် (Truck) ကားများပေါ်သို့တင်ပို့ပါသည်။

#### သတ္တုရိုင်းပါသော မြေသားများအားသယ်ယူခြင်း

သတ္တုရိုင်းပါသော မြေသားများအား သတ္တုတူးဖော်သည့်နေရာမှ ထရပ်ကား (Truck) ကားများဖြင့် သတ္တုသန့်စင်သည့်နေရာသို့ သယ်ယူပို့ဆောင်ပါသည်။

#### သတ္တုရိုင်းများအားသန့်စင်ခြင်း

သတ္တုရိုင်းများအား သန့်စင်သည့်နေရာတွင် ခဲမဖြူသတ္တု ၅ ရာခိုင်နှုန်းခန့်ပါဝင်သည့် မြေသားများအား ရေဖြင့် ထိုးချပြီး သတ္တုသန့်စင်သည့်စက်ရုံသို့ပို့ဆောင် သန့်စင်ပါသည်။

သတ္တုသန့်စင်သည့်စက်ရုံ၌ခဲမဖြူသတ္တု(၃၅-၅၀)ရာခိုင်နှုန်းခန့်ထက်တိုးသန့်စင်ခြင်းလုပ်ဆောင်ပါသည်။

**သတ္တုရိုင်းများအား အဆင့်တက်ပြုပြင်ခြင်း**

သတ္တုရိုင်းများအားအဆင့်တက်ပြုပြင်ခြင်း လုပ်ငန်းမှာ ရရှိပြီးသော ခဲမဖြူသတ္တု (၃၅-၅၀) ရာခိုင်နှုန်းခန့် အား hydro sizer, tableing and magnetic separator များအသုံးပြု၍ ဈေးကွက်ဝင်အဆင့် ခဲမဖြူသတ္တု ပါဝင်မှု(၆၅) ရာခိုင်နှုန်းနှင့်အထက်ရရှိအောင် ထက်တိုးသန့်စင်ခြင်းလုပ်ဆောင်ပါသည်။

**စီမံကိန်းမှထွက်ရှိလာသောရေများအားသန့်စင်စွန့်ပစ်သွားမည့်စနစ်**

စီမံကိန်းအတွင်းမှမြေသားနှင့်ရောနှောထွက်ရှိလာမည့်စွန့်ပစ်ရေများအားအနယ်ထိုင်ကန်များဖြင့်အနယ် ထိုင်စေပြီးမှ မြေသားပါဝင်မှု အနည်းဆုံးဖြစ်သည့် ရေများအားသာလျှင် စွန့်ပစ်သွားမည် ဖြစ်ပါသည်။

**ပိတ်သိမ်းခြင်းလုပ်ငန်းစဉ်**

ပိတ်သိမ်းခြင်းလုပ်ငန်းစဉ်တွင်သတ္တုတူးဖော်သည့်နေရာများ၊ စွန့်ပစ်မြေစာများစုပုံထားသည့် နေရာများ၊ အနယ်ထိုင်ကန်များအားမူလအခြေအနေနှင့်အနီးစပ်ဆုံးတူညီစေရန်ပြန်လည်လုပ်ဆောင်ရမည့်လုပ်ငန်း စဉ်များပါဝင်မည်ဖြစ်ပါသည်။ စီမံကိန်းဝင်းအတွင်းရှိသည့်အဆောက်အအုံများနှင့်သတ္တုသန့်စင်စက်များ သည် သတ္တုတွင်းဝန်ကြီးဌာနပိုင်များဖြစ်သဖြင့်ပြန်လည်အပ်နှံထားရှိရမည်ဖြစ်ပါသည်။

**၁.၁၂။ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာတွင်ပါဝင်သော အကြောင်းအရာများ**

အဆိုပြုစီမံကိန်းသည် ယခင်ကတည်းက တည်ဆောက်လည်ပတ်ခဲ့ခြင်း ဖြစ်နေပါသောကြောင့် အဆောက်အအုံများတည်ဆောက်ခြင်းလုပ်ငန်းစဉ်များ ပါဝင်ခြင်းမရှိပဲသတ္တုတွင်းတူးဖော်ထုတ် လုပ်ခြင်းလုပ်ငန်းစဉ်များနှင့်လုပ်ငန်းပိတ်သိမ်းသည့်ဖြစ်စဉ်များအားသာလျှင် ဖော်ပြသွားမည် ဖြစ်ပါသည်။လည်ပတ်ခြင်းလုပ်ငန်းစဉ်တွင်သတ္တုများထုတ်ယူနိုင်ရေးအတွက်အပေါ်ယံမြေသား များအားဖယ်ရှားခြင်း၊အပေါ်ယံမြေသားများအားစုပုံခြင်း၊သတ္တုပါသောမြေသားများအားသန့်စင် သည့်နေရာသို့သယ်ယူခြင်း၊ သတ္တုရိုင်း(ခဲမဖြူ၆၅%) များအား Gravityနည်းဖြင့် သန့်စင်ခြင်း စသည်တို့ဖြစ်ပါသည်။

**၁-၁၃။ အဓိကထိခိုက်နိုင်မှုများနှင့်လျော့နည်းသက်သာစေရန်လုပ်ဆောင်ရမည့်နည်းလမ်းများ (က)။****အဓိကထိခိုက်နိုင်မှုများ နှင့် ကာကွယ်လုပ်ဆောင်သွားရမည့်နည်းလမ်းများ**

အဓိက သက်ရောက်နိုင်မှုများ အနေဖြင့်လည်ပတ်သည့်ကာလအတွင်းမြေသားပါဝင်မှုများပြားသော စွန့်ပစ်ရေထွက်ရှိခြင်း၊ သန့်စင်ကန်များမှ ဆယ်ယူရရှိသည့်အနယ်အနှစ်များအား စွန့်ပစ်ခြင်း အစရှိသည့် ထိခိုက်မှုများ ပါဝင်မည်ဖြစ်ပါသည်။ မြေသားပါဝင်မှုများပြားသော စွန့်ပစ်ရေများအား အနယ်ထိုင် ကန်များတွင် သန့်စင်ပြီးမှစွန့်ပစ်မည်ဖြစ်ပါသည်။ သန့်စင်ကန်များမှ ထွက်ရှိလာမည့် အနယ်အနှစ်များ အားပတ်ဝန်းကျင်ထိခိုက်မှုအနည်းဆုံးနေရာအားရွေးချယ်စွန့်ပစ်သွားမည်ဖြစ်ပါသည်။ ထို့အပြင်

- ကြွင်းကျန်သက်ရောက်မှုများ နှင့် ကာကွယ်လုပ်ဆောင်သွားရမည့်နည်းလမ်းများ
- ဆက်စပ်သက်ရောက်မှုများနှင့် ကာကွယ်လုပ်ဆောင်သွားရမည့်နည်းလမ်းများ
- ကုန်းမြေဂေဟထိခိုက်မှုများ နှင့် ကာကွယ်လုပ်ဆောင်သွားရမည့်နည်းလမ်းများ
- ရေထုဂေဟအပေါ် ထိခိုက်မှုများနှင့် ကာကွယ်လုပ်ဆောင်သွားရမည့်နည်းလမ်းများ
- မြေပေါ်မြေအောက်ရေအပေါ်ထိခိုက်မှုနှင့် ကာကွယ်လုပ်ဆောင်သွားရမည့်နည်းလမ်းများ
- လေထုအရည်အသွေးပေါ်ထိခိုက်မှုများနှင့် ကာကွယ်လုပ်ဆောင်သွားရမည့်နည်းလမ်းများ
- စွန့်ပစ်ပစ္စည်းများကြောင့်ထိခိုက်မှုများနှင့် ကာကွယ်လုပ်ဆောင်သွားရမည့်နည်းလမ်းများ
- လူမှုစီးပွားရေးအပေါ်ထိခိုက်မှုများ နှင့် ကာကွယ်လုပ်ဆောင်သွားရမည့်နည်းလမ်းများ
- ကျန်းမာရေးအပေါ်ထိခိုက်မှုများဆန်းစစ်ခြင်း များကိုလည်းလုပ်ဆောင်သွားမည်ဖြစ်ပါသည်။

**၁-၁၄။ လူထုပူးပေါင်းပါဝင်မှုရှိရေး လုပ်ဆောင်ထားရှိချက်များ**

လူထုပူးပေါင်းပါဝင်ခြင်းသည် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းလုပ်ငန်းများ လုပ်ဆောင်ရေးအတွက် အဓိကအရေးကြီးသော လုပ်ငန်းစဉ် ဖြစ်သဖြင့် ထိရောက်မှုရှိသော လူထုပူးပေါင်းပါဝင်ခြင်း လုပ်ငန်းစဉ် များဖြစ် စေရန် အောက်ဖော်ပြပါအတိုင်း လုပ်ဆောင်သွားရှိပါမည်။

(က) အဓိကသက်ဆိုင်သူများ သတ်မှတ်လုပ်ဆောင်ခြင်း (Stakeholder Engagement and Identification) ၊

(ခ) လူနေရပ်ကွက်များအတွင်းသို့ကွင်းဆင်းဆောင်ရွက်ခြင်း (Household survey)၊

- (ဂ) အဓိကသက်ဆိုင်သူများ တွေ့ဆုံပွဲပြုလုပ်ခြင်း (Key stakeholders meetings)
- (ဃ) လူထုတွေ့ဆုံပွဲများပြုလုပ်ခြင်း (Public meetings)၊
- (င) အစီရင်ခံစာ အားချပြဆွေးနွေး အကြံညာကံရယူခြင်း (Public disclosure process)၊

### (က) အဓိကသက်ဆိုင်သူများ သတ်မှတ်လုပ်ဆောင်ခြင်း

စီမံကိန်းနှင့်ပတ်သက်ပြီး အဓိကသက်ဆိုင်သူများအနေဖြင့် အောက်ဖော်ပြပါသက်ရောက်သူများအား သတ်မှတ်ထားရှိပါသည်။

- (က) တနင်းသံရီတိုင်းဒေသကြီးအစိုးရအဖွဲ့၊
- (ခ) ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန(တနင်းသံရီတိုင်း)၊
- (ဂ) အမှတ်(၂)သတ္တုတွင်းလုပ်ငန်း (တနင်းသံရီတိုင်း)၊
- (ဃ) စည်ပင်သာယာရေးကော်မတီ (တနင်းသံရီတိုင်း)၊
- (င) သစ်တောဦးစီးဌာန (ထားဝယ်)
- (စ) စည်ပင်သာယာရေးကော်မတီ (ထားဝယ်ခရိုင်)၊
- (ဆ) စည်ပင်သာယာရေးကော်မတီ (မေတ္တာမြို့)
- (ဇ) ရေအရင်းအမြစ်နှင့်အသုံးချရေးဦးစီးဌာန (တနင်းသံရီတိုင်း)
- (ဈ) အလုပ်သမားညွှန်ကြားမှုဦးစီးဌာန (တနင်းသံရီတိုင်း)
- (ည) ကျန်းမာရေးဦးစီးဌာန (တနင်းသံရီတိုင်း)
- (ဋ) မြန်မာနိုင်ငံရဲတပ်ဖွဲ့ (တနင်းသံရီတိုင်း)
- (ဌ) သတ္တုတွင်းလုပ်ငန်းရှင်များအသင်း
- (ဍ) ဟိန္ဒူသတ္တုတွင်းစောင့်ကြည့်လေ့လာရေးအဖွဲ့ အဖွဲ့ဝင်များ
- (ဎ) စီမံကိန်းနှင့် စာရင်းအင်းဦးစီးဌာန (ထားဝယ်)
- (ဒ) အနီးအနားရှိကျေးရွာများ မှာကျေးရွာသူ၊သားများ နှင့် အုပ်ချုပ်ရေး အဖွဲ့ဝင်များ
- (ဓ) ဒေသအခြေစိုက်မီဒီယာများအစိုးရမဟုတ်သောအဖွဲ့အစည်းများအစရှိသည်တို့ပါဝင်မည်ဖြစ်ပါသည်။

**(ခ) လူနေရပ်ကွက်များအတွင်းသို့ကွင်းဆင်းဆောက်ရွက်ခြင်းမှတွေ့ရှိချက်များ**

ထိခိုက်မှုဆန်းစစ်လေ့လာခြင်းအဖွဲ့အနေဖြင့် အောက်ဖော်ပြပါ ရပ်ကွက်ကျေးရွာများအတွင်းသို့ ကွင်းဆင်းဆောင်ရွက်ခဲ့ပါသည်။ အဆိုပါလူနေရပ်ကွက်များအတွင်းသို့ ကွင်းဆင်းဆောက်ရွက်ရာမှ အောက်ဖော်ပြပါအချက်များအား အဓိကတွေ့ရှိရပါသည်။ ဒေသခံပြည်သူများ၏ လိုလားချက်များနှင့်စိုးရိမ်မှုများသည် ပုံစံအမျိုးမျိုးကွဲပြားခြားနားသော်လည်း အဓိကတူညီသည့်အချက်များအားဖော်ပြထားခြင်းဖြစ်ပါသည်။

	လိုလားချက်များ	စိုးရိမ်မှုများ
မြောင်းပြို	လမ်း၊တံတား၊ရေ၊မီး၊ဆေးခန်း၊လျှော်ကြေး၊လစာ၊ချောင်းဖော်၊	မြေစာစွန့်ပစ်မှု၊ထိခိုက်မှုထပ်မံဖြစ်စေရန်၊
အထက်ဟိန္ဒူး	လမ်း၊တံတား၊ရေ၊မီး၊ဆေးခန်း၊နုန်းများဆယ်ရန်၊ လစာ၊	
အောက်ဟိန္ဒူး	လမ်း၊တံတား၊ရေ၊မီး၊လစာ၊ ကျောင်းဆရာမ	မြေစာစွန့်ပစ်မှု
ရေပူဝ	လမ်း၊တံတား၊ရေ၊မီး၊	
ကင်ပွန်းခြုံ	လမ်း၊တံတား၊ရေ၊မီး၊နုန်းများဆယ်ရန်၊လျှော်ကြေး၊ချောင်းဖော်၊	ထိခိုက်မှုထပ် မဖြစ်စေရန်၊
ကျောက်မဲတောင်	လမ်း၊တံတား၊ရေ၊မီး၊ဆေးခန်း၊ဘုန်းကြီးကျောင်း၊ချောင်းဖော်၊	မြေစာစွန့်ပစ်မှု၊
တောင်သုံးလုံး	လမ်း၊တံတား၊ရေ၊မီး၊ဆေးခန်း၊ရေတွင်းများ၊ရေအရည်အသွေး၊စမ်းရန်၊လျှော်ကြေး၊ချောင်းဖော်	မြေစာစွန့်ပစ်မှု၊ထိခိုက်မှုထပ်မံဖြစ်စေရန်၊
ရွှေချောင်း	လမ်း၊တံတား၊ရေ၊မီး၊ဆေးခန်း၊ရွာဘောလုံးကွင်း၊ခဲသင်္ဘော၊ပြန်စားရန်၊လျှော်ကြေး၊ချောင်းဖော်၊ကျောင်းဆရာမ	ထိခိုက်မှုထပ် မဖြစ်စေရန်၊

**(ဃ) လူထုတွေ့ဆုံပွဲများပြုလုပ်ခြင်း**

လူထုပူးပေါင်းပါဝင်ခြင်း လုပ်ငန်းစဉ်တစ်ခုအဖြစ် လူထုတွေ့ဆုံပွဲများ ပြုလုပ်ခဲ့ပြီး တွေ့ဆုံပွဲများ အတွင်း တက်ရောက်လာသူအသီးသီးမှ ဆွေးနွေးချက်များမှာ အောက်ပါအတိုင်းဖြစ်ပါသည်။

**(၁) ထိခိုက်မှုနယ်နိမိတ်သတ်မှတ်ခြင်းဆိုင်ရာလူထုတွေ့ဆုံပွဲမှတွေ့ရှိချက်များ**

- ဆွေးနွေးပွဲအတွင်းတွေ့ဆုံဆွေးနွေးမှုများ

EGTEST ၏ တာဝန်ရှိသူတစ်ဦးမှ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းလုပ်ငန်းဆိုင်ရာနှင့် သတ္တုတူးဖော်ခြင်းလုပ်ငန်းစဉ်ကြောင့်ထိခိုက်နိုင်မှုများအားရှင်းလင်းတင်ပြပါသည်။

ဒေသခံများအနေဖြင့်နန်းစစ်ကန်များမှရေများကြောင့်ပတ်ဝန်းကျင်ရေထုအပေါ်ညစ်ညမ်းမှုများ ဖြစ်ပေါ်လာနိုင်ခြင်းနှင့်လယ်ကွင်းများအတွင်းဝင်ရောက်လာနိုင်ခြင်းများကိုအဓိကထားဆွေးနွေးသွားကြပါသည်။

- ထိခိုက်မှုနယ်နိမိတ်သတ်မှတ်ခြင်းဆိုင်ရာလူထုတွေ့ဆုံအတွင်းစာဖြင့်အကြံပြုရေးသားချက်များကိုနောက်ဆက်တွဲ ၂ ဖော်ပြထားပါသည်။

(၂) ပထမအကြိမ်လူထုတွေ့ဆုံပွဲမှတွေ့ရှိချက်များ

ဆွေးနွေးပွဲအတွင်းတွေ့ဆုံဆွေးနွေးမှုများ

EGTEST ၏ တာဝန်ရှိသူတစ်ဦးမှသတ္တုတူးဖော်ခြင်းလုပ်ငန်းစဉ်နှင့်သတ္တုသန့်စင်ခြင်းလုပ်ငန်းစဉ်များကြောင့်ထိခိုက်နိုင်မှုများ၊လျော့ချနိုင်သည့်နည်းလမ်းများကိုရှင်းလင်းတင်ပြပါသည်။ ဒေသခံများမှလည်း မိုးရာသီအတွင်း နန်းစစ်ကန်များ ပြိုကျပြီးလယ်ကွင်းများအတွင်းဝင်ရောက် ထိခိုက်နိုင်သောကြောင့် စိုးရိမ်မှုများရှိကြောင်း ဆွေးနွေးတင်ပြသွားပါသည်။

၁-၁၅။ ပတ်ဝန်းကျင်နှင့်လူမှုဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်

ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်သည်လုပ်ငန်းရှင်၊တစ်ဆင့်ခံကံထရိုက်များအားလုံးအပါအဝင် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး လုပ်ငန်းများအားစတင်တည်ဆောက်သည့် အချိန်မှစတင်ပြီး ပိတ်သိမ်းသည့် အချိန်သည့်တိုင်ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးလုပ်ငန်းများအား လုပ်ဆောင်နိုင်ရန်အတွက် တာဝန်ဝတ္တရားများသတ်မှတ်ခွင့်ပေးခြင်း၊လိုအပ်သောစီမံခန့်ခွဲမှုများလမ်းညွှန်ပေးခြင်း၊ စောင့်ကြည့်လေ့လာရေးအစီအစဉ်များ(စောင့်ကြည့်ရမည့်အရာများ ၊စောင့်ကြည့်ရမည့်အကြိမ်အရေအတွက်၊ စောင့်ကြည့်ရမည့်သူ)အစရှိသည့်များအားသတ်မှတ်ပေးခြင်းတို့ပါဝင်မည်ဖြစ်ပါသည်။ ပတ်ဝန်းကျင်နှင့်လူမှုဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်ကျဉ်းချုပ်အား နယ်နိမိတ်သတ်မှတ်ခြင်း အစီရင်ခံစာအခန်း(၁၂)တွင် ဖော်ပြထားပါသည်။

၁-၁၆ အရေးပေါ်အခြေအနေစီမံခန့်ခွဲမှုအစီအစဉ် (Emergency Response Plan)

အဆိုပြုစီမံကိန်းမှ ဖြစ်ပေါ်နိုင်သည့် အရေးပေါ်အခြေအနေများမှာ အောက်ပါအတိုင်းဖြစ်ပါသည်။

- (က) မီးဘေးအန္တရာယ်၊
- (ခ) မြေစာပုံပြိုကျခြင်း၊
- (ဂ) အနယ်ထိုင်ကန်များပြိုကျခြင်း စသည်တို့ဖြစ်ပါသည်။



အစီရင်ခံစာထဲတွင် အဆိုပါဖြစ်ပေါ်လာနိုင်သည့်အရေးပေါ်အခြေအနေများနှင့် ကာကွယ်လုပ်ဆောင်သွားရမည့်နည်းလမ်းများအားနယ်နိမိတ်သတ်မှတ်ခြင်းဆိုင်ရာအစီရင်ခံစာအခန်း(၈)တွင် ဖော်ပြထားရှိပါသည်။

#### ၁-၁၇။ သဘာဝဘေးအန္တရာယ်စီမံခန့်ခွဲမှုအစီအစဉ် (Disaster Management Plan)

အဆိုပြုစီမံကိန်းတွင်သဘာဝဘေးအန္တရာယ်များအနေဖြင့်အောက်ဖော်ပြပါတို့ပါဝင်မည်ဖြစ်ပါသည်။

(က) မီးဘေးအန္တရာယ်၊

(ခ) ငလျင်ဘေးအန္တရာယ်၊

(ဂ) ရေကြီးခြင်း စသည်တို့ဖြစ်ပါသည်။

အစီရင်ခံစာထဲတွင် အဆိုပါဖြစ်ပေါ်လာနိုင်သည့် ဘေးအန္တရာယ်များနှင့်ကာကွယ်လုပ်ဆောင်သွားရမည့်နည်းလမ်းများအား နယ်နိမိတ်သတ်မှတ်ခြင်းဆိုင်ရာအစီရင်ခံစာအခန်း(၈)တွင် ဖော်ပြထားရှိပါသည်။

#### ၁-၁၉။ ထိခိုက်မှုဆန်းစစ်ခြင်းလုပ်ဆောင်ရန်အတွက်လိုအပ်သောအချက်အလက်များ စုဆောင်းခြင်း

စီမံကိန်းနှင့်သက်ဆိုင်သော အချက်အလက်များအား စီမံကိန်းအကောင်အထည်ဖော်ဆောင်သည့် Myanmar Pongpipat မှစုဆောင်းပေးပါသည်။ လူမှုစီးပွားနှင့်သက်ဆိုင်သည့်အချက်အလက် (Secondary Data)များအား ထားဝယ်မြို့နယ် အထွေထွေအုပ်ချုပ်ရေးရုံးမှစုဆောင်းရရှိပါသည်။ ကျန်းမာရေးနှင့်သက်ဆိုင်သည့်အချက်အလက်များ(Secondary Data)အားထားဝယ်မြို့နယ်ကျန်းမာရေးဦးစီးဌာနမှရရှိပါသည်။(Primary Data)များအား လူနေရပ်ကွက်များအတွင်းသို့ Household Survey ကွင်းဆင်းဆောင်ရွက်ခြင်းမှရရှိပါသည်။

#### ၁-၂၀။ အနှစ်ချုပ်သုံးသပ်ချက်

အနှစ်ချုပ်သုံးသပ်ချက်အနေဖြင့်ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအဖွဲ့မှဒေသခံများ၊ အစိုးရမဟုတ်သောအဖွဲ့အစည်းများနှင့်ပူးပေါင်းကာမြေပေါ်ရေညစ်ညမ်းခြင်းများ နှင့် ပတ်ဝန်းကျင်လယ်ယာများ ထိခိုက်ခံမှုများအပေါ်လိုအပ်ပါကလျော်ကြေးပေးခြင်းကိုညှိနှိုင်းဆောင်ရွက်ရပါမည်။ လုပ်ငန်းရှင်ဘက်မှလည်းသက်ဆိုင်ရာဒေသခံအာဏာပိုင်များ၊ လူထုများနှင့်အတူကော်မတီများဖွဲ့စည်းပြီးအလုပ်အကိုင်အခွင့်အလမ်းများဖန်တီးပေးခြင်းနှင့်လျော်ကြေးငွေပေးလျော်ခြင်းများကိုဆောင်ရွက်နေပါသည်။

## 1. EXECUTIVE SUMMARY

### 1.1. Introduction

Myanmar Pongpipat Co., Ltd. will operate surface mining for Tin in Heinda Mine, near Heinda Village, Myitta Township, Tanintharyi Region. Myanmar Pongpipat has now initiated an Environmental and Social Impact Assessment (ESIA) to determine the feasibility of the project from an Environmental and social perspective. Ever Green Tech Environmental Services and Training Co., Ltd. has been appointed as the independent Environmental Assessment Practitioner (EAP) responsible for managing the ESIA and supporting Public Participation (PP) process.

### 1.2 Project Location

The project is located in Heinda Village, Myitta Village Cluster, near Dawei, Tanintharyi Region (14° 8'39.18"N and 98°26'24.70"E).



**Project Location**

### 1.3. Brief Description of the Project Proponent

The followings are the brief of project proponent.

Project Developer	
Project Developer	Myanmar Ponpipat Co., Ltd.
Type of Project	Surface Mining Project for Tin
Project Location	Heinda Village, Myitta Township, Near Dawei Township
Contact Person	U Khaing Swan (09-8742682)

### 1.4. Brief Description of the Environmental Assessment Practitioner

Below is the background information on Ever Green Tech Environmental Services and Training Co., Ltd., (Third party) who draw up the ESIA.

Ever Green Tech Environmental Services & Training Co., Ltd.		
Specialists including the written report	Dr. Kyaw Swar Tint	Ph.D. (Mining)
	Dr. Thein Tun	Ph.D. (Metallurgy)
	Dr. Myo Min Tun	Ph.D. (Metallurgy)
	Dr. Kyaw Zay Moe	Ph.D. (Botany)
	Dr. Khon Aung	M.B.B.S (Ygn)
	Dr. KoMyint	Ph.D. (Zoolgoy)
	U Min Aung	M.Sc. (Chemistry)
	Ma Nandar Nwe	B.E. (IT); Dip. in EIA/EMS
	Ma Yuzuna Moe Myint	B.Sc. (Forestry)
	Mg Thant Zin	B.Sc. (Forestry)
	Ma May Thet Zaw	M.E. (Civil)
Company Name	Ever Green Tech Environmental Services and Training Co., Ltd.	
Company Registration No.	3344/2015-2016 (Ygn)	

Contact Address	No.14, Thiri Mying (8th)Street, 13 <sup>th</sup> Quarter, Hlaing Township, Yangon
Telephone Number	09-43106929, 09-91019166, 09-799700171
E-mail	<a href="mailto:11kyawswar@gmail.com">11kyawswar@gmail.com</a>
Contact person	Dr. Kyaw Swar Tint Principal Environmental and Social Consultant 09-5099232, 09-43106929

### 1.5 Project at a Glance

The following table shows the brief descriptions of the proposed project.

Aspects	Descriptions
<b>Mining</b>	
Area	Over 2000 acres
Raw material	Tin ore from Heinda Mine Site
Ore grade	The average ore grade is 10 to 20% Tin
Type of mineral deposit	Alluvial Deposit
Ore grade	The average ore grade is 10 to 20% Tin
Mining method	Open Cut Mining Method
No. of back hoe	3 Nos.
No. of dump truck	10 Nos.
<b>Mineral Processing</b>	
Target products	Tin concentrate (over 65%) by gravity concentration method
Processing method	Hydraulic mining with sluicing
Production rate	0.5 ton/day
Water usage for mineral processing	3000 gallons per day for Side B processing plant 2000 gallons per day for Side C processing plant
Source of water	Surface water from Ba Wa Pin Creek (0.9 km far away)
Transportation for ore	Raw material (ore) from mine site was transported to the processing plant directly and there will need no storage facility for ore by trucks.

Transportation for workers	It is not necessary to transport to the workers to the mining and processing sites. Most of the workers will go there by their by their own motorbikes.
<b>Waste management</b>	
Solid wastes	<ol style="list-style-type: none"> <li>1. Recyclable domestic waste will be recycled. Other domestic waste will be disposed of in a domestic waste disposal site inside the mine.</li> <li>2. Process solid wastes (parking material, oil storage container, etc.) will be recycled.</li> </ol>
Liquid wastes	<ol style="list-style-type: none"> <li>1. Process water was pumped back to the plant and re-used in the treatment process during summer and winter seasons.</li> <li>2. Waste water will be treated in settling ponds and re- during rainy seasons.</li> </ol>
<b>Other Infrastructures</b>	
Office and other facilities	These include offices, equipment and furnishings, sewerage, power, water and water treatment, and mineral process equipments and materials.
Camp	The camp will be provided accommodation for the employee during the operational phase. It will house about 30 employees and visitors. This will include accommodation units, kitchen, messing facilities, power, sewerage and waste disposal.
Access and haul roads	Main access to the proposed project site is mainly via a gravel road from Dawei-Heinda road.
<b>Employment</b>	
Employment	At full production a total of 350 permanent people will be employed of which 350 will be sourced locally, 5 technicians from other places and 5 from Thailand (Mother Company).

### 1.6. Aim of the Project

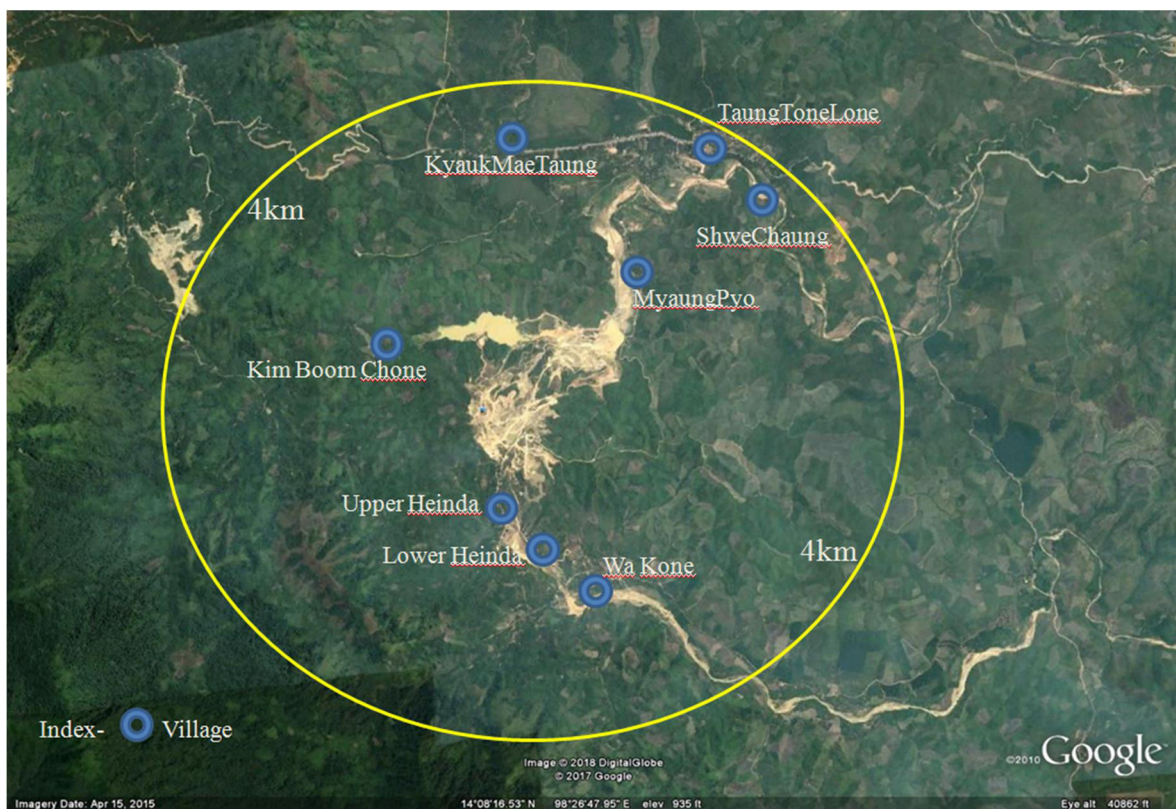
The developer statements publicly that the proposed project is needed in Myanmar according to the following reasons:



- (a) Since the use of Tin is in urgent demand in the world to cope with technology development, the proposed project will produce good quality tin concentrate (over 65%) with national human resources.
- (b) Myanmar Ponpipat Co., Ltd. will deploy a total investment of 230 million US \$ and the investment will create direct and indirect employment for over 350 local people during operation phase. It will increase the use of low-grade ore, benefits to local miners and suppliers, increasing employment as well as resulting in government revenues.

### 1.7. Scope of the EIA Study

All the environmental and social impact assessment will be conducted within 4km radius around the proposed project. As the proposed project will be operated within the existing mine area, the reason for conducting 4 km radius around the proposed project are that the impacts on the nearest local residents, the agricultural land and surface water pollution due to the soil particles in waste water.



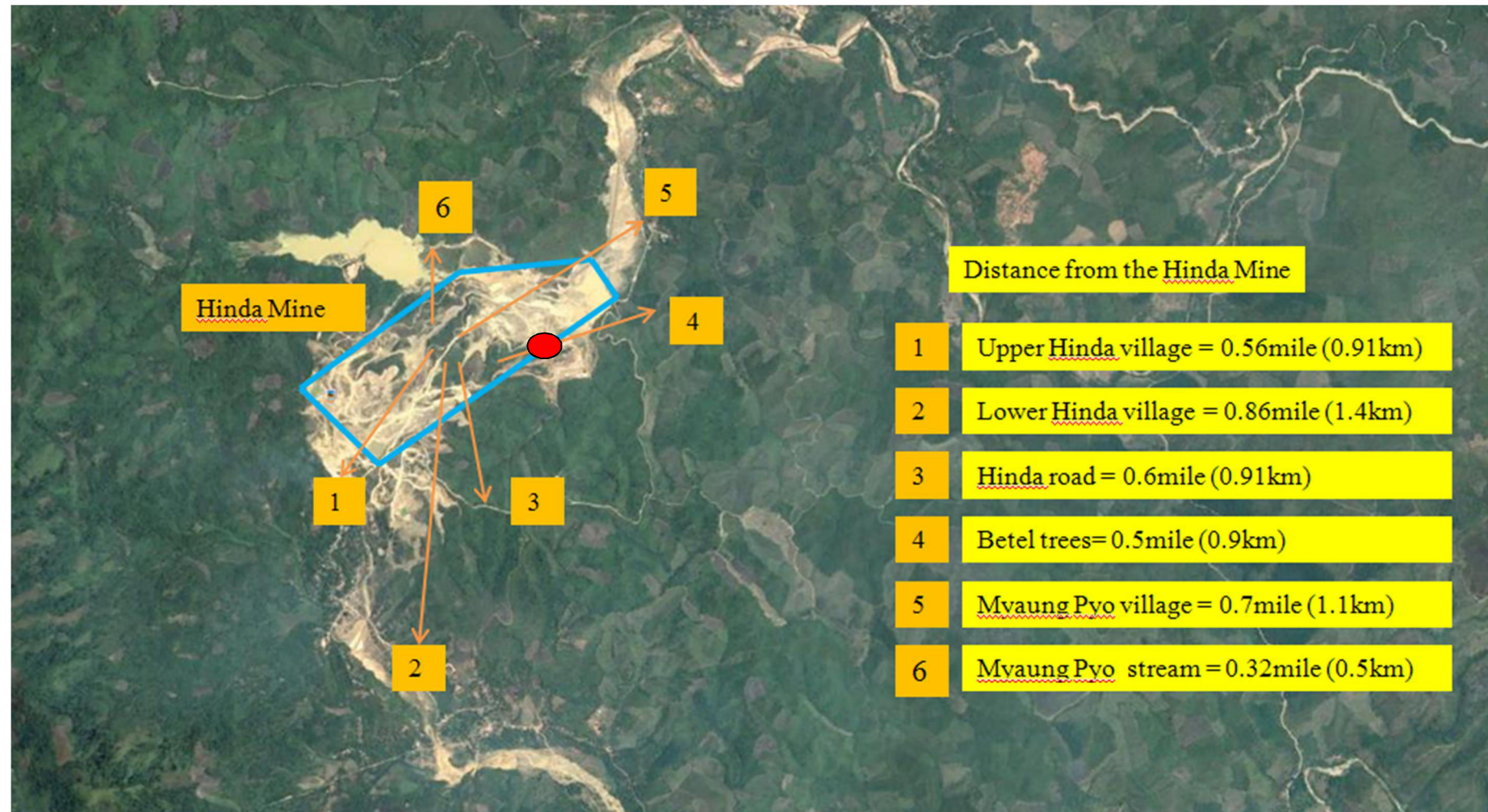
**Residents within 4 km Radius around the Proposed Project**

### 1.8. Vicinity around the Project

The most environmentally sensitive areas of the proposed project are shown in the following Table and Figure.

**Table - Vicinity around the Proposed Project**

No.	Vicinity	Description	Distance (km)
1.	Nearest Public Residents	Local residents in upper Heinda Village	0.91
2.	Nearest Road	Dawai-Heinda Road	0.9
3.	Nearest Water Body	Myaung Pyo creek	0.5
4.	Nearest Densely Populated Area	Heinda Villages	0.9
5.	Nearest Plantation	Betel Trees in Heinda Village	0.9



Vicinity around the Heinda Mine



## 1.9. Nearest Environmentally Sensitive Areas

### (1) Nearest Local Residents

Nearest local residents are Heinda Village and Myaung Pyo Village. Heinda Village might impact air pollution and damage of roads due to the mine trucks movement activities in village. Myaung Pyo village might impact on agricultural and village land during flood conditions due to rainy season water way in myaungpyo creek if they are not properly managed.

### (2) Nearest Surface Water Bodies

Nearest surface water bodies (myaung pyo creek) might impact due to the dispose of soil particles in wastewater if final effluence water from mine site was incomplete waste water treatment condition. There might be potential to flood at nearest area due to shallow water way Myaungpyo creek..

### (3) Nearest agricultural land

Nearest agricultural land (betel field) might be damage due to the soily water from Myaungpyo creek during flood condition if they are not properly managed.

## 1.10. Legal and Other Requirements

Myanmar has promulgated several laws and regulations concerning protection of the environment. The following table describes laws and regulations which are directly or indirectly associated with the proposed project.

**Table - Relevant Environmental Laws and Regulations in Myanmar**

Laws and Regulations	Year
Constitution of the Republic of the Union of Myanmar (Articles 24,45,349,359)	2008
Environmental Conservation Law (Law No.7(o), 14,15,24,25,29)	2012
Environmental Conservation Rules (Rule 55, 69 (a), (b))	2014
EIA Procedures (Article 102 to 110, 113, 115, 117)	2015
National Environmental Quality (Emission) Guidelines	2015
Myanmar Investment Law (Law No. 50(d), 51, 73)	2016

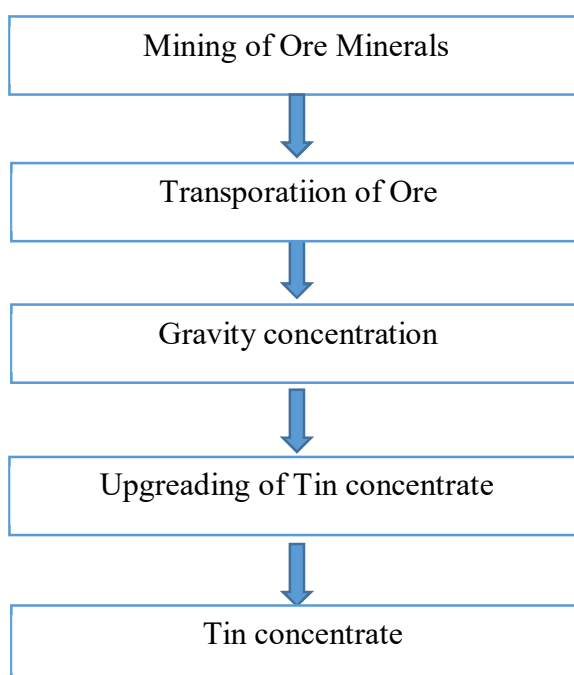
Labour Organization Law, (Law No. 1,7 to 11)	2011
The Settlement of Labour Dispute Law, (Law No. 38, 39, 40, 51)	2012
Employment and Skill Development Law, (Law No. 5, 14, 30(a,b))	2013
The Leave and Holiday Act, 1951 (Law Amended July, 2014)	2014
Minimum Wages Law (Law No. 12, 13 (a to g)	2013
Payment of Wages Act (Law No. 3,4, 5, 14, 8 with 7,10)	2016
The Myanmar Insurance Law (Law No. 15, 16)	1993
The Social Security Law (Law No. 11(a), 15(a), 18(b), 48, 49, 75)	2012
Workman Compensation Act	1951
Law Amending the Factories Act 1951 (Pyidaungsu Hluttaw Law No. 12/2016)	2016
Public Health Law (Law No. 3, 5)	1972
Pesticide Law (Pyidaungsu Hluttaw Law No. 14/2016)	2016
Private Industrial Enterprise Law	1990
Forest Law	1992
Protection of Wildlife and Wild Plants and Conservation of Natural Areas Law	1994
Protection of Biodiversity and Protected Area Law	2018
Protection and Preservation of Cultural Heritage Regions Laws (Law No. 15, 16)	1998
Prevention and Control of Communicable Diseases Law (Law No. 3, 4, 9, 11)	1995
The Control of Smoking and Consumption of Tobacco Product Law (Law No. 9)	2006
Conservation of Water Resources and Rivers Law (Law No. 8, 11(a), 13, 19, 24(b), 30)	2006
Environmental Conservation Law	2012
Agricultural Land Law	2012
The Protection and Preservation of Antique Objects Law (Law No. 12,15 20)	2015
The Protection and Preservation of Ancient Monuments Law	2015

(Law No. 12,15 20)	
The Prevention of Hazard from Chemical and Related Substances Rules (Law No. 8,15,16,17, 20, 22, 23, 27)	2013
The Freshwater Fisheries Law (Law No. 36,40,41)	1991
Myanmar Petroleum and Petroleum Products Law (Article 32, 33)	2017
Automobile Law (Pyidaungsu Hluttaw Law No. 55/2015)	2015
The Myanmar Engineering Council Law (Law No. 20,24,25, 31(a), 37)	2013
Myanmar Mining Law	2018
Myanmar Mining Rule	2018
Tanintharyi Region Environmental Conservation and Cleaning Law	2018

### 1.11. Project Descriptions

Because of the proposed project is already being operations mining process, and instead only the mining exploration and production processes will be described.

The operation processes include removing of top soil layer for the extraction of the ores, dumping of the removed top soil, transporting the ore minerals to the purification site and purification of ore (tin) by means of gravity concentration method. The summery of the operation processes is shown in the following diagram



**Steps of proposed mine project**

### *Exploration of Ore Minerals*

The soils mixing with the ore are dug by Back Hoe and put them in the Truck.

### *Transportation of Ore*

The run of mine ore are transported to the gravity concentration plant by means dump truck.

### *Gravity concentration plant*

Firstly, the liberation of unwanted materials from mine ore was done by using high pressure water jet. Then the liberate ore bypassing of two stages screen (2inch and 1.5 inch trommels) before gravity concentration process. Gravity concentration stage includes the process of sluice box, two stages of jigging and tabling. The gravity concentration is upgrading of concentrate at about (35-50% Tin).

### *Upgrading of Tin concentrate*

This stage will include beneficiations of the upgrading of tin concentrates from gravity separation process with hydro sizer, tableing and magnetic separator. These processes are considered essential for the production of concentrates of desirable and marketable grade. The final concentrate is containing about greater than 65 per cent tin.

### *Process of Disposing the Waste Water from the Project*

The waste water from the project mixed with soil particles are made to pass the tailing ponds and settle down the soil particles; and the water with proper natural condition with less mixed soil particles is only disposed.

### *Decommission Process*

In the decommission process, the processes of making the exploration areas, areas of dump of dug soil/ disposed soil and tailing ponds to their primary conditions before the project, as close as possible. The infrastructure of buildings and concentration plants inside the project compound are gave back to the Ministry of Natural Resources and Environmental Conservation as these are owned by the Ministry.

## **1.12. Phases for the EIA Report**

This report will not cover construction phase of the proposed project because Heinda Mine had been operated since 1999. However, this report will cover not only operation phase but also decommissioning phase (mine closure) of the proposed project. The operation phase will

include treating an alluvial ore to become Tin concentrates (over 65%) by gravity concentration and magnetic separation method. This stage will include beneficiations of alluvial ore with jigging, tableing, hydro sizer, magnetic separator and treatment of waste water.

### **1.13. Key Anticipated Environmental Impacts and Mitigation Measures**

#### **1.13.1. Major Impacts and Mitigation Measures**

As the proposed project will be operated in existing mine area and there will be no issues for resettlement and impact on agricultural land. Surface water pollution due to the soil particles in wastewater and unsafe condition of tailing ponds might have a chance to environmental impacts. These impacts are also the most public concerns of the local people in the nearest residents.

#### ***Mitigation Measures***

In order to reduce the impacts of wastewater, proper wastewater treatment system (construction of tailing ponds) with conceptual design are proposed. This treatment system will also reduce unsafe condition of tailing ponds. Other possible mitigation measures for different moderate or minor impacts are also included appropriately.

#### **1.13.2 Residual Impacts and Proposed Mitigation Measures**

The main residual impacts after mitigation measures will be surface water pollution. Removal of sediments in Myaungpyo Chaung regularly and safe drinking water supply system for nearest villages are proposed for residual impact.

#### **1.13.3 Cumulative Impacts and Proposed Mitigation Measures**

As the proposed project is situated in tin valuable mining area, the cumulative impact due to the proposed project will be surface water pollution together with other existing mines (Ba-Wa-Bin Mine -5.8 km far away and Dawei Myae Mines- 4.2 km far away). All of the waste water from hydraulic mining process will impact on Taninthayi River as cumulative impact. Effective wastewater system and digging of river bed along the Myaung Pyo creek bed regularly are proposed for cumulative impacts. Myanmar Pongpipat Co., Ltd has implemented the systematic detention ponds and recirculated the treated water for the mining process usage, ensuring the minimal environmental impact with “Zero Discharge System”.

In summarising the findings and recommendations of the preceding chapters the following summary conclusions can be drawn.

#### **1.13.4. Terrestrial Ecology Impacts**

The proposed mining operation will contribute to limited local deforestation which may cause the loss of some species of conservation concern, sensitive habitats, such as the riparian habitats along the valley bottoms, and the displacement of some faunal species from the immediate area of the mining footprint. However if the mine development incorporates the mitigation measures described in this ESHIA, and considering that the mine footprint (i.e. the scale of the mining development in relation to the extent of the surrounding forests) is small, and that this area has already seen many years of mining activity, the overall ecological impact could be defined as moderate to low.

Without mitigation and access control, commercial loggers and charcoaling groups will probably take advantage of the road to move quickly and easily in and out of the area, and it will probably be utilised by non-mining vehicles (e.g. public transport or motorbikes) to access nearest villages.

Even after the mine is closed it is certain that the local communities will continue to use the access road which will provide easy access to Heinda village. The road will provide ongoing access to the natural resources and result in permanent damage to the forest which may never recover. This secondary impact will be difficult to mitigate.

#### **1.13.5. Aquatic Ecology Impacts**

Project induced impacts on aquatic ecology are deemed to be of generally low significance as it relates to proposed project activities and infrastructure aspects. The risk of future acid mine drainage (AMD) arising from the waste rock dump or TSF appears to be very low, according to the acid base accounting. However, if the recommended mitigation strategies listed in this report and the ESHIA be implemented correctly, these potential risks and aquatic impacts will be reduced to low overall significance.

#### **1.13.6. Ground and Surface Water Impacts**

All surface and groundwater sources are used by the local population as sources of supply for domestic use. Existing human impacts relate mainly to small-scale agriculture, clothes

washing, clearing of the riparian areas in some places, and the construction of informal river crossings. Artisanal minings have resulted in deposition of sediment in the Myaungpyo Creek. Surface water samples were taken from 15 points around the site, and analysis indicates that surface water is not suitable for human direct consumption when compared with WHO guidelines. Slightly elevated levels of iron (Fe) were detected, as well as elevated levels of manganese (Mn) in samples taken on the ridge, but both were within SANS limits for the limited period (less than seven years) consumption.

Geochemical studies indicated that the hanging and foot wall rocks have a little variable sulphur contents, and that in most samples the sulphur content is not sufficiently high to generate acidic drainage if exposed to oxygen and water.

#### 1.13.7. Air Quality Impacts

The project's operations are not likely to result in exceedances of the selected criteria for NO<sub>2</sub>, SO<sub>2</sub>, and VOCs at surrounding sensitive receptors. There are likely to be exceedances of the daily PM<sub>10</sub> and PM<sub>2.5</sub> levels outside the project boundary as a result of dust generation. Simulated diesel particulate matter (DPM) concentrations as a result of vehicle and generator exhaust are likely to result in moderate to high increased life-time cancer risk at the plant boundary. Fitting diesel particulate filters (DPF) to the exhausts is likely to reduce the increased life-time cancer risk at the plant boundary to between moderate and low.

The largest source of GHG emissions at the project will be the diesel fuel usage, due to the large volumes of fuel used for mining and for electricity generation on-site. In addition to this, diesel required for refuelling of the plant operation as well as the clearance of approximately 70 ha of vegetation (access road, TSF and other surface infrastructure) will also contribute to the production of carbon emissions. It is recommended that a carbon footprint be established for the facility within the first year of operation. This must take into consideration the loss of vegetation.

Thereafter it will be necessary to develop a greenhouse gas management plan for the operation with the specific intention of reducing GHG emissions as far as practicable.

#### 1.13.8. Waste Impacts

MPC will manage all waste streams according to the waste management hierarchy and, as a minimum, according to No.(2) Mining Enterprise legislation and Mining Law. Wherever

practical, production of wastes should be prevented or minimised at source. Where prevention or further minimization is not possible, wastes should be re-used, recycled and then disposed of responsibly so as to minimise impacts to the environment. Further guidance on the management of waste streams is provided in the IFC General EHS Guidelines (2007) and the IFC EHS Guidelines for Mining (2007). In the event that there are no national standards available in Dawei Region, the proponent must comply with internationally recognised standards developed by international organisations such as the IFC. In considering the context of this project, it is also concluded that inclusion of on-site landfill facilities for final disposal of non-hazardous and hazardous wastes is appropriate from an environmental risk perspective. However, the Closure Plan for the mine will need to include details of closure of these facilities as well as post-closure monitoring requirements.

#### **1.13.9. Social and Economic Impacts**

Opportunities exist in terms of employment, mining capacity building, creation of small businesses and social development. These impacts are particularly important in nearest villages where poverty is endemic and people lack employment opportunities.

#### **Enhancement Measures for Job Opportunities**

The skills base in the area is low. In order to optimise local employment opportunities, skills training will be necessary. Particular attention will need to be given to women and youth as they left in villages when their household head (male partner) is go away (Thailand) for job.

#### **Impact on Surface Water Environment**

Although there is no need for economic and physical resettlement at all, a small amount of agricultural land, which is the most important asset of local residents, might likely to be affected by water flow in the creek during rainy season.

#### **Mitigation Measures for Waste Water**

This potential loss of agricultural land needs to be managed. A detailed and transparent Stakeholder Engagement Plan would be critical to mitigate the potential loss of agricultural land and livelihoods as follow:



#### 1.13.10. Health Impact Assessment

An influx of migrants/job seekers into the study area potentially leading to prostitution and increased HIV and AIDS infections, an increase in crime or communal conflict, inflation and land speculation are impacts that are particularly difficult to manage. Since Myanmar Ponpipat does not have direct control over these aspects they will need to work in collaboration with other stakeholders to minimise these potentially harmful impacts, realising that full or entire mitigation is probably not possible, but that robust and transparent conflict analyses and resolution approaches - along with proactive management planning around these potential flashpoints - is essential to ensure the minimisation of these triggers. Although mitigation measures are available to deal with these potential conflicts, the issue remains of moderate to high overall significance.

#### 1.14. Public Consultation and Public Participation Process (PCPP)

PCPP was conducted as primary data collection by household survey, group site survey with Heinda Mine Watchdog, group discussion, and public meetings as follows:

##### (a) Stakeholders Identification

The following local communities, authorities and NGOs can be considered as key stakeholders who are directly or indirectly related to the proposed project.

- (a) Local People (Heinda Village, Myaung Pyo Village, Wa Kone Village, Kim Boom Chone Village, Shwe Chaung Village, Myauk Mae Taung Village, Taung Thone Lone Village);
- (b) Village Administrative Offices (Heinda Village, Myaung Pyo Village, Wa Kone Village, Kim Boom Chone Village, Shwe Chaung Village, Myauk Mae Taung Village, Taung Thone Lone Village);
- (c) No. (2) Mining Enterprise (Tanintharyi);
- (d) Environmental Conservation Department (Tanintharyi);
- (e) Head of Local Administration Office (Dawei);
- (f) City Development Committee (Dawei);
- (g) Department of Public Health (Dawei);
- (h) Department of Forestry (Dawei);
- (i) Planning and Statistics Department (Dawei);

- (j) Department of Settlement and Land Record (Dawei);
- (k) Department of Water Resources Utilization Department (Dawei);
- (l) Department of Labour (Dawei); and
- (m) Local Media, NGOs and CBOs (Dawei Watch, D.R.A, TKP etc.).

#### **(b) Household Survey**

Household surveys were conducted in all of the affected villages near the proposed project. Detailed of household survey was described in Section 10.

#### **(c) Group Site Survey with Local Mine Supervision Team**

Site survey to Heinda Mine Site together with local mine inspection team (Watchdog for Heinda Mine organized by interested persons in nearest villages) was done and discussed about the mining impact and mitigation measures. According to the discussion results, all of the participants concerned about (i) surface water and (ii) the failure of tailing ponds.

#### **(d) Public Meetings**

Public meetings were conducted three times as for scoping proposal, for first public meeting and for second public meeting. Detailed of public meetings are described in Section 10.

#### **(e) Public Disclosure Process**

Public disclosure processes of proposed project include: (a) distribution of meeting minutes of public meetings to all key stakeholders, (b) distribution of summary of EIA report in local language to key stakeholders (b) formal disclosure of completed project reports by making copies available at convenient locations in the study areas and informing the public of their availability. Detailed of public disclosure process are described in Section 10.

### **1.14.1. Key Findings from the Study**

The following are the key findings from the EIA study.

#### **(a) Key Findings from Household Survey (Findings from Primary Data Collection)**

According to the household survey, all of the respondents concerns about surface water due to the muddy water from processing plant and damage of agricultural lands in the mine leased area in the past (entering of muddy water into agricultural lands during heavy rain in 2008)

along the Myaung Pyo Creek. The most public needs are upgrading of villages' road in Heinda Village.

### **(b) Key Findings from the Public Meeting of Scoping Report**

During public meeting for scoping report, EGTEST explained about the procedure of EIA and Impacts of surface mining. Most of the local people are discussed about the damage of agricultural land located in the mine leased area in the past (during heavy rain in 2008) and CSR program.

### **(c) Key Findings from the First Public Meetings**

During public meetings, consultants from EGTEST explained the impacts of mining and mineral processing of Heinda Mine and mitigation measures. Local people concern about the damage to agricultural land located in the mine leased area in the past and compensation for these damage area. They also concern about the surface water and failure of tailing ponds during heavy rain.

#### **1.14.2. Public Disclosure Process**

Summary of EIA report in Myanmar Language will distribute to all key stakeholders as public disclosure process. Softcopies for meeting minutes and summary will also distribute to all participants during second public meeting.

Public participation during the Impact Assessment Phase revolves around a review of the findings of the ESIA, presented in the Draft EIA Report. This report will be made available for public comment for a period of 40 days. Stakeholders will be invited to comment on the Draft EIA Report and ESMP in the following ways:

- By raising comments during a series of Public Meetings where the content of the Draft ESIA Report will be presented;
- By completing a comment sheet made available together with the report at the public places, and by submitting additional written comments, by email or fax, or by telephone, to the public participation office; and
- The Draft ESIA Report and ESMP Report and its accompanying Specialist Studies will be distributed for comment to public places in the project area, to everyone who requests a copy, and placed on the Ever Green Tech's office:

All comments and issues raised during the comment period on the Draft ESIA report will be added to the Comment and Response Report that will accompany the Final ESIA Report and ESMP.

### **1.15. Environmental Management Plan (EMP)**

EMP is a site specific plan developed to ensure that the project is implemented in an environmental sustainable manner where all contractors and subcontractors, including consultants, understand the potential environmental impacts arising from the proposed project and take appropriate actions to properly manage that risk. EMP also ensures the project implementation is carried out in accordance with the design by taking appropriate mitigation actions to reduce adverse environmental impacts during its life cycle. EMP for proposed mine site will include the following essential parts.

- (a) Mitigations and enhancement measures for all anticipated impacts;
- (b) Consideration of residual and cumulative impacts after mitigation measures;
- (c) Compensation program;
- (d) Environmental monitoring plan,
- (e) Training Program,
- (f) Record Keeping and Reporting, and
- (g) Audit and Corrective Action Plan.

#### **(a) Environmental Monitoring Program**

The purpose of environmental monitoring is to evaluate the effectiveness of implementation of Environmental Management Plan (EMP) by periodically monitoring the important environmental parameters within the impact area, so that any adverse affects are detected and timely action can be taken. Main objectives of environment monitoring plan include:

- (a) Identify all environment changes which may cause adverse effects on environment by the project implementation;
- (b) Monitor discharge sources (gas emission, waste water and solid waste) and operation of environmental protection equipments in order to ensure that these activities will comply with legislative requirements;
- (c) Check monitoring process and inspect installation system and equipments in respect of pollution prevention and control;

- (d) Prevent potential incidents;
- (e) Propose appropriate environment protection measures based on results of environmental monitoring;
- (f) Overcome and repair all weak-points based on results of environment monitoring program.

#### **(b) Occupational Safety and Health Management Plan**

Occupational safety and health management plan for the proposed mine site will include the following:

- (a) Potential Safety and Health Impacts on Workers
- (b) Emergency and First-aid Procedures
- (c) Medical Precautionary Measures
- (d) Maintenance and Troubleshooting Precautions
- (e) House Keeping
- (f) Safety awareness
- (g) Safety training

#### **(c) Emergency Response Plan (ERP)**

An emergency is an unplanned event when a project operation loses control, or could lose control, of a situation that may result in risks to human health, property, or the environment, either within the facility or in the local community. Emergency incident response plan for proposed mine site is proposed to mitigate harms on humans and environment in the project area and its vicinity in case of incident. This plan provides the management structure, key responsibilities, emergency assignments and general procedures to follow during and immediately after an emergency. Moreover, it is necessary to establish ERP to address the immediate requirements for a major disaster or emergency in which normal operations are interrupted and special measures must be taken to:

- Save and protect the lives of employees;
- Manage immediate communications and information regarding emergency operations and work site safety;
- Provide essential services and operations;

- Provide and analyze information to support decision-making and action plans; and
- Manage resources effectively in an emergency operation.

#### **(d) Natural Disaster Management Plan**

Disaster means a catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or man-made cause, or by accident or negligence which result in substantial loss of life or human suffering or damage to, or degradation of, environment, and is of such nature or magnitude as to be beyond the coping capacity of the community of the affected area. Disaster Management implies continuous and integrated process of planning, organising, coordinating and implementing measures which are necessary as expedient for

- Prevention of danger or threat to any disaster.
- Mitigation or reduction of risk of any disaster or its severity or consequences.
- Capacity building.
- Preparedness to deal with any disaster.
- Prompt response to any threatening disaster situation or disaster.
- Assessing the severity of magnitude of effect of every disaster.
- Evacuation rescue & relief.
- Rehabilitation and reconstruction.

#### *Types of Disasters*

1. Fire
2. Accidents – Collision, transport or work place accidents.
3. Natural calamities – Flood and Earth quake

#### **1.16. Conclusion**

According to the study for the scoping processes, the ESIA team will make with participants from local communities and local NGOs for concerning about the surface water and compensation for damage to agricultural lands on mine leased area in the past. So, the developer has been working with the local authorities to setup a committee to work with local community. MPC has issued the complete compensation in accordance to the committee resolution.

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## 2. INTRODUCTION

### 2.1 Project Background

Myanmar Pongpipat Co., Ltd. will operate surface mining for Tin in Heinda Mine, near Heinda Village, Myitta Township, Tanintharyi Region. Myanmar Pongpipat has now initiated an Environmental and Social Impact Assessment (ESIA) to determine the feasibility of the project from an Environmental and social perspective. Ever Green Tech Environmental Services and Training Co., Ltd. has been appointed as the independent Environmental Assessment Practitioner (EAP) responsible for managing the ESIA and supporting Public Participation (PP) process.

### 2.2. Aim of the Project

The developer statements publicly that the proposed project is needed in Myanmar according to the following reasons:

- (a) Since the use of Tin is in urgent demand in the world to cope with technology development, the proposed project will produce good quality tin concentrate (over 65%) with national human resources.
- (b) Myanmar Ponpipat Co., Ltd. will deploy a total investment of 230 million US \$ and the investment will create direct and indirect employment for over 350 local people during operation phase.

It will increase the use of low-grade ore, benefits to local miners and suppliers, increasing employment as well as resulting in government revenues.

The developer claims that the followings will be the direct and the indirect benefits of the proposed project.

### 2.3. The Need of EIA

An EIA is required for environmentally approvals from Environmental Conservation Department (ECD, Nay Pyi Daw) and Environmental Conservation Department (ECD, Taninthayi State). The Environmental Conservation Department under Ministry of Natural Resources and Environmental Conservation is the lead authority for this ESIA process and the development needs to be authorized by this department in accordance with this Environmental Conservation Law (2012). The environmental impacts associated with the proposed project require investigation in compliance with the EIA (Environmental Impact Assessment) procedures (2015).



## 2.4. Brief Description of the Project Proponent

The followings are the brief of project proponent.

Project Developer	
Project Developer	Myanmar Ponpipat Co., Ltd.
Type of Project	Surface Mining Project for Tin
Project Location	Heinda Village, Myitta Township, Near Dawei Township
Contact Person	U Khaing Swan (09-8742682)

## 2.5. Brief Description of the Environmental Assessment Practitioner

Below is the background information on Ever Green Tech Environmental Services and Training Co., Ltd., (Third party) who draw up the ESIA.

Ever Green Tech Environmental Services & Training Co., Ltd.		
Specialists including the written report	Dr. Kyaw Swar Tint	Ph.D. (Mining)
	Dr. Thein Tun	Ph.D. (Metallurgy)
	Dr. Myo Min Tun	Ph.D. (Metallurgy)
	Dr. Kyaw Zay Moe	Ph.D. (Botany)
	Dr. Khon Aung	M.B.B.S (Ygn)
	Dr. KoMyint	Ph.D. (Zoolgoy)
	U Min Aung	M.Sc. (Chemistry)
	Ma Nandar Nwe	B.E. (IT); Dip. in EIA/EMS
	Ma Yuzuna Moe Myint	B.Sc. (Forestry)
	Mg Yaw Ma Nar	B.Sc. (Forestry)
	Ma May Thet Zaw	M.E. (Civil)
Company Name	Ever Green Tech Environmental Services and Training Co., Ltd.	
Company Registration No.	3344/2015-2016 (Ygn)	

Contact Address	No.14, Thiri Mying (8th)Street, 13 <sup>th</sup> Quarter, Hlaing Township, Yangon
Telephone Number	09-43106929, 09-91019166, 09-799700171
E-mail	<a href="mailto:11kyawswar@gmail.com">11kyawswar@gmail.com</a>
Contact person	Dr. Kyaw Swar Tint Principal Environmental and Social Consultant 09-5099232, 09-43106929

## 2.6. Selected Consultants for Conducting EIA

	Name	Degree	Responsibility	Area of Expertise
Our Consultants	Dr. Kyaw Swar Tint	Ph.D. (Mining)	Principal Consultant	(a) Air Pollution Control (b) Noise and Vibration (c) Socio-Economy (d) Environmental Management and Monitoring
	Mr. Min Aung	M.Sc. (Chemistry)	Key Consultant	(a) Water Pollution Control (b) Modelling of Water Quality (c) Meteorology, Modeling for Air Quality (d) Soil and Ground Water Pollution Control
	Dr. Thein Tun	Ph.D. (Metallurgy)	Senior Consultant	(a) Risk Assessment and Hazard Management (b) Facilitation of Meeting (c) Legal Analysis (d) Occupational Safety and Health
	Dr. Myo Min Tun	Ph.D. (Metallurgy)	Senior Consultant	(a) Evaluation of Alternatives

				(b) Traffic and Transportation System (c) Resources Utilization Management (d) Waste Management
	Dr. Kyaw Soe	Ph.D. (Metallurgy)	Consultant	Environmental Baseline Study
	Ms. Nandar Nwe	M.S. in EIA/EMS (YTU), Dip; in Applied Psychology (YU)	Consultant	Social Impact Assessment (Household Survey)
	Ms. Thazin Htwe	M.S. in EIA/EMS (YTU), Dip; in Applied Psychology (YU)	Consultant	Social Impact Assessment (Public Consultation and Stakeholder Engagement)
	Mr. Yaw Ma Nar	B.Sc. (Forestry); Dip in EIA/EMS	Field Coordinator	Project Coordinator
	Dr. Kyaw Zay Moe	Ph.D. (Botany)	Consultant	Flora Diversity
	Dr. Ko Myint	Ph.D. (Zoology)	Consultant	Fauna Diversity
	Dr. Khon Aung	M.B.B.S. (Ygn)	Consultant	Health Impact Assessment
	Ms. May Thet Zaw	M.E. (Civil)	Consultant	Construction Impacts and Risk Assessment

## 2.7. Purposes of the ESIA Study

The main purposes of an ESIA are to provide the relevant authorities with sufficient information on the proposed activities to allow them to make an informed decision on whether or not the ESIA should be authorized. This ESIA will be conducted according to Environmental Impact Assessment Procedures, 2015. The objectives of an ESIA are to:

- Ensure that social and Environmental considerations are explicitly addressed and incorporated into the development decision-making process;
- Anticipate and avoid, minimize or offset significantly adverse biophysical, social and other relevant impacts of proposed developments;
- Protect the productivity and capacity of natural systems and the ecological processes which maintain their functions; and
- Promote development that is sustainable and that optimizes resource use and management opportunities.

An ESIA functions as a planning tool which helps determine the social, economic and Environmental impacts of a proposed project through Public Participation (PP) and independent specialist assessment. Through the ESIA, potential negative and positive impacts are identified, and recommendations are made for reducing or avoiding negative impacts, and enhancing positive impacts.

The findings of an ESIA are transferred into clear and measurable objectives that must be achieved during construction, operation and decommissioning of a proposed project. These objectives, and plans for achieving them, are captured in an Environmental and Social Management Plan (ESMP). The ESMP is a public document and typically becomes a component of the project financing terms and conditions should the project go ahead.

The basic guiding principles of the ESIA are:

- To inform decision-makers and result in appropriate levels of Environmental protection and community well-being;
- To provide timely information and outputs which assist with design and engineering modifications that reduce negative impacts;
- To identify any significant Environmental effects and key issues (i.e. the matters that must be taken into account when making decisions) and apply the necessary mitigation measures;
- To provide opportunities to inform and involve Interested and Affected Parties (I&APs), incorporating their inputs and concerns explicitly into the documentation and decision-making;
- To allow opportunities for participation by the authorities involved;
- To ensure that the ESIA team has implemented appropriate methodologies and experts from the relevant disciplines, and to ensure the team has assessed potential interrelationships between the biophysical, social and economic issues; and

- To provide, as far as possible, an objective, rigorous and balanced assessment of the issues.

## 2.8 The Need of the Scoping Report

Scoping is the process of determining the spatial and temporal boundaries (i.e. extent) and key issues to be addressed in an environmental assessment. The main purpose of scoping is to focus the environmental assessment on a manageable number of important questions. Scoping should also ensure that only significant issues and reasonable alternatives are examined. The ESS provides a description of the receiving environment and how the environment may be affected by the development of the proposed project. Desktop studies making use of existing information will be used to highlight and assist in the identification of potential significant impacts (both social and biophysical) associated with the proposed project. Additional issues for consideration will be extracted from feedback from the public participation process, which commenced at the beginning of the Scoping phase, and will continue throughout the duration of the project. All issues identified during this phase of the study have been documented within this final version of the Environmental Scoping Report and have been highlighted in teal for easy reference. Thus, this environmental Scoping Report (document at hand) hereby provides a record of all issues identified as well as any fatal flaws, in order to make recommendations regarding the project and further studies required to be undertaken within the EIA phase of the proposed project.

The scoping report is required to approve the procedures and methodologies for EIA studies by Environmental Conservation Department (ECD, Nay Pyi Daw) and Environmental Conservation Department (ECD, Taninthayi Region). The Environmental Conservation Department under Ministry of Natural Resources and Environmental Conservation is the lead authority for this process and the development needs to be authorized by this department in accordance with this Environmental Conservation Law (2012). The environmental impacts associated with the proposed project require investigation in compliance with the EIA (Environmental Impact Assessment) procedures (2015).

## 2.9. About the EIA and EMP Report

EIA is a formal process used to predict how the proposed project will affect natural resources such as water, air, land, socio-economic and wildlife. It is desirable to ensure that the

development options under consideration are sustainable. It also aims to make recommendations for the mitigation of the potential negative impacts and enhancement of the positive ones.

EMP is a site specific plan developed to ensure that the project is implemented in an environmental sustainable manner where all contractors and subcontractors, including consultants, understand the potential environmental impacts arising from the proposed project and take appropriate actions to properly manage that risk. EMP also ensures the project implementation is carried out in accordance with the design by taking appropriate mitigation actions to reduce adverse environmental impacts during its life cycle.

The EIA and EMP reports will contain:

- (a) the present status of air, noise, water, land, biological, socio-economic and health components of the environment;
- (b) identification and evaluation of positive and negative impacts due to the development of the project;
- (c) proposed pollution control measures, environmental management plan (EMP) to be adopted for mitigation of adverse impacts;
- (d) measures for the improvement of the community around the area, and
- (e) post-project environmental quality monitoring programme.

In making impact assessment, Green Tech ESIA Team mostly referred to the pollution limits set by Myanmar National Emission Guidelines, USEPA, OSHA and WHO.

## 2.10. Scope of the EIA Study

Firstly, the need of the project, the need of the EIA report, objectives and scope of the EIA report are described. Then, laws and regulations related to the EIA study are described. Then, alternative analysis, methodologies for EIA study, data collection system, public participation process are described. Then, anticipated environmental, social and health impacts and mitigation/enhancement measures in all phases (construction, operation, and decommissioning phases), residual and cumulative impacts are described. Finally, environmental management system, environmental monitoring program, occupational health and safety management plan, emergency control plan, disaster response plan and CSR program for described in the last section.

## 2.11. Phases for the EIA Report

This report will not cover construction phase of the proposed project because Heinda Mine had been operated since 1999. However, this report will cover not only operation phase but also decommissioning phase (mine closure) of the proposed project. The operation phase will include treating an alluvial ore to become Tin concentrates (over 65%) by gravity concentration and magnetic separation method. This stage will include beneficiations of alluvial ore with jigging, tableing, hydro sizer, magnetic separator and treatment of waste water.

## 2.12. Data Collections

The project related data, factory layout plans and design parameter are provided by Myanmar Pongpipat Co., Ltd. and No. (2) Mining Enterprise (Tanintharyi). Secondary data on demographic distribution in the area are sourced from Head of Local Administration Office (Dawei) and data on public health are sourced from Public Health Department (Dawei). Primary data for public concerns, socio-economic and health profiles are conducted by household survey.

## 2.13. Corporate Social Responsibility (CSR) Fund

MPC promises to set up at least 2% of annual net profit (or at least 150 Lakhs per year) as CSR fund. They also promise environmental mitigation and monitoring costs will not take account as CSR fund.

## 2.14. Developer's Policies for Socio-economic Development of Local People

The company's policies for local socio-economic development are shown in the following table.

No.	Description	Company's Policy
1.	Local Community Development Policy	Appoint local people with relevant skills as much as possible (At least 50% of Local People)
2.	Corporate Social Responsibility (CSR) Policy	Contribute at least 2 percent of the annual net profit after tax as CSR fund or at least 150 Lakhs per year.



## 2.15. Structure of the Scoping Report

This Scoping Report (SR) prepared as part of the EIA for proposed project is structured as follows:

**Section 1: Executive Summary** – Concise description to detail the significant findings and recommended actions as the purpose of the EIA and SR;

**Section 2: Introduction** – provides the introduction and background of the proposed project, introduces the Proponent and EAP as well as the purpose of the EIA and SR;

**Section 3: The Legal Description and other Requirements** – provides details of applicable Environmental legislation;

**Section 4: The Project Description** – provides details of the proposed project including design features and proposed infrastructure;

**Section 5: The Project Alternatives** – provides details of the proposed project including analysis of alternatives, no project alternative alternative technologies and locations and alternatives considered;

**Section 6: The Baseline Conditions** – provides a summary of knowledge about the existing physical, biological, social and cultural Environment in the study area that the project may influence;

**Section 7: Impact Assessment and Mitigation Measures** – describes the objectives positive and negative environmental, socio-economic and health impacts are identified and evaluated and the processes to be followed during the Scoping and Impact Assessment phases;

**Section 8: Risk Assessment** – describes the methodology and approach, natural hazards and disaster risk, mining industrial hazards, analysis of likelihood of hazards and the consequences, identification of measures to reduce risks and the processes to be followed during the Scoping and Impact Assessment phases;

**Section 9: Cumulative Impacts** – describes the identification and assessment of the potential cumulative impacts on the components in the surrounding environment and the Project's contribution to such impacts and the processes to be followed during the Scoping and Impact Assessment phases;

**Section 10: ESIA and Public Participation Process** – describes the objectives of PP in an ESIA and the processes to be followed during the Scoping and Impact Assessment phases;

**Section 11: Mine Closure Plan** – describes the objectives of the Plan is to include activities for progressive rehabilitation of the site over the life of the mine. This will minimize the effort and cost for the final rehabilitation;

**Section 12: ESIA Plan of Study** – describes the EIA methodology and the PP process, summarises the potential Environmental and social impacts associated with the proposed project, and describes how such issues should be assessed in the Impact Assessment phase of the EIA;

**Section 13: Proposed Content of the EIA Report** – the chapters for the EIA report and the content of each chapter are described.

**Section 14: Next Steps in the EIA Process** – concludes and provides details on the next phase of the EIA.

### 3. POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

This chapter sets out the relevant legal and policy context in Myanmar and documents the environmental and social standards with which the Project has to comply with, as well as the international standards that the Project will follow.

#### 3.1 Project's Environmental, Social and Health Policies

The main policy and commitment of Myanmar Ponpipat Co., Ltd. can be identified in the following points:

- the protection of public safety, the health and safety of the workforce and the local communities
- the protection and promotion of human rights, the economic and social development of local communities;
- Since establishment, we have always adhered to the principle of maintaining equal emphasis on production management and environmental protection;
- We follow concept of scientific development, strengthen environmental protection, reduce emission efforts, and work hard to achieve effective results;
- In order to better focus on energy conservation and environmental protection, we invest heavily and use advanced treatment technology to ensure the treatment of the air, water, and solids discharge. We will ensure that the environmental impact is minimized.

#### Sustainability Policy

Myanmar Ponpipat Co., Ltd.'s sustainability model is "To operate in a sustainable manner means to create value for stakeholders, and to use resources so that the needs of future generations will not be compromised, respecting people, the environment and the society as a whole." Myanmar Ponpipat Co., Ltd. adheres to a sustainability policy, which is composed of the following principles:

- *Stakeholder relations* – "Engaging stakeholders and involving them in company's business are both prerequisites for sustainability and for the construction of reciprocal value."

- *Human Rights* – “The respect of Human Rights represents the basis for an inclusive growth of societies, of the territories and, consequently, of the companies that work there.”
- *Relations with communities and contribution to local development* – “Dialogue, the respect of local communities, the evaluation of impacts are all preconditions for an effective cooperation, targeted at creating territorial value.”
- *Climate strategy* – “To satisfy the world’s energy demand, by containing, at the same time, emissions of gases that have an impact on climatic change, is one of the greatest challenges of modern society.”

*Safeguarding biodiversity and ecosystems* – “The conservation of biodiversity and ecosystems is a fundamental need of humanity. They support life, human wellbeing and business activities. The benefits they provide (ecosystem services) such as food, fresh water, climate regulation and nutrient recycling, are vital for the livelihood communities and for the equilibrium of the whole planet.”

The company’s policies for local socio-economic development are shown in the following table.

**Table - Company’s Policies for Local Socio-economic Development**

No.	Description	Company’s Policy
1.	Local Community Development Policy	Appoint local people with relevant skills as much as possible (At least 50% of all workers will be local workers)
2.	Corporate Social Responsibility (CSR) Policy	Contribute at least 2 percent of the annual net profit after tax as CSR fund or at least 150 Lakhs per year.

### 3.2. Statement of Commitments

#### 3.2.1 Commitments of Project Developer

We, Myanmar Ponpipat Co., Ltd commit to comply with the followings:

- a) Comply with the commitments of the environmental and socio-economic development revealed in the Environmental Impact Assessment report.
- b) Acknowledge and comply the laws, regulations and guidelines associated with the project, included in the report.
- c) Comply and proceed the alternative methods, mitigation measures and monitoring plans included in the report for the reduction of the negative environmental impacts; and take responsibility for the environmental impacts due to non-compliance of the commitment.
- d) Give priorities for the occupational health and safety of the workers.
- e) Utilize the exact amount of fund as stated in proposed expenditure for cooperate social responsibility funds.
- f) Take responsibility for all of the works and absence of the contractors, sub-contractors, officers and representatives of the company in operating the processes.
- g) Take responsibility to support after discussion for the impacted people to ensure for their stable livelihood not lower than before the project; and resettlement and rehabilitate the impacted local people, government organizations and other related people and organizations.
- h) We, Myanmar Ponpipat Co., Ltd. commit to follow the environmental commitments, mitigation measures, management plans illustrated in the EIA report. We also commit to follow the Environmental Conservation Laws 2012, the Environmental Conservation Rules 2015 that stated in EIA.

(Signature)

Name -

Position -

Date -



### **3.2.2 Commitments of the Environmental Assessment Practitioner**

The EIA report was written by Ever Green Tech Environmental Services and Training Co., and EIAs in this report were designed by the following criteria;

- (a) The designed EIA complied with the National Constitution, Environmental Conservation Law, EIA Procedures, and National Environmental Quality Guideline.
- (b) This EIA also complied with the existing or future Labor laws, Occupational Health and Safety Laws, Rules and Procedures.
- (c) These environmental impact protection procedures are designed of incident avoiding, mitigation and replacing for the project proponent who commits to follow the environmental impact protection procedure.
- (d) This environmental management report is systematically designed not only for environmental impact protection procedures and occupational safety and health but also emergency management planning and social welfare programs.
- (e) All facts including in this report are systematically surveyed without bias. As a third party, we commit and take full responsibility for all facts in this report.

Dr. Kyaw Swar Tint

Principal Environmental and Social Consultant

Ever Green Tech Environmental Services and  
Training Co., Ltd.



### 3.3. Relevant Environmental Laws and Regulations in Myanmar

Myanmar has promulgated several laws and regulations concerning protection of the environment. The following table describes laws and regulations which are directly or indirectly associated with the proposed project.

**Table - Relevant Environmental Laws and Regulations in Myanmar**

Laws and Regulations	Year	Purposes
Constitution of the Republic of the Union of Myanmar (Articles 24,45,349,359)	2008	- To conserve the natural environment, - To prevent and upgrade the rights and lives of the workers
Environmental Conservation Law (Law No.7(o), 14,15,24,25,29)	2012	- To enable to implement the Myanmar National Environmental Policy; - To enable to lay down the basic principles and give guidance for systematic integration of the matters of environmental conservation in the sustainable development process;
Environmental Conservation Rules (Rule 55, 69 (a), (b))	2014	- To implement correctly according to the environmental management plan
EIA Procedures (Article 102 to 110, 113, 115)	2015	- To develop the environmental impacts and to draw the environmental management plan;
National Environmental Quality (Emission) Guidelines	2015	These national Environmental Quality (Emission) Guidelines (hereafter referred to as Guidelines) provide the basis for regulation and control of noise and vibration, air emissions, and liquid discharges from various sources in order to prevent pollution for purposes of protection of human and ecosystem health.
Myanmar Investment Law (Law No. 50(d), 51, 73)	2016	To develop responsible investment businesses which do not cause harm to the natural environment and the society for the benefit of the Union and its citizens
Labour Organization Law, (Law No. 1,7 to 11)	2011	This Law was enacted, to protect the rights of the workers, to have good relations among the workers or between the employer and the worker, and to enable to form and carry out the labour organizations systematically and independently
The Settlement of Labour Dispute Law, (Law No. 38, 39,	2012	The Pyidaungsu Hluttaw hereby had enacted this Law for safeguarding the right of workers or having good relationship between employer and workers and making peaceful workplace.

40, 51)		
Employment and Skill Development Law, (Law No. 5, 14, 30(a,b))	2013	<ul style="list-style-type: none"> <li>- To facilitate employment which is appropriate to the age and ability of the job seeker</li> <li>- To help workers obtain employment and to provide stability of employment and skills development for employees</li> <li>- To help employers obtain appropriate employees</li> </ul>
The Leave and Holiday Act, 1951 (Law Amended July, 2014)	2014	<ul style="list-style-type: none"> <li>- To allow worker for leave and holiday allowances, religious or social activities with earn allowance, and benefits for Health allowances.</li> <li>- Concerned workers: Daily wage workers/ temporary workers/permanent workers.</li> </ul>
Minimum Wages Law (Law No. 12, 13 (a to g))	2013	This Law was enacted to meet with the essential needs of the workers, and their families, who are working at the commercial, production and service, agricultural and livestock breeding businesses and with the purpose of increasing the capacity of the workers and for the development of competitiveness,
Payment of Wages Act (Law No. 3,4, 5, 14, 8 with 7,10)	2016	<p>(a) Pay in local currency or foreign currency recognized by the Central Bank of Myanmar. This may be in cash, check or deposit into the bank account of Employee.</p> <p>(b) Moreover, pay can be in the means of...</p> <p>(1) Totally in cash OR half the cash and half in things set according to the local price to those employees working in trade, manufacturing and service sectors.</p> <p>(2) Totally in cash OR half the cash and half in things set as local price according to local traditions or common agreement to those working in agriculture and livestock sectors. But, this must be for the sake of the employees and their families. And, it also must be reasonable/fair.</p> <p>(3) An employee shall receive the payment for 60 days when he/she is in Alternative Civil Service.</p>
The Myanmar Insurance Law (Law No. 15, 16)	1993	<p>(a) to overcome financial difficulties by effecting mutual agreement of insurance against social and economic losses which the people may encounter, due to common perils;</p> <p>(b) to promote the habit of savings individually by effecting life assurance, thus contributing to the accumulation of resources of the State;</p> <p>(c) to win the trust and confidence of the people in the insurance system by providing effective insurance safeguards which may become necessary in view of the social and economic developments.</p>
The Social Security Law (Law No. 11(a), 15(a), 18(b), 48, 49, 75)	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.
Workman Compensation Act	1951 (amended 2005)	To protect personal injury caused to a workman by accident arising out of and in the course of his employment and to compensate in accordance with the provisions of Workman Compensation Act
Law Amending the Factories Act 1951 (Pyidaungsu Hluttaw Law No. 12/2016)	2016	To make effective arrangements in every factory for disposal of waste and effluent, and matters on health, cleanliness and precaution against danger.
Myanmar Fire Force Law,	2015	<ul style="list-style-type: none"> <li>-To take precautionary and preventive measure and loss of state own property, private property, cultural heritage and the lives and property of public due to fire and other natural disasters</li> <li>-To organize fire brigade systemically and to train the fire brigade</li> <li>-To prevent from fire and to conduct release work when fire disaster, natural disaster, epidemic disease or any kind of certain danger occurs</li> <li>-To educate, organize an inside extensively so as to achieve public corporation</li> <li>-To participate if in need for national security, peace for the citizens and law and order</li> </ul>
Public Health Law (Law No. 3, 5)	1972	To promote and safeguard public health and to take necessary measures in respect of environmental health.
Pesticide Law Pyidaungsu Hluttaw Law No. 14/2016	2016	To direct the Myanmar Agriculture Service to analyze and test pesticides or any active ingredient received as samples as to conformity with the content of ingredient as claimed on the label; and to undertake bio-efficacy trials on crops for determining effectiveness in practical use.
Private Industrial Enterprise Law	1990	To narrow down the gap between rural development and urban development by the development and improvement of industrial enterprises; to avoid or reduce the use of technical know-how which cause environmental pollution; to cause the use of energy in the most economical manner.
Forest Law	1992	To implement forest policy and environmental conservation policy, to promote public cooperation in implementing these policies, to develop the economy of the State, to prevent destruction of forest and biodiversity, to carry out conservation of natural forests and establishment of forest plantations and to contribute towards the fuel requirement of the country.
Protection of Biodiversity and Protected Area Law	2018	To protect wildlife, wild plants and conserve natural areas, to contribute towards works of natural scientific research, and to establish zoological gardens and botanical gardens.
Protection and Preservation of	1998	To implement the protection and preservation policy with respect to perpetuation of cultural heritage that has

Cultural Heritage Regions Laws (Law No. 15, 16)		existed for many years; to protect and preserve the cultural heritage regions and the cultural heritage.
Prevention and Control of Communicable Diseases Law (Law No. 3, 4, 9, 11)	1995	To prevent the outbreak of Communicable Diseases, by implementing following project activities:- (a) immunization of children by injection or orally; (b) immunization of those who have attained majority, by injection or orally, when necessary; (c) carrying out health educative activities relating to Communicable Disease.
The Control of Smoking and Consumption of Tobacco Product Law (Law No. 9)	2006	-To convince the public that health can be adversely affected due to smoking and consumption of tobacco product and to cause refraining from the use of the same; -To protect from the danger which affects public health adversely by creating tobacco smoke-free environment; -To obtain a healthy living style of the public including child and youth by preventing the habit of smoking and consumption of tobacco product;
Conservation of Water Resources and Rivers Law (Law No. 8, 11(a), 13, 19, 24(b), 30)	2006	To conserve and protect the water resources and rivers system for beneficial utilization by the public; to prevent environmental impact.
The Protection of rights of National Race Law,	2015	Consists of four bills, as submitted to the legislature; Buddhist Women's Special Marriage Bill, Religious Conversion Bill, Monogamy Bill and Population Control Bill.
Agricultural Land Law	2012	To protect the rights of the people who are working on the farm.
the Prevention of Hazard from Chemical and Related Substances Rules (Law No. 8,15,16,17, 20, 22, 23, 27)	2013	- Performing the sticking pictogram for being least the health impacts and accident injuries in the occupational area according to the prescribed standards and norms of the Globally Harmonized System GHS); - Making the necessary arrangements to be safety of the occupational area and issuing orders and directives for preventing and decreasing the accident; - Laying down the proliferation plans on knowledge, and safety of chemical and related substances to administrators, license holders, public and workers; - Cooperating with local and foreign governmental departments, organizations and non-governmental

		organizations in respect of safety management for chemicals hazard.
The Freshwater Fisheries Law (Law No. 36,40,41)	1991	<ul style="list-style-type: none"> <li>- To further develop the fisheries;</li> <li>- To prevent the extinction of fish;</li> <li>- To safeguard and prevent the destruction of freshwater fisheries waters;</li> <li>- To obtain duties and fees payable to the State;</li> <li>- To manage the fisheries and to take action in accordance with the Law.</li> </ul>
The Export and Import Law	2012	<p>Export and Import Law was enacted and the Control of Imports and Exports Act (1947) was abolished.</p> <p>It aims to implement the economic principles of the State successfully, to lay down the policies to export and import that support the development of the State; and that are to be in conformity with the international trade standards.</p>
Automobile Law Pyidaungsu Hluttaw Law No. 55/2015	2015	<ul style="list-style-type: none"> <li>- For the safe driving of motor vehicles in public areas through registration according to official rules and regulations.</li> <li>- To provide driving licenses for driving particular types of motorized vehicles after qualification checks.</li> <li>- For the easy flow of road users and for the protection against road risks and vehicle perils.</li> <li>- To avoid traffic congestion and to use high technology transportation systems efficiently in order to implement protection against road risks and vehicle perils.</li> <li>- To reduce environmental pollution caused by motor vehicles.</li> </ul>
The Myanmar Engineering Council Law (Law No. 20,24,25, 31(a), 37)	2013	<ul style="list-style-type: none"> <li>- To uphold and upgrade the dignity, ethics and quality of the Myanmar citizen engineers, graduate technicians and technicians who are practicing engineering works;</li> <li>- To explore using engineering technology and information technology combined the good methods, research and development activities by which the natural resources and human resources of the State may be beneficially applied with least impact environment;</li> <li>- To carry out guidance and supervision, and to take necessary actions for fulfillment of the requirements of stipulated technical standard, proper method, free from danger, keeping ethic and being dutiful in the fields of engineering and technology education, researches and services;</li> <li>- To service engineering and technology related functions and duties beneficial for the State assigned by the relevant Ministry and relevant organizations.</li> </ul>

The following table shows more detailed about the rules and regulations associated with the proposed project.

### Laws and Regulations Associated with the Proposed Project

Laws and Regulations	Year	Descriptions	Objectives
<b>Local Laws</b>			
Constitution of the Republic of the Union of Myanmar	2008	<p><u><b>Article 45-</b></u> The Union shall protect and conserve natural environment.</p> <p><u><b>Article 24 -</b></u> The Union shall enact necessary laws to protect the rights of workers.</p> <p><u><b>Article 349 -</b></u> Citizens shall enjoy equal opportunity in carrying out the following functions:</p> <p><u><b>Article 359 -</b></u> The Union prohibits forced labor except hard labor as a punishment for crime duly convicted and duties assigned by the Union in accord with the law in the interest of the public.</p>	<ul style="list-style-type: none"> <li>- To conserve the natural environment,</li> <li>- To prevent and upgrade the rights and lives of the workers</li> </ul>
Environmental Conservation Law	2012	<p><u><b>Article 16 -</b></u> A person or organization operating business in the industrial estate or business in the special economic zone or category of business stipulated by the Ministry:</p> <p>(a) is responsible to carry out by contributing the stipulated cash or kind in the relevant combined scheme for the environmental</p>	<ul style="list-style-type: none"> <li>- to enable to implement the Myanmar National Environmental Policy;</li> <li>- to enable to lay down the basic principles and give guidance for</li> </ul>



		conservation including the management and treatment of waste;	systematic integration of the matters of environmental conservation in the sustainable development process;
Environmental Conservation Rules	2014	<p><b><u>Rule 55 -</u></b></p> <p>Government department, organization or an individual which has been established before the enation of these rules and is responsible to conduct the environmental impact assessment or initial environmental examination for the project, business, service or activity:</p> <p>(a) Shall prepare the environmental management plan according to environmental impact assessment procedure and submit it to the Ministry;</p> <p>(b) Shall implement an environmental management plan with stipulated terms and conditions approved by the Ministry within the time stipulated by the Ministry.</p>	- To implement correctly according to the environmental management plan
EIA Procedures	2015	<p><b><u>Article 8</u></b> -Any Project already in existence prior to the issuance of the Rules, or the construction of which has already commenced prior to the issuance of the Rules, and which, in either case, shall be required to undertake, within the timeframe prescribed by the Department, an environmental compliance</p>	- To develop the environmental impacts and to draw the environmental management plan;

		audit, including on-site assessment, to identify past and/or present concerns related to that Project's Environmental Impacts, and to: (a) develop an EIA or EIA or EMP; (b) obtain an ECC; and (c) Take appropriate actions to mitigate Adverse Impacts in accordance with the Law, the Rules, and other applicable laws.	
Foreign Investment Law	2012	<p><b>Article 4</b> - The investment economic activities are designated as restricted or prohibited activities:-</p> <p>(b) The activities prejudicial to public health.</p> <p>(c) The activities prejudicial to the natural resources, environment and biodiversity.</p> <p><b>Article 17</b> - The duties of investor are as follows:-</p> <p>(h) To perform not to affect environmental pollution and spoilage as per existing law in connection with the investment activities.</p>	- not to destruct the environment due to the investment activities
Myanmar Mine laws And Laws Amending Myanmar Mine Laws	1994  2015 2018	<p><b>Article 2</b></p> <p>(i) – feasibility Study means a study on the commercial viability of a project which should include information on extraction, processing, financial information including anticipated investment, and the environmental and social impact of a</p>	<p>-to carry out for the development of conservation, utilization and research works of mineral resources;</p> <p>-to protect the environmental conservation works that may have detrimental effects</p>

		<p>project.</p> <p><u>Article 13 -</u></p> <p>(a) appointment of mine personnel and workers, assignment of work, prescribing of age, wages, salaries and other fees;</p> <p>(b) fixing of working days and working hours for the above and underground workers in a mine;</p> <p>(c) making provisions for safety and the prevention of accidents in a mine and their implementation;</p> <p>(d) making and implementation of plans relating to the welfare, health, sanitation and discipline of personnel and workers in a mine;</p> <p>(e) making provisions for the environmental conservation works that may have detrimental effects due to mining operation;</p> <p>(e-1) – By launching the mineral extraction work, to act the least destruction of the environment, and not to destruct the social economic effect of the local people to keep the fund annually for the environment.</p> <p>(e-2) – After the mining work is implemented or closing, the sites are preserved, maintain, and rehabilitation, preserve to promised land by the mining implementation program and to</p>	<p>due to mining operation.</p>
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		<p>raise the fund.</p> <p>(f) reporting of accidents, loss of life and bodily injury received due to such accidents in the mine;</p> <p>(g) submission to the inspection of the Chief Inspector and inspectors.</p> <p><b>CHAPTER V</b></p> <p><b>RIGHT OF UTILIZATION OF LAND AND WATER FOR MINERAL PRODUCTION</b></p> <p><b>Article 15</b> - If, in the interest of the State, it is necessary to acquire the land where mineral production could be undertaken on commercial scale, the Ministry shall co-ordinate with the relevant Ministry for the acquisition of such land in accordance with the existing law.</p> <p><b>Article 16</b> - If the holder of mineral production permit requires the use of public water for mineral production he shall first and foremost inform the Department of such requirement in accordance with the prescribed manner.</p> <p>Article 17- If the Department, after scrutinizing the requirement submitted under section 16 finds that the use of public water is</p>	
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		really necessary for the holder of mineral production permit, it shall co-ordinate with the relevant government department and organization for obtaining permission to use water in accordance with the existing law.	
The Forest Law	1992	<p><b>Article 12</b> - Whoever, within a forest land and forest covered land at the disposal Government:</p> <p>(a) is desirous of carrying out any development work or economic scheme shall obtain the prior approval of the Forestry Ministry;</p> <p><b>Article 40</b> – Whoever commits any of the following acts shall, on conviction, be punished with fine which may extend to kyats 5,000 or with imprisonment for a term which may extend to 6 months or with both:-</p> <p>(a) trespassing and encroaching in a reserved forest;</p> <p>(b) pasturing domestic animals or permitting domestic animals to trespass in a reserved forest;</p> <p>(c) breaking up any land, clearing, digging or causing damage to the original condition of the land without a permit in a reserved forest;</p> <p>(d) causing damage to a water-course, poisoning the water, using chemicals or explosives in the water in a reserved forest;</p> <p>(e) catching animals, hunting or fishing in a reserved forest;</p> <p>(f) kindling, keeping and carrying and fire or leaving any</p>	- To conserve the natural forests and trees;

		<p>fire burning which may set fire to the forests in a reserved forest;</p> <p>(g) moving forest produce without submitting to examination at the revenue station;</p> <p>(h) violating any provision of the rule, procedure, order, directive or notification issued under this Law.</p> <p><b>Article 44</b> – Whoever commits any of the following acts shall, on conviction, be punished with fine which may extend to kyats 30,000 or with counterfeit marking hammer;</p> <p>(c) altering, defacing or obliterating and mark affixed on the forest produce by the forest staff or by a person delegated by him;</p> <p>(d) altering, moving, destroying of defacing any boundary mark of a forest land without permission.</p> <p><b>Article 42</b> - Whoever commits any of the following acts shall, on conviction, be punished with fine which may extend to kyat 20,000 or with imprisonment for a term which may extend to 2 years or with both:</p> <p>(a) felling, cutting, girdling, marking, lopping, tapping or injuring by fire or otherwise any tree in a reserved forest;</p>	
The Forest rules	1995	<p><b>Rule 20-</b> The forest area and land cover with the forest which are undertaken by the government:</p> <p>(b) The Ministry of forestry can allow to launch the</p>	- to promote the sector of public co-operation in implementing the forestry policy and the environmental conservation policy of the Government;



		<p>developing and economic plan if the environment is not destruct.</p> <p><b>Rule 22-</b> The granted person can launch and must aware only to operate the permitted issues and not to destruct the environment.</p>	
Myanmar Mines Rules	1996 2018	<p><b>Chapter XIX</b> - Measures for Safety and Prevention of Accidents in the Mine</p> <p><b>Chapter XXI</b> - Making Provisions to prevent Detrimental Effects due to Mining operations on the Environmental Conservation Works</p> <p><b>Article 105</b> - The holder of a mineral exploration permit or a mineral production permit shall;-</p> <p>(a) backfill or otherwise make safe bore holes, excavations, surface of land damaged during the course of underground mining operations to the satisfaction of the Ministry or the Department.</p> <p>(b) establish forest plantations or pay compensation to as agreed when permission of the Ministry of Forestry was sought, if trees were cut and cleared for mineral exploration or mineral production within a forest land or in a land area covered with forests and which is at the disposal of the Government.</p> <p>106. In disposing of liquids, wastes, tailings and fumes which</p>	- to perform according to the rules of the mines

		have resulted from mineral production the holder of a mineral production permit or a manager shall undertake laboratory tests as may be necessary for the prevention of pollution of water, air and land in the environment and for the safety of living beings. When in the course of tests toxic materials are found, which are harmful to living beings, degradation shall be made by chemical means and systematic disposal shall be made only when it is assured that there is no danger.	
The Protection of Wildlife and Conservation of Natural Areas Law	1994	<p><b>Article 35</b> - Whoever commits any of the following acts shall, on conviction be punished with imprisonment for a term which may extend to 3 years or with fine which may extend to kyats 10,000 or with both</p> <p>(a) causing water and air pollution, causing damage to a water-course or putting poison in the water in a natural area;</p> <p>(b) possessing or disposing of pollutants or mineral pollutants in a natural area;</p> <p><b>Article 36</b> - Whoever commits any of the following acts shall, on conviction be punished with imprisonment for a term which may extend to 5 years or with fine which may extend to kyats 30,000 or with both-</p> <p>(a) killing, hunting or wounding a normally protected wild animal or seasonally protected wild animal without permission, possessing, selling, transporting or transferring such wild</p>	- to protect endangered species of wildlife and their natural habitats;

		<p>animal or any part thereof without permission;</p> <p>(b) extracting, collecting or destroying in any manner any kind of protected wild plants within the prescribed area without permission;</p> <p>(c) destroying ecosystem or any natural state in the natural area;</p> <p><b>Article 37</b> - Whoever commits any of the following acts shall, on conviction be punished with imprisonment for a term which may extend to 7 years or with fine which may extend to kyats 50,000 or with both-</p> <p>(a) killing, hunting or wounding a completely protected wild animal without permission, possessing, selling, transporting or transferring such wild animal or any part thereof without permission;</p>	
Protection and Preservation of Cultural Heritage Regions Laws	1998	<p><b>CHAPTER VII – Prohibitions 20.</b> No person shall carry out any of the following in the cultural heritage region:-</p> <p>(d) exploring for petroleum, natural gas, precious stones or minerals</p>	- To protect the cultural heritage regions from destruction.

### 3.4. International Agreements and Conventions

In addition to the domestic laws listed above, Myanmar is also a signatory to the following International conventions and these may have relevance to the proposed survey activities. Refer to the following Table.

*Table - International Agreements and Conventions Relevant to the Proposed Project*

International Agreements and Conventions	Status	Purposes
Vienna Convention for the Protection of the Ozone Layer, 1985	1998	Aims at the protection of the ozone layer, including requirements for limiting the production and use of ozone depleting substances.
Montreal Protocol on Substances that Deplete the Ozone Layer, 1989	1993	Aims at the protection of the ozone layer, including requirements for limiting the production and use of ozone depleting substances.
Basel Convention, 1989	2015	The Convention regulates the trans boundary movements of hazardous wastes and provides obligations to its parties to ensure that such wastes are managed and disposed of in an environmentally sound manner.
United Nations Framework Convention on Climate Change (UNFCCC), New York, 1992 and Kyoto Protocol 1997	1995 and 2005	Provide a framework for intergovernmental efforts to tackle climate change. Recognises that the climate system is a shared resource whose stability can be affected by industrial and other emissions of carbon dioxide and other greenhouse gases.
Convention on Biological Diversity, Rio de Janeiro, 1992	1994	Aims to promote national policies for the conservation of wild flora, fauna and habitat that needs to be included in planning policies. The three main goals are: (1) the conservation of the biological diversity; (2) the sustainable use of its components; (3) fair and equitable sharing of the benefits.
Asia Least Cost Greenhouse Gas	1998	Develop national and regional capacity for preparation

Abatement Strategy (1998 ALGAS)		<p>of GHG inventories.</p> <p>Assist in identifying GHG abatement options and preparation of a portfolio of abatement projects for each country.</p>
United Nations Agenda 21	1997	<p>Formed by the National Commission for Environmental Affairs (NCEA) in Myanmar. Provides a framework of programmes and actions for achieving sustainable development in the country.</p> <p>Building on the National Environment Policy of Myanmar, takes into account principles contained in the Global Agenda 21. Myanmar Agenda 21 also aims at strengthening and promoting systematic environmental management in the country.</p>
<p>Relevant ILO Conventions in force in Myanmar</p> <ul style="list-style-type: none"> <li>• C1 Hours of Work (Industry)</li> <li>• C14 Weekly Rest (Industry)</li> <li>• C17 Workmen's Compensation (Accidents)</li> <li>• C19 Equality of Treatment (Accident Compensation)</li> <li>• C26 Minimum Wage Fixing Machinery</li> <li>• C29 Forced Labour Convention</li> <li>• C42 Workmen's Compensation (Occupational Diseases) Revised 1934</li> <li>• C52 Holidays with Pay</li> <li>• C87 Freedom of Association and Protection of the Right to Organize</li> </ul>		<p>Sets out legal instruments drawn up by the ILO's constituents (governments, employers and workers) and setting out basic principles and rights for workers.</p>

### 3.5 National and International Guidelines for Proposed Project

National Guidelines and Internal standard guidelines are referred for Environmental Management Plan of the proposed project.

1. Environmental Impact Assessment Procedure (2015)
2. National Environmental Quality (Emission) Guidelines (2015) for Poultry Production
3. World Health Organization Guidelines (WHO)
4. National Ambient Air Quality Standard (NAAQS), USEPA
5. IFC Guidelines for Waste Management Facilities, 2007
6. IFC Guidelines for Water and Sanitation, 2007
7. IFC Guidelines for Community Health and Safety
8. IFC Guidelines for Occupational, Health and Safety

### 3.6. National Environmental Quality (Emissions) Guideline for Proposed Project

#### *Ore and Mineral Extraction*

This guideline applies to underground and open-pit mining, alluvial mining, solution mining, and marine dredging. Effluent and storm water flows should be managed so as to achieve the following effluent levels. The principle sources of air emission are fugitive dust from earth works and materials handling and transport facilities. Prevention and control of air emissions should be sufficient to achieve the general air emission guideline for ambient air quality.

*Table - Effluent Levels for Ore and Mineral Extraction*

Parameter	Unit	Guideline Value
Arsenic	mg/l	0.1
Cadmium	mg/l	0.05
Chemical oxygen demand	mg/l	150
Chromium (hexavalent)	mg/l	0.1
Copper	mg/l	0.3
Cyanide	mg/l	1
Cyanide (free)	mg/l	0.1
Cyanide (weak acid dissociable)	mg/l	0.5
Iron (total)	mg/l	2

Lead	mg/l	0.2
Mercury	mg/l	0.002
Nickel	mg/l	0.5
pH	S.U. <sup>a</sup>	6-9
Temperature	°C	<3 degree differential
Total suspended solids	mg/l	50
Zinc	mg/l	0.5

<sup>a</sup> Standard unit

**Table - Air Emission Levels for Ore and Mineral Extraction**

Parameter	Averaging Period	Guideline Value µg/m <sup>3</sup>
Nitrogen dioxide	1-year	40
	1-hour	200
Ozone	8-hour daily maximum	100
Particulate matter PM <sub>10</sub> <sup>a</sup>	1-year	20
	24-hour	50
Particulate matter PM <sub>2.5</sub> <sup>b</sup>	1-year	10
	24-hour	25
Sulfur dioxide	24-hour	20
	10-minute	500

<sup>a</sup> Particulate matter 10 micrometers or less in diameter

<sup>b</sup> Particulate matter 2.5 micrometers or less in diameter

**Table - Ambient Air Quality Standards**

Receptor	One Hour LAeq (dBA) <sup>a</sup>	
	Daytime 07:00 - 22:00 (10:00 - 22:00 for Public holidays)	Nighttime 22:00 - 07:00 (22:00 - 10:00 for Public holidays)
Residential, institutional, educational	55	45
Industrial, commercial	70	70

<sup>a</sup> Equivalent continuous sound level in decibels



### 3.7 Penalties and other Administrative Punishment

The developer must have to know the penalties and other administrative punishment granted in EIA Procedures in Myanmar.

No	Non-Compliance	Penalties	Specific Administrative Punishment of the Ministry
1.	Failure or delay in timely submission of reports within Period prescribed by Ministry	100 to 500 US\$ or equivalent Myanmar Kyat + 10-25 US\$/ day unit cured or equivalent Myanmar Kyat	-Issue Enforcement Notice
2.	Obstruction or interference with an official in the course of their duties	250 to 5,000 US\$ or equivalent Myanmar Kyat	-Issue Enforcement Notice -Criminal prosecution
3.	Failure to provide information to the Ministry or any representative	1,000 to 5,000 US\$ or equivalent Myanmar Kyat	-Suspension of Approval of EMP, EMP-CP, EMP-OP in whole or in part
4.	Failure to provide information to the Ministry Inspector or any representative when requested in regard to inspection and monitoring	250 to 5,000 US\$ or equivalent Myanmar Kyat	- Issue Enforcement Notice
5.	Undertaking or allowing any preparatory or other construction works without the prior approval by the Ministry of a reserved EMP or EMP-CP	1,000 to 5,000 US\$ or equivalent Myanmar Kyat +50 to 500 US\$/ day until cured or equivalent Myanmar Kyat	-Criminal prosecution

6.	Operating/implementing without a permit, or approval by the Ministry of an EMP or EMP-Op	1,000 to 5,000 US\$ or equivalent Myanmar Kyat +50 to 500 US\$/ day unit cured or equivalent Myanmar Kyat	- Criminal prosecution
7.	Non-compliance with an Enforcement Notice or Suspension Notice issued by the Ministry	2,000 to 10,000 US\$ or equivalent Myanmar Kyat +100-500 US\$/day unit cured or equivalent Myanmar Kyat	-Suspension of Approval of EMP, EMP-CP or EMP-OP in whole or in part -Revocation of Approval of EMP, EMP-CP or EMP-OP in whole or in part
8.	Failure to notify to the Ministry of any knowledge of any event of an imminent of environmental damage	1,000 to 5,000 US\$ or equivalent Myanmar Kyat	- Issue Enforcement Notice - Suspension of Approval of EMP, EMP-CP or EMP-OP in whole or in part -Revocation of Approval of EMP, EMP-CP or EMP-OP in whole or in part
9.	Failure to take reasonable steps to prevent an imminent thread of damage to the environment, social, human health, livelihoods, or property, where application based on the EMP, EMP-CP or EMP-OP	2,500 to 10,000 US\$ or equivalent Myanmar Kyat	-Issue Enforcement Notice - Suspension of Approval of EMP, EMP-CP or EMP-OP in whole or in part -Revocation of Approval of EMP, EMP-CP or EMP-OP in whole or in part

10.	Non-compliance with conditions in 'the ECC and allowable Emission Limit Values	1,000 to 10,000 US\$ or equivalent Myanmar Kyat	<p>-Issue Enforcement Notice</p> <p>- Suspension of Approval of EMP, EMP-CP or EMP-OP in whole or in part</p> <p>-Revocation of Approval of EMP, EMP-CP or EMP-OP in whole or in part</p>
11.	Failure to take pay compensation amounts required in respected in respect of social impacts	1,000 to 10,000 US\$ or equivalent Myanmar Kyat	<p>-Issue Enforcement Notice</p> <p>- Suspension of Approval of EMP, EMP-CP or EMP-OP in whole or in part</p> <p>-Revocation of Approval of EMP, EMP-CP or EMP-OP in whole or in part</p>
12.	Failure to fully restore social conditions upon resettlement	1,000 to 10,000 US\$ or equivalent Myanmar Kyat	<p>-Issue Enforcement Notice</p> <p>- Suspension of Approval of EMP, EMP-CP or EMP-OP in whole or in part</p> <p>-Revocation of Approval of EMP, EMP-CP or EMP-OP in whole or in part</p>

**Notes:**

1. All penalty amounts set forth in this Annex are denominated in United states Dollars (US\$) and are subject to annual inflation adjustment
2. Abbreviations are as follows;  
EMP =Environmental Management Plan  
EMP-CP = Environmental Management Plan – Construction Phase (OP- Operation Phase)



## 4. PROJECT DESCRIPTION

### 4.1. Project Background

Myanmar Ponpipat Co., Ltd. will operate surface mining for Tin in Heinda Mine, near Heinda Village, Myitta Township, Tanintharyi Region. The land use for all working area is Heinda Mine area. The Myanmar Ponpipat Co., Ltd submitted his application for mining lease over this area and after completion of all the formalities, No. (2) Mining Enterprise (Tanintharyi) has granted mining lease for the proposed mining project. The project area has over 2000 acres wide including three villages, one lake and two seasonal ponds.

Myanmar Ponpipat has now initiated an Environmental and Social Impact Assessment (ESIA) to determine the feasibility of the project from an Environmental and social perspective. Ever Green Tech Environmental Services and Training Co., Ltd. has been appointed as the independent Environmental Assessment Practitioner (EAP) responsible for managing the ESIA and supporting Public Participation (PP) process.

### 4.2. Location

The project is located in Heinda Village, Myitta Village Cluster, near Dawei, Tanintharyi Region shown in Appendix A.

### 4.3. Project at a Glance

The following table shows the brief descriptions of the proposed project.

Aspects	Descriptions
<b>Mining</b>	
Area	Over 2000 acres
Raw material	Tin ore from Heinda Mine Site
Ore grade	The average ore grade is 10 to 20% Tin .
Type of mineral deposit	Alluvial Deposit
Ore grade	The average ore grade is 10 to 20% Tin
Mining method	Open Cut Mining Method

No. of back hoe	3 Nos.
No. of dump truck	10 Nos.
<b>Mineral Processing</b>	
Target products	Tin concentrate (over 65%) by gravity concentration method
Processing method	Hydraulic mining with sluicing
Production rate	0.5 ton/day
Water usage for mineral processing	3000 gallons per day for Side B processing plant 2000 gallons per day for Side C processing plant
Source of water	Surface water from Ba Wa Pin Creek (0.9 km far away)
<b>Waste management</b>	
Transportation for ore	Raw material (ore) from mine site was transported to the processing plant directly and there will need no storage facility for ore by trucks.
Transportation for workers	It is not necessary to transport to the workers to the mining and processing sites. Most of the workers will go there by their by their own motorbikes.
Solid wastes	1. Recyclable domestic waste will be recycled. Other domestic waste will be disposed of in a domestic waste disposal site inside the mine. 2. Process solid wastes (parking material, oil storage container, etc.) will be recycled.
Liquid wastes	1. Process water was pumped back to the plant and re-used in the treatment process during summer and winter seasons. 2. Waste water will be treated in settling ponds and re-used in the treatment process during rainy seasons.
Domestic Effluent	Sewage treatment facilities will be provided for all sewage generated on site.
<b>Other Infrastructures</b>	

Office and other facilities	These include offices, equipment and furnishings, sewerage, power, water and water treatment, and mineral process equipments and materials.
Camp	The camp will be provided accommodation for the employee during the operational phase. It will house about 30 employees and visitors. This will include accommodation units, kitchen, messing facilities, power, sewerage and waste disposal.
Access and haul roads	Main access to the proposed project site is mainly via a gravel road from Dawei-Heinda road.
Source of Process Water and Domestic Water	Water reservoir pond near the Heinda Village
<b>Employment</b>	
Employment	At full production a total of 350 permanent people will be employed of which 350 will be sourced locally, 5 technicians from other places and 5 from Thailand (Mother Company).

#### 4.4. Mining Operation

The proposed project will make use of opencast (surface) mining method. Opencast mining involves the removal of non-mineral material, referred to as “overburden”, to provide access to the ore body located beneath. The following standard activities will take place at the Heinda Mine Site:

- Pre-stripping and site preparation;
- Removal of overburden; and
- Loading and hauling.

##### 4.4.1 Pre-stripping and Site Preparation

Pre-stripping activities include the removal of vegetation, topsoil and subsoil to allow for mining activities. Site preparation activities required onsite include the preparation of access and haul roads, waste rock dumps, and other construction and protective works. Areas identified for the base camp, work shop, fuel and explosives storage and warehouses will also be prepared.

#### **4.4.2 Removal of Overburden**

Once the site has been prepped overburden will be removed. Overburden will be excavated by back hoe and trucked to a waste rock dump.

#### **4.4.3 Loading and Hauling**

Loading and hauling of ore and waste rock will be done by using dump truck.

#### **4.4.4. Mining Pit Area**

The mining pit area refers to the area to be mined for its tin ore resource. In opencast mining the project layout starts with the basic design of the pit itself. Pit layouts are planned in intervals for the full project lifecycle to allow for the full production capacity to be reached. Once the mining pit area has been established associated infrastructure including surface haul roads, stockpiles, and waste dumps can be finalized.

#### **4.4.5. Waste Rock Dumps**

Waste rock dumps are required to accommodate overburden and waste rock excavated as part of the mining process.

#### **4.4.6. Office Complex**

An office complex is required to accommodate all management, technical, and administration staff for the mine. The office complex will include a car park, meeting rooms, dining hall, security and first aid station.

#### **4.4.7. Workshops**

Engineering and vehicle workshops, wash downs, garages, and fuel depots were located near the office inside the mine area.

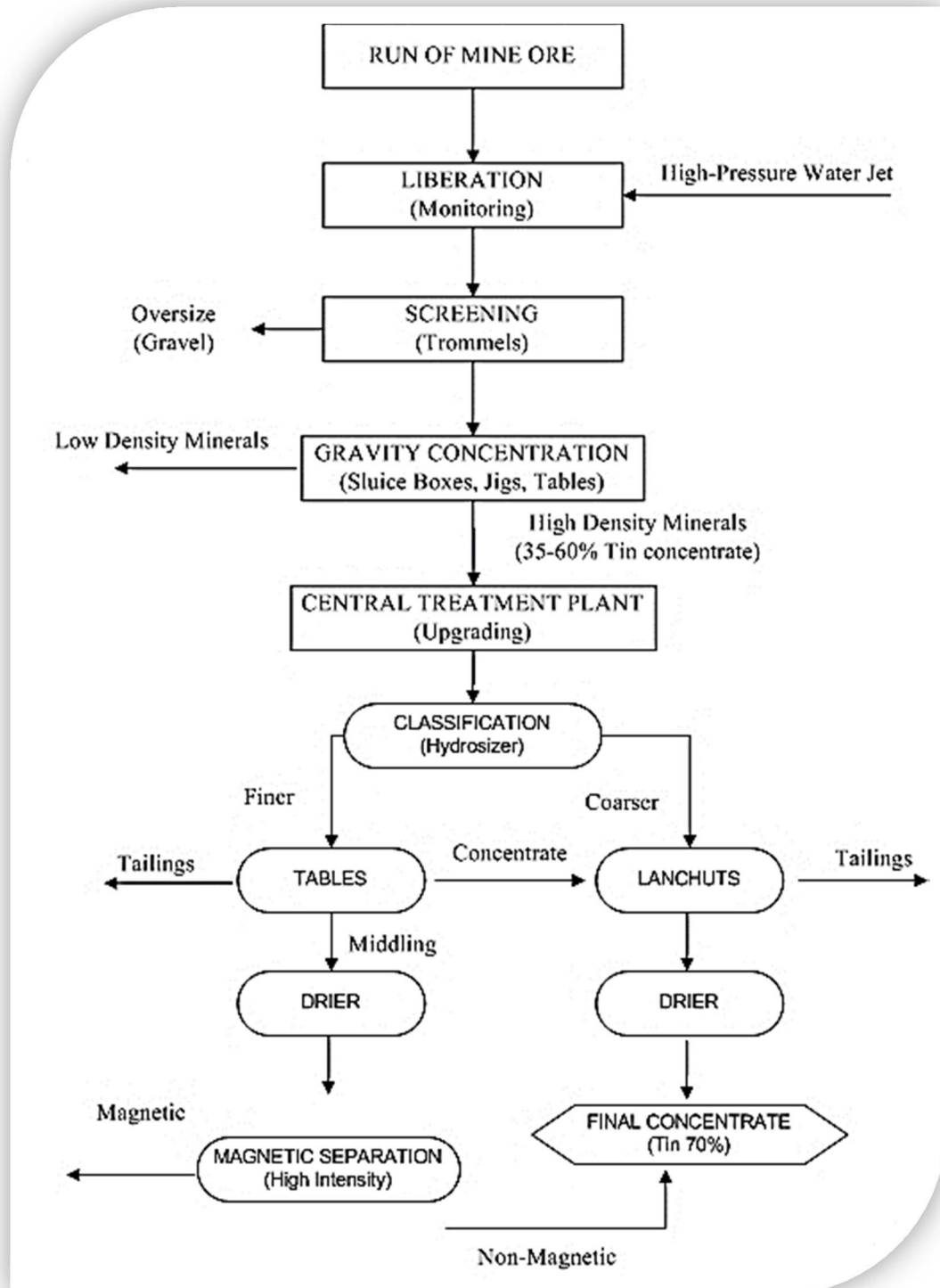




Location of Office Complex and Workshop

#### 4.5. Mineral Processing Operation

The production of tin concentrate by gravity method is shown in the following flow chart.



Flow Diagram of Concentration of Tin & Tungsten



#### 4.5.1. Ore

Alluvial ore deposite (10 – 15% tin) is used as raw ore and it is taking from Heinda mine site.

#### 4.5.2. Liberation and Screening

Liberation by making high pressure water jet as shown in the following figure. And then two stages of screening process with 2 inch and 1.5 inch trommels before gravity concentration.



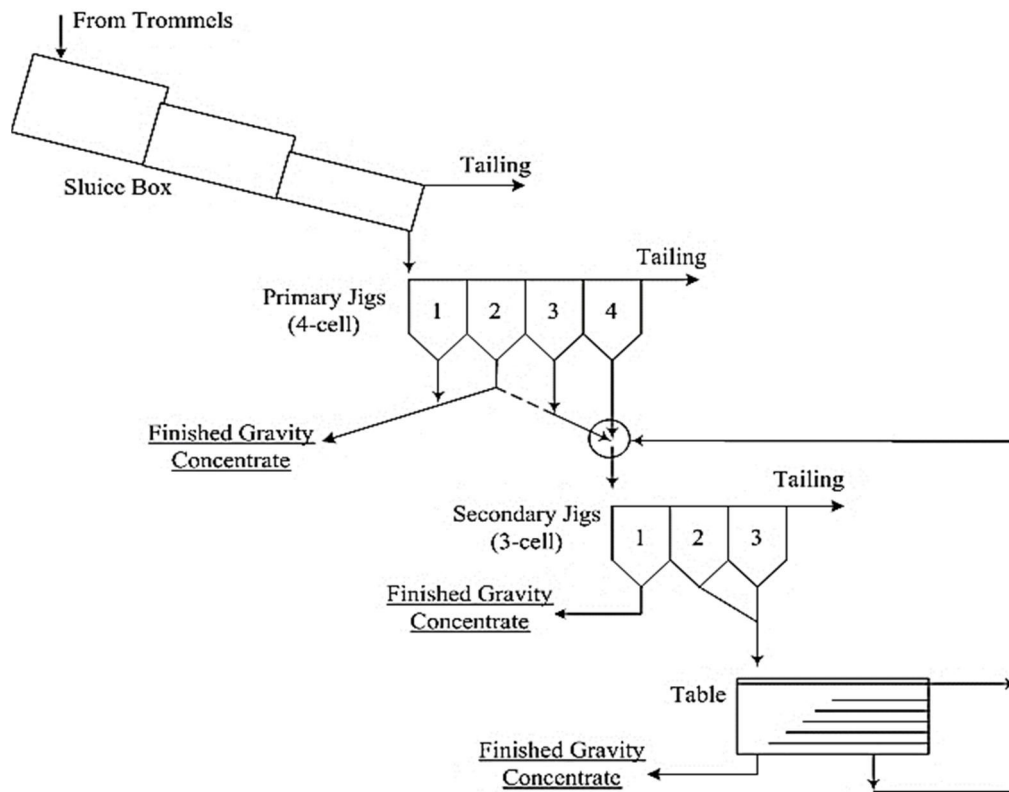
**Liberation Process**



**Screening Process**

#### 4.5.3. Gravity Concentration

The gravity concentration is upgrading of tin concentrate at about (35-50% tin). Gravity concentration stage includes sluice box, two stages of jigging and tabling as shown in the following flow diagram.

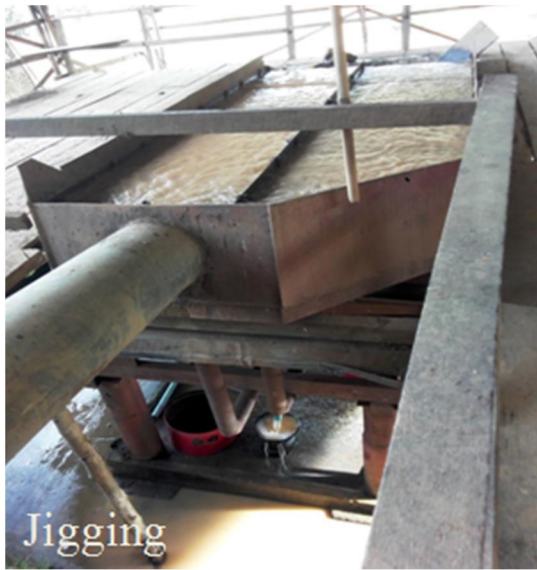


Flow Diagram of Gravity Concentration Method

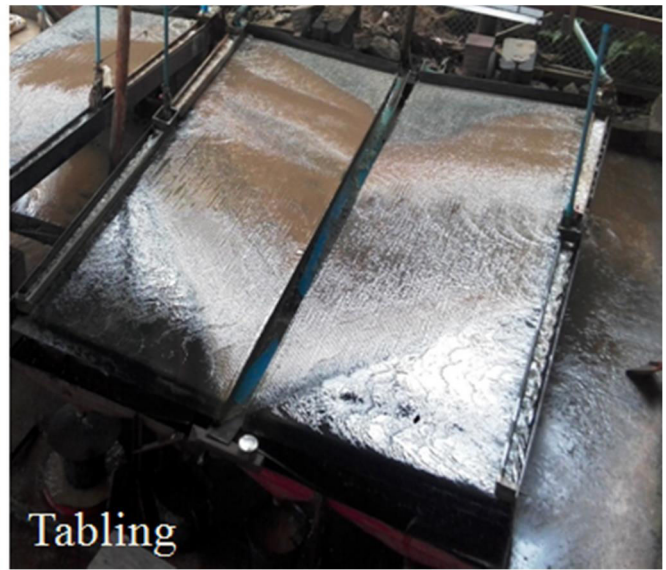


Sluice Box





**Jigging**



**Tabling**

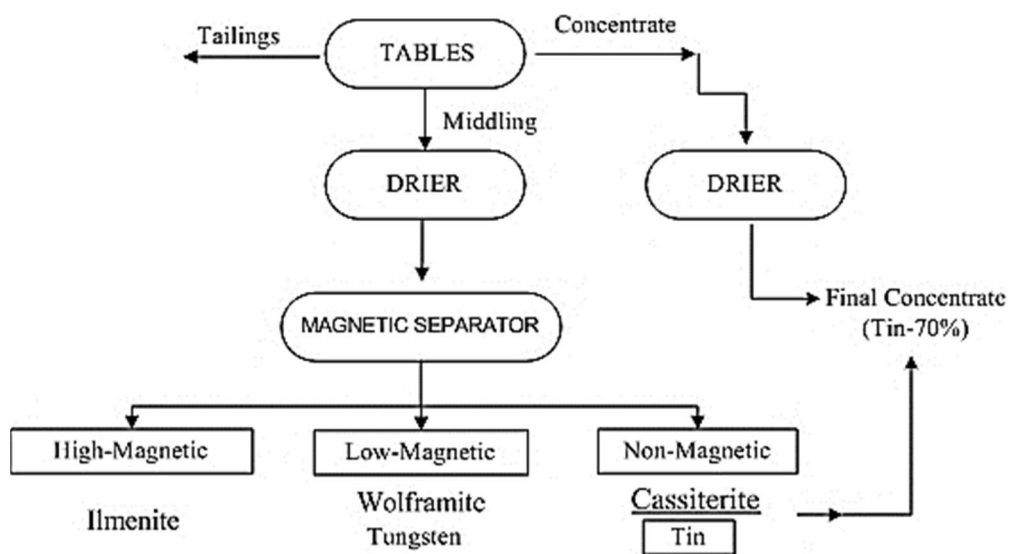
#### **4.5.4. Central Treatment Plant**

Central Treatment Plant has been the upgrading of tin concentrates from gravity separation process. It consists of two main steps; classification and lanchute. The classification of rough concentrates with hydrosizer by manipulating water flow and produce feed products of different sizes. Through such classification, the coarser size fraction treated in the lanchutes (short trapezoidal sluice) water action will more easily wash away other lighter but bigger mineral from the tin ore, thus facilitating the cleaning up process.



**Magnetic Separator**

The finer size or fine-grained cassiterite will normally report in the fraction with other bigger-grained lighter minerals and gangues. Shaking table may be added to the set-up to assist in treating the fine cassiterite. The middlings, including of tin ore and by-products mineral, from shaking tables are retreated by high-tension and magnetic separator of suitable type, design and number to cope with the feed rate desired as shown in the following figure. In treating by-product, or heavy minerals, such as wolframite, ilmenite and columbite, suitable forms of equipment as well as professional skills are considered essential for the production of concentrates of desirable and marketable grade. The final concentrate is containing about greater than 65 per cent tin and tungsten.



**Typical Flow Sheet of Central Treatment Plant**

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## 5.0. PROJECT ALTERNATIVES

An analysis of reasonable alternatives for meeting the project objectives may lead to designs that are more environmentally, socio-culturally or economically sound. It is also the requirement of EIA procedure in Myanmar.

### 5.1. “NO-GO” Alternative

The proposed project does not proceed (the “no-go” alternative), the adverse impacts identified in this report would be avoided. The main adverse impacts are surface water due to waste water from processing plant during operation phase.

If the proposed project does not proceed, the project’s benefits would be lost, diversification of the economy; increased employment for Dawei Region, and increased support of the local, regional and national economies. According to the EIA study, all of the impacts can be mitigated proper mitigation measures as proposed in this EIA report. So, no-go alternative is not suitable for current conditions of the local and national economy in Myanmar.

### 5.2. Alternative Analysis for Site Location

#### (a) Site Location

As the proposed project has been operated in Heinda mine since 1999 and mining has to be done in the exact location of abundance mineral resources. So, location alternative is not appropriate for the proposed mining project. Moreover, processing plants (Site B and Site C) are already built for a long time and there will no feasible alternative analysis for location of treatment plants.

#### (b) Location of Sediment Dumping Site

Although unlikely unstable tailings materials might cause soil erosion and sedimentation and poten surface water due to the entering of tailing materials into the detention. There are two communities (Heinda and Myaungphyo Villages) in the vicinity of the mine. According to the EIA Study, there will no impact to nearest communities (Heinda and Myaungphyo Villages) due to the failure of overburden and tailing materials. In the unlikely event, there might be potential to surface water in No. (2) Creek due to the unstable material from tailing material as shown in the following figure.





**Present Location of Waste Dumping Site**

In addition, there is also a chance of small scale subsidence events on the slopes of the rock dumps which may result in injury to employees working at the dumps. The management of waste rock and tailings will conform to the requirements of the IFC's EHS Guidelines for Mining (IFC, 2007). Furthermore, the facilities will be designed by an independent recognised global expert in tailings dam design and will be managed according to international best practice.

The present location of waste dumping site for site B is suitable because it is away from any water resources that can cause surface water pollution. But the location of waste dumping site for Site C might not enough space for further waste disposal and may cause land slide (failure of waste dumping site). However, systematic stacking of Site C disposal is being implemented to minimize the risk and regular monitoring is also being implement. Vegetation has been planted to hold the surface erosion. So, solid waste from settling ponds may be disposed at old working site as shown in the following



**Proposed Location of Waste Dumping Sites**

## 6.0. DESCRIPTION OF THE SURROUNDING ENVIRONMENT

This chapter describes the project sites baseline environmental and social conditions according to available sources of baseline information and qualitative assessments of the project site.

### 6.1. Meteorology and Climatology

Tanintharyi region has a tropical climate. The region has only slight changes in temperature. Dawei has temperate weather, as it is located in the low latitude zone and near the sea. The dry season of the area in which the project lies starts in February and ends in May. The rainy season starts in June and ends in September and the cold season follow with the cooler, drier months of October to January. Some important meteorological data, which are collected from Weather Station (Dawei). The project area is warm and wet season with the highest temperature (36.6°C) and lowest temperature (21.2°C). Yearly rainfall and temperature are as follow:

No.	Year	Rainfall		Temperature	
		Raining Days	Total Rainfall	Summer	Winter
				Maximum	Minimum
1	2011	164	223.57	36.0	15.0
2	2012	170	262.16	36.1	14.0
3	2013	156	219.94	35.1	15.8
4	2014	143	229.25	35.5	11.0
5	2015	148	193.25	35.8	21.5

Unusual Rainfall - 2016, March (9.13 inches)

Unusual Temperature – 2016, March (39.5 °C)

### 6.2. Topography

The topography of the area is determined by the type of bedrock underlying the soils, the geology of the area and the dissection of the streams flowing in the area. The regional geology of the area has given rise to considerably diverse relief, ranging from gently rolling slopes to hilly and severely incised slopes found along drainage ways and stream valleys as shown in the following figure.



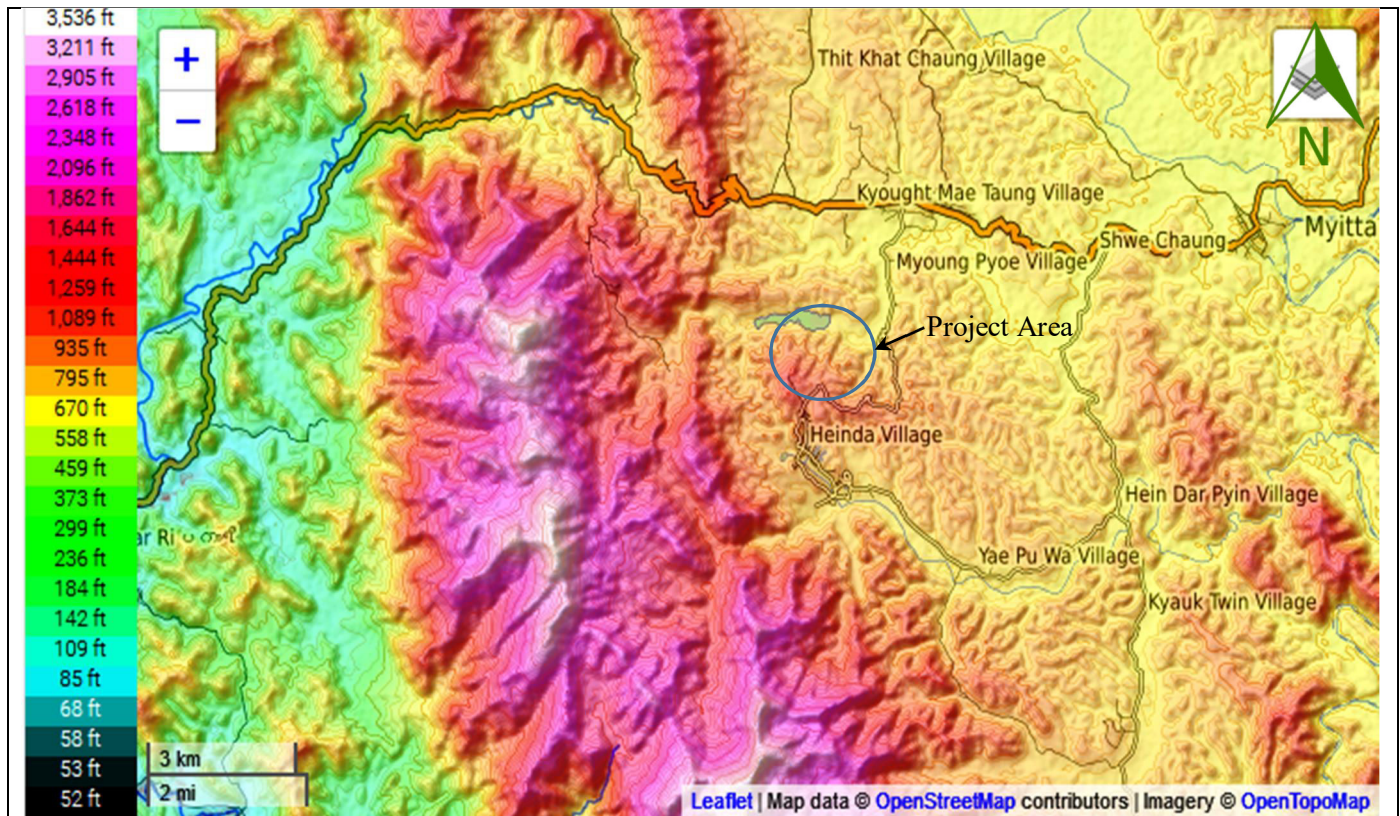


Figure- Digital Elevation Map of Project Area

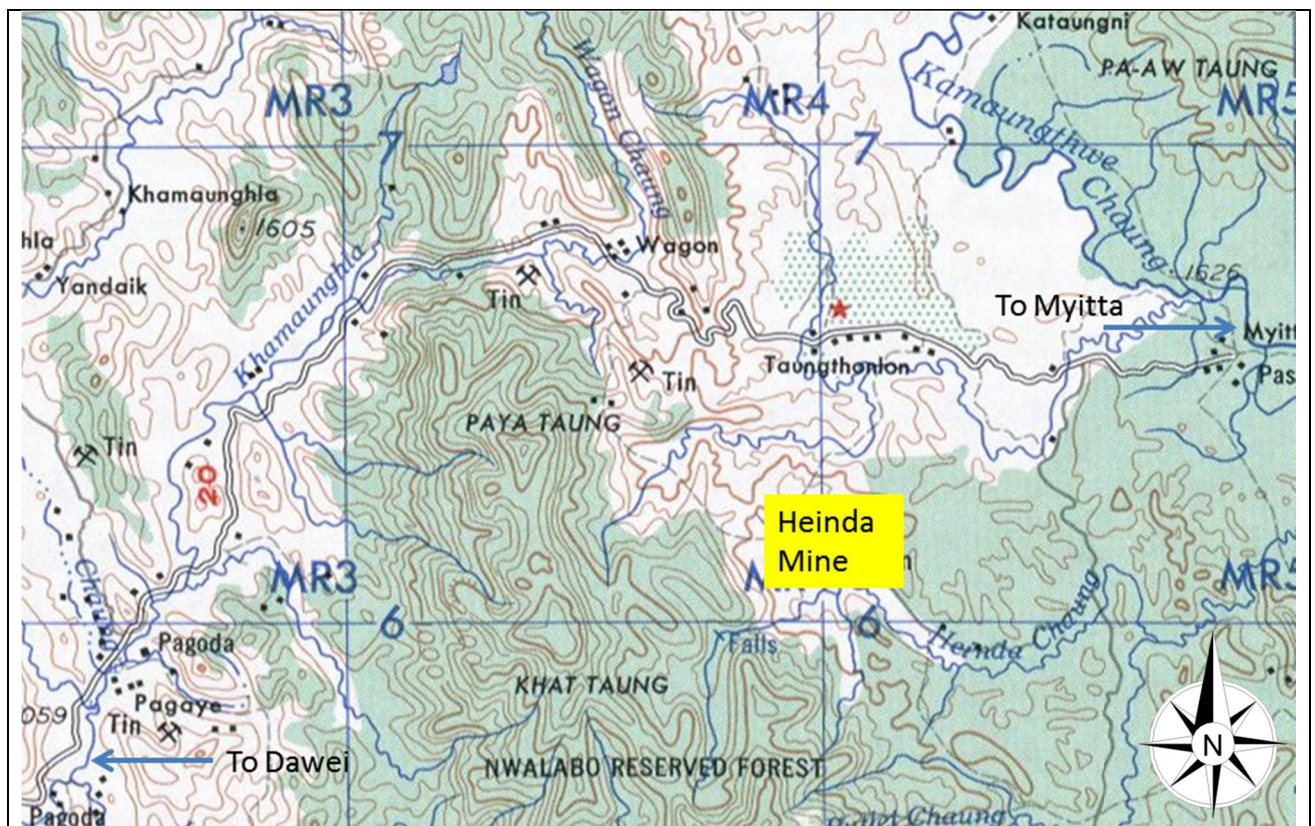


Figure - Topography Map of Heinda Mine



### 6.3. Geohydrology

Regionally groundwater flows from west to east but locally the high relief variations on site can give rise to variance in flow direction. Groundwater can be contaminated from many sources such as rubbish dumps, use areas, leaking fuel storage tanks, sewage effluent, seepage from improper sanitation and waste disposal.

There are no major water bodies in and around the mining area. However, there are Taung Nyo (No.2 creek) and Myaung Pyo seasonal streams in the surrounding area as shown in the following figure.

#### Baseline Study of the Hydrology

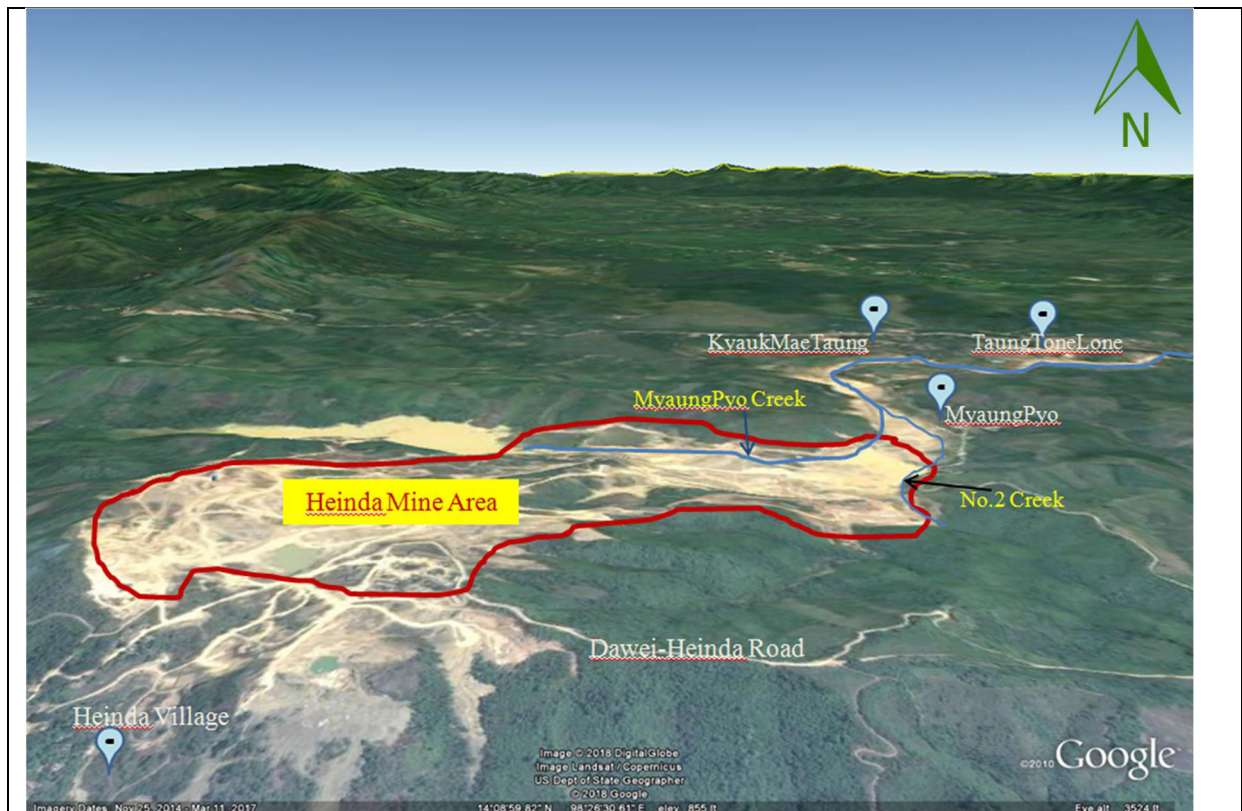
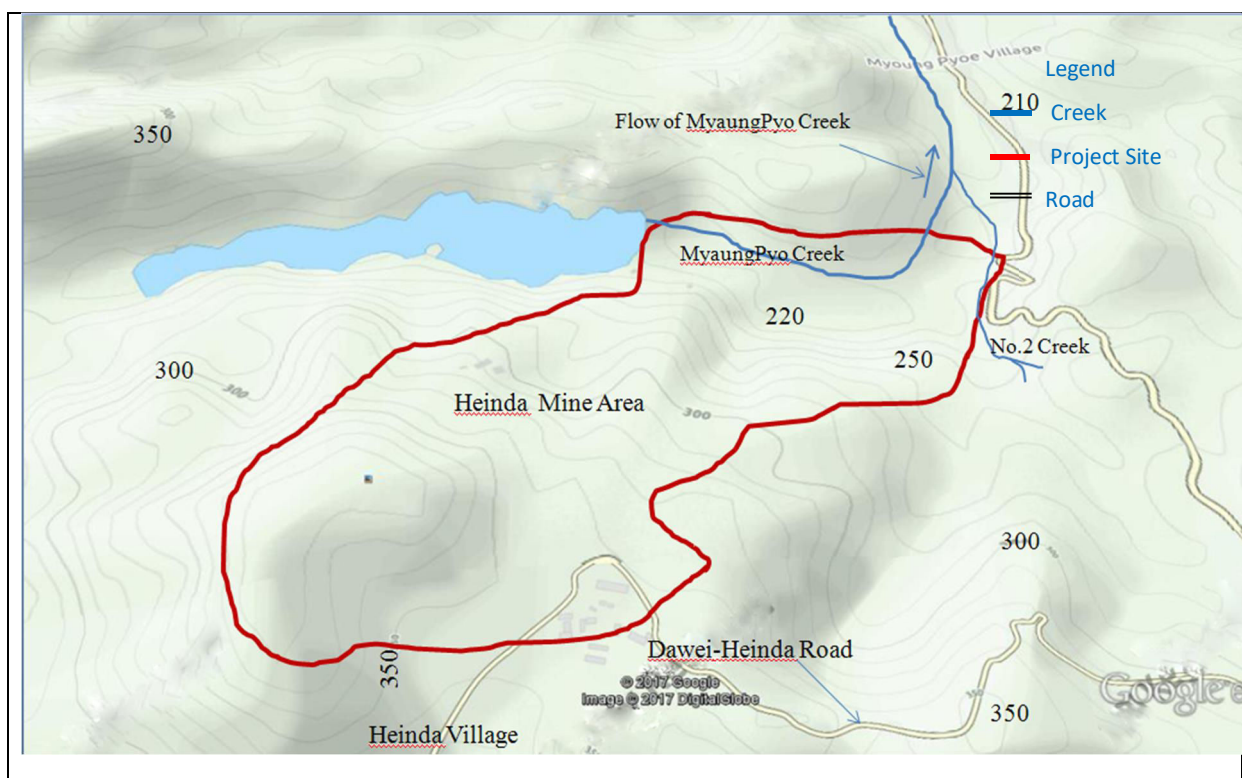


Figure - 3D Map of Heinda Mine Area

The drainage system in the project area can be described as dendritic consisting of gently sloping valleys from surrounding undulating hills common in Heinda mine area. The slope of land at the proposed opencast mining locations, mineral processing plant and settling ponds seems to be relatively flat to moderately gentle. Hence surface runoff in the project vicinity will consist of mainly overland flow.



**Figure - Seasonal Creeks around the Heinda Mine**

Resulting from observations of local topography, site geology and weather conditions, no noticeable perennial streams could be seen at site.

In addition, there were signs of localized major sedimentation of MyaungPyo creek and flooding at valley bottoms as noted from signs of sand deposition which could only occur due to impeded drainage of excess overland runoff from heavy storms that fall at nearby high ground areas. It is important that the discharge of such flood waters is carefully managed in order to minimize water logging. Water logging may drown some of access tracks, damage of agricultural land of local villages and other important installations thereby affecting efficient operation of the facility.

There are no signs of surface water runoff management facilities except for minor impounding works aimed at harvesting storm water for pastoral use. Average annual rainfall is about 220mm. The rainfall season is from May to October. Heavier rainfall occurs between and June to August and lighter rainfall in September and October, the so called long rains and short rains respectively. The months in between are hot, dry and windy.

## 6.4. Existing Geological Conditions

Tanintharyi Region is an administrative region of Myanmar, covering the long narrow southern part of the country on the Kra Isthmus. It borders the Andaman Sea to the west and the Tenasserim Hills, beyond which lies Thailand, to the east. To the north is the Mon State. There are many islands off the coast, the large Mergui Archipelago in the southern and central coastal areas and the smaller Moscos Islands off the northern shores.

### 6.4.1. General Geology

The Tanintharyi region is the southern part of the eastmost geotectonic belt of Myanmar, which is referred to either as the Shan-Tanintharyi Massif or simply as Karen- Tanintharyi Unit. Figure 2 shows the simplified geologic map of this area. Mergui Group of Carboniferous age formed as the basement and consists of thick sequence of folded argillite, greywacke and slate, with lesser amount of limestone, quartzite, agglomerate and conglomerate. The Mergui Group is later intruded by tin bearing granitic rocks of late Mesozoic age. Later, Tertiary rocks overly the Mergui Group and comprise of basal conglomerate, sandstone, claystone, mudstone and coal. Compared with other better-known areas, it is believed that the Tertiary sediments range from Oligocene to Miocene. Younger volcanic rocks such as rhyolite and basalt are scattered throughout the islands. The name Mergui Series was given by T. Oldhemin 1856 to the unfossiliferous strata consisting of crushed shale, agglomerate, limestone and quartzite, and occurs widely in the Tanintharyi region. The Mergui Series is pre-Carboniferous in age and underlies the Moulmein limestone. The predominant rock type of the Mergui Series in Dawei district is argillite, fine grained rock of blue gray to black color at fresh, with obscure bedding and only incipient cleavage. The Carboniferous argillite is carrying small crystals of andalusite and silliminite with finely divided graphite. Similar Carboniferous shale with graphite are also found in some places in the Myeik area.

The next important rock type is dark grey or almost black "greywacke" which weathered to ashy brown color. This rock lacks bedding and composed of sub angular fragments of fine-grained rock in matrix identical with the argillites.

Much of the Tanintharyi region is underlain by strata of the Mergui Group in the eastern part and by raised marine terraces and recent alluvium in the west along the coast. Only in the northwestern and southern parts are granitoid rocks and other crystalline rocks, like those of



Kyaikhami, exposed. The stratigraphic succession of the Tanintharyi region is shown in following table.

#### Geological Succession of the Tanintharyi region

AGE	UNIT
QUATERNARY	Alluvium and Marine Terrace Deposits
	Unconformity
PERMIAN	Moulmein Limestone
	Unconformity
CARBONIFEROUS-PERMIAN	Mergui Group
	Unconformity
EARLY PALEOZOIC- PRECAMBRIAN?	Gneisses and Schists
<b>Igneous Rocks</b>	
TERTIARY	Volcanic Rocks
MESOZOIC-EARLY TERTIARY	Granitoid Rocks

#### 6.4.2. Regional Geologic Setting

The investigated area lies on the southern part of Shan-Taninthayi massif and northern continuation of Taninthayi ranges, It is covered with Late Paleozoic rocks. The western part of the study area, which is in Taungnyo Range, are Carboniferous rock units (Taungnyo Series) arranged and systematically described (Leicester, 1930). Further up to the northwestern part, also in Mottama Range, Late Permian rocks (Martaban Beds, Pascoe, 1959) and Mesozoic granitic rocks are exposed.

Along the Tanintharyi area, quaternary deposit of gray and gray swampy soil and red brown forest soil types are present. Soil Map of Tanintharyi region is shown in following figure.

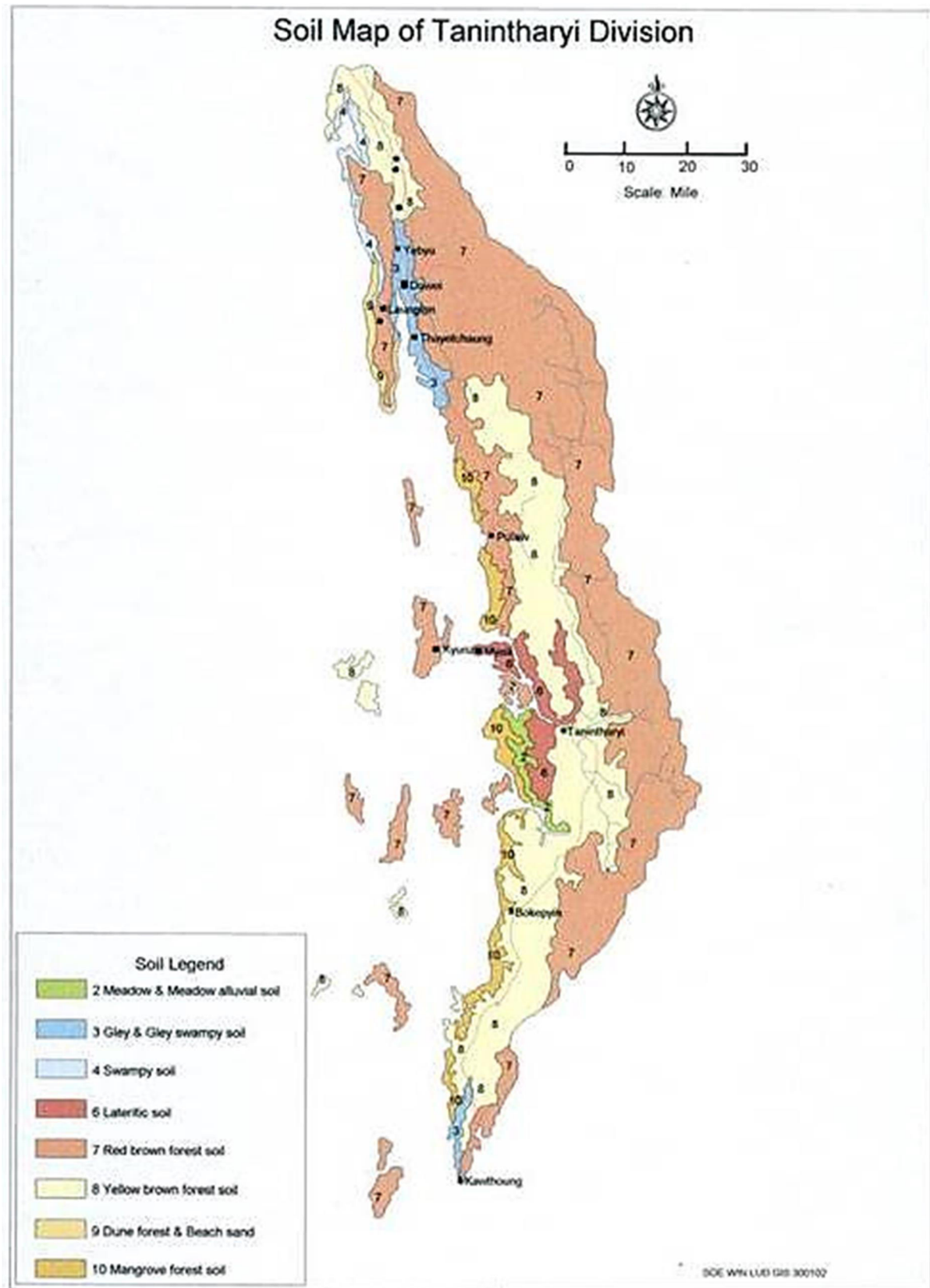
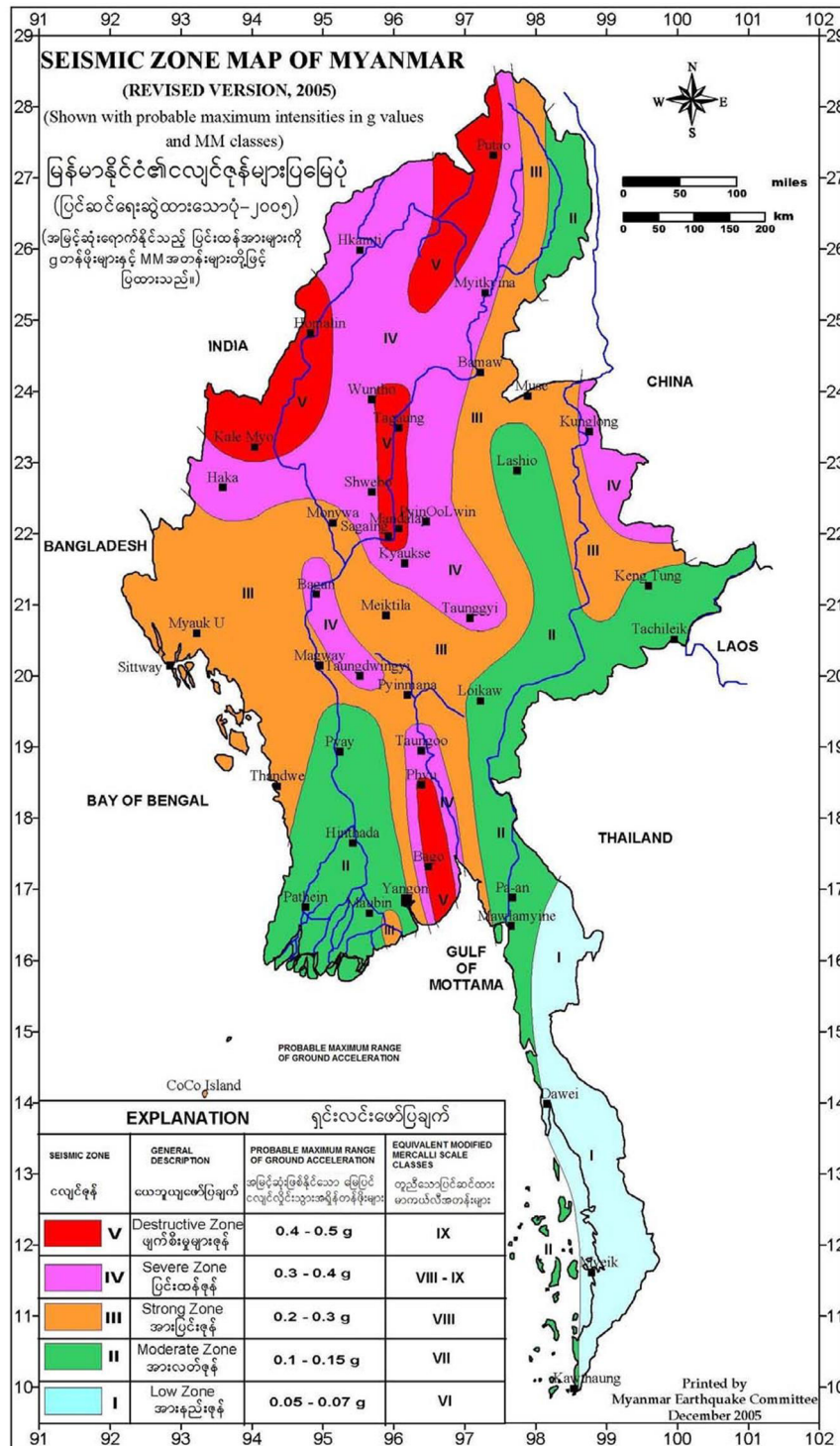


Figure - Soil Map of Tanintharyi Region

#### 6.4.3. Seismic Information

Myanmar is an earthquake-prone country because it lies in a one of the world major earthquake belt, Alpide Belt, which extends from northern Mediterranean through Iran, Himalaya region and Myanmar. Most of the earthquake in central and delta region of Myanmar have resulted from movement of Sagaing Fault which extends from the northwest of Katha, through Sagaing, along the eastern flank of Pegu Yoma and finally into the western Gulf of Martaban for a distance of about 600 miles.

Structurally, Hpa-pon fault and Three - pagoda fault are situated at the northern and southern part of the area and their trend in nearly NW - SE direction. Dawei and Myitta area fall in low zone (zone III) of earthquake hazard, as shown in probabilistic seismic hazard Assessment Map (PSHA Map) of Myanmar showing expected peak ground acceleration (PGA) values with 100% probability in 500 years.



Source: MIMU [Myanmar Information Management Unit]

Figure - Seismic Zone Map of Myanmar (PSHA Map, 2012)

## 6.5. Ambient Air Quality

### *Methodology*

Ambient Air Quality Monitoring was conducted near the guest house (14° 07'59.16"N 98°26'01.51"E) of mine site to determine whether mining activities are affected to its surrounding. The Environmental Perimeter Air Station (EPAS) was used to detect ambient air quality for 24-hour averaging periods. The following table presented the methods and parameters covered in the 24-hour monitoring period.



**Haz-Scanner EPAS Air Quality Monitoring Station**

**Table: Pollutants and Methodologies Covered in 24-hr Monitoring Period**

No.	Parameters	Analysis Methods
1.	Sulfur dioxide (SO <sub>2</sub> )	Electrochemical sensors
2.	Nitrogen dioxide (NO <sub>2</sub> )	Electrochemical sensors
3.	Carbon Dioxide (CO <sub>2</sub> )	NDIR (optional sensor)
4.	Carbon monoxide (CO)	Electrochemical sensors
5.	Hydrogen Sulfide (H <sub>2</sub> S)	Electrochemical sensors
6.	Particulate Matter 2.5 (PM <sub>2.5</sub> )	Infrared Light Scattering
7.	Particulate Matter 10 (PM <sub>10</sub> )	Infrared Light Scattering
8.	Ozone (O <sub>3</sub> )	Gas Sensing Semiconductor-GSS technology (optional sensor)





**Figure: Ambient Air Quality Monitoring during Day and Night Times**

## 6.6. Noise Levels

### *Methodology*

To examine the existing noise level, monitoring was conducted in four receptors locations around the mining site. Two units of TES-1353H Integrating Sound Level Meter were used for day and night times monitoring process. The detailed monitoring points and analysis method were presented in the following table and figure.

**Table: Noise Monitoring Locations and Methods**

Receptor Location	GPS Coordinates	Unit	Methodology
Local Residents in Heinda	98° 26'7.250"E 14° 07'48.368"N	dBA	Measured continuous Sound Pressure Level (SPL) with 0.5-inch Electret condenser microphone
Myaungpyo Village	98° 27'9.622"E 14°09'14.166"N		
Side B	98° 26' 12.741"E 14° 08'32.081"N		
Side C	98° 26' 31.902"E 14° 08'42.521"N		

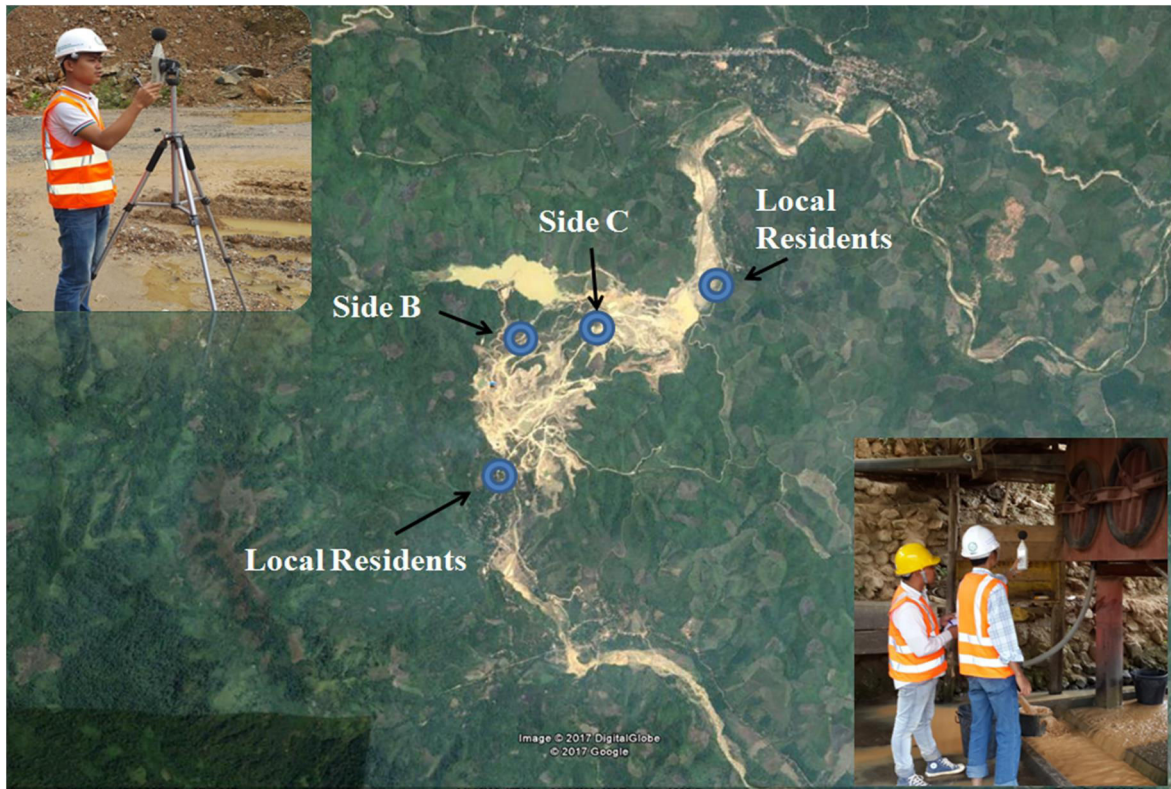


Figure - Locations of Noise Level Monitoring Stations

## 6.7. Surface and Process Water Quality

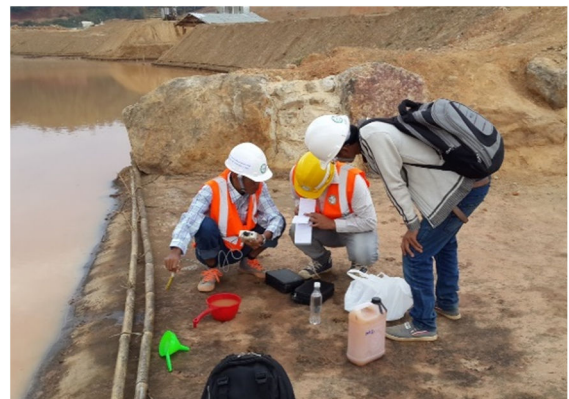
### Methodology for Surface Water Sampling

Water samples were collected from the nearby surface water bodies at the villages such as Myaung Pyo creek, Kin Mon Chone creek, Kyauk Mae Taung monastery and drinking water at Kin Mon Chone village in term of **grab sampling methods**. The sterilized plastic bottles were used for sampling. The sample were preserved in ice to keep the temperature and sent to Myanmar Innovation and Research Department (MIARD) (Previously known as Myanmar Science and Technology Research Department- MSTRD), National Health Laboratory (NHL) within 24 hours. The laboratory analyses were conducted at the mentioned laboratories. The analysis methods were expressed in tables in results and discussions section. The physical and chemical parameters such as pH, conductivity, temperature and dissolved oxygen were measured with portable pH and EC meters in terms of in-situ measurement. The photos of water sampling and in-situ measurement were illustrated in the following figures.





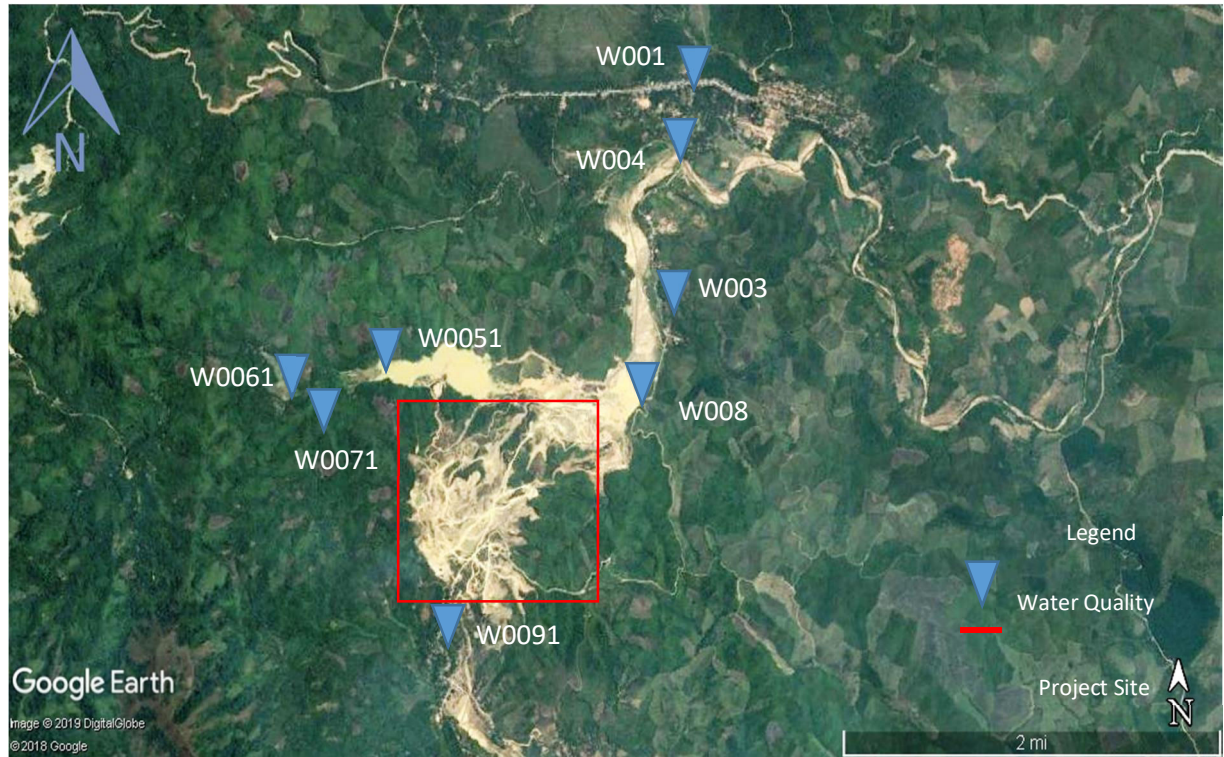
Figures: Surface Water Sampling



Figures: In-situ Water Quality Measurement



To sum up, the total of 9 samples were collected from the water sources at villages around the mining area. To be more cleared; sampling points for surface and process water were presented with the google map photo.



**Figure: Location of Water Sample Points**

## 6.8. Soil Sampling

### *Methodology*

Visual survey around the mine site was conducted prior to the actual sampling so that selection of sampling unit represents the whole area. Then surface soil samples were taken with hand auger at about 3 inches depth and collected in the bulk soil sample bag.



**Figures: Soil Sampling at Mine Site**

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## 6.9. Existing Biodiversity Environment

The purpose of the biodiversity study is to describe the baseline data of flora and fauna within the area which might to be impacted upon by the proposed mining project, with reference to the flora and fauna of the area. Report investigated to the possible solution for the better management of the project in order to minimize the negative effects of the project activities on the flora and fauna of the area.

The specific objectives of the study are as follow:

- Describe the baseline information of the flora (including target plant species of roadside, villages and forest plant species) and the fauna (target groups: birds, mammals, reptiles, amphibians, some kinds of insect and fish) with their associated habitats;
- Conduct a flora and faunal habitat assessment (including habitat potentially suitable for threatened species);
- Determine the presence of threatened species or IUCN Red listed species;
- Determine key habitats and movement corridors if possible;
- Provide a recommendation and mitigation measures to be considered, during the operation of the proposed project, related to flora and fauna.

## Project Area

The project area is located in Dawei District, Thanintharyi Division. The project area has approximately 2000 acres wide including three villages, one lake and two seasonal ponds. The main operation area is a mountain range with steepness slopes and is mostly bare land resulted from the extraction of target mineral resources of the tin products for a long time. There are some remaining patches of the destructive forest/secondary forest in margin and valley range inside the project area. In buffer zone, there is surrounding by a secondary forest fairly distributed (bamboo dominated). The plantations of *Areca catechu* L (Kunthi-pin) were abundantly found in the project area.

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## **(1) Methodology (Plant Species)**

### **(a) Data Collection of Plant Species**

The flora survey of this project area has three portions in which recording the roadside plant species of site A, site B and site C of the Heinda Mining Area, recording of the plant species from the two villages (Heinda and Myaungpyo villages), and finally observation of plant species of forest areas with (10) sample plots were included.

A Global Positioning System (GPS) was used to present the sample plots and the recorded places of roadside plant species for the project area, and the two villages of Heinda and Myaungpyo. To clarify the small trees and tree species diversity and to calculate the important value index (I.V.I), (10) quadrats were randomly set up and observed. The quadrat size was 20 m x 20 m for each sample plot. In each sample plot, every plant species with diameter at breast height (DBH)  $\geq 10$ cm was measured. Bamboo species were omitted and not included in I.V.I calculation but they were recorded through quadrat observation.

### **(b) Data Analysis**

Species diversity of the project area was calculated by Shannon-Wiener (1963) and Simpson (1948) indices. Then relative density (R.D), relative frequency (R.F), relative dominance (R.Dm) were calculated and summed to get Importance Value Index (I.V.I). In this report, important value index (I.V.I) was calculated based on a total of 10 quadrats for the projected area. Diversity indices such as Shannon-Wiener diversity index (H), evenness index (E) values, and Simpson diversity index (D) were used in this study.

For plant identification, essential requirements such as DBH measurements (Diameter at Breast Height), plant collection, taken photographs, interviewing with local people, etc. were conducted in this field survey. After field trip, plant identification was conducted based on available literatures such as key to the families of the flowering plants, issued by Department of Botany, Yangon University (1994), Backer *et. al.*(1963), Kress *et. al.* (2003), Gardner *et al.* (2000) etc., and verification was conducted by recorded photographs from field survey and some useful internet websites. The spatial location (latitude and longitude) of each quadrat and other recorded plant species was also recorded by using a GPS (Global Positioning System).



The project area map was used through internet website of [https:// itouchmap.com/ latlong.html](https://itouchmap.com/latlong.html).

Finally, threatened plant species from (10) sampling points, roadside plant species and recorded plant species of the two villages (Heinda and Myaungpyo village) were expressed in accordance with the global conservation status of plant species which are based on “The IUCN Red List of Threatened Species, 2016 ([http://www.iucnredlist.org/ details/199856/0](http://www.iucnredlist.org/details/199856/0)).

### (c) Importance Value Index

This index is used to determine the overall importance of each species in the community structure. In calculating this index, the percentage values of the relative frequency, relative density and relative dominance are summed up together and this value is designated as the Importance Value Index or IVI of the species (Curtis, 1959).

#### (i) Relative density

Relative density is the study of numerical strength of a species in relation to the total number of individuals of all the species and can be calculated as:

$$\text{Relative density} = \frac{\text{Number of individual of the species}}{\text{Number of individual of all the species}} \times 100$$

#### (ii) Relative frequency

The degree of dispersion of individual species in an area in relation to the number of all the species occurred.

$$\text{Relative frequency} = \frac{\text{Number of occurrence of the species}}{\text{Number of occurrence of all the species}} \times 100$$

#### (iii) Relative dominance

Dominance of a species is determined by the value of the basal cover. Relative dominance is the coverage value of a species with respect to the sum of coverage of the rest of the species in the area.

$$\text{Relative dominance} = \frac{\text{Total basal area of the species}}{\text{Total basal area of all the species}} \times 100$$

The total basal area was calculated from the sum of the total diameter of immerging stems. In small trees and trees, the basal area was measured at breast height (1.5m).

#### (iv) Shannon-Wiener Index diversity

The Shannon diversity index (H) is another index that is commonly used to characterize species diversity in a community. Shannon's index accounts for both abundance and evenness of the species present. The proportion of species  $i$  relative to the total number of species ( $p_i$ ) is calculated, and then multiplied by the natural logarithm of this proportion ( $\ln p_i$ ). The resulting product is summed across species, and multiplied by -1:

$$H = -\text{SUM} [(p_i) \times \ln(p_i)]$$

$$E = \text{Evenness} = H/H_{\max}$$

$$\text{SUM} = \text{summation}$$

$$p_i = \text{proportion of total sample represented by species } i /$$

$$\text{Divide no. of individuals of species } i \text{ by total number of samples}$$

$$S = \text{number of species, = species richness}$$

$$H_{\max} = \ln(S) \text{ Maximum diversity possible}$$

#### (v) Simpson's index diversity

Simpson's Diversity Index is a measure of diversity. In ecology, it is often used to quantify the biodiversity of a habitat. It takes into account the number of species present, as well as the abundance of each species.

Simpson's diversity index:

$$(D) = 1 - (\sum n(n-1)/N(N-1))$$

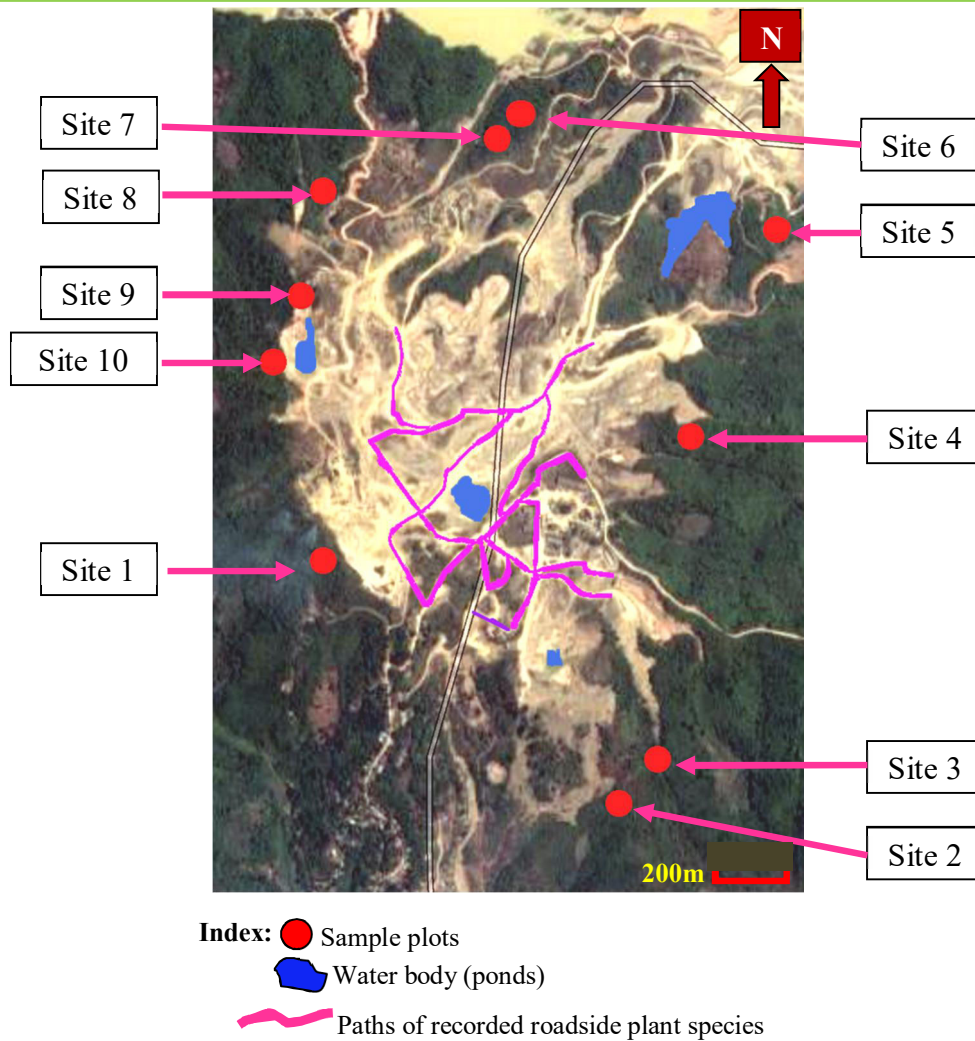
Where,  $n$  = the total number of organisms of a particular species

$N$  = the total number of organisms of all species

Representative GPS points: 12 sampling points for plants and 12 points for animals

No.	Numbers of sites of sample plot and villages	Representative GPS Points	
		Longitude	Latitude
1	Site 1(plants and animals)	98° 26' 00.844"E	14° 08'00.844"N
2	Site 2(plants and animals)	98° 26' 27.880"E	14° 07'42.210"N
3	Site 3(plants and animals)	98° 26' 31.8402"E	14° 07'47.4384"N
4	Site 4 (plants)	98° 26' 30.526"E	14° 08'13.638"N
5	Site 5(plants and animals)	98° 26' 40.336"E	14° 08'29.871"N
6	Site 6(plants)	98° 26' 18.241"E	14° 08'38.932"N
7	Site 7 (plants)	98° 26' 17.124"E	14° 08'37.896"N
8	Site 8 (plants)	98° 26' 3.3354"E	14° 08'33.7878"N
9	Site 9(plants and animals)	98° 25' 59.0088"E	14° 08'25.0512"N
10	Site 10(plants and animals)	98° 25'58.159"E	14° 08'17.458"N
11	Heinda village(plants and animals)	98° 26'7.5078"E	14° 07'48.1686"N
12	Myaungpyo village(plants and animals)	98° 27'7.4772"E	14°09'14.166"N
13	Heinda creek (animals)	98° 27'14.725"E	14°06'47.813"N
14	Heinda creek (animals)	98° 27'50.346"E	14°06'13.772"N
15	Heinda creek (animals)	98° 27'56.452"E	14°06'13.090"N
16	Heinda creek (animals)	98° 26'47.409"E	14°07'01.506"N





**Map of Project Area with Sample Plots and Paths of Recorded Roadside Plant Species**

## **(2) Methodology (animal species)**

### **(a) Data collection of animal species**

The faunal assessment was conducted in cold & dry seasons of January 2017. Field survey was conducted to investigate the faunal species that may be impacted by the proposed mining activities. These species were used in order to determine the possible magnitude of the impact of the proposed activities. Night study was also carried out to search for amphibians and reptiles. The groups of species investigated were: Vegetation; Arthropoda (butterfly and dragonfly); Avifauna; Mammals; Herpetofauna (reptiles & amphibians) and Fish. Conducting the site observation is to collect necessary data and information including the formation of GIS site mapping or photographic picture. Interview survey was taken with local people to investigate fauna species richness and their relative abundance. Consultation and open discussion was also made whenever necessary for sustainable use of biodiversity.

GPS was used to navigate and mark the sampling point along the area/transit line. Direct observation method or opportunistic method (Visual Encounter Survey (VES) and Active Search) used to collect the samples. Nocturnal searching was conducted in aquatic habitats at night for amphibians. During the search, amphibians were detected and identification of species and recorded number of individuals in each species in a particular area. At the same time, attempt was also made to locate reptiles. Diurnal searching was adopted for all herpetofauna, actually it focuses primarily on reptiles. Diurnal search comprises random searches throughout key habitat types within the study area with the idea of locating basking or actively moving reptiles. Snakes and other reptiles are identified from view. Branch, 1996 and Win Maung and Win Ko Ko (2002).

Bird survey was conducted at early morning and afternoon by applicable of point count and visual identification and the calls of bird species were used to identify species. Birds were observed with binoculars and identify aided with field guide. Bird ranges were confirmed using Kyaw Nyunt Lwin (2004).

Mammal (small and large) observation was made at water edge and in the forest. Distribution and presence of mammals were examined by conducting track and sign survey.

Visual sightings and ecological indications were used to identify the small mammal inhabitants of the study area. Scats were also collected and used for identification of nocturnal small mammals. A number of reference was followed by Tun Yin (1967) and Tin than (1992) were used for identification purposes.

The sample collection of butterfly and dragonfly of the insect was undertaken by use of insect net. The survey was investigated species richness and population abundance in the project area as well as within the buffer zone. Visual identification was made by Kinyon (2003) and Nair (2011).

Fish sample collection was made by use of hand cast-net and gill-net. The study investigated species richness and population abundance based on recorded species along the Heinda creek in the project area. Identification was made by FAO (2012).

## (b) Data Analysis

Diversity of the species will be analyzed to measure of diversity, species richness & distribution, evenness and its relative abundance by using the Shannon Wiener Diversity, Shannon Diversity Index, Simpson's Diversity Index and DAFOR scale.

### (i) Shannon Wiener Diversity

The Shannon index has been a popular diversity index in the ecological literature.  
Shannon Diversity Index “H”

$$H = -\sum [(n_i / N) \times (\ln n_i / N)]$$

Where, H = Shannon Diversity Index

N<sub>i</sub> = Number of individuals belonging to i species

N = Total number of individuals

$$E = H/H_{\max}$$

Where, H<sub>max</sub> = Maximum diversity possible

$$E = \text{Evenness} = H/H_{\max}$$

### (ii) Simpson's Index of Diversity

Simpson's Diversity Index is a measure of diversity. In ecology, it is often used to quantify the biodiversity of a habitat. It takes into account the number of species present, as well as the abundance of each species.

$$D = \frac{\sum n(n-1)}{N(N-1)}$$

Where, n = the total number of organisms of a particular species

N = the total number of organisms of all species

Simpson's index of diversity = 1-D

## 6.10. Social Environment

### 6.10.1 Regional Socio-economic Profile

Socio-economic profile of the overall Heinda and Dawei Township has been developed on the basis of available secondary data information and internet resources.

#### (1) Population

The project is located near the Dawei Township in Taninthayi Region. In 2017, there are about 131,000 people in Dawei Township as shown in the following Table. The percentage of urban population is about 63.8% in township.

Table - Population of Dawei Township

Township	Total(Male/Female)				Total(Urban/Rural)			Households
	Male	Female	Total	Sex Ratio	Urban	Rural	Urban Population (%)	
Dawei	62100	69826	131,026	96.3	13085	11815	63.8	24900

Source: Dawei Township Administrative Offices

#### (2) Ethnicity

The races residing in Dawei Township are shown in the following Table. Most of the people who live in these townships are Bamar, followed by Kayin, Indian, and Mon people. A small number of Chin and Shan live in Dawei Township.

Table- Races in Dawei Township (2015)

No.	Race	Number	%
1	Kachin	11	0.008
2	Kayar	50	0.038
3	Kayin	16880	12.883
4	Chin	2	0.002
5	Mon	341	0.109
6	Bamar	111141	84.824
7	Rakhine	29	0.022
8	Shan	2	0.002
9	China	241	0.184
10	Indian	1093	0.834
11	Pakistan	-	-
12	Bangladeshi	15	0.011
13	Others	1221	0.923
<b>Total</b>		131,026	100

Source: Dawei Township Administrative Offices

### (3) Religion

The different kinds of religion present in Dawei Township are shown in the following Table. More than 86% of the people living in the township are Buddhists. The majority of local people are Buddhists, followed by Christian, Moslem, and Hindus. There are many religious places in the region including four historic and well-known pagodas, 104 pagodas and 263 monasteries for Buddhists. There are also churches, Hindu temples, Mosque and Chinese Buddhist Temple.

Table- Religion in Dawei Township

Township	Religion	Buddhist	Christian	Hindu	Muslim	Total
Daewi	Number	112952	16068	521	1250	131026
	(%)	86.2	12.26	0.59	0.95	100.0

Source: Dawei Township Administrative Offices

### (4) Land Use

Land use in Dawei Township are shown in the following Table. Dawei Township mainly use its land for agriculture followed by grazing land area.

Table - Land Use of Dawei Township

Land Category	Dawei	
	Acre	%
Agricultural Land	62784	5.95
Forest and Natural Area	126036	11.95
Grazing land	2695	0.26
Industrial Land	46	0.004
Settlement Land	2184	0.2
Wastelands	145569	13.8
Forest wild	557588	52.87
wild land	126148	11.96
Other	31666	3.0
Total Area	1054,716	100.00

Source Dawei Township Administrative Offices

### (5) Living Profile

#### (a) Type of housing unit

The majority of the households in Dawei Township are living in wooden houses (49.8%) followed by households in bamboo houses (16.7%). About 48.1 per cent of urban households and 52.5 per cent of rural households live in wooden houses.

Table - Conventional households by type of housing unit by urban/rural

Residence	Total	Apartment/ Condominium	Bungalow/ Brick house	Semi-pacca house	Wooden house	Bamboo house	Hut 2 - 3 years	Hut 1 year	Other
Total	24,943	5.1	12.8	13.8	49.8	16.7	0.8	0.2	0.8
Urban	15382	5.2	15.7	17.1	48.1	12.5	0.4	0.1	0.9
Rural	42,405	5.1	8.0	8.5	52.5	23.4	1.5	0.4	0.6

Source: Department of Population, Ministry of Immigration and Population "The 2014 Myanmar Population and Housing Census–Mandalay Region- Dawei Township Report" October 2017

### (b) Water Usage

The sources of drinking water and non-drinking water in Dawei townships are shown in the following Table. In Dawei Township, 67.4 per cent of households use improved sources of drinking water (tap water/piped, tube well, borehole, protected well/spring and bottled water/water purifier). Compared to other townships in Tanintharyi Region, this household proportion belongs to the highest group in use improved sources for drinking water and it is lower than the Union average (69.5%). About 33.4 per cent of the households use water from protected well/spring and 17.4 per cent use water from unprotected well/spring. About 32.6 per cent of the households use water from unimproved sources. In rural areas, 63.8 per cent of the households use water from unimproved sources for drinking water.

Table - Source of Drinking Water in Dawei Township

Source of drinking water	Total	Urban	Rural
Tap water/ Piped	4.2	4.4	3.8
Tube well, borehole	12.5	19.7	1.0
Protected well/ Spring	33.4	36.1	29.0
Bottled water/ Water purifier	17.3	26.6	2.4
<i>Total improved drinking water</i>	<i>67.4</i>	<i>86.8</i>	<i>36.2</i>
Unprotected well/Spring	17.4	4.5	38.3
Pool/Pond/ Lake	0.1	*	0.2
River/stream/ canal	5.9	-	15.3
Waterfall/ Rain water	0.9	-	2.4



Other		8.2	8.7	7.6
<i>Total unimproved drinking water</i>		32.6	13.2	63.8
<b>Total</b>	<b>Per cent</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
	<b>Number</b>	<b>24,943</b>	<b>15,382</b>	<b>9,561</b>

Source: Department of Population, Ministry of Immigration and Population "The 2014 Myanmar Population and Housing Census-- Tanintharyi Region- Dawei Township Report" October 2017

### (c) Lighting

In Dawei Township, 4.4 per cent of the households use electricity for lighting. This proportion belongs to the lowest group in electricity usage compared to other townships in Tanintharyi Region. The percentage of households that use electricity in Tanintharyi Region is 8.0 per cent. The use of generator (private) for lighting is the highest in the township with 71.7 per cent. In rural areas, 49.6 per cent of the households use generator (private) for lighting.

Table - Conventional households by source of lighting by urban/rural

Source of lighting		Total	Urban	Rural
Electricity		4.4	4.7	4.0
Kerosene		6.7	0.5	16.7
Candle		11.3	6.3	19.4
Battery		0.6	0.4	1.0
Generator (private)		71.	85.5	49.6
Water mill (private)		1.3	1.5	0.8
Solar system/energy		2.8	0.1	7.1
Other		1.1	1.0	1.4
<b>Total</b>	<b>Per cent</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
	<b>Number</b>	<b>24,943</b>	<b>15,382</b>	<b>9,561</b>

Source: Department of Population, Ministry of Immigration and Population "The 2014 Myanmar Population and Housing Census- Tanintharyi Region- Dawei Township Report" October 2017

#### (d) Cooking fuel

In Dawei Township, households mainly use wood-related fuels for cooking with 40.8 per cent using firewood and 51.4 per cent using charcoal. Only 2.5 per cent of households use electricity for cooking. About 74.3 per cent of households in rural areas use firewood and 23.7 per cent use charcoal.

Table - Conventional households by type of cooking fuel by urban/rural

Type of cooking fuel		Total	Urban	Rural
Electricity		2.5	3.9	0.3
LPG		2.3	3.5	0.2
Kerosene		0.1	-	0.3
Bio-Gas		1.4	1.9	0.7
Firewood		40.8	19.9	74.3
Charcoal		51.4	68.6	23.7
Coal		0.8	1.1	0.4
Other		0.7	1.1	0.1
Total	Per cent	100.0	100.0	100.0
	Number	24,943	15,382	9,561

Source: Department of Population, Ministry of Immigration and Population "The 2014 Myanmar Population and Housing Census-Tanintharyi Region- Dawei Township Report" October 2017

#### (6) Occupational Patterns

Data shows (Tables) that trade is the common livelihood means of households in Dawei Township. The other main economic activities in the area are services, agriculture, arbitrary, industry, and public services. According to official statistics, Dawei has a total of 77,524 people as the township workforce and 43,783 are employed with an unemployment rate of 43.52%. Per capita income in the township is estimated to be 1445,499 Kyats in 2014-2015.

Table - Occupational patterns

Government Employee	Services	Agriculture	Livestock	Trade	Industry	Arbitrary	Others
6071	971	1219	65	1205	586	30635	2711

Table - Employment

Workforce	Employed	Unemployed	Unemployment rate
77524	43783	33741	43.52%

Table. Per Capita Income

Year	Income
2014-15	1445,499 Ks.
2015-16	-.
2016-17	-

## (7) Education

Over sixteen percent of the total township population is students. For education sector, although primary school education is compulsory and fee-free, school enrollment rate of 5-year-olds is relatively full of (97.96%) in the overall township. Percentage of students passing the matriculation is 36.27%. The teacher-student ratios are 1:16 in BEPS, 1:22 in BEMS, and 1:28 in BEHS. Data on education and literacy report that literacy rate in Dawei Township was 99.96%.

Table - Educational Infrastructure

School	No. of Schools	No. of Teachers	No. of Students	Teacher/ Student Ratio
Higher Education	5	209	1652	1:8
BEHS	7	346	9541	1:28
BEMS	12	154	3326	1:22
Post (BEPS)	17	190	4236	1:22
BEPS	89	399	6581	1:16
Monastery school	5	80	571	1:7
Preschool	29	57	859	1:15

Table - Scholl Enrollment

No. of 5 yrs-old children			Enrollment			Enrollment Rate
Male	Female	Total	Male	Female	Total	97.96%
1092	1118	2210	1107	1058	2165	

Table - Matriculation Pass Rate

2015-16			2016-2017		
Sit	Pass	Pass Rate	Sit	Pass	Pass Rate
2853	1035	36.27	3256	No. Info.	No. Info.

Table - Literacy Rate

Population	above 15 years of age	Literate	Literacy Rate
131,026	89215	89185	99.96%

## (8) Healthcare Profile

In public health sector, the ratios of medical service personnel and local population indicate the existing conditions of the insufficient health care facilities, especially for rural people. According to secondary data available, the most common diseases include Diarrhoea, Hepatitis, malaria, stomach ailment, and tuberculosis. It was also found out that there was substantial amount of incidence of Diarrhoea, stomach ailment and tuberculosis in the township. As also noted in the following Table, there are 200-bed township hospital, four private hospital in Dawei downtown and 100-bed military hospital in the village tract. There are also 26 rural healthcare centers and sub- centers. Infrastructures for health care services are also seemed to be insufficient especially for rural people.

Table -Healthcare Facilities

Population	No. of Doctors	Ratio	No. of Nurses	Ratio	No. of Healthcare Assistant	Ratio
132282	8	1:16535	40	1:3307	7	1:18897

Table - Hospitals

Sr. No.	Hospital	Govt./Private	Bed
1.	Township hospital (Dawei)	Govt.	200
2.	(12/100) military hospital	Govt.	100
3.	MyintMoeOo	Private	16
4.	ChanMyae	Private	16
5.	Thitagu Areyawjan	Private	50
6.	MaeDelann	Private	100

Table - Healthcare Centers

Sr. No.	Type of Healthcare Center	No. of Healthcare Center
1.	Rural Healthcare Center	4
2.	Rural Healthcare Sub-Center	22

Table - Common Diseases

Sr. No.	Disease	Incidence
1.	Malaria	84
2.	Diarrhoea	1466
3.	TB	467
4.	Stomach Ailment	606
5.	Hepatitis	649

Table - HIV/AIDS

2015-16		2016-17	
Infected	Dead	Infected	Dead
165	13	58	4

Table - Health Indices

No. of Maternal	No. of Infant	Per 1000			
		Birth Rate	Maternal Mortality Rate	Infant Mortality Rate	Abortion Rate
2623	2407	25.2	0.27	3	1

### 6.10.2 Cultural Heritage Associating the Project Area

In this proposed project area, cultural heritage sites and resources are identified according to the *2012 Rule & 1998 Protection and Preservation of Cultural Regions Law*, *2015 Protection and Preservation of Antique Objects Law* and *Ancient Monuments Law*. As a result, no cultural heritage sites and resources are discovered in the proposed project area.

Heritage Resource Type	Observation
Places, Buildings, Structures and equipment	None were identified within the proposed project area
Places associated with oral traditions or living heritage	None were identified within the proposed project area
Landscapes	None were identified within the proposed project area
Natural features	None were identified within the proposed project area
Traditional burial places	None were identified within the proposed project area
Geological sites of scientific or cultural importance	None were identified within the proposed project area
Archaeological Sites	None were identified within the proposed project area
Historical settlements and townscapes	None were identified within the proposed project area
Public monuments and memorials	None were identified within the proposed project area
Battlefields	None were identified within the proposed project area

The field assessment provided not only above-ground evidence of prehistoric structures, buildings older than 60 years, or material of cultural significance or in situ archaeological sites within the proposed development footprint. However the cultural significance of the project area is many religious edifices in the study area. MyaungPyo pagoda has been stated for nearly 20 year old and located near the tailing ponds of mine site area and MyaungPyo creek seen figure below.



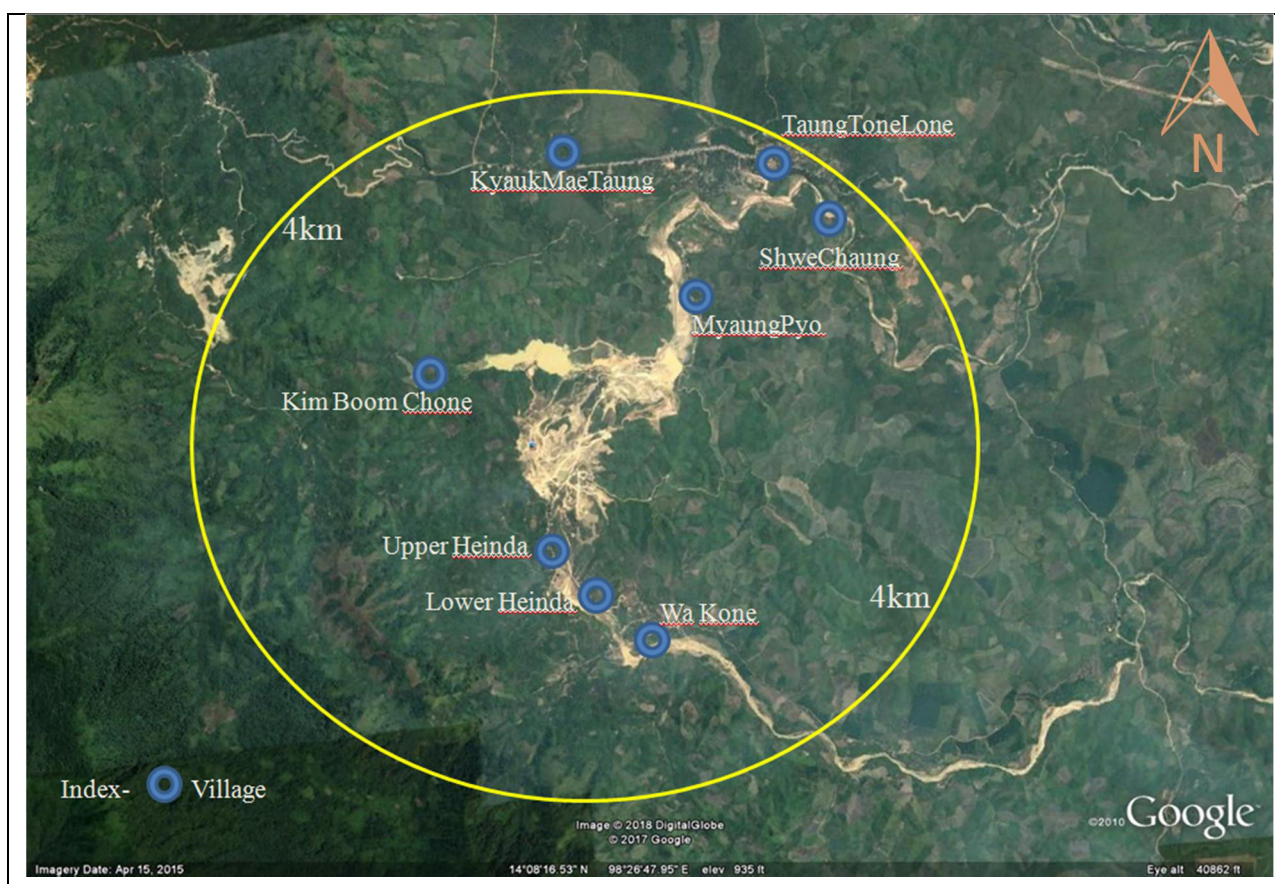


Figure: The Location of MyaungPyo Pagoda



### 6.10.3 The Vicinity of Project Area

The vicinity of project area is situated at Heinda village tract. The village tract is divided into 2 wards: upper Heinda and lower Heinda. For the purposes of the socio-economic assessment, the local study area was defined as villages and wards within 4 Km distance from the project site. Social survey focused on the directly affected villages of Heinda, MyaungPyo and KimBoomChone. Socio-economic field work also included household survey in Wa Kone, TaungThoneLone, KyaukMaeTaung and ShweChaung. Group discussion and stakeholder consultation were also carried out with authorities and village elders of nearby villages.



#### (1) Education

Data described in Table reveal that a total of 6 basic education schools are located in the study area. There is one BEHS school in Heinda village tract. The teacher/student ratio is 1:22 for this school.

Table - Schools in the Vicinity of the Project

School	No. of school
BEHS Heinda	1
BEMS TaungThoneLone	1
BEPS Heinda	1
BEPS MyaungPyo	1
BEPS ShweChaung	1
BEPS KyaukMaeTaung	1
Total	6



BEMS TaungThoneLone



BEPS MyaungPyo



BEPS KyaukMaeTaung



BEPS ShweChaung

## (2)Transportation

The Dawei-Heinda road is the main transport route into the project area. Most of the inner roads are soil-based roads. Programs for self-established road construction have been implemented. Common form of transportation services in the study area is road transport via motor cycles, buses, and light trucks.





Local Truck



Local Motorcycle

### Social Welfare

Social welfare societies are also established in the study area. Free funeral service, emergency healthcare transportation, and medical equipment aid are available in the study area.



Social Welfare Society's Aid



Free Funeral Service and Medical Equipment Aid

### (3) Culture

There are many religious edifices in the study area. As Buddhism flourishes throughout the country, many pagodas and monasteries are built and revered in the vicinity of the project. There are also two Hindu temples in the study area. Cultural beliefs associated with 37- inner and outer spirits was found to be existed in the study area and many households revere traditional spirits and have places in the house compound for them. Traditional seasonal festivals and communal events, e.g., festival for offering yellow robes to Buddhist monks during the month of Tasaungmone (Kahtain Pwe) and ceremonies for donning the yellow robes (novitiation ceremonies) are tumultuously held in the study area every year.



Pyay Taw Aye Pagoda



Place of Traditional Spirit



Hindu Temple in Heinda

#### (4) Regional Health Profile

Limited infrastructures for health care services exist in the vicinity of the project. Data provided in the following Table indicate that there is only one healthcare center and one private clinic in the study area.

**Table - Health Care Facilities Available in the Vicinity of the project**

Village	Health Care Center	Private Clinic
Heinda	1	-
MyaungPyo	-	-
TaungThoneLone	1	1
Shwe Chaung	-	-
Wa Kone	-	-
Kim Boom Chone	-	-
Total	2	1

## 7.0 IMPACT ASSESSMENT AND MITIGATION MEASURES

This section presents the environmental impacts and issues which have been identified during the ESIA Study. Where necessary mitigation measures with which to minimise or negate potential negative impacts; and maximise or enhance potential positive impacts will be recommended. Environmental impacts can be classified as environmental impacts of mining operation and environmental impacts of mineral processing.

### 7.1. Impact Assessment Methodology

The methodology and approach to be followed during this EIA is described below. Each specialist will undertake an impact assessment, and prepare an impact assessment report as supporting documentation to the EIA. These will include:

- Executive Summary;
- Introduction;
- Brief project description;
- Methodology including guidelines and standards used in the study;
- Baseline description of the Environment;
- Assessment of the potential significance of impacts of the project; and
- Recommendations for mitigation/management of impacts.

Impacts will be assessed using information gathered during the baseline assessment in combination with previously collected data and the detailed project plan. The significance of the identified impacts will be determined using the approach outlined in Table 7.1. This incorporates two aspects for assessing the potential significance i.e. occurrence and severity, which are further sub-divided as indicated. The impact ranking will be described for both pre and post implementation of mitigation/management measures conditions.

An impact can be defined as any change in the physical-chemical, biological, cultural and/or socio-economic Environmental system that can be attributed to human activities. The significance of the aspects/impacts of the process was rated by using a Matrix Method modified by Green Tech ESIA Team. The significances of the impacts were determined through a synthesis of the criteria below:



### 1. Scale

No.	Description	Rating	Score
1.	Impact will be affected (Distance = 100 m or Area = 1000 m <sup>2</sup> )	Site	1
2.	Impact will be affected (Distance = 1000 m or Area = 10 km <sup>2</sup> )	Limited	2
3.	Impact will be affected (Distance = 1000 m to 10 km or Area = 10 km <sup>2</sup> to 100 km <sup>2</sup> )	Local	3
4.	Impact will be affected (Distance = 10 km to 100 km or Area = 100 km <sup>2</sup> to 1000 km <sup>2</sup> )	District	4
5.	Impact will be affected ( to the distance exceeding 100 km or Area = 1000 km <sup>2</sup> )	Regional	5

Note: For linear objects areal gradations are used. If the area cannot be evaluated, the linear distance is used.

### 2. Duration

No.	Description	Rating	Score
1.	One day to one month	Very short term	1
2.	One month to two years	Short term	2
3.	Two years to ten years	Medium term	3
4.	Ten years to the whole life of operation	Long term	4
5.	Permanent and irreversible impact on nature	Permanent	5

### 3. Severity for the Environment

No.	Description	Rating	Score
1.	Isolated parts will be damaged and easy to mitigate/restore	Very low	1
2.	Isolated parts will be damaged and hard to mitigate/restore	Low	2
3.	Large parts will be damaged and easy to mitigate/restore	Low to Medium	3
4.	Large parts will be damaged and hard to mitigate/restore	Medium	4
5.	Large parts will be permanently destroyed	High	5

### 4. Frequency



No.	Description	Rating	Score
1.	Less than twice a year	Rare	1
2.	3 to 4 times per year	Intermittent	2
3.	Once a month	Regular	3
4.	1-3 times per week	Very Often	4
5.	More than 3 times per week	Continuous	5


#### 5. Probability


No.	Description	Rating	Score
1.	Impact is very unlikely to occur under normal conditions but may occur in exceptional circumstances	Very Seldom	1
2.	Impact is unlikely to but may occur at some time under normal operating conditions	Seldom	2
3.	Impact is likely to occur at some time under normal conditions	Probable	3
4.	Impact is very likely to occur at some time under normal conditions	Highly probable	4
5.	Impact will occur under normal operating conditions	Certain	5


Table- Impact Rating Table

Likelihood	Consequence														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
	6	12	18	24	30	36	42	48	64	60	66	72	78	84	90
	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105
	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120
	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150


 Very Low (0- 25)

 Moderate (76-100)

 Low (26- 50)

 Moderate to High (101-125)

 Low to Moderate (51-75)

 High (126 to 150)

### *Mitigation Requirement for Impact Significance*

No.	Impact Significance	Mitigation Requirement
1	Very Low (Negligible)	No mitigation required
2	Low	Required a small number of additional mitigations
3	Low to Moderate	Require more or less additional mitigations
4	Moderate	Require a number of additional mitigations
5	Moderate to High	Require a number of additional mitigation or modification of the project design
6	High	Require additional mitigations plus modification of the project design or alternative action may be required

### *Prediction Confidence*

Although not explicitly included in the criteria tables, there is uncertainty associated with the information and methods used in an ESIA because of its predictive nature. The certainty with which an impact analysis can be completed depends on a number of factors including:

- Understanding of natural/ecological and socio-economic processes at work now and in the future; and
- Understanding of present and future properties of the affected resource.

The level of prediction confidence for an impact analysis will be discussed when there are questions about the factors reviewed above. Where the level of prediction confidence makes a prediction of the impact problematic, a subjective assessment is made based on the available information, the applicability of information on surrogates and on professional opinion.

The level of prediction confidence is sufficiently low in some cases that an estimate of Environmental consequence cannot be made with a sufficient degree of confidence. Undetermined ratings are accompanied by recommendations for research or monitoring to provide more data in the future.

### *Development of Mitigation Measures*

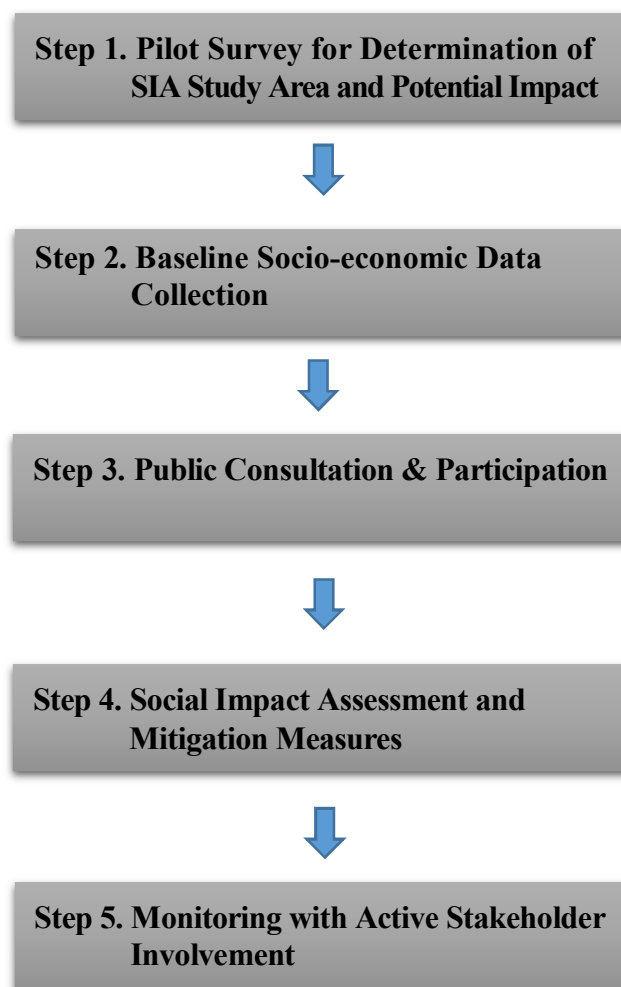
A common approach to describing mitigation measures for critical impacts is to specify a range of targets a predetermined acceptable range and an associated monitoring and evaluation plan. To ensure successful implementation, mitigation measures should be unambiguous statements of actions and requirements that are practical to execute. The following summarize the different approaches that may be used in prescribing and designing mitigation measures:

- Avoidance: e.g. mitigation by not carrying out the proposed action on the specific site, but rather on a more suitable site;
- Minimization: mitigation by scaling down the magnitude of a development, reorienting the layout of the project or employing technology to limit the undesirable Environmental impact;
- Rectification: mitigation through the restoration of Environments affected by the action;
- Reduction: mitigation by taking maintenance steps during the course of the action; and Compensation: mitigation through the creation, enhancement or acquisition of similar Environments to those affected by the action.

#### **7.1.1. Social Impact Assessment (SIA) Methodology**

The first phase of the Social Impact Assessment (SIA) will provide a baseline description of the study area, specifically focusing on the communities living and working in close proximity to the proposed development. The potential impacts of the proposed development on the social environment will be identified and assessed in terms of an agreed assessment methodology in the EIA phase. Mitigation measures will be proposed to enhance the positive impacts and reduce the significance of the negative impacts. Socioeconomic impact assessment for proposed project was conducted by the following procedures.





### **Main Steps in SIA Study**

#### **Step I: Pilot Social Survey for Determination of SIA Study Area and Potential Socio-economic Impacts**

Pilot survey was done for determination of SIA study area and study area was considered after the discussions with key informers project managers from MPC and the heads of Village General Administrative Offices of nearest villages. Google Map and census are also used for the determination of SIA study area during pilot survey.

#### **Step 2: Baseline Socio-economic Data Collection**

To assess the baseline socio-economic conditions that may result from the development of the proposed project, the SIA team employed both quantitative and qualitative approaches as follow:

##### ***Primary Data Collection by Household Survey***

The collection of primary data consisted of focus group discussions and household surveys in the target study areas. Household sample survey was conducted to evaluate primary socio-economic conditions of the project area and to understand the mood, perceptions and extent of preparedness of the people towards the proposed project. The household survey was carried out to tap the baseline socio-economic conditions of project area and to assess project perceptions and attitudes of the local people over a period of five days. The accuracy of primary data collection was based on the accuracy, number of surveyed household and experiences of surveyors. To get the accurate data, primary data collection was conducted by social specialist, social consultants, local authorities and local people.

#### **(a) Survey Team**

The team was formed with researchers from social, medical, and engineering sciences having research experiences in the field of social impact assessment and social management planning.

#### **(b) Development of Survey Questionnaire**

Socioeconomic aspects to be included in questionnaire were based on site visits and issues identified by interviews with local people and village heads during pilot survey. Items were formulated by the consultants and reviewed by social assessment team members as to clarity of item wordings and relevance to the socioeconomic domains measured. The survey questionnaire was designed to collect information as to the following household characteristics:

- household composition (age, gender, educational status, religion, ethnicity, language used and marital status);
- occupations;
- ownership of agricultural fields and livestock;
- energy sources and facilities;
- agricultural and other economic activities;
- daily movement patterns;
- income and expenditure patterns;
- access to and use of community services/facilities and natural resources;
- health and nutrition; and
- views/concerns/suggestions on the proposed project.

#### **(c) Recruitment and Training**



The enumerators were received a training program prior to commencing with the fieldwork. The training program included a briefing on the objectives of the survey, socioeconomic aspects to be measured, interview techniques as well as a detailed explanation of each question and its relevance to the survey objectives, how to pose the question and how to code the answer. Discussions were also held among participants about the socioeconomic conditions and initial questionnaire items were revised based on the discussion results. A set of guidelines were given to each enumerator for administration of survey questionnaire. In the field data collection activities, the enumerators were supervised by experienced supervisors with household survey.

#### **(d) Data Collections**

The project related data, factory layout plans and design parameter are provided by Myanmar Pongpipat Co., Ltd. and No. (2) Mining Enterprise (Tanintharyi). Secondary data on demographic distribution in the area are sourced from Head of Local Administration Office (Dawei) and data on public health are sourced from Public Health Department (Dawei). Primary data for public concerns, socio-economic and health profiles are conducted by household survey.

#### **(e) Data Analysis**

In household survey data collection period, field supervisors checked and ensured the control of data quality. During field surveys, information obtained through household survey and interviews was corroborated through direct observation by the study team aiming at assessing social and cultural infrastructure existed in the project area, physical assets of people, and living conditions. Observations were backed up by photographic records. Quantitative data were coded and processed using SPSS statistical package. Qualitative data were coded using standard methods.

#### **7.1.2. Health Impact Assessment Methodology**

There is no universally agreed formula for assessing public health significance, although assessments are mostly based on a subjective judgment about the magnitude of the potential health impacts (size of the affected population and scale of the positive or negative health impact); its likelihood of occurrence; and the degree of confidence in the impact actually occurring (based on scientific and other evidence of the health impact occurring in similar

circumstances elsewhere). The following table shows a Health Impact Significance Rating Methodology of Green Tech EIA Team.

Magnitude of Health Impact	Likelihood of Occurrence of Health Impact			Health Impact Rating
	Low	Medium	High	
	Unlikely to occur	Likely to occur sometimes	Likely to occur often	
None	No significance	No significance	No significance	0
Low	Very Low	Low	Medium	1
Medium	Low	Medium	High	2
High	Medium	High	Very High	3

When analyzing health impacts, it is important to consider the magnitude, likelihood and public health significance of the potential impacts. This analysis will involve expert judgment based on a consideration of the evidence gathered and its applicability to the local context and the specific project.

Distributional, health equity and inequality impacts will be analyzed by examining how particular sub-groups within a population, particularly vulnerable groups, are likely to be affected by the project. The scoping and community profiling steps are likely to have already identified potentially vulnerable groups through existing local information on these individuals/groups or through community surveys and meetings with key informants e.g. community leader, community health worker or local NGO.

Health equity/inequality impacts occur when the projects benefits and harms are unevenly distributed. This includes where the risk is equally distributed, such as air pollution, but the impact is disproportionate – affecting particularly children, older people and those with existing ill health.

Analysis of health impacts will involve systematically determining the range of potential impacts, their relative importance and where, when and how likely they are to occur. The

information for the HIA will be obtained from the primary data collection (household survey), literature review, community profile and Health Data from Public Health Department as well as knowledge and expertise of the HIA Consultant.

## **7.2. Detailed Studies to be undertaken in the EIA Phase – Specialist Studies**

The assessment of the impacts of the proposed activity will be conducted within the context provided by these principles and objectives. The impact assessment will be comprised of a number of specialist studies. Once completed, the findings of the specialist studies will be integrated with the Draft EIA Report and the impacts will be ranked using a scoring system that compares the significance of each impact. The following specialist studies have been commissioned and will play a crucial role in the EIA process:

- Biodiversity Impact Assessment
- Air Quality Impact Assessment;
- Noise Impact Assessment;
- Soils and Land Use Impact Assessment;
- Surface Water (Hydrology) Impact Assessment;
- Socio-economic Impact Assessment;
- Health Impact Assessment;
- Visual Impact Assessment; and
- Wastes and Utilities; and
- Disaster Risk Assessment.

The specialist reports will be included as part of the Draft EIA Report and ESMP, and will be made available for public review before submission to the decision-making authorities.

### **7.2.1. Biodiversity Impact Assessment**

The objectives of the Ecology Impact Assessment include:

- Undertaking the collection of baseline Environmental data;
- Characterisation of the baseline Environment;
- Identification, and assessment of key adverse impacts that may result from the activities of the project;
- Identification, assessment and recommendations of appropriate and practical mitigation measures to remove or minimize the adverse impacts identified; and



- Providing specialist ecological input into the Environmental and Social Management Plan (ESMP).

## Scope of Work

### *Flora*

- Conduct initial desktop review of vegetation likely to occur within the study area;
- Develop a species list of red data and protected plants;
- Conduct a detailed survey (using standard scientific methodology) in order to:
- Identify general vegetation types and communities on site;
- Identify dominant plant species;
- Record red data and protected species;
- Identify invader or exotic species;
- Identify floral species with any medicinal, cultural or commercial importance;
- Identify sensitive landscapes and habitats including wetland and riparian habitats;
- Identify possible impacts of the proposed project on flora species and communities; and
- Recommend mitigation measures for these identified impacts.

### *Fauna*

- Conduct initial desktop review of faunal species likely to occur within the study area;
- Develop a species list of red data and protected animals;
- Conduct a detailed survey (using standard scientific methodology) in order to identify terrestrial fauna linked to veldt types and vegetation communities on site, including:
- Visual observations;
- Live capture and release, including small mammal trapping;
- Identify the dominant faunal species on site;
- Record observed red data and protected faunal species;
- Identify observed exotic species;
- Identify possible impacts of the proposed project;
- Identify possible impacts of the proposed project on flora species, habitats and communities; and
- Recommend mitigation measures for these identified impacts.

## *Current Biological Environment*



Vegetation and terrestrial animals are very low abundant in the project area. Small population of flora and fauna in surrounding area of land are found. Aquatic fauna including fish and birds are fairly abundant. Small fisheries practiced by local fishermen are observed during in the survey period. No red list species of flora and fauna in both terrestrial and aquatic environments are recognized during the scoping survey. There is also no any wildlife protected area, wetland and reserved forests nearby the project area.

### *Methodology*

#### *(a) Field Survey and Data Collection*

Data collection will be taken by field observation. List of the terrestrial plant and habitats will be classified. Terrestrial and aquatic fauna survey will be carried out one time in cold season. The collected data will be analysis to investigate the plant and animal population and distribution by using the appropriate methods: Relative Frequency (R.F), Relative Abundance (RA) and Importance Value Index (I.V.I) for plants and habitat utilization for fauna species will be identified. The threatened species on both flora and fauna described in IUCN Red List will be included if possible found for the concern of conservation. Benthos and zooplankton will be collected and analysis for their abundance and distribution.

#### *(b) Impact Analysis*

Impact analysis will be done based on available survey data and information. Analysis method will be used in accordance with the standard of biodiversity and wildlife international.

#### *(c) Anticipate the Potential Impacts*

Impact analysis will be carried out to investigate the specific impacts on biodiversity during the constructional and operational.

- Impact on terrestrial and aquatic animals
- Impact on plant community

#### *(d) Survey Work*

Detail study for fauna and flora to be included are as follow:

- Baseline data of flora and fauna on both terrestrial and aquatic environment

- General type and dominant species of plants and animals
- Species richness, abundance and distribution of plants and animals
- Benthos and zooplankton species and their abundance
- Rare and Endangered species if possible found
- Further investigation on the potential impacts

### 7.2.2. Air Quality Impact Assessment

Air quality impact assessment will be conducted as follow:

#### *Scope of Work*

The following scope of work is proposed for the air quality study:

- To describe baseline ambient air quality and meteorological conditions based on current information, and to identify where knowledge gaps exist in this regard;
- If necessary, to conduct a preliminary baseline air quality monitoring programme to address identified baseline information gaps;
- To develop an emissions inventory identifying potential project sources of air emissions and quantifying emission rates from each source, based on actual measurements or literature emission factors;
- To assess the likely Environmental significance of project-related and cumulative air quality impacts (i.e. combined impacts from project and existing sources), by comparison against air quality standards /guidelines and human health effects reported in the literature; and
- To recommend project design and operational management measures to minimise/abate air quality emissions to the atmosphere.

#### *Approach*

The following approach is proposed to undertake the air quality study:

#### *Ambient Air Quality Monitoring*

At this stage then, monitoring should only be for baseline establishment purposes. In this regard a three-month sampling campaign is recommended. Ideally this campaign should be

done during winter to represent the worst case scenario. Haz-Scanner EPAS will be used for ambient air quality.



### **Haz-Scanner EPAS for Ambient Air Quality Monitoring**

The detailed about the Haz Scanner EPAS that will be used by EIA Team are as follow:

#### ***(a) Monitoring Parameters***

The parameters for ambient air quality monitoring will be SO<sub>2</sub>, NO<sub>2</sub>, CO<sub>2</sub>, CO, H<sub>2</sub>S, O<sub>3</sub>, PM<sub>2.5</sub> and PM<sub>10</sub>.

#### ***(b) Sampling Rate and Sensors***

Determination and analysis of ambient air qualities were conducted by using Haz-Scanner Environmental Perimeter Air Station (EPAS).

Sampling rate of air quality will be recorded automatically every one minute for important gases (Sulfur dioxide, Nitrogen dioxide, Carbon dioxide, Carbon monoxide, Hydrogen sulfide, Particulate matter, Hydrogen sulfide and Ozone) to describe ambient air quality. Sampling pump was adjusted to 2 liter/min. Different analysis methods will be integrated in the instrument, such as particulates 90° Infrared Light Scattering for particulate matters (PM<sub>10</sub>, PM<sub>2.5</sub>), electrochemical sensors for toxic gases (SO<sub>2</sub>, NO<sub>2</sub>, CO, H<sub>2</sub>S), NDIR (optional sensor) for (CO<sub>2</sub>) and Gas Sensing Semiconductor- GSS technology (optional sensor) for O<sub>3</sub>.

### Important Gases for Ambient Air Quality

No.	Parameters	Analysis Methods
1.	Sulfur dioxide (SO <sub>2</sub> )	Electrochemical sensors
2.	Nitrogen dioxide (NO <sub>2</sub> )	Electrochemical sensors
3.	Carbon Dioxide (CO <sub>2</sub> )	NDIR (optional sensor)
4.	Carbon monoxide (CO)	Electrochemical sensors
5.	Hydrogen Sulfide (H <sub>2</sub> S)	Electrochemical sensors
6.	Particulate matter 2.5 (PM <sub>2.5</sub> )	Infrared Light Scattering
7.	Particulate matter 10 (PM <sub>10</sub> )	Infrared Light Scattering
8.	Ozone (O <sub>3</sub> )	Gas Sensing Semiconductor- GSS technology (optional sensor)

### Location of Monitoring Points

The air quality monitoring will be conducted inside the project site.

### Monitoring Period

Air quality will be monitored by 12 hours for day time and 12 hours for night time as follow:

### Duration of Air Quality Monitoring

Monitoring Points	Duration
Night Time	(07:00 pm to 07:00 am)
Day Time	(07:00 am to 07:00 pm)

### Air Quality Monitoring Results

The air quality monitoring results obtained by every minute will be combined to make average values for day time (12 hours) and night time (12 hours) for evaluation and comparison with standard values.



The monitoring results will be compared with the following guidelines.

MEG	= Myanmar Emission Guideline 2015)
WHO Guideline	= World Health Organization Guideline Value, Global Update 2005
NAAQS	= National Ambient Air Quality Standard, 2003 (Central Pollution Control Board, Ministry of Environment and Forests)

For carbon dioxide, no guideline values were provided for the ambient air quality.

### *Risk Assessment*

The significance of project-related and cumulative sources of air pollution will be assessed using Green Techs impact rating protocol. This method considers the likelihood and significance of individual impacts in relation to human health, Myanmar emission guidelines and relevant air quality standards / guidelines (which may include those of the WHO, IFC and EU).

### *Mitigation Measures*

Management and mitigation measures will be identified for significant air quality impacts identified in this study to adequately control the release of air emissions from various project sources. Where these measures can be incorporated into the design phase of the proposed project to avoid possible significant impacts, this will be highlighted.

### **7.2.3. Noise Impact Assessment**

The approach will be based on SANS 10328:2008, 'Methods for Environmental noise impact assessments' as well as the IFC PS and Equator Principles. The technical guidelines will be based on good engineering practice, SANS 10103:2008, 'The measurement and rating of Environmental noise with respect to annoyance and to speech communication' and the IFC EHS Guidelines for noise.

### *Scope of Work*

Given the generally rural and agricultural nature of the existing Environment, noise levels can be predicted to be low. So, measure the present ambient noise levels at 1 measurement points that have been identified for the project.

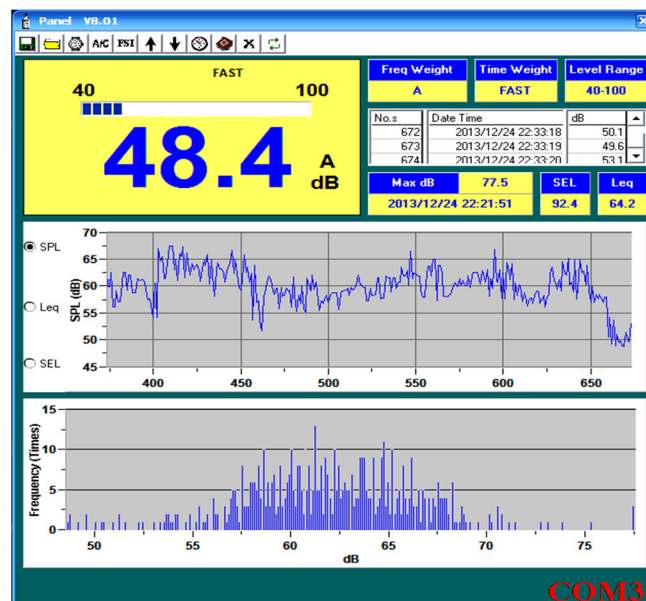
To monitor the existing noise level, the team will use TES-1353H Integrating Sound Level Meter which is applicable with IEC61672-1: 2003, IEC60651: 1979, ANSI S1.4: 1983 and IEC60804: 1985 standards. Existing noise level will be monitored in both day time (07:00 to 22:00) and night time (22:00 to 07:00).



**TES 1353H Integrating Sound Level Meter**

### *Noise Quality Monitoring Results*

The results for noise level monitoring will be calculated by using Panel V8.01 Software as follow:



**Integrating Sound Level Software (Panel V8.01)**

### *Noise Level Monitoring Standard*

Noise level monitoring results will be compared with Myanmar Emission Guidelines, 2015 for residential, institutional and educational areas as follow:

Receptor	One Hour LAeq (dBA) <sup>a</sup>	
	Day time (07:00-22:00) (10:00-22:00 for Public holidays)	Night time (22:00-07:00) (2200-10:00 for Public holidays)
Residential, Institutional, Educational	55	45

Source: Myanmar Emission Guidelines (2015)

### *Operation Noise Level Prediction*

Given the rural and agricultural nature of the of the project area, a substantial increase in noise levels can be anticipated during operation. For the proposed project, the major noise generating sources during the operation phase will be movement of trucks, operation of trommels, jigs and shaking tables. Noise level at nearest residents will be predicted and presented.

### **7.2.4. Soils and Land Use Impact Assessment**

The objectives of the soil assessment will be as follow:

- To assess the current physical and chemical status of the greenfield area targeted for the development;
- To determine the pre-development land capability of the soil cover to be affected by the proposed project; and
- To assess the expected impacts posed on the soil resource by the proposed development.

### *Scope of Work*

The entire area comprises greenfields. In terms of the legislation it is proposed to conduct a soil investigation based on the Soil Classification System for SA, 1991. Such an assessment

will include a physical investigation of the soil cover to be disturbed by the proposed mining infrastructure. The scope of work entails the following:

- Conduct a desktop study as a prerequisite prior to a field visit;
- Conduct a field visit during which a physical assessment of the soil covering the areas to be disturbed will take place;
- Compile soil, land use and land capability maps for the assessed area; and
- Compile a report on the findings and results of the assessed area.

### *Desktop Study*

A desktop study will be conducted to gain a general understanding of the soil resource covering the area in question. Existing broad scale maps will be obtained and reviewed to address the input requirements for the ESIA report.

### *In-field Soil Assessment*

In preparation for a field visit soil survey locations will be generated to optimise coverage of the expected soil types. Actual field mapping and classification will be supported by soil profiling to serve as a platform for detail level mapping. During soil mapping, the extent of ecologically sensitive areas, such as wetlands, will be identified and delineated on the basis of soil types.

The following attributes listed recorded at each location point

- Soil form and depth;
- Estimated soil texture and Structure;
- Content of coarse fragments;
- Underlying material;
- Current land use; and
- Land capability.

### *Sampling of Representative Areas*

Chemical balance in the soil profile may be subjected to disturbance during the planned development and post-activity restoration. In order to obtain fertility status of the soil

resource prior to commencement of any development activities, a sampling program is recommended in conjunction with the soil mapping exercise.

The sampling of major delineated units is good practice. A maximum of 4 sample locations are deemed sufficient to exhibit the required soil properties and chemical status. The following analysis package is proposed and will be submitted to the laboratory of the Department of Agricultural:

- Particle size distribution on selected samples (3-fraction testing);
- pH (water);
- Exchangeable cations Na, K, Ca, Mg (Saturated paste method);
- Phosphorus (Bray1 method);
- Organic carbon content on selected topsoil samples (Walkley Black method); and
- Electrical conductivity (indication of salt presence).

### *Soil Samples*

Soil samples are collected inside the mine site was conducted prior to the actual sampling so that selection of sampling unit represents the whole area. Then surface soil samples were taken with hand auger at about 3 inches depth and collected in the bulk soil sample bag.

### *Testing of Soil Quality*

All of the soil samples will be tested in National Laboratory under the Myanmar Research and Innovation Department.

### **7.2.5. Surface Water (Hydrology) Impact Assessment**

The surface water study will focus on the characterisation of the baseline hydrology at the project site and assess the potential impacts on surface water due to project development. The following tasks are proposed:

- Compilation of a baseline report to characterise the existing hydrology and water quality of the area;
- Development of floodlines for the area;
- Development of a stormwater management plan for the mine site; and
- Development of management plan for erosion of tailing ponds.

There are important interactions between groundwater and surface water in this type of Environment. There will therefore be strong collaboration between the groundwater and surface water specialist teams.

### *Scope of Work*

The scope of work for the surface water assessment is provided below.

### *Site Visits*

Two site visits are proposed. The first visit will be a reconnaissance visit to understand the situation in proposed site. The further two visits are to set up the baseline monitoring program and take field measurements.

### *Hydrology Study*

This report is the environmental impact of the proposed mine development on the hydrological regime at the proposed project site in Heinda area of Dawei region. It aims at assessing sensitivity of the baseline hydrological environment and the potential impacts of the proposed development upon it and proposes mitigation measures in order to ensure that the potential adverse impacts of the proposed mine project on the hydrological environment will be slight and neutral.

The proposed Heinda mine will consist of opencast mining, mineral processing plant, central treatment plant, settling ponds and access tracks. The area is mainly covered by grass and shrubs with occasional rocky outcrops projecting onto the surface cover. The soils cover is thin and comprises of rocky surfaces in some places.

The potential impacts on the surface water environment from the proposed mine development, in the absence of suitable mitigation measures, are considered to be as follows:

- Direct impacts of the mine operation on the hydrological environment for example of surface water (if encountered in excavations) from the spillage/leakage of fuels from vehicles and fuel/ waste storage areas.
- Direct impacts from excavated areas (overburden and surface mining) where vegetation has been removed through release of silt laden surface water runoff into local watercourses due to soil erosion and increased volumes of surface water runoff.



- Indirect impacts from tailing ponds (overburden and surface mining) where pond failure has been removed through release of sediment surface water runoff.

### *Baseline Hydrological Environment*

The description of the baseline hydrological environment at the subject site and in the surrounding area was by means of a desktop study. This was supplemented by a site walkover by the hydrologist to site.

Relevant desktop studies were undertaken to aid in understanding the underlying hydrology of project area. Supporting information relating to the proposed development was collected for purposes of understanding the surface mine project and to relate development to hydrological characteristics inherent in the area in order to:-

- Assess the sensitivity of the baseline hydrological environment at the subject site and in the surrounding area with respect to the proposed mine project development.
- Identify any potential impacts on the hydrological environment associated with the proposed development.
- Identify any constraints posed by the existing hydrological environment to the proposed development and to;
- Recommend appropriate mitigation measures in order to ensure that the potential impact of the proposed project is slight and neutral.

### *Field Survey Methodology*

In order to inform the hydrological impact assessment, a site walkover was carried out by the hydrologist to record observations and features of significance in the project area.

### *Significance Criteria*

Relevant documentation gathered from diverse sources categorize impact into five (5) categories to aid in assessing the potential impacts of the proposed development on the hydrological environment in terms of how significant an impact may be on the overall environment as follows:-

**Imperceptible Impact:** An impact capable of measurement but without noticeable consequences.

**Slight Impact:** An impact which causes noticeable changes in the character of the environment without affecting its sensitivities.

**Moderate:** An impact that alters the character of the environment in a manner that is consistent with existing and emerging trends.

**Significant Impact:** An impact which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.

**Profound Impact:** An impact which obliterates sensitive characteristics.

### **Existing Water Quality Monitoring**

Existing water quality will be monitored for both surface and ground water qualities as follow:

**Monitoring of Surface Water Quality:** The locations that take the surface water samples will be in the Myaung Pyo creek, Kin Mon Chone creek and project site.

**Monitoring of Ground Water Quality:** The locations that take the ground water samples will be in project site and at nearest villages.

### **Water Quality Testing**

All of the surface and ground water quality will be tested in Water Quality Testing Laboratory under the Department of Occupational Health.

## **7.2.6. Visual Impact Assessment**

### **Objectives of the Visual Impact Assessment (VIA)**

The objectives of the Visual Impact Assessment (VIA) will be to:

- Assess the baseline conditions of the visual context within which the proposed project will take place;
- Determine what visual receptor groups may potentially be affected by the project;
- Establish what visual impacts may potentially arise as a result of the project and determine their social significance; and
- Investigate possible methods with which the potential impacts may be mitigated.

### *Scope of Work*

The specific scope of works is briefly described below:

- The VIA will assess the value of the study area as a visual resource, as a function of its perceived aesthetic value, and will assess the magnitude and significance of the potential visual impact of the proposed activities;
- A Visual Resources Analysis will be carried out, which will identify elements that are considered to be of visual significance. Conversely elements that detract from the visual quality of the landscape will also be identified;
- A Visual Receptor Analysis will be done which will identify receptors that may be negatively impacted upon by the proposed activity. This will include adjacent landowners as well as significant commuting routes and areas where large groups of people may congregate;
- The VIA will also explore potential visual mitigation strategies and implementation measures that need to be considered during construction and implementation, operations and possible closure of the project site.
- The VIA will be carried out for the project site itself and the greater surrounding context, which has been determined as a 3 km kilometre radius around the project site boundary.

### **7.2.7. Waste and Utilities Assessment**

#### *Objectives of the Waste and Utilities Assessment*

The objectives of the Waste and Utilities Assessment will be to:

- Identification, and assessment of key adverse impacts that may result from the consumption of waste and utilities;
- Determine what natural resources may potentially be affected by the project;
- Investigate possible methods with which the potential impacts may be mitigated.
- Identification, assessment and recommendations of appropriate and practical mitigation measures to remove or minimize the adverse impacts identified; and
- Providing specialist waste and utilities management to input into the Environmental and Social Management Plan (ESMP).

### *Scope of Work*

The specific scope of works is briefly described below:

- Identification of site specific water use, electricity use and waste management activities including monitoring and control activities relating to the development in operational mode;
- Formulation of a set of strategies and actionable objectives for the sustainable water use or waste management approach for the current development. This will lead to a range of management measures to meet the set goals and objectives.

#### **7.2.8. Social Impact Assessment (SIA)**

SIA is a formal process used to predict how the proposed project will affect existing socio-economic conditions of nearest local communities. It is desirable to ensure that the development options under consideration are sustainable. It also aims to make recommendations for the mitigation of the potential negative impacts and enhancement of the positive ones.

SIA will also contain Social Management and Monitoring Plan (SMMP). SMMP is a site specific plan developed to ensure that the project is implemented in a socially sustainable manner where all contractors and subcontractors, including consultants, understand the potential socio-economic impacts arising from the proposed project and take appropriate actions to properly manage that risk.

### *Objectives of the SIA Report*

The objectives of the SIA report are to:

- (i) describe the process undertaken during project design to engage stakeholders, and the planned information disclosure measures and the process for carrying out consultation with affected people and facilitating their participation during project implementation;
- (ii) assess the project's likely positive and negative, direct and indirect impacts to existing socio-economic conditions in the project's area of influence;
- (iii) identify and evaluate the potential positive and negative socio-economic impacts resulting from the development of the proposed project;

- (iv) present a set of mitigation measures to avoid, reduce, mitigate, or compensate for adverse socio-economic impacts;
- (v) describe the monitoring measures and reporting procedures to ensure early detection of conditions that necessitate particular mitigation measures; and
- (vi) identify who is responsible for carrying out the mitigation and monitoring measures.

### *Scope of the SIA Study*

SIA will report will also cover the following:

- (a) the present status of socio-economic components of the environment;
- (b) The primary data collection of socio-economic conditions of the villages around the 4 km radius of the proposed project,
- (c) The secondary data collection for the whole Amayapura Township,
- (d) Identification and evaluation of socio-economic impacts for construction, operation and decommissioning phases of proposed project,
- (e) Mitigation and enhancement measures for anticipated social impacts in all phases,
- (f) Social management plan (SMP) to manage the necessary mitigation and enhancement measures, and
- (g) Social monitoring program to measure the improvement of the community around the area.

In making impact assessment, the SIA team will mostly referred to the Guidelines and Methodologies from Asia Development Bank (ADB), International Finance Organization (IFC) and Work Bank.

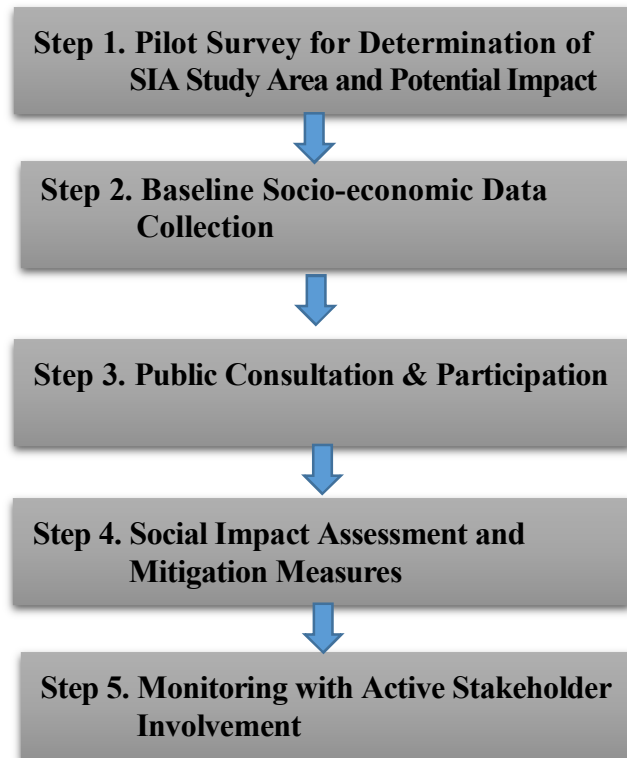
### *Details of the Social Assessment Practitioner*

SIA will be conduct by Socially Responsible Partner (SPR) SIA Team. Below is the background information of SIA Team.

Socially Responsible Partner, SPR		
Specialists including written the SIA report	Dr. Kyaw Swar Tint	Ph.D. (Mining)
	Dr. Thein Tun	Ph.D. (Metallurgy)
	Dr. Myo Min Tun	Ph.D. (Metallurgy)
	Dr. Win Swe	Ph.D. (Geography)
	Ma Nandar Nwe	Dip. and M.S. in EIA/EMS
	Ma Thazin Htwe	Dip. and M.S. in EIA/EMS
	Mg Thant Zin	B.Sc.(Forestry); Dip. in EIA/EMS

### *Methodology for SIA Study*

Socioeconomic impact assessment for proposed project was conducted by the following procedures.



**Main Steps in SIA Study used by SRP Group**

### *Socio-economic Impact Study*

The EIA team will make the impact assessment for socio-economic both positive and negative impacts such as job opportunities, impacts associated with population influx, impacts on social services etc.

#### **7.2.9. Health Impact Assessment**

HIA provides a systematic analysis of the potential community health impacts as well as developing options for maximizing the positive health impacts, minimizing the negative impacts and enhancing health equity/reducing health inequalities. This HIA report was conducted by Socially Responsible Partner (SRP) Social and Health Impact Assessment Group, and the potential health impact of the proposed project on local communities and the wider society were assessed.



### *Procedures for HIA Study*

HIA for proposed project will conduct by the following procedures.

- (a) Scoping process;
- (b) Identification and evaluation of potential health impacts;
- (c) Mitigation measures for potential health impacts; and
- (d) Management and monitoring process HIA as follow:

No.	Stage of Health Impact Assessment	Purposes	Outcomes
1.	Scoping Process	To determine the scope of the HIA to be undertaken.	Outlines of how the HIA will be conducted including the time, resources and activities required.
2.	Identification and assessment of potential health impacts	To identify and assess the potential health outcomes.	Document that describes the potential health outcomes of the proposed sugar mill.
3.	Mitigation	To minimize and remedy for potential health impacts.	Set of mitigation measures to prevent, reduce and minimize for potential impacts of proposed project.
4.	Management and Monitoring	To manage the effectiveness of the HIA and monitor health outcomes.	Document that manage and monitor the HIA process and other outcomes.

### *Scope of the Study*

Initially, a detailed understanding of the project, its aims and objectives is developed. This is followed by a desk-based community health and wellbeing profile using existing local health information from Public Health Department (Dawei). Based on secondary data collection, HIA for local people in nearest villages follows by a more detailed community health impact based on the ground fieldwork, social surveys, focus groups and discussions with key informants such as community health and development workers and local health/public health officials. This study also involves developing a baseline assessment and community profile with a particular focus on existing health and wellbeing problems and assets.

### *Methods of Data Collection*

The typical methods of data collection of existing health conditions consist of the following:

- (a) **Interaction with Government Departments:** Interaction with key government departments such as general administrative office, department of health etc. are conducted to identify constraints and additional information specific to the individual departments and ministries;
- (b) **Household Surveys:** Questionnaires and surveys about health are employed to obtain public needs and concerns from a representative sample household.

### *Data Sources*

Primary and secondary data for obtainable health conditions of local communities were collected from the following data sources.

- (a) Regional health data from department of health;
- (b) Group discussions with key informers,
- (c) Community feedback from household surveys,
- (d) Feedback from government and non-government stakeholders, and
- (e) Public meetings.

### *Law and Legislations Related to HIA*

The relevant laws and legislations that safeguard about the health and wellbeing of public in Myanmar are shown in the following table.

#### **Relevant Laws and Regulations for Human Environment in Myanmar**

<b>Laws and Regulations</b>	<b>Year</b>	<b>Purpose</b>
Town Act and Village Act	1907, 1908	To protect the people and animals of Myanmar from infection diseases.
Essential Supplies and Services Act	1947	To maintain supplies and services essential to the life of the community providing or regulating water supply and environmental sanitation in rural areas.

Public Health Law	1972	To promote and safeguard public health and to take necessary measures in respect of environmental health.
Animal Health and Development Law	1993	To prevent of dangers to animal feeds, prevention of infectious diseases, and prevention of cruelty to animals.

### *Methodology Used in HIA*

HIA for proposed project will be conducted by the following methodology.

- (a) Scoping process for determination of HIA study area and project affected persons (PAPs);
- (b) Data collection for anticipated health impacts;

#### *(a) Scoping Process for HIA Study*

Scoping for HIA study will be done to determine SIA study area and PAPs.

#### *Determination of HIA Study Area*

To similar as SIA study, the HIA study area will conduct within 3 km radius around the proposed project.

#### *HIA Survey Team*

The HIA team will organize 6 people (1 health consultant, 1 social consultant, 2 local people and 2 health surveyors). Two local people are members of quarter administrative offices and 2 surveyors are from qualified survey team. Roles and responsibilities of key consultants are as follow:

No.	Consultants	Role	Responsibility
1.	Dr. Khon Aung M.B.B.S (Ygn)	Health Consultant	Health Impact Assessment and Health Management Plan
2.	U Aung Naing Tun LLB, MBA, MPA, M.Dev.S, M.A (BL)	Health Law Consultant	Health Law Consultant

### *(b) Data Collection*

To assess potential health impacts, HIA team will make sure of both primary and secondary data collections as follow:

#### *Primary Health Data Collection*

Primary health and wellbeing data for nearest villages will be collected by household within the 3 km radius of the project area.

#### *Secondary Health Data Collection*

Secondary data for health and wellbeing profile of nearest village will be sourced from Department of Health, Station Hospital and some data are sourced from Local Administrative Office.

### **7.2.10. Risk Assessment**

There are various factors, which can cause disaster in the mines. These hazards are as follows:

- (1) Natural Hazards and Disaster Risk
- (2) Mining Industrial Hazards.

#### *(1) Natural Hazards and Disaster Risk*

Typical natural hazards in Myanmar include floods, storms and cyclones, droughts, landslides, and earthquakes.

Although there was no natural disaster in the project area according to the secondary data collection, flood and storms hazards can be considered as the most possible natural disaster.

#### *(2) Mining Industrial Hazards*

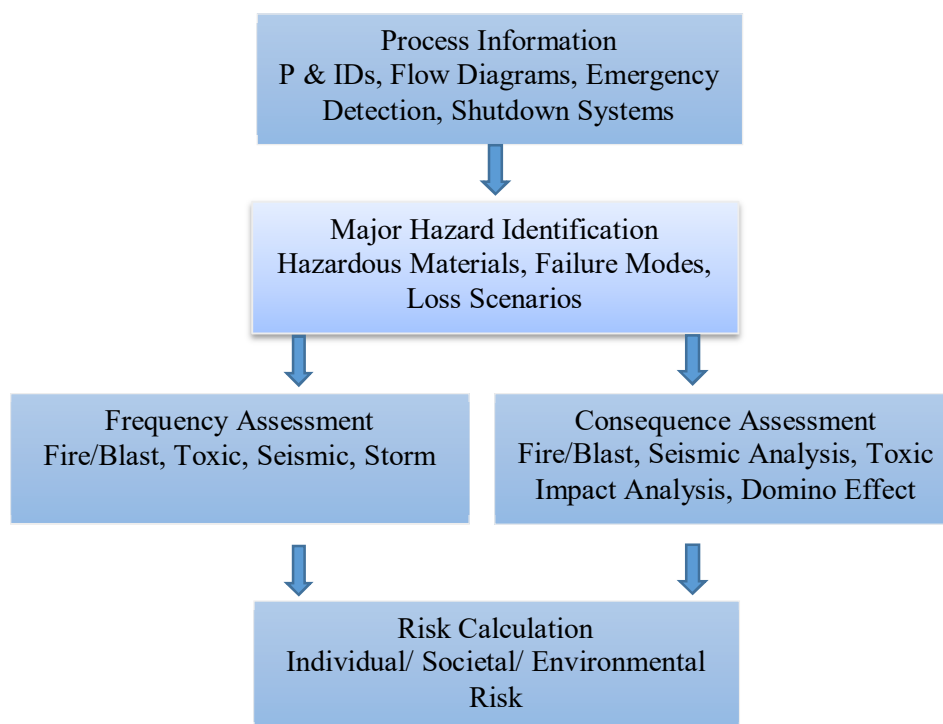
There are various factors, which can cause disaster in the mines. These hazards are as follows:

- Waste rock dumps;
- Equipment & Heavy machinery;
- Settling pond failures; and
- Fire, etc.

There is no a comprehensive approach, or a set of industry guidelines, or technical publications available that address the risks from hazards such as fire, lightening, earthquake, and forest fires etc.

### *Risk Assessment Flow Diagram*

The following is the flow chart for risk assessment procedure.



### *Risk Calculation*

Risk due to hazards at a proposed mine site and its surroundings is composed of summation of all risks given no escalation (i.e. no domino effects) of undesired events and all risks given an escalation (i.e. domino effects) of undesired events:

$$R = \sum R_i + \sum R_j$$

### *Tolerability of Environmental Risk (Category Definitions) – Loss of Containment*

Category	Definitions	
6	Catastrophic	<ul style="list-style-type: none"> <li>- Major airborne release with serious off-site effects</li> <li>- Site shutdown</li> </ul>

		- Serious contamination of ground water or water course with extensive loss of aquatic life
5	Major	<ul style="list-style-type: none"> <li>- Serious toxic effect on beneficial or protected species</li> <li>- Widespread but not persistent damage to land</li> <li>- Evacuation of local populace</li> <li>- Temporary disabling and hospitalization</li> <li>- Serious toxic effect on beneficial or protected species</li> <li>- Widespread but not persistent damage to land</li> <li>- Significant fish kill over 5-mile range</li> </ul>
4	Serve	<ul style="list-style-type: none"> <li>- Hospital treatment required</li> <li>- Public warning and off-site emergency plan invoked</li> <li>- Hazardous substance releases into water course with 1/2-mile effect</li> </ul>
3	Significant	<ul style="list-style-type: none"> <li>- Severe and sustained nuisance, e.g. strong offensive odors or noise disturbance</li> <li>- Major breach of permitted emissions limits with possibility of prosecution</li> <li>- Numerous public complaint</li> </ul>
2	Noticeable	<ul style="list-style-type: none"> <li>- Noticeable nuisance off-site, e.g. discernible odors</li> <li>- Minor breach of permitted emission limits, but no environmental harm</li> <li>- One or two complaints from the public</li> </ul>
1	Minor	<ul style="list-style-type: none"> <li>- Nuisance on site only (no off-site effects)</li> <li>- No outside complaint.</li> </ul>

UK HSE, “Safety and environmental standards for fuel storage sites”, Process Safety Leadership Group, 2009. Environment Agency for England and Wales, “Integrated Pollution Prevention and Control (IPPC) Environmental Assessment and Appraisal of BAT”, July 2003



### *Tolerability Criteria of Environmental Risk*

Category	Definition	Acceptable if frequency less than	Acceptable if reduced as low as is reasonably practical and frequency between	Unacceptable if frequency above
6	Catastrophic	1.0E-06 per year	1.0E-04 to 1.0E-06 per year	1.0E-04 per year
5	Major	1.0E-06 per year	1.0E-04 to 1.0E-06 per year	1.0E-04 per year
4	Serve	1.0E-06 per year	1.0E-04 to 1.0E-06 per year	1.0E-02 per year
3	Significant	1.0E-04 per year	1.0E-04 to 1.0E-06 per year	1.0E-01 per year
2	Noticeable	1.0E-02 per year	~1.0E+01 to 1.0E-02 per year	~1.0E+01 per year
1	Minor	All shown as acceptable	-	-

### **7.3. Key Potential Impacts and Mitigation Measures**

Although the mining operation will include pre-construction, construction, operation and decommissioning phases, there will no necessary to conduct impact assessment for pre-construction and construction phases because the mining operation was started since 1999. So, the impact assessment will take place only for operation and decommissioning phases.

#### **7.3.1. Environmental Impacts of Mining Operation due to Operation Phase**

Environmental impacts of mining operation due to operation phase will be as follow:

- (i) Impacts on Air Environment;
- (ii) Impacts of Noise
- (iii) Impacts on Surface Water Environment;
- (iv) Impacts on Soil and Ground Water Environment;
- (v) Impacts on Biodiversity Environment

#### 7.3.1.1. Impacts on Air Environment

Increase in airborne particulates due to increased dust and exhaust emissions during mine operation. Dust generation could potentially impact on community and worker health due to elevated concentrations of dust (PM<sub>10</sub>), especially along both roads and mining areas. In addition, dust could be generated once the tailings have dried out, since they are susceptible to wind-blown dispersal.

Given the rural nature of the area and ambient air quality monitoring, the air quality is relatively high. So, the proposed operations are not likely to result in exceedances of the selected criteria for PM<sub>10</sub>, NO<sub>2</sub>, SO<sub>2</sub>, DPM, VOCs and dust fall at surrounding sensitive receptors. Moreover, the proposed long-distance haulage is likely to result in exceedances of the selected criteria for PM<sub>10</sub>, and NO<sub>2</sub> for more than 400 m from the centre of the road.

#### Mitigation Measures

A reduction in the amount of dust generated through vehicles and during mining operation can be effectively mitigated by simply reducing the speed of vehicles and by wetting road surfaces. Covering the dried tailings with topsoil and re-vegetating the area can successfully mitigate against wind-blown tailings.

#### Greenhouse Gas (GHG) and Climate Change

Clearing vegetation from the project site will lower the carbon absorption potential of the area. Similarly, project activities and processes including transportation, use of generators and waste management activities have the potential to emit GHGs. Ability of the project infrastructure to withstand the effects of climate change (such as more severe weather, droughts and storms).

#### Mitigation Measures

Replanting the bare area within the mine site.

#### 7.3.1.2. Impacts of Noise

Given the rural and agricultural nature of the of the project area, a substantial increase in noise levels can be anticipated during operation. For the proposed project, the major noise

generating sources during the operation phase will be movement of trucks, operation of trommels, jigs and shaking tables. If most of the operation machineries are running at the same time, this cumulative noise level can increase to 82 dB(A) at 15 m (about 50 feet) distance as follow:

$$\begin{aligned} \text{site} &= 10 \log \left( \frac{10^{8.5} + 10^{8.4} + 10^{8.2} + 10^{7.5}}{4} \right) \\ &= 82.7 \text{ dB(A)} \end{aligned}$$

**Table Typical Construction Equipment Noise Emission Levels**

Equipment Type	Noise Level (dBA at 50 Feet)
Trommel	85
Truck (Medium and Heavy)	84
Jig	82
Shaking Table	75

The predicted noise level at nearest villages during operation phase can be predicted as follow:

Receptors and distances from project	Existing noise levels monitored by integrated noise level meter (dBA)		Calculated noise level at site (dBA)		Reduced noise level at receptors due to Distance (dBA)	Predicted cumulative noise level at receptors (dBA)		Allowable noised level (existing noised level + 3dBA) (dBA)	
	Day Time	Night Time	Day Time	Night Time		Day Time	Night Time	Day Time	Night Time
Local residents in Heinda (0.9km)	50.1	44.5	82.7	-	27.1	50.3	44.5	53.1	47.5
Myaungpyo Village (1.1km)	49.1	43.4			25.4	49.2	43.4	52.1	46.4

According to the above calculation and monitoring of noise level inside the nearest villages, there will no impact of noise according to the operation of mine and so no mitigation is required for the impact of noise. Noise level monitoring result can be higher than the actual result due to the travelling of motorbike and some cars inside the village road near the monitoring station.

#### 7.3.1.3. Impacts on Surface Water Environment

As Heinda Mine is situated in an area of high topographic relief coupled with high average rainfall levels. In the event of less likely, there might have the potential to contaminate surface water unless properly managed mining activities during operation phase. Site clearance, mine waste facilities, open pit developments, effluent discharge also have the potential to impact on surface water. Surface water impacts which have the potential to occur as a result of the proposed project include:

- Sediment loading of water courses and water bodies;
- Erosion;
- Alternation of stream courses due to the sedimentation into the river bed; and
- Alteration and impediment of perennial and non-perennial water courses and natural drainage patterns.

Surface water might be contaminated by the following factors:

#### *Discharge from Processing Plant*

Although wastewater will not release and reuse as process water during summer (February to May) and Winter (October to January), large volume of effluent water (rain water from sediment pond 7) might release during heavy rainy seasons (June to September) into the Myaungpyo Creek. The discharge water with high content of sediments in wastewater might effect aquatic lives, domestic and drinking water quality along the Myaungpyo Creek to the Tanintharyi River. Moreover, there will be impact on agricultural lands along the downstream of wastewater if wastewater enter into the agricultural land during the flood in rainy seasons. In this case, it would be highly unlikely that discharge water might effect to ecology under the systematic detention recycling system.

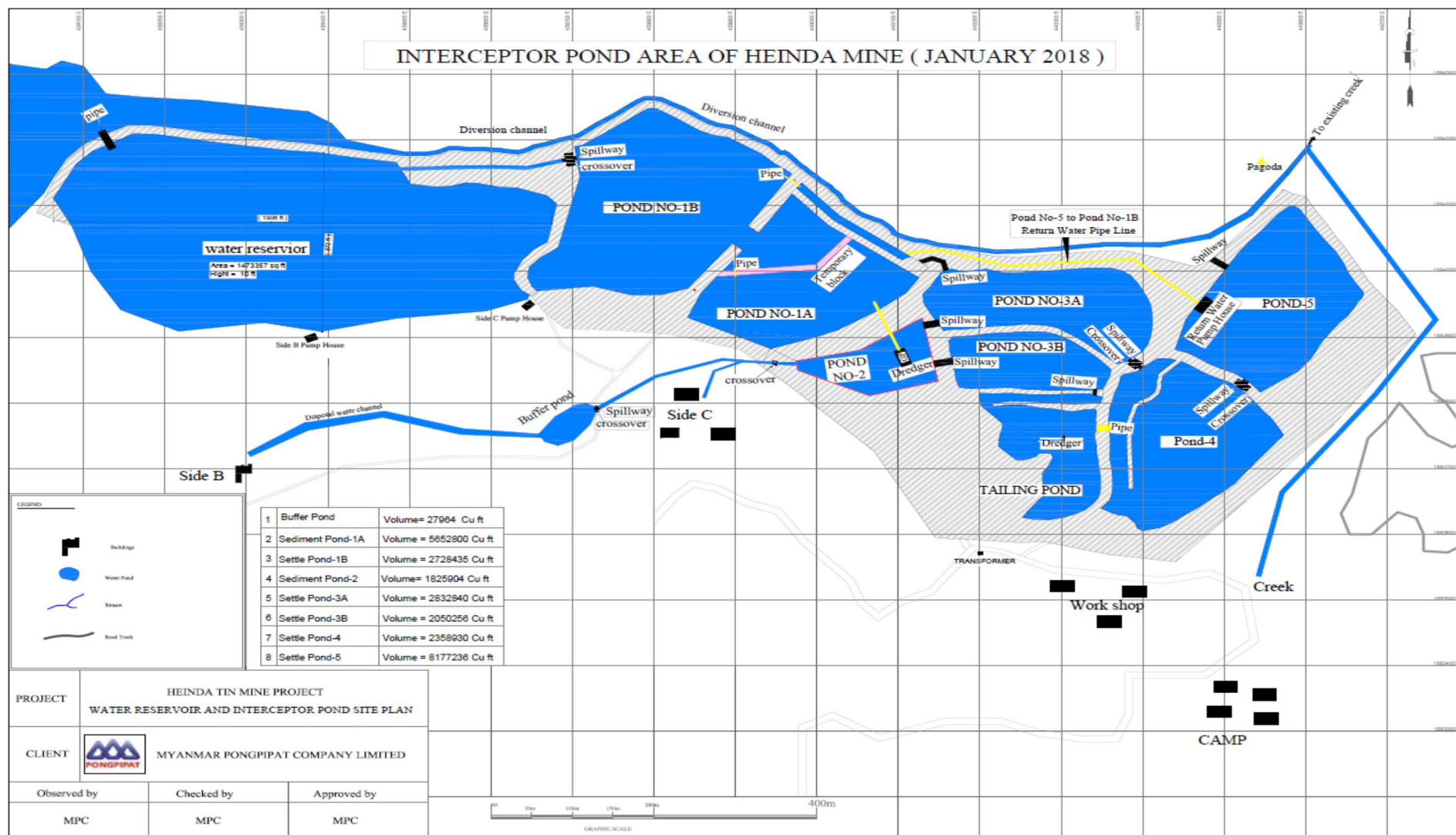
#### Mitigation Measure

Effective sediment ponds according to the following conceptual design will be constructed for wastewater from processing plant.



**Current Condition of Settling Ponds in Aerial Photo**

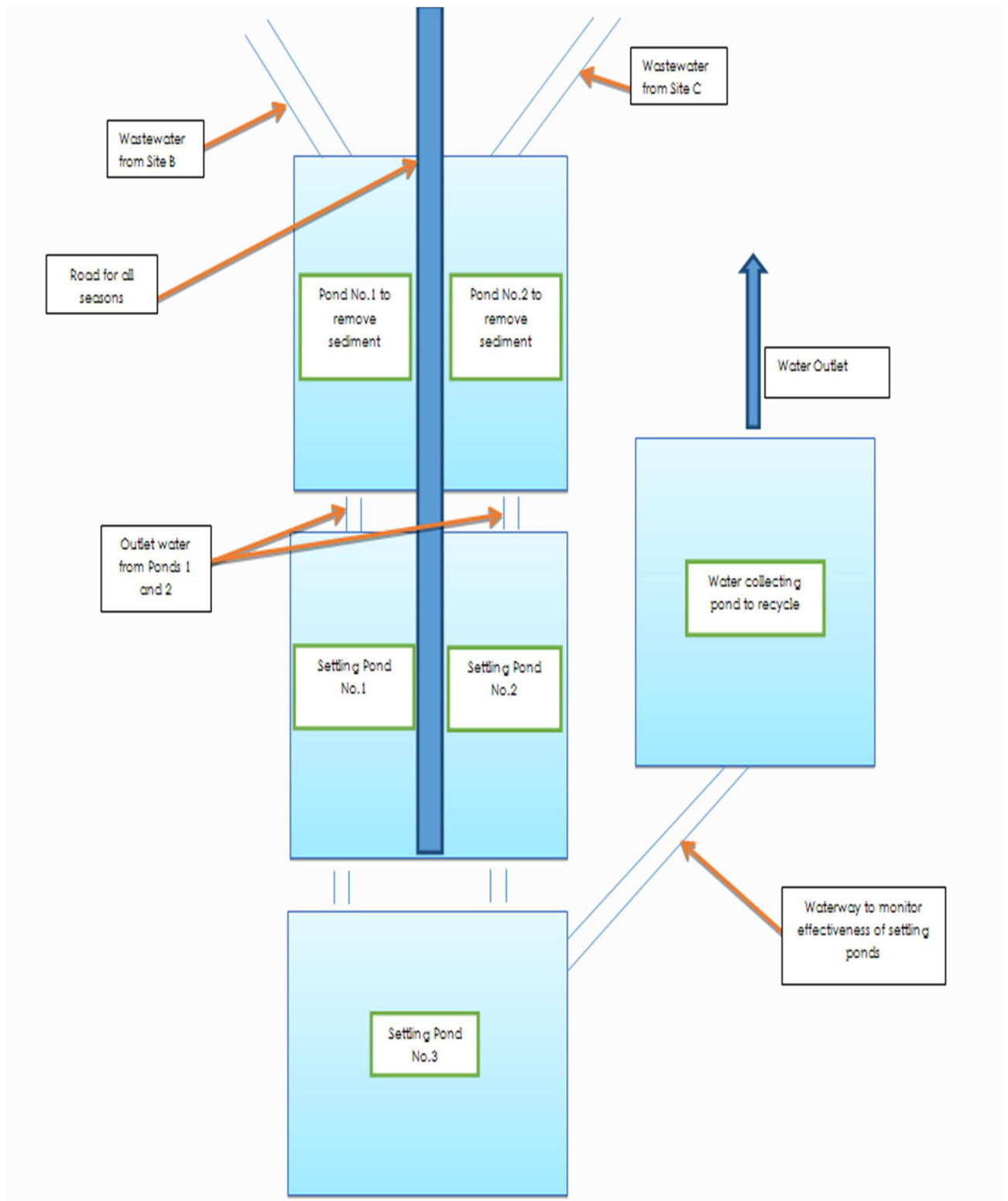




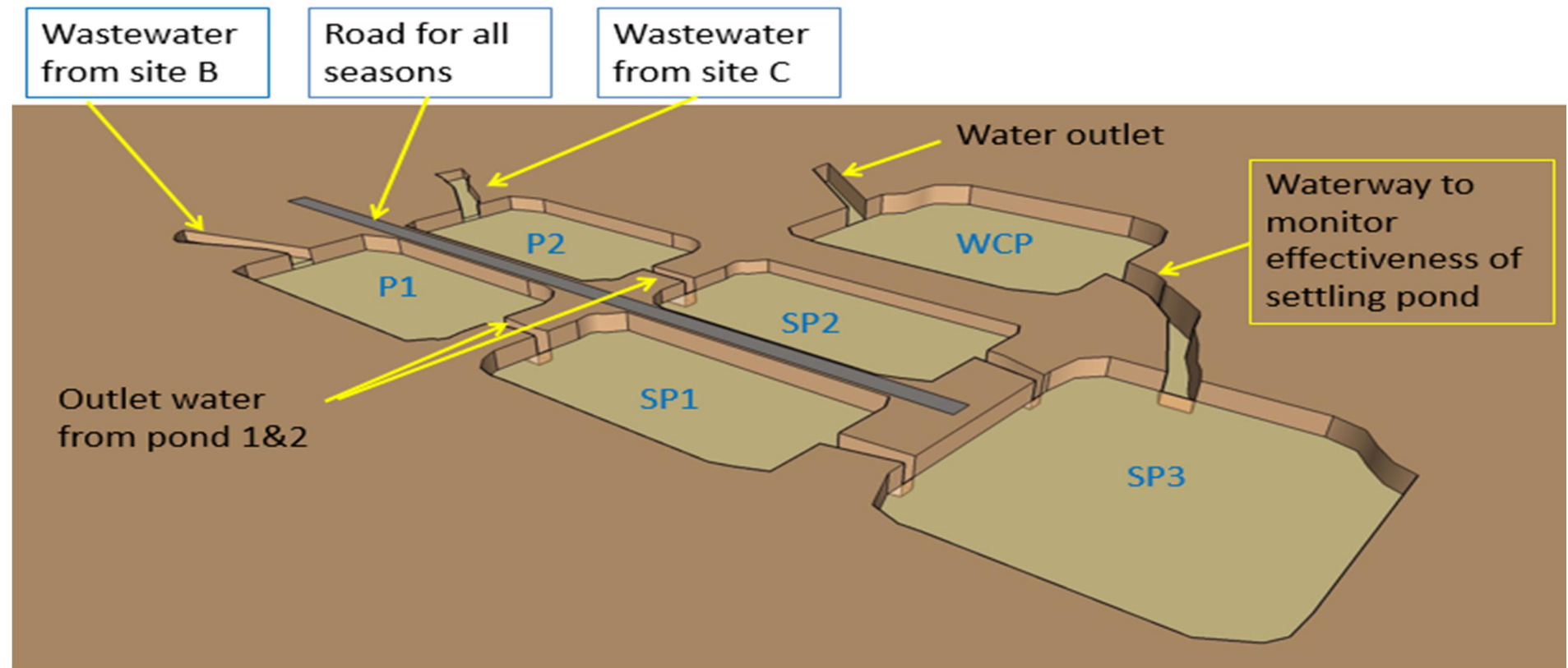
Current Condition of Settling Ponds in Map



According to the current condition of the settling ponds, sediment (fine soil particles) removal system not contain and all of the settling ponds will be full within a few years. So, the developer is proposed by the following conceptual design for settling ponds (wastewater treatment) with sediments removal system.



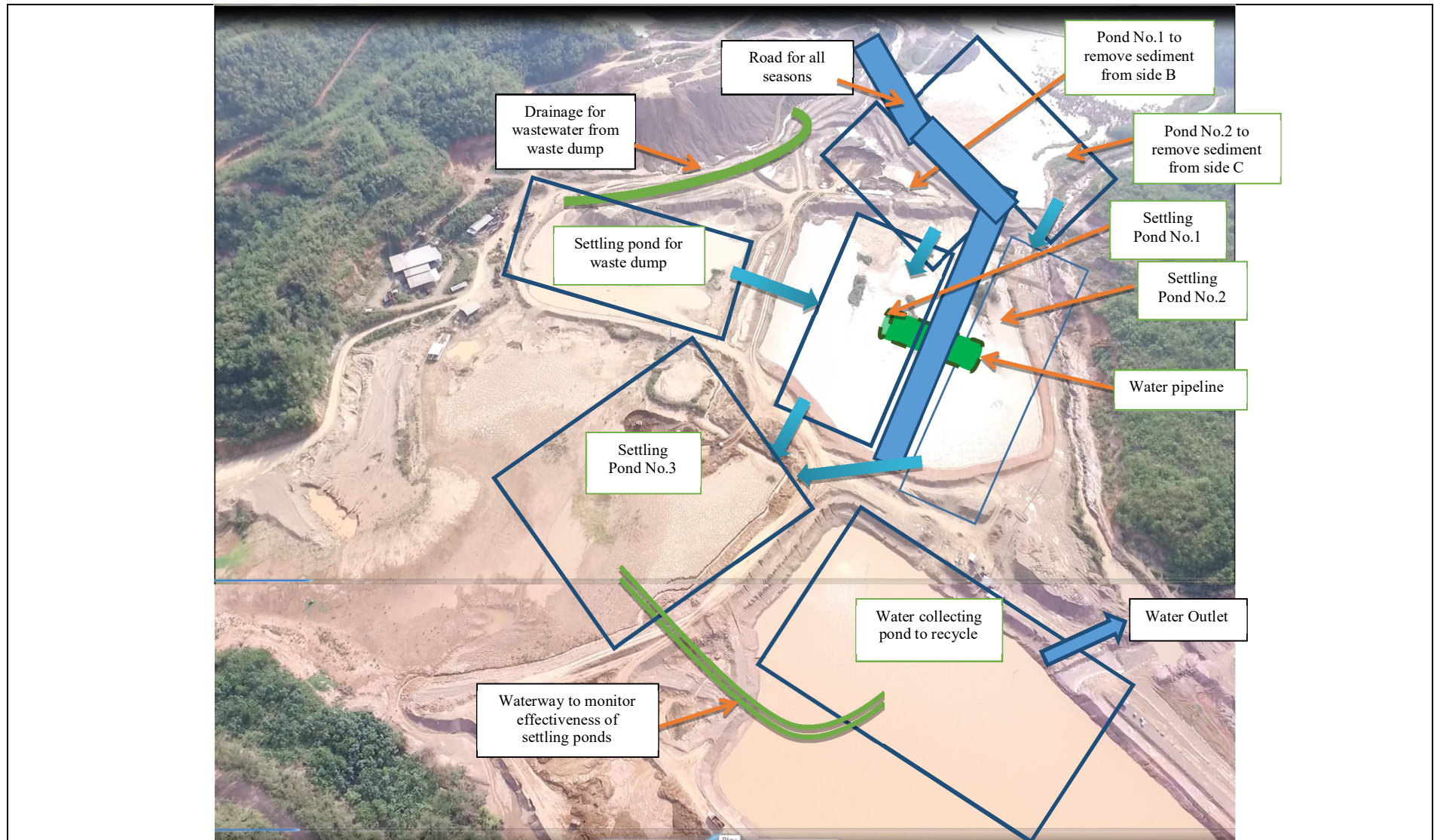
Conceptual Plan Design for Proposed Settling Ponds



P1- pond No.1 to remove sediment  
P2- pond No.2 to remove sediment  
WCP-Water collecting pond to recycle

SP1- Settling pond No.1  
SP2- Settling pond No.2  
SP3- Settling pond No.3

Conceptual 3D Design for Proposed Settling Ponds



Propose Conceptual Design of Settling Ponds in Google Earth

#### 7.3.1.4. Impacts on Soil and Ground Water Environment

Mining activities may affect local groundwater quality due to contaminated effluent or contamination through contact with wastes. Pollution could result from the infiltration of contaminated surface water into the groundwater table. The principal sources of contamination from the surface are hazardous materials such as chemicals and hydrocarbons. Heinda mining activity only use gravity separation and no chemical in the process therefore it would be less likely for contamination impact from chemicals in this case. Poorly managed domestic sanitation (e.g. badly sited pit latrines) and leachate from solid waste disposal sites can also pollute ground water sources. Once an aquifer is contaminated it is impossible to rehabilitate. Although plumes of pollution will migrate very slowly, major pollution incidents may eventually contaminate ground water sources in and around the village. The period over which the impacts occur will be relatively short, but the impacts will be very long lasting.

##### (a) Soil Erosion

Soils in the project area have high potential, but are also highly prone to erosion. The mining operations are also proposed in an area of high topographic relief coupled with high average rainfall levels. The project has the potential to result in soil transfer and sediment loading due to erosion. Soil erosion will also cause surface water pollution.

##### Mitigation Measures

Replantation of the old mining area as soon as possible. Movement, stockpiling and rehabilitation of soils during mine operation, and closure will require careful planning and management.

##### (b) Contamination from Non-ore Pollutants:

Hazardous materials and chemical pollutants (e.g. hydrocarbons from machinery and vehicles, floatation reagents, uncured cement, paints, shutter fluids, etc.) associated mining activities, as well as washing detergents and soap etc., might pollute both groundwater and surface water. These pollutants could be harmful to aquatic biota and impact on drinking water quality for communities and domestic stock downstream. The risk of wastewater arising from the waste rock dump and top soil storage facility.



### Mitigation Measures (Sedimentation and Contamination)

- Store and treat all contaminants so as to eliminate any water pollution risk. No stream or river can be used for partial or total wastewater treatment purposes. No wastewater dilution is allowed.
- Detain mine water and surface run-off from the mining areas in sedimentation ponds before the clear surface water (if uncontaminated) is allowed to flow into the adjacent drainage lines or streams.
- Drain and treat runoff waters coming from hazardous areas such as concentrator plant, mineral stock-piling, concentrates, mine tailings accumulation areas before disposing them at the discharge point.
- Contaminated water from the process plant should be treated in settling ponds and should be stored in a dedicated storage reservoir and fed back to the process water reticulation together with the supernatant or decant water from the TSF.
- Any effluent discharged into the environment must be treated to relevant national standards.
- Ensure that temperature of effluent prior to discharge does not result in an increase greater than 3°C of ambient water temperature.
- Do not discharge effluent with Total Suspended Solids (TSS) of more than 10% of the receiving stream.
- Do not discharge effluent with a pH that fluctuates more than 10% of the receiving stream.

### (c) Potential Groundwater Contamination from the TSF

Although it is unlikely that current existing human users of groundwater in the area will be affected, the resource will be permanently degraded. It is unlikely that acidification will occur during the operational phase, even though waste rock does not have a high acidification potential. Due to the geochemical properties of footwall materials, water quality descriptions for mine water quality during the operational phase, also apply to the TSF waste rock. It is expected that Al, Fe and Mn will mostly be present at concentrations of <10mg/L. As (Arsenic) concentrations may exceed drinking water guidelines, it is expected to be below guidelines. Cd (Cadmium) concentrations may marginally exceed drinking water guidelines. Cu (Copper), Ni (Nickel), Pb (Lead) and Zn



(Zinc) concentrations are expected to exceed drinking water guidelines, and may potentially exceeding DRC Mining regulation guidelines. Water draining through tailings material will have much lower concentrations. Although As, Cd, Ni and Pb concentrations may exceed drinking water guidelines, these are expected to be below guidelines of the effluent level of mining in Myanmar Emission Guidelines. Zn concentrations are expected to exceed drinking water guidelines but below Myanmar Emission Guidelines.

### Mitigation and Management

- Major fissure water features should be measured and mapped.
- Excess water must be pumped to the surface water storage facilities for re-use or discharge into the environment.
- If the flows exceed 0.3Ml/day, volumes of excess water must be measured and reported daily, together with a record of the percentage of surface storage capacity available at the end of the day.
- Water discharged to the surface water environment must conform to site-specific water quality objectives.
- All pollution control dams and the TSF must have impervious base layers or be lined, according to design standards.
- Solid waste disposal sites must be lined with impervious material.
- Strict management of all hazardous materials, such as hydrocarbons and chemicals, must be implemented.
- Prevention of hydrocarbon spills from machinery and vehicles by the use of drip-trays and permanent bunded areas for overnight parking. This should include any workshops envisaged for the project. In addition, workshops should be fitted with oil traps and sumps to ensure that no contaminated water/hydrocarbons are allowed to escape.
- Spills must be cleaned up and remediated immediately after occurrence.
- All contaminated surface water run-off from mine sites must be contained and treated appropriately to relevant national or international standards prior to discharge.
- Any effluent discharged into the environment must be appropriately treated to relevant national or international standards.

#### (d) Contamination from Non-ore Surface Sources

As for surface water resources, groundwater sources might be contaminated by infiltration of contaminated surface water into the groundwater table. The principal sources of contamination from the surface are hazardous materials such as chemicals and hydrocarbons, together with unlined reservoirs of water awaiting treatment and recycling. Poorly managed domestic sanitation (badly sited pit latrines, for instance) and leachate from solid waste disposal sites can also pollute ground water sources. Due to groundwater flow being toward the mine during the operational phase, the groundwater quality of surrounding aquifers are unlikely to be impacted.

Groundwater flow directions will be towards the mine workings in the vicinity of the mine, and water may accumulate in the lowest mining levels. While the mining level is above the valley floor short-term outflows of water may influence small areas bordering the workings; most-likely vertically downward, and probably not extending laterally more than 30m from then mine.

#### Mitigation Measures

Line the basin with appropriate material.

- All groundwater monitoring recommendations mentioned for the mining area are applicable, including groundwater level monitoring and sampling locations/frequency/analyses.
- Ensure that the TSF is regularly and frequently inspected by appropriately qualified and experienced experts, and that all defects are remedied without delay.
- Engineered capping design should have specific objectives to reduce toe seepages as well as infiltration rates to the groundwater system (e.g. through shaping without creating erosion, installing a capillary break, cover thickness, choice of vegetation, or an artificial cover)
- If practical, and found to be a workable solution, the base of the rock discard can be prepared with tailings material, thus preventing direct contact of groundwater from below, with waste rock. It will also reduce the contact time of rainfall recharge with waste rock; thus improving the leachate quality of the toe seepages.
- The most important water quality management measure to consider during the operational phase, is to ensure that mine water from upper levels are allowed to flow to pumping stations as quickly as possible from where it will be pumped into holding dams on various mining levels, and eventually out to the surface pollution control dam.

#### 7.3.1.5. Impacts on Biodiversity Environment

Fragmentation of habitats can lead to the loss of viable populations, especially in animals requiring large home ranges. Mining operations may well have an impact on terrestrial flora and faunal habitats, as well as potentially impacting breeding or foraging habitats of numerous species (birds, amphibians, reptiles, juvenile fish nursery areas etc.). Much of the forests and vegetation found close to the project area have been impacted by humans living and mining in the area since the discovery of tin deposits.

However, extensive areas of pristine primary forest still surround the project area. The impact on these areas is likely to increase in the near future as more land is cleared for tin mining on a commercial scale. This will put added pressure on the ecosystem and the few remaining faunal populations.

As mentioned the area has not seen a dramatic reduction in the numbers and diversity of resident faunal species, and this is not likely to improve with the introduction of the mining project. Although the number of people living in the area has increased little by little, the mining project and its associated noise and transport impacts may limit or prevent some wildlife from returning to the area.

#### Mitigation Measures

Being a mining project, no mitigation measures are required for biodiversity environment expect from replanting (rehabilitation and revegetation program).

#### 7.3.1.6. Impacts on River Flow Regimes

The water requirements for the operational purposes of the mine, including mineral processing, are currently estimated to be a continuous abstraction rate of about 6 litres / second.

The average wet season flow rate of 300 litres /sec measured the Myaung Phyto Creek in June 2017 indicates that these requirements are likely to exceed the capacity of the creek to supply it, especially during the dry season, without adversely affecting the ecological functioning of the river.

However, it will effect on the capacity of water resources in Myaung Phyto Creek during dry season. It will therefore be necessary to provide off-channel balancing storage on the mine site and will not have a significant impact on the quantitative flow regime of the Myaung Phyto Creek.

Estimated maximum inflows for SLC ranged from around 500 cubic metres to about 5000 m<sup>3</sup>/d at the anticipated maximum mine depth. These volumes of water will need to be pumped from the mine to keep the workings dry, and are equivalent to pumping rates rising from 6 to 60 litres per second over the operating life of the mine. These estimates are based on incomplete knowledge of the geohydrological conditions in the mining area, and must be regarded as first-order estimates.

### Mitigation Measures

- Minimise abstractions by recycling as much previously-used water as possible.
- Avoid working (especially mineral processing) during dry seasons.

#### 7.3.1.7. Failure of Tailing Storage Facility

In the event of most unlikely, a partial or total failure of the containment wall might lead to large volumes of sediment and tailings being released into the Myaungpy Creek. If the failure occurs as a result of a major rainfall / flooding event, water levels in the Myaungpyo may rise sufficiently high to damage or threaten the integrity of infrastructure near to the creek, such as the agricultural lands, betal plantation, infrastructures and road.

A catastrophic failure towards the end of the life of the mine during a very high flood will almost certainly result in sediment being washed downstream into the Myaungpyo Creek, which is also a tributary to the Pauk Tai River and Dawei River. It is important to note that the failure of the TSF will have water quality implications for the Myaungpyo Creek, and probably also for the Pauk Tai River.

### Mitigation Measures

- Ensure that the TSF is designed and constructed to the highest possible safety standards, to withstand an appropriately extreme flooding event.
- Ensure that the TSF is regularly and frequently inspected by appropriately qualified and experienced experts, and that all defects are remedied without delay.

#### 7.3.1.8. Hazardous Wastes

Inappropriate storage of wastes, particularly those exhibiting harmful properties (i.e. hazardous wastes), can result in the contamination of land and water resources. Leachate

may be formed as water percolates through the solid waste, and this leachate may contain a variety of toxic compounds, including metals. As such, it could result in the contamination of water and land. The presence of certain toxic compounds in water as a result of pollution may render the water unsuitable for certain applications, including human consumption.

### Mitigation Measures

- All wastes will be managed according to the requirements of No. (2) Mining Enterprise legislation and, preferably, the requirements of the IFC General EHS Guidelines (2007);
- All general wastes that cannot be reused or recycled will be stored temporarily in a dedicated area and then transported regularly to the proposed landfill for disposal;
- The proposed general landfill site will be sited, designed and operated to international standards to isolate the wastes and prevent environmental contamination, particularly groundwater contamination (EHS Guidelines for Waste Management Facilities, IFC 2007).
- The landfill site will be located and designed in such a way so as to minimise the risk of contamination of this water resource;
- A comprehensive Integrated Waste Management Plan (including the management of hazardous wastes) should be developed for the site
- All employees, contractors and visitors to the site must be informed of correct waste management procedures, including separation of general and hazardous waste at source;
- Waste storage and disposal areas must be located at least 100m from surface water resources or important drainage lines.
- The landfill sites must be secured at all times to prevent unauthorised access.

#### 7.3.1.9. Impacts on Transportation and Traffic

The project is located in a rural area with limited vehicular traffic, substantial pedestrian and livestock traffic, and high topographical relief. Anticipated mine traffic volumes and loads will be a substantial increase to current levels, as well as a change in the speeds and types of vehicles travelling through the area. Potential traffic impacts and mitigation measures may

require greater financial and/or technical inputs due to the terrain and minimal existing infrastructure.

Developing and upgrading the roads to service the mine, as well as a significant increase in heavy vehicle traffic, will increase risks to local residents' health and safety. Roads in the area are currently used by large numbers of pedestrians, bicycles and motorbikes. There will be an increase in the amount of vehicle movements in proximity to the mining operation. Although local communities are not unfamiliar with vehicles, the risk of traffic accidents is still very important. Villages situated along existing roads will be especially at risk. Vehicle related dust pollution ( $PM_{10}$ ) may also be a significant issue if not intentionally mitigated.

### Mitigation Measures

Reduce speed within the Heinda Village internal roads and use traffic safety sign at every crossing within the village roads. To minimise the risk of accidents occurring the following is recommended:

- A speed limit appropriate to the design and construction factors and characteristics of the roads be implemented (such as width, horizontal and vertical alignment, grade, sightlines and surfacing material) for all delivery vehicles, and strictly enforced.
- Heavy delivery vehicles should not travel between 10pm and 6am unless it is absolutely unavoidable.
- Delivery vehicles must not be overloaded and loads should be securely fastened.
- Consistent random spot checks on drivers must be conducted to ensure they are not under the influence of drugs or alcohol.
- In the event that accidents do occur, within each vehicle, an emergency response plan should be provided. This should specify the actions required of the driver in the event of an accident. This should contain the following information at least:
  - Contact numbers for local police, local ambulance and supervisor.
  - Instructions on basic first aid that can be administered to stabilise the injured.
  - The supervisor, in turn, should have a rehearsed emergency response plan to provide assistance to the driver and victims.



#### 7.3.1.10. Visual Impacts

Visual impact from the project refers to receptors and locations from which the change in landscape or topography would be visible during operation, closure, and post-closure of the project.

#### Mitigation Measures

Replantation have to make during the mining operation and before and after the mine closure within the mining area.

### 7.3.2. Impacts Resulting from the Decommissioning Phase

#### 7.3.2.1. Surface Hydrology and Hydrogeology

##### (a) Impacts on Surface Water Resources

The extent of the post-closure impacts on surface water resources will depend on the extent to which the mine site is rehabilitated. Unless the site is properly cleared and reinstated, surface runoff might carry sediments and residual pollutants into the Myaung Pyo Creek, and then into the Dawei River. Contamination will progressively decrease as the site returns naturally to a vegetated state.

##### (b) Impacts on Groundwater Resources

Removal of all infrastructure means:

- Removing all surface infrastructure, including the mineral processing plant, machinery, plant, workshops, stores and offices.
- Closing and capping the TSF.
- Closing and capping the pollution control dams.
- Closing the run-of-mine pad.

It is anticipated that the removal of all infrastructure will result in short-term impacts on ground water yields, most of which will be of negative significance, but will be an improvement compared to if everything were simply to be abandoned in situ. It is, however, anticipated that contamination plumes from the TSF will potentially reach the nearby the Myaung Pyo Creek – within 10 years to 35 years after mine closure.

### 7.3.2.2. Impacts Associated with the Decommissioned and Rehabilitated TSF

The TSF water balance will depend on the final cap design. Important considerations include cap permeability, cap thickness, vegetation, and run-off potential. Due to the saturated groundwater conditions along the natural drainage lines inside the TSF footprint area (a limiting factor for the volume of tailings water that can infiltrate to the groundwater system), most water entering the cap will continue to drain as toe seepages.

Due to the capping of the TSF, and the prediction that rainfall infiltration through the TSF footprint will not exceed natural rainfall recharge prior to the construction of the TSF, groundwater levels should not be impacted after closure, and the post-closure groundwater levels should approximate the pre-mining situation.

The contamination plume that develops over the long-term after the mine closes, will depend on water quality trends inside the TSF, the rate at which water seeps from the TSF to the groundwater system and aquifer hydraulic/hydro-chemical parameters. The contamination plume will be different at shallower and deeper aquifers.

If a means of mitigation can be identified to reduce the TSF impact by 50% (e.g. reduce infiltration by 50% through an effective capping system, or reduce the sulphate concentrations by 50% through choice of material) the impact on the surface water environment should improve accordingly, possibly to acceptable concentrations.

### *Mitigation and Management*

- Remove all above-ground structures, including all hazardous materials storage facilities.
- Remove any areas of contaminated soils - empty and clean out water storage dams.
- Revegetate the entire site: maintain stormwater management system until the site is sufficiently vegetated to prevent further erosion.
- Cap and re-vegetate the ROM pad and TSF.
- All demolition and rehabilitation work must be in accordance with the requirements of closure specifications and objectives.
- Liners will be removed from all pollution control dams and the TSF, and surface areas capped and re-vegetated.
- The post closure land use objectives for unaffected forest areas will be re-instated.

- Groundwater monitoring is to be continued for a period of at least 2 years after closure.
- Water levels and water quality must be recorded using a system of groundwater monitoring boreholes.
- Water levels and water quality in the mine portal system must be monitored for at least five years after closure to confirm predictions of post closure stratification.
- Quarterly groundwater monitoring during post closure must continue until a steady state water level is reached and ground water quality has returned to pre-mining state.
- The mine access portal should be sealed.
- The mine must be allowed to flood as quickly as possible.
- All mining-related changes to the surface topography during mining which may potentially increase rainfall recharge to the mine, such as ponding of water on surface, should be shaped to increase surface water run-off.
- Excess contaminated water on the surface should be pumped into the mine.
- Water levels and water quality measurements in the portal system must continue at least 5 years after flooding to confirm predictions.
- Shaft quality measurements probably at an initial monthly frequency, and later six-monthly.
- As a further safety precaution, the shaft systems will be sealed.
- Operational phase management measures included re-evaluations of the potential impact of the TSF on the local groundwater system. Studies were also recommended to verify the chemicals of concern if compared to applicable water quality guidelines, as well as alternative TSF design criteria. It is assumed that these studies will focus on measures to reduce the long-term impact on the groundwater system; primarily relating to the engineering capping design
- General groundwater monitoring recommendations are important. Surface water monitoring should continue as specified by the surface water expert.
- If an engineered solution cannot be found to prevent toe seepages, a solution should be found to manage contaminated toe seepages water from the TSF; i.e. to prevent contaminated water run-off.
- Groundwater monitoring should continue for a recommended period, as indicated by a qualified hydrogeologist, most likely initially on a six-monthly basis, for the same localities and water quality parameters as specified for the operational

phase. Groundwater monitoring will depend on the nature and extent of impacts after mine closure.

- Surface water monitoring should continue as specified by the surface water expert.
- All mining-related changes to the surface topography during mining which may potentially increase rainfall recharge to the mine (e.g. ponding of water on surface), should be shaped to increase surface water run-off.

## 8. RISK ASSESSMENT

Risk assessment is the analysis and mitigation of risks of natural disasters and major industrial mining accidents with respect to consequences for the Project and resulting environmental and social impacts.

### 8.1. General Aspects

The Risk Assessment (RA) for safety in a mine project enables the identification and assessment of Hazard Scenarios that could threaten the safety of individuals, the physical integrity of the environment or the pursuit of economic activities.

Safety has now been the priority of every mining company and there are harsh penalties issued upon companies that do not prioritise the health and safety of their employees and the environment in which they operate. Zero harm is the recent target for mining companies to achieve and this can only be achieved through collaboration with the government, mining companies and mining employees.

The legislation requires mining companies to have code of practices, standards and procedures in place so that workers can know how to keep their working places safe and free from hazards or risks. Workers must at all times be kept on the alert about hazards that are prone to their respective working places so as to combat the issues regarding injuries related to uncontrolled hazards. It should be noted that although mining is still a risky environment, owners and contractors are working very hard to eliminate, minimize and control the hazards associated with mining operations.

This chapter will discuss safety in surface tin mining. It will identify main hazards or hazardous areas in surface mines. Furthermore, it will outline systems and procedures, together with innovative technologies that are employed in surface mining to ensure a safe mining operation. This report was compiled by making use of the internet, literature reading from the library and online books on safety.

### 8.2. Identification of Hazards and Risk Assessment

There are various factors, which can cause disaster in the mines. These hazards are as follows:

- (1) Natural Hazards and Disaster Risk
- (2) Mining Industrial Hazards.

### **(1) Natural Hazards and Disaster Risk**

Typical natural hazards in Myanmar include floods, storms and cyclones, droughts, landslides, and earthquakes.

Although there was no natural disaster in the project area according to the secondary data collection, flood and storms hazards can be considered as the most possible natural disaster.

Natural Disaster Management Plan proposed in the following section— 4 in detail.

### **(2) Mining Industrial Hazards**

There are various factors, which can cause disaster in the mines. These hazards are as follows:

- Waste rock dumps;
- Equipment & Heavy machinery;
- Settling pond failures; and
- Fire

#### Waste Rock Dumps

The waste rock dumps may cause landslides. High rock dumps created at the quarry edge may cause sliding of the dump or may cause failure of the pit slope due to excessive loading, thereby causing loss of life and property. Siltation of surface water may also cause run-off from waste rock dumps.

#### Equipment & Heavy Machinery

One of the biggest contributors to surface mining accidents is equipment and machinery. This is the case because for most if not all surface mines are mechanised operations meaning that machines and equipment are responsible for the daily operations of the mine. Most of the accidents during transport of dumpers, trucks, proclaims, ripper dozers and other heavy vehicles are often attributable to mechanical failures and human errors.

For proper control and minimisation of hazards associated with equipment and machinery especially mobile equipment hazards, it is paramount that emphasis be placed on training. Operators of mobile equipment are to be trained on how to properly operate these equipment and be found competent.

Once they are deemed competent as haulage truck operators they will be trained on how to identify, minimise, control and eliminate hazards or risks associated with the operation of haul trucks as required by section 10 of Mine Health and Safety Act.



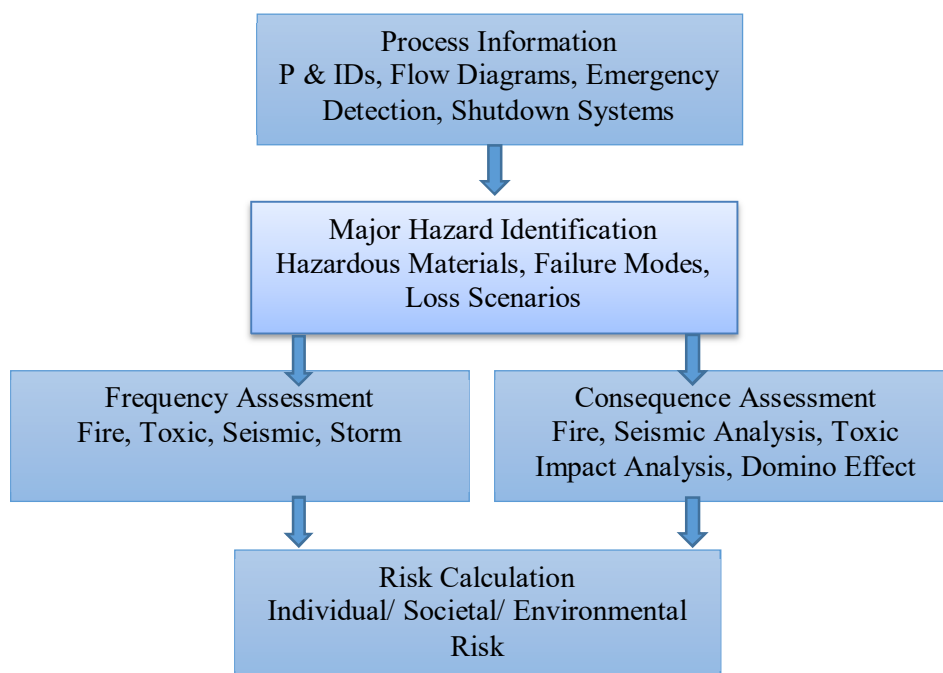
Another factor that contributes to haulage accidents is the construction of unsafe haul roads. It is of utmost importance that haul roads are designed and constructed according to laid down procedures and standards. In order to have a safe haul road that will be free from defects and result in excellent traffic, it is advisable to follow guidelines issued by (Tannant & Regensburg, 2001) when designing or constructing haul roads. The main aspect of traffic management of haul roads will be to focus on the geometric design of the road. By adhering to vertical alignment and horizontal alignment issues such as the stopping distances, sight distances, grade, width, super-elevation, curves and safety berms then most of the accidents can be eliminated.

#### Failure of Tailing/Settling Ponds

In the event of highly unlikely, the failure of tailing/settling ponds may cause instability of the pond side walls. The failure holds as much weight of water volume in the pond and erosion of soil at the walls. If it occurs it can cause undesirable events such as permanent disability, serious injuries, loss of life and damage to equipment and infrastructure. There is no a comprehensive approach, or a set of industry guidelines, or technical publications available that address the risks from hazards such as fire, blast, toxic smoke, lightening, earthquake, loss of containment (dike failure, etc.), forest fires and etc.

### 8.3. Risk Assessment Flow Diagram

The following is the flow chart for risk assessment procedure.



### Risk Calculation

Risk due to hazards at a storage tank terminal and its surroundings is composed of summation of all risks given no escalation (i.e. no domino effects) of undesired events and all risks given an escalation (i.e. domino effects) of undesired events:

$$R = \sum R_{no\ escalation} + \sum R_{escalation}$$

### Tolerability of Environmental Risk (Category Definitions) – Loss of Containment

Category	Definitions	
6	Catastrophic	<ul style="list-style-type: none"> <li>- Major airborne release with serious off-site effects</li> <li>- Site shutdown</li> <li>- Serious contamination of ground water or water course with extensive loss of aquatic life</li> </ul>
5	Major	<ul style="list-style-type: none"> <li>- Serious toxic effect on beneficial or protected species</li> <li>- Widespread but not persistent damage to land</li> <li>- Evacuation of local populace</li> <li>- Temporary disabling and hospitalization</li> <li>- Serious toxic effect on beneficial or protected species</li> <li>- Widespread but not persistent damage to land</li> <li>- Significant fish kill over 5-mile range</li> </ul>
4	Severe	<ul style="list-style-type: none"> <li>- Hospital treatment required</li> <li>- Public warning and off-site emergency plan invoked</li> <li>- Hazardous substance releases into water course with 1/2-mile effect</li> </ul>
3	Significant	<ul style="list-style-type: none"> <li>- Severe and sustained nuisance, e.g. strong offensive odors or noise disturbance</li> <li>- Major breach of permitted emissions limits with possibility of prosecution</li> <li>- Numerous public complaint</li> </ul>

2	Noticeable	<ul style="list-style-type: none"> <li>- Noticeable nuisance off-site, e.g. discernible odors</li> <li>- Minor breach of permitted emission limits, but no environmental harm</li> <li>- One or two complaints from the public</li> </ul>
1	Minor	<ul style="list-style-type: none"> <li>- Nuisance on site only (no off-site effects)</li> <li>- No outside complaint.</li> </ul>

UK HSE, “Safety and environmental standards for fuel storage sites”, Process Safety Leadership Group, 2009. Environment Agency for England and Wales, “Integrated Pollution Prevention and Control (IPPC) Environmental Assessment and Appraisal of BAT”, July 2003

### *Tolerability Criteria of Environmental Risk*

Category	Definition	Acceptable if frequency less than	Acceptable if reduced as low as is reasonably practical and frequency between	Unacceptable if frequency above
6	Catastrophic	1.0E-06 per year	1.0E-04 to 1.0E-06 per year	1.0E-04 per year
5	Major	1.0E-06 per year	1.0E-04 to 1.0E-06 per year	1.0E-04 per year
4	Serve	1.0E-06 per year	1.0E-04 to 1.0E-06 per year	1.0E-02 per year
3	Significant	1.0E-04 per year	1.0E-04 to 1.0E-06 per year	1.0E-01 per year
2	Noticeable	1.0E-02 per year	~1.0E+01 to 1.0E-02 per year	~1.0E+01 per year
1	Minor	All shown as acceptable	-	-

A comprehensive, holistic approach will be done for determining risk in and around the hydrocarbon storage tank terminal accounting for domino effects.

#### 8.4. Emergency Response Plan (ERP)

An emergency is an unplanned event when a project operation loses control, or could lose control, of a situation that may result in risks to human health, property, or the environment, either within the facility or in the local community. Emergency incident response plan for proposed mine site is proposed to mitigate harms on humans and environment in the project area and its vicinity in case of incident. This plan provides the management structure, key responsibilities, emergency assignments and general procedures to follow during and immediately after an emergency. Moreover, it is necessary to establish ERP to address the immediate requirements for a major disaster or emergency in which normal operations are interrupted and special measures must be taken to:

- Save and protect the lives of employees;
- Manage immediate communications and information regarding emergency operations and work site safety;
- Provide essential services and operations;
- Provide and analyze information to support decision-making and action plans; and
- Manage resources effectively in an emergency operation.

##### 8.4.1 Elements of ERP

Emergency Preparedness and Response Plan that is commensurate with the risks of the facility and that includes the following basic elements:

- (a) Communication systems
- (b) Emergency resources
- (c) Training and updating
- (d) Business Continuity and Contingency

Additional information is provided for key components of the emergency plan, as follows:

##### (a) Communication systems

##### (i) Worker Notification and Communication

Alarm bells, visual alarms, or other forms of communication should be used to reliably alert workers to an emergency. Related measures according to IFC Guidelines include:

- Testing warning systems at least annually (fire alarms monthly), and more frequently if required by local regulations, equipment, or other considerations; and
- Installing a back-up system for communications on-site with off-site resources, such as fire departments, in the event that normal communication methods may be inoperable during an emergency.

## **(ii) Community Notification**

If a local community may be at risk from a potential emergency arising at the facility, the company should implement communication measures to alert the community, such as:

- Audible alarms, such as fire bells or sirens;
- Fan out telephone call lists;
- Vehicle mounted speakers;
- Communicating details of the nature of the emergency;
- Communicating protection options (evacuation, quarantine); and
- Providing advises on selecting an appropriate protection option.

## **(iii) Media and Agency Relations**

Emergency information should be communicated to the media through:

- A trained, local spokesperson able to interact with relevant stakeholders, and offer guidance to the company for speaking to the media, government, and other agencies.
- Written press releases with accurate information, appropriate level of detail for the emergency, and for which accuracy can be guaranteed.

## **(b) Emergency Resources**

### **(i) Fire Services**

Myanmar Pongpipat should consider the level of local fire fighting capacity in the event of a major emergency or natural disaster. If insufficient capacity is available, fire fighting capacity should be acquired that may include personal fire engine, pumps, water supplies, trucks, and training for personnel.

*(ii) Medical Services*

Myanmar Pongpipat should provide first aid attendants for the facility as well as medical equipment suitable for the personnel, type of operation, and the degree of treatment likely to be required prior to transportation to hospital during emergency case.

*(iii) Availability of Resources*

Appropriate measures for managing the availability of resources in case of an emergency in Dawei region include:

- Maintaining a list of external equipment, personnel, facilities, funding, expert knowledge, and materials that may be required to respond to emergencies. The list should include personnel with specialized expertise for spill clean-up, flood control, engineering, water treatment, safety, environmental science, etc., or any of the functions required to adequately respond to the identified emergency.
- Providing personnel who can readily call up resources, as required.
- Tracking and managing the costs associated with emergency resources.
- Considering the quantity, response time, capability, limitations, and cost of these resources, for both site-specific emergencies, and community or regional emergencies.
- Considering if external resources are unable to provide sufficient capacity during a regional emergency and whether additional resources may need to be maintained on-site.

**Note: All of these resources should have alternate facilities.**

*(iv) Mutual Aid*

Mutual aid agreements decrease administrative confusion and provide a clear basis for response by mutual aid providers. Where appropriate, mutual aid agreements should be maintained with other organizations to allow for sharing of personnel and specialized equipment.

*(v) Contact List*

The company should develop a list of contact information for all internal and external resources and personnel in Dawei region. The list should include the name, description,



location, and contact details (telephone, email) for each of the resources, and be maintained quarterly. The contact list should include General Administrative Department (Dawei), General Administrative Department (Myitta), Myanmar Police Force (Myitta), Myanmar Police Force (KyoughtMaeTaung), Public Health and Medical Services (Myitta), Public Health and Medical Services (Heinda), Fire Services Department (Myitta), Fire Services Department (KyoughtMaeTaung), and Department of Relief & Resettlement (Dawei) etc.

### **(c) Training and Updating**

The emergency preparedness facilities and emergency response plans require maintenance, review, and updating to account for changes in equipment, personnel, and facilities. Training programs and practice exercises provide for testing systems to ensure an adequate level of emergency preparedness. Programs should:

- (i) Identify training needs based on the roles and responsibilities, capabilities and requirements of personnel in an emergency
- (ii) Develop a training plan to address needs, particularly for flood control, fire fighting, spill response, and evacuation. Conduct annual training, at least, and perhaps more frequent training when the response includes specialized equipment, procedures, or hazards, or when otherwise mandated
- (iii) Provide training exercises to allow personnel the opportunity to test emergency preparedness, including:
  - Desktop exercises with only a few personnel, where the contact lists are tested and the facilities and communication assessed.
  - Response exercises, typically involving drills that allow for testing of equipment and logistics.
  - What aspects require improvement,
  - Update the plan, as required, after each exercise. Elements of the plan subject to significant change (such as contact lists) should be replaced and
  - Record training activities and the outcomes of the training.

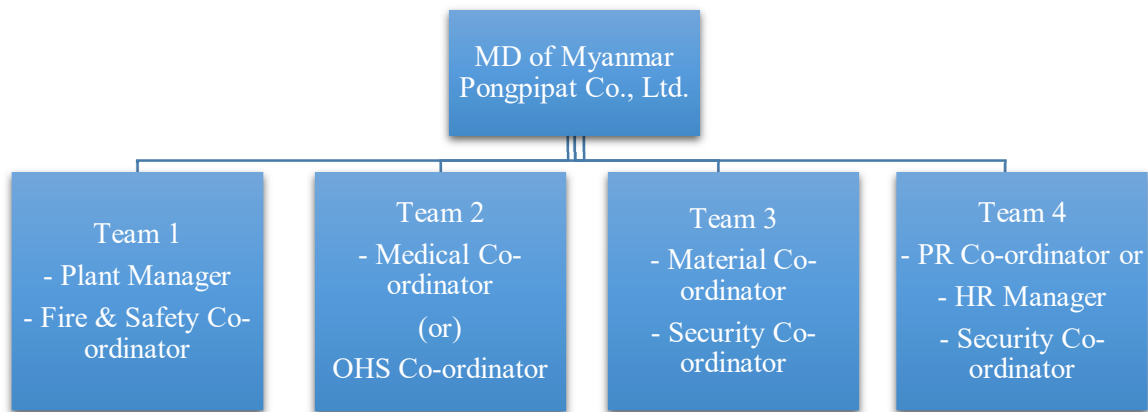
### **(d) Business Continuity and Contingency**

Measures to address business continuity and contingency include:

- (i) Identifying replacement supplies or facilities to allow business continuity following an emergency. For example, alternate sources of water, electricity, and fuel are commonly sought.

- (ii) Using redundant or duplicate supply systems as part of facility operations to increase the likelihood of business continuity.
- (iii) Maintaining back-ups of critical information in a secure location to expedite the return to normal operations following an emergency.

#### 8.4.2. Proposed Organization for ERP Team



*Figure - Organization for ERP Team*

#### 8.4.3. Duty Allocation for EPR Team

The followings are the proposed duty allocation for EPR team.

##### (a) Chief Emergency Controller (General Manager)

- Take control and declare emergency.
- Focal person for all team.
- Contact Authorities.

##### (b) Plant Manager

- Take steps. Make Emergency shut-down of activities. Put everything in Safe condition.
- Evacuate.
- Commence initial emergency case, till Fire Department or other agencies comes to take up.
- Identify materials requirements and call Material Manager.

**(c) Medical Coordinator**

- Establish Emergency Center, Treat affected persons,
- Transfer/Remove Patients.
- Assign and Deploy staff.
- Contact Authorities.

**(d) Material Coordinator**

- Dispatch necessary Supplies.
- Arrange Purchases.
- Providing equipment perform shutdown procedures, damage assessments, emergency repairs and equipment protection.

**(e) Fire & Safety Coordinator**

- Be Overall in-charge for Fire and Safety.
- Coordinate with Area Coordinator and Direct the Operations.
- Coordinate with City and Other Fire-tenderers.

**(f) Public Relationship Coordinator & Security Coordinator**

- Remove Crowd
- Arrange Gate security
- Contact Police
- Arrange evacuation
- Contact outside Agencies if asked.
- Handle news media
- Mobilise vehicles
- Arrange Food, clothings to Officers inside.

**(g) Emergency Control Center**

- Adequate Internal phones
- Adequate external phones
- Workers Tally

Map showing hazardous storages, Fire horns, Safety equipments, Gates and side gates, Assembly points, List of persons.

## 9.0 CUMULATIVE IMPACT ASSESSMENT

### 9.1. Methodology and Approach

Cumulative Impact Assessment is the process of assessing potential effects on receptors from environmental and social impacts caused by the combined influence of more than one project. Impacts directly associated with the Project are discussed in the preceding sections. In this section the impacts associated with cumulative effects of the Project and other development are described. Evaluation of potential cumulative impacts is an integral element of an impact assessment. In reference to the scope for an impact assessment, IFC's Performance Standards specify that:

*“Risks and impacts will be analyzed in the context of the project's area of influence. This area of influence encompasses...**areas potentially impacted by cumulative impacts** from further planned development of the project, any existing project or condition, and other project-related developments that are realistically defined at the time the Social and Environmental Assessment is undertaken; and (iv) areas potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location”. (IFC 2006).*

Cumulative impacts in relation to an activity are defined in the EIA Regulations (Government Notice R543) as meaning *“the impact of an activity that in itself may not be significant, but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area”*

**Cumulative Impact Defined.** Cumulative impacts result from the successive, incremental, and/or combined effects of an action, project, or activity when added to other existing, planned, and/or reasonably anticipated future ones. For practical reasons, the identification and management of cumulative impacts are limited to those effects generally recognized as important on the basis of scientific concerns and/or concerns of affected communities.

## 9.2. Anticipated Cumulative Impacts

The predicted possible cumulative impacts and their causes are shown in the following table.

No.	Impacts	Causes
1.	Water pollution in the downstream area of mine site	Turbidity, dissolved matters and suspended matters may be rise to downstream area due to the operations of the mine site
2.	Sediment discharged from tin mining activities causes siltation of waterways	waterways had narrowed and creeks had been redirected by siltation in several locations

### *Mitigation Measures for Cumulative Impacts*

A reduction in the amount of Turbidity, dissolved matters and suspended matters during mining operation can be effectively mitigated by effective design of tailing pound treatment system.

In downstream areas the first line of defense is to maintain land cover and prevent soil erosion in the first place. The second line of defense is to trap the material before it reaches the stream network (known as sediment control). In downstream areas the defense is to keep land uncovered for as short a time as possible during construction, and to use silt screens to prevent the sediment from getting released in water bodies. During dredging the spill can be minimized but not eliminated completely through the way the dredger is designed and operated. If the material is deposited on land, efficient sedimentation basins can be constructed. If it is dumped in relatively deep water there will be a significant spill during dumping, but not thereafter, and the spill that does arise will have minimal impact if there are only fine-sediment bottoms nearby.

## 10. COMMUNITY ENGAGEMENT AND COMMUNITY DEVELOPMENT

In this study, effective public consultation and participation approaches in the form of stakeholder identification, focus group discussions, public meetings and public disclosure were conducted. Public participation empowers local people so that they regard the development projects as their own. Public participation (community involvement) also reduces the impact of uncertainties and stress caused by the proposed project.

### 10.1. Stakeholders Identification

The following local communities, authorities and NGOs can be considered as key stakeholders who are directly or indirectly related to the proposed project.

- (a) Local People (Heinda Village, Myaung Pyo Village, Wa Kone Village, Kim Boom Chone Village, Shwe Chaung Village, Myauk Mae Taung Village, Taung Thone Lone Village);
- (b) Village Administrative Offices (Heinda Village, Myaung Pyo Village, Wa Kone Village, Kim Boom Chone Village, Shwe Chaung Village, Myauk Mae Taung Village, Taung Thone Lone Village);
- (c) No. (2) Mining Enterprise (Tanintharyi);
- (d) Environmental Conservation Department (Tanintharyi);
- (e) Head of Local Administration Office (Dawei);
- (f) City Development Committee (Dawei);
- (g) Department of Public Health (Dawei);
- (h) Department of Forestry (Dawei);
- (i) Planning and Statistics Department (Dawei);
- (j) Department of Settlement and Land Record (Dawei);
- (k) Department of Water Resources Utilization Department (Dawei);
- (l) Department of Labour (Dawei); and
- (m) Local Media, NGOs and CBOs (Dawei Watch, D.R.A, TKP etc.).

### 10.2. Focus Group Discussions

Focus group discussions were carried out with heads of village administration office and elders from almost all of the nearest villages. Through these discussions, information was collected for consideration of PAPs (Project Affected Persons) and potential socio-economic impacts.



### 10.3. Household Surveys

Household sample survey was conducted to evaluate primary socio-economic conditions of the project area and to understand the mood, perceptions and extent of preparedness of the people towards the proposed project. The household survey was carried out to tap the baseline socio-economic conditions of project area and to assess project perceptions and attitudes of the local people over a period of five days. The accuracy of primary data collection was based on the accuracy, number of surveyed household and experiences of surveyors. To get the accurate data, primary data collection was conducted by social specialist, social consultants, local authorities and local people.

### 10.4. Public Meeting for Scoping Report

Public meeting for scoping report was held in Heinda Village in (9.1.2017). There were about 40 people from local people attended in this meeting.



Recorded Photo for Public Meeting for Scoping Report

*Most Public Needs and Concerns during Household Survey and Public Meeting*

During social survey, immediate community needs and concerns about the project were assessed. The most important positive outcomes from the project expected by the local people and their concerns about proposed project are as follow:

Village Name	Most Public Needs	Most Pubic Concerns
Heinda	<ul style="list-style-type: none"> <li>- Upgrade earth based road to bituminous road or concrete road</li> <li>- Upgrade health care facilities</li> <li>- Electricity</li> </ul>	<ul style="list-style-type: none"> <li>- Blockage and damage of village roads due to the travelling of mine cars</li> </ul>
Wa Gone	<ul style="list-style-type: none"> <li>- Upgrade earth based road to bituminous road or concrete road</li> <li>- Drinking water Facilities</li> </ul>	<ul style="list-style-type: none"> <li>- Blockage and damage of village roads due to the travelling of mine cars</li> </ul>
Myaung Phyo	<ul style="list-style-type: none"> <li>- Compensation for damage to agricultural lands in the past</li> <li>- Electricity</li> <li>- Drinking water Facilities</li> </ul>	<ul style="list-style-type: none"> <li>- Entering of waste water into domestic well</li> <li>- Damage to domestic water resources due to waste water</li> </ul>
Yae Bu Wa	<ul style="list-style-type: none"> <li>- Help to improve in bridge &amp; roads</li> <li>- Electricity</li> </ul>	<ul style="list-style-type: none"> <li>- Impacts of waste water</li> </ul>
Taung Thone Lone	<ul style="list-style-type: none"> <li>- Compensation for damage to agricultural lands in the past</li> <li>- Help to improve in agricultural sector</li> <li>- Upgrade of Village Roads</li> </ul>	<ul style="list-style-type: none"> <li>- Entering of waste water into agricultural lands</li> </ul>
Kyaut Mae Taung	<ul style="list-style-type: none"> <li>- Compensation for damage to agricultural lands in the past</li> <li>- Electricity</li> <li>- Upgrade of Village Roads</li> </ul>	<ul style="list-style-type: none"> <li>- Damage to local water resources</li> <li>- Entering of waste water into agricultural lands</li> </ul>
Shwe Chaung, Shwe Hla, Heindu Chaung	<ul style="list-style-type: none"> <li>- Compensation for damage to agricultural lands in the past</li> <li>- Electricity</li> <li>- Help to improve in bridge &amp; roads</li> <li>- Need school teachers</li> </ul>	<ul style="list-style-type: none"> <li>- Damage to local water resources</li> <li>- Entering of waste water into agricultural lands</li> </ul>



### 10.5. Key Stakeholders Meeting

Key Stakeholders meeting was held in Zay Yar Htet San Hotel in (6.3.2017). There were about 50 people from local authorities, communities, NGOs, INGOs and local media, and those who are directly or indirectly affected by the proposed project are attended in this meeting.



Recorded Photo for Key Stakeholders Meeting

### 10.6. Public Meetings

Public meetings are accomplished two times as follow:

#### 10.6.1. First Public Meeting

First public meeting was held in (1.4.2017) Heinda . The aim of first public meeting is -

- (i) To discuss about the possible socio-economic impacts; and
- (ii) To discuss about the alternative ways to avoid the possible socio-economic impacts.

There were about 110 people from local authorities, communities, NGOs and INGOs, and those who are directly or indirectly affected by the proposed project are attended in this meeting. Number of people from different stakeholders are shown in the following table and detailed attendance list are shown in Appendix I. Suggestion letters and key discussion during the meeting are shown in Appendix II and III.



**Recorded Photos during First Public Meeting**

#### 10.6.2. Second Public Meeting

Second public meeting was hold in (9.6.2017) and about (120) people are attended in this meeting. The aim of second public meeting is -

- (i) To discuss the alternative ways to avoid socio-economic impacts;
- (ii) To announce-the anticipated socio-economic impacts of proposed projects;
- (iii) To discuss about mitigation measures for these impacts; and
- (iv) To discuss about the social management and monitoring plan.





**Recorded Photos during Second Public Meeting**

### **10.6.3. Public Disclosure Process**

Summary of SIA report as Myanmar Language are distributed to all key stakeholders as public disclosure process. Softcopies for meeting minutes and summary are also distributed to all participants during second public meeting. Key discussion during the second public meeting is shown in Appendix IV.

## 11. MINE CLOSURE PLAN

### 11.1. Determination of closure objectives

The aim of this closure plan is to ensure that the area transformed by mining, processing and other operational activities is either returned to as natural a state as possible or facilities remaining at the end of the life of mine are utilised for other economically viable and sustainable activities. The closure objectives will achieve as cost effective a manner as possible, and the closure solution will sustainable in the long term. So, the Heinda mine closure objectives are:

- To ensure that the biodiversity and environment on the site is protected.
- To make sure that the following commitments will be achieved as a minimum:
  - The site will be made safe for both humans and animals,
  - The site will be rehabilitated to be physically, chemically and biologically stable
  - The residual impacts will be managed to acceptable levels and will not deteriorate over time, and
  - Closure will be achieved with minimal socio-economic upheaval.

Cross-cutting to the above, MPC will commit to provide sufficient funds at the end of life of mine, to properly implement the closure plan, and also to make provision for possible premature closure, and post closure monitoring requirements.

### 11.2. Reclamation and Rehabilitation

Land degradation is one of the major adverse impact of Heinda Mine and any efforts to control adverse impact would be incomplete without land appropriate reclamation strategy. Though the lease area granted for mine, whether for actual mine excavation or construction of infrastructure facilities, is in the possession of the mine management, necessary steps to keep the area under disturbance at any stage of mining operation to the minimum have been planned. This has been planned by ensuring rehabilitation of the completely excavated area at the earliest by reducing the gap, between the first damage (due to mining activities) and the first repair (reclamation) to the minimum.

It is not possible for current reclamation at any stage of active mine life. There will be no reclamation or backfilling work proposed during the first five years of mining operation. Therefore biological reclamation of the mined out area is envisaged only after the abandoning stage.



### *Biological Reclamation*

Soil binding species like Agave Sisal (Sisal). Dendrocalmus Strictus (Kanta Bamboo) etc. will be planted to stabilize slope or dump. Sirus, Babul, Khair, Acacia. are also the other species which can be used for the biological reclamation purpose. Along the road side fruit bearing tree (e.g, mango) plantation will be proposed.

### *Reclamation of Waste Dump*

The reclamation of will be taken up once individual dumps become inactive. Suitable species will be chosen after consultation with the Forest Department (Dawei). Grass turf will be developing over the inactive dump till reclamation. Reclamation operation will be taken up from the 11<sup>th</sup> years of mining operation after attaining the maximum thickness of tin ore bearing gravels.

### *Shape and Size of Waste Dump*

There will be two waste dumps for the mining operation.

Sr. No.	Location of Dump	Size of Dump in M <sup>3</sup>
1	Along the northern lease  Mine site(98° 26'52.75"E 14° 08'39.76"N)	237x130 x 7.5

Backfilling will be started after the as soon as the mining operation.

### *Stabilization and Vegetation of Waste Dump*

To avoid erosion, silting and flow of top soil the following measures will be used, based on the past experience:

- Proper soil binding species will be planted over the dump.
- The height of waste dump will not more than 5 meter.
- Suitable garland channel to be prepared for proper flow of precipitation run-off at toe of dump and also all around the lease boundary.
- Contour bunding at 100 meters intervals.

### Soil Conservation

The properly stacked soil will be spread over the fully reclaimed area for biological growth in plantation scheme and filling the sapling pits.

### Plantation

The plantation will be done in the area of mining lease year wise plantation is shown in table below for the first five years of mining operation:

Year	No. of Tree	Area in Sq.Meters	Survival rate %
1	170	1150	70 %
2	170	1150	70 %
3	170	1150	70 %
4	170	1150	70 %
5	170	1150	70 %

**Table - Proposed Stage Wise Cumulative Plantation around Heinda Mining Project**

Year	Un-worked area - Dumps		Peripheral		Worked out pit		Village Road in Buffer zone		Total	
	Area	Trees	Area	Trees	Area	Trees	Area	Trees	Area	Trees
1	0.05	5	0.04	4	-	-	0.01	2	0.102	110
1	0.05	5	0.04	4	-	-	0.01	2	0.102	110
1	0.05	5	0.04	4	-	-	0.01	2	0.102	110
1	0.05	5	0.04	4	-	-	0.01	2	0.102	110
1	0.05	5	0.04	4	-	-	0.01	2	0.102	110
1 to- end of mine	0.78	780	0.20	200	1.00	1000	0.30	300	2.280	2280
Post Mining Afforestation	1.00	1000	0.60	600	6.00	6000	1.00	1000	8.600	8600
Total	2.04	2030	1.00	1000	7.00	7000	1.350	1400	11.390	1430

It is intended to plant 50 trees every year along the village roads and other nearby areas outside the lease in consultation with local authorities.

### 11.3. Rehabilitation Strategy

Rehabilitation will be addressed separately and concurrently according to the phases set out below:

- during operational phase,
- during closure phase, and
- post closure phase.

#### (1) Operational Phase Rehabilitation

The proposed rehabilitation strategy is to conduct rehabilitation concurrently while construction of the decline will take place.

Table - Phase 1 Rehabilitation Activities [Construction and Operation]

Physical Rehabilitation	Biophysical Rehabilitation	Water resource restoration
Infrastructure Maintenance	-Soil analysis -Baseline criteria determination -Local seed harvesting -Topsoil management -Concurrent pollution remediation	-Concurrent pollution remediation -Baseline Monitoring -Impact Monitoring

#### (2) Closure phase rehabilitation

Decline use and related activities will be temporarily terminated and the associated infrastructure 'moth-balled' pending a final decision as to the future mining potential for this area.

The drainage system constructed to isolate the decline and drain the shaft area has to be evaluated upon closure in terms of metal and salinity composition. The results of this analysis will guide final disposal of the drainage material. Where the material remain inert, as proposed by the waste characterization study, the material can be retained or used for final closure backfilling.

The excavated drainage system will then be filled with a top soil mix consisting of sand dune material and gravel from the plains (50:50 ratio). Biophysical rehabilitation will then commence where soil amelioration and vegetation establishment takes place. Thereafter vegetation, ecological and soil monitoring to indicate degree of restoration and ecological sustainability.

Table - Phase 2 Rehabilitation Activities [Closure]

Biophysical Rehabilitation	Physical Rehabilitation	Water resource restoration
<ul style="list-style-type: none"> <li>-Soil amelioration</li> <li>-Vegetation of temporary areas</li> <li>-Topsoil replacement</li> <li>-Monitoring</li> <li>-Maintenance</li> </ul>	<ul style="list-style-type: none"> <li>-Demolish temporary infrastructure</li> <li>-Maintain permanent infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>-Concurrent pollution remediation</li> <li>-Baseline Monitoring</li> <li>-Impact Monitoring</li> </ul>

#### 11.4. Criteria for Mine Closure Plan

Closure or completion criteria, are generally a set of indicators used to measure the successful completion of the closure process. They should reflect the area's individual set of environmental, heritage, social and economic circumstances.

Ideally, closure criteria should be identified and agreed upon with the relevant government agencies prior to detailed closure planning commencing. However, progressive rehabilitation and subsequent monitoring allows completion criteria to be tested and refined. As a result, the closure criteria identified the following Table is indicative only.

Table -Indicative Closure Criteria

Closure Criteria	Indicator	Monitoring
<b>Safety/stability</b>		
All structures left in a safe and stable state	<ul style="list-style-type: none"> <li>-No significant erosion / movement of landforms during closure period.</li> <li>-No significant slumping/geotechnical failure of rehabilitated waste dumps</li> <li>- No significant erosion / subsidence around ventilation</li> </ul>	-Quarterly photo monitoring at all rehabilitation / closure domains.

<b>Sustainable Landform</b>		
Rehabilitated landform is sustainable for its intended land use in the long term	<ul style="list-style-type: none"> <li>-Rehabilitated landform is being utilised for its intended use.</li> <li>-No degradation of the landform as a result of its intended use.</li> </ul>	<ul style="list-style-type: none"> <li>-Annual photo monitoring after rehabilitation is established and the landform is being utilized for its intended use.</li> <li>-If rehabilitated landform is not being utilised for its intended use, document reasons on an annual basis.</li> </ul>
<b>Surface Water Contamination</b>		
All contaminated water contained so as to not impact on downstream surface water quality (in Myaung Pyo Creek) including impacting aquatic ecosystems, limiting agricultural use and/or causing human health risk.	<ul style="list-style-type: none"> <li>-All potentially contaminated water contained within the Mine Site.</li> <li>-All water containment structures are maintained and no settling ponds failures occur</li> <li>-Settling ponds drainage water quality improves and stabilises.</li> <li>-Surface water quality of closure domain area runoff improves and stabilises.</li> <li>-Rehabilitated surfaces are stable with minimal erosion.</li> </ul>	<ul style="list-style-type: none"> <li>-Annual visual inspections and photo monitoring.</li> <li>-Water quality monitoring.</li> <li>-Annual settling ponds failure/leakage assessments</li> </ul>
<b>Air Quality</b>		
Dust leaving the site does not pose a potential pollution or health risk	<ul style="list-style-type: none"> <li>-Rehabilitated surfaces are stable with minimal wind erosion.</li> </ul>	<ul style="list-style-type: none"> <li>-Annual visual inspections and photo monitoring.</li> <li>-No unreasonable levels of dust during windy</li> </ul>
<b>Vegetation establishment</b>		
Vegetation in disturbed areas is self sustaining and requires no more maintenance than surrounding area of vegetation.	<ul style="list-style-type: none"> <li>-Vegetation has become established on all applicable closure domain landforms.</li> <li>-Vegetation coverage has been stable or improving for at least 12 months.</li> <li>-Limited erosion is visible.</li> <li>-Insect activity is visible.</li> </ul>	<ul style="list-style-type: none"> <li>-Annual visual inspections and photo monitoring.</li> </ul>

### 11.5. Closure Assumptions

The following assumptions have been made in relation to the proposed closure activities.

- The rehabilitation completion criteria are the criteria that would have applied at the time that mining activities at the Heinda Tin Mine.
- The closure activities assume that there is no possibility of subsequent mining operations. As such, this Preliminary Closure Plan assumes complete closure and relinquishment of the leases.
- Any area in the vicinity of fuel storage/use is considered hydrocarbon contaminated.
- Any area that is associated with processing activities, including tailings storage areas, has potential to be contaminated and is assumed to require remediation until proven otherwise.
- Concrete slabs and footings have been assumed to be removed to ground level and the remaining slab and/or footing covered over.
- Existing safety bunds around the open pit voids are adequate and that additional safety barriers are not required.
- Existing contaminated water management structures, namely the Water Reservoir Pond and over flow pipe are sound and additional remediation work is not required.
- Material, including pipework, broken concrete and other similar material, may be placed within one or more excavations within one of the tailings dams and covered.
- The Construction Area Domain includes waste rock material with a nil acid generation potential. This area would remain unrehabilitated for future use as a source of road construction material.

### 11.6. Closure Areas

The closure areas for Heinda Mine are follow:

- Mining area;
- Processing plant area;
- Settling/Tailing ponds area;
- Waste Rock/Dump emplacement area; and
- Workshop and Office area.

The following table is show closure actions and monitoring of each domains.



**Table - Closure Actions and Monitoring**

Task	Activity	Comment
<b>Domain 1 - Processing Plant Closure</b>		
Closure Objectives	<ul style="list-style-type: none"> <li>• Safe, stable landform.</li> <li>• Non-polluting.</li> <li>• Development of sustainable vegetative cover</li> </ul>	
Completion Criteria	<ul style="list-style-type: none"> <li>• No significant erosion or geotechnical failure.</li> <li>• All potentially sediment-laden surface water is directed a suitable sedimentation pond.</li> <li>• Surface is not the subject of dust generation through wind erosion.</li> <li>• Suitable vegetation established.</li> </ul>	
Decommissioning	<ul style="list-style-type: none"> <li>• Remove remaining plant and infrastructure.</li> </ul>	
Rehabilitation	<ul style="list-style-type: none"> <li>• Extract fine material for use as growth medium elsewhere within the Mine Site.</li> </ul>	
	<ul style="list-style-type: none"> <li>• Retain former slime pond as water storage and sediment basin.</li> </ul>	
	<ul style="list-style-type: none"> <li>• Reprofile domain to form a free draining, stable landform.</li> </ul>	
	<ul style="list-style-type: none"> <li>• Deep rip and revegetate domain with appropriate tree species sourced from locally collected seed.</li> </ul>	
Monitoring	<ul style="list-style-type: none"> <li>• Visual inspection and photographic record annually for remainder of lease term.</li> </ul>	<ul style="list-style-type: none"> <li>• Photographic locations should be marked with a painted concrete block and photographs should be taken at the same time of day, same direction and using the same focal length or zoom.</li> </ul>
<b>Domain 2 – Mine Site Closure</b>		

Closure Objectives	<ul style="list-style-type: none"> <li>• Safe, stable landform.</li> <li>• Non-polluting.</li> </ul>	
Completion Criteria	<ul style="list-style-type: none"> <li>• No significant erosion or geotechnical failure.</li> <li>• Internally draining.</li> <li>• Surface is not the subject of dust generation through wind erosion.</li> <li>• Suitable fences and/or bunds exist to prevent unauthorised/inadvertent access.</li> </ul>	
Decommissioning	<ul style="list-style-type: none"> <li>• Remove remaining equipment/pipework.</li> </ul>	
Rehabilitation	<ul style="list-style-type: none"> <li>• Repair and upgrade perimeter bunding and fencing as appropriate.</li> </ul>	
Monitoring	<ul style="list-style-type: none"> <li>• Visual inspection and photographic record annually for remainder of lease term.</li> </ul>	<ul style="list-style-type: none"> <li>• Photographic locations should be marked with a painted concrete block and photographs should be taken at the same time of day, same direction and using the</li> </ul>
	<ul style="list-style-type: none"> <li>• Undertake annual water quality analysis (pH, electrical conductivity) and report results to ECD (Tanintharyi) and No.2 Mining Enterprise (Tanintharyi)</li> </ul>	<ul style="list-style-type: none"> <li>• It is likely that the pH will decrease and heavy metal like zinc, manganese will increase in the Myaung Pyo Creek.</li> </ul>
<b>Domain 3 - Waste Rock/Dump Emplacement Closure</b>		
Closure Objectives	<ul style="list-style-type: none"> <li>• Safe, stable landform.</li> <li>• Non-polluting.</li> <li>• Development of sustainable vegetative cover</li> </ul>	
Completion Criteria	<ul style="list-style-type: none"> <li>• No significant erosion or geotechnical failure.</li> <li>• All potentially sediment-laden surface water is directed a suitable sedimentation pond.</li> <li>• Surface is not the subject of dust generation through wind erosion.</li> <li>• Suitable vegetation established.</li> </ul>	
Decommissioning	<ul style="list-style-type: none"> <li>• Nil</li> </ul>	

Rehabilitation	<ul style="list-style-type: none"> <li>Spread topsoil or other fine material as required on the outer toe of the waste rock emplacement and revegetate domain with appropriate tree species sourced from locally</li> </ul>	
Monitoring	<ul style="list-style-type: none"> <li>Visual inspection and photographic record annually for remainder of lease term.</li> </ul>	<ul style="list-style-type: none"> <li>Photographic locations should be marked with a painted concrete block and photographs should be taken at the same time of day, same direction and using the same focal length or zoom.</li> </ul>

Task	Activity	Comment
<b>Domains 4 - Tailings /Settling ponds Closure</b>		
Closure Objectives	<ul style="list-style-type: none"> <li>Safe, stable landform.</li> <li>Non-polluting.</li> <li>Development of sustainable vegetative cover</li> </ul>	
Completion Criteria	<ul style="list-style-type: none"> <li>No significant erosion or geotechnical failure.</li> <li>Clean water diversions operating effectively and are non-eroding.</li> <li>All potentially contaminated surface water is contained or directed to the Mill Reclaim Pond Domain.</li> <li>Surface is not the subject of dust generation through wind erosion.</li> <li>Suitable vegetation established in areas of placed soil material and becoming established in other areas.</li> </ul>	
Decommissioning	<ul style="list-style-type: none"> <li>Remove all pipework and other materials and dispose of in an appropriate location.</li> </ul>	
Rehabilitation	<ul style="list-style-type: none"> <li>Reprofile the tailings dam surface to form a free draining, stable landform.</li> </ul>	<ul style="list-style-type: none"> <li>Small depressions in the area and will continue to be a leachate recharge location unless removed.</li> </ul>

	<ul style="list-style-type: none"> <li>Place approximately 200mm of coarse material over all areas of open tailings.</li> </ul>	<ul style="list-style-type: none"> <li>A capping of coarse material will prevent generation of wind blown dust and will assist with seed retention and germination Minor areas of erosion are present.</li> </ul>
	<ul style="list-style-type: none"> <li>Repair all areas of erosion and construct / repair / modify surface water control structures as appropriate.</li> </ul>	<ul style="list-style-type: none"> <li>Minor areas of erosion are present.</li> </ul>
	<ul style="list-style-type: none"> <li>Place fine material / soil in 'islands' covering between 20% and 40% of the surface of the tailings dam and revegetate with appropriate species sourced from locally collected seed. It is noted that the middlings material, if not reprocessed or following</li> </ul>	
Monitoring	<ul style="list-style-type: none"> <li>Visual inspection and photographic record annually for remainder of lease term.</li> </ul>	<ul style="list-style-type: none"> <li>Photographic locations should be marked with a painted concrete block and photographs should be taken at the same time of day, same direction and using the same focal length or zoom.</li> </ul>

Task	Activity	Comment
<b>Domain 5 – Workshop and Office Area Domain</b>		
Closure Objectives	<ul style="list-style-type: none"> <li>Safe, stable landform.</li> <li>Non-polluting.</li> <li>Development of sustainable vegetative cover</li> </ul>	
Completion Criteria	<ul style="list-style-type: none"> <li>No significant erosion or geotechnical failure.</li> <li>Surface is not the subject of dust generation through wind erosion.</li> </ul>	
Decommissioning	<ul style="list-style-type: none"> <li>Remove / demolish all remaining buildings with the exception of the administration buildings and</li> </ul>	

Rehabilitation	• Excavate a number of emplacement sites and push all	
	• Leave concrete footings in place.	
	• Excavate and treat onsite all hydrocarbon contaminated soil.	• It is assumed that some contamination will be associated with the former diesel storage tanks.
	• Reprofile and rip the domain area to form a stable, free draining	
	• Construct/repair surface water diversion structures to ensure that surface water flows to either the	
	• Spread appropriate soil material or other growth medium.	
	• Revegetate domain with appropriate species sourced from	
Monitoring	• Visual inspection and photographic record annually for remainder of lease term.	• Photographic locations should be marked with a painted concrete block and photographs should be taken at the same time of day, same direction and using the same focal length or zoom.

### 11.7. Closure Costs

Mine Closure plan for Heinda mine collaborate that has a remaining life of mine operation years. The closure estimate required for this mine is a Class 0 estimate (-Operation Years to +35%). The follow sections in this document list the closure criteria and list the assumptions that were made in estimating the closure cost. The final life of mine (LOM) closure cost was determined, taking into consideration ongoing rehabilitation throughout the operational phase of the mine.

Financial provisioning information for closure of the Heinda mine Project is provided in following Table. Closure cost estimates were calculated in an MS® Excel spreadsheet (Nevada Standard Reclamation Cost Estimate, version 1.41) as part of Heinda mine overall final estimates are provided in the following table.

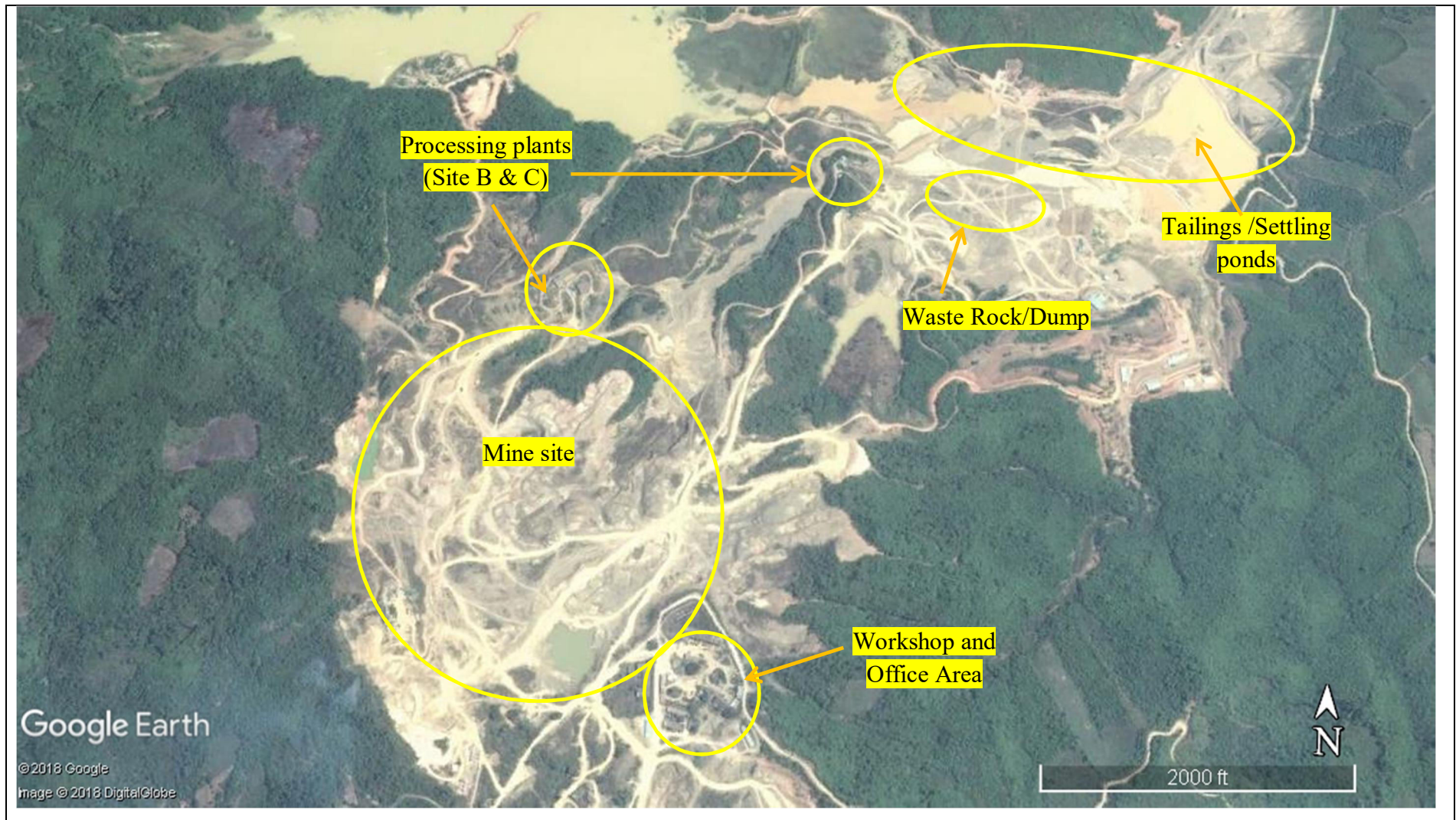
### Disturbance and Landforms at Completion

The expected maximum disturbance footprint of major and ancillary built infrastructure is summarised in Table 1, with reference to Mining Rehabilitation Fund (MRF) categories, and shown on Figure 3.

Table- Infrastructure Disturbance by MRF Category at Closure

Domain Category	Includes	Footprint (Acra)	Time (Year)
Alluvial processing plant	gravity concentrate plants (Site B and C)	6	1
Mine open cut	Landfill site	65.6	5
Waste Rock/ Dump emplacement	Waste Rock/Sediment Dump deposit area	9.7	1
Tailings /Settling ponds	Settling ponds 1 to 7	60	5
Transport or service infrastructure corridor	Access roads	23	1





### Criteria for Mine Closure Costing

The following risk based criteria were used to estimate the closure cost:

- Return of land to its pre-mining land capability where possible
- Facilities that remains – making the area safe for both humans and animals
- Facilities that remain will be made stable and sustainable. In other words, they should not move with time
- All structures and infrastructure (Workshop and Office Area) recharge to ME 2.
- Waste rock dumps will remain post-closure
- The waste rock dumps will be shaped during the operational phase to prevent storm water from flowing over the sides of the dumps. These dumps will not be vegetated
- The tailings dumps will remain post-closure
- The tailings dump top surface will be shaped during the operational phase to control storm water. As part of the operating costs, storm water control measures such as paddocking will be installed to retain and evaporate the storm water on the top, and to prevent post-closure erosion due to concentrated runoff
- The tailings dump side slopes will be flattened (cut to fill) during the operational phase to a slope of 1v:3h and 300 mm of waste rock cladding will be placed on the side slopes during the closure phase for erosion protection during the post-closure phase
- The open pit will remain post-closure with the necessary storm water control measures in place to ensure slope stability
- The slimes and slurry dams will be rehabilitated and vegetated on closure
- Remove all assets
- Removal and/or burying all rubble and waste in a designated waste site, excluding waste rock dump and tailings dump and slimes/slurry dam materials
- Engineering works (re-shaping, earthworks, drainage etc.)
- Rehabilitation of all disturbed land surfaces, i.e. rip, topsoil if sufficient topsoil is available and re-vegetate, including the slimes/slurry dams but excluding tailings dumps and waste rock dumps
- All vehicles, plant and workshop equipment will be removed for salvage or resale
- All fixed assets that can be profitably removed will be removed for salvage or resale

- Any item that has no salvage value to the mine, but could be of value to individuals, will be sold (zero salvage assumed in cost estimation) and the remaining treated as waste and dumped in the open pit
- The excavations will be filled in with soil, the top 150 mm being topsoil
- Unpaved roads will be ripped and shaped to restore the natural contours as far as possible
- Paved roads will be ripped up, the wearing course treated as waste and the sub-base ripped or ploughed and covered with 150 mm topsoil
- Inert ceramics, such as bricks, concrete, gravel etc., will be dumped in the pit, subject to approval by the Waste Management authority
- All disturbed and exposed surfaces will be covered with at least 150 mm of topsoil and re-vegetation must be allowed to take place naturally
- Air and water quality will be monitored until they reach a steady state after closure
- Demolish all concrete fence foundations to 500 mm below the original ground level
- Plough or rip fence lines and cover with topsoil where necessary
- The company contracted to supply fuel will be requested to remove all fuel storage and reticulation facilities
- The pit area will be fenced off and shaped to drain inwards
- Ensure the slopes of the open pit are safe in the long term
- Remove pumping equipment from disused boreholes and install a concrete cap/seal at the top of the collar
- Submission of closure report and application for closure to the authorities
- Environmental monitoring and maintenance for at least 5 years after closure

### **Mine Closure Assumptions for Estimation of Closure Costs**

The following assumptions were made:

- The values for the resale of equipment and salvable material were not considered
- Average haul distance will be 2.5 km within the lease
- The waste rock dumps will be shaping to prevent erosion (the shaping will be done during the operational phase). A berm will be constructed at the toe of the waste rock dumps and some topsoil placed against the toe (10 m high) to facilitate potential natural vegetation
- The tailings dump sides will be shaped to 1v:3h during the operational phase and cladded with 300 mm of waste rock on the side slopes during the closure phase, to prevent erosion during the post-closure phase

- The tailings dump top surface will be shaped during the operational phase to control storm water. As part of the operating costs, storm water control measures, such as paddocking, will be installed to retain and evaporate the storm water on the top and to prevent post-closure erosion due to concentrated runoff
- Slimes dams will be rehabilitated and vegetated by means of flattening the slopes to 1v:3h using waste rock and covering this layer with 150 mm of topsoil and sub-dividing the top surface into paddocks (50 m x 50 m grid) to control storm water, and covering the top surfaces with a 150 mm layer of topsoil
- Slurry dams will be rehabilitated and vegetated by means of cladding the slopes with a 300 mm waste rock layer and covering it with 150 mm of topsoil and sub-dividing the top surface into paddocks (50 m x 50 m grid) to control storm water, and covering the top surfaces with a 150 mm layer of topsoil. Bulk earth works will not be required on the sides, as the slopes are already 1v:3h
- There will be no ring-main at the pit and the de-watering boreholes will be decommissioned
- It is assumed that the post-mining pit stability will be addressed as part of the operation and necessary remedial actions implemented prior to closure
- No rehabilitation will be done inside the pit, except for ripping of the haul road to facilitate the growth of natural vegetation
- The tailings and waste rock / slurry dams will not exceed the planned area footprint
- Borrow pits used for construction of slimes dam walls that are situated outside the slimes dam footprint will be rehabilitated during the operational phase (flatten slopes to 1v:3h or flatter and allow to vegetate naturally)
- The airfield (including all the structures) will be closed, and the runway ripped to facilitate vegetation
- There is sufficient topsoil for rehabilitation purposes
- Where topsoil is not available, the cost for in-situ remediation will be the same as the estimate for top soiling
- The closure costs for the various well fields and associated infrastructure have been included in this estimate.



TABLE - MINE CLOSURE ESTIMATE SPREADSHEET (Heinda Mine)

It	DESCRIPTION	COMMENTS ASSUMPTIONS	Qu t	Length m	B m	Area m <sup>2</sup>	Hi gh m	Vol\ m <sup>3</sup>	KEY Qut	RATE	COST(US\$)	TOTAL COST (US\$)
	<b>DAMS AND PONDS</b>											
1a	Settling Pond	100m by 80m	5	500	400	200,000.00	5					
	tailings pond	120 m by 100m	2	240	200	48.000	5					
				7400	600							
	Rock fill of 300mm (sides only)	Sides only						m3	102,600.00	2.96	303696.00	
	Topsoil, growing medium	allow for 150mm of growing medium						m3	1.178.000.00	0.33	388740.00	
	50m x 50m paddock grid (1m2 retainer berms)	allow 2m base by 1m high berms for 0.25 ha grid formation						m2	800.000.00	0.19	160000.00	
	Vegetate sides & top							m2	267000.00	0.23	61410.00	
											<b>Sub-total</b>	<b>913846.00</b>
	<b>ROADS</b>											
	<b>General gravel rds (14m wide) plus Haul Road (40m wide)</b>	300mm ht. 7m wide, haul road 40m wide 500m long outside pit		8.645.00	14.00	121.030.00					4949.60	
	Rio in situ material/landscape							m2	137946.00	0.4	55178.40	
											<b>Sub-total</b>	<b>60128.00</b>
	<b>WASTE DUMP</b>											
11	Existing dump 250m x150m		1	250.00	150.00							
	Construct berm around pit (2m high berm and 4m base)	4m2 of berm						m3	19,600.00	2.96	57982.00	



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	4m2 soil wedge for revegetation -10m from foot of dump	Place soil for bottom 10m ht. from foot of dump.						m3	19,600.00	0.33	6468.00	
											<b>Sub-total</b>	<b>64450.00</b>
	<b>PITS</b>											
13	Alluvial Surface Pit-1	Open pit with an approximate diameter of 70m	1			3848.45						
14	Alluvial Surface Pit-2	Open pit with an approximate diameter of 110m	1			9503.31						
	cut pond sides to 1 in 3 fall	push over tailings material (cut to fill)						m3	13351.00	2.96	3952.00	
	rock fill	allow for rock cladding along sloping side - 3 00mm thick						m3	720,266	2.96	2056856.00	
	50m x 50m paddock grid (1m2 retainer berms)	allow 2m base by 1m high berms for 0.25ha grid formation (part of operational cost)						m2	600.000	0.00	0.00	
	revegetation	allow to revegetate naturally						m2	1200.00	0.23	12000	
											<b>Sub-total</b>	<b>2062008.00</b>
											<b>Total</b>	<b>3100432.00</b>





## 11.8. Ongoing Maintenance, Monitoring and Record Keeping

### 11.8.1 Ongoing Maintenance

Closure planning and design has been conducted to ensure minimal ongoing maintenance requirements. Ongoing maintenance within the mine site will be limited to the following.

- (a) Targeted noxious weed control over the entire mine site on an annual basis if required.
- (b) Remedial earthworks in areas where significant rill or gully erosion is evident.
- (c) Supplementary seeding/revegetation in areas where monitoring indicates that revegetation has not been successful.
- (d) Placement of additional soil / growth medium in the event that reseeding/revegetation operations identified in (c) above are not successful.
- (e) Remediation where annual monitoring indicates that the existing surface water control structures, including diversion banks and channels, the pond overflow pipes and storage structures are leaking or are inadequate.

### 11.8.2 Monitoring

MPC will undertake the following monitoring annually, typically in spring. This monitoring will commence prior to the completion of the closure activities and will continue until relinquishment of all mineral authorities.

- Visual inspection for each area with emphasis placed on identifying:
  - areas where revegetation operations have not meet the required closure criteria;
  - areas where weeds have become established;
  - areas of erosion or sedimentation; and
  - evidence of potentially contaminated water leaking from the tailing ponds.
- Typically photographs would be taken from a fixed photo location marked by a painted concrete block or similar.
- A procedures manual will be developed describing how the photos are to be taken, the time of year and day that they are to be taken, the focal length or zoom to be used and the direction of each photo.
- Water sampling using calibrated field meters to determine the pH and electrical conductivity of surface water within the N0.7 tailing ponds and the Myaung Pyo creek.

### 11.8.3 Record Keeping

Within three months of the completion of the annual environmental monitoring program, MPC will prepare a brief report in accordance with the requirements of Guidelines to *Environmental Impact Assessment Guidelines for the Mining Sector* published by the Ministry of Natural Resources and Environmental Conservation. The report will:

- document the results of the current and previous monitoring, including graphs;
- provide copies of the photographs taken of each monitoring area;
- outline the results of the visual inspection;

describe activities undertaken during the previous 12 months and those proposed during the subsequent 12 months.

## 12. ENVIRONMENTAL MANAGEMENT PLAN (EMP)

In order to manage the physical, biological and sociological impacts identified in the impact assessment, Myanmar Ponpipat Co., Ltd. has committed to implement an environmental management plan of the project (EMP). This management plan will form the basis for the development of an integrated management system for environmental and community issues. EMP is a site specific plan developed to ensure that the project is implemented in an environmental sustainable manner where all contractors and subcontractors, including consultants, understand the potential environmental impacts arising from the proposed project and take appropriate actions to properly manage that risk. EMP also ensures the project implementation is carried out in accordance with the design by taking appropriate mitigation actions to reduce adverse environmental impacts during its life cycle. EMP for proposed mine site will include the following essential parts.

- (h) Environmental Management and Monitoring Plan,
- (b) Occupational Safety and Health Management Plan, and
- (c) Corporate Social Responsibility (CSR) Program.

### 12.1. Environmental Management and Monitoring Team

The purpose of environmental monitoring is to evaluate the effectiveness of implementation of Environmental Management Plan (EMP) by periodically monitoring the important environmental parameters within the impact area, so that any adverse affects are detected and timely action can be taken. Main objectives of environment monitoring plan include:

- (g) Identify all environment changes which may cause adverse effects on environment by the project implementation;
- (h) Monitor discharge sources (gas emission, waste water and solid waste) and operation of environmental protection equipment in order to ensure that these activities will comply with legislative requirements;
- (i) Check monitoring process and inspect installation system and equipment in respect of pollution prevention and control;
- (j) Prevent potential incidents;
- (k) Propose appropriate environment protection measures based on results of environmental monitoring;

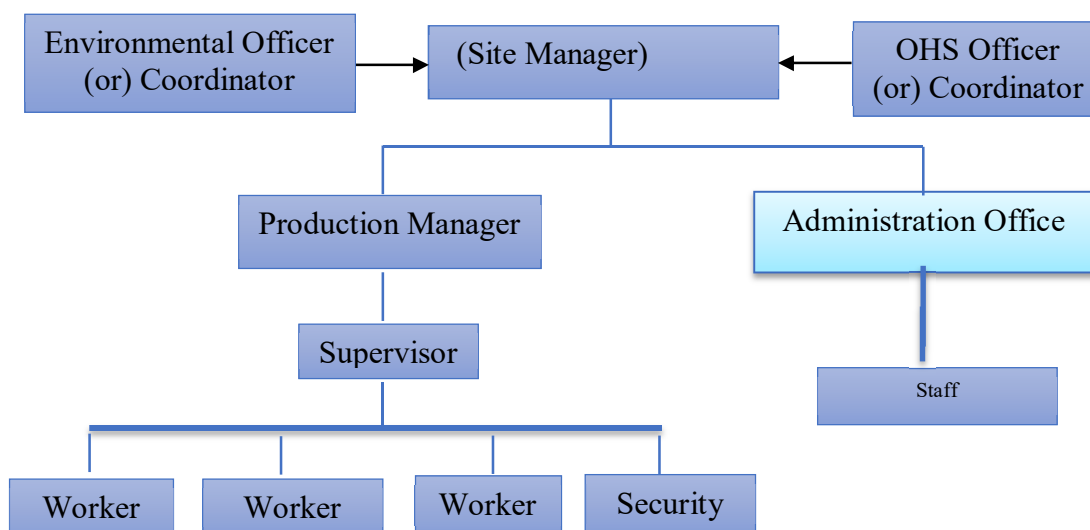
- (l) Overcome and repair all weak-points based on results of environment monitoring program.

### 12.1.1. Environmental Monitoring Team for Regular Monitoring

The environmental monitoring team should accomplish regular environmental monitoring. The environmental officer or environmental coordinator should have to be fully responsibility for environmental affair and environmental monitoring. The following table shows proposed organization plan for the environmental monitoring group of the proposed project.

No.	Group Member	Quantity	Remark
1.	Environmental Officer (or) Coordinator	1	To be appointed
2.	Occupational Health and Safety Officer (or) Coordinator	1	To be appointed
3.	Plant Manager	1	Appointed
4.	Supervisor	1	Appointed
5.	Helpers	1	Appointed

According to the above proposed table, it is necessary to reorganized the organization structure of Myanmar Ponpipat as follow:



### Organization Structure

Apart from having an Environmental Management Plan, it is necessary to have a permanent staff charged with the task of ensuring its effective implementation of mitigation measures

and to conduct environmental monitoring. So, it is necessary to assign environmental officer with necessary monitoring equipment. According to the above table, it is necessary to appoint environmental officer (or) coordinator and occupational health and safety officer (or) coordinator. It can be signed as dual duty if site manager is able to do workers' safety and health matters. Training program for safety issues should be completed if necessary. Environmental monitoring can also be done by registered third party monitoring agency. Detailed function of the environmental officer but not limited are as follow:

### *Environmental Officer*

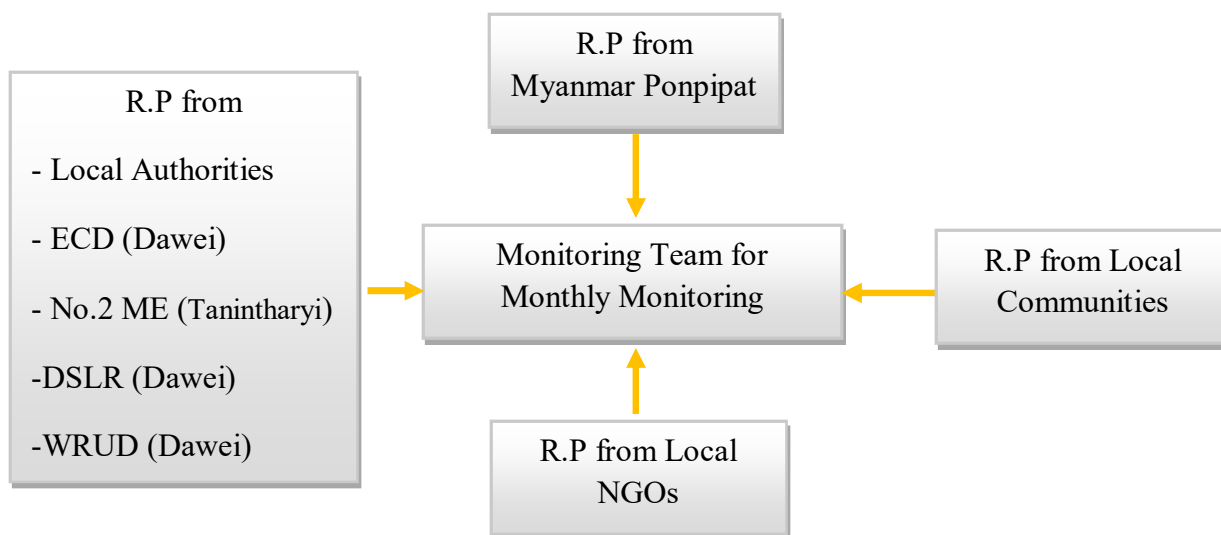
The major duties and responsibilities of the environmental officer or person-in-charge for environmental monitoring of proposed project should be as given below:

- (a) To implement the environmental management plan,
- (b) To assure regulatory compliance with all relevant rules and regulations,
- (c) To ensure regular operation and maintenance of pollution control devices,
- (d) To minimize environmental impacts of operations by strict adherence to the EMP.
- (e) To initiate environmental monitoring as per approved schedule.
- (f) Review and interpretation of monitored results and corrective measures in case monitored results are above the specified limit,
- (g) Maintain documentation of good environmental practices and applicable environmental laws as ready reference,
- (h) Maintain environmental related records,
- (i) Coordination with regulatory agencies, external consultants, monitoring laboratories,
- (j) Maintain of log of public inconvenience and the action taken,
- (k) Ready to solve any complaints from local people about environmental and social issues especially in Waste water run out from mine sites.

### **12.1.2. Environmental Monitoring Team for Monthly Monitoring**

Environmental monitoring team for monthly monitoring has to organize representatives from environmental monitoring team for regular monitoring, representative persons from General Administrative Office (GAO, Dawei), General Administrative Office (GAO, Heinda), (d) No. (2) Mining Enterprise (Tanintharyi), Environmental Conservation Department (ECD, Dawei),

Department of Settlement and Land Record (DSLRL, Dawei), Department of Water Resources Utilization Department (WRUD, Dawei), local communities and local NGOs as proposed as follow:



Note: should participate , R.P = Representative Persons

### Proposed Environmental Monitoring Team for Monthly Monitoring

#### 12.1.3. Parameters, Responsibilities, and Estimated Cost for Mitigation and Monitoring

Monitoring should be conducted daily by the environmental monitoring group of proposed project and monthly by proposed monitoring team or by the registered monitoring agency. Monitoring frequency should be sufficient to provide representative data for the parameter being monitored. Monitoring data should be analyzed and reviewed at regular intervals and compared with the operating standards so that any necessary corrective actions can be taken. Monitoring should be carried out throughout all project implementation phases and the responsibilities for monitoring for operation phases. The parameters to be monitored; location of the monitoring sites; frequency and duration of monitoring, responsibilities and estimated cost for each of the monitoring parameters are presented in the following Table.



### Estimated Cost for Environmental Monitoring

Discharge Source	Parameter	Monitoring Frequency	Proposed Monitoring Locations	Estimated Cost/Kyats	Responsibility	Laboratory testing
<b>Monitoring at mine site</b>						
Runoff water from mine sites (Effluent)	pH, Turbidity, TDS, Colour, TSS, Copper, Lead, Zinc, Arsenic, Mercury, Cadmium	Weekly Rainy season (4 months)	Settling ponds in mine sites	50,000	Environmental Officer of MPC	The Department of Research and Innovation (DRI)
Drainage system around the settling ponds at mine site	Check drainage systems of settling ponds	Weekly Rainy season (4 months)	Near settling ponds	-	Environmental Officer of MPC	-
Sediment removal from settling ponds	Sedimentation rate in settling pond	Weekly during Rainy Seasons (4 months)	settling ponds in the mine sites	-	Environmental Officer of MPC	-
Landslides at mine site	Slope stability at mine site	Daily before commence of mining operations	In mine site	-	Environmental Officer of MPC	-
<b>( Monitoring at Sedimentation Dump Site)</b>						
Stability of sediment dump	Failure of waste dump	Weekly during Rainy Seasons (4 months)	Sediment dumping site	-	Environmental Officer of MPC	-
Runoff water from sediment dump	pH, Turbidity, TDS, Colour, TSS, Copper,	Weekly during Rainy Seasons	Drainage from sediment dump site	50,000	Environmental Officer	The Department of

	Lead, Zinc, Arsenic, Mercury, Cadmium	(4 months)			of MPC	Research and Innovation (DRI)
Blockage of drainage system around sediment dump site	Block in drainage system	Weekly during Rainy Seasons (4 months)	Drainage system from sediment dump site	-	Environmental Officer of MPC	-
Replantation on the sediment site	Survival and growth rate of plantation	Weekly for 2 years after plantation	sediment dump site	-	Environmental Officer of MPC	-
<b>(Monitoring at Settling Ponds)</b>						
Discharge water from final settling pond	pH, Turbidity, TDS, Colour, TSS, Copper, Lead, Zinc, Arsenic, Mercury, Cadmium	Monthly	runoff water from final Settling Ponds	5,0000	Environmental Officer of MPC	The Department of Research and Innovation (DRI)
Sediment removal from settling ponds	Sedimentation rate in settling pond	Daily	Settling Ponds	-	Environmental Officer of MPC	-
stability of settling ponds	Failure of settling ponds' retaining walls	Weekly for rainy season, Monthly for dry season	Settling ponds ponds' retaining walls	-	Environmental Officer of MPC	-

Others Monitoring Programs						
Soil pollution	Lead, Zinc, Copper, Arsenic, Mercury, Cadmium, Chromium, pH, Iron, Nickel, Manganese	Once 6 months	At near Waste dump	40,000	Environmental Officer of MPC	The Department of Research and Innovation (DRI)
Soil pollution	Oil & Grease	once 6 months	At Oil storage tank	10,000	Environmental Officer of MPC	The Department of Research and Innovation (DRI)
Noise	dB (A)	once 6 months	At Processing/central treatment Plant	40,000	Environmental Officer of MPC	Ever Green Tech Environmental Services Co., Ltd.
plantation condination Replantation on the mine site and other places	Survival and growth rate of plantation	Weekly for 2 years after plantation	old mine site and sediment dump site	-	Environmental Officer of MPC	-

According to the above tables of estimated cost for environmental monitoring and mitigation measures, the periodic monitoring cost will be 240,000 MMK.

#### 12.1.4. Important Factors for Environmental Monitoring

The following factors should be considered during the environmental monitoring.

- (a) Monitoring have to be done by registered third party monitoring agency or proposed environmental monitoring team of the proposed team. and at least three representatives from proposed monitoring team have to be participated in every monitoring process.
- (b) If monitoring results show constantly (3 consecutive years) and significantly (e.g. less than 75 percent) better than the required levels, frequency of monitoring can be reduced (IFC, World Bank, 2007).
- (c) By studying the wind rose, the most dominant wind direction and wind speed for every season can be predicted and monitoring station for dust, noise and gas emissions should be carried out at that wind direction.

#### 12.1.5. Environmental Management Training Program

Environmental management training program is an important part in EMP. Training and human resource development is an important link to achieve sustainable operation of the facility and environmental management.

##### *Training Program for Operation Phase*

In operation phase, all staff of proposed project must be trained on environment safety throughout training courses to be familiar with operation processes and guidelines, mine closure plans (replantation, rehabilitation), emergency responses plans on landslide risks, tailing pond failure, etc., Project Management Board should be established and maintain training programs that are regularly updated to help staff at all levels and related functional departments are aware of their responsibility on environment protection. For successful functioning of the project, relevant EMP's should be communicated to the following groups of people:

##### *Office Staff*

Employees must be made aware of the importance of occupational safety, waste segregation and storage, and energy conservation. This awareness can be provided through, formal and informal training, leaflets and periodic in house meetings. They should be informed about

their responsibilities for successful operation of various environmental management schemes inside the premises.

### ***Mine Worker***

Mine workers must be trained the following topics by relevant personnel:

- Health and safety requirements
- Physical and health hazards of chemicals
- Transportation controls and communitcaiton systems
- Escape and emergency evacuation plans
- Highwalls
- Water, fire and electrical hazards
- Illumination and night work
- Fall prevention and protection
- First aid

### **12.1.6. Record Keeping**

Record keeping and reporting of performance is an important management tool for ensuring sustainable operation. Records should be maintained for regulatory, monitoring and operational issues. Typical record keeping requirements for the site is summarized in following table.

#### **Record Keeping Requirements**

Parameter	Particulars	Record
Discharge of waste water	Discharge water from final settling pond	Daily
water pollution	Waste	Daily
Failure of settling ponds' retaining walls	Check stability of settling ponds' retaining walls	Weekly for rainy season, Monthly for dry season
Failure of waste dump	Stability of sediment dump	Weekly during Rainy Seasons (4 months)

Sediment removal from settling ponds	Sedimentation rate in settling pond	Weekly during Rainy Seasons (4 months)
Soil pollution	Lead, Zinc, Copper, Arsenic, Mercury, Cadmium, Chromium, pH, Iron, Nickel, Manganese, Oil & Grease	Once 6 months
Noise	Ambient noise level around the mine site	once 6 months
Replantation on the sediment site	Survival and growth rate of plantation	Weekly for 2 years after plantation

#### 12.1.7. Environmental Audits and Corrective Action Plans

Environmental audit is an independent and objective oriented examination of whether the practice complies with expected standards. Broadly, environmental audit means a check on some aspects of environmental management, and implies some kind of testing and verification. To assess whether the implemented EMP is adequate, MPC will conduct periodic environmental audits.

There are two levels of Environmental Audits, i.e. Environmental Impact Audit and Environmental Management Audit. Environmental Impact Audit involves comparing the impacts predicted in an EIA with those that actually occur after implementation of the project while Environmental Management Audit involves checks against adherence to plans, mitigation measures and general compliance of terms and conditions. These audits will be followed by Corrective Action Plans (CAP) to correct various issues identified during the audits.

#### 12.1.8. Reporting Monitoring Results

Monitoring will be carried out according to the Monitoring Program in this EIA Report and monitoring results will be reported to Minister of Environmental Conservation (Tanintharyi Regional Government), No. (2) Mining Enterprise (Tanintharyi), Environmental Conservation Department (ECD, Tanintharyi), General Administrative Office (GAO, Dawei), and Members of Supervisory body of Heinda Mine.



#### **12.1.9. Compliance with Environmental Quality Standards**

As specified in the EIA Procedure, projects shall be responsible for the monitoring of their compliance with the following standard parameters from Myanmar National Environmental Quality (Emission) Guidelines, December 2015.

- (1) Effluent Standards for Mining Sites
- (2) Ambient Air Quality Standards
- (3) Ambient Noise Standards

Detail parameters values are showed in the previous section 3.5.

Projects shall engage in continuous, proactive and comprehensive self-monitoring of the project and comply with applicable guidelines and standards.

#### **12.2. Occupational Safety and Health Management Plan**

Occupational safety and health management plan for the proposed project will include the following:

- (h) Potential Safety and Health Impacts on Workers
- (i) Emergency and First-aid Procedures
- (j) Medical Precautionary Measures
- (k) Maintenance and Troubleshooting Precautions
- (l) House Keeping
- (m) Safety awareness
- (n) Safety training

#### **(A) Potential Safety and Health Impacts on Workers**

Workers' in antimony refinery will impose health problems by the following:

- (a) Fugitive Dust Emissions;
- (b) Noise;
- (c) Electrical Hazard;
- (d) Manual Handling and Work Place; and
- (e) Confined Spaces.

#### **(i) Fugitive Dust Emission**

Fugitive dust will emit from mining sites section vehicle movement and transportation activities.

### *Excavation and Preparatory Work in Ore & Waste*

During run-of-mine or waste excavation and disposal of waste during dry months some dust is generated. However, since the ore and waste rock contain some natural moisture of the order 2.0 to 2.5% not much dust is generated during manual mining operations of blasted ore/waste even during dry season.

### *Transportation of Tin ore and dump*

The tin ore from working face to the washing pond will be transported by 10 tonnes capacity trucks. The trucks shall be well maintained so that exhaust smoke dose not contain abnormal values of noxious gases and un-burnt fuel. The other source of air pollution is due to the dust generated during the movement of trucks in the mine.

### *Mitigation Measures for Fugitive Dust Emission*

Emission of fugitive dust can be controlled by

Regular water sprinkling should be carried out on the roads leading to the active area of the mine workings during the shifts by water sprinklers to ensure effective dust suppression. In every day about 3 to 4 times and depending up on the road condition water shall be sprinkled by taking utmost care to ensure that less water is consumed for effective dust suppression keeping in view the water conservation aspects.

### **(ii) Noise**

Noise will produce from mineral processing section. Screening process (tormmels) and jigging process are generates noise of a higher frequency. Exposure to noise over a period of time can result in impairment or loss of hearing. Myanmar National Environmental Quality (Emission) Guidelines, permissible noise exposure limit for industrial workers, which is based on 70 dB (A) for a day and the Occupational Safety and Health Administration (OSHA) has recommended permissible noise exposure limit for industrial workers, which is based on 90 dB (A) for 8 hours exposure a day with 5 dB (A) trading rates. The limits are given in Table follow.

**Table - Permissible Exposure Noise Limits**



Total Time of Exposure Per Day in Hours	Noise Level dB(A)
8	90
6	92
4	95
3	97
2	100
1	105
$\frac{1}{2}$	110
$\frac{1}{4}$	115

According to OSHA, the maximum allowable noise level for the workers is 90 dB (A) for 8 hours exposure a day.

#### *Mitigation Measure for Noise*

Adequate protective measures in the form of ear muffs/ear plugs to the workers working in high noise areas need to be provided because noise level near the concentration plant will exceed 90dB(A).

#### *Mitigation Measures to Reduce Noise at Working Zone*

To begin with, an examination should be made to see whether the process or production set-up can be modified to avoid the sources of noise.

- Screen off noisy work and take measures to reduce reverberation in working areas by putting up noise absorbers.
- Use ear protectors if the noise is disruptive or if there is a risk of hearing damage.

- (c) Where noise levels exceed allowable levels laid down in health and safety legislation, warning notices will be required either at the machine/process or, if excessive generally throughout a workshop, at all entrances.
- (d) Ear protection equipment (ear defenders, ear plugs, etc.) is the most prevalent risk control measure used to reduce personal exposure to noise. Ear protection devices must be in good condition and have sufficient noise attenuation properties. In addition, ear protection can prevent hot spatter from entering the ear.
- (e) Segregation of noisy processes to one area of the workshop, away from the general work area as much as possible, can be used as a control measure to reduce exposure to noise for the majority of workers.

### **(iii) Electrical Hazard**

The main electrical hazard is electric shock or electrocution. Live electrical parts can include the power supply, the power and work cables, and the work itself (if the work is not connected to earth ground).

### **Prevention of Electrical Hazard**

- (a) The current-carrying capacity of cables, interconnectors, terminals, etc., should be high enough to carry the maximum operating current.
- (b) There should be a separate earthing conductor.
- (c) Avoid working in wet, damp or humid conditions.
- (d) Avoid working in a confined space.
- (e) Wear dry leather gloves, insulated footwear and other appropriate protective clothing.
- (f) Make sure all electrical connections are tight, clean, and dry.
- (g) Keep cables and connectors in good condition.
- (h) Avoid open-circuit voltage.

### **(iv) Hazards of Manual Handling and Work Place**

Manual handling can present a hazard during lifting, lowering, carrying, pushing, pulling or moving of tin concentrate, tools, materials, equipment and consumables, etc. One of the most common injuries experienced by workers is back injury during manual handling. Other

general sources of hazard on industrial premises include moving machinery, site transport, and delivery vehicles.

#### *Mitigation Manual Handling and Work Place Hazard*

- (a) Using specialized or dedicated lifting equipment and systems.
- (b) Proper safety training should give all employees.
- (c) Maintaining tidy work areas, removing obstructions and discarded items greatly reduces the risk of injury.

#### **(v) Hazard of Confined Spaces**

The proposed central treatment plant will include entering in confined spaces (tabling section and magnetic separation section) for collecting of tin concentrate. Confined spaces have the characteristics of limited space, entry, or exit and poor ventilation, which cause lack of safe breathing air and possible buildup of fine tin concentrate powder.

#### *Mitigation of Confined Spaces Hazard*

The worker should wear respiratory equipment when they enter into confined spaces.

#### **(B) Emergency and First-aid Procedures**

First aid is immediate, temporary treatment given in the event of accident or illness.

**Inhalation:** Workers with symptoms of exposure to fumes and gases from roasting furnace and antimony filter room should go to an uncontaminated area and inhale fresh air or oxygen and call a physician. Administer oxygen by mask if the person is breathing.

**Eye:** Contact lenses, if worn, should be removed. Irrigate the eyes immediately with large amounts of water for 15 minutes. Occasionally hold the eyelids apart to insure complete irrigation. Apply a dry protective dressing. Call for emergency medical assistance.

For “flash burns” cover the eye with cold (preferably iced) compresses for 5 to 10 minutes; then repeat. Apply a dry protective dressing. Call a physician. Don’t rub the eye. Don’t use ointments or drops unless prescribed by a physician.

**Skin:** For skin contact with irritants, flush the areas with large amounts of water, and then wash with soap and water. Remove contaminated clothing. If mucous membranes are irritated, flush with water. Wash cuts and scrapes with mild soap and water. Avoid contamination. Apply a dry sterile dressing.

For thermal burns, cold water is an effective first aid measure. If skin is not broken, immerse burn part in clean cold water or apply clean ice to relieve pain. Do not disturb or open blisters. Prevent contamination. Bandage loosely with a clean dry dressing. Call for emergency medical assistance.

**Electrical Shock and Electrical Burns:** Disconnect and turn off power. Remove victim from contact. Use no conducting materials if the rescuer must resort to pulling the victim from the live contact. The rescuer must first protect himself by use of insulated materials such as gloves. If not breathing, administer CPR as soon as electrical contact is broken. Call for emergency medical assistance. Continue CPR until spontaneous breathing has been restored or until a physician arrives. Administer oxygen. Keep comfortably warm. Keep horizontal until there is no further evidence of shock. Treat electrical burns as thermal burns. For electrical burns apply clean, cold (iced) compresses. Prevent contamination. Cover with a clean, dry dressing. Call for emergency medical assistance.

### (C) Medical Precautionary Measures

The following medical precautionary measures are recommended for the proposed project.

- (a) Periodic health examinations are recommended with the cooperation with Public Health Office (Dawei). The potential health effects of nonwork related factors, such as smoking, must be considered.
- (b) An effective educational, training, and industrial hygiene program should be instituted. The program should cover the following: (a) the nature and potential hazards of welding, cutting and gouging; (b) proper and safe use of equipment; and (c) emergency and first aid procedures.
- (c) Medical personnel should be available on-site or by phone for advice and consultation. Emergency phone numbers should be posted near the telephones. At least one person on each shift should be trained in first aid, as well as qualified to administer oxygen and cardiopulmonary resuscitation (CPR).





- (d) The following should be readily available: (a) first aid supplies approved by a physician; (b) stretchers and blankets for transportation; (c) oxygen inhalation equipment; and (d) approved instant acting eye washes and showers.
- (e) Good personal hygiene practices are very important. Employees should wash their face and hands before eating, and it is recommended they not be permitted to eat, drink, or smoke in the work area. Food and beverages should not be stored in the work area. Contaminated clothing should be changed.
- (f) Protection against skin conditions, such as chemical burns, rashes, and dermatitis can be provided by appropriate protective clothing and equipment, as well as the use of protective creams or lotions.

#### **(D) Maintenance and Troubleshooting Precautions**

Faulty or improperly maintained equipment can cause property damage, physical injury, or possibly death by fire or electrical shock. Here is a list of some important items to check when troubleshooting or maintaining equipment.

- (a) Stop operating immediately if equipment is malfunctioning.
- (b) Do not perform any maintenance unless you are qualified to perform such work.
- (c) Make test readings carefully.
- (d) Protect the equipment from heat, excessive wet conditions, oil or grease, corrosive atmospheres, and inclement weather.
- (e) Replace parts only with manufacturer's recommended replacement parts.
- (f) Keep all protective devices and covers in position.

#### **(E) House Keeping**

The following measures shall be practiced at the proposed project.

- (a) Regular cleaning of the floors with service water.
- (b) Keeping all de-dusting systems in perfect working conditions to avoid dust accumulation inside and outside the plant.
- (c) Avoid dumping of wastes, damaged equipment and items anywhere inside the plant affecting aesthetics and increasing risk of fire and other hazards.

- (d) Keeping ventilation systems of premises in perfect working condition to avoid ingress of dust inside the pressurized room.
- (e) Maintaining hygienic conditions in areas like canteens, near drinking water sources and toilets.
- (f) Maintaining green belt along the factory boundaries to suppress noise, fugitive dust and to improve the aesthetics.
- (g) Developing a positive outlook in the employees for improving the working place, both in factory and office or laboratory clean and well maintained.

#### **(F) Safety Awareness**

Safety awareness must be promoted among project managers and employees by:

- (a) Imparting regular training.
- (b) Installing/displaying safety caution boards and safety posters mentioning Do's & Don'ts at different vulnerable locations.
- (c) Arranging safety & housekeeping competition etc.
- (d) To procure and maintain personal protective equipment in good working condition.

#### **(G) Safety Training**

Training programmes in safety and accident prevention will be organized at all levels of employees with a view to familiarize them with the general safety rules, safety procedures in various operational activities and to update their knowledge in safety and accident prevention, industrial hygiene and emergency equipment. These training programmes will be conducted periodically in a planned manner to refresh their knowledge. Training shall be imparted for:

- (a) Safe working and maintenance practices.
- (b) Use of proper tools and tackles.
- (c) Use of personal protective equipment.
- (d) Handling emergency situation.

### 12.3. Corporate Social Responsibility (CSR) Program

Contribution at random places with no records will have some social problem due to the lack of transparency. So, Myanmar Ponpipat should have CSR program to contribute and manage CSR fund effectively.

#### 12.3.1. CSR Fund

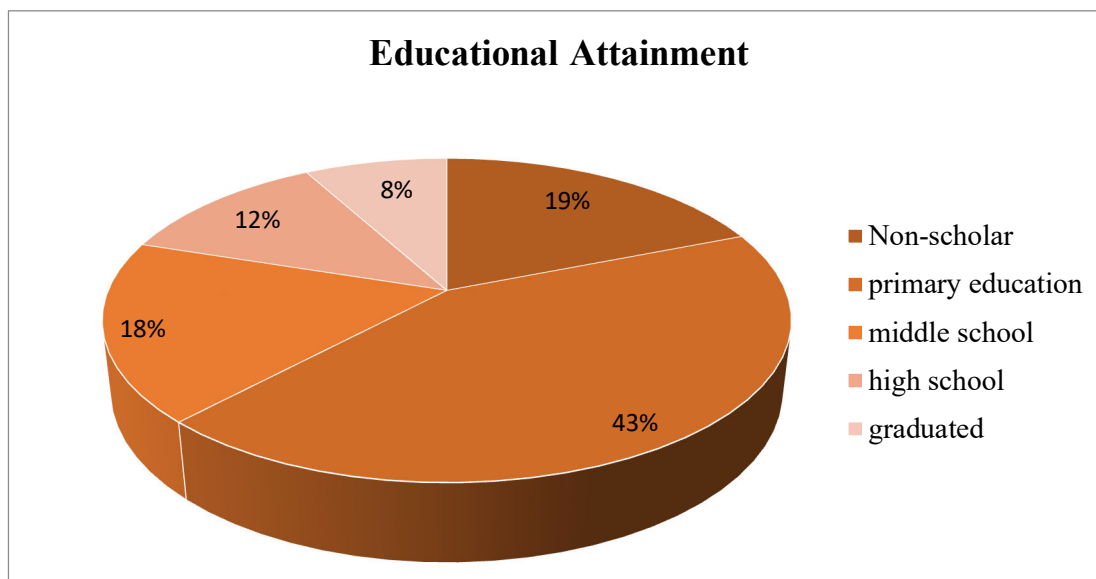
Myanmar Ponpipat will set up CSR fund for local community development. It is important that CSR activities will be accomplished not only by financial assistance but also by technical aid and manpower in some assistances to retain good relation with local communities. Allocated percent of CSR fund is based on local community needs and local needs are considered according to the public consultation process

(social survey and public meetings). Proposed allocated percent of CSR budget are as follow:

No.	Activities	Proposed allocated per cent of CSR budget	Public Needs according to Primary Data Collection
1.	Donation to NGOs and CBOs	20%	Yes
2.	Construction of roads	30%	Yes
3.	Donation to schools	20%	Yes
4.	Donation to health care facilities	20%	Yes
5.	Donation to agricultural development	10%	Yes
Total		100%	

#### *Education*

The educational attainment of respondents enumerated in the household socioeconomic survey in the project area is reported in the following figure.



Overall, educational attainment of local residents in the project area was found to be relatively low. According to the social survey on educational attainment by primary data collection, most of the people are just finished primary school due to difficult to go to school and household economy.

In Dawei, school enrollment rate of 5-year-olds was 62.86% in the overall Dawei Township. The teacher student ratio is greater than acceptable teacher student ratio (1:20) and so the developer should assist to upgrade the educational infrastructure.

As education is the fundamental requirement for rural area development, Myanmar Ponpipat should have a plan to upgrade existing education system in nearest villages as CSR program.

### 12.3.2. Participating Government Schemes for Social Welfare

Myanmar Ponpipat should actively participate in implementation of government schemes for welfare of the society of the Dawei region.

### 12.3.3. Cooperation with Local NGOs

Myanmar Ponpipat should cooperate with local NGOs and CBOs in nearest villages in the activities to improve regional, religious, and all round developments in Dawei Region. Some percentage of CSR fund should provide regularly to NGOs and CBOs in nearest villages.

#### **12.3.4. CSR Officer (or) Coordinator**

MPC will assign CSR officer (or) coordinator to closely relate with local people in order to manage the contributions of CSR fund effectively. CSR officer should donate CSR fund after the discussion with representatives from nearest villages.

#### **12.3.5. Declare the Contribution of CSR Fund**

All of the CSR activities and contribution programs will be declared to public by means of local media, company annual report or company's website on a regular basis. Audit on contribution of CSR fund will be carried out together with environmental and social audits through independent external audit team for transparency.

## 13.0. PROPOSED CONTENT OF THE EIA REPORT

The proposed chapters for the ESIA report and the content of each chapter is described below.

### Chapter Content of chapter

Non-technical executive summary

#### 1.0 Executive Summary

Concise description to detail the significant findings and recommended actions in easy language.

#### 2.0 Introduction

This chapter will provides the introduction and background of the project, presentation of the project proponent, presentation of the environmental and social experts, outlines the ESIA process required.

#### 3.0 Policy, Legal and Institutional Framework

Review of the legal and administrative framework within which the Assessment was carried out. This chapter will contains corporate environmental and social policies, policy and legal framework, international conventions, treaties and agreements, and national and international standards and guidelines, contractual and other commitments, institutional framework, project's environmental and social standards, and health standards for projects with health impacts.

#### 4.0 Project Description

The project is described concisely and includes all related facilities required during the operation, decommissioning of the project. The geographical location of the project site is also provided. So, this chapter will contain project background, project location, overview map and site layout maps, project development and implementation time schedules, description of the project size, ore extraction, ore processing, transportation facilities, waste rock: stockpiles, dumps, and tailings, Amount and type of emissions to air, effluent discharges to water; amount of type solid waste disposal; and amount and type of hazardous waste, all together with overview maps and site layout maps and design drawings for each project phase.



## 5.0 Project Alternatives

This chapter will include: Method for analysis of alternatives, no project alternative alternative technologies and locations description of the selected Alternative(s) by project phase.

## 6.0 Environmental Baseline Descriptions

The physical, ecological and socio-economic context of the project area of influence is described. This chapter also includes the data collected during the ESIA process, the accuracy, reliability and sources of data, description of the surrounding environment, setting the study limits, methodology and objectives, legally protected national, regional or state areas, including without limitation: (i) mangrove swamps; (ii) wildlife sanctuaries; (iii) geophysically significant reserves; (iv) protected cultural heritage areas; and (v) protected archeological areas or areas of historical significance, physical components: description with data and maps of (i) topography; (ii) water resources; (iii) geology and soils, hydrology/hydrogeology; (iv) environmental quality; (v) climate; (vi) vegetation cover; and (vii) natural hazards including earthquakes, tsunamis, extreme weather events, flooding, drought, and others, biological components: descriptions and maps on fauna and flora including abundance, spatial distribution of rare, endangered and vulnerable species, and species of economic and health/nutritional values, and maps and description of valued or sensitive environmental areas and habitats, infrastructure and services: location and size or capacity of transport infrastructure, public utilities and services, socio-economic components: income and livelihoods, living conditions and access to public services and natural resources, land use maps, population distribution maps, maps and charts of other socio-economic indicators such as poverty, employment and education, public health components: mortality and morbidity, occurrence of diseases, accidents and injuries, and social health determinants, cultural components: description and maps of cultural, historical, and religious sites, structures and objects, and objects with high aesthetic value; description of traditional knowledge and beliefs, and cultural practices, visual components including where applicable landscape, city scape and sea scape using three dimensional models

## 7.0 Impacts Identification and Evaluation (Impact Assessment and Mitigation Measures)

The project's likely positive and negative environmental, socio-economic and health impacts are identified and evaluated. The significance of each impact is provided, in terms of its magnitude, geographic extent, duration, reversibility, frequency and probability of occurrence. So, this chapter will include impact assessment methodology, impact identification, assessment and mitigation for each Project phase (pre-construction, construction, operation, decommissioning, closure, and post-closure), identification and assessment of potential environmental impacts including (i) physical, biological, social, socio-economic, health, cultural, and visual impacts; (ii) potential impacts on climate change such as greenhouse gas emissions and loss of carbon sinks or stocks; and (iii) identification of impacts of climate change on the project based on available climate change predictions from designated national authorities or international scientific research bodies, identification and assessment of the likelihood and severity of natural and industrial hazards relevant to the project, the design, layout, functioning, management and implementation of appropriate impact mitigation measures, characterization and assessment of any residual impacts and comparison with applicable regulations, standards and guidelines, comprehensive monitoring plan, relevant maps, aerial photos, satellite images in proper scale clearly indicating the location of sources of adverse Impacts, the spatial and temporal distribution of such impacts and with reference to the description of the surrounding environment, the components that are likely to be impacted and the nature of the impacts.

## 8.0 Risk Assessment

Risk Assessment associated with the project will be further investigated in detail during the EIA study. This is an aspect that will be assessed in the EIA phase. So, this chapter will include Methodology and Approach, Natural Hazards and Disaster Risk, Mining Industrial Hazards, analysis of likelihood of hazards and the consequences, identification of measures to reduce risks and Emergency Response Plans

## 9.0 Cumulative Impacts

**Cumulative Impacts:** Cumulative impacts associated with the project will be further investigated in detail during the EIA study. This is an aspect that will be assessed in the

EIA phase. So, this chapter will include Methodology and Approach, Cumulative Impact Assessment, Brief description and map of relevant existing and future private and public projects and developments, Identification and assessment of the potential cumulative impacts on the components in the surrounding environment and the Project's contribution to such impacts, Determination of the leverage and influence that the Project may have over the significant and project related cumulative impacts, Description of measures to mitigate the Project's contribution to the cumulative impacts.

## **10.0 Community Engagement and Community Development**

This chapter will include: Methodology and Approach, Summary of consultations and activities undertaken, Results of Consultations, Further ongoing Consultations, Disclosure

## **11.0 Mine Closure Plan**

The Plan is to include activities for progressive rehabilitation of the site over the life of the mine. This will minimize the effort and cost for the final rehabilitation. The Mine Closure Plan is to include requirements for updating. It is to be updated within two years of the start of operations. Thereafter, it should be updated every five years. Five years before mine closure, a Post Closure Plan is to be submitted with the Mine Closure Plan. The Post-Closure Plan is to include activities for post-closure monitoring and maintenance of all mine facilities, including surface mine workings, tailings, and waste disposal facilities. It is to include a plan and financing for long-term monitoring and maintenance.

## **12.0 Environmental and Social Management Plan**

Management plans will include the required management strategies for mitigation measures and monitoring. So, this chapter will include Project Description by Project phase (pre-construction, construction, operation, decommissioning, closure and post-closure), Project's Environmental, Socio-economic and, where relevant, Health Policies and Commitments, legal requirements and institutional arrangements, Summary of Impacts and Mitigation Measures, Overall budget for implementation of the EMP, Management and Monitoring Sub-Plans by Project phase (preconstruction, construction,

operation, decommissioning, closure and postclosure); the Management and Monitoring Sub-Plans shall address and satisfy all relevant environmental and social management and monitoring issues such as but not limited to noise, vibrations, waste, hazardous waste, wastewater and storm water, air quality, odor, chemicals, water quality, erosion and sedimentation, biodiversity, occupational and community health and safety, cultural heritage, employment and training, and emergency response, Content of each Sub-Plan: Objectives, Legal Requirements, Overview maps and site layout maps, images, aerial photos, satellite images, Implementation Schedule, Management Actions, Monitoring Plans, Projected Budgets and Responsibilities

### **13.0 Summary and conclusion**

Summary and conclusions of the ESIA

### **References and ESIA Technical**

### **Appendices**

## **14. NEXT STEPS IN THE EIA PROCESS**

Following the completion of the scoping process, the next step will be to finalise the specialist studies that will inform the impact assessment. During the impact assessment phase, the issues raised by stakeholders and the potential impacts of the project on the environmental and socio-economic status of the area will be examined in detail. Stakeholder issues will therefore assist to drive the EIA process. When complete, the findings of the specialist studies will be integrated into a single report, the Draft EIA Report and EMP. The report will then be made available for stakeholder comment, after which it will be finalised and submitted to the ECD for review process.

## **15. CONCLUSION**

According to the study for the scoping processes, the ESIA team will make with participants from local communities and local NGOs for concerning about the surface water pollution and compensation for damage to agricultural lands in the past. So, the developer has been working with the local authorities to setup a committee to work with local community, although MPC has issued the compensation in accordance to the resolution.

## APPENDICES





Location Map of Project Site



**APPENDIX I**  
**ATTENDANCE LIST OF PUBLIC MEETING FOR SCOPING REPORT**



ဟိန္ဒာသတ္တုတွင်းပတ်ဝန်းကျင်ထိခိုက်မှုလေ့လာဆန်းစစ်ခြင်းအတွက်နယ်နိမိတ်သတ်မှတ်ခြင်းလုပ်ငန်းစဉ်နှင့်ပတ်သက်၍တွေ့ဆုံရှင်းလင်းပွဲတက်ရောက်သူများစာရင်း

နေ့စွဲ - ၉-၁-၂၀၁၇

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်
၁။	မအေးဒွန်းဝေ	ဟိန္ဒာ (ဂုဏ်ထူး)	ဟိန္ဒာ	မ အေး ဒွန်း ဝေ
၂။	ဦးအောင်လွင်	ဟိန္ဒာ (ဂုဏ်ထူး)	ဟိန္ဒာ	ဦးအောင်လွင်
၃။	အောင်စိုးထွန်း	သတ္တုတူးဖော်ရေး (ဟိန္ဒာ)	၀၇-၈၇၄၄၅၇၄	အောင်စိုးထွန်း
၄။	အောင်စိုးမိုး	ဂုဏ်ထူး	ဟိန္ဒာ	အောင်စိုးမိုး
၅။	ဦးဝင်းသန်း	ဂုဏ်ထူး	ဟိန္ဒာ (အမှတ် ၁၀)	ဦးဝင်းသန်း
၆။	ကိုဝင်းဝင်း	"	ဟိန္ဒာ	ကိုဝင်းဝင်း
၇။	ကိုစန်းလင်းထွန်း	"	ဟိန္ဒာ	စန်းလင်းထွန်း
၈။	ကိုမိုးမိုး	"	"	မိုးမိုး
၉။	ဦးအောင်တင်သန်း	"	"	အောင်တင်သန်း
၁၀။	အောင်စိုးမိုး	"	"	အောင်စိုးမိုး

ဟိန္ဒာသတ္တုတွင်းပတ်ဝန်းကျင်ထိခိုက်မှုလေ့လာဆန်းစစ်ခြင်းအတွက်နယ်နိမိတ်သတ်မှတ်ခြင်းလုပ်ငန်းစဉ်နှင့်ပတ်သက်၍တွေ့ဆုံရှင်းလင်းပွဲတက်ရောက်သူများစာရင်း

နေ့စွဲ - ၉-၁-၂၀၁၇

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်
၁။	ဦးအောင်	ဂုဏ်ထူး	ဟိန္ဒာ	ဦးအောင်
၂။	ဦးလှမောင်	"	"	ဦးလှမောင်
၃။	ဦးထွန်းအေး	"	"	ဦးထွန်းအေး
၄။	ဦးမိုးမိုး	"	"	ဦးမိုးမိုး
၅။	ဦးအောင်လင်း	"	"	ဦးအောင်လင်း
၆။	အောင်တင်သန်း	"	"	အောင်တင်သန်း
၇။	ဦးထွန်းလွင်	"	"	ဦးထွန်းလွင်
၈။	ဦးအောင်အေး	"	"	ဦးအောင်အေး
၉။	ဦးအောင်လင်း	"	"	ဦးအောင်လင်း
၁၀။	ဦးမိုးမိုး	"	၀၇-၇၇၈၀၈၇၇	ဦးမိုးမိုး

ဟိန္ဒာသတ္တုတွင်းပတ်ဝန်းကျင်ထိခိုက်မှုလေ့လာဆန်းစစ်ခြင်းအတွက်နယ်နိမိတ်သတ်မှတ်ခြင်းလုပ်ငန်းစဉ်နှင့်ပတ်သက်၍တွေ့ဆုံရှင်းလင်းပွဲတက်ရောက်သူများစာရင်း

နေ့စွဲ - ၉-၁-၂၀၁၇

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်
၂၀	ဦးစား ဘာ လေ မာန်	ရပ်မိရပ်ဘ	ဟိန္ဒာ:	
၂၁	အောင်လေ	"	ဟိန္ဒာ:	၀၉၁၆၀၆၁
၂၂	ဦးခင်စိန်	"	၀၇-၄၇၄၁၅၂၇၆	
၂၃	ဒေါ်ဇွန်ဇွန်	"	ဟိန္ဒာ:	ဒေါ်ဇွန်ဇွန်
၂၄	ဦးအောင်အောင်	"	၀၇-၄၅၁၀၆၀၇၇၇	
၂၅	ဦးမောင်မောင်	"	ဟိန္ဒာ:	
၂၆	ဦးအောင်အောင်	"	"	
၂၇	ဦးမောင်မောင်	"	"	
၂၈	ဦးအောင်လေ	"	"	
၂၉	ဦးအောင်လေ	"	"	

ဟိန္ဒာသတ္တုတွင်းပတ်ဝန်းကျင်ထိခိုက်မှုလေ့လာဆန်းစစ်ခြင်းအတွက်နယ်နိမိတ်သတ်မှတ်ခြင်းလုပ်ငန်းစဉ်နှင့်ပတ်သက်၍တွေ့ဆုံရှင်းလင်းပွဲတက်ရောက်သူများစာရင်း

နေ့စွဲ - ၉-၁-၂၀၁၇

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်
၃၀	ဦးအောင်အောင်	ရပ်မိရပ်ဘ	ဟိန္ဒာ:	
၃၁	အောင်အောင်	"	"	
၃၂	ဦးစိုးစိုး	"	၀၇၀၀	
၃၃	ကိုအောင်အောင်	"	ဟိန္ဒာ: အမှတ် ၈၁	
၃၄	အောင်အောင်	"	ဟိန္ဒာ: အမှတ် ၈၁	
၃၅	ကိုမောင်အောင်	"	၀၇-၄၅၅၈၄၇၀၃၇ ဟိန္ဒာ:	
၃၆	ဦးအောင်	"	ဟိန္ဒာ:	
၃၇	အောင်အောင်	"	ဟိန္ဒာ:	
၃၈	ဦးအောင်အောင်	"	ဟိန္ဒာ:	

**APPENDIX II**  
**KEY DISCUSSIONS DURING PUBLIC MEETING FOR SCOPING PROPOSAL**



စဉ်	တင်ပြဆွေးနွေးသူ / အဓိကဆွေးနွေးချက်များ
၁။	ဒေါက်တာကျော်စွာတင့် (Ever Green Tech) - ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာလုပ်ငန်းစဉ်များအကြောင်း၊ နယ်နိမိတ်သတ်မှတ်မှုလုပ်ငန်းစဉ်နှင့် ဒေသခံလူထုပူးပေါင်းပါဝင်မှုအရေးကြီးပုံ၊ ထိခိုက်နိုင်မှုများနှင့်ကြိုတင်ကာကွယ်ထားရှိသင့်သည်များ၊ လူမှုဖွံ့ဖြိုးရေးရံပုံငွေ အသုံးပြုမှုများအားဆွေးနွေးတင်ပြသွားပါသည်။
၂။	ဦးသက်အေး (ဟိန္ဒူးအုပ်ချုပ်ရေးမှူး) - လူမှုဖွံ့ဖြိုးရေးရံပုံငွေအား ကုမ္ပဏီမှ ပုံမှန်သုံးစွဲခြင်းရှိ/မရှိ မည်ကဲ့သို့သိရှိနိုင်ပါကြောင်း၊ - ရေပူဝရွာအားထိခိုက်မှုဆန်းစစ်ခြင်းလုပ်ငန်းများလုပ်ဆောင်ရာတွင်ထည့်သွင်းပေးစေလိုပါကြောင်း ဆွေးနွေးသွားပါသည်။
၃။	ဒေါက်တာကျော်စွာတင့် (Ever Green Tech) - လူမှုဖွံ့ဖြိုးရေးရံပုံငွေအား ကုမ္ပဏီမှ ပုံမှန်သုံးစွဲရမည်ဖြစ်ပါကြောင်း၊ မြန်မာနိုင်ငံရင်းနှီးမြှုပ်နှံမှုကော်မရှင်မှလည်းလမ်းညွှန်ပေးထားပါကြောင်း၊ ပုံမှန်သုံးစွဲရမည်ဖြစ်ကြောင်းသိရှိပြီးဖြစ်၍ သုံးစွဲခြင်းရှိ/မရှိစောင့်ကြည့်လေ့လာသွားနိုင်ပါကြောင်း၊ - ရေပူဝရွာအားထိခိုက်မှုဆန်းစစ်ခြင်းလုပ်ငန်းများလုပ်ဆောင်ရာတွင်ထည့်သွင်းကွင်းဆင်းသွားမည်ဖြစ်ကြောင်းဆွေးနွေးသွားပါသည်။
၄။	ဒေါ်နီနီထွေး (သတ္တုတွင်းစောင့်ကြည့်လေ့လာရေးအဖွဲ့) - သတ္တုတွင်းမှ စွန့်ပစ်ရေထုတ်လွှတ်မှုကြောင့် ထိခိုက်နစ်နာမှုများရှိခဲ့ပါကြောင်း၊ - ဆန်းစစ်မှုလုပ်ငန်းများအား တိကျသေချာစွာလုပ်ဆောင်ပေးရန်၊
၅။	ဒေသခံတစ်ဦး (အောက်ဟိန္ဒူးကျေးရွာ) - လူမှုဖွံ့ဖြိုးရေးရံပုံငွေသုံးစွဲမှုအား တိကျသေချာစွာပုံမှန်သုံးစွဲရန်လိုအပ်ပါကြောင်း၊

**COMMENTS BY SUGGESTION LETTERS DURING FIRST PUBLIC MEETING**





ပထမအကြိမ်တေမြှုပ်ခဲ့ခြင်းတကုရောကုလာသူများမှစာဖြင့်ရေးသားအကြံပြုချက်များ

စဉ်	အကြံပြုချက်	အကြံပြုဆွေးနွေးသူ
၁။	အကြံပြုချက် MPC မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ	(လက်မှတ်) Per Aye 2012
၂။	မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ	(လက်မှတ်) အကြံပြု မှတ်တမ်းအရ
၃။	သဘာဝပတ်ဝန်းကျင် ဖွင့်လှစ်မှု၊ စစ်ဆေးမှု၊ စစ်ဆေးမှု၊ စစ်ဆေးမှု သဘာဝပတ်ဝန်းကျင် ဖွင့်လှစ်မှု၊ စစ်ဆေးမှု၊ စစ်ဆေးမှု၊ စစ်ဆေးမှု	အကြံပြု (လက်မှတ်) - အကြံပြု - အကြံပြု - အကြံပြု
၄။	သဘာဝပတ်ဝန်းကျင် ဖွင့်လှစ်မှု၊ စစ်ဆေးမှု၊ စစ်ဆေးမှု၊ စစ်ဆေးမှု သဘာဝပတ်ဝန်းကျင် ဖွင့်လှစ်မှု၊ စစ်ဆေးမှု၊ စစ်ဆေးမှု၊ စစ်ဆေးမှု	အကြံပြု (လက်မှတ်) - အကြံပြု - အကြံပြု - အကြံပြု
၅။	မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ မှတ်တမ်းအရ	အကြံပြု (လက်မှတ်) - အကြံပြု - အကြံပြု - အကြံပြု

(လက်မှတ်)  
 - ဦးစောမွန်  
 - ဧရာဝတီ  
 - ၀၇.၄၇၂၄၇၃၇၂





**APPENDIX III**  
**KEY DISCUSSIONS DURING FIRST PUBLIC MEETING**



လူမှုဝန်းကျင်ထိခိုက်မှု  
ကွင်းဆင်းစစ်ဆေးမှု ရလဒ်များ

ရွာအမည်	လိုလားချက်များ	စိုးရိမ်မှုများ
မြောင်းပြို	လမ်း၊တံတား၊ရေ၊မီး၊ဆေးခန်း၊လျော်ကြေး၊ လစာ၊ချောင်းဖော်၊	မြေစာစွန့်ပစ်မှု၊ထိခိုက်မှုထပ် မဖြစ်စေရန်၊
အထက်ဟိန္ဒူး	လမ်း၊တံတား၊ရေ၊မီး၊ဆေးခန်း၊နုန်းများဆ ယ်ရန်၊လစာ၊	
အောက်ဟိန္ဒူး	လမ်း၊တံတား၊ရေ၊မီး၊လစာ၊ ကျောင်းဆရာမ	မြေစာစွန့်ပစ်မှု
ရေပူဝ	လမ်း၊တံတား၊ရေ၊မီး၊	
ကင်ပွန်းခြုံ	လမ်း၊တံတား၊ရေ၊မီး၊နုန်းများဆယ်ရန်၊လေ ော်ကြေး၊ချောင်းဖော်၊	ထိခိုက်မှုထပ် မဖြစ်စေရန်၊
ကျောက်မဲတောင်	လမ်း၊တံတား၊ရေ၊မီး၊ဆေးခန်း၊ ဘုန်းကြီးကျောင်း၊ချောင်းဖော်၊	မြေစာစွန့်ပစ်မှု၊
တောင်သုံးလုံး	လမ်း၊တံတား၊ရေ၊မီး၊ဆေးခန်း၊ရေတွင်းများ ၊ရေအရည်အသွေး စမ်းရန်၊လျော်ကြေး၊ချောင်းဖော်	မြေစာစွန့်ပစ်မှု၊ထိခိုက်မှုထပ် မဖြစ်စေရန်၊
ရွှေချောင်း	လမ်း၊တံတား၊ရေ၊မီး၊ဆေးခန်း၊ရွာဘောလုံး ကွင်း၊ခဲသင်္ဘော ပြန်စားရန်၊လျော်ကြေး၊ချောင်းဖော်၊ ကျောင်းဆရာမ	ထိခိုက်မှုထပ် မဖြစ်စေရန်၊

၂၇-၃-၂၀၁၇ တွင် မြောင်းပြိုချောင်း စောင့်ကြည့်ရေးအဖွဲ့ဝင်များနှင့်

တွေ့ဆုံဆွေးနွေးမှု ရလဒ်များ

- ၁။ အမှတ် ၂ ချောင်းတွင်း မြေစာမပုံရန်။
- ၂။ ချောင်း ၂ ချောင်းအား ရွာထိပ်မရောက်မီပေါင်းရန်။
- ၃။ အနည်ထိုင်ကန်များအား အောက်သို့သာ တူးချရန်။
- ၄။ မြောင်းပြိုချောင်းအား တူးရန်၊ ချဲ့ရန်၊ ကျောက်စီရန်။





- ၅။ မြေစာများရွာအနားတွင် စွန့်ပစ်ခြင်းမပြုရန်။
- ၆။ ကန်ဘောင်အတွင်း/အပြင်နံရံအား ကျောက်လုံးစီပေးရန်။
- ၇။ ကန်များအား ပုံမှန်ဆယ်ပေးရန်။
- ၈။ ကန်များအား ဖွင့်ချခြင်းမပြုရန်။
- ၉။ မြောင်းပြိုရွာအတွင်း ရေမဝင်စေရန်။
- ၁၀။ မြောင်းပြိုရွာ သုံးရေသွယ်ယူပေးရန်။

ပထမ အကြိမ် အဓိကသက်ဆိုင်သူများနှင့် တွေ့ဆုံပွဲ  
ထားဝယ်မြို့

စဉ်	တင်ပြဆွေးနွေးသူ / အဓိကဆွေးနွေးချက်များ
၁။	<ul style="list-style-type: none"> <li>- လူမှုဖွံ့ဖြိုးရေးရုံးပုံငွေအား ကုမ္ပဏီမှ ပုံမှန်သုံးစွဲခြင်းရှိ/မရှိ</li> <li>- စွန့်ပစ်ရေထုတ်လွှတ်မှုကြောင့် ထိခိုက်နစ်နာမှုများရှိ</li> <li>- ဆန်းစစ်မှုလုပ်ငန်းများအား တိကျသေချာစွာလုပ်ဆောင်ပေးရန်။</li> </ul>
၁။	ဆွေးနွေးပွဲတွင် အင်္ဂလိပ်ဘာသာဖြင့် မပြောရန်
၂။	ရေစုကန်၊ ရေစစ်ကန်များ၏ ပုံများ ထည့်သွင်း ပြသပေးရန်။
၃။	<p>၁၉၉၉မှစ၍ MPC စတင်လည်ပတ်ခဲ့ပြီး စွန့်ပစ်မြေစာများ စနစ်တကျမရှိမှု၊ ရေဆိုးစွန့်ပစ်မှုတို့ကြောင့် မြောင်းပြို ချောင်းပျောက် ကွယ်သည်အထိ ဖြစ်ခဲ့ ဆုံးရှုံးမှုများအား မည်သည့်တာဝန် ယူမှုမှ မပြုလုပ်ခဲ့ပါကြောင်း၊</p> <p>အစည်းအဝေးလုပ်မည်ဆိုပါက နှစ်ပတ် ကြိုတင် အကြောင်းကြားစေလိုကြောင်း၊ ထို့ပြင် ဆွေးနွေးမည့် အကြောင်းအရာ သုံးပတ်ခန့် ကြိုတင်ပို့ပေးစေလိုပါကြောင်း၊</p>
၄။	<ul style="list-style-type: none"> <li>- တောင်သုံးလုံး၊ ကျောက်မဲတောင်၊ ဆိုးကျိုးများ ခံစားနေရ</li> <li>- ချောင်းတူးခြင်းနှင့်ပတ်သက်၍ သိလိုကြောင်း၊</li> <li>- ချောင်းဖော်ခြင်းလုပ်ငန်းအား ဟိန္ဒူချောင်းအထိတူးသင့်ကြောင်း၊အနက် ၁၅ပေ အကျယ် ပေ၅၀ ခန့် တူးသင့်ပါကြောင်း၊</li> <li>- သဲမြေစာများအား ဘေးတွင် ပုံထားခြင်းဖြင့် ပြန်လည်မျောပါ ပြိုကျလာနိုင်သဖြင့် ချောင်း ပြန်ကောနိုင်ပါကြောင်း</li> </ul>
၅။	- MPC မှ ရေကာတာ ပိတ်ထားသဖြင့် မနှစ်ကရေကြီး၊
၆။	<ul style="list-style-type: none"> <li>- ချောင်းဘေးနံရံများ အခိုင်အမာဖြစ်ရန်</li> <li>- အုန်းကြိမ်ချောင်းအားပြန်လည်ဖော်ပေးရန်</li> <li>- ခြံများပျက်စီးခဲ့ခြင်းအားတာဝန်ယူ ဖြေရှင်းပေးရန်</li> </ul>
၇။	<ul style="list-style-type: none"> <li>- ESIA လုပ်ငန်းအတွက် အချိန်မည်မျှယူထားသည်</li> <li>- သက်ရောက်မှု ဧရိယာမည်မျှသတ်မှတ်ထားသည်ကို သိလိုပါကြောင်း</li> <li>- အစီရင်ခံစာအား မည်သူအားတင်ပြမည်ကို သိလိုပါကြောင်း</li> <li>- ဒေသခံနှင့် လုပ်ငန်းရှင် မည်သူအားဦးစားပေးရွေးချယ်ပေးမည်</li> </ul>

**APPENDIX IV**  
**KEY DISCUSSIONS FROM SECOND PUBLIC MEETING**



ဒုတိယအကြိမ် လူထုတွေ့ဆုံပွဲ  
အ.ထ.က (ဟိန္ဒား)

စဉ်	ဆွေးနွေးသူ / အဓိကဆွေးနွေးချက်များ
၁။	<ul style="list-style-type: none"> <li>- Tailing Pond ၇ ခု တည်ဆောက် လည်ပတ် နေပါ ကြောင်း</li> <li>- Tailing Pondများ တူးဖော်ခြင်း ပြုလုပ်ခိုင်းထားကြောင်း၊ အမှတ် ၆၊ အမှတ် ၄ ကန်တွင် နှုန်းများစုပုံ သွားမည်</li> </ul>
၂။	<ul style="list-style-type: none"> <li>- ဒေသခံများအား ခဲလုပ်ငန်း လုပ်ကိုင် ခွင့်ပြုရန်</li> <li>- မီးလိုင်းများအား စနစ်တကျပြုလုပ်ပေးရန်</li> <li>- တောပြုန်းခြင်းဖြစ်နေသဖြင့် တားဆီးပေးစေလိုကြောင်း</li> <li>- ရပ်ရွာဖွံ့ဖြိုးရေးများ ဆောင်ရွက်ပေးစေလိုကြောင်း</li> </ul>
၃။	ကျောက်မဲတောင်အုပ်ချုပ်ရေးမှူး ချောင်းရေကြီးမှုကြောင်း မြေယာဆုံးရှုံးမှုများရှိပါကြောင်း၊ ထိုက်သင့် သော နစ်နာကြေး ရရှိလိုပါကြောင်း၊
၄။	<ul style="list-style-type: none"> <li>- ကုမ္ပဏီအနေဖြင့် အမြတ်ငွေ၏ ၂ % အား ဒေသဖွံ့ဖြိုးရေးတွင် သုံးစွဲသွားမည်</li> <li>- ဆရာ/မများအား ထောက်ပံ့မှုများ ပြုထားပါကြောင်း</li> <li>- လမ်း/တံတားများ ပြင်ပေးနေ</li> <li>- ဟိန္ဒားဆေးရုံအား ပြုပြင်ပေးပြီးဖြစ်</li> <li>- မီးသင်္ဂြိုဟ်စက်မတည်ကူညီ</li> <li>- ဖောင်းတောရေကန်အား သန့်ရှင်းရေးပြုလုပ်ပေးမည်</li> <li>- ရေပိုက်လိုင်းများအား ပြုပြင်ပေးထား</li> <li>- မြောင်းပြိုရွာဖွံ့ဖြိုးရေး သိန်းငါးဆယ် လှူထား</li> </ul>
၅။	<ul style="list-style-type: none"> <li>- နှုန်းများအား မိုးရေနှင့်အတူ ဖောက်ချခဲ့ကြောင်း၊</li> <li>- ဒုတိယအကြိမ် ရေကန်ကျိုးပေါက်၍ ဖြစ်ပါကြောင်း၊ မြေစာများဖယ်ထုတ်ရန် တဧက ၅၀၀၀ကျပ်ပေး၊ လျော်ကြေးပေးခြင်းမဟုတ်၊</li> <li>- မြေစာများအား ဥပဒေနှင့် အညီ စွန့်ပစ်ရန်</li> <li>- ဒေသတွင်းနစ်နာမှုများအားကူညီဖြည့်ဆည်း ပေးစေလို၊</li> <li>- ကျောက်မဲတောင်၊ တောင်သုံးလုံး၊ ရွှေချောင်းရွာများမှာလည်း ထိခိုက် နစ်နာမှုများ ရှိခဲ့ပါကြောင်း၊</li> </ul>
၆။	ဒေသဖွံ့ဖြိုးရေး ရန်ပုံငွေအား ဒေသခံများ ပါဝင်သော အဖွဲ့၏စီမံခန့်ခွဲမှုဖြင့်သာ ဆောင်ရွက်စေလိုပါကြောင်း
၇။	<ul style="list-style-type: none"> <li>- မိုးကျတော့မည်ဖြစ်သဖြင့် ရေကန်များ အလုံအလောက်/ အခိုင်အခန့် ရှိမရှိ</li> <li>- စွန့်ပစ်မြေစာများအား လုံခြုံစိတ်ချရသောနေရာသို့ စွန့်ပစ်မှုများ ရှိသင့်ပါကြောင်း</li> <li>- နစ်နာသူများအား ဖြေရှင်းပေးနိုင်သော အဖွဲ့အစည်းတစ်ခု ထူထောင်ပေးရန်</li> <li>- ရေအရည်အသွေးအား ပုံမှန်စစ်ဆေးသတင်းထုတ်ပြန် ပေးရန်</li> </ul>

ဒုတိယအကြိမ် လူထုတွေ့ဆုံပွဲ  
မြောင်းပြိုရွာ ဘုန်းတော်ကြီးကျောင်း

စဉ်	ဆွေးနွေးသူ / အဓိကဆွေးနွေးချက်များ
၁။	- Power Point တွင် English စာလုံးများ ထည့်သွင်းရေးသားထားခြင်းအား လက်မခံပါကြောင်း
၂။	- မြေယာပျက်စီးမှု လျော်ကြေးများ ဆွေးနွေးပေးစေလို
၃။	- CSR Program အား ဆွေးနွေးခြင်းမပြုခင် ဒေသခံများ၏ လိုလားချက်များအား သိရှိရန် အရင် ဆွေးနွေးစေလို - မြစ်ချောင်းများ၏ ရေစီးဆင်းမှု ကောင်းမွန်လာစေရေး ဆောင်ရွက်ရာတွင် အစအဆုံး ဆောင်ရွက်ရန်၊
၄။	- မြေစာဖုံးလွှမ်းခြင်းခံခဲ့ရသော လယ်ယာမြေများ ပြန်လည်ဖော်ထုတ်နိုင်ရေး ကူညီပေးရန်။ (ဥပမာ - ရွာများအား ထွန်စက်များဝယ်ယူလှူဒါန်းပေးထားပြီး စက်အင်အားဖြင့် ဆောင်ရွက်ခြင်း)