Myanmar Conch Cement Company Limited

ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

Cement Plant (5000tpd) Project in Kyaukse Industrial Zone, Kyaukse Township, Mandalay Region

Submitted to Ministry of Natural Resources and Environmental Conservation

September 2022

Revised Report

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အစီရင်ခံစာ အကျဉ်းချုပ်

၁။ မိတ်ဆက်

စက်မှုဝန်ကြီးဌာန၏ ကျောက်ဆည်ဘိလပ်မြေစက်ရုံ (တန် ၄၀၀) ၊ အမှတ် (၃၃) အကြီးစားစက်ရုံသည် ၂၀၀၃ ခုနှစ် ဇန်နဝါရီလမှစ၍ ဖွင့်လှစ်ခဲ့ပြီး ၂၀၁၃-၂၀၁၄ ခုနှစ်ထိ (၁၂) နှစ်ခန့် နိုင်ငံပိုင်လုပ်ငန်း အနေဖြင့် လည်ပတ်ဆောင်ရွက်ခဲ့ပါသည်။ ၂၀၁၄-၂၀၁၅ ခုနှစ်တွင် မြန်မာကွန်ချိုဘိလပ်မြေ ကုမ္ပဏီလီမိတက်နှင့် အကျိုးတူ ပူးပေါင်းကာ BOT စနစ်ဖြင့် ဆက်လက် ဆောင်ရွက်ခဲ့ပါသည်။

စက်မှုဝန်ကြီးဌာနနှင့် မြန်မာကွန်ချိုဘိလပ်မြေ ကုမ္ပဏီလီမိတက်သည် တည်ဆောက်-လည်ပတ်-လွှဲပြောင်း (BOT) စာချုပ် ချုပ်ဆိုရန်အတွက် ဆွေးနွေးချက်အပေါ် သဘောတူညီရေး (AOD) ကို ၂၀၁၄ ခုနှစ် မတ်လ ၃၁ ရက်နေ့တွင် ရေးထိုးခဲ့ပြီး ၂၀၁၄ ခုနှစ် ဧပြီလ ၁ ရက်နေ့ (၂၀၁၄ - ၂၀၁၅ ဘဏ္ဍာနှစ်) တွင် ပူးပေါင်းဆောင်ရွက်ခဲ့ပါသည်။ ထုတ်လုပ်မှုအပေါ် မျှဝေခံစားရေး စနစ်ဖြင့် BOT (တည်ဆောက်-လည်ပတ်-လွှဲပြောင်း) ကို စက်မှုဝန်ကြီးဌာန၏ အမှတ် - ၃ (ယခုလက်ရှိ အမှတ် - ၂) အကြီးစားစက်မှုလုပ်ငန်းနှင့် ၂၀၁၄ ခုနှစ် နိုဝင်ဘာလ ၁၃ ရက်နေ့တွင် စာချုပ်ချုပ်ဆိုခဲ့ပါသည်။

အဆိုပြုစီမံကိန်းမှာ မန္တလေးတိုင်းဒေသကြီး ကျောက်ဆည်မြို့နယ်၊ ကျောက်ဆည်စက်မှုဇုန်တွင် တည်ရှိပြီး ဘိလပ်မြေ ထုတ်လုပ်ခြင်းနှင့် ဘိလပ်မြေ ထုတ်ကုန်များ ဖြန့်ဖြူးရောင်းချခြင်းတို့ကို ဆောင်ရွက်မည် ဖြစ်ပါသည်။ စီမံကိန်း၏ စုစုပေါင်း ဘိလပ်မြေ ထုတ်လုပ်နှုန်းမှာ တစ်နှစ်လျှင် ခန့်မှန်း ဘိလပ်မြေ တန်ချိန် ၁.၇ သန်း ဖြစ်ပါသည်။

စီမံကိန်းအဆိုပြုသူ -	မြန်မာကွန်ချိုဘိလပ်မြေ ကုမ္ပဏီလီမိတက်
ကုမ္ပဏီမှတ်ပုံတင်အမှတ် -	၉၀၉/၂၀၁၅
ဆက်သွယ်ရမည့်ပုဂ္ဂိုလ် -	ဦးမင်းမင်း Deputy General Manager
လိပ်စာ -	အမှတ် (၃၃) အကြီးစားစက်မှုလုပ်ငန်း၊ ကျောက်ဆည်စက်မှုဇုန်၊ မန္တလေးတိုင်းဒေသကြီး။
ဖုန်းနံပါတ် -	+၉၅၉ ၂၀၃၇၁၀၈
အီးမေးလ် -	myintinvestmentgroup@gmail.com

အောက်ဖော်ပြပါ ဇယားတွင် သက်ဆိုင်ရာ စီမံကိန်း အကောင်အထည် ဖော်ဆောင်သည့် အဖွဲ့အစည်းနှင့် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ အကောင်အထည် ဖော်ဆောင်မည့် အဖွဲ့အစည်းအား ဖော်ပြထားပါသည်။

စီမံကိန်း အဆိုပြုသူ	Myanmar Conch Cement (Mandalay) Company Limited
ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ အကောင်အထည် ဖော်ဆောင်သည့် အဖွဲ့အစည်း	Resource & Environment Myanmar Co., Ltd. And Sustainable Environment Myanmar Co., Ltd.

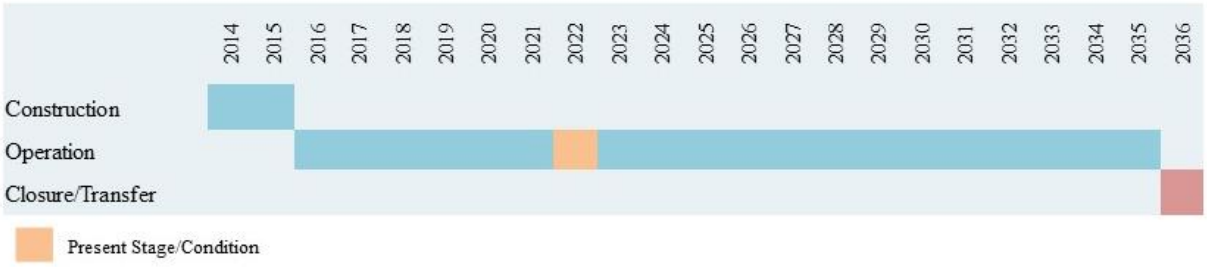
၂။ ဥပဒေရေးရာမူဘောင်

မြန်မာကွန်ရှ် ဘိလက်မြေ ကုမ္ပဏီသည် သက်ဆိုင်ရာ ဥပဒေ၊ စည်းမျဉ်းစည်းကမ်းများ၊ အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) စံချိန်စံညွှန်း (NEQG) နှင့် IFC မှ ပတ်ဝန်းကျင်နှင့် ဘေးကင်းလုံခြုံရေးဆိုင်ရာ အထွေထွေလမ်းညွှန်ချက်များကို လိုက်နာဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။ ဥပဒေ၊ စည်းမျဉ်းစည်းကမ်း နှင့် ပတ်ဝန်းကျင်ဆိုင်ရာ စံချိန်စံညွှန်းများ အသေးစိတ်ကို ပတ်ဝန်းကျင်ထိခိုက်မှု အစီရင်ခံစာ အခန်း (၂) တွင် ဖော်ပြထားပါသည်။

၃။ စီမံကိန်းအကြောင်းအရာ

မြန်မာကွန်ရှ် ဘိလပ်မြေ ကုမ္ပဏီလီမိတက်သည် ထုံးကျောက် ကြိတ်ခွဲခြင်းမှ ဘိလပ်မြေ ထုတ်ပိုးခြင်း အထိ လုပ်ငန်းစဉ်များ ပါဝင်ပါသည့် တစ်ရက်လျှင် မီးသင်းကျောက် မက်ထရစ်တန် ၅၀၀၀ (တစ်နှစ်လျှင် ဘိလပ်မြေတန်ချိန် ၁.၇ သန်း) ထုတ်လုပ်နိုင်စွမ်းရှိသည့် ဘိလပ်မြေစက်ရုံကို တည်ဆောက်သွားမည် ဖြစ်ပါသည်။

၃.၁ စီမံကိန်းအချိန်ဇယား



၃.၂ ဘိလပ်မြေ ထုတ်လုပ်မှု

မြန်မာကွန်ရှ် ဘိလပ်မြေထုတ်လုပ်သည့် နည်းပညာမှာ Central DCS ထိန်းချုပ်မှုစနစ်မှတစ်ဆင့် အဆင့်မြင့် ခြောက်သွေ့ နည်းစဉ်ကို အသုံးပြုထားခြင်း ဖြစ်ပါသည်။ ထုံးကျောက်မိုင်းမှ ထုတ်ယူသည့်စနစ်၊ ကုန်ကြမ်း ကြိတ်ခွဲစနစ်၊ ကုန်ကြမ်း သိုလှောင်သည့်စနစ်၊ ကုန်ကြမ်း အချိုးကျ ရောစပ်စနစ်၊ ကုန်ကြမ်း ကြိတ်ခွဲစနစ်နှင့်

စွန့်ပစ်ဓာတ်ငွေ့ သန့်စင်စနစ်၊ ကုန်ကြမ်းရောမွှေခြင်းနှင့် မီးသင်းဖိုစနစ်၊ မီးသင်းကျောက် ဓာတ်ပြုခြင်း၊ အအေးခံစနစ်နှင့် စွန့်ပစ်အပူသုံး ဓာတ်အားထုတ်လုပ်သည့်စနစ် စသည်တို့ ပါဝင်ပါသည်။

၃.၃ လျှပ်စစ်သုံးစွဲမှု

ကုန်ထုတ်လိုင်းအတွက် စီမံကိန်းလည်ပတ်စဉ်တွင် လိုအပ်သောလျှပ်စစ်ကို ထောက်ပံ့ရန် တည်ဆောက်ထားသော ၉ မဂ္ဂါဝပ် စွန့်ပစ်အပူသုံး လျှပ်စစ်ဓာတ်အား ထုတ်လုပ်သည့်စနစ် နှင့် ၂×၂၀ မဂ္ဂါဝပ် ကျောက်မီးသွေးသုံး လျှပ်စစ်ဓာတ်အားပေး စက်ရုံမှ သုံးစွဲသွားပါမည်။

၃.၄ အခြားဆောင်ရွက်နိုင်သောနည်းလမ်းများ

- စီမံကိန်း တည်နေရာဆိုင်ရာ အခြားနည်းလမ်းများ

  အဆိုပြုစီမံကိန်းတည်နေရာမှာ လုပ်ငန်းလည်ပတ် ဆောင်ရွက်လျက်ရှိနှင့်ပြီး ဖြစ်ပါသည်။

- ဒီဇိုင်း၊ နည်းပညာ နှင့် လုပ်ငန်းစဉ်ဆိုင်ရာ အခြားနည်းလမ်းများ

Dry Process ဖြင့် ဘိလပ်မြေ ထုတ်လုပ်မှုကို နှိုင်းယှဉ်ခြင်းနှင့် ရွေးချယ်ခြင်း	
Dry Process	**Wet Process**
ဒီဇိုင်း၊ နည်းပညာနှင့် လုပ်ငန်းစဉ်	
လောင်စာသုံးစွဲမှုနည်းပါးသည်။	လောင်စာသုံးစွဲမှုများသည်။
ဘိလပ်မြေထုတ်လုပ်ရန် လိုအပ်သော မီးဖိုသင်းဖို အရွယ်အစား သေးငယ်သည်။	ဘိလပ်မြေထုတ်လုပ်ရန် လိုအပ်သော မီးသင်းဖို၏ အရွယ်အစား ပိုကြီးသည်။
ကုန်ကြမ်းများ ရောစပ်ခြင်းကို ထိန်းချုပ်ရန် ခက်ခဲသောကြောင့် ပိုမိုကောင်းမွန်သော တစ်သားတည်းကျသည့် ပစ္စည်းကို ရရှိရန် ခက်ခဲသည်။	ကုန်ကြမ်းကို အလွယ်တကူ ရောစပ်နိုင်သောကြောင့် ပိုမိုကောင်းမွန်သော တစ်သားတည်းကျသည့် ပစ္စည်းကို ရရှိနိုင်သည်။
လုပ်ငန်းစဉ်၏အချိန်နည်းသည်။	လုပ်ငန်းစဉ်၏အချိန်ကြာမြင့်သည်။
စီပွားရေးဆိုင်ရာ နှိုင်းယှဉ်ချက်	
ထုတ်လုပ်မှုစရိတ် နည်းပါးသည်။	ထုတ်လုပ်မှုစရိတ် မြင့်မားသည်။
အရင်းအနှီးမြုပ်နှံစရိတ် များသည်။	အရင်းအနှီးမြုပ်နှံစရိတ် လျော့နည်းသည်။
ပတ်ဝန်းကျင်ဆိုင်ရာ အားသာချက်	
ရေကို ပြန်လည်အသုံးပြုခြင်းကြောင့် စွန့်ပစ်ရေများကို ပတ်ဝန်းကျင်သို့ မစွန့်ပစ်နိုင်ပါ။	စွန့်ပစ်ရေများကို ပတ်ဝန်းကျင်သို့ စွန့်ပစ်နိုင်သည်။

၄။ စီမံကိန်း၏ ပတ်ဝန်းကျင်ဆိုင်ရာနှင့်လူမှုဝန်းကျင်ဆိုင်ရာ အကြောင်းအရာများ

ရေ၊ လေ၊ ဆူညံသံကဲ့သို့ ပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး၊ ဇီဝမျိုးစုံမျိုးကွဲ၊ လူမှုစီးပွားအကြောင်းအရာများ အစရှိသည့် လက်ရှိပတ်ဝန်းကျင်ဆိုင်ရာ အခြေအနေများကို မြို့နယ်အထွေထွေ အုပ်ချုပ်ရေးဌာနမှ ဒေသဆိုင်ရာ မှတ်တမ်းများ၊ တက္ကသိုလ်များမှ ရရှိထားသော စာတမ်းများ၊ အစီရင်ခံစာများနှင့် ကွင်းဆင်း လေ့လာမှုများကို အခြေခံ၍ ဖော်ပြထားပါသည်။

လေအရည်အသွေး၊ ရေ အရည်အသွေး၊ ဆူညံသံ အတွက် ပတ်ဝန်းကျင်ဆိုင်ရာ အခြေခံအချက်အလက် များကို ၂၀၁၄ ခုနှစ် ဒီဇင်ဘာလ အတွင်း ကွင်းဆင်း တိုင်းတာခဲ့ပါသည်။ တုန်ခါမှု (vibration) အဆင့် တိုင်းတာခြင်းအား ၂၀၁၈ ခုနှစ် နိုဝင်ဘာလတွင် ထပ်မံ ကွင်းဆင်းတိုင်းတာခဲ့ပါသည်။ ကွင်းဆင်းတိုင်းတာသည့် နေရာများ၊ ရလာဒ်များ၊ ဓာတ်ခွဲခန်းရလာဒ်များ၊ အသုံးပြုသည့် ပစ္စည်း၊ နည်းလမ်းနှင့် မှတ်တမ်းဓာတ်ပုံများအား အစီရင်ခံ အခန်း (၄) တွင် အသေးစိတ်ထည့်သွင်း ဖော်ပြထား ပါသည်။

၄.၁ ရူပဝန်းကျင်

မိုးလေဝသနှင့် ဇလဗေဒဦးစီးဌာနမှ ရရှိထားသော ၂၀၀၇ ခုနှစ်မှ ၂၀၁၆ ခုနှစ်အတွင်း မိုးလေဝသအချက်အလက်များ အရ မန္တလေးဒေသ၏ အမြင့်ဆုံးအပူချိန်မှာ ၃၂.၅ ဒီဂရီစင်တီဂရိတ် ဖြစ်ပြီး အနိမ့်ဆုံးအပူချိန်မှာ ၂၂.၄ ဒီဂရီ စင်တီဂရိတ်ဖြစ်ပါသည်။ ၂၀၀၇ ခုနှစ်မှ ၂၀၁၆ခုနှစ် အတွင်း မန္တလေးဒေသ၏ နှစ်စဉ်စိုထိုင်းစမှာ ၆၈ ရာခိုင်နှုန်း ခန့်ရှိပါသည်။ ကျောက်ဆည်မြို့နယ်သည် အပူပိုင်းခြောက်သွေ့ရာသီဥတု အတွင်း ကျရောက်နေပြီး မိုးရေချိန်မှာ တစ်နှစ်အတွင်း လက်မ ၄၀ မှ ၆၀ အထိ ရရှိပါသည်။

၄.၂ ဇီဝဝန်းကျင်

ကျောက်ဆည်မြို့နယ်တွင် ရောနှောတောများ၊ သီးနှံပင်များ၊ မြက်တောများ၊ ခြံုပင်များ၊ သီးပင်စားပင်များကို အများဆုံးတွေ့ရှိရပြီး ၎င်းတို့မှ အများစုမှာ သစ်မာများဖြစ်သည်။ လေ့လာထားသော အခြေခံအချက်အလက်များ အရ မျိုးသုဉ်းပျောက်ကွယ်လုနီးပါးဖြစ်သော အပင်များမရှိပါ။ အများစုမှာ မျိုးသုဉ်းပျောက်ကွယ်ရန် စိုးရိမ်စရာ မလိုသည့် အဆင့်တွင် ရှိနေပြီး မျိုးသုဉ်းပျောက်ကွယ်မှု အဆင့်မှာ နည်းပါးပါသည်။ လက်ရှိ စီမံကိန်းနေရာ အနီးတစ်ဝိုက်တွင် ပတ်ဝန်းကျင်ဆိုင်ရာ အထိအခိုက်မခံနိုင်သော သဘာဝထိန်းသိမ်းရေး နေရာများမရှိပါ။

စီမံကိန်းဧရိယာအတွင်းတွင် အပင်မျိုးစိတ် (၄၇) မျိုးခန့်တွေ့ရှိရပြီး အများစုမှာ သစ်ပင်ခြံုပင်နှင့် တွယ်တက်ပင်တို့ ဖြစ်သည်။ ကွင်းဆင်းနေစဉ်ကာလအတွင်း နို့တိုက်သတ္တဝါမျိုးစိတ် (၆) မျိုး၊ တွားသွားနှင့် ကုန်းနေရေနေသတ္တဝါ မျိုးစိတ် (၁၁) မျိုး၊ ဒွက်မျိုးစိတ် (၃၉) မျိုး၊ လိပ်ပြာမျိုးစိတ် (၂) မျိုး၊ ပုဇွန်းမျိုးစိတ် (၃) မျိုး ၊ ခရုမျိုးစိတ် (၁) မျိုး စသည်တို့ကို စီမံကိန်းဧရိယာနှင့် အနီးနားတစ်ဝိုက်တွင် တွေ့ရှိခဲ့ပါသည်။ မျိုးဆက်ပျက်သုဉ်းနိုင်သည့် မျိုးစိတ်များ ဆိုင်ရာ စာရင်း (IUCN Red list threatened species) အရ တွားသွားသတ္တဝါများ နှင့် ကုန်းနေရေနေသတ္တဝါများ၊ လိပ်ပြာ မျိုးစိတ်များနှင့် ပုစဉ်းမျိုးစိတ်များသည် မျိုးသုန်းမည့် အခြေအနေတွင် ပါဝင်နေခြင်းမရှိပါ။ ငှက်မျိုးစိတ်

တစ်မျိုးသည်သာ ဒေသရင်းမျိုးစိတ်ဖြစ်ပြီး အခြားမျိုးစိတ်များမှာ ဒေသရင်းမျိုးစိတ် မဟုတ်ကြောင်း တွေ့ရှိရပါသည်။

၄.၃ လူမှုဝန်းကျင်

ကျောက်ဆည်မြို့နယ်တွင် ကျောက်ဆည်မြို့၊ ကျေးရွာအုပ်စု ၈၆ စု၊ ကျေးရွာပေါင်း ၂၂၃ ရွာနှင့် ပေါင်းစပ်ဖွဲ့စည်းထားပါသည်။ ၄င်းတို့အနက်မှ အဆိုပြုစီမံကိန်းအတွက် စီမံကိန်းနေရာအနီးတဝိုက်ရှိ ကျေးရွာ ၆ ရွာအား လေ့လာရန်အတွက် သတ်မှတ်ထားပါသည်။ အဆိုပါကျေးရွာများသည် မတူညီသည့် ကျေးရွာအုပ်စုများ အောက်တွင် ရှိပါသည်။ ကျေးရွာအားလုံးနှင့် ကျေးရွာအုပ်စုအားလုံးသည် ကျောက်ဆည်မြို့နယ်အုပ်ချုပ်ရေး ဦးစီးဌာန၏ ထိန်းချုပ်မှုအောက်တွင် ရှိပါသည်။

ကျောက်ဆည်မြို့နယ်၏ အဓိကစီးပွားရေးမှာ စိုက်ပျိုးရေးဖြစ်ပါသည်။ စက်မှုလုပ်ငန်းများကိုလည်း တွေ့ရှိရပြီး ထုံကျောက်တောင်နှင့် ဘိလပ်မြေထုတ်လုပ်ရေးအား တွင်ကျယ်စွာ တွေ့ရှိရပါသည်။ ကျောက်ဆည်မြို့နယ်သည် အဝေးပြေးကားလမ်းနှင့် ရထားလမ်းဆုံသည့်နေရာတွင် တည်ရှိနေသည့်အတွက် သယ်ယူပို့ဆောင်ရေး အလွန်ကောင်းမွန်ပါသည်။ ကျောက်ဆည်မြို့နယ်၏ အဓိကကုန်ပစ္စည်းများမှာ ဆန်၊ နှမ်း၊ ကြက်သွန်နှင့် ငရုတ်တို့ ဖြစ်ကြပါသည်။ အဆိုပါ ကုန်များအား ရန်ကုန်နှင့် မန္တလေးမြို့များသို့ ရထားလမ်းနှင့် ကားလမ်းများမှတဆင့် တင်ပို့ကြပါသည်။

ကျောက်ဆည်မြို့နယ်တွင် မြို့နယ်ဆေးရုံ ၁ ရုံ နှင့် တိုက်နယ်ဆေးရုံ ၄ ရုံရှိပါသည်။ ကျေးလက်ဒေသများတွင် ကျေးလက်ကျန်းမာရေးဌာန ရခုနှင့် ကျေးလက်ကျန်းမာရေးဌာနခွဲ ၂၈ ခုရှိပါသည်။ အဆိုပါ ဆေးရုံများနှင့် ကျေးလက်ကျန်းမာရေးဌာနများသည် ကျောက်ဆည်မြို့နယ်၏ ကျန်းမာရေးကဏ္ဍကို ထောက်ပံ့ပေးပါသည်။

၅။ ပတ်ဝန်းကျင်အပေါ် သက်ရောက်မှုများနှင့် လျော့နည်းစေရန် ဆောင်ရွက်မည့် လုပ်ငန်းများ

၅.၁ လေအရည်အသွေးအပေါ်သက်ရောက်မှုနှင့် လျော့နည်းစေရေးအစီအစဉ်များ

လေထုညစ်ညမ်းမှုများမှာ အဓိကအားဖြင့် အမျိုးမျိုးသော ထုတ်လုပ်မှု လုပ်ငန်းစဉ်များဖြစ်သည့် သယ်ယူပို့ဆောင်ခြင်း၊ ကြိတ်ခွဲခြင်း၊ ကုန်ချောကြိတ်ခြင်း၊ ကုန်ကြမ်းပစ္စည်းများ ရောနှောခြင်း စသည်တို့အပြင် မီးသင်းကျောက် ထုတ်လုပ်ခြင်းနှင့် အတူ ထုတ်ပိုးခြင်းတို့မှ ထွက်ရှိသော အမှုန်အမွှားနှင့် အခိုးအငွေ့များကြောင့် ဖြစ်ပါသည်။

စီမံကိန်းဆောင်ရွက်မှုများကြောင့် လေထုညစ်ညမ်းစေသည့် အရာများ ထုတ်လွှတ်မှုကို လျော့ပါးစေရန် လုံလောက်သော ထိန်းချုပ် စီမံခန့်ခွဲမှု နည်းစနစ်များ ရေးဆွဲ အကောင်အထည် ဖော်ဆောင်ထားပြီး ဖြစ်ပါသည်။

- ဖုန်၊အမှုန်စုပ်စက် (Bag Filter) နှင့် (ESP) များတပ်ဆင်ခြင်း၊ စက်များကို အဖုံးအကာများ တပ်ဆင်ခြင်း၊ လမ်းများကို ရေဖြန်းခြင်း၊ ကုန်ကြမ်းပစ္စည်းများအား အမိုးအကာဖြင့် ထားရှိခြင်း၊ စက်ရုံဝန်းကျင် တစ်လျှောက် သစ်ပင်စိုက်ပျိုးခြင်း
- မီးခိုးခေါင်းတိုင်အား လုံလောက်သော အမြင့်ရှိစေရန် ပုံစံပြုတည်ဆောက်ထားခြင်း

- ကိရိယာများကို အချိန်ပိုင်းအလိုက် ကြိုတင်ကြံခိုင်ရေး လုပ်ငန်း/ကိစ္စ ဆောင်ရွက် (ကြိုတင်ကာကွယ် စောင့်ရှောက်) နိုင်စေရန် အစီအစဉ်များ ရေးဆွဲထားခြင်း၊
- အမျိုးသားပတ်ဝန်းကျင် ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက် (NEQG) နှင့်အညီ လိုက်နာ ဆောင်ရွက်ခြင်းတို့ ဖြစ်ပါသည်။

၅.၂ ရေ အရည်အသွေး၊ ရေ အသုံးပြုမှုနှင့် စွန့်ပစ်ရည် စီးဆင်မှုနှင့် လျော့နည်းစေရေးအစီအစဉ်များ

စက်ရုံလည်ပတ်သည့် ကာလတွင် သင်းတွဲတူးမြောင်းမှ ရေကို ရယူအသုံးပြုမည်ဖြစ်ပြီး သက်ဆိုင်ရာဌာနမှ ခွင့်ပြုချက် ရယူထားပြီး ဖြစ်ပါသည်။ ဆောက်လုပ်ရေးနှင့် ထုတ်လုပ်ရေးကာလအတွင်း အောက်ဖော်ပြပါ ရေညစ်ညမ်းမှု ထိန်းချုပ်ရေး အလေ့အကျင့်များကို လိုက်နာဆောင်ရွက်မည် ဖြစ်ပါသည်။

- ရုံးများ၊ စားသောက်ဆိုင်များနှင့် ဝန်ထမ်းအိမ်ယာများမှ ထွက်ရှိသော စွန့်ပစ်ရေများကို စွန့်ပစ်ရေ ပြုပြင်သည့် စနစ်ဖြင့် ဆောင်ရွက်ခြင်း
- လောင်စာနှင့်ချောဆီ သိုလှောင်ရန် နေရာကို အမိုးအကာဖြင့် သီးသန့် တည်ဆောက်ခြင်း
- ဘိလပ်မြေထုတ်လုပ်မှုမှာ Dry Process ဖြစ်ပြီး အအေးခံစနစ်တွင် အသုံးပြုသော ရေကိုလည်း ပြန်လည် အသုံးပြုခြင်းကြောင့် ရေညစ်ညမ်းမှု မဖြစ်ပေါ်စေခြင်း

၅.၃ ဆူညံသံ၊ တုန်ခါမှုနှင့် လျော့နည်းစေရေးအစီအစဉ်များ

စက်ပစ္စည်းများ လုပ်ဆောင်နိုင်စွမ်း အပြည့် မောင်းနှင် အသုံးပြု နေစဉ် ၅ မီတာ အကွာရှိ သက်ရောက်နိုင်မည့် ဆူညံသံ အဆင့်အား အောက်ပါ အတိုင်း ထိန်းချုပ် သတ်မှတ် ထားမည် ဖြစ်ပါသည်။

- Continuous/Intermittent noise 85 dB(A) max
- Impulse noise 115 dB(A) max

လုပ်ငန်းလည်ပတ်စဉ်ကာလ NEQG ပါ လမ်းညွှန်ချက်နှင့် ကိုက်ညီစေရန် ဆူညံသံ စောင့်ကြပ်ကြည့်ရှုခြင်းအား သင့်လျော်သည့် နေရာများတွင် ကာလအပိုင်းအခြား အလိုက် ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။

၅.၄ အစိုင်အခဲ စွန့်ပစ်ပစ္စည်းနှင့် လျော့နည်းစေရေးအစီအစဉ်များ

စီမံကိန်း လည်ပတ်ဆောင်ရွက်နေစဉ်အတွင်း ကုန်ထုတ်လုပ်မှုလုပ်ငန်းစဉ်များမှ စွန့်ပစ်ပစ္စည်းများနှင့် လူသုံးစွန့်ပစ် ပစ္စည်းများ ထွက်ရှိနိုင်ပါသည်။

- ကုန်ကြမ်းများ၊ အမှုန်စုပ်စက်များ အစရှိသော ကုန်ထုတ် လုပ်ငန်းစဉ်မှ ထွက်ရှိသော ဖုန်၊အမှုန်များအား အလဟသ မဖြစ်စေပဲ ထုတ်လုပ်ခြင်း လုပ်ငန်းစဉ်တွင် ပြန်လည်အသုံးပြုခြင်း၊
- ပြန်လည် အသုံးပြုနိုင်သည့် စွန့်ပစ်ပစ္စည်းများ (ပလပ်စတစ်၊ သစ်သားအပိုင်းအစ၊ သတ္တု အပိုင်းအစ၊ စာရွက် စသည်) ကို တတ်နိုင်သမျှ ပြန်လည်/လှည့်လည် အသုံးပြုခြင်း

- အစိုင်အခဲစွန့်ပစ်ပစ္စည်းများနှင့် အမှိုက်အိတ်များ စုဆောင်းရန် အတွက် ရုံးနှင့် လူနေနေရာများတွင် ပုံးများ ထားရှိခြင်း
- ပြန်လည် အသုံးမပြုနိုင်သည့် စွန့်ပစ်ပစ္စည်းများအား မြို့နယ် ဖွံ့ဖြိုးတိုးတက်ရေး ကော်မတီခွင့်ပြုထားသည့် စွန့်ပစ်နေရာသို့ ပို့ဆောင်ခြင်း စသည်တို့အား အကောင်အထည်ဖော် ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။

၅.၃ ဇီဝမျိုးစုံမျိုးကွဲနှင့် ဂေဟစနစ်

စီမံကိန်းအကောင်အထည်ဖော် ဆောင်ရွက်စဉ်အတွင်း မြေနေရာရှင်းလင်းခြင်း တို့ကြောင့် သဘာဝပေါက်ပင် များနှင့် သတ္တဝါတို့၏ နေရင်းဒေသများ ဆုံးရှုံးမှု ဖြစ်ပေါ်နိုင်ပါသည်။ အဆိုပြု စီမံကိန်းသည် စက်မှုဇုန် အတွင်း၌တည်ရှိပြီး မူလရှိနှင့်ပြီး ဘိလပ်မြေစက်ရုံ နေရာတွင် ဆောင်ရွက်ခြင်း ဖြစ်သောကြောင့် ပတ်ဝန်းကျင်ဆိုင်ရာ ထိခိုက်လွယ်သော သဘာဝထိန်းသိမ်းရေး နေရာများ ရှိမည်ဟု သတ်မှတ်နိုင်မည် မဟုတ်ပါ။

၅.၆ လူမှုစီးပွားရေးအပေါ် သက်ရောက်မှုများနှင့် စီမံခန့်ခွဲမှုများ

ယာဉ်သွားလာမှု - စီမံကိန်းဆောင်ရွက်သည့် ကာလအတွင်း ကျောက်ဆည်မှ စက်မှုဇုန်သို့ သွားသည့် ကားလမ်းတွင် ယာဉ်အသွားအလာ များပြားမည့် ဖြစ်နိုင်ခြေပါသည်။ သင့်လျော်သော ယာဉ်သွားအသွားအလာ စီမံခန့်ခွဲမှုများ လုပ်ဆောင်သွားမည် ဖြစ်ပြီး ဒေသအတွင်းရှိ လမ်းများ၏ တိုးတက်မှု အစီအစဉ်များတွင် ပူးပေါင်း ဆောင်ရွက် သွားမည် ဖြစ်ပါသည်။

အလုပ်အကိုင်၊ ကျွမ်းကျင်မှုနှင့် စီးပွားရေးရာ ဖြစ်နိုင်ဖွယ်ရှိသော သက်ရောက်မှုများ

စီမံကိန်းသည် လုပ်ငန်းလည်ပတ်ရန် ကျွမ်းကျင်မှု မလိုအပ်သော အလုပ်များတွင် ဒေသနှင့် အနီးတဝိုက်ရှိ လူများကို ဦးစားပေး ခေါ်ယူသွားမည် ဖြစ်ပါသည်။ ဆောက်လုပ်ရေးနှင့် စက်ရုံလည်ပတ်စဉ် ကာလအတွင်း ဒေသနေ ကျွမ်းကျင် အလုပ်သမားများနှင့် နည်းပညာရှင် အဆင့်အားလုံး အတွက်လည်း အလုပ်အကိုင် အခွင့်အလမ်းများ ရှိပါသည်။

နေလည်စာ သို့မဟုတ် အနားပေးချိန်တွေမှာ အစားစာ ရောင်းချသည့်ဆိုင်ကဲ့သို့ ဒေသခံ လက်လီရောင်းချ ဝန်ဆောင်မှုတွေကို အလုပ်သမားများမှ ဝယ်ယူအားပေးနိုင်တဲ့ အလားအလာ တစ်ချို့ရှိပါသည်။ ထိုအချက် ကလည်း ဒေသ အတိုင်းအတာအရ စီးပွားရေးကို အကျိုးဖြစ်ထွန်း စေပါသည်။ စီမံကိန်းတွင် အသုံးပြုဖို့ရာ အတွက် လိုအပ်သည့် တစ်ချို့သောပစ္စည်းများ ဒေသတွင်း စျေးကွက်မှ ဝယ်ယူ အသုံးပြုနိုင်သည့် အချက်ကလည်း ဒေသတွင်း စီးပွားရေး အခွင့်အလမ်းကို တိုးတက်စေပါသည်။

၆။ အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးခြင်းနှင့် သတင်းအချက်အလက် ထုတ်ပြန်ခြင်း

အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးခြင်း အစည်းအဝေးကို ၂၀၁၄ ခုနှစ် ဒီဇင်ဘာလ ၁၅ ရက်နေ့နှင့် ၂၀၁၅ ခုနှစ် မတ်လ ၉ ရက်နေ့တွင် ကျောက်ဆည်ဘိလပ်မြေစက်ရုံ အစည်းအဝေးခန်းမ၌ ကျင်းပခဲ့ပါသည်။ အများပြည်သူနှင့် ဆွေးနွေးပွဲများ ဆောင်ရွက်စဉ်အတွင်းသာ ဆွေးနွေး အကြံပြုခဲ့ပြီး သီးခြား ဝေဖန်အကြံပြုချက်များ အနေဖြင့်

လက်ခံ ရရှိခဲ့ခြင်း မရှိပါ။ အများပြည်သူမှ အကြံပြုချက်များနှင့် သဘောထားမှတ်ချက်များအား ထည့်သွင်းစဉ်းစား ထားမှုအား အောက်ပါ ဇယားတွင် ဖော်ပြထားပါသည်။

စဉ်	သဘောထားမှတ်ချက်နှင့် အကြံပြုချက်	အစီရင်ခံစာ အပိုဒ်
၁	ရေအရည်အသွေးစစ်ဆေးရန်အတွက် အကြံပြုချက်	၄.၃.၁ ရေအရည်အသွေး
၂	အမှိုက်နှင့် ပလတ်စတစ်အိတ်များ အတွက် စိုးရိမ်မှု	၅.၄.၄ စွန့်ပစ်ပစ္စည်း
၃	တောင်သူလယ်သမားများနှင့် ၎င်းတို့၏ ရေအရင်းအမြစ်အပေါ် သက်ရောက်မှု	၅.၄.၂ ရေအရည်အသွေးနှင့် ရေ အရင်းအမြစ်
၄	မီးဘေးအန္တရာယ် ကြိုတင်ကာကွယ်ရေး အစီအစဉ်	၅.၄.၆ မီးဘေးအန္တရာယ်နှင့် ပေါက်ကွဲမှု သက်ရောက်မှုများ
၅	ရေရယူမည့် ပိုက်လိုင်း	၅.၄.၂ ရေအရည်အသွေးနှင့် ရေ အရင်းအမြစ်
၆	လူမှုအကျိုးပြုလုပ်ငန်း (CSR)	6.9 လူမှုအကျိုးပြုလုပ်ငန်း (CSR) အစီအစဉ်

၇။ လူမှုအကျိုးပြုလုပ်ငန်း ဆောင်ရွက်ခြင်း

စီမံကိန်း၏ အကျိုးအမြတ် တစ်စိတ်တစ်ပိုင်းအား လူမှုအကျိုးပြုလုပ်ငန်းများ ဆောင်ရွက်ရန် အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးခြင်း အစည်းအဝေးပွဲများမှ ဒေသနေပြည်သူများ၏ အောက်ပါ ဆွေးနွေး အကြံပြုချက်များကို မြန်မာကွန်ချ် ဘိလပ်မြေကုမ္ပဏီအနေဖြင့် စီစဉ်ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။

- ဒေသတွင်း ကျန်းမားရေးဆိုင်ရာ ဝန်ဆောင်မှု အခြေအနေများကို တိုးမြှင့်ခြင်း
- ဘုန်းကြီးကျောင်းများ၌ လှူဒါန်းခြင်း
- ပညာရေး တိုးမြှင့်ခြင်း (ကျောင်းများပြုပြင်ခြင်း)
- လမ်းများပြုပြင်ခြင်း
- အသိပညာမြှင့်တင်ပေးခြင်း (စာကြည့်တိုက်များ တည်ဆောက်ခြင်း၊ လှူဒါန်းခြင်း)
- အနီးအနားရှိ ကျေးရွာများ၌ ရေ နှင့် လျှပ်စစ်ဓာတ်အား အခြေအနေများ တိုးမြှင့်ပေးခြင်း
- အလုပ်အကိုင် အခွင့်အလမ်းများ တိုးမြှင့်ပေးခြင်း
- အခြားကုသိုလ်ဖြစ် ဆောင်ရွက်ချက်များ

မြန်မာကွန်ချ် ဘိလပ်မြေကုမ္ပဏီသည် စီမံကိန်း၏ အသားတင်အမြတ်ငွေမှ နှစ်စဉ် ၂ ရာခိုင်နှုန်းကို လူမှုအကျိုးပြု လုပ်ငန်း အတွက် (လုပ်ငန်းလည်ပတ်နေစဉ်ကာလအတွင်း) သုံးစွဲသွားရန် စီစဉ်ထားပါသည်။ ဒေသတွင်း ဖွံ့ဖြိုး တိုးတက်ရေးအတွက် ပညာရေး၊ ကျန်းမာရေးနှင့် အခြေခံအဆောက်အအုံများကို ကုမ္ပဏီမှ လှူဒါန်းထားပြီး

ဖြစ်ပါသည်။ သက်ဆိုင်ရာ ဌာနများနှင့် ဆွေးနွေးတိုင်ပင်၍ လူမှုအကျိုးပြုလုပ်ငန်း အစီအစဉ်များကို မြို့နယ်ဖွံ့ဖြိုးတိုးတက်ရေး စီမံကိန်းများဖြင့် ပူပေါင်းပြီး အကောင်အထည် ဖော်ဆောင်သွားမည် ဖြစ်ပါသည်။

၈။ ပတ်ဝန်းကျင်စီမံခန့်ခွဲရေး အစီအစဉ်နှင့် စောင့်ကြပ် ကြည့်ရှုရေး ကုန်ကျစရိတ်

ဖြစ်နိုင်ခြေ လေ့လာမှု အစီရင်ခံစာတွင် ပတ်ဝန်းကျင်ဆိုင်ရာ ခန့်ခွဲမှု အစီအစဉ်၊ ပတ်ဝန်းကျင် ညစ်ညမ်းမှု လျှော့ချရန် ပစ္စည်းများ တပ်ဆင်ခြင်းနှင့်လျော့နည်းရေး အစီအမံများ အတွက် ကုန်ကျစရိတ် အပါအဝင် စီမံကိန်း ကုန်ကျစရိတ်ကို ဖော်ပြထားပါသည်။ ဇယား ၁ တွင် ပတ်ဝန်းကျင်ဆိုင်ရာ ခန့်ခွဲမှု အစီအစဉ်နှင့် တာဝန်ယူ ဆောင်ရွက်မည့် အဖွဲ့အစည်း အတွက် ကုန်ကျစရိတ်ကို ခန့်မှန်း တွက်ချက် ထားပါသည်။

ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီအစဉ်နှင့် စောင့်ကြပ် ကြည့်ရှုစစ်ဆေးမှု ခန့်မှန်း ကုန်ကျစရိတ် (လုပ်ငန်း လည်ပတ်စဉ် ကာလ)

အကြောင်းအရာ	နှစ်စဉ် ကုန်ကျစရိတ် (အမေရိကန် ဒေါ်လာ)
ပတ်ဝန်းကျင် ထိခိုက်မှု လျှော့ချရန် ကုန်ကျစရိတ် (EP, Bag Filter, Cyclone Filter, Exhaust Fan for Preheater EP and Water Treatment Plant) စက်နှင့် ပစ္စည်း ကိရိယာများ ဝယ်ယူမှု ကုန်ကျ စရိတ်	၄,၂၀၁,၉၇၉
ပတ်ဝန်းကျင်ဆိုင်ရာ အင်ဂျင်နီယာ အတွက် ကုန်ကျစရိတ် အပါအဝင် ပတ်ဝန်းကျင် စောင့်ကြပ် ကြည့်ရှု စစ်ဆေးမှု ကုန်ကျစရိတ်	၁၈,၀၀၀
ပတ်ဝန်းကျင်ဆိုင်ရာ စာရင်း စစ်ဆေးခြင်း	၅,၀၀၀
ပတ်ဝန်းကျင် စိမ်းလန်း စိုပြေရေး ကုန်ကျစရိတ်	ရ,၀၀၀
စုစုပေါင်းကုန်ကျစရိတ်	၄,၂၃၁,၉၇၉

မြန်မာကွန်ချ် ဘိလပ်မြေကုမ္ပဏီသည် အစီရင်ခံစာပါ ကတိကဝတ်၊ ပတ်ဝန်းကျင်ထိခိုက်မှု လျှော့ချရေး လုပ်ငန်းများနှင့် အစီအစဉ်များကို အပြည့်အဝ အစဉ်အမြဲ လိုက်နာဆောင်ရွက်မည် ဖြစ်ပါသည်။

၉။ ပိတ်သိမ်းခြင်းအဆင့်

အဆိုပြု စီမံကိန်း၏ သက်တမ်းမှာ နှစ် ၃၀ ကျော်ရှိမည်ဟု ခန့်မှန်းထားသောကြောင့် လက်ရှိအချိန်တွင် ယေဘူယျ အခြေခံမူများကိုသာ ချမှတ်နိုင်မည်ဖြစ်သည်။ စီမံကိန်း ပိတ်သိမ်းခြင်းတွင် အောက်ပါလုပ်ငန်းများ ဆောင်ရွက်ရန် လိုအပ်မည်ဖြစ်ပါသည်။

- စက်ကိရိယာများကို ဖယ်ရှားခြင်း
- အသုံးအဆောင်များကို စွန့်ပစ်ခြင်း သို့မဟုတ် ဖြည့်စွက်ခြင်းနှင့် သင့်လျော်သလို စွန့်ပစ်ခြင်း
- စီမံကိန်း မဆောက်လုပ်မီ အခြေအနေသို့ ရရှိနိုင်ရန် ပြန်လည် ထိန်းသိမ်း ဆောင်ရွက်ခြင်း၊

- ပိတ်သိမ်းခြင်းလုပ်ငန်းများ ပြီးစီးပါက စွန့်ပစ်ပစ္စည်းများကို နီးစပ်ရာ ခွင့်ပြုချက်ရရှိထားသော အမှိုက်စွန့်ပစ်သည့်နေရာများတွင် စွန့်ပစ်ခြင်းနှင့် အခြားနည်းလမ်းဖြင့် အသုံးချနိုင်သော စွန့်ပစ်ပစ္စည်းများကို ရောင်းချခြင်း
- စီမံကိန်း၏ နောက်ပိုင်းကာလများအတွင်း ပိတ်ခြင်းအစီအစဉ်ကို ညှိနှိုင်း အကောင်ထည်ဖော်ဆောင်သွားမည် ဖြစ်ပါသည်။

CHAPTER I

INTRODUCTION

1.1 Background

No.33 Heavy Industry (Kyaukse, 400t/d) under No.2 Heavy Industry Enterprise, Ministry of Industry, invite tenders to upgrade clinker 5000 ton per day new cement plant in 2013. In case of this tender submission by forty companies from local and international, Myanmar Conch Cement Co., Ltd won the competition and was appointed in March 2014. Myanmar Conch Cement Co., Ltd is cooperated by Myint Investment Group Co., Ltd (MIG) which is local company and Anhui Conch Co., Ltd which has high technology and first-class cement production in China.

Ministry of Industry and Myanmar Conch Cement Co., Ltd signed AOD (Agreement on Discussion) on March 31, 2014, to contract BOT and cooperated on April 1st, 2014 (2014-2015 Budget Years). BOT (Build Operate Transfer) is contracted with No.3 (No.2 at the present) Heavy Industry, Ministry of Industry by Product Share system on November 13, 2014. This contract is to construct 5000 ton per day new cement plant and to upgrade 400 ton per day existing cement plant. When the project is implemented, the ratio of product share is to pay 5% of production monthly. The life of contract is 20 years. Five years in first time and another five years in second time are allowed to extend.

The Sustainable Environment Myanmar Co., Ltd. or "the Consultant" has been invited by "the Client", Myanmar Conch Cement Company Ltd. to conduct for Environmental and Social Impact Assessment (ESIA) for the proposed cement plant and limestone quarry at Than Taw Myat area, Kyaukse Township, Mandalay Region. In support and approval of ESIA, the Consultant will collect and analyze physical, biological, and social data like people's perception, concern, opinion, and expectation on the project for the approval clean environment and guiltless society during and after the development of the project.

Location: The production facility is located at No.33 Heavy Industry (Kyaukse), Kyaukse Township, Mandalay Region.

Production capacity: Total cement production capacity of the project will be approximately 1.7 million tons of cement per year.

The proposed project consists of three major parts including limestone quarry, cement plant, power plant (for own used and logistics.

1.1.1 Location

In one-inch, topographic map No.93C/2 of Myanmar Survey Department. It is also located at Mandalay region, about 2 kilometers east of Kyaukse city. (Figure.1.1-1). It also lies between UTM Grid No. 2388000 N to 2390500 N and 213000 E to 216000 E, WGS 84, UTM zone 47 Q.

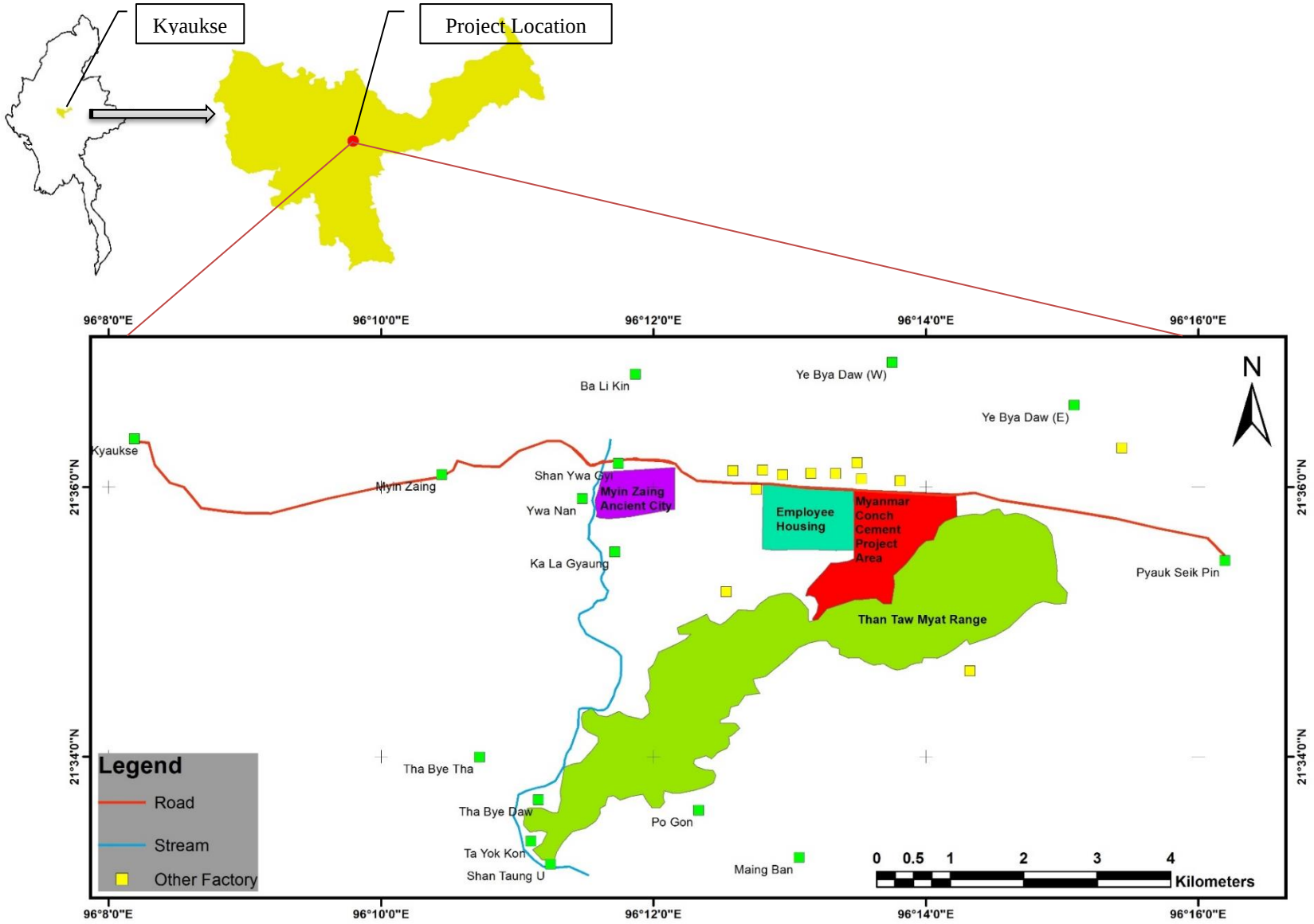


Figure 1-1 Location of Myanmar Conch Cement Plant Project

1.2 Objective of Study

The ESIA report will be prepared to cover all of activities of the Myanmar Conch Cement project including quarry, cement plant, power plant (for own used) and logistic activity.

Scope of work consists at least, but not limited to the followings:

- ESIA study and report preparation:
- Presentations to the Myanmar Authorities:
- Liaison with the relevant government authorities e.g., Ministry of Industry, Ministry of Environmental Conservation and Forestry (MOECAF) and Local government agencies (Government Administrative Department of Kyaukse Township) etc.

Theme of the present task is to recommend the Project to be sustainable and trusted. The survey and investigation would be in the aspects of existing natural environmental conditions and social and cultural environment. Highest environmental and social standards and guidelines prepared by International Finance Corporation (IFC) and potentially approved legislation and guidelines of Myanmar Government are prioritized. Baseline information of existing natural and cultural heritage would be collected and potential impacts by the project must be pointed out to be applicable for developing environmental management plan (EMP) and Social Action Plan (SAP).

1.3 Scope and Methodology of Environmental and Social Impact Assessment (ESIA)

1.3.1 Scope of Environmental, and Social Impact Assessment (ESIA)

Myanmar Conch Cement Company Limited to upgrade No.33 Kyaukse cement factory into a plant that can produce 5,000 tons of cement daily through a build-operate-transfer (BOT) system, according to the Ministry of Industry. The production facility is located at No.33 Heavy Industry (Kyaukse), Kyaukse Industrial Zone, Kyaukse Township, Mandalay Region.

The study includes detailed characterization of existing status of environment in an area of 3 km radius around proposed cement plant and for various identified environmental components viz. air, noise, water, land, biological and socio-economic. Under the scope of ESIA, it is envisaged:

- To access the present status of air. Noise, water, land, biological and socio-economic components of the environment.
- To identify, quantify and evaluate significant impacts of operations on various environmental components.
- To evaluate proposed pollution control measures and delineate Environmental Management Plan (EMP) outlining additional control measures to be adopted for mitigation of adverse impacts

1.3.2 Methodology for ESHIA

The ESIA work carried out is briefly reported below and described in detail in subsequent sections.

1) Review the relevant policies, legislation, regulations and guidelines regarding environmental protection and conservation relevant for the project so that the accurate analytical framework will be developed for the study and the preparation and submission of the report meets Myanmar requirements.
2) Collect review and collation of existing data, documents maps, aerial photos, etc., to determine adequacy of the data and to identify information gaps.
3) Undertake field data collection including field sampling, reconnaissance, baseline survey and seasonal watch on drainage/near-shore condition and fishes to establish the baseline data of the study area.
4) Detailed analyses of data, both existing and those collected additionally, to describe existing environmental and social setting and suture trends.
5) Carry out environmental impact assessment based on existing environmental setting/future trends and project features operation plans.
6) Propose environmental impact mitigation measures and monitoring programs with estimated expenses.
7) Prepare ESIA report

1.3.3 Air Environment

The parameters selected for Ambient Air Quality (AAQ) status are Particulate Matter (PM), Sulphur Dioxide (SO_2) Nitrogen Oxides (NOx). The meteorological data of proposed project site was collected in Kyaukse Meteorological station. The key emissions from the proposed plant will be emissions of Particulate Matter (SPM), Sulphur dioxide (SO_2), and Nitrogen Oxide (NOx).

1.3.4 Noise Environment

Noise levels were monitored in the study area to establish base line status. The anticipated in plant noise sources are generators and crushers. The impacts of these identified sources were studied, and their mitigation measures are included for attenuation of the noise.

1.3.5 Water Environment

Information on water resources for both groundwater & surface water was collected and assessed. Water resources were collected and analyzed for physio-chemical (inorganic and organic) and bacteriological quality.

1.3.6 Land Environment

Field surveys were conducted to delineate classification of land use pattern around the study area. A few villages situated in different directions and distances were selected for detailed characterization of land environment.

1.3.7 Socio-Economic Environment

Data on the demographic pattern, population density, educational facilities, agriculture income, fuel, medical facilities, health status, transport and recreational facilities were collected from the study area and analyzed.

All the aforesaid environmental parameters have been used for identification, prediction, and evaluation of significant impacts. An Environment Impact Statement (EIS) was prepared after identifying, predicting, and evaluating the impacts. An environmental management plan has been delineated.

1.4 Project Proponent

Project Proponent Name:	Myanmar Conch Cement Co., Ltd.
Company Registration Number by DICA:	909/2015
Contact Name of Proponent:	U Min Min Deputy General Manager
Proponent's Address for Correspondence:	No. 33, Heavy Industry, Office No. 2, Heavy Industry Enterprise, Kyaukse, Mandalay Region.
Telephone:	+959 2037108
Fax:	N/A
Email Address:	myintinvestmentgroup@gmail.com

1.5 Description of the Consultant Team

1.5.1 Resource & Environment Myanmar Ltd. (REM)

Resource & Environment Myanmar Ltd. (REM) is in the city of Yangon, Myanmar, in the country it is a leading resources and environment consulting firm, the company members are composed of the current or former faculty members of environment, society and earth resources management and other related subjects. Its predecessor was a research team founded in 1998 in University of Yangon, the team members were ecologists, social economists, geologists, doctors, economists, and data management staff. In 2003, an environmental impact assessment team was established; the team

members are retired and current professors and scientists who have strong interest in environmental and resource management.

After five years of cooperation in several projects with the scientists from various subjects of University of Yangon (such as environmental data collection, oilfield development evaluation, construction of offshore oil & gas production base, beach resorts and onshore gas pipelines, etc.), the Resource & Environment Myanmar was registered under the current laws and regulations in Myanmar, the Company can provide systematic services for a variety of major infrastructure projects under the request.

The Company could have provided environmental impact assessment, social and health impact evaluation for private or government authorities` projects. In addition, the Company also delivers geotechnical engineering, geological and hydrogeological survey, and soil investigation, geological hazard assessment (potential landslide risk figure, seismic hazard assessment, and flood risk map).

The Company currently has nine research groups, including ecology, plants, soil and water, social investigation, cultural heritage, public health, risk, information management and atmospheric research, a total of 33 experts and has passed ISO9001:2008 No. 686750 certified laboratory's assistance.

Recently, Resource & Environment Myanmar Ltd. was established as a group of company for consultancy services in 2014 by three partners – Resource & Environment Myanmar Co., Ltd., Imago Global Co., Ltd., and Sustainable Environment Myanmar Company Ltd.

Sustainable Environment Myanmar Ltd. has the resources and capability to handle environmental management issues as per the provisions of the Environmental Conservation Law, 2012.

Environmental work includes the following:

1. Environmental Audit (regarding ongoing projects).
2. Environmental Impact Assessments (regarding new projects)
3. Environmental & Social Management Plan
5. Environmental Monitoring

For the present Environmental Impact Assessment, following members participated in field data collection, stakeholder consultation, desk study and ESIA report preparation.

Company Name:	Resource & Environment Myanmar Ltd. (REM)
Company Registration Number (DICA):	1337/2007-2008
Consultant Registration Number (MONREC):	0002
Address:	No. 702, Building B, Delta Plaza Compound, Shwegondaing Road, Bahan Township.
Phone:	+959 73013448
Email:	zawnaingoo@enviromyanmar.net

1.5.2 Sustainable Environment Myanmar Co., Ltd (SEM)

Sustainable Environment Myanmar Co., Ltd. has the resources and capability to handle environmental management issues as per the provisions of the Environmental Conservation Law, 2012. Environmental work includes the following:

1. Environmental Audit (regarding ongoing projects)
2. Environmental Impact Assessments (regarding new projects)
3. Environmental & Social Management Plan
5. Environmental Monitoring

Company Name:	Sustainable Environment Myanmar Co., Ltd (SEM)
Company Registration Number (DICA):	634/2014-2015
Consultant Registration Number (MONREC):	0025
Address:	No 306, Building B, Delta Plaza Compound, Shwegondaing Road, Bahan Township.
Phone:	+959 261328891
Email:	services@sustainablemyanmar.com

Table 1.1 Study Team

Name	Registration/ License No. by ECD	Organization	Education	Area of expertise
Team Leader of Study Team				
U Zaw Naing Oo Director and Principal Consultant	Certificate for Transitional Consultant Registration No. 0002 (Organization)	REM	M.Sc., (Geology/ Economic Geology) Environmental Management Systems Auditor/Lead Auditor Training Course (ISO 14001:2004)	Geoscience Environmental Impact Assessment and Environmental Management
Members of The Team (Except the team leader)				
Daw Khin Ohmar Htwe Director and Principal Consultant	Certificate for Transitional Consultant Registration No. 0002 (Organization)	REM	M.A. (Geography) Re-vitalization of Networking Societies, CSEAS, Kyoto University, Japan.	Social Impact Assessment Specialist
U Than Oo General Manager and Principal Consultant	Certificate for Transitional Consultant Registration No. 0025 (Organization)	SEM	Master of Engineering in Electric Power System Management (AIT) B.E. (Electrical Power)	Technical Consultant Energy Specialist Environmental Impact Assessment and Management
U Chit Myo Lwin Project Manager	Certificate for Transitional Consultant Registration No. 0025 (Organization)	SEM	B.Sc. (Geology)	Physical Baseline Data Survey GIS Specialist
U Min Min Oo Environmental Engineer	Certificate for Transitional Consultant Registration No. 0025 (Organization)	SEM	B.E. (Chemical)	Air Pollution Control AERMOD & CALPUFF Air Dispersion Modelling Environmental Impact Assessment and Management
U Arkar Phyoe Mining Engineer	Certificate for Transitional Consultant Registration No. 0025	SEM	B.E. (Mining)	Risk Assessment and Management HSE

Name	Registration/ License No. by ECD	Organization	Education	Area of expertise
	(Organization)			
Dr. Sandar Hlaing Principal Consultant	Certificate for Transitional Consultant Registration No. 0025 (Organization)	SEM	M.A. (Geography) Ph.D. (Environmental Geography)	Stakeholder Engagement and Public Consultation
Dr. Sandar Win Principal Consultant	Certificate for Transitional Consultant Registration No. 0025 (Organization)	SEM	Ph.D. (Zoology)	Ecological Assessment (Fauna)
Dr. Tin Tin Khaing Principal Consultant	Certificate for Transitional Consultant Registration No. 0025 (Organization)	SEM	Ph.D. (Botany)	Ecological Assessment (Flora)
Daw Myat Thitsar Naing	Certificate for Transitional Consultant Registration No. 0025 (Organization)	SEM	M.A. (English)	Stakeholder Engagement and Public Consultation Socioeconomic Reporting Translator
Daw Ei Mom Khin	Certificate for Transitional Consultant Registration No. 0025 (Organization)	SEM	B.Sc. (Forestry) M.Sc. (Forestry), Vietnam National University of Forestry	Environmental Legal Framework and Policy Socioeconomic Survey and Analysis
U Myo Thura	Certificate for Transitional Consultant Registration No. 0002 (Organization)	REM	B.Sc. (Geology)	Physical Baseline Data Survey
Daw Naing Naing Win	Certificate for Transitional Consultant Registration No. 0025 (Organization)	SEM	M.Sc. (Zoology)	Ecology and Biodiversity (Fauna-Mammalogy and Herpetology)

Name	Registration/ License No. by ECD	Organization	Education	Area of expertise
U Nyan Lin Maung	Certificate for Transitional Consultant Registration No. 0025 (Organization)	SEM	B.Sc. (Microbiology)	Ecology and Biodiversity (Fauna)
U Myat Ko Ko Hein	Certificate for Transitional Consultant Registration No. 0025 (Organization)	SEM	B.Sc. (Forestry)	Ecology and Biodiversity (Flora and Habitat map) Environmental Monitoring
Daw Than Than Htay	Certificate for Transitional Consultant Registration No. 0025 (Organization)	SEM	M.Sc. (Zoology)	Ecology and Biodiversity (Entomology)
Daw Shwe Wut Hmone	Certificate for Transitional Consultant Registration No. 0025 (Organization)	SEM	M.Sc. (Botany)	Ecology and Biodiversity (Flora)
Daw Myat Thet Khaing	Certificate for Transitional Consultant Registration No. 0025 (Organization)	SEM	M.Sc. (Zoology)	Ecology and Biodiversity (Aquatic)
Daw Poe Mon Mon Kyaw	Certificate for Transitional Consultant Registration No. 0025 (Organization)	SEM	A.G.T.I (Civil)	HSE Environmental Management
Daw Wah Wah San	Certificate for Transitional Consultant Registration No. 0025 (Organization)	SEM	M.P.S	Data Analyst

1.6 Structure of the ESIA Report

The following is the structure of this ESIA:

Executive Summary

Chapter 1 Introduction

Chapter 2 Legal framework

Chapter 3 Project description

Chapter 4 Existing Environmental Resources

Chapter 5 Environmental Impact Assessment

Chapter 6 Environmental Management Plan

Chapter 7 Environmental Monitoring Plan

Chapter 8 Public Consultation and Information Disclosure

Chapter 9 Conclusion and Commitments

1.7 Commitment of the Project Proponent

စီမံကိန်းအဆိုပြုသူ၏ ကတိကဝတ်

ရက်စွဲ။ ။၁၅.၉.၂၀၂၂

မန္တလေးတိုင်းဒေသကြီး၊ ကျောက်ဆည်မြို့နယ်ရှိ ကျောက်ဆည်စက်မှုဇုန် အတွင်းတွင် တည်ရှိသော မြန်မာကွန့်ချ် ဘိလပ်မြေစက်ရုံ၏ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း အစီရင်ခံစာအား သယံဇာတနှင့် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန၏ လမ်းညွှန်ချက်နှင့်အတူ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဥပဒေ၊ နည်းဥပဒေများ၊ လုပ်ထုံးလုပ်နည်းများအတိုင်း လိုက်နာ၍ တတိယအဖွဲ့အစည်းဖြစ်သည့် Resource and Environment Myanmar Co., Ltd. မှ ပြင်ဆင်ဆောင်ရွက်ထားပါသည်။

Myanmar Conch Cement Co., Ltd. မှ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်းများအရ လိုက်နာအကောင်အထည်ဖော် ဆောင်ရွက်ရမည့် အောက်ဖော်ပြပါ ကတိကဝတ်များအား လက်မှတ်ရေးထိုးတင်ပြအပ်ပါသည်။

(က) ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းသည် တိကျမှုနှင့် ပြည့်စုံမှုရှိကြောင်း၊

(ခ) လုပ်ထုံးလုပ်နည်း အပါအဝင် သက်ဆိုင်ရာဥပဒေများ၊ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း ပြုလုပ်ရန် လုပ်ငန်းတာဝန်များနှင့်အညီ တိကျစွာ လိုက်နာပြုစု ထားကြောင်း၊

(ဂ) အစီရင်ခံစာပါ ကတိကဝတ်၊ ပတ်ဝန်းကျင်ထိခိုက်မှု လျော့ချရေးလုပ်ငန်းများနှင့် အစီအစဉ်များကို အပြည့်အဝ အစဉ်အမြဲ လိုက်နာဆောင်ရွက်မည် ဖြစ်ကြောင်း။

အထက်ပါ အတိကဝတ်နှင့် လိုက်နာဆောင်ရွက်မှု ထုတ်ပြန်ခြင်းကို Myanmar Conch Cement Co., Ltd. ၏ တာဝန်ရှိပုဂ္ဂိုလ်မှ ကိုယ်စားအနေဖြင့် အောက်တွင် လက်မှတ်ရေးထိုး တင်ပြအပ်ပါသည်။

1.8 Commitment of the EIA Consultant Firm

Resource and Environment Myanmar Ltd.
B 702 Delta Plaza, Shwegonedaing Rd., Bahan, Yangon, Myanmar
Tel: (959) 73013448; Fax: (951) 552901; admin@enviromyanmar.net

Resource & Environment Myanmar Co., Ltd. (REM); a local environmental consultant firm, conducted environmental impact assessment and prepared ESIA report for Myanmar Conch Cement Company Limited in compliance with EIA Procedure (December 2015) and other relevant laws/rules and formally submitted to the Environmental Conservation Department (ECD) for final approval.

We do state, to the best of our knowledge at the time of report preparation, that

- All information contained in this report is accurate and a truthful representation of all findings as relating to the project and
- The ESIA Report has been prepared in strict compliance with all applicable laws, rules regulations and procedure in force.

We also consulted to Myanmar Conch Cement Company Limited to undertake that.

Myanmar Conch Cement Company Limited in respect of the "Cement Manufacturing" will at all times comply fully with (1) any and all commitments and obligations as set forth in the ESIA Report which has been reviewed by Review Team, and (2) any and all plans and the various components thereof, including without limitation, impact avoidance, mitigation, and remediation measures, and with respect to such commitments, obligations, plans and measures related to the development, construction, commissioning, operation and maintenance of the project, and any circumstance in which work done or to be done, or services performed or to be performed, in connection with the project's development.

Signed: (Zaw Naing Oo) Date: 15-09-2022

Director

For: **Resource & Environment Myanmar Co., Ltd. (REM)**

CHAPTER II

LEGAL FRAMEWORK

2.1 Myanmar Law and Regulation (Background)

Myanmar has already had some legislations and regulations which are, the more or the less, relating to natural environmental aspects since before its independence. The Forest Act and the Burma Wildlife Protection Act, for example, have been enacted respectively in 1902 and 1936 for the sustainability of the forest products. Amended versions of such earlier act and newly promulgated one are briefly outlined to give a perspective on the existing legal and administrative framework concerning the environmental affairs in Myanmar.

National Commission on Environmental Affairs (NCEA) was formed in 1990 with the purposes of setting environmental standards and creating environmental policies for utilizing natural resources and controlling environmental pollutions.

NCEA has adopted a National Environmental Policy in 1994 to ensure the incorporation of environmental concerns in planning for economic development. The NEP emphasizes "the responsibility of the State and every citizen to preserve its natural resources in the interest of present and future generations". In accordance with Notification No. 26/94 made in 1994, National Environmental Policy was stated as follows.

"To establish sound environment policies, utilization of water, land, forests, mineral, marine resources and other natural resources in order to conserve the environment and prevent its degradation, the Government of the Union of Myanmar hereby adopts the following policy: The wealth of the nation is its people, its cultural heritage, its environment and its natural resources. The objective of Myanmar's environmental policy is aimed at achieving harmony and balance between these through the integration of environmental considerations into the development process to enhance the quality of the life of all its citizens. Every nation has the sovereign right to utilize its natural resources in accordance with its environmental policies; but great care must be taken not to exceed its jurisdiction or infringe upon the interests of other nations.

It is the responsibility of the State and every citizen to preserve its natural resources in the interests of present and future generations. Environmental protection should always be the primary objective in seeking development".

The commission also formulated a blue print, the Myanmar Agenda 21, in 1997 in response to the call of the Earth Summit to develop national strategies to implement the Global Agenda 21. This document may serve as a framework for integrating environmental considerations in future national

development plans as well as sectorial and regional development plans in Myanmar with the purpose of securing the aims of sustainable development.

The *Myanmar Agenda 21* is divided into 4 Parts and 19 Chapters and encompasses a broad range of sectors and issues. Building on the National Environment Policy, the agenda takes into consideration the programme guidelines found in the *Global Agenda 21* and is aimed at strengthening and promoting systematic environmental management in the country.

Most importantly, the *Myanmar Agenda 21* makes recommendations for the drafting and promulgation of a framework law which can further promote the integration of environmental and developmental concerns in the decision-making processes of the country.

2.2 Myanmar Conch Cement Company Limited's Environmental and Social Policy

2.2.1 Environmental Policy

Myanmar Conch Cement Company Limited is committed to responsible environmental management in all its operations during construction, operation, decommissioning, closure, and post-closure monitoring of the Project. To this effect the company adopted the group environmental, health and safety policy and regulations it is shown in Appendix 2.

2.2.2 Social Policy

Myanmar Conch Cement Company will implement a Social Management Plan that seeks to enhance the economic and social cultural benefits of its presence in the operational area of Kyaukse. To that effect the focus of the Social Management Plan would be to as much as possible prevent the occurrence of negative effects on people resident in the project area of influence while maximizing their benefits. As such effect Myanmar Conch Cement Company will exercise its social responsibility as a caring corporate citizen that value co-existence and hence the need to ensure minimal disturbance to local people's enjoyment of life.

2.3 Environmental Conservation Law

The Myanmar Environmental Conservation Law (2012) has been enacted to implement the National Environmental Policy. This law includes principles and guidelines for sustainable development, conservation of clean environment, and preservation of natural and cultural heritage. Under this law regulations and standards will be issued from time to time which the Company will be required to comply with.

2.4 Applicable Legislations, Guidelines and the Legal Framework of Environmental Issues Past and Present Environmental Legislation of Myanmar

The National Commissions for Environmental Affairs (NCEA) formed in February 1990 outlined **Myanmar Agenda 21**, which contains social, economic, institutional and infrastructural strengthening programmes as well as environmental conservation programmes.

To achieve sound environmental management in Myanmar, the respective Ministries fundamentally devise 56 environmental policies and regulations that are directly related with environmental conservation and protection. The State law and Order Restoration Council ratified the **Forest Law in November 1992**, in order to conserve the environmental factors and to maintain a sustained yield of the forest produce and **Protection of Wildlife and Wild Plants and Conservation of Natural Area Law in 1994.**

In order to uphold further environmental protection, promote sustainable development and bring into line for environmental affairs, in April 2011, National Environmental Conservation Committee (NECC) was reformed for the national environmental management in Myanmar. The Ministry of Environmental Conservation and Forestry (MoECaF) was upgraded in place of the environmental management. The Government entered the set-up of Environmental Conservation Department as a separate organization under the Ministry of Environmental Conservation and Forestry (MoECaF) on 11 October 2012. The Ministry of Environmental Conservation and Forestry (MoECaF) on 11 October 2012. The Ministry of Environmental Conservation and Forestry promulgated The Environmental Conservation Law on 30th March 2012.

Until June 2014, the procedure of Environmental Impact Assessment has not yet enacted. At present, MOECAF has already issued the Environmental Conservation Rules (ECRs) based on Environmental Conservation Law no. 42 (A).

The Project Proponent (The Company) shall prepare an Environmental Impact Assessment (EIA) for the project in accordance with the requirements and regulations of the Ministry of Natural Resource and Environmental Conservation (MONREC).

Besides, according to the schedule 8 in PPA, the Company shall prepare an Environmental and Social Impact Assessment (ESIA) in accordance with IFC Performance Standards relating to the adequate identification and assessment of project risks and impacts.

The Acts and Law that Cement Production Facility (5000tpd) in Kyaukse Industrial Zone will comply with are as follows:

No	Laws, Regulation, or Guidelines	Relevance to Environmental Assessment
1	Environmental Conservation Law 2012	Provision of basic guidance to integrate environmental conservation in sustainable development, ministry's responsibility to develop relevant guideline and regulation, setting up monitoring system, waste management, conservation of natural resource and cultural heritage. **Section 7(o):** managing to cause the polluter to compensate for environmental impact, cause to contribute fund by the organizations which obtain benefit from the natural environmental service system, cause to contribute a part of the benefit from the businesses which explore, trade, and use the natural resources in environmental conservation works. **Section 14:** A person causing a point source of pollution shall treat, emit, discharge, and deposit the substances which cause pollution in the environment in accord with stipulated environmental quality standards **Section 15:** The owner or occupier of any business, material or place which causes a point source of pollution shall install or use an on-site facility or controlling equipment to monitor, control, manage, reduce, or eliminate environmental pollution. If it is impracticable, it shall be arranged to dispose the wastes in accord with environmentally sound methods. **Section 29**: No one shall, without permission of the Ministry, import, export, produce, store, carry or trade any material which causes impact on the

		environment prohibited by the Ministry.
2	Environmental Conservation Rules (2014)	The principle of this rule is to support the execution conducted by ministry as required by environmental conservation law. **Section 69 (a):** Any person shall not emit, ask to emit, dispose, ask to dispose, pile and ask to pile, by any means, hazardous waste or hazardous substances stipulated by notification according to any rules in this rule at any place which may affect the public directly or indirectly. **Section 69 (b):** Nobody shall carry out any activity which can damage the ecosystem and the natural environment, which is affected due to such system, except for the permission of the Ministry for the interests of the people
3	Environmental Impact Assessment Procedure (2015)	Provides the procedures for environmental screening, scoping, preparation of an IEE, preparation of EIA, preparation of and Environmental Compliance Certificate (ECC). Delineates responsibilities for monitoring compliance with Environmental Management Plans (EMPs) and ECCs.
4	The Ethnic Rights Protection Law (2015). Rules under discussion (August 2017)	To obtain equal citizen's rights for all ethnic groups and to preserve and develop their language, literature, arts, culture, custom, national character, and historical heritage **Section 5**: The matters of projects shall completely be informed, coordinated, and performed with the relevant local ethnic groups in the case of development works, major projects, businesses and extraction of natural resources will be implemented within the area of ethnic groups.

5	Myanmar Investment Law (2016)	The objectives of the law are: (a) to develop responsible investment businesses which do not cause harm to the natural environment and the social environment for the interest of the Union and its citizens; (b) to protect the investors and their investment businesses in accordance with the law; (c) to create job opportunities for the people, (d) to develop human resources; (e) to develop high functioning production, service, and trading sectors. (f) to develop technology, agriculture, livestock and industrial sectors; (g) to develop various professional fields including infrastructure around the Union; (h) to enable the citizens to be able to work alongside with the international community (i) to develop businesses and investment businesses that meet international standards.
6	Myanmar Investment Rules (2017)	It provides the responsible business compliance with Environmental Conservation Law and EIA Procedure to prevent environment and social impact. **Section 202:** The project company must comply with the conditions of the Permit and other applicable laws when making an Investment. **Section 206:** If the project company is desirous to appoint a foreigner as senior management, technician expert or consultant according to section 51 (a) of the Law, it will submit such foreigner's passport, expertise evidence or degree and profile to the Commission Office for approval. **Section 212:** The project company holds the

		Permit or Tax Incentives must have taken out the relevant insurance at any insurance business that holds the license in the Union. **Section 214:** The project company will pay fees for the performance of relevant functions including Application and fees for the Permit, Endorsement, Tax Incentive and Land Rights Authorization.
7	The Private Industrial Enterprise Law(1990)	***Purpose:*** To avoid environmental pollution and to fulfill other responsibilities. **Section 3(f):** The basic principle of the Private Industrial Enterprises is to cause avoidance of or reduction of the use of technical know-how which cause environmental pollution. **Section 4(a):** Any person desirous of conducting any private industrial enterprise. **Section 4(b):** Any person conducting any private industrial enterprise on the day this law is enacted; by using any type of power which is three horse power and above or manpower of ten wage-earning workers and above shall register under this law. **Section 11(a):** The Supervisory body has the duties and powers in giving opinion in respect of the inspection, recommending or refusing to recommend for grant of registration, causing to be removed or to be terminated or to be closed down private industrial enterprises which are conducting on the day this law is enacted. **Section 11(g):** The Supervisory body has the duties and powers in granting lease of land in an industrial area to entrepreneurs, causing to be done so in accordance with the stipulation. **Section 13(b):** The entrepreneur shall abide by the terms conditions of the registration certificate. **Section 13(g):** The entrepreneur shall abide by

		the orders and directives issued from time to time by the Ministry and the Directorate: **Section 13(h):** The entrepreneur shall also abide by the existing law. **Section 25(b):** The Minister may, in respect of the following matters direct the respective State or Divisional Officer-in-charge to cause the removal of buildings, moveable and immoveable property: Failure to comply with any condition prescribed by the Directorate by an entrepreneur who has been granted a lease of land in any industrial area.
8	The Conservation of Cultural Heritage Objects Law (2015)	Generally, set for steps to adhere in the event of discovering objects which are judged as culturally valuable. Types of cultural heritage objects and reporting process are also listed.
9	The protection and preservation of Cultural Heritage Region Law(1998)	***Purpose:*** To ensure the protection of cultural heritages and the cultural heritage area from the damage by the natural disaster or man-made. ***Section 13*** - The project proponent will report to the village-tract or ward administrators if the project proponent will find any ancient monument under the ground or on the ground or under the water. ***Section 15*** - The project proponent will obtain permission of Department of Ancient Research Museum if the project area is in the prescribed area of Ancient monument. ***Sub-section (f) of section 20*** - The project proponent will obtain the prior permission, by written of Department of Ancient Research and National Museum if the project proponent disposes the chemical and solid waste in the Ancient Monument area.

10	The Public Health Law, 1972	***Purpose:*** To ensure the public health include not only employees but also resident people and cooperation with the authorized person or organization of health department. The project owner will cooperate with the authorized person or organization in line with the section 3 and 5 of said law. ***Section 3*** - The project owner will abide by any instruction or stipulation for public health. ***Section 5*** - The project owner will accept any inspection, anytime, anywhere if it is needed.
11	The Prevention and Control of Communicable Diseases Law, 1995	***Purpose:*** To ensure the healthy work environment and prevention the communicable diseases by the cooperation with the relevant health department. The project owner will cooperate with the health officer in line with the clause (9) of sub-section (a) of section 3 of said law. The project owner will abide by any instruction or stipulation for public health. Section 4. The project owner will inform promptly to the nearest health department or hospital if the following are occurred: (section 9) a) Mass death of birds or chicken b) Mass death of mouse c) Suspense of occurring of communicable disease or occurring of communicable disease d) Occurring of communicable disease which must be informed **Section 11:** The project owner will accept any inspection, anytime and anywhere if it is needed.
12	The Control of Smoking and Consumption	***Purpose:*** To ensure the creation of

	of Tobacco Product Law, 2006	smoking area and non-smoking area in the operation area for health and control of smoking. The project owner will arrange the specific place for smoking in the operation area and keep the caption and mark in accordance with the stipulations under sub-section (b) of section of said law. The project owner will supervise and carry out the measures so that no one shall smoke at the non-smoking area under sub-section (c) of section 9 of said law. The project owner will allow the inspection of supervisory body in the operation area under sub-section (d) of section 9 of said law.
13	The Labor Organization Law, 2011	***Purpose***: To ensure protection the rights of the employees, having the good relationships between the employees and employer and enabling to form and carry out the labor organizations systematically and independently. ***Section 17*** - The project owner promises to allow the labor organization to negotiate and settle with the employer if the workers are unable to obtain and enjoy the rights of the workers contained in the labor laws and to summit demands to the employer and claim in accord with the relevant law if the agreement cannot be reached. ***Section 18*** - The project owner promises to demand the re-appointment of worker is dismissed by the employer without the conformity with the labor laws. ***Section 19*** - The project owner promises to send the representatives to the Conciliation Body in settling a dispute between the employer and the worker.

		Section 20 - The project owner promises the labor organization to participate and discuss in discussing with the government, the employer and the complaining employees in respect of employee's rights or interest contained in the labor laws. ***Section 21*** - The project owner promises the labor organization to participate in solving the collective bargains of the employees in accord with the labor laws. ***Section 22*** - The project owner promises the labor organization to carry out the holding the meetings, going on strike and other collective activities in line with the labor laws.
14	The Settlement of Labor Dispute Law, 2012	For safeguarding the right of workers or having good relationship between employer and workers and making peaceful workplace or obtaining the rights fairly, rightfully and quickly by settling the dispute of employer and worker justly.
15	Employment and Skill Development Law, 2013	▪ Creation of employment opportunities ▪ Implementing measures to reduce unemployment ▪ Carrying out to enhance discipline and capacity of the workers ▪ Carrying out for the skills development of the workers ▪ Forming and guiding the Employment and Skills ▪ Development Agencies
16	The Leave and Holiday Act, 1951; Amendment in 2014	***Purpose***: The employees can take the leaves and get the holidays legally and to ensure the right to get the holidays and leaves. The project owner will allow the leaves and holidays in line with the law.

		This act has been used as the basic framework for leaves and holidays for workers with minor amendment in 2006 and 2014. This defines the public holidays that every employee shall be granted with full payment. It also defines the rules of leaves for workers including medical leave, earned leave and maternity leave.
17	Workmen's Compensation Act, 1923	***Purpose:*** To ensure the compensations to injured employee while implementing in line with the above law. To abide by the prescribed compensations in various kinds of injury. ***Section 13*** The project owner will pay the compensation in line with the provisions of said law.
18	Social Security Law, 2012	***Purpose***: The Project owner has to create the social security for the employees because the project is the business under the Myanmar Citizen Investment Law. To ensure the social security for employees of the project, the project owner has to register to the social security offices and to pay the prescribed funds.
19	The Factory Act, 1951; Amended in 2016	The hydropower project can be operated as a factory with the employees and to ensure the healthy, safety, welfare, fair working-times and clean environment for the employees. The law focuses all stipulations for the employer. The project owner commits to comply nearly all sections. The project owner has to abide by all provisions for healthy, safety, welfare, working-hours and other needs. **Gender provision** • No woman, adolescent or child will be employed in the company to lift, carry or move any load so heavy as to be likely to cause injury. [section 36 (a)]

		• Pregnant women workers are not forced to work at night. [section 36 (d)]
20	The Minimum Wage Law, 2013	The law was replaced the 1949 Minimum Wage Act. The Law provides a framework for minimum wage determination, the presidential office establishing a tripartite minimum wage committee shall decide minimum wage with industrial variation base on a survey on living costs of workers possibly every two years. This also stipulates equal payment.
21	The Payment of wages Law , 2016	***Purpose***: To ensure the project owner pays the wages not less than prescribed wages and notify obviously this wages in work place, moreover to be inspected. Receipt of wages is made regularly. Unlawful deductions are not to be made. The Law sets out : • The obligations on employers regarding the payment of employees' wages • The methods and time frames for payment • The permissibility of deducting wages • The duties and responsibilities of the Director General and investigating officers of the Factories and General Labor Laws Inspection Department (the "Department") under the Ministry of Labor, Immigration and Population
22	The Myanmar Engineering Council Law, 2013	Purpose: To develop the dignity, ethical principles and ability of Myanmar citizen engineers, graduate technologists and technicians who are working in the engineering services sector; to explore beneficial, useful and good methods to research and develop the State/s natural resources and human resources with the least environmental impact by a combination of

		engineering technology and information technology; to guide, control, maintain and take necessary action with regard to specified standards and norms relating to specified subjects, systematic methods, safety and ethical principles and duties in teaching engineering subjects and in technological research and services; to perform engineering and technological activities of the State and tasks assigned by the relevant ministry or organization from time to time. **Section 37:** No one shall perform any engineering work and technological work which are specified as being dangerous to the public by a rule enacted under this law without having received a registration certificate issued by the council, except for engineers appointed in a government department or an organization in the performance of their duties.
23	The Petroleum and The Petroleum Product law (2017)	The Ministry of Transport and Communications shall carry out the following functions relating to any petroleum and petroleum product; **Section 9(a**): issuing license to vehicles, vessels and barges that carry any petroleum and petroleum product; **Section 9(e)**: determining procedures and conditions to be abided by in carrying out transport business except transport by pipeline. The Ministry of Natural Resources and Environmental Conservation shall carry out the following functions relating to any petroleum and petroleum product; **Section 10(a):** issuing license for the right to store for the storage tanks and warehouses **Section 10(b):** issuing transport permit for the vehicles, vessels and barges that shall carry any

		petroleum and petroleum product; **Section 10(d):** if it occurs environmental impacts in carrying out petroleum and petroleum product business activities, taking action, as necessary, in accordance with the existing laws of on-site inspection. **Section 11:** On all receptacles containing any dangerous petroleum and petroleum product, the warning sign of danger by stamping, embossing, painting, printing or any other means shall be expressed. If it is impossible to express as such, similar warning signs of the nature of danger of gasoline, spirit or petroleum shall be expressed in writing at the ostensible place in salient words or signs near the receptacle. **Section 31(a):** Any licensee shall not violate any prohibition contained in the rules, regulations, bye-laws, notifications, orders, directives, procedures and conditions or fail the duty to implement **Section 31(c):** Any licensee shall not import, transport, store and sell and distribute the dangerous petroleum and petroleum product, or non-dangerous petroleum and petroleum product except by the means stipulated in this law.
24	Prevention of Hazard from Chemicals and Related Substances Law (2013)	Establishes the licensing and approval system for the use of chemicals. Prohibited the operation of a chemical substances business without a license and prohibits the use of prohibited and unregistered chemicals or related substances.
25	The Myanmar Citizen Investment Law (2012)	The project owner is Myanmar Citizen so to ensure the appointing of employees, avoiding any injury to environmental and insure the prescribed insurance in line with the above law.

26	The Electricity Law (2015)	To ensure the compliance with the conditions of permission for productions of electricity, abiding by any stipulation, implementing with the best practices and paying compensation in line with above law.
27	The Myanmar Insurance Law (1993)	The project can cause the damages to the environment and injuries to public so to ensure the needed insurances are insured at Myanmar Insurance. ***Section 15*** - If the project owner uses the owned vehicles the project owner has to insure the insurance for injured person. ***Section 16*** - The project owner has to insure the insurance to compensate for general damages because the project may cause the damages to the environment and injury to public.
28	The Fire Force Law (2015)	To ensure to prevent the fire, to provide the precautionary material and apparatuses, if the fire caused in the project area to be defeated because the project is business in which electricity and any inflammable materials such as petroleum are used. So, the project owner has to institute the specific fire service in line with the above law. ***Sub-section (a) of section 25*** - The project proponent promise not fails to institute the specific fire services. ***Sub-section (b) of section 25*** - The project owner promise not fail to provide materials and apparatuses for fire precaution and prevention. Sub-section (b) of section 25. The project owner promises not fail to provide materials and apparatuses for fire precaution and prevention.
29	Petroleum Act (1934)	The project will carry the oil in any phase and may import it. So, to ensure taking the license for

		importation and storage and abiding by the stipulations in the license. The project owner will obtain the license for import and store the fuel under section 3 of said law and abide by the stipulations in the license.
30	The Petroleum Rules (1937)	The project will carry the oil in any phase and may import it. So, to ensure taking the license for importation and storage and abiding by the stipulations in the license. The project owner will obtain the license for import and store the fuel under section 3 of said law and abide by the stipulations in the license.
31	Conservation of Water Resources and Rivers Law (2006)	The project will build the dam and has to dyke for avoiding the flood to low area so to get the permission to build the dyke and avoiding the change of water way. Moreover, avoiding the disposal of stipulated material into river-creek.
32	Conservation of Water Resources and Rivers Rules (2013)	For the cement plant, the project owner has to get the approval of Ministry of Transport and abide by the conditions in this approval, to know how to dispose, to pay the costs for repair the water pollution and environmental conservation and service-fees for measuring and inspecting.
33	Freshwater Fisheries Law (1991)	According to the sub-section (e) of section 2 of said law, the freshwater area includes any river, creek, pond and water area so the project will use the river or creek which is freshwater area. If the project will build the dam beside the river and to change the water way in freshwater area to ensure getting the permission is granted by the fishery department before construction.
34	The Explosive Substances Act (1908)	To ensure the security and avoiding the accident in using the explosive substances in the construction phase because in this Act, the

		expression "explosive substance" shall be deemed to include any materials for making any explosive substance; also ay apparatus, machine, implement or material used, on intended to be used, or adapted for causing, or aiding in causing, any explosion in or with any explosive substance; also any part of any such apparatus, machine or implement. ***Section 3*** - The project promises not to cause explosion of a nature likely to endanger life or serious injury to property in using or under control of the project. ***Sub-section (a) of section 4*** - The project owner promises not to cause by an explosive substance, or conspires to cause by an explosive substance, an explosion of a nature likely to endanger life or to cause serious injury to property. ***Sub-section (b) of section 4*** - The project owner promises not to make or keep explosive substance with intent to endanger life or cause serious injury to property. ***Section 5*** - The project owner promises not to make or keep the explosive substances under suspicious circumstances.
35	The Motor Vehicle Law (2015) and Rules (1987)	When the construction period and if it is needed in operation and production period for all vehicles the project proponent will promise to abide by the nearly all provisions of said law and rules, especially, the provisions related to air pollution, noise pollution and life safety.
36	The Conservation of Antique Objects Law (2015)	The antique object is non-valuable for national heritage. So, anybody has to inform if he or she has found any antique object.

		Section 12 - The project proponent will inform to the village-tract office antique object is found.
37	The Protection of Biodiversity and Natural Protected Areas Law (May 2018)	To implement biodiversity policy and strategy To implement national natural protected area conservation policy To carry out the protection and conservation of wildlife, ecosystems and migratory animals in accordance with International Conventions acceded by the State To control smuggling or trafficking of wild animals and plants, their parts of body, and by products To protect prominent geological site, endangered species of wildlife and their natural habitats; To contribute for the development of research on natural science and awareness raising Establish the zoological and botanical garden to preserve wildlife
38	The Protection and Preservation of Ancient Monument Law (2015)	***Section 12*** - The project proponent will inform to the village-tract or ward administrators if the project proponent will find any antique object in the project area.
39	The Forest Law 1992 (repeal)	Provisions to conserve water, soil, biological diversity and the environment; sustain forest produce yields; protect forest cover; establish forest and village firewood plantations; sustainably extract and transport forest products
40	The Law on Standardization (2014)	National Standards and Quality Department enacted the law on Standardization in 2014 and the main objectives of the law are: - To enable to determine Myanmar Standards; - To enable to support export promotion by enhancing quality of production organizations and their products, production processes and services;

		- To enable to protect the consumers and users by guaranteeing imports and products area not lower than prescribed standard, and safe from health hazards; - To enable to support protection of environmental related products, production processes and services from impact, and conservation of natural resources; - To enable to protect manufacturing, distributing and importing the disqualified goods which do not meet the prescribed standard and those which are not safe and endangered to the environment; - To support on establishing the ASEAN Free Trade Area and to enable to reduce technical barriers to trade. - To facilitate technological transfer and innovation by using the standards for the development of national economic and social activities in accordance with the national development program.
41	Myanmar Mine Law (1994) and Associated Mines Rules	The project proponent will avoid the prohibition, related to storage, imposition, and transportation of coal, of Ministry. The Mines Law (1994) aims to protect the environment from mining operations that may be detrimental to environmental conservation. Section (3) of the Mine Law states the following objectives: ▪ To carry out for the development of conservation, utilization and research works of mineral resources; and ▪ To protect the environmental conservation

		works that may have detrimental effects due to mining operations. Under the section referring to the duties of the holder of Permit, it is stated that the holder of permit shall comply with the rules prescribed under this Law in respect of the following matters: ▪ Making provisions for safety and the prevention of accidents in a mine and their implementation; ▪ Making and implementation of plans relating to the welfare, health, sanitation and discipline of personnel and workers in a mine; ▪ Making provisions for the environmental conservation works that may have detrimental effects due to the mining operation; ▪ Reporting of accidents, loss of life and bodily injury received due to such accidents in the mine; and ▪ Submission for inspection by the Chief Inspector and his inspectors. Rules 69 to 73 govern the rights of utilization of land and water for mineral production. They include the provision that puts the burden of responsibility of land and water pollution onto the mineral permit holder. It is his responsibility not to pollute. The holder of a mineral exploration permit or a mineral production permit must 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. The holder

		must also establish forest plantations or pay compensation to the Ministry of Forestry (now MONREC), if trees were cut and cleared for mineral exploration or mineral production within a forest land or in a land area covered with forests. In disposing of liquids, wastes, tailings and fumes which have resulted from mineral production, the holder of a mineral production permit must 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. If toxic materials are found in the waste products, 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 holder of a permit for mineral production within an area under the Ministry's administrative control or which does not lie within the Mineral Reserve Area or Gemstone Tract, shall carry out such production only after coordinating and receiving agreement from the individual or organization having the right of cultivation, right of possession, right of use and occupancy, beneficial enjoyment, right of succession or transfer of the said land. If the holder of a 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. If the Department, after scrutinizing the requirement submitted under Section 16 finds that the use of public water is necessary for the holder

		of a mineral production permit, it shall co-ordinate with the relevant government department(s) and organization(s) to obtain permission to use water in accordance with the existing law. Chapter XXI of the Myanmar Mining Rules (MMR) describes "making provisions to prevent detrimental effects due to mining operations on the environmental conservation works". The requirements include: ▪ Backfilling or making safe bore holes, excavations or surface of the land damaged during the course of underground mining; and ▪ Undertaking laboratory tests, as necessary, to prevent pollution of water, air and land.
42	Foreign Investment Law (2012)	The Basic Principals of the FIL state that the investment shall be allowed based upon principles including "protection and conservation of the environment". The duties of the investor requires the business to be carried out in a manner that does not cause environmental pollution or damage in accordance with existing laws in respect of the investment business. ***Notification No 1 of 2013*** The list of Economic Activities under Prohibition includes the installation of a factory that utilizes imported wastes, specifically: ▪ Manufacturing of hazardous material which are not in compliance with the environmental and conservation Law, Rules and Procedures promulgated from time to time;

		▪ Activities which may emit hazardous chemicals, minerals, rays, noise, particles etc., and may cause earth/water/air pollution which affect public health; and ▪ Exploitation of minerals including gold in the revering and water way. The list of Economic Activities Permitted with Specific Conditions at No (3) in Notification 1 includes economic activities which require Environmental Impact Assessment. These include exploration and production of minerals, manufacturing of iron, steel and minerals and operation in cultural heritage, archaeological and prominent geographical symbolical sites, amongst others, all require the assessment of Environmental Impact and Social Impact or Environmental Impact without Social Impact to be carried out for the initial study of the environment, prior to the granting of approval to proceed. Clause 37 of the Rules of the FIL states "In order to scrutinize accepted proposals sector by sector, a Proposal Review Group, composed of high ranking officers from the following departments (including the Environmental Conservation Department), is to be formed to perform preliminary scrutiny". Section 47 states that the Commission shall scrutinize investment proposals, including the remarks from the Ministry of Environmental Protection and Forestry on the proposed mitigation measures to reduce the social and environmental impacts of the project. Notification No 1/2013 of MIC dated 29th January, 2013 includes in the List of

		Economic Activities requiring Environmental Impact Assessments, the exploration and production of minerals depending upon the scale of business activity, to avoid environmental and social impacts, or to minimize environmental and social impacts. It will be allowed only after the EIA is concluded.
43	Myanmar Coastal Authority Law (2015)	Myanmar Coastal Authority Law state that: ***Section 19A and 19B:*** The authority will impose severe penalties on entities responsible for polluting the coastal waters by illegally dumping waste, oil and chemicals, etc. Moreover, the authority intends to impound the subjects in violation until the fine is settled. ***Section 21A:*** The authority shall cooperate with relevant government agencies and organizations in taking action against subject vessels that caused death or severe injury or that are involved in illegal haulage or disposal of prohibited materials such as explosives; radioactive materials; and biological, chemical and nuclear weapons or disposal of crude oil, natural gas or hazardous and toxic materials in coastal waters. ***Section 23A and 23B:*** The authority is responsible for distribution of relevant information related to and undertaking preventative actions against: accumulation of wastes on the sea bed; illegal disposal of hazardous and toxic materials; oil and chemical spills; other causes of water pollution. ***Section 23C:*** The authority shall seek external help from experts for pollution prevention and efforts to clean up oil and chemical spill incidents. In doing so, the authority can request the responsible entities to be held responsible for

		expenses.
44	Myanmar Marine Fisheries Law (1990)	***Section 39 of Myanmar Marine Fisheries Law states:*** "No person shall dispose of living aquatic creatures or any material into the Myanma Marine Fisheries Waters to cause pollution of water or to harass fishes and other marine organisms."
45	Law Relating to Aquaculture (1989)	***Section 29 (b) of Law Relating to Aquaculture states:*** "obstructing navigation and flowing of water or polluting the water within the fisheries water or abetting such acts".
46	The Territorial Sea and Maritime Zones Law (2017)	***Purpose:*** To prevent from pollution of air, water and marine environment in territorial sea and maritime zone of nation.

2.4.1 Some Highlights on the EIA Rules

There are 14 Chapters in EIA Rules. In the rules, the determination of environmental assessment as a requirement of investment projects are also described in the Schedule I Projects (projects requiring an IEE) and in the Schedule II Projects (projects requiring a full EIA). Schedule III also identifies environmentally, ecologically and socio-culturally sensitive areas which should not be included in any investment project and a reasonable distance should be ensured from such areas so as not to cause any permanent damage or result in any adverse environmental, ecological or social impacts. Workflow diagrams for all the IEE/EIA processes are also shown in the rules.

2.4.2 International Treaties

Myanmar has also made commitments to the following international agreements and protocols on environmental, social, safety and occupational issues as shown in the Table 2.1.

Table 2.1 International Environmental Convention/Protocol/Agreement

No	*International Environmental Convention/Protocol/Agreement*	*Date of Signature*	*Date of Rectification*	*Date of Member*	*Cabinet Approval Date*
1	Plant Protection Agreement for the South-East Asia and the Pacific Region, Rome, 1956		4-11-1959 (Adherence)	4-11-1959	
2	Treaty Banning Nuclear Weapons Test in the Atmosphere in Outer Space and Under Water, Moscow, 1963	14-08-1963	15-11-1963 (rectification)		

No	*International Environmental Convention/Protocol/Agreement*	*Date of Signature*	*Date of Rectification*	*Date of Member*	*Cabinet Approval Date*
3	Treaty on the Prohibition of the Emplacement of Nuclear Weapons and other Weapons of Mass Destruction on the Sea-Bed and Ocean Floor and in the Subsoil there of, London, Moscow, Washington, 1971	11-02-1971			
4	Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons, and on their Destruction, London, Moscow, Washington, 1972	10-04-1972			
5	International Convention for the Prevention of Pollution from Ships, London, 1973	(Accession)	undertakes to give effect to this Convention under para 1 & 2 of Article 1 of the Protocol of 1978		
6	Protocol of 1978 Relating to the International Convention for the Prevention of Pollution from Ships, London, 1973		04-8-1988 (Accession)	Except for Annexes III, IV and V of the Convention	
7	United Nations Convention on the Law of the Sea, Montego Bay, 1982	10-12-1982	21-05-1996 (Ratification)		
8	United Nations Framework Convention on Climate Change, New York, 1992 (UNFCCC)	11-06-1992	25-11-1994 (Ratification)		41/94 (09-11-1994)
9	Convention on Biological Diversity, Rio de Janeiro, 1992	11-06-1992	25-11-1994 (Ratification)		41/94 (09-11-1994)
10	Treaty on the Non-Proliferation of Nuclear Weapons, London, Moscow, Washington, 1968		02-12-1992(Accession)		
11	Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and their Destruction, Paris, 1993	14-1-1993			
12	International Tropical Timber Agreement (ITTA), Geneva, 1994	06-07-1995	31-1-1996 (Rectification)		
13	Vienna Convention for the Protection of the Ozone Layer, Vienna, 1985		24-11-1993 (Rectification)	22-2-1994	46/93
14	Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal, 1987		24-11-1993 (Rectification)	22-2-1994	46/93

No	*International Environmental Convention/Protocol/Agreement*	*Date of Signature*	*Date of Rectification*	*Date of Member*	*Cabinet Approval Date*
15	London Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, London, 1990		24-11-1993 (Rectification)	22-2-1994	46/93
16	The Convention for the Protection of the World Culture and Natural Heritage, Paris, 1972		29-4-1994 (Acceptance)		6/94
17	ICAO ANNEX 16 Annex to the Convention on International Civil Aviation Environmental Protection Vol. 1 Aircraft Noise	Accession			
18	ICAO ANNEX 16 Annex to the Convention on International Civil Aviation Environmental Protection Vol. II Aircraft Engine Emission	Accession			
19	Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space Including the Moon and Other Celestial Bodies Outer Space Treaty), London, Moscow, Washington, 1967	22-5-1967	18-3-1970 (Rectification)		
20	Agreement on the Networks of Aquaculture Centres in Asia and the Pacific, Bangkok, 1988		22-5-1990 (Accession)		
21	South East Asia Nuclear Weapon Free Zone Treaty, Bangkok, 1995	15-12-1995	16-7-1996 (Rectification)		
22	United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and / or Desertification, Particularly in Africa, Paris, 1994 (UNCCD)		02-01-1997(Accession)	02-04-1997	40/96 (4-12-96)
23	Convention on International Trade in Endangered Species of Wild Fauna and Flora, Washington, D.C., 1973; and this convention as amended in Bonn, Germany,1979 (CITES		13-6-1997 (Accession)	11-09-1997	17/97 (30-4-97)
24	Agreement Relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982, New York, 1994		21-5-1996 (Accession)		

No	*International Environmental Convention/Protocol/Agreement*	*Date of Signature*	*Date of Rectification*	*Date of Member*	*Cabinet Approval Date*
25	Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas, Rome, 1973		8-9-1994(Acceptance)		
26	ASEAN Agreement on the Conservation of Nature and Nature Resources, Kuala Lumpur, 1985	16-10-1997			
27	Catagena Protocol on Biosafety, Cartagena, 2000	11-05-2001			13/2001 (22-03-2001)
28	ASEAN Agreement on Transboundary Haze Pollution	10-06-2002	13-3-2003 (Rectification)		7/2003 (27-02-2003)
29	International Treaty on Plant Genetic Resources for Food and Agriculture, 2001		04-12-2004(Rectification)	29-6-2004	
30	Kyoto Protocol to the Convention on Climate Change, Kyoto, 1997		13-8-2003(Accession)		26/2003 (16-07-2003)
31	Stockholm Convention on Persistent Organic Pollutants (POPs), 2001		18-4-2004 (Accession)	18-7-2004	14/2004 (01-04-2004)

2.5 National Environmental Quality Standards

Emission guideline and target values of ambient air quality, air emission, wastewater and noise levels were set in the National Environmental Quality (Emission) Guideline (NEQG) on 29th December 2015 by MONREC.

2.5.1 Water Quality

(a) Water Quality (General Guideline)

Industry-specific guidelines apply during the operations phase of projects and cover direct or indirect discharge of wastewater to the environment. They are also applicable to industrial discharges to sanitary (domestic) sewers that discharge to the environment without any treatment. Wastewater generated from project operations includes process wastewater, wastewater from utility operations, runoff from process and storage areas, and miscellaneous activities including wastewater from laboratories, and equipment maintenance shops. Projects with the potential to generate process wastewater, sanitary sewage, or storm water should incorporate the necessary precautions to avoid, minimize, and control adverse impacts to human health, safety or the environment. Industry-specific guidelines summarized hereinafter shall be applied by all projects, where applicable, to ensure that effluent emissions conform to good industry practice.

For project types where industry-specific guidelines are not set out in these Guidelines, the following general guideline values, or as stipulated on a case-by-case basis, apply during project operations.

General wastewater guideline value is determined by the MONREC as shown in the following Table.

Table 2.2 Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges (General Application)

Parameter	Unit	Guideline Value
5-day Biochemical oxygen demand	mg/L	50
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
Oil and grease	mg/L	10
pH	S.U. [a]	6-9
Phenols	mg/L	0.5
Temperature	°C	<3[b]
Total suspended solids	mg/L	50
Zinc	mg/L	0.5

[a] *Standard Unit*

[b] *At the edge of a scientifically established mixing zone which takes into account ambient water quality, receiving water use, potential receptors and assimilative capacity; when the zone is not defined, use 100 meters from point of discharge.*

In addition to general and industry-specific wastewater guidelines applicable during project operations, the following guideline values apply during the construction phase of projects, covering storm water or surface water, and sanitary wastewater discharges from all project sites.

Table 2.3 Site Runoff and Wastewater Discharges (Construction Phase)

Parameter	Unit	Maximum Concentration
Biological oxygen demand	mg/l	30
Chemical oxygen demand	mg/l	125
Oil and grease	mg/l	10

pH	S.U. [a]	6-9
Total coliform bacteria	100 ml	400

[a] *Standard Unit*

(b) Water Quality (Cement and Lime Manufacturing)

This guideline applies to cement and lime manufacturing projects. Extraction of raw materials, which is a common activity associated with cement manufacturing projects, is covered in the guideline for Construction Materials Extraction.

Table 2.4 Effluent Levels

Parameter	Unit	Guideline Value
pH	S.U. [a]	6-9
Temperature increase	°C	<3[b]
Total suspended solids	mg/l	50

[a] *Standard Unit*

[b] *At the edge of a scientifically established mixing zone which takes into account ambient water quality, receiving water use, potential receptors and assimilative capacity; when the zone is not defined, use 100 meters from point of discharge.*

2.5.2 Air Quality

(a) Air Emissions (General Guidelines)

Projects with significant sources of air emissions, and potential for significant impacts to ambient air quality, should prevent or minimize impacts by ensuring that:

a. emissions do not result in concentrations that reach or exceed national ambient quality guidelines and standards, or in their absence current World Health Organization (WHO) Air Quality Guidelines[1] for the most common pollutants as summarized below; and
b. emissions do not contribute a significant portion to the attainment of relevant ambient air quality guidelines or standards (i.e. not exceeding 25 percent of the applicable air quality standards) to allow additional, future sustainable development in the same air shed.

Industry-specific guidelines summarized hereinafter shall be applied by all projects to ensure that air emissions conform to good industry practice.

Table 2.5 Air Emissions (General Guidelines)

Parameter	Averaging Period	Guideline Value µg/m3
Nitrogen dioxide	1-year	40
	1-hour	200
Ozone	8-hour daily maximum	100
Particulate matter PM10[a]	1-year	20
	24-hour	50

Particulate matter PM2.5[b]	1-year 24-hour	10 25
Sulfur dioxide	24-hour 10-minute	20 500

[a] *Particulate matter 10 micrometers or less in diameter*

[b] *Particulate matter 2.5 micrometers or less in diameter*

(b) Air Emissions (Industry-Specific Guidelines)

Table 2.6 Air Emission Levels (For Cement Manufacturing)

Parameter	Unit	Guideline Value
Cadmium + Thallium	mg/Nm^3 [a]	0.05
Dioxins / Furans	mg TEQ [b]/Nm^3	0.1
Dust (other point sources including clinker cooling, cement grinding)	mg/Nm^3	50
Hydrogen chloride	mg/Nm^3	10
Hydrogen fluoride	mg/Nm^3	1
Mercury	mg/Nm^3	0.05
Nitrogen oxides	mg/Nm^3	600
Particulate matter PM10c (existing kilns)	mg/Nm^3	100
Particulate matter PM10 (new kiln system)	mg/Nm^3	30
Sulfur dioxide	mg/Nm^3	400
Total metals [d]	mg/Nm^3	0.5
Total organic carbon	mg/Nm^3	10

[a] *Milligrams per normal cubic meter at specified temperature and pressure*

[b] *Toxicity equivalence factor*

[c] *Particulate matter 10 micrometers or less in diameter*

[d] *Total metals are Arsenic, Lead, Cobalt, Chromium, Copper, Manganese, Nickel, Vanadium, and Antimony*

(c) Air Emissions (Small-combustion Facilities)

The following small-combustion facilities emission guideline applies to project systems designed to deliver electrical or mechanical power, steam, heat, or any combination of these, regardless of fuel type, with a total, rated heat input capacity of 3-50 megawatt thermal. The industry-specific Thermal Power guideline applies to larger facilities exceeding 50-megawatt generation.

Table 2.7 Small-combustion Facilities Emission Guideline

Combustion Technology / Fuel	Particulate Matter PM10[a]	Sulfur Dioxide	Nitrogen Oxides
Gas	-	-	200[b] mg/Nm^3[c] 400[d] mg/Nm^3 1,600[e] mg/Nm^3
Liquid	100	3%	1,600-1,850[f] mg/Nm^3
Natural gas (3-<15 MW [g])	-	-	90[h] mg/Nm^3 210[i] mg/Nm^3
Natural gas (15-<50 MW)	-	-	50 mg/Nm^3
Fuels other than natural gas (3-<15 MW)	-	0.5% sulfur	200[h] mg/Nm^3 310[j] mg/Nm^3
Fuels other than natural gas (15-<50 MW)	-	0.5% sulfur	150 mg/Nm^3
Gas	-	-	320 mg/Nm^3
Liquid	150 mg/Nm^3	2,000 mg/Nm^3	460 mg/Nm^3
Solid [j]	150 mg/Nm^3	2,000 mg/Nm^3	650 mg/Nm^3

[a] *Particulate matter 10 micrometers or less in diameter*

[b] *Spark ignition; d dual fuel;* [e] *compression ignition*

[c] *Milligrams per normal cubic meter at specified temperature and pressure*

[f] *Higher value applies if bore size >400 mm*

[g] *Megawatt*

[h] *Electric generation; j mechanical drive*

[j] *Includes biomass*

2.5.3 Noise Levels

Noise prevention and mitigation measures should be taken by all projects where predicted or measured noise impacts from a project facility or operation exceed the applicable noise level guideline at the most sensitive point of reception. Noise impacts should not exceed the levels shown below or result in a maximum increase in background levels of three decibels at the nearest receptor location off-site.

Table 2.8 Applicable Noise Level Guideline

Receptor	One Hour LAeq (dBA)[a]	
	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

[a] *Equivalent continuous sound level in decibels*

2.5.4 Odor

Point and diffuse source odors from industries should be minimized using available prevention and control techniques as described in the IFC EHS industry-specific guidelines. Point source activities are those that involve stack emissions of odor and which generally can be controlled using waste reduction, waste minimization and cleaner production principles or conventional emission control equipment. Diffuse source activities are generally dominated by area or volume source emissions of odor (e.g. intensive agricultural activities) and which can be more difficult to control. Projects should control odors to ensure that odors that are offensive or unacceptable to neighbors do not occur. Generally, odor levels should not exceed five to ten odorant units at the edge of populated areas in the vicinity of a project. Projects with multiple odorous point or diffuse releases, or emitting complex odors should conduct an odor impact assessment to determine ground-level maximum concentrations taking into account site-specific factors including proximity to populated areas.

2.6 International Guidelines

2.6.1 International Finance Corporation Performance Standards

International Finance Corporation (IFC), a member of the WB Group, has published the IFC Performance Standards (PS) on Environmental and Social Sustainability (2012) which defines clients' responsibilities for managing their environmental and social risks.

IFC uses a process of environmental and social categorization to reflect the magnitude of risk and impacts of the Project it finances, as summarized below:

Category A: business activities with potential significant adverse environmental or social risks and/or impacts that are diverse, irreversible, or unprecedented.

Category B: business activities with potential limited adverse environmental or social risks and/or impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures; and

Category C: business activities with minimal or no adverse environmental or social risks and/or impacts.

The IFC PSs on Environmental and Social Sustainability are made of eight components, which provide guidance on how to identify risks and impacts, and are designed to help avoid, mitigate, and manage risks and impacts as a way of doing business in a sustainable way. The PS establishes standards that the client is to meet throughout the life of an investment. IFC PSs are listed below:

PS 1:	**Assessment and Management of Environmental and Social Risks and Impacts;**
PS 2:	**Labor and Working Conditions;**
PS 3:	**Resource Efficiency and Pollution Prevention;**
PS 4:	**Community Health, Safety, and Security;**
PS 5:	**Land Acquisition and Involuntary Resettlement;**
PS 6:	**Biodiversity Conservation and Sustainable Management of Living Natural Resources;**
PS 7:	**Indigenous Peoples; and**
PS 8:	**Cultural Heritage.**

2.6.2 International Finance Corporation Environmental, Health, and Safety Guidelines

The IFC EHS Guidelines are technical reference documents with general and industry-specific examples of good international industry practice.

The General EHS Guidelines are designed to be used together with the relevant industry sector EHS guidelines that provide guidance to users on EHS issues in specific industry sectors. The EHS Guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs. When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent.

The EHS Guidelines for cement and lime manufacturing include information relevant to cement and lime manufacturing projects. Extraction of raw materials, which is a common activity associated with cement manufacturing projects, is covered in the EHS Guidelines for Construction Materials Extraction. The contents of both sector EHS Guidelines will be described in the following sections, after a brief presentation of the general EHS Guidelines.

General EHS Guidelines

The General EHS Guidelines are organized as reported in the following Table.

Table 2.9 Organization of the IFC EHS General Guidelines

Main Area	Topic
Environmental	• **Air Emissions and Ambient Air Quality** • **Energy Conservation** • **Wastewater and Ambient Water Quality** • **Water Conservation** • **Hazardous Materials Management** • **Waste Management** • **Noise**

	• **Contaminated Land**
Occupational Health and Safety	• **General Facility Design and Operation** • **Communication and Training** • **Physical Hazards** • **Chemical Hazards** • **Biological Hazards** • **Radiological Hazards** • **Personal Protective Equipment (PPE)** • **Special Hazard Environments** • **Monitoring**
Community Health and Safety	• **Water Quality and Availability** • **Structural Safety of Project Infrastructure** • **Life and Fire Safety** • **Traffic Safety** • **Transport of Hazardous Materials** • **Disease Prevention** • **Emergency Preparedness and Response**
Construction and Decommissioning	• **Environment** • **Occupational Health & Safety** • **Community Health & Safety**

With respect to the environmental issues, IFC Guidelines refer to World Health Organization (WHO) standards that include the following:

- WHO Ambient Air Quality Standards;
- WHO Guidelines for Community Noise;
- WHO Drinking Water Quality; and
- WHO Guidelines for the Safe Use of Wastewater, Excreta and Greywater.

In addition, the following guidelines and standards may be applicable:

- Dutch Intervention Values for Soil Quality;
- International Union for Conservation of Nature (IUCN) Red Data Book for protected species (fauna and flora);
- Occupational Health and Safety Administration (OHSA) standards – United States Department of Labor; and
- United Nations Framework Convention on Climate Change (UNFCCC) Baseline and Monitoring Methodologies for Large Scale Clean Development Mechanism (CDM) Project Activities.

According to IFC requirements, air emissions should not result in pollutant concentrations higher than the relevant national ambient quality guidelines and standards. In their absence, the current WHO Air Quality Guidelines or other internationally recognized sources, such as the United State Environmental Protection Agency (USEPA), National Ambient Air Quality Standards (NAAQS) and the relevant European Council Directives can be also referred to.

In the following Table, Ambient Air Quality values outlined in the IFC EHS General Guidelines are reported.

Table 2.10 Ambient Air Quality Values – IFC EHS General Guidelines

Pollutant	Averaging Period	Maximum Limit Value ($\mu g/m^3$)
Sulphur Dioxide (SO_2)	10 min	500
	1 hour	--
	24 hours	20
	Year	--
Nitrogen Dioxide (NO_2)	1 hour	200
	24 hours	--
	Year	40
Ozone (O_3)	1 hour	--
	8 hours	100
Carbon Monoxide (CO)	1 hour	-
	8 hours	-
Black Smoke (BS)	24 hours	--
	Year	--
Total Suspended Particles (TSP)	24 hours	--
	Year	--
Particular Matter <10 µm (PM_{10})	24 hours	50
	Year	20
Particular Matter <2.5 µm ($PM_{2.5}$)	24 hours	10
	Year	25
Lead (Pb)	Year	--

In addition, IFC EHS General Guidelines require as a general rule that Project specific ground concentration does not contribute more than 25% of the above mentioned applicable air quality standard to allow additional, future sustainable development in the same airshed.

As outlined in the IFC EHS General Guidelines, noise impacts should be estimated by the use of baseline noise assessments for developments close to local human populations to verify that the levels

presented in the following Table are not exceeded, or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site.

Table 2.11 Noise Level Guidelines – IFC EHS General Guidelines

Noise Level Guidelines		
Receptor	**IFC - One Hour L_{Aeq} (dBA)**	
	Day-time 07:00 - 22:00	**Night-time 22:00 – 07:00**
Residential; institutional; educational	55	**45**
Industrial; commercial	**70**	**70**

Noise monitoring programs should be designed and conducted by trained specialists. Typical monitoring periods should be sufficient for statistical analysis and may last 48 hours with the use of noise monitors that should be capable of logging data continuously over this time period, or hourly, or more frequently, as appropriate (or else cover differing time periods within several days, including weekday and weekend workdays). The type of acoustic indices recorded depends on the type of noise being monitored, as established by a noise expert. Monitors should be located approximately 1.5 m above the ground and no closer than 3 m to any reflecting surface (e.g., wall). In general, the noise level limit is represented by the background or ambient noise levels that would be present in the absence of the facility or noise source(s) under investigation.

In terms of Occupational Health and Safety (OHS) aspects, IFC noise limits for different working environments are provided in the following Table.

Table 2.12 Noise Limits for Different Working Environments – IFC EHS General Guidelines

Noise Limits for Various Working Environments		
Location / Activity	**Equivalent Level LA_{eq},8h**	**Maximum LA_{max},fast**
Heavy Industry (no demand for oral communication)	85 dB(A)	**110 dB(A)**
Light industry (decreasing demand for oral communication)	50-65 dB(A)	**110 dB(A)**
Open offices, control rooms, service counters or similar	45-50 dB(A)	-
Individual officers (no disturbing noise)	40-45 dB(A)	-
Classrooms lecture halls	35-40 dB(A)	-
Hospitals	**35-40 dB(A)**	**B(A)**

Discharges of process wastewater, sanitary wastewater, wastewater from utility operations or storm water to surface water should not result in contaminant concentrations in excess of local ambient

water quality criteria or, in the absence of local criteria, other sources of ambient water quality. Receiving water use and assimilative capacity, taking other sources of discharges to the receiving water into consideration, should also influence the acceptable pollution loadings and effluent discharge quality.

Waste management should be addressed through a waste management system that addresses issues linked to waste minimization, generation, transport, disposal, and monitoring.

Land is considered contaminated when it contains hazardous materials or oil concentrations above background or naturally occurring levels. Contaminated lands may involve surficial soils or subsurface soils that, through leaching and transport, may affect groundwater, surface water, and adjacent sites. Where subsurface contaminant sources include volatile substances, soil vapor may also become a transport and exposure medium, and create potential for contaminant infiltration of indoor air spaces of buildings. Contamination of land should be avoided by preventing or controlling the release of hazardous materials, hazardous waste, or oil to the environment. When contamination of land is suspected or confirmed during any project phase, the cause of the uncontrolled release should be identified and corrected to avoid further releases and associated adverse impacts. Contaminated lands should be managed to avoid the risk to human health and ecological receptors. The preferred strategy for land decontamination is to reduce the level of contamination at the site while preventing the human exposure to contamination.

With respect to the OHS field, the General EHS Guidelines state that employers and supervisors are obliged to implement all reasonable precautions to protect the health and safety of workers. The guidelines provide guidance and examples of reasonable precautions to implement in managing principal risks to occupational health and safety. Although, the focus is placed on the operational phase of projects, much of the guidance also applies to construction and decommissioning activities.

The General EHS Guidelines on Community Health and Safety complement the guidance provided for the environmental and occupational health and safety topics, specifically addressing some aspects of project activities taking place outside of the traditional project boundaries, but nonetheless related to the project operations, as may be applicable on a project basis. These issues may arise at any stage of a project life cycle and can have an impact beyond the life of the Project.

Finally, the General EHS Guidelines provide additional, specific guidance on prevention and control of community health and safety impacts that may occur during new project development, at the end of the project life-cycle, or due to expansion or modification of existing project facilities.

2.7 Environmental Impact Assessment

The EIA procedure, issued on 29th December 2015, defines the requirements for the EIA and states that: “An EIA investigation shall consider all biological, physical, social, economic, health, cultural

and visual-components of the environment, together with all pertinent legal matters relating to the environment (including land use, resources use, and ownership of and rights to land and other resources) that may be affected by the Project during all project phases including pre-construction, construction, operation, decommissioning, closure, and post-closure; and shall identify and assess all Adverse impacts and risks that potentially could arise from the project.

Article 7 – This Procedure does not address specific matters in relation to resettlement. Projects involving resettlement shall additionally comply with separate procedures issued by responsible ministries, and in the absence of such procedures all such Projects shall adhere to international best practice on Involuntary Resettlement."

Three different steps are foreseen for the EIA process which is described in the following sections:

- screening phase;
- scoping phase; and
- EIA Investigation and Report Preparation

2.7.1 Screening Phase

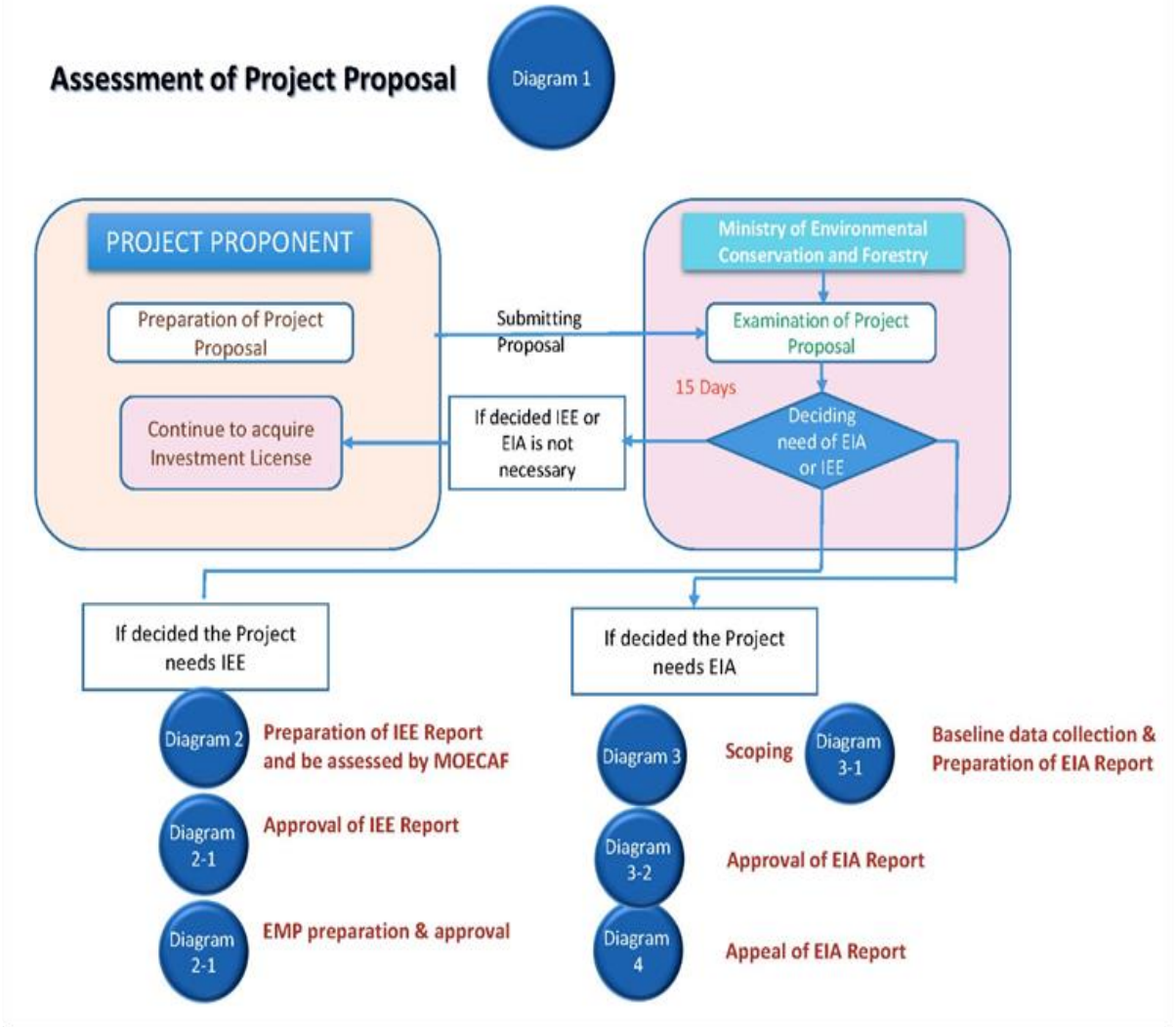
The EIA process starts with the screening process as shown in the Figure below. The MOECAF is empowered and has the exclusive authority to define the screening criteria for a project.

Guidance is provided as to which projects or activities should carry out an Initial Environmental Examination (IEE) or EIA, as presented in the Annex to the law. If, as a result of that determination, an IEE or an EIA is required, then the proponent of the project or activity has to prepare, obtain approval for, and implement an appropriate Environmental Management Plan (EMP) in respect of the proposed project or activity. Any appeal from such determination must be made in accordance with the EIA Procedure.

The Annex shows for each type of economic activity, the criteria for selection of whether IEE or EIA apply to the proposed economic activity. The MONREC determines whether the project is an IEE type project or an EIA type project or if it is exempted from undertaking any environmental assessment.

The Project Proponent might be required to submit a project proposal (completed in accordance with MONREC's guidelines) to the EC department of MONREC for screening.

Within 15 days from receiving the complete project proposal, the MONREC shall determine the required type of environmental assessment (EIA, IEE, or none) and shall inform the Project Proponent in writing about its determination. In addition, the MONREC can change the status of an IEE Type Project to be an EIA Type Project if any of the above additional factors are relevant in this sense.



2.7.2 Scoping Phase

All EIA type projects are required to undergo the Scoping phase. The project proponent shall be responsible to ensure that the Scoping and the preparation of the Term of Reference (ToR) for the EIA report are undertaken in a professional manner and in accordance with any applicable guidelines issued or adopted by the MONREC. The scoping shall, in respect to the proposed project:

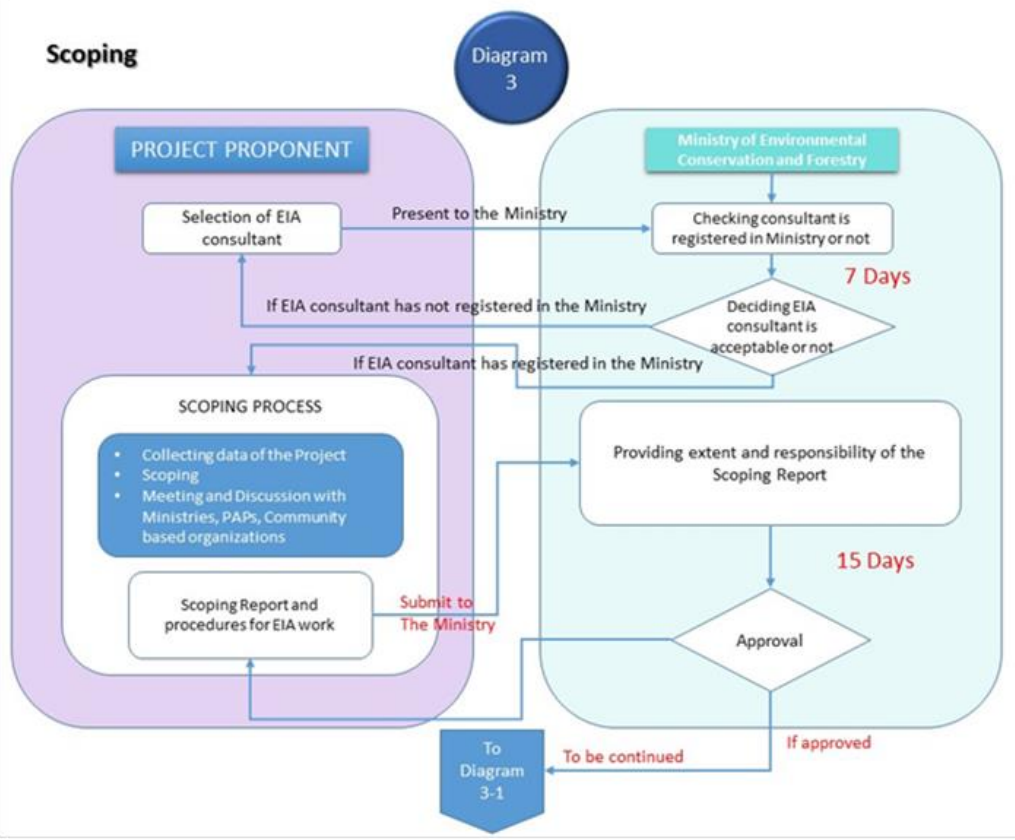
- define the study area, AoI, time boundaries, project phases, and potential stakeholders;
- start the process of understanding the applicable regulations and standards, and their context for project design and completion of the EIA;
- make a provisional identification of environmental, social and, if any, health impacts, focusing in particular on the environmental, social and health issues that need to be addressed in subsequent EIA studies;
- provide an indication of the required baseline data and information and methods to get them (although there is no need to actually collect any data at this stage);

- provide an opportunity for consultants, relevant authorities, project developers, interested and affected parties to express their views and concerns regarding the proposal before an EIA proceeds;
- enable an efficient and comprehensive assessment process that saves time, resources, costs and delays; and
- identify potentially affected communities and other stakeholders with an interest in the project.

As part of the scoping, the project proponent shall ensure that the following public consultation and participation process is carried out.

- disclose information about the proposed project to the public and civil society through local media, including by means of the prominent posting of legible sign boards and advertising boards at the Project Site which are visible to the public; and
- arrange the required complement of consultation meetings as advised by the MONREC, with local communities, potentially PAPs, local authorities, community based organizations, and civil society.

The project proponent shall prepare a scoping report and ToR for the EIA investigations and submit the completed Scoping Report and ToR to the MONREC for review and approval. The Scoping process is shown in the Figure.



2.7.3 EIA Investigation and Report Preparation

The Project Proponent has to ensure that the EIA investigation properly addresses all adverse impacts and is undertaken in accordance with the approved TOR. The EIA investigation shall consider all biological, physical, social, economic, health, cultural and visual components of the environment, together with all pertinent legal matters relating to the environment (including land use, resources use, and ownership of and rights to land and other resources) that may be affected by the Project during all project phases, including pre-construction, construction, operation, decommissioning, closure, and post-closure; and shall identify and assess all adverse impacts and risks for environment, social and, if relevant, health that potentially could arise from the Project.

The EIA Procedure does not address the social impacts of involuntary resettlement or which relate to indigenous people. Separate procedures shall be issued by responsible ministries, and in the absence of such procedures all such Projects shall adhere to international practice on involuntary resettlement and indigenous people.

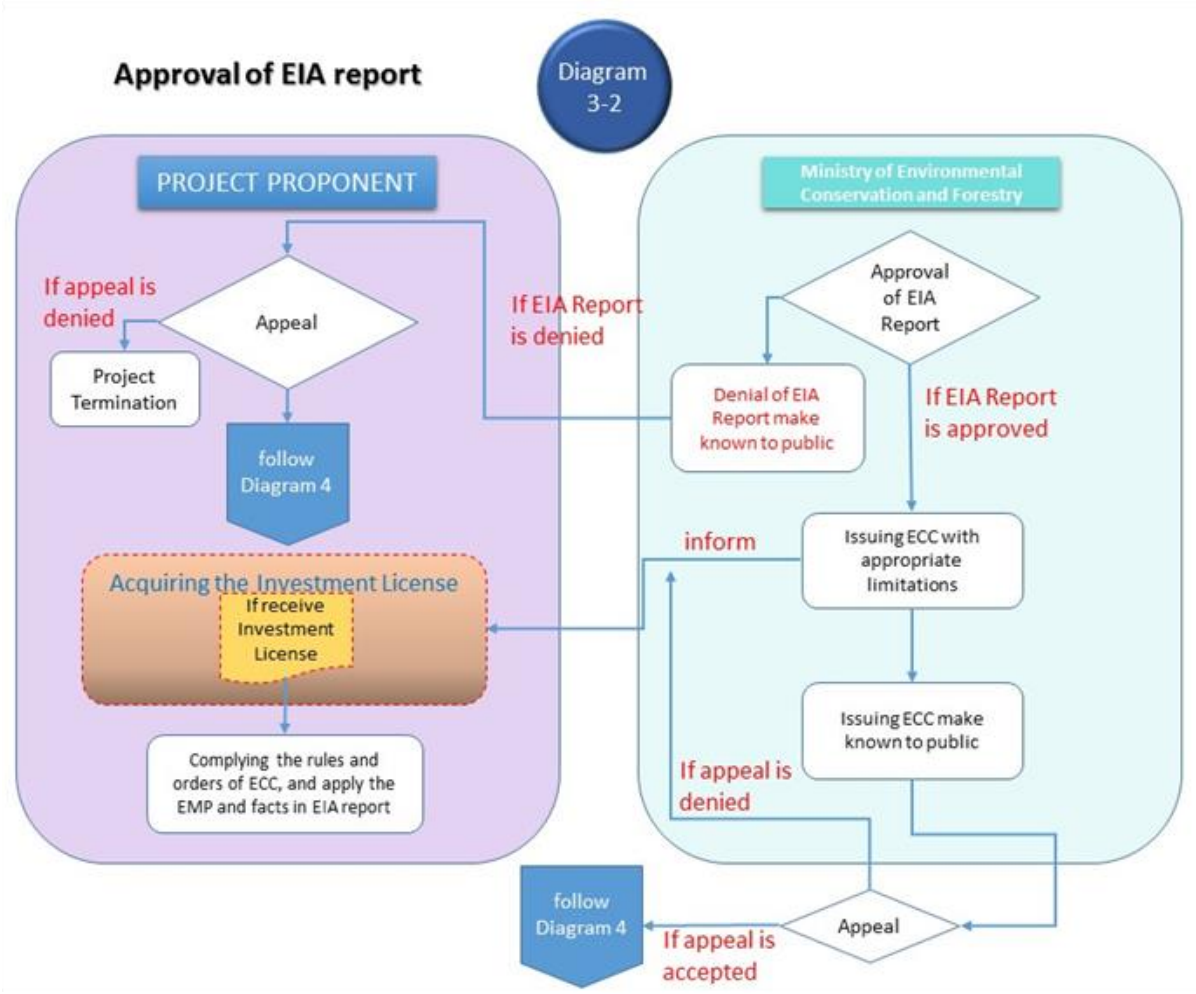
The Project Proponent is obliged to use, comply with and refer to applicable national standards, international standards adopted by the Government and/or the MONREC, or, in the absence of relevant national or adopted international standards, such standards as may be agreed with the MONREC.

The EIA Report shall consider the views, concerns, and perceptions of stakeholders, communities and individuals that could be affected by the Project or who otherwise have an interest in the Project. The EIA should include the results of public consultations and negotiations with the affected populations on the environmental and social issues. Public concerns should also be taken into account in assessing impacts, designing mitigation measures, and selecting monitoring parameters. After completing all investigations and public consultation and participation processes required for EIA Type Projects, the Project Proponent shall submit the EIA Report to the MONREC in both digital and hard copy, together with the required service fee.

The MONREC shall within 10 days after submission disclose the EIA Report to civil society, PAPs, concerned government organizations, and other interested stakeholders. The MONREC shall submit the EIA Report to the EIA Report Review Body for comment and recommendations and also arrange for public consultation meetings at national and State/ Regional/ local levels where the Project Proponent shall present the EIA Report. All received comments and recommendations, including those of the EIA Report Review Board, will be collected and reviewed by the MONREC prior to making a final decision on approval of the EIA Report.

The MONREC shall deliver its final decision within 90 days from the receipt of the EIA Report. All costs incurred in completing to the EIA Report disclosure and review, including the public participation process, shall be borne by the Project Proponent. Upon completion of its review of the

EIA Report, the MONREC will issue an ECC or inform the Project Proponent of its decision to reject the EIA Report and publically disclose its decision. The proposed flow chart covering the EIA review process is shown in the Figure.



In conclusion, the IEE and EIA approval process can be summarized as reported in the following Table.

Table 2.13 The IEE & EIA Approval Process in Myanmar

EIA Process	Duration	MIC Permission	Duration
IEE/EIA/NON Proposal Screening	15 days	Proposal Screening	15 days
		MIC Permission	90 days
IEE Process			
▪ **Approval of IEE experts**	7 days		
▪ **IEE report preparation**	-		
▪ **IEE report approval**	60 days		
EIA Process			
▪ **Approval of EIA experts**	7 days		

▪ **Developing EIA scoping report and TOR**	-		
▪ **Scoping report and TOR approval**	15 days		
▪ **Investigation/preparing EIA report**	-		
▪ **EIA report approval**	90 days		

2.8 The Institutional Framework

Ministry of Industry organized with two Directorates and four Enterprises as follows:

- Union Ministerial Office
- Directorate of Industrial Collaboration(DIC)
- Directorate of Industrial Supervision and Inspection (DISI)
- No. (1) Heavy Industries Enterprise (HIE-1)
- No. (2) Heavy Industries Enterprise (HIE-2)
- No. (3) Heavy Industries Enterprise (HIE-3)
- Myanma Pharmaceutical Industries (MPI)

A number of institutions will have a regulatory and monitoring mandate directly or indirectly under their respective pieces of legislation. However, the following will be the key institutions whose requirements will need to be complied with.

Institutional Framework of Mandalay Region as follows:

- Mandalay Regional Government
- Ministry of Security and Border Affairs
- Ministry of Municipal Affairs
- Ministry of Agriculture, Livestock and Irrigation
- Ministry of Natural Resources and Environmental Conservation
- Ministry of Electricity, Energy and Construction
- Ministry of Planning and Finance
- Ministry of Ethnic Affairs
- Regional Advocate General's Office
- Regional General Administrative Office

CHAPTER III

PROJECT DESCRIPTION

3.1 Introduction

3.1.1 Project Purpose and Objectives

The cement plant is planning a 5000 t/d clinker production line which is installed with cement grinding process with 2-Φ4.2×13m roller press and 9MW waste heat power generating system. At the same time, we have carried out technical improvement for existing 400t/d kiln to achieve energy saving and emission reduction.

3.1.2 Topography of the Cement Plant Site

The isolated hill of the Than Taw Myat hill is exposing in the plain near east of Kyaukse city. It is generally NE-SW trending. The climate of Myanmar is controlled by the monsoon circulating system of South Asia. Mountain ranges run generally N to S or NW-SE presenting a barrier for the SW monsoon in the summer and the NE monsoon in the winter.

3.2 Cement Plant and Project Timeline

Cement Plant with a capacity of 5,000 metric tons of clinker per 24 hours a day (1.7 million tons of cement per year) covers the process from limestone crushing to cement packing as well as loading facilities. The schedule of project implementation is described in the Figure 3-1.

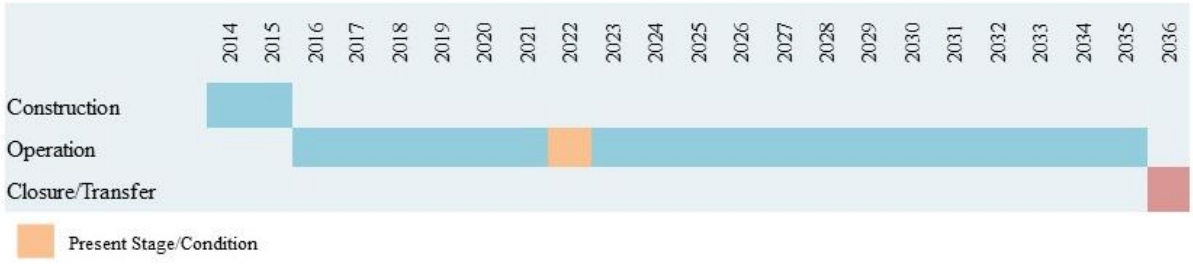


Figure 3-1 Project Timeline

Cement Plant and its facilities are located No.3 Industrial Zone (Kyaukse) in Kyaukse Township, Mandalay Region.

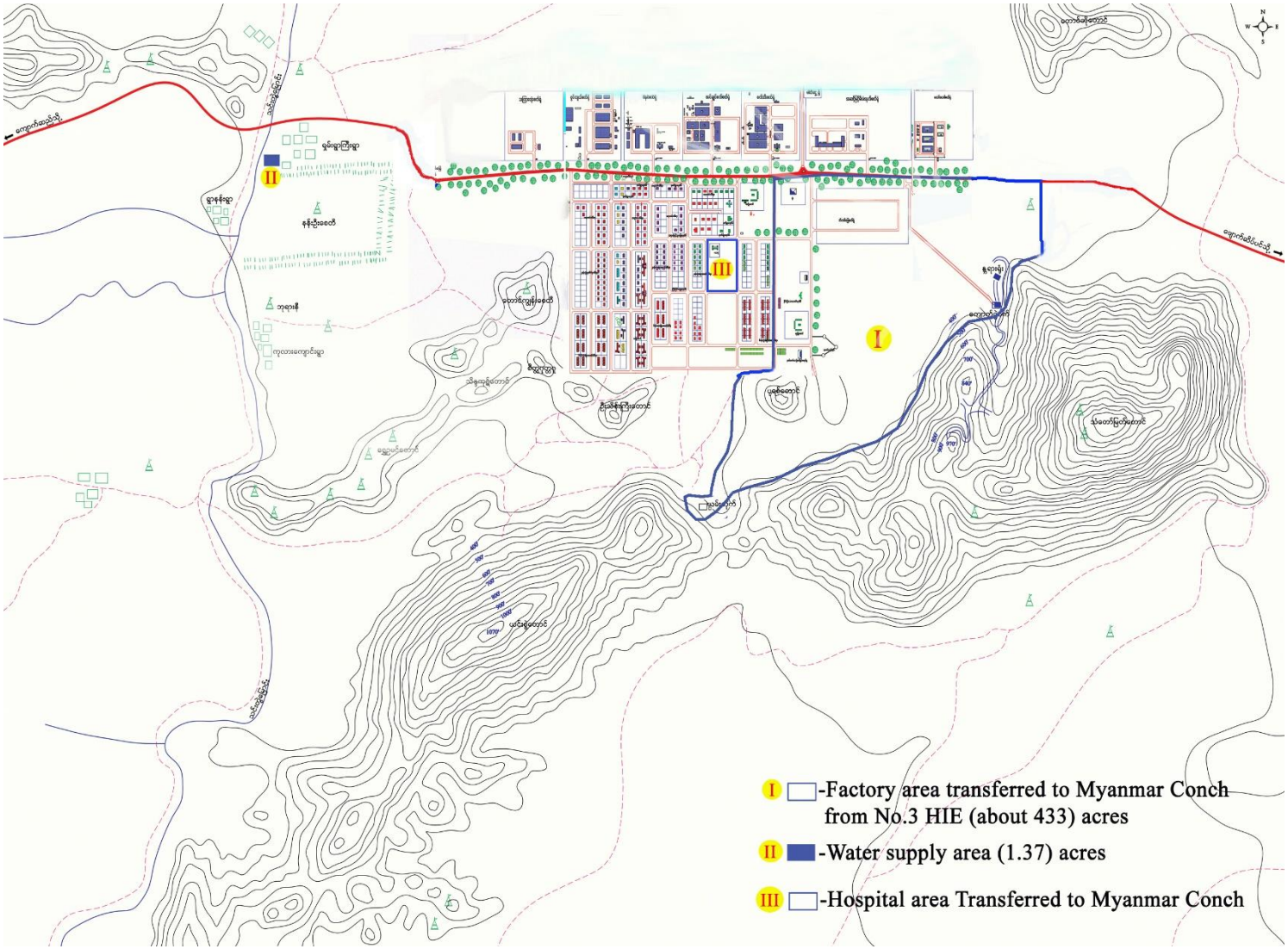


Figure 3-2 Location and Area map of proposed cement plant

Figure 3-3 Myanmar Conch Cement Plant and associate facilities including Captive Power Plant and Limestone Quarry

3.3 Project Activities

3.3.1 Construction Phase Activities

Establishing two Type-90 concrete mixing stations to produce concrete used in engineering construction with daily concrete production capacity of 1000 cubic, meeting concrete casting requirement during the construction period and without external procurement or concrete transport:

Establishing a stone crushing system. Shipping rubbles from blasting mining to the factory with car for factory road leveling and the concrete production without outsourcing or transport stones.

3.3.1.1 The foundation construction phase

According to the exploration for the geological data, both the equipment foundation and silo structure adopt pile foundation and the construction technology is Rotary Drilling Cast-in-place Pile technology with the 150 c – 200 – c model rotary digging pile machine. The construction process is rotary digging first and then place reinforcing cage and pouring concrete, of which the operation time is short and the construction scope is small without vibration, noise or pollution to the surrounding environment. For the less important items (such as the production of auxiliary room and living room), Myanmar Conch Cement Company adopt natural foundation with the construction technology of mechanical digging. The construction sequence is to carry out backhoe excavation with PC200 machine, foundation construction, and earthwork backfilling, of which the operation time is short with fast construction progress and two-way earthwork in the factory, realizing earthwork balance without affecting the surrounding environment.

3.3.1.2 The upper structure construction stage

This project is an industrial construction, whose structure forms are varied with respectively the frame structure, brick structure and silo structure etc., When constructing the upper part, we adopt frame structures made by steel tube scaffold, wooden template and wood square support set; then we carry out steel processing and finally pouring concrete forming in a bottom-up and layered construction way; Silo structure is made of steel stents and steel template, joint together to form the overall die set, adopting hydraulic system in a bottom-up way gradually. In this process, we carry out the making and fixing of reinforcing steel bar and concrete pouring to form models gradually.

3.3.2 Operation Phase Activities

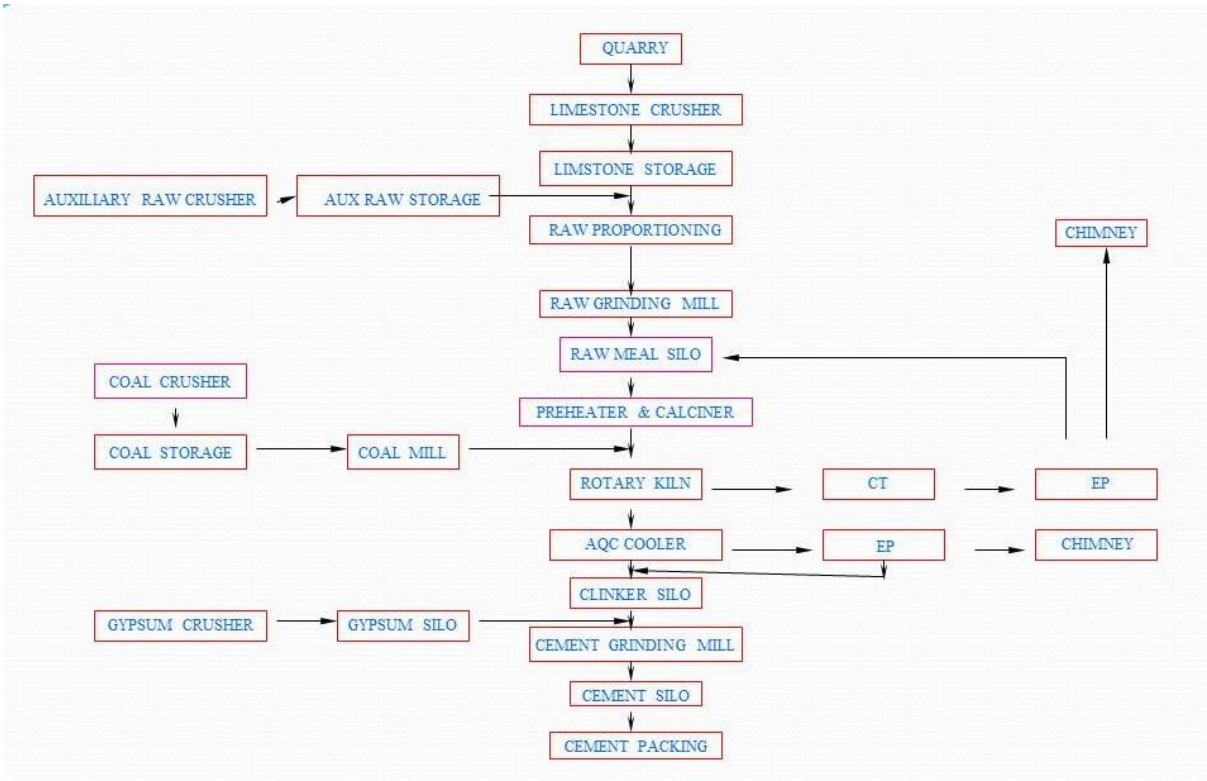


Figure 3-4 Process Flow Diagram

3.3.2.1 Crushing, Blending and Milling

a) Limestone Crushing and Conveying

Limestone is from the existing quarry resources of NSP and limestone crushing workshop with single-rotor hammer crusher is set up in quarry. Limestone by blasting mined is directly discharged into hopper of crusher by rear-dump truck. Then limestone is fed in crusher through apron feeder. The crushing limestone is conveyed to limestone pre-blending stockpile by belt conveyor. The capacity of the crusher is 700 t/h.

b) Limestone Pre-blending

A Φ60 m polar pre-blending stockpile is constructed in plant area. Limestone after mining and crushing is conveyed to pre-blending stockpile by belt conveyor. Then limestone is layered stockpiled by boom stacker and reclaimed to belt conveyor by scraper reclaimer to a Φ10×23m limestone proportion bin with 1000t effective reserves. In order to avoid dust pollution, bag filters are set up in belt conveyor transferring stations. Air after purification is emitted into the atmosphere. The capacity of stacker and reclaimer is 900t/h and 500t/h, respectively.

c) Silicon and Aluminum Material Crushing

An impact crusher is set up in the plant area and the capacity of it is 300t/h. Silicon and aluminum material are transported by truck and then directly discharged into hopper of the crusher. Then the material is fed in crusher through apron feeder. The crushing material is conveyed to pre-blending stockpile by belt conveyor.

d) Raw Material Proportion and Conveying

Silicon, aluminum and iron material are reserved in 3-Φ7×21mproportion bins. Reserves of the bin is 500t. The measured material is conveyed to the raw grinding mill.

Raw meal quality control system installed with multi-element fluorescence analyzer and microcomputers is used to analyze raw meal composition. And adjust feeding rate according to analysis results and target values automatically to ensure raw meal composition qualified.

e) Coal and Auxiliary Material Pre-blending and Storage

A rectangle pre-blending stockpile (355×29.3m) for coal and auxiliary material is constructed in plant area. The reserves of coal and auxiliary material is 30000t and 27000t, respectively. Two side stackers and two side scrapers are installed, the capacity of which is 450t/h, 150t/h, and 250t/h, respectively. After delivery by truck to plant site, coal will be discharged to unloading carport and then conveyed to a pre-blending stockpile for blending by belt conveyor. After blending the coal will be conveyed into coal bins by belt conveyor. After delivery by truck to plant site, auxiliary material will be crushed and then conveyed to a pre-blending stockpile for blending. After blending the auxiliary material will be conveyed into auxiliary material bins by belt conveyor.

f) Raw Meal Grinding and Waste Gas Treatment Process

Roller press together with dry, grinding and separator function is used. Waste gas from pre-heater is used as the heat source. The raw material is grinded into fine powder by roller on the grinding table and is dried by hot air. The productivity of roller press is 450t/h, when material particle size is less than 70mm, product fineness is 0.08mm and residue on square hole sieve is less than 10~12%.

After grinding, raw meal is raised up by hot air and then separated by separator. Qualified raw meal will leave roller press. The fineness of raw meal can be controlled by adjusting speed of separator rotor. Gas of high concentration dust is subsequently separated by cyclone separator. Then raw meal will be conveyed by air slide and elevator to raw meal homogenizing silo. One part of the gas from cyclone separator will return in roller press through circulating fan and the other part will be emitted to atmosphere after cleaning by electrostatic precipitator.

In order to ensure the roller press running safely, magnetic separator and metal detector are set up on the belt conveyor to roller press avoiding iron into mill. When iron in material is detected, it will be discharged by pneumatic distribution valve.

g) Raw Meal Homogenizing and Conveyed to Kiln

A Φ22.5×56m IBAU homogenizing silo with effective reserves of 18000t and storage period of 2.0d is constructed in production line. Qualified raw meal from roller press is transported to the top of homogenizing silo and then falls into silo in radial multipoint through distributor. And material in silo is almost layer-built horizontally. Raw meal for blending is conveyed to blending chamber at the bottom of silo vertically through aeration unites. High-pressure air is supplied by roots blower. Raw meal will flow down when aerated. When blended by gravity, raw meal will form funnel-shaped discharging flow. And raw meal blends radially when flowing into the measuring bin. After blending, qualified raw meal will be measured by the impact flow meter and then conveyed to pre-heating system through air slide and belt elevator.

There are weight sensors and inflation devices at the bottom of the measuring bin. The material flow stability will be affected by material level in the measuring bin. Therefore, according to signal given by weight sensors, we can adjust the valve opening at the bottom of bin to ensure a stable material level in the measuring bin. Raw meal flow is detected by the impact flow meter and adjusted by the opening of the valve.

There is a sampler in front of the elevator to kiln. Sintering operation is conducted according to the sample analysis result.

3.3.2.2 Calcination and Clinkering

a) Coal Powder Preparation

Roller press and bag filter with bursting panel will be used for coal powder preparation. The roller press will be placed pre-heater area for utilizing waste heat from pre-heater to dry coal. Raw coal will be fed into roller press through scale feeder under raw coal bin. Qualified coal powder will go into bag filter. Coal powder from bag filter will be conveyed to coal powder bins for kiln and calciner by screw conveyor. And waste gas from roller press will be emitted to the atmosphere after cleaning by electrostatic precipitator. The normal concentration of dusty air is less than 30 mg/Nm3. Under each coal bin, there is one set of metering devices and the measuring coal powder will be fen into coal burner and calciner. Strict safety facilities should be considered in design in coal powder preparation system, such as bursting panel, CO concentration detector and N2 fire-extinguisher system.

b) Clinker Sintering

High efficiency "HELP" type pre-heater with 2-string and 5-stage and low-NOx C-KSV is used in clinker sintering. The productivity of single line is 5500 t/d. Qualified raw meal is fed into precalcining system by elevator. After heating, raw meal will be fed into calciner. After precalcining, it will be fed into for sintering. Tertiary air for calciner comes from kiln burner hood. In order to ensure well-defined operation and obtain high quality clinker, coal burner with multi-channel injection pipe is used. It has advantages of less air, mixed fully, adjustable flame, and good adaptability to inferior coal and is favorable to improve clinker quality and to reduce heat consumption.

One part of the gas from pre-heater goes into raw meal mill as heating source through preheater fan and cooling tower. The other part is used for drying coal in coal powder preparation system.

The fourth generation grate cooler is used for cooling clinker. Its capacity is 5000t/d. high temperature clinker from kiln is cooled rapidly by cold air blown by fans under grate. Grate cooler is equipped with roller crusher to ensure clinker particle size less than 25mm. Clinker after cooling is 65℃ higher than environment temperature. Clinker will be conveyed to clinker silo by tray conveyor after cooling and crushing.

One part of the hot gas exhausted from grate cooler is used as second air into kiln, another part is used as tertiary air into calciner and the remained waste gas will be emitted to atmosphere after AQC and then treated by electrostatic precipitator.

c) Clinker Storage

Clinker is stored in aΦ60m polar clinker silo with reserves of 10000t and storage period of 20d. Clinker will be conveyed to clinker silo by tray conveyor after cooling and crushing. There are 23 discharge openings distributed in 3 rows at the bottom of clinker silo and air-activated sector gate is equipped with to control discharge speed. Clinker from silo is conveyed to cement grinding area by belt conveyor.

There are bag filters on the top of clinker silo and belt conveyor transferring stations to purify dusty gas.

3.3.3 Milling Bagging and Dispatch

3.3.3.1 Storage, crushing and conveying of gypsum and admixture (limestone)

Limestone for cement grinding is stored in existing pre-blending stockpile of production line. Limestone will be conveyed to cement grinding proportion bin by adding belt conveyors out of pre-blending stockpile.

Gypsum and other admixture will be transported to plant area by truck. A 60×30m storage hall with reserves of 4000t will be constructed. Massive gypsum will be crushed and then conveyed to the cement grinding proportion bin. Unmassive gypsum and other admixture which don't need to be crushed will be taken to the belt conveyor by shovel excavator and then conveyed to cement grinding proportion bin.

3.3.3.2 Raw material for cement proportion and cement grinding

Clinker, gypsum, limestone and admixture will be in proportion for cement grinding in this production line.

3-Φ7×18m and 1-Φ9×22m polar silos will be constructed for proportion. Different proportions will be designed by belt weigher according to different types of cement. Mixture in proportion will be conveyed to cement grinding system.

Weighing feeder for clinker, measuring range: 24～240t/h

Weighing feeder for gypsum, measuring range: 3.0～30t/h

Weighing feeder for admixture, measuring range: 7.5～75t/h

Weighing feeder for limestone, measuring range: 7.5～75t/h

The above weighing devices will be controlled by central control room for material proportion.

Two sets of Φ4.2×13m roller press are used in grinding system and its productivity is 2×180t/h (P.O 42.5). Material in proportion for cement grinding will be conveyed to the bin of roller press by bucket elevator. Material out of roller press will be conveyed to V-shape separator by bucket elevator. Coarse powder will return to roller press for grinding again and fine powder will go to cyclone. Material out of cyclone will be conveyed to cement mill by the air slide. Cement out of mill will be conveyed to O-SEPA separator. Coarse cement will return to mill and qualified cement will be separated by high efficient bag filter and then conveyed to cement silos by air slide.

Dusty gas exhausted from cement grinding system will be emitted to the atmosphere after purifying by efficient bag filter and the concentration of emitting gas is less than 30mg/Nm^3.

3.3.3.3 Cement storage and conveying

6-Φ18×45m polar silos distributed in two rows are used for cement storage, whose reserves is 10000t. Air for blending is supplied by roots blower. Three sets of discharge system will be designed at the bottom of each cement silo. Cement will be conveyed to packing workshop and bulk workshop, respectively by air slide. Bag filter will be set on the top and bottom of silos to purify dusty gas. Level meters will be equipped on the top of silos to detect material level.

There are 3-Φ7×22m steel bins in bulk workshop. There is a bulk machine at the bottom of each silo, whose capacity is 200t/h.

3.3.3.4 Cement packing and delivery

8-spout packers, whose capacity of 100~120t/h are used. Cement from silos is conveyed to vibrating screen by elevator. After removing impurities, cement will go into the middle-bin and then fed into 8-spout packer by rotary feeder. Electronic scales are used to ensure precise requirements. Packaged cement will be loaded on truck or stored in storeroom. There are 8 self-loaders on shipment to improve efficiency and reduce labor intensity.

Tons-bag packer is used to meet large bag market sale need. Its capacity is about 50 t/h.

Bag filters are used to purify dusty gas.

3.3.4 Raw Materials

3.3.4.1 Limestone resource

Limestone mine is located in Than Taw Myat (altitude 400m) which is in the southeast of the plant and about 700 meters far. There's about 0.42 km^2 mining area has already acquired the mining right and done detailed investigation, and in this area the resources tonnage is about 70 million tons. In addition, there's another limestone mine deposit which connected to the existing mine, and after survey sampling, this limestone can be used for cement production, so it can be considered as a backup limestone mine.

3.3.4.2 Clay

Clay can be produced adequately near the factory around 300m range, and SiO_2 about 62%, Al_2O_3 about 14%. This resource can use trucks transportation to the factory.

3.3.4.3 Iron

Ferruginous Bauxite obtained from Nat Taung near the Innya village, six miles or so southern east of Pyin Oo Lwin City. Iron ore grade is high, supply adequate, motor transported into the factory by car, the content of Fe_2O_3 is about 30%.

3.3.4.4 Gypsum

Gypsum has been produced and utilized in the vicinity of Nan Lut Village, Mauk Mae Township, Shan State (Southern part) and transportation can use trucks. The content of SO_3 is about 45% and this can meet the demand of producing high-quality cement.

3.3.4.5 Coal

The fire coal adopts from local, Indonesia, Australia and South Africa coal and purchasing is depending on tender submission of supplier. The lower calorific value of the fire coal is bout 4500kcal/kg, and the coal consumption per one day is about 750ton, the annual coal consumption of cement plant is about 273,750 tons.

Table 3.1 Raw Materials Demand Prediction, Transportation and Store Information

Raw Materials	Annual Requirements (Ton)	Ingredients/Quality Requirements	Mode Of Transportation	Store Information
Limestone	2195976	CaO: 48%-50%， SiO_2: 6-7%, MgO: 2%-3%.	Self-mining + belt conveyor	Long pre-blending stockpile； Reserves 2*58000 Ton
Sandstone or Clay	81558	SiO_2: ≈ 62%	Self-mining + truck transportation	Combined Storing Building
Iron ore	54946	Fe_2O_3: ≈ 50%	truck transportation	
Coal (Foreign)	140250	Received Basis (Qnet,ar): 5000-5500kal/kg; (Volatiles) ≥ 24%	By sea + truck transportation	Raw Coal Pre-Blending Stockpile; Reserves 47000 Ton
Coal (Local)	356034	Air dry basis (Qnet,ad): 5400kal/kg； (Volatiles) ≥ 36%	truck transportation	Raw Coal stockyard
Gypsum	96488	SO_3：33-40%	truck transportation	Gypsum stockyard

To ensure compliance with environmental regulations, Myanmar Conch will collaborate with tender companies that supply raw materials.

3.3.4.6 Water Usage

The total water demand for the entire project is estimated to be 12,926 m^3 per day. The largest water consumption division of the project will be at the power station with an estimated daily consumption of 10,440 m^3 whereas around 800m^3/day will be consumed in the cement production and for daily domestic water usage. Water consumption for construction purpose such as cement mixing, dust suppression and vehicle wash down will be around 200 m^3/day to 400 m^3/day. An anticipated water demand required during operation phase is shown in Table 3-2.

Table 3.2 Anticipated Water Demand and Distribution during Project Operation Phase

No.	Using water for the project		Water Consumption (m^3 /d)	Remark
1	Clinker Production Line	Water for production	600	supplementary water of Production and water consumption (mechanical cooling）
2		Water for living	200	Including main plant area, ore crushing and transportation
3	1×9MW Waste heat generation system		2,040	Total water consumption
4	2×20MW Coal-fired power Station		8,400	Fresh water cycle
Total			**11,240**	Total water consumption
			12,926	Unforeseen water volume is 15% of total water consumption

Remark：
1. Indoor and outdoor fire water is non-conventional water consumption, not included in normal water demand
2. Greening and sloping roads is used by production and living wastewater that has been recycled.

3.3.4.7 Electricity, Diesel Fuel Consumption

For the electricity during operation phase, Myanmar Conch use 9MW waste heat power generating system and 2×20MW coal-fired power stations have been constructed for supplying power to production line and life. Annual electricity consumption is about 200 million units and annual consumption of diesel is estimated as 1,000 tons.

3.3.5 Products, By-products, and Waste

Process product is clinker, the final product is cement. Main pollutants are dust and noise. Environmental protection measures are as follows:

3.3.5.1 Dust control technology

- Rotary preheater flue gas by electrostatic precipitator (five electric field), after purification by the preheater chimney emissions. Particulate emission concentration of 50mg/Nm^3.
- Cooler exhaust gas electrostatic precipitator (four electric field), after purification by grate cooler stack emissions. Particulate emission concentration of 50mg/Nm^3.
- High concentration pulverized coal preparation configuration type explosion-proof bag dust collector, explosion-proof valve, CO concentration monitor and other security measures. The filter adopts the antistatic effect of filter material, good effect in practical application. Particulate emission concentration of 30 mg/Nm^3.
- Cement grinding configuration bag filter, adopting the antistatic effect of filter material, particulate emission concentration of 30 mg/Nm^3.
- Bag filter dust removal, material transit point using monomer particulate emission concentration of 30 mg/Nm^3. Reduce material drop height, as far as possible when design in order to reduce dust.
- Raw material heap tent using the semi-closed pile of tents, reduce dust.
- Adopt high-efficiency dust-free seal conveying technology, reached the advanced world standards of labor protection.

3.3.5.2 Atmosphere pollution control technology

- Use new dry process production technology.
- Firing system consists of five double row high-efficiency low-resistance type “HELP” type cyclone tube + low NOx C-KSV precalcining system.
- C-KSV decomposition furnace USES the fuel grade of low nitrogen combustion technology, NOx emission concentration below 800 mg/Nm^3.
- SO_2 by C-KSV decomposition furnace and the absorption of raw material grinding and waste gas processing system, emission concentration well below.

3.3.5.3 Sewage disposal technology

- Domestic sewage treatments by sewage treatment system for landscaping.

3.3.5.4 Noise control measures

- Choose low noise equipment.
- Adding silencer
- Optimize the general layout, architectural structures are used to cut off the spread of sound waves.
- Strong intensity noise workshop using close or half-closed workshop.
- Indoor control room and office use acoustic chamber.
- Greening the environment, reduce acoustic environmental impact.

3.3.5.5 Solid waste disposal measures

A variety of solid wastes will be generated during the construction phase, including:

- Inert construction material (including excess soil, rubble etc.) will be used as fill.
- Other construction wastes are segregated and dealt with in three categories:
  - Hazardous wastes (such as used oil and oil filters) are handed over to an approved contractor for recycling oil.
  - Metal and wood scrap is sold directly for off-site recycling.
  - Domestic waste is picked up by the Municipality.

Large quantities of solid and liquid waste will be generated during the construction phase. Table 3-3 represented the main waste streams, their method of collection and final fate.

Table 3.3 Waste Management during Construction Phase

Construction materials	Source	Collection method	Disposal method
Excavated materials	Land excavation	Stored as 2 piles in the project area	To be used as raw materials during plant operation
Metal scrap	Steel use	Stored in designated area in the project site	To be sold
Used oil and grease	Lubricant	Stored in designated area for Hazardous Waste	To be sold for local oil recycling industry
Garbage	Domestic use	Collected in bins and containers	Disposed in the designated dumpsite
Used Batteries	Mobile equipment	Stored in designated area for Hazardous Waste	To be sold for local recycling industry
Used Tires	Mobile equipment	Stored	To be sold for local recycling industry
Sewage	Construction of staff quarters and toilets	Sewage pool	Flows directly into the sewage pool

- Collected dust or particulate matter from the production process is returned to the production line to be utilized as a raw material.
- Sludge from wastewater treatment is recycled as a raw material in the cement production process.

3.3.6 Raw material grinding technology

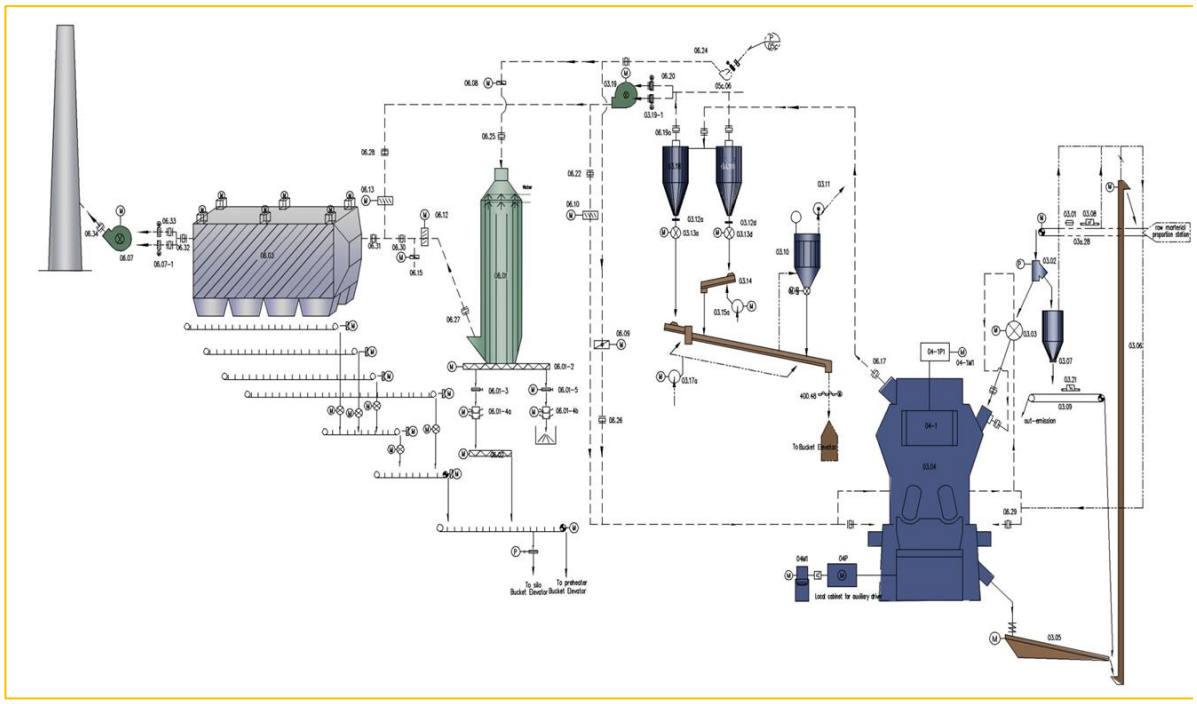
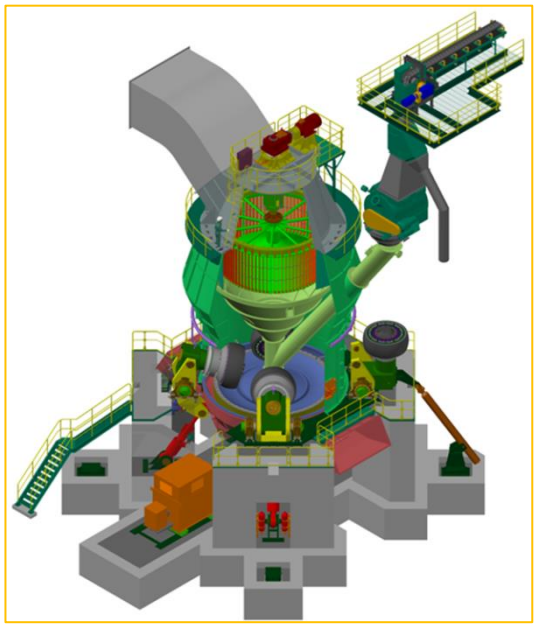


Figure 3-5 Raw mill process flow

3.3.7 CK mill (Raw Mill)



Capacity:	450 t/h
Type:	CK450, Vertical Roller Mill
Input Size:	< 70 mm
Output Fitness:	< 15% (Residue on 0.08 mm Mesh)
Power:	YRK850-6, 3800 kW

Figure 3-6 Raw Grinding Mill

The type of raw mill is vertical roller mill (CK450) with production capacity 450 t/h. It is a kind of system that support to reduce environmental impacts with advantageous such as high efficient, low noise level and low energy consumption.

The system is high efficient with low power consumption per to raw meal is 14-17 kWh. In compare with similar mill, energy consumption is decreased by 8-10%. The mill in high technology is with High grinding efficiency, low service life, and high classifying efficiency. Moreover the machine can conveniently perform to be operated and maintained safety.

3.3.8 The burning system

The burning system is efficiency and low resistance. The efficiency of "help" cyclone is 2-5% higher than the traditional one at the same blowing rate. The resistance is 3-4% lower than the traditional one. Large volume of calciner long suspending time of meal, good adjustability for raw material and coal which has good adjustability for poor coal and the alternative fuels. Deoxidation region of NOx will make low NOx emission, discharge value 500 mg/Nm^3. High efficient, reliability 4th generation cooler.

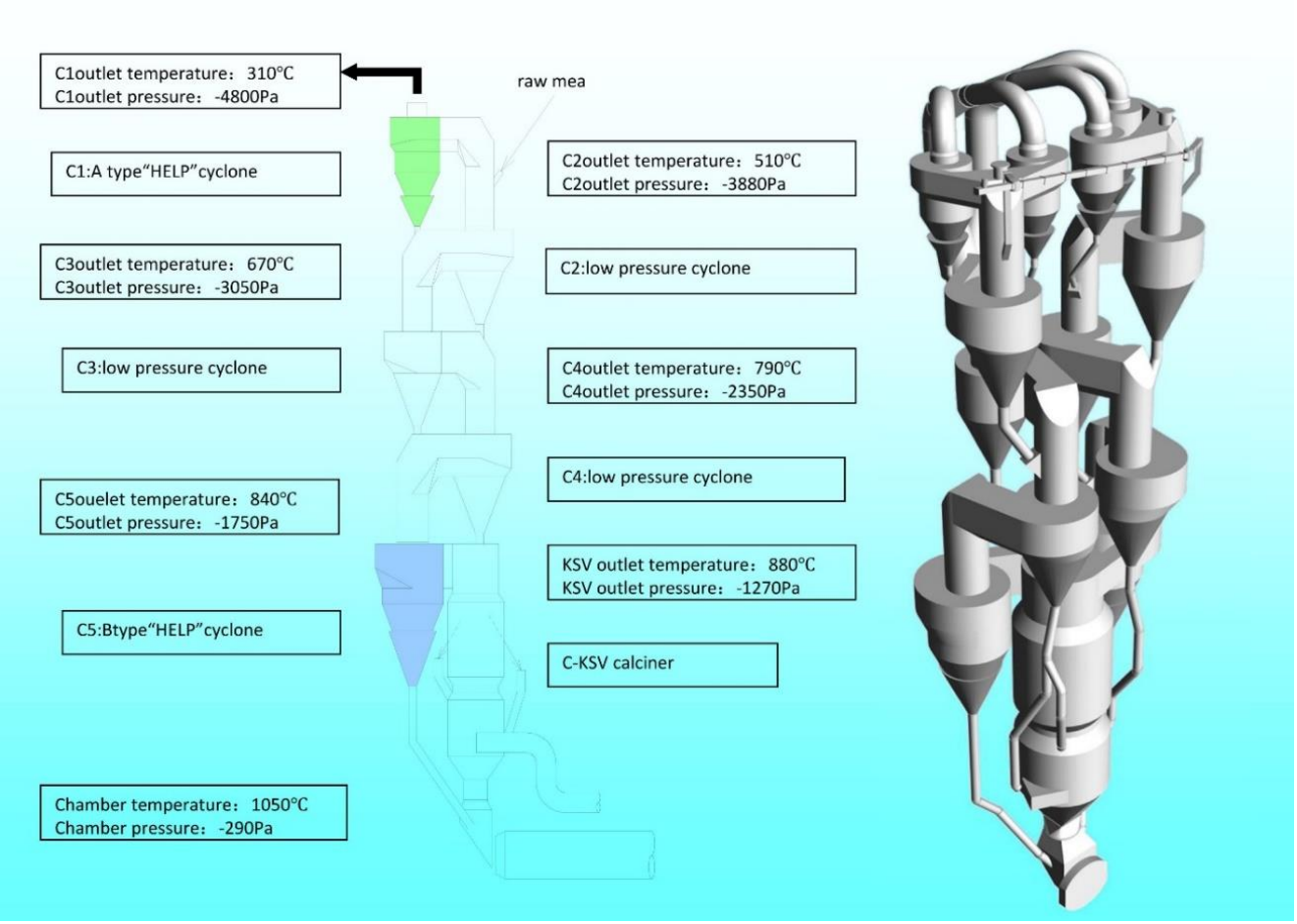


Figure 3-7 The burning system of cement plant

3.3.9 The “help” cyclone structural features

The burning system in cement plant, the project is leading to minimize the environmental impact and so it is used the “help” cyclone structural features. There are four purposes in the “help” cyclone structural features as follow:

High efficiency: “HELP” cyclone separating rate C1:95-96%, C5:90-92 %, compare with second generation (C1:93-95%, C5:88%) have certain amplitude increase.

Low Pressure: Because the peripheral gas velocity is reduced resulting from the increase of the cross sectional area of the intermediate part of the conical portion, the coefficient of pressure loss is lower than 25~30% than the conventional cyclone.

Small Volume: “HELP” cyclone increase velocity, but can maintain higher dust collection efficiency.

No Plugging Material: The inclination of the bottom plate of the inlet part of the cyclone is 50 degree for the purpose of the reduction of the dust accumulation.

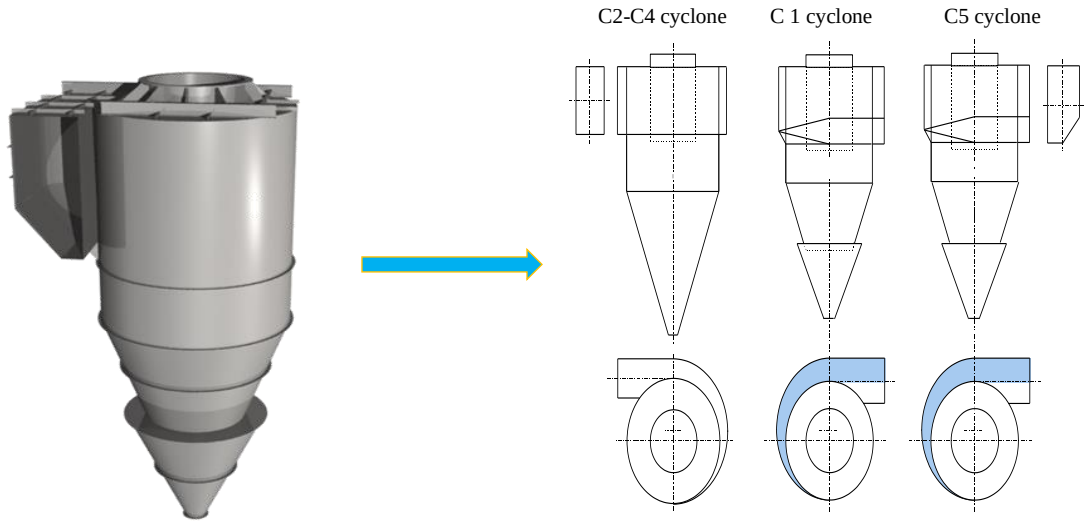


Figure 3-8 Cyclone 3D model

3.3.10 C-KSV calciner structural features

C-KSV calciner is structurally constructed in four zones which are as follow.

A. *Spouted Bed*: The bottom zone is inverted conical and forms so-called Spouted Bed, the fuel is fed to several main burners installed in this zone.

B. *Vortex Chamber*: The second zone consists of a cylindrical Vortex Chamber, high temperature secondary air from clinker cooler is fed tangentially into lower part of the Vortex Chamber through the tertiary air dust, and auxiliary burners supports the main tertiary air dust, and auxiliary burners supports the main combustion process.

C. *Auxiliary Spouted Bed*: The third zone is formed by a conically tapered constriction which assists the swirl dispersion of the raw meal in the Vortex Chamber.

D. *Mixing Chamber*: The four zone consists of a cylindrical Mixing Chamber, which function as a further mixing and after-combustion zone. The auxiliary spouted current and vortex are perfectly mixed in the Mixing Chamber and combustion is accomplished here.

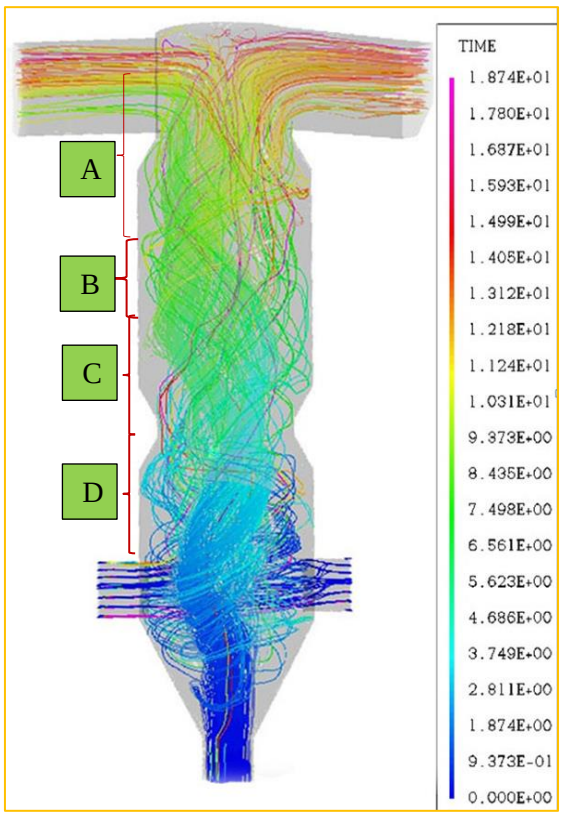


Figure 3-9 C-KSV calciner structural features

3.3.11 The 4th generation cooler

The generation of cooler is 4th generation with high recovery efficiency and high reliability. The cooler is formed with thick clinker layer; high load for specific grate area, the efficiency of heat recuperation is 3-5% higher than the third generator grate cooler. It is designed by the way of modularization convenient installation on site, short installation periods. There are no leakage material fixed bed, no need to leak material airlock and chain bucket conveying equipment; reduce the burning system height.

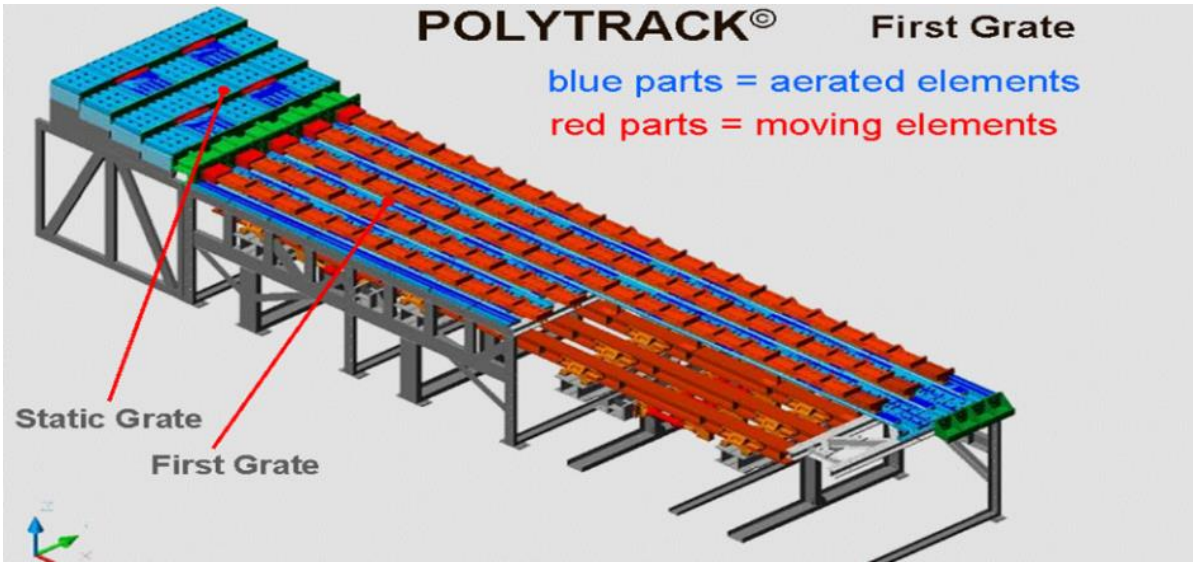


Figure 3-10 The 4th generation cooler with high recovery efficiency and reliability technology

3.3.12 CKSV burning system centre control operating system

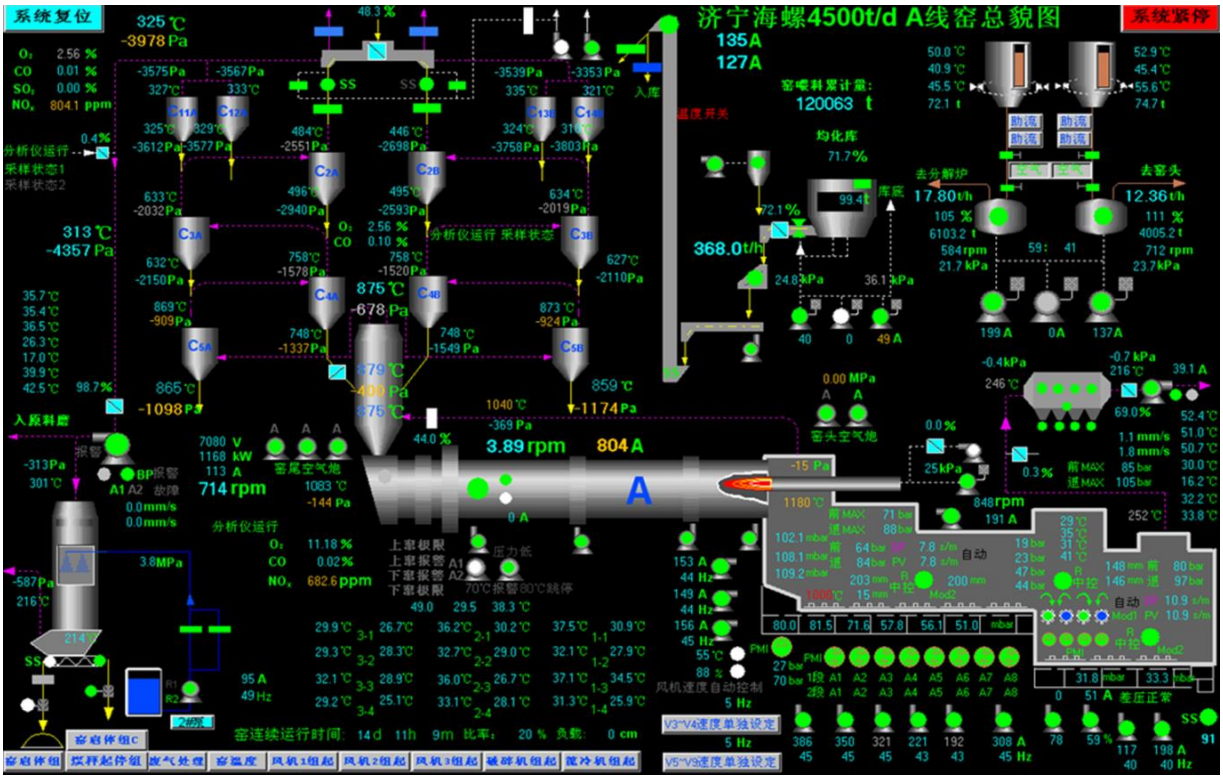


Figure 3-11 CKSV burning system centre control operating system

3.3.13 Stack Height

Good International Industry Practice (GIIP) Stack Height *(Based on United States 40 CFR, part 51.100 (ii)).*

HG = H + 1.5L; where

HG = GEP stack height measured from the ground level elevation at the base of the stack

H = Height of nearby structure(s) above the base of the stack

L = Lesser dimension, height (h) or width (w), of nearby structures

"Nearby structures" = Structures within/touching a radius of 5L but less than 800 m.

HG= H + 1.5L = 37m+1.5 x 22m = 70m

The stack height of the cement plant is100m.

Figure 3-12 Cement Plant Stack

3.4 Environmental Protection Measure

3.4.1 Overview

The plant plan is to construct 1×5000 t/d NSP cement clinker production line and a supporting 2-Φ4.2×13m combined cement grinding system with roller press and 9MW WHG system, also the existing 400t/d SP kiln will have technical innovation for energy conservation and emission reduction & necessary production and living auxiliary facility.

3.4.2 Process technology and equipment configuration scheme

Raw material & fuel crushing and homogenizing system: limestone crushing adopts one set of Hammer crusher with single rotor and one set of double-geared roller crusher for auxiliary material. The plant is set with one Φ90m circular limestone pre-blending storage yard, one 320×34.5m rectangular raw coal and auxiliary material pre-blending storage yard. Three Φ7×21m blending silo are set for silicon aluminum & iron raw material.

The preparation system of raw material and fuel: raw material grinding adopts CK450 vertical mill, tertiary fan system, production capacity is about 450t/h; one Φ22.5×56m raw meal blending silo is set and its reserves is about 18000t; the pulverized coal preparation workshop adopts grinding system with the combination of tube mill and anti-explosion bag filter with high concentration

Burning system and clinker storage: CKSV preheater system、Φ4.8×74m rotary kiln and the fourth generation grate cooler is adopted, the production capacity is 5000t/d. One Φ60m clinker silo is set and its reserves is about 10000t

Cement grinding system: Combined cement grinding system with two sets ofΦ4.2×13m+ RP170 120 roller press are equipped, six Φ18×45m cement silo and its reserves is about 6-10000t, three Φ7×22m steel plate cement delivery silo, four sets of 8-spouts packer.

WHG (Waste Heat Generation) system.

3.4.3 Environmental protection design standards

Environmental design of this project will give priority to enforce China's environmental standards, to meet the requirements of environmental protection under the premise of achieve better indicators advanced.

Table 3.4 5000 t/d production line of environmental protection design value list

Pollutants		Unit	Design Value
Dust	Rotary kiln and cooler	mg/Nm^3	50
	Other	mg/Nm^3	30
NO_x		mg/Nm^3	≤550
Sewage	Oil	mg/L	≤5
	SS	mg/ L	≤70

3.4.4 The Environmental Protection and Estimated Emissions

The overall planning of this project merge with the ecological concept of “plant is harmonious with nature” and embody the consistent thought of conch construction” resource-saving and environmentally friendly”.

Logistics system strives to short and smooth process, to reduce unnecessary transfer and dust raising point. Raw burning material, finished product transportation pass way should be set apart, to make external transportation flow orderly within prescribed zone and to avoid dust and noise secondary pollution.

The production line layout and limestone quarry, between the original office and residential area, the impact from quarry opening can be reduced. All the buildings are closed or semi-closed; material is not outdoor working in order to reduce dust dissipation and noise transmission.

Raw burning material discharging are centralized arranged and in separate areas, far from office and living area, grinding area and office & living area are separated by artificial lake and forest belt in order to reduce dust and noise impact.

The artificial lake has been set between plant site and original living area, the rainwater will be subsided, collected and recycling utilization, the plant microenvironment has been improved and the landscape of front area of plant has been enriched.

The ecological vegetation protection forest has been reserved between plant site & original building and plant site and surrounding farmland, which can absorb dust, nitric oxide, sulfur oxide and isolate noise; greening layout adopt arbor, bush, three dimensional isolated belt of lawn, vacuuming plants that is fit to local climatic condition has been selected with special attention, to improve part climate and make whole plant harmonious with natural ecology.

3.4.5 Dust Control Technology

- Rotary preheater flue gas by electrostatic precipitator (five electric field), after purification by the preheater chimney emissions. Particulate emission concentration of 50 mg/Nm^3.
- Cooler exhaust gas electrostatic precipitator (four electric field), after purification by grate cooler stack emissions. Particulate emission concentration of 50 mg/Nm^3.
- High concentration pulverized coal preparation configuration type explosion-proof bag dust collector, explosion-proof valve, CO concentration monitor and other security measures. The filter adopts the antistatic effect of filter material, good effect in practical application. Particulate emission concentration of 30 mg/Nm^3.
- Cement grinding configuration bag filter, adopting the antistatic effect of filter material, particulate emission concentration of 30 mg/Nm^3.
- Bag filter dust removal, material transit point using monomer particulate emission concentration of 30 mg/Nm^3. Reduce material drop height, as far as possible when design in order to reduce dust.
- Raw material heap tent using the semi-closed pile of tents, reduce dust.
- Adopt high-efficiency dust-free seal conveying technology, reached the advanced world standards of labor protection.

3.4.6 Emission Control Technical for Air Pollutants

- Use new dry process production technology.
- Firing system consists of five double row high-efficiency low-resistance type "HELP" type cyclone tube + low NOx C-KSV proclaiming system.
- C-KSV decomposition furnace USES the fuel grade of low nitrogen combustion technology, NOx emission concentration below 550 mg/Nm^3.
- SO_2 by C-KSV decomposition furnace and the absorption of raw material grinding and waste gas processing system, emission concentration well below.

3.4.6.1 NO_x air pollutant control

Clinker produce under the high temperature, and NO_x contains three types: thermal type, fuel type, and instant type.

Thermal Type - the N_2 of air react with O_2 under the high temperature and generate NO_x. The amount main lies on the temperature, when the temperature below 1350 °C, hardly no NO_x generate, when the temperature above 1500 °C, many more NO_x generate, because of the calcining zone temperature of rotary kiln above 1500 °C, the N_2 swift react with O_2, and generate many more NO_x.

Fuel Type - the main fuel used in clinker calcine was coal, when the coal burn and the “fuel type” NO_x generate.

Instant Type - when the coal burn, the N of air will react with hydrogen-carbon ion of fuel for example CH, and generate NO_x, the amount of this type NO_x inappreciably.

Reductive burn area was built between smoke chamber and calciner, a part of coal was distributed in this area, and let it burn in anoxic status, then CO, CH_4, H_2, HCN, C and another reductive element were generated. These reductive elements were reacted with NO_x that come from smoke chamber, and the NOx turn to N_2 and other innoxious gas, Furthermore, the coal burnt in anoxis status restrain the generation of "fuel type" NO_x, finally achieved the reduce of NO_x.

Main chemical reaction:

$$2CO + 2NO \longrightarrow N_2 + 2CO_2$$

$$2H_2 + 2NO \longrightarrow N_2 + 2H_2O$$

$$2NHi + 2NO \longrightarrow N_2 + \ldots$$

Burning system consists of the 5-stage twin string low-resistance "HELP" cyclones and low NOx C-KSV calciner system

3.4.6.2 CO_2 air pollutant control

Conch cement production process of the main source for the emissions of CO_2

- The technology process of CO_2 emissions (carbonate decomposition)
- Combustion reaction (clinker calcining and material drying):
- Power consumption of the indirect CO_2 emissions:
- Other factors, such as organic carbon in the raw material composition, the production of clinker burning of fly ash and dust contains $CaCO_3$ decomposition, the power consumption of auxiliary production, etc.
- Waster heat power generation, heat drying, the combustible waste as a substitute fuel, the alternative raw materials, adding calcium mix material factors, such as relatively reduced CO_2 emissions.

Emission estimation for CO_2

Estimation of CO_2 emissions from cement production is accomplished by applying an emission factor, in tonnes of CO_2 released per tonne of clinker produced, to the annual clinker output. The emission factor (EF) is the product of the fraction of lime used in the cement clinker and a constant reflecting the mass of CO_2 released per unit lime. The average clinker lime percentage has been estimated to be 64.6 percent. This number when multiplied by the molecular weight ratio of CO_2/CaO gives a clinker emission factor of tonnes of CO_2/tonne of clinker produced.

$EF_{clinker}$ = Fraction CaO x (44.01 g/mole CO_2 / 56.08 g/mole CaO)

$EF_{clinker}$ = 0.646 x 0.785 = 0.5071 tonnes of CO_2

1 ton of clinker produced = 0.5071 tonnes of CO_2

1,550,000 tonnes of clinker produced per year = 1,550,000 x 0.5071 tonnes of CO_2

= 786,005 tonnes of CO_2

Table 3.5 Conch cement list of CO2 emission control technology

New dry process cement processing technology and equipment	1. Preheater and calciner system 2. High efficiency and energy saving of grate cooler 3. New type of high efficient burner 4. CK material vertical mill system 5. Roller press grinding system of cement	▪ The new dry process cement technology and equipment, when eliminated 10000 tons backward process, can save coal 1400t, saving electricity 0.9 million kWh, to reduce CO_2 emissions 7000 tons.
Waste heat power	Pure low temperature waste heat power generation	▪ Ton clinker generating capacity has reached around 40 kWh/t/cl, can satisfy the electricity consumption of cement production line more than 45 %. ▪ Can reduce CO_2 emissions about 40 kg/t of clinker. According to one 5000 t/d clinker production line years clinker converted 1.6 million tons of clinker, 64000 tons of annual total emissions of CO_2
Waste recycling technology	1. Slag utilization 2. The utilization of fly ash 3. Carbide slag comprehensive utilization 4. Coal gangue utilization technology	▪ Each additional mixing materials mixed with 10 % of cement grinding, on 5000 t/d NSP clinker line can reduce the dosage of 160000 tons of clinker ▪ The coefficient is 0.86, emissions CO_2 138000 t/a.
Cement kiln waste disposal together	1. Cement kiln waste incineration disposal 2. Cement kiln incineration disposal of sludge	▪ When alternative fuel combustible waste rate of 10 %, one 5000 t/d NSP clinker line can reduce the dosage of 16000 tce ▪ The coefficient is 2.29, emissions CO_2 370000 t/a.

3.4.6.3 SO_2 air pollutant control

SO_2 is mainly composed of cement raw material and fuel in the element sulfur and sulfide oxidation and decomposition. SO_2 through the C-KSV decomposition furnace absorption and raw material grinding and waste gas processing system. SO_2 is absorbed by the material of calcium oxide and other

alkaline oxides formed into clinker materials such as sulfate and sulfite. Sulfur absorption rate can reach more than 95%. Conch cement preheater emissions of SO_2 concentration is low then 30 mg/Nm^3, reach the world advance level.

Dust control adopts advanced electrostatic precipitator and bag filter, dust emission concentration control in 10~30 mg/Nm^3, reached the world advanced level.

3.4.7 Noise control measures

- Choose low noise equipment.
- Adding silencer.
- Optimize the general layout, architectural structures are used to cut off the spread of sound waves.
- Strong intensity noise workshop using close or half-closed workshop.
- Indoor control room and office use acoustic chamber.
- Greening the environment, reduce acoustic environmental impact.

The early stage of the project

- Special design of environmental protection ;
- Modeling analysis forecasting, then improved the process and architectural design of each production workshop.

The overall layout

- Optimize the general layout, building structure is used to cut off the spread of sound waves ;
- Greening the environment, reduce acoustic environmental impact.

Noise control design

- The influence of noise at boundary of targeted deadened the sound design;
- Strong noise using close or half-closed workshop;
- Interior control room and office USES the acoustic chamber.

Equipment selection

- Choose low noise equipment;
  Configure the silencer.
  Engineering design and environmental design, and construction at the same time.
  Braunstein + Berndt in Germany Sound PLAN noise prediction software;

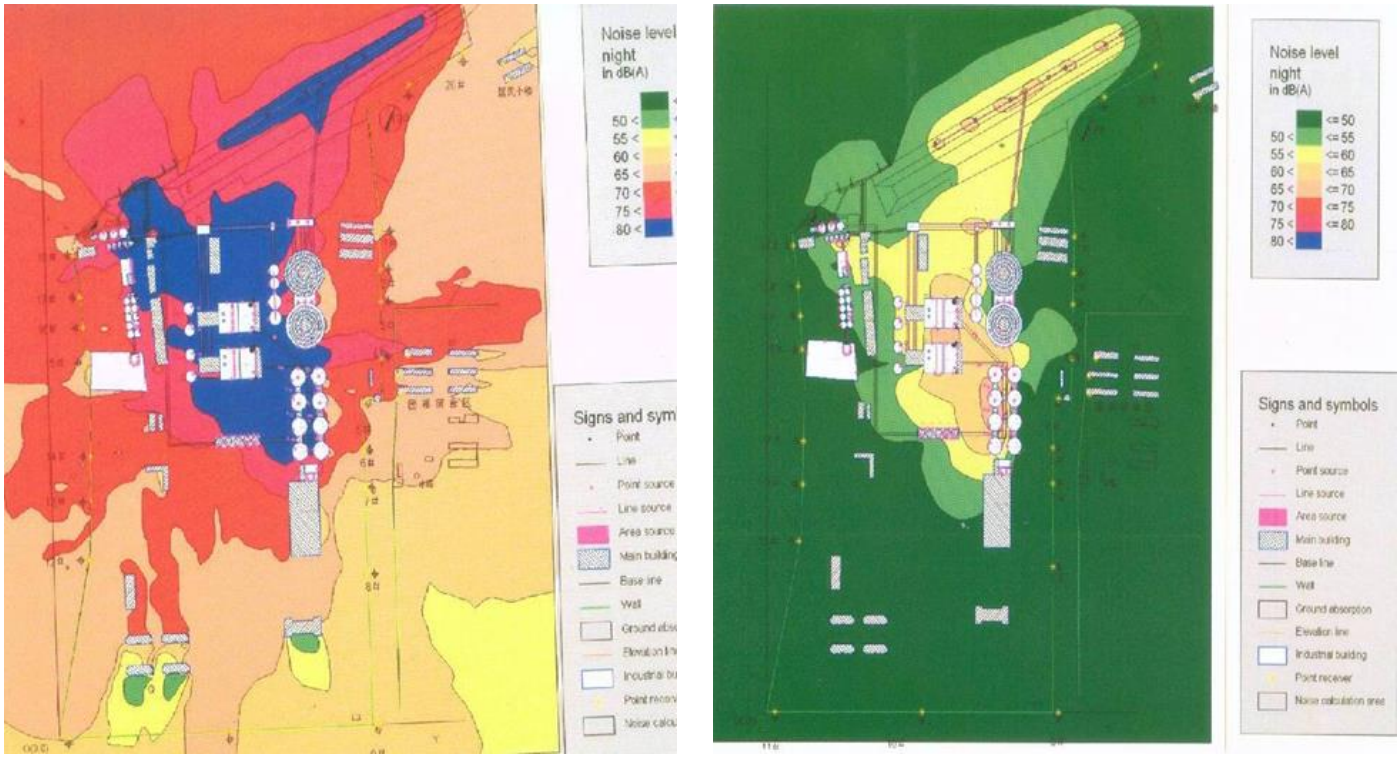


Figure 3-13 Noise control before and after contrast figure

3.4.8 Water environment protection and reuse technology

Figure 3-14 Water environment protection and reuse technology

Basically, power plant uses water in steam cycle and cooling processes. Raw water is come from raw water pond which is inside cement plant. Also, there will be some water loss from water quality adjustment (blow down) and water evaporation (natural evaporation).

On the water source and water factory process control, the design concept of a complete, mature, embodied in III C low consumption, circulation, energy saving and reuse plus or minus four aspects, conform to the standard GB and international I cleaner production level. There are four technologies for water environment protection and reuse;

a. Water supply system

b. Low water consumption system

c. High efficient circulating system

d. The rain energy-saving system and

e. Wastewater reuse system

a. Water supply system

Raw water is come from Thindwe pump house to Cement plant use by 8-inch MS pipe with 11415 feet long. The proposed project's water supply pipeline is routed separately along the existing water supply pipeline route to the factories in the industrial zone, so there is no impact along the water pipeline.

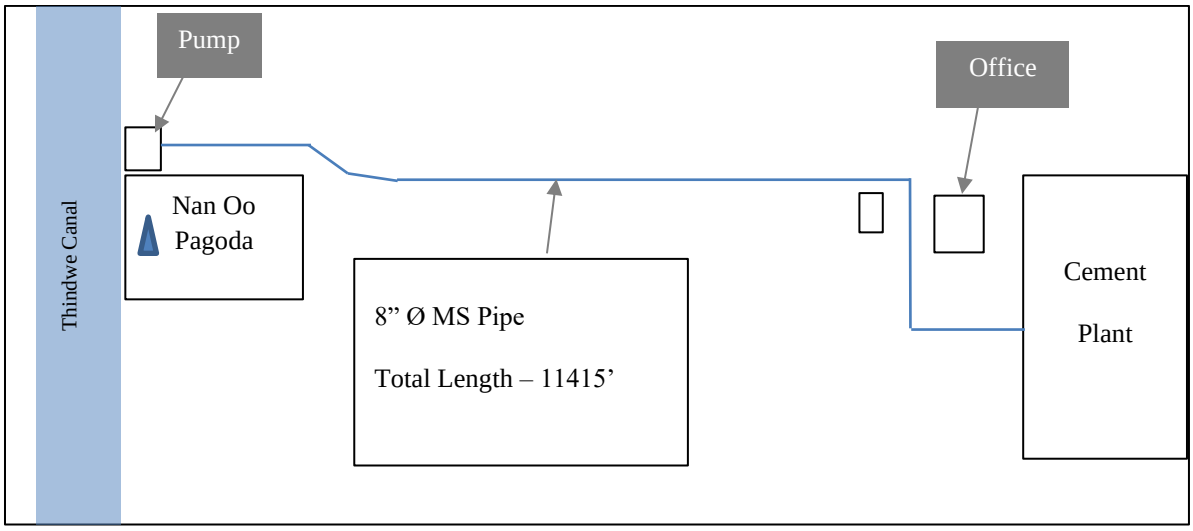
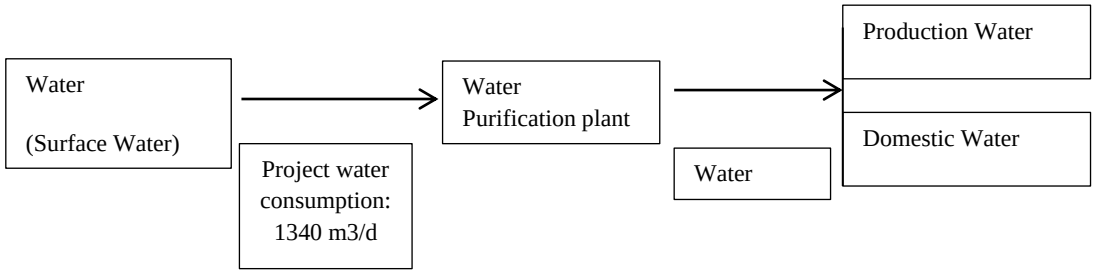


Figure 3-15 Water Supply

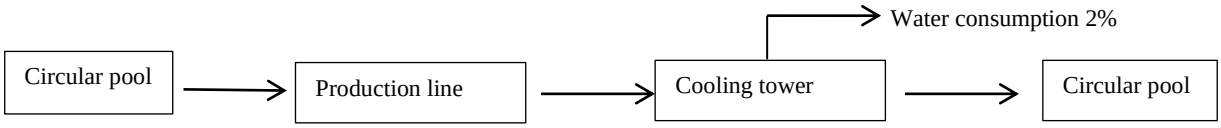
b. Low water consumption system

Through the control of the production waste water and reuse, 0.268-unit clinker fresh water consumption (international I cleaner production level standard: 0.300 or less).



c. Highly efficient circulating system

Production water for the closed loop system, circulating water utilization rate of 98% (international Ⅰ cleaner production level standards: 95% or higher).



d. The rain energy-saving system

Pool is set in the factory, the factory to collect rainwater after precipitation, used for greening, landscaping, road dust, water and part of production water, reduce water consumption.

Figure 3-16 Rain collecting pool near factory

e. Wastewater reuse system

For centralized treatment of sewage, achieve the integrated wastewater discharge standard (GB8978-1996) level of standards, can be used for landscaping, to reduce the pollutant emissions, protect the environment.


Figure 3-17 Photo showing the reuse system of wastewater from power plant for green environment

3.4.9 Sewage disposal technology

- Production water supply 100% recycling.
- Domestic sewage treatments by sewage treatment system for landscaping.
- Plant wastewater is zero emissions.

Figure 3-18 Domestic wastewater treatment system

3.4.9.1 The process of sewage treatment

Following is the sewage main process design: Sewage by artificial grille dirt after the sewage directly into the regulation pool, the water quantity and water quality settings for the purpose of regulating the sewage pool.

Organic ingredients higher in domestic wastewater, biodegradability is better, so the biological treatment methods greatly reduce the content of organic matter in the sewage is the most economic. Because the ammonia containing a certain amount of domestic sewage and organic substances, especially organic nitrogen in biological degradation of organic matter, organic nitrogen represented by ammonia, ammonia is also a pollution control index, so the sewage treatment using anaerobic and aerobic biological contact oxidation process of A/O, namely the biochemical pool to be divided into the two-parts A pool and O pool. Adjust the pool water by sewage lifting pump to a biochemical pool, biochemical treatment. A class in the pool, because of the high concentration organic wastewater, microorganism in hypoxia, the microorganism as facultative microbes, they will organic nitrogen into ammonia nitrogen in wastewater, and the use of organic carbon source as electron donor, NO2--N, NO3--N into N2, but also the use of some organic carbon and ammonia synthesis cell material. So not only has a pool of organic matter removal of organic load function, reduce the subsequent O biochemical pool, in favor of nitrification, and rely on the high concentration of organic matter in the sewage, complete denitrification, and ultimately eliminate the eutrophication pollution of nitrogen. The biochemical effects of a pool, there is organic matter and high ammonia nitrogen is still a certain amount in the sewage, to further oxidation and decomposition of organic matter, at the same time in the carbonation tends to be complete, nitrification can be carried out smoothly, set the O biochemical pool.

A pool of water flow into the O pool, the treatment of grade O biochemical pool by autotrophic bacteria (Nitrosomonas) completed, they use the decomposition of organic matter in the inorganic carbon or carbon dioxide in the air as a nutrient source, ammonia nitrogen in wastewater into NO2--N and NO3--N. O tank outlet part into the sedimentation tank for precipitation, the other part back into A pool of internal circulation, in order to achieve the purpose of denitrification. In class A and O biochemical pool are equipped with filling, the biochemical treatment process depends on a variety of microorganisms in the packing attached to complete. In a pool of dissolved oxygen control in about 0.5mg/l; in O biochemical pool of dissolved oxygen control in more than 3mg/l, the ratio of gas and water control in about 15-20:1.

O biochemical pool water into the vertical flow sedimentation tank, solid-liquid separation.

Precipitation water artesian pool after solid-liquid separation into the pool disinfection, sterilization can be directly discharged.

Sedimentation tank down from the sludge gas device, a part to a pool of inner circulation; a portion of the ascension to sludge; sludge tank after the sludge concentration by manure treatment.

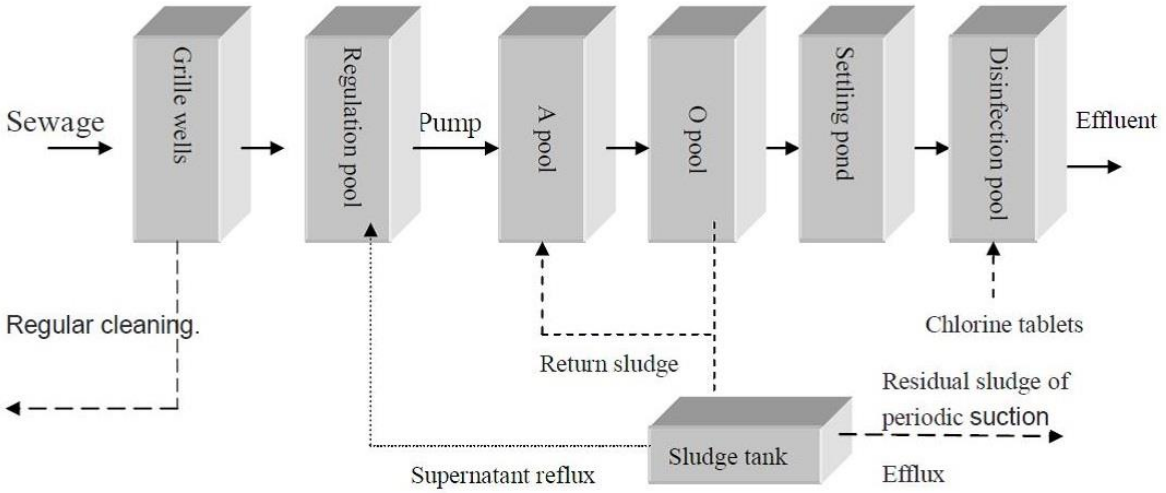


Figure 3-19 Sewage treatment flow chart

3.4.9.2 Brief description of process facilities

- The grille wells (Steel concrete)

Grille well arranged on the regulating tank inlet end of sewage source, design consideration of land saving and investment.

Grid is set in the well by artificial grille block removal of sewage in suspended solids, scraps of paper, to protect pump and the pipeline system cannot be blocked. The artificial grille wells size 1000 (depth) x 1000 (wide) x 1500 (L) mm. And the cover plate is arranged in the grille wells, antifreeze.

- Regulation pool (Steel concrete)

Septic tank supernatant flow into the tank, regulating pond is main is to strengthen the pre-treatment effect, its function has the following four aspects: One , the proportion of inorganic particles precipitated a lot of impurities, convenient sediment clean up, prolong the effective volume of the subsequent adjustment pool; Two , to separate the oil, can be part of the oil slick in the sewage sludge removal by adsorption and blocking; Three , through the hydrolysis and acidification reaction, the organic solids in the wastewater and difficult to be biodegraded into small molecules dissolved organic matter, the follow-up to ensure the regulation pool does not accumulate in the mud and effectively guarantee the submersible sewage pump is not blocked, the death card, greatly prolong the service life of submersible sewage pump, shortening the processing time, increase the removal efficiency; Four , the regulation, due to different quality and quantity are not the same general peak flow rate is 2-8 times the average throughput, due to the continuous and stable operation of sewage treatment system, and can adjust the concentration of sewage, design of effective volume of the detritus regulating reservoir is generally 4-8 times the average throughput, built-in potential sewage pump, in order to ensure a certain rated flow to the sewage treatment equipment.

Regulation pool is arranged at the bottom part of perforated pipe aeration, regularly, to fully control the quality and quantity of water.

- A biochemical pool

Because of the high organic components in wastewater, biodegradability, therefore the design of the use of biological membrane method.

Because of the high content of organic nitrogen in wastewater, the biodegradation occurs when the ammonia nitrogen in the form of ammonia nitrogen discharged into the water so the index will rise, while ammonia is a pollution control index, so in O biochemical pool before the addition of a biochemical pool for denitrification of nitrate into the mixture of a biochemical pool can be used in the water back flow and organic carbon source, the influent NO2- and NO3- reduction into N2 to denitrification, in the removal of organics and ammonia nitrogen degradation value.

- O biochemical pool

A biochemical pool for treating sewage, flow into the O biochemical pool, to enter the contact oxidation stage, enters the aerobic treatment.

O biochemical pool is primarily a biological membrane method, biological treatment device with active mud, by providing a source of oxygen, organic substances in wastewater by adsorption and microbial degradation, make the water purification.

Considering the contact oxidation time is appropriate in the design process, namely 4.5hours, with high specific surface area of the elastic filler, filling rate is 70%, the specific surface area near 600m2/m3, in the design area load should also consider the surrounding environment, to ensure that the processing efficiency is better. Packing service life in 10 years. Rotary blower pool oxygen produced by the well-known domestic companies to provide. The model for the HF-301S, volume 0.31-0.35m3/min, pressure 1000-5000kgf/cm2, power 0.75KW, the ratio of gas and water is also considered in higher value: 15-20:1, aeration system with aeration porosity is small, the oxygen utilization rate etc.

Contact oxidation is the biological treatment process with membrane method with activated sludge process. After fully oxygenated water, submerged all packing and with a certain speed flow through the filler, the filler surface covered with oxygen biofilm sewage full contact, so that the organic matter in water by adsorption and degradation, so that the sewage is evolution.

This design adopts the three-dimensional elastic packing international advanced, not only a large specific surface area, and the flow characteristics of superior.

Due to the large number of microorganisms are fixed in the packing layer surface, the formation of sludge bed high concentration, commonly known as a biofilm, it has strong resistance to shock load.

The structure of the activated sludge no or very little to produce suspension, and thus will not produce sludge expansion, this is also a major feature of this method.

This stage is the key to the filler layer producing biological culture and, on the bed, if the operation in the early stage of this work, the basic no other problems during the operation.

As the filler frame instead of the suspension effect of activated sludge method because the surface does not need to return sludge, it reduces the operation management program.

This process will be O biochemical pool is divided into two contact oxidation pond, sewage pool sequentially through the contact, the contact oxidation can be divided into two levels, make full use of the characteristics of contact oxidation process, the wastewater by two stage biological contact oxidation. The organic matter content decreased, more thorough biological degradation.

- Settling tank

O biochemical pool water flow into the sedimentation tank, sedimentation tank as the center vertical flow inclined tube sedimentation tank, the surface load is 2.0m3/m2 • H. Biological membrane tank main settlement after biological treatment off and suspended particles small, supernatant fluid flow into the disinfection tank, sludge sedimentation regularly to sludge pool.

- Disinfection pool

According to the national standard "TJ14-74" standard, sedimentation tank effluent flowing into the pool disinfection, disinfection with chlorine disinfectant tablet, has the added convenience and safety. After sterilization, the indicators have reached the national emission standard, discharged into the municipal pipe network.

- Sludge tank

Sludge into sludge settling time of biofilter, anaerobic digestion / the gap of aerobic mixed, through digestion and may reduce the amount of residual sludge is about 70% above. Sludge supernatant with activated sludge return to a biochemical pool, sludge cleaned regularly (usually one year removed 2 times).

3.4.10 Solid Waste Disposal Measures

- Accept low filter of particulate matter, all return to production line use, not outside.
- Production and living wastewater treatment plant sludge, mixed with cement in the production of raw materials for recycling.
- The proposed project is currently in production, and no solid waste is generated during the manufacturing process. Domestic waste will be transported to the nearest authorized waste disposal facility.

3.4.11 Environment Greening

- Road on both sides of the strip inside the plant area and ground slope greening.
- Second-ranking workshop space around the auxiliary greening.
- Planting broadleaf, anti-dusting vacuuming the suitable tree species as a shield.

3.4.12 High Level of Green Environmental Protection Technology

- Conch cement has always been adhering to the concept of recycling economy, energy-saving and environmental protection and green development;
- Integration of a high level of green environmental protection technology;
- Fully integrate ecological concept of “plant and nature coexist harmonious”
- Factory environmental protection index reached the international advanced level.
- Fully integrate ecological concept of “plant and nature coexist harmonious and embody the consistent thought of Conch constructing “resource-saving and environment friendly” enterprise.
- Adopt efficient dust-free seal conveying technology, reached the advanced world standards of labor protection.

3.4.13 Energy Conservation and Emission Reduction Technology

The following figures show strong confidence for energy conservation and emission reduction technology.

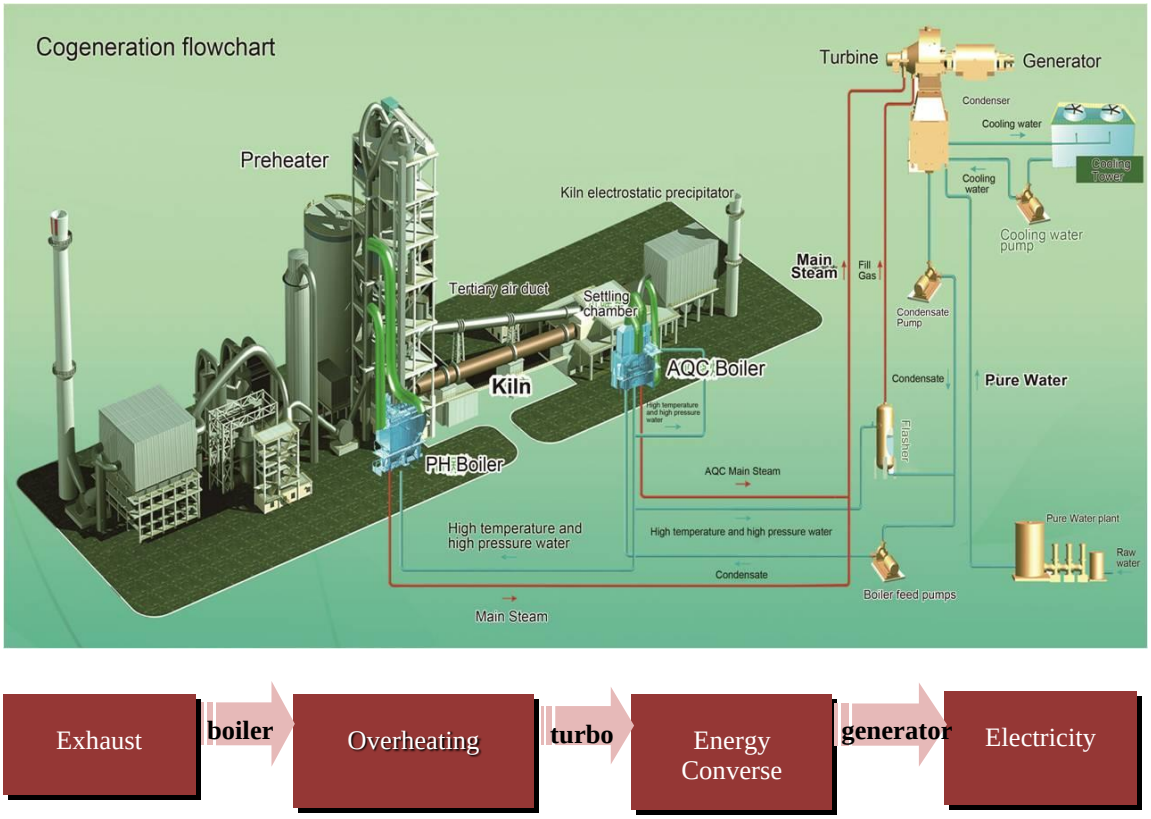


Figure 3-20 Cement production line of pure low temperature waste heat recover power generation system

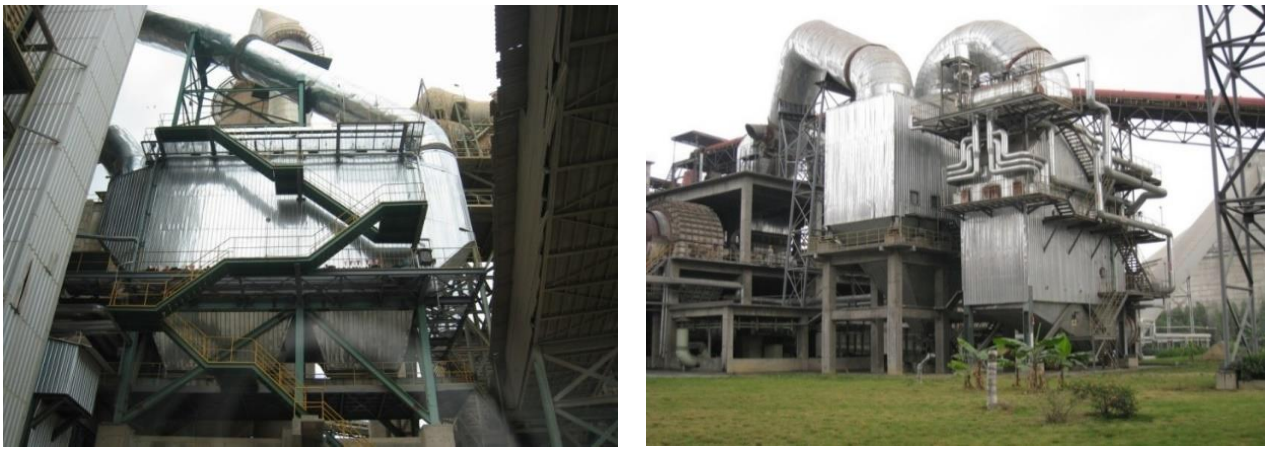


Figure 3-21 Use highly efficient waste heat recovery boiler

- Use patent flash technology of the thermal system.
- Device configuration parameters of low mixed steam condensing steam turbine generator, heat recovery efficiency is high;
- Ton clinker generating capacity has reached around 40 kWh/t/cl, can satisfy the electricity consumption of cement production line more than 45%.
- Can reduce CO_2 emissions about 40 kg per ton of clinker, accounted for about 20% of the total production line fuel combustion emissions.
- According to one 5000 t/d clinker production line years clinker converted 1.6 million tons of clinker, 64000 tons of annual total emissions of CO_2.

3.5 Conclusion

- Adopts the internationally advanced level, reliable operation of environmental protection equipment, practical environmental protection measures, ensure pollutant indexes reached the world advanced level.
- Design and engineering design at the same time low environmental protection.
- Used in the process of low production effective management measures to prevent accident;
- Clean production level is high, fully embodies the concept of circular economy.

3.5.1 Cement technology and Environmental Advantage List

Based on the project requirement, the capacities of main machinery and equipment have been estimated. Moreover, environmental protection to approaching are appropriately cared in machinery and equipment.

Table 3.6 Conch cement NSP cement technology and Environmental Advantage List

Item	Name of index		Unit	Average level	Conch factory	National EQEG
1	Clinker production capacity		t/d	5000	5000	
2	Raw material grinding power consumption		kWh/t	18	16.5	
3	Firing System heat consumption		kCal/kg.cl	740	710	
4	Overall power consumption of clinker		kWh/t.cl	65	55	
5	Heat recovery efficiency of Grate cooler		%	70	75	
6	Cement grinding power consumption		kWh/t	38	32	
7	Cogeneration	Generating capacity	kWh/t.cl	30~35	40	
8	Environmental Protection	Emission reduction of CO_2	Ten thousand Tons/year	-	6.4	
		Discharge concentration of dust	mg/Nm^3	30~50	10~30	50
		Discharge concentration of NO_x	mg/Nm^3	800	500	600

		Discharge concentration of SO_2	mg/Nm^3	50	<30	400
		Noise at boundary of factor	dB(A)	60-70	55~65	70
		Sewage discharge	-	Emission	Zero emission	
		Municipal domestic garbage disposal system	t/d	-	300	

3.5.2 Estimated emissions, Heavy Metals and Other Air Pollutants

The accurate monitoring of heavy metal emissions is complicated due to factors such as low concentrations of trace elements with values close to or below detection limits and the inability to capture volatile species such as mercury in the sampling system.

Regarding the fluoride present in the kilns, most of it is bound in the clinker, and the rest is bound in the powder as a calcium fluoride form under the burning process conditions. Fluoride and hydrofluoric acid gaseous emissions are prohibited due to calcium excess.

Cement manufacturing process, which is using technology long dry kiln, where the temperature is stable in the main burner and a long residence time makes the emissions of dioxins/furans produced very small. Air emissions control devices used in cement manufacturing consist of a dust collector/bag filter as well as an electrostatic precipitator (EP) that are used to prevent or reduce emissions of dioxins and furans into the environment.

Table 3.7 Estimated Emissions

Parameter	Unit	Guideline Value (NEQG)	Estimated Emission
Cadmium + Thallium	mg/Nm^3	0.05	-
Dioxins / Furans	mg TEQ	0.1	-
Dust (other point sources including clinker cooling, cement grinding)	mg/Nm^3	50	10~30
Hydrogen chloride	mg/Nm^3	10	-
Hydrogen fluoride	mg/Nm^3	1	-
Mercury	mg/Nm^3	0.05	-
Nitrogen oxides	mg/Nm^3	600	500
Particulate matter PM10 (existing kilns)	mg/Nm^3	100	-
Particulate matter PM10 (new kiln system)	mg/Nm^3	30	10~30
Sulfur dioxide	mg/Nm^3	400	<30
Total metals	mg/Nm^3	0.5	-
Total organic carbon	mg/Nm^3	10	-

3.6 Plant Layout

The project layout plan is shown in figure 3.1 consisting of the environmental protection plan. Fully integrate ecological concept of “plant and nature coexist harmonious and embody the consistent though of construction “resource-saving and environment friendly” enterprise.

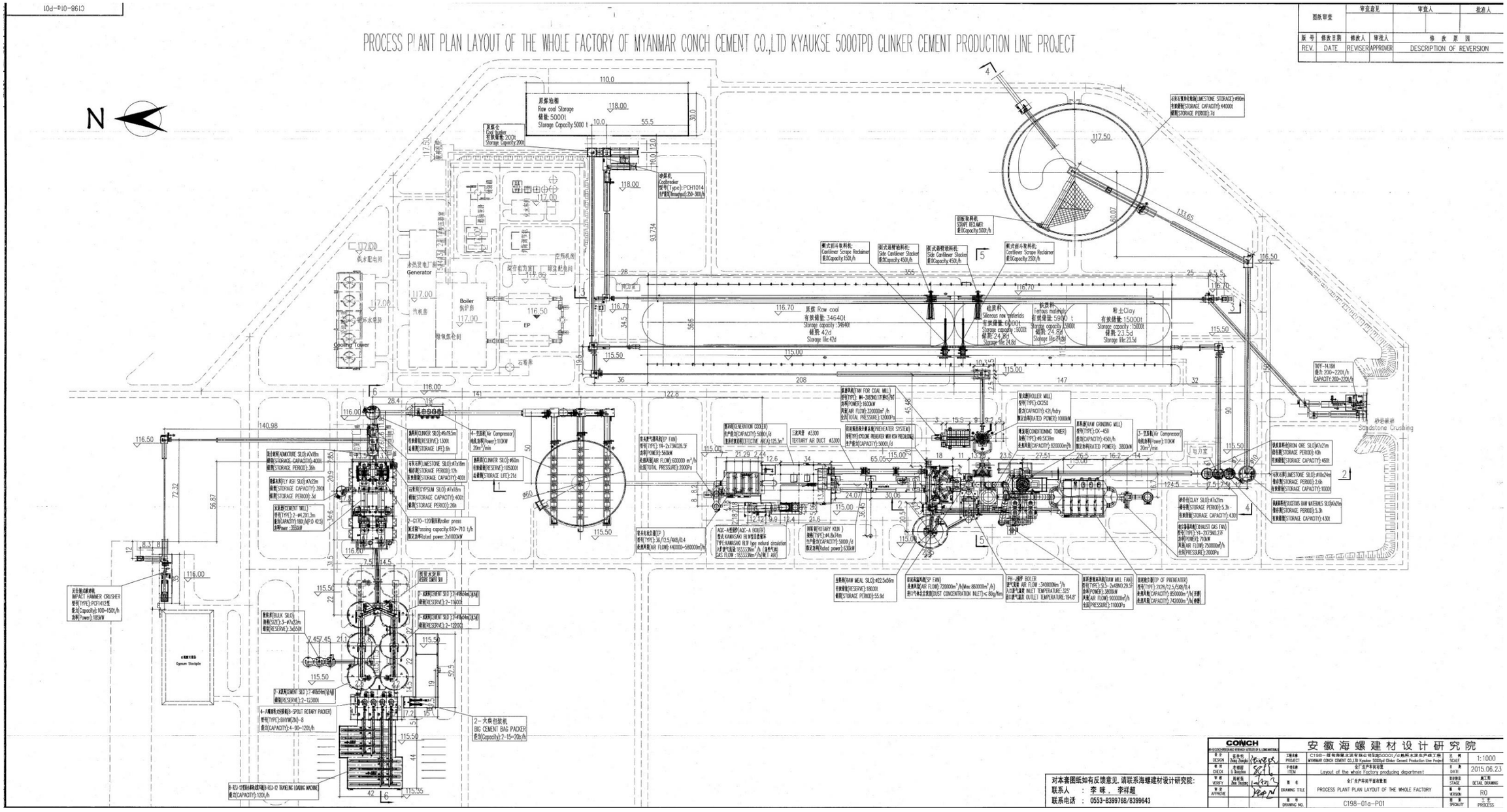


Figure 3-22 Preliminary general layout plant for cement plant

3.7 Project Alternatives

Acceptance or rejection of a project alternative depends on a variety of factors. These are international best practice, best available technology not entailing excessive costs, social impacts, social-economic impacts and environmental impacts. Available reasonable alternatives are evaluated below:

3.7.1 Site Alternative

The alternative of constructing the Cement Plant at another site is not applicable in that the project is an ongoing concern.

3.7.2 Design, Technology and Process Alternatives

This project mainly uses new dry-process cement production technology. New dry-process cement production's process is pre-heater and pre-decomposition technology outside the kiln as the core. Modern cement production methods that make cement production with Efficient, High-quality, Energy-saving, and clean production. Main equipment is suspension preheater. The main function is to make full use of exhaust gas from the rotary kiln and calciner, waste heat, heats the raw meal, make the raw meal preheat and partially decompose carbonate.

The alternative of a wet process in the cement production was evaluated. In the wet process, raw mix is fed into the kiln in the form of slurry which may have water content of 30 to 40%. The slurry which is easy to blend and homogenize is directly fed into the kiln. This is also essential where relatively poor grade limestone must be enriched through the process of beneficiation requiring use of water as a process media. In this process the fuel consumption is higher (about 1650 kilocalories/kg of clinker) compared to the dry process (about 1100 and 900 kilocalories/kg of clinker for kiln 1 and 2 respectively).

The following are the other reasons for rejecting the wet process alternative:

i. Additional liquid waste to be discharged to the environment thereby leading to increased pollution,
ii. Additional requirement
iii. Increased use of water resources as process water.

3.7.3 Comparison and Selection of Dry Process Cement Manufacturing

In the aspect of the quality and rate then wet process is better. From the fuel consumption and time of process aspect then dry process is better. This project chooses the dry process because fuel consumption in dry process is low i.e., about 100 kg of coal per ton of cement produced while 350 kg of coal per ton of cement produced in wet process.

Table 3.8 Comparison between Dry and Wet processes

Dry Process	Wet Process
Design, Technology and Process	
Mixing of raw material in dry state in blenders.	Mixing of Raw materials in wash mill with 35 to 50% water.
The dry materials exiting the mill are called “kiln feed”.	Materials exiting the mill are called “slurry” and have flow ability characteristics.
Fuel consumption is low i.e., 100 kg of coal per ton of cement produced.	Fuel consumption is high i.e., 350 kg of coal per ton of cement produced.
Size of the kiln needed for manufacturing of cement is smaller.	Size of the kiln needed for manufacturing of cement is bigger.
Difficult to control mixing of Raw materials, so it is difficult to obtain a better homogeneous material.	Raw material can be mixed easily, so a better homogeneous material can be obtained.
Lesser time of process.	Higher time of process.
Physical state is raw mix (solid).	Physical state is slurry (liquid).
Economic	
Cost of production is less.	Cost of production is high.
Capital cost is high due to blenders.	Capital cost (Cost of establishment) is comparatively less.
Environmental Advantage	
Liquid waste may not be discharged to the environment due to the recycling of water.	Liquid waste may be discharged to the environment.

3.7.4 “Without Project” Alternative

The alternative of not implementing the Project was rejected because the project under review is an ongoing concern. Other reasons included:

i. Current demand for cement is unmet by current production levels and as such ceasing plant operations would greatly undermine supply of the commodity and negatively affect the construction industry and the national economy as a whole.
ii. Local businesses will lose opportunities for growth,
iii. Loss of direct employment and training opportunities for approximately 600 people employed by the mine and plant as well as contractual staff (e.g., those working to rehabilitate the gas cleaning facility).
iv. Loss of indirect employment and training opportunities for contractors and suppliers of goods and services as well as those involved in cement supply.
v. Loss of revenue by the regional government and central governments.

3.8 Organization structure and Staffing

The plant is operated with the force of 26 Middle Manager, 53 supervisor, 74 technician, 323 general staff and 34 trial staff. The organizational structure of Myanmar Conch Cement Company Limited is described as the following.

					General Manager						
Mine (95)	**Manufacture (164)**	**Packing (50)**	**Powerhouse (67)**	**Production Technology (23)**	**QC (37)**	**Supply (19)**	**Sale (9)**	**Finance (11)**	**AD (33)**	**Engineering (1)**	**Development (1)**
Middle Manager: 3 Supervisor: 8 Technician: 4 General Staff: 72 Trail Staff: 8	Middle Manager: 6 Supervisor: 18 Technician: 32 General Staff: 99 Trail Staff: 9	Middle Manager: 2 Supervisor: 3 Technician: 9 General Staff: 36	Middle Manager: 1 Supervisor: 10 Technician: 20 General Staff: 28 Trail Staff: 8	Middle Manager: 2 Supervisor: 2 Technician: 3 General Staff: 13 Trail Staff: 3	Middle Manager: 3 Supervisor: 3 Technician: 2 General Staff: 26 Trail Staff: 3	Middle Manager: 2 Supervisor: 5 General Staff: 12	Middle Manager: 1 Supervisor: 1 Technician: 2 General Staff: 5	Middle Manager: 1 Supervisor: 1 Technician: 2 General Staff: 7	Middle Manager: 5 Supervisor: 1 General Staff: 24 Trail Staff: 3	Supervisor: 1	General Staff: 1

Figure 3-23 Organization Structure of Myanmar Conch Cement Company Limited

3.9 Decommissioning Phase

The plant has an expected lifespan of over 30 years and so only general principles can be established at the present time. Decommissioning will require the following activities:

- Removal of all surface equipment and units.
- Potential removal of hard standing and surface cover.
- Abandonment of sub-surface utilities or filling and abandonment as appropriate.
- Reinstatement of the site and all project areas to pre-construction conditions.
- After completion of construction activities, the rubbish will be cleared and disposed of at nearby authorized waste disposal sites. Waste products that can be utilized in other ways will be sold.
- Myanmar Conch Cement will develop a site closure plan during the later stages of project design and maintain the plan throughout the life of the development.

CHAPTER IV

EXISTING ENVIRONMENTAL RESOURCES

4.1 Introduction

This Environmental and Social Impact Assessment Study report will give an assessment of the various environmental impacts likely to be caused on the surrounding nature in and around the proposed project. It will also incorporate the appropriate control measures required to be adopted or implemented to minimize the adverse effects thereof.

To carry out such assessment study, it is first necessary to delineate and define the existing environmental factors in and around the proposed project on the existing environmental scenario which will include various environs like ecology, Flora-fauna, socio economic profiles, environmental quality in respect of water, air, and noise.

4.1.1 Setting the Study Limits

The area of influence (AOI) for this project will be designated based on the following project components. Myanmar Conch Cement Co., Ltd. is planning a 5000 t/d clinker production line which is installed with cement grinding process with 2-Φ4.2×13m roller press and 9MW waste heat power generating system, 2×20MW coal-fired power stations have been constructed for supplying power to production line.

Temporary Boundaries of the EIA: In the construction phase and operation phase, the environmental impacts are expected to occur on the atmospheric environment, water environment, noise and vibration, waste treatment, and flora and fauna due to construction equipment operation. In the operation phase, some positive changes are expected, such as green belt development and annual plantation. The socio-economic positive impacts are expected to occur mainly during the construction and operational period. Thus, the temporary boundaries of this ESIA will be considered into the construction, operation phases and decommissioning phase to examine their impact on the environment.

Spatial Boundaries of the EIA: The spatial boundaries of the assessment of the environmental impacts can be considered as indirect impact zones. Direct impacts generated by construction and operation activities will incur dust generation, noise and vibration generation and changes in habitat of flora and fauna in the project area. Indirect impacts such as dust generation and soil leakage due to construction vehicle movements are expected to affect nearby areas.

This section incorporates the description of the existing environmental settings within the area of proposed project site. The base line study was conducted during dry season during December 2014.

4.1.2 Baseline Data Collection and Consideration for Environmental Impact Assessment

Desktop studies as well as site specific baseline surveys were carried out to provide a full picture of the status of the existing natural and human environment and to understand potential impacts and any sensitive risk receptors for the Project.

The collection and generation of relevant baseline environmental data (primary and secondary) in the Project-related area were mainly carried out by the local firm. These data are relevant to decisions about project location, design, operation, and mitigation measures.

The overarching purpose for the collection of a proper environmental and socio-economic baseline data focuses to give an overall evaluation of the existing environmental and socio-economic conditions, values, and functions of the project areas (identified as: access road and cement plant area) and include the followings:

- Physical Environment.
- Biological Environment; and
- Social-economic and cultural Environment.

Water Quality

The water quality sampling points are considered to establish baseline water quality conditions based on actual and potential water uses, conditions and types of water bodies, and the safety of the water sampling site. The groundwater sample were collected at least two available location such as tube well and well.

Air Quality

For determining the existing condition on the site as it relates noise and air were conducted by the retrieval of available historical data. The preliminary research conducted show that no data for the subject site are available. Therefore, direct measurements were conducted on site using standard calibrated instruments. Air quality survey was conducted to have baseline data for the project area and access road.

Noise and Vibration

Measurement of environmental sound and vibration level was conducted by referring to the recommendation of International Organization for Standardization (ISO), i.e., ISO 1996-1:2003 and ISO 1996-2:2007.

Biological Environment

The scope and purpose of the ecological baseline study are:

- To provide comprehensive and accurate information on the ecological baseline.
- To identify and predict potential ecological impacts.
- To evaluate the significance of the impacts identified.
- To recommend effective and practicable alternatives and mitigation measures; and
- To recommend the need for and the scope of an appropriate monitoring and audit program.

A targeted site reconnaissance was conducted to ground-truth information gathered and supplements it with site observations, data, and photographs. The site reconnaissance targeted the following

specific ecological and legislative/organizational objectives:

- To name, describe and map vegetation communities and habitats present within the Project Area at a suitable scale, using existing community nomenclature where possible.
- To identify, describe and map other ecologically sensitive areas within the Project Area such as springs, watercourses, and other water bodies.
- To the extent possible within the survey time frame and season, determine if species of conservation significance known or predicted likely to be present in the Study Area are present within the Project Area.
- To identify opportunities for future ecological monitoring and enhancement within the framework of the proposed project.

Socio-economic and Cultural Environment

It is necessary to study existing demographic profile of the region, the economic resources, the health conditions, education, and cultural resources of the community for social impact assessment of the project. This study primarily emphasized on the existing socio-economic conditions of villages which are in the project area especially those residing in the Myanmar Conch Cement project.

According to the project type and project activities, based on the possible impacts, study area/spatial boundary are initially identified as 3 km, 5 km and environmental and social data were collected. According to the survey results of air quality, water quality, noise, biodiversity, and social condition described in Chapter 4, assessment of respective environmental and social aspects described in Chapter 5, and respective guidelines and comparisons, it is enough for impact assessment.

4.2 Existing Environmental Condition

The environmental baseline data such as water, air and noise quality, water and ecological survey were conducted selected sample sites within the project site. The ecological survey was conducted to assess the type of flora and fauna prevailing within the site.

Topography, climate and meteorology, geology was collected through literature review and available data from universities. Topography and geology of the area was studied using available topographic maps and satellite imagery.

The following is the activities of environmental baseline data collection in the project site.

4.2.1 Kyaukse Cement Plant Site Location

The Kyaukse cement plant is in Kyaukse industrial zone and far from residential area. The scoping study includes both physical, social, and environmental, but it had only limited information available. From this information we found the potential impacts by the project activities and should be field survey in the ESIA stage.

Kyaukse plain area is one of the important river basins of the Ayeyarwady River. Moreover, it

is well known for its high productivity in paddy. Kyaukse Town is the centre of the area and both highways and railroads from Yangon to Mandalay pass through the study area. Hence, Kyaukse plain has become one of the "Rice Bowls" of Upper Myanmar. Agriculture is not only the growing of crops; but also, it is a form of applied ecology crop raising depends on natural environment which has its limitation. Initially agricultural systems are governed by the related physical conditions till the latter are modified. It is a universal fact that many of the present-day patterns of agricultural land use are the products of past human activity and varying degree of modification of physical conditions which man has introduced with the help of science and technology.

The present site condition and environmental condition of Kyaukse cement plant are shown in Figure.

Figure 4-1 The project site condition of Cement Plant (2014)

Figure 4-2 Proposed cement plant area and old cement factory (2014)

Figure 4-3 The present construction works at new cement plant site (2014)

Figure 4-4 Car workshop and fuel tank storage area

Figure 4-5 Myin Saing ancient pagoda and it's environment

Figure 4-7 The present environmental condition of Thindwe canal

4.2.2. Project Site Setting

Kyaukse Township is situated in the Dry Zone of Central Myanmar, between north latitudes 21°26' N and 22°2' N and east longitudes 95°57' E and 96°58' E. This township is included in Kyaukse District of Mandalay Division. Kyaukse Township is bounded on the east by Pyin Oo Lwin Township of Mandalay Division and Yatsauk Township of Shan State, on the west by Tada-U Township, on the north by Sintgaing and Pyin Oo Lwin Townships, on the south by Myittha Township. Total boundary length is about (197.7) miles. The township has an area of 725.278 square miles (464,178 acres) and extends about 50 miles from east to west and about 20 miles from north to south which has an elongated shape. The township extends from northeast to southwest and generally it has a rectangular shape.

As natural boundaries, the Myitnge River serves on the north, the Shan Highland on the east, and the Samon and Panlaung Rivers on the west. Natural boundary is about (3.15) miles long and the remaining administrative boundary is about (194.55), miles.

4.2.3 Existing Physical Environment

4.2.3.1 Climate and meteorology

The meteorology and climate of Myanmar is controlled by the great monsoon circulation system of SE Asia and is influenced in detail by topographic peculiarities. The mountain ranges in Myanmar are generally running N-S, so that they present effective climate barriers for the SW monsoon in the summer and the NE monsoon in the winter. Therefore, the central part of the Inner Myanmar Tertiary Basin (Central Dry Zone) lies in rain shadow during the summer monsoon (June to September) and receives less than 500 mm of precipitation. The considerable differences in relief along the path of the monsoon lead to the formation of the following climatic zones. (DRUMMOND 1958):

Subtropical monsoon and subtropical mountain climates (the higher sections of the Indo-Myanmar and of the Shan Massif, north of 23° to 24° N), with mean temperatures of January is below 18°C and occasional frost during the winter months in the higher and northerly situated mountain regions; about 40 km in the western ranges and 190 km in the eastern platea are in subtropical monsoon climate and 70 km in the eastern plateau is in subtropical mountain climatic condition.

Kyaukse Township is situated in the dry zone of Central Myanmar. Therefore, temperature is relatively high, and rainfall is relatively low. The average temperature of Kyaukse Township is 31 °C, 21.26 °C in maximum, 21.26°C in minimum, and 27.2 °C in mean. The hottest month is April 38.01 °C and the coolest month is January 12.53°C. Rainfall is scanty and unreliable annual rainy days are 52 days in average, 65 days in maximum with 9.38 meter, and 37 days in minimum with 7.27 meter.

MONTHLY RAINFALL (mm)

YEA	JAN	FEB	MAR	APR	MA	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2011	*	0	0	29	87	35	4	247	21	101	1	12
2012	0	0	4	Trace	64	1	18	0	89	34	10	2
2013	1	0	0	73	69	62	7	58	326	309	0	0
2014	0	7	0	26	174	44	62	104	172	74	58	0
2015	20	0	10	95	166	6	75	34	51	0	25	2
2016	0	0	0	25	93	73	55	186	250	134	59	0
2017	0	0	0	136	194							

"*" Data not available.

"Trace" The amount of rainfall which cannot be measured.

"1 mm = 0.04 inch"

MONTHLY MEAN MAXIMUM TEMPERATURE (°C)

YEA	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2011	*	32.9	35.8	37.1	35.6	35.4	35.7	33.2	34.4	32.0	31.6	28.8
2012	29.5	34.3	36.5	38.0	38.3	35.9	34.5	35.4	35.4	34.5	32.5	30.8
2013	31.2	34.9	38.4	39.9	36.3	36.2	36.1	34.6	33.5	32.0	31.8	28.9
2014	30.6	33.5	37.5	38.4	38.1	37.2	36.2	35.4	34.8	34.7	33.6	31.4
2015	30.4	33.9	37.7	37.9	38.6	37.6	34.7	34.4	35.9	33.0	31.3	29.8
2016	29.8	34.0	37.5	41.1	37.7	35.0	34.1	33.9	34.1	33.7	31.2	31.7
2017	31.3	34.9	36.8	36.6	36.4							

"*" Data not available.

MONTHLY MEAN MINIMUM TEMPERATURE (°C)

YEA	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2011	*	14.1	20.5	23.7	25.3	26.0	26.1	25.4	25.1	23.7	18.4	15.9
2012	13.0	14.1	19.8	24.1	26.4	25.6	25.4	25.2	24.8	23.0	21.5	13.7
2013	12.6	15.8	21.8	25.6	25.5	26.0	26.3	25.8	25.3	23.8	20.3	14.2
2014	13.3	15.0	19.4	25.1	25.7	26.5	26.0	25.6	25.1	23.3	20.5	15.1
2015	15.9	13.7	18.4	22.6	24.8	25.5	24.9	24.7	25.0	22.2	18.5	14.6
2016	12.1	16.0	19.0	24.1	24.1	24.8	24.9	24.4	24.7	24.3	19.8	16.3
2017	13.8	16.5	19.8	25.0	25.9							

MONTHLY RELATIVE HUMIDITY (%) at (09:30) hrs M.S.T

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2011	*	55	57	70	73	71	69	78	74	80	69	76
2012	69	51	50	58	61	69	69	70	73	69	71	67
2013	62	58	43	50	69	71	68	73	77	80	71	69
2014	64	56	48	63	64	63	68	71	74	73	66	66
2015	64	83	52	64	64	65	74	74	73	74	75	73
2016	67	64	52	54	66	77	74	80	78	80	81	79
2017	73	60	60	70	70							

MONTHLY MEAN WIND SPEED (mph)at (09:30) hrs M.S.T

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2011	*	06	2.4	1.3	2.3	3.7	4.8	2.4	2.2	1.5	1.2	1.3
2012	1.8	15	1.6	2.3	2.0	3.6	2.8	2.1	12	1.3	09	0.6
2013	0.9	0.6	1.1	1.6	1.7	1.8	3.6	1.2	0.6	0.2	0.1	0.2
2014	0.04	02	0.3	2.4	1.1	1.8	0.9	1.1	0.6	0.3	0.1	0.6
2015	0.6	0.6	0.8	1.8	2.2	3.5	1.5	1.2	1.2	0.4	0.4	0.2
2016	0.5	0.7	0.8	2.0	1.2	1.5	18	10	1.1	10	0.4	0.8
2017	0.4	06	1.0	15	1.4							

MONTHLY MEAN WIND DIRECTION at (09:30) hrs M.S.T

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2011	*	NW	SW	SW	SW	S	S	SW	SW	NE	NE	NE
2012	NE	NE	NE	NE	NE	S	S	SW	NE	NE	NE	NE
2013	N	NE	NE	SW	SW	SW	SW	SE	SW	SW	NW	NE
2014	NE	NW	SW	SW	SW	SW	SE	SW	SE	NE	SW	NE
2015	W	NE	W	SW	W	SW	E	S	S	NE	NE	NE
2016	NE	E	S	S	SE	S	SE	SW	SE	SE	NE	NE
2017	NE	NE	SE	SE	S							

4.2.3.2 Geography

Kyaukse Township is situated in the Dry Zone of Central Myanmar, between latitudes 21° 26'N and 22° 2'N and longitudes 95°57'E and 96°58'E. It has an area of 725.278 square miles. Yeyaman Range or the eastern portion of the Kyaukse Township is a continuation of the Eastern Highland, and it gently slopes westward and northward as flat plain. Topography of Kyaukse Township can be divided into two parts, namely, Kyaukse Plain and the Yeyaman Range. Kyaukse plain is 375 square miles, about 51.7 percent of the township area. The plain is a southern continuation of Mandalay plain. It becomes lower from south to north and from east to west. This portion lies about 200 feet above the mean sea level. The plain is typically a river basin constructed by Myitnge, Panlaung, Samon and Zawgyi Rivers.

Isolated hills are also found on the plain. Distinguished hills are Kalagyaung (1,705 feet) in southern part, in the eastern part Shwethalyaung (816 feet) and Minmwe hill (782 feet) in the northern part. Although this plain lies in the Dry Zone, various crops can be cultivated successfully because water can be supplied by canals from Zawgyi and Panlaung Rivers. The major crop is paddy and, the scenario of the township appears as a granary.

Yeyaman Range is a part of the Shan highland. The average height is over (4,000 feet) and the range includes many mountain peaks with steep escarpment. The lowest peak of the range is

more than (1,000 feet) high. Mt. Taungma is the highest point with (5,105 feet) above sea level. Yeyaman Range extends eastwards, and it immediately rises up from the Kyaukse plain.

4.2.3.3 Topography

The area is isolated hill that exposed in the flat region although the area is at western of Shan Plateau range. The Thandawmyat area is mainly occupied by the low land in the eastern part of central low land area. The area is occurred as plantation.

4.2.3.4 Regional geologic setting

The area lies along the western margin of the Eastern Highlands of Myanmar. It comprises, from northeast to southwest, the western margin of the Shan Plateau, a segment of the Shan Scarps forming a belt of steep N to NNW-trending linear valleys and ridges and a mountainous area to the west lying within the north trending the scarp and the Cenozoic sediments of the Central lowlands.

The Plateau, which extends eastwards to the Thai-Laos-China borders, comprises gently undulating area mostly underlain by Permo-Triassic dolomites at elevations of 3,00 to 5,000 ft, separated by ridges and dissected valleys underlain by thick Precambrian, Palaeozoic and in places Mesozoic successions of sedimentary and minor volcanic rocks, of which the pre-Mesozoic rock are locally metamorphosed.

West of the map area the Central Lowlands, comprising the Eastern Though, Burma Volcanic Arc and Pegu Yoma, and Western Trough, lie between the Eastern Highlands and the Indoburman Ranges. The narrow Eastern Trough is underlain largely by late Tertiary sediments. The Burma Volcanic Arc, a medial ridge within the Central Lowlands, is defined by the presence of late Cenozoic volcanoes, but includes mid-Cretaceous granitic plutons intrusive into submarine andesitic lavas, dacites and sedimentary rocks, upper Cretaceous to Lower Eocene conglomerates, and Eocene and Oligocene volcanic rocks: small exposures of gneiss, schist and amphibolite are also present.

4.2.3.5 Biological Environment, Habitat – Terrestrial Fauna and Flora

Deciduous trees occupy most of Yeyaman Range and most of them are hardwoods. The dominant species are Teak (Tectona grandis), Pyinkadoe (Xyliadalatrigormis) and Thitya (Shorea Oblangitolia). Moreover, some kinds of bamboo like Kyathaung Wa (Bambusa polynorpha) and Tin Wa (Cappalostachyum Pergraeile) are also found along the foothills and on the lower slopes of mountains.

Vegetation on Dattaw Hill includes dry and thorny forests in which Than (Terminalia oliveri), Dahat (Tectona hamiltoniana), Tazaung (Euphorbia trigona) and Sha species (Acacialeucaphloea) are mainly found. On the upper slopes of the mountain, Htaukkyant (Terminalia alata) and Hmyin Wa (Dendfocalamus strictus) are also found.

The thick growth of vegetative cover on the hills and ranges of the township protects the soil from erosion. Besides, there is no occurrence of "Taungya" cultivation that can result in surface soil erosion.

Dry forests grow in the northeastern part of the township where water supply is not available. Than (Terminalia oliveri) and Dahat (Tectona hamiltoniana) trees are found around the Yeyaman Range. In the remaining portion, Thorn, Bushes, Sha (Acacia catechu), Thanakha (limonia acidissipma) and Htanaung (Acacia leueophtiea) are found. Creeper species can be found in this region.

4.2.3.6 Protected and Environmentally Sensitive Areas

In Kyaukse region have a lot of religious place pagodas and "Waibu Chaung" is famous meditation center and then cultural heritage of "Myin Zaing" ancient city where is fared about 2.82 km at west of Conch Cement Factory in Industrial Zone.

4.2.3.6.1 The Facts on the archaeological culture of Myin Zaing

Kyaukse district is filled with many evident concerned with Myanmar history and culture. Myin Zaing, and ancient city, is an ancient site from 1996 to 1998, the city gates and the king's palace sites ate excavated to reveal the fading urban culture and aesthetic culture.

4.2.3.6.2 Location and Area

An ancient capital Myin Zaing, is situated in Kyaukse Township, Mandalay Region. It is located 4 miles at south-east of Kyaukse and 96° 12' of east longitudes and 21° 30' of north latitudes.

The ancient capital Myin Zaing is different from others, and it has unique feature, and it comprises three rectangle wards. The city walls are related to each other. Three city walls are covered the city. The area of middle ward is 0.6 sq. mile, and it has moat. The east wall is 1980 feet long, the south is 3198 feet long and the north is 3000 feet long respectively.

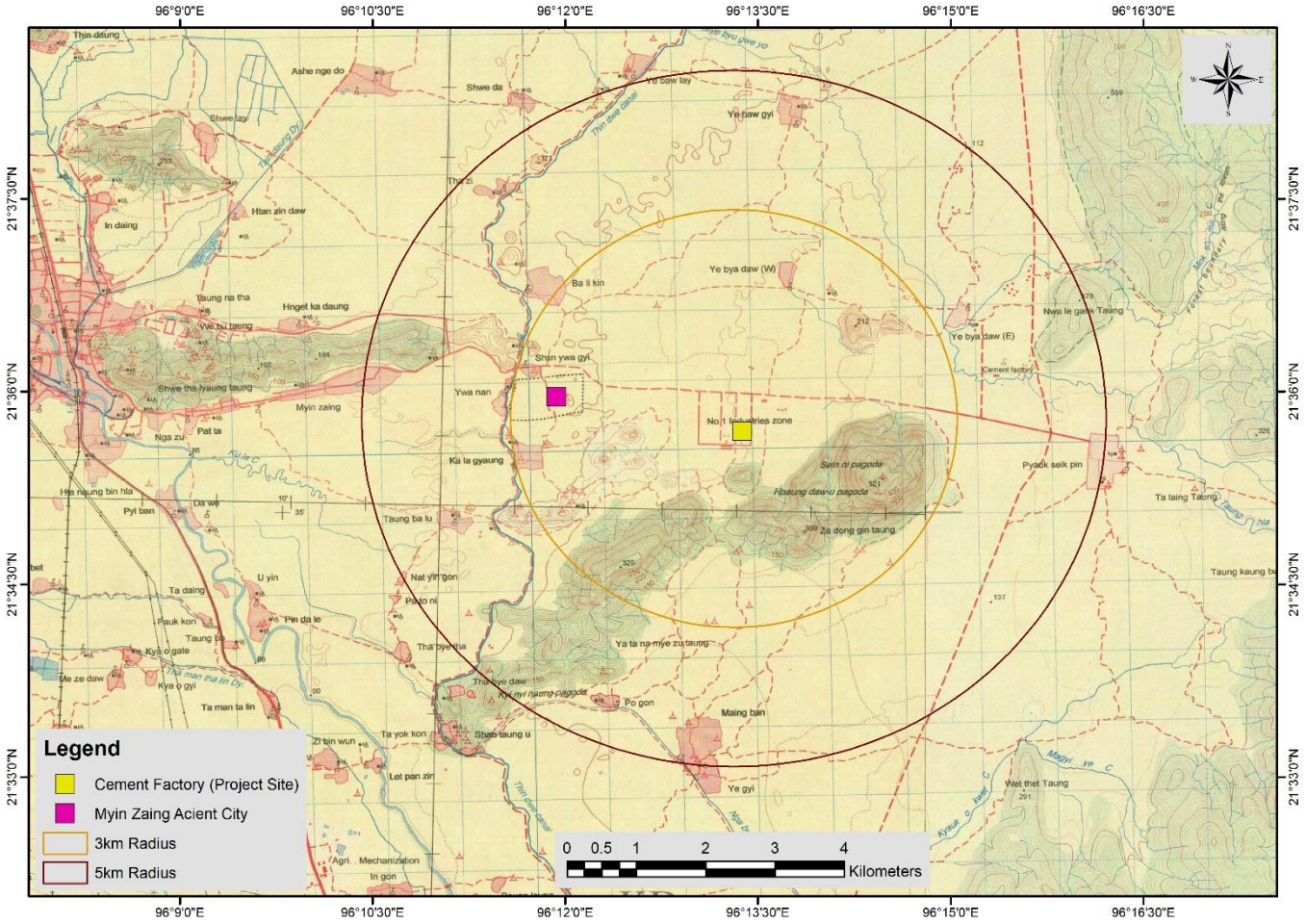


Figure 4-8 Location of Myin Zaing Ancient City and its Environment

4.2.3.6.3 Brief History

In 395 ME, the founder of the first Myanmar Empire, King Annuraddha had founded the 45 cities from Bamhaw, Kaung Sin, KaungTone to Yamethin and Swar so that chinese and Shan Yoon can't invade. The King had constructed these cities as the fortresses and Myin Zaing was one of them. In Kyaukse, King Anawratha had built nine descript (Lae Twin Koe Kha Yaing), seven dams and eleven villages.

Myin Zaing, Makkhara and Pinle, the city states, were ruled by three Shan brothers, Athinkhayar, Yarzathingyan, Thihathu, from 662 ME to 674 ME as rivals. After the Bagan King Thayokepyay (King Narathihapatae) had ruled, the glory of Bagan was faded and in 66 ME, Myin Zaing became a kingdom as a rival of Bagan. In Myin Zaing, Athinkhayar who is the eldest one among three Shan brothers and ruled the city was assassinated by his younger brother, Thihathu, the rules of Pinle. The city lasted for 12 years until 672 ME.

The plan of this ancient city is unique. The rampart in the middle is rectangular shape and at the southern east of the city, there is a stupa called Nan-Oo Pagoda. One can find the trace of rampart at the north and that of the stave, at the northern east.

4.2.3.6.4 The significant facts of the cultural heritage site

The vital facts in the cultural heritage site in Myin Zaing are the rampart and the city gates that stand prominently. The drain at the west of the rampart which is prescribed in literature and in history, the stone's inscription that we found, and the existence of Nan-Oo Pagoda are the essential facts. Using the bricks, concrete and stone can also be studied.

4.2.3.6.5 Soil

Two layers of soil have been found where soil was humid and less dense. During excavation, the first layer which is 6 inches' depth is brown and the second layer is black and humid.

4.2.3.6.6 Present State

As and agriculture, pea, corn, and sunflower are cultivated. We can find that there is no other business and no habitants.

4.2.4 Human Environment

The project area is in Kyaukse Township which is situated in Mandalay Region. Kyaukse Township is situated in the Dry Zone of Central Myanmar, within North latitudes 21° $26^{'}$ and 22° 2' and within East longitudes 95° $57^{'}$ and 96° $58^{'}$. The township has an area of 725.278 square miles (464,178 acres) which extends about 50 miles from east to west and about 25 miles from north to south. It has an east-west elongated shape. Kyaukse Township is bounded on the north and northeast by Pyin Oo Lwin Township, on the south and southeast by Yatsauk Township, on the south and southwest by Myittha Township, on the west by Tada-U Township, and on the north and northwest by Sintgaing Township. As natural boundaries, the Myitnge River serves on the north, the Shan Highland on the east, and the Samon and Panlaung Rivers on the west. The rest portion of the boundary line is demarcated by administrative rule.

Although the total area of the township is 464,178 acres (725.278 square miles). It is due to the discard of Yeyaman range and other no irrigable area. At present, it is composed of Kyaukse Town and 86 village tracts. Shown in (Figure 4.10, 4.11 and Table 4.1).

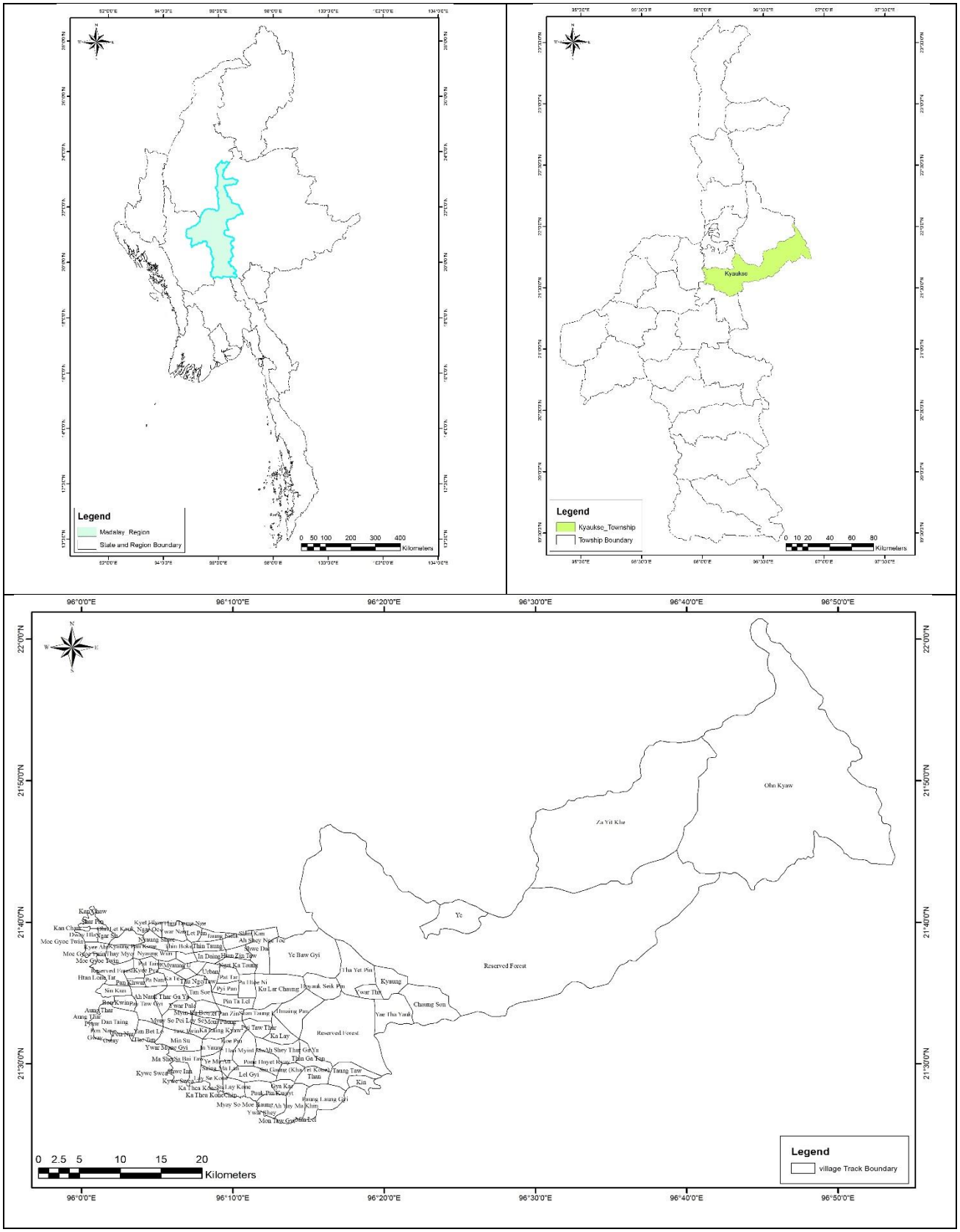


Figure 4-9 Location of Kyaukse Township, Mandalay Region

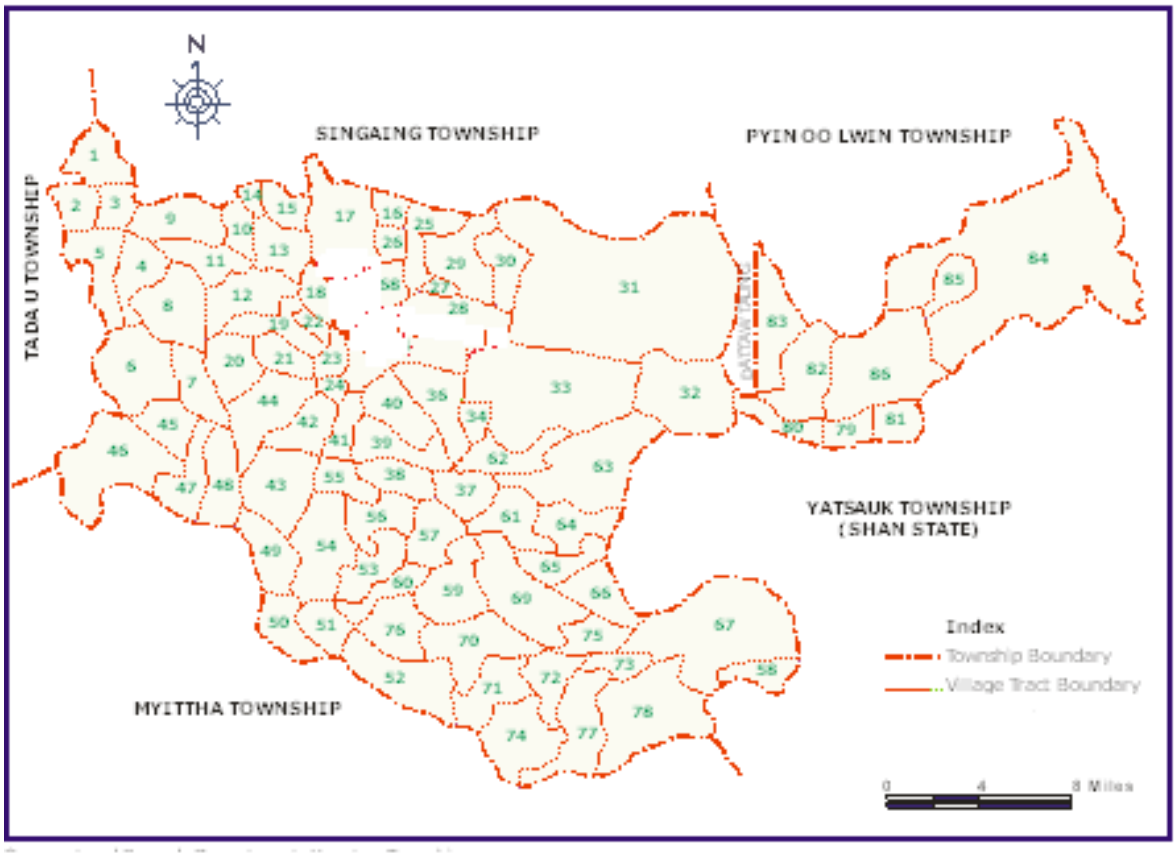


Figure 4-10 Village Tracts of Kyaukse Township

Table 4.1 Area of Wards and Village Tracts in Kyaukse Township (2014)

No.	Village Tracts	Area (Sq. mi.)
1	Kyaukse Town	1.74
2	Shabin	1.61
3	DweHhla	1.30
4	Ngarzu	1.47
5	Thinpyo	1.51
6	Kyeeik	3.35
7	Sinkun	3.70
8	Pankhwa	1.91
9	Kyipya	3.06
10	Kyaungpangon	2.16
11	Nyaungshwe	1.05
12	Nyaungwun	2.38
13	Puttaing	3.33
14	Thinpoke	1.99
15	Ngaroe	0.58
16	Ywanan	1.30
17	Taungnauk	1.22
18	Latpan	1.43
19	Zayatphyu	0.98
20	Myaung U	1.20
21	Panan	1.77
22	Kade	1.95
23	Latpanbin	0.49
24	Thangedaw	0.81
25	Tazoe	0.79
26	Indaing	3.17
27	Thindaung	1.91
28	Htanzintaw	0.40
29	Ngatkataung	3.93
30	East Ngedo	3.52
31	Shwedar	1.67
32	Yebawgyi	16.01
33	Phyaukseikpin	8.08
34	Kalarkyaung	10.07
35	Patoni	1.35
36	Patta	2.37
37	Pintale	2.17
38	Latpanzin	1.32
39	Monbaung	1.35
40	Thamantalin	1.89
41	Pyiban	1.28
42	Myinkabat	1.04
43	Ywapale	1.58
44	Myezopei	4.18
45	West Thagaya	3.37
46	Bongwin	1.95
47	Dantaing	6.51
48	Yanbatlo	2.30
49	Peitawgyi	3.11
50	Sabeitaw	2.53
51	Shwe-in	2.05
52	Layzegon	2.00
53	Sulegon	4.14
54	Inyaung	1.98
55	Minzu	3.45
56	Tawdwin	2.06
57	Kalaikyaw	2.40
58	Koebin	1.81
59	Kin	1.61
60	Hanmyintmo	1.96
61	Yema U	2.36
62	Pyidawtha	2.23
63	Shantaung U	2.51
64	Hmaingpan	1.94
65	Kalay	2.90
66	East Thagaya	1.28
67	Thingaton	1.77
68	Taungdaw	5.56
69	Mezeipin	0.78
70	Ponhyatgyi	3.94
71	Legyi	2.75
72	Paukpingwe	2.27
73	Kyarkar	2.80
74	Khatatgon	0.98
75	Myezomogaung	3.32
76	Thanywa	3.72
77	Saimalan	1.66
78	Pekhin	3.53
79	Paunglaung	5.11
80	Ywathit	0.53
81	Yethayauk	0.70
82	Chaungzon	0.71
83	Yeywa	26.51
84	Thayetpin	25.67
85	Ohnkyaw	355.00
86	Zayitkhe	78.47
87	Kyaungywa	26.67
	Township	**725.28**

Source : Immigration and Man-Power Department, Kyaukse.

4.2.4.1 History of Kyaukse Township

Traditionally, Kyaukse Area was recognized as the origin of Myanmar national power. All the earliest Myanmar dynasties in Upper Myanmar were based upon Kyaukse Area as their powerful hinterland. In these days the lower Myanmar was dominated by Mon nationals as the rivalries of Myanmar Kings based upon Hantharwady (now Bago) Kingdom. These Mon Kingdoms were finally conquered by Myanmar Kings. The first Myanmar nation which was founded by King Anawrahta was centred in Bagan. As the king realized the importance of food in the political power he managed for the development of agriculture in the Central Myanmar by means of constructing an irrigation network. A series of dams were constructed across the rivers of the Zawgyi and the Panlaung in Kyaukse area and when a dam was constructed near the village of Kyauk (meaning stone) it was named Kyaukse (se is dam in Myanmar meaning). When other villages were combined with kyauk village, the village became to be named Kyaukse village, and later it grew to the size of a town. Later Myanmar dynasties of Inwa and Konbaung also relied upon Kyaukse area as their political power base and the area developed in its socio-economy with the passage of time. In fact, the advantage of Kyaukse is strongly related with its locational factors that the location in a flat plain at the foothill area of Shan Highlands which provide good conditions for the development of a drainage network and fertile soils. The area's centrality is also important for easy access to various parts of Myanmar. Moreover, Kyaukse area became a refuge for war victims during the reign of ancient Myanmar kings. The immigration of various ethnic nationals from various parts of Myanmar is also responsible for the socio-economic development of Kyaukse area.

In any case, Kyaukse area was developed as a distinct region during the period of Bagan Dynasty, an important area for Central Myanmar and upper Myanmar as a rice bowl, and as transportation nodal point to lower Myanmar, Shan State and event to Thailand.

4.2.4.2 Demography of Kyaukse Township

As human beings are solely responsible for the socio economy of all regions, the characteristics of human population become the basis for understanding the socio economic conditions of a particular region. Population number, population growth, population distribution and density, ethnic composition and believes are the major factors for the socio economic development of all regions.

The urban area of Kyaukse Town has the largest population number with 39,925 persons and village tracts with large population number include Bongwin, Sulaygone, Letpan, Yebawgyi, Thanywa, Phyaukseikpin, Pankhwarr, Dantaing, Letpanzin and Minzu - all these areas are located in the fertile alluvial plain with easy access to other village tracts in the township. The areas in the foothill of Shan Highlands, the area with difficulty in transportation away from the main transportation routes and areas with difficulties in obtaining water and in agricultural production are usually sparsely populated and they have population densities under 200 persons per square mile. (Table 4.2)

Population density of Kyaukse Township is about 340 persons per square mile. However, the population density varies with the population number and areas of village tracts in Kyaukse Township. Therefore, the highest population density is found in Kyaukse Town with about 22,999 persons per square miles whereas the lowest population density is found in Ohnkyaw village with about 3 persons per square miles. This figure indicates variations in socio economies of different areas due to variations in land utilization and land cover.

Table 4.2 Total Population of Kyaukse Township

No.	Village Tracts	Male	Female	Total	Area	Density (Person per Sq.mi.)
1	Kyaukse Town	19420	20505	39925	1.74	22945
2	Shabin	761	762	1523	1.61	946
3	DweHhla	671	672	1343	1.30	1033
4	Ngarzu	160	161	321	1.47	218
5	Thinpyo	387	388	775	1.51	513
6	Kyeeik	1288	1288	2576	3.35	769
7	Sinkun	2104	1592	3696	3.70	999
8	Pankhwa	1127	1094	2221	1.91	1163
9	Kyipya	872	917	1789	3.06	585
10	Kyaungpangon	670	667	1337	2.16	619
11	Nyaungshwe	607	609	1216	1.05	1158
12	Nyaungwun	1037	1033	2070	2.38	870
13	Puttaing	1410	1010	2420	3.33	727
14	Thinpoke	1507	1522	3029	1.99	1522
15	Ngaroe	551	551	1102	0.58	1900
16	Ywanan	371	379	750	1.30	577
17	Taungnauk	829	758	1587	1.22	1301
18	Latpan	5531	5571	11102	1.43	7764
19	Zayatphyu	559	559	1118	0.98	1141
20	Myaung U	665	660	1325	1.20	1104
21	Panan	875	1006	1881	1.77	1063
22	Kade	1104	1111	2215	1.95	1136
23	Latpanbin	471	472	943	0.49	1924
24	Thangedaw	486	504	990	0.81	1222
25	Tazoe	784	789	1573	0.79	1991
26	Indaing	2194	2219	4413	3.17	1392
27	Thindaung	1369	1425	2794	1.91	1463
28	Htanzintaw	615	613	1228	0.40	3070
29	Ngatkataung	940	986	1926	3.93	490
30	East Ngedo	1823	1826	3649	3.52	1037

31	Shwedar	858	859	1717	1.67	1028
32	Yebawgyi	3149	3159	6308	16.01	394
33	Phyaukseikpin	2794	2797	5591	8.08	692
34	Kalarkyaung	1637	1680	3317	10.07	329
35	Patoni	889	865	1754	1.35	1299
36	Patta	2735	2976	5711	2.37	2410
37	Pintale	1185	1311	2496	2.17	1150
38	Latpanzin	1248	1376	2624	1.32	1988
39	Monbaung	962	1060	2022	1.35	1498
40	Thamantalin	760	847	1607	1.89	850
41	Pyiban	760	861	1621	1.28	1266
42	Myinkabat	327	328	655	1.04	630
43	Ywapale	775	786	1561	1.58	988
44	Myezopei	863	861	1724	4.18	412
45	West Thagaya	1044	1141	2185	3.37	648
46	Bongwin	841	923	1764	1.95	905
47	Dantaing	1837	2085	3922	6.51	602
48	Yanbatlo	540	626	1166	2.30	507
49	Peitawgyi	1246	1441	2687	3.11	864
50	Sabeitaw	1226	1227	2453	2.53	970
51	Shwe-in	551	554	1105	2.05	539
52	Layzegon	1087	1084	2171	2.00	1086
53	Sulegon	6319	6605	12924	4.14	3122
54	Inyaung	1180	1207	2387	1.98	1206
55	Minzu	1699	1785	3484	3.45	1010
56	Tawdwin	1042	1047	2089	2.06	1014
57	Kalaikyaw	1138	1398	2536	2.40	1057
58	Koebin	1611	1760	3371	1.81	1862
59	Kin	2160	2219	4379	1.61	2720
60	Hanmyintmo	1720	1790	3510	1.96	1791
61	Yema U	436	469	905	2.36	383
62	Pyidawtha	1169	1197	2366	2.23	1061
63	Shantaung U	710	728	1438	2.51	573
64	Hmaingpan	1482	1519	3001	1.94	1547
65	Kalay	727	734	1461	2.90	504
66	East Thagaya	884	855	1739	1.28	1359
67	Thingaton	700	726	1426	1.77	806
68	Taungdaw	1324	1326	2650	5.56	477
69	Mezeipin	277	280	557	0.78	714

70	Ponhyatgyi	398	403	801	3.94	203
71	Legyi	1591	1544	3135	2.75	1140
72	Paukpingwe	826	927	1753	2.27	772
73	Kyarkar	771	778	1549	2.80	553
74	Khatatgon	1637	1641	3278	0.98	3345
75	Myezomogaung	1975	1975	3950	3.32	1190
76	Thanywa	3279	3287	6566	3.72	1765
77	Saimalan	847	851	1698	1.66	1023
78	Pekhin	625	661	1286	3.53	364
79	Paunglaung	1310	1308	2618	5.11	512
80	Ywathit	420	438	858	0.53	1619
81	Yethayauk	518	517	1035	0.70	1479
82	Chaungzon	792	778	1570	0.71	2211
83	Yeywa	320	323	643	26.51	24
84	Thayetpin	2020	2020	4040	25.67	157
85	Ohnkyaw	405	405	810	355.00	2
86	Zayitkhe	164	153	317	78.47	4
87	Kyaungywa	715	715	1430	26.67	54
Township		121369	124865	246558	725.28	340

4.2.4.3 Economic Condition of Kyaukse Township

As revealed in the previous sector various economic activities of Kyaukse Township include agriculture, manufacturing, servicing and governmental office works. However, it is also necessary to analyze the land use and land cover types of Kyaukse Township for better understanding of the socio-economic conditions of the local people and the township.

Agricultural Activities

Under present conditions, the agricultural land use is the dominant land use type in Kyaukse Township and majority of the people has to live in rural areas and rely upon agriculture as their principal mean of living. According to the Myanmar tradition, agriculture is performed mainly on the family subsistence basis and the paddy is the dominant crop as the staple food of the nation. After harvesting paddy, another crop is usually grown as a second crop in winter. Moreover, the farmer used to raise oxen as draught animal and a small number of other animals for home consumption. These animals require little care and live on the agricultural wastes. Moreover, the animals can be sold in local markets to resolve the financial difficulties. Therefore, the traditional agriculture of Myanmar is only the subsistence type of agriculture and the farmers cannot gain great benefit from their farmlands for they usually possess a few acres of lands.

These conditions still prevail in the country although there were much agricultural reforms in the country since the colonial period. After independence of the country, due to the influence of socialism, the government enacted that the agricultural lands were the state owned and the farmers have only the right for cultivating the existing crop lands. As the growth of feudalism was undesirable for the rural people land ownership was also restricted to a few numbers of acres. Under central planned economy, the conditions become even worse for the farmers for they have to cultivate only those crops directed by the state government and the output crops have to be sold to the government at the restricted prices. When the climatic conditions were favourable for crop production, the farmers did not meet with great difficulties. However, when the crop failures were met for some reasons, they always met with great difficulties for they had to purchase the crop at higher prices from the private traders to resell the crops at lower prices to the government which assessed the amount of output and which ordered to sell the limited amount of output crop to it. These problems were also suffered by the people of Kyaukse Township and they caused lower socio-economic status of the majority of rural population.

After economic liberalization in 1988, the state government permitted freedom to the farmers and the farmers could grow their desired crops. Moreover, the government supplied the farmers to uplift the agricultural sector of the country and to raise up agricultural production. A series of dams and canal networks were constructed throughout the whole nation wherever the conditions are favorable, agricultural loans were supplied to the farmers at lower interest rates and the agricultural technologies were distributed to the farmers by the state government through the Department of Myanmar agricultural Service. As the high yield varieties are always tested and distributed by Myanmar Agricultural Service, the crops yields have increased than ever before.

Still being agro-based economy, the country of Myanmar is striving for its economic development relying upon agricultural sector. To ensure crop cultivation and productivity, measures for obtaining irrigation water are carried out by the state government.

In the study area, Kyaukse Township, agriculture can be carried out in the whole year in the flat plain areas with the help of irrigation, particularly from the dams constructed across the Zawgyi and Panlaung rivers by the ancient Myanmar Kings. After 1988, the existing dams were renovated and the new Zawgyi dam was constructed by the state government. As a result, the cultivated area and crop output of Kyaukse Township greatly increased and the economic conditions of the rural population have greatly developed which in turn brings about the development in social conditions. Larger villages, new large houses in contrast to traditional bamboo houses and thatched huts, television sets, motor-cycles, cars, tractors, farm machines, renovated pagodas, monasteries, schools, etc, are the evidences of socio- economic development of local people.

For agricultural modernization and mechanization, the government has built an agricultural machinery factory at Ingone village in Kyaukse Township and the factory produces and distributes power tillers and other farm implements. In Kyaukse Township there is no village tract that does not use agricultural machines, particularly the hand power machines and thrusters with the exception of some village tracts in the Ye-Yaman range area.

With the changing socio-economic conditions, the types of cultivated crops by the farmers have also changed although the paddy remains as the dominant crop. The farmers used to cultivate the crop to sell rather than for home consumption. As some crops can be exported to foreign markets and can earn high income, the farmers prefer to grow these crops. However, as the price conditions are not stable, there also occurred economic difficulties in the farmers even if the crop productions are high. Therefore, the state government also tried to supply the farmers with the market information and guide the farmers to grow ten major crops including paddy, cotton, sugarcane, various kinds of pulses, oil seed crops, corn, vegetables, kitchen use crops, perennial fruit crops and other crops.

According to the data there are 75,750 acres of paddy cultivated area in Kyaukse Township in 2009. This area includes 60,514 acres of monsoon paddy and 15,336 acres of summer paddy which is grown only with the irrigation water supply. The production of paddy is 8,224,035 baskets with an acreage yield of about 109 baskets per acre.

The production of other crops include the sown area of 62,806 acres of pulses with the output of 805,635 baskets, oil seed crop sown area of 83,081 acres and output of 1,733,379 baskets, cotton sown area of 21,000 acres and output of 6,870,907 viss and other crops including vegetables, perennial fruit tree cultivated area of 23,234 acres. In recent years the perennial fruit crops of the township become popular in foreign markets especially in China and sown area is increasing year by year. Seintalon variety of mango from Kyaukse Township now possesses an extensive market in the country and in China. As a result, there is a need for promotion of crop production in Kyaukse Township for the economic development of the cultivators and the township.

General Land use

Generally, the official data of the government office used to classify the various landuse into 4 classes as:

1. Agricultural lands
2. Forest lands
3. Cultivable virgin lands and
4. Uncultivable lands

Agricultural Lands

According to the office data, there are 113,166 acres of agriculture lands in Kyaukse Township in 2009. The area of these agricultural lands forms about 24.38% of total township area. In Kyaukse Township most of the agricultural lands are used primarily for cultivation of paddy, Ya crops and garden crops. Paddy is chiefly cultivated in Le lands while Ya crops and garden crops are grown in Ya lands and garden lands. In 2009 there are 65,686 acres of le lands, 46,239 acres of Ya lands and 1,241 acres of garden lands in Kyaukse Township. The areas of these lands constitute about 14.05%, 9.96 % and 0.27 % of the total township area.

The forest land area is demarcated and administered by Forest Department since the colonial period. Due to forest and environmental conservation policies of this department the authorized forest area has never changed and land use changes in forest areas due to population pressure and profitable agricultural production are limited as illegal actions. According to the data there are 263,083 acres of forest area (56.68% of total area) in Kyaukse Township. These forest areas include 255,972 acres of reserved forests and 7,111 acres of unreserved forests. The unreserved forests area is now recognized as the cultivable virgin lands by Land Records Department.

The uncultivable lands include urban and village lands, transportation lands, pasture lands and under water lands. In 2009, the area of uncultivable lands is 87,929 acres and it forms about 18.94% of total township area. Although the proportion of the uncultivated area is small in total area of Kyaukse Township most of the socio-economic activities are performed in these lands and it directly influences upon the socio-economy of the township. Therefore, it can be deduced that the investments in the development of uncultivated lands can bring about the socio-economic development of Kyaukse Township under the systematic land use planning and implementation. (Table 4.3)

Table 4.3 General Land Use of Kyaukse Township

Sr. No.	Year	Agricultural Land (in acre)	Forest Land (in acre)	Uncultivated Lands (in acre)
1	1988	108707	263083	92388
2	2005	112732	263083	88363
3	2009	113166	263083	87929

Source : Land Records Department, Kyaukse Township

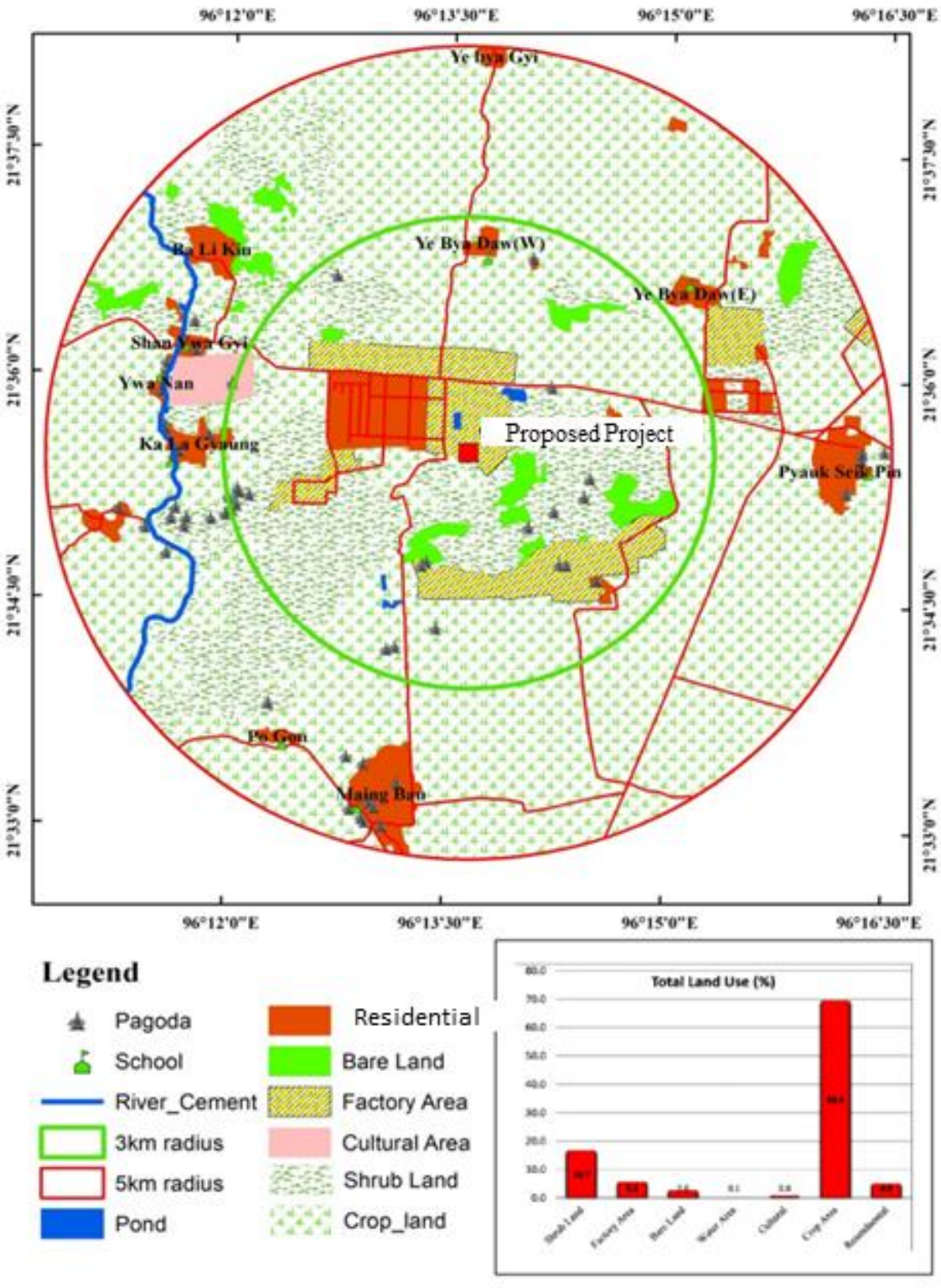


Figure 4-11 Land Use Map of the Cement Plant and Surrounding Environment

4.2.4.4 Education Status and Health in Kyaukse Township

4.2.4.4.1 Education Status

Traditionally, monastic education is the principle mean to educate the people. School education was started only in the colonial period and schools were opened in the towns and some major village tracts. However, the colonial education did not cover the whole population and this condition has continued till the period of central planned economy from 1962 to 1988. During socialist period the state gained political and regional stability and the government could perform education commitments for the people. In Kyaukse Township, however, only basic education schools can be opened in the village tracts and the people have to rely upon Mandalay for higher education. After 1988, regional development works were encouraged by the state government and the government used an increasing amount of financial cost in education sector. New schools were opened the existing ones were upgraded and renovated and new colleges universities and professional colleges were opened throughout the whole country while more number of teachers was appointed and refresher courses for the teachers were opened every year. Not only has the state used financial costs in education sector but it also has encouraged the private sector to share the costs in education sector. As a result, teacher parents associations were formed in every school and financial assistance from the well-wishers were kept as education funds.

As a result of national education standard promotion plan, new schools and a college could be opened in Kyaukse Township and more number of teachers and students were found in the schools every year. At present there are one technical college in Kyaukse Town in the higher education sector and 7 high schools, 8 middle schools and 161 primary schools with a total of 171 schools, in basic education sector of the township. Moreover, there are 939 teachers and 33,420 students in these schools which gives a high teacher student ratio of 1:32 (Table 4.4).

Table 4.4 Education of Kyaukse Township

No.	Type	No. of Schools	Teacher in person	Student in person
1	Technical College	1	222	3760
2	Highschool	7	327	10488
3	Middle Schools	8	138	4485
4	Primary Schools	161	474	14687
Township Total		**177**	**1161**	**33420**

Source: Immigration & Man Power Department, Kyaukse.

4.2.4.4.2 Health Condition

Healthcare is a basic requirement for the socio-economic development. There is one Township Hospital and 3 Station Hospitals in Kyaukse Township. In rural area, there are 5 Rural Healthcare Centres. These hospitals and rural healthcare centres provide health sector of Kyaukse Township. In these hospitals and healthcare centres, 62 doctors and 78 nurses were appointed in 2009. (Table 4.5)

Table 4.5 Healthcare Centre Condition of Kyaukse Township

No.	Type	No. of Public Health Care Centre	Health Manpower
1	Township Hospital	1	-
2	Station Hospital	3	-
3	Rural Health Centre	5	-
4	Dispensaries	29	62
5	Doctors	-	78
6	Nurses	-	
Township Total		**38**	**140**

Source: Immigration & Manpower Department Kyaukse

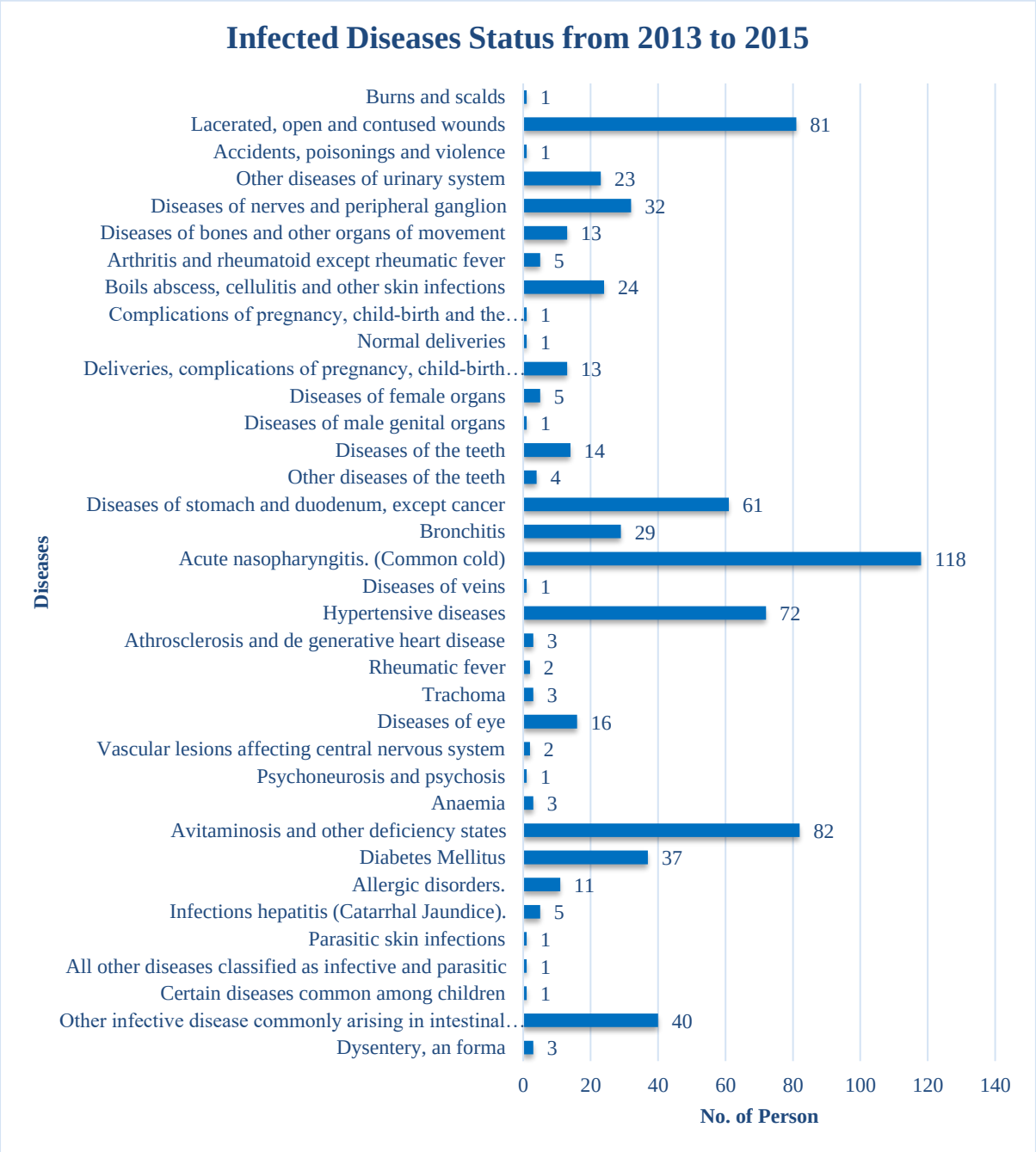
Table 4.6 Medical & Health Service Condition of Affected Villages

No.	Type	No. of Public Health Care Centre	Health Manpower
1	Rural Health Centre	2	-
2	Sub-Centers	2	-
3	Doctors	-	1
4	Nurses	-	1
5	Midwife	-	1
Total		**4**	

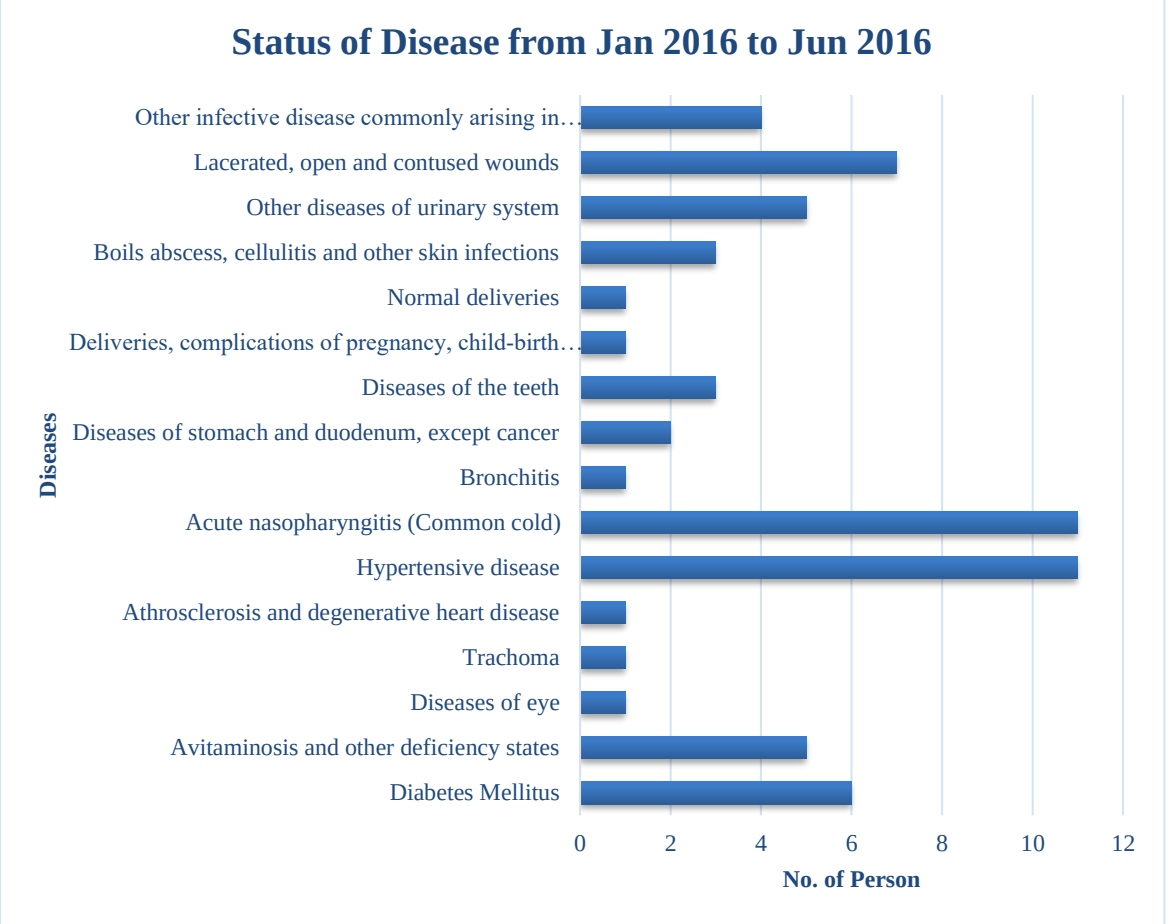
Table 4.7 Medical & Health Service Condition of Industrial Zone

No.	Medical Resource	No. of Public Health Care Centre	Health Manpower
1	Hospital	1	-
2	Doctor	-	1
3	Nurse	-	1
4	Midwife	-	2
Total		**1**	**4**

Status of Infected Disease from 2013 to 2015



Status of Infected Disease from Jan 2016 to June 2016



Mortality and Morbidity

According to township profile, Malaria, diarrhea, TB, dysentery, and hepatitis are mostly occurred and the rate of mortality and morbidity can be seen as follows.

Table 4.8 Mortality and Morbidity Rate

No	Township	Kind of disease									
		Malaria		Diarrhea		TB		Dysentery		Hepatitis	
		Occur	Expire	Occur	Expire	Occur	Expire	Occur	Expire	Occur	Expire
1	Kyaukse Township	16	-	256	4	276	30	739	1	116	1
Total		16	-	256	4	276	30	739	1	116	1

4.2.4.5 Transportation of Kyaukse Township

Kyaukse, once being only a small town on Yangon and Mandalay rail road and road system was served only by low quality roads in intra-township transportation. Most of the roads were earthen roads and the people used to travel from one village to another on foot or by bullock carts before 1988. The major roads before 1988 include Kyaukse-Tada U road, Kyaukse-Myotha road and Kyaukse-Ywangan road. Most of these roads are only metaled roads and they have difficulties for travel in the rainy season. Therefore, the rural people have to use a lot of time to travel from their villages to other major cities. This condition had constrained the people to rely upon Mandalay City to obtain their required service and trade and the commodity flow had always directed to Mandalay City. Moreover, there were only a few number of passenger buses between Kyaukse and Mandalay and it lead to the lower transportation facilities and lower economic status of the rural population.

After 1988, regional development tasks were implemented in Kyaukse Township and development of road system was specifically carried out; new roads were constructed, the existing ones were upgraded, the bridges were constructed across the rivers and streams and the numbers of passenger busses were increased. Among them the construction of the district circular road and bridges across the Zawgyi River brought about fast and smooth transportation for the rural people. The upgrading of Kyaukse-Ywangan road into all season tar-road has also promoted the passenger and commodity flow between Mandalay Region and Southern Shan State. With the development of transportation, people can directly transport their products to Mandalay Market and they can enjoy much greater economic benefits when compared to the conditions, they have to rely upon local brokers to sell their products. Faster transportation make the rural area to gain easy access to Mandalay City, the largest commercial and transportation centre in Upper Myanmar and the people can be able to use everyday facilities as Mandalay citizens. The development of road transportation is also related to the establishment of state owned industries in the east of Kyaukse and nowadays every villager in the eastern portion of Kyaukse Township can travel to Mandalay city in a few hours and from there can continue to any destination throughout the whole country. With the upgrading and extension of the roads, more efficient vehicles for heavy load can be used in daily transportation in Kyaukse Township and this could reduce time, cost and labour while providing faster commodity flow.

4.3 Environmental Baseline Condition

The environment of project area and its environment were surveyed in physical environment, ecological environment, and socio-economic environment.

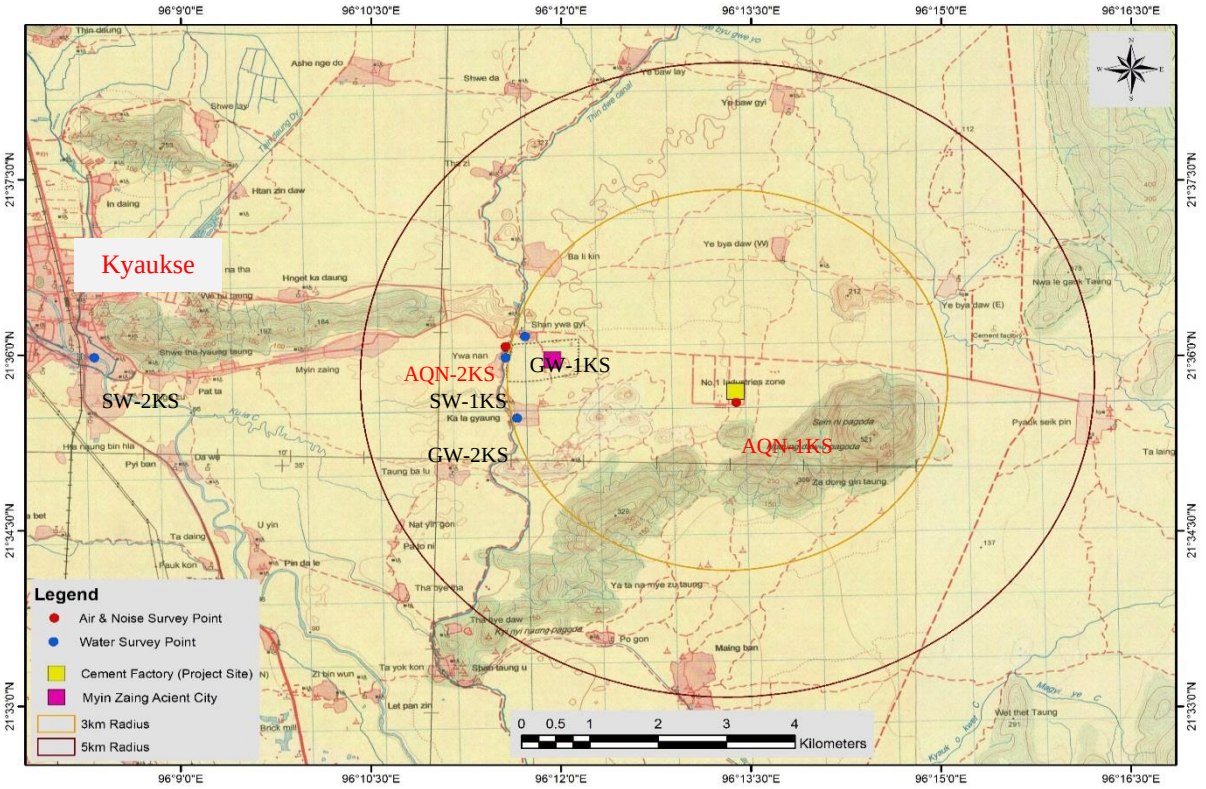


Figure 4-12 Environmental Baseline Data Sampling Points

4.3.1 Water Quality

Thindwe Cannal which is surface water resources is 4.2 km far from the project area and Shan Ywar Gyi Village which has underground water usage is situated 4 km away from the project area. Surface/ underground water usage is not found within the project area.

4.3.1.1 Survey Item

Parameters for water quality survey are determined by referring to the parameters of Country's Standard (National Environmental Quality (Emission) General Guideline) as described in Table 4.6. As for 1 sampling point for drinking water quality including ground water level measuring, and 1 point for surface water in small artificial drainage were measured.

Table 4.9 Survey Parameters for Water Quality Survey

No.	Parameter	Unit	Country's Standard (National Environmental Quality (Emission) General Guideline) µg/m^3
1	Temperature	^oC	-
2	pH	-	6.0~9.0
3	DO	mg/L	-
4	EC	µS/cm	-
5	Total Dissolved Solid	ppm	-
6	Salinity	%	-
7	Colour	-	-
8	Total phosphorous	mg/l	2
9	Total Suspended Solid	mg/l	50
10	Total nitrogen	mg/l	10
11	Oil & grease	Mg/l	10
12	E.Coliform	-	-
13	Total coliform	100 ml	400
14	BOD5	mg/l	50
15	COD	mg/l	250
16	Total Hardness	mg/l	-
17	Total Alkalinity	mg/l	-

4.3.1.2 Survey Location

The detail of each sampling points is described in Table 4.10 and Figure 4-13.

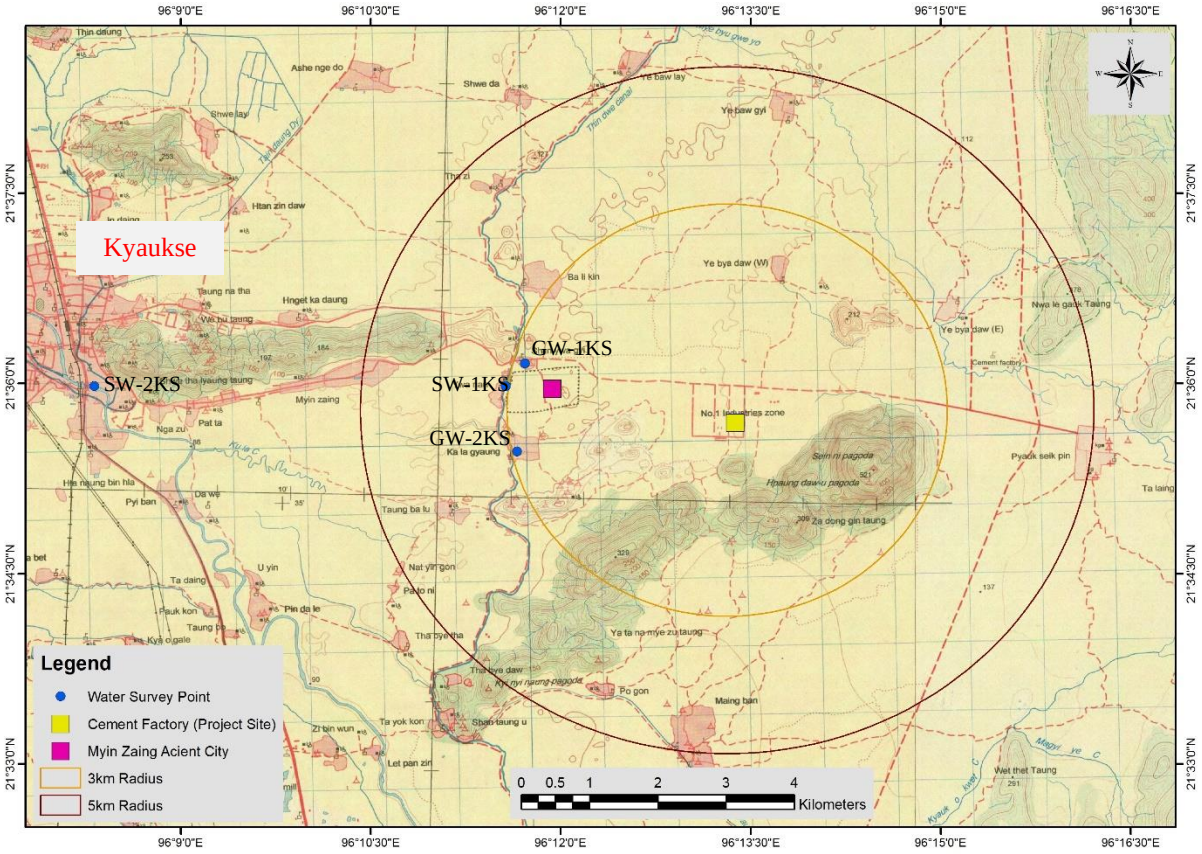


Figure 4-13 The locations of the surface and underground water sampling points

Table 4.10 Sampling Points for Water Quality Survey

Category	Sampling Point	Coordinates	Description of Sampling Point
Surface Water	SW-1KS	21° 36' 6.90" N 96° 11' 36.80" E	At the Thintwe Canal, south of Shan Ywar Gyi village, Kyaukse Township
Surface Water	SW-2KS	21° 36' 5.10" N 96° 8' 4.40" E	At the Zawgyi River, the southern part of Kyaukse Town
Ground Water	GW-1KS	21° 36' 9.63" N 96° 11' 35.06" E	At the west of Shan Ywar Gyi Village, Kyaukse Townhsip
Ground Water	GW-2SK	21° 35' 37.31" N 96° 11' 36.95" E	At the north of Ka La Gyaung Village, Kyaukse Township

SW- 1KS

SW-1KS was collected and measured from the Thindwe canal, south of Shan Ywar Gyi village, Kyaukse Township. The canal with medium turbidity is purposely used for agriculture. The location of SW-1KS is as shown in Figure 4-14.

Figure 4-14 Location of SW-1KS

SW- 2KS

The location was surveyed at the Zawgyi River in south of Kyaukse Town. The water from this river is purposely used as agriculture. The location of SW-2KS is as shown in Figure 4-15.

Figure 4-15 Location of SW-2KS

GW-1KS

GW-1KS was collected from the tube well located at the west of Shan Ywar Gyi village, Kyaukse Township. The tube well is about 30 m depth from the ground surface with fairly high transparency. The water is utilized for washing and orchard plantation. The location of GW-1KS is as shown in Figure 4-16.


Figure 4-16 Location of GW-1KS

GW-2KS

The sampling point was surveyed from the tube well where is situated at the Ka Lay Gyaung village, Kyaukse Township. The water level of this tube well is about 4 m from the ground surface. The tube well is utilized only for washing purpose. The location of GW-2KS is as shown in Figure. 4-17.


Figure 4-17 Location of GW-2KS

4.3.1.3 Survey Period

Water quality surveys were conducted as one day for two underground water and two surface water sampling points on 21st December, 2014.

4.3.1.4 Survey Method

Water samples were taken by Alpha horizontal water sampler and collected in sterilized sample containers. All sampling was in strict accordance with recognized standard procedures. The parameters pH, temperature, dissolved oxygen (DO), electrical conductivity (EC), were measured at each site concurrently with sample collection. All samples were kept in iced boxes and were transported to the laboratory and stored at 2-4°C refrigerators.

Table 4.11 Field Equipment for Water Quality Survey

No.	Equipment	Manufacturer	Originate Country	Model
1	pH meter	HANNA	USA	HI7609829-1 pH Sensor
2	DO meter	HANNA	USA	HI7609829-2
3	Alpha Bottle (Water Sampler)	Wildlife Supply Company®	Indonesia	-

Table 4.12 Container and Preservation Method for Water Samples

No	**Parameter**	**Container**	**Preservation**
1	COD	500 ml plastic bottle	Sulfuric acid, Refrigerate
2	BOD_5	1,800 ml plastic bottle	Refrigerate
3	Heavy metals	500 ml plastic bottle	HNO_3 Refrigerate
4	TOC	300 ml glass bottle (incubate)	H2SO4, Refrigerate
5	Bacteria	200 ml glass bottle (Sterilize)	Refrigerate
6	Others	1,800 ml polyethylene bottle	Refrigerate

The following table provides the test method for water quality.

Table 4.13 Analysis Method for Water Samples

No	**Item**	**Analysis method**
1	pH	HI7609829-1 pH Sensor
2	Turbidity	HI7609829-2 Turbidity Sensor
3	Suspended Solids	Gravimetric method
4	Dissolved oxygen（DO）	HI7609829-2 Galvanic dissolved oxygen (DO) sensor
5	Chemical oxygen demand(COD)	Dichromate method
6	Biochemical oxygen demand(BOD5)	Direct inoculation method
7	EC	HI7609829-1 EC Sensor
8	Coli Group	AOAC Petrifilm Method

9	Ammonium nitrogen (NH4-N)	The nash reagent photometric method
10	Nitrate Nitrogen (NO3-N)	Hanna HI 83200 Multiparameter Bench Photometer
11	Nitrite Nitrogen	Kjeldahl Distillation Method
12	Total nitrogen	Kjeldahl Distillation Method
13	Total Phosphours	Molybdenum antimony anti-spectrophotometric method
14	Copper (Cu) (mg/l)	Hanna HI 83200 Multiparameter Bench Photometer
15	Zinc (Zn) (mg/l)	Hanna HI 83200 Multiparameter Bench Photometer
16	Cadmium (Cd) (mg/l)	AAS – Graphite Furnace Method
17	Lead (Pb) (mg/l)	AAS – Graphite Furnace Method
18	Mercury (Hg) (mg/l)	AAS – Graphite Hydride Method
19	Nickel (Ni) (mg/l)	Hanna HI 83200 Multiparameter Bench Photometer
20	Chromium (Cr) (mg/l)	Hanna HI 83200 Multiparameter Bench Photometer
21	Arsenic	As Arsenic Test (highly sensitive) Test kit

Water samples were sent to the Department of Irrigation, Myanmar Environment Institute and SGS's laboratory in Myanmar.

4.3.1.5 Survey Result

The results of water samples were shown in Table 4.14. Detailed lab result certificates are shown in Appendix 3.

Table 4.14 Water quality results

No.	Sample No./Physical Parameter	SW-1KS	SW-2KS	GW-1KS	GW-KS	Unit	EQEG (Myanmar)
1	Temperature _Atm.	32.70	32.10	26.40	31.70	°C	-
2	Temperature – Water	22.91	24.09	24.28	26.59	°C	-
3	pH	7.58	7.62	6.80	7.52	-	6.0~9.0
4	DO	7.82	7.83	7.47	4.33	mg/l	-
5	EC	342.8	368.5	915.5	1257.8	µs/cm	-
6	TDS	231.34	242.77	601.88	793.4	ppm	-
7	Salinity	0.2	0.2	0.5	0.6	%	-
8	Colour	5	Nil	Nil	Nil	mg/l	-
9	Total Phosphorus	0.06	0.05	ND	ND	mg/l	2
10	Total Suspended Solid	65	37	9	8	mg/l	50
11	Total Nitrogen	ND	ND	ND	ND	mg/l	10
12	Oil and grease	ND	ND	2.3	ND	mg/l	10
13	E.Coliform	3	2	ND	ND	cfu/ml	-
14	Total Coliform	1.5×10^1	2×10^1	1	ND	100 ml	400
15	BOD5	7	6	6	9	mg/l	50
16	COD	32	32	32	32	mg/l	250
17	Total Hardness	183	192	320	423	mg/l	-
18	Total Alkalinity	176	191	141	444	mg/l	-

4.3.2 Air Quality

Survey Item

Parameters for air quality survey were determined by referring Country's Standard (National Environmental Quality (Emission) General Guideline) and IFC as shown in Table 4.15.

Table 4.15 Survey Parameters for Air Quality

No.	Item	Unit	Country's Standard (National Environmental Quality (Emission) General Guideline) µg/m³	Target value to be applied IFC EHS General Guideline (WHO) µg/m3
1	Nitrogen dioxides (NO_2)	µg/m³	200 (1 hour)	200 (1 hour)
2	Sulfur dioxide (SO_2)	µg/m³	20 (24 hour)	125 (Interim target-1) 50 (Interim target-2) 20 (guideline) (24-hour)
3	Carbon monoxide (CO)	mg/m³	No Guideline	No Guideline
4	Particle matter 2.5 (PM2.5)	µg/m³	25 (24 hour)	75 (Interim target-1) 50 (Interim target-2) 37.5 (Interim target-3) 25 (guideline) (24-hour)
5	Particle matter 10 (PM10)	µg/m³	50 (24 hour)	150 (Interim target-1) 100 (Interim target-2) 75 (Interim target-3) 50 (guideline) (24-hour)

4.3.2.1 Survey Location

The air quality monitoring survey was carried out in during field survey.

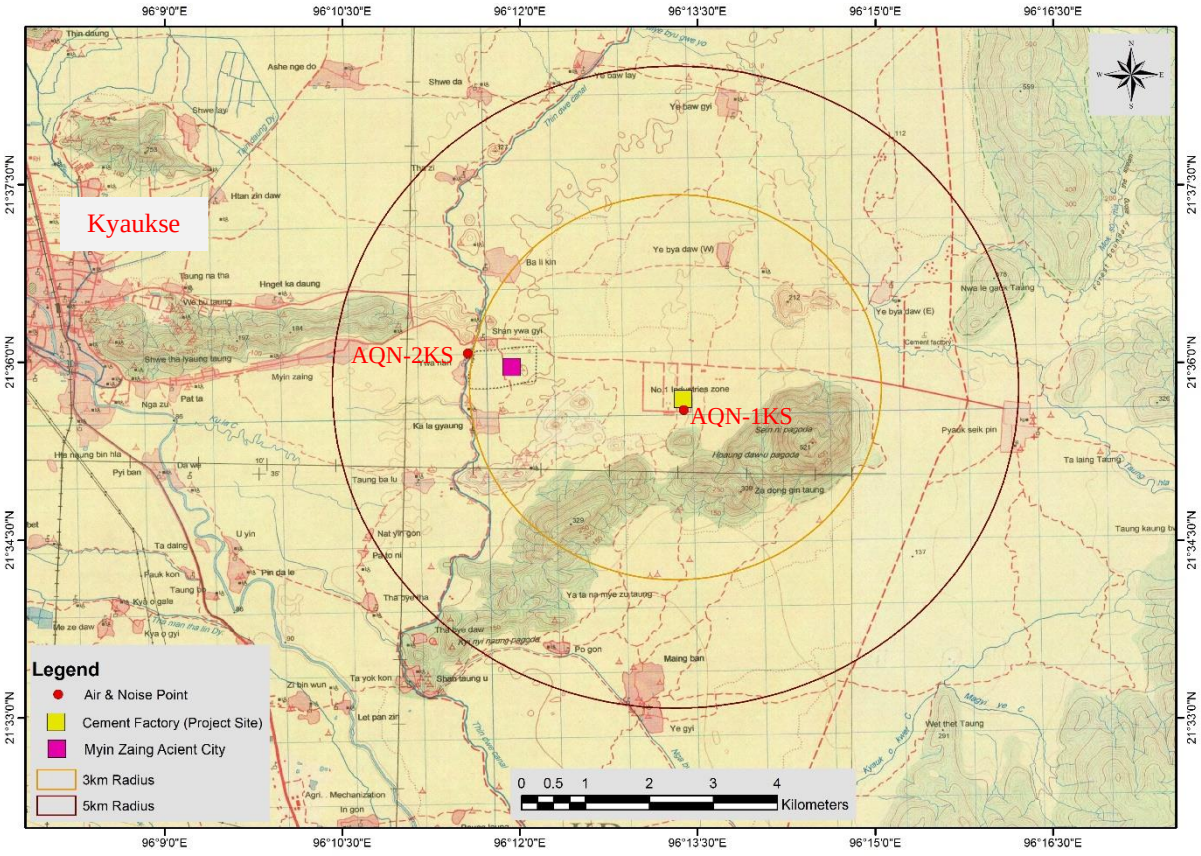


Figure 4-18 Location of air and noise quality monitoring locations

The location of sampling point is as shown in Table 4.16. The sampling point is described below in detail.

Table 4.16 Sampling Points for Air Quality Survey

Sampling Point	Coordinates	Description of Sampling Point
AQN-1KS	21° 35' 47.20" N 96° 13' 51.60" E	At the east of No.33 Heavy Industry Zone (Kyaukse), Kyaukse Townhsip
AQN-2KS	21° 36' 9.80" N 96° 11' 35.20" E	In the monastery compound, the west of Shan Ywar Gyi Village, Kyaukse Townhsip

AQN-1KS

AQN-1SK was surveyed at cement plant of the east of No.33 Heavy Industry Zone (Kyaukse), Kyaukse Township. As the location was at the construction site, the particulate matters were

moderately high and the emitted pollution sources were from construction truck nearby. The dominant noises were from construction activities nearby in industrial zone. The location of AQN-1KS is as shown in Figure 4-19.

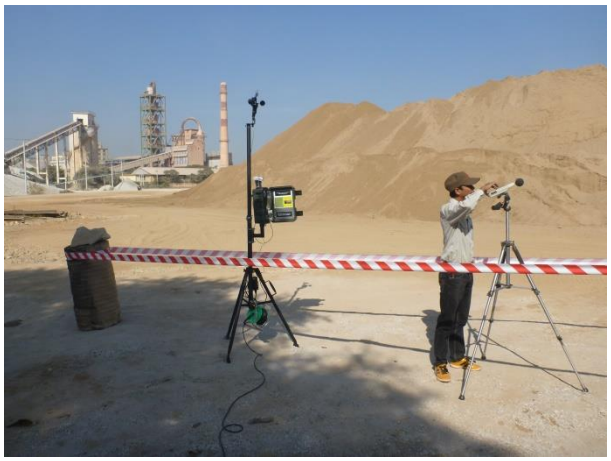


Figure 4-19 Location of AQN-1KS

AQN-2KS

The location was cited in the monastery compound, where is generally flat terrain, the west of Shan Ywar Gyi Village, Kyaukse Townhsip. The location was covered with some monastic building at east fared about 30 m. The possible emitted sources were from some motorbike and cooking fire. The dominant noises were from monastery and human activities from village. The location of Figure 4-20.

Figure 4-20 Location of AQN-2KS

4.3.2.2 Survey Period

Air quality survey was conducted for 24 hours. The sampling duration is as shown in Table 4.17.

Table 4.17 Sampling Duration for Air Quality Survey

Season	Period
Dry Season	20th -22nd December, 2014

4.3.2.3 Survey Method

Sampling and analysis of ambient air pollutants was conducted by referring to the recommendation of United States Environmental Protection Agency (U.S. EPA). The Haz-Scanner EPAS Wireless Environmental Perimeter Air Station was used to collect Ambient Air Monitoring data.

Table 4.18 Sampling and Analysis Method for Air Quality

No.	Parameter	Analysis Method
1	Sulfur dioxide (SO2)	On site reading
2	Carbon monoxide (CO)	On site reading
3	Nitrogen dioxides (NO2)	On site reading
4	Particle matter 2.5 (PM 2.5)	On site reading
5	Particle matter 10 (PM10)	On site reading

4.3.2.5 Survey Result

Ambient gaseous levels were presented in Table 4.19 and 4.20. The concentration of CO, NO_2, and SO_2 are acceptable compared to the standard except particulate matters ($PM_{2.5}$ & PM_{10}).

The reason why the air quality measurement results obtained in 2014 exceeded the NEQG standard is because the measurement period is due to December (dry season). It is found that the results of another air quality measurement in June 2016 did not exceed the NEQG standard. This is fully described in Appendix 7.

Table 4.19 Ambient air quality results at AQN-1KS

Location	**Item**	**Unit**	**Measured Value (Mean)**	**Country's Standard (National Environmental Quality (Emission) General Guideline) µg/m³**	**Target value to be applied** IFC EHS General Guideline (WHO) **µ**g/m3
AQN-1KS	NO_2	**µg/m³**	30	200 (1 hour)	200 (1 hour)
	SO_2	**µg/m³**	20	20 (24 hour)	125 (Interim target-1) 50 (Interim target-2) 20 (guideline) (24-hour)
	CO	**mg/m³**	0.55	No Guideline	No Guideline
	PM2.5	**µg/m³**	70	25 (24 hour)	75 (Interim target-1) 50 (Interim target-2) 37.5 (Interim target-3) 25 (guideline) (24-hour)
	PM10	**µg/m³**	90	50 (24 hour)	150 (Interim target-1) 100 (Interim target-2) 75 (Interim target-3) 50 (guideline) (24-hour)

Source: Resource & environment Myanmar Co., Ltd.

Shaded area shows higher than the standard.

Table 4.20 Ambient air quality results at AQN-2KS

Location	**Item**	**Unit**	**Measured Value (Mean)**	**Country's Standard (National Environmental Quality (Emission) General Guideline)** **µg/m^3**	**Target value to be applied** IFC EHS General Guideline (WHO) **µ**g/m3
AQN-2KS	NO_2	**µg/m^3**	60	200 (1 hour)	200 (1 hour)
	SO_2	**µg/m^3**	10	20 (24 hour)	125 (Interim target-1) 50 (Interim target-2) 20 (guideline) (24-hour)
	CO	**mg/m^3**	0.34	No Guideline	No Guideline
	PM2.5	**µg/m^3**	70	25 (24 hour)	75 (Interim target-1) 50 (Interim target-2) 37.5 (Interim target-3) 25 (guideline) (24-hour)
	PM10	**µg/m^3**	100	50 (24 hour)	150 (Interim target-1) 100 (Interim target-2) 75 (Interim target-3) 50 (guideline) (24-hour)

Source: Resource & environment Myanmar Co., Ltd.

Shaded area shows higher than the standard.

Wind Speed and Direction

The average wind speed and direction were collected for 24 hours continuous in each location. According to the wind rose diagram, average wind speed of varies from 0.06 to 0.13 m/s in all stations. Prevailing wind direction of AQN-1KS and AQN-2KS is southwest.

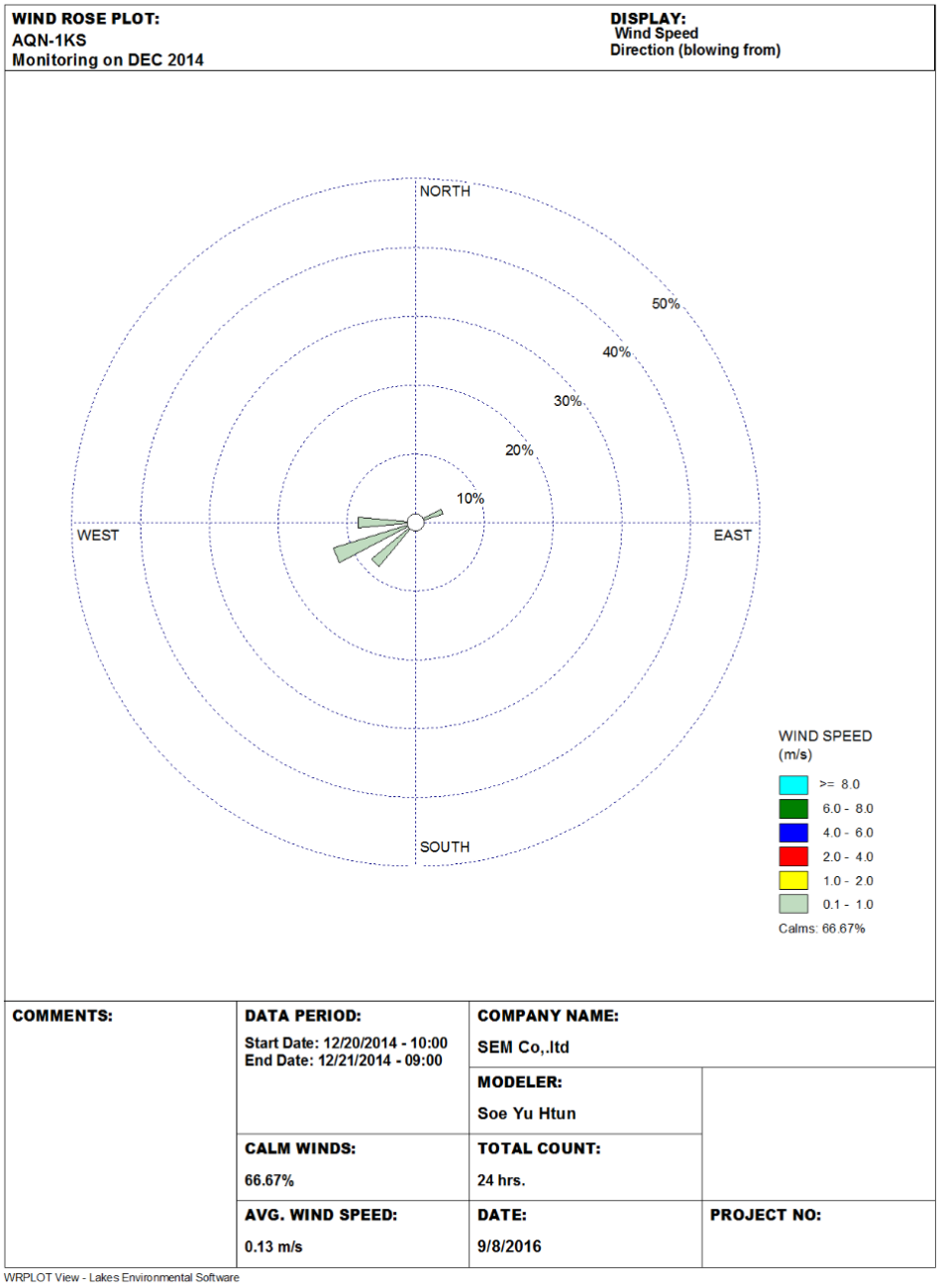


Figure 4-21 Wind Rose diagram for AQN-1KS

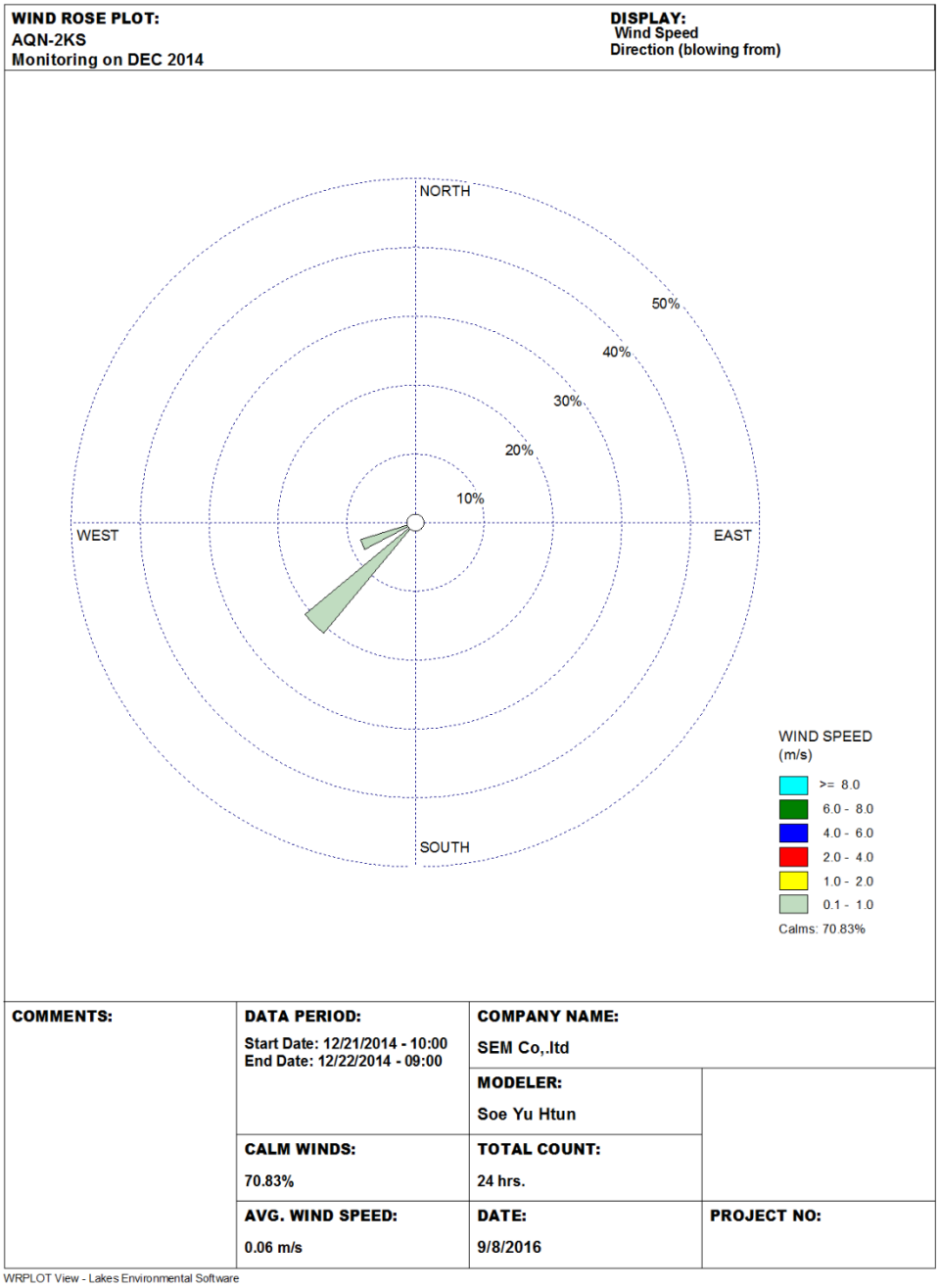


Figure 4-22 Wind Rose diagram for AQN-2KS

4.3.3 Noise Level

4.3.3.1 Survey Item

Parameter for noise level survey was determined by referring Country's Standard (National Environmental Quality (Emission) General Guideline) as shown in Table 4.21. The survey result was evaluated by comparing with Country's Standard (National Environmental Quality (Emission) General Guideline).

Table 4.21 Survey Parameters for Noise Level

Receptor	One Hour LAeq (dBA)	
	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**

4.3.3.2 Survey Location

Locations of noise monitoring survey points are as same as air quality monitoring.

4.3.3.3 Survey Period

Noise level survey was conducted on 24 hours. The measurement duration is as shown in Table 4.22.

Table 4.22 Sampling Duration for Noise Level Survey

Season	Period
Dry Season	December 20th -22nd 2014

4.3.3.4 Survey Method

Measurement of environmental sound level was conducted by referring to the recommendation of International Organization for Standardization (ISO), ISO 1996-1:2003 and ISO 1996-2:2007.

The instrumentation used for noise quality survey is shown in Table 4.23.

Table 4.23 Instrumentation for Noise Level Survey

Instrumentation	Description
Sound level meter	Sound level meter with SD Card, Model SL-4023SD

4.3.3.5 Survey Result

One day L_{Aeq} was calculated by using the following array formula in the excel sheet. This formula is firstly used for hourly L_{Aeq} and then for the 24 hours L_{Aeq}.

10*LOG10 (AVERGAE (10^ ((RANGE)/10)))

By means of the calculated results, 24 hours noise levels encountered at SN 1 monitoring point is as 83 dB(A) at day time L_{eq} and 82 dB(A) at night time L_{eq}.

Hourly (LAeq) are also presented in Table 4.24. It was assumed that by means of the industrial area, daily life in the living environment generated the noise from vehicles, construction and human activities. The dominant noise sources are generally from the various machines in the factory area.

Table 4.24 Hourly LAeq value in noise monitoring stations

Time	N-1KS (L_{Aeq})	N-2KS (L_{Aeq})	Noise Standard IFC standard (Commercial, Industrial)	Country's Standard (Commercial, Industrial)
6:00-7:00	66	62		
7:00-8:00	68	64		
8:00:9:00	63	62		
9:00-10:00	65	58		
10:00-11:00	57	48		
11:00-12:00	71	59		
12:00-13:00	69	50		
13:00-14:00	63	56		
14:00-15:00	66	57		
15:00-16:00	71	83		
16:00-17:00	66	54		
17:00-18:00	67	59		
18:00-19:00	71	61		
19:00-20:00	72	54		
20:00-21:00	66	53		
21:00-22:00	64	52		
Day L_{Aeq}	67	58	75	70
22:00-23:00	59	61		
23:00-24:00	53	46		

Time	N-1KS (L_{Aeq})	N-2KS (L_{Aeq})	Noise Standard IFC standard (Commercial, Industrial)	Country's Standard (Commercial, Industrial)
24:00-1:00	55	46		
1:00-2:00	54	45		
2:00-3:00	60	45		
3:00-4:00	61	45		
4:00-5:00	62	46		
5:00-6:00	67	63		
Night L_{Aeq}	59	50	70	70

Unit in dB

4.3.4 Vibration

4.3.4.1 Survey Location

The location of sampling point is as shown in Figure 4-23. The sampling point is described below in detail.

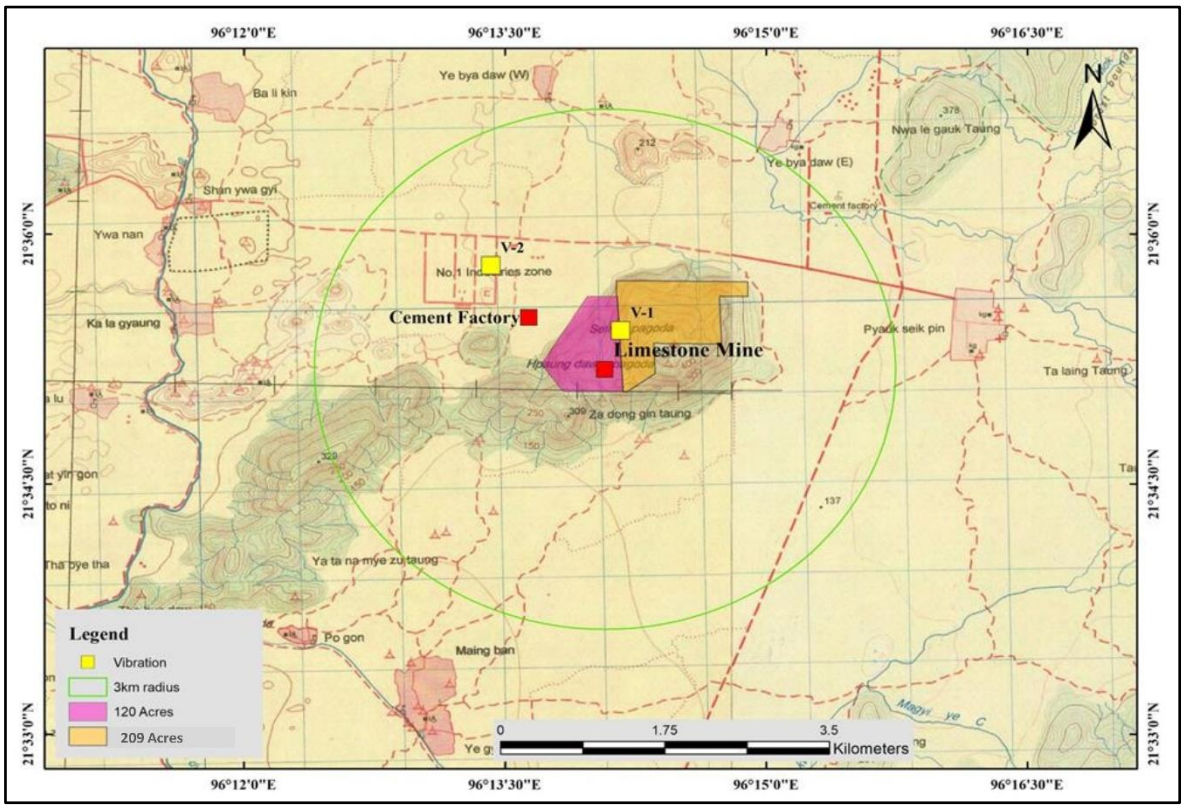


Figure 4-23 Location of vibration quality monitoring locations

Table 4.25 Sampling Points for Vibration Survey

Sampling Point	Coordinates	Description of Sampling Point
V1	21°35'25.30"N 96°14'9.93"E	At limestone Quarry Site of Myanmar Conch Cement Compound.
V2	21°35'48.70"N 96°13'25.14"E	At Staff residence of Myanmar Conch Cement Compound.

4.3.4.2 Survey Period

Vibration level survey was conducted for 24 hours. The sampling duration is as shown in Table 4.26.

Table 4.26 Sampling Duration for Air Quality Survey

Sampling Point	Period
V1	8th-9th, November, 2018
V2	8th-9th, November, 2018

4.3.4.3 Survey Method

Measurement of environmental vibration level was conducted by referring to the recommendation of International Organization for Standardization (ISO), i.e., ISO 1996-1:2003 and ISO 1996-2:2007. The instrumentation used for vibration level survey is shown in the following Table 4.27. Vibration meter was set up to record the log as ten minutes intervals during an hour for one consecutive day.

Table 4.27 Instrumentation for noise survey

Instrumentation	Description
Vibration meter	Rion VM55 with SD Card

Figure 4-24 Rion Vibration Level Meter

4.3.4.4 Survey Result

Average vibration level results of two points for 24hours are presented in Table 4.28 and Figure 4-25.

Table 4.28 Daily average vibration level results (dB)

Result	V-1			V-2		
	Daytime	Evening time	Nighttime	Daytime	Evening time	Nighttime
	56	41	39	35	37	27

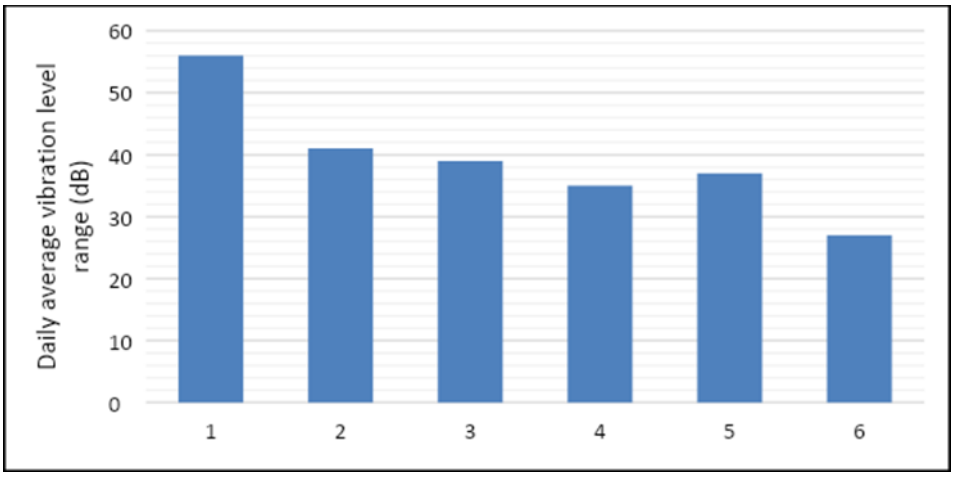
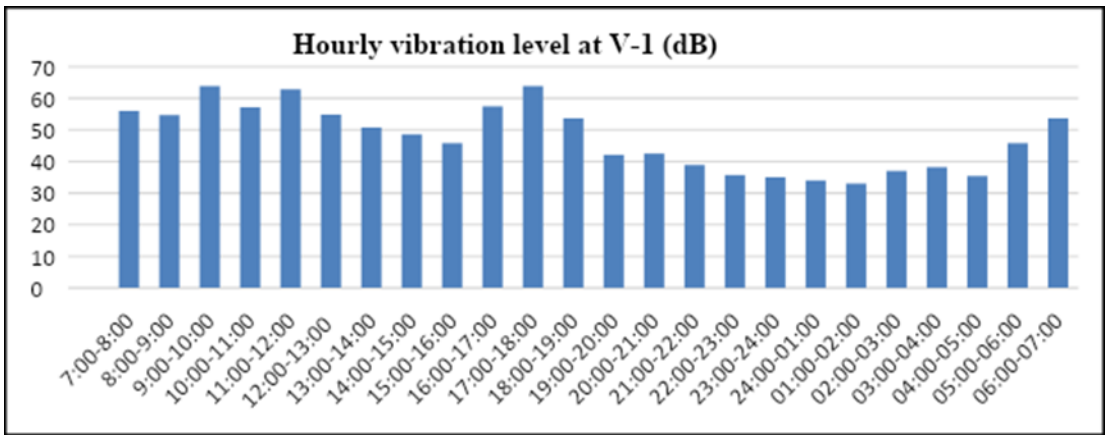
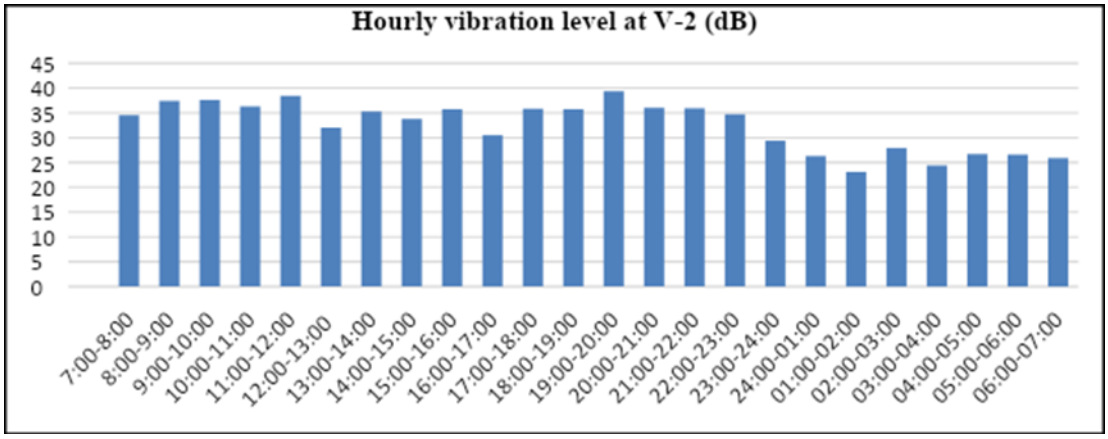


Figure 4-25 Daily Lveq value in vibration survey

Table 4.29 Hourly Lveq value in vibration survey

Time	V-1	V-2
7:00-8:00	56	35
8:00-9:00	55	37
9:00-10:00	64	38
10:00-11:00	57	36
11:00-12:00	63	38
12:00-13:00	55	32
13:00-14:00	51	35
14:00-15:00	49	34
15:00-16:00	46	36
16:00-17:00	57	31
17:00-18:00	64	36
18:00-19:00	54	36
19:00-20:00	42	39
20:00-21:00	43	36
21:00-22:00	39	36
22:00-23:00	36	35
23:00-24:00	35	29
24:00-01:00	34	26
01:00-02:00	33	23
02:00-03:00	37	28
03:00-04:00	38	24
04:00-05:00	35	27
05:00-06:00	46	27
06:00-07:00	54	26





4.3.5 Terrestrial and Aquatic Ecology

4.3.5.1 Flora

The project site is located in Kyaukse Township within eastern part of dry zone of Central Myanmar. It is surrounded on the east by Thandawmyat Taung, on the south by Kalagyaung Taung and Kalagyaung village, on the west by Shanywagyi village and on the north by east and west Yepyartaw village. The rainfall less than 40 inches a year includes Dry Scrub Forest and Semi-desert Scrub. The water level is so poor that the vegetation is *Acacia* and *Ziziphus* Thom Scrub and *Euphorbia* Scrub occurring as low bushes. The soil is sandy and porous where *Euphorbia antiquorum* and *Cactus* can be seen. In Shanywagyi and Kalagyaung village near the project site, the Thindwe canal is established for cultivation.

Methodology

(1) Field observation

Flora

A Global Positioning System was used to navigate and mark coordinates between sample plots around the study area. Field observation was conducted in and around the project area. In order to obtain essential ecological data for predicting flora of shrubs and herbs, 2m x 2m quadrats were laid down and observed. In each plot every plant species were listed and counted. For the tree species 10mx10m quadrats (total10) were subjectively chosen and observed. In each sample plot every living tree of girth at breast height (GBH) ≥10cm was measured, listed and counted. In each subplot along the belt transect every plant species were listed and counted. Care has been taken to cover different elevation, slope, aspects, drainage and density gradients to study overall spectrum of species diversity. In addition all trees, shrubs, herbs and cultivated crops were recorded and listed. Identification of plants and animal species was conducted with assistances of skilled local people. The identified species were translated to scientific name with assistance of the senior researcher at Yangon University. The

families were identified by using key to the families of the flowering plants, issued by Department of Botany, Yangon University (1994). Specimen identification was performed with the use of literatures by Backer *et a*l., 1963, and Kress *et al*. 2003 and confirmed at Herbarium in Department of Botany, University of Yangon.

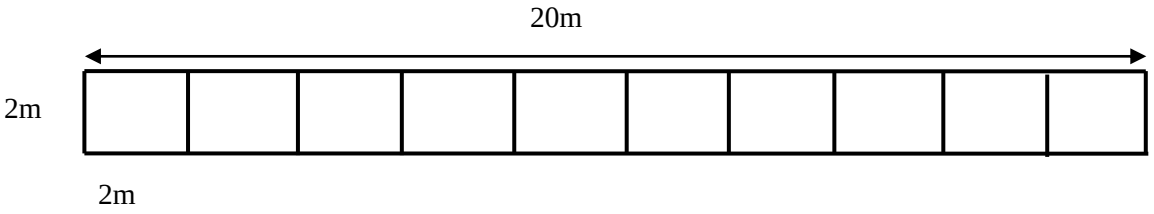


Figure 4-26 Lay out design of the belt transect

Habitat Map

To obtain the habitat map, there is combination between field observation and secondary image from Google Earth and generate it applying in GIS software. At first, the field observations were performed for habitat survey at site collecting the data with the Garmin GPS and upload it in Map Info Software. On the other hand, the Google image was visually digitized based on the primary field survey. Finally, the habitat map was analyzed based on both of field survey and secondary image data using the Map Info software.

Source & Tools

- Google Earth Images
- Map Info 11.0 and Discover
- Garmin GPS 62 cx
- Field Survey

The habitat map of the cement factory and surrounding region is shown in Figure 4-27.

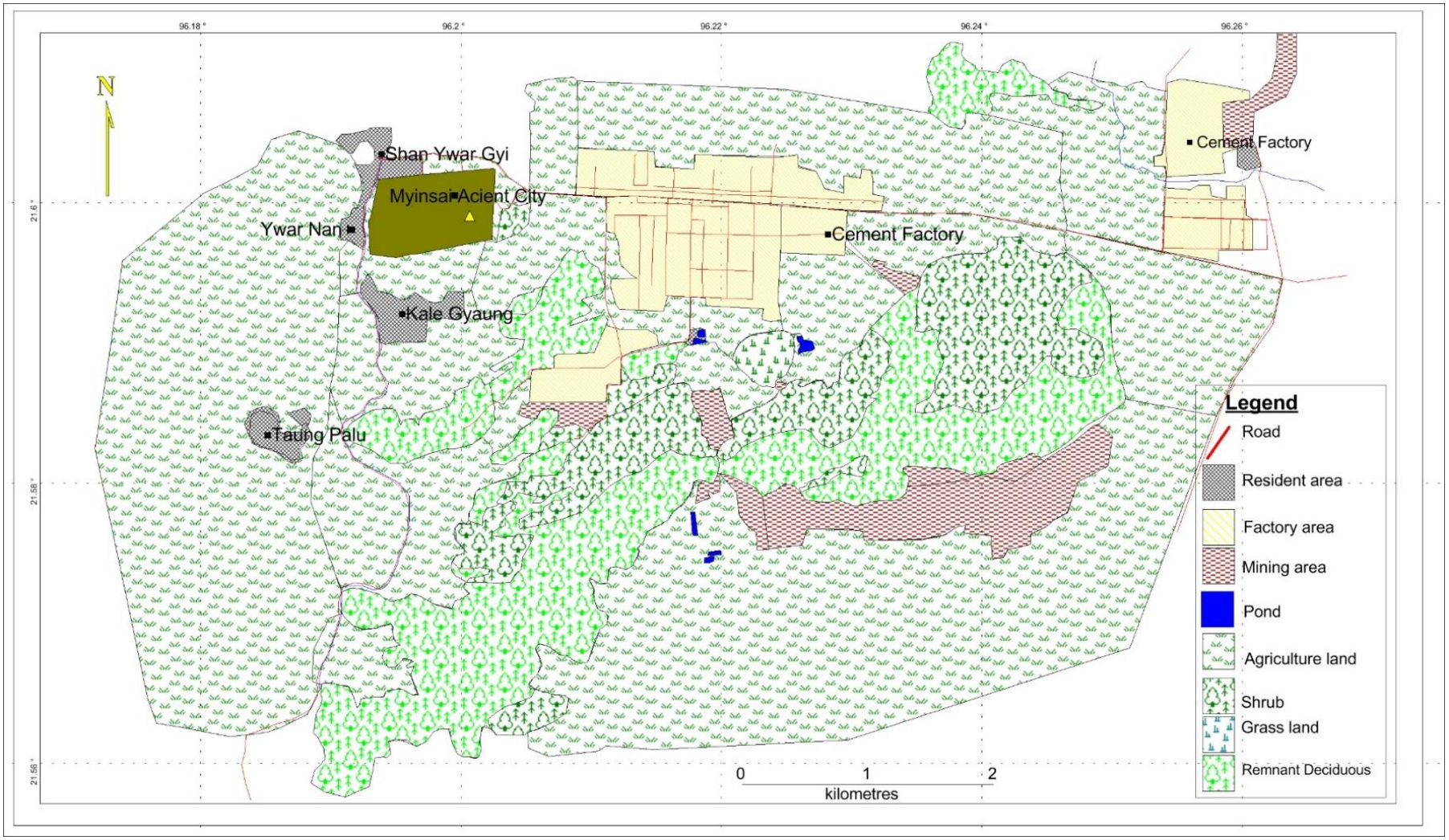


Figure 4-27 Habitat map of the cement factory and surrounding area

Fauna

Herpecto fauna were mainly collected by walking around in survey area. To identify the amphibian and reptiles species, we took photos and capturing by hand. Some species were interviewed from local people. Butterflies species were collected by aerial net along the trail and collected species are packed by the trasipaper (triangle paper) and moth ball is placed in plastic box to keep the sample for long-life. Some Butterflies cannot identify in field so that we took photo and sample to identify the species with reference book. To study and identify the bird species, we use binocular and camera to take photos because some bird species cannot identify in field and then we check out the species with photos and reference book. When conduct the base line survey for bird species, we use the point count method in selected habitat. The species recorded from point count method, we use again the reference book to identify the species and listed in table to produce a complete species list. Interview survey from local people was used for mammal because some mammal lived in this area during past but they are not found in current. Mammal presence or absence in survey area was confirmed by interviewing from local people who are already being familiar with the forest. All data recorded in the survey area were collected in the field data sheet.

Aquatic Ecology

Interviewed with local fisherman from the study area were conducted during the collection of the specimen. Fishermen were interviewed with regard to fishery process including kinds of gear used, number of fishing time per day, target species. The fishing gears are trap, hook and line and gill nets. The water body of the irrigation canal was studied for aquatic fauna. The fishes were collected with the help of the fishermen during the survey period. Traps were also used to get various types of fish like surface dwellers and bottom dwellers. The fishes were photographed soon after the collection and measurements were also taken for key characteristics. The fishes were then preserved in 10% formalin solution for further identification in the laboratory. The fishes were then identified according to Jayaram (1981) and Talwar and Jhingram (1991).

(2) Interviewing and literature survey

In addition to the field observation, secondary data was also surveyed by interviewing from local residents and literature reviewing. In the interview survey, the surveyor visited the residents in and around the survey area and interviewed the name of plants and animals existing in and around the area. Also, the past situation of flora and fauna, and the change on biodiversity and ecosystem in the area was interviewed for examination.

Result

The list of the flowering plants from Thandawmyat Taung, Shanywagyi, Kalagyaung and Yepyartaw village and their surrounding area were presented in the following tables. The families and genera were arranged alphabetically. The scientific name and Myanmar name were also presented.

Table 4.30 The plants in Thandawmyat Taung and its surrounding area near the project site

Sr	Family	Scientific name	Myanmar name	IUCN
1	Agavaceae	*Agave americana* L.	Nanat gyi	NL
2	Anacardiaceae	*Lannea coromandelica* (Houtt.) Merr.	Nabe	NL
3	Asteraceae	*Pterocaulon spicatum* (Labill) Domin	Linda pa byin	NL
4	Capparaceae	*Boscia variabilis* (Kurz) Collect. & Hens.	Tha mon	NL
5	Boraginaceae	*Cordia dichotoma* Forst.f.	Tha nut	NL
6	Combretaceae	*Calycopteris floribunda* Lam.	Gyut-nwe	NL
7	Euphorbiaceae	*Bridelia burmanica* Hook. f.	Seik che	NL
8	Euphorbiaceae	*Euphorbia antiquorum* L.	Tazaung gyi	NL
9	Mimosaceae	*Acacia catechu* (L.f.) Willd.	Sha	NL
10	Mimosaceae	*Acacia nilotica* (L.) Delile	Su phyu	NL
11	Mimosaceae	*Acacia pennata* (L.) Willd	Su yit	LC
12	Mimosaceae	*Albizia procera* (Roxb.) Benth	Thit phyu	NL
13	Mimosaceae	*Leucaena leucocephala* (Lam.) DC	Bawzagaing	NL
14	Fabaceae	*Millettia pendula*	Thinwin	NL
15	Mimosaceae	*Pithecellobium dulce* (Roxb.) Benth.	Kala magyi	NL
16	Mimosaceae	*Prosopis juliflora* (Swartz) DC.	Ganda sein	NL
17	Lamiaceae	*Tectona hamiltoniana* Wall.	Dahat	NL
18	Malpighiaceae	*Hiptage benghalensis* (L.) Kurz	Bein nwe	NL
19	Malvaceae	*Grewia tiliifolia*	Tayaw	NL
20	Sterculiaceae	*Sterculia versicolar* Wall.	Shaw phyu	NL
21	Poaceae	*Dendrocalamus strictus* (Roxb.) Nees	Hmyin Wa	NL
22	Rhamnaceae	*Ziziphus jujuba* Lam.	Zi	LC
23	Solanaceae	*Solanum erianthum* D. Don.	Dauk satpya	NL
24	Verbenaceae	*Symphorema involucratum* Roxb.	Daung talaung	NL

NL = Not Listed

LC = Least Concerned

Table 4.31 The plants in Shanywagyi, Kalagyaung village and surrounding area

Sr	Family	Scientific name	Myanmar name	IUCN	Remark
1	Acanthaceae	*Barleria prionitis* L.	Leik su shwe	NL	
2	Acanthaceae	*Asystasia gangetica* (L.) T. Anders.	Kyauk hkwe pan	NL	
3	Agavaceae	*Agave americana* L.	Nanat gyi	NL	
4	Amaranthaceae	*Achyranthes aspera* L.	Nauk po	NL	
5	Amaranthaceae	*Amaranthus spinosus* L.	Hinnu nwe subauk	NL	
6	Amaranthaceae	*Digera muricata* (L.) Mart.	Yut nadaung	NL	
7	Amaranthaceae	*Celosia argentea* L.	Kyet mauk	NL	
8	Apocynaceae	*Calotropis gigantea* (L.) R. Br.	Mayo	NL	
9	Asteraceae	*Eupatorium odoratum* L.	Bizat	NL	
10	Asteraceae	*Pluchea indica* (L.) Less	Wabalu	NL	
11	Asteraceae	*Vernonia cinerea* (L.) Less	Kadu-pyan	NL	
12	Bignoniaceae	*Dolichandrone spathacea* (L.f.) K. Schum	Thakut	LC	
13	Boraginaceae	*Heliotropium sp.*			
14	Cactaceae	*Cereus pterogonus* (L.) Cact.	Shazaung pyathat	NL	
15	Cactaceae	*Opuntia dillenii* (Ker-Gawl.)	Kyasha	LC	
16	Capparaceae	*Capparis sp.*			
17	Capparaceae	*Cleome sp.*			
18	Capparaceae	*Crateva magna* (Lour.) DC.	Kon kadet	NL	
20	Combretaceae	*Combretum apetalum* Wall.	Nabu nwe	NL	
21	Commelinaceae	*Commelina sp.*			
22	Convolvulaceae	*Ipomoea batatas*	Ka zun	NL	
23	Cucurbitaceae	*Coccinia grandis* (L.) J. Voigh	Kin mon	NL	
24	Cucurbitaceae	*Cucumis trigonous* Roxb.	Ka sit	NL	
25	Cucurbitaceae	*Luffa cylindrica* (L.) M. Roem.	Thabut kha	NL	
26	Cucurbitaceae	*Trichosanthes tricuspidata* Lour.		NL	

27	Euphorbiaceae	*Euphorbia antiquorum* L.	Tazaung gyi	NL	
28	Euphorbiaceae	*Jatropha pungens*	Kyet su	NL	
29	Euphorbiaceae	*Phyllanthus sp.*			
30	Mimosaceae	*Acacia catechu* (L.f.) Willd.	Sha	NL	
31	Mimosaceae	*Acacia leucophloea* (Roxb.) Willd.	Tanaung	NL	
32	Mimosaceae	*Acacia nilotica* (L.) Delile	Su phyu	NL	
33	Mimosaceae	*Albizia lebbeck* (L.) Benth	Anya kokko	NL	
34	Mimosaceae	*Acacia pennata* (L.) Willd	Su yit	LC	
35	Mimosaceae	*Albizia procera* (Roxb.) Benth	Thit phyu	NL	
36	Mimosaceae	*Leucaena leucocephala* (Lam.) DC.	Bawzagaing	NL	
37	Mimosaceae	*Pithecellobium dulce* (Roxb.) Benth.	Kala magyi	NL	
38	Mimosaceae	*Prosopis juliflora* (Swartz) DC.	Ganda sein	NL	
39	Mimosaceae	*Samanea saman* (Jacq.) Merr.	Thinbaw kokko	NL	
40	Mimosaceae	*Senna siamea* (Lam.) Irwin & Barneby	Mazali	NL	
41	Caesalpiniaceae	*Tamarindus indica* L.	Magyi	NL	
42	Verbenaceae	*Gmelina asiatica* L.		NL	
43	Malvaceae	*Abutilon indicum (L.) Sweet*	Bauk khwe	NL	
44	Bombacaceae	*Bombax ceiba* L.	Letpan	NL	
45	Tiliaceae	*Muntingia calabura* L.	Hnget thagya	NL	
46	Meliaceae	*Azadirachta indica* A. Juss.	Tama	NL	
47	Moraceae	*Ficus sp.*	Nyaung		
48	Moraceae	*Streblus asper* Lour.	Okhne	NL	
49	Rhamnaceae	*Ziziphus jujuba* Lam.	Zi	LC	
50	Rubiaceae	*Morinda tinctoria* Roxb.	Nibase	NL	
51	Rutaceae	*Limonia acidissima* L.	Thi	NL	
52	Salvadoraceae	*Azima sarmentosa* (Blume) Benth. & Hook.f.	Mo hnan	LC	

53	Sapotaceae	*Madhuca longifolia* (L) Macbride	Meze	NL	
54	Solanaceae	*Datura suaveolens*	Padaing	Ex	Globally endangered but can be found abundantly in Myanmar Dry Zone
55	Vitaceae	*Cissus sp.*			

NL = Not Listed

LC = Least Concerned

Ex = Extinct in the wild

Table 4.32 The cultivated crops in Shanywagyi and Kalagyaung village

Sr	Family	Scientific name	Myanmar name	IUCN
1	Pedaliaceae	*Sesamum indicum* (L.) DC.	Hnan	NL
2	Poaceae	*Oryza sativa* L.	Saba	NL
3	Solanaceae	*Capsicum annuum* L.	Ngayok	NL
4	Zingiberaceae	*Curcuma longa* L.	Sa nwin	NL

NL = Not Listed

Table 4.33 The cultivated crops in east and west Yepyartaw village

Sr	Family	Scientific name	Myanmar name	IUCN
1	Cucurbitaceae	*Citrullus lanatus* (Thunb.) Matsum. & Nakai	Hpa ye	NL
2	Cucurbitaceae	*Cucumis melo* L.	Tha khwar hmwe	NL
3	Fabaceae	*Cicer arietinum* L.	Kala pe	NL
4	Pedaliaceae	*Sesamum indicum* (L.) DC.	Hnan	NL
5	Solanaceae	*Capsicum annuum* L.	Ngayok	NL

NL = Not Listed

Table 4.34 The birds found in the project site

Sr	Family	Scientific name	Myanmar name
1	Passeridae	*Passer sp.*	Sargalay
2	Hirundinidae	*Hirundo rustica*	Pyan hlwa

Figure 4-28 Low bushes vegetation on Thandawmyat Taung near project site

Figure 4-29 Deciduous vegetation with Lannea coromandelica on Thandawmyat Taung

Figure 4-30 Natural vegetation of low bushes in Myinsaing near Shanywagyi village

Figure 4-31 Cultivated crop Sesamum indicum near Shanywagyi village

Figure 4-32 Cultivated crop Cicer arietinum near Yepyartaw village

4.3.5.2 Fauna Survey

Terrestrial Fauna

Some species of birds were found in this area. *Passer domesticus* (House sparrow) and *Hirunda rustica* (Barn Swallow) observed at the trees of near the industry and worker houses. *Turdoides gularis* (White -throated Babbler) (endemic species) was found at the trees of near the industry. *Bubulcu coromandus* (Eastern Cattle Egret) and *Egretta garzetta (*Little Egret) were found near the small pond of industrial environs. *Corvus splenden insolens* (House crow), *Columba* sp. (Pigeon), *Acridotheres tristics* (Common Myna), *Streptopelia chinensis* (spotted dove) were found in monastery environs of Shanywagyi village. A few species of butterflies; *Danaus genutia*., *Eurema* ada and Ca*topsilia pomona* were common occurred near the industry, worker houses and villages of these study sites.

Recorded of mammals and reptiles according to talk of workers and villagers was as follows, *Lepus peguensis* (Burmese hare) was found Industrial Zones environs. *Viper viper* was more observed and sometime *Najar* sp. was observed.

Table 4.35 Confirm List of Bird species recorded around the project area

No	Order	Family Name	Common Name	Scientific Name	IUCN/Status
1	Passeriformes	Passeridae	House Sparrow	*Passer domesticus*	Least Concern
2	Passeriformes	Corvidae	House Crow	*Corvus splenden*	Least Concern
3	Passeriformes	Sturnidae	Common Myna	*Acridotheres tristis*	Least Concern
4	Passeriformes	Hirundinidae	Barn Swallow	*Hirundo rustica*	Least Concern
5	Passeriformes	Timaliidae	White-throated Babbler	*Turdoides gularis*	Least Concern(Endemic species)
6	Columbiformes	Columbidae	Rock Pigeon	*Columba livia*	Least Concern
7	Columbiformes	Columbidae	Spotted Dove	*Streptopelia chinensis*	Least Concern
8	Pelecaniformes	Ardeidae	Little Egret	*Egretta garzetta*	Least Concern
9	Pelecaniformes	Ardeidae	EasternCattle Egret	*Bubulcus coromandus*	Least Concern

Table 4.36 List of mammal species recorded on project area

Order	Family	Common Name	Scientific Name	IUCN/Status	Observation Status
Lagomorpha	Leporidae	Burmese Hare	*Lepus peguensis*	Least concern	interview

Table 4.37 List of reptile species recorded on project area

Order	Family	Common Name	Scientific Name	IUCN/Status	Observation Status
Squamata	Viperidae	Viper	*Viper viper*	Not List	Interview
Squamata	Elapidae	Cobra	*Najar sp.*	Not List	Interview
Squamata	Columbidae	Checkered Keelback	*Xenochrophis piscator*	Not List	Interview

Table 4.38 List of butterfly species recorded on project area

Order	Family	Scientific Name	IUCN/Status	Observation Status
Lepidoptera	Peridae	*Catopsilia Pomona*	Not List	Sighting
Lepidoptera	Danaidae	*Danus genutia*	Not List	Sighting
Lepidoptera	Peridae	*Eurema ada*	Not List	Sighting

Aquatic fauna

Some kind of freshwater fish species; *Pantius* spp, *Clarias* spp and *Channa* spp. along the Thintwe canal were found by talk of fishermans. *Xenochrophis piscator* (Water snake) was found in the Zeetaw Dam.

Table 4.39 List of fish species recorded on project area

Order	Family	Common Name	Scientific Name	IUCN/Status	Observation Status
Siluriformes	Clariidae	Cat Fish	*Clarias batrachus*	least concern	Interview
Parciformes	Channidae	Snake-headed Fish	*Channa marulius*	least concern	Interview
Cypriniformes	Cyprinidae	Chola Barb	*Puntius chola*	least concern	Interview

Figure 4-33 This Site of trees and shrubs was occurred Passer domesticus, Turdoides gularis and Hirunda rustica

Figure 4-34 Nets of Passer domesticus near the industry (arrows)

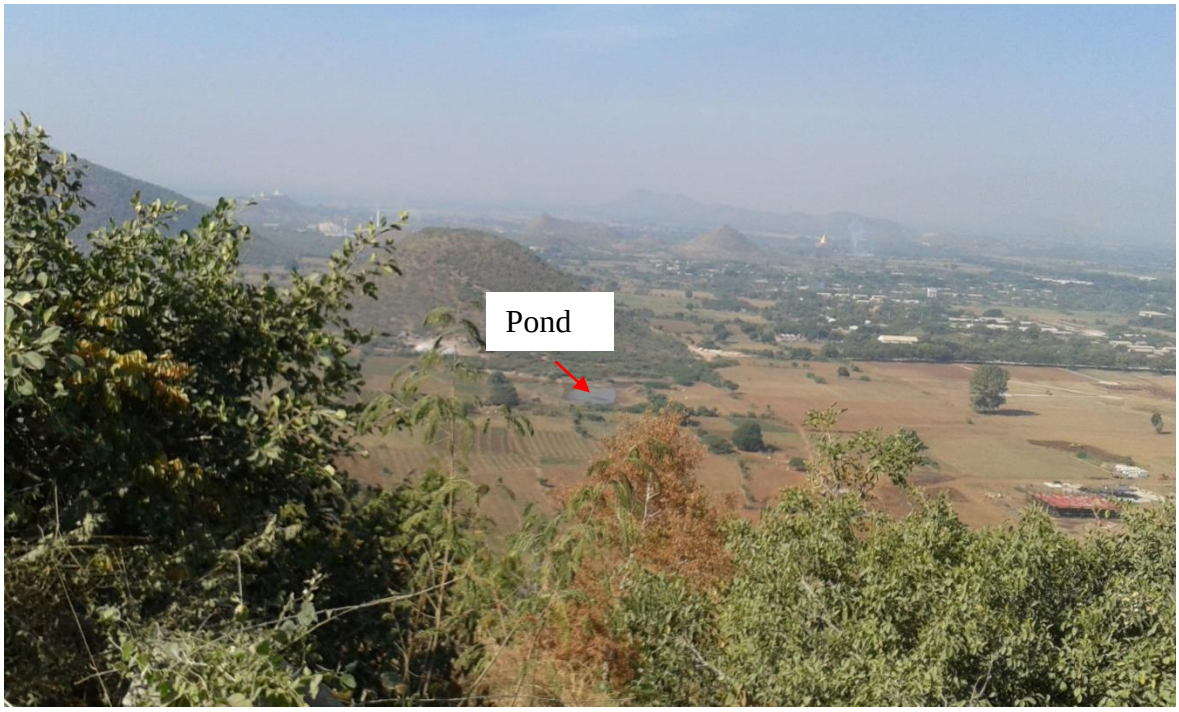


Figure 4-35 Bubulcus ibis and Egretta sp. found at the small pond near industrial environs

Figure 4-36 Monestry (Shanywagyi Village) in which Corvus splenden insolen, Streptopelia chinensis and Columba sp. were found

Figure 4-37 Thindwe Canal near the Shanywagyi Village and fishermen

Figure 4-38 Xenochrophis piscator, Water snake was found in Zeetaw Dam

In summarize, the high level of industrial and other human activities in the area has led to negative alterations of wildlife habitats. The study revealed that all the wildlife animals and important species of flora and fauna do not exist in the Kyaukse Industrial Zone area. This could have resulted from high levels of industrial activities coupled with settlements and agricultural activities in the nearby area. Considering habitat signs that were observed and interviews with the local people, a variety of snakes, insects, hares and bush rats exist.

4.3.6 Public Perception and Socio-economic Profile of Respondents in the Project Area

It is necessary to study existing demographic profile of the region, the economic resources, the health conditions, education, and cultural resources of the community for social impact assessment of the project. This study primarily emphasized on the existing socio-economic conditions of villages which are in the project area especially those residing in the Myanmar Conch Cement project.

The project area is located at Kyaukse Township in Mandalay Region. The survey is focused on community study within 3 km circles surrounding the project site. The survey covers 6 Villages as shown in Table 4.41.

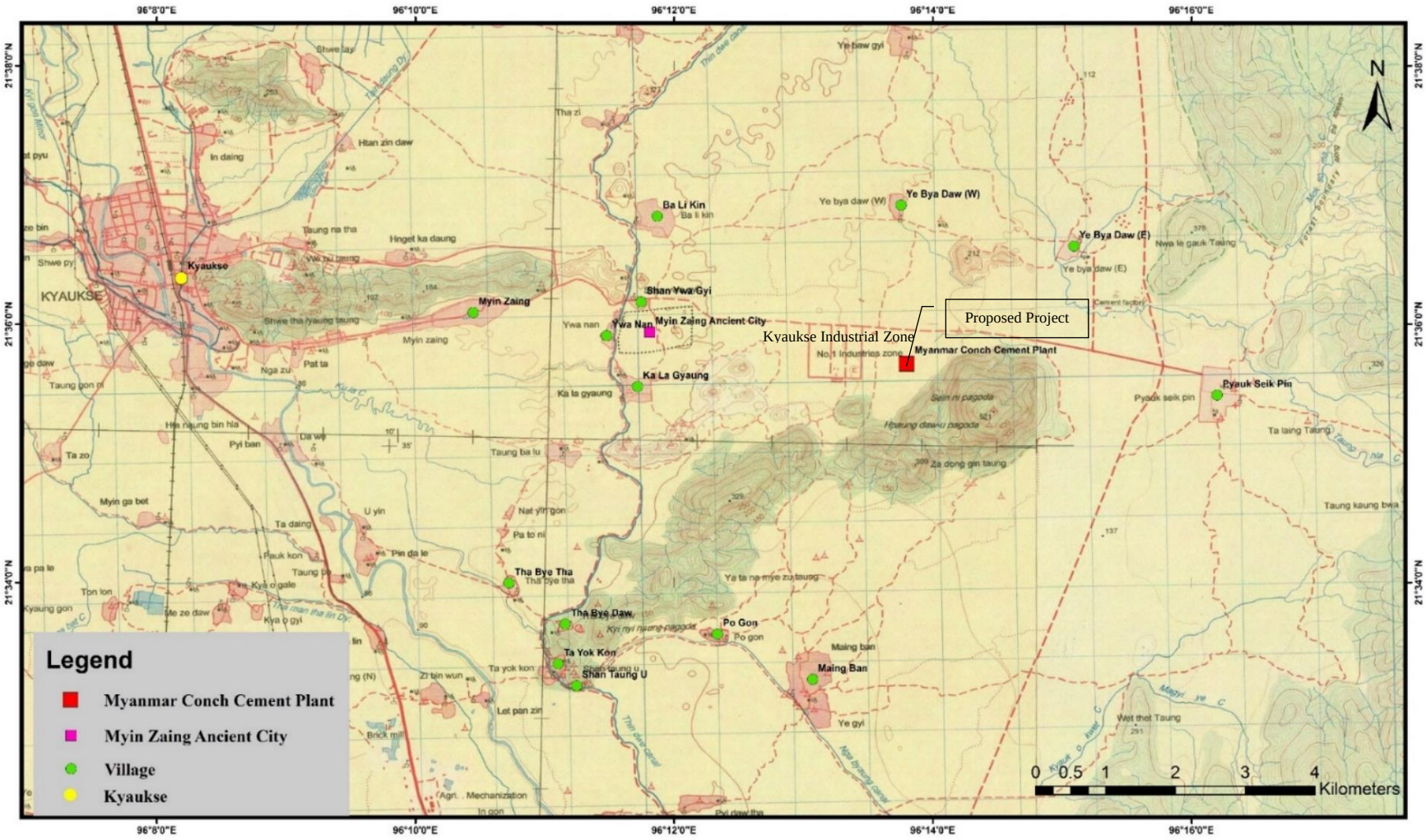


Figure 4-39 Location of Villages and Other Facilities Around the Proposed Project

Table 4.40 Location of Villages in the Project Area

No.	Name of Village	Latitude (North)	Longitude (East)	Elevation (meter)	Distance (km)
1	ShanYwarGyi	21° 36' 12"	96° 11' 46"	61	3.72
2	Pyaukseikpin	21° 35' 26"	96° 16' 18"	156	4.1
3	YwarNan(East)	21° 35' 53"	96° 11' 29"	111	3.95
4	KaleGyaung	21° 35' 33"	96° 11' 39"	91	3.5
5	TaungPaLu	21° 35' 0.1"	96° 11' 0.6"	88	4.63
6	YeByarTaw(West)	16° 20' 43"	97° 50' 44"	65	2.44
7	Myin Zaing Ancient City	21°35'55.55"	96°11'50.99"	97	3.1

Source: Field survey

4.3.6.1 Methodology

Stakeholder Meeting, Semi-structured Interviews and Questionnaire Distribution are done to cover representatives from the General Administrative Department, Kyaukse Township. There are 140 respondents in the survey, and the survey focused to measure on potential impacts of the project to surrounding residential area. Primary data are collected and, later, assessed by qualitative and quantitative measurements.

4.3.6.2 Demography

Table 4.41 Total Population of the Study Area

Factory/Village	House	Household	Male	Female	Total Population	Sample Size
Workers	450	450	1,050	1,047	2,097	20
ShanYwarGyi	140	143	323	345	668	20
Pyaukseikpin	905	1,015	2,012	2,163	4,175	20
YwarNan(East)	3120	139	290	291	3840	20
KaleGyaung	270	270	592	639	1771	20
TaungPaLu	244	244	497	494	991	20
YeByarTaw(West)	126	126	251	273	524	20

Source: Field survey, December 2014

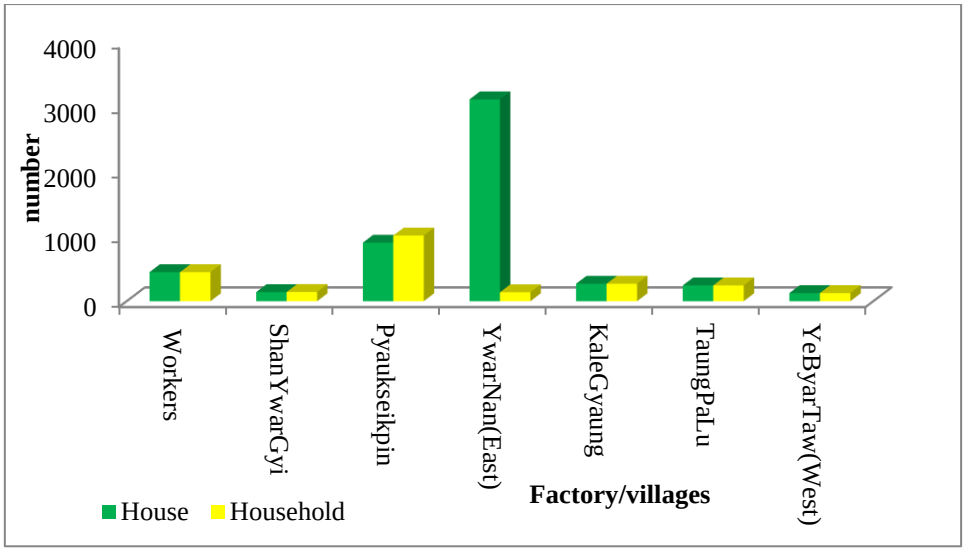


Figure 4-40 Houses and Households of the Study Villages

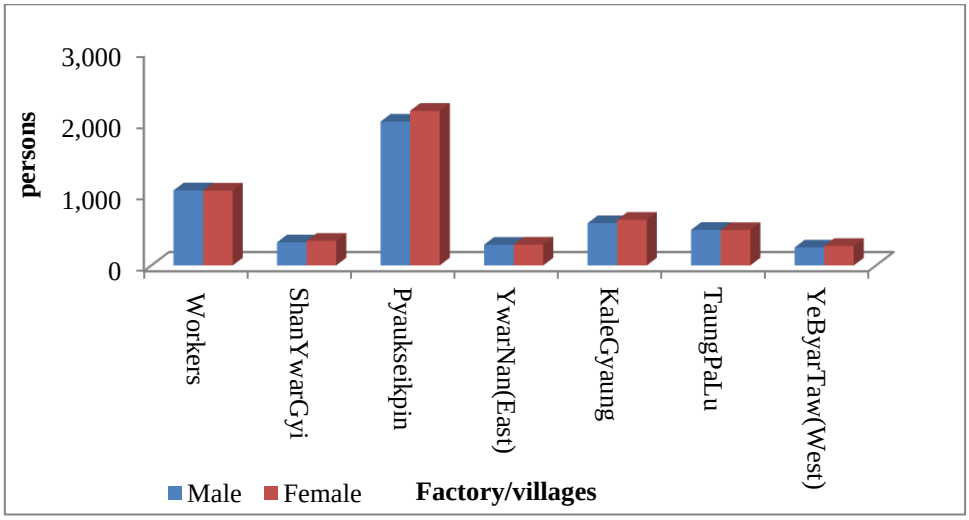


Figure 4-41 Total Population by Gender in the Study Wards

4.3.6.3 Socio-economic Profile of the Study Villages

Gender, Age Composition and Family Size

Field surveys and semi- structured interviews are done in four sample groups within the project area. The respondents are 64 males (46 percent of total respondents) and remaining are 76 females (54 percent of the respondents). Most of the respondents belong to Bamar ethnic group and they are Buddhists. Respondents on semi- structured interviews mainly represented age group between 21 years old and over 60 years old. Most of the respondents belong to age group above 35 years except Kale Gyaung Village where age group below 35 years is also high.

Table 4.42 Age Composition of respondents (%)

Factory/Village	20-34years	35-49	50-64	above 65
Workers	35	45	20	0
ShanYwar Gyi	25	45	25	5
Pyaukseikpin	45	35	15	5
YwarNan(East)	40	30	30	0
Kale Gyaung	35	20	40	5
Taung Pa Lu	15	30	35	20
Ye Byar Taw (West)	10	45	30	15

Source: Field Survey, December 2014

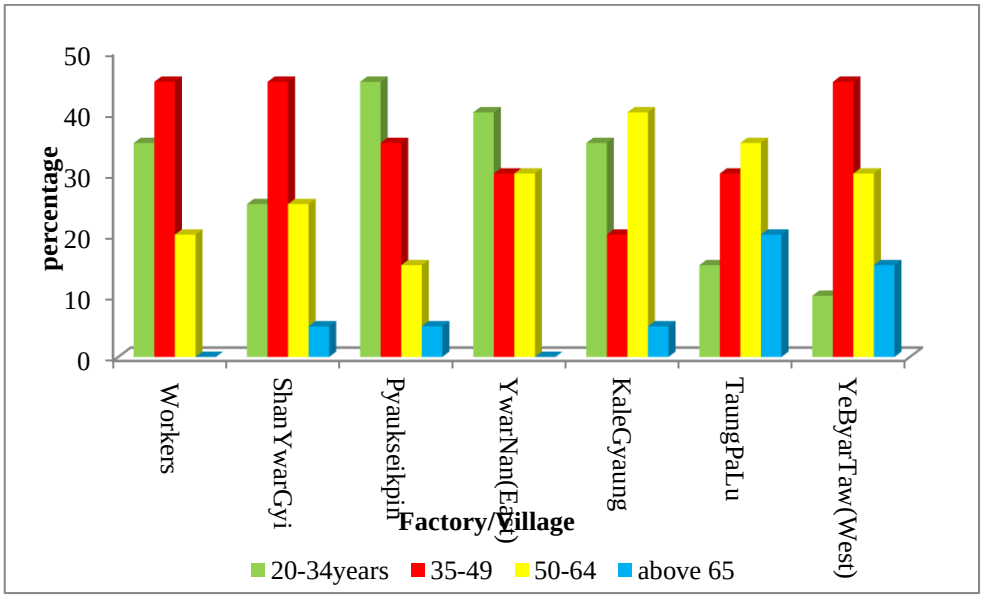


Figure 4-42 Age Composition of respondents (%)

Family size of respondents can be grouped into three classes as;

1. Family with 1 to 3 persons,
2. Family with 4 to 6 persons, and
3. Family with more than 6 persons.

High number of respondents with big families (more than 6 persons) is found in Factory' workers and Ye Byar Taw (West) Village. Respondents with small families (1 to 3 persons) are mainly found in Pyaukseikpin village

Table 4.43 Family size of respondents (%)

Factory/Village	1 to 3 persons	4 to 6	above 6 persons
Workers	35	60	5
ShanYwar Gyi	30	45	25
Pyaukseikpin	40	40	20
YwarNan (East)	30	55	15
Kale Gyaung	25	55	20
Taung Pa Lu	10	75	15
Ye Byar Taw (West)	10	60	30

Source: Field Survey, December 2014

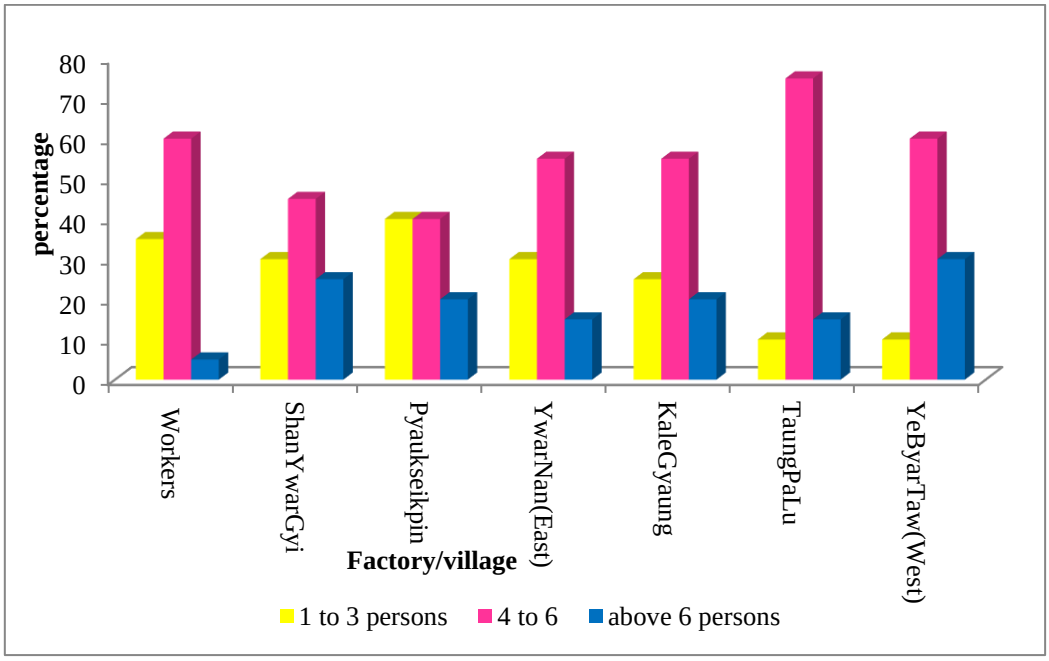


Figure 4-43 Family sizes of respondents (%)

Education Level

High percentage of no schooling level among the respondents is found in ShanYwar Gyi and Ywar Nan (East) villages. High percentage of graduate level are found in Factory's workers and Pyaukseikpin Village. Respondents of monastic education level is mainly found in Taung Pa Lu and Ye Byar Taw (West) villages. In general, most of the respondents are in the basic education levels from primary school to high school.

Table 4.44 Education Level of Respondents (%)

Factory/Village	No schooling	Primary school	Middle school	High school	Graduate	Monastic school
Workers	0	10	0	15	70	5
ShanYwarGyi	15	45	5	10	0	25
Pyaukseikpin	0	60	10	0	15	15
YwarNan(East)	10	35	15	10	5	25
KaleGyaung	0	40	30	10	0	20
TaungPaLu	5	30	10	0	5	50
YeByarTaw(West)	0	35	15	0	0	50

Source: Field Survey, December 2014

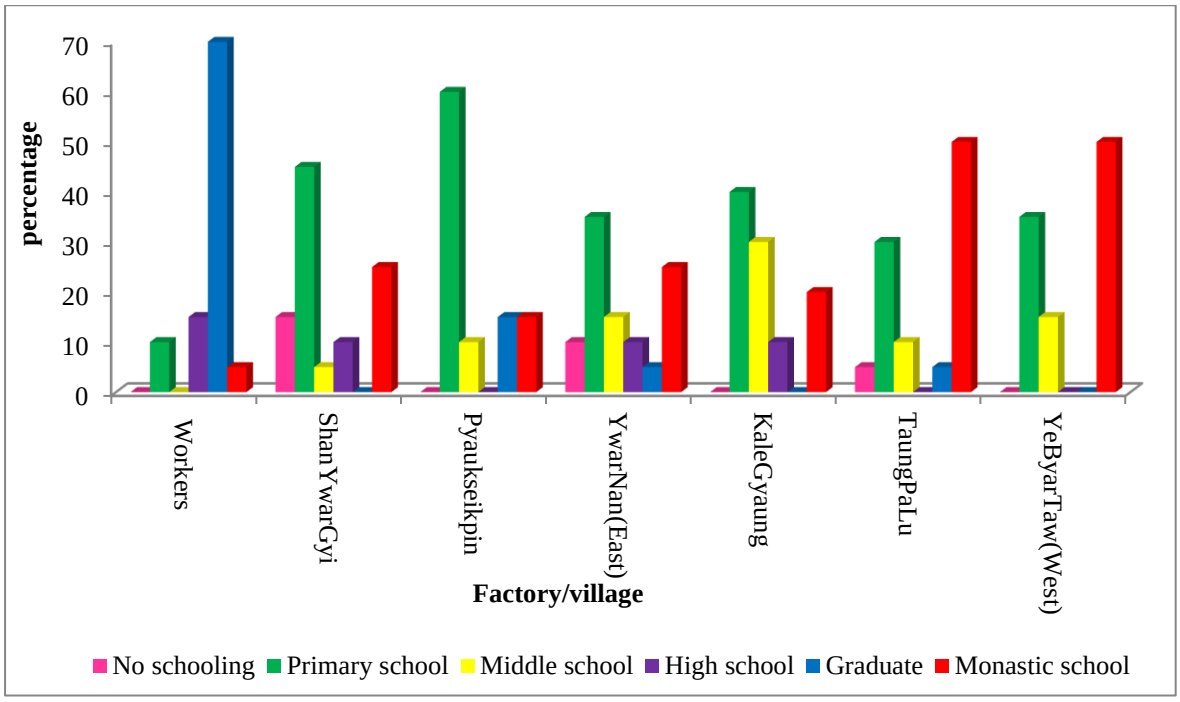


Figure 4-44 Education Level of Respondents (%)

Occupational Structure

According to the field survey data, type of occupation includes factory, agriculture, seller and odd jobs. Most of the villagers are farmers and workers. There are some sellers in ShanYwar Gyi, Pyaukseikpin and Ywar Nan (East) villages. Dependents are mainly found in Kale Gyaung Village. Odd jobs are also common among the respondents.

Table 4.45 Profile of Occupational Structure in the Study Villages (%)

Factory/Village	Factory	Farmer	Odd jobs	Seller	Dependent	Others
Workers	100	0	0	0	0	0
ShanYwar Gyi	0	40	30	10	5	15
Pyaukseikpin	5	55	5	10	0	25
YwarNan(East)	0	55	20	10	0	15
Kale Gyaung	0	40	20	0	10	30
Taung PaLu	0	65	20	0	0	15
Ye Byar Taw (West)	0	90	10	0	0	0

Source: Field Survey, December 2014

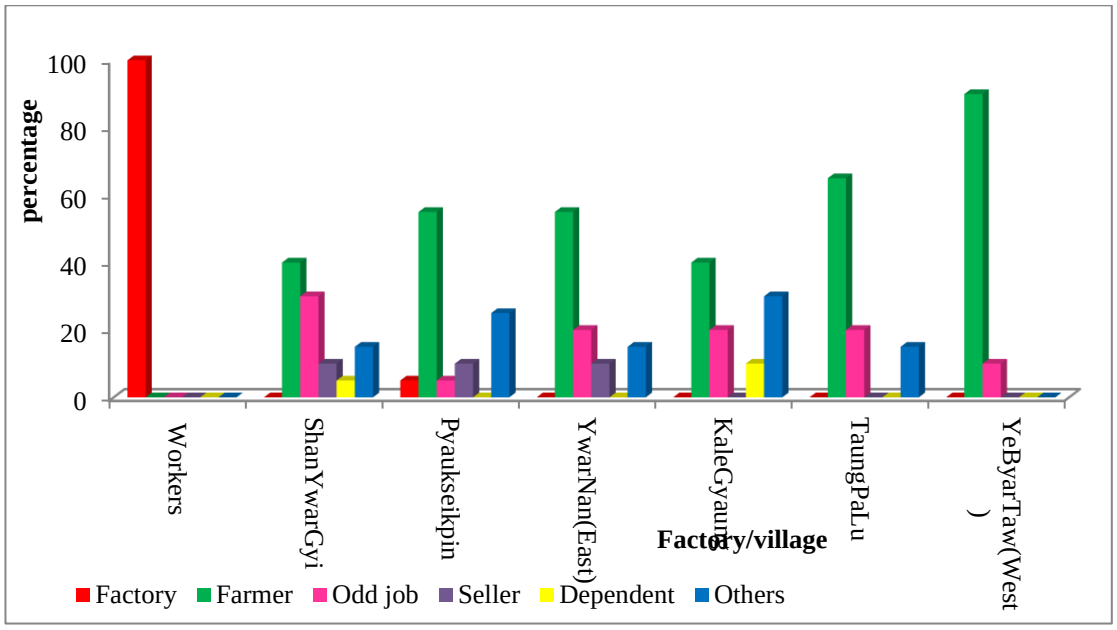


Figure 4-45 Profile of Occupational Structure in the Affected Villages (%)

Income Level and Source of Income

Income level of people in the affected villages is measured by using primary data received from field survey in December, 2014. More than 40 percent of respondents from ShanYwar Gyi and Ywar Nan(East) villages are in the income level of above 10.1 to 15 lakh (kyats) per year. There are some respondents in the income level of below 5 lakh (kyats) per year. Main source of income for all villages is agriculture except Factory' workers.

Table 4.46 Income Level of the Affected Villages (%)

Factory/Village	<5lakh kyats	5-10lakh	10.1-15lakh	15.1-20lakh	>20lakh
Workers	0	0	25	15	60
ShanYwarGyi	0	10	45	20	25
Pyaukseikpin	20	5	25	35	15
YwarNan(East)	5	5	40	25	25
KaleGyaung	10	20	25	15	30
TaungPaLu	10	15	5	45	25
YeByarTaw(West)	5	15	35	10	35

Source: Field Survey, December 2014

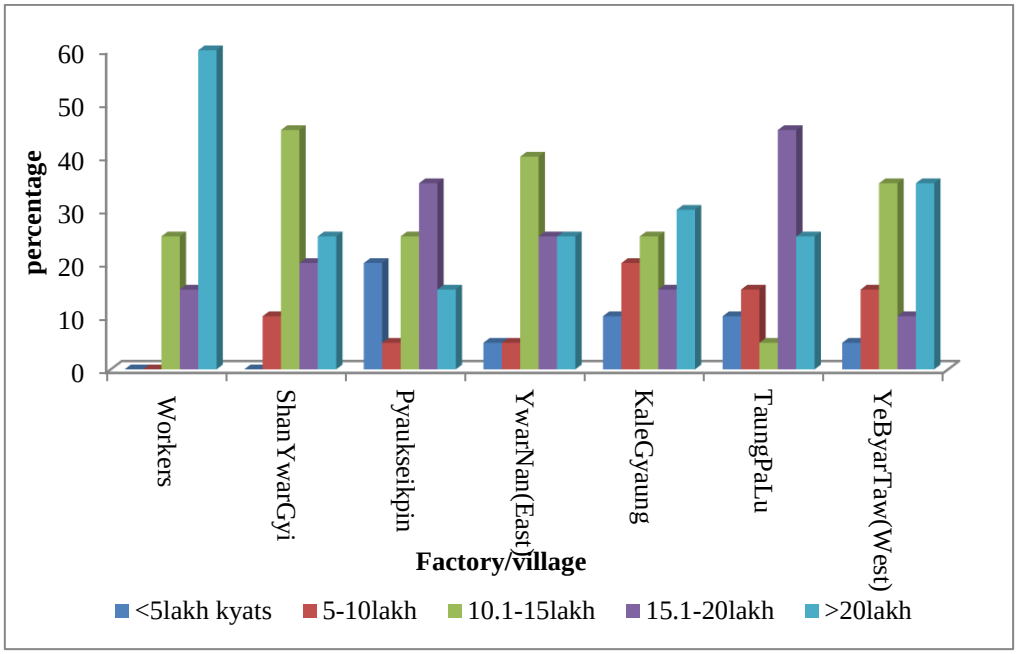


Figure 4-46 Income Levels of Respondents (%)

Expenditure

Most of the respondents spend 1 to 2 lakh Kyats for their family expenditure. About 15 percent of respondents from Kale Gyaung Village have expenditure over 3.1 lakh Kyats. Small expenditure group is found in ShanYwar Gyi and Pyaukseinpin villages where the respondents can spend only below 1 lakh Kyats for general expenses.

Table 4.47 Expenditure of Respondents per month (%)

Factory/Village	<1lakh kyats	1 to 2 lakh	2.1-3 lakh	>3.1 lakh
Workers	5	50	35	10
ShanYwar Gyi	60	35	0	5
Pyaukseikpin	65	20	10	5
Ywar Nan(East)	55	30	10	5
Kale Gyaung	35	35	15	15
Taung Pa Lu	50	40	5	5
Ye Byar Taw (West)	25	70	0	5

Source: Field survey, December 2014

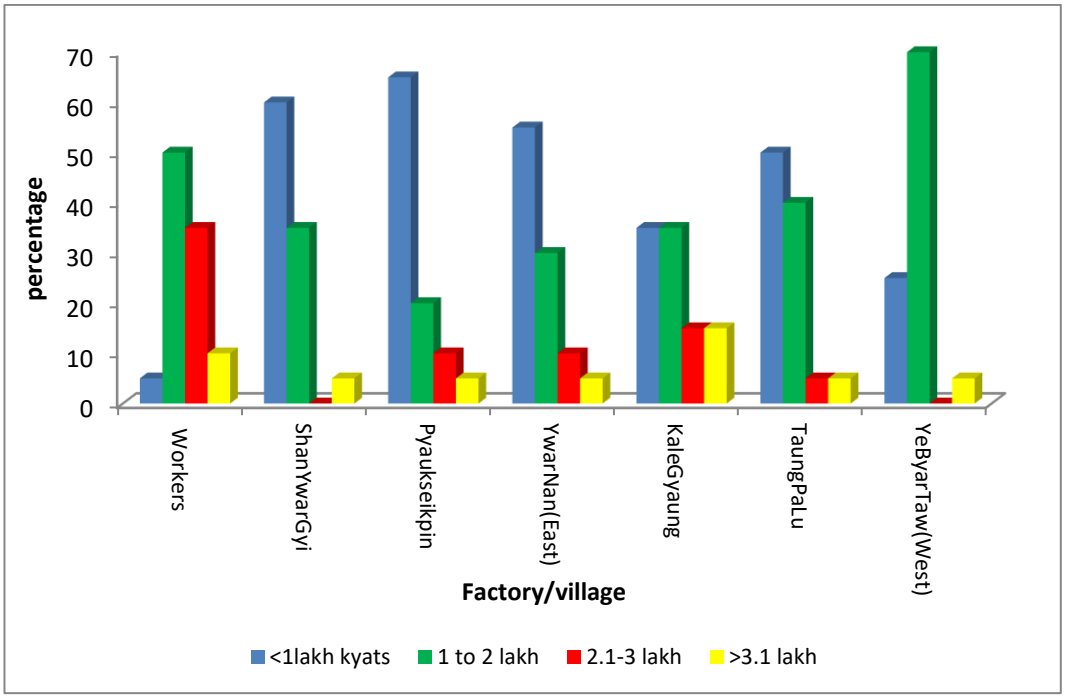


Figure 4-47 Expenditure of Respondents (%)

Possession

All respondents own their houses. Type of houses found in the affected villages are pucca house, Semi-pucca, wooden houses and huts. Most of the respondents owned wooden houses. High (over 70%) percentage of respondents from Pyaukseikpin, Ywar Nan (East) and Taung Pa Lu villages owned wooden houses. However, high percentage (40%) of respondents from Factory' workers owned concrete houses.

Table 4.48 Types of Houses of Respondents (%)

Factory/Village	Concrete	Semi-concrete	Wooden	Hut
Workers	40	30	30	0
ShanYwar Gyi	10	15	55	20
Pyaukseikpin	5	10	75	10
Ywar Nan(East)	5	5	80	10
Kale Gyaung	10	0	55	35
Taung Pa Lu	0	10	80	10
Ye Byar Taw (West)	5	10	55	30

Source: Field survey, December 2014

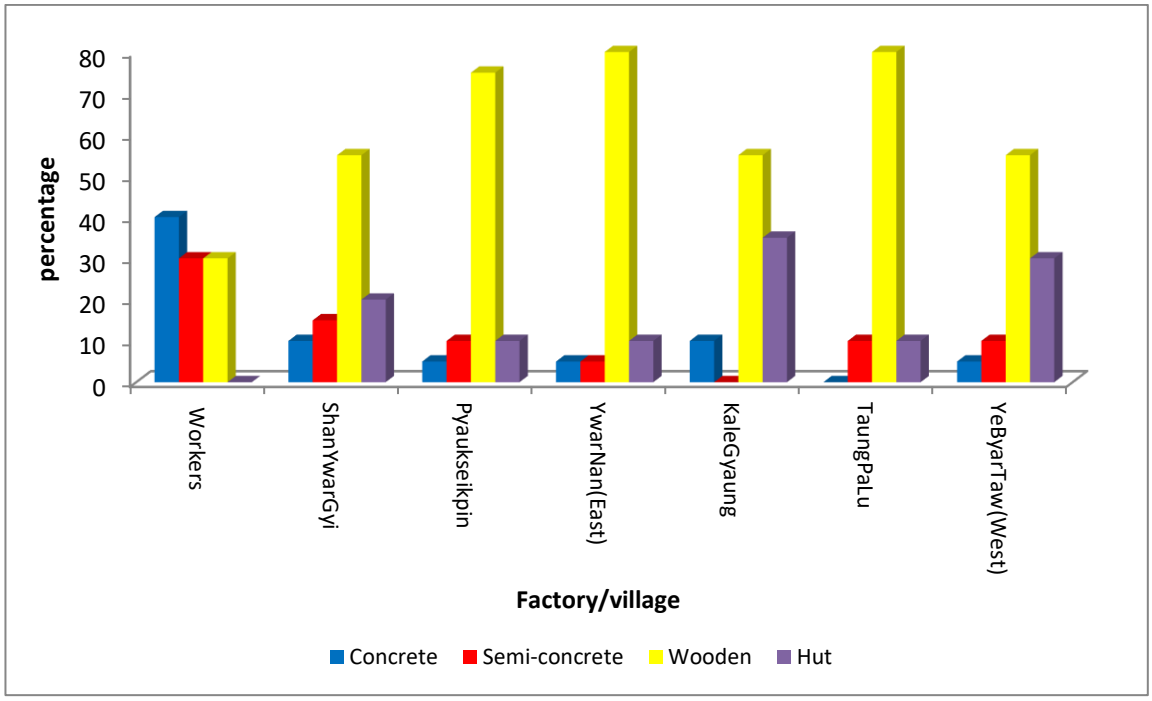


Figure 4-48 Types of Houses of Respondents (%)

Most of the respondents owned TV and Video sets (DVD), generator, sewing machines, motor bike and hand phones. All of the respondents owned TV, DVD and Hand phones.

Table 4.49 Possession of Respondents (%)

Factory/Village	TV	DVD	Hand phone	Generator	Sewing	Motor Bike
Workers	90	80	95	0	10	20
ShanYwar Gyi	45	45	70	5	5	30
Pyaukseikpin	45	45	65	0	20	35
Ywar Nan (East)	60	55	80	15	10	45
Kale Gyaung	45	45	95	10	0	35
Taung Pa Lu	50	50	85	20	10	45
Ye Byar Taw (West)	45	30	85	5	5	35

Source: Field survey, December 2014

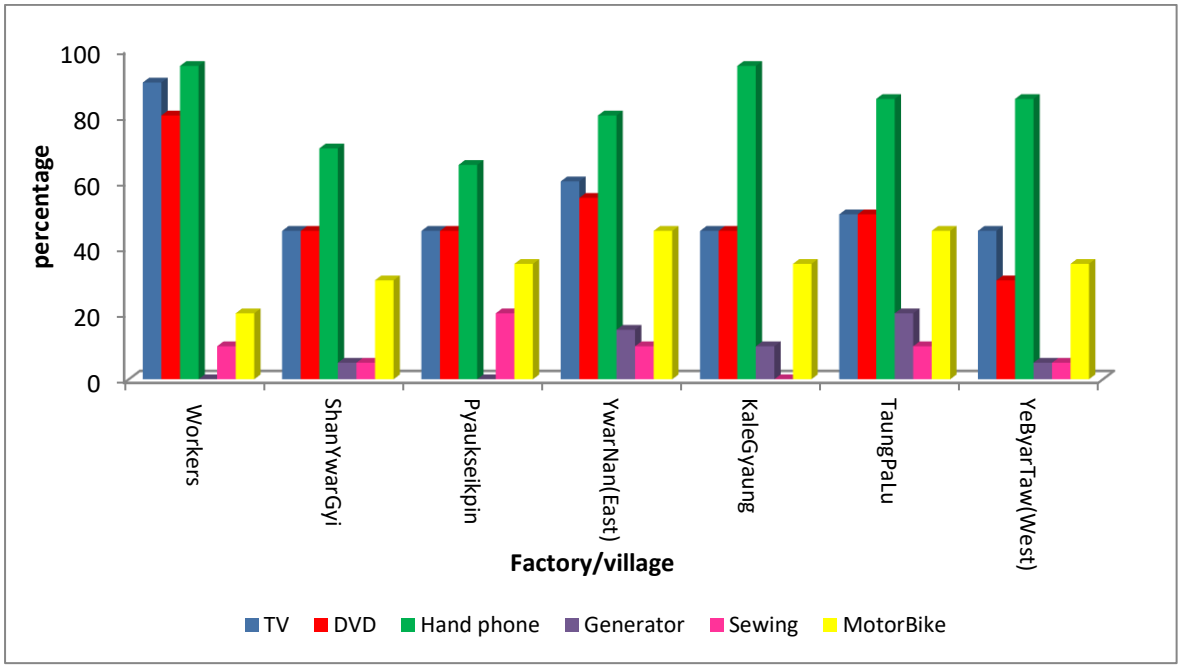


Figure 4-49 Possession of Respondents (%)

Transportation Status

All respondents travelled to Kyaukse at least once a month for shopping, medical treatments and social affairs. They also travelled to Yangon, Mandalay and Naypyitaw. Most of the respondents said that the status of transport is good enough for them.

Table 4.50 Satisfactory on Status of Transport of Respondents (%)

Factory/Village	Yes	No
Workers	80	20
ShanYwar Gyi	95	5
Pyaukseikpin	100	0
Ywar Nan (East)	85	15
Kale Gyaung	90	10
Taung Pa Lu	95	5
Ye Byar Taw (West)	95	5

Source: Field survey, December 2014

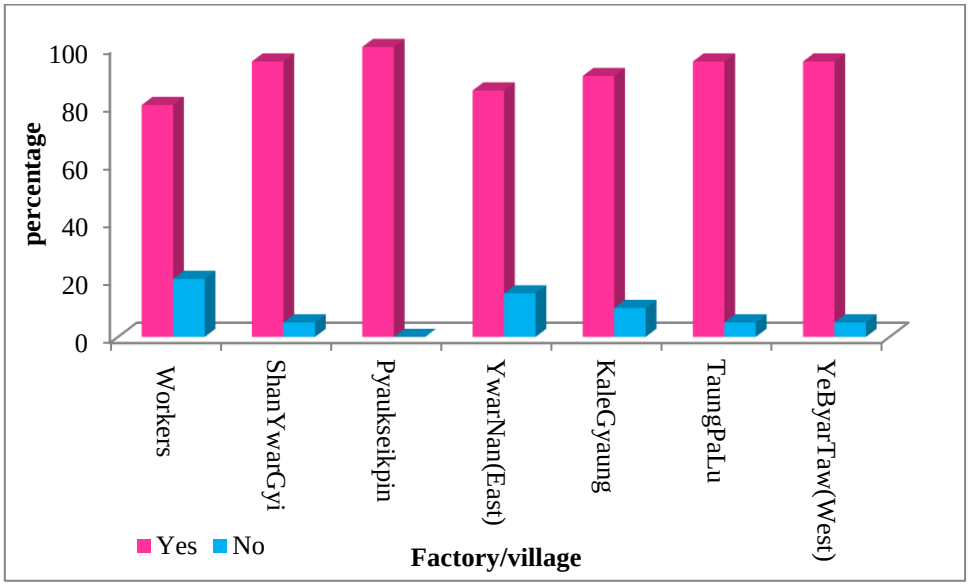


Figure 4-50 Satisfactory on Status of Transport of Respondents (%)

Most of the respondents from villages considered that transport is in normal condition. Some percentages from all respondents revealed that transport condition is good enough for them.

Table 4.51 Opinion on Transport (% of Respondents)

Factory/Village	Good	Normal	Bad
Workers	25	75	0
ShanYwar Gyi	25	75	0
Pyaukseikpin	35	65	0
Ywar Nan (East)	35	60	5
Kale Gyaung	15	65	40
Taung Pa Lu	25	65	10
Ye Byar Taw (West)	60	35	5

Source: Field survey, December 2014

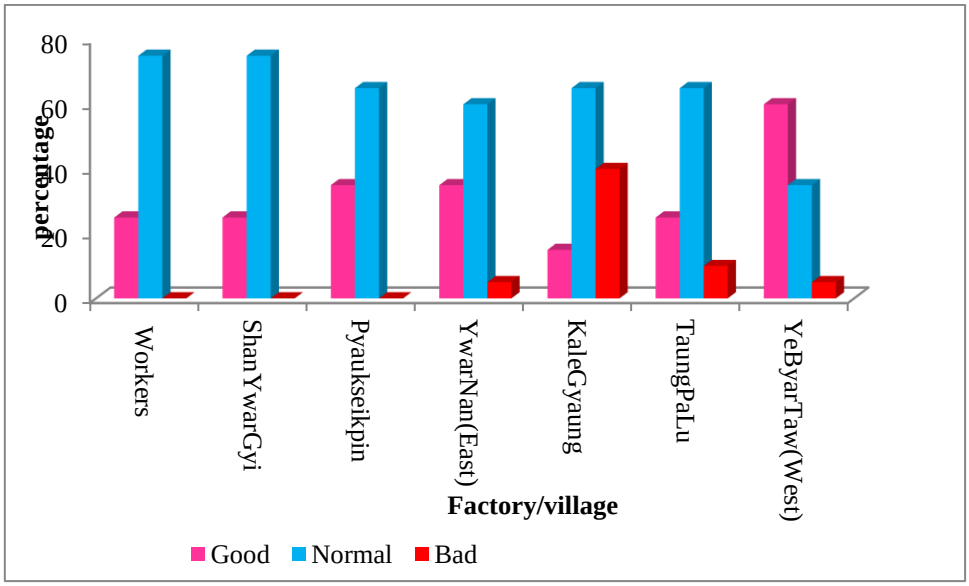


Figure 4-51 Opinion on Transport of Respondents %)

Transportation Survey at the Project Area

Most of the information on traffic flow was collected from local traffic control. Direct observation was done for 48 hour period to determine the average condition within two days from Friday to Sunday.

In each sample traffic points, number of vehicles and average weight loaded were collected on the basis of 48 hours period.

1) Summary of sampling point

Sampling point located on the road network of Tae Kyaukse Industrial Zone, Kyaukse Cement Factory Project area assigned to collect traffic data. In order to measure the traffic conditions on the

road which connect to the proposed Kyaukse Cement Factory Project, point 1 is selected on Kyaukse-Pyaukseikpin Road. The locations of sample point are as shown in Table 4.52 and Figure 4.52.

Table 4.52 Sample Points for Vehicle Traffic Survey

Sample point	Coordinates	Description of Sampling Point
Entrance of Kyaukse Industrial Zone	North 21˚ 36' 52", East 96˚ 1' 58"	On the Kyaukse-Pyaukseikpin Road

Source: Field Survey, REM

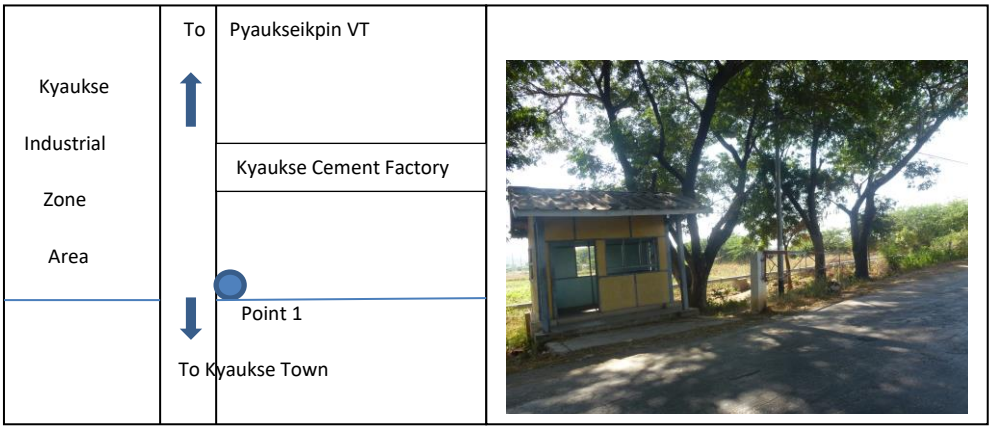


Figure 4-52 Location of Point No. 1

2) Survey Period

Vehicles traffic surveys were conducted for for 48 hours in 1 weekday and 1 weekend.

Table 4.53 Sampleing Duration for Vehicles Traffic Survey

Sample point	Date/ Time
Point No.1	22.6.2014 to 23.6.2014 (6:00 am to 6:00 pm, Sunday and 6:00 am to 6:00 pm, Monday)

Source: Field Survey, REM

3) Survey Method

(1) Methodology

- Manual Count Method
- Using Counter, book and pen
- On each sampling points, traffic volumn and average traveling velocity for each classification of vehicle were measured. The classification of vehicles is as shown in Table 4.54.

Table 4.54 Classification of VehiclesTypes

No.	Classification	Description
1	Motor Bike	Motor bike
2	3 wheeled vehicle	Small car
3	4 wheeled vehicle	Pick-up, Jeep,Taxi, Saloon, Parjero, Surf, Light truck
4	6 to 22 wheeled heavy vehicle	Medium and big Heavy truck

Source: Field Survey, REM

4) Survey Result

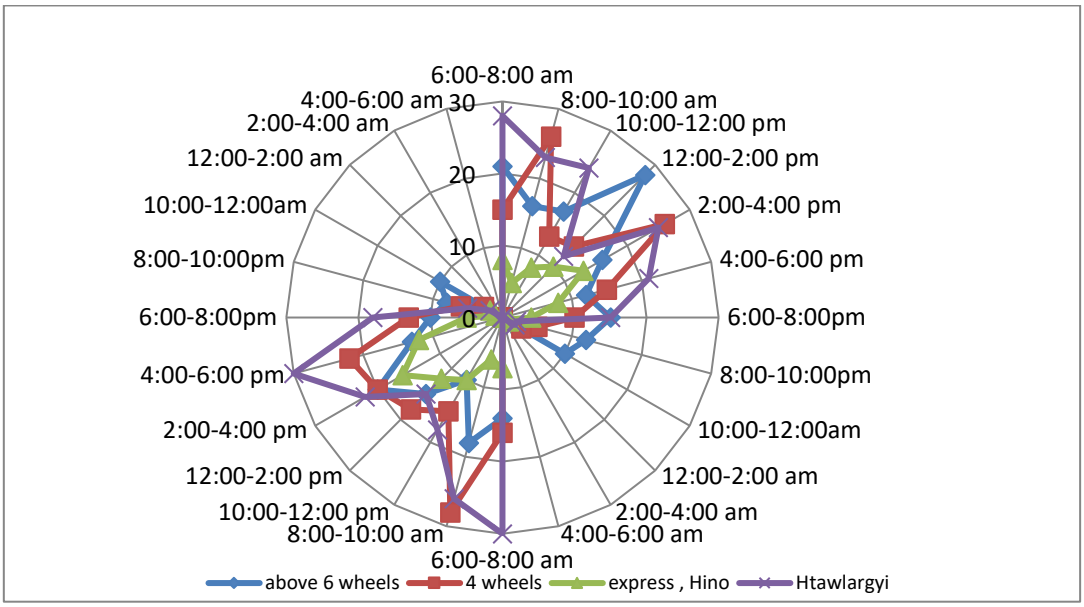
(1) Point No. 1

Most of the vehicles passed through point 1 were big trucks 4 wheeled and above 6 wheeled vehicles. Other vehicles include trucks with 4 wheeled, express, hino and small Htawlagyi. Most of the motor bike are found at point 1 during that period.

Table 4.55 Vehicle Traffic Volume on Point No.1 within 48 Hours Period

Day	Time	above 6 wheels	4 wheels	Express , Hino	Htawlargyi	Motor bike
Friday	6:00-8:00 am	21	15	8	28	70
	8:00-10:00 am	16	26	5	23	106
	10:00-12:00 pm	17	13	8	24	153
	12:00-2:00 pm	28	14	10	12	142
	2:00-4:00 pm	16	26	13	25	118
	4:00-6:00 pm	12	15	8	21	177
	6:00-8:00pm	15	10	4	15	52
	8:00-10:00pm	12	5	1	2	16
	10:00-12:00am	10	3	1	2	5
Saturday	12:00-2:00 am	0	0	0	0	0
	2:00-4:00 am	0	0	0	0	0
	4:00-6:00 am	0	0	0	0	0
	6:00-8:00 am	14	16	7	30	112
	8:00-10:00 am	18	28	6	26	83
	10:00-12:00 pm	10	15	10	18	148
	12:00-2:00 pm	15	18	12	15	188

	2:00-4:00 pm	20	20	16	22	173
	4:00-6:00 pm	13	22	12	30	151
	6:00-8:00pm	10	13	5	18	32
	8:00-10:00pm	8	6	1	5	12
	10:00-12:00am	10	3	2	2	8
	12:00-2:00 am	0	0	0	0	0
	2:00-4:00 am	0	0	0	0	0
	4:00-6:00 am	0	0	0	0	0



Source: Field Survey, REM

Figure 4-53 Vehicle Traffic Volume on Point No.1 within 24 Hours Period, Point No.1

Figure 4-54 Photo showing the transportation in the Study Area

4.3.7 Information on Regional Development

As for local development activities in Kyaukse Township, there are activities carried out by the Department of Rural Development and local development activities carried out by the government and the people, including roads, bridges, water supply, electricity supply, and rural housing development.

Major economy of Kyauske Township is agriculture. Industrial activities are also found in there and limestone quarry and cement production are widely observed. Kyaukse Industrial Zone is in Kyaukse Township. There has industries owned by government and private factories are also existed in there. The list of factories and industries are provided in the followings.

Table 4.56 List of Industries/ Factories in Kyaukse Township

No	Industries/ Factories	Ownership
1	Shoe Factory	Private
2	Sewing Machine Factory	Private
3	No. (9), Textile Factory	Government
4	No. (2), Plastic Factory	Government
5	No. (33), Heavy Industry	Government
6	No. (36), Heavy Industry (Mirror)	Government
7	No. (33), Heavy Industry (Cement)	Government
8	No. (39), Heavy Industry	Government
9	No. (2) Farming Equipment Manufacturing Factory	Government
10	No. (2), Pharmaceutical Factory	Government
11	Home appliance manufacturing Factory	Government
12	Sin Min Cement Industry	Private
13	AAA Cement Factory	Private
14	Myanmar Elephant Cement Factory	Private
15	Penang Bag Factory	Private
16	Bicycle Manufacturing Factory	Private
17	Double Rhinos Cement Factory	Private

Source: Kyaukse Township Profile, GAD

4.3.8 Government related Infrastructure

In accordance with township data, six hospitals are provided for Kyaukse township by the government. As medical clinic, there has twenty-seven clinics in total. Furthermore, twenty-eight rural health centers are also provided for rural area. Within the studied area, there three rural health centers and one township hospital.

In the studied area, 7 post-primary schools, 2 high schools are observed and the villages which have schools can be seen as follows.

Table 4.57 Education Structure in the studied villages

Village	Type of Schools	Number of School	Number of Teacher	Number of Student
Hpo Kone	Post-primary School	1	2	23
	High School	1	-	-
Hmaing Pan	Post-primary School	1	4	76
	High School	1	18	300
Hpyauk Seik Pin	Post-primary School	1	7	300
	High School	1	12	330
Kalay	Post-primary School	1	6	200
Thin Ga Tom	Post-primary School	1	6	103
Yae Hpyar Taw (E)	Post-primary School	1	6	160
Yae Hpyar Taw (W)	Post-primary School	1	4	100

There are no other government offices or universities in the vicinity of the proposed project. It is located only in Kyaukse city.

4.3.9 Visual Components

As visual components, Kyuaukse region has limestone mountains and beautiful hills. Moreover, ancient city and its archaeological sites can be seen in Kyaukse township.

a) Aesthetic

Kyaukse township has lots of period features and glorious views of the surrounding hills, forest, and archaeological sites. Because of limestone mountain, mining sites and factories are also another view matching the natural environment. Including residential area, Kyaukse township is full of natural beauty, historical features, and human environments.

Project site is situated on the mountains and far away from the residential area and archaeological sites. Therefore, there is any disturbance to the aesthetic view of the residents.

b) Landscape

In accordance with geographical features, limestone mountains and surrounded hills can be seen in Kyaukse township including mining sites and cement factories. Because there was ancient city in Kyause region, historical buildings complete the features of Kyause township. Besides, forest area is

observed more than residential area. That's why Kyaukse township has different features including natural and manmade landscape.

For the studied area, being the industrial zone, factories, mining, mountains, and forest are excited together with villages in this region. Therefore, natural, and manmade landscape can be seen at the same place within the studied area.

c) Cultural Landmarks

As Buddhism is dominant in Kyaukse township, famous religious buildings are including cultural landmarks. Tamoke Shwegugyi, Shwetheindaw, Shwehsatthwar, Shwemuhtaw and Shwethalyaung are famous among Buddhists, and they have strong belief on bringing good lucks.

Apart from religious monuments, archaeological sites are also famous cultural landmarks because it was ancient city expressing history of Kyaukse region. These were significant among observers and researchers.

Within the studied area, except the pagodas, there is not any significant cultural landmarks.

4.3.10 Disaster

According to the data of Government Administration Department (2018), the disasters of floods, cyclones and fire are occurred in Kyaukse Township.

Table 4.59 Lists of natural disasters in Kyaukse Township

No.	Type of Disaster	Frequency	No. of dead/loss	Loss of building	Loss of budget (MMK)
1	Cyclone	2	-	- 5 houses - 1school	0.29
2	Flood	7	-	- road and bridge	0.40
3	Fire	2	-	-3 houses	0.1935

Source: Government Administration Department (2018)

CHAPTER V

ENVIRONMENTAL IMPACT ASSESSMENT

5.1 Introduction

This chapter discusses environmental impacts caused by project both the biophysical and socio-economic and cultural environment within the project's area of influence. According to the IFC's Performance Standard 1, PS 1 underscores the importance of managing environmental and social performance throughout the life of a project. An effective Environmental and Social Management System (ESMS) is a dynamic and continuous process initiated and supported by management, and involves engagement between the client, its workers, local communities directly affected by the project (the Affected Communities) and, where appropriate, other stakeholders.

Drawing on the elements of the established business management process of "plan, do, check, and act," the ESMS entails a methodological approach to managing environmental and social risks and impacts in a structured way on an ongoing basis. A good ESMS appropriate to the nature and scale of the project promotes sound and sustainable environmental and social performance, and can lead to improved financial, social, and environmental outcomes.

The objectives of the PS1 are:

- To identify and evaluate environmental and social risks and impacts of the project.
- To adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimize, and, where residual impacts remain, compensate/offset for risks and impacts to workers, Affected Communities, and the environment.
- To promote improved environmental and social performance of clients through the effective use of management systems.
- To ensure that grievances from Affected Communities and external communications from other stakeholders are responded to and managed appropriately.
- To promote and provide means for adequate engagement with Affected Communities throughout the project cycle on issues that could potentially affect them and to ensure that relevant environmental and social information is disclosed and disseminated.

Therefore, ESIA is regarded as a decision-making tool which provide the information needed to manage to allow full consideration of environmental interests likely to have significant environmental impact. The ESIA report details how the project will affect the environment and whether alternative (including no project option) should be considered in a more sustainable mean.

EIA team has visited the project site and spent to acquire necessary data. Collected sample are analyzed in the laboratories (water, soil, etc.). Moreover, environmental noise observation, ambient air status of the existing project sites, biodiversity data collection and assessing are conducted. At the same time, SIA team has done frequent field trips to the potential project affected area for collection

of existing socio-economic situation including public health information and conducted interviews and consultation with people from affected communities.

5.1.1 Scope of ESIA

The scope of ESIA is generally considered to include construction and installation of new cement plant, transportation, and storage of material for construction and operation phase of the proposed project.

5.1.2 Objective of Impact Assessment

The overall object of EIA is to provide a tool where by the adverse or beneficial environmental and social impacts of the projects are systematically identified, evaluated and alleviated the significant degree of adverse impact to reach an acceptable range by applying effective mitigation measures. In this approach, early recognition and avoidance of sensible issues would deliver the key beneficial inputs in decision making process of project proponent whereas to avoid any unwanted environmental and social issues of the project existence in the area.

The specific objectives of Impact Assessment are

- Collection of baseline data
- Scope, assess and evaluate the potential environmental impact of the proposed development
- Recommend mitigation and enhancement measures towards avoidance, minimization, and rehabilitation of impacts

5.2 Methodology

In order to prepare the impact assessment, assessment team has referred the information provided by company and as well as all possible secondary data information, also from field through site observation, primary data collection and public consultation with the combination of professional judgments. The impact assessment was done according to the following methodology.

- **Magnitude** is a measure of the degree of change in a measurement or analysis (e.g. the concentration of a metal in water compared to the water quality guideline value for the metal) and is classified as non/negligible, low, moderate or high. The categorization of the impact magnitude may be based on a set of criteria (e.g. health risk levels, ecological concepts and/or professional judgment) pertinent to each of the discipline areas and key questions analyzed. The specialist study must attempt to quantify the magnitude and outline the rationale used. Appropriate, widely-recognized standards are used as a measure of the level of impact.

- **Duration** refers to the length of time over which an environmental impact may occur: i.e. transient (less than 1 year), short-term (0 to 5 years), medium-term (5 to 15 years), long-term (greater than 15 years with impact ceasing after closure of the project) or permanent.
- **Scale/Geographic extent** refers to the area that could be affected by the impact and is classified as site, local, regional, national or international.
- **Probability of occurrence** is a description of the probability of the impact actually occurring as improbable (less than 5% chance), low probability (5% to 40% chance), medium probability (40% to 60% chance), highly probable (most likely, 60% to 90% chance) or definite (impact will definitely occur).
- **Impact significance** was rated by the specialists using the scoring system shown in the box below.

Scoring System for Assessment of Significance

Magnitude		Duration		Scale		Probability	
10	Very high	5	Permanent	5	International	5	Definite
8	High	4	Long-term	4	National	4	High probable
6	Moderate	3	Medium-term	3	Regional	3	Medium probability
4	Low	2	Short-term	2	Local	2	Low probability
2	Minor	1	Transient	1	Site only	1	Improbable
1	None					0	None

After ranking these factors for each impact, the significance of the two aspects, occurrence and severity, was assessed using the following formula:

SP (significance points) = (magnitude + duration + scale) x probability

The maximum value is 100 significance points (SP). The potential environmental impacts were then rated as of **High** (SP > 75), **Moderate** (SP 30 – 75) or **Low** (SP < 30) significance, both with and without mitigation measures on the following basis:

SP > 75	Indicates **high** environmental significance	Where it would influence the decision regardless of any possible mitigation. An impact which could influence the decision about whether or not to proceed with the project.
SP 30 - 75	Indicates **moderate** environmental significance	Where it could have an influence on the decision unless it is mitigated. An impact or benefit which is sufficiently important to require management. Of moderate significance – could influence the decisions about the project if left unmanaged.
SP < 30	Indicates **low** environmental significance	Where it will not have an influence on the decision. Impacts with little real effect and which should not have an influence on or require modification of the project design or alternative mitigation.
+	**Positive impact**	An impact that is likely to result in positive consequences/ effects.

5.3 Potential Impact Evaluation (Construction Phase)

5.3.1 Dust and Air Pollution

The construction activities at the cement plant include the following main steps:

- preparation works and excavation;
- concrete works;
- structure installation and assembling; and
- commissioning.

During the construction phase, emissions of air pollutants at the cement plant site are mainly associated to transportation (i.e., vehicle movement), earth works, foundation works, dismantling, construction, and site clearance activities.

Construction phase activities will generate the following main types of air emissions:

- combustion and exhaust emissions generated from the construction equipment, generators and vehicles; and
- fugitive dust generated by earthworks including excavation, backfilling, grading, equipment movement, material piling, loading and unloading, and demolition of decommissioned buildings.

In any case, it should be noted that these emissions are concentrated in a limited period of time and occur inside the boundaries of the cement plant. The repercussions are entirely acceptable and will only affect the plant area.

Magnitude	None	Minor	Low	Moderate	High	Very High
	Overall, during construction phase there will be impacts on air quality due to construction site equipment. However, the adoption of the proposed mitigation measures will allow reducing the impacts to an acceptable level, especially as they are limited to the construction phase.					
Duration	Transient	Short-term	Medium-term	Long-term	Permanent	
	Construction phase (1-2 years)					
Scale	Site only	Local	Regional	National	International	
	Emissions are concentrated in a limited period of time and occur inside the boundaries of the cement plant.					
Probability	None	Improbable	Low probability	Medium probability	High probable	Definite
	Probability of the impact is low probability.					
Significance Points	Positive impact	low	moderate	high		
	SP = (4+2+1) x 2 = 14					

Mitigation Measures

With the purpose to reduce the emissions of gaseous pollutants during the construction phase from the equipment used for the cement plant, the following mitigation measures and good practice are taken into account:

- vehicle engines and other machinery will be kept turned on only if necessary, avoiding any unnecessary emission;
- machines and equipment will be periodically checked and maintained to ensure their good working condition;
- all equipment and machines must be maintained and tested for compliance with standards and technical regulations for the protection of the environment and have appropriate certifications;
- activities will be conducted trying to use the minimum required number of means at the same time;
- electric small-scale mechanization and technical tools will be used when available and feasible; and
- repair and maintenance of construction equipment and vehicles will be performed outside of the construction site by at specialized enterprises.

Concerning dust control methods and measures, the following actions are recommended to reduce the generation of dust:

- watering or increase of the moisture level of the open materials storage piles to reduce dust levels (especially during dry season);
- enclosure or covering of inactive piles to reduce wind erosion;
- loads in all trucks transporting dust-generating materials will be sprayed with water to suppress dust, as well as wheels of means moving inside and outside of the construction site;

- speed reduction for the means travelling inside the construction site; and
- stabilization and re-vegetation of cleared areas that are no longer needed as soon as practicable during construction.

Environmental monitoring activities will have to be performed in order to monitor the air pollution during construction activities in the surroundings of the site and, in particular, at the residential buildings located close to the site boundaries.

5.3.2 Water Quality, Water Use and Storm Water Runoff

Control features are needed at the plant site during construction to ensure that in major rainfall events, sediments are not transported to the river environment.

Magnitude	None	Minor	Low	Moderate	High	Very High
	Temporary drainage system will be provided for collecting drain water from construction activity and rain to sediment pond and reuse inside construction area.					
Duration	Transient	Short-term	Medium-term	Long-term	Permanent	
	Construction phase (1-2 years)					
Scale	Site only	Local	Regional	National	International	
	The scale of the impact is site only.					
Probability	None	Improbable	Low probability	Medium probability	High probable	Definite
	Probability of the impact is low probability.					
Significance Points	Positive impact	low	moderate	high		
	SP = (4+2+1) x 2 = 14					

Following water pollution control measures are to be practiced during the construction.

- Wastewater generated from offices, canteens, and worker accommodation is treated by septic sewage system. Wastewater treatment unit will be provided for treating wastewater from canteens.
- Temporary drainage system will be provided for collecting drain water from construction activity and rain to sediment pond and reuse inside construction area.
- Create a special storage for fuel and lubricants/oil. The storage is a closed building and it is protected from rain water.
- Provide grease and oil trap for workshop and maintenance area.

5.3.3 Noise and Vibration (Equipment movement & machinery)

The use of heavy equipment such as dozer, loader, crane during the construction period for site clearance and earth moving, will inevitably generate the noise, which create nuisance for person working around and local people passing through. This is negative impact but duration is short and considered as insignificant. Potential impacts on noise environment generated by the construction phase of the cement plant are discussed in the following.

- earthwork: the main noise sources are related to the use of equipment and earthwork machinery such as: bulldozers, excavators, loaders, various transport vehicles.
- groundwork: the main noise sources are pile hammers, and excavators. It has been noted that the pile hammers noise is characterized by an impulse noise.
- structure installation: the main noise sources during the structure installation stage are concrete mixer, vibrating machine, electric saw, etc., and collision noise impact during the load and unload of materials. And;
- equipment installation: the main noise source during the equipment stage is crane elevator.

Magnitude	None	Minor	Low	Moderate	High	Very High
	This is negative impact but duration is short and magnitude of impact is considered as low.					
Duration	Transient	Short-term	Medium-term	Long-term	Permanent	
	Construction phase (1-2 years)					
Scale	Site only	Local	Regional	National	International	
	The scale of the impact is site only.					
Probability	None	Improbable	Low probability	Medium probability	High probable	Definite
	Probability of the impact is low probability.					
Significance Points	Positive impact	low	moderate	high		
	SP = (4+2+1) x 2 = 14					

The protection, mitigation and monitoring measures foreseen in order to minimize and reduce the impacts related to the noise emissions during the construction phase of the cement plant are:

- to select adequate equipment (fit with noise mufflers);
- to minimize machinery and equipment unused conditions with engines in action;
- to maintain machinery and equipment in good conditions;
- to maintain an active community consultation and positive relations with local residents that will assist in alleviating concerns that might arise and resolve any potential noise complaints;
- to post warning signs within the vicinity of the impact and all personnel shall be provided with personal protective equipment. For example, workers operating equipment that generates noise should be equipped with the appropriate noise protection gear; and
- to restrict the construction activities that will generate disturbing sounds to normal working hours.

5.3.4 Solid Waste (process, utility, procurement)

The construction phase will be carried out through different activities as civil, mechanical, electrical installation operations and liquid effluents which in turn will generate volumes of waste with typology characteristic of the nature of each activity.

Domestic waste will be generated by the workers at the construction camp. It may comprise non-hazardous materials including for example paper, food residues, used containers (bottles, can, etc.), broken furniture and packaging, and sanitary effluent.

Magnitude	None	Minor	Low	Moderate	High	Very High
	By adopting appropriate solid waste management plan based on the 3Rs methodology, impacts caused by solid waste handling and disposal would be minimized.					
Duration	Transient	Short-term	Medium-term	Long-term	Permanent	
	Construction phase (1-2 years)					
Scale	Site only	Local	Regional	National	International	
	The scale of the impact is site only.					
Probability	None	Improbable	Low probability	Medium probability	High probable	Definite
	Probability of the impact is low probability.					
Significance Points	Positive impact	low	moderate	high		
	SP = (4+2+1) x 2 = 14					

Construction of designated landfill site and incinerator should be considered as a better option in the absence of local waste handling contractor.

5.3.5 Soil Impacts

The increasing of soil erosion could be caused by the excavation activities for the construction of the cement plant. As concern the cement plant, all the construction activities will be performed within the present boundaries of the project. In any case, if necessary, effective construction site drainage measures, utilizing cut-off drains (to divert surface runoff from exposed soils or construction areas) will be implemented, in order to reduce the top soil erosion. Regarding the excavation activities, top-soil and sub-soil will be removed especially at the foundations area. The excavated soil will be temporary stored using the best available procedure and techniques to avoid loss and/or degradation. After the construction works will be completed, soil cover shall be placed back on for reinstatement activities.

Pollution could affect soil in case of accidental spillage of oil from vehicles used for transportation of construction material and accidental spillage from the building material used for construction purposes. These accidental events could be considered remote if specific maintenance activities and safety procedures will be correctly implemented. To prevent soil contamination by oil or grease spills, leakages or releases, all manipulations of oil derivate in the process of construction and provision of fuel to the machines should be performed with maximum attention.

Magnitude	None	Minor	Low	Moderate	High	Very High
	After the construction works will be completed, soil cover shall be placed back on for reinstatement activities. Accidental events could be considered remote if specific maintenance activities and safety procedures will be correctly implemented. The impact magnitude is expected to be low.					
Duration	Transient	Short-term	Medium-term	Long-term	Permanent	
	Construction phase (1-2 years)					
Scale	Site only	Local	Regional	National	International	
	The scale of the impact is site only.					
Probability	None	Improbable	Low probability	Medium probability	High probable	Definite
	Probability of the impact is low probability.					
Significance Points	Positive impact	low	moderate	high		
	SP = (4+2+1) x 2 = 14					

The following environmental protection and mitigation measures will be implemented in order to reduce or prevent potential impacts on soil:

- Leak proof containers should be used for storage and transportation of oil/grease and wash off from the oil/grease handling area shall be drained through drains and treated properly before disposal.
- Construction waste and debris shall be collected on a regular basis, covered by roof and disposed of at designated landfills.
- It must be prohibited to operate with equipment and vehicles outside the designated work areas and roads.
- Training and equipment will be in place to minimize the potential environmental impact in the case of accidents (for example through the use of spill kits).

5.3.6 Flora and Fauna Habitation Loss

The direct ecological impact resulting from the construction of the project is the loss of vegetation and habitat associated with site clearance. The cement plant is in an industrial zone and the present project is upgrade the existing cement plant area where high ecological values of species are unexpected.

However, the area has for a long time been devoid of significant gain due to its developed nature and nearby settlements. The only animals sighted in the area mainly comprised of small mammals, reptiles (reported sighting of snakes, lizards, chameleon), invertebrates (snails, millipedes, centipedes), insects (butterflies, spiders, flies, bees, ants, termites etc.) and birds.

But implementation of proper green belt and afforestation plans, the plant and it environment shall be acted as a green growth model.

Magnitude	None	Minor	Low	Moderate	High	Very High
	The cement plant is located in an industrial zone and the present project is upgrading the existing cement plant area where high ecological values of species are unexpected. The magnitude of the impact is considered as low.					
Duration	Transient	Short-term	Medium-term	Long-term	Permanent	
	Construction phase (1-2 years)					
Scale	Site only	Local	Regional	National	International	
	The scale of the impact is site only.					
Probability	None	Improbable	Low probability	Medium probability	High probable	Definite
	Probability of the impact is low probability.					
Significance Points	Positive impact	low	moderate	high		
	SP = (4+2+1) x 2 = 14					

5.3.7 Social Impact Assessment

5.3.7.1 Potential impact to Employment, Skill and Business

Project will source it operative work forces mainly from the local area due to the reason of project's commitment of prioritizing the selection to local people and availability in adjacent areas for the basic level semi-skill and non-skilled works.

Owing to the information collected during the course of the survey in study area, the people are expecting with though that the cement project will bring improvements to the living standard and local economic status of local people by creating job opportunities.

Since construction phase is the period of high demand of job openings with temporary employment, the numbers of employees will be dramatically high.

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

Company is intending to conduct both awareness and critical training necessary to its employees, it is perceived that capacity building which is expected by both company and local community is the one of the beneficial effects as well. As this will be long term income stability to the hired employees assuring the economy security to its family members.

Recommended Mitigation and Enhancement Measures

- Identify the range of skill required for the labor force and conduct a gap analysis against skills availability

- Notify local people of job openings through local advertising, information center, project notice boards to place in office or road junctions of each village
- Develop and implement a local employment policy for the people of affected communities
- Careful management to be practiced about the expectation of local people in regard to the employment to avoid any disputes

5.3.7.2 Local Economy

There is some probability that the workforce will patronize local retail services, such as food outlets during lunch or coffee time, which would be beneficial to the economy at the local scale.
On the project side, it is certain that some materials required for the project use could be locally available and due to the easy accessibility, there might be greater consumption for local market and increase business opportunity for local business.

5.3.7.3 Traffic Issue (Transportation)

During the construction phase, there will have potential traffic increase on the road from Kyaukse to Industrial Zone where local people are using for their transportation. The volume of vehicles carrying construction materials will be high during the construction period. Proper traffic management plan is to be adopted and local road improvement scheme is to be developed without interfering the existing transportation system of local people.

5.4 Potential Impact Evaluation (Operation Phase)

5.4.1 Dust and Air Pollution

Air quality deterioration is a major issue in typical cement industries due to the existence of numerous sources of pollutants. Primary emission points of source of cement facilities including mobile and stationary, that generate dust and air pollutants are raw material transportation, raw material grinding, clinker burning, cement grinding, packing and transportation, generator, vehicle and equipment movement operation.
With regard to the dust and air emission, generate dust that can cause a nuisance to local residents and cause a health risk to workers. Therefore, main risk is considered exposure to the workers and residents with degradation of ambient air quality.

Particulate Matter (PM)

The fugitive particulate matter (PM) emissions in cement plants come from raw material handling, grinding, blending and delivery, clinker storage, grinding, cement storage, bulk loading, and packaging of final products. PM also comes from stationary sources such as the stacks attached to the raw mill, rotary kiln, coal mill, grate cooler, cement mill etc. Around the proposed project area, there are numerous PM emission sources (e.g., existing cement plant projects and various other projects), all of which contribute to air pollution. There is almost no data on the nature and rate of PM emissions from these various sources.

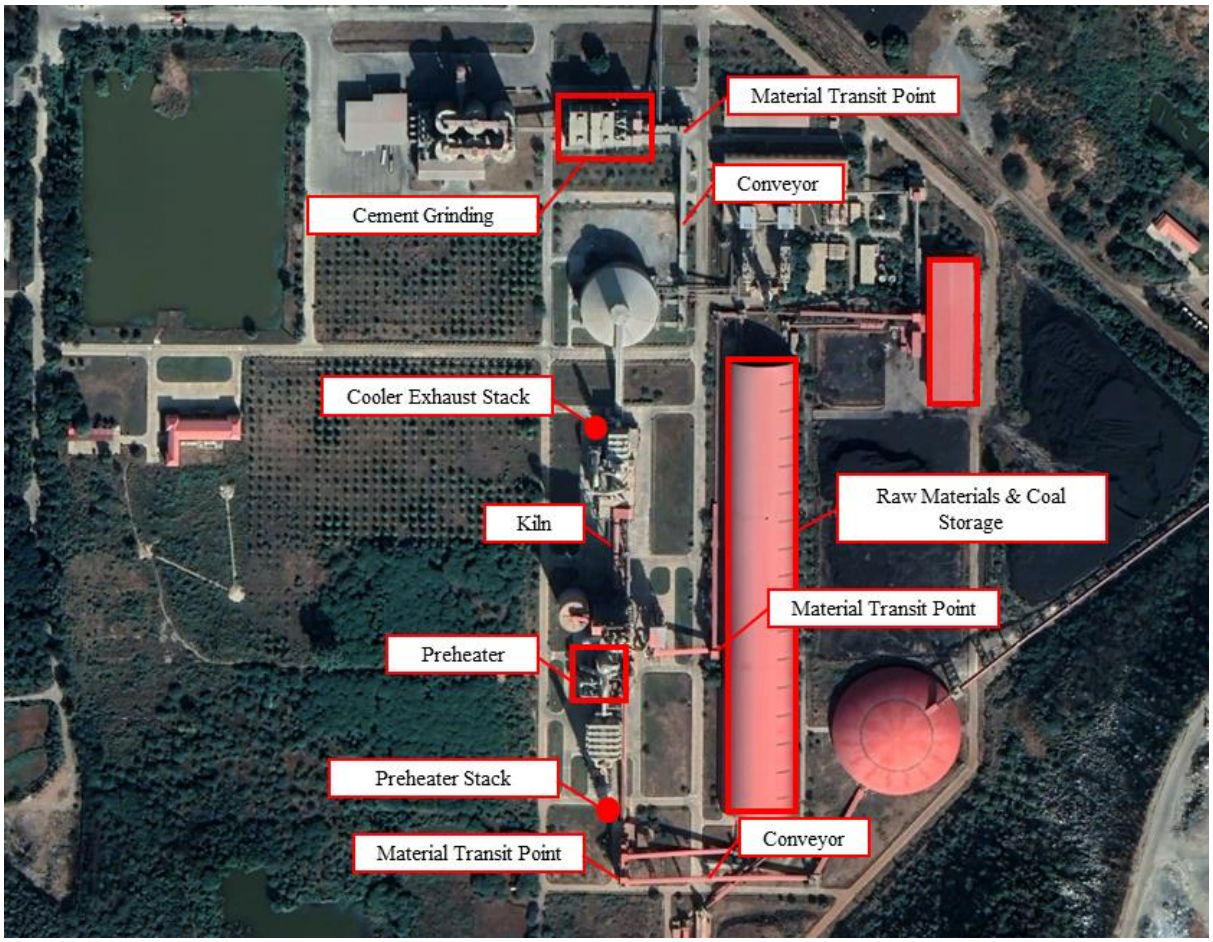


Figure 5-1 Emission Source

PM Collection System of Proposed Project

Project Activities and PM Emissions Source	Pollution Control Measures
Preheater Flue Gas	Electrostatic Precipitator
Cooler Exhaust Gas	Electrostatic Precipitator
Coal Preparation	Bag Filter
Cement Grinding	Bag Filter
Material Transit Point	Bag Filter
Raw Material Storage	Semi-closed
Conveyor	High-efficiency dust-free seal conveying

Estimated Particulate Matter Emission

Processing Rate (m^3/h)	Density at Inlet (g/Nm^3)	Efficiency (%)	Density at Outlet (mg/Nm^3)	Estimated Emission	NEQG Guideline Values (mg/Nm^3)
<85000	≤50	99.85%	≤30	10~30	50

Heavy Metals and Other Air Pollutants

The concentration level of these elements in the clinker is influenced by their concentrations in different input materials and by their volatility at the operating conditions. The majority of (non-volatile) metals are incorporated into the clinker, while the remainder, particularly volatile and semi-volatile metals (Cd, Hg), accumulate in the cement dust. Depending on the efficiency of the factory's existing filters, volatile and semi-volatile metals, as well as fine particles of cement dust, may broadcast the gaseous products. Thus, it can be concluded for any metal added to the cement kiln with raw materials, the most of them will be retained by cement kiln process solids, while the less of them will appear in the stack gas stream. (Amira Cipurkovic et al).

As mentioned in the section 3.5.2 of the report, the accurate monitoring of heavy metal emissions is complicated due to factors such as low concentrations of trace elements with values close to or below detection limits and the inability to capture volatile species such as mercury in the sampling system. If there is a situation where heavy metals can be measured once the plant is operational, they will be measured and included in the monitoring report.

Global Warming or GHGs (CO_2) Emissions

Climate change should be recognized when the project activities are related with the Greenhouse gases emissions (GHGs) such as carbon dioxide (CO_2). Cement manufacturing contributes the greenhouse gases, CO_2 emission mainly from fossil fuel burning, coal burning in this case and fuel combustion wherever using energy and the other aspect is the chemical reaction involved in the production of cement components like the conversion of limestone, $CaCO_3$ to lime, CaO, and the production of clinker, etc. The greenhouse gas contribution mainly concerned with the climate change impact.

Estimation of CO_2 emissions from cement production is accomplished by applying an emission factor, in tons of CO_2 released per ton of clinker produced, to the annual clinker output. The clinker will be produced 5000 tons per day in the present project and it is estimated that 1.8 million tons of clinker will be produced per year.

1 ton of clinker produced = 0.5071 tons of CO_2

1,800,000 tons of clinker produced per year = 1,800,000 x 0.5071 tons of CO_2

= 912,780 tons of CO_2

Magnitude	None	Minor	Low	Moderate	High	Very High
	In minimization of the dust and air pollutant emission from the project activities, the company has designed the adequate control measures to reduce the risk to workers and impact to ambient air.					
Duration	Transient	Short-term	Medium-term	Long-term	Permanent	
	Potential impacts to air quality will occur throughout the operation phase and therefore can be considered as long term in nature.					
Scale	Site only	Local	Regional	National	International	
	The scale of the impact is likely to be up to 5km from the project site boundary.					
Probability	None	Improbable	Low probability	Medium probability	High probable	Definite
	The probability of impacts is low probability.					
Significance Points	Positive impact	low	moderate	high		
	SP = (4+4+2) x 2 = 20					

For raw material grinding, clinker burning, cement grinding, packing processes, following measures are to be implemented.

- Installation of dust collectors/ electrostatic precipitator
- Use of low power consumption machinery and equipment to reduce power consumption
- Enclosure of area to contain dust emission control the production process to ensure complete combustion
- Process optimization

Furthermore, tree plantations are also provided along the boundary of Cement Plant. This green belt can minimize dust dispersion generated from construction. Detailed green belt development plan shall be established.

Inherent design criteria are provided here for dust control and minimization purpose.

- Advance machines, equipment and methods are utilized to minimize air pollutions, such as covering machines, watering accessible road and installing dust collecting system i.e. Electrostatic Precipitator(EP), Bag Filter(BF).
- Chimneys and Stacks are designed and constructed to have sufficient heights to effectively vent dust, smoke and odors to the atmosphere.
- All dust collectors or deducting equipment are designed, installed and guaranteed to regulate particulate matter emissions not exceeding 60 mg/Nm^3 at all ranges of kiln operation.
- Periodically Preventive Maintenance (PM) is scheduled for deducting equipment such as Electrostatic Precipitator and Bag Filter. Preventive Maintenance period is every 6 months for Bag Filter and every 2 years for Electrostatic Precipitator.
- Operational conditions of dedusting equipment are maintained such as temperature of flue gas entering Electrostatic Precipitator not to exceed operational range etc.

- Regular inspection and maintenance of gas analyzer at an inlet of Electrostatic Precipitator are carried out to maintain a good operational condition.
- Sprinkle the road used for material transportation.
- The concentration of dust in areas where plant personnel are working such as the areas along the conveying system, at which material is transferred including the areas around receiving hoppers, is limited to be less than 15 mg/m^3.
- The project proponent will collaborate closely with local authorities to monitor and improve air quality.

5.4.2 Water Quality, Water Use and Storm Water Runoff

During the operation period, raw water is supplied from Thindwe canal that connected to the Zawgyi River and pumped into raw water pond inside the plant area. The proposed project's water supply pipeline is routed separately along the existing water supply pipeline route to the factories in the industrial zone, so there is no impact along the water pipeline. The maximum water usage during operation of cement plant will be around 12,926 m^3/d.

Information of Thindwe Canal	
Length:	65000ft
Flow Rate:	280m^3/s (1008000m^3/h) 24,192,000

Accordingly, the project consumes 0.053% of Thindwe Canal's water flow rate. Therefore, the impact of water consumption by the project can be considered as low. Water consumption data from other existing projects that use the same water source are not available.

The Irrigation and Water Utilization Management Department, Ministry of Agriculture, Livestock, and Irrigation have already permitted to the project to use about 270,000 gallons water from Thindwe canal.

Cement plant production water is mainly cooling equipment water. The design uses a circulation supply and return system, which has high recycling efficiency. A small amount of production wastewater enters natural ponds, part of it is used for watering roads and greening, and some of it is used for replenishing water on clinker lines, saving new water consumption and reducing sewage discharge.

Type	System	Treatment	Discharge Point
Cooling Facilities Wastewater	Closed cycle system	Chemical Water Treatment	Not discharge wastewater.
Boiler Blow Down Water	-	-	Not discharge wastewater. Only discharge steam to reduce pressure.
Ash Handling	Pneumatic Conveying	-	-

Type	System	Treatment	Discharge Point
Wastewater	System		
ESP Wash Water	No Wet ESP	-	-
Domestic Wastewater	Sewage Treatment System	Biochemical Treatment	Septic Tank
Coal Storage Runoff	Drainage system		Recycle water pond

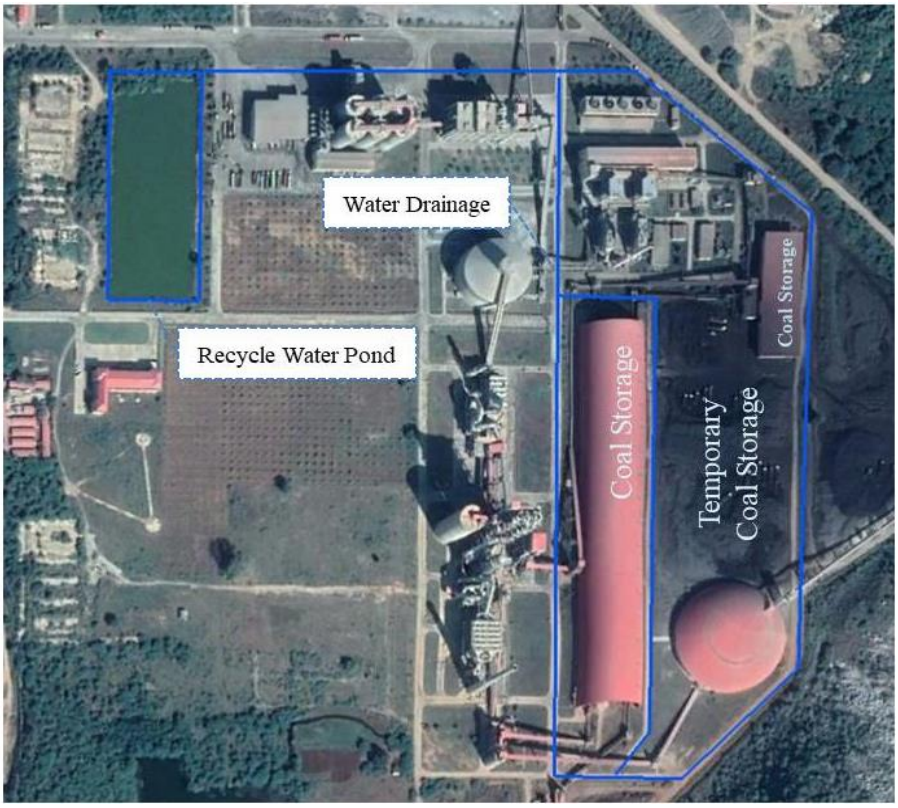


Figure 5-2 Cement Plant Drainage

Magnitude	None	Minor	Low	Moderate	High	Very High
	Waste water from process and utilities will not directly discharge into the environment.					
Duration	Transient	Short-term	Medium-term	Long-term	Permanent	
	Potential impacts to water quality will occur throughout the operation phase and therefore can be considered as long term in nature.					
Scale	Site only	Local	Regional	National	International	
	The scale of the impact is likely to be up to 5km from the project site boundary.					
Probability	None	Improbable	Low probability	Medium probability	High probable	Definite
	There will be no direct effluent discharge from the plant, and therefore no possibility of waste from either location being transported to the river environment.					
Significance Points	Positive impact	low	moderate	high		
	SP = (4+4+2) x 2 = 20					

Waste water coming from cement plant shall be controlled by installation of treatment system such as use of closed system, grease and oil trap, aeration pond, sediment pond, septic tank. Following water pollution control measures are to be practiced during operation stage.

- Cement production is operated in dry condition and Water used for cooling system is reused or circulated in cooling water system. Therefore, the production does not cause water pollution.
- Wastewater management system of the plant is a closed system. Effluent is recirculated without discharging from the plant except that there is heavy rain and emergency discharge may be required.
- Wastewater generated from production process is sent to oil separator and sedimentation pond, respectively. The water from sedimentation pond is reused in some equipment and other activities in cement plant, such as Conditioning Tower, Raw Mill, and Cement Mill.
- Wastewater generated from offices, canteens, and staff accommodation is treated by septic-seepage system. Wastewater treatment unit will be provided for treating wastewater from canteens.
- Create a special storage for fuel and lubricants / oil. The storage is a closed building and it is protected from rain water.
- Provide grease and oil trap for workshop and maintenance area.
- Provide separated water drainage and treatment system for outdoor coal storage. Compact the storage ground with clay to prevent seepage into the ground

Based on the data provided, if effective water management and treatment system are fully implemented, the ground and surface water quality and water consumption is predicted to be insignificance.

5.4.3 Noise and Vibration

Operation of motorized equipment during cement production generate high noise levels with potential to disturb and cause annoyance to people in the surrounding area.

All noise generating equipment will be serviced regularly to improve efficiency and reduce friction of moving parts which may generate noise. Workers assigned to jobs with prolonged exposure to highly pitched noise will be provided with personal protective gear such as ear plugs or muffles as appropriate.

Magnitude	None	Minor	Low	Moderate	High	Very High
	Sources of noise pollution will be managed to limit noise levels to less than 85 dB. Access to areas with noise levels above 85 dB will be restricted to individuals with protective wear (ear plugs or ear muffles) only.					
Duration	Transient	Short-term	Medium-term	Long-term	Permanent	
	Noise impacts will occur throughout the operation phase and therefore can be considered as long term in nature.					
Scale	Site only	Local	Regional	National	International	
	The scale of the impact is likely to be site only.					
Probability	None	Improbable	Low probability	Medium probability	High probable	Definite
	The major receptor of noise pollution is limited to workers as the factory is far from settlements and is outside the area of noise influence. Therefore, the probability is low probability.					
Significance Points	Positive impact	low	moderate	high		
	SP = (4+4+1) x 2 = 18					

5.4.4 Solid Waste

There will be several wastes associated to the operation and maintenance of the plant, such as:

- used oil and air filters from machinery and vehicles;
- used batteries from vehicles and trucks; and
- other maintenance waste (i.e., oily rags, paint residues, etc.)

Staff working on site will also generate general domestic waste (i.e. food and packaging) and office waste (paper, etc.).

If not controlled properly, there could be impacts from the waste generated during the operation phase of the Project. In more detail, a not proper disposal of this waste, of hazardous waste such as used oils filters, could result in potential contamination for surface water, groundwater resources and soils, which could have negative impacts on ecosystem functioning and on human health for those living close to the dump sites.

Domestic Waste

The amount of domestic garbage generated in the office and living areas is estimated that the domestic garbage will be about 600t/year, mainly due to the peels, plastic packaging, kitchen waste, and waste generated during the life and office of employees. The company set up the trash can, and regularly concentrates into the high temperature environment of the kiln system at 1200 ℃ for incineration disposal. The fly ash generated after incineration is collected by the dust collection device and is returned to the production system.

Hazardous Waste

Name	System	Waste Disposal
Sodium Hydroxide	Demineralization	-
Hydrochloric Acid	Demineralization	-
Flocculent	Water Treatment	-
Polyelectrolyte	Water Treatment	-
Lime	Water Treatment	-

Toxic-proof and Chemical Hazards Prevention

Personnel involved in handling of these chemicals will be properly trained and made aware of the safety data and related first-aid measures. Water tap/jet will be installed near the demineralization plant so that the affected personnel can thoroughly wash in case of acid / base contact incident.

Install ventilation cabinets in the laboratory and air-conditioning system in control room. Take rubber liner and lining plastic corrosion prevention measures for pipelines of water treatment equipment.

Magnitude	None	Minor	Low	Moderate	High	Very High
	If all the potentially hazardous waste is disposed of correctly and the additional waste deposited at the local dumpsites can be reduced to the absolute minimum, the impact associated with waste generated during the operation phase will be of low magnitude.					
Duration	Transient	Short-term	Medium-term	Long-term	Permanent	
	Solid waste impacts will occur throughout the operation phase and therefore can be considered as long term in nature.					
Scale	Site only	Local	Regional	National	International	
	The scale of the impact is likely to be site only.					
Probability	None	Improbable	Low probability	Medium probability	High probable	Definite
	Probability is low.					
Significance Points	Positive impact	low	moderate	high		
	SP = (4+4+1) x 2 = 18					

The overall impacts during operation should be considered as negligible if the following mitigation measures will be taken into account during the operation phase:

- a waste management plan shall be developed including requirements for separation, handling and disposal of all waste generated;
- storage and handling of hazardous materials should be in accordance with national and local regulations appropriate to their hazard characteristics;
- waste shall be separated on site and waste storage areas shall be roofed and bounded to prevent potential cross-contamination;
- all waste shall be disposed of in line with local requirements at a suitable waste disposal facility.

5.4.5 Soil Impacts

During the operation phase, the contamination of soil and subsoil is expected as a result of leaks or spills as:

- equipment containing lubricating oil and/or chemical additives used in the plant process will be placed in enclosed premises; and
- fuel-oil (heavy and light fuel oil) used as power source for the cement plant will be stored in dedicated storage tanks, in such a manner that any possible small leakages of polluting oil can be contained.

Magnitude	None	Minor	Low	Moderate	High	Very High
	Considering the mitigation measures described in the following section, the risk of soil contamination related to spills of oil and/or pollutants can be considered low.					
Duration	Transient	Short-term	Medium-term	Long-term	Permanent	
	Soil impacts will occur throughout the operation phase and therefore can be considered as long term in nature.					
Scale	Site only	Local	Regional	National	International	
	The scale of the impact is likely to be site only.					
Probability	None	Improbable	Low probability	Medium probability	High probable	Definite
	Probability is low.					
Significance Points	Positive impact	low	moderate	high		
	SP = (4+4+1) x 2 = 18					

The following environmental protection and mitigation measures will be implemented in order to reduce or prevent potential impacts on soil:

- to prevent soil contamination by oil or grease spills, leakages or releases, all manipulations of oil derivate in the process of construction and provision of fuel to the machines should be performed with maximum attention;
- leak proof containers should be used for storage and transportation of oil/grease and wash off from the oil/grease handling area shall be drained through drains and treated properly before disposal.

5.4.6 Fire and explosion Impacts

Explosion or fire may occur in locations such as oil supply system, coal transmission system, pressure vessel or dense cable zone.

Firefighting Water Supply

- Indoor hydrants are set in architectures of main building. Outdoor firefighting pipeline network of cement plant provides indoor firefighting water and sets 2 firefighting water pump

combiners. They form a circular firefighting pipeline network on the bottom layer of main building. Indoor hydrants are fitted with alarm buttons.

- Movable and portable fire extinguishers are set in turbine power generator room of main building. Portable dry powder fire extinguishers are also set in control room of main building and electric devices to extinguish fire caused by electricity or oil which cannot be extinguished by water.
- When electrical equipment in the electrical distribution room is caught fire, use to dry powder fire extinguishers to put out the fire.

5.4.7 Risk of Natural Disasters

According to the data of Government Administration Department (2018), the disasters of floods, cyclones and fire are occurred as below.

Table 5.1 List of natural disasters in Kyaukse Township

No.	Type of Disaster	Frequency	No. of dead/loss	Loss of building
1	Cyclone	2	-	- 5 houses - 1school
2	Flood	7	-	- road and bridge
3	Fire	2	-	-3 houses

Source: Government Administration Department (2018)

Component	Potential Impacts	Mitigation Measures
Cyclone	Strong wind causes damage to infrastructure.	- Prepare emergency response/rescue plan - Frequently watch local weather news and disaster notices by the relevant media
Flood	Impact on the cement plant and nearby community due to increase of water level	- Prepare emergency response/rescue plan - Frequently watch local weather news and disaster notices by the relevant media
Fire	Impact on the community around the project site by increasing of risk of fire	- Installation of the fire hydrants in and around the coal power plant and offices in sufficiently. - Implementation of emergency drill - Cooperation with Kyaukse Fire Brigade

5.4.8 Land or Land Use Impacts

Myanmar Conch Cement Company has a BOT (Build Operate Transfer) agreement with No.3 (currently No.2) Heavy Industry, Ministry of Industry through the Product Share system. The occupied area is an industrial zone already operated by No.33 Heavy Industry (400t/d) under the Ministry of Industry's No.2 Heavy Industry Enterprise. As a result, during the construction and

operation phases, the effects of land occupation in terms of restrictions on land use are regarded as negligible.

5.4.9 Ecological Disturbance and Effect on Climatic Condition

Establishment and operation of the plant has disturbed the ecological setting of the area thereby rendering it less conducive a habitat for both plant and animal life through physical disturbance and discharge of pollutants. On the other hand, the presence of a large water-body (storage of rain water and pond in plant site) create a habitat with favorable conditions for breeding of mosquitoes especially at the end of the project life when disturbing activities will have ceased. Such insects being disease vectors for malaria have potential to negatively affect human health.

Minor changes are likely to have occurred in micro weather conditions within the confines of the factory. The main elements likely to be affected are humidity and temperature while rainfall, wind and sunshine are unlikely to be affected. Although the changes have not been monitored to that effect it is unlikely that the same would be significant enough to affect the climatic conditions of the area.
Consequently, project impacts on the climatic conditions of the area are considered to be insignificant. It should however be noted that release of large quantities of carbon dioxide, a greenhouse gas in the calcination and clinkering process of cement production has significant effects on global climatic conditions through enhanced global warming.
Project effect on ecological and climatic conditions in general is a probable impact of low severity acting on a localized area with long term duration. Further, the area affected is not a designated area of significant ecological importance, and it is located on the outskirts of a city and in an industrial zone.

Magnitude	None	Minor	Low	Moderate	High	Very High
	The affected area is not a designated area of significant ecological importance, and it is located on the outskirts of a city and in an industrial zone.					
Duration	Transient	Short-term	Medium-term	Long-term	Permanent	
	Impacts will occur throughout the operation phase and therefore can be considered as long term in nature.					
Scale	Site only	Local	Regional	National	International	
	The scale of the impact is likely to be local.					
Probability	None	Improbable	Low probability	Medium probability	High probable	Definite
	Probability is low.					
Significance Points	Positive impact	low	moderate	high		
	SP = (4+4+2) x 2 = 20					

However, the project effect on global warming is considered to be moderately significant. This is due to the high levels of CO_2 emissions. Carbon dioxide is a global warming gas with significant implications on global climatic conditions. Conch cement plants consumption of limestone will be 2.3

million metric ton per annum which is equivalent to release of nearly 600,000 tons of carbon dioxide during the decarbonizing process.

Limit disturbance of habitat by keeping the plant and quarry footing to minimal requirements together with adequate treatment of waste streams and progressive rehabilitation of disturbed areas to enhance life support systems.

The company will embark on the planting of trees to provide a sink for the generated carbon dioxide.

5.4.10 Social Impact Assessment

5.4.10.1 Potential impact to Employment, Skill, and Business

During the operational phase, it has the high opportunity to employ local people in all level of full-skilled, semi-skilled, and unskilled and technicians. In this regard, company shall develop local hiring plan. Here local people refer to the people living in the affected areas or entire project area of influence.

This project is anticipated to source the operative force on local basis and has the potential to increase the educational and technical qualification of local work forces through onsite technical transferring and in-house training programs.

The project will definitely have significant beneficial impacts on the local communities.

One of the effective implementation of the Social Impact Management Plan of the project is the development of a capacity and local awareness building.

In order to enhance the local capacity building, and avoid unnecessary social conflict and dispute related to the employment within local communities, following measures are suggested.

- Identify the range of skill required for the labor force and conduct a gap analysis against skills availability
- Notify local people of job openings through local advertising, information center, project notice boards to place in office or road junctions of each village
- Develop and implement a local employment policy for the people of affected communities
- Careful management to be practiced about the expectation of local people in regard to the employment to avoid any disputes
- Undertake regular review of labor requirement and skill demands ensuring that training strategies meet the needs of project
- Initiate training and job skill development programs
- Considering to establish a contractual agreement with contractors to ensure that all contractors understand the company’s expectation of favor local content in hiring employees

5.4.10.2 Local Economy

Production and supply of cement by Myanmar Conch plant has a multiplier effect on other sectors of the economy such as mining, construction and trade (both local and the export market). The company equally has a multiplier effect on the economy of contractors and other suppliers of goods and services whose collective operations contribute to the development of both the local and national economy.

In addition, cement production and sale at the Kyaukse cement plant contribute revenue to the local and Regional governments through both direct (e.g. company tax, employees' pay as you earn and personal levy, land rates, etc.) and indirect taxes and this revenue is in return used in budget support to the benefit of the country including provision of social services such as education and health.

5.4.10.3 Capacity Building and Skill Development

Kyaukse Cement plant contributes to capacity building in industry by training and orienting all staff and students on attachment in various fields. The effect of this manifest in general improvement in national capacity as the workers and trainees leave the company with enhanced skills applicable in similar industries and sectors of the national economy.

Further, the company will support in high school education training sponsorship program covering a selected number of students each year.

The impact is low and indirect impact of high significance benefiting a limited number of people on an ongoing basis.

5.4.10.4 Traffic (Transportation) during operation phase

During the operation phase, there will have potential traffic increase on the road from Kyaukse to Industrial Zone where local people are using for their transportation. The volume of vehicles carrying raw materials will be high during the operation period. Proper traffic management plan is to be adopted and local road improvement scheme is to be developed without interfering the existing transportation system of local people.

5.4.11 Impact on Non-Renewable Resources

5.4.11.1 Raw Materials

The production of cement necessitates the use of nonrenewable resources such as raw materials and fossil fuels. The primary raw materials for clinker production are limestone, clay, or their natural mixtures. Because of the consumption of limestone-based resources, the cement industry should be concerned about future raw material shortages. To be used efficiently, limestone (calcareous) and limestone (siliceous) are initially produced, while limestone (Dolomitic) is also produced separately.

This limestone (Dolomitic) is crushed separately and will be reused in construction activities and access road construction.

5.4.11.2 Energy Saving

Waste Heat Power Generation adopts pure low-temperature waste heat to generate electricity without additional fossil fuel consumption, so there will be no new pollution sources.

The maintenance of vehicles and machines utilized in limestone production are directly fueled by Petrol truck from petrol storage tank to avoid waste of fuel and to have safety. The maintenance of vehicles and machines utilized in limestone production are undertaken by technicians in accordance with standards. The efficiency of machines is daily checked.

5.5 Visual/Landscape Impact

It is anticipated that the scale of construction and operation of cement plant will certainly have visual impact on the landscape due to the introduction of different features.

In consideration of impacts due to the change of landscape of the region, the degree of significance of visual impact could be moderate to high. Anyway, there are control measures those can be adopted during the detailed design of the project such as plant design and growing vegetation.
Color for the cement facilities should be carefully selected. Lighter color can be utilized to complement the surrounding areas. Where technically feasible, to decrease the visibility of facilities, plantation around the building should be planned.

5.6 Impacts on Areas of Historical, Archaeological and Cultural Significance

The project area is located about 3 km east of ancient city (Myin Saing). Project activities have potential to negatively affect areas of historical, archaeological and cultural significance if found within the project area of influence. However, there are no such areas known to exist within the immediate area of physical/mechanical project influence. The impact is non-significant. Improbable impact of low to moderate severity affecting a localized area of low sensitivity on a short to long term basis.

Magnitude	None	Minor	Low	Moderate	High	Very High
	The magnitude of the impact may be low due to the lack of ancient cultural heritage areas surrounding the proposed project.					
Duration	Transient	Short-term	Medium-term	Long-term	Permanent	
	Impacts will occur throughout the operation phase and therefore can be considered as long term in nature.					
Scale	Site only	Local	Regional	National	International	
	The scale of the impact is likely to be site only.					
Probability	None	Improbable	Low probability	Medium probability	High probable	Definite
	Probability is low.					
Significance Points	Positive impact	low	moderate	high		
	SP = (4+4+1) x 2 = 18					

Relevant authorities such as the Ministry of Culture, Archeological Department and the local authority shall be informed whenever findings of heritage significance are found.

Appendix 9 describes the letter from the Department of Archeology and the National Museum, as well as the map.

5.7 Health Impact Assessment

The aim of the Health Impact Assessment (HIA) aspect of the study is to determine the potential effect that construction and operation of the present Cement Project will have on the local communities' health and the capacity of local health services to cope with any increased demand for services in terms of equipment, trained personnel, medicines and the balance between the community and workforce needs.

The objectives of the HIA are:

- To identify and evaluate all short, medium and long-term impacts of the project on the health of all stakeholders in all project phases within an agreed geographical boundary so that any potential negative impacts can be reduced or avoided, and positive impacts enhanced.
- To recommend and justify specific, practical measures for mitigating negative and enhancing positive health impacts.

The main focus of the health impacts will be the communities near the cement plant site and quarry site; affected communities were determined by the social studies and the same groups will be considered for health impacts.

The existing healthcare condition and facilities are described in Chapter 4. Due to the need to consider capacity of hospitals, clinics etc., to deal with the potential extra demands that the existence of the Project may place upon them (especially during construction), the health of residents in these villages also need to be considered, as be the status of the clinics in these locations.

5.7.1 Impacts on Occupational Health

There is various occupational health and safety risks are likely to happen during the construction and operation period. Exposure problems to noise, dust, and heat are the major occupational hazards.

Noise induced hearing loss is the notified occupational hazard. Workers involved in raw material handling activity, ash handling and those working close to the boilers and raw material handling yard are exposed to high dust levels. Over a long period of time such exposure is likely to result in respiratory problems.

Measures will be implemented to reduce the dust generation at the originating point by installing appropriate control devices. The employees will be subjected to regular health check-up. The workers will be diagnosed for respiratory functions at periodic intervals and during specific complaints for lung function test, X-ray test, etc.

Fully equipped clinic with doctors, occupational health specialist, paramedical staff, medicines, ambulance and other medical equipment is available.

Plant personnel working in dust prone areas will wear personnel protective equipment like air filters over their nose. Job rotation schemes will be practiced for over-exposed persons (Those exposed to heat stress and high dust levels).

5.7.2 Impacts on Community Health

There is a risk that the workforce employed during the construction period could impact the local communities' health status. Groups vulnerable to health impacts would include young children, the elderly, the socio- economically deprived, and groups with chronic health conditions. Case studies of large construction projects elsewhere in the world have shown that the presence of a large number of single males in the construction workforce has increased demand for casual sex. Measures to manage the interaction between the local community and the workforce could need to be developed and implemented.

In addition, noise and dust pollution from the construction activities, as well as the heavy construction traffic, may affect the communities residing close to the construction areas and main haul roads.

A significant increase in traffic levels combined with a number of factors including poor current road conditions, uneven surfaces and the limited understanding of road safety among local drivers and pedestrians is likely to increase the number of accidents.

The construction of the factory may lead to a rapid encroachment and migrant populations However, using the high percentage of local workers will largely reduce the health risk during construction period.

In some respects, development projects can improve the well-being of populations around the area (e.g. safe water more readily available, new infrastructure, better access to health care), and

potentially increase the food supply (as a result of improved transport infrastructure). However, there are risks that health and nutrition may worsen, particularly in young children.

Other communicable diseases may appear or increase in incidence owing to the influx of migrants to the area. Sexually-transmitted infections and HIV/AIDS are a particular problem. Because of well preparation and dust management of the project, the disease on respiratory organs (e.g. tuberculosis and asthma) would be minor, but special attention on watch of local people for symptoms of these problems would be paid attention.

There are also likely to be socio-demographic changes associated with changes in reproductive behavior and women's activities. The location and nature of new homes and infrastructure (e.g. schools, health centers and roads) also contribute to the success or failure of projects.

The national ambient air quality standards prescribe level of air pollutants that will protect public health and other adverse effect on environment. Exposure to PM, SO2 and NO2 is likely to affect public health if the ambient concentrations are above the stipulated criteria.

The wastewater from the project will not be discharged outside into any streams. The noise will be confined within the plant boundary. No toxic chemicals will be stored inside the plant premises. Solid waste is not hazardous, they will be utilized and managed effectively.

Liquid fuel will be stored inside the plant and layout and design of the storage tanks and necessary fire risk mitigation measures will be provided. Approval to locate this storage tanks will be obtained from the Chief Controller of Explosives. On-site and Off-site disaster management plan will be prepared in consultation with the district administration and implemented during the operation stage of the project.

Therefore, the impact of the project operation on the health and safety of surrounding public will be insignificant in nature.

5.7.3 Health Concerns in Relation to Myanmar Conch Cement Plant Operations

In probing the perception of the communities regarding air pollution, the standard approach was to enquire of respondents, whether air quality was an important issue for the community. Where the response was affirmative, specific issues were probed and respondents were asked to support their statements with evidence, based on personal or household experience. Myanmar Conch Cement Company is upgrading the existing Government’s cement factory and construct new cement factory in premise of Kyaukse Industry Zone.

In summary, the community members interviewed for this study are of the view that Myanmar Conch Cement is not one of the major contributors to air pollution compare to other cement plants in the Industrial Zone. The perception of the majority of respondents is that air quality has not been improving over time, but this view was not shared by all respondents, who ranked Myanmar Conch as one of the minor polluter compared to other.

The general perception received from respondents in the communities is that those communities closest to Myanmar Conch Cement Plant. In conducting the survey, women were observed to be the gender most impacted by cement dust, as they carried the burden of both maintaining household cleanliness and providing care to family ailments they attribute to poor air quality.

Data was collected mainly from community individuals and groups, but key informants were also canvassed. These were from the Public Health Department, Local authority and persons identified as community leaders. As a group there was less unanimity in relation to cause and effect of air pollution on the communities.

5.8 Impacts during Decommissioning Phase

a) No detailed assessment of environmental impacts associated with decommissioning can be made at present. The plant has an expected lifespan of over 30 years and so only general principles can be established at the present time.

b) In broad terms, the process of decommissioning is likely to give rise to impacts similar to those experienced in the construction phase. The methods and techniques selected are expected to be in accordance with national and international standards prevailing at the time of decommissioning.

c) Decommissioning will require the following activities:

- Removal of all surface equipment and units;
- Potential removal of hard standing and surface cover;
- Abandonment of sub-surface utilities or filling and abandonment as appropriate;
- Reinstatement of the site and all project areas to pre-construction conditions. With regards to the rehabilitation of the quarries during operation, the works shall be conducted on an on-going basis in accordance with the accepted timetable set out in the planning proposals to the National authorities.
- For the cement plant, Myanmar Conch Cement will develop a site closure plan during the later stages of project design and maintain the plan throughout the life of the development. The plan should include arrangements for decommissioning the plant in a manner which avoids any pollution and return the site to an acceptable state. In addition, any decommissioning plan should take into account the social and economic impacts and include mitigation measures where necessary.
- The opportunities the site provides for long term biodiversity conservation purposes should be investigated as part of the site closure plan. There are no identified sites of ecological significance outside the main development areas that should be affected by decommissioning activities, though consideration will need to be given as to the long-term use of the access roads to the quarries. This will depend on their future use. It may be necessary to remove the roads and “re-instate” the ground and vegetation, but maintaining vehicle access or foot access only are also possibilities.

- The site closure plan and preceding rehabilitation plans will need to be reviewed and updated in the light of experience with implementing the ecological mitigation and compensation measures – especially the "Habitat Restoration" proposals. These habitat restoration activities will need to be monitored, during the project, so that lessons can be learned and applied prior to and at the time of final site closure.
- Overall, decommissioning activities are transitory, and are likely to be similar in magnitude to construction impacts.

5.9 Residual Impact

5.9.1 Summary of Residual Impact on Construction Phase

Environmental Attributes	Impact	Proposed Mitigation	Residual Impact	Residual Impact Rating
Air quality	Air pollutants emission during site clearing, transportation of construction material and construction activities.	Development of procedures for: ▪ Vehicle engines and other machinery will be kept turned on only if necessary. ▪ Machines and equipment will be periodically checked and maintained. ▪ Water spraying roads and dusty materials stockpiles. ▪ Sheeting vehicles carrying dusty materials on leaving the site to prevent materials being blown from vehicles. ▪ Speed reduction for the means travelling inside the construction site.	Dust propagation will be limited to construction area and will not influence local community. However, workers should be supplied with dust masks especially in dry days.	Low
Noise levels	Noise environment generated by earthwork, groundwork, structure installation and equipment installation.	▪ Good site management; ▪ Appropriate choice of machinery; ▪ Methods of working; ▪ Hours of working; ▪ Efficient material handling;	Until further details are known, it is not possible to predict whether there may be noise increases at nearby residential properties.	N/A
Water Quality, Water Use and Storm Water Runoff	Wastewater generated from offices, canteens, and worker	▪ Wastewater generated from offices, canteens, and worker accommodation is treated by septic sewage system.	Potential for accidental release of wastewater from the site will be minimized.	Low

Environmental Attributes	Impact	Proposed Mitigation	Residual Impact	Residual Impact Rating
	accommodation. Accidental release of fuel and lubricants/oil.	▪ Temporary drainage system will be provided for collecting drain water from construction activity and rain to sediment pond and reuse inside construction area. ▪ Create a special storage for fuel and lubricants/oil. ▪ Provide grease and oil trap for workshop and maintenance area.		
Solid Waste (process, utility, procurement)	Waste generation.	By adopting appropriate solid waste management plan based on the 3Rs methodology.	Waste for disposal will be disposed of through the municipality.	Low
Flora and Fauna Habitation Loss	Loss of vegetation on site clearance.	Implementation of proper restoration and rehabilitation master plan, the plant and it environment shall be acted as a green growth model.	The cement plant is located in an industrial zone and the present project is upgrade the existing cement plant area where high ecological values of species are unexpected.	Low
Social	▪ Increased employment (positive change). ▪ Potential traffic increase on the road from Kyaukse to Industrial Zone where local people are using for their transportation.	Proper traffic management plan is to be adopted and local road improvement scheme is to be developed without interfering the existing transportation system of local people.	The traffic has the potential to contribute to congestion and lead to complaints due to noise nuisance on a local basis.	Low

5.9.2 Summary of Residual Impact on Operation Phase

Environmental Attributes	Impact	Proposed Mitigation	Residual Impact	Residual Impact Rating
Air quality	▪ Generate dust that can cause a nuisance to local residents and cause a health risk to workers. ▪ Main risk is considered exposure to the workers and local residents with degradation of ambient air quality.	▪ Installation of dust collectors/ electrostatic precipitator. ▪ Use of low power consumption machinery and equipment to reduce power consumption. ▪ Enclosure of area to contain dust emission control the production process to ensure complete combustion. ▪ Process optimization. ▪ Sprinkle the road used for material transportation.	▪ Local air quality will be virtually unaffected and will remain well within the EQEG and IFC guidelines specified for the protection of human health. ▪ It is unlikely that there would be any discernable adverse effect due to dust deposition at any residential properties. ▪ Localized minor effects on air quality at properties very close to certain roads, but increments a very small fraction of air quality criteria.	Low
Noise levels	Operation of motorized equipment during cement production generate high noise levels with potential to disturb and cause annoyance to people in the surrounding area.	▪ Sources of noise pollution will be managed to limit noise levels to less than 85 dB. ▪ Access to areas with noise levels above 85 dB will be restricted to individuals with protective wear (ear plugs or ear muffles) only.	The major receptor of noise pollution is limited to workers as the factory is far removed from settlements and are outside the area of noise influence.	Low
Water Quality, Water Use and Storm Water Runoff	Waste water from process and utilities will not directly discharge into the environment.	▪ Water used for cooling system is reused or circulated in cooling water system. ▪ Wastewater generated from offices, canteens, and staff accommodation is treated by septic-seepage system. ▪ Create a special storage for fuel and lubricants / oil. ▪ Provide grease and oil	Cement production is operated in dry condition.	Negligible

Environmental Attributes	Impact	Proposed Mitigation	Residual Impact	Residual Impact Rating
		trap for workshop and maintenance area.		
Solid Waste (process, utility, procurement)	▪ Potential contamination for surface water, groundwater resources and soils. ▪ Negative impacts on ecosystem functioning and also on human health.	▪ Establishment of waste management disposal/recycling techniques. ▪ Hazardous waste disposal techniques to be established.	▪ Increase in recycling/reuse of waste generated. ▪ Waste management will be covered by internal procedures and will be regulated through local regulations.	Low
Flora and Fauna Habitation Loss	Dust deposition on leaves leading to loss of vegetation productivity and health.	▪ Belts of trees to provide local screening. ▪ Reduce dust emissions at source.	Emissions and impacts can be kept to an acceptable level by use of latest technologies and best working practices.	Low
Social	▪ Increased Employment (positive change) & tax.	▪ Measures to maximize local employment and improve local skill base recommended. ▪ Enhanced apprenticeship / training for some local people whose skills could be improved. ▪ Publication of local employment targets in local newsletter.	▪ This depends on skills of the young people and interest to return to home area, and on the opportunity offered by targets set. ▪ Increased tax for Kyaukse district.	Major beneficial

5.9.3 Summary of Residual Impact on Closure (Decommissioning Phase)

Environmental Attributes	Impact	Proposed Mitigation	Residual Impact	Residual Impact Rating
Air quality	Dust emissions during ground works.	▪ Water spraying roads. ▪ Sheeting vehicles carrying dusty materials. ▪ Speed limits on unmade surfaces. ▪ Dust emission monitoring in selected points.	Dust propagation will be limited to demolition area and will not influence local community. However, workers should be supplied with dust masks especially in dry days.	Low
Noise	Noise from decommissioning	▪ Good site management; Good choice of machinery;	Until further details are known, it is not possible to predict whether there	N/A

Environmental Attributes	Impact	Proposed Mitigation	Residual Impact	Residual Impact Rating
	of plant.	▪ Methods of working, including sequential blasting; ▪ Hours of working; ▪ Efficient material handling.	may be noise increases at nearby residential properties.	
Water quality and storm water runoff	Discharge of silty and contaminated storm water to surface water. Ground contamination by leakages from machines.	▪ Potentially polluting materials will be stored in dedicated storage areas. ▪ Machines and equipment technical condition will be reviewed periodically. ▪ Machines and equipment will be sited on hard surfaces. ▪ All storm water will go via sedimentation ponds and oil separation. ▪ Procedures for finding contaminated material during excavations will be established. ▪ Covering and damping of excavated materials. ▪ Appropriate storage of contaminated material if found.	Ground contamination and storm water contamination will be limited on site by proper handling and storage of materials and equipment. Storm water will be treated in sedimentation ponds, the impacts on overall quality of discharge wastewater will be low.	Low
Solid Waste	Solid waste generation	Segregation and recycling of waste and proper storage in isolation from the ground.	Solid waste will be managed by local waste contractors and disposed according to their permits and in compliance with local regulations.	Low
Landscape	Damage to the landscape character.	Restoration of the plant including a reforestation program.	Return of the sites to existing to better than existing condition.	Low beneficial
Social	Emergency situations during demolition works.	Local fire and emergency squads available on-site.	Procedures for prevention of handling with emergency situations will be implemented. Proper training and equipment need to be delivered to the staff.	Low

5.10 Cumulative Impact Assessment

The Cumulative Impact Assessment (CIA) assessed the significance of potential cumulative impacts from the projects on one or more VECs in the study area. It also factored in the accumulation pathways on these cumulative impacts caused by pre-existing and future projects.

When assessing the impacts of the Project, it is necessary to consider the cumulative impacts that might occur from the combined effect over a given resource of several projects that will be operated physically close to the Project.

In the assessment of the Project, the following environmental items were identified that should be considered the cumulative impacts of the proposed cement plant project and other projects in Kyaukse Industrial Zone.

(1) Air Quality

(2) Water Quality

(3) Waste

(4) Noise and Vibration

(5) Flora/Fauna and Ecosystem

(6) Community Health and Safety

The table below demonstrates additional project activities in the proposed cement project area. They are, however, associated with industrial activities such as cement production, limestone quarrying, and power plant. Figure 5.11-1 shows the location of the proposed cement plant project and surrounding projects.

Table 5.2 Development of Related Industrial Project Activities in the Project Area

No	Industries/ Factories	Ownership/ Project Operator
1	Shoe Factory	Private
2	Sewing Machine Factory	Private
3	No. (9), Textile Factory	Government
4	No. (2), Plastic Factory	Government
5	No. (33), Heavy Industry	Government
6	No. (36), Heavy Industry (Mirror)	Government
7	No. (33), Heavy Industry (Cement)	Government
8	No. (39), Heavy Industry	Government
9	No. (2) Farming Equipment Manufacturing Factory	Government
10	No. (2), Pharmaceutical Factory	Government
11	Home appliance manufacturing Factory	Government
12	Sin Min Cement Industry	Private
13	AAA Cement Factory	Private
14	Myanmar Elephant Cement Factory	Private
15	Penang Bag Factory	Private
16	Bicycle Manufacturing Factory	Private
17	Double Rhinos Cement Factory	Private

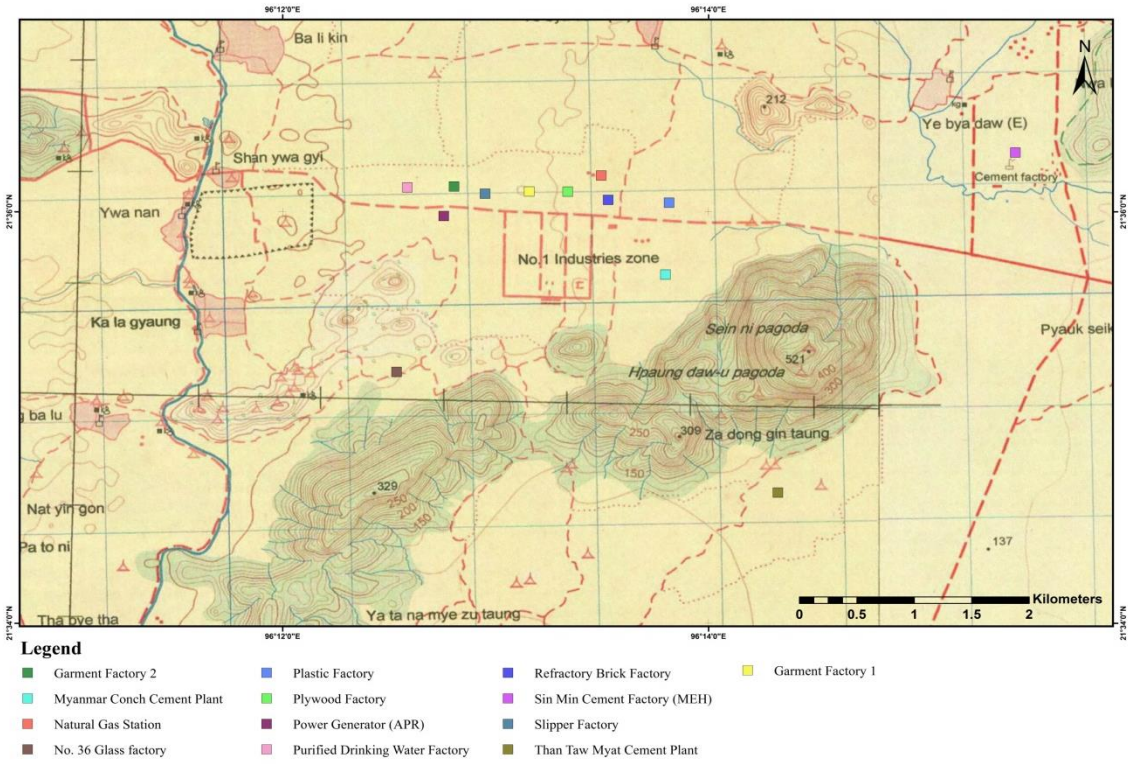


Figure 5-3 Location of the Projects that should be assessed Cumulative Impacts

5.10.1 Cumulative Impact Prediction

The cement plant and its associated facilities may have an impact on the following VEC components: air quality, water quality, waste, noise and vibration, flora and fauna, and community health and safety. To predicting cumulative impacts, Myanmar Conch Cement Plant is associated with some of the fully operational facilities within the factory boundary, such as limestone mining and coal power plants, but without considering other project activities in the region.

Table 5.3 Cumulative Impact Evaluation and Mitigation Measures

No.	Environmental Item (VECs)	Cumulative Impact Evaluation	Mitigation Measures
1.	Air Quality	In this study, efforts have been made to assess cumulative impacts of the proposed cement plant on air quality. There are many emission sources (e.g., existing cement plant project and another various projects) surrounding the proposed project area, all of which contribute to air pollution. Data on the nature and rate of emissions from these diverse sources are almost nonexistent. Similarly, there are significant uncertainties regarding future developments in this area and potential emissions from such sources. As noted earlier, due to lack of data on sources and rates of emissions from different sources, it was not possible to develop a regional air quality model for assessing effects of various sources on ambient air quality. In this regard, an in-house Continuous Air quality Monitoring Station (CAMS) may be established inside the cement plant complex to monitor in real time the air quality parameters of the area.	Stakeholder consultation and strictly follow to EMP
2.	Water Quality	When combined with other projects in the area, the cumulative impact on water quantity increases marginally. As other projects are developed, it is anticipated that the extent of the cumulative impact will increase resulting in an overall significance. The cumulative effects on water flow may be felt during the dry season in areas downstream of abstraction points. Cumulative impacts on water quality are likely to be interactive and increase in extent and severity as more projects become operational in the study area over time. Cumulative impacts on water quantity and quality will be more pronounced during the operational phase of projects.	Stakeholder consultation and take mitigation actions
3.	Waste	When combine with other projects in the area, amount of industrial and business-related waste generated from the projects will	strictly follow to EMP

No.	Environmental Item (VECs)	Cumulative Impact Evaluation	Mitigation Measures
		proportionately be increased.	
4.	Noise and Vibration	When the proposed cement plant project and other various projects start their operation, traffic volume will be increased cumulatively in and around the Kyaukse Industrial Zone. Therefore, impact of noise and vibration increased by vehicle traffic generated from operation of the projects should be estimated.	Avoid repeat action with other noise generation activities and working at nighttime.
5.	Biodiversity (Flora/Fauna)	The proposed cement plant is in an industrial zone and the present project (cement plant) is upgrading the existing cement plant area where high ecological values of species are unexpected. However, the area has for a long time been devoid of significant gain due to its developed nature and nearby settlements. Establishment and operation of the proposed cement plant project and another various project has disturbed the ecological setting of the area thereby rendering it less conducive a habitat for both plant and animal life through physical disturbance and discharge of pollutants. Projects effect on ecological and climatic conditions in general is a probable impact of low severity acting on a localized area of low to moderate sensitivity with short to medium term duration. Further, the area affected is not a designated area of significant ecological importance and its location on the outskirts of a metropolitan city and in an industrial zone makes it vulnerable to disturbance even in the absence of the project under review.	Stakeholder consultation and implementation of proper restoration and rehabilitation
6.	Community Health and Safety	Community safety might be influenced by the increase of traffic volume in and around the Kyaukse Industrial Zone caused by the operation of the projects. Increased traffic will impact road infrastructure necessitating ongoing maintenance as well as increase the incidents of accidents. The cumulative impact on road infrastructure and safety is likely to increase in severity as other project activities commence construction and operation. Damage to road infrastructure and large traffic volumes will increase the risk of accidents.	CSR program will be implemented in cooperation with Township Development Plans by discussing with related departments.

CHAPTER VI

ENVIRONMENTAL MANAGEMENT PLAN

6.1 Introduction

Industrial development is an important constituent in our pursuits for economic growth, employment generation and betterment in the quality of life. On the other hand, industrial activities, without proper precautionary measures for environmental protection are known to cause pollution and associated problems. Hence, it is necessary to comply with the regulatory norms for prevention and control of pollution. Alongside, it is also imperative to go beyond compliance through adoption of clean technologies and improvement in management practices. Commitment and voluntary initiatives of industry for responsible care of the environment will help in building a partnership for pollution control.

Myanmar Conch Cement Company Ltd. has committed to fully protection of the environment in the proposed project area with developing and implementation of environmental management plan (EMP) which will act as an adequate tool to mitigate the potential adverse impact and enhance the beneficial impacts associated with present Cement Project during the construction and operation phase.

Environmental protection is the major requirement for the Myanmar Conch Cement project in Kyaukse Industrial Zone area. In consistent with company's environment protection policy and recommended international best practices, this plan focus on the systematic formulation of control measures and implementing of those in various stages of the project.

As principal objective of EMP is to develop an effective management tool that will ensure that diverse ranges of environmental and social components observed through earlier environmental impact assessment process are systematically mitigated through effective managing and monitoring mechanism. This will assist Myanmar Conch Cement Company Ltd. to achieve its environmental and social goals with the principle of avoiding potential damage, costly remedial action and adverse public concerns. In addition, this tool will help project for enhancing benefits, compliance with company policy host country legislations and internationally accepted best industrial practices,

This environmental management plan outlines the appropriate and effective management and mitigation measures so as to alleviate the environmental and social concerns which have identified in the impact assessment section of this report. In addition, this report has integrated environmental protection strategy into the project.

Preparation of Environmental Management Plan (EMP) is required for formulation, implementation and monitoring of environmental protection measures during and after commissioning of the proposed Cement Plant project. This Environmental Management Plan has indicated the details as to how various measures have been or are proposed to be taken. The base line setting of different relevant environmental components in the study is and predicted potential impacts on those components due to

the proposed project are documented. In this plan, mitigation measures for the identified environmental impacts are documented for both construction and operational stages of the proposed project in the form of an Environmental Management Plan (EMP).

The elements of biological, physical, and human system receptors which are concerned of being disturbance of proposed project for construction and operation period is mentioned as follows.

- Terrestrial Biodiversity
- Air Quality
- Water Quality
- Noise and Vibration
- Waste Management
- Landscape and visual intrusion
- Health and Safety
- Social Dimensions

This document shall be treated as a dynamic and live document. Reviewing, revising and updating are subject to do as deemed necessary in line with the variation of proposed activities described in this document ensuring its remains appropriate to ongoing aspects of project.

6.2 Role and Responsibilities

Being owner of this document, Myanmar Conch Cement Company Ltd. will hold ultimate responsibility and shall fully exercise in developing, reviewing, updating and effective implementing of this document. If the measures set up in it does not meet or follow accordingly, company will redefine as necessary until full satisfaction is achieved.

Responsibilities for the implementation of environmental social considerations lie with Myanmar Conch Cement Company Ltd. management. Management shall be accountable for delivering commitments made in this document.

Finding from the continuous monitoring of environmental management plan is subject to be reviewed periodically and as deemed necessary by management. Based on the result, management shall be able to take necessary remedial actions and to enforce to adopt adequate performance strategy toward the continual improvement of the environmental management system.

The EMP provide a guide on project impacts that will need monitoring both for corrective action and learning purposes. Finally, an Emergency Response Plan will provide guidance on appropriate

response procedures to any emergency that may arise because of project implementation. All the above mentioned plans will guide project implementation during its operational phase.

The Safety and Occupational Health Management Plan will guide quarry and plant operations for enhanced workers safety and occupational health. A Decommissioning and Closure Plan has been included because the project under review by nature will require a decommissioning and closure phase before the site can be abandoned.

Implementation of the EMP will primarily be the responsibility of the Plant Manager assisted by the Environmental Manager and the Safety and Health Manager. However, site specific management interventions will be the responsibility of each respective Head of Department and specific individuals identified in the EMP for each specific intervention who will ensure that all the staff under their supervision work towards realization of the objectives set out in the management plan. Figure 6.1 given below present the Management Structure at Myanmar Conch Cement Plant showing responsibilities.

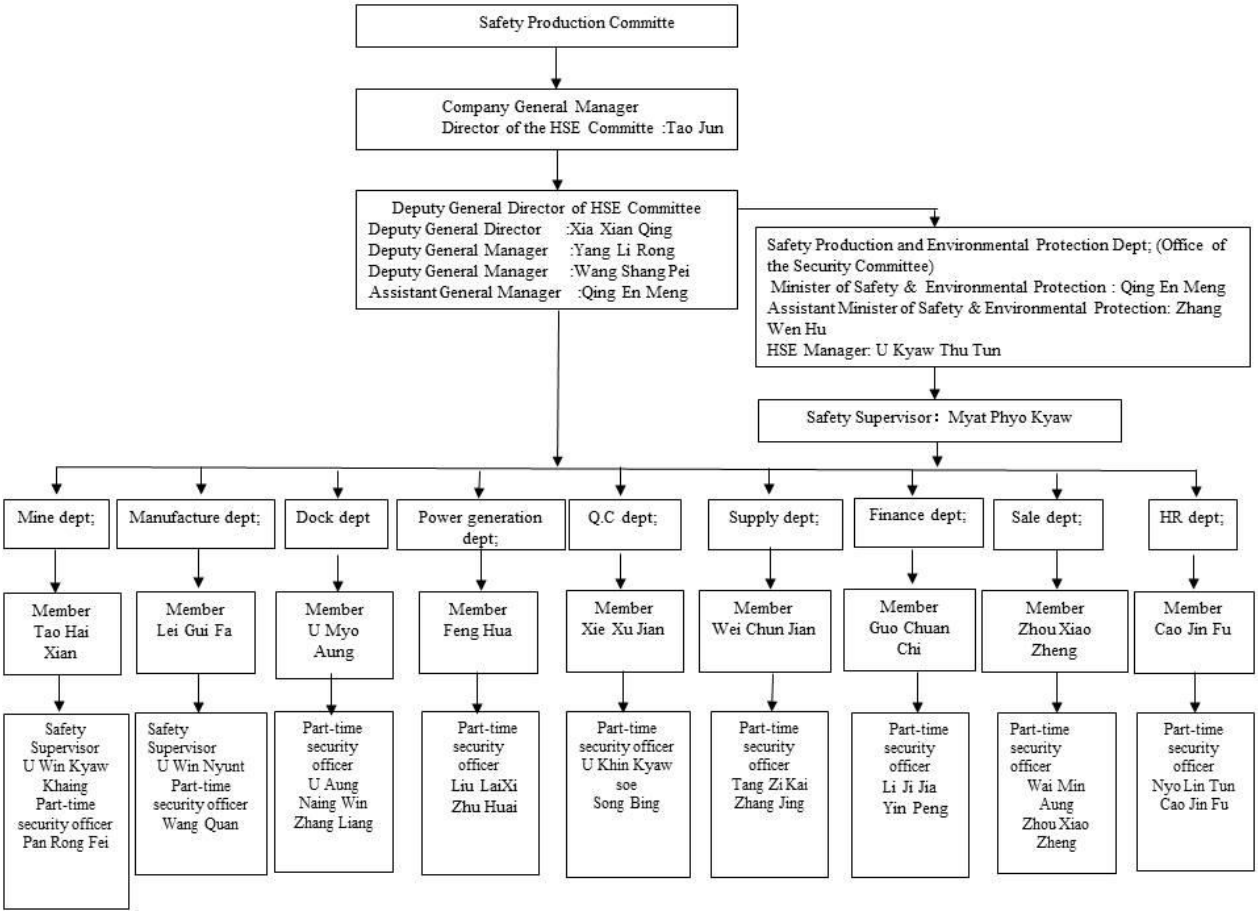


Figure 6-1 Organization Structure of Myanmar Conch Cement Factory

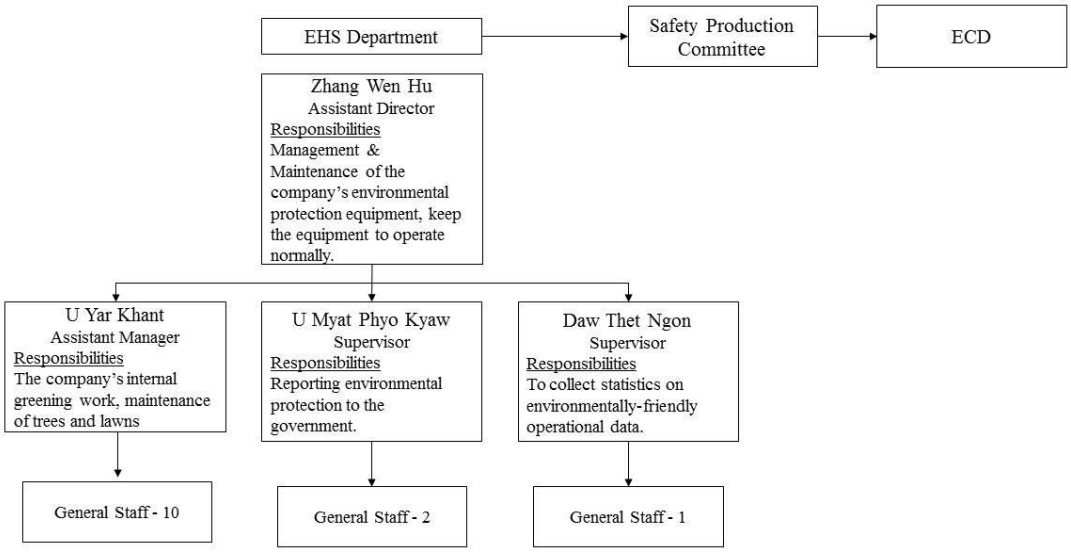


Figure 6-2 Organization Structure and Responsibilities of EHS Department

Table 6.1 Tasks and Responsibilities for Implementation of Environmental and Social Management Plan

Department/Section	Tasks and Responsibilities
Safety Production Committee	- Establish Environmental policy, objectives, targets, and Environment Management Plans available for the project. - Ensure that all activities are carried out in compliance with relevant laws and regulations. - Submitting Environmental Monitoring Report to ECD.
EHS Department	- Management and Maintenance of the company's environmental protection equipment. - Monitoring the factory operations according to EMP and EMoP. - Control the training and competency. - Other health impacts on project workers and the public around the project site, if necessary, health programs will be carried out by contacting the Public Health Department and following instructions.
Site HSE Manager/ Representative	- Ensuring that activities are carried out in accordance with Myanmar Conch Cement Co., Ltd. requirements. - Identify all possible risks and its environmental consequences with the aim of prevent them and act in case of accident. - Provide environmental training to all employees. - Compliance with requirements, including legal requirements relevant to the environment.

Supervisor/s	- Implement and follow the Environmental policy, objectives, targets, and Environment Management Plans available for the project. - Ensure that all activities are carried out in compliance with relevant laws and regulations.

6.3 Environmental Management Plan for Cement Plant and Facilities

6.3.1 Construction Period

i) During excavation and transportation on roads at the plant site, there is a scope for local fugitive dust emissions. Frequent water sprinkling in the vicinity of the construction activity will be done.

ii) There is a likelihood of fugitive dust from the construction activity and material handling from the truck movement in the premises of the proposed plant. The industry will take up tree plantation program around the plant site.

iii) It will be ensured that construction vehicles are properly maintained. The vehicle maintenance area will be located in such a manner, so as to prevent contamination of water sources by accidental spillage of oil.

iv) Proper care will be taken for storage of fuel and chemical substance etc. Location will be identified for the storage of such flammable liquids, away from the main plant. The storage will be as per institutional safety standards.

v) The construction workers will be provided with sufficient and suitable toilet facilities to allow proper standards of hygiene.

vi) Onsite workers using high noise equipment will adopt noise protection devices.

Noise prone activities will be restricted to daytime hours only.

vii) Hazardous material will be stored in proper areas.

viii) After completion of construction activities, the rubbish will be cleared and disposed of at nearby authorized waste disposal sites.

6.3.1.1 Air Pollution/Emission Management Plan

Objectives: To reduce the sources and amounts of pollutants responsible for the loss of ambient air quality and to improve the quality of life of the communities, protecting their health risks from air pollution.

Legal Requirements: National Environmental Quality (Emission) Guidelines, 2015

Implementation Schedule: During construction phase

Responsibilities: Monitoring by HSE section and/or third party

Management Action:

- Tree plantations are provided along the boundary of Cement Plant. This green belt can minimize dust dispersion generated from construction.

- Sprinkle the road at the construction site location used for material and equipment transportation.
- In order to attenuate the air pollution, one of the mitigation measure, known as green belt program which also act as a noise barrier, will be developed in the project area.
- The recommended locations where this plantation should occur are around the plant boundary, road side, open land and other areas where there are no facilities is intended to build.
- In selection of the plant species, it is highly recommended to use ever green local plant species as possible.
- Not only in buffer zone, but in other available areas where ever possible, plant species of aesthetic value, fruit bearing, and birds attracting tree will be planted.
- Establishing a tree plantation program, it would benefit the abatement of noise and dust emission. Other than that, it would be converted the project area into a possible park for the nearby villages and project staff for recreation.

6.3.1.2 Noise and Vibration Management Plan

Objectives: To control and limit noise emissions and vibration levels, at residential properties and other sensitive receptors in the vicinity of the Project.

Legal Requirements: National Environmental Quality (Emission) Guidelines, 2015

Implementation Schedule: During construction phase

Responsibilities: Monitoring by HSE section and/or third party

Management Action:

- All machinery shall be turned off if they are not in use.
- Regular maintenance to be scheduled for the equipment which emitting unwanted noise
- Use of low-noise engines and installing noise muffler and silencers.
- Noise emission shall be maintained as per guideline (general emission < 85 dB(A), Impulse < 115 dB(A) from 5 m distance, 85 dB(A) from building, 70 dB(A) from plant boundaries at all time of operation)
- Public warning program shall be developed with intention of notifying the occurrence of blasting in advance.
- Workers must be equipped with earplugs or earmuffs as appropriate, and wearing must be enforced whenever working in the noisy environment. Appropriate training shall be given to the employees on the noise abatement methodology.
- Prepare the land for construction but still leave several trees on the green area
- Transportation of construction materials to and from the site should be well covered to prevent air pollution without disrupting construction activities.
- Vibrator and hammer shall be used with protective screen.

- Hammer with quiet design shall be used and noisier diesel operated hammer is not allowed.
- Pile driving shall be restricted form 06:00 am to 06:00 pm.
- No piling activities will occur during night time.
- Avoid construction processes at night time except for emergency cases and exercise the best mechanism to minimize the noise emitting.

6.3.1.3 Water Quality Management Plan

Objectives: To reduce discharge of wastes that impact water quality and to determine if additional implementation of management practices are necessary to improve and/or protect water quality.

Legal Requirements: National Environmental Quality (Emission) Guidelines, 2015

Implementation Schedule: During construction phase

Responsibilities: Monitoring by HSE section and/or third party

Management Action:

- Wastewater generated from offices, canteens, and worker accommodation is treated by septic-sewage system. Wastewater treatment unit will be provided for treating wastewater from canteens.
- Temporary drainage system will be provided for collecting drain water from construction activity and rain to sediment pond and reuse inside construction area.
- Create a special storage for fuel and lubricants / oil. The storage is a closed building and it is protected from rain water.
- Provide grease and oil trap for workshop and maintenance area.

6.3.1.4 Management Plan for Terrestrial Ecology

Objectives: To avoid and minimize impacts to flora and fauna habitat features within the vicinity of project area.

Legal Requirements: The Protection of Biodiversity and Natural Protected Areas Law (May 2018)

Implementation Schedule: During construction phase

Responsibilities: Monitoring by HSE section and/or third party

Management Action:

During the construction period, loss of vegetation and habitat are highly expected in plant construction area due to the site clearance and removal activities. In order to minimize the disturbance to local flora and fauna species, following mitigation and recommendation are provided to take necessary actions.

- Ensure all native fauna is not intentionally harmed as a result of construction works.
- Night work activity shall be avoided as possible as it can in working quarry site.

- Project site boundaries shall be regularly checked ensuring unnecessary habitat and vegetation do not happen in the project area.
- Relocate the native fauna specie to the area where same habitat system is provided for those.
- Designate a fauna catcher on site prior to commence of area clearing with the anticipation of removing fauna to a nearest location where same habitat exists.
- Regular monitoring and auditing the performance of environmental monitoring activities by competent environmentalist.
- Instruction given to all drivers and workers to take care from causing incidents of fauna fatalities by the movement of construction vehicles and machine.
- Hunting and catching the local wildlife is strictly prohibited.
- To construct sediment control system, etc. using fencing during raining period to avoid disturbance to surrounding habitats of unaffected area.
- Reinstatement of borrow pits will be followed upon the completion of individual activity.
- Where technically feasible and practicable, new plants are to be grown as early as possible during the construction phase of project. New vegetation in the project area should use native species and the use of exotic species should not be allowed.
- Works areas in temporarily affected areas shall be reinstated with tree/shrub/ grass upon completion of the works.

6.3.1.5 Health and Safety

Objectives: To prevent industrial accidents and work-related illnesses.

Legal Requirements: Social Security Law (2012), Employment and Skills Development Law (2013)

Implementation Schedule: During construction phase

Responsibilities: Monitoring by HSE section

Management Action:

Enforcing site security

- Restricting access to the facility by proper fencing
- Installing warning signs in Myanmar at the entrance of the site to warn people about the risks associated with the construction
- Displaying emergency telephone numbers for Police, Ambulance, and Fire services
- Locking gates outside working hours
- Erecting site identification board of durable material and finish at the entrance of the site giving the name of the site, and the name, address, and telephone number of the site manager
- Providing at least one 24-hour guard for the site
- Keeping the daily record of persons and vehicles entering/ leaving the site

Ensuring site safety

- Visitors report to the site office where they should sign-in and be issued a pass
- Visitors should also sign out on departure and surrender their pass
- Staff and employees working on-site attend a safety course before commencing work
- Personnel and visitors to the construction area of the site wear personal protective clothing inclusive of high visibility clothing, protective footwear, and safety helmets

Enhancing safety at site

- The fuel storage facility is fenced with barbwire, locked, guarded, and has access to a well-compacted road and fire- fighting equipment
- A drinking water supply is provided at site
- Tanks are clearly labelled with details of contents, potential hazards (e.g., explosive, flammable, toxic etc.) and emergency services telephone numbers
- Closed working spaces are properly ventilated
- Electrical grounding is ensured while handrails and guard railing should be regularly inspected and maintained

6.3.1.6 Emergency Response Plan

Objectives: Ensure employees are aware of their responsibilities in an emergency and outline basic procedures to follow during safety related emergencies.

Legal Requirements: Natural Disaster Management Law (2013)

Implementation Schedule: During construction phase

Responsibilities: All supervisors are responsible for ensuring effective implementation of the Emergency Response Plan and will act as key respondents. Designated assistants will act in the absence of supervisors and will act as key respondents in that case.

Management Action:

- A safety committee will be formed, and regular safety meetings will be organized.
- All safety equipment and tools will be regularly maintained. In addition, environmentally friendly fire-fighting equipment such as dry powder extinguishers should be provided within the premises of the facility.
- Fire-fighting training drills for the operating staff will be conducted. The safety specialist will prepare, implement, and maintain a comprehensive fire protection and prevention program. The safety staff will also be responsible for the inspection and maintenance of the fixed and portable fire protection equipment and for the investigation of fire incidents.
- All emergency exits at project site should be clearly marked (emergency lights and/or fluorescence), and free from debris to ensure quick and free passage in case of emergency.

- As the magnitude of an emergency increases, so will the need for multi-agency support from within the community. Upon notification of an imminent or actual emergency, the emergency response team will initiate the notification of key personnel and agencies. Based on the type and seriousness of the event, appropriate personnel are notified of the current or imminent situation.

6.3.2 Operation Period

6.3.2.1 Air Pollution Management Plan

Objectives: To reduce the sources and amounts of pollutants responsible for the loss of ambient air quality and to improve the quality of life of the communities, protecting their health risks from air pollution.

Legal Requirements: National Environmental Quality (Emission) Guidelines, 2015

Implementation Schedule: During operation phase

Responsibilities: Monitoring by HSE section and/or third party

Management Action:

- Advance machines, equipment and methods are utilized to minimize air pollutions, such as covering machines, watering accessible road, and installing dust collecting system i.e., Electrostatic Precipitator (EP), Bag Filter (BF) and cyclone dust collector. List of environmental protection equipment and specification are described in Appendix 4-B.

Emissions Source	Pollution Control Measures
Preheater Flue Gas	Electrostatic Precipitator
Cooler Exhaust Gas	Electrostatic Precipitator
Coal Preparation	Bag Filter
Cement Grinding	Bag Filter
Material Transit Point	Bag Filter
Raw Material Storage	Semi-closed
Conveyor	High-efficiency dust-free seal conveying

Electrostatic Precipitator (EP)

Bag Dust Collector

- Chimneys and Stacks are designed and constructed to have sufficient heights to effectively vent dust, smoke, and odors to the atmosphere.
- All dust collectors or dedusting equipment are designed, installed, and guaranteed to regulate particulate matter emissions not exceeding 60 mg/Nm^3 at all ranges of kiln operation.
- Periodically Preventive Maintenance (PM) is scheduled for dedusting equipment such as Electrostatic Precipitator and Bag Filter. Preventive Maintenance period is every 6 months for Bag Filter and every 2 years for Electrostatic Precipitator.
- Operational conditions of dedusting equipment are maintained such as temperature of flue gas entering Electrostatic Precipitator not to exceed operational range etc.
- Regular inspection and maintenance of gas analyzer at an inlet of Electrostatic Precipitator are carried out to maintain a good operational condition.
- Tree plantations are provided along the boundary of Cement Plant. This green belt can minimize dust dispersion generated from on-site transportation.

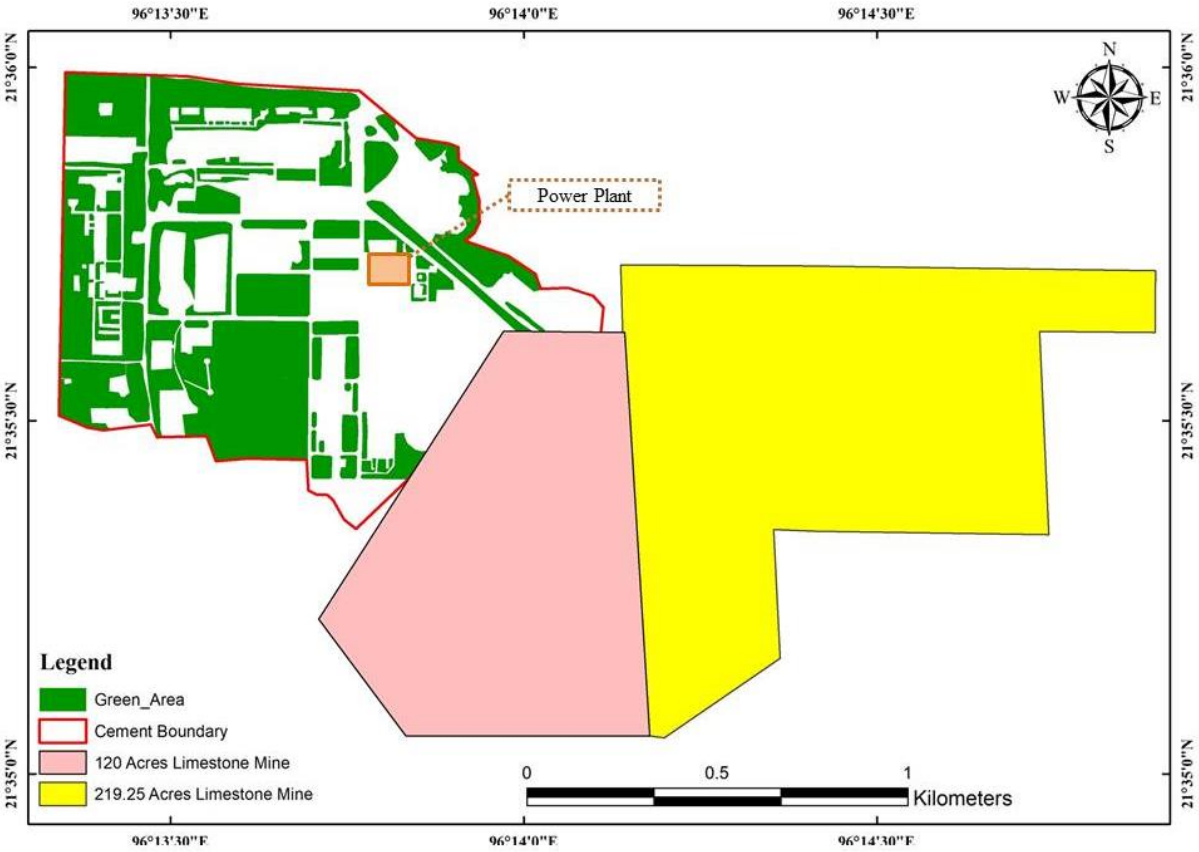


Figure 6-3 Buffer zone and green belt development Area

- Sprinkle the road used for material transportation.
- The concentration of dust in areas where plant personnel are working such as the areas along the conveying system, at which material is transferred including the areas around receiving hoppers, is limited to be less than 15 mg/m^3.

Continuous Monitoring System

- Continuous online monitoring system for PM, CO, SO_2 and NO_x with computer display and recording facility will be installed to facilitate regular checkup of air emissions and ensure compliance with the prescribed standards.
- The emission of gases and dust will be maintained within the National standard (NEQG).

Air Quality Monitoring

Item	Parameters	Coordinates	Monitoring Period
Air quality	NO_2, SO_2, CO, $PM_{2.5}$, PM_{10} (If the other guidelines parameters can be measured, they will be measured and reported in the monitoring report.)	AQNV-1: 21°35'48.7"N 96°13'24.9"E AQNV-2: 21°35'25.3"N 96°14'9.9"E	24-hour continuous monitoring

Figure 6-4 Air Quality Monitoring Points

6.3.2.2 Noise and Vibration Management Plan

Objectives: To control and limit noise emissions and vibration levels, at residential properties and other sensitive receptors in the vicinity of the Project.

Legal Requirements: National Environmental Quality (Emission) Guidelines, 2015

Implementation Schedule: During operation phase

Responsibilities: Monitoring by HSE section and/or third party

Management Action:

- The noise level generated by machinery and equipment will be kept to a minimum. The noise limitation at 5m from machinery and equipment running at full load capacity is controlled as follows:

- Continuous/Intermittent noise 85 dB(A) max
- Impulse noise 115 dB(A) max
- The machinery generating high level of noise is installed in the enclosed building to avoid disturbance in adjacent areas. The noise limitation at a distant of 5 m from building while running at full load capacity shall be not more than 85 dB(A) and at boundary of plant shall be not more than 70 dB(A) at all times of operation.

Table 6.2 Main Equipment Noise Intensity and Preventive Measures

No.	Noise Source	Noise Intensity dB(A)	Preventive Measure
1	Raw Mill	95~105	Foundation vibration reduction
2	Coal Mill	95~100	Foundation vibration reduction
3	Cement Grinding Mill	95~105	Foundation vibration reduction
4	Roots Blower	105~115	Foundation vibration reduction and install silencer, closed building
5	Main Fan of Kiln Inlet	90~110	Foundation vibration reduction and install silencer
6	Grate Cooler	85~100	closed building
7	Air Compressor Room	90~95	Foundation vibration reduction and install silencer, closed building
8	Water Pump	85~90	Flexible joints and closed building

- Machinery and equipment are periodically inspected and maintained in good operational conditions.
- Areas with high-intensity noise, over 80 dB(A), are identified and designated warning signs.
- Personnel Protective Equipment (PPE) is provided and strictly enforced. It is obligatory for employees to wear ear protection equipment when they work in areas with noise level over 80 dB(A).
- Tree plantations are provided along the boundary of Cement Plant. This green belt can minimize noise generated from operation.
- The company will implement the mitigation measures mentioned above.

Noise and Vibration Monitoring

Item	Parameters	Coordinates	Monitoring Period
Noise and Vibration	Sound Level (LAeq in dB(A))	Same as air monitoring points	24-hour continuous monitoring Day Time (07:00-22:00) and Night Time (22:00-07:00)

Figure 6-5 Noise and Vibration Monitoring Points

6.3.2.3 Water Quality Management Plan

Objectives: To reduce discharge of wastes that impact water quality and to determine if additional implementation of management practices are necessary to improve and/or protect water quality.

Legal Requirements: National Environmental Quality (Emission) Guidelines, 2015

Implementation Schedule: During operation phase

Responsibilities: Monitoring by HSE section and/or third party

Management Action:

- Cement production is operated in dry condition and Water used for cooling system is reused or circulated in cooling water system. Therefore, the production does not cause water pollution.
- Wastewater management system of the plant is a closed system. Effluent is recirculated without discharging from the plant except that there is heavy rain and emergency discharge may be required.
- Wastewater generated from production process is sent to oil separator and sedimentation pond, respectively. The water from sedimentation pond is reused in some equipment and other activities in cement plant, such as Conditioning Tower, Raw Mill, and Cement Mill.
- Wastewater generated from offices, canteens, and staff accommodation is treated by septic-seepage system. Wastewater treatment unit will be provided for treating wastewater from canteens. Section 3.4.9 describes the details of the wastewater treatment unit, including photos and location.

- Create a special storage for fuel and lubricants / oil. The storage is a closed building and it is protected from rain water.
- Provide grease and oil trap for workshop and maintenance area.
- Provide separated water drainage and treatment system for outdoor coal storage. Compact the storage ground with clay to prevent seepage into the ground. Outdoor coal storage is used temporarily while coal is being transported, and a coal storage building has already been constructed.

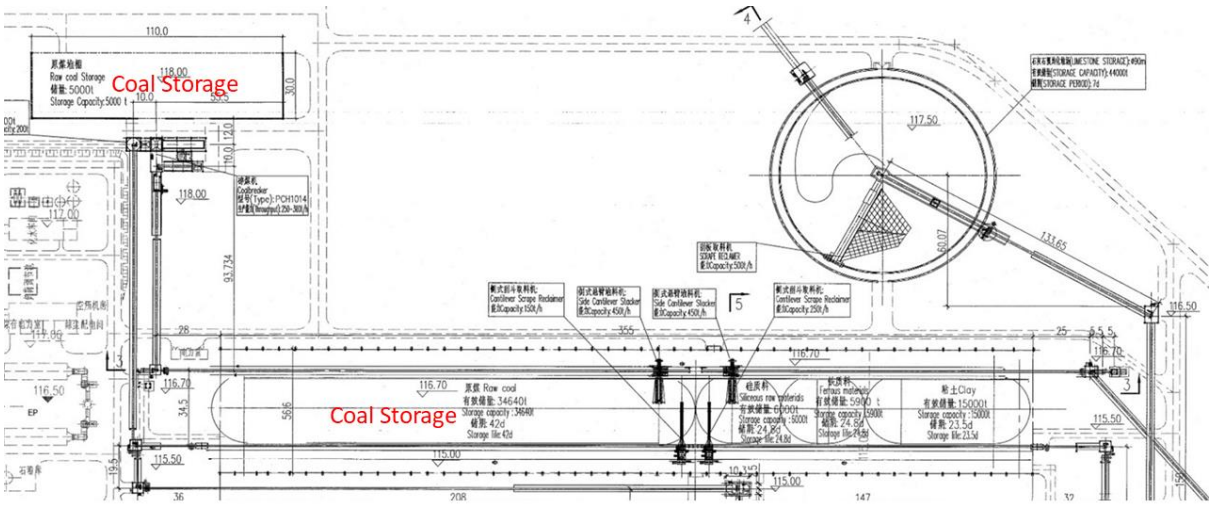


Figure 6-6 Coal Storage Layout

Within the studied area, based on the survey results, most get water supply from tube well. For drinking water, purified water is available and water treatment method like filtering and boiling are used. For irrigation to the farms, most use the reservoir, but some uses own wells.

Water quality surveys were conducted for two underground water and two surface water sampling points (section 4.3.1). Water quality results were compared by effluent level of general guideline in NEQG. By the analysis results, concentrations of parameter are within the applied standard in each location.

Provided that recommended additional mitigation measures are fully implement and prove effective, the significant of impact is reduced to minor.

Water Quality Monitoring

Item	Parameters	Coordinates	Monitoring Period
Water quality (Surface Water & Groundwater)	BOD, COD, Heavy Metal, Salinity, Nitrate, TDS, TSS, Temperature, pH, Chloride, DO, Iron, Turbidity, Total Hardness	SW-1: 21°35'54.2"N 96°13'51.13"E GW-1: 21°35'43.9"N 96°13'17.85"E	One Time

Figure 6-7 Water Quality Monitoring Points

6.3.2.4 Solid Waste Management Plan

Objectives: To implement integrated solid waste management in ways that is protective to human health and the environment.

Legal Requirements: National Environmental Quality (Emission) Guidelines, 2015

Implementation Schedule: During operation phase

Responsibilities: Monitoring by HSE section and/or third party

Management Action:

The main process waste streams generated during the project operation will comprise:

- kiln dust removed from the by-pass flow and stack.
- used lubricating oils from plant machinery and vehicles.
- used hydraulic oils.
- sludge from the wastewater treatment system.
- separated oil sludge from oil/water separators; and
- used oil or water treatment chemical containers

In addition to the above process waste, there will be several wastes associated to the operation and maintenance of the plant, such as:

- used oil and air filters from machinery and vehicles;
- used batteries from vehicles and trucks; and
- other maintenance waste (i.e., oily rags, paint residues, etc.); and
- very small quantities of expired chemicals.

Name	System	Waste Disposal
Sodium Hydroxide	Demineralization	-
Hydrochloric Acid	Demineralization	-
Flocculent	Water Treatment	-
Polyelectrolyte	Water Treatment	-
Lime	Water Treatment	-

Staff working on site will also generate general domestic waste (i.e., food and packaging) and office waste (paper, etc.).

- Adopted the 3Rs Program (Reduce, Reuse, and Recycle) in waste management to maximize resource utilization. Reuse and recycling will be preferred if possible, trying to sell (or donate) a range of materials for reuse and recycling in the local community and/or regionally. Furthermore, in case of hazardous one (such as lead acid batteries) the recycling process will be undertaken in an appropriate way to avoid H&S and environmental issues.
- Waste generated from the production process include off-spec clinker, off-spec raw materials and dust from dust collectors will be recycled to the production process.
- Used refractory brick generated during regular maintenance of cement kiln will be fed to raw materials preparation process and used in cement production process.
- Recyclable waste e.g., plastic, wood scrap, metal scrap, paper etc. will be reused/recycled as much as possible.
- Disposal at the local dumpsites will be the only possible solution for waste that cannot be reused or recycled. In any case, the main mitigation to reduce the impact due to disposal of waste at the dumpsite will be to minimize the amount of waste that is sent there through the waste minimization and reuse/recycling measures outlined above.

Hazardous Waste Management

- All hazardous materials shall be stored in clearly labelled containers.
- Storage and handling of hazardous materials will be in accordance with national and local regulations appropriate to their hazard characteristics.
- Spent oils (including transformer oil) will be recycled.
- Fire prevention systems and secondary containment shall be provided for storage facilities, where necessary, to prevent fires or releases of hazardous materials.
- Personnel involved in handling of these chemicals will be properly trained and made aware of the safety data and related first-aid measures. Water tap/jet will be installed near the demineralization plant so that the affected personnel can thoroughly wash in case of acid / base contact incident.

- Install ventilation cabinets in the laboratory and air-conditioning system in control room. Take rubber liner and lining plastic corrosion prevention measures for pipelines of water treatment equipment.

Fuel Tank

- Fuel tank has 3 numbers, and one has 10000gal storage separately. Without storing large amount of fuel, it is purchased from the suppliers for daily consumption. The fuel supplier transports fuel to the plant's fuel storage with fuel trucks.

Figure 6-8 Fuel Storage Tank

Waste Monitoring

Item	Parameters	Locations	Monitoring Period
Waste Management	Domestic and hazardous waste	- Water treatment chemical storage - Fuel Tank	Daily monitoring and quarterly reporting

6.3.2.5 Soil Management Plan

Objectives: To prevent soil contamination by oil or grease spills, leakages, or releases.

Legal Requirements: -

Implementation Schedule: During operation phase

Responsibilities: Monitoring by HSE section and/or third party

Management Action:

- All hazardous materials will be stored in clearly labelled containers. No significant impacts on soil are expected during the operation phase.

- Leak proof containers will be used for storage and transportation of oil/grease and wash off from the oil/grease handling area shall be drained through drains and treated properly.

Soil Quality Monitoring

Raw Material Storage, Water Treatment Chemical Storage, and Fuel Tanks will be monitored under the Monitoring Plan.

Item	Parameters	Locations	Monitoring Period
Soil Quality	Moisture, pH, Organic Carbon, Humus, Total N, NO_3-N, Ca, Mg, K, Na, P, K_2O, SO_4	S-1: 21°35'44.02"N 96°13'54.99"E S-2: 21°35'23.81"N 96°13'40.77"E	One Time

Figure 6-9 Soil Quality Monitoring Point

The summary of management plan for cement plant and facilities are shown in Table 6.3.

Table 6.3 Summary of Environmental Management Plan for Cement Plant and Facilities

No.	Issues	Activities	Management plans	Management Location	Time Management Implementation
I	Construction Stage				
1	Air Pollution	- Mobilization of materials and equipment - Building factory	- Sprinkle the road at construction site - Prepare the land for construction but still leave several trees on the green area for absorbing air pollution without disrupting construction activities. - Transportation of construction materials to and from the site should be well covered to prevent dust and falling of materials.	Cement plant construction site	During the construction stage
2	Noise Pollution	- Mobilization of materials and equipment - Building factory	- All machinery shall be turn off if they are not in use - Regular Maintenance to be schedule for the equipment which emitting unwanted noise. - Use of low-noise engine and installing noise muffler and silencers - Noise emission shall be maintained as per guideline - Workers must be equipped with earplugs or earmuffs as appropriate - Vibrator and hammer shall be used with protective screen - No piling activities will occur during night time.	Cement plant construction site	During the construction stage
3	Traffic impact	- Mobilization of materials and equipment	- Coordinate the use of roads which is outside the existing road class with local government. - Warning signs are placed at the exit or entrance of the project location. - When entering the construction location, the vehicle carries the material should reduce its	Cement plant construction site	During the construction stage
4	Terrestrial Ecology	- Site clearance and removal activities	- Ensure all native fauna is not internationally harmed as a result of construction works - Project site boundaries shall be regularly checked ensuring unnecessary habitat and vegetation do not happen in the project area. - Instruction given to all drivers and workers to take care from causing incidents of fauna fatalities by the movement of construction vehicles and machine - Construct sediment control system to avoid disturbance to surrounding habitats of unaffected area - Works area in temporarily affected areas shall be reinstated with tree/ shrub/ grass etc.	Cement plant construction site	During the construction stage
II	Operation Stage				
1	Air emission (Dust, SO2, NOx)	Cement Kiln (Combustion reaction)	- Install air emission control device (best available technology) such as Bag Filter (BF), Electrostatic Precipitator	Cement Plant	During the operation stage

No.	Issues	Activities	Management plans	Management Location	Time Management Implementation
			(EP) and Cyclone Dust Collector. - Periodically Preventive Maintenance (PM) will be scheduled for dedusting equipment at main stack. - Try to maintain good operation conditions of dedusting equipment e.g. control of electrical system of EP, temperature control of flue gas to the EP not to exceed operational range etc. - Install Low NOx burner to reduce thermal NOx of combustion reaction in cement kiln process.		
2	Air emission (Dust)	- Stockpile - Logistic & Transportation	- Water spray at raw material and solid fuel stockpile to reduce fugitive dust. - Prevent to spontaneous ignition in coal stockpile - Tree plantation will be provided along the cement plant boundary. This green belt will minimize ground level dust dispersion to surrounding area.	Cement Plant	During the operation stage
3	Noise	- Raw Mill - Cement mill - Coal mill - Generator	- Implement noise insulation surrounding machine casing in case of high noise level at grinding process. - Machinery and equipment will be periodically inspected and maintained to keep in good operational conditions and reduce noise from machine operation. - High noise area will be identified and warning sign posted at the area with noise level over 80 dB (A). - Provide the personnel protective equipment (PPE) to the employees and strictly enforce PPE usage.	Cement Plant	During the operation stage
4	Water	Storm water runoff	- Implement the runoff water drainage system to prevent flood in cement plant. - Provide the adequate water reservoir in cement plant in order to re-circulated water in cement production process. - Try to manage water in closed circuit system to maximize water usage. - The site drainage should be regularly inspected and clean up.	Cement Plant	During the operation stage
5	Water quality	Cement process & Utilities	- Machine cooling water will be discharged to cooling tower to reduce temperature and led to oil separator unit before entering water reservoir/sedimentation pond and being recycled. - Wastewater management system of the plant (i.e. Grease & Oil trap, Sedimentation Pond) will be a closed system. Effluent will be recycled without discharging out of the plant except during heavy rain where emergency storm discharge may be required. - Domestic wastewater generated from office building, canteen, staff accommodations will be treated by septic-seepage.	Cement Plant	During the operation stage

No.	Issues	Activities	Management plans	Management Location	Time Management Implementation
6	Solid waste	Cement process & Utilities	- Adopted the 3Rs Program (Reduce, Reuse, and Recycle) in waste management in order to maximize resource utilization. - Wastes generated from the production process include off-spec clinker, off-spec raw materials and dust from dust collectors will be recycled to the production process. - Used refractory brick generated during regular maintenance of cement kiln will be fed to raw materials preparation process and used in cement production process. - Used oil from maintenance activities will be recycled in maintenance activities with partly burned in cement kiln as alternative fuel. Contaminated rags will be burned in cement kiln. - Recyclable waste e.g. plastic, wood scrap, metal scrap, paper etc. should reused/recycled as much as possible.	Cement plant	During the operation stage
7	Occupational Health and Safety	Cement process & Utilities	- Warning sign shall be posted at high noise, high heat radiation and dusty areas. - Personnel protective equipment (PPE) shall be provided to the employees and strictly enforce safety rules to all the employee and contractors. - Provide orientation, EHS and other trainings to employees to prevent subsequent accidents and increase employee competency.	Cement plant	During the operation stage
8	Aesthetics	Cement process	- Green area will be provided along the cement plant boundary and within the cement plant area to improve scenery of area.	Cement plant	During the operation stage
9	Quality of life for the villagers	Cement process & others	- Maximum hiring of local people for the workforce as much as possible. - Coordination with local community leader should be carried out to get feedback on environmental impact or complaint. - Correction and prevention measures should be provided to correct the issues and communicate to the community accordingly. - Strictly implement and follows environmental protection and mitigation measures stated in the EIA. - Develop the CSR program to improve the quality of life for the villagers nearby project's site.	Surrounding Communities	During the operation stage

6.4 Social Management Plan and Mitigation

This section presents the summary of Social Management Plan of the project with the purpose of mitigation or enhancement to the potential adverse and beneficial impacts identified and evaluated in the assessment.

The objectives of the Social Management Plan are

- To describe the project's commitments in managing and mitigating social impacts raised from the existence of project in defined location and in enhancing identified benefits to communities and stake holders
- To formulate the mechanism to mitigate and monitor these potential impacts
- To establish a system in which public participation is paramount in setting up strategies for the dealing of identified impacts and benefit throughout the life of project
- To recommend the additional social control measures
- Identify the range of skill required for the labor force and conduct a gap analysis against skills availability
- Notify local people of job openings through local advertising, information center, project notice boards to place in office or road junctions of each village
- Develop and implement a local employment policy for the people of affected communities
- Careful management to be practiced about the expectation of local people in regard to the employment to avoid any disputes
- Undertake regular review of labor requirement and skill demands ensuring that training strategies meet the needs of project
- Initiate training and job skill development programs
- Considering to establish a contractual agreement with contractors to ensure that all contractors understand the company's expectation of favor local content in hiring employees

6.4.1 Environmental and Social Impacts and Mitigation

In the survey, about 140 sample respondents selected from 6 Villages such as Pyaukseikpin, YwarNan(East) and Taung Pa Lu villages within the project area were interviewed. To understand their existing situations, attitudes and impacts from the project development, the interviews were undertaken with the help of the structured questionnaires which cover the contents of basic information of interviewees, their socio-economic conditions, education and current environmental problems, facilities and social problems, perceptions of the project and attitudes towards the project, regarding the impact caused by the project development.

6.4.1.1 Project Information

It is also important to survey whether the people in the project area know about the project or not. If they know about the project they can prepare for the impacts of the project. The survey results showed that most of the respondents have already known about the project but some villages have not received the information of project.(Table 6.2 and Figure 6.2) The survey also stressed on the sources of information about the project from which the respondents received.The result of the survey showed that information about the project is rarely came from villagers.

Table 6.4 Receiving Information of Respondents (%)

Factory/Village	Yes	No
Workers	50	50
ShanYwarGyi	95	5
Pyaukseikpin	15	85
YwarNan(East)	50	50
KaleGyaung	35	65
TaungPaLu	30	70
YeByarTaw(West)	60	40

Source: Field Observation, December 2014

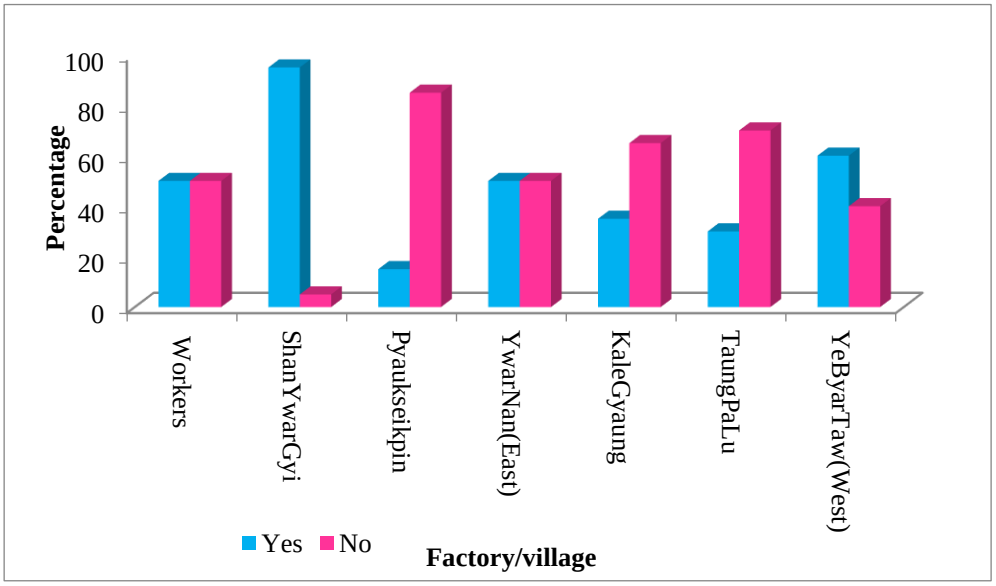


Figure 6-10 Receiving Information of Respondents (%)

6.4.1.2 Attitudes on the Project

All respondents of KoneYone, 11 Miles and KhaShi(Auk) villages like the project. They considered that the project will support their job oppunities and infrastructure such as education, water supply and electricity. (Table 6.3 and Figure 6.3)

Table 6.5 Attitudes on the project of Respondents (%)

Factory/Village	Yes	No
Workers	100	0
ShanYwar Gyi	85	15
Pyaukseikpin	70	30
YwarNan (East)	90	10
Kale Gyaung	90	10
Taung Pa Lu	65	25
Ye Byar Taw (West)	95	10

Source: Field Observation, December 2014

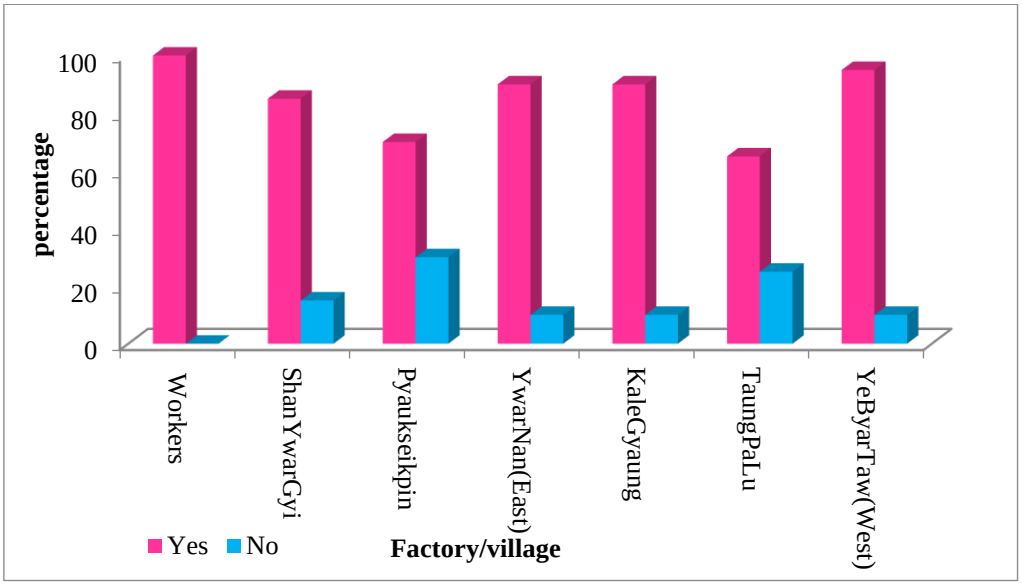


Figure 6-11 Attitudes on the project of Respondents (%)

6.4.2 Opinion towards the mitigation measures of the Project

According to the survey results, most of the respondents believed that the project will not have prominent negative, social and health impacts on their livelihood and surrounding region. Some of respondents believed that health impact of the project would be expected. (Table 6.4 and Figure 6.4)

Table 6.6 Opinion towards the impact of the project (%)

Factory/Village	Environmental Impact		Social Impact		Health Impact	
	Yes	No	Yes	No	Yes	No
Workers	25	75	15	85	40	60
ShanYwar Gyi	5	95	10	90	5	95
Pyaukseikpin	5	95	5	95	20	80
YwarNan(East)	5	95	5	95	20	80
KaleGyaung	10	90	5	95	15	85
TaungPaLu	20	80	20	80	5	95
YeByarTaw(West)	15	85	5	95	5	95

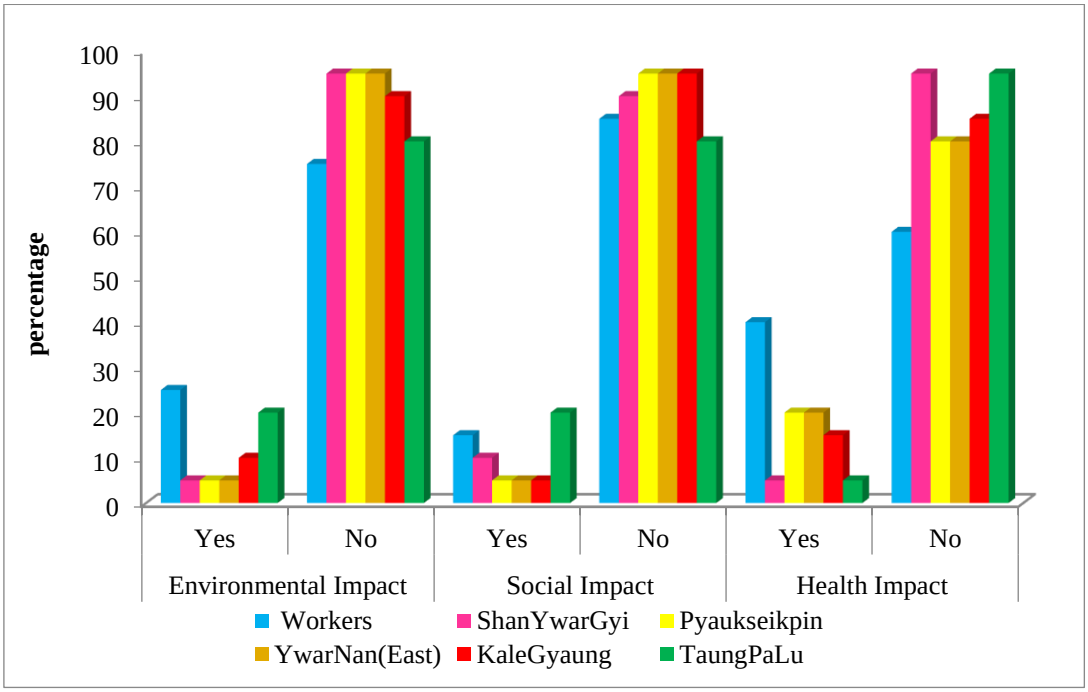


Figure 6-12 Opinion towards the impact of the project (%)

6.4.3 Suggestion Summary

6.4.3.1 Factory Workers

Requirement	Worried
- To increase job opportunity - To support health and education	- impact of dust on health - respiratory problems due to air pollution

6.4.3.2 ShanYwar Gyi, Pyaukseikpin, Ywar Nan (East), Kale Gyaung, Taung PaLu and Ye Byar Taw Villages

Requirement	Worried
- To increase job opportunity - To support health and education - To have the reginal development - To promote the infrastructure	- impact on Ya lands - respiratory problems due to air pollution

6.4.3.3 Suggestion

The project developer should be able to

1. Develop social, economic and health status,

2. Create job oppunities and give job training for the villagers
3. Maintain safe environment,
4. Prevent potential impacts of the project,
5. Improve shool facilities,
6. Create Mobile clinics,
7. Support Supply electricity,
8. Inform about the project to the local people

6.4.4 Recommended Mitigation Measure for SIA

In order to mitigate the negative impacts to local community and to enhance positive benefits, following measures are recommended to implement and monitor the result on a regular basis throughout the life of the project and may stay in the accommodation provided by project.

- Project work force shall respect for the religious, political beliefs and moral codes of local community.
- Project work force shall respect the value of local communities
- All working on and visiting the project will not discriminate based on gender, age, color, race, language, culture. political affiliation, religious belief, disability and other related factors
- Any damage, vandalism, to the property of local communities shall be immediately investigated and necessary actions including punishment s are taken against those.
- Any complaints of communities concerning unacceptable behavior conducted by project workforce shall be seriously taken into consideration attention in with local residents
- Use complaints log and grievance mechanism to ease the concerns of local residents by tracking, assessing and managing the performance of project workforces. Detailed grievance mechanism is show in Appendix.
- Ensure that direct hired employees and contractors adhere to the Code of Conduct at all time during construction, operation and decommissioning phased of projects and disciplinary procedures for inappropriate manner of employees shall be implemented throughout the life of project.
- The location of construction camps shall be constructed as far as possible from the local residential area to help minimizing the potential impact of culture changes associated with the new construction work forces.
- Community management committee shall be organized to establish an effect channel and appropriate mechanism in communicating local residents and gain the feedback of project related community issues.

- Community management committee shall engage with local community through ongoing disclosure of the project information and consultation on matters that directly affect them.
- It is to be ensure that communication is free of external manipulation and influences

6.4.5 Enhancement Plan for Socio-economic and Cultural Environmental Impacts

Myanmar Conch Cement Company will implement a Social Management Plan that seeks to enhance the economic and social cultural benefits of its presence in the operational area of Kyaukse and the wider catchment. To that effect the focus of the Social Management Plan would be to as much as possible prevent the occurrence of negative effects on people resident in the project area of influence while maximizing their benefits. As such effect Myanmar Conch Cement Company will exercise its social responsibility as a caring corporate citizen that value co-existence and hence the need to ensure minimal disturbance to local people's enjoyment of life. It is Myanmar Conch Cement Company's vision that people in the project area of influence enjoy life to a better extent than would have otherwise have been without Myanmar Conch Cement Company presence. Consequently, Myanmar Conch Cement will strive to offer the best it can within its means and in line with company policy and strategic plans to improve the welfare of its fellow citizens. To that effect Myanmar Conch Cement will implement the following programs as part of its social management plan. The proposed interventions are aimed at broadening the beneficiary base for the company's business undertakings beyond the traditional beneficiary groups of shareholders, employees and tax/levy collectors by including the public especially those closest to the operational area.

6.4.6 Employment and Retrenchment Action Plan

Myanmar Conch Cement will continue to give priority to local residents starting with those closest to the cement production facilities in offering employment opportunities. Employment will only be offered to outsiders if the required skills and experience could not be found locally. Further, the company will provide equal opportunities to both males and females provided they meet the education and skills/experience criteria. Similarly, discrimination based on HIV/AIDS status will not be entertained provided the employees are capable of carrying out the required tasks. Myanmar Conch Cement contractors will also be encouraged to abide by the same employment policies.

Further, the company will implement a multi-skilling and entrepreneurship training program to all employees during working life to prepare them for work outside Myanmar Conch Cement. A counseling program will also be provided to prepare all employees scheduled for retrenchment or retirement prior to the effective dates for such retrenchment/retirement.

6.4.7 Education and Training Plan

Myanmar Conch Cement will explore ways of supporting the education and training programs at all levels especially those associated with the company's business. It will also seek to support schools in the neighborhood by addressing needy areas such as infrastructure development, offering a limited number of scholarships for exceptionally performing students/pupils as an incentive for hard work, sponsoring orphans and pupils from vulnerable families, etc.

6.4.8 Local Economic Development

Myanmar Conch Cement will as a matter of policy give priority to local contractors and suppliers of goods and services provided they meet the quality requirements at a cost not exceeding comparative advantage. This will be done with a view to supporting local economic development. Information on how to conduct business with Myanmar Conch Cement will equally be publicized to help would be local contractors and suppliers.

6.4.9 Health and Welfare Plan

All Myanmar Conch Cement employees and their families are covered by a health insurance scheme that affords them to access healthcare services at company cost. Myanmar Conch Cement will seek to expand the service to members of the public in its operational area by rendering support to medical facilities in the area. The company will also participate in health campaigns with other partners targeting HIV/AIDS and malaria as an integral part of its social responsibility plan. Specific activities would include but not be limited to awareness campaigns; counselling services, distribution of insecticide treated nets (ITNs), spraying in offices and homes and in areas with stagnant water etc.

6.4.10 Physical Infrastructure Plan

As part of its Decommissioning and Closure Plan Myanmar Conch Cement will consider donating the infrastructure at the plant including buildings, water and sewerage reticulation facilities, communication facilities etc. to government or any entity with a viable proposal for providing social services for the wellbeing and development of local communities. To this effect proposals will be invited at the decommissioning stage for use of the facilities.

6.4.11 Community Management Support Plan

Myanmar Conch Cement will from time to time liaise with local communities in identifying development programs reflecting major community needs and work with them in supporting the community provided the community will have demonstrated the willingness to help themselves with Myanmar Conch Cement providing supplementary support.

6.4.12 Community Involvement Plan

As part of its policy on corporate citizenship, Myanmar Conch Cement will endeavor to inform the community in which it operates and get them up to date with developments taking place at the cement plant. This will facilitate community participation in decision making on major developments. This process as witnessed during this EIA/EMP preparation process will continue throughout project implementation phase by calling the public and consulting them on major decisions with a bearing on the local and wider environment.

Table 6.5 given below present a summary of proposed interventions for enhancement of significant positive socio-economic and cultural environmental impacts associated with project implementation. The table further provide guidance on management objectives, expected management standard and specific management responsibility for each intervention. An implementation schedule has been included as well to guide timely implementation of the proposed management interventions together with costing for budgetary purposes.

Table 6.7 Enhancement Plan for Socio-economic and Cultural Environmental Impacts

Item No.	Identified Impact	Enhancement Objective	Enhancement Measure	Target Performance Standard	Responsibility	Implementation Schedule
1	Support to construction industry	To meet the needs of the construction industry and national development as a whole	Increase production of cement to satisfy the market demand and enforce equitable measures in the supply of the commodity together with competitive pricing mechanisms.	Plant production maintained at full capacity Transparent supply and Distribution system put in place	Plant Manager and Sales and Marketing Manager.	Throughout operational phase
2	Increased government revenue	To improve the livelihoods and wellbeing of local communities	Offer competitive salaries, wages and contract terms (to contractors and suppliers of good and services). Provide special incentives to local communities within the project's area of influence as a way of compensating for the negative effects suffered e.g. prioritization in employment offer to people closest to the plant. Engage in and implement Social responsibility	Offer packages equal to or better than similar companies in the sector	Human Resources Manager and Procurements Officer.	Throughout Operational phase

			programs			
3	Capacity building and skills development	To contribute to the development of a pool of competent technical and professional staff for the mine and contribute to the country's human resources development as a whole.	Adopt a deliberate policy of sponsoring students and offering a standard number of plant attachments each year. Render support to trades training institutions associated with the company's key business or product e.g. trainers of brick layers.	An established scholarship program for State High School students	Human Resources Manager	Throughout operational phase

6.5 Mitigation Plan for Socio-economic and Cultural Environmental Impacts

Table 6.6 is a summary of interventions proposed for mitigation of significant negative socio-economic and cultural environmental impacts of the project. Additionally, the table provide guidance on management objectives, expected management standards and specific management responsibilities for each intervention. An implementation schedule has been included as well to guide timely implementation of the proposed management interventions together with costing for budgetary purposes.

Table 6.8 Mitigation Plan for Socio-economic and Cultural Environmental Impacts

Item No.	Identified Impact	Enhancement Objective	Enhancement Measure	Target Performance Standard	Responsibility	Implementation Schedule
1	Noise pollution and hearing impairment	To safeguard the health and safety of members of the public	➢ Public access to the plant and quarry areas will be restricted and all non- staff members allowed access to the plant and quarry areas will be under the guidance of a competent member of staff and will undergo health and safety orientation before entry and will be provided with appropriate personal protective equipment.	Members of the public will be safeguarded against injurious noise levels	Plant Manager/Quarry Manager/ Corporate Affairs Manager	Throughout operational phase
2	Damage to property and respiratory health risks due to dust emissions	To control dust emissions so as to safeguard public health and property in the fallout area	➢ Air quality in fallout area will continue to be monitored for dust concentrations and results obtained will be used to work out and control plant operations to meet statutory and ambient air quality standards	Air quality in fallout areas comply with statutory limits	Plant Manager/ Environmental Manager	Monthly

3	Risk of injury from explosions	To safeguard public safety	➢ Access to limestone quarry will be restricted and free access by members of the public will not be allowed. ➢ The quarry area will be fenced off and appropriate signage will be placed in suitable locations	No unauthorized entry will be allowed to the limestone quarry	Plant manager	Through out operational phase
4	Impacts on areas of historical, archaeological and cultural significance	To safeguard the area's historical and cultural heritage	➢ Relevant authorities such as the local authority should be informed whenever findings of heritage significance are found.	All historical/ archaeological findings reported to relevant authorities for safe custody.	HSE manager	Whenever findings are made
5	Increased risk of malaria	To minimize prevalence of malaria vectors	➢ Indoor spraying for control of mosquitoes and other disease vectors	All stagnant water ponds and dwellings close to the quarry sprayed with residual insecticides	HSE Manager	Annual

It is anticipated that once the proposed management interventions have been implemented the negative impacts will be rendered insignificant or less significant for project acceptability from both the environmental and socio-economic and cultural stand point of view. Some residual effects will however continue to manifest and these will need to be monitored as provided for in the monitoring plan.

6.6 Occupational Health and Safety Management Plan

Myanmar Conch Cement Co., Ltd. is part of the **Anhui Conch Cement Company Ltd.,** one of the world's biggest suppliers of cement production**.** Myanmar Conch Cement Company has a Health and Safety policy of which all personnel are briefed on and are consulted in its development through their representatives.

Myanmar Conch Cement Company Works Health and Safety policy highlights the importance of individual and collective behavior and of action undertaken by all of the employees to prevent industrial accidents and work-related illnesses.

Implementation of a Health and Safety Management System has significantly improved Myanmar Conch Cement Company Works Safety performance in all operations. This has been facilitated consequently by Management's strong involvement and commitment intensify Safety concerns and awareness at all levels on matters of health and safety.

Consequently, Myanmar Conch Cement Works has demonstrated its resolve to create a safe and healthy work environment for its employees, contractors and visitors through:

- The application of proven occupational Health and Safety technologies, standards and operating procedures to minimize exposure to risk
- The reporting and investigation of potential accident situations within the workplace and the implementation of mitigation plans to prevent reoccurrence
- The provision of adequate financial and human resources, employee training and awareness raising to facilitate the continual improvement in Safety performance, and
- The use of Myanmar Conch Group Database and Networks to improve its knowledge of Safety Risks associated with Cement manufacturing processes. As a result, it has been possible to create synergies from the actions taken in the various Divisions and Business Units, and create new momentum to drive Safety Excellence forward within the Group, which includes Myanmar Conch Cement Works**.**

6.6.1 Occupational Health

Myanmar Conch Cement Company Works has implemented an HIV/AIDS awareness and prevention program in consultation with local HIV/AIDS organizations and government initiatives to inform and counsel employees regarding the dangers of HIV/AIDS and how to reduce the spread of the disease.

- Pre-employment and regular medical examinations shall be carried out on all plant employees.
- Myanmar Conch Cement Company Works shall provide well-equipped sanitary facilities for its employees.
- Workers in areas of high temperature and other high-risk areas shall be allowed to take shorter shifts.

6.6.2 Occupational Safety

The general safety of employees while at work is the responsibility Myanmar Conch Cement Company, except in cases where the employee was acting in a negligent and dangerous manner. To that effect the following measures are in place.

- Conveyors and similar machinery shall be provided with a means of stopping them at any point.
- Guards shall be fitted to all drive belts, pulley, gears and other moving parts to protect workers.
- Raised platforms, walkways, gantries, scaffolds, stairways and ramps shall be equipped with handrails and non-slip surfaces.
- All electrical equipment shall be grounded, well insulated and conform to applicable codes.
- Plant site piping shall be color-coded for acid, water, compressed air and process solution.
- Mine and plant employees shall be provided with hardhats, safety boots, overalls, ear and eye protection, dust masks and gloves as appropriate. (Table)
- The company shall ensure that The Mining Explosives Regulations governing the safe storage, handling and transport of explosives to, in and around the mine is strictly enforced.
- Only qualified and certified personnel shall be allowed to carry out blasting operations.
- Hazard and warning signs shall be erected or posted around the plant site to warn employees and contractors of potential dangers.

Table 6.9 Summary of Recommended Personal Protective Equipment According to Hazard

Objective	Work place Hazards	Suggested PPE
Eye and face protection	Flying particles, molten metal, liquid chemicals, gases or vapors, light radiation.	Safety Glasses with side-shield, protective shades, etc.
Head protection	Falling objects, inadequate height clearance and overhead power cords.	Plastic Helmets with top and side impact protection
Hearing protection	Noise, ultra sound	Hearing protectors (ear plugs or ear muffs)
Foot protection	Falling or rolling objects, pointed objects, corrosive or hot liquid	Safety shoes and boots for protection against moving & falling objects, liquids and chemicals
Hand protection	Hazardous materials, cuts or lacerations, vibrations, extreme temperatures	Gloves made of rubber or synthetic materials (Neoprene) leather, steal, insulating materials, etc.
Body/leg protection	Extreme temperatures, hazardous materials, biological agents, cutting and laceration.	Insulating clothing, body suits, aprons etc. of appropriate materials.

6.6.3 Occupational Safety Training

6.6.3.1 Occupation Health and Safety Training

Myanmar Conch Cement Company shall provide Occupation Health and Safety orientation training to all new employees to ensure they are appraised of the basic site rules of work at/on site and of personal protection and preventing injury to fellow employees.

Training shall consist of basic hazard awareness, site specific hazards, safe work practices, and emergency procedures for fire, evacuation, and natural disaster, as appropriate. Any site-specific hazard or color coding in use shall be thoroughly reviewed as part of orientation training.

6.6.3.2 Visitor Orientation

Where visitors to the site can gain access to areas where hazardous conditions or substances may be present, a visitor orientation and control program shall be established to ensure visitors do not enter hazard areas unescorted.

6.6.3.3 Basic Occupational Health and Safety (OHS) Training

Myanmar Conch Cement Company will institute a basic OHS training as follows;

- A basic occupational training program and specialty courses shall be provided, as needed, to ensure that workers are oriented to the specific hazards of individual work assignments.
- Training shall generally be provided to management, supervisors, workers, and occasional visitors to areas of risks and hazards.
- Workers with rescue and first-aid duties shall receive dedicated training so as not to inadvertently aggravate exposures and health hazards to themselves or their coworkers.
- Training would include the risks of becoming infected with blood–borne pathogens through contact with bodily fluids and tissue.
- Through appropriate contract specifications and monitoring, Myanmar Conch management shall ensure that service providers, as well as contracted and subcontracted labor, are trained adequately before assignments begin.

6.6.3.4 Area Signage

Myanmar Conch Cement Company shall put in place a signage program as follows;

- Hazardous areas (electrical rooms, compressor rooms, etc.), installations, materials, safety measures, and emergency exits, etc. shall be marked appropriately.
- Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors and the general public as appropriate.

6.6.3.5 Labelling of Equipment

All container that may contain substances that are hazardous as a result of chemical or toxicological properties, or temperature or pressure, shall be labeled as to the contents and hazard, or appropriately color coded.

Similarly, piping systems that contain hazardous substances shall be labeled with the direction of flow and contents of the pipe, or color coded whenever the pipe passing through a wall or floor is interrupted by a valve or junction device.

6.6.3.6 Environmental Training

Myanmar Conch will be responsible for identifying environmental training which may be required for the performance of the work and ensure that such training is provided for the personnel concerned to mitigate adverse environmental impact.

Environmental training will include the following:

- Project HSE policy and objectives
- Overview of the provisions of the site-specific EMP
- Emergency preparedness and response plan/drill
- Dust control plan
- Noise control plan
- Wastewater control plan
- Waste control plan
- Current applicable environmental laws and regulations
- Importance of good housekeeping
- Good practices in dealing with potential pollutants
- Personal responsibilities and liabilities
- PPE

6.7 Emergency Response and Rescue Plan

6.7.1 Objective

The following constitute the main objectives of the Emergency Response and Rescue Plan

- Ensure employees are aware of their responsibilities in an emergency situation.
- Outline basic procedures to follow during safety related emergencies.

6.7.2 Maintenance of Emergency Contacts

The Central Control Room operator should prepare and maintain an updated list of the following:

1) Key Plant Management Team Members

2) External emergency service contacts such as the Fire Services Department of Kyaukse, Township Police, company-subscribed clinics and township hospitals, including contact numbers of the doctors in charge.

Table 6.10 Contact Numbers for Emergency Response

Internal Contacts (Myanmar Conch Cement)		
Name & Designation	**Work**	**Mobile**
Factory Manager (U Khin Maung Tint)	-	09-2210829
Quarry Manager (U Soe Nyunt)	-	09 448533924
HSE Manager	-	-
External Emergency Contacts		
Police	066 50335, 06650332	
Fire Service Department	066 50316	
Doctor, Township Hospital	066 50874, 066 50008	
DRR	066 50470, 066 50250	

Update and post all Safety Notice Boards in various sections of the Plant with:

1) Emergency Plans which will clearly indicate exit routes, location of first aid boxes, fire extinguishers and Assembly Points.
2) Emergency Tool boxes/rescue equipment.
3) Company Ambulance contact numbers.

6.7.3 Emergency Assembly Points

There will be clearly marked and designated Emergency Assembly Points in the Plant areas.

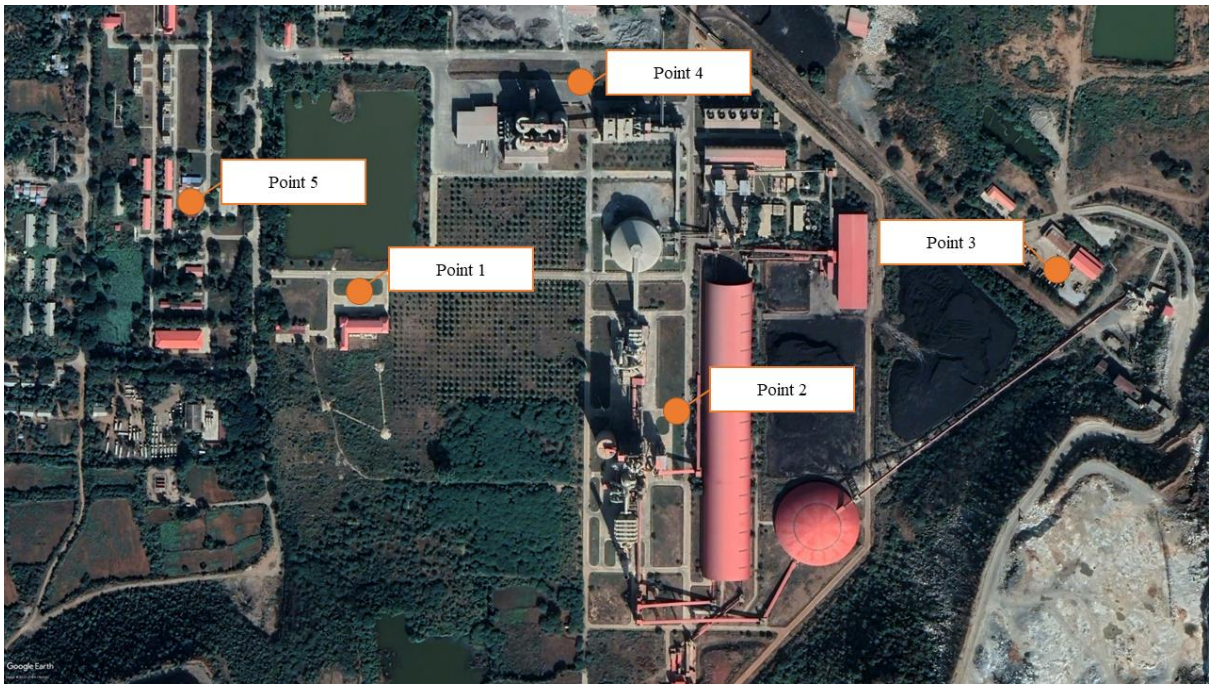


Figure 6-13 Emergency Assembly Points

6.7.4 Fire Fighting Equipment

Myanmar Conch Cement Company will institute the following measures in order to enhance fire safety preparedness:

1) All offices shall be fitted with smoke detectors to offer early warning to employees in case of fire. The workplaces will be provided with fire alarms which will be activated in case of fire.
2) Electrical substations and other critical installations such as the cement packing plant, poly-bag warehouses, etc. shall be equipped with specialized automatic fire protection and control systems to detect and trigger the fire extinguishing agent.
3) All working areas will be provided with suitable fire extinguishers which shall be mounted in easily accessible locations.
4) At least a square meter of the area where a fire extinguisher has been mounted shall be kept clear.
5) Fire Extinguisher locations shall be posted with ‘’Fire Extinguisher’’ signs and will be mounted at eye level.
6) In addition to fire extinguishers, there shall be designated points for connecting fire hoses around the plant. These points shall be regularly serviced as per fire regulatory requirements.

Figure 6-14 Fire Extinguisher

Figure 6-15 Fire Hydrant and Equipment

6.7.5 Incident Management

The following shall constitute key management interventions in response to each respective emergency.

1) Fire

a) In the event of fire, the person discovering the fire should:
b) Raise the alarm.
c) Call the Central Control Room and or the Fire Brigade on.
d) If safe to do so tackle the fire, if in doubt get out.
e) Evacuate the premises and report to your designated assembly point.

2) Accidents

In case of an accident in the workplace:

a) The involved, if they are able to do so, should immediately report to their supervisor. Alternatively, the person discovering the accident should report it immediately to the Central Control Room Operator, who should in turn inform the Shift Manager.
b) The Shift Manager shall immediately go to the accident scene to assess its nature.
c) If the accident is a major one, that is, resulting in serious personal injury, and or property damage, the Shift Manager shall mobilize the required emergency services, including first aiders and inform the Safety Manager, Plant Manager, and others, accordingly.
d) If the accident occurs after-hours, the Shift Manager shall inform all the required personnel as per Plant Call Out procedure.
e) Information pertaining to the accident shall be released to the public through the Corporate Affairs Department or the Plant Manager.

f) During any emergency all communication on phones will be restricted to personnel handling the emergency.

3) Road Traffic Accidents

In case of a Road Traffic Accident:

a) Render assistance to any person injured, if practical.
b) Report the accident to the nearby Kyaukse Police Station.
c) Do not accept responsibility for the accident but cooperate with the Police who will investigate the accident.
d) Obtain the particulars of the other involved parties, i.e. vehicle registration number, driver's name, witnesses etc.
e) Inform immediate supervisor and Safety Manager.

4) Hazardous Material Spills

In case of major hazardous material spills the following procedure will apply in order to minimize the impact on the environment:

a) Contain

The spilled oil shall be contained by constructing a bund around the affected area.

The trapped oil shall be pumped/collected into suitable containers, such as sealed drums and kept in a bounded area while awaiting removal from site.

b) Notify

The spill incident shall be reported to the supervisor who shall assess the situation and notify the relevant senior officials as per Incident Reporting Procedure.

In all cases where the oil spill is on ore, that is, in the pit or at the Run of Mine (ROM) pad, the senior officials will be consulted to recommend the best remedial action.

c) Dispose

Contaminated soil and absorbent material will be disposed of in accordance with the waste management procedure.

d) Maintain

The affected area shall, as soon as is reasonably practicable, be cleaned up and replaced with fresh soil.

4) Factory Clinic and First Aid

There are two first aid facilities and a factory clinic at the project. There is an emergency response plan in place, and the first aid supplies provided are sufficient for the proposed project.

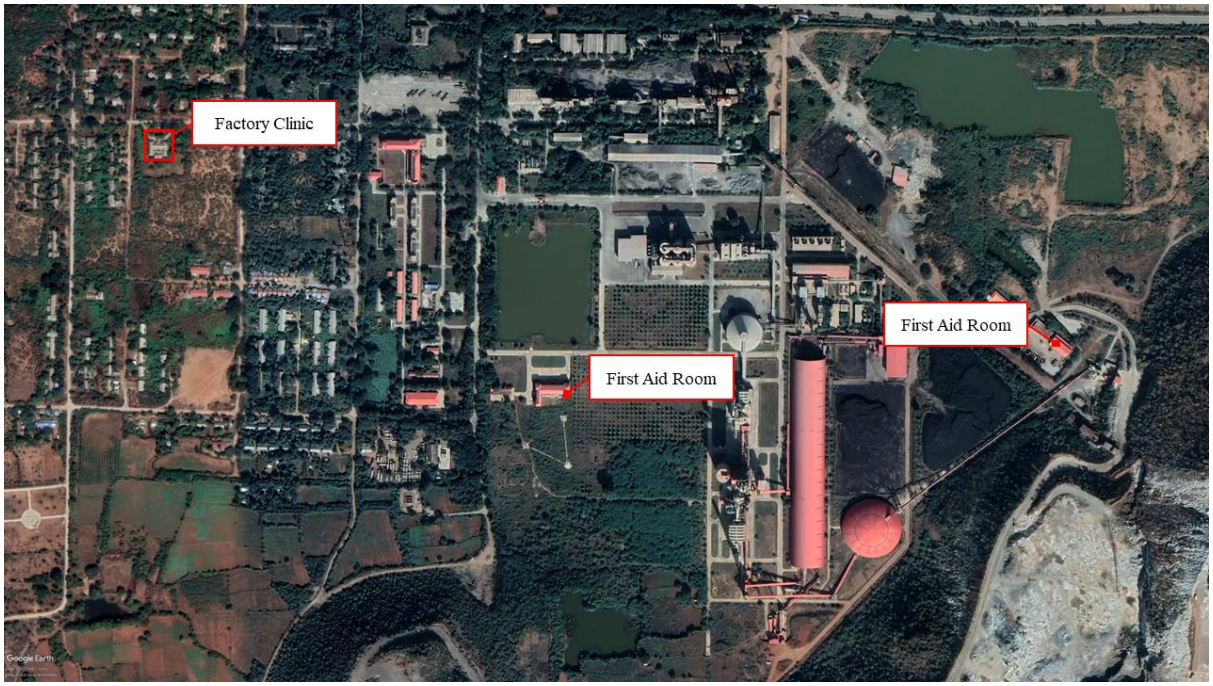


Figure 6-16 Factory Clinic and First Aid Rooms

6.7.6 Responsibility

All supervisors are responsible for ensuring effective implementation of the Emergency Response Plan and will act as key respondents. Designated assistants will act in the absence of substantive supervisors and will act as key respondents in that case.

Table 6.9 is a summarized Emergency Response Plan aimed at guiding response to emergency situations which may arise as stipulated above. The plan identifies likely emergency situations together with their causative factors followed by an elaboration of the proposed response. The plan finally identifies the respondents in order of priority. It is anticipated that implementation of the plan would safeguard the health and safety of workers and prevent excessive loss of property.

Table 6.11 Emergency Response Plan

	Emergency Situation	Cause	Proposed Response	Respondents
1	Staff Injury	- Unskilled labor - Neglect of safety procedures - Faulty equipment and tools	- Apply Appropriate First Aid - Document incidence - Take to hospital if necessary - Investigate causative factor and institute appropriate measures to prevent similar occurrences	**Key Respondents:** Immediate supervisor or person first arriving at accident scene and Safety and Health Manager **Other Respondents:** First Aid Attendant on Duty Immediate Supervisor, Factory Manager.

2	Chemical poisoning	- Unskilled labor - Neglect of safety procedures - Faulty equipment and tools	- Apply Appropriate First Aid - Document incidence - Take to hospital if necessary	**Key Respondents:** Immediate supervisor or person first arriving at accident scene and Safety and Health Manager **Other Respondents:** First Aid Attendant on Duty Immediate Supervisor, Factory Manager.
3	Fire Outbreak	Neglect of safety procedures	- Sound alarm and instruct all to assemble at Fire Assembly point - Conduct roll Call - Fight the fire using appropriate tools (fire extinguisher, sand, water) - Inform Kyaukse Fire Brigade and Police - Document incidence	**Key Respondent:** Fire Discoverer, immediate supervisor and Safety and Health Manager **Other Respondents:** Emergency Response Team.
4	Chemicals and other material Spillage	- Neglect of safety procedures - Poor containment/storage facilities	- Contain material by bunding around with sand or any other suitable material to stop material flow and spread - Clean up affected areas - Document incidence	**Key Respondent:** Immediate supervisor and Environmental Manager **Other Respondents:** Emergency Response Team.
5	Natural Disaster (Earthquake, Flood etc.)	- Impact on the cement plant and nearby community due to increase of water level and earthquake	- Frequently watch local weather news and disaster notices by the relevant media - Sound alarm and instruct all to assemble at Assembly point - As the magnitude of an emergency increases, so will the need for multi-agency support from within the community. Based on the type and seriousness of the event, appropriate personnel are notified of the current or imminent situation.	**Key Respondent:** Immediate supervisor and Environmental Manager **Other Respondents:** Emergency Response Team.

6.8 Community Health Care Plan

The Ministry of Health remains the major provider of health care. It has a pluralistic mix of public and private system both in the financing and provision. Health care is organized and provided by public and private providers. In implementing the social objective laid down by the State, and by the National Health Policy, the Ministry of Health is taking the responsibility of providing promotive, preventive, curative and rehabilitative services to raise the health status of the population.

There are 14 State and Regional Health Departments, 73 District Health Departments and a township hospital in every township. Under the township hospital there are station hospitals and rural health centers (RHC) staffed by health assistants, midwives and public health supervisors. Under the (RHCs) there are sub- centers staffed by midwives and (volunteer) auxiliary midwives, supported by networks of community health workers/volunteers.

Myanmar Conch is required to formulate safety and health management scheme according to the requirements of General EHS Guidelines. The scheme shall include the following measures taken by management department to prevent infectious diseases (STD, malaria, cholera and waterborne diseases).

Before starting civil works, the company works with general contractor to carry out the publicity activities for improving the awareness of infectious disease prevention. The publicity activities involve women's organization, youth organization, medical health staff and relevant family members, etc.

The developer has to be ready for occasional or extraordinary problem of the unfortunate outcome of pollution from the cement plant and associated facilities. For such a case, emergency health management plan is proposed as below.

6.8.1 Organizational Management

Myanmar Conch at all levels shall establish the prevention and control management network for infectious diseases, formulate and strictly comply with the provisions of the Regulations for Prevention and Control of Infectious Diseases, improve the report system for infectious diseases, provide necessary fund, transport and communication equipment, and make decisions according to intervention measures. HSE management personnel have the right to supervise and manage construction companies and propose relevant intervention measures to project department. In addition to the results of this report for other health impacts on project workers and the public around the project site, if necessary, health programs will be carried out by contacting the Public Health Department and following instructions.

6.8.2 Health Publicity and Education

Medical service personnel at all levels are responsible for the health education about prevention of infectious diseases, and organize forces to eliminate the threats of rats, insects carrying diseases and other animals transmitting infectious diseases.

6.8.3 Epidemic Report

Medical staff of Construction Company is responsible to report infectious diseases. When discovering any patient, suspected patient and carrier of infectious diseases, they shall report it to the superior authority within the specified period, and to health administration of Myanmar. Also, they should go to treat patients at the site and conduct the preliminary investigation. The company's professional health management personnel are responsible to sum up materials.

6.8.4 Patient Administration

The infectious disease patients, pathogen carriers and suspected infectious disease patients shall before they are cured or cleared of suspicion, be barred from jobs which national health administration prohibits them from doing because of the likelihood of causing the spread of infectious diseases. management should be strengthened. Myanmar Conch shall collect the information of its employees, including age, gender and occupation, etc., the arrangement of its sanitary resources, the availability of local medical services, the natural factors at construction site, its food health, environmental hygiene and water source health, etc., and the outbreak of infectious diseases at construction site, etc. Based on this basic information, the construction company shall put forward the prevention scheme for infectious diseases under key prevention and control and carry out the work of prevention and control.

6.8.5 Drinking Water Source

Myanmar Conch Company is responsible for purification and disinfection of drinking water source and professional doctor is responsible to monitor water resource, provide technical guidance, purchase and distribute disinfectant.

6.8.6 Infectious Diseases

During outbreak and prevalence of infectious diseases, the company and contractors at all levels should immediately organize forces for prevention & control, and cut off the transmission channel of infectious diseases. Health supervisor should give technical guidance and provide preventive biological products. If necessary, emergency response measures may be taken, such as, stopping construction, enclosing public drinking water source, restricting gatherings or other group activities, etc.

6.8.7 Malaria Control

Train and educate all workers (including contractors' workers) about malaria prevention; further reduce the incidence of malaria (and eliminate the germ carriers of other waterborne diseases); provide sufficient drainage facilities at construction areas to reduce the area of stagnant; provide culverts on the new road to keep smooth natural drainage; and provide the mosquito nets processed with mosquito repellent for dormitories of construction workers.

6.8.8 Responsible Party

The project company investigates the health condition and determines the health reference data of the affected communities three months before the commencement of project construction.

6.8.9 Community Safety and Health Management Scheme

6.8.9.1 Air Quality

During construction, dust detection is performed frequently. In dry season, water is sprayed on the access road regularly or some sections near residential areas should be closed. Trucks for earthwork and rockwork should not be overloaded. Grass and trees are planted on the cleaned land as soon as possible. Modern diesel vehicles are maintained timely. Travel speed of vehicles in residential areas is less than 20km/h. Drivers are trained to improve the awareness of mechanical maintenance for drivers and operators.

6.8.9.2 Noise and Vibration

Periodically measure noise at boundary; use low-noise machines and vehicles; place acoustic barrier in the places sensitive to noise (schools and temples); and allow construction and transportation only in the day.

6.8.9.3 Surface Water/Groundwater Quality

The following measures may be taken to mitigate the impacts: properly control and dispose of harmful substances (store and use them at the places with cofferdam and good drainage); provide appropriate drainage system at the construction sites for concrete proportioning and mixing and treat contaminated water in sedimentation tank before runoff is discharged; implement the measures to prevent and control water loss and soil erosion and migration of sediments; properly collect and treat wastewater and washing water before discharging into the natural environment.

6.8.9.4 Accident and Personal Injury

In order to prevent neighboring residents from entering construction site without permission, all construction sites must assign security guards at the security check station (water gate or guard post), in order to strictly keep neighboring residents away from construction site. In the residential communities, motor vehicles or motor cycle must follow speed limits.

6.9 Corporate Social Responsibility (CSR)

Expecting part of the profit of the project to share the social benefit of the community, the project company "Myanmar Conch Cement" would manage to fulfill the following request of the local residents during stakeholder meetings.

The CSR program planned by the project included following components;

1. Improve local medical service conditions
2. Donate to monastery
3. Improve education (repair schools)
4. Renovate road
5. Broaden knowledge (donate/build library)
6. Improve water, power conditions for peripheral villages
7. Increase job opportunity
8. Other charitable activities

Myanmar Conch Cement Co., Ltd. plan and reserve for cooperate social responsibility (CSR) (during operation period), two percent (2%) of yearly net profit of the project. The company has already donated for development of education, health, and associated infrastructure for regional development.

6.10 Traffic Safety Management Plan

Objectives: To manage potential adverse impacts on traffic flow.

Legal Requirements: Social Security Law (2012)

Implementation Schedule: During Construction, Operation and Decommissioning Phase

Responsibilities: Monitoring by HSE section

Management Action:

- Adequate training on traffic and road safety operations will be provided to the drivers.
- Road network within site and nearby site will be developed.
- Internal traffic plan designed with due consideration of traffic congestion.
- Proper signage will be displayed at important traffic junctions.
- Signage for speed limit will be placed and are maintained.

6.11 Preventive Maintenance Plan

Item	Maintenance Schedule
Cement Plant and Auxiliary Equipment	Once per year
ESP	Every two years
Bag Filer	Every 6 months

6.12 Decommissioning and Closure Plan

This Decommissioning and Closure Plan has been developed as part of the overall Environmental Management Plan for Myanmar Conch Cement Company in line with the company's Environmental, Health and Safety (EHS) Policy. The Plan covers a description of all activities that need to be carried out to effect decommissioning and closure in an environmentally friendly and socially acceptable manner. To this effect work standard have been stipulated to achieve the decommissioning and closure objectives in line with the overall EHS policy.

Key considerations in the development of the Plan have been the envisioned state of environmental setting within the mining license area particularly the plant area, the limestone quarry area at the time of closure. It is this vision that characterizes the rehabilitation works and standards to which the said works will have been done together with monitoring requirements.

It should however be noted that preparation of this plan is based on the information available as of now. The current manufacturing plant has an estimated lifespan of more than 30 years. Over this period operational and environmental conditions may difference requiring adjustment to the proposed plan in view of the above this plan is hereby presented to serve the purpose of initial planning subject to perfection at the time of actual decommissioning and closure.

6.12.1 Rationale for Development of a Decommissioning and Closure Plan

Every project has a start and end time. Limestone mining and cement manufacturing works at Kyaukse Cement plant are not an exception. The mine and plant which have been operating since 2003 will have exhausted its useful lifespan and thus will be decommissioned and finally closed.

The plant will undergo decommissioning where mining operations and cement production will cease followed by removal of all infrastructure on site, clean up and rehabilitation after which a period of rehabilitation and restoration to acceptable standards of alternative use will follow and finally monitoring will take place to ensure stability of the site before final closure.

6.12.2 Closure Vision

Myanmar Conch's Vision that the company works site covering the whole mining license area is **"**R**estored to acceptable alternative land use capability compatible with the surrounding land use and developmental planning/zoning by the relevant ministries without disturbance from residual mining and cement manufacturing impacts**."

To achieve the above envisioned state consideration will be given to pre-mining and obtaining land use characteristics, the general environmental setting of the site and surrounding area at the time of closure together with conservation and developmental needs at both the national, regional, and local level. These factors will render guidance to the nature and extent of rehabilitation and monitoring works that will need to be undertaken. Noting that the mine still has a lifespan of 30 years before the

anticipated closure it is difficult to have a specific picture of the would be socio-economic and environmental setting of the area. However, it is possible to give an indicative future state and preferred land use for the site and associated facilities based on current development trends. In line with the above logic an elaboration of land use alternatives under consideration are given below:

6.12.3 Restoration to Pre-Construction Forest State

The current cement plant area was originally covered by bush characterized by karst topography and sparse small trees conditions. Current trends show that vegetation around the project area has over the years degraded to very poor and open bare land and grassland. Much of the area has been converted to farmland, settlements, and industrial activities. This general trend appears to dominate and will most probably continue until decommissioning and closure of the cement plant. Noting that the area does not have a conservation status restoration of the area to woodland vegetation as the principle land use will only serve the purpose for a limited period of time before the area get invaded like other surrounding areas.

From above, it can be concluded that re-vegetation of disturbed areas will need to be done. However, the area is unlikely to attain forest cover/reserve as the principle land use designate. It can thus be concluded that the objective of restoration to a pre-construction state is incompatible with the surrounding areas together with the developmental trends obtaining in the area. Other land use patterns compatible with the surrounding areas – farming, industry and settlements would most likely be the preferred land use to which the area will be put to. However, re-vegetation to the extent possible for rehabilitation of disturbed areas will have to be done to meet the final land use option.

6.12.4 Industrial Use

The project site under discussion is an industrial operation and the zoning for the area is compatible with this type of land use. The site does not present any limitations to use of the site as an industrial facility apart from the safety aspects associated with the pollution concerns for some types of industries in view of proximity to a water body. However, adequate mitigation measures can easily be put in place to render the safety risks insignificant for safe use of the site. The only limitation is that it is difficult to guarantee investor availability to take up the site and operate a viable industry.

6.12.5 Decommissioning and Closure Activities

6.12.5.1 Removal and Disposal of Movable Equipment

Movable equipment both motorized such as motor vehicles, tippers, loaders, drill rig, etc. and non - motorized such as furniture, computers, and other office equipment, etc. would be moved to a central location and auctioned on site. Thereafter they will be moved from site within one month of purchase by the buyers. Disposal will however take consideration of works that will need to be carried out in site rehabilitation and any equipment and tools found to be valuable for the purpose of carrying out

rehabilitation works will be retained and only be disposed of after completion of rehabilitation works associated with the said equipment. This equipment includes tippers, front end loaders, drilling machines, folk lifters, etc.

6.12.5.2 Dismantling, Removal and Disposal of Immovable Equipment and Infrastructure

The first activity to be carried out in this regard will be to carry out an inventory of all available equipment and infrastructure with a view to identifying usable ones in line with the chosen land use option for the site. The result of this activity will be a listing of equipment and infrastructure that will be reserved for post closure use and those which require dismantling/demolition and removal from site. To this effect the principle of universal usage will be applied. Some type of facilities is such that regardless of the type of land use to be put in place they will serve a purpose. These include buildings such as offices, canteen, shower rooms, storerooms/warehouses, sheds, water treatment and supply facilities, sewer facilities, electricity, roads, workshop (excluding fittings and equipment), electricity substation, etc. These facilities will be reserved for post-closure use. In this regard usage may vary in specific terms but will generally have the same purpose of housing. For example, the canteen may not necessarily be used as a canteen but may be converted into a lecture room. Similarly, the engineering workshop may not be used as a workshop but can be partitioned into offices. A more detailed inventory would be worked out at the time of decommissioning.

Other facilities, installations and equipment with specialized usage may not have universal use and as such may not be required for use post closure and as such would require removal from site. These include crushing units, grinding/milling/blending units, cement loading/bagging units, conveyer units, kilns, rail line, overhead cranes, weigh bridge, mobile workshop, explosives storage facilities, etc. The following procedures and methods will be used in removing these facilities and equipment from site.

- Adherence to Best Practices in Waste Management by ensuring maximum use of equipment and facilities to be removed from site thereby reducing on waste designated for disposal.
- Auctioning the equipment, installations and facilities as whole units followed by removal from site by buyers under the company supervision.
- Encouraging removal of equipment and facilities capable of being removed from site as whole units to be removed as such without dismantling/disassembling them.
- Engagement of specialized services for dismantling of units which could not be removed as whole units in such a manner as to maintain their usability and easy assembling (piece by piece dismantling). This approach would enhance both personal and environmental health and safety. The dismantled material should then be stored in isolated units (in respect of each unit).

- Enforcement of Myanmar Conch safety standards on all agents carrying out the required dismantling/removal works to maintain a healthy and safe working environment.
- Negotiation with buyers for removal of equipment from site within a specified period e.g., 3 months.

Once all usable equipment and facilities have been removed from site the next step would be the dismantling of the remaining equipment and segregation of components into various material types for sale as scrap. This work shall be done with due consideration to environmental concerns e.g., by ensuring that equipment with oil is drained appropriately and the oil stored safely pending disposal as per standard procedures governed by law.

Once the dismantling exercise has been completed the materials will be sold as scrap to the various scrap users.

6.12.5.3 Demolition of Non-Usable Structures, Building Foundations and Removal of Debris

Apart from usable equipment and facilities as noted above a lot of other infrastructure on site could not be recovered and these will require demolition for easy clean up and removal from site for disposal. These include slurry, clinker, and cement storage silos (where these cannot be used as grain storage facilities), concrete (standard and reinforced) basements and columns for crushers, grinders, milling plants and other removed units. Demolitions will be done using various equipment including drilling machines, cranes, bulldozers, excavators, manual and hydraulic hammers, etc. Once demolition is completed the debris can then once more be assessed and sorted as appropriate for disposal after recovery of usable materials. Disposal would then be carried out in consultation with the relevant authorities.

6.12.5.4 Rehabilitation of the Plant Surface Area

The beginning point in rehabilitation works will be the carrying out of safety, environmental and health risk assessment in relation to the preferred land use option – social amenities/farming in this case. This will include pollution assessment of the area to establish nature and degree of remedial works needed.

After assessment has been done and pollution status established the next step would be the application of appropriate pollution remedial measures to detoxify the area. This may include general cleanup of the area to remove any debris, vacuum sweeping of all cement dust deposition, soil excavation for areas assumed to be heavily contaminated, liming or bioremediation e.g. in cases of moderate pollution by hydrocarbons. Once pollution remediation has been done follow up would include levelling, re-grassing, reforesting, etc. landscaping of disturbed open sites.

6.12.5.5 Decommissioning Progress

The sites in question are still active and as such no decommissioning activities have taken place thus far.

6.12.5.6 Post Decommissioning Rehabilitation Works

Post decommissioning activities will mostly comprise of care and maintenance to ensure chemical and physical stability of the site together with establishment of planted vegetation. Consequently, key activities to be undertaken will be monitoring by nature and corrective action to ensure realization of the decommissioning and closure objectives.

The following will thus constitute main activities:

- Sampling and analysis of remediated sites
- Sampling and analysis of nearby water resources
- Monitoring of revegetated areas
- Preventive maintenance of remaining infrastructure
- Emergency response to serious unforeseen occurrences.
- Final handover of facilities to government or would be buyer/beneficiaries

6.12.5.7 Budgetary Provisions

The budget for plant decommissioning and closure will be committed to relevant ministry after discussion with Ministry of Industry. Specific cost lines are as follows:

- Disposal of Equipment and Installations both movable and immovable as well as salvaged scrap
- Demolition works and disposal of demolition waste
- Plant Surface Area Rehabilitation
- Solid Waste Dump Site

The following considerations were considered on working the budget:

- First consideration for disposal of equipment and materials with use value would be sale by auctioning
- First line option for disposal of equipment/machinery/instillations, furniture and scrap would be sale by auctioning
- Plant surface area needing rehabilitation will depend on area contaminated.

6.13 Implementation of the Environmental Management Plan

The proposed Environmental Management Plan is scheduled for implementation effective after approval MIC. The ongoing activities have now been consolidated in this Management Plan to provide a holistic approach to the management of environmental aspects of the project.

It shall be the responsibility of each supervising Head of Department to ensure that the EMP provisions are effectively implemented starting with he/herself down the line of command. Day to day monitoring and evaluation of EMP implementation will however be the responsibility of the Environmental Manager of Myanmar Conch Company. Myanmar Conch Company will ensure that annual audits are internally conducted to assess implementation of the EMP and its effectiveness. Feedback from the audit will be used to review the EMP with a view to strengthening aspects not yielding the intended results. The EMP will be subjected to External Auditing every after three years with the same objectives.

Results of the External Audits will be shared with the MONREC and safety agencies. Suffice to say so the authorizing agencies have the mandate to demand for an audit where it is grossly noted that the environmental aspects of the plant and or quarries are not being managed according to the commitments made in this EMP.

CHAPTER VII

ENVIRONMENTAL MONITORING PLAN

7.1 Introduction

Successful implementation of Environmental Monitoring Plan (EMP) depends on regular monitoring, documenting and reporting. Myanmar Conch Cement Company should have provision of Health, Safety and Environmental department for monitoring the EMP implementation during construction and operation phase of the project.

If survey findings are compared with applicable guidelines, the explanation will be provided together with supporting documentation in the monitoring report, which will be submitted to the Environmental Conservation Department. Analysis on the survey results will be presented in the monitoring report that will be submitted to the Environmental Conservation Department by comparing the baseline or previous survey data. In the monitoring report that will be submitted to the Environmental Conservation Department, photos of each monitoring point, photos of sample collection, and photos of surveying will all be described. The traffic situation around the project will be surveyed at least once a year, and measures taken to reduce traffic issues will be included in the monitoring report.

The environmental monitoring officer should monitor the EMP implementation and submit a quarterly report to the concerned department. Additionally, another yearly monitoring report with quarterly monitoring data should be submitted to the Environmental Conservation Department for renewing the Environmental Clearance Certificate. The detail monitoring plan has been presented in Table 7.1.

Table 7.1 Monitoring Plan

Indicator	Location of Data Collection	Frequency	Institution
Construction Phase			
Monitoring EMP implementation	Project area	Daily monitoring and documenting, and quarterly reporting	HSE Department
Air quality (NO_2, SO_2, CO, $PM_{2.5}$, PM_{10})	2 locations (one in plant site and one in nearest village)	Quarterly	Third Party
Noise	2 locations (one in plant site and one in nearest village)	Quarterly	Third Party
Waste Management Plan - Construction - Domestic	Project area and Labor shed	Quarterly	HSE Department
Noise Management Plan	Within project area	Daily monitoring and documenting	HSE Department

Operation Phase			
Air quality (NO_2, SO_2, CO, $PM_{2.5}$, PM_{10}) If the other guidelines parameters can be measured, they will be measured and reported in the monitoring report.	Project site (1 point) One in nearest village (1 point)	Quarterly	Third Party
Continuous Monitoring (CEMS) (NO_2, SO_2, CO, $PM_{2.5}$, PM_{10})	Cement Plant Stack	Daily	HSE Department
Noise	Project site (1 point) One in nearest village (1 point)	Quarterly	Third Party
Soil Quality	Two Location (two points are nearest village)	Yearly	Third Party
Implementation of Air quality & Noise Management Plan	Within factory area	Daily monitoring and quarterly reporting	HSE Department
Implementation Waste Management Plan	Within factory area Water Treatment Chemical Storage	Daily monitoring and quarterly reporting	HSE Department
Implementation Soil Management Plan	Within factory area Water Treatment Chemical Storage Fuel Tank	Daily monitoring and quarterly reporting	HSE Department
Water Quality Monitoring (DO, BOD, COD, Heavy metal, pH, salinity, Total hardness, Nitrate, TDS, TSS, Temperature, etc.)	Nearest Surface Water Resource	Quarterly	Third Party
Implementation of Biodiversity Management Plan	Within project area	Regular monitoring and quarterly reporting	HSE Department or Third Party
Occupation and Community Health and Safety Management Plan - Preventive Maintenance - HSE Meeting - Fire Prevention Measures - HSE Training & Drills - First Aid Facilities	Project site and surrounding the area	Regular monitoring and quarterly reporting	HSE Department
Closure Phase			
Monitoring EMP implementation	Project area	Daily monitoring and documenting, and reporting	HSE Department
Waste Management Plan - Construction - Domestic	Project area and Labor shed	Monthly	HSE Department

7.2 Compliance Monitoring

Compliance monitoring is the prudent element of Environmental Monitoring Plan that ensure effective implementation of the Environmental Management Plan, compliance of all project related activities with relevant environmental rules and regulations and safety procedure.

Monitoring of the compliance may be carried out by the Environmental Personnel of the Project Management Unit but should be audited yearly by the external auditor. The monitoring activities and results should be well documented and followed by the standard monitoring checklist.

The principle approach of the step by step monitoring involves:

- Walkthrough inspection: quick survey of the activities, operations, equipment, and facilities.
- Through inspection: visual observation activities, operation, equipment and facilities and review of related documents, previous records, reports, etc.
- Interview of relevant personnel: interviewing of related employees, key personnel, etc.
- Consultation with local people: consultation with local people to understand community perception on the project related activities and to identify social issues related with the project

The inspection, observation, consultation and reporting should be followed by an organized checklist. The checklist of the monitoring should be developed during preparation of Environmental and Social Action Plan at the stage of detail design of the project.

The target areas of monitoring are:

- Compliance of project related activities with national and international (if required) environmental rules and regulation as described in chapter 2 during preconstruction, construction and operation phases
- Compliance of the project related activities with the Suggested EMP during pre-construction, construction and operation phases
- Compliance of the Plant operation (noise, emission, waste disposal, waste water discharge, etc.) with relevant national and international (if required) standards
- Compliance of the Environmental Monitoring Activities with suggested Environmental Monitoring Plan
- Record each of incidents

The compliance monitoring report along with the checklist should be indexed and annexed with the monthly and annual monitoring report. A format of compliance monitoring checklist shall be prepared during detail design stage. It may be required to submit the annual monitoring report to Department of Environmental Conservation for renewing of the Environmental Clearance Certificate each year.

7.3 EMP and Monitoring Cost

7.3.1 Estimated Environmental Management Plan and Monitoring Cost (Construction and Operation Phase)

The Project cost is inclusive of cost for implementing Environmental Management Plan and installation of pollution abatement and mitigation measures described in the feasibility study report. The costs for Environmental Management Plan and responsible institute have been estimated in Table 7.3-1 and 7.3-2. If estimated cost is not sufficient in the implementation of Environmental Management and Monitoring Plans, budget will be set up again.

Table 7.2 Estimated Environmental Management Plan and Monitoring Cost (Construction Phase)

	Item	Cost (USD)
	Environmental Monitoring Cost including cost for environmental engineers	7,000
	Environmental Auditing	8,000
	Total	**15,000**

Table 7.3 Estimated Environmental Management Plan and Monitoring Cost (Operation Phase)

Item	Cost (USD)
Environmental Impact Mitigation Cost (i.e. EP, Stack, Bag Filter, Cyclone Filter, Exhaust Fan for Preheater EP and Water Treatment Plant) *	4,201,979
Environmental Monitoring Cost including cost for environmental engineers	18,000
Environmental Auditing	5,000
Greening cost	7,000
Total	**4,231,979**

**** Detailed list and cost of environmental protection equipment are listed in Appendix 4.***

7.3.2 Estimated Environmental Management Plan and Monitoring Cost (Decommissioning Phase)

The following costs have been estimated to implement the Decommissioning and Closure Plan for cement plant. At least one year before power plant decommissioning, a detailed and final cost analysis of closure and environmental protection will be prepared and submitted to the regulatory bodies (MONREC and MOI).

Table 7.4 Cement plant operations Decommissioning Cost

Activity/Task	Cost USD
Removal of offices, cement production line and workshops	40,000
Removal of cooling tower and circulating water pumps	20,000
Removal of raw material storage and conveyor belt	18,000
Re-profiling of the drainages	15,000
Ripping of concrete structure	10,000
Removal of water treatment plant	10,000
Removal of electrical equipment and cables	5,000
Removal of scrap materials	2,000
Removal of danger signs around the site	1,000
Total	**121,000**

CHAPTER VIII

PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

8.1 Public Consultation Meeting

The information disclosure and public meeting for EIA report of 5000 ton/day Myanmar Conch Cement plant. During preparation of EIA report of 5000 ton/day cement plant, the public consultation meeting was held on 15th December 2014 and an EIA Disclosure Meeting held on 9th March 20015 at the Meeting Hall, Kyaukse Cement Factory.

The following table shows the meeting venue and participant organization.

No.	Date	Name of Town/Village	Participation	Arranged by
1	15.12.2014 10:00 AM to 12:00	Meeting Hall, Kyaukse Cement Factory	Myanmar Conch Company, Authorities from Kyaukse Township, Head of Village, Villagers and SEM Company	Myanmar Conch Company
2	9.3.2015 9:00 a.m	Meeting Hall, Kyaukse Cement Factory	Myanmar Conch Company, Authorities from Kyaukse Township, Head of Village, Villagers and SEM Company	Myanmar Conch Company

8.1.1 Stakeholder Meeting I

Date:	15.12.2014
Place:	Meeting Hall, Kyaukse Cement Factory
Time:	10:00 am to 12:00
Meeting Agenda:	The meeting was organized with eight agendas. Agenda 1: Announcing the opening of the ceremony Agenda 2: Explanation of current cement factory by U Thaung Win (GM- Kyaukse Cement Plant) Agenda 3: Presentation about new cement plant (5000 tons per day) by Mr. Sha (Conch Co, Ltd.) Agenda 4: Explanation of EIA/SIA procedures that will be carried out for Kyaukse Cement factory by Daw Khin Ohnmar Htwe (Director-SEM Co. Ltd.) Agenda 5: Question & Answer Session & giving suggestions Agenda 6: Providing presents to the guests Agenda 7: Announcing the closing of the ceremony Agenda 8: Lunch Time
Agenda 1	Announcing the opening of the ceremony by MC
Agenda 2	General Manager U Thaung Win presented that the meeting is

	organized to carry out EIA/SIA procedures for Myanmar Conch Co. Ltd and their 5000 tpd cement plant project. The project is started to run so as to fulfill the demand of cement of the country and to get help with the latest technologies from the developed country. Current cement plant was built in 2002. There are both advantages and disadvantages from the cement plant. However, the advantages outweigh the disadvantages. Thus, the project will continue to run with the advanced technology in order to reduce environmental degradation. The cement plant is currently working with Myanmar Conch & Myint Company Limited and the BOT was signed in November, 2013. Benefits will be acquired for the country from this project. The consultant company will carry out for environmental and social conservation and he hoped that the development of the country will be seen from this project.
Agenda 3	Mr. Sha (Myanmar Conch Cement Co. Ltd) explained about the new 5000 tons per day cement plant project. He presented that Conch Co. Ltd is one of the largest business groups in China and totally 110 cement factories have been built by the company. Latest technologies and machineries are used and the advanced technologies are utilized for environmental conservation. Then, the photos of factories built in Guang Shi, Shi Chong, Chi Zui and San Tong region are shown with PowerPoint. Now the staff housings have been building and it is granted for sure that the housings will meet their standard. Next, U Khin Mg Tint, manager of Kyaukse Cement Plant presented the machinery and technologies that will be used in project and the plans for reducing environmental degradation.
Agenda 4	Daw Khin Ohnmar Htwe, Director from SEM Company explained that SEM stands for Sustainable Environment Myanmar and that the company will consult about the project. Also, the company will consult the ways to reduce environmental impacts and will collect surveys from the nearby villages concerning their opinions and suggestions about the project. The current project is located within Kyaukse Industrial Zone and there are Shwe Thar Hlyaung Pagoda, Waibu Gyaung Meditation Centre and Ancient Myin Saing Town around the project site. She also explained the factors involved in carrying out ESIA, such as background information of the project, rules and regulations, etc. Now ESIA is in progress at the stage of holding stakeholder meeting and measuring the project site area. The second meeting will be held in February, 2015 and the findings from surveys will be presented in that meeting.
Agenda 5	Questions, answers and suggestions from the meeting are as follows: ***Question (1):*** U Myint Aung (GM- Fire-safe Brick Industry) How many staff will be appointed in the factory? Will the residents be employed or will the Chinese workers be used for long term? ***Answer:*** Mr. Sha (Myanmar Conch Co. Ltd) At first, there will be totally 900 staffs, about 800 will be local people

	and 100 will be Chinese technicians. Chinese staff number will be reduced gradually. ***Suggestion:*** U Kyi Myint (AGM - Cement Mill) Mineral water has never been tested in this region. But that water is usually used as drinking water. Water quality test has never been done. Therefore, I would like to suggest for water quality test. Also, domestic water should be suggested to test. ***Answer:*** Daw Khin Ohnmar Htwe (Director- SEM Co. Ltd.) We have heard that Thinndwe Canal Water is currently used. However, tube well will also be tested. A teacher from Kyaukse University will cooperate in that water quality test. Findings will be presented in second meeting. ***Question (2):*** Daw Mar Mar Myint (Factory and Labour law Investigation Department) How will be the problem of rubbish and plastic bags? ***Answer:*** U Khin Maung Tint (Engineer - Cement factory) Here in this project, the gases emitted from factory such as CO2, NOx and SO2 will mainly be controlled. Comparing the percentage of other rubbish, plastic will be less. ***Question (3):*** U Aung Naing Oo (GM shoe factory) I've been appointed at Kyaukse for 8 years. We have to use Thinndwe Canal water. That water has high level of calcium. If the laboratory result shows that the water is not suitable to use as domestic water, how will it be managed? How's the plan for that? ***Answer:*** Daw Khin Ohnmar Htwe (Director - SEM Co. Ltd.) After being tested, if the result shows that the water is not suitable to use, we will suggest how to carry out water treatment for the factory. ***Question (4):*** U Aung Naing Oo (GM Shoe Factory) When water purifying machines are used, these machines can last only one year. Then they cannot be used anymore. Thus, that plan is not alright. ***Answer:*** U Khin Maung Tint (Engineer- Cement factory) Our factory has its own Water Treatment System. For all the surrounding area, I think it's not our concern. ***Answer:*** Daw Khin Ohnmar Htwe (Director - SEM Co. Ltd.)

	If that problem is submitted from Industrial Zone to Region, they will continue to solve that problem. We will help you out how to submit, how to present and who to contact for that problem. ***Question (5):*** U Khin Maung (Hmine Pan Village) Can the project affect farmers and their water resource? ***Answer:*** U Thaung Win (GM- Cement Factory) The necessary water from 5000 tpd Cement Plant will not be obtained from Thinndwe Canal. Water will be drained from Zawgyi River. ***Question (6):*** U Zin Htun (Fire Brigade Department) I'd like to know the fire safety plan and fire prevention plan for factory. ***Answer:*** Daw Khin Ohnmar Htwe (Director - SEM Co. Ltd.) Current factory has its own fire engine car. We have planned to have HSE Department for new 5000 tpd cement plant in our report. Also, health education for workers will be done such as putting on masks and caps. ***Question (7):*** U Khin Mg (Pann Hlaing Village) Will the water transportation pipes be passed across the fields? If there are any losses for farmers, how will it be solved? ***Answer:*** U Soe Nyunt (Myanmar Conch) We'll overlap the pipes to the water pipe lines of glass factory. If there were any losses when building water pipe lines for glass factory, you can submit again with accurate records.
Agenda 6	Myanmar Conch Co. Ltd offered the presents to the honorable guests.
Agenda 7	MC of the ceremony announced that the ceremony has finished successfully.
Agenda 8	Then the guests, participants and personnel had lunch together.

Table 8.1 List of Participants of Stakeholder Meeting, 15-12-2014 (Monday)

No.	Name	Address
1	U Soe Naing	Village Head, Phyaukseikpin
2	U Kan Nyaunt	Elder Person, Phyaukseikpin
3	Daw Mar Mar Myint	Labour Department
4	Daw Kyawt Kyawt Yee	Labour Department
5	U Aung Ngwe	Myint Investment Group
6	U Khin Maung Myint	Myint Investment Group
7	U Khin Maung Oo	Myint Investment Group
8	U Khin Maung Myint	AGM, No.33 Factory
9	U Soe Tint	Assistant Manager, Glass Factory
10	U Aung Zaw Oo	Assistant Manager, SewingMachine Factory
11	U Myo Min Naing	AGM, Plastic Factory
12	U Kyi Myint	AGM, Cement Mill
13	U Myint Wai	Finance Manager, Cement Factory
14	U Win Nyunt	Assistant Manager, Cement Factory
15	Daw Aye Aye Myint	Assistant Manager,No.(9) Garment Factory
16	U Lin Yaung	Assistant General Manager,No.(33)Heavy Industry
17	U Tin Thaung	Elder Person, Kalachaung Village
18	U Hla Aung	Elder Person, Kalachaung Village
19	U Win Shwe	Elder Person, Kalachaung Village
20	U Kyaw Thin	Elder Person, Kalachaung Village
21	U Tin Hlaing	Supporting Committee, Ashay Ywar Nan Village
22	U Aung San Oo	100 houses leader, Ashay Ywar Nan Village
23	U Zaung Naing	100 houses leader, TaungPaLu Village
24	U San Lin Aung	Village Head, Kalachaung Village
25	U Soe Naing	100 houses leader, Shan Ywar Gyi Village
26	U Soe Naing	Purified Drinking Water Factory
27	U Soe Win	Assiatant Manager, (QC)
28	U Soe Win	Manager, Cement Factory
29	U Thein Myint	Manager, Cement Factory
30	U Zin Tun	Head of Township Fire Department
31	U Hein Thet Swe	Township Fire Department
32	U Soe Lwin	100 houses leader, YeBawLay Village
33	U Tin Tun	Elder Person, YeBawLay Village
34	U Pho Ke	100houses leader, BaLiKwin Village
35	U Sein Myint	Elder Person, BaLiKwin Village
36	U Zaw Win	Civil Engineer, Water and Sani
37	U Mya Hlaing	Elder Person, Hmaing Pan Village
38	U Khin Maung	Supporting Committee, HmaingPan Village
39	U Naing Oo	Hmaing Pan Village Head.
40	U Khin Maung Win	Elder Person, Hmaing Pan Village
41	U Thet Pyin	Elder Person, Hmaing Pan Village
42	Daw Win Mon Oo	Manager, QC
43	U Zaw Tun Aung	ECD, Mandalay region
44	U Sai Than Naing	Deputy Chief of Bicycle Factory.
45	U Thaung Win	Chief of Cement Factory

46	Daw Myat Moe Thu	Manager, Cement Factory
47	U Tint Swe	Forest Department, Kyaukse Township
48	U Maung Kyaw	Shwe Dar Village Head
49	U Myint Aung	Chief of Concrete Brick Factory
50	U Aung Naing Oo	GM, Shoes Factory
51	Daw Khin Ohnmar Htwe	SEM/REM Co.Ltd
52	Daw Phyu Phyu Shein	REM Co.Ltd
53	Dr. Sein Kyaw	Myanmar Conch Co.Ltd

8.1.2 Stakeholder Meeting II

Date:	9.3.2015
Place:	Meeting Hall, Kyaukse Cement Factory
Time:	9:45 am to 11:00pm
Meeting Agenda:	The meeting was organized with seven agendas. Agenda 1: Announcing the opening of the ceremony Agenda 2: Welcome remark from Mr.Xia On behalf of Myanmar Conch Company Limited Explanation of current cement plant by U Thaung Win (GM- Kyaukse Cement Plant) Agenda 3: Welcome remark by GM U Thaung Win Agenda 4: Presentation on results and findings of ESIA procedures by Daw Khin Ohnmar Htwe (Consultant- SEM Co. Ltd.) Agenda 5: Question & Answer Session & giving suggestions by participants Agenda 6: Providing souvenir to the guests by Myanmar Conch Company Limited Agenda 7: Announcing the closing of the ceremony
Agenda 1	Announce the opening of the ceremony by MC.
Agenda 2	Welcome remark from Mr.Xia On behalf of Myanmar Conch Company Limited Explanation of current cement plant by U Thaung Win (GM- Kyaukse Cement Plant) Welcome ladies and gentleman. Our company will carry out the project with the management plan for less environmental effect. Our company will tightly follow Environmental Conservation Law. Thank you all for your presence here.
Agenda 3	Welcome remark by GM U Thaung Win Mingalarbar. Current cement plant was built since 2004 and produced 500 tpd cements. There was only little development in this region before the series of factories were constructed and run here. However, more development of the region can be seen because of the construction of factories. There are both advantages and disadvantages from upgrading the cement plant. However, the advantages outweigh the disadvantages. Thus, the project will continue to run with the advanced technology and in order to reduce environmental

	degradation. We will also use the machineries for the factory which meet international standard. We have also done ESIA for effective environmental conservation. Financial Benefits will also be acquired for the country from this project. Also, people from this area will be employed in project area. I would like to conclude by saying that we welcome all of your suggestions.
Agenda 4	Presentation on results and findings of ESIA procedures by Daw Khin Ohnmar Htwe (Consultant- SEM Co. Ltd.) Good morning ladies and gentlemen. We are here today to explain about the ESIA findings concerning Kyaukse cement plant 5000tpd. This is the second time of holding stakeholder meeting as we arranged the first stakeholder meeting on 15th December, 2014. We have investigated the impacts of projects and we will suggest and consult the possible ways to reduce disadvantages. We also welcome all of your suggestions. Firstly, I would like to explain about the background information of project. Secondly, I would like to explain why EIA procedures would be carried out. Thirdly, I will present baseline data got from EIA procedures. Finally, I will present Environmental Management Plan which is the most important for the project. Firstly, this factory will be established as green industry. Green industry means that there will be growing large number of trees around factory. As environment around cement plant probably have much ashes and dusts, more trees will be grown so that it can maintain ecosystem. Also, according to the environmental protection concept of the company, it aims to get balance between environment and project by saving natural resources. Also, there will be concerns of people for their health status. So, the company will utilize electronic machineries for dust control that meet international standard. To control air pollution, there will be installation of ventilators to maintain fresh air. Also, water environment protection and reuse technology will be utilized with water storage tank. To control noise from factory, noise control technology will be used. With the help of technology, less energy usage and less pollution will be created. The next point is the electricity which is mainly essential for factory. For that requirement, coal fire plant which will be run by two 20 megawatt generators. Also 1.8 megawatt diesel engine generator will be constructed. Another thing is boiler. Circulated Fluidized Boiler (CFB) will be used in this cement plant. CFB has lesser side effects than any other and with the use of it, ashes and dust production will be controlled. The second point is the reason for carrying out EIA. Based on the type and size of the project, EIA or IEE has to be done. The factors involved in carrying out ESIA are collecting background information of the project, rules and regulations, etc. When it comes to ESIA, the most important point is about submitting Environmental Management Plan (EMP). EMP means how to manage machinery transportation, how to manage to have least negative impacts, and so on. The company will have to strictly follow the plans involved in EMP. There

	is also organization who will investigate whether company follow EMP or not, in township or even in district level. Environmental Conservation Department will also come and investigate the project and the report will also be submitted to ECD once every one month or six months. When we say EIA, we assess on environmental and social situations in accordance with instructions and guidelines from international agencies such as IFC, EHS guidelines, etc. Also, we use guidelines from other ASEAN countries and from other developed countries like Japan. Natural Environment includes plants, animals, and water, air and ground quality tests. When testing air quality in and around project area, it was found out that air quality is reached below international standard. Similarly, it was stated that noise pollution is also below international standard. However, when testing water quality from Thindwe creek and Zawgyi River, it is found out at the level of PH 7. In addition, there's no occurrence of endangered species of plants or animals around project area. When constructing cement plant and its machinery are in use, there will be both positive and negative impacts. The dust and smoke may be released from site area. Gases from power plant may be emitted to the air. Clayey water may be poured into creeks and river and might lead to water pollution. Waste water from mine, power plant and staff housings may cause water pollution. During construction period, waste materials might be released from staff housings. There will be more or less smoke during the process. The machineries which are used in construction and the cement production process will produce noise and vibration. Mines, trucks and bull dozers will also produce noise and vibration. To control all these aspects, Environmental Management Plan has been drawn. Also, local people employment is also planned during construction sites and in factory. We have met the villagers from villages near this project site in the first stakeholder meeting on 15.12.2014 as a social environmental study. We also met the villagers in the villages situated 5 kilometers far from the plant such as Pyauk Seik Pin Village, Ye Bya Daw (West) village, Shan Ywar Gyi Village , Ah Shay Ywar Nan Village and Taung Palu Village through Village Administrators as fieldwork. We've done the questionnaire surveys to find out their socioeconomic status and necessities of villages and collected basic facts. In this survey, we found out two facts; the first point is that Myanmar Conch Company will have to give job opportunities to the people from neighboring villages as the first priority if the project is getting started. The second point is that the company has to fulfill the needs in health and education sector for example; taking responsibility for mobile medical treatment and for fulfilling in education sector such as building schools. The next point is to help for the development of road and electricity. These are the examples of helping for the regional development. This is the end of our presentation. Our purpose today is to explain our findings from ESIA surveys. If the attendees have questions or suggestions, we are happy to answer all these questions. Today

	stakeholder meeting is held because we are going to submit our report concerning Cement Plant to MIC according to today findings and suggestions. Thank you.
Agenda 5	Questions and answers and suggestions from the meeting are as follow; ***Suggestion (1):*** U Kyi Myint (AGM cement mill) According to your explanation, we know that water is tested by sampling water. I would like to ask your help and suggest that water should be tested in order to decide whether there are bacteria or not and it should be consumed or not. ***Answer:*** Daw Khin Ohnmar Htwe (SEM Company Limited) "When we test the water, it is found that there's no need to get worried. We tested water because we worry whether ground water gets damaged". ***Suggestion (1):***U Kyi Myint (AGM cement mill) We sent the water sample to the lab and found that the water has high level of calcium. If you have technology to solve it, we want you to help us. ***Answer:*** Daw Khin Ohnmar Htwe We will provide technology for water treatment after discussion with water engineer. ***Question (1):*** U Kyi Myint (AGM cement mill) You explained that there will be team for further investigation. Is there any interim program to assess whether changing environment impacts upon people or not. ***Answer:*** Daw Khin Ohnmar Htwe (SEM Company Limited) We can't do interim test. For example, if water is tested and it is discovered that it should not consumed anymore, we will report to Environmental Conservation Department immediately. Then, we will send and test water sample to the respective department under Ministry of Health. There will be prohibition, if water is not totally suitable to consume. This will be done with the cooperation of the factory. ***Discussion:*** U Wanna Win (Director of Environmental Conservation Department) I am U Wanna Win, Director of Environmental Conservation Department, Mandalay Region. I attended today meeting as we are invited as a team which is going to draw Environmental Management Plan concerning Cement Plant project. The Environmental Conservation Department is established in this government. We have a

	lot of necessities as our department has been newly established. We estimate that the environmental standard and guidelines will be issued in 2017.
Agenda 6	Myanmar Conch Co. Ltd offered the presents to the honorable guests.
Agenda 7	MC of the ceremony announced that the ceremony has finished successfully.

Table 8.2 List of Participants of Stakeholder Meeting, 9-3-2015 (Monday)

No	Name	Village
1	U Maung Maung Soe	Ye Baw Gyi Village
2	U Kyaw Thu Hlaing	Purified drinking water factory
3	U Ye Myint	Bicycle factory
4	U Ko Ko Thwe	Plastic factory
5	U Thaung Win	Cement factory
6	Mr.C	Myanmar Conch
7	U Kyi Myint	Cement factory
8	U Aung Ngwe	Myanmar Conch
9	U Soe Tint	Assistant Manager Ka Kha Kha(36) Mon
10	U Zaw Lin	Administrator No (9)
11	U Myint Wai	Assistant General Manager (Cement Factory)
12	U Khin Maung Tint	Manager (Cement Factory)
13	U Kyaw Thu Tun	Assistant General Manager (Cement Factory)
14	U Wunna Than	Electrical Station, District
15	U San Lin Aung	Ka Lar Kyaung Village
16	U Myint Aung	Assistant General Manager, Mee Khan Pote Village
17	U Soe Naing	Phyauk Saik Pin Village
18	U Myat Tun Aung	Officer, ECD
19	U Wunna Win	Director
20	U Tin Tun	Ye Baw Lay Village
21	U Soe Lwin	Ye Baw Lay Village
22	U Aung Soe Hlaing	Ye Baw Gyi Village
23	U Aye	Ye Baw Gyi Village
24	U Hla Myaing	Myanmar Conch
25	Daw Thet Ngon	MIG
26	Daw Khin Myo Myint	MIG
27	U Soe Win	Assistant Manager (Q/C)
28	U Win Nyunt	Manager
29	U Aung Tun Thar	Manager
30	U Khin Maung Myint	Assistant General Manager
31	U Mya San	Assistant Manager

32	Daw Se Sar	Assistant Manager
33	Daw Ohmar Tun	Assistant Manager
34	U Soe Win	Manager
35	U Yar Khant	Deputy Minister/Conch
36	U Khin Maung Oo	Supervisor (Q/C)
37	U Kan Nyunt	Supervisor (Pro)
38	U Soe Nyunt	Consultant
39	U Maung Htwe	Mhaing Pan
40	U Naing Oo	Mhaing Pan
41	Daw Khin Ohmar Htwe	SEM company

8.1.3 Photo Records




Figure 8-1 Public Consultation Meeting in Hall, Kyaukse Cement Factory

8.1.4 Opinion towards the Impact of the Project

According to the survey results, most of the respondents believed that the project will not have prominent negative, social and health impacts on their livelihood and surrounding region. Some of respondents believed that health impact of the project would be expected.

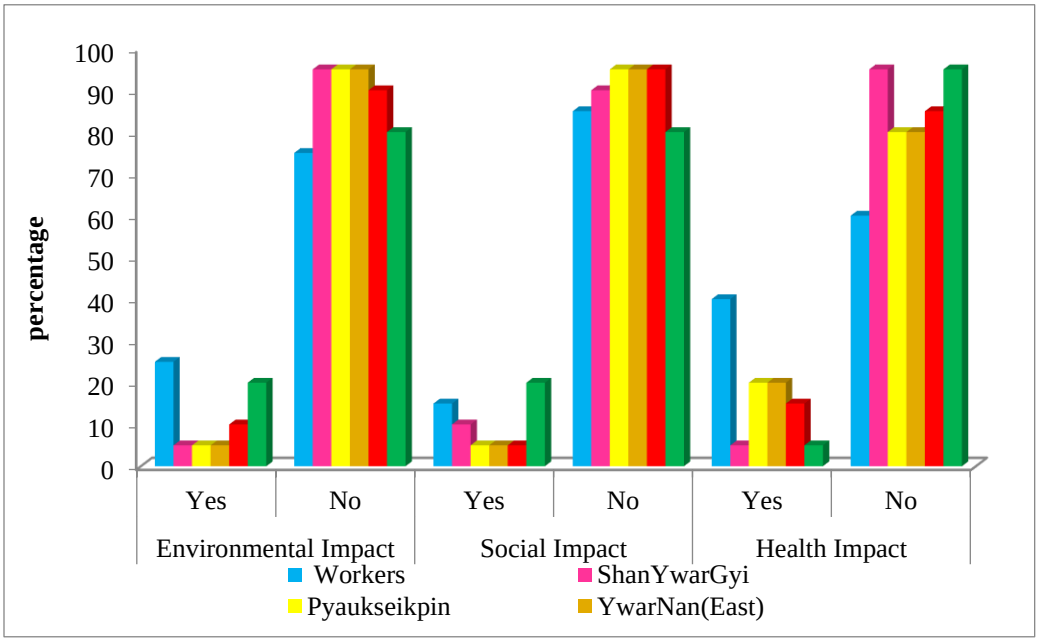


Figure 8-2 Opinion towards the impact of the project (%)

Suggestion Summary		
Respondents	**Requirement**	**Worried**
Factory Workers	- To increase job opportunity - To support health and education	- impact of dust on health - respiratory problems due to air pollution
ShanYwar Gyi, Pyaukseikpin, Ywar Nan (East), Kale Gyaung, Taung PaLu and Ye Byar Taw Villages	- To increase job opportunity - To support health and education - To have the reginal development - To promote the infrastructure	- impact on Ya lands - respiratory problems due to air pollution

The project developer should be able to

- Create job oppunities
- Maintain safe environment,
- Prevent potential impacts of the project,
- Develop social, economic and health status
- Inform about the project to the local people.

8.1.5 Consideration of Public Comments in The EIA Report

During the public consultation, some of the public's concerns were clarified and addressed. Discussions and recommendations were only made in the public consultation meeting, and no specific critical comments were received. The table below shows how public comments were considered when preparing the EIA report.

No.	Comments and Suggestion	Section
1	Suggestion for water quality test	4.3.1 Water Quality
2	Concern about rubbish and plastic bags	5.4.4 Solid Waste
3	Project effect on farmers and their water resource	5.4.2 Water Quality and Water Resources
4	Fire safety plan and fire prevention plan	5.4.6 Fire and explosion Impacts
5	Water transportation pipes	5.4.2 Water Quality and Water Resources
6	CSR	6.9 Corporate Social Responsibility (CSR)

8.2 Information Disclosure Activities

Myanmar Conch Co. Ltd disclosed the information of Kyaukse Cement Plant (5000 ton per day) to social media by broadcasting on MRTV and MWD. Besides, it has published on Light of Industry (Setmhuu Alinn) Journal of Ministry of Industry.

In 2017, representatives of Ministries, committee member from NLD and NGOs visited to Kyaukse Cement Plant on January to Augusts. The authorities from the factory demonstrate about the plant clearly.

U Khin Maung Cho, Minister of Industry and U Khin Maung Tint, No.2 Heavy Industry Enterprise came and studied about the plant on January.

U Khin Maung Cho, Minister of Industry (8/1/2017)

U Khin Maung Tint, No.2 Heavy Industry Enterprise (13/1/2017)

U Ohn Win, Union Minister, Mandalay and U Myo Thant, MONREC also visited to Myanmar Conch Cement Plant on 4th March 2017.

U Ohn Win, Union Minister, Mandalay and U Myo Thit, MONREC (4/3/2017)

Dr. Zaw Myint Maung, Chief Minister, Mandalay, and Member of Parliament from Mandalay came and explored the Kyaukse Cement Plant on May.

Dr. Zaw Myint Maung , Chief Minister (14/5/2017) | **Member of Parliament from Mandalay (30/5/2017)**

Then, Dothitsar (NGO) visited to the plant on 23rd July 2017.


Dothitsar (NGO) (23 / 7 /2017)

On 17th August, Central Commerce Committee from NLD came and visited to the factory.


Central Commerce Committee from NLD (17/8/2017)

8.2.1 Public Consultation and Information Disclosure during Operation Stage

Public Consultation	
Invitation Method for Public Consultation Meeting	The meeting will be informed through the invitation letters or public notice posted in each village one week in advance.
Venue	Myanmar Conch Cement Plant, Kyaukse Industrial Zone, Kyaukse Township.
Information Disclosure	
Announcement Method	Public disclosure will be announced in the public consultation meetings. Disclosure period and comment submission method will be described in the disclosure places.
Disclosure Place	General Administration Office, Kyaukse Township
Disclosure Period	One Month
Comment Submission Method	Comments can be submitted with the comment form provided at the disclosure places or by e-mail either in Myanmar or English language.

8.2.2 Social Economic Survey Form

Socio-economic Survey

1.	State/ Region	
2.	Township	
3.	Word/ Village Tract	
4.	Village	
5.	Respondent's name	
6.	Gender	Male----------1 Female----------2
7.	Age	_____
8.	Total number of family size	_____
9.	Education Level	No schooling----------1 Primary school----------2 Middle school----------3 High school----------4 Graduate----------5 Monastic school----------6
10.	Occupational Structure	Factory----------1 Farmer----------2 Odd jobs----------3 Seller----------4 Dependent----------5 Others----------97
11.	Income level per year	<5lakh kyats----------1 5-10lakh----------2 10.1-15lakh----------3 15.1-20lakh----------4 >20lakh----------5
12.	Source of income	_____
13.	Expenditure *per month*	<1lakh kyats----------1 1 to 2 lakh----------2 2.1-3 lakh----------3 >3.1 lakh----------4
14.	Type of houses	Concrete----------1 Semi-concrete----------2 Wooden----------3 Hut----------4

Thank You

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Beacon of Industry Journal

မျက်နှာဖုံးမှ-

အောင်မြင်နေသော အစိုးရ-ပုဂ္ဂလိက ပူးပေါင်းဆောင်ရွက်ရေးပြယုဂ်

ဘဏ္ဍာနှစ်	ရရှိတန်ချိန်	ရရှိဝင်ငွေ (ကျပ်သန်း)
၂၀၁၄-၂၀၁၅	၈,၀၄၇	၇၇၇.၂၆
၂၀၁၅-၂၀၁၆	၁၂,၀၀၀	၁,၀၈၀.၀၀
၂၀၁၆-၂၀၁၇	၇၅,၀၀၀	၇,၀၅၀.၀၀
၂၀၁၇-၂၀၁၈	၈၇,၅၀၀	၇၆၈၂.၀၀
စုစုပေါင်း		၁၂,၆၄၅.၂၆

ကျပ်သန်းပေါင်း

ဘဏ္ဍာနှစ်	ကုန်သွယ်လုပ်ငန်းခွန်	သယံဇာတအခွန်	Income Tax
၂၀၁၄-၂၀၁၅	-	-	-
၂၀၁၅-၂၀၁၆	၇၉၈.၂၅၄	၁၆.၅၂၆	၇၀.၀၀
၂၀၁၆-၂၀၁၇	၄,၇၇၀.၉၈၄	၄၇.၈၇၀	-
၂၀၁၇-၂၀၁၈	၅,၇၂၉.၀၀၂	တွက်ချက်ဆဲ	-
	၁၀,၈၉၉.၂၄၀		၇၀.၀၀

စာမျက်နှာ ၁၃ သို့-

Figure 8-3 Light of Industry (Setmhuu Alinn) Journal (March 31,2018)

CHAPTER IX

CONCLUSION

Myanmar Conch Cement Company has been one of the industrial giants of the City of Kyaukse providing employment to the local residents and producing the much needed cement for both the mining and construction industry locally and the region. The plant which has been in operation since the 2003 and will be upgraded into a plant that can produce 5,000 **tons of cement daily through a build-operate-transfer (BOT) system.** Myanmar Conch Cement Company industrial landmark has not only impacted positively on its neighborhood but has shared the challenges of old technology in environmental pollution.

Myanmar Conch Cement Company has embarked on a program that would see it rise above its environmental challenges and place the present factory operation on a platform that radiate a positive image as an environmentally friendly and socially acceptable operation. To this effect an Environmental Impact Assessment study was embarked on leading to the preparation of an Environmental Impact Statement (EIS) and Management Plan (EMP) that address environmental (biophysical, socio-economic and cultural), health and safety concerns that could counteract the benefits expected to accrue from development and operation of the plant. The EIS has reviewed the environmental setting of both the limestone quarry and the plant and has reviewed the impacts of concern that the said facilities exert on the surrounding environment together with an elaboration of the required management interventions aimed at preventing, mitigating and compensating the impacts. The EMP provide a mechanism for a systematic and well- coordinated implementation of the proposed management interventions for management of all environmental, health and safety concerns associated with the development and operation of the plant. Management and staff at Myanmar Conch Cement Plant are committed and keen to follow through and ensure efficient implementation of the same. It is Management’s hope that the Environmental Conservation Department and other Regulatory Institutions will find the EIS and Management Plan contained therein sufficient to guide operation and decommissioning of the Myanmar Conch Works establishment in an environmentally friendly and socially acceptable manner to the benefit of workers, consumers and other stakeholders at large.

With careful planning and implementation of all the proposed interventions it is most unlikely that the project will continue to generate unacceptable impacts.

9.1 List of Commitments

A consolidated summary list of environmental and social impacts and mitigation measures commitments that Myanmar Conch Cement Co., Ltd. will be expected to adopt to manage and mitigate potential impacts associated with the project development is provided below in Table 9.1.

Table 9.1 Project Key Commitments

Commitment Source	Commitment
ESIA Report, Chapter 2, Section 2.3 – Environmental Conservation Law	Myanmar Conch Co., Ltd will follow The Environmental Conservation Law (2012).
ESIA Report, Chapter 2, Section 2.4	Myanmar Conch Co., Ltd will follow applicable legislations, guidelines, and the legal framework for the proposed project.
ESIA Report, Chapter 2, Section 2.5 – Standards and Guidelines	Myanmar Conch Co., Ltd will follow National Environmental Quality Standards for the ambient air quality, noise levels and effluent discharge.
ESIA Report, Chapter 2, Section 2.6 - International Guidelines	Myanmar Conch Co., Ltd will follow International Finance Corporation's Performance Standard.
ESIA Report, Chapter 3, Section 3.4 – Environmental Protection Measure	Myanmar Conch Cement Co., Ltd. has always been adhering to the concept of recycling economy, energy-saving and environmental protection, and green development.
ESIA Report, Chapter 6, Environmental Management Plan	Myanmar Conch Cement Co., Ltd. will develop Management Plan for Cement Plant and Facilities.
ESIA Report, Chapter 6, Section 6.3.2.1 – Air Pollution Management Plan	Myanmar Conch Cement Co., Ltd. commits to develop Air Pollution Management Plan as follows. - Advance machines, equipment and methods are utilized to minimize air pollutions i.e., Electrostatic Precipitator (EP), Bag Filter (BF). - Stacks are designed and constructed to have sufficient heights to effectively vent dust, smoke, and odors to the atmosphere.

	- Periodically Preventive Maintenance (PM) is scheduled for dedusting equipment. - Continuous Monitoring System for PM, CO, SO_2 and NO_x. - Tree plantations are provided along the boundary of Cement Plant to minimize dust dispersion.
ESIA Report, Chapter 6, Section 6.3.2.2 – Noise and Vibration Management Plan	Myanmar Conch Cement Co., Ltd. commits to control and limit noise emissions and vibration levels as follows. - The noise limitation at 5m from machinery and equipment running at full load capacity is controlled as follows: Continuous/Intermittent noise 85 dB(A) max Impulse noise 115 dB(A) max - Foundation vibration reduction and install silencer, closed building. - Personnel Protective Equipment (PPE) is provided and strictly enforced.
ESIA Report, Chapter 6, Section 6.3.2.3 - Water Quality Management Plan	Myanmar Conch Cement Co., Ltd. commits to develop Water Quality Management Plan as follows. - Water used for cooling system is reused or circulated in cooling water system - Wastewater generated from offices, canteens, and staff accommodation is treated by sewage treatment system. - Create a storage for fuel and lubricants/oil.
ESIA Report, Chapter 6, 6.3.2.4 - Solid Waste Management Plan	Myanmar Conch Cement Co., Ltd. commits to follow Solid Waste Management Plan as follows. - Waste generated from the production process will be recycled to the production process. - Recyclable waste e.g., plastic, wood scrap, metal scrap, paper etc. will be reused/recycled. - Storage and handling of hazardous materials will be in accordance with national and local regulations appropriate to their hazard characteristics.
ESIA Report, Chapter 6,	Myanmar Conch Cement Co., Ltd. commits to develop Soil Management

6.3.2.5 - Soil Management Plan	Plan as follows. - All hazardous materials will be stored in clearly labelled containers. - Leak proof containers will be used for storage and transportation of oil/grease.
ESIA Report, Chapter 6, 6.4 - Social Management Plan and Mitigation	Myanmar Conch Cement Co., Ltd. commits to develop Social Management Plan and Mitigation as follows. - Hiring of local people for the workforce as much as possible. - Coordination with local community to get feedback on environmental impact or complaint. - Implement and follows environmental protection and mitigation measures stated in the EIA. - Develop the CSR program.
ESIA Report, Chapter 6, 6.5 - Mitigation Plan for Socio-economic and Cultural Environmental Impacts	Myanmar Conch Cement Co., Ltd. commits to develop Social Management Plan and Mitigation as follows. - Undertake regular review of labor requirement and skill demands. - Notify local people of job openings. - When findings of historic significance are discovered, Myanmar Conch Cement commits to notify the appropriate authorities.
ESIA Report, Chapter 6, 6.6 - Occupational Health and Safety Management Plan	Myanmar Conch Cement Co., Ltd. commits to develop Occupational Health and Safety Management Plan as follows. - Strictly enforce safety rules to all the employees. - Area Signage and Labelling of Equipment - Occupational Safety Training and Environmental Training - Personnel protective equipment (PPE) will be provided to the employees.
ESIA Report, Chapter 6, 6.7 - Emergency Response and Rescue Plan	Myanmar Conch Cement Co., Ltd. commits to develop Emergency Response and Rescue Plan as follows. - Emergency Contacts and Emergency Assembly Points - Install smoke detectors, fire protection and control system, and firefighting equipment

	- Incident Management including Fire, Accidents, Road Traffic Accidents, Hazardous Material Spills, - Provide Factory Clinic and First Aid
ESIA Report, Chapter 6, 6.8 - Community Health Care Plan	The company commits to comply with the measures undertaken by Ministry of Health and the Department of Health in respect of prevention of the occurrence and spread of communicable disease and control. By engaging in communication with the Public Health Department, the company commits to developing community health care plans or health programs and to follow by their instructions.
ESIA Report, Chapter 6, 6.9 - Corporate Social Responsibility (CSR)	Myanmar Conch Cement will manage to fulfill the following request of the residents during stakeholder meetings. The CSR program planned by the project included following components. 1. Improve local medical service conditions 2. Donate to monastery 3. Improve education (repair schools) 4. Renovate road 5. Broaden knowledge (donate/build library) 6. Improve water, power conditions for peripheral villages 7. Increase job opportunity 8. Other charitable activities
ESIA Report, Chapter 6, 6.10 - Traffic Safety Management Plan	Myanmar Conch Co., Ltd commits to develop Traffic Safety Management Plan.
ESIA Report, Chapter 6, 6.11 - Preventive Maintenance Plan	Myanmar Conch Co., Ltd commits to develop Preventive Maintenance Plan.
ESIA Report, Chapter 7, Table 7.1 Monitoring Plan	Myanmar Conch Co., Ltd will develop Environmental Monitoring Plan and yearly monitoring report with quarterly monitoring data will be submitted to the Environmental Conservation Department
ESIA Report, Chapter 7, 7.3 EMP and Monitoring Cost	Myanmar Conch Co., Ltd commits to implement EMP and Monitoring Cost.

ESIA Report, Chapter 8, Conclusion	Myanmar Conch Cement Co., Ltd will develop ISO 14001 for better compliance with environmental protection and conservation for sustainable environment.

Appendix 1

Presentation Material (Power point)

Myanmar Conch Cement Company Ltd.

Environmental and Social Impact Assessment for 5,000 tons/day Cement Factory and Associated Facilities

စီမံကိန်း အတွက်
သက်ဆိုင်သူများနှင့်
ဒုတိယအကြိမ်တွေ့ဆုံဆွေးနွေး ညှိနှိုင်းခြင်း အစမ်းအနား

ဖေဖော်ဝါရီလ ၉ ရက်၊ ၂၀၁၅

01

မာတိကာ

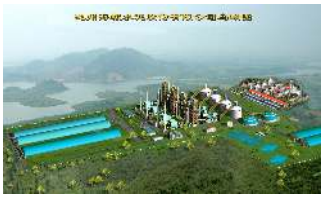
- စီမံကိန်းအချက်အလက်
- ပတ်ဝန်းကျင်ထိခိုက်မှုလေ့လာဆန်းစစ်ခြင်း(EIA)
- ပတ်ဝန်းကျင်အကျိုးသက်ရောက်မှု လေ့လာခြင်း (EIA) အတွက် အခြေခံအချက်အလက်များကောက်ယူခြင်း
- ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီအစဉ်

02

Project Background (စီမံကိန်းနောက်ခံအချက်အလက်)

03

The environmental protection concept of general layout planning



ဂေဟစနစ်ထိန်းသိမ်းသော အယူအဆ အရ စက်ရုံ နှင့် သဘာဝပတ်ဝန်းကျင် အတူတကွ တည် ရှိပြီး သဘာဝအရင်းအမြစ်များကို ချွေတာ ပြီး ပတ်ဝန်းကျင် နှင့်သဟဇာတ ဖြစ်သော လုပ်ငန်း ကို တည်ထောင် မည်ဟု ရည်မှန်းပါသည်။

05

Dust control technology (ဖုန် ထွက်နည်းရန် ထိန်းသိမ်းသော နည်းစနစ်)

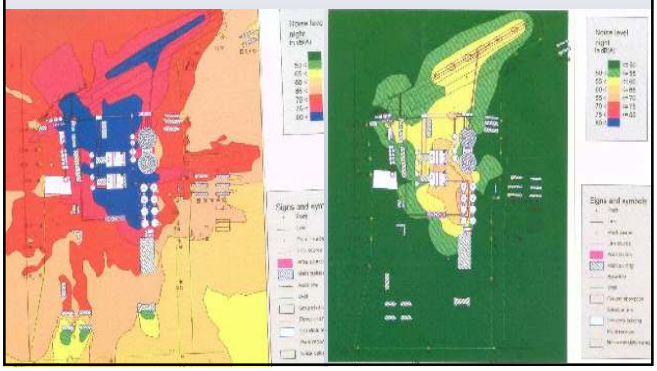
ဖုန် ထွက်နည်းရန် အတွက် ခေတ်မီသော လျပ်စစ်ဓါတ်သုံး ဖုန်ဖမ်းစက် နှင့် ဖုန် စုဆိတ်များ သုံးကာ ဖုန်ထွက်နည်းရန် ထိန်းသိမ်းပါမည်။
(နိုင်ငံတကာ စံချိန်ဖြစ်သော 10 ~ 30 mg/Nm^3 အများဆုံးစံနှုန်း အတိုင်းထိန်းသိမ်းပါမည်။)

Emission control technical for air pollutants လေထုအရည် အသွေး ကို လည်း မညစ်ညမ်းအောင် လေသန့်စင်စက်များတပ်ဆင်ပါမည်။

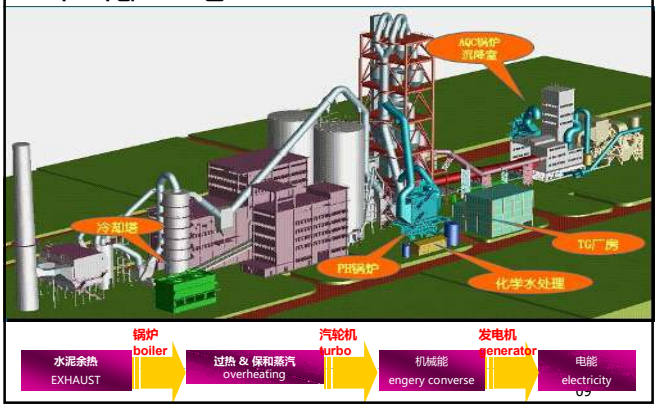
The water environment protection and reuse technology

လုပ်ငန်းသုံးရေကို အဆင့်ဆင့်အသေးခံကာ ရေသိုလှောင်ကန် ဖြင့်ထိန်းသိမ်းပြီး သန့်စင်ကာ ပြန်လည် အသုံးပြုပါမည်။

Noise control technology ဆူညံသံ ကိုလည်း လျော့ကျအောင် ထိန်းချုပ်ပါမည်။

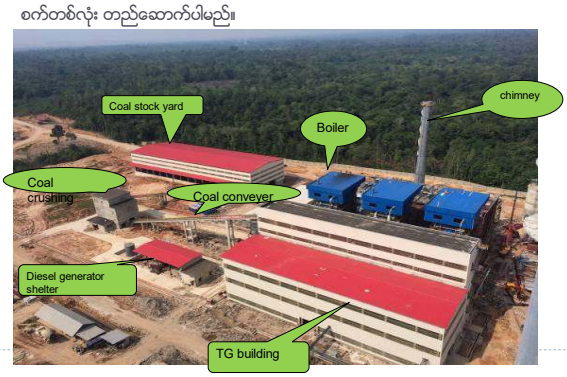


(စွမ်းအင် အနည်းဆုံး သုံး၍ ညစ်ညမ်းမှုကို အများဆုံး လျော့ချနိုင်သည့် နည်းပညာ ကို အသုံးပြု ထားပါသည်)



ကိုယ်ပိုင် ကျောက်မီးသွေးလောင်စာသုံး ဓါတ်အားပေးစက်ရုံ

ဘိလပ်မြေစက်ရုံအတွက် ၂၀ မဂ္ဂါဝပ် စက်နှစ်လုံးတပ် ကိုယ်ပိုင် ကျောက်မီးသွေးလောင်စာသုံး ဓါတ်အားပေးစက်ရုံ နှင် ၁.၈ မဂ္ဂါဝပ် ဒီဇယ် ဂျင်နရေတာ စက်တစ်လုံး တည်ဆောက်ပါမည်။



အဓိက စက်ပစ္စည်းများ Main Equipments – Boiler (ဘွိုင်လာ)

Boiler (CFB)	2 sets
Type	CKM-90/5.3-M
Mode	Natural circulation, membrane water wall
Rated capacity	90t/h
Main steam temp.	485℃
Main steam pres.	5.3MPa
Feed water temp.	150℃
Exhaust gas temp.	145℃
Blow down rate	≤2%
Heat efficiency	88% (max90%)

CFB ဘွိုင်လာ အားသာချက်များ Advantages of CFB boiler

（1）Good Adaptability to fuel; ≥3500kcal/kg stable combustion
（2）High combustion efficiency ≥90%
（3）High heat transfer capability in furnace
（4）High desulfurization efficiency ≥85%
（5）Low NO_X emission
（6）Large range of load change Good regulating performance
（7）Coal feed points is less
（8）No buried tube wear

Steam Turbine ရေနွေးငွေ့သုံး တာဘိုင်

- Cooling Tower အအေးခံတာဝါ

Electrostatic Precipitator(EP)- ပြာမှုန် ဖမ်းစက်

ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဆိုင်ရာ ဥပဒေနှင့် စည်းမျဉ်းများ (၁)

- ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း လုပ်ထုံးလုပ်နည်းများ

✓ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန (ECD) သည် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း လုပ်ထုံးလုပ်နည်းများ ကို စီစစ်ရေးဆွဲပြင်ဆင်လျက်ရှိသည်။

✓ လက်ရှိအချိန်တွင် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း လုပ်ထုံးလုပ်နည်းများ၏ ခြောက်ကြိမ်မြောက် မူကြမ်းဆိုင်ရာ အကြောင်းကြားချက်ကို ပြင်ဆင်ထားပြီးဖြစ်ပြီး မြန်မာနိုင်ငံတော်တရားရေးရုံးသို့ မကြာမီတွင် တင်ပြအစီရင်ခံသွားမည်ဖြစ်သည်။

✓ ၎င်းမူကြမ်းတွင် အဆိုပြုထားသောစီမံကိန်းအမျိုးအစားနှင့်အရွယ်အစားပေါ်မူတည်၍ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းအစီရင်ခံစာ (သို့မဟုတ်) ကနဦးပတ်ဝန်းကျင် ဆန်းစစ်ခြင်းအစီရင်ခံစာ လိုအပ်ခြင်းရှိ၊ မရှိ ခွဲခြားပေးခြင်း နှင့် စီမံကိန်းဒေသိယဆိုင်ရာ အခြားထူးခြားသောလက္ခဏာများကို သတ်မှတ်ဖော်ပြထားသည်။

✓ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာ (EIA) နှင့် ကနဦးပတ်ဝန်းကျင် ဆန်းစစ်ခြင်းအစီရင်ခံစာ (IEE) နှစ်မျိုးစလုံးတွင် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (EMP) တင်ပြရန် လိုအပ်သည်။

ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဆိုင်ရာ ဥပဒေနှင့် စည်းမျဉ်းများ (၂)

- EIA အစီရင်ခံစာတွင် အသုံးပြုမည့် လျာထားသော အများဆုံး ခွင့်ပြုနိုင်သည့် တန်ဖိုးပမာဏ

✓ ၂၀၁၃ခုနှစ် ဩဂုတ်လ အထိ မြန်မာနိုင်ငံတွင် အမျိုးသားပတ်ဝန်းကျင် အရည်အသွေး စံချိန်စံညွှန်းများကို ပြဋ္ဌာန်းထားခြင်းမရှိသေးပါ။

✓ ထို့ကြောင့် ဤစီမံကိန်းအဆိုပြုသူမှ အပူဓာတ်ငွေ့ပွစ်အင်သုံး စက်ရုံများကြောင့် အနီးပတ်ဝန်းကျင်အပေါ်တွင် တန်ပြန်ဆိုးကျိုးသက်ရောက်မှုကို ဖြစ်ပေါ်စေနိုင်သည့် ပွန့်ထုတ်ဓာတ်ငွေ့၊ ပြင်ပလေထုအရည်အသွေး၊ အသံဆူညံမှုနှင့် တုန်ခါမှု စသည့်သက်ရောက်မှုများကို တိုင်းတာ ရေတွက်မည့် သတ်မှတ်ချက်စံချိန်စံညွှန်း ပမာဏများကို (လျာထားသောအများဆုံး ခွင့်ပြုနိုင်သည့် ပမာဏ)အဖြစ် အဆိုပြုသတ်မှတ်ခဲ့သည်။

✓ ၎င်းသတ်မှတ်ချက်စံချိန်စံညွှန်းပမာဏများ (လျာထားသော အများဆုံး ခွင့်ပြုနိုင်သည့် ပမာဏ) ကို

၁) အပြည်ပြည်ဆိုင်ရာ အေဂျင်စီများ၏ လမ်းညွှန်ချက် (ဥပမာ- နိုင်ငံတကာ ဘွဲ့ကြေးကော်ပိုရေးရှင်း၏ ပတ်ဝန်းကျင်၊ ကျန်းမာရေးနှင့် လူမှုရေးဆိုင်ရာလမ်းညွှန်ချက်များ (IFC EHS Guidelines))

၂) အခြားအရှေ့တောင်အာရှနိုင်ငံများ၏ စံချိန်စံညွှန်းများ

၃) ကျပန်အပါဝင် အပြည်ပြည်ဆိုင်ရာရှိ ဖွံ့ဖြိုးတိုးတက်ပြီး နိုင်ငံများ၏ စံချိန်စံညွှန်းများ နှင့် လက်ရှိ တိုင်းတာရရှိသည့် ပတ်ဝန်းကျင်ဆိုင်ရာ အခြေခံအချက်အလက်များကို ကိုးကား၍ သတ်မှတ်ထားသည်။

စီမံကိန်း အတွက် အမြင့်ဆုံး သတ်မှတ်ထားသော စံနှုန်းများ

Item	Name of index		Unit	Average level	CONCH factory
1	Clinker production capacity		t/d	5000	**5000**
2	raw material grinding power consumption		kWh/t	18	**16.5**
3	Firing System heat consumption		kCal/kg.cl	740	**710**
4	Overall power consumption of clinker		kWh/t.cl	65	**55**
5	Heat recovery efficiency of Grate cooler		%	70	**75**
6	•Cement grinding power consumption		kWh/t	38	**32**
7	Cogeneration	Generating capacity	kWh/t.cl	30～35	**40**
		Emission reductions of CO_2	Ten thousand tons/year	-	**6.4**
8	Environmental protection	Discharge concentration of dust	mg/Nm^3	30～50	**10～30**
		Discharge concentration of NOx	mg/Nm^3	800	**500**
		Discharge concentration of SO_2	mg/Nm^3	50	**＜30**
		Noise at boundary of factory	dB(A)	60～70	**55～65**
		Sewage discharge	-	Emission	**Zero emission**
		Municipal domestic garbage disposal system	t/d	-	**300**

ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းလုပ်ငန်း လုပ်ဆောင်ခြင်း

- ရည်ရွယ်ချက်
  - စီမံကိန်းဇရိယာနှင့်သက်ဆိုင်သောအခြေခံအချက်အလက်များရရှိရန်
  - ပတ်ဝန်းကျင်နှင့်လူမှုရေးရှုထောင့်မှဖြစ်နိုင်သည့်သိသာသော ကောင်းကျိုး၊ ဆိုးပြစ်များကိုတန်ဖိုးဖြတ်ရန်
  - ဆိုးပြစ်များကိုလျော့ချနိုင်မည့်နည်းလမ်းများကိုအကြံပြုရန်
  - ဆောက်လုပ်ရေးလုပ်ငန်းလုပ်ကိုင်ချိန် နှင့် လုပ်ငန်းလည်ပတ်ချိန်တွင် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုကိုထိန်းချုပ်နိုင်ရန်အတွက် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးစီမံခန့်ခွဲမှု အစီအစဉ်တစ်ရပ်ကိုတည်ထောင်ရန်

ပတ်ဝန်းကျင်ဆိုင်ရာအခြေခံလေ့လာတိုင်းတာမှုအခြေအနေ

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အခြေခံလေ့လာတိုင်းတာဆန်းစစ်ခြင်းဆိုင်ရာ ဖော်ပြချက်

အကြိုပကာမနယ်ပယ် အတိုင်းအတာသတ်မှတ်ခြင်းရလဒ်မှ ရရှိချယ်ထားသော ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ရန်လိုအပ်သည့် သက်ရောက်မှုများကို ပိုမိုချဲ့ထုံလေ့လာဆန်းစစ်နိုင်ရန်အတွက် အောက်ဖော်ပြပါ လက်တွေ့ ကွင်းဆင်းတိုင်းတာခြင်းအပါအဝင် အသေးစိတ်လေ့လာတိုင်းတာဆန်းစစ်ခြင်းကို စက်ရုံ၏ အတွင်းနှင့် အပြင်တွင် ဆောင်ရွက်ခဲ့ပါသည်။

စဉ်	လေ့လာဆန်းစစ်ချက်	ဖော်ပြချက်
၁	သဘာဝပတ်ဝန်းကျင်နှင့်လူမှုပတ်ဝန်းကျင်ဆိုင်ရာသတင်းအချက်အလက်များကို စုဆောင်းခြင်း (ယခင်ကစစ်တမ်းကောက်ပြီးသောအချက်အလက်များ)	ယခင်ကစစ်တမ်းကောက်ပြီးသော သတင်းအချက်အလက်များကို အခြေခံ၍ အချက်အလက်များကို စီစစ်ဆောင်းခဲ့ပါသည်၊ လူတွေ့မေးမြန်းစုံစမ်းခြင်းများကို လည်း အချက်အလက်များကို ရရှိရန် ဆောင်ရွက်ခဲ့သည်။
၂	လေ့လာမည့်ဧရိယာအတွင်း တွင်ကွင်းဆင်း တိုင်းတာခြင်းများ (လေထုအရည်အသွေး၊ အသံဆူညံမှုနှင့် ရေထုအရည်အသွေး)	စက်ရုံပန်းကျင်၏ လက်ရှိ ပတ်ဝန်းကျင်အခြေအနေကို သိရှိနားလည်နိုင်ရန် အကြံပေးအဖွဲ့မှ လေထုအရည်အသွေးနှင့် ရေထုအရည်အသွေး ကွင်းဆင်းတိုင်းတာခြင်းများ နှင့် အသံဆူညံမှု တိုင်းတာခြင်းများကို လုပ်ဆောင်ခဲ့ကြသည်။

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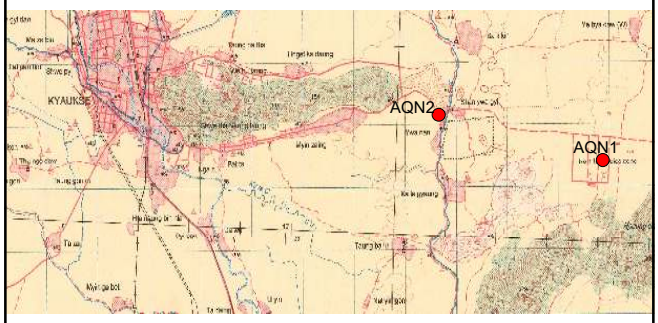
လေထုအရည်အသွေး (၁/၂)



မူရင်း: 1:50,000 scale UTM Map, Survey Department, MOAI

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လေထုအရည်အသွေးတိုင်းတာဆန်းစစ်ခြင်း

အချက်အလက် (ယူနစ်)		စမ်းသပ်ရလဒ် နေရာ - ၁	စမ်းသပ်ရလဒ် နေရာ - ၂	ပတ်ဝန်းကျင်စံနှုန်း (ဂျပန်နှင့် ထိုင်း*)	ပတ်ဝန်းကျင်စံနှုန်း (IFC)
ကန်ဒတ် (SO_2)	ppm	0.01	0.02	0.04(Japan)	NA
ကာဗွန်မိုနောက်ဆိုဒ် (CO)	Ppm	0.34	0.55	10(Japan)	NA
နိုက်ထြိုဂျင် ဒိုင်အောက်ဆိုဒ် (NO_2)	Ppm	0.06	0.03	0.06(Japan)	NA
ဖုန်မှုန့်ပါဝင်မှု (PM2.5)	mg/m^3	0.10	0.09	0.33(Thailand)	0.075
သေးငယ်သော ဖုံပါဝင်မှု (PM10)	mg/m^3	0.1	0.08	0.12(Thailand)	0.15

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အသံဆူညံ မှု တိုင်းတာဆန်းစစ်ခြင်း

Summary of Noise Level Unit: dB(A)

Monitoring Points	N 1		N 2							
	Day	Night	Day	Night						
L_{Aeq}(dB)	53	44	58	49						
IFC Industrial, Commercial	70	70	70	70						

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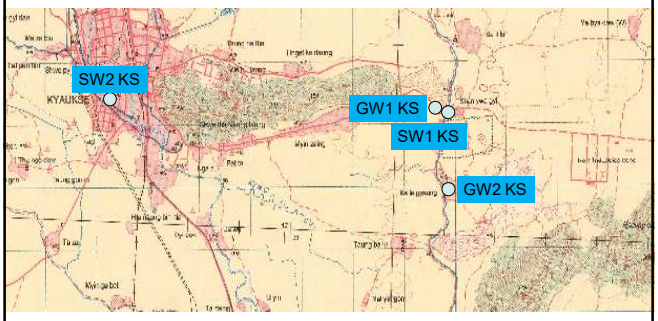
ရေအရည်အသွေး စမ်းသပ်မှု ရလဒ်အကျဉ်း



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ရေအရည်အသွေး စမ်းသပ်မှု ရလဒ်အကျဉ်း

No.	Sample No./ Physical Parameter	SW-1KS	SW-2KS	GW-1KS	GW-2KS
2	Date/Time	21.12.2014/11:38:56	21.12.2014/12:59:54	21.12.2014/ 11:22:04	21.12.2014/ 12:08:25
5	Atmorsphere Temperature (°C)	32.7	32.1	26.4	31.7
6	Temperature (°C)	22.91	24.09	24.28	26.59
7	pH	7.58	7.62	6.8	7.52
8	ORP(mv)	109.6	171	114.9	117.9
9	DO (mg/l)	7.82	7.83	7.47	4.33
10	EC (µs/cm)	342.8	368.5	915.5	1257.8
11	TDS (ppm)	231.34	242.77	601.88	793.4
12	Salinity(%)	0.2	0.2	0.5	0.6
13	Color (TCU)	5	Nil	Nil	Nil
14	BOD	7	6	6	9
15	COD	32	32	32	32
16	Total Coliform (cfu per ml)	1.5x10¹	2x10¹	1	ND
17	E.Coliform (cfu per ml)	3	2	ND	ND
18	Total Suspended Solid	65	37	9	8
19	Total Nitrogen	ND	ND	ND	ND
20	Total Phosphorus	0.06	0.05	ND	ND
21	Oil and grease	ND	ND	2.3	ND
22	Total Hardness	183	192	320	423
23	Total Alkalinity	176	191	431	444

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အပင်နှင့် သတ္တဂါ

ခွဲခြားခဲ့သော မျိုးစိတ်များ

အပင်	နို့တိုက်သတ္တဂါ	ငှက်	တွားသွားသတ္တဂါ	ကုန်း/ရေဖိုင်းသတ္တဂါ	ငါး
88	2	16	4	2	5

နိုင်ငံတကာ အရေးကြီး မျိုးစိတ်စာရင်းအရ

အပင်	နို့တိုက်သတ္တဂါ	ငှက်	တွားသွားသတ္တဂါ	ကုန်း/ရေနှိုင်းသတ္တဂါ	ငါး
0	0	0	0	0	0

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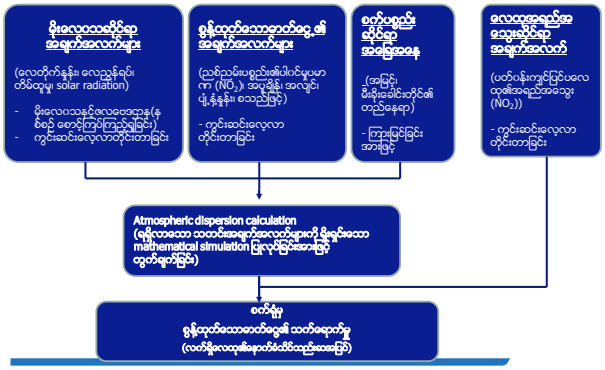
ပတ်ဂန်းကျင်နှင့် လူမှုရေးဆိုင်ရာ ထိခိုက်မှုဆန်းစစ်ခြင်း

လေထုအရည်အသွေး
ရေထုအရည်အသွေး
အသံဆူညံမှုနှင့်တုန်ခါမှု

25

လေထုအရည်အသွေး(၁)

ဘိလပ်မြေစက်ရုံ နှင့် အသေးစားကိုယ်ပိုင်သုံး ကျောက်မီးသွေးလောင်စာသုံး မဲတဘားပေးစက်ရုံ စွန့်ထုတ်သောဓာတ်ငွေ့၏ လက်ရှိသက်ရောက်မှုကို ဓန့်မှန်းတွက်ချက်ခြင်း



26

လေထုအရည်အသွေး(၃)

လေ့လာဆန်းစစ်ခြင်း၏ ရလဒ်

•ကွင်းဆင်းတိုင်းတာချက်များအရ စွန့်ထုတ်ဓာတ်ငွေ့၏အရည်အသွေးသည် လျာထားသော အများဆုံးခွင့်ပြုနိုင်သော စံတန်ဖိုးပမာဏအောက် နည်းပါးနေပြီး ပြင်ပလေထုအရည်အသွေးသည်လည်း တိုင်းတာသည့်ကာလအတွင်းတွင် သိသာစွာ ဆိုးရွားခြင်းမရှိပါ။

•ပြုပြင်မွမ်းမံပြီးသည့်နောက်ပိုင်းတွင် လေထုအရည်အသွေးသည် ယခုလက်ရှိအရည်အသွေးထက် ပိုမိုကောင်းမွန်တိုးတက်လာမည်ဟု ဆန်းစစ်ရပြီး စက်ရုံမှ သက်ရောက်မှုသည် လျော့နည်းသွားပါလိမ့်မည်။

27

ရေထုအရည်အသွေး(၂)

လေ့လာဆန်းစစ်ခြင်း၏ ရလဒ်

•ကွင်းဆင်းတိုင်းတာခြင်းနှင့် တွက်ချက်ခြင်းအရ ဓာတ်အားပေးစက်ရုံမှ စွန့်ထုတ်သောရေပူ၏အပူချိန်သည် သိပ်မမြင့်မားပါ။ ထို့အပြင် စွန့်ထုတ်သောရေများကို လျော့ကန်တွင် သိုလှောင်ကာ အဆင့်ဆင့် သန့်စင်စေပြီး ပြန်လည်အသုံးပြုစေပါမည်။

• အပြင်ဘက်ရှိ ရေထု၏အရည်အသွေးသည် သတ်မှတ်ထားသော ခွင့်ပြုနိုင်သည့် ပမာဏအတွင်းတွင် ရှိသော်လည်း အအေးခံတာဂါမှု စွန့်ထုတ်သော ရေ၏ pH တန်ဖိုးသည် အမြဲမပြတ် ရုတ်ချည်း ပြောင်းလဲနေပါသည်။ ထို့ကြောင့် နည်းစနစ်ကျနသော လုပ်ငန်းလည်ပတ်ခြင်းနှင့် စောင့်ကြည့်တိုင်းတာခြင်းများ ဆောင်ရွက်သင့်ပါသည်။

28

အသံဆူညံမှုနှင့် တုန်ခါမှု

လေ့လာဆန်းစစ်ခြင်း၏ ရလဒ်

•လုပ်ငန်းခွင်ဘေးအန္တရာယ်ကင်းရှင်းရေးရှုထောင့်မှကြည့်မည်ဆိုလျှင် ဘိလပ်မြေစက်ရုံ နှင့် ဓာတ်အားပေးစက်ရုံ ၏ ဂန်ထမ်းများနှင့် အင်ဂျင်နီယာများအပေါ်တွင် သက်ရောက်သည့် အသံဆူညံမှုကို စောင့်ကြည့်တိုင်းတာရန် အဆိုပြုပါသည်။
•ပြုပြင်မွမ်းမံပြီးသည့်နောက်ပိုင်းတွင် အသံဆူညံမှုနှင့် တုန်ခါမှု အခြေအနေသည် လက်ရှိအခြေအနေထက်ပိုမိုကောင်းမွန်လာမည်ဟု ဆန်းစစ်ရပြီး စက်ရုံမှ သက်ရောက်မှုသည် လျော့နည်းသွားပါလိမ့်မည်။
•လိုအပ်ပါက အသံကာကွယ်နိုင်စွမ်းအားမြင့်သည့် စက်ကိရိယာများကိုအသုံးပြုခြင်းနှင့် အသံလုံ အကာအကွယ်အဟန့်အတားများ ဖွဲ့စည်းတည်ဆောက်ခြင်းအားဖြင့် အသံဆူညံမှုအဆင့်ကို လျော့ကျသွားစေနိုင်ပါသည်။

ဘိလပ်မြေ စက်ရုံ နှင့် ကျောက်မီးသွေးသုံး လျှပ်စစ်ဓာတ်အားပေးစက်ရုံတည်ဆောက်ခြင်း နှင့် ကျောက်မီးသွေး ထုတ်လုပ်ခြင်း (ညစ်ညမ်းမှုထိန်းချုပ်ခြင်း)

အကျိုးသက်ရောက်မှု	မဆောက်လုပ်မီ / ဆောက်လုပ် ဆဲ	လုပ်ငန်း လည်ပတ် စဉ်ကာလ	အကျဉ်းဖော်ပြချက်
လေထုညစ်ညမ်းမှု	ခ-	ခ-	***ဆောက်လုပ်ချိန်*** -ဆောက်လုပ်ရေးလုပ်ငန်းနှင့်ဆောက်လုပ်ရေးစက်ယန္တရားများသွားလာလည်ပတ်မှုမှ ဖုန်မှုန့်နှင့်အိတ်ဇောငွေ့များ ထွက်ရှိနိုင်ပါသည်။ ***လုပ်ငန်းလည်ပတ်စဉ်*** - လျှပ်စစ် ဓါတ်ထုတ်လုပ်မည့် ဓါတ်အားပေးရုံများမှ ဓါတ်ငွေ့များ လေထုထဲသို့ ထုတ်လွှတ်နိုင်ပါသည်။
ရေထုညစ်ညမ်းမှု	ခ-	ခ-	***ဆောက်လုပ်ချိန်***-ဆောက်လုပ်ရေးလုပ်ငန်းခွင်မှရှုံ့ဆန်သောရေများ မြစ်ချောင်းအတွင်းသို့ တိုက်ရိုက်စီးဆင်းမှုကြောင့်ရေထုညစ်ညမ်းမှုဖြစ်စေနိုင်သည်။ ***လုပ်ငန်းလည်ပတ်စဉ်*** - ထုံးကျောက် မိုင်း ၊ ဓါတ်အားပေးရုံများ နှင့် ဂန်းထမ်းအိမ်ယာများမှ စွန့်ပစ်သော ရေဆိုးများ နှင့် သုံးရေများကြောင့် ရေထုညစ်ညမ်းမှုဖြစ်စေနိုင်သည်။
စွန့်ပစ်ပစ္စည်း	ခ-	ခ-	***ဆောက်လုပ်ချိန်***-ဆောက်လုပ်ရေးကန်ထရိုက်တာ၏အလုပ်သမားတန်းလျားမှမီးဖိုချောင်စွန့်ပစ်အမှိုက်နှင့်လူတို့စွန့်ပစ်သောအညစ်အကြေးများ ထွက်ရှိနိုင်ပါ သည်။ ဆောက်လုပ်ရေးလုပ်ငန်းခွင်မှထုပ်ပိုးပစ္စည်းများ၊ ကတ်ထူပုံးများ သည်စွန့်ပစ်ပစ္စည်းအဖြစ်ထွက်ရှိနိုင်ပါသည်။ ဆောက်လုပ်ရေးယန္တရားနှင့်စက်ကရိယာများအားပုံမှန်ပြုပြင်ထိန်းသိမ်းရာမှထွက်ရှိသောစွန့်ပစ်လောင်စာဆီများ ထွက်ရှိနိုင်ပါသည်။ ***လုပ်ငန်းလည်ပတ်စဉ်*** - မီးခိုးငွေ့များ နှင့်အနယ်များထွက်ရှိနိုင်ပါသည်။ အလုပ်သမားတန်းလျားမှလူတို့စွန့်ပစ်သောအညစ်အကြေးများထွက်ရှိနိုင်ပါ သည်။

က- သိသာသောဆိုးကျိုးသက်ရောက်မှု က+ သိသာသောကောင်းကျိုးသက်ရောက်မှု
ခ- ဆိုးကြိုးသက်ရောက်မှုအချို့ရှိ ခ+ ကောင်းကျိုးသက်ရောက်မှု အချို့ရှိ
ဂ သက်ရောက်မှုများမသိသာ၊ ထပ်မံ၍စစ်ဆေးရန်လိုအပ်
ဃ သက်ရောက်မှုမရှိ (သို့) လျစ်လျူရှု၍ရ (သို့) ထပ်မံစစ်ဆေးရန်မလို

ဘိလပ်မြေ စက်ရုံ နှင့် ကျောက်မီးသွေးသုံး လျှပ်စစ်ဓာတ်အားပေးစက်ရုံတည်ဆောက်ခြင်း နှင့် ကျောက်မီးသွေး ထုတ်လုပ်ခြင်း (ညစ်ညမ်းမှုထိန်းချုပ်ခြင်း)

အကျိုးသက်ရောက်မှု	မဆောက်လုပ်မီ၊ ဆောက်လုပ်ဆဲ	လုပ်ငန်း လည်ပတ် စဉ်ကာလ	အကျဉ်းဖော်ပြချက်
ဆူညံသံနှင့် တုန်ခါမှု	ခ-	ခ	**ဆောက်လုပ်ချိန်** - ဆောက်လုပ်ရေးလုပ်ငန်းခွင်တွင် ဆောက်လုပ်ရေးလုပ်ငန်းများကြောင့် ဆူညံသံ နှင့် တုန်ခါမှုများ ရှိနိုင်ပါသည်။ **လုပ်ငန်းလည်ပတ်ချိန်** - ဘိလပ်မြေ စက်ရုံ နှင့် ဓါတ်အားထုတ်လုပ်မည့် စက်ရုံ မှ ဆူညံသံ နှင့် တုန်ခါမှုများ ထွက်ရှိနိုင်ပါသည်။ ထုံးကျောက်မိုင်းမ နှင့် ကျောက်မီးသွေးတင် ယာဉ်များ ၊ တူးဖော် ယာဉ်များ ကြောင့် ဆူညံသံ နှင့် တုန်ခါမှုများ ထွက်ရှိနိုင်ပါသည်။

က-သိသာသော ဆိုးကြိုးသက်ရောက်မှု က+ သိသာသောကောင်းကျိုးသက်ရောက်မှု
ခ- ဆိုးကြိုးသက်ရောက်မှုအချို့ရှိ ခ+ ကောင်းကျိုးသက်ရောက်မှုအချို့ရှိ
ဂ သက်ရောက်မှုများမသိသာ၊ ထပ်မံ၍စစ်ဆေးရန်လိုအပ်
ဃ သက်ရောက်မှုမရှိ (သို့) လျစ်လျူရှု၍ရ (သို့) ထပ်မံစစ်ဆေးရန်မလို

ဘိလပ်မြေ စက်ရုံ နှင့် ကျောက်မီးသွေးသုံး လျှပ်စစ်ဓာတ်အားပေးစက်ရုံတည်ဆောက်ခြင်း နှင့် ကျောက်မီးသွေး ထုတ်လုပ်ခြင်း (ညစ်ညမ်းမှုထိန်းချုပ်ခြင်း)

အကျိုးသက်ရောက်မှု	မဆောက်လုပ်မီ / ဆောက်လုပ်ဆဲ	လုပ်ငန်း လည် ပတ်စဉ် ကာလ	အကျဉ်း ဖော်ပြချက်
နေ့စဉ်နေထိုင်ရေး နှင့်အလုပ်အကိုင်စသည့် ဒေသတွင်းစီးပွားရေးအခြေအနေ	ခ+	ခ-/ခ+	***ဆောက်လုပ်ချိန်*** - ဒေသတွင်းရှိအလုပ်သမားအင်အားများကို ဆောက်လုပ်ရေး လုပ်ငန်းခွင်တွင်အသုံးပြုရန်အစီအစဉ်ရှိပါသည်။ ***လုပ်ငန်းလည်ပတ်စဉ်***(ခ+) -ဒေသတွင်းရှိအလုပ်သမားအင်အားများ ကို ဆောက်လုပ်ရေး လုပ်ငန်းခွင် နှင့် စက်ရုံ လည်ပတ်ရာတွင်အသုံးပြုရန်အစီအစဉ်ရှိပါသည်။ ***လုပ်ငန်းလည်ပတ်စဉ် (ခ-)*** - စက်ရုံ နှင့်လုပ်ငန်းခွင်မှထွက်သော ရေဆိုးများကြောင့် မြေအောက်ရေ နှင့် မြစ်ရေ အရည်အသွေးကို ထိခိုက်နိုင်ပါသည်။
HIV/AIDS စသည့်ကူးစက်စေနိုင်သောရောဂါများ	ခ-	ဃ	***ဆောက်လုပ်ချိန်*** -ပြင်ပမှဆောက်လုပ်ရေးအလုပ်သမားများဒေသတွင်းသို့ဝင်ရောက်လာခြင်းကြောင့်ကူးစက်နိုင်သောရောဂါများဖြစ်ပွားမှုကို မြင့်တက်စေနိုင်ပါသည်။ ***လုပ်ငန်းလည်ပတ်စဉ်*** - ရောဂါကူးစက်မှု မဖြစ်ပေါ်နိုင်ပါ။

က- သိသာသော ဆိုးကြိုးသက်ရောက်မှု က+ သိသာသောကောင်းကျိုးသက်ရောက်မှု
ခ- ဆိုးကြိုးသက်ရောက်မှုအချို့ရှိ ခ+ ကောင်းကျိုးသက်ရောက်မှုအချို့ရှိ
ဂ သက်ရောက်မှုများမသိသာ၊ ထပ်မံ၍စစ်ဆေးရန်လိုအပ်
ဃ သက်ရောက်မှုမရှိ (သို့) လျစ်လျူရှု၍ရ (သို့) ထပ်မံစစ်ဆေးရန်မလို

ဘိလပ်မြေ စက်ရုံ နှင့် ကျောက်မီးသွေးသုံး လျှပ်စစ်ဓာတ်အားပေးစက်ရုံတည်ဆောက်ခြင်း နှင့် ကျောက်မီးသွေး ထုတ်လုပ်ခြင်း (ညစ်ညမ်းမှုထိန်းချုပ်ခြင်း)

အကျိုးသက်ရောက်မှု	မဆောက်လုပ်မီ / ဆောက်လုပ်ဆဲ	လုပ်ငန်းလည်ပတ်စဉ်ကာလ	အကျဉ်းဖော်ပြချက်
လုပ်ငန်းခွင်ပတ်ပန်းကုန်(လုပ်ငန်းခွင်သေးငယ်မှု အပါအဝင်)	ခ-	ခ-	***ဆောက်လုပ်မှုနှင့် -လုပ်ငန်းလည်ပတ်မှု*** မဆီလျော်သောလုပ်ငန်းခွင်ဝန်းကျင်မှုကြောင့် မတော်တဆထိခိုက်မှု နှင့် ရောဂါကူးစက်မှု အန္တရာယ်များဖြစ်ပေါ်စေနိုင်ပါသည်။
မတော်တဆ ထိခိုက်မှု	ခ-	ခ-	***ဆောက်လုပ်မှုနှင့် -*** ဆောက်လုပ်ရေးသုံးယာဉ်များ၏အများသုံးလမ်းများအား အသုံးပြုမှုကြောင့် မတော်တဆယာဉ်တိုက်မှုများဖြစ်စေနိုင်သည်။ ***လုပ်ငန်းလည်ပတ်မှု -*** မဆီလျော်သော ကိုင်တွယ်အသုံးချမှု (ဆီ နှင့် ဓါတ်ငွေ့) ကြောင့် မတော်တဆထိခိုက်မှုအန္တရာယ်များ ဖြစ်ပေါ်စေနိုင်ပါသည်။

က- သိသာသော ဆိုးကျိုးသက်ရောက်မှု က+ သိသာသောကောင်းကျိုးသက်ရောက်မှု
ခ- ဆိုးကျိုးသက်ရောက်မှုအချို့ရှိ ခ+ ကောင်းကျိုးသက်ရောက်မှုအချို့ရှိ
ဂ သက်ရောက်မှုများမသိသာ၊ ထပ်မံချုပ်ဆေးရန်လိုအပ်
ဃ သက်ရောက်မှုမရှိ (သို့) လျစ်လျူရှုရ (သို့) ထပ်မံစစ်ဆေးရန်မလို

သက်ဆိုင်သူများ နှင့် တွေ့ဆုံပွဲများ

ပထမ အကြိမ်အစည်းအဝေး

No.	Date	Name of Town/Village	Participation	Arranged by
1	15.12.2014 10:00 AM to 12:00	Meeting Hall, Kyaukse Cement Factory	Myanmar Conch Company, Authorities from Kyaukse Township, Head of Village, Villagers and SEM Company	Myanmar Conch Company

တွေ့ဆုံပွဲများ




ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီအစဉ်

- အဓိက ကြိုတင်ကာကွယ်ကုစားမှုများ
- စောင့်ကြည့်ရေး အစီအစဉ်

စီမံကိန်း အား ကမ္ဘာဘဏ် အုပ်စုနှင်ငံတကာငွေကြေးကော်ပိုရေးရှင်း (IFC) ၏ စံချိန် စံညွှန်းများဖြင့် လုပ်ဆောင် စေပါမည်။

IFC International Finance Corporation

Environmental, Health, and Safety Guidelines
CEMENT AND LIME MANUFACTURING

WORLD BANK GROUP

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ပြင်ဆင်မှုကာလ နှင့် ဆောက်လုပ်ရေး ကာလ အတွက် အဓိက ကာကွယ်ကုစားရေး အစီအစဉ်များ

ညစ်ညမ်းမှု ထိန်းသိမ်းရေး

- ဆောက်လုပ်ရေးကြောင့် လေထုညစ်ညမ်းမှု၊ အသံဆူညံမှု၊ တုန်ခါမှု၊ ရေအရည်အသွေး၊ အမှိုက်စွန့်မှု၊ တို့ အား စောင့် ကြည့် ထိန်းချုပ်ခြင်း
- ဖုန်မှုန့်များ သက်သာစေရန် ရေဖြန်းခြင်း
- အလုပ်သမား တန်းလျားများတွင် မိလ္လာကန်များအား စနစ်တကျ တည်ဆောက်ပေးခြင်း
- လူအများ အနားယူချိန်များတွင် ဆူညံသံများပိုထွက်သော လုပ်ငန်းများ မလုပ်ရန်တားမြစ်ခြင်း
- ဆူညံ တုန်ခါမှု နည်းသော စက်ယန္တရား များ သာ သုံး ရန် လိုအပ်သည်။

လူမှုပန်းကျင်

- လူထု ကျန်းမာရေး နှင့် လုပ်သားများ လုပ်ငန်းခွင် ဘေးကင်းရေးအတွက် ပညာပေးခြင်း အစီအစဉ်
- ဆောက်လုပ်ရေး လုပ်ငန်းခွင် နှင့် ဆောက်လုပ်ရေးယာဉ်များ အား ထိန်းချုပ် စီမံမှု အစီအစဉ်

လုပ်ငန်းလည်ပတ်စဉ်ကာလအတွက် ကာကွယ်ပြင်ဆင်မှုများ

ညစ်ညမ်းမှု ထိမ်းချုပ်ခြင်း

- လေထုညစ်ညမ်းမှု ဆူညံတုန်ခါမှု၊ ရေ အရည်အသွေး၊ အမှိုက်ပစ်ခြင်း နှင့် လုပ်ငန်းများအား စောင့်ကြည့် ခြင်း။
- ရေဆိုးသန့်စင်ကန် မှတွက်လာသော ရေများကို WTP ဖြင့် ထပ်မံသန့်စင်စေခြင်း

သဘာဝပတ်ဝန်းကျင်

- ရေဆင်းစနစ် အား ထိန်းသိမ်းရန် အတွက် ရေဆိုးကန်များအား စနစ်တကျ ထိန်းချုပ်ခြင်း

လူမှုပန်းကျင်

- ဒေသသတွင်း ရှိလူများအလုပ်အကိုင်ရရန်ဖန်တီးပေးခြင်း၊ ဒေသတွင်းလူနေမှုပြင့် မားရန်လမ်းများ စီစဉ်ဖောက်လုပ်ခြင်း၊ ဆေးပေးခန်း၊စာသင်ကျောင်းများပြင်ဆင်၊ ဆောက်လုပ်ပေးခြင်း
- စီမံကိန်းဝန်းထဝင်းများအားလုံး ဒေသ၏ ယဉ်ကျေးမှု ဓလေ့စရိုက်များ၊ ဘာသာရေးဆိုင်ရာ ယုံကြည်မှုများ ၊ ထုံးတမ်းစဉ်လာများအား လေးစားလိုက်နာရန်

ပတ်ဝန်းကျင်ဆိုင်ရာ ကာကွယ်ထိန်းသိမ်းမှု နှင့် စောင့်ကြပ်စစ်ဆေးမှု

- Air pollution : Dust, SO2, NOx, Odor
- လေထုညစ်ညမ်းမှု.--ဖုန်မှုန့်၊ ကန့်၊ နိုက်ထရိုဂျင်အောက်ဆိုဒ်၊ အန့်ဆိုး။
- Water & Wastewater
- ရေ နှင့် ရေဆိုး။
- Waste management
- အမှိုက်စွန့်ပစ်မှု။
- Noise
- အသံဆူညံမှု။
- Risk management → Emergency Response Plan
- ဘေးအန္တရာယ်စီမံခန့်ခွဲမှု--အရေးပေါ်တုံ့ပြန်မှုအစီစဉ်။
- Traffic management
- ယာဉ်သွားလာစီမံခန့်ခွဲမှု။

ပတ်ဝန်းကျင်ဆိုင်ရာ ကာကွယ်ထိန်းသိမ်းမှု နှင့် စောင့်ကြပ်စစ်ဆေးမှု အစီအစဉ်

Air Pollution လေထုညစ်ညမ်းမှု

အချက်အလက်	ကာကွယ်ထိန်းသိမ်းမှု	စောင့်ကြည့်စစ်ဆေးမှု
ဓာတ်အား စက်ရုံမှ ထုတ်လွှတ်မှု ▪ဖုန်မှုန့်၊ ကန်၊ နိုက်ထရိုဂျင် အောက်ဆိုဒ်ဒ်	▪ ထုတ်လွှတ်မှု ထိန်းချုပ်ပစ္စည်းများ (BAT) –လုပ်ငန်းလည်ပတ်မှု ထိန်းချုပ်ခြင်း –လောင်စာဆွေးချေသုံးစွဲမှု: Low Sulfur Coal	▪ ခေါင်းတိုင်မှ အစဉ် တိုင်းတာခြင်း ▪စက်ရုံနှင့် ပန်းကျင်ဧရိယာ တွင် နမူနာကောက်ယူ တိုင်းတာခြင်း ▪on-line monitoring အတွက် CEMs များတပ်ဆင်ခြင်း (Integrated in process control)
ကျောက်မီးသွေး ပုံ နှင့် အခြား စက်များမှ ထုတ်လွှတ်မှု ▪ Dust ▪ Odor အနံ့	▪ လောင်ကျွမ်းမှု မြှင့်အောင် ကာကွယ်ခြင်း ▪လေကာခြင်း ▪ရေဖြန်းခြင်း ▪ကြားခံ နယ်မြေများ၊ တောများ တည်ထောင်ခြင်း ▪Conveyor ကို ဖုံးအုပ်ထားခြင်း	▪ စက်ရုံနှင့် ပန်းကျင်ဧရိယာ တွင် နမူနာကောက်ယူ တိုင်းတာခြင်း

BAT : Best Available Technology
GSA : Gas Suspension Adsorption

ပတ်ဝန်းကျင်ဆိုင်ရာ ကာကွယ်ထိန်းသိမ်းမှု နှင့် စောင့်ကြပ်စစ်ဆေးမှု အစီအစဉ်

Water & Wastewater ရေနှင့် ရေဆိုး

အချက်အလက်	ကာကွယ်ထိန်းသိမ်းမှု	စောင့်ကြည့်စစ်ဆေးမှု
ရေ ▪ ရေကြီးမှု ▪ စီးဆင်းရေ ▪ မြေအောက်ရေ	▪ ရေလွှမ်းမှု ကာကွယ်ခြင်း၊ ရေဆင်းစနစ် ▪ ရေလှောင်ကန် (Internal use) ▪ ရေအေး ပြန်လည်လှည့်ပတ်သုံးစွဲခြင်း	▪ စီးဆင်းရေ ▪ မြေအောက်ရေ တိုင်းတာစစ်ဆေးရန်
စွန့်ပစ်ရေ ▪ ကျောက်မီးသွေး ပုံမှ ရေဆိုး ▪ စက်ရုံမှ ရေဆိုး (Backwash water)	▪ ကျောက်မီးသွေး သိမ်းဆည်းသည့် နေရာကို အခင်းခင်းထားခြင်း ▪ မည်သည့် ရေဆိုးမှ ပတ်ဝန်းကျင်သို့ မထွက်အောင် zero discharge ထားရှိခြင်း ▪grease & oil trap, sedimentation pond စသည့် ရေဆိုးသန့်စင်စနစ်များ တပ်ဆင်ခြင်း	▪ မြေအောက်ရေ (ပတ်ဝန်းကျင်ရှိရေတွင်းများ)

ပတ်ဝန်းကျင်ဆိုင်ရာ ကာကွယ်ထိန်းသိမ်းမှု နှင့် စောင့်ကြပ်စစ်ဆေးမှု အစီအစဉ်

Internal Waste အမှိုက်စွန့်ပစ်မှု

အချက်အလက်	ကာကွယ်ထိန်းသိမ်းမှု	စောင့်ကြည့်မှု
စွန့်ပစ်ပစ္စည်း ▪ လွင့်ပျံသည့် ပြာများ ▪ အောက်ခြေ ထွက် ပြာများ ▪ ဂေါတံ Gypsum	▪ ဘိလပ်မြေ ထုတ်ရာတွင် ကုန်ကြမ်းအဖြစ် fly ash, gypsum တို့ကို အသုံးပြုမည် ▪ယင်း တို့ကို ထိန်းသိမ်းရန် ဂိုဒေါင် ထားရှိခြင်း ဖြင့် ဖုံးလွှမ်းခြင်း ကို ကာကွယ်မည်။	▪ ပြာများ ▪ ဂေါတံ Gypsum အရည်အသွေးထိန်းချုပ်မှု
စွန့်ပစ်ရေ ▪ သုံးပြီး ဆီများ ▪ ဓာတုပစ္စည်းများ	▪ ဘိလပ်မြေထုတ်ရန် အစားထိုးကုန်ကြမ်း အဖြစ် သုံးမည်။ i.e. used oil, some chemicals	အရည်အသွေးထိန်းချုပ်မှု

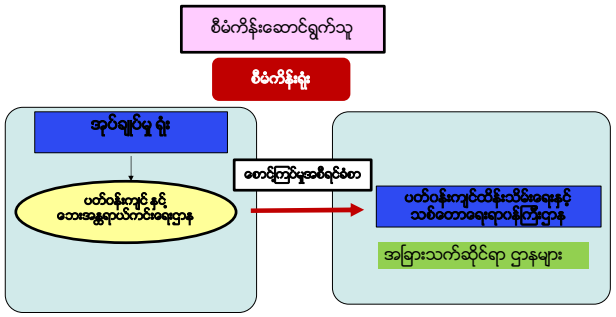
Waste Management :
▪ Adopted 3Rs Program (Reduce, Reuse, Recycle) in order to maximize resource use

ပတ်ဝန်းကျင်ဆိုင်ရာ ကာကွယ်ထိန်းသိမ်းမှု နှင့် စောင့်ကြပ်စစ်ဆေးမှု အစီအစဉ်

Noise အသံဆူညံမှု

အချက်အလက်	ကာကွယ်ထိန်းသိမ်းမှု	စောင့်ကြည့်မှု
ဓာတ်အား စက်ရုံမှ ဆူညံသံ ▪ Turbine Generator ▪ Blow down	▪ turbine generator ကို အဆောက်အအုံ တွင်း တွင် ထားမည်။ ▪noise insulation အဖြစ် turbine casing ရှိမည် ▪ လေကာ ထားရှိခြင်း ▪ ကြားခံ နယ်မြေ နှင့် သစ်တော ဖြင့် ကာကွယ် ခြင်း	ဆူညံသံကို စက်ရုံနှင့်ပတ်ဝန်းကျင်နေရာများ
အခြား လုပ်ငန်းမှ ဆူညံသံ ▪ Coal mill	▪ တုန်ခါမှုကို ထိန်းချုပ်မှု	ဆူညံသံကို စက်ရုံနှင့်ပတ်ဝန်းကျင်နေရာများ

အဖွဲ့အစည်းပိုင်းမှ စီစဉ်ဆောင်ရွက်မှု



အဖွဲ့အစည်းပိုင်းမှ စီစဉ်ဆောင်ရွက်မှု
(လည်ပတ်သည့်ကာလ)

ကျန်းမာရေး၊ဘေးအန္တရာယ်ကင်းရေး နှင့် ပတ်ဝန်းကျင် ဌာန (Health Safety and Environment Department)

အဆိုပါ ပညာရှင်/ အင်ဂျင်နီယာတို့၏ အဓိက လုပ်ငန်းများမှာ အောက်ပါ အတိုင်းဖြစ်မည်။

1) လုပ်ငန်းများလည်ပတ်ရာတွင် ပတ်ဝန်းကျင် လေ့လာမှု အား အောက်ပါ အတိုင်းဆောင်ရွက်ရန်
2) EMP အတိုင်း လုပ်ငန်းဖွံ့ဖြိုးတည်ဆောက်မှု ကို ဆောင်ရွက်ရန်
3) ဝန်းကျင်ဇီဝိယာနေ ပြည်သူတို့၏ ပတ်ဝန်းကျင်ဆိုင်ရာ ဝေဖန်ချက် များအား ကိုင်တွယ်ဖြေရှင်းပေးရန် နှင့်
4) စောင့်ကြည့်မှု အစီရင်ခံစာများ အား ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ပန်ကြီးဌာန နှင့် အခြား ဌာနများသို့ တင်ပြရန်

နောက်ထပ် လုပ်ငန်းစဉ်များ

မတ်လ : **ပတ်ဝန်းကျင်လေ့လာမှု အစီရင်ခံစာ ပြီးစီးခြင်း နှင့် တင်သွင်းခြင်း**

စီမံကိန်း အတွက် ပူးပေါင်း ပါဝင် မှုအား ကျေးဇူးတင်စွာဖြင့်

Resource & Environment Myanmar

EIA (ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းလုပ်ငန်း) အတွက်
စီမံကိန်းအကြံပေး ပညာရှင်အဖွဲ့ -

Sustainable Environment Myanmar Co., Ltd.

Regist. 634 / 2014-2015

www.enviromyanmar.net

ကျေးဇူးတင်ပါသည်။

Appendix 2

Environmental, Health and Safety Policy and Rules of Myanmar Conch Cement Company

CEMENT FACTORY (KYAUKSE)

ACCIDENT PREVENTION

Content Page

Factory Safety Rules and Accident Prevention Regulation

1. Safety Rules

Generally applicable safety rules which should be complied with by all works personnel will now be given:

(1) Wear protective clothing as and when required (safety helmets, footwear, gloves, goggles, masks).

(2) Keep your place of work and your tools neat and tidy. Do not use any damaged or defective tools, instruments or other equipment.

(3) Take proper care when dealing with flammable or caustic substances.

(4) Do not remove or detach any protective devices or safety appliances unless authorized to do so. Keep them in good working order. Do not start any machines on which guards, screens or other protective devices are missing.

(5) Do not start a machine until you have satisfied yourself that it is in proper working order and that there is no danger to any person.

(6) Never carry out repairs on a machine while it is running.

(7) When carrying out repairs, make sure that the machine or equipment cannot be started or switched on inadvertently. This can be ensured by switching off the current and displaying a notice saying "Do not switch on/ Repairs in progress!" or by locking the switch so that it cannot be operated.

(8) Clean and lubricate moving parts of machinery only if suitable protective devices are provided.

(9) Report any damage to machinery, including machinery of which you are not in charge yourself.

(10) Take care when handling burning and soldering equipment: immediately repair or re-place any defective parts of such equipment.

(11) Hands off electrical machines and appliances! Do not try to carry out repairs to them yourself: leave that to electricians.

(12) Place ladders, scaffolding and working platforms securely in position so that they will not fall or collapse.

(13) When carrying out erection, building or demolition work, prevent access by unauthorized persons.

(14) Make sure that pits, trenches, etc. are properly safe.

(15) Secure yourself and any loose objects against falling from heights.

(16) Do not stand under loads being lifted by cranes, etc.

(17) Take care when crossing motor vehicle traffic routes or railway lines. Only use the public railway crossings.

(18) Do not allow unauthorized persons to travel as passengers in road vehicles, locomotives or goods waggons.

(19) Never ride on conveyor belts or on loads handled by cranes or other lifting appliances.

(20) Avoid consuming alcohol before and during work.

(21) Immediately report any accident. Giving aid to victims of accidents is your obvious human duty. Have any injuries, even minor ones, immediately attended to.

2. Accident prevention regulations

2(a) Factory obligations

"General regulations", the factory is required to fulfil the following obligations for the prevention of accidents:

- Stop any installations in which a defect has developed which constitutes an otherwise non-preventable hazard to the employees.
- Make available personal protective equipment if, because of technical operations, it cannot be ruled out that the employees will be exposed to accident or health hazards. Such equipment is to be kept in proper working order.
- Instruct and inform the employees as to the dangers associated with their work and as to the measures for the prevention thereof. This should be done before they start the job and afterwards at appropriate intervals, but at least once a year.
- Issue copies of the accident prevention regulations to the persons entrusted with their enforcement within their appointed spheres of duty.
- Encourage the employees to participate in accident prevention (e.g., by attendance of training courses on industrial safety).

- Appoint safety and give them adequate opportunity to carry out their duties.
- Inspection officials facilities to inspect the works.
- Inform that the required safety measures have been complied with.
- Provide all information required in connection with accident prevention arrangements.
- Give immediate notice in writing of any accident prevention obligations transferred by the employer to others.
- Clearly define the spheres of responsibility of the supervisory personnel appointed.
- See to it that the obligations as to accident prevention and co-ordination of activities are duly fulfilled.

2(b). Obligations of the employees

The Employees must fulfil the following obligations:

- Support all measures for the promotion of industrial safety.
- Follow instructions issued by the employer with a view to accident prevention, except under circumstances where they are evidently unnecessary.
- Use the protective equipment made available.
- Not carry out instructions at variance with safety requirements.
- Use installations and appliances only for the purposes intended by the employer.
- Correct any faults presenting a safety hazard, or report them to their superiors, without delay.
- Use installations, appliances and materials, and enter installations, only when authorized to do so.

3. Promotion of safety in cement works

3(a) Information and instruction

- Displaying information on accidents that have occurred in the various sections of the works and in the works as a whole.
- Displaying information (tables, graphs) showing the number of accident-free days since the last noticeable accident.

- Displaying posters stating " *dos and don'ts*", showing how accidents occur, etc. These should cover not only accidents in the works itself, but also road accidents ("*theme of the month*").
- Displaying safety information notes showing typical accidents: or similar information on accidents that have actually occurred in the works.
- Instructing the employees, especially those newly recruited as to the dangers associated with their work and the safety rules they should obey.
- Circulars on industrial safety matters to the employees and their families.
- Information on accidents should be reported at works meetings, possibly backed up by the showing of films or slides with spoken commentary.
- Special instruction of employees when commissioning and starting up new installations.
- Instruction on the hazards due to non-use of personal protective equipment (e.g., wearing of safety helmets, safety footwear, ear protectors, etc.).
- Instruction on the problem of safeguarding installations under repair against unauthorized or inadvertent switching-on.
- Discussion of themes relating to industrial safety, analysing the causes of accidents, at section engineers, foremen's and works management meetings.
- Collaboration with the planning department and the supplying firms (Suppliers of machinery, etc.) with a view to achieving optimum safety conditions both in the normal running and in the maintenance and repair of plant.

3(b) Motivation to safety-consciousness

- Positive motivation by encouragement and persuasion is preferable to negative motivation by scaring.
- Special posters encouraging safety-conscious behaviour are more effective than general posters warning against accidents.
- Key personnel can give a good example by safety-conscious behaviour.
- Constant reminders that preserving one's health is the greatest benefit.
- Positive response to safety-consciousness displayed by employees(commendation, thanks).

- Personal conversations between key personnel and their subordinates on the meaning and purpose of safety measures.
- Safety-consciousness of senior personnel: establishing the right balance between safety and productivity.
- Co-operation between the safety officers, the senior works personnel and the management.

Safety and Accident of Rotary Cement Kiln

There are many situations in which a worker could be injured because of a lack of machine guards, failure to wear proper protective clothing, or faulty job performance by himself or another person. A kiln operator must familiarize himself with all the potential hazards that might exist in and around the kilns under his control, and set for himself a high standard of safety consciousness. He especially should be alert to point out hazards to other employees and should see to it that no employee works in an unsafe manner on his kilns.

Before entering into a detailed discussion of the hazards around kilns, fundamentals of safety in general should be reviewed so the reader can relate them to the rotary kiln.

1. Safety

Simply stated, safety measures are introduced into a plant for two reasons; to protect an employee from injury, either physically or financially, while performing his work, and to prevent financial loss to the employer because of damage to the equipment or resulting from compensation payments which are a part of nearly every industrial accident. Management and employee alike are responsible for making the plant a safe place in which to work, and to achieve injury-free work performance day after day. A plant safety program can only be successful when all parties whole heartedly believe in safety, and when safety becomes a part of the working life of every man in the plant regardless of his position. Evasion of safety responsibilities by the individual, implicitly delegating such responsibility to others, generally referred to as "passing the buck", is bound to result in failure of the program.

If a supervisor appears to be strict and unyielding with respect to safety rules and procedures, his efforts should be appreciated, and not resented. After all, it is the responsibility of the supervisor to see that the employee first endeavours to make himself a safe worker, and only after he has accomplished this and is a good example to others can the employee then try to win others over to the side of safety. That's what safety is all about. It is first of all a state of mind, an idea implemented by a constructive attitude that causes a man to recognize dangerous situations before an accident occurs. It is not something to be lived with under duress because it has been imposed in the form of rules by management. Most important, it deserves the support of all employees in the plant.

2. Accidents kiln hazardous conditions

Now consider the work "accident". An accident to many workers represents a condition in which someone is injured and property is damaged. Anything less is looked on as a close call, a near miss, or a bit of good luck. To put it in the proper perspective, an accident is an accident even though no one is injured or no damage is done. An accident is any unintentional or unexpected interruption of the orderly progress of the work. Accidents do not happen. An accident is the result of some unsafe act or equipment. We have but little control over the severity of injury once an accident has occurred, but we can control the conditions leading up to the injury. A statistical analysis of thousands of accidents and injuries shows that every accident that resulted in major injury (a lost time accident) was proceeded by 29 minor accidents (no lost time and only minor injury) and by 300 accidents that caused no injury at all. So - called near misses and close calls are included in the 300. These statistics warn that, if we have a great number of close calls on the one usually finds the reasons for an injury in the plant. Ironically, take the time to do something after a close call to prevent these minor accidents from reaching major proportions.

For every accident that is the result of unsafe conditions there are nine that were caused by unsafe acts, including those resulting from failure to recognize unsafe conditions. An employee can easily fall into the habit of overlooking some basic safety procedures and taking unnecessary chances when he develops the attitude that because nothing happened the last time, nothing will happen the next time he does the same thing.

The “Accident Roundtable", published monthly by the Portland Cement Association, points out that accidents in the vicinity of kilns have a higher frequency rate than those in other areas of the plant. It is common practice in cement plants to provide general safety rules that apply to all employees throughout the plant. There are, however, certain hazards that are unique to rotary kilns, and it is these dangers that the kiln operator must become aware of. Table is a compilation of kiln hazards and possible action that can be taken to eliminate or reduce the dangerous condition.

3. Accident preparation of coal

3(a). Safe production of coal powder preparation workshop

Because coal is easily burned and blasted, the safe production of coal powder prepa-ration workshop is very important.

3(b). Avoid the self-ignition of coal

Strictly control coal powder temperature, for air swept mill, the input gas temperature cannot exceed 200°C, and output gas temperature should be less than 70°C.

Try to shorten the gathering of pulverized coal.

- Reduce the coal powder storage when mill is stopped.
- Use up the coal powder if the mill is not running for a long time.
- Before the running of mill, use limestone powder to fill the dead angel of the chamber and pipes.

3(c). Avoid explosion of coal

There are three sufficient and necessary factors for coal burning:

- Coal power with certain density, if CO and CH4 exit coal powder can blast with lower density.
- Oxygen content exceed 14 %.
- Gas temperature exceed 250 ~ 300°C.

Because the first factor can not be avoided in coal powder preparation workshop, we mainly think about the second factor and third factor. To avoid the explosion of the system, the input gas temperature should be strictly controlled, and the air leakage should be avoided. For bag filter, we trend to let it run in the condition of minus pressure to avoid the entry of fresh air.

ဘိလပ်မြေစက်ရုံ(ကျောက်ဆည်)

ယမ်းနှင့်ဆက်စပ်သုံးပစ္စည်းများသယ်ယူရွှေ့ပြောင်းရာတွင်လိုက်နာရမည့်အချက်များ

၁။ ယမ်းနှင့်ဆက်စပ်သုံးပစ္စည်းများသယ်ယူရွှေ့ပြောင်းရာတွင်လေလွင့်ပျောက်ဆုံးမှု၊ ပျက်စီးမှုနှင့် အန္တရာယ်မဖြစ်ပွားစေရေးအတွက် တာဝန်ခံအရာရှိတစ်ဦးမှ ကြီးကြပ်သယ်ယူရွှေ့ပြောင်းရမည်။

၂။ စက်ရုံပြင်ပ(ခရီးဝေး)သယ်ယူရွှေ့ပြောင်းရာတွင် သက်ဆိုင်ရာအထက်အဖွဲ့အစည်း၏ ခွင့်ပြုမိန့်အရသာသယ်ယူ ရွှေ့ပြောင်းရမည်။

၃။ သယ်ယူရွှေ့ပြောင်းရာတွင် သတ်မှတ်အမျိုးအစားအလေးချိန်နှင့်အရေအတွက်အတိုင်းသာ ဖြစ်ရမည်။

၄။ သယ်ဆောင်ရွှေ့ပြောင်းသည့်တာဝန်ခံအရာရှိသည် ထုတ်ယူခွင့်ပြုမိန့်၊ သယ်ဆောင်မိန့်များလက်ဝယ်ပါရှိရမည်။

၅။ ပစ္စည်းများအားထုတ်ပေးရာဌာနနှင့် စနစ်တကျလွှဲပြောင်းလက်ခံခဲ့ရမည်။

၆။ လုံခြုံရေးရဲဝန်ထမ်းအမြဲပါရှိရမည်။

၇။ သယ်ယူယာဉ်၏သတ်မှတ်အလေးချိန်အောက်သာသယ်ဆောင်ပြီးယာဉ်မောင်းသူမှသတိနှင့်အန္တရာယ် ကင်းစွာမောင်းနှင်ရမည်။

၈။ ယမ်း နှင့် Detonator များအား သီးသန့်မော်တော်ယာဉ်ဖြင့်ခွဲခြားသယ်ဆောင်ရမည်။

၉။ အခြားပစ္စည်းများနှင့်ရောနှောတင်ဆောင်ခြင်းမပြုရ။

၁၀။ သယ်ဆောင်မည့်မော်တော်ယာဉ်အား ယာဉ်မောင်းဆီ၊ ယာဉ်မောင်းဓါတ်ငွေ့စက်ဆီ၊ ချောဆီ၊ လျှပ်စစ် များကြောင့်အန္တရာယ်မဖြစ်စေရေးနှင့်ယာဉ်ကြုံခိုင်ရေးအား ကြိုတင်စစ်ဆေးပြီး စိတ်ချရမှသာသယ် ဆောင်မောင်းနှင်ရမည်။

၁၁။ ဆေးလိပ်သောက်၍မောင်းနှင်ခြင်းမပြုရ။

၁၂။ အရက်သေစာနှင့်မူးယစ်ဆေးဝါးသုံးစွဲ၍မောင်းနှင်ခြင်းမပြုရ။

၁၃။ ယာဉ်တန်းဖြင့်သာသွားလာသယ်ဆောင်ရမည်။

၁၄။ တာဝန်ခံအရာရှိမှ ယာဉ်တန်းအားကြီးကြပ်၍လိုက်ပါရမည်။

၁၅။ လူဦးရေထူထပ်သောနေရာနှင့်အိမ်ခြေများ၊ အန္တရာယ်ရှိနိုင်သောနေရာများတွင် ယာဉ်အားရပ်နားခြင်းမပြုရ။

၁၆။ လမ်းခရီးတွင် မသက်ဆိုင်သူနှင့်ပစ္စည်းများအားတင်ဆောင်ခြင်းမပြုရ။

၁၇။ ပစ္စည်းသယ်ဆောင်ရာလမ်းခရီးတွင် အခက်အခဲတစ်စုံတစ်ရာဖြစ်ပေါ်ပါက လုပ်ငန်းရှုံးချုပ်၊ စက်ရုံနှင့်သက်ဆိုင်ရာနယ်မြေခံတပ်ရင်းတို့အား သတင်းပို့တင်ပြရန်။

၁၈။ ယမ်းနှင့်ဆက်စပ်သုံးပစ္စည်းများအား သေချာစွာထုတ်ပိုးကာရန်ပြီးမှသာ သယ်ဆောင်ရမည်။

၁၉။ ရေစိုခြင်း၊မိုးမိခြင်း၊အကြောင်းတစ်စုံတစ်ရာကြောင့်ပျက်စီးခြင်းမဖြစ်စေရေးတာဝန်ခံမှ ကြီးကြပ်သယ်ဆောင်ရမည်။

၂၀။ ယမ်းနှင့်ဆက်စပ်သုံးပစ္စည်းများသယ်ဆောင်ရန်လမ်းခရီးတွင်အခြိန်ကြာမြင့်စွာရပ်နားနေခြင်း၊ မသက်ဆိုင်သည့်လမ်းကြောင်းသို့သွားခြင်းများလုံးဝမပြုလုပ်ရ။

၂၁။ စက်ရုံသို့ရောက်ရှိလျှင်ရောက်ရှိခြင်းစက်ရုံမှူး၊ ဒု-စက်ရုံမှူးထံသတင်းပို့၍ စက်ရုံရှိယမ်းတိုက်သို့စနစ်တကျအပ်နှံထားရှိရမည်။

ဘိလပ်မြေစက်ရုံ(ကျောက်ဆည်)

ဒီဇယ်ဆီသိုလှောင်ကန်သုံးစွဲမှုအန္တရာယ်ကင်းရှင်းရေးအတွက်လိုက်နာရမည့်အချက်များ

၁။ ဆီသိုလှောင်ကန်ခြံဝန်းပတ်ဝန်းကျင်တွင် ပေ (၁၅၀)ပတ်လည်အား မီးတားအဖြစ်ရှင်းလင်းထားရှိရမည်။

၂။ ဆီသိုလှောင်ကန်ခြံဝန်းအတွင်းအစဉ်ရှင်းလင်းထားရှိရမည်ဖြစ်ပြီးမသက်ဆိုင်သူများဝင်ရောက်ခြင်း မပြုရ။

၃။ ဆီသိုလှောင်ကန်အစောင့်အား အမြဲတာဝန်ချထားရမည်။

၄။ ဆီများထုတ်သွင်းရာတွင် တာဝန်ခံမှတာဝန်ယူဆောင်ရွက်ရမည်။

၅။ ခြံဝန်းအတွင်း မီးသတ်စင် (Fire Point) တွင် မီးချိတ်၊ မီးကဒ်၊ မီးသတ်ဘူး၊ ရေနှင့်သဲတို့အားထားရှိရမည်။

၆။ ဆီသိုလှောင်ကန်ပတ်ဝန်းကျင်တွင် မည်သည့်အကြောင်းကြောင့်မျှ မီးရှို့ခြင်းမပြုလုပ်ရ။

၇။ ဆီသိုလှောင်ကန်ခြံဝန်းအတွင်းသို့ မီးခြစ်အစရှိသောမီးလောင်စေနိုင်သောပစ္စည်းနှင့်မီးလောင်ခြင်းကို အထောက်အကူပြုသောပစ္စည်းများယူဆောင်လာခြင်းမပြုရ။

၈။ ဆီများထည့်သွင်းခြင်း၊ ထုတ်ယူခြင်းပြုလုပ်ရာတွင် မီးလောင်ခြင်းမဖြစ်ပွားစေရန် စနစ်တကျကြိုးကြပ်ဆောင်ရွက်ရမည်။

၉။ ဆီများထည့်သွင်းခြင်း၊ ထုတ်ယူခြင်းပြုလုပ်ရာတွင် ထည့်သည့်ပစ္စည်းနှင့်လက်ခံပစ္စည်းတစ်ခုချင်းအား Ground (Earthing Cable) ချခြင်းနှင့်ပစ္စည်းတစ်ခုနှင့်တစ်ခု Connection Cable ချိတ်ဆွဲပြီးမှ ဆီထည့် ခြင်း၊ ထုတ်ခြင်းပြုလုပ်ရမည်။

၁၀။ ဆီသိုလှောင်တိုင်ကီများအား Earthing Cable ချိတ်ဆွဲထားရမည်။

၁၁။ ဆီသိုလှောင်တိုင်ကီများ၏ Vent Hole များကောင်းမွန်ခြင်းရှိ/မရှိအစဉ်စစ်ဆေးနေရမည်။

၁၂။ ဆီသိုလှောင်တိုင်ကီများယိုစိမ့်ခြင်းရှိ/မရှိအစဉ်စစ်ဆေးနေရမည်။

၁၃။ ဆီသိုလှောင်ကန်အတွင်းသို့ရေနှင့်အမှိုက်သရိုက်များမဝင်စေရန်ဂရုပြုရမည်။

၁၄။ ပလတ်စတစ်ပုံးဖြင့်ဆီထုတ်ခြင်း၊ ဆီထည့်ခြင်းမပြုလုပ်ရ။

၁၅။ ဆီသိုလှောင်ကန်အနီးမီးထွက်တတ်သောထုရိုက်ခြင်းများမပြုရ။

၁၆။ ဆီထုတ်သွင်းစာရင်းအားစနစ်တကျမှတ်တမ်းထားရှိရမည်။

၁၇။ ဆီကန်သို့ မြန်မာ့ရေနံနှင့်ပြင်ပမှဝယ်ယူသည့်ဆီများ အပ်နှံသည့်အခါတိုင်း သက်ဆိုင်ရာစစ်ဆေးလက်ခံ ရေးအဖွဲ့မှ စစ်ဆေးပြီးမှသာ လက်ခံထားသိုရန်။

ဘိလပ်မြေစက်ရုံ(ကျောက်ဆည်)
ယမ်းတိုက်၊စနက်တံအဆောက်အဦးနှင့်ယမ်းနှင့်ဆက်စပ်သုံးပစ္စည်းများဆိုင်ရာ
လိုက်နာရမည့်အချက်များ

၁။ ယမ်းတိုက်နှင့်စနက်တံအဆောက်အဦးများအားလည်းကောင်း၊ ယမ်းနှင့်ဆက်စပ်သုံးပစ္စည်းများအား လည်းကောင်း၊ ယမ်းတိုက်ပတ်ဝန်းကျင်အားလည်းကောင်း၊ မတော်တဆဘေးအန္တရာယ်မဖြစ်ပွားစေ ရေးနေ့စဉ်စစ်ဆေးနေရမည်။

၂။ ယမ်းတိုက်နှင့်စနက်တံအဆောက်အဦးပတ်ဝန်းကျင်ပေ(၂၅၀)အတွင်း ကန့်သတ်နယ်မြေအဖြစ် သတ်မှတ်ထားရှိ၍ လူ၊တိရစ္ဆာန်များဖြတ်သန်းသွားလာခြင်းမပြုရ။

၃။ ယမ်းတိုက်အဆောက်အဦးမှ ပေ(၂၃၁၀)ပေပတ်လည်အတွင်း လုံခြုံရေးအဆောက်အဦးမှလွဲ၍ မည်သည့်လူနေအိမ်ခြေအဆောက်အဦးမျှမရှိစေရ။

၄။ ယမ်းတိုက်အနီးလုံခြုံရေးအစောင့်တဲဆောက်လုပ်၍ (၂၄)နာရီလုံခြုံရေးရဲချထားရန်။

၅။ လျှပ်စစ်မီးကြိုးများ (HighPowerTension) သွယ်တန်းပါက ယမ်းတိုက်နှင့်စနက်တံအဆောက်အဦး၏ ပေ(၁၁၅၅)ပေ ပတ်လည်မှဖြတ်သန်းသွယ်တန်းခြင်းမပြုရ။

၆။ ယမ်းတိုက်နှင့်စနက်တံအဆောက်အဦးပတ်ဝန်းကျင်အားမီးတားပြုလုပ်ထားရမည်။ တောမီးလောင်မှု ကြောင့်အန္တရာယ်မဖြစ်ရေးကြိုတင်ကာကွယ်ထားရှိရမည်။

၇။ ယမ်းတိုက်မှပေ(၅၀)ပတ်လည်အတွင်း မြက်ပင်နှင့်အမှိုက်များအပြောင်ရှင်းထားရမည်။

၈။ ယမ်းတိုက်နှင့်စနက်တံအဆောက်အဦးအတွင်းအပြင်နှင့် ပတ်ဝန်းကျင်အားအစဉ်သန့်ရှင်းအောင်ပြုလုပ် ထားရမည်။

၉။ ယမ်းတိုက်ရှေ့တွင် မီးသတ်ရေကန်(သို့မဟုတ်) ရေတိုင်ကီ၊ မီးသတ်ဆေးဗူး၊ မီးချိတ်၊ မီးကဒ်ပါရှိသည့် မီးသတ်စင် Fire Point ထားရှိ၍ မီးသတိပြု၊ ဆေးလိပ်မသောက်ရ စသည့်မီးဘေးကာကွယ်ရေး ဆိုင်း ဘုတ်များချိတ်ဆွဲထားပေးရမည်။

၁၀။ အဆောက်အဦးများအတွင်းမိုးယိုခြင်းမရှိစေရန်နှင့် လေဝင်လေထွက်ကောင်းမွန်စေရန်အမြဲစစ်ဆေး ပြုပြင်နေရမည်။

၁၁။ ယမ်းတိုက်ပတ်လည်ရှိရေနုတ်မြောင်းအား ရေစီးရေလာကောင်းမွန်အောင်အစဉ်ဆောင်ရွက်ထားရန်။

၁၂။ ယမ်းတိုက်နှင့်စနက်တံအဆောက်အဦး၏မိုးကြိုးလွှဲများအားသတ်မှတ် Resistance ရှိ/မရှိတစ်နှစ် တစ်ကြိမ်စစ်ဆေးသွားရမည်။

၁၃။ ယမ်းများကိုမိုးရေမိခြင်း၊ ရေစိုခြင်းမရှိစေရန်နှင့်သိုလှောင်ရုံတွင် Humidity (စိုထိုင်းဆ) နည်းစေရန် နေရောင်တိုက်ရိုက်မဝင်စေရန်ဆောင်ရွက်ရမည်။

၁၄။ ယမ်းတိုက်တွင် အပူချိန်တိုင်းကိရိယာ သာမိုမီတာထားရှိ၍ အပူချိန်မှတ်တမ်းစာအုပ်ဖွင့်လှစ်ထားရှိပြီး ယမ်းတိုက်ဖွင့်လှစ်သည့်အခါ အပူချိန်မှတ်တမ်းရေးသွင်းထားရန်။

၁၅။ ယမ်းတိုက်နှင့်စနက်တံအဆောက်အဦးအတွင်းသို့မသက်ဆိုင်သူများဝင်ရောက်ခြင်းမပြုစေရ။

၁၆။ ယမ်းတိုက်နှင့်စနက်တံ အဆောက်အဦးအတွင်း ယမ်းနှင့်ဆက်စပ်သုံးပစ္စည်းများအား စနစ်တကျသိုလှောင် ထားရမည်။

၁၇။ အောက်ခံသစ်သားတုံးပေါ်တွင် စနစ်တကျစီရီဖြန့်ခင်းထားရှိရမည်။

၁၈။ အမျိုးအစားအလိုက်ခွဲခြားထားရမည်။

၁၉။ စနက်တံ Detonator ကိုယမ်းများနှင့်အတူ ရောနှောထားသိုခြင်းမပြုရန်။

၂၀။ ယမ်းများအပုံစီရာတွင် (၄)လက်မပတ်လည်အောက်ခံတုံးများခံ၍ နံရံမှအနည်းဆုံး ၁ ၁/၂ ပေ ခွာ၍ အပုံစီထားရန်။

၂၁။ ပစ္စည်းစာရင်းအားနံရံရှိ Boardတွင်ရေးမှတ် မှတ်တမ်းထားရှိရမည်။

၂၂။ ပစ္စည်းစာရင်းအား လယ်ဂျာစာအုပ်ထားရှိမှတ်တမ်းတင်ရမည်။

၂၃။ ကျောက်မိုင်းဌာနမှလိုအပ်သည့် ယမ်းကိုသာ Store Requistion and Issue Voucher အရသာစိစစ်ထုတ် ပေးရမည်။

၂၄။ ယမ်းနှင့်ဆက်စပ်သုံးပစ္စည်းများအား ဦးစွာလက်ခံရရှိသည့်ပစ္စည်း ဦးစွာထုတ်ပေးခြင်း စနစ် First in first out ဖြင့်ထုတ်ပေးအသုံးပြုရန်။

၂၅။ Safety Fuse များအား Rack ပေါ်တွင်သာထားရန်။

၂၆။ Emulsion Explosive ယမ်းများမှာသတ်မှတ်သက်တမ်း (Shelf Date) (၆)လရှိပြီးထားသိုမှုစနစ်ကျပါက ကောင်းမွန်ပါက (၉)လအထိခံသည်ကို သိရှိပြီး သက်တမ်းမကျော်လွန်စေရေး စနစ်တကျ စိစစ်ထုတ်ယူ သုံးစွဲရန်။

၂၇။ ယမ်းနှင့်ဆက်စပ်သုံးပစ္စည်းများအား (၃)လတစ်ကြိမ်အထက်အောက်လှန်ပေးရန်။

၂၈။ ယမ်းတိုက်ရှိ ယမ်းနှင့်ဆက်စပ်သုံးပစ္စည်းများ၌ ထုတ်လုပ်သည့်နှစ်၊ အစောဆုံး (စက်ရုံမှထုတ်ယူထားသည့်အချိန်အစောဆုံး)နှင့် အကြာဆုံးပစ္စည်းများအား ဦးစွာသုံးစွဲရန်။

၂၉။ ယမ်းနှင့်ဆက်စပ်သုံးပစ္စည်းထားရှိသော အောက်ခံခုတုံးများ၌ ခြနှင့်ပျက်စီးမည့်ပိုးမွှားအန္တရာယ်မှကာကွယ်ဆေး (ခြသတ်ဆေး)သုတ်လိမ်းထားရန်။

၃၀။ ယမ်းနှင့်ဆက်စပ်သုံးပစ္စည်းများအား ပစ္စည်းတစ်မျိုးချင်းဘင်ကဒ်ဖွင့်လှစ်ထားရန်။

၃၁။ ယမ်းနှင့်ပတ်သက်သောကိစ္စအဝဝကို တာဝန်ခံဆောင်ရွက်နိုင်မည့် နားလည်တတ်ကျွမ်းသည့် ဝန်ထမ်းတစ်ဦးအား သီးခြားတာဝန်ပေးဆောင်ရွက်ရန်။

၃၂။ ပစ္စည်းများထည့်ခြင်း၊ ထုတ်ခြင်းများအား တာဝန်ခံအရာရှိကိုယ်တိုင် စနစ်တကျကြီးကြပ်ဆောင်ရွက်ရန်။

၃၃။ ယမ်းတိုက်အား အဖွင့်/အပိတ်ဆောင်ရွက်တိုင်း တာဝန်မျှ၊ လုံခြုံရေးမျှတို့နှင့်အတူ ဆောင်ရွက်ရန်။

၃၄။ လုပ်ငန်းခွင်တွင်တစ်နေ့တာအသုံးပြုပိုလျှံသည့် ယမ်းနှင့်ဆက်စပ်သုံးပစ္စည်းများအား ယမ်းတိုက်တွင် ပြန်လည်အပ်နှံသိမ်းဆည်းရန်။

၃၅။ ယမ်းနှင့်ဆက်စပ်သုံးပစ္စည်းများအား ဘေးအန္တရာယ်ကင်းရှင်းစွာဖြင့် ဆက်လက်ထားသိုသုံးစွဲနိုင်သည့် အခြေအနေရှိ/မရှိ စာရင်းဇယားလက်ကျန်နှင့်မြေပြင်လက်ကျန် ကိုက်ညီမှု ရှိ/မရှိကို တာဝန်ရှိသူတို့မှ မကြာခဏစစ်ဆေးခြင်းပုံမှန်ဆောင်ရွက်သွားရန်နှင့် စစ်ဆေးတွေ့ရှိချက်၊ ညွှန်ကြားချက်များ ယမ်းတိုက် မှတ်တမ်းတွင် မှတ်တမ်းတင်ရေးထားရန်။

၃၆။ ယမ်းနှင့်ဆက်စပ်သုံးပစ္စည်းများလျော့နည်းပျောက်ဆုံးပါက စက်ရုံမှူး၊ ဒု-စက်ရုံမှူးများ၊ လုံခြုံရေးရဲနှင့် အထက်လုံခြုံရေးအဖွဲ့အစည်းများသို့ အမြန်ဆုံးတင်ပြဆောင်ရွက်ရန်။

၃၇။ ယမ်းနှင့်ဆက်စပ်သုံးပစ္စည်းများလျော့နည်းပျောက်ဆုံးခြင်းနှင့် အသုံးပြုရန်အတွက်သံသယရှိသည့် အခြေအနေများတွေ့ရှိပါက သတ္တုတွင်းဦးစီးဌာနသို့ အမြန်ဆုံးတင်ပြဆောင်ရွက်ရန်။

၃၈။ မီးလောင်စေနိုင်သောပစ္စည်းများ၊ အရည်များ၊ ဓါတ်ငွေ့များအား အဆောက်အဦးအတွင်းနှင့် ပတ်ဝန်းကျင်သို့ ယူဆောင်လာခြင်းမပြုရ။

၃၉။ ယမ်းတိုက်လုံခြုံရေးစီမံချက်အတိုင်းအတိအကျလိုက်နာဆောင်ရွက်ရန်။

Appendix 3

Laboratory Results

ANALYSIS REPORT

ORIGINAL

Job Ref: 8161/2014
Date : 27.12.2014

Client Name : **RESOURCE AND ENVIRONMENT MYANMAR CO., LTD**
B-702 Delta Plaza, Shwegondaing Rd, Bahan Township,
Yangon, Myanmar
Project Name : ESIA of 5000 Ton per Day Cement Plant in Kyaukse Industrial Zone
Sample Brought By : Client
Sample Received Date : 22.12.2014
Analysed Date : 23.12.2014

Results (mg/l)	Methods	Stations				Detection Limited
		GW-1 KS (21.12.2014)	GW-2 KS (21.12.2014)	SW-1 KS (21.12.2014)	SW-2 KS (21.12.2014)	
Lab Code	-	238/14	239/14	240/14	241/14	-
Commodity Name	-	Ground Water	Ground Water	Surface Water	Surface Water	-
Total Nitrogen	APHA 4500-N B	Not Detected	Not Detected	Not Detected	Not Detected	0.6
Total Suspended Solid	APHA 2540 D	9	8	65	37	2
Total Phosphorus	Laboratory Manual For the Physico-Chemical Analysis of Soil, Water and Plant ; Phototmetric (Ascorbic) Method	Not Detected	Not Detected	0.06	0.05	0.05
Total Alkalinity ($asCaCO_3$)	APHA 2320 B	431	444	176	191	2
Total Hardness (as $CaCO_3$)	AOAC 18 Ed (2005) Rev 4, 2011(method no973.52)	320	423	183	192	2
Oil & Grease	APHA 5520 B	2.3	Not Detected	Not Detected	Not Detected	0.2

End of Report

SGS (Myanmar) Limited

(Nu Nu Yi)
Manager

ISO TECH LABORATORY
Laboratory Technical Consultant: U Saw Christopher Maung
B.Sc Engg: (Civil), Dip S.E (Delft) Lecturer of YIT (Retd), Consultant (Y.C.D.C), LWSE 001.
Former Member (UNICEF, Water quality monitoring & Surveillance Myanmar)

ISO 9001:2008 Cert. No.688283

WW1214 094

WATER QUALITY TEST RESULTS FORM

Client	ESIA of 5000 Ton per Day Cement Plant in Kyaukse Industrial Zone
Nature of Water	SW - 1 KS
Location	Kyaukse
Date and Time of collection	21.12.2014
Date and Time of arrival at Laboratory	22.12.2014
Date and Time of commencing examination	25.12.2014
Date and Time of completing	30.12.2014

Results of Water Analysis

			WHO Drinking Water Guideline (Geneva - 1993)
pH			6.5 - 8.5
Colour (True)	5	TCU	15 TCU
Turbidity		NTU	5 NTU
Conductivity		micro S/cm	
Total Hardness		mg/l as $CaCO_3$	500 mg/l as $CaCO_3$
Calcium Hardness		mg/l as $CaCO_3$	
Magnesium Hardness		mg/l as $CaCO_3$	
Total Alkalinity		mg/l as $CaCO_3$	
Phenolphthalein Alkalinity		mg/l as $CaCO_3$	
Carbonate ($CaCO_3$)		mg/l as $CaCO_3$	
Bicarbonate (HCO_3)		mg/l as $CaCO_3$	
Iron		mg/l	0.3 mg/l
Chloride (as CL)		mg/l	250 mg/l
Sodium chloride (as NaCL)		mg/l	
Sulphate (as SO_4)		mg/l	200 mg/l
Total Solids		mg/l	1500 mg/l
Suspended Solids		mg/l	
Dissolved Solids		mg/l	1000 mg/l
Manganese		mg/l	0.05 mg/l
Phosphate		mg/l	
Phenolphthalein Acidity		mg/l	
Methyl Orange Acidity		mg/l	
Salinity		ppt	

Remark: This certificate is issued only for the receipt of the test sample.

Tested by
Signature:
Name: Zaw Hein Oo
B.Sc (Chemistry)
Chemist
ISO TECH Laboratory

Approved by
Signature:
Name: Soe Thit
B.E (Civil) 1980,
Technical Officer
ISO TECH Laboratory

ISO TECH LABORATORY
Laboratory Technical Consultant: U Saw Christopher Maung
B.Sc Engg: (Civil), Dip S.E (Delft) Lecturer of YIT (Retd), Consultant (Y.C.D.C), LWSE 001.
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ISO 9001:2008 Cert. No.688283

WTL-RE-001
Issue Date - 01-12-2012
Effective Date - 01-12-2012
Issue No - 1.0/Page 2 of 2

WW1214 094

WATER QUALITY TEST RESULTS FORM

Client: ESIA of 5000 Ton per Day Cement Plant in Kyaukse Industrial Zone

Nature of Water: SW - 1 KS

Location: Kyaukse

Date and Time of collection: 21.12.2014

Date and Time of arrival at Laboratory: 22.12.2014

Date and Time of commencing examination: 25.12.2014

Date and Time of completing: 30.12.2014

Results of Water Analysis

			WHO Drinking Water Guideline (Geneva - 1993)
Temperature (°C)		°C	
Lead (as Pb)		mg/l	1.5 mg/l
Fluoride (F)		mg/l	0.01 mg/l
Arsenic (As)		mg/l	0.01 mg/l
Nitrate ($N.NO_3$)		mg/l	50 mg/l
Chlorine (Residual)		mg/l	
Ammonia (NH_3)		mg/l	
Ammonium (NH_4)		mg/l	
Dissolved Oxygen (DO)		mg/l	
Chemical Oxygen Demand (COD)	32	mg/l	
Biochemical Oxygen Demand (BOD) (5 days at 20 °C)	7	mg/l	
Cyanide (CN)		mg/l	0.07 mg/l
Zinc (Zn)		mg/l	3 mg/l
Copper (Cu)		mg/l	2 mg/l
Silica (Si)		mg/l	

Remark: This certificate is issued only for the receipt of the test sample.

Tested by

Signature:

Name: Zaw Hein Oo
B.Sc (Chemistry)
Chemist
ISO TECH Laboratory

Approved by

Signature:

Name: Soe Thit
B.E (Civil) 1980,
Technical Officer
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WTL-RE-001
Issue Date - 01-12-2012
Effective Date - 01-12-2012
Issue No - 1.0/Page 1 of 2

WW1214 095

WATER QUALITY TEST RESULTS FORM

Client	ESIA of 5000 Ton per Day Cement Plant in Kyaukse Industrial Zone
Nature of Water	SW - 2 KS
Location	Kyaukse
Date and Time of collection	21.12.2014
Date and Time of arrival at Laboratory	22.12.2014
Date and Time of commencing examination	25.12.2014
Date and Time of completing	30.12.2014

Results of Water Analysis

			WHO Drinking Water Guideline (Geneva - 1993)
pH			6.5 - 8.5
Colour (True)	Nil	TCU	15 TCU
Turbidity		NTU	5 NTU
Conductivity		micro S/cm	
Total Hardness		mg/l as $CaCO_3$	500 mg/l as $CaCO_3$
Calcium Hardness		mg/l as $CaCO_3$	
Magnesium Hardness		mg/l as $CaCO_3$	
Total Alkalinity		mg/l as $CaCO_3$	
Phenolphthalein Alkalinity		mg/l as $CaCO_3$	
Carbonate ($CaCO_3$)		mg/l as $CaCO_3$	
Bicarbonate (HCO_3)		mg/l as $CaCO_3$	
Iron		mg/l	0.3 mg/l
Chloride (as CL)		mg/l	250 mg/l
Sodium chloride (as NaCL)		mg/l	
Sulphate (as SO_4)		mg/l	200 mg/l
Total Solids		mg/l	1500 mg/l
Suspended Solids		mg/l	
Dissolved Solids		mg/l	1000 mg/l
Manganese		mg/l	0.05 mg/l
Phosphate		mg/l	
Phenolphthalein Acidity		mg/l	
Methyl Orange Acidity		mg/l	
Salinity		ppt	

Remark: This certificate is issued only for the receipt of the test sample.

Tested by
Signature:
Name: Zaw Hein Oo
B.Sc (Chemistry)
Chemist
ISO TECH Laboratory

Approved by
Signature:
Name: Soe Thit
B.E (Civil) 1980,
Technical Officer
ISO TECH Laboratory

ISO TECH LABORATORY
Laboratory Technical Consultant: U Saw Christopher Maung
B.Sc Engg: (Civil), Dip S.E (Delft) Lecturer of YIT (Retd), Consultant (Y.C.D.C), LWSE 001.
Former Member (UNICEF, Water quality monitoring & Surveillance Myanmar)

ISO 9001:2008 Cert. No.688283

WTL-RE-001
Issue Date - 01-12-2012
Effective Date - 01-12-2012
Issue No - 1.0/Page 2 of 2

WW1214 095

WATER QUALITY TEST RESULTS FORM

Client	ESIA of 5000 Ton per Day Cement Plant in Kyaukse Industrial Zone
Nature of Water	SW - 2 KS
Location	Kyaukse
Date and Time of collection	21.12.2014
Date and Time of arrival at Laboratory	22.12.2014
Date and Time of commencing examination	25.12.2014
Date and Time of completing	30.12.2014

Results of Water Analysis

			WHO Drinking Water Guideline (Geneva - 1993)
Temperature (°C)		°C	
Lead (as Pb)		mg/l	1.5 mg/l
Fluoride (F)		mg/l	0.01 mg/l
Arsenic (As)		mg/l	0.01 mg/l
Nitrate ($N.NO_3$)		mg/l	50 mg/l
Chlorine (Residual)		mg/l	
Ammonia (NH_3)		mg/l	
Ammonium (NH_4)		mg/l	
Dissolved Oxygen (DO)		mg/l	
Chemical Oxygen Demand (COD)	32	mg/l	
Biochemical Oxygen Demand (BOD) (5 days at 20 °C)	6	mg/l	
Cyanide (CN)		mg/l	0.07 mg/l
Zinc (Zn)		mg/l	3 mg/l
Copper (Cu)		mg/l	2 mg/l
Silica (Si)		mg/l	

Remark: This certificate is issued only for the receipt of the test sample.

Tested by

Signature:

Name: Zaw Hein Oo
B.Sc (Chemistry)
Chemist
ISO TECH Laboratory

Approved by

Signature:

Name: Soe Thit
B.E (Civil) 1980,
Technical Officer
ISO TECH Laboratory

ISO TECH LABORATORY
Laboratory Technical Consultant: U Saw Christopher Maung
B.Sc Engg. (Civil), Dip S.E (Delft) Lecturer of YIT (Retd), Consultant (Y.C.D.C), LWSE 001,
Former Member (UNICEF, Water quality monitoring & Surveillance Myanmar)

ISO 9001:2008 Cert. No.683283

WW1214 096

WATER QUALITY TEST RESULTS FORM

Client	ESIA of 5000 Ton per Day Cement Plant in Kyaukse Industrial Zone
Nature of Water	GW - 1 KS
Location	Kyaukse
Date and Time of collection	21.12.2014
Date and Time of arrival at Laboratory	22.12.2014
Date and Time of commencing examination	25.12.2014
Date and Time of completing	30.12.2014

Results of Water Analysis			WHO Drinking Water Guideline (Geneva - 1993)
pH			6.5 - 8.5
Colour (True)	Nil	TCU	15 TCU
Turbidity		NTU	5 NTU
Conductivity		micro S/cm	
Total Hardness		mg/l as $CaCO_3$	500 mg/l as $CaCO_3$
Calcium Hardness		mg/l as $CaCO_3$	
Magnesium Hardness		mg/l as $CaCO_3$	
Total Alkalinity		mg/l as $CaCO_3$	
Phenolphthalein Alkalinity		mg/l as $CaCO_3$	
Carbonate ($CaCO_3$)		mg/l as $CaCO_3$	
Bicarbonate (HCO_3)		mg/l as $CaCO_3$	
Iron		mg/l	0.3 mg/l
Chloride (as CL)		mg/l	250 mg/l
Sodium chloride (as NaCL)		mg/l	
Sulphate (as SO_4)		mg/l	200 mg/l
Total Solids		mg/l	1500 mg/l
Suspended Solids		mg/l	
Dissolved Solids		mg/l	1000 mg/l
Manganese		mg/l	0.05 mg/l
Phosphate		mg/l	
Phenolphthalein Acidity		mg/l	
Methyl Orange Acidity		mg/l	
Salinity		ppt	

Remark: This certificate is issued only for the receipt of the test sample.

Tested by
Signature:
Name: Zaw Hein Oo
B.Sc (Chemistry)
Chemist
ISO TECH Laboratory

Approved by
Signature:
Name: Soe Thit
B.E (Civil) 1980,
Technical Officer
ISO TECH Laboratory

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ISO 9001:2008 Cert. No.688283

WTL-RE-001
Issue Date - 01-12-2012
Effective Date - 01-12-2012
Issue No - 1.0/Page 2 of 2

WW1214 096

WATER QUALITY TEST RESULTS FORM

Client	ESIA of 5000 Ton per Day Cement Plant in Kyaukse Industrial Zone
Nature of Water	GW - 1 KS
Location	Kyaukse
Date and Time of collection	21.12.2014
Date and Time of arrival at Laboratory	22.12.2014
Date and Time of commencing examination	25.12.2014
Date and Time of completing	30.12.2014

Results of Water Analysis

			WHO Drinking Water Guideline (Geneva - 1993)
Temperature (°C)		°C	
Lead (as Pb)		mg/l	1.5 mg/l
Fluoride (F)		mg/l	0.01 mg/l
Arsenic (As)		mg/l	0.01 mg/l
Nitrate ($N.NO_3$)		mg/l	50 mg/l
Chlorine (Residual)		mg/l	
Ammonia (NH_3)		mg/l	
Ammonium (NH_4)		mg/l	
Dissolved Oxygen (DO)		mg/l	
Chemical Oxygen Demand (COD)	32	mg/l	
Biochemical Oxygen Demand (BOD) (5 days at 20 °C)	6	mg/l	
Cyanide (CN)		mg/l	0.07 mg/l
Zinc (Zn)		mg/l	3 mg/l
Copper (Cu)		mg/l	2 mg/l
Silica (Si)		mg/l	

Remark: This certificate is issued only for the receipt of the test sample.

Tested by

Signature: Hein

Name: Zaw Hein Oo
B.Sc (Chemistry)
Chemist
ISO TECH Laboratory

Approved by

Signature: Soe Thit

Name: Soe Thit
B.E (Civil) 1980,
Technical Officer
ISO TECH Laboratory

ISO TECH LABORATORY
Laboratory Technical Consultant: U Saw Christopher Maung
B.Sc Engg: (Civil), Dip S.E (Delft) Lecturer of YIT (Retd), Consultant (Y.C.D.C), LWSE 001.
Former Member (UNICEF, Water quality monitoring & Surveillance Myanmar)

ISO TECH LABORATORY

ISO 9001:2008 Cert. No.688283

WW1214 097

WATER QUALITY TEST RESULTS FORM

Client	ESIA of 5000 Ton per Day Cement Plant in Kyaukse Industrial Zone
Nature of Water	GW - 2 KS
Location	Kyaukse
Date and Time of collection	21.12.2014
Date and Time of arrival at Laboratory	22.12.2014
Date and Time of commencing examination	25.12.2014
Date and Time of completing	30.12.2014

Results of Water Analysis

			WHO Drinking Water Guideline (Geneva - 1993)
pH			6.5 - 8.5
Colour (True)	Nil	TCU	15 TCU
Turbidity		NTU	5 NTU
Conductivity		micro S/cm	
Total Hardness		mg/l as $CaCO_3$	500 mg/l as $CaCO_3$
Calcium Hardness		mg/l as $CaCO_3$	
Magnesium Hardness		mg/l as $CaCO_3$	
Total Alkalinity		mg/l as $CaCO_3$	
Phenolphthalein Alkalinity		mg/l as $CaCO_3$	
Carbonate ($CaCO_3$)		mg/l as $CaCO_3$	
Bicarbonate (HCO_3)		mg/l as $CaCO_3$	
Iron		mg/l	0.3 mg/l
Chloride (as CL)		mg/l	250 mg/l
Sodium chloride (as NaCL)		mg/l	
Sulphate (as SO_4)		mg/l	200 mg/l
Total Solids		mg/l	1500 mg/l
Suspended Solids		mg/l	
Dissolved Solids		mg/l	1000 mg/l
Manganese		mg/l	0.05 mg/l
Phosphate		mg/l	
Phenolphthalein Acidity		mg/l	
Methyl Orange Acidity		mg/l	
Salinity		ppt	

Remark: This certificate is issued only for the receipt of the test sample.

Tested by
Signature:
Name: Zaw Hein Oo
B.Sc (Chemistry)
Chemist
ISO TECH Laboratory

Approved by
Signature:
Name: Soe Thit
B.E (Civil) 1980,
Technical Officer
ISO TECH Laboratory

ISO TECH LABORATORY
Laboratory Technical Consultant: U Saw Christopher Maung
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ISO 9001:2008 Cert. No.688283

WTL-RE-001
Issue Date - 01-12-2012
Effective Date - 01-12-2012
Issue No - 1.0/Page 2 of 2

WW1214 097

WATER QUALITY TEST RESULTS FORM

Client	ESIA of 5000 Ton per Day Cement Plant in Kyaukse Industrial Zone
Nature of Water	GW - 2 KS
Location	Kyaukse
Date and Time of collection	21.12.2014
Date and Time of arrival at Laboratory	22.12.2014
Date and Time of commencing examination	25.12.2014
Date and Time of completing	30.12.2014

Results of Water Analysis

			WHO Drinking Water Guideline (Geneva - 1993)
Temperature (°C)		°C	
Lead (as Pb)		mg/l	1.5 mg/l
Fluoride (F)		mg/l	0.01 mg/l
Arsenic (As)		mg/l	0.01 mg/l
Nitrate ($N.NO_3$)		mg/l	50 mg/l
Chlorine (Residual)		mg/l	
Ammonia (NH_3)		mg/l	
Ammonium (NH_4)		mg/l	
Dissolved Oxygen (DO)		mg/l	
Chemical Oxygen Demand (COD)	32	mg/l	
Biochemical Oxygen Demand (BOD) (5 days at 20 °C)	9	mg/l	
Cyanide (CN)		mg/l	0.07 mg/l
Zinc (Zn)		mg/l	3 mg/l
Copper (Cu)		mg/l	2 mg/l
Silica (Si)		mg/l	

Remark: This certificate is issued only for the receipt of the test sample.

Tested by

Signature: Hein

Name: Zaw Hein Oo
B.Sc (Chemistry)
Chemist
ISO TECH Laboratory

Approved by

Signature: Soe Thit

Name: Soe Thit
B.E (Civil) 1980,
Technical Officer
ISO TECH Laboratory

Myanmar Food Processors and Exporters Association (MFPEA)

Food Industries Development Supporting Laboratory (FIDSL)

UMFCCI Tower, 7th Floor, Room No.(4),No.(29), Minye Kyawswa Road,

Lanmadaw Township, Yangon, Myanmar

LABORATORY ANALYSIS REPORT

FIDSL - 06 -003/15

1	Company's Name	: Resource and Environment Myanmar Co.,Ltd
2	Address	: B702,Delta Plaza, Shwegondaing Rd, Bahan, Yangon
3	Project Name	: ESIA of 5000 Ton per Day Cement Plant in Kyaukse Industrial Zone
4	Sample Location	: Kyaukse
3	Phone No.	:
4	Date Received	: 24.12.204
5	Sample Number	: 2445/14
6	Product Name	: SW - 1KS
7	Type of Test	: Micro Tests
8	Date of Issue	: 1.1.2015
9	Results	

(This Laboratory analysis report is based solely on the sample(s) submitted by the customer.)

Sr. No	Test Parameter	Test Method	Result
1	Coliform	(AOAC - 991.14)	1.5×10^1 cfu per ml
2	Escherichia Coli (E.coli)	(AOAC - 991.14)	3 cfu per ml

Remarks : ND = Not Detected

cfu = Colony Forming Unit

Dr. Aye Kyaw
Manager
FIDSL (MFPEA)

Myanmar Food Processors and Exporters Association (MFPEA)

Food Industries Development Supporting Laboratory (FIDSL)

UMFCCI Tower, 7th Floor, Room No.(4),No.(29), Minye Kyawswa Road,

Lanmadaw Township, Yangon, Myanmar

LABORATORY ANALYSIS REPORT

FIDSL - 06 -004/15
Page 1/1

1	Company's Name	: Resource and Environment Myanmar Co.,Ltd
2	Address	: B702,Delta Plaza, Shwegondaing Rd, Bahan, Yangon
3	Project Name	: ESIA of 5000 Ton per Day Cement Plant in Kyaukse Industrial Zone
4	Sample Location	: Kyaukse
3	Phone No.	:
4	Date Received	: 24.12.204
5	Sample Number	: 2446/14
6	Product Name	: SW - 2KS
7	Type of Test	: Micro Tests
8	Date of Issue	: 1.1.2015
9	Results	

(This Laboratory analysis report is based solely on the sample(s) submitted by the customer.)

Sr. No	Test Parameter	Test Method	Result
1	Coliform	(AOAC - 991.14)	2×10^1 cfu per ml
2	Escherichia Coli (E.coli)	(AOAC - 991.14)	2 cfu per ml

Remarks : ND = Not Detected

cfu = Colony Forming Unit

Dr. Aye Kyaw 1.1.15

Manager

FIDSL (MFPEA)

Myanmar Food Processors and Exporters Association (MFPEA)

Food Industries Development Supporting Laboratory (FIDSL)

UMFCCI Tower, 7th Floor, Room No.(4),No.(29), Minye Kyawswa Road,

Lanmadaw Township, Yangon, Myanmar

LABORATORY ANALYSIS REPORT

FIDSL - 06 -001/15

1	Company's Name	: Resource and Environment Myanmar Co.,Ltd
2	Address	: B702,Delta Plaza, Shwegondaing Rd, Bahan, Yangon
3	Project Name	: ESIA of 5000 Ton per Day Cement Plant in Kyaukse Industrial Zone
4	Sample Location	: Kyaukse
3	Phone No.	:
4	Date Received	: 24.12.204
5	Sample Number	: 2443/14
6	Product Name	: GW-1KS
7	Type of Test	: Micro Tests
8	Date of Issue	: 1.1.2015
9	Results	

(This Laboratory analysis report is based solely on the sample(s) submitted by the customer.)

Sr. No	Test Parameter	Test Method	Result
1	Coliform	(AOAC - 991.14)	1 cfu per ml
2	Escherichia Coli (E.coli)	(AOAC - 991.14)	(ND) per ml

Remarks : ND = Not Detected

cfu = Colony Forming Unit

Dr. Aye Kyaw 1.1.15

Manager

FIDSL (MFPEA)

Myanmar Food Processors and Exporters Association (MFPEA)

Food Industries Development Supporting Laboratory (FIDSL)

UMFCCI Tower, 7th Floor, Room No.(4),No.(29), Minye Kyawswa Road,

Lanmadaw Township, Yangon, Myanmar

LABORATORY ANALYSIS REPORT

FIDSL - 06 -002/15
Page 1/1

1	Company's Name	: Resource and Environment Myanmar Co.,Ltd
2	Address	: B702,Delta Plaza, Shwegondaing Rd, Bahan, Yangon
3	Project Name	: ESIA of 5000 Ton per Day Cement Plant in Kyaukse Industrial Zone
4	Sample Location	: Kyaukse
3	Phone No.	:
4	Date Received	: 24.12.204
5	Sample Number	: 2444/14
6	Product Name	: GW-2KS
7	Type of Test	: Micro Tests
8	Date of Issue	: 1.1.2015
9	Results	

(This Laboratory analysis report is based solely on the sample(s) submitted by the customer.)

Sr. No	Test Parameter	Test Method	Result
1	Coliform	(AOAC - 991.14)	(ND) per ml
2	Escherichia Coli (E.coli)	(AOAC - 991.14)	(ND) per ml

Remarks : ND = Not Detected

cfu = Colony Forming Unit

Dr. Aye Kyaw 4/1/15

Manager

FIDSL (MFPEA)

Appendix 4

Myanmar Conch Cement Co.,Ltd.

Technical Specification of Equipment

Limestone Crusher

Hammer crusher
LPC1020R22
750 t/h
YRKK630-6, 900 kW

Feed Size
≤ 1500x1200x1000 mm
Output Size
≤ 70 mm

Limestone Storage

Limestone dome Ø 90 m
41760 tons

Bridge Scrapper Reclaimer

Rail Type	QU 80 kg/m
Capacity	500 t/h
Total power	215 kW

Raw material Storage

QGC 250/29.5
Side Scrapper Reclaimer

Rail Type	50 kg/m
Capacity	250 t/h
Total power	155 kW

QGC 250/29.5
Side Scrapper Reclaimer

Rail Type	50 kg/m
Capacity	250 t/h
Total Power	155 kW

Raw material Grinding

Limestone Silo	Ø 10x24 (1000 t)
Sandstone Silo	Ø 7x21 (430 t)
Clay Silo	Ø 7x21 (430 t)
Bauxite Silo	Ø 7x21 (460 t)

Feed Size	≤ 70 mm
Fineness	≤ 18 % (RO 0.08mm)
Moisture Feed	≤5%,
Prod:	≤0.5%
YRKK850-6	3800 kW

Raw material Grinding

CK450 Vertical Roller Mill
450 t/h
Roller Ø2200x770 mm (4 Nos.)
Grinding Table Ø4500 (5960)
(25.24 rpm)

Homogenization Silo Ø22.5x56 m
(18000 t) (40 m)

Density 0.8~1 t/m3

Coal Grinding Mill

CK250 Vertical Roller Mill
42 t/h 1000 kW
Roller Ø1800x630 (3 Nos.)
Grinding Table Ø2500 (3270)
(32.7 rpm)

Coal feeder (Calciner) DRW4.14
18~22 (max 26) t/h 11 kW
Coal feeder (Kiln Head) DRW4.14
12~15 (max 18) t/h 7.5 kW

Preheater

5 stage 2 strings Preheater

No.1 C	4x Ø3.9 m
No.2 C	2x Ø5.85 m
No.3 C	2x Ø5.85 m
No.4 C	2x Ø6.35 m
No.5 C	2x Ø7.2 m

Calciner KSV	Ø9x21.9 m
WindSpeed	6.2 m/s
Calcination Rate	95%
No. of Burner	4 Nos.
Coal Consums:	18~23 t/h

Rotary Kiln

Rotary Kiln (3 Supports)

Ø 4.8x74 m	5000 tpd
Slope	4 %
Speed	0.35 ~ 4 rpm
Power	630 kW

5 Channels Pillard Burner

11~14 t/h (max 18 t/h)

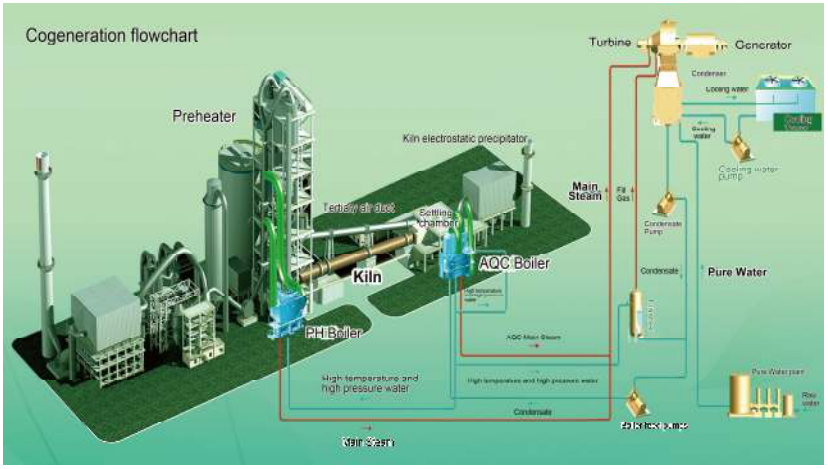
Air Quenching Cooler

ETA1067-E/64-E
4th Generation Grate Cooler
Capacity 5000 tpd
Clnk: crusher 4 Roller
Mid: bet: 1st & 2nd Chamber
Total cooling Fan
Power 2330 kW

Effective Area
123.8 m2 (134.9 m2)

Cooling Efficiency
1400˚C ~ 65˚C + Ambient Temp:

Waste Heat Generation System



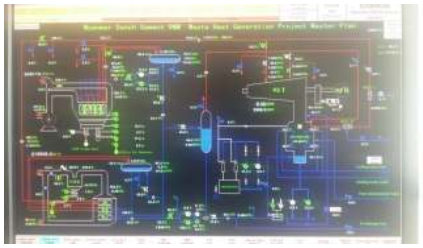
Waste Heat Generation System

PH Boiler inlet Gas T	325°C
Feed Water Flow	29.4 t/h
Steam Pressure	0.789 Mpa (max 1.2 Mpa)
SH outlet Temp:	308.9°C
Evaporation	28.9 t/h

AQC Boiler inlet Gas T	355°C
Feed Water Flow	12 t/h
Steam Pressure	0.789 Mpa (max 1.2 Mpa)
SH outlet Temp:	34.1°C
Evaporation	16 t/h

Waste heat Generator

Rated power	9 MW
Rotation speed	3000 rpm
Steam	45 t/h



Turbine Inlet pres.	1MPa
Turbine Inlet temp.	340°C

Clinker Silo

Concrete Wall & Steel Roofing

Size Ø 60x(21.8+19.2)m

Capacity	105000 t
Clnk density	1.45 t/m3

Cement Grinding Mill

Clinker Silo	Ø 9x19.5 (1300 t)
Gypsum Silo	Ø 7x18 m (400 t)
Limestone Silo	Ø 7x18 m (400 t)
Slag Silo	Ø 7x18 m (400 t)
Coal Ash Silo	Ø 7x22 m (390 t)

Cement silo	6x Ø18x45 m
1,4	12300 t (38 m)
2,5	12200 t (37.5 m)
3,6	11600 t (35 m)

Cement Grinding Mill

GT 170-120	Ø 1700x1200
Capacity	610~710 t/h
Feed Size	< 40 mm
Moisture	< 3%
Output Size	≤ 0.5 mm
2xYRKK500-4,	2x1000 kW

2xØ 4.2x13 m	2x180 t/h
Feed Size	< 2 mm
Fineness	> 3200 m2/kg
Mill speed	15.8 rpm
Grinding media	240 t
2x YRKK900-8,	2x3550 kW

Cement Silo & Packing

Bulk Cement Silo	3x Ø7x22 m 3x 550 t (14 m)

Rotary Packer	4 Nos. 4x120 t/h
Big Bag Packing	15~20 bag/h
Cement Bag	1500 ~2000 kg/bag

Cement Packaging System

BHYW8D	8-Spout Rotary Packer
Capacity	120 t/h
Cement Bag	50 kg
Distribution Loading pts.	8 Nos.

Appendix 4 -B

List of Environmental Protection Equipment and Specification

NO	Commodity	Country	Technical Specification	Q'ty	Unit	Unit Price（CIF/USD）	Total Price（CIF/USD）
A01.03	Bag filter	CHINA	Type:FMD-5×64-B,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	28,930.00	28,930
A01.04	Bag filter	CHINA	Type:FMD-4×32,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	11,351.00	11,351
A02.03	Bag filter	CHINA	Type: FMD-5×64-B,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	28,930.00	28,930
A03.02	Bag filter	CHINA	Type: FMD-4×32,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	11,351.00	11,351
A03.03	Bag filter	CHINA	Type:FMD-4×32,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	11,351.00	11,351
A03.04	Bag filter	CHINA	Type:FMD-4×32,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	11,351.00	11,351
A04.03	Bag filter	CHINA	Type: FMD-5×32（anti-explosion）,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	15,011.00	15,011
A04.04	Bag filter	CHINA	Type:FMD-4×32（anti-explosion）, Incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	13,258.00	13,258
A05.03	Bag filter	CHINA	Type: FMD-4×32, incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	11,351.00	11,351
A05.05	Bag filter	CHINA	Type: FMD-4×32（anti-explosion）,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	13,258.00	13,258
A05.06	Bag filter	CHINA	Type: FMD-4×32（anti-explosion）,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	13,258.00	13,258

A06.01	Bag filter	CHINA	Type: FMD-4×32,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	11,351.00	11,351
A06.02	Bag filter	CHINA	Type: FMD-4×32,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	11,351.00	11,351
A06.07	Bag filter	CHINA	Type:FMD-5×32,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	13,805.00	13,805
	Bag filter	CHINA	incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET		
A07.06	Bag filter	CHINA	Type: FMD-4×32,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	11,351.00	11,351
A07.07	Cyclone dust collector	CHINA	Dimension:4-φ5600mm, air quantity: 900000m3/h	1	SET	311,536.00	311,536
A07.12	Kiln inlet ESP	CHINA	Use for dust collection of preheater and raw mill. Cross sectional area of electric field:290m2, length of electric field：5×3.84, height of electric field::12.5, desilting area:27847.68m2 Type:2×28/12.5/5×8/0.4 ,including electric dust collecting body,Chian conveyor,rotary feeder equipment,insulation casing heater,high voltage power-up device,temperature control device,damp resistor,LV control cabinet.	1	SET	2,199,088.00	2,199,088
A07.16	Exhaust fan for preheater ESP	CHINA	Type: Y4-2×73№.27F, incl.:main motor, fan body, electric actuation, inlet and outlet expansion joint, oil station, vibration detector, foudation bolt.	1	SET	129,753.00	129,753
A08.03	Bag filter	CHINA	Type: FMD-6×32,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	17,061.00	17,061
A08.08	Bag filter		Type:FMD-5×32,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	13,805.00	13,805
A11.05	Electrostatic precipitator	CHINA	Type:36/12.5/4×8/0.4,incl: esp casing，distribution plate， support，discharge electrode，precipitation electrode，etc	1	SET	1,379,505.00	1,379,505
A12.01	Bag filter	CHINA	Type:FMD-5×96-C,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	34,310.00	34,310
A12.02	Bag filter	CHINA	Type:FMD-6×32,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	17,022.00	17,022

A12.03	Bag filter	CHINA	Type: FMD-6×32,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	17,022.00	17,022
A12.04	Bag filter	CHINA	Type:FMD-6×32,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	17,022.00	17,022
A12.05	Bag filter	CHINA	Type: FMD-4×32,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	11,351.00	11,351
A12.06	Bag filter	CHINA	Type:FMD-4×32,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	11,351.00	11,351
A12.07	Bag filter	CHINA	Type:FMD-4×32,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	11,351.00	11,351
A13.03	Bag filter	CHINA	Type: FMD-4×32（anti-explosion）, . Incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	13,258.00	13,258
A13.07	Bag filter	CHINA	Type:PPW128-2X9（M）,incl.:housing part,filter-bag,bag cage,heavy punch flap,support frame,air tank,control box，etc.	2	SET	191,386.00	382,772
A13.17	Cyclone Dust Collector	CHINA	Type： 2-φ5000mm，air volume:335000m3/h；	1	SET	139,679.00	139,679
A14.03	Bag filter	CHINA	Type: FMD-5×32,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	13,805.00	13,805
A14.04	Bag filter	CHINA	Type: FMD-4×32,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	11,351.00	11,351
A15.01	Bag filter	CHINA	Type: FMD-5×32,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	13,805.00	13,805
A15.02	Bag filter	CHINA	Type:FMD-4×32,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	11,351.00	11,351
A15.03	Bag filter	CHINA	Type:FMD-4×32, incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	11,351.00	11,351

A15.04	Bag filter	CHINA	Type:FMD-4×32, incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	11,351.00	11,351
A15.05	Bag filter	CHINA	Type:FMD-4×32,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box.	1	SET	11,351.00	11,351
A15.06	Bag filter	CHINA	Type:FMD-4×32,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	11,351.00	11,351
A16.16	Bag filter	CHINA	Type: PPCA128-2×13,type:240000m3/h. incl.: housing part , filter-bag, bag cage,rotary quantitative feeder, support frame,air tank, control box，etc.	2	SET	273,865.00	547,730
A16.18	Bag filter	CHINA	Type:PPCA96-8L,type:53000m3/h. incl.: housing part , filter-bag, bag cage,rotary quantitative feeder, support frame,air tank, control box，etc.	2	SET	68,261.50	136,523
A16.20	Bag filter	CHINA	Type:DMD-80,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	2	SET	7,840.00	15,680
A17.02	Bag filter	CHINA	Type:FMD-5×32,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	4	SET	13,805.75	55,223
A17.05	Bag filter	CHINA	Type:DMD-80,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	4	SET	7,839.75	31,359
A17.06	Bag filter	CHINA	Type:DMD-80,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	2	SET	7,840.00	15,680
A18.01	Bag filter	CHINA	Type:DMD-64,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	3	SET	6,455.00	19,365
A18.05	Bag filter	CHINA	Type:DMD-48,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	3	SET	5,794.00	17,382
A19.04	Bag filter	CHINA	Type:FMD-5×64,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	4	SET	28,929.75	115,719
A19.05	Bag filter	CHINA	Type:FMD-4×32,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	4	SET	11,351.50	45,406

A19.07	Bag filter	CHINA	Type:FMD-5×32,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	2	SET	12,724.50	25,449
A20.06	Bag filter	CHINA	Type:FMD-4×32,incl.:housing part(consist of protective ladder,handrail,air inlet and air oulet,dust discharge hopper),filter-bag,bag cage,heavy punch flap ,support frame,pulse valve,air cylinder,air triplet,air tank,control box，etc.	1	SET	11,351.00	11,351
A23.15	Water treatment equipment	CHINA	Water purification device,sewage treatment device，Dosing device, the life water treatment device，etc.	1	SET	440,551.00	440,551
A41.17	ESP	CHINA	Volume: 220000 m3/h, incl.: casing, platform,rectifier transformer, hummering equipment,low voltage control cabinet, inspection power box, ash bucket heater,etc	2	SET	932,088.00	1,864,176
A41.30	Pulse Bag Filter	CHINA	Type：DC-64,flow：7800m3/h,pressure：1550Pa power：7.5kW,380V,incl.: dust catcher ontology, filter bag, bag cage, storage tank, support and electric cabinet , fan，motor，vibration equipment，control cabinet etc	1	SET	16,651.00	16,651
A41.32	Pulse Bag Filter	CHINA	Type：DNC-64 flow：1500m3/h incl.: dust catcher ontology, filter bag, bag cage, storage tank, support and electric cabinet , fan，motor，vibration equipment，control cabinet etc	1	SET	6,399.00	6,399
A41.38	Pulse Bag Filter	CHINA	Flow：5400m3/h pressure：1650Pa,power：3kW 380V,incl.: dust catcher ontology, filter bag, bag cage, storage tank, support and electric cabinet , fan，motor，vibration equipment，control cabinet etc	1	SET	11,538.00	11,538
A41.43	Bag filter	CHINA	1975m3/h,1250Pa,2.2kW,380V,Includes: shell, bucket, support and foundation bolt, connection bolt, nut, ladder, platform, handrail, induced draft fan, motor, impulse valve, vibration unit, filter bag, filter cage and control cabinet	1	SET	8,916.00	8,916
	TOTAL						8,403,958

Appendix 5

History of Cement Factory (400ton), No (33) Heavy Industry (Kyaukse)

မာတိကာ

အမှတ်(၃၃)အကြီးစားစက်ရုံ(ကျောက်ဆည်)

ဘိလပ်မြေစက်ရုံ(ကျောက်ဆည်)

စက်မှုလုပ်ငန်းသမိုင်း

စက်ရုံနောက်ခံသမိုင်း

၁။ မြန်မာနိုင်ငံတွင် ၂၀၀၂-၂၀၀၃ခုနှစ် ကာလအထိ ဘိလပ်မြေစက်ရုံအမှတ်-၁ (သရက်)၊ ဘိလပ်မြေစက်ရုံ၊ အမှတ်-၂(ကြံခင်း)၊ ယခင်ဘိလပ်မြေစက်ရုံ အမှတ်-၃ (ဘားအံ)၊ မြန်မာ့စီးပွားရေးကော်ပိုရေးရှင်း၏ ဘိလပ်မြေစက်ရုံ(ဘားအံ)ဟူ၍ စက်ရုံ(၄) ရုံနှင့် ပုဂ္ဂလိက ဘိလပ်မြေစက်ရုံ(၂)ရှိခဲ့ပါသည်။ အဆိုပါစက်ရုံများမှ တစ်နှစ်လျှင် ပျမ်းမျှ ဘိလပ်မြေ ထုတ်လုပ်မှု (၁.၀၆၈)သန်း တန် ထုတ်လုပ်နိုင်ပါသည်။

၂။ ၄င်းကာလ မြန်မာနိုင်ငံလူဦးရေအရ လူတစ်ဦးလျှင် ဘိလပ်မြေသုံးစွဲနှုန်းမှာ (၄၈) ကီလိုဂရမ်ခန့်ဖြစ်ပြီး ဖွံ့ဖြိုးစနိုင်ငံများအနေဖြင့် လူတစ်ဦး၏ သုံးစွဲနှုန်းမှာ (60)kg မှ (100)kg အထိ ရှိပြီး လူဦးရေ (၅၀-၆၀)သန်းထိ ခန့်မှန်း၍ တွက်ချက်ပါလျှင် ၁၉၉၉-၂၀၀၀ ခုနှစ်မှသည် ၂၀၂၀ခုနှစ်အတွင်း ပြည်တွင်း ဘိလပ်မြေလိုအပ်ချက်မှာ တန်ချိန် (၃ သန်းမှ ၇ သန်း) အထိ ရှိလာနိုင်မည်ဟု ခန့်မှန်းထားရှိပါသည်။

၃။ သို့ဖြစ်၍ နိုင်ငံတော်ဖွံ့ဖြိုးရေးအတွက် မရှိမဖြစ်အရေးပါသော ဆောက်လုပ်ရေး ပစ္စည်းဖြစ်သည့် ဘိလပ်မြေလိုအပ်ချက်အပေါ်ဖြည့်ဆည်းနိုင်ရန် နိုင်ငံတော်အကြီးအကဲ များ၏ လမ်းညွှန်ချက်၊ စက်မှုဝန်ကြီးဌာန၏ ကြီးကြပ်ညွှန်ကြားချက်နှင့်အညီ မြန်မာ့ကြွေထည်မြေထည်လုပ်ငန်း၏ တာဝန်ရှိသူများမှ ကျောက်ဆည် ဘိလပ်မြေစက်ရုံစီမံကိန်း ကို အကောင်အထည်ဖော်ဆောင်ရွက်ခဲ့ပါသည်။

စက်ရုံတည်ဆောက်ရခြင်း၏ ရည်ရွယ်ချက်

၄။ မွန္တလေးတိုင်း၊ ကျောက်ဆည်မြို့နယ်အတွင်း ဘိလပ်မြေစက်ရုံအကောင်အထည် ဖော်ဆောင်ရွက်ရခြင်းမှာ အောက်ပါအချက်များကို အခြေခံကာ ရွေးချယ်တည်ဆောက် ရခြင်းဖြစ်ပါသည်-

(က) ပြည်တွင်းကုန်ကြမ်းများကို အကျိုးရှိစွာသုံးစွဲနိုင်မှုအရ ဘိလပ်မြေစက်ရုံ၏ အဓိကကုန်ကြမ်းဖြစ်သော ထုံးကျောက်လုံလောက်စွာရရှိနိုင်မှုရှိခြင်း။

(ခ) မြန်မာနိုင်ငံအထက်ပိုင်းရှိ ဆည်မြောင်းတာတမံများ၊ လမ်းများ၊ လူနေအိမ်များ ခေတ်မှီဖွံ့ဖြိုးတိုးတက်စေရန်နှင့် စီမံကိန်းများ၏ လိုအပ် ချက်များ ဖြည့်ဆည်းနိုင်ခြင်း။

(ဂ) စက်ရုံတည်ဆောက်ခြင်းဖြင့် ဒေသဖွံ့ဖြိုးတိုးတက်ရေး အထောက်အကူပြုနိုင်ခြင်း၊ အလုပ်အကိုင်အခွင့်အလမ်းသစ်များ ပေါ်ပေါက်လာခြင်း။

(ဃ) လိုအပ်သော မြေဧရိယာ အကျယ်အဝန်းရရှိခြင်း။

(င) မြန်မာနိုင်ငံ၏ အလယ်ပိုင်းမှ လမ်းပန်းဆက်သွယ်ရေး လွယ်ကူချောမွေ့ စွာတင်ပို့နိုင်ခြင်း။

(စ) အခြားသွင်းအားစုများ လွယ်ကူစွာသယ်ယူရရှိနိုင်ခြင်း တို့ဖြစ်ပါသည်။

<u>တည်နေရာအကျယ်အဝန်း</u>

၅။ မန္တလေးတိုင်း၊ ကျောက်ဆည်မြို့နယ်၊ ကျောက်ဆည်မြို့၏ အရှေ့ဘက် (၆)မိုင် အကွာတွင်တည်ရှိပါသည်။ ကျောက်ဆည်မြို့မှ ဖျောက်ဆိပ်ပင်ကျေးရွာသွား ကားလမ်း ၏ ဘေးတွင်ရှိပါသည်။ ပင်မစက်ရုံ (၂၉.၀၀)ဧက၊ ရုံးအဆောက်အဦ၊ ဝန်ထမ်းအိမ်ယာ နှင့် မြေကြီးကုန်ကြမ်းအပါအဝင် အကျယ်အဝန်း(၆၅၄.၂၅)ဧက စုစုပေါင်း ၆၈၃.၂၅ဧက နှင့် သင်းတွဲရေလှောင်ကန်နေ ရာ (၁.၃၇)ဧက အပါအဝင် စုစုပေါင်း (၆၈၄.၆၂)ဧက ရှိ ပါသည်။

၆။ မြေကြီးကုန်ကြမ်းအတွက် ဖျောက်ဆိပ်ပင်ကျေးရွာအနီး (၃၉.၄၈)ဧက၊ ကုလား ကျောင်းကျေးရွာအနီး၊ ရွှေဥမင်တောင်ခြေ (၁၀.၆၂)ဧက၊ မြစ်သားမြို့နယ်(ပျော်ရွာ အနီး) (၁၈.၂၄)ဧက စုစုပေါင်း (၆၈.၃၉)ဧက ရှိပါသည်။

၇။ ထုံးကျောက်ကုန်ကြမ်းအတွက် မူလ (၄၁၉.၂၅)ဧက/၁.၇ စတုရန်းကီလိုမီတာကို (၂၆.၄.၂၀၀၀ မှ ၂၅.၄.၂၀၂၀)ထိ (၂၀)နှစ် ထုတ်လုပ်ခွင့်ပြုမိန့် ရရှိခဲ့ပြီး လုပ်ငန်းရုံးချုပ် ၏ (၂၈.၈.၁၃)ရက်စွဲပါစာအမှတ် ၁၅၀၉/၁၃၅၅ /စီ-၈(၄၀၅)ဖြင့် မြေဧရိယာ (၁၇၁)ဧက ကို ပြန်လည်အပ်နှံခဲ့ပါသည်။ ကျန်ရှိသော မြေဧရိယာ(၂၄၈.၂၅)ဧက (၁.၀၀၄၇) စတုရန်းကီလိုမီတာအား သတ္တုတွင်းဝန်ကြီးဌာနမှ (၂၆.၄.၂၀၀၀) မှ (၂၅.၄.၂၀၂၀)ထိ (၂၀)နှစ် ဓါတ်သတ္တုအကြီးစားထုတ်လုပ်ရန် ခွင့်ပြုမိန့်အဖြစ် (၁.၁၀.၂၀၁၃)ရက်ပါ ခွင့် ပြုမိန့်အမှတ် ၁၅/၂၀၀၀ (ဇရိယာပြင်ဆင်ခြင်း)ဖြင့် (၂၅.၉.၂၀၁၃ မှ ၂၅.၄.၂၀၂၀)ထိ ထုံးကျောက်ထုတ်လုပ်ခွင့်ပြုချက်ရရှိခဲ့ပါသည်။

၈။ သံကျောက် (Bauxite) ကုန်ကြမ်းအတွက် မန္တလေးတိုင်း၊ ပြင်ဦးလွင်မြို့နယ်၊ နတ်တောင်ဒေသ၊ အင်ယားကျေးရွာအုပ်စု (၁၉၀.၀၀)ဧက (၀.၇၇ စတုရန်းကီလိုမီတာ) ဖြစ်ပြီး သတ္တုတွင်းဝန်ကြီးဌာနမှ (၂.၁.၂၀၀၄ မှ ၁.၁.၂၀၁၉)ထိ (၂၅)နှစ် ဓါတ်သတ္တုအ

ကြီးစားထုတ်လုပ်ရန် ခွင့်ပြုမိန့်အဖြစ် (၂.၁.၂၀၀၄)ရက်ပါခွင့်ပြုမိန့်အမှတ်၁/၂၀၀၄ဖြင့် ခွင့်ပြုရရှိခဲ့ပါသည်။

ပင်မစက်ရုံ၊ဝန်ထမ်းအိမ်ယာ၊ အသုံးပြုအဓိကကုန်ကြမ်းလုပ်ကွက်များ၏ အကျယ် အဝန်းနှင့် ထုတ်လုပ်ရန်ခွင့်ပြု အကျယ်အဝန်းတို့မှာ အောက်ပါအတိုင်းဖြစ်ပါသည်-

(က) ပင်မစက်ရုံနှင့် ဆက်စပ်ဧရိယာ (စက်ရုံပိုင်)

- ပင်မစက်ရုံ	၂၉.၀၀၀ ဧက
- ရုံးအဆောက်အဦနှင့် ဝန်ထမ်းအိမ်ယာ	၆၅၄.၂၅၀ ဧက
(မြေကြီးကုန်ကြမ်းအပါအဝင်)	----------
	၆၈၃.၂၅၀ ဧက
- သင်းတွဲရေလှောင်ကန်နေရာ ဧက	၁.၃၇၀

စုစုပေါင်း	၆၈၄.၆၂ ဧက

(ခ) ကုန်ကြမ်းမြေ ထုတ်လုပ်ဧရိယာ (စက်ရုံပိုင်)

- ဖျောက်ဆိပ်ပင်ကျေးရွာအနီး	၃၉.၄၈ ဧက
- ကုလားကျောင်းကျေးရွာအနီး(ရွှေဥမှင်တောင်ခြေ)	၁၀.၆၇ ဧက
- မြစ်သားမြို့နယ်(ပျော်ရွာအနီး)	၁၈.၂၄ ဧက

စုစုပေါင်း	၆၈.၃၉ ဧက

(ဂ) ထုံးကျောက်ထုတ်လုပ်ဧရိယာ(ထုတ်လုပ်ခွင့်ပြုမိန့်)

- မူလခါတ်သတ္တုအကြီးစားခွင့်ပြုမိန့်အမှတ် ၁၅/၂၀၀၀ (၂၆.၄.၂၀၀၀)၊ (၆.၄.၂၀၀၀) မှ (၂၅.၄.၂၀၂၀) (၂၀)နှစ်	၄၁၉.၂၅ ဧက
- (၂၈.၈.၂၀၁၃)ရက်စွဲပါစာ ၁၅၀၉/၁၃၅၅/စီ-၈ (၄၀၅)ဖြင့် ပြန်လည်အပ်နှံခြင်း	၁၇၁.၀၀ ဧက
(၁.၁.၂၀၁၃)ခါတ်သတ္တုတွင်းအကြီးစားခွင့်ပြုမိန့်	၂၄၈.၂၅ ဧက

၁၅/၂၀၀၀ (ဇရိယာပြင်ဆင်ခြင်း)

(၂၆.၄.၂၀၀၀) မှ (၂၅.၄.၂၀၂၀) (၂၀)နှစ်အရ

(၂၅.၉.၂၀၁၃) မှ(၂၅.၄.၂၀၂၀) လက်ကျန်ဇက (၇)နှစ်

- စက်ရုံလုပ်ကွက်နှင့် ဆက်စပ်လျက်ရှိသော ထုံး ၁၂၀.၀၀ ဇက တောင်အား ခါတ်သတ္တုအကြီးစားရရှိရေး ထပ်မံ တင်ပြရန်ထားရှိ ဇရိယာ

<u>တည်ဆောက်မှု</u>

၉။ စက်ရုံတည်ဆောက်ခြင်းလုပ်ငန်းအတွက် တရုတ်ပြည်သူ့သမ္မတနိုင်ငံ China National Constructional and Agricultural Machinery Import and Export Coporation (CAMC) နှင့် မြန်မာ့ကြွေထည်မြေထည်လုပ်ငန်း၊ စက်မှုဝန်ကြီးဌာနတို့ သည် (၂.၆.၂၀၀၀)တွင် စာချုပ်ချုပ်ဆိုခဲ့ပါသည်။ စာချုပ်တန်ဘိုးမှာ အမေရိကန်ဒေါ်လာ (၁၆.၅)သန်းနှင့် ညီမျှသော ပြည်တွင်းသုံးငွေကျပ် (၁၀၆)သန်းဖြစ်ပါသည်။ တည် ဆောက်မှုလုပ်ငန်းအား (၂၈.၁.၂၀၀၁)ရက်နေ့တွင် စတင်ခဲ့ပါသည်။ (၂၁.၇.၂၀၀၂) ရက်တွင် စက်စမ်းသပ်လည်ပတ်ခဲ့ပြီး (၂၇.၁.၂၀၀၃)ခုနှစ်တွင် စက်ရုံဖွင့်လှစ်ခဲ့ပါသည်။

<u>ရင်းနှီးမြှုပ်နှံမှု</u>

၁၀။	<u>စဉ်</u>	<u>ငွေစာရင်း စုစုပေါင်း</u>	<u>မူလရင်းနှီး</u>	<u>ထပ်မံရင်းနှီး</u>
		<u>ခေါင်းစဉ်</u>	<u>မြှုပ်နှံမှု</u>	<u>မြှုပ်နှံမှု (ကျပ်သန်း)</u>
	၁။	နိုင်ငံခြား ၆၆၇.၆၂၅	၁၀၆.၀၀၀ (US$ 16.5) (US$17.653 + Euro 0.56163)	၅၆၁.၆၂၅ (US$1.653 + Euro 0.56163)
	၂။	ပြည်တွင်းငွေ ၁၁၉၄၃.၆၄၆	၆၃၉၄.၆၁၀	၅၅၄၉.၀၃၆

စုစုပေါင်း ၆၅၀၀.၆၁၀ ၆၁၁၀.၆၆၁ ၁၂၆၁၁.၂၇၁

-၂၀၁၃-၂၀၁၄ ဘဏ္ဍာရေးနှစ်အထိ ရင်းနှီးမြှုပ်နှံမှုတန်ဘိုး ၁၂၆၁၁.၂၇၁ ကျပ်သန်း

- ၂၀၁၃-၂၀၁၄ ဘဏ္ဍာရေးနှစ်အထိ အသားတင်တန်ဘိုး ၈၇၉၂.၂၈၅ ကျပ်သန်း

- ၂၀၀၉-၂၀၁၀ ဘဏ္ဍာရေးနှစ်တွင် မူလရင်းနှီးမြှုပ်နှံမှုငွေများ ၁၀၄၇၈.၈၅၇ ကျပ်သန်း အရင်းကြေခဲ့ပြီးဖြစ်ပါသည်။

၁၁။ နှစ်အလိုက်ရင်းနှီးမြှုပ်နှံမှုနှင့် အရင်းကြေကာလ

ကျပ်သန်း)

စဉ်	ခုနှစ်	နှစ်အလိုက်ရင်းနှီးမြှုပ်နှံမှု			အမြတ်			အရင်းကြေပြီး အမြတ်	
		ပြည်ပ	ပြည်တွင်း	ပေါင်း	အသားတင်	တန်ဘိုးလျော့	ပေါင်း		
၁	၁၉၉၉-၂၀၀၀	-	1.998	1.998	-	-	-		-
၂	၂၀၀၀-၂၀၀၁	10.847	328.970	339.817	-	-	-		-
၃	၂၀၀၁-၂၀၀၂	11.235	1753.784	1765.019	-	-	-		-
၄	၂၀၀၂-၂၀၀၃	-	4223.426	4223.426	95.273	9.907	105.180	(-)	6225.080
၅	၂၀၀၃-၂၀၀၄	5.693	444.507	450.200	119.349	209.677	329.026	(-)	6346.254
၆	၂၀၀၄-၂၀၀၅	23.284	723.966	747.250	138.538	230.408	368.946	(-)	6724.558
၇	၂၀၀၅-၂၀၀၆	24.246	239.745	263.991	1450.665	282.174	1732.839	(-)	5255.710
၈	၂၀၀၆-၂၀၀၇	9.918	500.129	510.047	3302.870	244.878	3547.748	(-)	2218.009
၉	၂၀၀၇-၂၀၀၈	0.138	1100.817	1100.955	1468.139	293.492	1761.631	(-)	1557.333
၁၀	၂၀၀၈-၂၀၀၉	2.434	633.088	635.522	1793.060	337.985	2131.045	(-)	61.810
၁၁	၂၀၀၉-၂၀၁၀	14.264	426.368	440.632	129.459	372.983	502.442		-
	၀၉-၁၀ထိ အရင်းကြေပြီး	102.059	10376.798	10478.857	8497.153	1980.504	10478.857		-
	၀၉-၁၀ထိ အရင်းကြေပြီး အမြတ်				2024.519		2024.519		2024.519
၁၂	၂၀၁၀-၂၀၁၁	4.972	337.704	342.676	1373.742	417.912	1791.654		1448.978
၁၃	၂၀၁၁-၂၀၁၂	1.380	825.287	826.667	216.540	405.939	622.479	(-)	204.188
၁၄	၂၀၁၂-၂၀၁၃	559.214	383.839	943.053	2041.828	452.974	2494.802		1551.749
၁၅	၂၀၁၃-၂၀၁၄	-	146.941	146.941	4146.744	519.740	4666.484		4519.543
		667.625	12070.569	12738.194	18300.726	3778.069	22078.795		9340.601

စက်စွမ်းအား

၁၂။ စက်ရုံ၏ တပ်ဆင်စက်စွမ်းအားမှာ တစ်နှစ်လျှင် ကလင်ကာ (၁၅၀၀၀၀)တန် နှင့် သတ်မှတ်စက်စွမ်းအားမှာ (၁၂၀၀၀၀)တန် ဖြစ်ပါသည်။ စက်ရုံ၏ အဓိကကုန်ထုတ်စက်ကြီးများနှင့် အရံစက်များ၏ တပ်ဆင်စက်စွမ်းအား၊ သတ်မှတ်စက်စွမ်းအားများမှာ အောက်ပါအတိုင်းဖြစ်ပါသည်-

စဉ်	စက်အမည်	ရေတွက်ပုံ	တပ်ဆင် စက်စွမ်းအား	သတ်မှတ် စက်စွမ်းအား	လက်ရှိ စက်စွမ်းအား	တစ်နေ့ အလုပ်ချိန် (နာရီ)
၁။	ကုန်ကြမ်းများ					
	- ပဆင့်ထုံးကျောက် ခွဲစက်(၂၀၁၂-၂၀၁၃)	တန်/နာရီ	၂၀၀	၂၀၀	၂၀၀	
	- ဒုဆင့်ထုံးကျောက် ခွဲစက်	တန်/နာရီ	၁၀၀	၈၀	၈၀	၇
	- ဂေါဒန်ခွဲစက်	တန်/နာရီ	၅	၄	၄	၈
	- သံကျောက်ခွဲစက်	တန်/နာရီ	၅	၄	၄	၈
	- မြေကြီးခွဲစက်	တန်/နာရီ	၃၀	၂၄	၂၄	၈
၂။	ကုန်ချောများ					
	- ကုန်ကြမ်းကြိတ်စက်	တန်/နာရီ	၄၀	၃၆	၃၆	၂၂
	- မီးသင်းဖို	တန်/နာရီ	၅၀၀	၄၀၀	၄၀၀	၂၄
	- ကုန်ချောကြိတ်စက်	တန်/နာရီ	၂၅	၂၀	၂၀	၂၂
	- အိတ်သွတ်စက်	တန်/နာရီ	၉၀	၇၂	၇၂	၇
၃။	အခြား					
	- အိတ်ချုပ်စက်	Bag/min	၁၄၀	၁၁၂	၁၁၂	၈
	- Coal Mill	တန်/နာရီ	၈ ~ ၉			
	- Preblending (Reclaimer)	တန်/နာရီ	၉၀ ~ ၁၀၀			

ထပ်မံတိုးချဲ့ တည်ဆောက်ခြင်းနှင့် အကြီးစားပြင်ဆင်ခြင်း

၁၃။ စက်ရုံအား(၂၇.၁.၂၀၀၃)ရက်မှစ၍ လည်ပတ်ခဲ့ရာ ၂၀၁၁-၂၀၁၂ ခုနှစ်တွင် သက်တမ်း (၈)နှစ်ခန့်ရှိပြီး ဖြစ်၍ Renovation အကြီးစားပြင်ဆင်ခြင်းလုပ်ငန်းများ၊ Primary Crusher ထပ်မံတိုးချဲ့ တည်ဆောက်မှုများ ဆောင်ရွက်ခဲ့ပါသည်။ ဆောင်ရွက် ခဲ့သည့် စက်ပစ္စည်းများနှင့် တန်ဘိုးမှာ အောက်ပါအတိုင်းဖြစ်ပါသည်-

(က) အကြီးစားပြင်ဆင်ခြင်း(ပကြိမ်)

စာချုပ်ချုပ်ဆိုသည့် ကုမ္ပဏီ -Kunming De Zhong Trading Co.,Ltd.

စာချုပ်တန်ဘိုး - US$ 1152720

စာချုပ်ချုပ်ဆိုသည့်နေ့ - ၂၁.၇.၂၀၁၀

တည်ဆောက်မှု - (၂၅.၅.၂၀၁၁ ~ ၃၁.၈.၂၀၁၁)

မွမ်းမံပြင်ဆင်သည့်စက်များ

1. Belt Weigher (10)Sets.
   (a) Clinker Crusher & Gypsum Belt Weighers (5)Sets.
   (b) Clay Belt Weighers (1)Set.
   (c) Raw Belt Weighers (4)Sets.
2. Preheater System
3. Kiln Feeding System (1) Set.
4. Kiln Inlet & Outlet Seal & Shell
5. Kiln Tyre & Supporting Rollers Replacement
6. Clinker Chain Conveyor
7. Cooler Inlet Seal
8. Clinker Pre Grinder

Renovation ဆောင်ရွက်ခြင်းဖြင့် (၈)နှစ်တာရှိသော စက်များ၏ စက်စွမ်းအား များကို ပြန်လည်မြှင့်တင်နိုင်ခဲ့ပါသည်။

(ခ) Primary Crusher ထပ်မံတိုးချဲ့တည်ဆောက်ခြင်း

၁၄။ မူလ Hammer Crusher သည် Input Size 900 mm မှ Output Size 25mm (Crushing Ratio 1:36) ထိ မြင့်မားစွာ ကြိတ်ခွဲထုတ်လုပ်ရသဖြင့် Hammer နှင့် Grate Bar များ၏ ပွန်းစားမှုများ၍ သက်တမ်းများ ကျဆင်းလာ ခြင်း၊ Crusher အဝင် ကျောက်ဆိုဒ် 300mm အထိရ ရှိရုန် Hydraulic Breaker ဖြင့် ထပ်မံထုခွဲ ရသဖြင့် ဆီစားနှုန်းများလာခြင်းများကြောင့် လက်ရှိ Crusher ၏ အထက်တွင် Primary Crusher အသစ်တစ်လုံးအား (၂၀၁၂-၂၀၁၃) ဘဏ္ဍာ ရေး နှစ်တွင် ထပ်မံတည်ဆောက်ခဲ့ပါသည်။

စာချုပ်ချုပ်ဆိုသည့် ကုမ္ပဏီ - Changqing Minmetal & Machinery Import & Export

စာချုပ်တန်ဘိုး - Euro 561630

စာချုပ်ချုပ်ဆိုသည့်နေ့ - 30.9.2011

တည်ဆောက်မှု - (10.4.2012 ~ 9.1.2013)

Capacity - Input Size (1050mm), Output Size (150mm)

200 t/hr (min)

Primary Crusher တည်ဆောက်ခြင်းဖြင့် လက်ရှိခွဲစက် Input Size 150mm ရရှိခြင်း၊ Breaker ဖြင့် တပ်ဆင်ခွဲခြင်း မပြုလုပ်ရသဖြင့် ဆီသက်သာ ခြင်း၊ လက်ရှိ Hammer Crusher Capacity မြှင့်တင်နိုင်ခြင်းများ ရရှိပါသည်။

(ဂ) <u>အကြီးစားပြင်ဆင်ခြင်း (၃-ကြိမ်)</u>

ပြုလုပ်သည့်ကုမ္ပဏီ - Myanmar Conch Cement Co.,Ltd. & 3 HIE

တည်ဆောက်မှု - (8.7.2014 ~ 26.8.2014)

မွမ်းမံပြင်ဆင်သည့်စက်များ

1. E.P (လျှပ်စစ်ဖုန်စုပ်စက်)ပြုပြင်ခြင်း
2. Preblending Bed (Reclaimer) အသစ်လဲလှယ်ခြင်း
3. Preheater ပြုပြင်ခြင်း
4. Kiln Inlet & Outlet Seal ပြုပြင်ခြင်း
5. Coal Mill Hot Gas Line အသစ်တပ်ဆင်ခြင်း
6. Air Compressor အသစ်လဲလှယ်ခြင်း
7. Packer အသစ်လဲလှယ်ခြင်း

Renovation ဆောင်ရွက်ခြင်းဖြင့် သဘာဝဓါတ်ငွေ့၊လျှပ်စစ်ဓါတ်အားသုံးစွဲမှု Norm များလျော့နည်းသုံးစွဲခြင်း၊ E.P လျှပ်စစ်ဖုန်စုပ်စက် ကောင်းမွန်ခြင်း ကြောင့် ခေါင်းတိုင်မှမီးခိုးနှင့်အမှုန့်များထွက်ရှိမှု အပြည့်အဝလျော့ချနိုင်ခြင်း၊ သဘာဝပတ်ဝန်းကျင်၊ လေထုညစ်ညမ်းမှု၊ စက်ရုံတွင်းအမှုန့်များ မထွက်မှု များကြောင့် လုပ်ငန်းခွင်သာယာပြီး ကျန်းမာရေး အထောက်အကူပြုခြင်းများ ရရှိပါသည်။

<u>ထုတ်ကုန်အမျိုးအစား</u>

၁၅။ မြန်မာနိုင်ငံသည် ပြိတိသျှကိုလိုနီနိုင်ငံ အောက်ရောက်ရှိခဲ့သဖြင့် မြန်မာနိုင်ငံ၏ ပထမဆုံး ဘိလပ်မြေစက်ရုံကို Burma Cement Company (B.C.C) မှ ၁၉၃၅ ခုနှစ် တွင် သရက်မြို့၌ စတင်တည်ဆောက်ခဲ့ပြီး စတင်သုံးစွဲခဲ့သော ပြိတိသျှစံချိန်စံညွှန်းများ မှာ B.S 12-1940 နှင့် BS 12-1947 တို့ဖြစ်ပါသည်။ မြန်မာနိုင်ငံအစိုးရသည် သရက် စက်ရုံကို ၁၉၅၄ ခုနှစ်တွင် လျော်ကြေးပေး၍ နိုင်ငံပိုင်စက်ရုံအဖြစ် လွှဲပြောင်းရယူကာ

ကုန်ထုတ်လိုင်းများ ထပ်မံတိုးချဲ့ တည်ဆောက်ခဲ့ပြီး ၁၉၇၅ခုနှစ်တွင် ကြံခင်းဘိလပ်မြေစက်ရုံ၊ ၁၉၈၅ ခုနှစ်တွင် ဘားအံ ဘိလပ်မြေစက်ရုံများ ထပ်မံတည်ဆောက်ခဲ့ရာ လက်ခံကျင့်သုံးသော ဗြိတိသျှစံချိန်စံညွှန်းများ မှာ BS 12-1958 နှင့် BS 12-1978 ဖြစ်ပါသည်။ ၂၀၀၀ပြည့်နှစ် နောက်ပိုင်းတွင် အမှတ်(၁) စက်မှုဝန်ကြီးဌာန၏ ကျောက်ဆည်ဘိလပ်မြေစက်ရုံနှင့် မြန်မာ့စီးပွားရေးဦးပိုင်လီမိတက်၏ ကျောက်ဆည်ဆင်မင်းဘိလပ်မြေစက်ရုံများကို BS 12-1989 စံချိန်စံညွှန်းဖြင့် စာချုပ်ချုပ်ဆိုခဲ့ပြီး မြန်မာစီးပွားရေး ကော်ပိုရေးရှင်းမှ တန် (၄၀၀၀) ဘိလပ်မြေစက်ရုံ(မြိုင်ကလေး)ကိုမူ BS 12-1996 စံချိန် စံညွှန်းဖြင့် စာချုပ်ချုပ်ခဲ့ပါသည်။

၁၆။ အမှတ်(၁)စက်မှုဝန်ကြီးဌာန၊ မြန်မာ့ကြွေထည်မြေထည်လုပ်ငန်း လက်အောက် တွင် ဘိလပ်မြေစက်ရုံ(၃)ရုံရှိပြီး လိုက်နာကျင့်သုံးခဲ့သော ဘိလပ်မြေစံချိန်စံညွှန်းမှာ BS 12-1978 ဖြစ်ပါသည်။ ထပ်မံ၍ အမှတ်(၁)စက်မှုဝန်ကြီးဌာနမှ BS 12-1996 စံချိန် စံညွှန်းသို့ ပြောင်းလဲကျင့်သုံးရန် ညွှန်ကြားခဲ့သဖြင့် လိုအပ်သော စမ်းသပ်ပစ္စည်းများနှင့် Compressive Strength စမ်းသပ်မှုတွင် Early Strength အနေဖြင့် 2 Days Strength များ ထည့်သွင်းစမ်းသပ်ခဲ့ပါသည်။ နောက်ဆုံး ၂၀၀၀ ပြည့်နှစ်တွင် ပြဋ္ဌာန်းခဲ့သော ဥရောပစံချိန်စံညွှန်းဖြစ်သည့် European Standard EN 197-1(2000) ကို European Economic Commucity (E.E.C) အဖွဲ့နိုင်ငံများနှင့် European Free Trade Association (EFTA) အဖွဲ့ဝင် နိုင်ငံများ၏ တာဝန်ပေးချက်အရ European Committee for Stardardization (CEN) မှ တာဝန် ယူပြု၍ ပြဋ္ဌာန်းနိုင်ခဲ့ပါသည်။ ၁၉၉၆ ခုနှစ် မေလတွင် ပြဋ္ဌာန်းခဲ့သော BS 12-1996 သည် European Standard E.N 197-1 (2000) ကို အတည်မပြုမီ ကြားဖြတ်ပြဋ္ဌာန်းခဲ့သော Britist Standard တစ်ခုအဖြစ် မှတ်ယူခဲ့ကြပါသည်။ BS 12-1996 သည် European Committee for Standardization (CEN) ၏ အခြေခံမူများအပေါ်တွင် အခြေခံကာ သတ်မှတ်ရေးဆွဲခဲ့ ခြင်းဖြစ်၍ ၂၀၀၀ ပြည့်နှစ် ဒီဇင်ဘာလတွင် အသစ်ပြဋ္ဌာန်းသော European Standard EN 197-1(2000) နှင့် အဓိကအချက်အလက်များတွင် ကွဲလွဲမှုများမရှိပါ။

၁၇။ European Standard EN 197-1(2000) စံချိန်စံညွှန်းသည် မြန်မာနိုင်ငံ၏ ယခင်စံချိန် စံညွှန်းများဖြစ်သော BS 12-1978, BS 12-1989 , BS 12-1996 တို့ထက် ပိုမိုကျယ်ပြန့်ပြီး Portland Cement အပါအဝင် အများသုံးဘိလပ်မြေ (၂၇)မျိုး (27 Common Cement) နှင့် သက်ဆိုင်ပါဝင်မှုများကြောင့် စက်ရုံ၏ လက်ရှိစံချိန်စံညွှန်း

ကိုလည်း စာချုပ်ပါ BS 12-1989 မှ EN 197-1(2000) ထိ အရည်အသွေး စံချိန်စံညွှန်းတိုးမြှင့် ထုတ်လုပ်လျက်ရှိပါသည်။

၁၈။ သို့ဖြစ်ပါ၍ ဘိလပ်မြေစက်ရုံ၏ အရည်အသွေးမှာ EN 197-1:2000 525 Class ဖြစ်ပါသည်။

<u>ထုတ်လုပ်မှုနည်းစဉ်</u>

၁၉။ ထုံးမှုန့်နည်းစဉ်သုံး ကြိုတင်အပူပေးစနစ် ငါးဆင့်ပါ လည်ပတ်မီးသင်းဖို(Dry Process) ဖြစ်ပါသည်။ တောင်ပေါ်မှ ပေးပို့လာသော ထုံးကျောက်များအား Primary Crusher, Secondary Crusher, Hammer Crusher MB 28/45 ဖြင့် ကြိတ်ခွဲ၍ Belt Conveyor (T.D-75 B 650 x 750m) ဖြင့် သယ်ယူ၍ (10m Ø x 20m) (2000Tons) Silo တွင်သိုလှောင်ပါသည်။ ကြိတ်ခွဲပြီး ထုံးကျောက်များကို ရွှံ့စေး(မြေကြီး)နှင့် CaO% ပါဝင်မှု အချိုးအစားအား တွက်ချက်ပြီး 1:3.5 မှ 1:5.5 အထိ ရောစပ်ကာ ကုန်ကြမ်းသိုလှောင်ရုံတွင် Raw Mix များ သိုလှောင်ပါသည်။ Raw Mix များအား Bauxite,Pure Lime တို့ဖြင့် လိုအပ်အရည်အသွေးပြည့်မှီအောင် ရောစပ်၍ ကုန်ကြမ်းကြိတ်စက် (Ball Mill)(Ø3.0 x 7m + 1.8m) with Dryer ဖြင့် Raw Meal များအား ကြိတ်ခွဲရ ယူပါသည်။ ထွက်ရှိသော Raw Meal များအား နာရီစဉ်အလိုက် CaO နှင့် Fe_2O_3 ပါဝင် မှု (CaO 40.5 % ~ 41.5)၊ Fe_2O_3 (2.3 % ~ 2.5 %)အထိ ချိန်ညှိခြင်း၊ Moisture ပါဝင်မှု 5% နှင့် မှုန့်ညက်မှု Fineness 10% ထက်မကျော်စေရန် ကြိတ်ခွဲပါသည်။ ကုန်ကြမ်းကြိတ်စက်မှ ထွက်ရှိလာသော Raw Meal များအား Silo (12m Ø x 21m) 2600T အတွင်းသို့ စုဆောင်းပြီးလျှင် လေအားဖြင့်လည်းကောင်း၊ Recycle လုပ်ခြင်း ဖြင့်လည်းကောင်း ပါဝင်သည့် ကုန်ကြမ်းရောစပ်မှု အချိုးအဆအား မျှတတည်ငြိမ်စေရန် ဆောင်ရွက်ပြီး Five Stage Preheater ဖြင့် ကြိုတင်အပူ ပေးပါသည်။ Preheater မှတဆင့် မီးသင်းဖို (Øm 3.2 + 52m) အပူချိန် (1450ºC) တွင် မီးဖုတ်၍ မီးသင့် ကျောက်ထုတ်လုပ်ပါသည်။ အဆိုပါ မီးသင့်ကျောက်များအား Litre Weight (1.3 ~ 1.4 kg/$_{lit}$)နှင့် Free CaO (< 1.5%) ပါဝင်မှုကို နာရီစဉ်စမ်း သပ်၍ အရည်အသွေးပြည့်မှီ မီးသင်းကျောက်များအား Single Drum Cooler (Ø3.2m x36m) ဖြင့်လည်ပတ် အအေးခံ၍ Silo (990 tons x 4) (3960)tons တွင်သို လှောင်ပါသည်။

၂၀။ Silo အတွင်း သိုလှောင်ထားသော Clinker များကို ဂေါဒန်ကျောက် (5 ~ 7%) ထိရောစပ်၍ ကုန်ချောကြိတ်စက် (2.4mØ x 12m) (Ball Mill) ဖြင့်ကြိတ်၍ ဘိလပ်မြေထုတ်လုပ်ပါသည်။ ကုန်ချောကြိတ်စက်မှ ထွက်ရှိလာသော ဘိလပ်မြေများ အား

ဘိလပ်မြေဆိုင်လို (3300 tons x 2) (6600)tons တွင် သိုလှောင်ပါသည်။ Cement Silo ၏ Discharge မှ Air Slide ဖြင့် 6 Nozzle Rotary Cement Packing Machine BH-6W-L (90t/hr) သို့ ပေးပို့ အိတ်သွတ်ဖြန့်ဖြူးပါသည်။

၂၁။ ၂၀၀၂-၂၀၀၃ ခုနှစ်မှ ၂၀၁၃-၂၀၁၄ ခုနှစ်အထိ အဓိကကုန်ထုတ်စက်ကြီးများ၏ ထုတ်လုပ်မှုနှင့် ထုတ်ကုန်ပစ္စည်း၏ စံချိန်စံညွှန်းများမှာ အောက်ပါအတိုင်း ဖြစ်ပါသည်-

စဉ်	နှစ်အမည်	ကုန်ကြမ်းကြိတ်စက်		မီးသင်းဖို		ကုန်ချောကြိတ်စက်	
		စက်လည် (နာရီ)	ထုတ်လုပ်မှု (တန်)	စက်လည် (နာရီ)	ထုတ်လုပ်မှု (တန်)	စက်လည် (နာရီ)	ထုတ်လုပ်မှု (တန်)
၁	၂၀၀၂-၂၀၀၃	730း44	26994	722း56	14389.74	623း25	15925.52
၂	၂၀၀၃-၂၀၀၄	4324း44	131716	4918း37	76717	4594း14	82166
၃	၂၀၀၄-၂၀၀၅	5426း41	176854	6197း58	100960	6207း56	108360
၄	၂၀၀၅-၂၀၀၆	5088း09	168907	6462း11	94933	5724း58	103926
၅	၂၀၀၆-၂၀၀၇	4964း47	154345	5700း26	86653	5685း03	94639
၆	၂၀၀၇-၂၀၀၈	4891း38	147538	5788း05	82988	4788း29	63163
၇	၂၀၀၈-၂၀၀၉	4744း25	155027	5929း35	86840	5831း50	85050
၈	၂၀၀၉-၂၀၁၀	3575း41	126642	5797း51	71120	6517း30	110410
၉	၂၀၁၀-၂၀၁၁	4221း00	139414	6053း53	78370	5099း11	84500
၁၀	၂၀၁၁-၂၀၁၂	3424း52	109771	5411း43	62212	4142း14	66915
၁၁	၂၀၁၂-၂၀၁၃	3445း34	114648	5345း38	64520	3912း25	66450
၁၂	၂၀၁၃-၂၀၁၄	4881း13	154582	6447း48	88250	5638း18	94825
			1606438		907952.74		976329.52

ဘိလပ်မြေအရည်အသွေး

Setting Time Initial > 45 min, Final < 600 min

Blaine Valve > 225 m^2/kg

Expension 0 ~ 10 mm

Compressive Strength	3 days > 23 N/mm^2 ,28 days > 41 N/mm^2
Fineness	< 6 %

ကုန်ကြမ်းနှင့် အခြားလိုအပ်ချက်များ

၂၂။ ဘိလပ်မြေထုတ်လုပ်ရာတွင် အဓိကကုန်ကြမ်းများမှာ ထုံးကျောက်၊ မြေကြီး၊ ဘောက်ဆိုဒ် နှင့် ဂေါ်ဒန်တို့ဖြစ်ပြီး တရက်လိုအပ်ချက်နှင့် ပါဝင်မှု (Composition) မှာ အောက်ပါ အတိုင်းဖြစ်ပါသည်-

(က) ထုံးကျောက် ၆၀၀ တန်/ရက်(CaO 44.00 ~ 52.50%)

(ခ) မြေကြီး ၆၀တန်/ရက် (SiO_2 58.00 ~ 66.50%)

(ဂ) သံကျောက်(Bauxite) ၂၀တန်/ရက်($Fe_2O_3$40~54%)($Al_2O_3$22~35%)

(ဃ) ဂေါ်တန်ကျောက် ၂၀တန်/ရက် ($SO_3$25 ~ 34.5%) Purity(55 ~ 70%)

(င) ကျောက်မီးသွေး ၁၀၀ တန်/ရက် (SiO_2 41.00 ~ 58.97%)

၂၃။ ကုန်ကြမ်းရောစပ်မှုအရ ပျမ်းမျှသုံးစွဲရသော ကုန်ကြမ်းအချိုးနှင့် သတ်မှတ် Norm မှာ အောက်ပါအတိုင်းဖြစ်ပါသည်-

		ကုန်ကြမ်းအချိုး	သတ်မှတ်Norm
(က)	ထုံးကျောက်	၈၂ %	(၁.၄၅၀)
(ခ)	မြေကြီး	၁၅ %	(၀.၁၅၀)
(ဂ)	သံကျောက်(Bauxite)	၃ %	(၀.၀၆၅)
(ဃ)	ဂေါ်တန်	(၆ ~ ၇%) (ကုန်ချောပိုင်း)	(၀.၀၇၀)

ထုံးကျောက်၏ ပမာဏ

၂၄။ ထုံးကျောက်သိုက်ပမာဏမှာ (၁၁-၂)အဆင့် တန် (၇၀)သန်းခန့်၊(၂၄၈.၂၅)ဧကာ

ကျယ်ဝန်းပြီး တန် (၅၀၀) ဘိလပ်မြေစက်ရုံ၏ လိုအပ်ချက်အပေါ်တွင် နှစ် (၃၀၀)ခန့် အသုံးပြုနိုင်ပါသည်။

တန် (၅၀၀)　　၆၀၀ တန်/ရက်　　၁၈၀၀၀၀ တန်/နှစ်

ထုံးကျောက်ကုန်ကြမ်းထုတ်လုပ်မှုအဆင့်ဆင့်

၂၅။ ထုံးတောင်ကျောက်မိုင်း (Quarry) မှ ထုံးကျောက်များထုတ်လုပ်ရာတွင် လွန်တူးခြင်း (Drilling)၊ ယမ်းဖောက်ခွဲခြင်း (Blasting)၊ ကားတင်ခြင်း (Loading)နှင့် ကျောက်ခွဲစက် (Crusher) သို့ သယ်ပို့ခြင်း၊ (Hauling) စသည့် လုပ်ငန်းစဉ် အဆင့်ဆင့်ဖြင့် ယန္တရားများ အသုံးပြု၍ ထုတ်လုပ်ပါသည်။ ထုံးကျောက်တောင်ဖွံ့ဖြိုးရေး လုပ်ငန်းအား ၂၀၀၀-၂၀၀၁ ခုနှစ်မှစ၍ စတင်အကောင်အထည်ဖော် လုပ်ကွက်ဖွင့်ထုတ်လုပ်ခဲ့ရာ နှစ်စဉ်လုပ်ကွက်သစ်ဖွင့်ခြင်း၊ တောင်တက်ကားလမ်းများ ဖောက်လုပ်ခြင်း၊ ထုံးကျောက်တောင်မျက်နှာပြင်ရှင်းလင်း ခြင်း၊ Dimond Drill တူးဖော်ခြင်း၊ လုပ်ကွက်တက်လမ်းသို့ ကွန်ကရစ်လမ်းခင်းခြင်း၊ ကုန်ထုတ်လမ်းကြမ်းများ ဖောက်လုပ်ခြင်း၊ လုပ်ကွက်သို့ ချဉ်းကပ်လမ်းဖောက်လုပ်ခြင်း၊ လက်ရှိလမ်းအားချဲ့ခြင်း၊ ကျောက်သားနံရံရေမြောင်းများ ကာရံခြင်း၊ လမ်းဂွေ့ချဲ့ခြင်း၊ အပေါ်ယံမြေ လွှာဖယ်ရှားခြင်းများကို နှစ်အလိုက် ငွေလုံးငွေရင်းအသုံးစရိတ်ဖြင့် ဆောင်ရွက်ခဲ့ပါသည်။

နှစ်အမည်	ခွင့်ပြုငွေ (ကျပ်သန်း)	ဆောင်ရွက်မှုလုပ်ငန်း
၂၀၀၁-၂၀၀၂	20.00 သန်း	- ကုန်ကြမ်းလမ်း၊ တောင်တက်လမ်းဖောက်ခြင်း
၂၀၀၂-၂၀၀၃	20.00 သန်း	- လုပ်ကွက်ဖွင့်၊ ကျောက်ထုတ်လုပ်ခြင်း၊ တောင်တက်လမ်းဖောက်ခြင်း
၂၀၀၃-၂၀၀၄	27.00 သန်း	- 250' ကွန်ကရစ်လမ်းခင်းခြင်း၊ 5661ဂါလံ HSD ဝယ်ယူခြင်း
၂၀၀၄-၂၀၀၅	20.00 သန်း	- 750' Level မှ 950' Level သို့ 1744' ကုန်ထုတ်လမ်းဖောက်ခြင်း၊ 1006' ကွန်ကရစ်လမ်းခင်းခြင်း
၂၀၀၅-၂၀၀၆	20.00 သန်း	- စိန်လွန်ကျင်း (၅)ကျင်း တူးဖော်ခြင်း လုပ်ငန်း
၂၀၀၆-၂၀၀၇	15.00 သန်း	- (2150') ကျောက်သားနံရံရေမြောင်းပြုလုပ်ခြင်း
၂၀၀၇-၂၀၀၈	20.00 သန်း	- Over Burden ဖယ်ရှားခြင်း (890',900',910') Level
၂၀၀၈-၂၀၀၉	10.00 သန်း	- ကျောက်ဖယ်ရှားခြင်း၊ လမ်းချဲ့ခြင်း၊ 800' လမ်းဖောက်ခြင်း
၂၀၀၉-၂၀၁၀	10.00 သန်း	- (680'x24'x0.67') ကွန်ကရစ်လမ်း
၂၀၁၀-၂၀၁၁	15.00 သန်း	- ကွန်ကရစ်လမ်းခင်း 268 ', ကုန်ထုတ်လမ်းကြမ်း 200',လုပ်ကွက်သစ်ဖွင့်ခြင်း (100')၊ လမ်းအကျယ်ချဲ့ခြင်း (1200')
၂၀၁၁-၂၀၁၂	15.00 သန်း	- Over Burden ဖယ်ရှားခြင်း (870' Level လုပ်ကွက်သစ်ဖွင့်ခြင်း

၂၀၁၂-၂၀၁၃ ၂၀၁၃-၂၀၁၄	- 20.00 သန်း	- မရှိပါ။ - ကုန်ထုတ်လမ်း 740' ဖောက်လုပ်ခြင်း၊ 100' လမ်းချဲ့ခြင်း၊ 840' 810' Level လုပ်ကွက်ဖွင့်ခြင်း။

အခြားကုန်ကြမ်းလိုအပ်ချက်များ

၂၆။ မြေကြီးကုန်ကြမ်းအား စက်ရုံအနီးလုပ်ကွက်မှ ထုတ်လုပ်ပါသည်။ တစ်ရက်လျှင် ၁၁၀တန် သုံးစွဲပြီး ၂၀၁၃-၂၀၁၄ ခုမှ ၂၀၁၃-၂၀၁၄ ခုထိ ထုတ်လုပ်ပြီး (၁)ဧကခန့်ရှိပါသည်။

၂၇။ ဘောက်ဆိုဒ်ကုန်ကြမ်းအား မွန္တလေးတိုင်း၊ ပြင်ဦးလွင်မြို့နယ်၊ နတ်တောင်မှ ထုတ်လုပ်ပါသည်။ တစ်ရက်လျှင် ၂၀ တန်ခန့် သုံးစွဲပြီး (၁.၁.၂၀၁၉)ထိ (၂၅)နှစ် ထုတ်လုပ်ခွင့်ရရှိပါသည်။

၂၈။ ဂျိပ်တန်ကုန်ကြမ်းအား နမ္မ၊ သီပေါတို့မှ ဝယ်ယူရရှိပြီး တစ်ရက်လျှင် ၂၀ တန်ခန့်သုံးစွဲပါသည်။

လျှပ်စစ်ဓါတ်အား လိုအပ်ချက်နှင့်ရရှိမှု အခြေအနေ

၂၉။ လျှပ်စစ်ဓါတ်အားကို အင်းကုန်းဓါတ်အားခွဲရုံမှ 33KV / 6.3 KV, 5 MVA နှင့် အိမ်ယာအတွက် အပ်ချုပ်စက် Transformer 33/ 6.6KV, 8 MVA များမှ ရယူပြီး တစ်နေ့လျှင် 5MW လိုအပ်ပါသည်။ စက်ရုံလက်ရှိသုံးစွဲမှု မှာ 3 MW ဖြစ်ပါသည်။ အင်းကုန်း မှ စက်ရုံနယ်မြေသို့ ACSR 185 mm^2 လိုင်းကြိုးဖြင့် Feeder (4) မှ ပေးပို့လျက် ရှိပါသည်။ ၂၀၁၄-၂၀၁၅ခုနှစ်မှ၍ အင်းကုန်းဓါတ်အားခွဲရုံမှ မယူဘဲ Gas Engine Power Station (APR) ကျောက်ဆည်စက်ရုံနယ်မြေမှ ရယူသုံးစွဲလျက်ရှိပါသည်။

၃၀။ စက်ရုံ၏ လက်ရှိတွင် ကုန်ထုတ်မီတာ (YN-11013) အား (5 MVA, 33/6.3KV Sub-Station ဖြင့်လည်းကောင်း၊ အိမ်ယာမီတာ (XN-43968) အား [8 MVA, 33/ 6.6KV. Sub-Station] မှ 500 KVA ဖြင့်လည်းကောင်း၊ သင်းတွဲမီတာ (XN – 88675) Water Pump အား (350 KVA, 33/0.4 KV)ဖြင့်လည်းကောင်း ရယူအသုံးပြုလျက် ရှိပါသည်။

၃၁။ ၂၀၀၂-၂၀၀၃ မှ ၂၀၁၃-၂၀၁၄ထိ ကုန်ထုတ်လုပ်မှုအပေါ် လျှပ်စစ်ဓါတ်အား သုံးစွဲမှု Consumption များမှာ အောက်ပါအတိုင်းဖြစ်ပါသည်-

စဉ်	နှစ်အမည်	ဘိလပ်မြေ ထုတ်လုပ်မှု	သုံးစွဲယူနစ် (KWH)	Consumption (KWH/ton)
၁။	၂၀၀၂-၂၀၀၃	15925.52	1694672	106.42
၂။	၂၀၀၃-၂၀၀၄	82166.00	12451240	151.54
၃။	၂၀၀၄-၂၀၀၅	108360.00	15173530	140.03
၄။	၂၀၀၅-၂၀၀၆	103926.00	14278790	137.37
၅။	၂၀၀၆-၂၀၀၇	94639	13903180	146.91
၆။	၂၀၀၇-၂၀၀၈	63163	13062718	206.81
၇။	၂၀၀၈-၂၀၀၉	85050	13477144	158.46
၈။	၂၀၀၉-၂၀၁၀	110410	12758592	115.56
၉။	၂၀၁၀-၂၀၁၁	84500	11810392	139.77
၁၀။	၂၀၁၁-၂၀၁၂	66915	11323708	169.23
၁၁။	၂၀၁၂-၂၀၁၃	66450	10040316	151.10
၁၂။	၂၀၁၃-၂၀၁၄	94825	13252360	139.76
		976329.52	**143226742**	**146.70**

သဘာဝဓါတ်ငွေ့

၃၂။ အဓိကလောင်စာဖြစ်သော သဘာဝဓါတ်ငွေ့အား ချောက်(လမ်းရွာ)ရေနံမြေ Station မှ Ø 14" ပိုက်ဖြင့် ပလိပ်ခွဲရုံမှ Ø10" ပိုက်ဖြင့် ခွဲယူပေးပို့ပြီး စက်ရုံသို့ Ø4" ပိုက်လိုင်းဖြင့် ပေးပို့ပါသည်။ သဘာဝဓါတ်ငွေ့လိုအပ်ချက်မှ တစ်ရက်လျှင် ၂ကုဗပေ သန်းဖြစ်ပြီး အများဆုံးသုံးစွဲမှုမှာ (၁.၈)ကုဗပေသန်းခန့်ရှိပါသည်။ ၂၀၀၂-၂၀၀၃ခုနှစ်မှ ၂၀၁၃-၂၀၁၄ ခုနှစ်အထိ ကလင်ကာထုတ်လုပ်မှုအရ သဘာဝဓါတ်ငွေ့သုံးစွဲမှု၊ Norm (စံနှုန်း)တို့မှာ အောက်ပါအတိုင်းဖြစ်ပါသည်-

စဉ်	နှစ်အမည်	ကလင်ကာ ထုတ်လုပ်မှု (တန်)	သဘာဝဓါတ် ငွေ့သုံးစွဲမှု (ကုဗပေသန်း)	သုံးစွဲမှု (Norm) (ကုဗပေ/တန်)
၁။	၂၀၀၂-၂၀၀၃	14389.74	45.747	3179.08
၂။	၂၀၀၃-၂၀၀၄	76717.00	330.687	4310.46
၃။	၂၀၀၄-၂၀၀၅	100960.00	465.582	4611.55
၄။	၂၀၀၅-၂၀၀၆	94933.00	439.771	4632.44
၅။	၂၀၀၆-၂၀၀၇	86653.00	400.073	4616.96
၆။	၂၀၀၇-၂၀၀၈	82988.00	407.265	4907.52
၇။	၂၀၀၈-၂၀၀၉	86840.00	400.574	4612.78
၈။	၂၀၀၉-၂၀၁၀	71120.00	400.540	5631.89
၉။	၂၀၁၀-၂၀၁၁	78370.00	434.164	5539.93
၁၀။	၂၀၁၁-၂၀၁၂	62212.00	398.990	6413.39
၁၁။	၂၀၁၂-၂၀၁၃	64520.00	381.493	5912.79
၁၂။	၂၀၁၃-၂၀၁၄	88250.00	497.865	5641.53
		907952.74	**4602.751**	**5069.37**

သတ်မှတ် (Norm) မှာ ၅၀၀၀ ကုဗပေ/တန်(ကလင်ကာ)ဖြစ်ပါသည်။

၃၃။ စက်ရုံ၏ ကလင်ကာ (၁)တန်၏ အပူသုံးစွဲမှုမှာ 1000Kcal/kg of Clinker ဖြစ်ပြီး သဘာဝဓါတ်ငွေ့ Natural Gas ကျောက်ဆည်၏ Chemical Composition ပါဝင်မှုမှာ အောက်ပါအတိုင်းဖြစ်ပါသည်-

1. Mathane CH_4 96.2
2. Ethane C_2H_6 2.1
3. Propane C_3H_8 0.8
4. Iso Butanes C_4H_{10} 0.3
5. N. Butanes
6. Iso Pentane C_5H_2 0.2

7. N.Pentane 0.1
8. SRAR Cal; 0.587
9. Heating Vate(Net) (BTU/SCF) 961.00

၃၄။ စက်ရုံ၏ လက်ရှိကလင်ကာ(၁)တန်၏ အပူသုံးစွဲမှုမှာ 1100 Kcal/kg of Clinker ထိရှိပါသည်။

ကျောက်မီးသွေး

၃၅။ စက်ရုံအား စတင်တည်ဆောက်ပြီး သဘာဝဓါတ်ငွေ့အပြည့်အဝ မရရှိချိန်ဖြစ် သည့် ၂၀၀၃-၂၀၀၄ ခုနှစ်တွင် အရံလောင်စာဖြစ်သည့် ကျောက်မီးသွေးနှင့် မီးထိုး ဆောင်ရွက်ခြင်း၊ ၂၀၁၂-၂၀၁၃ခုနှစ်တွင်လည်း (gas + coal) ၂မျိုး ဖြင့် Dual မီးထိုး ခြင်းများ စမ်းသပ်ဆောင်ရွက်ခဲ့ပါသည်။ ကျောက်မီးသွေးသီးသန့် မီးထိုးပါက တစ်နေ့လျှင် Calorific Value 4500 Kcal/kg ရှိသော ကျောက်မီးသွေး (၁၀၀)တန် လို အပ်ပါသည်။ Dual Burnning ပြုလုပ်ပါကGas(Psi)အနည်းငယ်နှင့် ကျောက်မီးသွေး (၄၀)တန်ခန့် လိုအပ်ပါသည်။ ကျောက်မီးသွေးကို နမ္မ၊ ကလေးဝ မှ ဝယ်ယူသုံးစွဲပါ သည်။

ရေ

၃၆။ စက်များအအေးခံစနစ်အတွက် လိုအပ်သော ရေအား စက်ရုံမှ (11415′) အရှည် ကွာဝေးသော သင်းတွဲမြောင်းမှ 22 KW Pump & Motor (၂)လုံးဖြင့် စုပ်ယူ၍ 8″ØGI Pipe ဖြင့် စက်ရုံရှိ ၈၀၀၀၀ ဂါလံဆံ့ Water Pound (Receiver) သို့ ပို့လွှတ်သွယ် တန်း ရယူပါသည်။ သင်းတွဲ Pump (Capacity 60$m^3/_{hr}$)တွင် ၁၀၀၀၀၀ ဂါလံ Water Pound (၂)ခုရှိပြီး၊ အကျယ်မှာ 97′ x 31′ နှင့် 107′-6″x40′-6″ ဖြစ်ပါသည်။ စက်ရုံမူလ အအေးခံစနစ်တွင် အသုံးပြုရန် Supply System အတွက် 1000m^3 (ဂါလံ-၂၀၀၀၀၀) ဆံ့ ရေကန် (၁)လုံးနှင့် Circulation System အတွက် 1000m^3 (ဂါလံ၂၀၀၀၀၀)ဆံ့ ရေကန်(၁)လုံးစီ ထားရှိပါသည်။ တစ်နေ့ရေလိုအပ်ချက်မှာ ၇၅၀၀ ဂါလံ ဖြစ်ပါသည်။

လျာထားထုတ်လုပ်မှုနှင့် ဖြန့်ဖြူးရောင်းချမှု

၃၇။ ၂၀၀၂-၂၀၀၃ ခုနှစ်မှ ၂၀၁၃-၂၀၁၄ ခုနှစ်ထိ လျာထား၊ ထုတ်လုပ်၊ ဖြန့်ဖြူးမှုမှာ အောက်ပါအတိုင်း ဖြစ်ပါသည်-

စဉ်	နှစ်အမည်	လျာထားချက် (တန်)	ထုတ်လုပ်မှု (တန်)	ဖြန့်ဖြူး ရောင်းချမှု (တန်)
၁။	၂၀၀၂-၂၀၀၃	29000	15925.52	13629.500
၂။	၂၀၀၃-၂၀၀၄	105600	82166.00	83073.860
၃။	၂၀၀၄-၂၀၀၅	120000	108360.00	107746.350
၄။	၂၀၀၅-၂၀၀၆	120000	103926.00	105596.740
၅။	၂၀၀၆-၂၀၀၇	120000	94639.00	92937.950
၆။	၂၀၀၇-၂၀၀၈	110000	63163.00	64764.500
၇။	၂၀၀၈-၂၀၀၉	100000	85050.00	85102.250
၈။	၂၀၀၉-၂၀၁၀	83400	110410.00	109441.250
၉။	၂၀၁၀-၂၀၁၁	65000	84500.00	85232.920
၁၀။	၂၀၁၁-၂၀၁၂	80000	66915.00	67497.045
၁၁။	၂၀၁၂-၂၀၁၃	80000	66450.00	66275.800
၁၂။	၂၀၁၃-၂၀၁၄	80000	94825.00	94704.500
		1093000	**976329.52**	**976002.665**

၃၈။ နှစ်အလိုက်ဖြန့်ဖြူးရောင်းချသော ဘိလပ်မြေ တစ်တန် ဈေးနှုန်းများမှာ အောက်ပါအတိုင်းဖြစ်ပါသည်-

စဉ်	နှစ်အမည်	တစ်တန်ဈေးနှုန်း(ကျပ်)
၁။	၂၀၀၂-၂၀၀၃	8000 ~ 13500
၂။	၂၀၀၃-၂၀၀၄	14000
၃။	၂၀၀၄-၂၀၀၅	13000
၄။	၂၀၀၅-၂၀၀၆	60000
၅။	၂၀၀၆-၂၀၀၇	70000
၆။	၂၀၀၇-၂၀၀၈	70000
၇။	၂၀၀၈-၂၀၀၉	70000
၈။	၂၀၀၉-၂၀၁၀	70000
၉။	၂၀၁၀-၂၀၁၁	70000
၁၀။	၂၀၁၁-၂၀၁၂	60000
၁၁။	၂၀၁၂-၂၀၁၃	76000
၁၂။	၂၀၁၃-၂၀၁၄	86000

ရင်းနှီးမြှုပ်နှံမှု ဘဏ္ဍာရေးဆိုင်ရာ အချက်အလက်များ

၃၉။ ၂၀၀၂-၂၀၀၃ ခုနှစ်မှ ၂၀၁၃-၂၀၁၄ ခုနှစ်အထိ ရင်းနှီးမြှုပ်နှံမှု ဘဏ္ဍာရေးဆိုင်ရာ အချက်အလက်များမှာ တစ်ဖက်ပါအတိုင်းဖြစ်ပါသည်-

ငွေလုံးငွေရင်းအသုံးစရိတ်

(ကျပ်ထောင်ပေါင်း)

စဉ်	နှစ်အမည်	ငွေစာရင်းခေါင်းစဉ်အမည်			
		ဆောက်လုပ်ရေး	စက်ပစ္စည်း	အခြား	စုစုပေါင်း
၁။	၂၀၀၂-၂၀၀၃	3574799.00	202316.00	428272.00	4205387.00
၂။	၂၀၀၃-၂၀၀၄	287380.00	136090.00	27000.00	450470.00
၃။	၂၀၀၄-၂၀၀၅	453852.00	273398.00	20000.00	747250.00
၄။	၂၀၀၅-၂၀၀၆	21300.00	220800.00	20000.00	262100.00
၅။	၂၀၀၆-၂၀၀၇	102603.00	392445.00	14999.00	510047.00
၆။	၂၀၀၇-၂၀၀၈	326386.00	754569.00	20000.00	1100955.00
၇။	၂၀၀၈-၂၀၀၉	36514.00	589008.00	10000.00	635522.00
၈။	၂၀၀၉-၂၀၁၀	192737.00	237897.00	9998.00	440632.00
၉။	၂၀၁၀-၂၀၁၁	32051.00	294732.00	15893.00	342676.00
၁၀။	၂၀၁၁-၂၀၁၂	356430.00	399557.00	70680.00	826667.00
၁၁။	၂၀၁၂-၂၀၁၃	294926.00	648126.00	-	943052.00
၁၂။	၂၀၁၃-၂၀၁၄	112291.00	14670.00	19980.00	146941.00
		5791269.00	4163608.00	656822.00	10611699.00

ကုန်သွယ်မှု

စဉ်	နှစ်အမည်	ဝင်ငွေ (ကျပ်သန်း)	ကုန်ကျစရိတ် (ကျပ်သန်း)	အမြတ် (+) အရှုံး(-) (ကျပ်သန်း)		ကုန်ကျစရိတ်နှင့် ဝင်ငွေအချိုး %
၁။	၂၀၀၂-၂၀၀၃	151.428	56.155	(+)	95.273	37.08
၂။	၂၀၀၃-၂၀၀၄	1000.335	880.987	(+)	119.348	88.07
၃။	၂၀၀၄-၂၀၀၅	1444.866	1306.292	(+)	138.574	90.41
၄။	၂၀၀၅-၂၀၀၆	3321.549	1870.884	(+)	1450.665	56.33
၅။	၂၀၀၆-၂၀၀၇	6342.243	3039.373	(+)	3302.870	47.92
၆။	၂၀၀၇-၂၀၀၈	3878.978	2410.839	(+)	1468.139	62.15
၇။	၂၀၀၈-၂၀၀၉	5045.126	3252.066	(+)	1793.060	64.46
၈။	၂၀၀၉-၂၀၁၀	6539.528	4385.550	(+)	2153.978	67.06
၉။	၂၀၁၀-၂၀၁၁	4888.144	3514.402	(+)	1373.742	71.90
၁၀။	၂၀၁၁-၂၀၁၂	3650.705	3434.165	(+)	216.540	94.07
၁၁။	၂၀၁၂-၂၀၁၃	5056.898	3015.087	(+)	2041.811	59.62
၁၂။	၂၀၁၃-၂၀၁၄	7767.806	3621.062	(+)	4146.744	46.62
(၁၂)နှစ်စုစုပေါင်း		49087.606	30786.862		18300.744	62.72

ငွေသား

စဉ်	နှစ်အမည်	ရငွေ (ကျပ်သန်း)	ပေးငွေ (ကျပ်သန်း)	ပိုငွေ (+)/ လိုငွေ(-) (ကျပ်သန်း)	
၁။	၂၀၀၂-၂၀၀၃	194.946	83.921	(+)	111.025
၂။	၂၀၀၃-၂၀၀၄	761.384	669.714	(+)	91.670
၃။	၂၀၀၄-၂၀၀၅	1513.528	1196.547	(+)	316.981
၄။	၂၀၀၅-၂၀၀၆	3276.798	1839.862	(+)	1436.936
၅။	၂၀၀၆-၂၀၀၇	6185.400	3163.851	(+)	3021.549
၆။	၂၀၀၇-၂၀၀၈	3819.632	3010.946	(+)	808.686
၇။	၂၀၀၈-၂၀၀၉	4852.847	3639.768	(+)	1213.079
၈။	၂၀၀၉-၂၀၁၀	6957.126	3989.929	(+)	2967.197
၉။	၂၀၁၀-၂၀၁၁	5503.813	3427.860	(+)	2075.953
၁၀။	၂၀၁၁-၂၀၁၂	3700.882	2939.484	(+)	761.398
၁၁။	၂၀၁၂-၂၀၁၃	5533.283	2813.035	(+)	2720.248
၁၂။	၂၀၁၃-၂၀၁၄	7406.195	3290.877	(+)	4115.318
(၁၂)နှစ်စုစုပေါင်း		49705.834	30065.794		19640.040

ဖွဲ့စည်းပုံနှင့် လူအင်အား

၄၀။ ဘိလပ်မြေစက်ရုံ စတင်တည်ဆောက်ပြီး ၂၀၀၂-၂၀၀၃ခုနှစ်တွင် စက်ရုံ၌ စုစု ပေါင်း ဝန်ထမ်း (၁၃၃)ဦးရှိသည့်အနက် အုပ်ချုပ်သူအရာထမ်း (၁၂)ဦး၊ ကျွမ်းကျင်ဝန် ထမ်း အမှုထမ်း (၅၃)ဦးနှင့် လုပ်သားအထွေထွေ (၆၈)ဦးရှိခဲ့ပါသည်။ ၂၀၀၂-၂၀၀၃ခုနှစ် မှ ၂၀၁၃-၂၀၁၄ခုနှစ်အထိ ဖွဲ့စည်းပုံနှင့် ဝန်ထမ်းခန့်ထားမှုမှာ အောက်ပါအတိုင်း ခန့်အပ်ခဲ့ပါသည်။

စဉ်	နှစ်အမည်	ဖွဲ့စည်းပုံ	အရာထမ်း	အမှုထမ်း	အခြား	ပေါင်း
၁။	၂၀၀၂-၂၀၀၃	666	12	53	68	133
၂။	၂၀၀၃-၂၀၀၄	666	12	55	70	137
၃။	၂၀၀၄-၂၀၀၅	666	35	349	2	386
၄။	၂၀၀၅-၂၀၀၆	666	36	322	11	369
၅။	၂၀၀၆-၂၀၀၇	666	32	309	8	349
၆။	၂၀၀၇-၂၀၀၈	666	40	299	9	348
၇။	၂၀၀၈-၂၀၀၉	666	39	275	16	330
၈။	၂၀၀၉-၂၀၁၀	666	42	241	14	297
၉။	၂၀၁၀-၂၀၁၁	666	46	225	11	282
၁၀။	၂၀၁၁-၂၀၁၂	666	46	218	21	285
၁၁။	၂၀၁၂-၂၀၁၃	458	49	195	27	271
၁၂။	၂၀၁၃-၂၀၁၄	458	53	188	16	257

အထွေထွေသုံးသပ်ချက်

၄၁။ အမှတ်(၁)စက်မှုဝန်ကြီးလက်အောက်ရှိ စက်ရုံ(၃)ရုံဖြစ်သည့် သရက်စက်ရုံ၊ ကြံခင်းစက်ရုံနှင့် ကျောက်ဆည်စက်ရုံတွင် ကျောက်ဆည်ဘိလပ်မြေစက်ရုံသည် Dry Process စက်ရုံဖြစ်ပြီး မြန်မာနိုင်ငံ စက်မှုဝန်ကြီးဌာန၏ ပထမဦးဆုံးသော အခြောက် စနစ် စက်ရုံဖြစ်ပါ သည်။ ၂၀၁၂-၂၀၁၃ခုနှစ်တွင် အမှတ်(၁)စက်မှုဝန်ကြီးဌာနအား အမှတ်(၂)စက်မှုဝန်ကြီးဌာနနှင့် ပူးပေါင်း၍ စက်မှုဝန်ကြီးဌာနဟု ပြောင်းလဲချိန်တွင် မြန်မာ့ကြွေထည်မြေထည်လုပ်ငန်းအား အမှတ်(၃)အကြီးစားစက်မှုလုပ်ငန်း၊ ဘိလပ်မြေ စက်ရုံ(သရက်၊ ကြံခင်း၊ ကျောက်ဆည်)တို့အား အမှတ်(၃၁)အကြီးစားစက်ရုံ(သရက်)၊ အမှတ်(၃၂) အကြီးစားစက်ရုံ(ကြံခင်း)၊ အမှတ်(၃၃)အကြီးစားစက်ရုံ(ကျောက်ဆည်) အဖြစ်ပြောင်းလဲသတ်မှတ်ခဲ့ပါသည်။ စက်ရုံအား ၂၀၀၂-၂၀၀၃ခုနှစ်မှ ၂၀၁၃-၂၀၁၄ ခုနှစ်ထိ(၁၂)နှစ်ခန့် နိုင်ငံပိုင်လုပ်ငန်းဖြင့် ထုတ်လုပ်ဖြန့်ဖြူးရောင်းချခဲ့ပြီး ၂၀၁၄-၂၀၁၅ ခုနှစ်တွင် Myanmar Conch Co.,Ltd. သို့ အကျိုးတူ ပူးပေါင်းသော စက်ရုံ (Production Share) အား BOT စနစ် (Build , Operate and Transfer) ဖြင့် ဆက် လက်ဆောင်ရွက်ခဲ့ပါသည်။

၄၂။ ၂၀၁၄-၂၀၁၅ခုနှစ် ဧပြီလမှစ၍ Product Share ဖြင့်ပူးပေါင်းဆောင်ရွက်မှု စတင် နိုင်ရန်အတွက် BOT စာချုပ် မချုပ်ဆိုမီ AOD (Agreement on Discussion) ဖြင့်

(၂.၄.၂၀၁၄)ရက်နေ့တွင် ကြိုတင်သဘောတူ ဆောင်ရွက်ခဲ့ပါသည်။ ၄င်း AOD ကို (၁၇.၉.၂၀၁၄)ရက်နေ့တွင် Amendment ပြုလုပ်၍ အတည်ပြုခဲ့ပါသည်။ ၄င်းနောက် BOT စာချုပ်ဆိုခြင်းကို (၁၃.၁၁.၂၀၁၄)ရက်နေ့တွင် ချုပ်ဆိုခဲ့ပြီး Product Share ဖြင့် Myanmar Conch Co.,Ltd. နှင့် ဆက်လက်ဆောင်ရွက်ခဲ့ခြင်း ဖြစ်ပါသည်။

၄၃။ သို့ဖြစ်ပါ၍ ကျောက်ဆည်ဘိလပ်မြေစက်ရုံ(ကျောက်ဆည်)၊ အမှတ်(၃၃)အကြီးစားစက်ရုံသည် ၂၀၀၃ခုနှစ် ဇန်နဝါရီလ (၂၇)ရက်မှစ၍ ဖွင့်လှစ်ခဲ့ပြီး ၂၀၁၃-၂၀၁၄ခုနှစ် အထိ (၁၂)နှစ်တာ ကာလအတွင်း မြန်မာနိုင်ငံ၏ အဓိကတည်ဆောက်ရေးလုပ်ငန်းများဖြစ်သော ရဲရွာရေအားလျှပ်စစ်တည်ဆောက်ခြင်း၊ မြို့ကြီးတမံတည်ဆောက်ခြင်း၊ ကျိုင်းတောင်းရေအားလျှပ်စစ်တည်ဆောက်ခြင်း၊ မန္တလေး-ရန်ကုန် အမြန်လမ်းမကြီးတည်ဆောက်ခြင်းစသည့် အရေးကြီးလုပ်ငန်းများအတွက် အထက်မြန်မာပြည်ရှိ အစိုးရစက်ရုံတစ်ခုအဖြစ် ဘိလပ်မြေလိုအပ်ချက်များကို ဖြည့်ဆည်းဆောင်ရွက်ခဲ့သည့် စက်မှုလုပ်ငန်းသမိုင်းဝင် စက်ရုံတစ်ရုံအဖြစ် မှတ်တမ်းတင်ထားရှိသွားမည် စက်ရုံတစ်ရုံ ဖြစ်ပါကြောင်း မှတ်တမ်းပြုအပ်ပါသည်။

ဘိလပ်မြေစက်ရုံ(ကျောက်ဆည်)

အမှတ်(၃၃)အကြီးစားစက်ရုံ(ကျောက်ဆည်)

မန္တလေးတိုင်းဒေသကြီး၊ ကျောက်ဆည်မြို့

၂၀၁၄ ခုနှစ် နိုဝင်ဘာလ။

Appendix 6

GRIEVANCE MECHANISM PROCEDURE

Table of Content

GRIEVANCE MECHANISM PROCEDURE

1. INTRODUCTION

The purpose of this document is to formalize the management of grievances from stakeholders to minimize the social risks to the business. The grievance process, outlined in the document, provides an avenue for stakeholders to voice their concerns and gives transparency on how grievances will be managed internally, which aims to reduce conflict and strengthen relationships between external stakeholders.

2. SCOPE

The grievance mechanism procedure applies to all external stakeholders of our operations and activities. This procedure does not cover grievances raised by internal stakeholders, such as employees, who are to refer to Myanmar Conch's internal grievance standard located on Myanmar Conch's intranet.

Specific and localized grievance mechanisms may need to be put in place for future development projects, which take into account local language and customs.

3. DEFINITIONS

Term	Definition
Grievance	An issue, concern, problem, or claim (perceived or actual) that an individual or community group wants addressed by the company in a formal manner.
Grievance Mechanism	A formalized way to accept, assess, and resolve community complaints concerning the performance or behavior of the company, its contractors, or employees. This includes adverse economic, environmental and social impacts.
Internal Stakeholders	Groups or individuals within a business who work directly within the business, such as employees and contractors.
External Stakeholders	Groups or individuals outside a business who are not directly employed or contracted by the business but are affected in some way from the decisions of the business, such as customers, suppliers, community, NGOs and the government.

4. GRIEVANCE REPORTING CHANNELS

Myanmar Conch will communicate this procedure to its external stakeholders to raise awareness and offer transparency of how stakeholders can voice their grievances. Various channels for external stakeholders to vocalize their grievances formally include:

Telephone: Stakeholders can call Myanmar Conch's head office on 01 378854 (55-56) and request to speak to a stakeholder contact officer.

Email: Grievances can be sent to myintinvestmentgroup@gmail.com

Face to face: Stakeholders can voice their grievance to any Myanmar Conch employee who will then escalate using the correct process.

Stakeholders can voice their grievance to any Myanmar Conch employee who will then escalate using the correct process.

5. ROLES AND RESPONSIBILITIES

Role/ Position Title	Responsibility
Grievance Owner	▪ Employee investigating the grievance and liaising with the external stakeholder/s. ▪ Developing resolutions and actions to rectify any issues. ▪ Follow up and track progress of grievance. ▪ Document any interactions with external stakeholders.
Stakeholder Contact Officer	▪ Receive grievances and assign a grievance owner. ▪ Makes sure the grievance mechanism procedure is being adhered to and followed correctly. ▪ Maintains grievance register and monitor any correspondence. ▪ Monitor grievances/trends over time and report findings. ▪ Raise internal awareness of the grievance mechanism among employees and contractors.
Employees	▪ Receive grievances in person. ▪ Report grievance to the Stakeholder Contact Officer by lodging the Grievance Lodgement Form. ▪ May provide information and assistance in developing a response and close out of a grievance.

6. GRIEVANCE MECHANISM PROCESS

The figure below describes the process that will be used to resolve any grievances:

6.1 Receive Grievance

In Person/ over the phone

If a grievance is received face to face or over the phone and the stakeholder wishes to address the grievance formally, it is the responsibility of the employee who receives the grievance to complete a Grievance Lodgement Form (see Form I). Once the form is completed the employee will then pass the form on to the stakeholder contact officer for processing.

Electronic

The stakeholder contact officer receives all grievances that come through via email. The stakeholder contact officer will review the grievance form and process the grievance in accordance to this procedure.

6.2 Record

All formal grievances will be logged in the External Grievance Register (see Form II) and Grievance Lodgement Forms will be saved in Myanmar Conch's intranet for record of correspondence.

6.3 Screen

The stakeholder contact officer is responsible for assigning a grievance owner to liaise with the external stakeholder/s and work on a resolution. Grievances will be screened depending the level of severity in order to determine who the grievance owner will be and how the grievance is approached. See below table categorizing the different levels:

Category	Description	Grievance Owner
Level 1	When an answer can be provided immediately and/or Myanmar Conch are already working on a resolution. (Only formal grievances to be lodged in the External Grievance Register)	Stakeholder Contact Officer
Level 2	One off grievances that will not affect the reputation of Myanmar Conch.	Supervisor level or above
Level 3	Repeated, extensive and high-profile grievances that may jeopardize the reputation of Myanmar Conch.	Executive level

6.4 Acknowledge

A grievance will be acknowledged, by the grievance owner, within two working days of a grievance being submitted. Communication will be made either verbally or in written form (stakeholders will outline their preferred method of contact on the Grievance Lodgement Form, see Form I).

The acknowledgement of a grievance should include a summary of the grievance, method that will be taken to resolve the grievance and an estimated timeframe in which the grievance will be resolved. If required, the acknowledgment provides an opportunity to ask for any additional information or to clarify any issues.

6.5 Investigate

The grievance owner is responsible for investigating the grievance. The investigation may require the grievance owner to make site visits, consult employees, contact external stakeholders and complete other activities. Records of meetings, discussions and activities all need to be recorded during the investigation. Information gathered during the investigation will be analyzed and will assist in

determining how the grievance is handled and what steps need to be taken in order to resolve the grievance.

6.6 Act

Following the investigation, the grievance owner will use the findings to create an action plan outlining steps to be taken in order to resolve the grievance. The grievance owner is responsible for assigning actions, monitoring actions undertaken and making sure deadlines are adhered to. Once all actions have been completed and the grievance owner feels the grievance has been resolved, they will then formally advise the external stakeholder via their preferred method of contact.

6.7 Follow up and close out

The grievance owner will make contact with the external stakeholder/s three weeks after the grievance is resolved. When contacting the external stakeholder, the grievance owner will verify that the outcome was satisfied and also gather any feedback on the grievance process. Minutes of the meeting will be recorded and saved in Myanmar Conch's intranet.

If required the grievance owner may need to follow up with the external stakeholder on numerous occasions to confirm all parties are satisfied.

7. APPEAL

If the external stakeholder is unhappy with the resolution and/or does not agree with the proposed actions, then the grievance owner needs to escalate the matter to the executive management team. The executive team will review the grievance and all documentation gathered throughout the investigation and determine whether further actions are required to resolve the grievance. Myanmar Conch are fully committed to resolving an external stakeholder's grievance so if Myanmar Conch are unable to resolve a complaint or a stakeholder is unhappy with the outcome, Myanmar Conch may seek advice from other independent parties.

8. REPORTING

Information outlining the number of grievances, time to resolution and outcomes of grievances will be communicated. Myanmar Conch will evaluate and update the Grievance Mechanism procedure every two years (or when required) to continually improve its stakeholder engagement.

9. STORING OF GRIEVANCES

All records, including grievance forms, investigation notes, interviews and minutes of meetings will be securely filed in Myanmar Conch's intranet to ensure privacy and confidentiality is maintained for all parties involved.

I. GRIEVANCE LODGEMENT FORM

Name:		☐ Please do not use my name when talking about this concern in public.
Company: (if applicable)		
Date:		Time:
Preferred Contact Method:	☐ Telephone ☐ Email ☐ Mail	
	Please provide contact detail:	
Supporting Documents Attached?	☐ Yes ☐ No	
Please provide details of your grievance		
What outcome are you seeking?		
Additional Information		

Claimant Signature: Date:

Myanmar Conch Signature: Date:

Office Use only

Stakeholder Reference:	☐ NGO	☐ Government
	☐ Neighbor	☐ Contractor
	☐ Indigenous	☐ Consultant
	☐ Other	
	Comment:	

II. EXTERNAL GRIEVANCE REGISTER

Stakeholder	Date received	Stakeholder Contact Officer	Grievance Owner	Grievance Level (1, 2, 3)	Grievance Description	Cause of the grievance	Outcome	If a resolution was offered please indicate 'accepted' or 'not accepted'	Actions/ Notes

Myanmar Conch Cement Company Limited

Appendix 7

Monitoring Report

(Ambient Air and Noise)

July 2016

Myanmar Conch Cement Company Limited

Monitoring Report

(Ambient Air and Noise)

July 2016

DECLARATIONS

DECLARATION - EIA Experts

Sustainable Environment Myanmar Co. Ltd., one of the subsidiary company of Resource & Environment Myanmar Ltd. (REM); a local consultant firm of EIA Experts, submit the following Environmental Monitoring Report on behalf of –**Myanmar Conch Cement Company Ltd.**

We do state that the Environmental Monitoring Report has been carried out according to the Environmental Conservation Law (2012), Environmental Conservation Rules and Environmental Impact Assessment Procedure (December, 2015).

To our knowledge, all information contained in this report is accurate and a truthful representation of all findings as relating to the project.

Signed: (Zaw Naing Oo)  Date: 1– 07-2016

Sustainable Environment Myanmar Co., Ltd. (SEM)

Ambient Air Quality and Noise (before operation of 5000 t/day cement factory)

Introduction

This is the first report for Air and noise quality monitoring at Myanmar Conch Cement Factory in Kyaukse Industrial Zone. This report sets out the environmental monitoring required throughout the operation of the cement factory.

Local Myanmar consultant company (Sustainable Environment Myanmar Co., Ltd.) was done the monitoring on ambient air and noise for Myanmar Conch Cement Company Ltd.

The terms of reference for monitoring are shown in Table 1. The location of air and noise monitoring points are shown in Figure 1 and Table 2.

First, the monitoring result of the baseline data that collected before operation of the present cement factory was explained.

Monitoring on ambient air and noise before operation of new cement plant

Air Quality

Survey Item

Parameters for air quality survey were determined by referring environmental quality standard for air in IFC as shown in Table 1.

Table 1 Survey Parameters for Air Quality

No.	Parameter	Unit	Environmental Standard (24 hr)
			IFC EHS General Guideline
1	Sulfur dioxide (SO_2)	$\mu g/m^3$	20
2	Carbon monoxide (CO)	mg/m^3	NA
3	Nitrogen dioxides (NO_2)	$\mu g/m^3$	-
4	Particle matter 2.5 (PM2.5)	$\mu g/m^3$	25
5	Particle matter 10 (PM10)	$\mu g/m^3$	50

Survey Location

The air quality monitoring survey was carried out in during 22nd to 24th December, 2014.

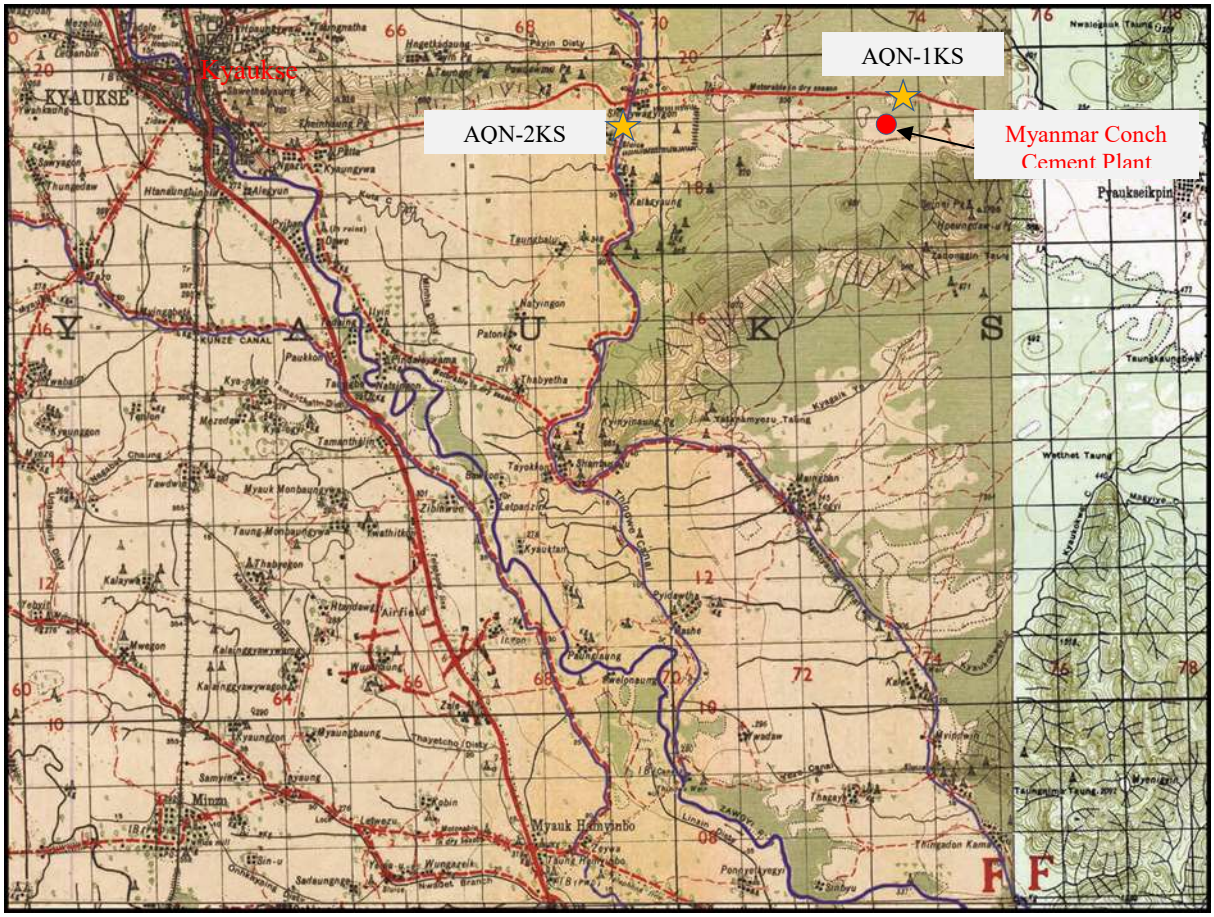


Figure 1 Location of air and noise quality monitoring locations on December 2014.

The location of sampling point is as shown in Table 2. The sampling point is described below in detail.

Table 2 Sampling Points for Air Quality Survey

Sampling Point	Coordinates	Description of Sampling Point
AQN-1KS	21° 35' 47.20" N 96° 13' 51.60" E	At the east of No.33 Heavy Industry (at the northeast of 5000 TPD cement plant), Kyaukse Township
AQN-2KS	21° 36' 9.80" N 96° 11' 35.20" E	In the monastery compound, the west of Shan Ywar Gyi Village, Kyaukse Township

AQN-1KS

AQN-1SK was surveyed at cement plant of the east of No.33 Heavy Industry Zone (Kyaukse), Kyaukse Township. As the location was at the construction site, the particulate matters were moderately high and the emitted pollution sources were from construction truck nearby. The dominant noises were from construction activities nearby in industrial zone. The location of AQN-1KS is as shown in Figure 2.

Figure 2 Location of AQN-1KS

AQN-2KS

The location was cited in the monastery compound, where is generally flat terrain, the west of Shan Ywar Gyi Village, Kyaukse Townhsip. The location was covered with some monastic building at east fared about 30 m. The possible emitted sources were from some motorbike and cooking fire. The dominant noises were from monastery and human activities from village. The location of Figure 3.

Figure 3 Location of AQN-2KS

Survey Period

Air quality survey was conducted for 24 hours. The sampling duration is as shown in Table 3.

Table 3 Sampling Duration for Air Quality Survey

Season	Period
Dry Season	20th -22nd December, 2014

Survey Method

Sampling and analysis of ambient air pollutants was conducted by referring to the recommendation of United States Environmental Protection Agency (U.S. EPA). The Haz-Scanner EPAS Wireless Environmental Perimeter Air Station was used to collect Ambient Air Monitoring data.

Table 4 Sampling and Analysis Method for Air Quality

No.	Parameter	Analysis Method
1	Sulfur dioxide (SO2)	On site reading
2	Carbon monoxide (CO)	On site reading
3	Nitrogen dioxides (NO2)	On site reading
4	Particle matter 2.5 (PM 2.5)	On site reading
5	Particle matter 10 (PM10)	On site reading

Result of ambient air quality before operation of new cement plant

1. Monitoring Results (20th -22nd December, 2014)

A. Ambient Air Quality

NO_2, SO_2, CO, PM2.5, PM10

Location	Item	Unit	Measured Value (Mean)	Country's Standard (National Environmental Quality (Emission) General Guideline) µg/m³	Target value to be applied IFC EHS General Guideline (WHO) µg/m3	Method	Note (Reason of excess of the standard)
AQN-1KS	NO_2	µg/m³	30	200 (1 hour)	200 (1 hour)	EPAS	
	SO_2	µg/m³	20	20 (24 hour)	125 (Interim target-1) 50 (Interim target-2) 20 (guideline) (24-hour)	EPAS	
	CO	mg/m³	0.55	No Guideline	No Guideline	EPAS	
	PM2.5	µg/m³	70	25 (24 hour)	75 (Interim target-1) 50 (Interim target-2) 37.5 (Interim target-3) 25 (guideline) (24-hour)	EPAS	
	PM10	µg/m³	90	50 (24 hour)	150 (Interim target-1) 100 (Interim target-2) 75 (Interim target-3) 50 (guideline) (24-hour)	EPAS	

Remark – Unit are same as in original WHO standard in IFC EHS General Guideline and Environmental Quality (Emission) General Guideline).

AQN-1KS - At the east of No.33 Heavy Industry Zone (at the northeast of 5000 TPD cement plant) (Kyaukse), Kyaukse Township

NO_2, SO_2, CO, PM2.5, PM10

Location	Item	Unit	Measured Value (Mean)	Country's Standard (National Environmental Quality (Emission) General Guideline) µg/m³	Target value to be applied IFC EHS General Guideline (WHO) µg/m3	Method	Note (Reason of excess of the standard)
AQN-2KS	NO_2	µg/m³	60	200 (1 hour)	200 (1 hour)	EPAS	
	SO_2	µg/m³	10	20 (24 hour)	125 (Interim target-1) 50 (Interim target-2) 20 (guideline) (24-hour)	EPAS	
	CO	mg/m³	0.34	No Guideline	No Guideline	EPAS	
	PM2.5	µg/m³	70	25 (24 hour)	75 (Interim target-1) 50 (Interim target-2) 37.5 (Interim target-3) 25 (guideline) (24-hour)	EPAS	
	PM10	µg/m³	100	50 (24 hour)	150 (Interim target-1) 100 (Interim target-2) 75 (Interim target-3) 50 (guideline) (24-hour)	EPAS	

AQN-2KS - In the monastery compound, the west of Shan Ywar Gyi Village, Kyaukse Township

B. Noise Quality

Location	Item	Unit	Measured Value Day Time (6:00 – 22:00)	Measured Value Day Time 22:00 – 6:00)	Country's Standard	Target value to be applied	Referred International Standard	Note (Reason of excess of the standard)
N-1 KS	Noise	dB	67		None	70	IFC EHS	
				59	None	70	IFC EHS	

N-1 KS - At the east of No.33 Heavy Industry Zone (at the northeast of 5000 TPD cement plant) (Kyaukse), Kyaukse Township

Location	Item	Unit	Measured Value Day Time (6:00 – 22:00)	Measured Value Day Time 22:00 – 6:00)	Country's Standard	Target value to be applied	Referred International Standard	Note (Reason of excess of the standard)
N-2 KS	Noise	dB	58		None	70	IFC EHS	
				50	None	70	IFC EHS	

N-2 KS - In the monastery compound, the west of Shan Ywar Gyi Village, Kyaukse Township

Monitoring on ambient air and noise after operation of new cement plant

Environmental Monitoring team of Sustainable Environment Myanmar Co., Ltd. was done the monitoring on ambient air and noise during the period of 28 to 29 June 2016.

The method and monitoring equipment are the same as previous monitoring work. For air quality, the team decided to measure upwind and downwind from the cement plant. The location of air and noise monitoring points are shown in Table 5 and the location of monitoring points and photos of field activities are shown in Figure 4 and Figure 5.

Table 5 Sampling Points for Air Quality Survey

Sampling Point	Coordinates	Description of Sampling Point
AQN-1KS	21° 35' 47.20" N 96° 13' 51.60" E	At the east of No.33 Heavy Industry (at the northeast of 5000 TPD cement plant), Kyaukse Township
AQN-2KS	21° 36' 9.80" N 96° 11' 35.20" E	In the monastery compound, the west of Shan Ywar Gyi Village, Kyaukse Township
AQN-3KS	21° 35' 22.77" N 96° 13' 40.18" E	At the south of 5000 TPD cement plant, No.33 Heavy Industry Zone (Kyaukse), Kyaukse Township

Noise monitoring points are the location of air quality monitoring points.

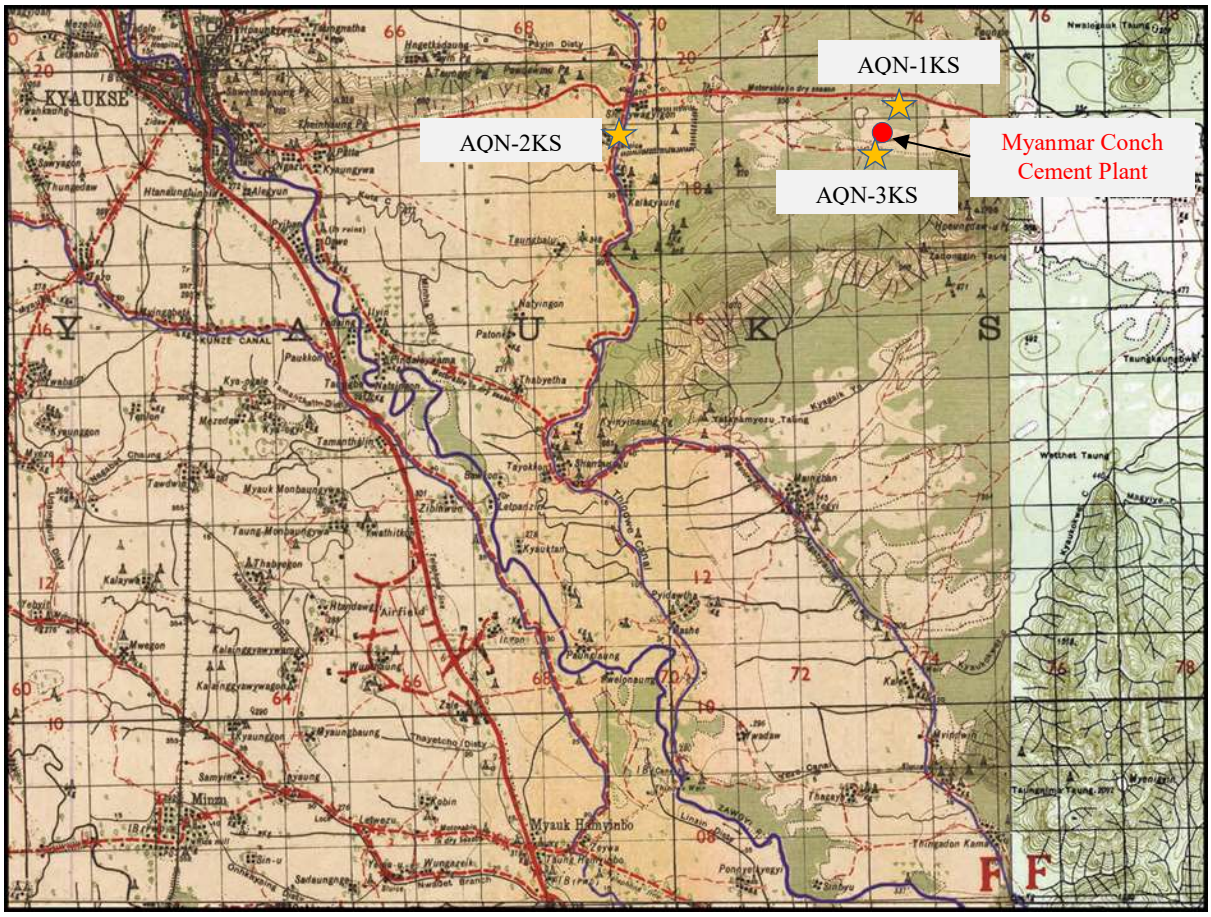


Figure 4 Location of air and noise quality monitoring locations on June, 2016.

Figure 5 Photos showing the field activities in air and noise monitoring on 28th and 29th, June 2016.

Survey Period

Air quality survey was conducted for 24 hours. The sampling duration is as shown in Table 6.

Table 6 Sampling Duration for Air Quality Survey

Season	Period
Wet Season	28th -29th June, 2016

Result of Ambient Air Quality and Noise (After operation of 5000 t/day cement factory)

1. Monitoring Results (28th -29th June, 2016)

A. Ambient Air Quality

NO_2, SO_2, CO, PM2.5, PM10

Location	Item	Unit	Measured Value (Mean)	Country's Standard (National Environmental Quality (Emission) General Guideline) µg/m³	Target value to be applied IFC EHS General Guideline (WHO) µg/m3	Method	Note (Reason of excess of the standard)
AQN-1KS	NO_2	µg/m³	50	200 (1 hour)	200 (1 hour)	EPAS	
	SO_2	µg/m³	20	20 (24 hour)	125 (Interim target-1) 50 (Interim target-2) 20 (guideline) (24-hour)	EPAS	
	CO	mg/m³	0.09	No Guideline	No Guideline	EPAS	
	PM2.5	µg/m³	10	25 (24 hour)	75 (Interim target-1) 50 (Interim target-2) 37.5 (Interim target-3) 25 (guideline) (24-hour)	EPAS	
	PM10	µg/m³	50	50 (24 hour)	150 (Interim target-1) 100 (Interim target-2) 75 (Interim target-3) 50 (guideline) (24-hour)	EPAS	

AQN-1KS - At the east of No.33 Heavy Industry Zone (at the northeast of 5000 TPD cement plant) (Kyaukse), Kyaukse Township

NO_2, SO_2, CO, PM2.5, PM10

Location	Item	Unit	Measured Value (Mean)	Country's Standard (National Environmental Quality (Emission) General Guideline) µg/m³	Target value to be applied IFC EHS General Guideline (WHO) µg/m3	Method	Note (Reason of excess of the standard)
AQN-2KS	NO_2	µg/m³	60	200 (1 hour)	200 (1 hour)	EPAS	
	SO_2	µg/m³	30	20 (24 hour)	125 (Interim target-1) 50 (Interim target-2) 20 (guideline) (24-hour)	EPAS	
	CO	mg/m³	0.09	No Guideline	No Guideline	EPAS	

	PM2.5	**µg/m³**	10	25 (24 hour)	75 (Interim target-1) 50 (Interim target-2) 37.5 (Interim target-3) 25 (guideline) (24-hour)	EPAS	
	PM10	**µg/m³**	20	50 (24 hour)	150 (Interim target-1) 100 (Interim target-2) 75 (Interim target-3) 50 (guideline) (24-hour)	EPAS	

AQN-2KS - In the monastery compound, the west of Shan Ywar Gyi Village, Kyaukse Township

The AQN 2KS measurement site is in Shan Ywar Gyi Village's monastery compound, next to the main traffic road leading to the Kyaukse industrial zone. The sulfur dioxide concentration in the ambient air quality value is estimated to be slightly higher due to heavy traffic conditions at the time of measurement.

NO_2, SO_2, CO, PM2.5, PM10

Location	**Item**	**Unit**	**Measured Value (Mean)**	**Country's Standard (National Environmental Quality (Emission) General Guideline) µg/m³**	**Target value to be applied** IFC EHS General Guideline (WHO) µg/m3	**Method**	**Note (Reason of excess of the standard)**
AQN-3KS	NO_2	**µg/m³**	70	200 (1 hour)	200 (1 hour)	EPAS	
	SO_2	**µg/m³**	10	20 (24 hour)	125 (Interim target-1) 50 (Interim target-2) 20 (guideline) (24-hour)	EPAS	
	CO	**mg/m³**	0.06	No Guideline	No Guideline	EPAS	
	PM2.5	**µg/m³**	10	25 (24 hour)	75 (Interim target-1) 50 (Interim target-2) 37.5 (Interim target-3) 25 (guideline) (24-hour)	EPAS	
	PM10	**µg/m³**	20	50 (24 hour)	150 (Interim target-1) 100 (Interim target-2) 75 (Interim target-3) 50 (guideline) (24-hour)	EPAS	

AQN-3KS - At the south of 5000 TPD cement plant, No.33 Heavy Industry Zone (Kyaukse), Kyaukse Township

Wind Speed and Direction

The average wind speed and direction were collected for 24 hours continuous in each location. According to the wind rose diagram, average wind speed of varies from 0.08 to 2.04 m/s in all stations. The average wind speed and direction were collected for 24 hours(1 day) continuous in each location. According to the wind rose diagram, average wind speed of varies from you already filled m/s in all stations. Prevailing wind direction of AQ-1KS and AQ-3KS are northeast direction while AQ-2KS is mostly due south direction.

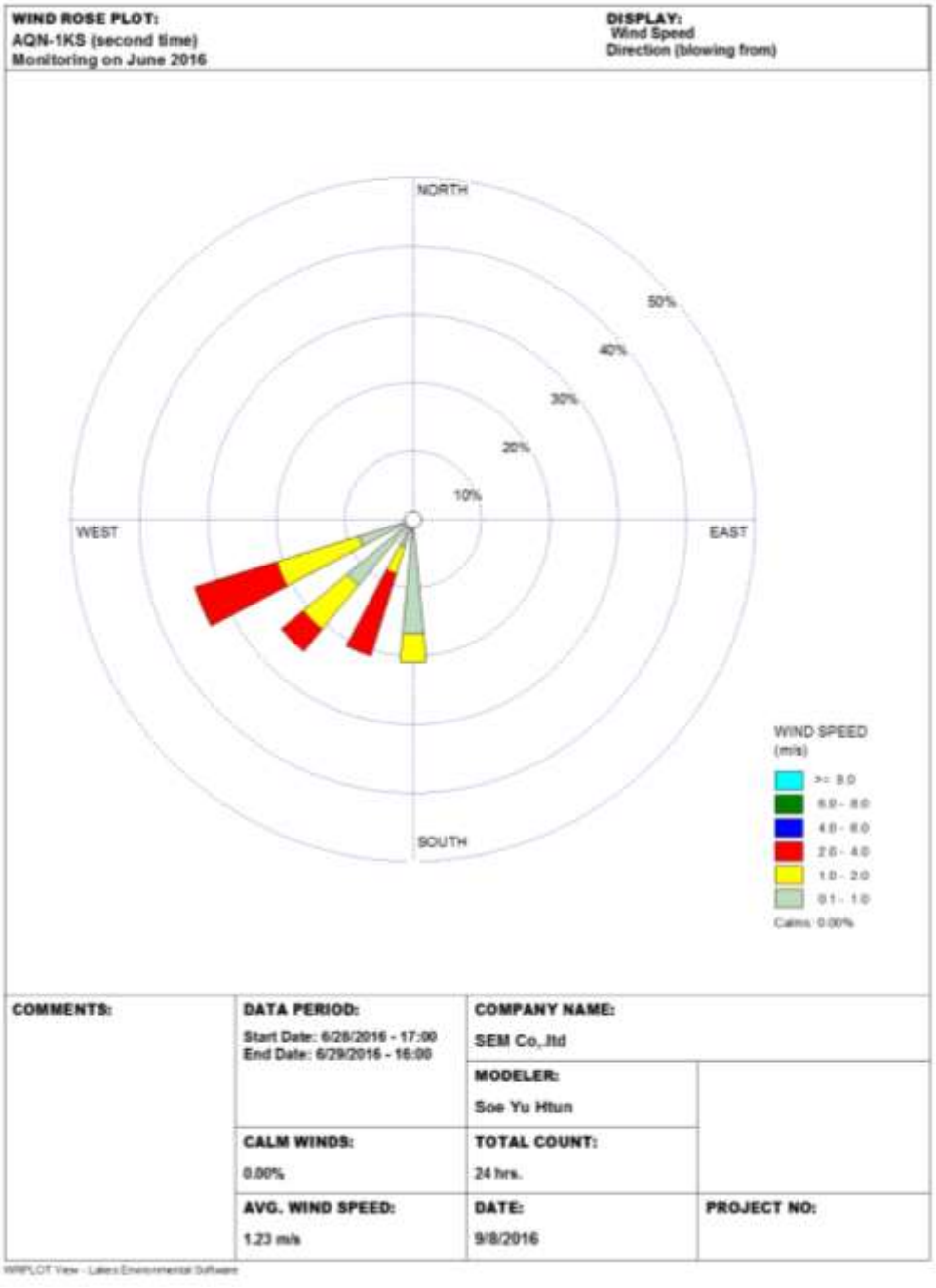


Figure 5 Wind Rose diagram for AQN-1KS

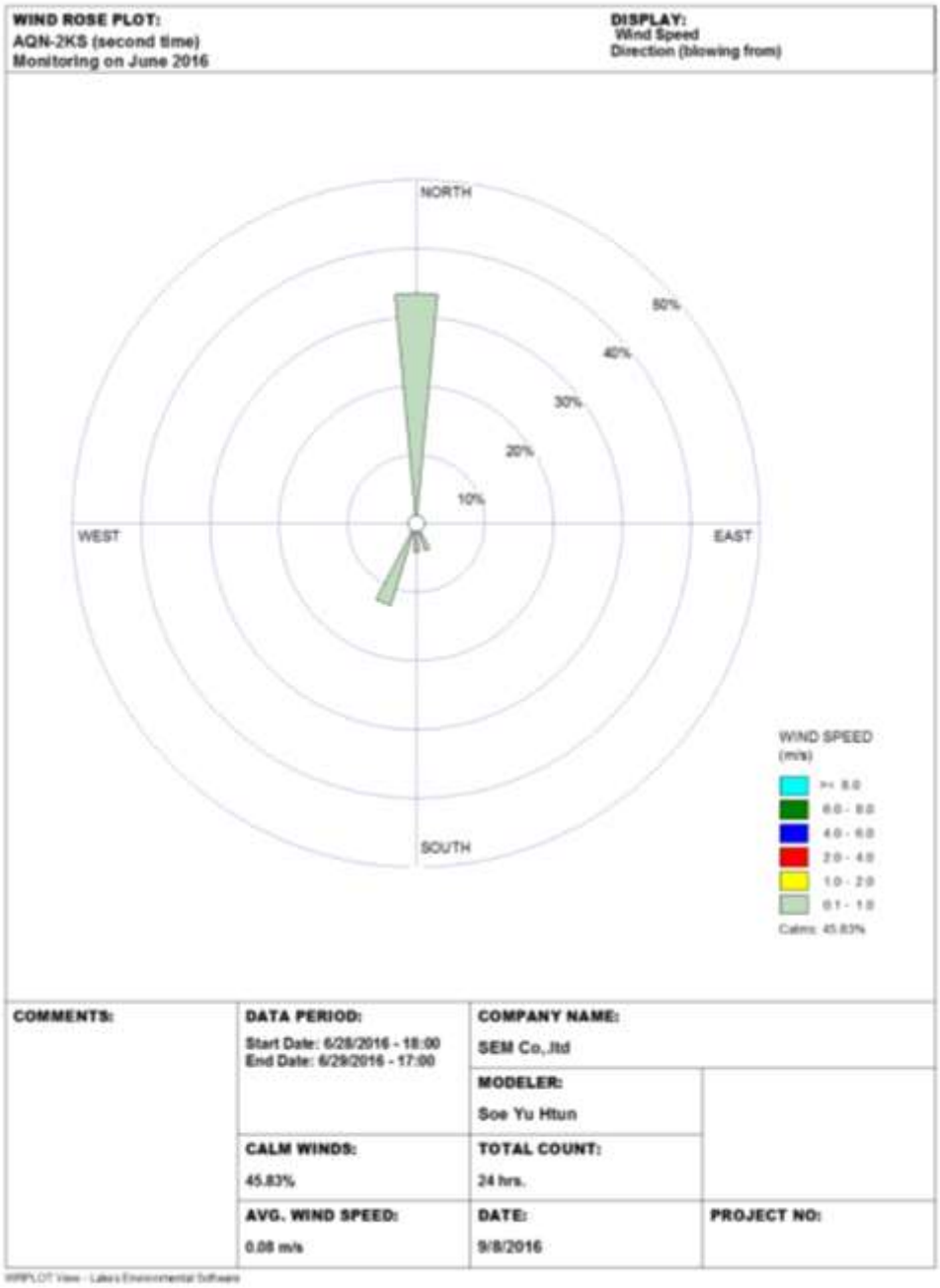


Figure 6 Wind Rose diagram for AQN-2KS

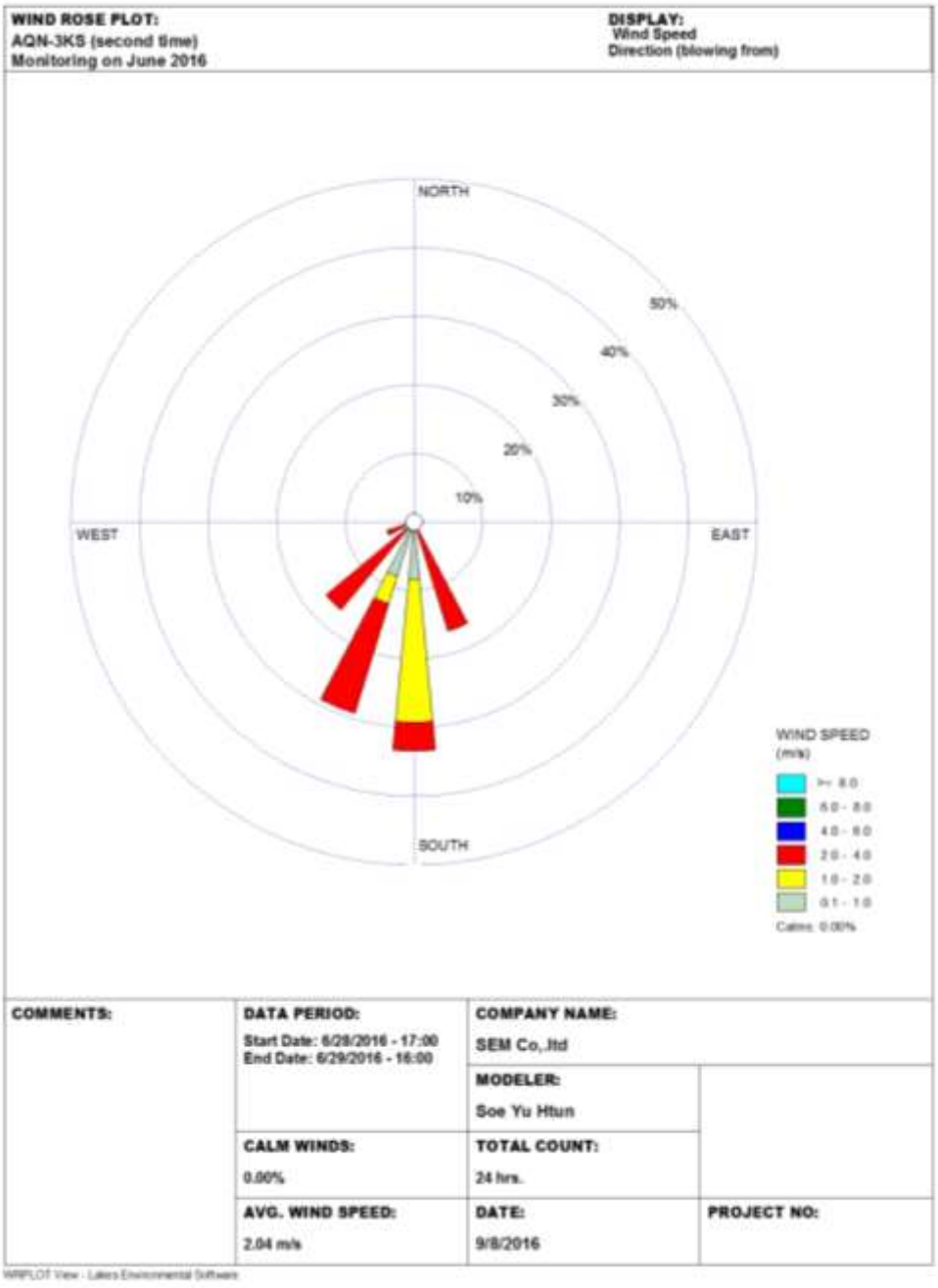


Figure 7 Wind Rose diagram for AQN-3KS

B. Noise Quality

Location	Item	Unit	Measured Value Day Time (6:00 – 22:00)	Measured Value Day Time 22:00 – 6:00)	Country's Standard (National Environmental Quality (Emission) General Guideline)	Target value to be applied	Referred International Standard	Note (Reason of excess of the standard)
N-1 KS	Noise	dB	61		70	70	IFC EHS	
				54	70	70	IFC EHS	

N-1 KS - At the east of No.33 Heavy Industry Zone (at the northeast of 5000 TPD cement plant) (Kyaukse), Kyaukse Township

Location	Item	Unit	Measured Value Day Time (6:00 – 22:00)	Measured Value Day Time 22:00 – 6:00)	Country's Standard (National Environmental Quality (Emission) General Guideline)	Target value to be applied	Referred International Standard	Note (Reason of excess of the standard)
N-2 KS	Noise	dB	52		70	70	IFC EHS	
				49	70	70	IFC EHS	

N-2 KS - In the monastery compound, the west of Shan Ywar Gyi Village, Kyaukse Township

Location	Item	Unit	Measured Value Day Time (6:00 – 22:00)	Measured Value Day Time 22:00 – 6:00)	Country's Standard (National Environmental Quality (Emission) General Guideline)	Target value to be applied	Referred International Standard	Note (Reason of excess of the standard)
N-3 KS	Noise	dB	53		70	70	IFC EHS	
				57	70	70	IFC EHS	

N-3 KS - At the south of 5000 TPD cement plant, No.33 Heavy Industry Zone (Kyaukse), Kyaukse Township

Conclusion

All measured ambient air quality and noise results are within the International Finance Corporation (IFC) and National Environmental Quality (Emission) Guideline.

Appendix 8

Letter from Irrigation Department (Kyaukse), Ministry of Agriculture, Livestock and Irrigation

P1

ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်အစိုးရ
လယ်ယာစိုက်ပျိုးရေးနှင့်ဆည်မြောင်းဝန်ကြီးဌာန
ဆည်မြောင်းဦးစီးဌာန
ဦးစီးအရာရှိ(မြို့ပြ)ရုံး
ကျောက်ဆည်မြို့

မှတ်ပုံတင်ပြီး
အမှတ်စဉ် ...
ရက်စွဲ ၂၈.၇.၁၅

စာအမှတ်- ၈၈၅/ကမံ

ရက်စွဲ။ ၂၀၁၅ခုနှစ်၊ ဇူလိုင် လ(၂၇)ရက်။

သို့/

စက်ရုံမှူး

အမှတ်(၃၃)အကြီးစားစက်ရုံ(ကျောက်ဆည်)

အကြောင်းအရာ။ ။သင်းတွဲရေလှောင်ကန် ရေဝင်လမ်း တိုးချဲ့ခွင့်ပြုပါရန် တင်ပြခြင်း။

ရည်ညွှန်းချက် ။ ။ လ/ထညွှန်မှူး၊ ဆည်မြောင်းဦးစီးဌာန၊ ကျောက်ဆည်မြို့၏ (၂၇.၇.၂၀၁၅)ရက်စွဲပါ စာအမှတ်-၂၂၂၆/လင

အကြောင်းအရာပါနှင့် ပတ်သက်၍ စက်မှုဝန်ကြီးဌာန အမှတ်(၃၃)အကြီးစားဘိလပ်မြေစက်ရုံ ကျောက်ဆည်မှ တစ်ရက်လျှင် ရေဂါလန်(၂၇၀၀၀၀)ခန့် သုံးစွဲမည်ဖြစ်ရာ ယခင်ရေယူမြောင်းအကျယ် (၂')အား အသုံးမပြုဘဲ အောက်ခြေအကျယ်(၄') ရေဝင်မြောင်းအသစ် ဖောက်လုပ်မည်ဖြစ်ပြီး ရေယူသုံးစွဲမည်ဖြစ်ကြောင်း စိုက်ပျိုးရေပေးဝေမှုအား ထိခိုက်မှုမရှိကြောင်း တင်ပြလာခြင်းအပေါ် ဆောင်ရွက်ခွင့်ပြုပြီး တစ်ရက်လျှင် (၂၇၀၀၀၀)ဂါလန် ရေသုံးစွဲမှုအတွက် ဌာနမှသတ်မှတ်ထားသည့် ရေခွန်နှုန်းထားများအတိုင်း ပေးဆောင်ပါရန် ပြန်လည်ညွှန်ကြားလာပါသဖြင့် သိရှိဆောင်ရွက်နိုင်ပါရန် ပြန်လည်တင်ပြအပ်ပါသည်။

ပူးတွဲလျက်

- ရည်ညွှန်းစာ (၁) စောင်

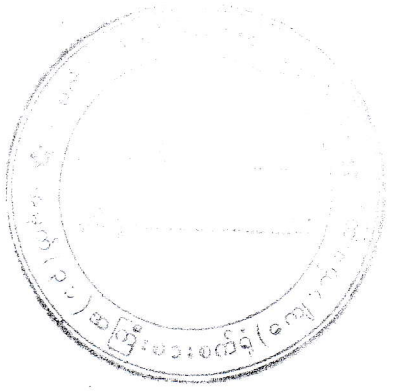
(သန်းဦး)
ဦးစီးအရာရှိ(မြို့ပြ)
ဆည်မြောင်းဦးစီးဌာန
ကျောက်ဆည်မြို့

မိတ္တူ။

- ရုံးလက်ခံ။

Appendix 9

Letter from Department of Archaeology and National Museum



အမှတ် (၂) အကြီးစား စက်မှုလုပ်ငန်း အမှတ်(၃၃)အကြီးစားစက်ရုံ(ကျောက်ဆည်) စာအမှတ်၊၁၅၀၃(၃၃)/၁၀၁၅/စီ-၁(၄၃၁)/၂၀၁၇ ရက် စွဲ၊ ၂၀၁၇ ခုနှစ် ၊အောက်တိုဘာလ ၂၄ ရက်

သို့

Myanmar Conch Cement Co.,Ltd

အကြောင်းအရာ။ **မြင်စိုင်းမြို့ဟောင်းယဉ်ကျေးမှုအမွေအနှစ်ဧရိယာနှင့် လွတ်ကင်းပါကြောင်းထောက်ခံချက်ပေးပို့လာခြင်းကိစ္စ။**

ရည်ညွှန်းချက်။ ရှေးဟောင်းသုတေသနနှင့်အမျိုးသားပြတိုက်ဦးစီးဌာန၊မန္တလေးဌာနခွဲ၊ မန္တလေးမြို့၏(၂၃. ၁၀. ၂၀၁၇)ရက်စွဲပါစာအမှတ်၁၂၆၂/၃-စ/ မပ

မန္တလေးတိုင်းဒေသကြီး၊ကျောက်ဆည်ခရိုင်အတွင်းရှိ စက်မှုဝန်ကြီးဌာန၊အမှတ်(၂) အကြီးစားစက်မှုလုပ်ငန်း ၊အမှတ်(၃၃)အကြီးစားစက်ရုံ (ကျောက်ဆည်)၏တစ်ရက်တန်(၅၀၀၀)ကျ ဘိလပ်မြေစက်ရုံတည်ဆောက်ခြင်းအတွက် မြင်စိုင်းမြို့ဟောင်းယဉ်ကျေးမှုအမွေအနှစ်ဒေသ ဧရိယာနှင့်လွတ်ကင်းပါကြောင်းရှေးဟောင်းသုတေသနနှင့် အမျိုးသားပြတိုက်ဦးစီးဌာန၊မန္တလေး ဌာနခွဲမှ ထောက်ခံချက်အား အကြောင်းပြန်ကြားလာပါ၍ သိရှိနိုင်ပါရန် ဤစာနှင့်အတူ ပူးတွဲပေးပို့ အပ်ပါသည်။

24/10/2017

ဝင်းမြင့်သိန်း
ခေတ္တ စက်ရုံမှူး

မိတ္တူကို-
- ရုံးလက်ခံ/- မျှော်စာတွဲ

ရှေးဟောင်းသုတေသနနှင့်အမျိုးသားပြတိုက်ဦးစီးဌာန
မန္တလေးဌာနခွဲ၊ မန္တလေးမြို့
စာအမှတ်၊ ၁၂၆၂ / ၃-၈ / မပ
ရက်စွဲ၊ ၂၀၁၇ခုနှစ်၊ အောက်တိုဘာလ ၂၃ ရက်

အကြောင်းအရာ။ မြင်စိုင်းမြို့ဟောင်းယဉ်ကျေးမှုအမွေအနှစ်ဇုန်ဧရိယာနှင့်ကင်းလွတ်ကြောင်းနှင့် ထိခိုက်မှုမရှိကြောင်း ထောက်ခံချက်ပေးနိုင်ပါရန် လျှောက်ထားလာခြင်းကိစ္စ

ရည်ညွှန်းချက် (၁)အမှတ်(၂)အကြီးစားစက်မှုလုပ်ငန်း၊ အမှတ်(၃၃) အကြီးစားစက်ရုံ ကျောက်ဆည်၏၁၄.၉.၂၀၁၇ရက်စွဲပါ စာအမှတ်၊ ၁၅၀၃ (၃၃) / ၁၀၀၅ / စီ-၁(၄၀၅)/ ၂၀၁၇

(၂)ရှေးဟောင်းသုတေသန နှင့် အမျိုးသားပြတိုက်ဦးစီးဌာန၊ နေပြည်တော် ရုံးချုပ် ၏ ၁၇.၁၀.၂၀၁၇ရက်စွဲပါစာအမှတ်၊ ၃၂၂၁ / ၃ / ၄-ဂ

၁။ မန္တလေးတိုင်းဒေသကြီး၊ ကျောက်ဆည်ခရိုင်အတွင်းရှိ အမှတ်(၃၃)အကြီးစားစက်ရုံ (ကျောက်ဆည်)၏ တစ်ရက်တန်(၅၀၀၀)ကျဘိလပ်မြေစက်ရုံတည်ဆောက်ခြင်းအတွက် မြင်စိုင်းမြို့ဟောင်းယဉ်ကျေးမှုအမွေအနှစ်ဒေသဇုန်ဧရိယာနှင့် လွတ်ကင်းကြောင်းနှင့် ထိခိုက်မှုမရှိကြောင်း ထောက်ခံချက်ပေးနိုင်ပါရန် ရည်ညွှန်း(၁)ပါစာဖြင့် တင်ပြလျှောက်ထားလာပါသည်။

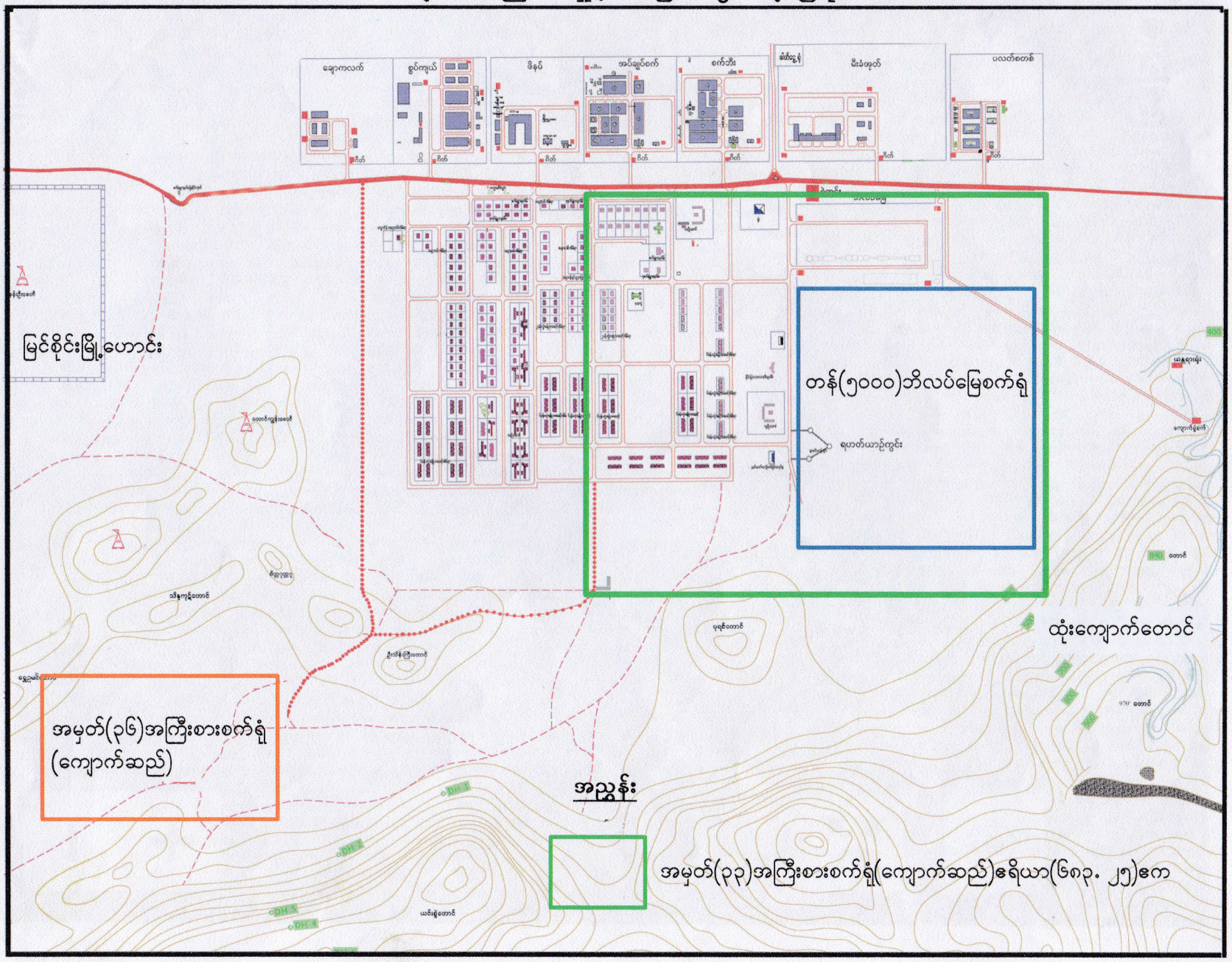
၂။ အဆိုပါတင်ပြလျှောက်ထားလာခြင်းအား ရည်ညွှန်း(၂)ပါစာအရ မြင်စိုင်းမြို့ဟောင်းယဉ်ကျေးမှုအမွေအနှစ်ဒေသဇုန်ဧရိယာနှင့်လွတ်ကင်းပါကြောင်းအကြောင်းပြန်ကြားအပ်ပါသည်။

23/10/2017

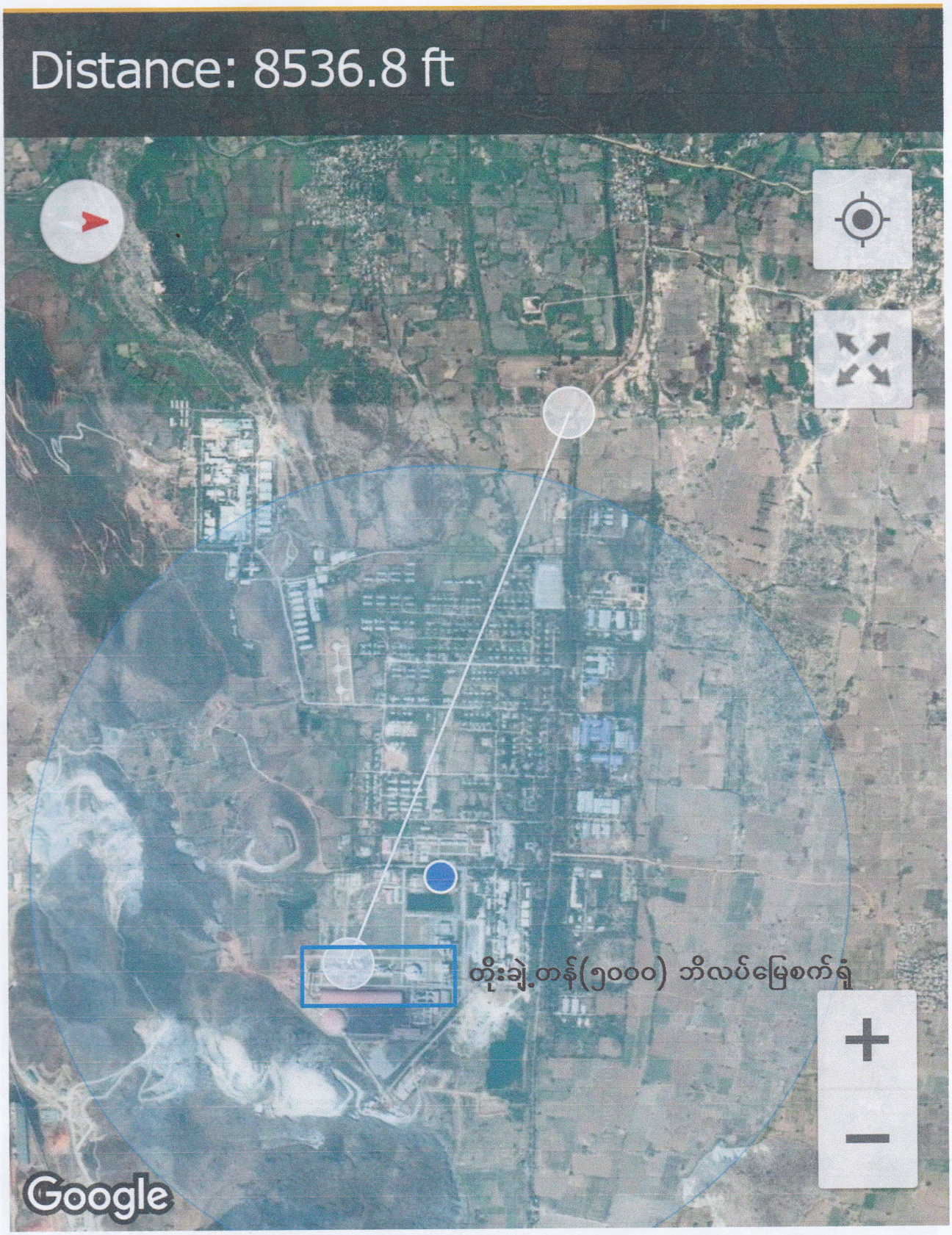
(စိုးစိုးဝင်း)
ညွှန်ကြားရေးမှူး

ဦးဝင်းမြင့်သိန်း(ခေတ္တစက်ရုံမှူး)
မိတ္တူကို
ရုံးလက်ခံ
မျှော

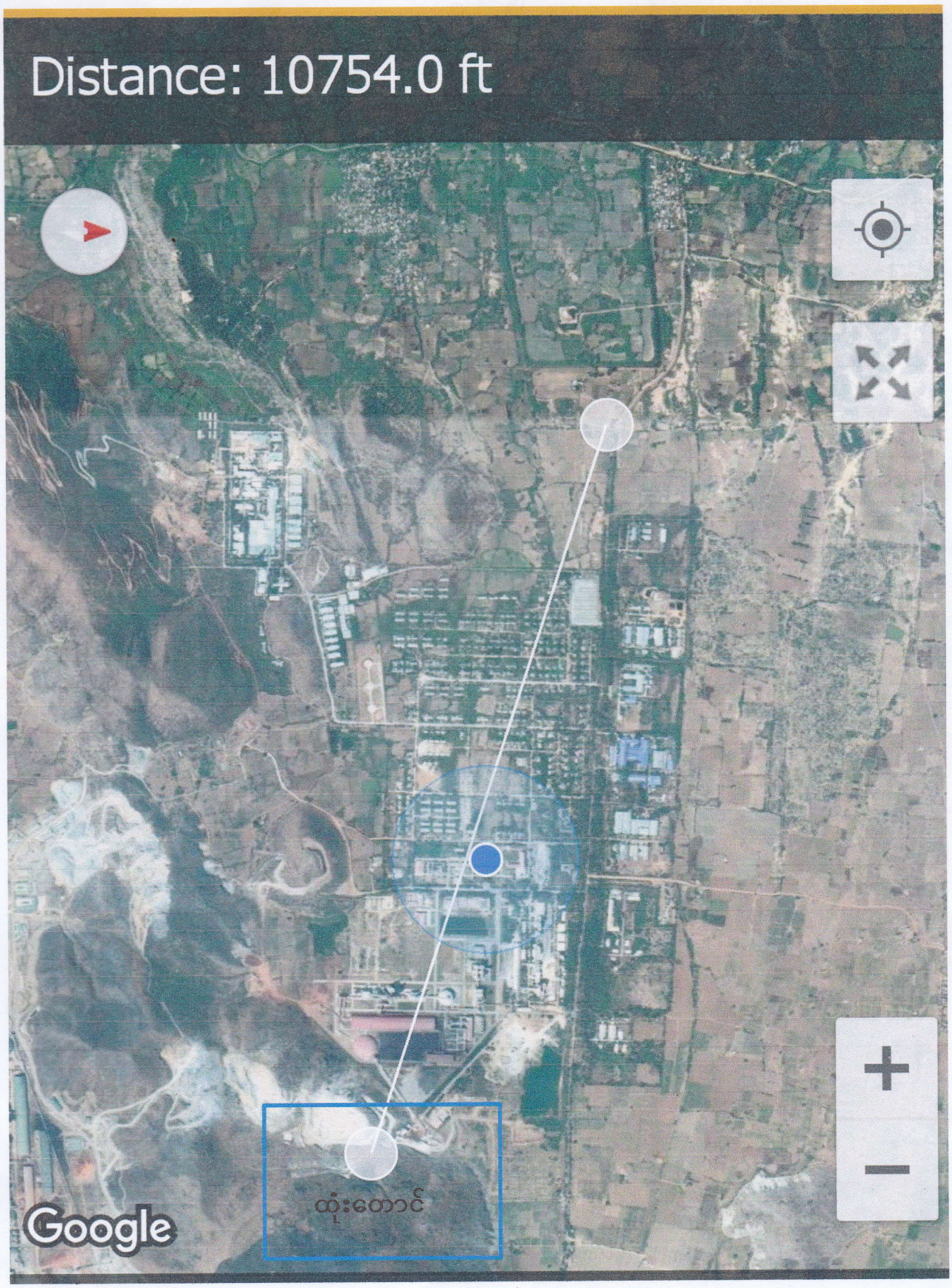
စက်မှုဝန်ကြီးဌာန
ကျောက်ဆည်စက်မှုနယ်မြေအကွက်ချမြေပုံ



အမှတ်(၃၃)အကြီးစားစက်ရုံ(ကျောက်ဆည်)
မြင်စိုင်းမြို့ဟောင်းယဉ်ကျေးမှုအမွေအနှစ်ဒေသနှင့်စက်ရုံအကွာအဝေးတည်နေရာပြမြေပုံ



အမှတ်(၃၃)အကြီးစားစက်ရုံ(ကျောက်ဆည်)
မြင်စိုင်းမြို့ဟောင်းယဉ်ကျေးမှုအမွေအနှစ်ဒေသနှင့်ထုံးတောင်အကွာအဝေးတည်နေရာပြမြေပုံ



Appendix 10

Agreement with Forestry Department

သစ်တောဦးစီးဌာနနှင့်ဆောင်ရွက်ထားရှိမှုအခြေအနေ

၁။ ယခင် သတ္တုတွင်းဝန်ကြီးဌာန မှ သတ္တုတွင်း ဥပဒေ/နည်းဥပဒေအရမန္တလေးတိုင်းဒေသကြီး၊ ကျောက်ဆည်မြို့နယ် အတွင်းရှိ သံတော်မြတ်တောင်တွင် ဘိလပ်မြေသုံးထုံးကျောက်များ: ကိုမါတ်သတ္တုအကြီးစား ထုတ်လုပ်ခွင့်အား ခွင့်ပြုမိန့်အမှတ်၊ ၁၅/၂၀၀၀ ဖြင့် (၂၆.၄.၂၀၀၀) မှ (၂၅.၄.၂၀၂၀) ထိ နှစ်(၂၀) ထုတ်လုပ်ခွင့်ပေးခဲ့ပြီးဖြစ်ပါသည်။

၂။ ထိုစဉ်အခါကသံတော်မြတ်တောင်သည် "သံတော်မြတ်တောင်လျာထားကြိုးပြင် ကာကွယ်တော" သာဖြစ်သဖြင့် မလိုအပ်၍ သစ်တောဦးစီးဌာနနှင့်စာချုပ်၊ ချုပ်ဆိုခြင်းမပြု ခဲ့ပါ။ သို့ပါသော်လည်း သစ်တောဦးစီးဌာနမှ (၂၉.၈.၂၀၁၄)ရက်နေ့တွင်အမိန့်အမှတ်(၆၅)ဖြင့် သံတော်မြတ်တောင်ဧရိယာအား "သံတော်မြတ်တောင်ကြိုးပြင်ကာကွယ်တော " အဖြစ်စတင် သတ်မှတ်ခဲ့ပါ သည်။

၃။ သို့ဖြစ်ပါ၍ သံတော်မြတ်တောင်သည် ယခုအခါ "သံတော်မြတ်တောင်ကြိုးပြင် ကာကွယ်တော "အတွင်းကျရောက်လျက်ရှိသဖြင့်သစ်တောဦးစီးဌာနနှင့်စာချုပ်၊ ချုပ်ဆိုနိုင်ရေးဆောင်ရွက်ရန်(၂၀၉)ဧကအတွက် (၁)ဧကလျှင် ၅၀၀၀၀/-နှုန်းဖြင့် လုပ်ငန်းအာမခံငွေ -၁၀၄၅၀၀၀/-(ကျပ်တစ်ရာ့လေးသိန်း၊ငါးသောင်းတိတိအား) (၂၆.၁၀.၂၀၁၇)ရက်နေ့တွင် မြန်မာ့စီးပွားရေးဘဏ် (ကျောက်ဆည်)သို့ပေးသွင်းခဲ့ပြီးချလံမိတ္တူကိုလည်းကျောက်ဆည်ခရိုင်သစ်တောဦးစီးဌာနသို့ပေးပြီးဖြစ်ပါကြောင်းတင်ပြအပ်ပါသည်။

ပူးတွဲ - ငွေသွင်းချလံမိတ္တူ

MD-010598

T.F. No. 1 NOTE-To be prepared by the payer in duplicate. [Art.5, C.A.C]

မှတ်ချက်။ ငွေပေးသွင်းသူက မိတ္တူနှစ်စောင်ရေးသွင်းရမည်။

ရှုလန်နံပါတ်	Chalan No. 27 Credit
[illegible] ငွေတိုက်အရာရှိ	To
* [illegible] အတွက်	THE TREASURY OFFICER
[illegible] က ပေးရန်ရှိသည့်	PLEASE receive the sum of Kyat (*in words*)
ငွေပေါင်း (စာဖြင့်) [illegible]	K (*in figures*)
[illegible] ငွေ(ဂဏန်းဖြင့်) [illegible]	being the amount payable by
ကိုလက်ခံပါမည့်အကြောင်း။	on account of *
[illegible] အာကာအရပေးပါကြောင်း။	Authority under which payment is made is
[illegible] မြို့။ ငွေပေးသွင်းသူ၏လက်မှတ်	STATION :
၁၆-၁၀-၁၇ နေ့စွဲ။	Dated 20 } Signatures of the payer.

Examined and entered.

Treasurer. Head Accountant.

လက်ထောက်ညွှန်ကြားရေးမှူး

Received the sum of kyat (*in words*)

K (*in figures*) on the above account

STATION :

Dated 20 Treasurer. Head Account. Treasury Officer.

26 OCT 2017

MYANMA ECONOMIC BANK

* Full details should be given. If on account of previous payment, the month, date of payment, number of voucher, etc. should also be stated.

* အကြောင်းအရာများကို ပြည့်စုံစွာရေးထည့်ရမည်။ အလျင်က ထုတ်ပေးထားသည့်ငွေအတွက်ဖြစ်လျှင်၊ ထိုသို့ထုတ်ပေးသည့် ဘောက်ချာနံပါတ်၊ လနှင့်နေ့ရက်စသည်တို့ကိုရေးထည့်ရမည်။

[illegible]

Appendix 11

Corporate Social Responsibility

ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (EMP)နှင့် အညီဆောင်ရွက်ထားသည့် အခြေအနေ

CSR ဆောင်ရွက်ခြင်း

ဒေသပတ်ဝန်းကျင်ရှိကျေးရွာများ၊မြို့နယ်နှင့် တိုင်းဒေသကြီးများသို့ အောက်ဖော်ပြပါအတိုင်း လိုအပ်သလိုလှူဒါန်းမှုများပြုလုပ် ခဲ့ပါသည်-

-၂၀၁၄-ခုနှစ်၊ အောက်တိုဘာလ (၂၁)ရက် နေ့တွင်ကျောက်ဆည်မြို့နယ်၊ စည်ပင်သာယာရေးအဖွဲ့သို့ အပြာရောင်အမှိုက်ကား 9H- 8665- (၁)စီး လှူဒါန်းခြင်း၊တန်ဖိုးအားဖြင့်၁၂၇-သိန်းရှိပါသည်။

-၂၀၁၄-ခုနှစ်၊နိုဝင်ဘာလ(၂)ရက်နေ့တွင်ကျောက်ဆည်ခရိုင်၊တန်ဆောင်တိုင် မီးထွန်းပွဲတော်အတွက် ၇၆၀,၀၀၀/-လှူဒါန်းခြင်း၊

-၂၀၁၅-ခုနှစ်၊ဇန်နဝါရီ(၈)ရက်နေ့တွင် ကျောက်ဆည်မြို့မရဲစခန်းရုံး အထွေထွေပြုပြင်ရန်အတွက်ငွေ-၂၂၅,၀၀၀/-လှူဒါန်းခြင်း၊

-၂၀၁၅-ခုနှစ်၊ဇန်နဝါရီလတွင် ကျောက်ဆည်မြို့နယ်၊တံတားလည်ကျေးရွာ အုပ်စုအတွင်းရှိအောင်သုခလူမှုကူညီရေးအသင်းသို့ Super Coustom ကား (၁)စီးလှူဒါန်းခြင်း၊

-၂၀၁၅-ခုနှစ်၊မတ်လ(၃၁)ရက်နေ့တွင်ကျောက်ဆည်မြို့၊ ရွှေသာလျောင်း တောင်ပေါ်ရှိ ကျောက်သင်္ဘောကျောင်းတိုက်အသစ်တည်ဆောက်ရာတွင် ဘိလပ်မြေအိတ် (၅၀၀)လှူဒါန်းခြင်း၊

-၂၀၁၅-ခုနှစ်၊ ဧပြီလ(၈)ရက်နေ့တွင် ကျောက်ဆည်ခရိုင်မြန်မာ့ရိုးရာရေ သဘင်ပွဲတော်ကျင်းပရေးအတွက်ငွေ-၇၅၀,၀၀၀/-လှူဒါန်းခြင်း၊

-၂၀၁၅-ခုနှစ်၊ဇွန်လ (၁၇)ရက်နေ့တွင် ကျောက်ဆည်မြို့အထွေထွေရောဂါ ကုဆေးရုံသို့ ဘိလပ်မြေအိတ်(၁၀၀)လှူဒါန်းခြင်း၊

-၂၀၁၅-ခုနှစ်၊ ဇူလိုင်လ (၁၄)ရက်နေ့တွင် စက်မှုဝန်ကြီးဌာန၊ အငြိမ်းစား ဝန်ထမ်းဟောင်းများ အသင်းအဖွဲ့သို့အလှူငွေ-၂၀၀၀,၀၀၀ /- လှူဒါန်းခြင်း၊

-၂၀၁၅-ခုနှစ်၊ သြဂုတ်လ(၈)ရက်နေ့တွင် နိုင်ငံတော်အတွင်းဖြစ်ပွားခဲ့သည့် ရေဘေးအတွက်အလှူငွေ(သိန်းထောင့်တစ်ရာကျော်) (၁၁၂,၁၉၈,၀၀၀/-) အားမန္တလေးတိုင်းဒေသကြီးသို့တိုက်ရိုက်သွားရောက်လှူဒါန်းခြင်း၊

-၂၀၁၅- ခုနှစ်၊ စက်တင်ဘာလ (၃၀)ရက် နေ့တွင်မြန်မာနိုင်ငံရဲတပ်ဖွဲ့၊ နှစ်ပတ်လည်နေ့တွင်ကျောက်ဆည်မြို့နယ်သို့ငွေ-၂၀၀,၀၀၀/-လှူဒါန်းခြင်း၊

-၂၀၁၅-ခုနှစ်၊အောက်တိုဘာလ(၂၇)ရက်နေ့တွင်ကျောက်ဆည်မြို့၊ရွှေသာလျောင်းတောင်-ဆင်လျှိုပွဲတော်အတွက်ငွေ ၅၀၀,၀၀၀/-လျှုဒါန်းခြင်း၊

-၂၀၁၅-ခုနှစ်၊ နိုဝင်ဘာလ (၅)ရက်နေ့တွင် ကျောက်ဆည်မြို့အထွေထွေရောဂါကုဆေးရုံသို့ ဘီလပ်မြေအိတ်(၁၀၀)လှူဒါန်ခြင်း၊

-၂၀၁၅-ခုနှစ်၊ နိုဝင်ဘာလ(၁၆) ရက်နေ့တွင်ကျောက်ဆည်ခရိုင်အတွင်းရှိဇော်ဂျီဂေါက်ကွင်းပြန်လည်မွမ်းမံတည်ဆောင်ရေးအတွက် သံဘောင်များလှူဒါန်းခဲ့ရာ တန်းဘိုးအားဖြင့်ငွေ-၁,၀၇၇,၇၀၀/-ဖြစ်ပါသည်။

- ၂၀၁၅-ခုနှစ်၊ ဒီဇင်ဘာလ (၂၆)ရက်နေ့တွင်ပတ်ဝန်းကျင်ရှိကျေးရွာများအတွက်ဘီလပ်မြေအိတ်(၂၀၀)လှူဒါန်းပါသည်။

- ၂၀၁၅-ခုနှစ်၊ ဒီဇင်ဘာလ(၂၈)ရက်နေ့တွင်ကျောက်ဆည်မြို့နယ်စည်ပင်သာယာရေးအဖွဲ့သို့ ပြည်သူများသွားလာသည့်လမ်းများတွင်အသုံးပြုရန်အတွက်ဘီလပ်မြေအိတ်(၂၀၀)လှူဒါန်းခြင်း။

-၂၀၁၆-ခုနှစ်၊ဇန်နဝါရီ(၂၈)ရက်နေ့တွင် နေပြည်တော်ရှိရေကျော်ရွာသို့
-ဘီလပ်မြေအိတ်(၂၅၀)လှူဒါန်းခြင်း၊

-၂၀၁၆ -ခုနှစ်၊ မတ်လ(၁၁)ရက် နေ့တွင် ကျောက်ဆည်မြို့နယ်ပြည်သူ့ရဲတပ်ဖွဲ့သို့လုံခြုံရေးအတွက်CCTVတပ်ဆင်ရန်ငွေ-၇၀၀,၀၀၀/-လှူဒါန်းခြင်း၊

-၂၀၁၆-ခုနှစ်၊ဧပြီလ(၂၄)ရက်နေ့တွင်ကျောက်ဆည်မြို့နယ်အတွင်းရှိရေသရောက်ရွာ လေဘေးသင့်သဖြင့် (၃´ × ၁၀´) သွပ်ပြားအချပ် (၁၀၀၀)၊ တန်ဘိုးအားဖြင့်၃,၆၁၀,၀၀၀/-လှူဒါန်းခြင်း၊

-၂၀၁၆-ခုနှစ်၊မေလ(၁၉)ရက်နေ့တွင်ကျောက်ဆည်မြို့နယ်၊ကုလားကျောင်းကျေးရွာရှိ ဒေသန္တရဆေးပေးခန်းအတွက်အုတ်-၂၀၀၀-ချပ်၊သဲ(၃)ကျင်း၊ ဘီလပ်မြေ(၂၅)အိတ်၊သံဇကာ(၂)လိပ်၊ကွန်ကရစ်တိုင်(၇)တိုင်လှူဒါန်းခြင်း၊

-၂၀၁၆- ခုနှစ်၊ မေလ(၃၁) ရက်နေ့တွင်ဆောက်လုပ်ရေးဝန်ကြီးဌာနသို့ တန်ဘိုးနည်း အိမ်ယာတည်ဆောက်ရေးအတွက် ဘီလပ်မြေအိတ်တန်(၅၀၀)-တန်ဘိုးအားဖြင့်၄၆,၀၀၀,၀၀၀/-လှူဒါန်းခြင်း၊

-၂၀၁၆-ခုနှစ်၊ဇွန်လ(၂၂)ရက်နေ့တွင်မန္တလေးမြို့ရှိချို့တဲ့သူများကိုစေတနာဖြင့်ပေးကမ်းခြင်းအဖွဲ့သို့ငွေ-၁၀,၀၀၀,၀၀၀/-လှူဒါန်းခြင်း၊

-ကျောက်ဆည်မြို့.အထွေထွေရောဂါကုဆေးရုံကြီးတွင်အလှူးပေ(၆၀၀)၊ အနံ(၁၈)ပေရှိကွန်ကရိလမ်းအား ၂၀၁၇-ခုနှစ်၊မေလအတွင်းခင်းကျင်းပြုလုပ်လှူဒါန်းပေးခဲ့ပါသည်။

–၂၂.၆.၂၀၁၇တွင်ကျောက်ဆည်မြို့နယ်၊လူမှုဖူလုံရေးရုံးနှင့်ပူးပေါင်း၍ဝန်ထမ်းများအားအခမဲ့ဆေးကုသပေးခြင်း၊ကျန်းမာရေးစစ်ဆေးပေးခြင်းများကိုဆောင်ရွက်ပေးခဲ့ပါသည်။

–ကျောက်ဆည်စက်မှုဇုံရှိ(၂၅)ကုတင်ဆံ့ဆေးရုံအတွက်ဆရာဝန်တစ်ဦးနှင့်သူနာပြုသုံးဦးကိုကုမ္ပဏီမှခန့်အပ်ပေးထားပါသည်။

–ဆေးရုံမှလိုအပ်သောကုသမှုဆိုင်ရာပစ္စည်းနှင့်ဆေးများကိုကုမ္ပဏီမှနှစ်စဉ်တာဝန်ယူ၍ပံ့ပိုးပေးထားပါသည်။

–ကျောက်ဆည်မြို့နယ် မြို့မိုး ရပ် ရပ်ကွက် ကျောက်ဆည်မြို့ကျောင်းလမ်း ရပ်ကွက် ကျောင်းဆောင်း ငါး တောင် ၅၀၀,၀၀၀,၀၀၀/- လှူဒါန်းခဲ့ပါသည်။ (၂၀၁၇)

– ကျောက်ဆည်မြို့နယ် အင်းကျည်း ရပ်ကွက် ကျောင်းဆောင်း နှစ် [illegible] အတွက် (၂,၀၀၀,၀၀၀/-) လှူဒါန်းခဲ့ပါသည်။ (၂၀၁၇)

Appendix 12

Members of Project Team

Description of the Consultant Team

Resource & Environment Myanmar Ltd. (REM) is located in the city of Yangon, Myanmar, in the country it is a leading resources and environment consulting firm, the company members are composed of the current or former faculty members of environment, society and earth resources management and other related subjects. Its predecessor was a research team founded in 1998 in University of Yangon, the team members were ecologists, social economists, geologists, doctors, economists, and data management staff. In 2003, an environmental impact assessment team was established; the team members are retired and current professors and scientists who have strong interest in environmental and resource management.

After five years of cooperation in several projects with the scientists from various subjects of University of Yangon (such as environmental data collection, oilfield development evaluation, construction of offshore oil & gas production base, beach resorts and onshore gas pipelines, etc.), the Resource & Environment Myanmar was registered under the current laws and regulations in Myanmar, the Company can provide systematic services for a variety of major infrastructure projects under the request.

The Company could have provided environmental impact assessment, social and health impact evaluation for private or government authorities` projects. In addition, the Company also delivers geotechnical engineering, geological and hydrogeological survey, and soil investigation, geological hazard assessment (potential landslide risk figure, seismic hazard assessment, and flood risk map).

The Company currently has nine research groups, including ecology, plants, soil and water, social investigation, cultural heritage, public health, risk, information management and atmospheric research, a total of 33 experts and has passed ISO9001:2008 No. 686750 certified laboratory's assistance.

Recently, Resource & Environment Myanmar Ltd. was established as a group of company for consultancy services in 2014 by three partners – Resource & Environment Myanmar Co., Ltd., Imago Global Co., Ltd. and Sustainable Environment Myanmar Company Ltd.

Sustainable Environment Myanmar Ltd. has the resources and capability to handle environmental management issues as per the provisions of the Environmental Conservation Law, 2012.

Environmental work includes the following:

1. Environmental Audit (regarding ongoing projects).

2. Environmental Impact Assessments (regarding new projects)

3. Environmental & Social Management Plan

5. Environmental Monitoring

For the present Environmental Impact Assessment, following members participated in field data collection, stakeholder consultation, desk study and ESIA report preparation.

Resource and Environment Myanmar Project Team Member

No.	Name	Expertise
1.	U Zaw Naing Oo (Managing Director)	Environmental Impact Assessment and Environmental Management Plan
2.	Daw Khin Ohnmar Htwe (Director)	Social Impact Assessment
3.	U Chit Myo Lwin (Project Manager)	Physical Environmental Baselines Data Collection
4.	Dr. Sandar Win (Principal Consultant)	Ecological Assessment (Fauna)
5.	Dr. Tin Tin Khaing (Principal Consultant)	Ecological Assessment (Flora)
6.	U Myo Thura (Consultant)	Geotechnical Engineering
7.	Daw Khaing May Sint Aung (Consultant)	Socio-economic and cultural environmental baseline coordinator
8.	Dr. Hnin Wut Yi (Consultant)	Safety and Occupational, Health Baseline Coordinator
9.	Daw Poe Mon Mon Kyaw (Consultant)	Safety and Occupational, Health Baseline Coordinator
10.	U Min Min Oo (Consultant)	Chemical Engineering

Myanmar Conch Cement Co., Ltd (Kyaukse) Project Team Member

No.	Name	Expertise
1.	U Khin Maung Tint (AGM)	Mechanical Engineering
2.	U Soe Nyunt (Consultant)	Mining Geology
3.	U Phyo Wai Thet	Mining Manager

Name of Consultant	-	Zaw Naing Oo
Present Position	-	Principal Consultant, Physical Environment, Managing Director
Name of Firm	-	Sustainable Environment Myanmar Co., Ltd. (SEM)
Nationality	-	Myanmar
Profession	-	Environmental Scientist and Environmental Geology, Environmental Management
Date of Birth	-	22 – 03-68
Years with Firm/Entity	-	2007 Nationality - Myanmar
Membership in Professional Society		- Myanmar Geosciences Society (MGS) - Faculty Member of Myanmar Environment Institute (MEI)
Detailed of Tasks Assigned		- Project management for ESIA study - Environmental Baseline study for soil, water, air and noise - Environmental Management - Preparation of ESIA Report

Profile

Zaw Naing Oo obtained his M.Sc. degree in geosciences and became professional geologist in Myanmar since 1997. He worked as a teaching staff in Geology Department, Yangon University during 1997 to 2007. At present he is a Director for Resource & Environment Myanmar Ltd. as well as EC Member of Myanmar Environment Institute. He has twenty years of experience in the field of Geosciences and currently he works as a principal consultant in an area of Environmental Impact Assessment and Environmental Management in various projects.

Recently, he works as a Managing Director in SEM and he has also managed multi-disciplinary planning, environmental monitoring and audit and environmental management projects.

Professional History

2009 to date - Director, Principal Consultant, EIA and EMP, Resource & Environment Myanmar Co., Ltd.

2007 – 2009 - Project Manager, Soil Investigation Pte. Ltd., Singapore

1997 – 2007 - Demonstrator, Assistant Lecturer, Geology Department, Yangon University

Demonstrator/ Consultant Geologist: Practical works on petrology, aerial photo interpretation and remote sensing for undergraduate students Feasibility study, surveying, geotechnical investigation, geological mapping, data base and reporting of Ta-sang Hydropower project, Union of Myanmar.

Assistant Lecturer: Conduct lecture on Petrology and Mineralogy of Gold Deposit, Structural Geology, Remote Sensing and GIS Application in mineral exploration, Field leader for undergraduate geology students, field training in various parts of Myanmar, Geology and geotechnical investigation of upper Bu village multipurpose dam project, Union of Myanmar,

Coordinator- "Application of Geographic Information Systems and Remote Sensing in Agriculture" jointly organized by dept. of geography and Myanmar Agriculture Service, Bago Division.

Land Survey and Physical Resource Specialist (2003-2005) - MDX Group of Companies, Bangkok, Thailand Responsible for desk study including preparation for necessary documents, information, maps, data entry sheets and managements

Project Manager: Site Investigation for Downtown Line MRT Project, Site Investigation for Project C916-Construction of Station and Tunnel at Beauty World Station

Reporting SI work and Rock Mass Quality for design and construction of MRT Station and Tunnel

Additional SI Work for C-855 Tunnel Section Reporting for SI work for design and construction of Station and Tunnel, Supervise & reporting CPT test, Supervise and reporting geophysical works (resistivity and surface wave) along the tunnel line.

Selected Relevant Experience in an Environmental and Social Impact Assessment

Environmental Impact Assessment and Environmental Management on:

S/n	Project name	Owner of the project	Person to contact and telephone	Completion time	Remarks
1	EIA of Myanmar-China Gas Pipeline Project	CNPC IEM (Intern. Environmental Management Co. Ltd.)	Ron Livingston (MD) 662 6366390	November, 2010	Submitted to Myanma Oil and Gas Enterprise
2	ESHIA of Mai Khot Coal Power Project	IPC (Italian Thai Power Co. Ltd.)	Vudtichai Eksangsri (CVO) 66 85 2495 655	October, 2010	Submitted to Ministry of Energy
4	ESHIA of Upper Yeywar – Shwezaryan 230 kV Transmission Line	Ministry of Electric Power (1) & GK Power Systems Ltd.	Zeya Thura Mon (MD) +(95-1) 502016-18	September, 2011	Submitted to Ministry of Electric Power Enterprise
5	ESHIA of Baluchaung-Shwemyo 230 kV Transmission Line	Ministry of Electric Power (1) & GK Power Systems Ltd.	Zeya Thura Mon (MD) +(95-1) 502016-18	November, 2011	Submitted to Ministry of Electric Power Enterprise
6	Socioeconomic Assessment for Rakhine Region	Myanmar Engineering Society	U Than Myint +95 9 5136467	November, 2011	UNDP Multi Hazard Project
8	Environmental Baseline Survey of Dawei Deep Sea Port and Industrial Development	Italian Thai Devlopment and Team Engineering Consultant	Dr. Sirinimit Boonyuen (MD, Env Unit) +662-509-9000 ext. 2305	May, 2012	Submitted to the Special Economic Zone Committee
9	ESHIA of Thaketa Gas Turbine Project	BKB Co. Ltd.	Dr. Sone Han (Local Rep./ Proj. Director) +95 9 5183631	May, 2012	Submitted to MIC
10	SIA of Main Road Project, Dawei	Italian Thai Development and Seatac Group	Pracha Jantarasarsophon tsiajao@yahoo.com	July, 2012	Submitted to the Special Economic Zone Committee
11	ESHIA of Modi Taung Gold Project	National Prosperity Co. Ltd.	Thiha Zaw Lin Project Director	March, 2012	Submitted to MIC
12	EIA of 500 MW CCPP at Hlawga	Htoo & HIE, China	Zhuang Jinxiang 18669086755 zhuangjx_love@126.com	Feb. 2013	Submitted to MIC
13	EIA of MCC Cement Plant, Mawlamyaing	SCG Thailand & Pacific Link Myanmar	Mr. Mongkon, mongkonp@scg.co.th	April, 2013	Submitted to MIC
14	IEE for the Project of Manufacturing of construction materials and factory utensils (Welded H-Beams and Pipes)	Prime Metal Company Ltd.	U Tin Maung Tun 09-5177264	April, 2013	Submitted to MIC
15	IEE for the project of Manufacturing of Garment at Hlaingtharyar, Yangon	South Bay Manufacturing Co., Ltd	Mr, Rong, 01-544021	June, 2013	Submitted to MIC
16	IEE for the project of Manufacturing of Garment at Intagaw, Bago	Hung Kiu (Myanmar) Garment Manufacturing	Mr. Ng Hung Yau, 959 - 5116258	July, 2013	Submitted to MIC

17	IEE for the project of Manufacturing of Garment at Pathein City	Hakers Enterprise (Myanmar) Co., Ltd.	Daw Nan San Seng, 01 534876	August, 2013	Submitted to MIC
17	IEE for the project of Manufacturing of Garment at Dagon South, Yangon	Myanmar Sein Pann Manufacturing	Daw Tin Tin Win, 01-554003	August, 2013	Submitted to MIC
18	Environmental Impact Assessment of Shweli River II Hydropower Project (in progress)	Hydrolancang International Energy Company Ltd. and KHIDI	-	October, 2013	Submitted to MOEP
19	ENVIRONMENT AND SOCIAL CONSIDERATION STUDY ON THE PROJECT FOR REHABILITATION OF EDUCATION COLLEGES IN THE REPUBLIC OF THE UNTON OF MYANMAR	Yamashita Sekkei Inc. and KRI International Corp.	-	February, 2014	Submitted to MOE
20	ENVIRONMENTAL & SOCIAL INFORMATION COLLECION SURVEY FOR THE PROJECT FOR THE STRATEGIC URBAN DEVELOPMENT PLAN OF THE GREATER YANGON	Nippon Koei Co., Ltd		September, 2013	JICA
21	ACTUAL ENVIRONMENTAL SURVEY FOR FEASIBILIY STUDY FOR THE CONSTRUCTION OF BAGO RIVER BRIDGE	ALMEC Corporation, NIPPON KOEI Co., Ltd.	-	April, 2014	Ministry of Construction
22	ACTUAL ENVIRONMENTAL SURVEY FOR FEASIBILIY STUDY FOR THE CONSTRUCTION OF THAKETA RIVER BRIDGE	ALMEC Corporation, NIPPON KOEI Co., Ltd.	-	April, 2014	Ministry of Construction
23	ESIA for Baseline study of Thilawa Special Economic Zone Class A	Nippon Koei Co., Ltd.	-	December, 2013	MOECAF
24	Environmental and Social Survey for Environmental Impact Assessment Studies under the Project for Electric Power	Nippon Koei Co., Ltd.		September, 2014	MOECAF

	Development in the Thilawa Area				
25	Environmental Baseline Survey for environmental and social consideration for energy sector rehabilitation program in Myanmar	Nippon Koei Co., Ltd.		October, 2014	MOECAF
26	Survey for Preparation of Abbreviated Resettlement Plan for Feasibility study for the construction of new Thaketa and Bago River Bridge	Nippon Koei Co., Ltd.		September, 2014	Ministry of Construction
27	ESIA of Upper Yeywa Hydropower Project	Department of Hydropower Implementation (DHPI), Ministry of Electric Power (MOEP).			MOEP
28	ESIA survey for Mongwa Hydropower project_60 MW, Shan State	Special Region No.4 Government	U Hla Thaung (Director) 09453340179	May, 2014	MOEP
29	EIA of reclamation works at Sittwe, Rakhine State	Su Htoo San Co., Ltd	U Myint Han (Director)	April, 2015	
30	Environmental Management of EIA Star City Project, Thanlyn	SLP Environment Co., Ltd (EIA consultant	EIA consultant: Steve Pearmain (MD) www.slpenvironmental.com	August,2015	MOECAF
31	Environmental management and public consultation meeting of ESIA survey for Thayet Cement Plant, Thayet Town, Magwe Region	Myanmar Jidong Cement Co., Ltd. (Thayet BOT Cement Project) (Client) & D'Appolonia S.p.A (ESIA consultant)	April Thazin (09 5081666)	Sept, 2015	IFC
32	Environmental management and public consultation meeting of ESIA and EMP survey for cement plant in Thandawmyat Taung, Kyaukse Township)	Myanmar Conch Cement Co. Ltd.	Daw Nan Lin Lin Tun (MD) 01-378854 (55-56) myintinvestmentgroup@gmail.com	Mar, 2015	MOECAF
33	Environmental management (EMP survey for Double Rhinos Cemnet Factory in Thandawmyat Taung, Kyaukse Township)	Than Taw Myat Co., Ltd. (Client)	NA	July, 2015	MOECAF

34	Environmental management (IEE survey for Water Treatment Plant Project as part of the Initial Development Phase of DSEZ)	ERM-Siam Co., Ltd. (IEE consultant) & Myanmar Industrial Estate Holding Pte. Ltd. (Client)	Kamonthip Ma-oon (Principal Consultant) Kamonthip.Ma-oon@erm.com	Jan, 2016	Dawei Special Economic Zone Management Committee

Education
- Diploma in Environmental Management
- M.Sc., Yangon University, 1998 (Geology/ Economic Geology)
- B.Sc., Yangon University, 1992
- Environmental Management Systems Auditor/Lead Auditor Training Course (ISO 14001:2004)

Language
- Burmese mother tongue and English

Name:	**Daw Khin Ohnmar Htwe**
Present Position:	Principal Consultant
Nationality:	Myanmar
Profession:	Social Survey and Impact Assessment
Specialisation:	Social Impact Assessment Specialist, managing and preparing for the SIA, Administrator and Instructor, Tutor , Department of Geography, University of Yangon, Principa.
Qualifications:	• BA(Geography) University of Pathein • MA(Geography) University of Yangon • Diploma in English University of Yangon • Monbusho, Japan , Tokyo, Japan • CSEAS, Kyoto University, Kyoto, Japan

Profile

Daw Khin Ohnmar Htwe received her Master degree in Geography from University of Yangon in 1995. Several research projects in rural development, conservation and waste management, and livelihood have been conducted during 1995 until 2011. One year long Practice-Oriented Area Study on Re-vitalization of Networking Societies by "Zaichi (Village Communities) and Local Towns (Rural Urban) was completed in CSEAS, Kyoto University, Japan. She served as teaching staff in Geography Departments of Pathein and Yangon universities during 1995 to 2006, and became a leading consultant on Social Impact Assessment and Management in Resource & Environment Myanmar Co. in 2009. As one of the founders, and Head of the Social Studies in Myanmar Environment Institute (MEI), she not only shares knowledge on Social Issues in Environment but also conducts research projects including preliminary SIA of Letpadaung Taung Copper Project for the Investigation Commission of the State, in 2012

Selected Relevant Experience in Present Employment Since 1995

1995 to 1998	Tutor , Department of Geography, University of Yangon
2001 to 2006	Principal, Century Childcare, Computer and Language Centre
2007 to 2009	Administrator and Instructor, Shinpo Japanese Language School
2009 to present	Senior Consultant, Resource and Environment Myanmar (REM)
2011 to present	Head of Section, Myanmar Environment Institute (MEI)

Research projects

Duration		Title
From	To	
1995	1995	An Evaluation of Myanmar Climate for Tourist Industry by Applying the TCI Method
2002	2004	Solid Waste Disposal in Yangon City
2003	2005	Analysis on Periodic Market System in Rural Shan State, The Case of Inle Lake
2003	2005	Environmental Images and Conservation Practices of Rural Society, The Case of Inle Lake
2003	2005	Spatial and Seasonal Variation of Agriculture in Inle Lake
2007	2009	Adaptation to Nature: House Types and House Styles in Inle Lake
2008	2011	Peoples' Wisdom Against Disasters: Case Study in Some Villages of Maubin Township, Ayeyarwaddy Region, Myanmar
2009	2011	Integrated Study on Agriculture and Rural Development in Central Dry Zone, Myanmar
2010	2011	Networking of NGO and CBO in Mandalay City
2010	2011	Rural Development of ShanlayKyun, AmarapuraTownship, Mandalay Region
2010	2011	Rural Development of Thanbo Island in Ayeyarwaddy River , Mandalay Region

EIA and SIA Experiences

Sr.	Period	Title
1	Jan, 2010	Traffic Survey in ESHIA for Myanmar-China Gas Pipeline Project, CNPC, 2009
2	2010	ESHIA for Mong Hkok Coal-fire Power Plant Project
3	Aug, 2011	Multi-hazard Risk Assessment in Rakhine State , UNDP Project
4	2011	EIA and SIA of Yeywar-Shwesaryan Power Transmission Line
5	2011	EIA and SIA of Baluchaung-Shwemyo Power Transmission Line
6	2012	EIA and SIA of the Dawei Deep Sea Port and Industrial Development Project

7	April, July, 2012	Public Meeting (SIA) of the Dawei Main Road Project
8	2011	SIA for Tharkayta Gas Turbine Project
9	April, May 2012	IEE for Small Scale Gold Processing Plant, Modi Taung Project, Yamethin
10	July 2012	SIA of Shweli River II Hydropower Project
11	September 2012	Urban Environmental Issues in Yangon City Area, Joint Study of Japan International Cooperation Agency and Yangon City Development Committee
12	December 2012	Social Baseline Data Collection for Dawei Special Economic Zone
13	January 2013	Social Impact Assessment for Hlawga 500 MW Combine Cycle Power Plant

Publications

- Member of Myanmar Geosciences Society (MGS)

Employment History

1995 to 1998	Tutor , Department of Geography, University of Yangon
2001 to 2006	Principal, Century Childcare, Computer and Language Centre
2007 to 2009	Administrator and Instructor, Shinpo Japanese Language School

Language

1. Burmese mother tongue and English and Japan Languages.

Name of Consultant	-	Chit Myo Lwin
Present Position	-	Project Manager
Name of Firm	-	Sustainable Environment Myanmar Co., Ltd. (SEM)
Nationality	-	Myanmar
Profession	-	Physical Environment
Date of Birth	-	19 September 1988
Years with Firm/Entity	-	2009
Nationality	-	Myanmar
Membership in Professional Society	- -	Myanmar Geosciences Society (MGS) Faculty Member of Myanmar Environment Institute (MEI)

Detailed of Tasks Assigned

Profile

Chit Myo Lwin obtained his BSc degree in geology and became professional geologist in Myanmar since 2009. At present he is a senior consultant of physical envrionment for Resource and Environment Myanmar Co., Ltd. He has six years of experience in the field of Geosciences and EIA, and currently he works as a consultant in an area of Environmental Impact Assessment and Environmental Management in various projects.

Recently, he works as a senior consultant in Sustainable Myanmar Co., Ltd and he has also report the baseline data collection in the environment monitoring projects.

Professional History

2014 to up to now- Project Manager, Principal Consultant, EIA and EMP, Resource & Environment Myanmar Co., Ltd.

2013 – 2014 - Geoscientist and project coordinator in Siam Cement Company (SCG)

2009 - 2013 - Physical Environmental Consultant, Resource and Environment Myanmar Co., Ltd.

Geoscientist : Conduct project on gold mineral exploration in Bauk Mauk Township (Upper Sagaing Region), Limestone exploration in Mon and Kayin States, geology and geotechnical investigation of Tanintharyi hydropower project, raw material exploration for cement in MCL cement plant (Mawlamyine) in Union of Myanmar.

Coordinator **:** Project coordinator between developer and contractors for cement plant (Siam Cement Plant in Mawlamyine) and negotiation with government and local people for project development at site as well.

Consultant : Physical environmental consultant in EIA surveys of different projects such as oil and gas sector, multi-hydropower project, gas turbine project, cement plant, city development, deep sea port project and so on.

Project Manage : EIA study for Kyaukse Cement Plant, Sittwe Reclamation for city development

Selected Relevant Experience in the Environmental and Social Impact Assessment, and Geoscience

Environmental Impact Assessment and Environmental Management on:

S/n	Project name	Owner of the project	Person to contact and telephone	Completion time	Remarks
1	Gold exploration in Bank Mauk Tsp.	Care Mineral Cooperation (CMC)	Than Tun (MD) 959 5151309	June, 2009	Submitted to Ministry of Mine
2	EIA of Myanmar-China Gas Pipeline Project	CNPC IEM (Intern. Environmental Management Co. Ltd.)	Ron Livingston (MD) 662 6366390	November, 2010	Submitted to Myanma Oil and Gas Enterprise
3	Geotechnical and geological surveys in Hydropower project at Taninthar yi	ITD (Italian Thai Development Co. Ltd.)		April, 2011	ITD (Italian Thai Development Co. Ltd.)
4	ESHIA of Mai Khot Coal Power Project	IPC (Italian Thai Power Co. Ltd.)	Vudtichai Eksangsri (CVO) 66 85 2495 655	October, 2010	Submitted to Ministry of Energy
5	ESHIA of Upper Yeywar – Shwezaryan 230 kV Transmission Line	Ministry of Electric Power (1) & GK Power Systems Ltd.	Zeya Thura Mon (MD) +(95-1) 502016-18	September, 2011	Submitted to Ministry of Electric Power Enterprise
6	ESHIA of Baluchaung-Shwemyo 230 kV Transmission Line	Ministry of Electric Power (1) & GK Power Systems Ltd.	Zeya Thura Mon (MD) +(95-1) 502016-18	November, 2011	Submitted to Ministry of Electric Power Enterprise
7	Socioeconomic Assessment for Rakhine Region	Myanmar Engineering Society	U Than Myint +95 9 5136467	November, 2011	UNDP Multi Hazard Project
8	Environmental Baseline Survey of Dawei Deep Sea Port and Industrial Development	Italian Thai Devlopment and Team Engineering Consultant	Dr. Sirinimit Boonyuen (MD, Env Unit) +662-509-9000 ext. 2305	May, 2012	Submitted to the Special Economic Zone Committee
9	ESHIA of Thaketa Gas Turbine Project	BKB Co. Ltd.	Dr. Sone Han (Local Rep./ Proj. Director) +95 9 5183631	May, 2012	Submitted to MIC
10	SIA of Main Road Project, Dawei	Italian Thai Development and Seatac Group	Pracha Jantarasarsophon tsiajao@yahoo.com	July, 2012	Submitted to the Special Economic Zone Committee
11	ESHIA of Modi Taung Gold Project	National Prosperity Co. Ltd.	Thiha Zaw Lin Project Director	March, 2012	Submitted to MIC
12	EIA of 500 MW CCPP at Hlawga	Htoo & HIE, China	Zhuang Jinxiang 18669086755 zhuangjx_love@126.com	Feb. 2013	Submitted to MIC
13	5000 t/d cement plant in Mawlamyine as geoscientist and coordinator	Siam Cement Company	Mongkon Pornchunchoovongmongkonp@scg.co.th	Oct 2013-May 2014	

14					
15	ESIA for Baseline study of Thilawa Special Economic Zone Class A	Nippon Koei Co., Ltd.	-	December , 2013	MOECAF
16	Environmental and Social Survey for Environmental Impact Assessment Studies under the Project for Electric Power Development in the Thilawa Area	Nippon Koei Co., Ltd.		September , 2014	MOECAF
17	Environmental Baseline Survey for environmental and social consideration for energy sector rehabilitation program in Myanmar	Nippon Koei Co., Ltd.		October, 2014	MOECAF
18	Survey for Preparation of Abbreviated Resettlement Plan for Feasibility study for the construction of new Thaketa and Bago River Bridge	Nippon Koei Co., Ltd.		September , 2014	Ministry of Construction
19	ESIA of Upper Yeywa Hydropower Project	Department of Hydropower Implementation (DHPI), Ministry of Electric Power (MOEP).			MOEP
20	5000 t/d cement plant of Kyaukse	Myanmar Conch Co., Ltd.		2015	MOECAF
21	Reclamation project for city development in Sittwe	Su Htoo San Co., Ltd.		2015	MOECAF
22	Baseline data collection of physical environment (EIA) and baseline reporting (Star City Project, Thanlyn)	SLP Environment Co., Ltd (EIA consultant)	EIA consultant: Mr. Steve Pearmain (MD) www.slpenvironmental.com	Aug 2015	MOECAF
23	Baseline data collection of physical environment, geological survey at limestone quarry, land use mapping and baseline reporting (Thayet Cement Plant Town, Magwe Region)	Myanmar Jidong Cement Co., Ltd. (Thayet BOT Cement Project) (Client) & D'Appolonia S.p.A (ESIA consultant)		2015	MOECAF
24	Planning for project and baseline data collection of physical environment and reporting (EIA & EMP project for cement	Myanmar Conch Cement Co., Ltd.	Daw Nan Lin Lin Tun (MD) 01-378854 (55-56) myintinvestmentgrou	2015	MOECAF

	plant in Thandawmyat Taung, Kyaukse Township)		p@gmail.com		
25	Planning and surveying for environmental management plan (EMP) (Double Rhinos Cement Factory in Thandawmyat Taung, Kyaukse Twonship)	Than Taw Myat Co., Ltd. (Client)		2015	MOECAF
26	Seismic Risk Analyzing along the Sagaing Fault in Bago Region using Geographic Information System and Remote Sensing Technologies (Project Paper)	Department of Geography (University of Yangon)	Dr. Htun Ko (Head of Department) Htunko66@gmail.com	2015	Department of Geography (University of Yangon)
27	Planning for project and baseline data collection of physical environment and baseline reporting (Water Treatment Plant Project as part of the Intial Development Phase of DSEZ)	ERM-Siam Co., Ltd. (IEE consultant) & Myanmar Industrial Estate Holding Pte. Ltd. (Client)	Kamonthip Ma-oon (Principal Consultant) Kamonthip.Ma-oon@erm.com	2016	

Education - B.Sc. (Geology)

Language - Burmese mother tongue and English

Present Position - Principal Consultant, Ecologist (Fauna)

Name - Dr. Sandar Win

Date of birth - 30 April 1968

Religion - Buddhist

Employment record

Position - Lecturer

Department - Zoology, Kyaukse University

Education - Ph.D (Zoology)

Field Study - Environmental pollution and fish diseases

Responsibility - Teaching and guide to graduate and MSc (Supervisor)

Guide to Ph.D (Co-supervisor) and some research papers were writing.

Advisor of Fisheries Federation, Mandalay Region

Publication - Journal of Myanmar Academy of Arts and Science,
Vol (8)4, 2009, 2010
Universities Research Journal Vol (3)4, 2010

Home address - No 2/38, 66x16 Street, Nanshae Pyitawthar, Mandalay

Phone No - 09 402514981

Email - dr.sandarwinphd@gmail.com

ESIA Experiences:

- **Floristic Study on Angiospermae of Kyaukse Township in Mandalay Region.**
- **ESIA study for Coal Fired Power Plant Project in Tachilaik Township, 2014**
- **ESIA study for 5000 ton/day Cement Project in Kyaukse Township, 2014**

Present Position	- Principal Consultant, Ecologist (Flora)
Name	- Dr. Tin Tin Khaing
Date of birth	- 13th August, 1966
Religion	- Buddhist
Position	- Lecturer
Department	- Botany, Sagaing University
Education	- B.Sc(Hons), Yangon University
	M.Sc, Yangon University
	Ph.D, Mandalay University
Home address	**- Teacher Hostel, Sagaing University**
Phone No	**- 09 444036432**
Email	**- tintinkhaing@gmail.com**

ESIA Experiences:

- **Floristic Study on Angiospermae of Kyaukse Township in Mandalay Region.**
- **ESIA study for Coal Fired Power Plant Project in Tachilaik Township, 2014**
- **ESIA study for 5000 ton/day Cement Project in Kyaukse Township, 2014**

Curriculum Vitae (CV) for Key Expert

1. General:

Position Title and No.	Environmental Technician (Soil and Water Quality)
Name of Key Expert:	Myo Thura (Mr)
Name of the Firm proposing the Key Expert:	Resource and Environment Myanmar Co., Ltd
Date of Birth:	8th November, 1984
Nationality:	Myanmar
Country of Citizenship/Residence:	Myanmar

2. Education: B.Sc. (Geology)

3. Employment Record relevant to the assignment:

<XX years professional experience since 2007>

Period	***Employing organization and your title/ position***	***Country***	***Summary of* activities *performed relevant to the Assignment:***
2007 – 2010	Nay Pyi Taw Project, GE-(3), Soil Laboratory.	Myanmar	Responsible for studies of soil quality investigation.
2010 – 2013	Upper Baluchaung Hydropower Project, Neo Energy Oasis Development Co., Ltd.	Myanmar	Responsible for site investigation of rock and soil condition.
2013 – 2014	Ayar Won Housing Project, Win pilling Co., Ltd.	Myanmar	Responsible for Pile Foundation.
2014 – present	Resource & Environment Myanmar Co., Ltd.	Myanmar	Responsible for water and soil base line survey

Contact information for reference: Zaw Naing Oo, Director of Resource and Environment Myanmar Ltd. zawnaingoo@enviromyanmar.net

4. Membership in Professional Associations and Publications:

5. Language Skills:

	Speaking	*Reading*	*Writing*
English	fair	fair	fair
Myanmar	native	native	native

6. Reference to Prior Work/Assignments that Best Illustrates Capability to Handle the Assigned Tasks

No.	*Title*	*Client*	*Poisson*	*Period*
1	Myin Gyan IPP project (Independent Power Plan) (EIA)	ERM Co,. ltd	Field surveyor	June.2014 to May 2015
2	Thilawa SEZ Zone A Development Monitoring project (EIA) Phase_1 construction stage	MJTD	Field surveyor	Jan.2014 to Dec 2015

End of document

Dr. Hnin Wut Yi

PROFESSIONAL TRAININGS AND WORKSHOPS ATTENDED

Total Quality Management Training (Certified) organized by MMA-Malaria / QDSTM / UNOPS / GFATM (Year 2) on 13-15 June 2012

VOLUNTEER EXPERIENCE

As an Observer at Collaborative study conducted by Research Department of PSI/Myanmar at Minbu Township, Magway Division from 26th February to 3rd March 2012 (20 villages)

OTHER EXPERIENCE

As a Medical Officer at Htun Foundation Hospital for 9 mths
As an Assistant Medical Officer at Malaria Project of MMA for 3 mths

LANGUAGE SKILLS

Myanmar - Mother Language
English - 4 skills

COMPUTER SKILLS

Microsoft Word, Microsoft Excel & Power Point (2011)

HOBBIES

Travelling, Reading & Communication with different people

Name	-	Poe Mon Mon Kyaw
Present Position	-	Health and Safety Manager
Name of Firm	-	Sustainable Environment Myanmar Co., Ltd. (SEM)
Nationality	-	Myanmar
Profession	-	Social Survey
Date of Birth	-	2.1.1992
Years with Firm/Entity	-	2014
Membership in Professional Society	-	Myanmar Engineering Society
Detailed of Tasks Assigned	-	Environmental Health and Safety Management

Profile

Poe Mon Mon Kyaw obtained her A.G.T.I diploma in Civil in 2011. She worked for Myanmar Earthquake Committee as an assistant technical Engineer about one year and Golden Hexagon construction Co., Ltd as a site engineer about five months. At present she is working at Sustainable Environment Myanmar Company Limited as Health and Safety Manager.

Professional History

2013-2014	-	Technical Assistant Engineer Myanmar Earthquake Committee (MEC)
2014 Jan-Aug	-	Site Engineer Golden Hexagon Construction.Co,Ltd.
2014 Aug to Date	-	Health and Safety Manager Sustainable Environment Myanmar

Selected Relevant Experience in Environmental and Social Impact Assessment

Sr.	Period	Title	Responsibility
1	2013-2014	Myanmar Earthquake Committee, Myanmar Engineering Society	Practical works on the project of Earthquake Risk Assessment in Bago, Sagaing and Taungoo, Myanmar National Building Code Project and Detailed Measure of the Shwedagon Pagoda Project.
2	Jan-Aug 2014	Golden Hexagon Construction	Inspector and supervisor in construction of 6 storied building Quantity surveyor in construction site and draft AutoCAD designer on progress of construction site
3	Mar-2015	Myanmar Conch Cement Co. Ltd	Baseline data collection of safety, health and environment condition at factory and reporting for environmental management and safety, occupational health (EIA & EMP project for cement plant in Thandawmyat Taung, Kyaukse Township)
4	July-2015	Neo Energy Oasis Development Co., Ltd.	Baseline data collection of safety, health and environment condition at factory and reporting for environmental management and safety, occupational health (EIA of Baluchaung Hydropower Project, Southern Shan State)

5	Sept 2015	Myanmar Jidong Cement Co., Ltd. (Thayet BOT Cement Project) (Client) & D'Appolonia S.p.A (ESIA consultant)	Baseline data collection of safety, health, and environment at cement factory and environmental management planing (ESA of Thayet Cement Plant, Thayet Town, Magwe Region)
6	Jan 2016	ERM-Siam Co., Ltd. (IEE consultant) & Myanmar Industrial Estate Holding Pte. Ltd. (Client)	Baseline data collection of socio-economic and HSE condition at villages and baseline reporting (IEE project of Water Treatment Plant Project as part of the Intial Development Phase of DSEZ)

Education - Technical University (Thanlyin) , 3rd Year (Physics)

Language - Burmese, English.

Min Min Oo

Name of Consultant	: Min Min Oo
Present Position	: Consultant (Environmental Management)
Name of Firm	: Sustainable Environment Myanmar Co., Ltd. (SEM)
Nationality	: Myanmar
Profession	: Environmental Management
Date of Birth	: 15.12.1988
Years with Firm/Entity	: March 2015
Membership in Professional Society	: Associated Member of Myanmar Engineering Society (MES)
Detailed of Tasks Assigned	: Baseline data collection of Environmental, Health & Safety
	: Reporting
	: Supporting to ESIA & EMP report preparation

Profile

Min Min Oo obtained his Bachelor of Engineering in Chemical and became Chemical Engineer in Myanmar since 2011. He worked as a Processing Technician in Pinya Manufacturing Co., Ltd. during 2012 to 2014. At present, he is a Consultant (Environmental Management) for Sustainable Environment Myanmar Co., Ltd. (SEM). He has two years of experience in the field of carbonated soft drink manufacturing and currently he works as a consultant in an area of Environmental Impact Assessment and Environmental Management in projects.

Professional History

2015-up to now	Consultant (Environmental Management), Sustainable Environment Myanmar Co., Ltd.
2012-2014	Processing Technician, Pinya Manufacturing Co., Ltd.

Selected relevance experience in Environmental and Social Impact Assessment

Environmental Impact Assessment and Environmental Management on:

Sr.	Project Name	Owner of the Project	Verification Source – Contact details of the Organization/Client	Completion Time	Remarks
1	Environmental management (EMP survey for Double Rhinos Cement Plant in Thandawmyat Taung, Kyaukse Township.)	Than Taw Myat Co., Ltd. (Client)	U Tin Win Aung +95 9256006482 pantin234@gmail.com	July, 2015	
2	Environmental management and	Myanmar Jidong Cement Co., Ltd.	April Thazin +95 95081666	Sept, 2015	

	public consultation meeting of ESIA survey for Thayet Cement Plant, Thayet Town, Magwe Region.	(Thayet BOT Cement Project) (Client) & D'Appolonia S.P.A (ESIA consultant)			
3	ESIA of Alpha Cement Plant in Kyaukse Industrial Zone, Kyaukse Township.	Myanmar Conch Cement Co., Ltd. (Client)	U Khin Maung Tint +95 9797606773	N/A	Assist to ESIA Report revision
4.	ESIA of Baluchaung Hydropower Project, Southern Shan State.	Neo Energy Oasis Development Co., Ltd. (Client)	Daw Aye Aye Khine +95 9256122787 khine11268.ygn@gmail.com	Jan, 2017	Assist to ESIA Report revision
5.	ESIA of 23MW CFPP project in Tachileik.	Min Khit Thit Mining Co., Ltd. (Client)	U Saw Lwin +95 95010257 uslmdy13@gmail.com	March, 2017	Assist to ESIA Report revision
6.	Public Consultation Meeting (IEE for 2D Seismic Survey at MOGE3 in Magwe Region.	ERM-Siam Co., Ltd. (Consultant), MOGE & PTTEP International Ltd. (Client)	Daw Thiri Aung +95 1652700 (701-704) thiriaung@pttep.com	March, 2017	Assist to Public Consultation Meeting
7.	Public Consultation Meeting (ESIA for CCPP project in Kanbauk, Dawei.)	ERM-Siam Co., Ltd. (Consultant) & Myanmar UPA Co., Ltd. (Client)	Daw Khine Wint Mon +95 92011012 admin@unitedpowerofasia.com	April, 2017	Assist to Public Consultation Meeting
8.	ESIA report preparation for Cement Grinding Plant in Class A Thilawa SEZ.	YTL Cement Myanmar Co., Ltd. (Client)	Ang Tze Hui +6018 7000678 thang@ytlcement.com	N/A	Assist to ESIA Report revision
9.	ESIA of Alpha Cement Plant project in Patheingyi Township, Mandalay Region.	Myanmar Conch Cement Co., Ltd. (Client)	U Khin Maung Tint +95 9797606773	N/A	Scoping Report preparation
10.	ESIA of Double Rhions Cement Plant Project in Thantawmyat Taung, Kyaukse Township.	Than Taw Myat Co., Ltd. (Client)	U Tin Win Aung +95 9256006482 pantin234@gmail.com	N/A	Scoping Report preparation

Education

Bachelor of Engineering (Chemical)	Technological University (Thanlyin)	19 Feb, 2012
Environmental Engineering & Management	Myanmar Engineering Society	27 March, 2016
Advanced Environmental Engineering & Management	Myanmar Engineering Society	26 Feb, 2017

Environmental Studies	Myanmar Environment Institute	23 July, 2016
Total Water Treatment Training Modules Program, Raw Water Treatment	Myanmar Engineering Society & i-Chem Academy	19 Jun, 2016
Total Water Treatment Training Modules Program, Waste Water Treatment – Physical, Chemical Process (PCP)	Myanmar Engineering Society & i-Chem Academy	24 July, 2016
Applied GIS Mapping	Imago Global Co., Ltd	3 Feb, 2016

Language

Burmese mother tongue and English

CURRICULUM VITAE

Name	- U Khin Maung Tint
NRC No.	- 9/Kasana (N) - 090147
Date of Birth	- 05 March 1972
Age	- 45 years
Nationality	- Myanmar
Religion	- Buddhist
Gender	- Male
Height	- 5’ 7”
Weight	- 150 lb
Marital Status	- Married
Father’s Name	- U Kalar
Qualification	- B.E (Mech)
Position & Organization	- Assistant General Manager (No. 33, Heavy Industry (Kyaukse), No. 2 (Heavy Industrial Enterprise, Naypyitaw) (20 March 2001 to present)
Present Address	- Service Quarter of No. 33 Hearvy Industry (Kyaukse)., Kyaukse Industrial Zone, Kyaukse Township, Mandalay Region
Permanent Address	- Zaytan Ward, Kyaukse Town, Mandalay Region
Contact Number	- 09 797606773

CURRICULUM VITAE

Name	- U Soe Nyunt
NRC No.	- 12/Mayaka (N) - 090130
Date of Birth	- 09 June 1953
Age	- 65
Nationality	- Myanmar
Religion	- Buddhist
Gender	- Male
Height	- 5’ 9”
Weight	- 180 lb
Marital Status	- Married
Father’s Name	- U Aye Ko
Qualification	- B.Sc (Geology)
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Contents

1.1 Overview of The Project

1.1.1 Background of The Project

The local Myint Investment Group Co. Ltd has joined Anhui Conch Cement Co Ltd from China to upgrade No.33 Kyaukse cement factory into a plant that can produce 5,000 tons of cement daily through a build-operate-transfer (BOT) system, according to the Ministry of Industry.

The joint venture, Myanmar Conch Cement Co Ltd, was permitted on November 11 by the Directorate of Investment and Company Administration.

Myanmar Conch Cement will produce cement, distribute and sell cement and cement products, and operate limestone quarry and power plant (for own used).

Location: The production facility is located at No.33 Heavy Industry (Kyaukse), Kyaukse Township, Mandalay Region.

Production capacity: Total cement production capacity of the project will be approximately 1.7 million tons of cement per year.

The proposed project consists of three major parts including limestone quarry, cement plant, power plant (for own used and logistics).

1.2 Legal Framework for the Health Sector:

The National Health Policy of 1993 provides the overall legal framework for the health sector. Among other things it aims to raise the level of health of the country and promote physical and mental well- being of the people with the objective of achieving “health for all” using a primary health care approach, and to expand the health services not only to rural areas but also to border areas to meet the health needs across the country.

Supporting the progress towards universal health coverage, the Government has recently introduced policies that would improve service delivery, expand utilization and reduce out-of-pocket spending in health. Policies include provision of free essential drugs at primary health care facilities and township hospitals. In addition, health care services would be free at the point of delivery for children under 5, pregnant mothers, and patients needing emergency surgery (only first day of hospital admission). Ensuring effective implementation of these policies to improve MNCH outcomes is a top priority for the country moving forward.

The HIA team carried out law review processes and some of the relevant laws and their relevancy could be summarized as follow.

Public Health Law (1972): The law is concerned with protection of people's health, controlling the quality and cleanliness of food, drugs, environmental sanitation and epidemic diseases.

Prevention and Control of communicable diseases Law (1995) (Revised in 2011): The law described the functions and responsibilities of citizens and health personnel in relation to prevention and control of communicable diseases. It also describes measures to be taken in relation to environmental sanitation, reporting and control of outbreaks of epidemics.

National Food Law (1997): The law enacted to enable the public to consume food of genuine quality, free from danger to prevent public from consuming food that may cause danger or are injurious to health, to supervise production of controlled food systematically and to control and regulate the production, import, export, storage, distribution and sale of food systematically.

1.2.1 Institutional Framework for The Health Sector:

The Ministry of Health remains the major provider of health care. It has a pluralistic mix of public and private system both in the financing and provision. Health care is organized and provided by public and private providers. In implementing the social objective laid down by the State, and by the National Health Policy, the Ministry of Health is taking the responsibility of providing promotive, preventive, curative and rehabilitative services to raise the health status of the population. Of the seven departments under MOH, Department of Health and Department of Health Planning are the most important ones in the context of the proposed project. Department of Health plays a major role in providing comprehensive health care throughout the country including remote and hard to reach border areas. There are 14 State and Regional Health Departments, 73 District Health Departments and a township hospital in every township. Under the township hospital there are station hospitals and rural health centers (RHC) staffed by health assistants, midwives and public health supervisors. Under the (RHCs) there are sub- centers staffed by midwives and (volunteer) auxiliary midwives, supported by networks of community health workers/volunteers. At each level, oversight is provided through a system of health committees represented by local government, health staff and the community. At the national level the National Health Committee is a high-level policy-making body that provides guidance to the MOH.

Some Ministries are also providing health care for their employees and their families. They include Ministries of Defense (Majority of healthcare staff and facilities followed by MOH), Railways, Mines, Industry, Energy, Home and Transport. Ministry of Labour has set up three general hospitals, two in Yangon and the other in Mandalay to render services to those entitled under the social security scheme.

Ministry of Industry is running a Myanmar Pharmaceutical Factory and producing medicines and therapeutic agents to meet the domestic needs.

The private, for profit, sector is mainly providing ambulatory care though some providing institutional care has developed in Yangon, Mandalay and some large cities in recent years. They are regulated in conformity with the provisions of the law relating to Private Health Care Services. The Myanmar Medical Association (MMA) and its branches also provide a link between them and their counterparts in public sector so that private practitioners can also participate in public health care activities.

The private, for non-profit, run by Community Based Organizations (CBOs) and Faith based Organizations are also providing ambulatory care though some providing institutional care and social health protection has developed in large cities and some townships. There is a strong presence of international and local NGOs on the front-lines delivering services supported by development partners. Moreover, ethnic minority organizations provide health services in many conflict and post-conflict areas in the regions. Recognizing the growing importance of the needs to involve all relevant sectors at all administrative levels and to mobilize the community more effectively in health activities, health committees had been established in various administrative levels down to the wards and village tracts.

Ministry of Health is taking initiatives to strengthen its stewardship functions. MOH is also making efforts to strengthen regulation of the fast-growing private sector.

1.3 Objective of the Health Impact Assessment

The purpose of this assessment is to quantify the health impacts associated with the coal fired thermal power plant and the related activities that are planned to be developed in the coming years. The methods used for this quantification reflect the latest advice provided by the World Health Organization (WHO), as recommended in the HRAPIE (Health risks of air pollution in Europe) Project performed for the European Commission, and accounting for the views of European and North American health experts while there have been no similar guidelines for Myanmar.

The project will have some potential impacts on local air quality, water quality, epidemics and residents nearby. So, mitigation measures for occupational hazards should be taken by the Project Company. If occupational protective measures proposed in Feasibility Research Report and HIA report can be effectively implemented during design, construction and management, occupational safety and health funds can be invested and prevention and management of occupational hazards can be strengthened when the project puts into operation, hazardous factors during normal operation period can be prevented and controlled. The project is feasible from the perspective of occupational health.

1.4 Scope of The Study

The HIA study, focusing the project area and its vicinity, includes workers and six villages which are Shan Ywar Gyi, Pyaukseikpin, Ywar Nan (East), Kale Gyaung, Taung Pa Lu and Ye Byar Taw (West).

(a) Scoping: In scoping process, specific information for all the villages such as gender, age group, education and occupation information are collected.

(c) Household Survey: To obtain the basic health profile survey of the study area is conducted with a structured questionnaire especially devised for this project by trained questioners.

(d) Impact Identification and Assessment: Anticipated impacts of the project relating to its environment are assessed from baseline health conditions, comments and suggestions of local community from public meetings.

(e) Mitigation Recommendation: Mitigation recommendations are based on impacts ratings and rankings with the aim to enhance predicted positive health impacts and minimize negative ones.

1.5 Health Impact Assessment Methodology

This HIA followed the standard steps of scoping, developing a baseline health profile, assessing impacts, developing recommendations and reports writing. Prioritizing health effect category is used to assess the health impact of the project on its environment.

1.5.1 Baseline Condition

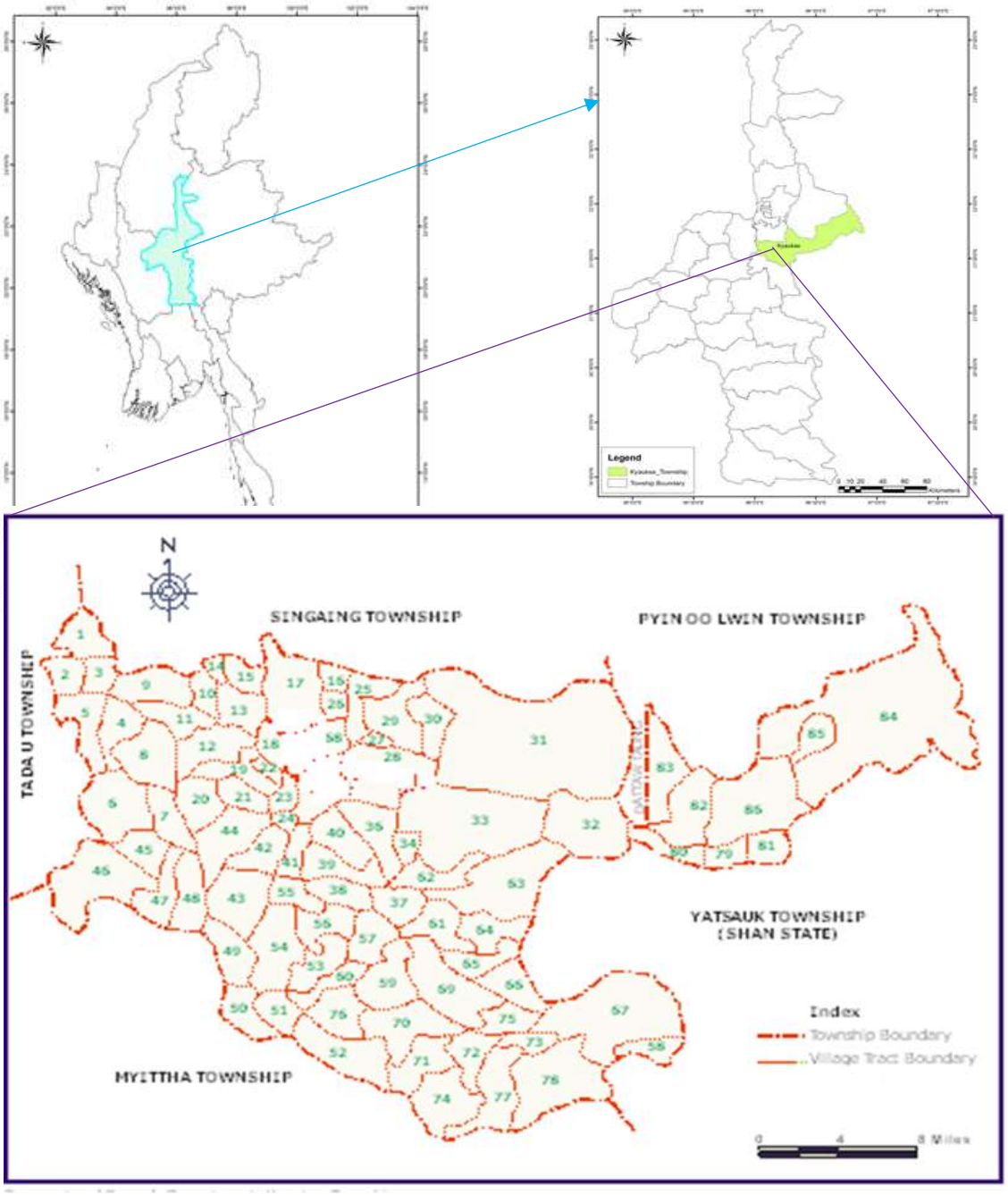
Baseline health conditions are the fundamental component for the overall health impact assessment (HIA) process. The baseline health summary provides a point of reference for the health status of a community prior to development of proposed project and also describes an overall health profile for an area. Moreover, the health profile can inform decision makers about health vulnerabilities in a region as well as positive health traits present in population.

1.5.2 Source of Information

Baseline health studies were conducted through a survey of 140 households. Concerning health services utilization, majority of household members consulted with doctor either public or private clinics for their illness. The other gave the answer of consulting with health care personnel or among family members.

1.6 Social and Environmental Condition of Kyaukse Township

The project area is located in Kyaukse Township which is situated in Mandalay Region. Kyaukse Township is situated in the Dry Zone of Central Myanmar, within North latitudes 21° 26' and 22° 2' and within East longitudes 95° 57' and 96° 58'. The township has an area of 725.278 square miles (464,178 acres) which extends about 50 miles from east to west and about 25 miles from north to south. It has an east-west elongated shape. Kyaukse Township is bounded on the north and northeast by Pyin Oo Lwin Township, on the south and southeast by Yatsauk Township, on the south and southwest by Myittha Township, on the west by Tada-U Township, and on the north and northwest by Sintgaing Township. As natural boundaries, the Myitnge River serves on the north, the Shan Highland on the east, and the Samon and Panlaung Rivers on the west. The rest portion of the boundary line is demarcated by administrative rule. Although the total area of the township is 464,178 acres (725.278 square miles). It is due to the discard of Yeyaman range and other no irrigable area. At present, it is composed of Kyaukse Town and 86 village tracts. Shown in (Figure



As human beings are solely responsible for the socio economy of all regions, the characteristics of human population become the basis for understanding the socio-economic conditions of a particular region. Population number, population growth, population distribution and density, ethnic composition and believes are the major factors for the socio-economic development of all regions.

The urban area of Kyaukse Town has the largest population number with 39,925 persons and village tracts with large population number include Bongwin, Sulaygone, Letpan, Yebawgyi, Thanywa, Phyaukseikpin, Pankhwarr, Dantaing, Letpanzin and Minzu - all these areas are located in the fertile alluvial plain with easy access to other village tracts in the township. The areas in the foothill of Shan Highlands, the area with difficulty in transportation away from the main transportation routes and areas with difficulties in obtaining water and in agricultural production are usually sparsely populated and they have population densities under 200 persons per square mile.

Population density of Kyaukse Township is about 340 persons per square mile. However, the population density varies with the population number and areas of village tracts in Kyaukse Township. Therefore, the highest population density is found in Kyaukse Town with about 22,999 persons per square miles whereas the lowest population density is found in Ohnkyaw village with about 3 persons per square miles. This figure indicates variations in socio economies of different areas due to variations in land utilization and land cover.

1.7 Medical & Health Service Condition

1.7.1 Medical & Health Service Condition of Kyaukse Township

Healthcare is a basic requirement for the socio-economic development. There is one Township Hospital and 3 Station Hospitals in Kyaukse Township. In rural area, there are 5 Rural Healthcare Centers. These hospitals and rural healthcare centers provide health sector of Kyaukse Township. In these hospitals and healthcare centers, 62 doctors and 78 nurses were appointed in 2009.

No.	Type	No. of Public Health Care Centre	Health Manpower
1	Township Hospital	1	-
2	Station Hospital	3	-
3	Rural Health Centre	5	-
4	Dispensaries	29	62
5	Doctors	-	78
6	Nurses	-	
Township Total		**38**	**140**

Source: Immigration & Man Power Department Kyaukse.

1.7.2 Medical & Health Service Condition of Affected Villages

In nearly all sample villages around the project area such as Shan Ywar Gyi, Pyaukseikpin, Ywar Nan (East), Kalegyaung, Taung Pa Lu and Ye Byar Taw (West) villages, there is no hospital. Around the project affected area, has two rural health care centers and two sub-centers.

No.	Type	No. of Public Health Care Centre	Health Manpower
1	Rural Health Centre	2	-
2	Sub-Centers	2	-
3	Doctors	-	1
4	Nurses	-	1
5	Midwife	-	1
Total		**4**	

1.7.3 Medical & Health Service Condition of Industrial Zone

Medical resources near this project mainly depend on a 25 sickbeds hospital in Kyaukse Industrial Zone, which has 25 sickbeds, 1 doctor, 1 nurse and 2 midwives, and sets up obstetrics, orthopedics (factures), surgery (simple stitching) and common blood test.

No.	Medical Resource	No. of Public Health Care Centre	Health Manpower
1	Hospital	1	-
2	Doctor	-	1
3	Nurse	-	1
4	Midwife	-	2
Total		**1**	**4**

1.8 Health Impact Assessment

The aim of the Health Impact Assessment (HIA) aspect of the study is to determine the potential effect that construction and operation of the present Cement Project will have on the local communities' health and the capacity of local health services to cope with any increased demand for services in terms of equipment, trained personnel, medicines and the balance between the community and workforce needs.

The objectives of the HIA are:

- To identify and evaluate all short, medium and long term impacts of the project on the health of all stakeholders in all project phases within an agreed geographical boundary so that any potential negative impacts can be reduced or avoided, and positive impacts enhanced.

- To recommend and justify specific, practical measures for mitigating negative and enhancing positive health impacts.

The main focus of the health impacts will be the communities near the cement plant site and quarry site; affected communities were determined by the social studies and the same groups will be considered for health impacts.

Due to the need to consider capacity of hospitals, clinics etc., to deal with the potential extra demands that the existence of the Project may place upon them (especially during construction), the health of residents in these villages also need to be considered, as be the status of the clinics in these locations.

1.8.1 Impact on Occupational Health

Exposure problems to noise, dust, and heat are the major occupational hazards. Noise induced hearing loss is the notified occupational hazard. The employees will be subjected to regular health check-up. The workers will be diagnosed for respiratory functions at periodic intervals and during specific complaints for lung function test, sputum test, X-ray test, etc.

Fully equipped clinic with doctors, occupational health specialist, paramedical staff, medicines, ambulance and other medical equipment is available.

Workers involved in raw material handling activity, ash handling and those working close to the boilers and RMH yard are exposed to high dust levels. Over a long period of time such exposure is likely to result in respiratory problems. Measures will be implemented to reduce the dust generation at the originating point by installing appropriate control devices.

Plant personnel working in dust prone areas will wear personnel protective equipment like air filters over their nose. Job rotation schemes will be practiced for over-exposed persons (Those exposed to heat stress and high dust levels).

It will be ensured that workers are not exposed above the threshold noise limits prescribed by OSHA and Factories Act through suitable administrative controls. Personal Protective Equipment like earplugs and muffs will be provided and administrative pressure applied for using them. Auditory examination by qualified doctors upon the first employment and thereafter periodic examination will be conducted which include determination of auditory threshold for pure tones.

1.8.2 Impact on Public Health and Safety

The national ambient air quality standards prescribe level of air pollutants that will protect public health and other adverse effect on environment. Exposure to PM, SO2 and NO2 is likely to affect public health if the ambient concentrations are above the stipulated criteria.

The factual position is validated by referring to the prescribed ambient air quality criteria (AAQC) developed by USEPA. AAQC are cause-effect relationships, observed experimentally, epidemiological, or in the field, of exposure to various ambient levels of specific pollutants as shown below.

Level in ppm	Level in $\mu g/m^3$	Exposure Time	Observed human symptoms
For Particulate Matter (Dust)			
	2000	2 hour	Discomfort
	1000	10 min	Direct respiratory mechanical changes
	110	24 hour	Increased respiratory disease risk
For SO2			
15	4000	1 hour	Decreased mucociliary activity
10	26200	10 min	Bronchospasm
5	13100	10 min	Increased airway resistance in healthy adults at rest
1	2620	10 min	Increased airway resistance in asthmatics at rest and in healthy adults at exercise
0.5	1310	1 hour	Visible injury to sensitive vegetation in humid regions
0.19	500	24 hours	Aggravation of chronic respiratory disease in adults
0.07	180	365 days	Aggravation of chronic respiratory disease in children
For NO2			
5	9420	15 min	Impairment of normal transport of gases between blood and lungs in healthy adults
2.5	4710	2 hour	Increased airway resistance in healthy adults
2	3770	4 hour	Foliar injury to vegetation
1.0	1890	15 min	Increased airway resistance in bronchitis

The wastewater from the project will not be discharged outside into any streams. The noise will be confined within the plant boundary. No toxic chemicals will be stored inside the plant premises. Solid waste is not hazardous, they will be utilized and managed effectively.

Liquid fuel will be stored inside the plant and layout and design of the storage tanks and necessary fire risk mitigation measures will be provided. Approval to locate this storage tanks will be obtained from the Chief Controller of Explosives. On-site and Off-site disaster management plan will be prepared in consultation with the district administration and implemented during the operation stage of the project.

Therefore, the impact of the project operation on the health and safety of surrounding public will be insignificant in nature.

1.8.3 Base Line Health Condition

Health impact assessment is a combination of procedures, methods and tools by which a policy, program, or a project may be judged as to its potential effects on the health of a population and the distribution of those effects within the population.

Stakeholder Meeting, Semi-structured Interviews and Questionnaire Distribution are done to cover representatives from the General Administrative Department, Kyaukse Township. There are 140 respondents in the survey, and the survey focused to measure on potential impacts of the project to surrounding residential area.

Table 1.7-1: Total Population & Sample Size of the Study Area

Factory/Village	House	Household	Male	Female	Total Population	Sample Size
Workers	450	450	1,050	1,047	2,097	20
Shan Ywar Gyi	140	143	323	345	668	20
Pyaukseikpin	905	1,015	2,012	2,163	4,175	20
YwarNan (East)	3120	139	290	291	3840	20
Kale Gyaung	270	270	592	639	1771	20
Taung Pa Lu	244	244	497	494	991	20
Ye Byar Taw(West)	126	126	251	273	524	20

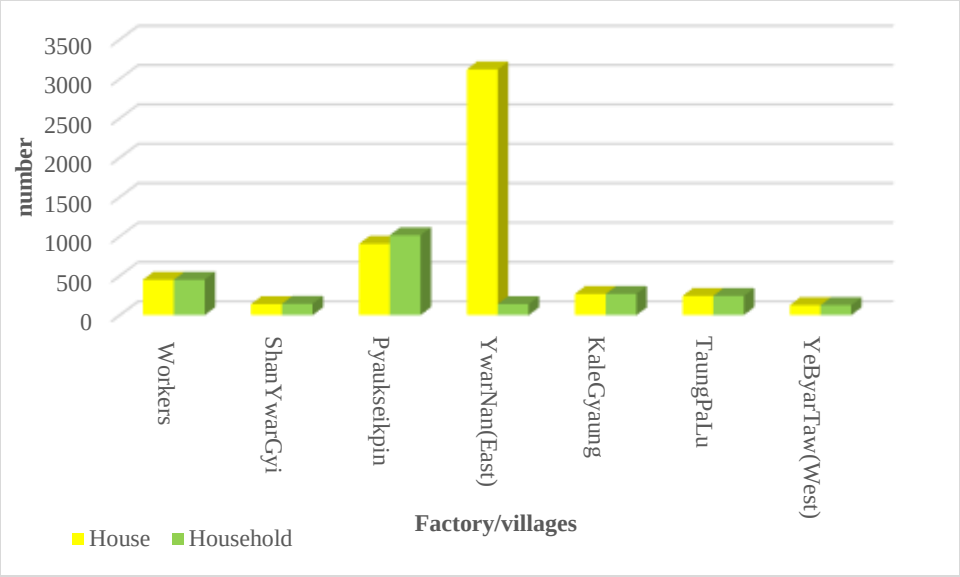


Figure 1.7-1: Houses and Households of the Study Villages

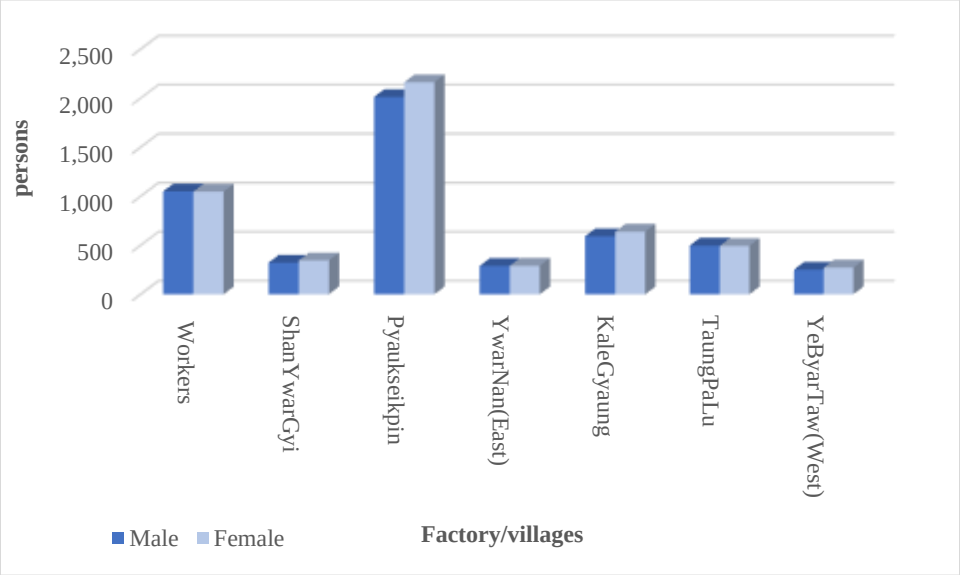


Figure 1.7-2: Total Population by Gender in the Study Villages

Table 1.7-2: Age Composition of respondents (%)

Factory/Village	20-34years	35-49	50-64	above 65
Workers	35	45	20	0
ShanYwar Gyi	25	45	25	5
Pyaukseikpin	45	35	15	5
Ywar Nan(East)	40	30	30	0
Kale Gyaung	35	20	40	5
Taung Pa Lu	15	30	35	20
Ye Byar Taw (West)	10	45	30	15

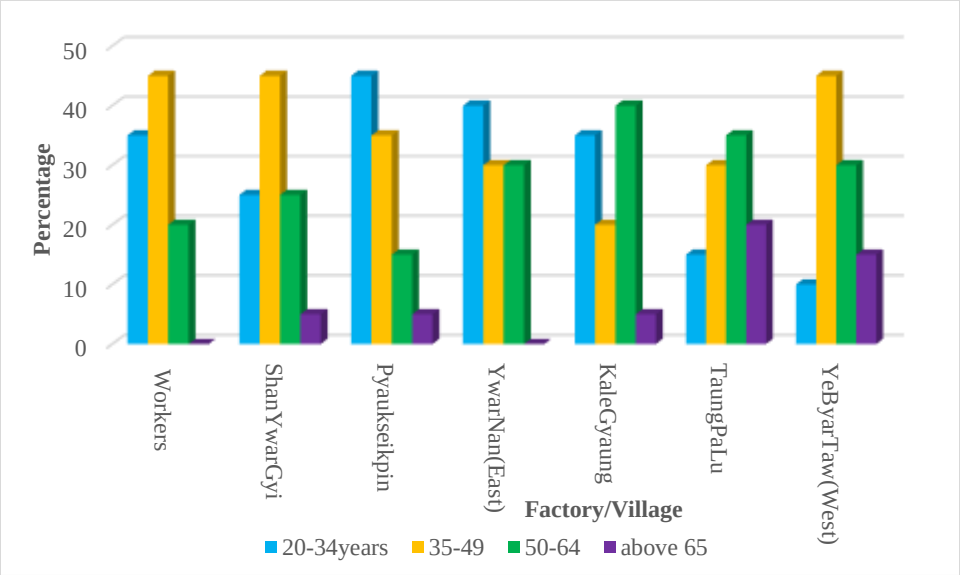


Figure 1.7-3: Age Composition of respondents (%)

Family size of respondents can be grouped into three classes as;

1. Family with 1 to 3 persons,
2. Family with 4 to 6 persons, and
3. Family with more than 6 persons.

High number of respondents with big families (more than 6 persons) is found in Factory' workers and Ye Byar Taw (West) Village. Respondents with small families (1 to 3 persons) are mainly found in Pyaukseikpin village.

Table1.7-3: Family size of respondents (%)

Factory/Village	1 to 3 persons	4 to 6	above 6 persons
Workers	35	60	5
ShanYwar Gyi	30	45	25
Pyaukseikpin	40	40	20
Ywar Nan (East)	30	55	15
Kale Gyaung	25	55	20
Taung Pa Lu	10	75	15
Ye Byar Taw (West)	10	60	30

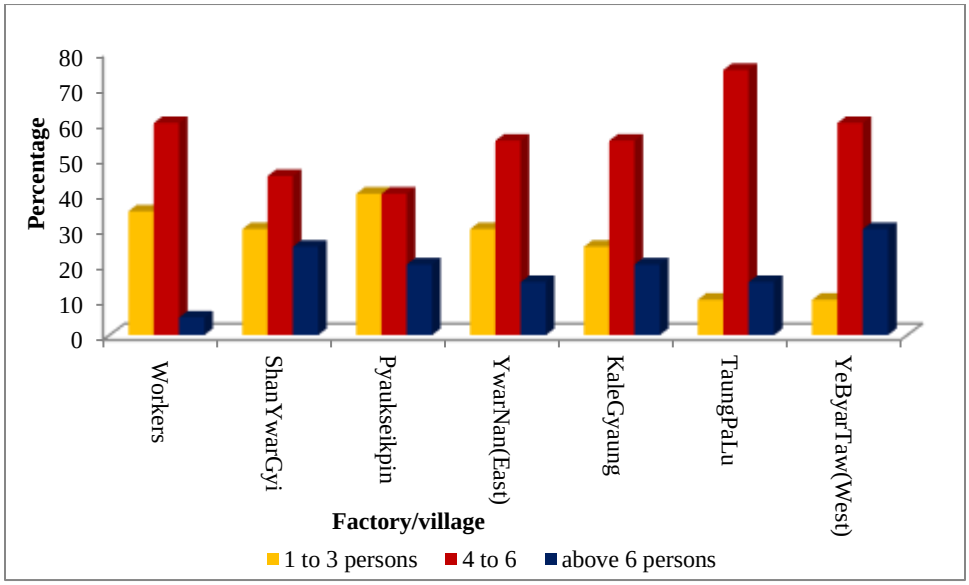


Figure 1.7-4: Family sizes of respondents (%)

Education Level

High percentage of no schooling level among the respondents is found in ShanYwar Gyi and Ywar Nan (East) villages. High percentage of graduate level are found in Factory's workers and Pyaukseikpin Village. Respondents of monastic education level is mainly found in Taung Pa Lu and Ye Byar Taw (West) villages. In general, most of the respondents are in the basic education levels from primary school to high school.

Table1.7-4: Education Level of Respondents (%)

Factory/Village	No schooling	Primary school	Middle school	High school	Graduate	Monastic school
Workers	0	10	0	15	70	5
ShanYwar Gyi	15	45	5	10	0	25
Pyaukseikpin	0	60	10	0	15	15
Ywar Nan(East)	10	35	15	10	5	25

Kale Gyaung	0	40	30	10	0	20
Taung Pa Lu	5	30	10	0	5	50
Ye Byar Taw(West)	0	35	15	0	0	50

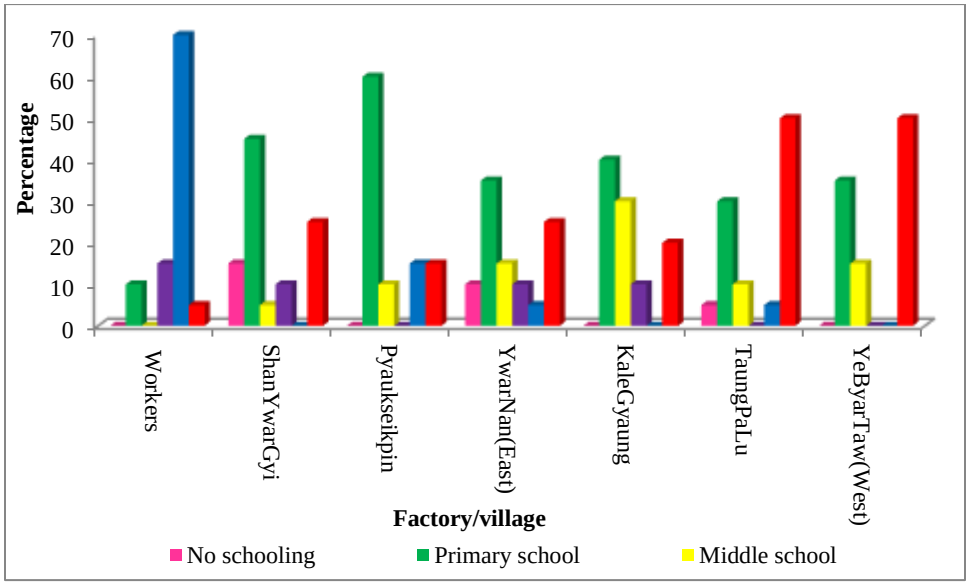


Figure1.7-5: Education Level of Respondents (%)

Status of Infected Disease from 2013 to 2015

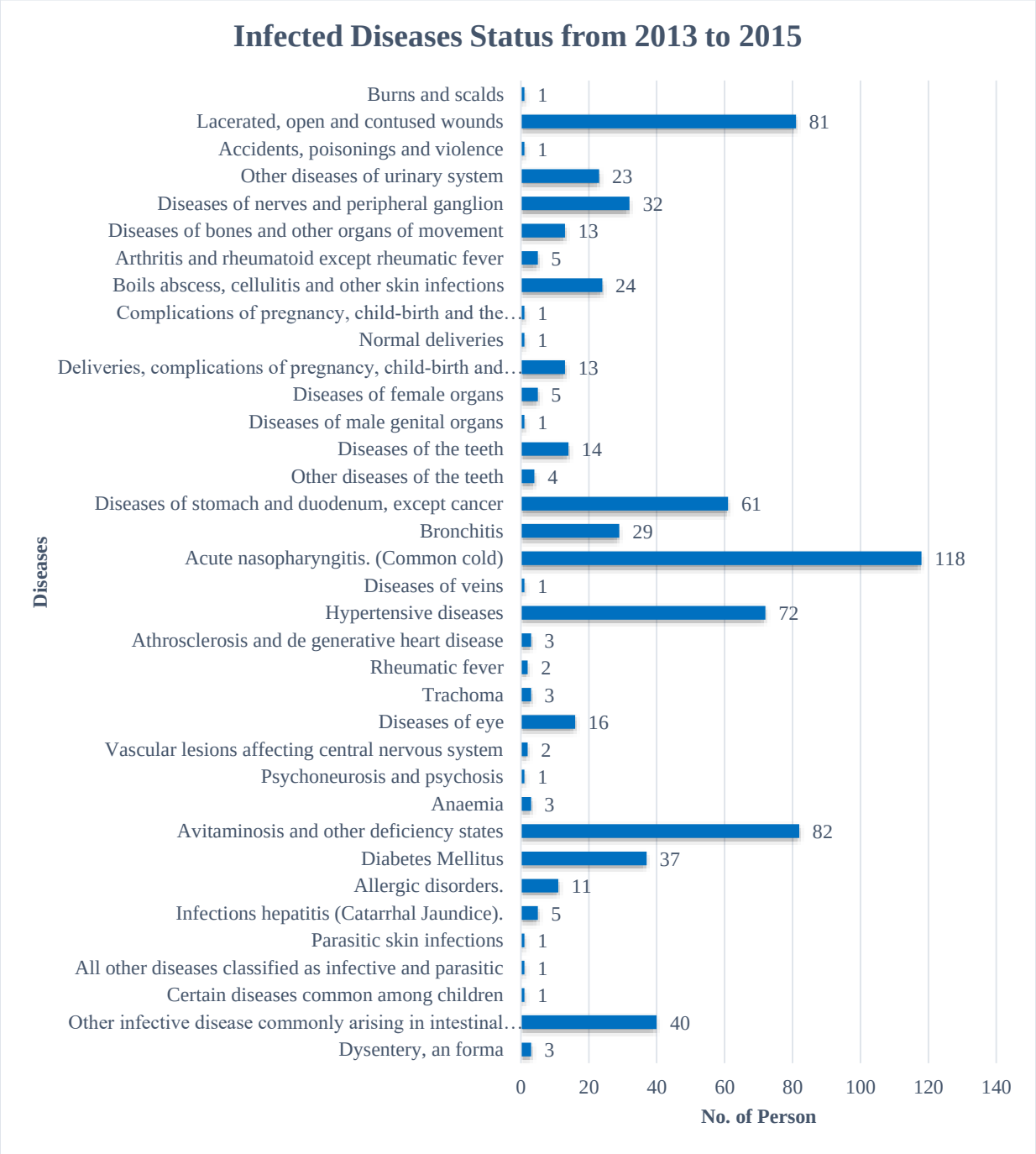


Figure 1.7-6: Status of Infected Disease from 2013 to 2015

Status of Infected Disease from Jan 2016 to June 2016

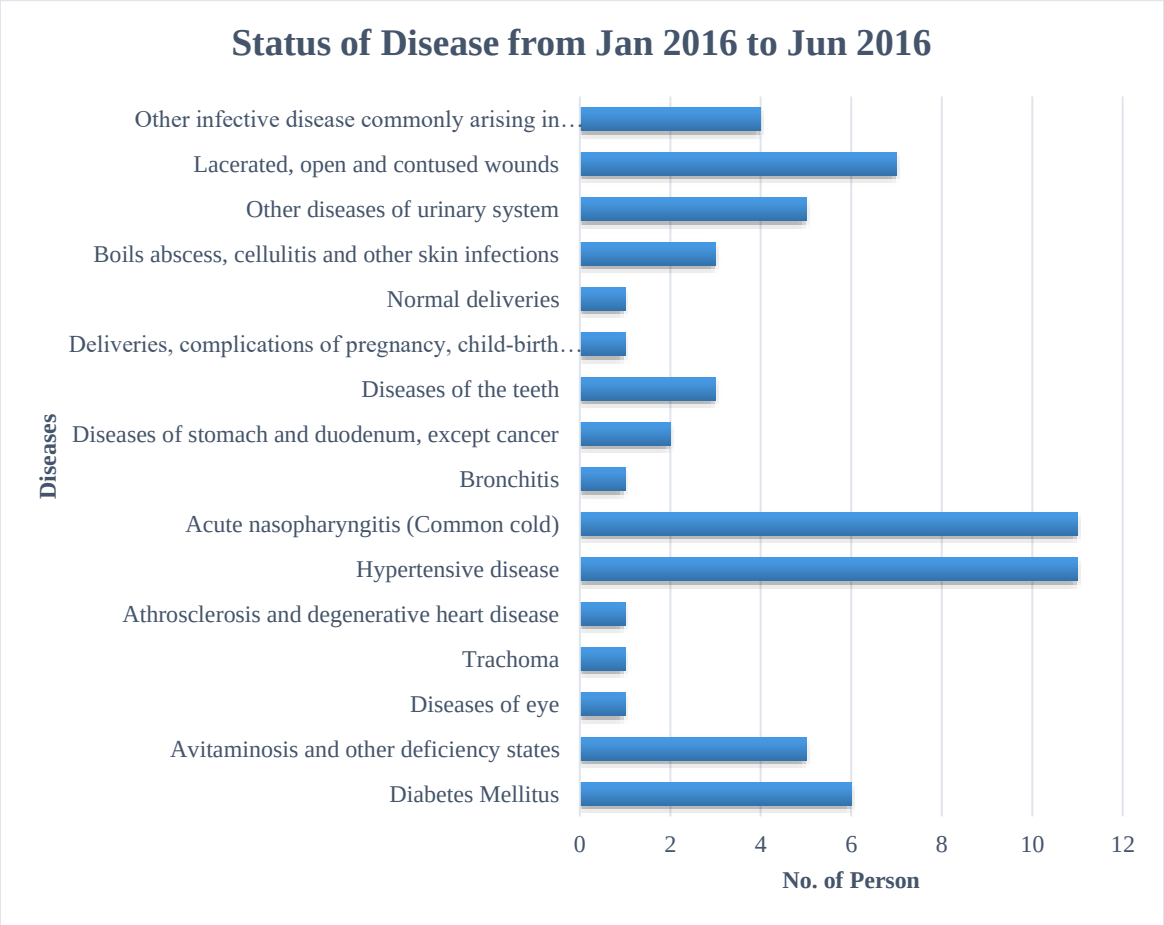


Figure 1.7-7: Status of Infected Disease from Jan 2016 to June 2016

1.9 Emergency Health Management Plan

As already mentioned above, there has to occur no potential health problem because of the project so that regular health management plan is not necessary. However, the developer has to be ready for occasional or extraordinary problem of the unfortunate outcome of pollution from the power plant and associated facilities. For such a case, emergency health management plan is proposed as below.

1.9.1 Occupational Health and Safety Management Planning

Table 1.9.1-1: Workers safety and hygiene management plan

Purpose	Ensure that the project may not adversely affect the health and safety of employees.
Objective	Zero work related accident report.
Measures	Establish safety, hygiene and environment management plan of the construction company and ensure that all measures regarding safety and hygiene are accepted and implemented. The safety, hygiene and environment management plan of the construction company and joint venture partners includes but not limited to: (1) Work area and entrances/exits The plant shall have one main entrances/exits, respectively located at management zone, west end of main passageway in east-west direction and north end of main passageway in south-north direction. (2) Precautions for fire protection Inflammable gas alarm probes shall be provided at inlets of cable trench where inflammable gas may accumulate; portable and wheeled fire extinguishers (gaseous) shall be provided. Firefighting cooling water system shall be provided in liquefied hydrocarbon tank zone, and portable dry powder extinguisher and other fire extinguishing facilities shall be provided. (3) Escape passageway Measures to separate pedestrian passageway from vehicle lane, either internal or external, of building to be built to ensure the convenience, safety and appropriateness of traffic. Special passageway shall be provided for vehicle, pedestrian and equipment entering and leaving factory. Barrier-free passageway which is not limited and is available at any time shall be provided for equipment and facilities requiring maintenance, inspection and/cleaning. Cover plate shall be provided in hazardous zone to avoid injury accident caused by falling objects; warning symbols shall be provided in hazardous zone to avoid unauthorized access to hazardous zone.

(4) First aid

Emergency drill plan shall be prepared annually, which shall include six types, i.e., fire, leakage, rescue, medical, shelter-in-place, uninformed drill.

(5) Give emergency training to each operator to enable them to familiarize themselves to procedure and requirements regarding emergency rescue for their own post, and to be skilled in the use of various kinds of protective articles so as to continuously improve the self-rescue and mutual rescue ability of production and operation persons.

(6) Improve the provision, maintenance and service of emergency protective equipment (such as eye wash equipment, protective clothing, and so on). Carry out frequent maintenance and service and regularly detect its performance and efficiency to ensure that it is in good condition.

(7) Occupational health and safety training

Strengthen the occupational health and safety training of employees and management personnel. As required, all new employees shall receive occupational health and safety training so as to ensure that they can familiarize themselves to basic working rules and personal protective knowledge and method to prevent the injury of their co-workers.

(8) Training of visitors

Strengthen the training of visitors If site visitors are permitted to visit the zones where hazardous conditions or materials may exist, then visitor guidance and control plan shall be developed to ensure that any unaccompanied visitor may not enter hazardous zone. The training shall include emergency exit and emergency gathering site in plant, configuration requirement for personal protective equipment, emergency telephone, and so on.

(9) Training of new employees and contractors

Every new employee must receive pre-employment occupational health and safety education and training, familiarize themselves to nature of production facilities, existing hazard factors regarding occupational disease and their hazard as well as

	such occupational hygiene knowledge as correct preventative and emergency rescue measures, and so on. The employees of contractors also need to receive occupational health training. (10) Strengthen regular detection of occupational hazard factors. (11) Regularly organize workers to take occupational health check as required.
Responsible person	The project company

1.9.2 Community Health Care Plan

Table 1.9.2-1: Infectious disease control scheme

Purpose	Guarantee no negative impacts of the project on the health of workers and neighboring residents
Objective	Zero report of casualty and work-related diseases No outbreak of infectious diseases in neighboring communities due to workers and people seeking work at the project area
	Myanmar Conch is required to formulate safety and health management scheme according to the requirements of General EHS Guidelines, within one month after approval from MONREC. The scheme shall include the following measures taken by management department to prevent infectious diseases (STD, malaria, cholera and waterborne diseases). Before starting civil works, the company works with general contractor to carry out the publicity activities for improving the awareness of infectious disease prevention. The publicity activities involve women's organization, youth organization, medical health staff and relevant family members, etc. 1) Organizational Management Myanmar Conch at all levels shall establish the prevention and control management network for infectious diseases, formulate and strictly comply with

the provisions of the Regulations for Prevention and Control of Infectious Diseases, improve the report system for infectious diseases, provide necessary fund, transport and communication equipment, and make decisions according to intervention measures. HSE management personnel have the right to supervise and manage construction companies, and propose relevant intervention measures to project department.

2) Health Publicity and Education

Medical service personnel at all levels are responsible for the health education about prevention of infectious diseases, and organize forces to eliminate the threats of rats, insects carrying diseases and other animals transmitting infectious diseases.

3) Epidemic Report

Medical staff of construction company is responsible to report infectious diseases. When discovering any patient, suspected patient and carrier of infectious diseases, they shall report it to the superior authority within the specified period, and to health administration of Myanmar. Also, they should go to treat patients at the site and conduct the preliminary investigation. The company's professional health management personnel are responsible to sum up materials.

4) Patient Administration

The infectious disease patients, pathogen carriers and suspected infectious disease patients shall before they are cured or cleared of suspicion, be barred from jobs which national health administration prohibits them from doing because of the likelihood of causing the spread of infectious diseases. management should be strengthened. Myanmar Conch shall collect the information of its employees, including age, gender and occupation, etc., the arrangement of its sanitary resources, the availability of local medical services, the natural factors at construction site, its food health, environmental hygiene and water source health, etc., and the outbreak of infectious diseases at construction site, etc. Based on this basic information, the construction company shall put forward the prevention

	scheme for infectious diseases under key prevention and control and carry out the work of prevention and control. 5) Myanmar Conch company is responsible for purification and disinfection of drinking water source and professional doctor is responsible to monitor water resource, provide technical guidance, purchase and distribute disinfectant. 7) During outbreak and prevalence of infectious diseases, the company and contractors at all levels should immediately organize forces for prevention & control, and cut off the transmission channel of infectious diseases. Health supervisor should give technical guidance and provide preventive biological products. If necessary, emergency response measures may be taken, such as, stopping construction, enclosing public drinking water source, restricting gatherings or other group activities, etc. 9) Malaria Control Train and educate all workers (including contractors' workers) about malaria prevention; further reduce the incidence of malaria (and eliminate the germ carriers of other waterborne diseases); provide sufficient drainage facilities at construction areas to reduce the area of stagnant; provide culverts on the new road to keep smooth natural drainage; and provide the mosquito nets processed with mosquito repellent for dormitories of construction workers.
Responsible Party	The project company investigates the health condition and determines the health reference data of the affected communities three months before the commencement of project construction.

1.9.3 Community Safety and Health Management Scheme

Table 1.9.3-1: Community Safety and Health Management Scheme

Purpose	Guarantee no bad impacts of this project on the health of community residents
Objective	Zero report of casualty and work-related diseases

Measures	(1) Air Quality During construction, dust detection is performed frequently. In dry season, water is sprayed on the access road regularly or some sections near residential areas should be closed. Trucks for earthwork and rockwork should not be overloaded. Grass and trees are planted on the cleaned land as soon as possible. Modern diesel vehicles are maintained timely. Travel speed of vehicles in residential areas is less than 20km/h. Drivers are trained to improve the awareness of mechanical maintenance for drivers and operators. (2) Noise and Vibration Periodically measure noise at boundary; use low-noise machines and vehicles; place acoustic barrier in the places sensitive to noise (schools and temples); and allow construction and transportation only in the day. (3) Surface Water/Groundwater Quality The following measures may be taken to mitigate the impacts: properly control and dispose of harmful substances (store and use them at the places with cofferdam and good drainage); provide appropriate drainage system at the construction sites for concrete proportioning and mixing and treat contaminated water in sedimentation tank before runoff is discharged; implement the measures to prevent and control water loss and soil erosion and migration of sediments; properly collect and treat wastewater and washing water before discharging into the natural environment. (4) Accident and Personal Injury In order to prevent neighboring residents from entering construction site without permission, all construction sites must assign security guards at the security check station (water gate or guard post), in order to strictly keep neighboring residents away from construction site. In the residential communities, motor vehicles or motor cycle must follow speed limits.
Responsible Party	The project company.

1.9.4 Institutional Arrangement

Though there is detailed workplace and community health requirement stipulated for power generation sectors, matter pertaining to occupational and community health requirements are general under the jurisdiction of Ministry of Health, Ministry of Industry, and Ministry of Labor. However, when it comes to project development, it is fully responsibility of project proponents to excuse in accordance with existing laws or project principles.

Provided that existing laws do not adequately address mechanism to solve occupational and community health issues arising from project, the role and responsibilities of institutions concerned for health issues shall be falling within the jurisdiction of project management during construction and operation phases.

Institution	Role and Responsibilities
Project Management	Assigned a staff to deal with workplace health related issues. Assigned a staff to lead a community health care plan. Deal with township authorities for implementing community health care plan.
Project Health, Safety and Environmental Division	Prepared detailed health management and monitoring scheme largely based on generic EMP and incorporated the workplace and community health matters into HSE Management System. Ensure that all issues pertaining to occupational and public health are adequately addressed. Establish a community health care plan.

Occupational and Community Health Staff in Project HSE division	Dealt with workplace health and community health issue. Develop, maintain and monitoring the health related mitigation measures as required by project EMP. Development community health surveillance mechanism.

Appendix 14

မန္တလေးတိုင်းဒေသကြီး၊ ကျောက်ဆည်မြို့၊ ကျောက်ဆည်စက်မှုဇုန်၊ လက်ရှိဘိလပ်မြေစက်ရုံ အဆင့်မြှင့်တင်ခြင်းနှင့် အသစ်တည်ဆောက်မည့် တန် ၅၀၀၀ ဘိလပ်မြေ ထုတ်လုပ်ရေးလုပ်ငန်းအတွက် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း (Environmental Impact Assessment – EIA) အစီရင်ခံစာ အပေါ် စိစစ်တွေ့ရှိချက်နှင့် ပြန်လည်ဖြည့်စွက်တင်ပြချက်များ

စဉ်	ပြင်ဆင်ဖြည့်စွက်တင်ပြရန် အချက်များ	ပြန်လည်ဖြည့်စွက် တင်ပြချက်များ
၁။	**အကျဉ်းချုပ်အစီရင်ခံစာ**	
	အကျဉ်းချုပ်အစီရင်ခံစာ (Executive Summary) တွင် အောက်ပါအချက်များကို ထည့်သွင်းဖော်ပြ ပေးရန်- • စီမံကိန်းအတွက် ယခင်က ဆောင်ရွက်ခဲ့သော ပတ်ဝန်းကျင်ဆိုင်ရာ လုပ်ငန်းစဉ် အကြောင်းအရာများဖော်ပြရန် • စီမံကိန်း၏ ရည်ရွယ်ချက်များ၊ စီမံကိန်း ပတ်ဝန်းကျင်ရှိ ပတ်ဝန်းကျင်ဆိုင်ရာနှင့် လူမှုဆိုင်ရာတည်ရှိမှုများ၊ လက်ရှိစီမံကိန်း၏ အခြေအနေနှင့် အကောင်အထည်ဖော် ဆောင်ရွက်နေသည့် အဆင့်များ၊ အချိန်ဇယားများ စသည့် စီမံကိန်းအကြောင်းအရာ ဖော်ပြချက်များ ထည့်သွင်းဖော်ပြရန်၊ • စီမံကိန်းအတွက် အခြားဆောင်ရွက်နိုင်သော နည်းလမ်းများအား ထည့်သွင်းစဉ်းစားထားမှုများ၊ နှိုင်းယှဉ်ဆန်းစစ်ချက်များဖော်ပြရန်၊ • အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးခဲ့သည့် အကြောင်းအရာများ၊ အများပြည်သူမှ အကြံပြုချက်များနှင့် သဘောထားမှတ်ချက် များအား အစီရင်ခံစာ၏ မည့်သည့်အပိုင်းတွင် ထည့်သွင်းစဉ်းစားထားမှုများကို ထည့်သွင်း ဖော်ပြရန်၊ • နောက်ဆက်တွဲ (၅) တွင် ဖော်ပြထားသော တန် ၄၀၀ ဘိလပ်မြေစက်ရုံ၏ အချက်အလက် အကြောင်းအရာများကို အနှစ်ချုပ်၍ (စီမံကိန်း ရာဇဝင်အသေးစိတ်) တွင် ထည့်သွင်းဖော်ပြရန်၊ • အစီရင်ခံစာ အကျဉ်းချုပ်တွင် ပိတ်သိမ်းခြင်း အဆင့်၏ လုပ်ငန်းများကို ဖော်ပြရန်၊	အကျဉ်းချုပ်အစီရင်ခံစာ (Executive Summary) တွင် အောက်ပါအချက်များကို ထပ်မံဖြည့်စွက် ဖော်ပြထားပါသည်။ • စီမံကိန်းအတွက် ယခင်က ဆောင်ရွက်ခဲ့သော ပတ်ဝန်းကျင်ဆိုင်ရာ လုပ်ငန်းစဉ် အကြောင်းအရာများ • စီမံကိန်း၏ ရည်ရွယ်ချက်များ၊ စီမံကိန်း ပတ်ဝန်းကျင်ရှိ ပတ်ဝန်းကျင်ဆိုင်ရာနှင့် လူမှုဆိုင်ရာတည်ရှိမှုများ၊ လက်ရှိစီမံကိန်း၏ အခြေအနေနှင့် အကောင်အထည်ဖော် ဆောင်ရွက်နေသည့် အဆင့်များ၊ အချိန်ဇယားများ စသည့် စီမံကိန်းအကြောင်းအရာ ဖော်ပြချက်များ • စီမံကိန်းအတွက် အခြားဆောင်ရွက်နိုင်သော နည်းလမ်းများအား ထည့်သွင်းစဉ်းစားထားမှုများ၊ နှိုင်းယှဉ်ဆန်းစစ်ချက်များ • အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးခဲ့သည့် အကြောင်းအရာများ၊ အများပြည်သူမှ အကြံပြုချက်များနှင့် သဘောထားမှတ်ချက်များအား အစီရင်ခံစာတွင် ထည့်သွင်းစဉ်းစားထားမှုများ • နောက်ဆက်တွဲ (၅) တွင် ဖော်ပြထားသော တန် ၄၀၀ ဘိလပ်မြေစက်ရုံ၏ အချက်အလက် အကြောင်းအရာများ အနှစ်ချုပ် • ပိတ်သိမ်းခြင်း အဆင့်၏ လုပ်ငန်းများ အကျဉ်းချုပ်

Appendix 14

စဉ်	ပြင်ဆင်ဖြည့်စွက်တင်ပြရန် အချက်များ	ပြန်လည်ဖြည့်စွက် တင်ပြချက်များ
၂။	**နိဒါန်း**	
	စီမံကိန်းဆောင်ရွက်သူနှင့်ပတ်သက်သော အကြောင်း အရာများ၊ တာဝန်ရှိပုဂ္ဂိုလ်နှင့် ပတ်သက် သော အချက်အလက်များ၊ ကုမ္ပဏီ အမည်၊ လိပ်စာ၊ ဖုန်းနံပါတ်၊ ဖက်စ်နံပါတ်၊ အီးမေးလ်၊ တာဝန်ခံပုဂ္ဂိုလ် စသည်) တို့ကို ပြည့်စုံစွာ ထည့်သွင်း ဖော်ပြပေးရန်၊	စီမံကိန်းဆောင်ရွက်သူနှင့် ပတ်သက်သော အကြောင်း အရာများ၊ တာဝန်ရှိပုဂ္ဂိုလ်နှင့် ပတ်သက်သော အချက်အလက်များ၊ ကုမ္ပဏီ အမည်၊ လိပ်စာ၊ ဖုန်းနံပါတ်၊ ဖက်စ်နံပါတ်၊ အီးမေးလ်၊ တာဝန်ခံပုဂ္ဂိုလ် စသည်) တို့ကို အခန်း ၁၊ အပိုဒ် ၁.၄၊ စာမျက်နှာ (၅) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။
	ပတ်ဝန်းကျင်နှင့် လူမှုရေးဆိုင်ရာ ကျွမ်းကျင်သူများ၏ အတွေ့အကြုံ၊ ပညာရပ်ဆိုင်ရာ အရည်အချင်းများ၊ အကြံပေးပုဂ္ဂိုလ်အဖြစ် မှတ်ပုံတင် ထားခြင်း စသည် တို့ကို ထည့်သွင်းဖော်ပြရန်။	ပတ်ဝန်းကျင်နှင့် လူမှုရေးဆိုင်ရာ ကျွမ်းကျင်သူ များ၏ အတွေ့အကြုံ၊ ပညာရပ်ဆိုင်ရာ အရည်အချင်းများ၊ အကြံပေးပုဂ္ဂိုလ်အဖြစ် မှတ်ပုံတင် ထားခြင်း စသည် တို့ကို အခန်း ၁၊ ဇယား ၁.၁၊ စာမျက်နှာ (၈) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။
၃။	**ကတိကဝတ်**	
	ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံး လုပ်နည်း အပိုဒ် ၆၂ အရ အောက် ဖော်ပြ အတိုင်း စီမံကိန်းအဆိုပြုသူမှ လိုက်နာ အကောင်အထည်ဖော် ဆောင်ရွက်ရမည့် ကတိကဝတ်အား လက်မှတ်ရေးထိုး၍ ထည့်သွင်း ဖော်ပြ ပေးရန်- (က) ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းသည် တိကျမှုနှင့် ပြည့်စုံမှုရှိကြောင်း၊ (ခ) လုပ်ထုံးလုပ်နည်း အပါအဝင် သက်ဆိုင်ရာ ဥပဒေများ၊ ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်း ပြုလုပ်ရန် လုပ်ငန်းတာဝန်များနှင့်အညီ တိကျစွာ လိုက်နာပြုစု ထားကြောင်း၊ (ဂ) အစီရင်ခံစာပါ ကတိကဝတ်၊ ပတ်ဝန်းကျင်ထိခိုက်မှု လျော့ချရေး လုပ်ငန်းများနှင့် အစီအစဉ်များကို အပြည့်အဝ အစဉ်အမြဲ လိုက်နာဆောင်ရွက်မည် ဖြစ်ကြောင်း။	ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်းအရ စီမံကိန်း အဆိုပြုသူမှ လိုက်နာ အကောင်အထည်ဖော် ဆောင်ရွက်ရမည့် ကတိ ကဝတ်အား လက်မှတ် ရေးထိုး၍ အခန်း ၁၊ အပိုဒ် ၁.၇၊ စာမျက်နှာ (၁၂) တွင် ထည့်သွင်း ဖော်ပြထား ပါသည်။
	• အစီရင်ခံစာရေးသားပြုစုသူမှ ပတ်ဝန်းကျင် ထိခိုက်မှု ဆန်းစစ်ခြင်းသည် တိကျမှုနှင့် ပြည့်စုံ မှုရှိကြောင်း၊ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း ဆိုင်ရာလုပ်ထုံးလုပ်နည်း အပါအဝင် သက်ဆိုင် ရာဥပဒေကို တိကျစွာ လိုက်နာ၍ ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းကို ဆောင်ရွက်ထားခြင်း ဖြစ်ကြောင်း ကတိကဝတ်ကို ထည့်သွင်း ဖော်ပြ ပေးရန်၊	• အစီရင်ခံစာရေးသားပြုစုသူမှ ပတ်ဝန်းကျင် ထိခိုက်မှု ဆန်းစစ်ခြင်းသည် တိကျမှုနှင့်ပြည့်စုံမှု ရှိကြောင်း၊ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း ဆိုင်ရာ လုပ်ထုံးလုပ်နည်း အပါအဝင် သက်ဆိုင် ရာဥပဒေကို တိကျစွာ လိုက်နာ၍ ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းကို ဆောင်ရွက်ထားခြင်း ဖြစ်ကြောင်း ကတိကဝတ်ကို အခန်း ၁၊ အပိုဒ် ၁.၈၊ စာမျက်နှာ (၁၃) တွင် ထည့်သွင်း ဖော်ပြ ထားပါသည်။

Appendix 14

စဉ်	ပြင်ဆင်ဖြည့်စွက်တင်ပြရန် အချက်များ	ပြန်လည်ဖြည့်စွက် တင်ပြချက်များ
	• စီမံကိန်းအဆိုပြုသူနှင့် အစီရင်ခံစာ ရေးသား ပြုစုသူတို့ လိုက်နာဆောင်ရွက်ရမည့် ကတိ ကဝတ်များကို သီးခြားခွဲခြား လက်မှတ်ရေးထိုး ဖော်ပြပေးရန်။	• စီမံကိန်းအဆိုပြုသူနှင့် အစီရင်ခံစာ ရေးသား ပြုစုသူတို့ လိုက်နာဆောင်ရွက်ရမည့် ကတိကဝတ်များကို အခန်း ၁၊ အပိုဒ် ၁.၇ နှင့် ၁.၈ တွင် သီးခြားခွဲခြား လက်မှတ်ရေးထိုး၍ ထည့်သွင်း ဖော်ပြထားပါသည်။
၄။	**မူဝါဒ၊ ဥပဒေနှင့် အဖွဲ့အစည်းဆိုင်ရာမူဘောင်**	
	• စီမံကိန်း၏ ပတ်ဝန်းကျင်စီမံခန့်ခွဲရေး ဆောင်ရွက်မည့် လူပုဂ္ဂိုလ်တို့၏ တာဝန်ဝတ္တရားများကို အသေးစိတ် ဖော်ပြရန်၊ • စီမံကိန်းအကောင်ဖော်စဉ်အတွင်း လိုက်နာ ဆောင်ရွက်မည့် လူမှုဝန်းကျင်ဆိုင်ရာ လမ်းညွှန် ချက်များ၊ စံနှုန်းများကို ဖော်ပြရန်၊	• စီမံကိန်း၏ ပတ်ဝန်းကျင်စီမံခန့်ခွဲရေး ဆောင်ရွက် မည့် လူပုဂ္ဂိုလ်တို့၏ တာဝန်ဝတ္တရားများကို အခန်း ၆၊ အပိုဒ် ၆.၂၊ စာမျက်နှာ (၂၂၈) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • စီမံကိန်းအကောင်ဖော်စဉ်အတွင်း လိုက်နာ ဆောင်ရွက်မည့် လူမှုဝန်းကျင်ဆိုင်ရာ လမ်းညွှန် ချက်များ၊ စံနှုန်းများကို အခန်း ၂၊ အပိုဒ် ၂.၂၊ စာမျက်နှာ (၁၅) တွင် ထည့်သွင်း ဖော်ပြထား ပါသည်။
၅။	**စီမံကိန်းအကြောင်းအရာဖော်ပြချက်နှင့် အခြားနည်းလမ်းရွေးချယ်ခြင်း**	
	စီမံကိန်း၏ အဓိကအစိတ်အပိုင်းများအား ရှင်းလင်းစွာ ဖော်ပြရန်၊	စီမံကိန်း၏ အဓိကအစိတ်အပိုင်းများအား အခန်း ၃၊ ပုံ ၃-၃၊ စာမျက်နှာ (၆၁) တွင် ထပ်မံဖြည့်စွက် ဖော်ပြ ထားပါသည်။
	စီမံကိန်းလုပ်ငန်း ပိတ်သိမ်းခြင်း အဆင့်တွင် ဆောင်ရွက်သွားမည့် လုပ်ငန်းစဉ်များကို ထည့်သွင်း ဖော်ပြပေးရန်၊	စီမံကိန်းလုပ်ငန်း ပိတ်သိမ်းခြင်း အဆင့်တွင် ဆောင်ရွက်သွားမည့် လုပ်ငန်းစဉ်များကို အခန်း ၃၊ အပိုဒ် ၃.၉၊ စာမျက်နှာ (၁၀၁) တွင် ထပ်မံဖြည့်စွက် ဖော်ပြထားပါသည်။
	စီမံကိန်း အစိတ်အပိုင်းတစ်ခုချင်းစီ၏ တည်နေရာ များပါဝင်သော မြေပုံ ထည့်သွင်း ဖော်ပြရန်၊	စီမံကိန်း အစိတ်အပိုင်းတစ်ခုချင်းစီ၏ တည်နေရာ များပါဝင်သော မြေပုံကို အခန်း ၃၊ ပုံ ၃-၃၊ စာမျက်နှာ (၆၁) တွင် ဖော်ပြထားပါသည်။
	• လုပ်ငန်းလည်ပတ်မှုအတွက် ကုန်ကြမ်းပစ္စည်းများ (ထုံးကျောက်၊ ရွှံစေး၊ သံ၊ ဂျစ်ပဆမ်) ၏ သိုလှောင်မှု ပမာဏနှင့် (လစဉ်/ နှစ်စဉ်) အသုံးပြုမှု ပမာဏများကို ထည့်သွင်း ဖော်ပြပေးရန်၊ • လုပ်ငန်းလည်ပတ်ချိန်တွင် လောင်စာဆီ အသုံးပြု မှုနှင့် လောင်စာဆီ အမျိုးအစား (ဥပမာ ဒီဇယ်၊ ဓာတ်ဆီ၊ LPG စသည်ဖြင့်) ၊ လောင်စာဆီ သိုလှောင်ကန် ထားရှိခြင်း ရှိ/မရှိ၊ လျှပ်စစ်နှင့် ရေ အသုံးပြုမှုတို့၏ (လစဉ်/နှစ်စဉ်) ပမာဏများကို ထည့်သွင်း ဖော်ပြပေးရန်၊ • စီမံကိန်းတည်ဆောက်ခြင်းအဆင့် အတွက် လောင်စာ၊ လျှပ်စစ်ဓာတ်အားနှင့် ရေ အသုံးပြုမှု ပမာဏများကို ထည့်သွင်း ဖော်ပြပေးရန်၊	• လုပ်ငန်းလည်ပတ်မှုအတွက် ကုန်ကြမ်းပစ္စည်း များ၏ သိုလှောင်မှုပမာဏနှင့် အသုံးပြုမှု ပမာဏ များကို အခန်း ၃၊ ဇယား ၃.၁၊ စာမျက်နှာ (၆၉) တွင် ဖော်ပြထားပါသည်။ • လုပ်ငန်းလည်ပတ်ချိန်တွင် လောင်စာဆီ အသုံး ပြုမှု၊ လောင်စာဆီ အမျိုးအစား၊ လျှပ်စစ်နှင့် ရေ အသုံးပြုမှု ပမာဏာများကို အခန်း ၃၊ အပိုဒ်ခွဲ ၃.၃.၄.၆၊ စာမျက်နှာ (၆၉) နှင့် အပိုဒ်ခွဲ ၃.၃.၄.၇၊ စာမျက်နှာ (၇၀) တို့တွင် ဖြည့်စွက် ဖော်ပြထား ပါသည်။

Appendix 14

စဉ်	ပြင်ဆင်ဖြည့်စွက်တင်ပြရန် အချက်များ	ပြန်လည်ဖြည့်စွက် တင်ပြချက်များ
		• စီမံကိန်းတည်ဆောက်ခြင်း အဆင့်အတွက် လောင်စာ၊ လျှပ်စစ်ဓာတ်အားနှင့် ရေအသုံးပြုမှု ပမာဏများကို အခန်း ၃၊ အပိုဒ်ခွဲ ၃.၃.၄.၆၊ စာမျက်နှာ (၆၉) နှင့် အပိုဒ်ခွဲ ၃.၃.၄.၇၊ စာမျက်နှာ (၇၀) တို့တွင် ဖြည့်စွက် ဖော်ပြထားပါသည်။
	• ကုန်ကြမ်းပစ္စည်းများ သယ်ယူပုံနှင့် လက်ခံရရှိပုံ အဆင့်များကို ထည့်သွင်းဖော်ပြပေးရန်၊ • အကယ်၍ ကုန်ကြမ်းပေးသွင်းသည့် တင်ဒါ ကုမ္ပဏီများမှ လက်ခံရရှိပါက ၎င်းကုမ္ပဏီသည် သဘာဝပတ်ဝန်းကျင်ဆိုင်ရာ စည်းမျဉ်း စည်းကမ်းများကို လိုက်နာဆောင်ရွက်ကြောင်း ထည့်သွင်းဖော်ပြရန်၊ • ကုမ္ပဏီမှ စက်ရုံထိ ကုန်ကြမ်းပစ္စည်း သယ်ယူ ပို့ဆောင်သည့် နည်းလမ်းများ၊ အသုံးပြုသည့် (ခန့်မှန်း) ယာဉ်အရေအတွက်များကို ဖော်ပြရန်၊	• ကုန်ကြမ်းပစ္စည်းများ သယ်ယူပုံနှင့် လက်ခံရရှိပုံ အဆင့်များကို အခန်း ၃၊ အပိုဒ် ၃.၃.၄၊ စာမျက်နှာ (၆၈) နှင့် ဇယား ၃.၁ တို့တွင် ဖော်ပြထား ပါသည်။ • ကုန်ကြမ်းပစ္စည်း သယ်ယူ ပို့ဆောင်သည့် နည်းလမ်းများကို အခန်း ၃၊ အပိုဒ် ၃.၃.၄၊ စာမျက်နှာ (၆၈) နှင့် ဇယား ၃.၁ တို့တွင် ဖော်ပြ ထားပါသည်။
	• ဆောက်လုပ်ရေးကာလအတွင်း ထွက်ရှိနိုင်မည့် စွန့်ပစ်ရေ အမျိုးအစားနှင့် ပမာဏများကို ခန့်မှန်း တွက်ချက်၍ ထည့်သွင်း ဖော်ပြရန်၊ • စီမံကိန်းအစိတ်အပိုင်း (လုပ်ငန်းစဉ်) တစ်ခုချင်းစီ အတွက် ရေအသုံးပြုမှုပမာဏ (လစဉ်/နှစ်စဉ်) ကို ခန့်မှန်းတွက်ချက်၍ ဖော်ပြရန် လိုအပ်ပါသည်။ • ရေဆိုးစွန့်ပစ်ခြင်းနည်းစနစ် (Sewage Disposal Technology) လုပ်ငန်းစဉ် အဆင့်ဆင့်ကို (Flow Chart)၊ ပုံစံ (Diagram/ Layout Plan) များဖြင့် ထည့်သွင်း ဖော်ပြရန်၊ • (Domestic Wastewater) ကို Septic Sewage System ဖြင့် သန့်စင်သည့်လုပ်ငန်းစဉ်အဆင့်ဆင့် (ပုံ) နှင့် စုစုပေါင်းစွန့်ပစ်ရေ ခန့်မှန်းပမာဏ (လစဉ်/ နှစ်စဉ်)၊ သန့်စင်နိုင်သည့် ပမာဏ (ခန့်မှန်း) နှင့် သိုလှောင်နိုင်သည့် ပမာဏ အသေးစိတ်ကို ရှင်းလင်းဖော်ပြရန်၊	• စီမံကိန်းမှာ ၂၀၁၅ ခုနှစ်တွင် တည်ဆောက် ပြီးစီးကာ လက်ရှိအချိန်တွင် လုပ်ငန်းလည်ပတ် ဆောင်ရွက်နေပြီ ဖြစ်ပါသဖြင့် ဆောက်လုပ်ရေး ကာလ အတွင်းထွက်ရှိနိုင်မည့် စွန့်ပစ်ရေ အမျိုး အစားနှင့် ပမာဏများကို ခန့်မှန်းတွက်ချက် ဖော်ပြရန် အခက်အခဲ ရှိပါသည်။ • စီမံကိန်း အစိတ်အပိုင်း တစ်ခုချင်းစီအတွက် ရေ အသုံးပြုမှုပမာဏကို အခန်း ၃၊ အပိုဒ်ခွဲ ၃.၃.၄.၆၊ စာမျက်နှာ (၆၉) တွင် ထည့်သွင်း ဖော်ပြထား ပါသည်။ • ရေဆိုးစွန့်ပစ်ခြင်းနည်းစနစ် (Sewage Disposal Technology) လုပ်ငန်းစဉ် အဆင့်ဆင့်ကို (Flow Chart) ၊ ပုံစံ (Diagram/Layout Plan) များဖြင့် အခန်း ၃၊ အပိုဒ် ၃.၄.၉၊ စာမျက်နှာ (၈၉) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • (Domestic Wastewater) ကို Septic Sewage System ဖြင့် သန့်စင်သည့် လုပ်ငန်းစဉ်နှင့် ခန့်မှန်းပမာဏကို အခန်း ၃၊ အပိုဒ် ၃.၄.၉၊ စာမျက်နှာ (၈၇-၉၂) တွင် ထည့်သွင်း ဖော်ပြထား ပါသည်။
	• လေထုညစ်ညမ်းမှု ဖြစ်စေသော အရာများ၏ ခန့်မှန်းခြေ ထုတ်လွှတ်မှုပမာဏကို ဖော်ပြပေးနှင့် လေထုညစ်ညမ်းမှု တစ်ခုချင်းစီ၏ ပမာဏကို ခန့်မှန်းတွက်ချက် ဖော်ပြပေးရန်၊ • ထို့ပြင် NEQEG တွင် ဘိလပ်မြေထုတ်လုပ်ခြင်း အတွက် ထုတ်လွှတ်အခိုးအငွေ့ သတ်မှတ်ချက် တွင် ပါဝင်သော Parameters များ	• လေထုညစ်ညမ်းမှုကို ဖြစ်စေသော အရာများ၏ ခန်းမှန်းခြေထုတ်လွှတ်မှု ပမာဏကို အခန်း ၃၊ အပိုဒ် ၃.၅.၁၊ စာမျက်နှာ (၉၅) နှင့် အပိုဒ် ၃.၅.၂၊ စာမျက်နှာ (၉၆) တို့တွင် ထည့်သွင်း ဖော်ပြထား ပါသည်။ • NEQG တွင် ဘိလပ်မြေထုတ်လုပ်ခြင်း အတွက် ထုတ်လွှတ် အခိုးအငွေ့ သတ်မှတ်ချက်တွင် ပါဝင် သော Parameters များ၏ လမ်းညွှန်ချက်

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စဉ်	ပြင်ဆင်ဖြည့်စွက်တင်ပြရန် အချက်များ	ပြန်လည်ဖြည့်စွက် တင်ပြချက်များ
	(Cadmium + Thallium, Dioxins/ Furans, Hydrogen Chloride, Hydrogen Fluoride, Mercury, Sulfur Dioxide, Total Metals & Total Organic Carbon) ၏ လမ်းညွှန်ချက် တန်ဖိုးများ (Guidelines Values) ကို အစီရင်ခံစာတွင် ဖော်ပြပေးရန်နှင့် ဖော်ပြပါ Parameters များ ထုတ်လွှတ်နိုင်ခြေ မရှိပါက သင့်တော်သော အကြောင်းပြချက်များဖြင့် ရှင်းလင်းထည့်သွင်း ဖော်ပြပေးရန်၊ • ဖော်ပြပါ Parameters များမှ အချို့ ထုတ်လွှတ် နိုင်သည်ဟု မျှော်လင့်ပါက ထုတ်လွှတ်နိုင်သည့် ခန့်မှန်းခြေပမာဏနှင့် နည်းလမ်းများကို ထည့် သွင်း ဖော်ပြပေးရန်၊ • စီမံကိန်းမှ လေထုညစ်ညမ်းမှုဖြစ်စေသော ဖုန်မှုန့်နှင့် အမှုန်အမွှားများ (Particulate Matter) ထွက်ရှိမှုကို ကာကွယ်ရန်နှင့် လျော့ပါးစေရေး နည်းလမ်းများကို ဖော်ပြပေးရန်နှင့် Particulate Matter များ၏ ထုတ်လွှတ်မှုပမာဏကိုလည်း ခန့်မှန်းတွက်ချက် ဖော်ပြပေးရန်၊	တန်ဖိုးများ (Guidelines Values) နှင့် သင့်တော် သော အကြောင်းပြချက်များအား အခန်း ၃၊ အပိုဒ် ၃.၅.၂၊ စာမျက်နှာ (၉၆) တွင် ထည့်သွင်း ဖော်ပြ ထားပါသည်။ • စီမံကိန်းမှ လေထုညစ်ညမ်းမှု ဖြစ်စေသော ဖုန်မှုန့်နှင့် အမှုန်အမွှားများ (Particulate Matter) ထွက်ရှိမှုကို အခန်း ၃၊ အပိုဒ် ၃.၄.၅၊ စာမျက်နှာ (၈၀) တွင်လည်းကောင်း၊ Particulate Matter များ၏ ထုတ်လွှတ်မှု ခန့်မှန်းပမာဏများကို အခန်း ၃၊ အပိုဒ် ၃.၅.၂၊ စာမျက်နှာ (၉၆) တွင် လည်းကောင်း ထည့်သွင်း ဖော်ပြထားပါသည်။
	• အစိုင်အခဲစွန့်ပစ်ပစ္စည်း စွန့်ပစ်ခြင်းစနစ်ကို တည်ဆောက်ခြင်းနှင့် ဖျက်သိမ်းခြင်းအဆင့် အတွက် ဖော်ပြပေးရန်၊ • တည်ဆောက်ခြင်းအဆင့်တွင် စွန့်ပစ်ခြင်းနည်း လမ်းကို အကြံပြုချက် အနေဖြင့် ဖော်ပြထား သောကြောင့် အမှန်တကယ် အသုံးပြုသော နည်းလမ်းကို ရှင်းလင်းစွာ ဖော်ပြပေးရန်၊ • ထုတ်လုပ်ခြင်းလုပ်ငန်းစဉ်မှ ထွက်ရှိသော စွန့်ပစ် အစိုင်အခဲပစ္စည်း ခန့်မှန်းပမာဏ (လစဉ်/နှစ်စဉ်) ကိုထည့်သွင်း ဖော်ပြပေးရန်၊ • အဆိုပြုစီမံကိန်းသည် လက်ရှိတွင် အကောင် အထည်ဖော်နေပြီ ဖြစ်ပါသဖြင့် လက်ရှိ အသုံးပြု နေသော စွန့်ပစ်ပစ္စည်း မစွန့်ပစ်မီ ယာယီ သိုလှောင်မည့်နေရာများ၊ စွန့်ပစ်နည်းစနစ်များနှင့် နောက်ဆုံးစွန့်ပစ်သည့် နေရာများကိုလည်း ဖော်ပြပေးရန်၊	• အစိုင်အခဲစွန့်ပစ်ပစ္စည်း စွန့်ပစ်ခြင်းနည်းစနစ်ကို တည်ဆောက်ခြင်း အဆင့်အတွက် အခန်း ၃၊ အပိုဒ် ၃.၃.၅.၅၊ စာမျက်နှာ (၈၁) တွင်လည်း ကောင်း၊ ဖျက်သိမ်းခြင်းအဆင့် အတွက် အခန်း ၃၊ အပိုဒ် ၃.၉၊ စာမျက်နှာ (၁၀၁) တွင် လည်း ကောင်း ထည့်သွင်း ဖော်ပြထားပါသည်။ • တည်ဆောက်ခြင်းအဆင့်အတွက် အမှန်တကယ် အသုံးပြုသောနည်းလမ်းကို အခန်း ၃၊ အပိုဒ် ၃.၃.၅.၅၊ စာမျက်နှာ (၈၁) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • အဆိုပြုစီမံကိန်းသည် လက်ရှိတွင်ထုတ်လုပ်ခြင်း လုပ်ငန်းစဉ်အား ဆောင်ရွက်နေပြီဖြစ်ပြီး ထုတ်လုပ်ခြင်းလုပ်ငန်းစဉ်မှ စွန့်ပစ်အစိုင်အခဲ ပစ္စည်း ထွက်ရှိခြင်းမရှိပါ။ လူသုံးစွန့်ပစ် အမှိုက်များအား နီးစပ်ရာ ခွင့်ပြုထားသည့် စွန့်ပစ် ပစ္စည်းစွန့်ပစ်ရာနေရာသို့ ပို့ဆောင်မည် ဖြစ်ပါ သည်။ အခန်း ၃၊ အပိုဒ် ၃.၄.၁၀၊ စာမျက်နှာ (၉၂) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။

Appendix 14

စဉ်	ပြင်ဆင်ဖြည့်စွက်တင်ပြရန် အချက်များ	ပြန်လည်ဖြည့်စွက် တင်ပြချက်များ
	• ဘေးအန္တရာယ်ရှိ စွန့်ပစ်ပစ္စည်း စီမံခန့်ခွဲမှု အစီအစဉ် (အသုံးပြုပုံ၊ သိမ်းဆည်းပုံ၊ ကိုင်တွယ်ပုံ အစရှိသည်ဖြင့်) နှင့် အဆင့်တစ်ခုချင်းစီမှ ထွက်ရှိနိုင်သော အန္တရာယ်ရှိ စွန့်ပစ်ပစ္စည်းပမာဏကို ဖော်ပြပေးရန်၊	• ဘေးအန္တရာယ်ရှိ စွန့်ပစ်ပစ္စည်း စီမံခန့်ခွဲမှု အစီအစဉ်ကို အခန်း ၃၊ အပိုဒ် ၃.၃.၅.၅၊ စာမျက်နှာ (၈၁) တွင် ထည့်သွင်း ဖော်ပြထား ပါသည်။
	• လုပ်ငန်းစဉ်အဆင့်ဆင့်အား ရှင်းလင်းဖော်ပြရာ တွင် ကုန်ကြမ်းသယ်ယူပို့ဆောင်ရေးစနစ်ကို ထည့်သွင်း ဖော်ပြရန်၊ • အကယ်၍ ကုန်ကြမ်းပေးသွင်းသည့် တင်ဒါ ကုမ္ပဏီများမှ လက်ခံရရှိပါက ၎င်းကုမ္ပဏီသည် သဘာဝပတ်ဝန်းကျင်ဆိုင်ရာ စည်းမျဉ်း စည်းကမ်းများကို လိုက်နာဆောင်ရွက်ကြောင်း ထည့်သွင်း ဖော်ပြရန်၊ • ကုမ္ပဏီမှ စက်ရုံထိ ကုန်ကြမ်းပစ္စည်း သယ်ယူ ပို့ဆောင်သည့်နည်းလမ်းများ၊ အသုံးပြုသည့် (ခန့်မှန်း) ယာဉ်အရေအတွက်တို့ကို ထည့်သွင်း ဖော်ပြရန်၊ • လုပ်ငန်းစဉ်အဆင့် တစ်ခုချင်းစီမှ ထွက်ရှိနိုင်သော ပတ်ဝန်းကျင် ညစ်ညမ်းမှုများ၊ ထုတ်လွှတ်မှုများ ကို ထည့်သွင်းဖော်ပြရန်၊ • စက်ပစ္စည်းများ၏ အလုပ်လုပ်ပုံများကို ဖော်ပြရာ တွင် ၎င်းစက်ပစ္စည်းများအတွင်း ကုန်ကြမ်းပစ္စည်း များ၏ ဓာတုဆိုင်ရာ ဓာတ်ပြုပြောင်းလဲမှုများနှင့် နောက်ဆုံးချိန်တွင် စက်ရုံမှ ထုတ်လွှတ်လိုက်မည့် ဓာတ်ငွေ့များ၊ အမှုန်များစသည့် အခြေအနေများ ကို အဆင့်လိုက်ထည့်သွင်း ဖော်ပြရန်။ • အသုံးပြုသော စက်ကိရိယာများ၏ ပစ္စည်းအရည် အသွေးနှင့် ရည်မှန်းထားသော အခြေအနေကို ပြည့်မှီနိုင်ကြောင်း ထောက်အထား (ထုတ်လုပ် သည့် ကုမ္ပဏီမှ ဖော်ပြထားသော Technical Specification များ) ကို ထည့်သွင်း ဖော်ပြပေးရန် လိုအပ်ပါသည်။ • လက်ရှိတွင် အဆိုပြုထားသော စီမံကိန်းသည် အကောင်အထည်ဖော်လျက် ရှိနေပြီ ဖြစ်သော ကြောင့် လက်ရှိရောက်ရှိနေသည့် စီမံကိန်း တစ်ခု လုံး၏ အခြေအနေနှင့် အကောင်အထည်ဖော် ဆောင်ရွက်နေသည့် အချိန်ဇယားသစ်ကို ရှင်းလင်းစွာ ဖော်ပြပေးရန်၊ • အနည်းဆုံးအနေဖြင့် လုပ်ငန်းတည်ဆောက်ခြင်း၊ လည်ပတ်ဆောင်ရွက်ခြင်းနှင့် ပိတ်သိမ်းခြင်း အဆင့်များအတွက် အချိန်ဇယား	• ကုန်ကြမ်းသယ်ယူပို့ဆောင်ရေးစနစ်ကို အခန်း ၃၊ အပိုဒ် ၃.၃.၄၊ စာမျက်နှာ (၆၈) နှင့် ဇယား ၃.၁ တို့တွင် ဖော်ပြထားပါသည်။ • ကုန်ကြမ်းပေးသွင်းသည့် တင်ဒါကုမ္ပဏီများမှ သဘာဝပတ်ဝန်းကျင်ဆိုင်ရာ စည်းမျဉ်း စည်းကမ်းများကို လိုက်နာဆောင်ရွက်ကြောင်း အား အခန်း ၃၊ အပိုဒ် ၃.၃.၄၊ စာမျက်နှာ (၆၈) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • စက်ရုံသို့ ကုန်ကြမ်းပစ္စည်း သယ်ယူပို့ဆောင် သည့် နည်းလမ်းများကို အခန်း ၃၊ အပိုဒ် ၃.၃.၄၊ စာမျက်နှာ (၆၈) နှင့် ဇယား ၃.၁ တို့တွင် ဖော်ပြထားပါသည်။ ကုန်ကြမ်း ပစ္စည်းများအား ကုမ္ပဏီပိုင်ကားများဖြင့် သယ်ယူ ပို့ဆောင်ခြင်း မရှိပါ။ • လုပ်ငန်းစဉ်အဆင့်တစ်ခုချင်းစီမှ ထွက်ရှိနိုင်သော ပတ်ဝန်းကျင် ညစ်ညမ်းမှုများ၊ ထုတ်လွှတ်မှုများ ကို အခန်း ၃၊ အပိုဒ် ၃.၄.၄၊ စာမျက်နှာ (၇၉) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • စက်ပစ္စည်းများအတွင်း ကုန်ကြမ်းပစ္စည်းများ၏ ဓာတုဆိုင်ရာ ဓာတ်ပြုပြောင်းလဲမှုနှင့် စက်ရုံမှ ထုတ်လွှတ်လိုက်မည့် ဓာတ်ငွေ့များ၊ အမှုန်များ စသည့် အခြေအနေများကို အခန်း ၃၊ အပိုဒ် ၃.၄.၄၊ စာမျက်နှာ (၇၉) နှင့် အပိုဒ် ၃.၅.၁၊ စာမျက်နှာ (၉၅) တွင် ထည့်သွင်း ဖော်ပြထား ပါသည်။ • Technical Specification များအား နောက် ဆက်တွဲ ၄ ဖြင့် ထပ်မံဖြည့်စွက် ဖော်ပြထား ပါသည်။ • ယခုလက်ရှိ အကောင်အထည်ဖော် ဆောင်ရွက် နေသည့် အခြေအနေပါ မူတည်၍ လုပ်ငန်း တည်ဆောက်ခြင်း၊ လည်ပတ်ဆောင်ရွက်ခြင်းနှင့် ပိတ်သိမ်းခြင်း အဆင့်များအတွက် ခန့်မှန်း အချိန်ဇယားကို အခန်း ၃၊ အပိုဒ် ၃.၂၊ စာမျက်နှာ (၅၉) တွင် ထည့် သွင်းဖော်ပြထားပါသည်။

Appendix 14

စဉ်	ပြင်ဆင်ဖြည့်စွက်တင်ပြရန် အချက်များ	ပြန်လည်ဖြည့်စွက် တင်ပြချက်များ
	(ကြာမြင့်သည့် ကာလအရေအတွက်) တို့ကို ယခုလက်ရှိ အကောင်အထည်ဖော် ဆောင်ရွက်နေသည့် အခြေအနေပါ မူတည်၍ ခန့်မှန်း ဖော်ပြပေးရန်၊ • စီမံကိန်း အချိန်ဇယားအား ထည့်သွင်း ဖော်ပြပေး ရန်၊	
	• အခြားဆောင်ရွက်နိုင်သော နည်းလမ်းများ နှိုင်းယှဉ်ခြင်းနှင့် သရုပ်ခွဲဆန်းစစ်ခြင်းကို ပိုမို ထိရောက်သော နည်းလမ်းများဖြင့် ဖော်ပြပေးရန်၊ • အခြားဆောင်ရွက်နိုင်သော နည်းလမ်း တစ်ခုချင်း စီ၏ ကောင်းကျိုး/ဆိုးကျိုးများကို နည်းပညာ၊ စီးပွားရေး၊ ပတ်ဝန်းကျင်ဆိုင်ရာ ရှုထောင့်များ (အနည်းဆုံး) မှ သုံးသပ်အကဲဖြတ်၍ အကောင်းဆုံးနည်းလမ်း ကို နောက်ဆုံးရွေးချယ်ထားကြောင်း ထည့်သွင်း ဖော်ပြပေးရန်၊ • ဦးစားပေးရွေးချယ်ထားသော အစားထိုးနည်းလမ်း ကို ရွေးချယ်ခြင်း အတွက် ကျိုးကြောင်းဆီလျော် သော အကြောင်းပြချက်များကို ဖော်ပြပေးရန်၊	• အခြားဆောင်ရွက်နိုင်သော နည်းလမ်းများ နှိုင်းယှဉ်ခြင်းနှင့် သရုပ်ခွဲဆန်းစစ်ခြင်းကို ပိုမို ထိရောက်သော နည်းလမ်းများဖြင့် အခန်း ၃၊ အပိုဒ် ၃.၇၊ စာမျက်နှာ (၉၉) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • အခြားဆောင်ရွက်နိုင်သော နည်းလမ်း တစ်ခုချင်းစီ၏ ကောင်းကျိုး/ဆိုးကျိုး များကို နည်းပညာ၊ စီးပွားရေး၊ ပတ်ဝန်းကျင်ဆိုင်ရာ ရှုထောင့်များ (အနည်းဆုံး) မှ သုံးသပ်အကဲဖြတ်၍ အကောင်းဆုံးနည်းလမ်း ကို နောက်ဆုံးရွေးချယ်ထား ကြောင်းကို အခန်း ၃၊ အပိုဒ် ၃.၇.၃၊ စာမျက်နှာ (၉၉) တွင် ထည့်သွင်းဖော်ပြ ထားပါသည်။ • ဦးစားပေးရွေးချယ်ထားသော အစားထိုးနည်းလမ်း ကို ရွေးချယ်ခြင်း အတွက် ကျိုးကြောင်းဆီလျော် သော အကြောင်းပြချက်များကို အခန်း ၃၊ အပိုဒ် ၃.၇၊ စာမျက်နှာ (၉၉) တွင် ထည့်သွင်းဖော်ပြ ထားပါသည်။
၆။	**လက်ရှိပတ်ဝန်းကျင် အခြေအနေ**	
	• စီမံကိန်းလှုပ်ရှားဆောင်ရွက်မှုများတွက် ထုံးကျောက်၊ မြေစေး၊ သဲ တို့ကို အဖုံးဖွင့်မိုင်း (Open Pit Mining) (မိုင်းခွဲမှု) စနစ် ပါဝင် သောကြောင့် တုန်ခါမှု (Vibration) ကို အခြေခံအချက်အလက်တွင် (Basline Data) ထည့်သွင်း တိုင်းတာ ဖော်ပြပေးရန်၊	• တိုင်းတာထားသည့် တုန်ခါမှု (Vibration) ရလာဒ် များကို အခန်း ၄၊ အပိုဒ် ၄.၃.၄၊ စာမျက်နှာ (၁၅၀) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။
	• စီကိန်းနှင့် ဆက်စပ်နေသော နယ်နမိတ်များကို တိကျစွာ ဖော်ပြရန်နှင့် စီမံကိန်းမှ မည်သည့် အကွာအဝေးတွင် တည်ရှိသည်ကို ဖော်ပြပေးရန်၊ • မျော်မှန်းထားသည့် တိုက်ရိုက်/သွယ်ဝိုက် သက် ရောက်မှုများ၊ စီမံကိန်းနှင့် ဆက်နွယ်နေသော လုပ်ငန်းများကို သတ်မှတ်ထားသော လေ့လာ သည့်ဧရိယာပေါ် အခြေခံ၍ ဖော်ပြပေးရန်၊	• စီမံကိန်းနှင့်ဆက်စပ်နေသော နယ်နိမိတ်များနှင့် စီမံကိန်းမှ အကွာအဝေးကို အခန်း ၄၊ ပုံ ၄-၃၉ နှင့် ဇယား ၄.၄၁၊ စာမျက်နှာ (၁၇၁) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • မျော်မှန်းထားသည့် တိုက်ရိုက်/ သွယ်ဝိုက် သက် ရောက်မှုများ၊ စီမံကိန်းနှင့် ဆက်နွယ်နေသော လုပ်ငန်းများကို သတ်မှတ်ထားသော လေ့လာ သည့် ဧရိယာပေါ် အခြေခံ၍ ဖော်ပြထားသော ဖော်ပြချက်အား အခန်း ၄၊ အပိုဒ် ၄.၁.၁၊ စာမျက်နှာ (၁၀၂) တွင် ထည့်သွင်း ဖော်ပြထား ပါသည်။

Appendix 14

စဉ်	ပြင်ဆင်ဖြည့်စွက်တင်ပြရန် အချက်များ	ပြန်လည်ဖြည့်စွက် တင်ပြချက်များ
	• မန္တလေးတိုင်းဒေသကြီး၊ ကျောက်ဆည်ခရိုင်၊ ကျောက်ဆည်မြို့နယ်အတွင်း ဆောင်ရွက်ထားရှိ ခဲ့ပြီးသော လုပ်ငန်းများ၊ ဖွံ့ဖြိုးရေးအစီအစဉ်များ စသည်တို့ကို ဖော်ပြ၍ စီမံကိန်းတည်ရှိရာ ကျောက်ဆည်စက်မှုဇုန်နှင့် ဆက်စပ်သည့် လူမှု စီးပွားဖွံ့ဖြိုးရေး စီအစဉ်များ၊ စီမံချက်များ စသည့် သက်ဆိုင်ရာ အကြောင်းအရာများကို သတ်မှတ် ဖော်ထုတ်၍ အကျဉ်းချုံး ဖော်ပြပေးရန်၊	• မန္တလေးတိုင်းဒေသကြီး၊ ကျောက်ဆည်ခရိုင်၊ ကျောက်ဆည်မြို့နယ် အတွင်း ဆောင်ရွက်ထားရှိ ခဲ့ပြီးသော လုပ်ငန်းများ၊ ဖွံ့ဖြိုးရေး အစီအစဉ်များ နှင့် ကျောက်ဆည်စက်မှုဇုန်နှင့် ဆက်စပ်သည့် လူမှုစီးပွား ဖွံ့ဖြိုးရေးစီမံချက် စသည့် သက်ဆိုင် ရာ အကြောင်းအရာများ အကျဉ်းချုပ်ကို အခန်း ၄၊ အပိုဒ် ၄.၃.၇၊ စာမျက်နှာ (၁၈၆) တွင် ထပ်မံ ဖြည့်စွက် ဖော်ပြ ထားပါသည်။
	• စီမံကိန်းဧရိယာ အနီးဝန်းကျင်၌ သတ်မှတ်ထား သော ကာကွယ်ထားသည့် ဧရိယာများတည်ရှိပါက စီမံကိန်းမှ မည့်သည့် အကွာအဝေးတွင် တည်ရှိ ကြောင်းကို မြေပုံဖြင့် ထည့်သွင်း ဖော်ပြပေးရန်၊	• စီမံကိန်းဧရိယာ အနီးဝန်းကျင်၌ သတ်မှတ်ထား သော ကာကွယ်ထားသည့် ဧရိယာများနှင့် စပ်လျဉ်း၍ အခန်း ၄၊ အပိုဒ် ၄.၂.၃.၆၊ စာမျက်နှာ (၁၁၂) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။
	• မြေအရည်အသွေး၊ ရေအရည်အသွေး၊ မြစ်ကြမ်းပြင် အနည်အနှစ် အရည်အသွေး၊ လေထုအရည်အသွေး၊ ဆူညံသံတိုင်းတာမှုများနှင့် သက်ရှိဇီဝ အစိတ်အပိုင်း လူမှုပတ်ဝန်းကျင် အခြေအနေ စသည်တို့ကို တိုင်းတာထား သော နမူနာကောက်ယူရာ နေရာများအား ရွေးချယ်ရသည့် အကြောင်းအရင်း များကို အစီရင်ခံစာတွင် ထည့်သွင်းဖော်ပြ၍ တွက်ချက်မှုများ၊ တွေ့ရှိချက်များ ဖြင့် ထိုတိုင်းတာချက်များသည် သက်ရောက်မှု ဆန်းစစ်ခြင်းအတွက် ပြည့်စုံ၍ ခြုံငုံလုံလောက်မှုရှိကြောင်း တွက်ချက် ဖော်ပြပေးရန်၊ • $PM_{2.5}$ နှင့် PM_{10} တိုင်းတာမှုရလာဒ်များ NEQEG တန်ဖိုးကို ကျော်လွန်နေ သဖြင့် လျော့ပါးစေသာနည်းလမ်းများနှင့် သင့်လျော်သော အကြောင်းပြချက် များ အထောက်အထားများ ထည့်သွင်း ဖော်ပြပေးရန်၊ • SO_2 သည် အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည် အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်များ NEQEG လမ်းညွှန်ချက်ကို ကျော်လွန်နေကြောင်း တွေ့ရှိရ သဖြင့် သင့်လျော်သော အကြောင်းပြချက်များ ထည့်သွင်း ဖော်ပြပေးရန်၊ • ၂၀၁၆ ခုနှစ် တိုင်းတာချက်အရ အမှတ် ၃ မှတ် အားလုံး ရှိ CO ပမာဏသည် ယခင် ၂၀၁၄ ခုနှစ်တွင် တိုင်းတာခဲ့သော ပမာဏနှင့် နှိုင်းယှဉ်ကြည့်လျှင် အလွန် ကွာခြားနေကြောင်း တွေ့ရှိရသဖြင့် ဆန်းစစ်ချက် ထည့်သွင်း ဖော်ပြပေးရန်၊	• မြေအရည်အသွေး၊ ရေအရည်အသွေး၊ မြစ်ကြမ်းပြင် အနည်အနှစ် အရည်အသွေး၊ လေထုအရည်အသွေး၊ ဆူညံသံတိုင်းတာမှုများနှင့် သက်ရှိဇီဝ အစိတ်အပိုင်း လူမှုပတ်ဝန်းကျင် အခြေအနေ စသည်တို့ကို တိုင်းတာထား သော နမူနာကောက်ယူရာ နေရာများအား ရွေးချယ်ရသည့် အကြောင်းအရင်း များကို အခန်း ၄၊ အပိုဒ် ၄.၁.၂၊ စာမျက်နှာ (၁၀၃) တွင် ထည့်သွင်း ဖော်ပြထား ပါသည်။ • $PM_{2.5}$ နှင့် PM_{10} တိုင်းတာမှုရလာဒ်များ NEQEG တန်ဖိုးကို ကျော်လွန် နေသည့် အကြောင်းအရင်း အား အခန်း ၄၊ အပိုဒ် ၄.၃.၂.၅၊ စာမျက်နှာ (၁၄၄) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • SO_2 သည် အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည် အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်များ NEQEG လမ်းညွှန်ချက်ကို ကျော်လွန်နေရသည့် အကြောင်းအရင်းကို အစီရင်ခံစာ နောက်ဆက်တွဲ (၇) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • ၂၀၁၄ခုနှစ်တွင် တိုင်းတာခဲ့သော CO တန်ဖိုးများ နှင့် ၂၀၁၆ ခုနှစ်တွင် တိုင်းတာခဲ့သော CO တန်ဖိုးများ၏ ပမာဏ ကွဲပြားနေရခြင်းမှာ Unit Conversion value နှင့် Unit ($\mu g/m^3$ or mg/m^3) လွဲမှားဖော်ပြမှုကြောင့် ဖြစ်ပါသည်။ အစီရင်ခံစာ၏ နောက်ဆက်တွဲ (၇) တွင် ပြန်လည် ပြင်ဆင်ဖော်ပြထားပါသည်။

Appendix 14

စဉ်	ပြင်ဆင်ဖြည့်စွက်တင်ပြရန် အချက်များ	ပြန်လည်ဖြည့်စွက် တင်ပြချက်များ
	• လေအရည်အသွေးတိုင်းတာရာတွင် (NO2, SO2, CO, PM2.5, PM10) ကို အဓိကတိုင်းတာ ဖော်ပြ ထားပြီး NEQEG တွင် ဘိလပ်မြေထုတ်လုပ်ခြင်း လုပ်ငန်းအတွက် သတ်မှတ်ထားသော ပါရာမီတာ များဖြစ်သည့် (Cadmium+Thallium, Dioxins/ Furans/ Dust/ Hydrogen Chloride/ Hydrogen Fluoride/ Mercury/ Total Metals/ Total Organic Carbon) ကို ထည့်သွင်း တိုင်း တာထားခြင်း မရှိသဖြင့် ထည့်သွင်းတိုင်းတာ ဖော်ပြပေးရန်၊	• လေအရည်အသွေးတိုင်းတာရာတွင် (NO2, SO2, CO, PM2.5, PM10) ကိုသာ အဓိက တိုင်းတာ ဖော်ပြနိုင်ပြီး အခြား ပါရာမီတာများအား နည်းပညာ အခက်ခဲကြောင့် လတ်တလောတွင် ထည့်သွင်း တိုင်းတာထားခြင်း မရှိပါ။
	• စီမံကိန်းဧရိယာရှိ ရေအခြေအနေများ (မြေပေါ်/ မြေအောက်ရေ၊ မြစ်ချောင်းများ၊ ရေစီးဆင်းသည့် နေရာများ၊ မိုးရေစီဆင်းမှု၊ ရေနုတ်မြောင်း) ကို ပြည့်စုံစွာ ထည့်သွင်း ဖော်ပြပေးရန်၊ • အစီရင်ခံစာတွင် စီမံကိန်းအတွက် ရေကို သင်းတွဲ မြောင်းမှ ရယူမည် ဖြစ်ကြောင်း ထည့်သွင်း ဖော်ပြထားသော်လည်း အများပြည်သူနှင့် တွေ့ဆုံပွဲတွင် ဦးခင်မောင် (မိုင်းပန်ရွာ- Hmine Pan) ရွာမှ မေးသောမေးခွန်းတွင် လိုအပ်သောရေကို ဇော်ဂျီမြစ်မှ ယူမည်ဟု ဦးသောင်းဝင်း (GM – Cement Factory) မှ ဖြေကြားထားသောကြောင့် ရေရယူမည့် အရင်းအမြစ်အား စီမံကိန်းအတွက် အမှန် တစ်ကယ် ရေရယူမည့် ရေအရင်းအမြစ်ကို ထည့်သွင်း ဖော်ပြပေးရန်၊ • ရေရယူမည့်အရင်းအမြစ်မှ စီမံကိန်းသို့ သွယ်တန်းထားသော ရေပိုက်လိုင်း အကြောင်းကို ထည့်သွင်း ဖော်ပြထားခြင်း မရှိပါ။ သို့သော် အများပြည်သူနှင့် တွေ့ဆုံပွဲတွင် ရေပိုက်လိုင်းကို ဖန်စက်ရုံသို့ သွယ်တန်းထားပြီးဖြစ်သော ရေပိုက်လိုင်းပေါ်တွင် ထပ်မံမြှုပ်နှံမည်ဟု ဦးစိုးညွန့် (Cement Factory) မှ ဖြေကြားထားပါသည်။ ရေပိုက်လိုင်းတစ်လျှောက် ထိခိုက်နိုင်မှု ရှိ/မရှိ အခြေအနေများကို ထည့်သွင်း ဖော်ပြပေးရန်၊ • အစီရင်ခံစာ၏ နောက်ဆက်တွဲတွင် ဖော်ပြထား သော ဘိလပ်မြေစက်ရုံ၏ ဒီဇယ်သိုလှောင်ကန် သုံးစွဲမှု အန္တရာယ်ကင်းရှင်းရေး အတွက် လိုက်နာရမည့် အချက်များကို ဖော်ပြထားခြင်းကြောင့် ဘိလပ်မြေစက်ရုံတွင် ဒီဇယ် သိုလှောင်ကန်များ ထားရှိမည်ဟု ယူဆပါသည်။ ထို့ကြောင့် ဒီဇယ် သွင်းခြင်း၊ ထုတ်လုပ်ခြင်းလုပ်ငန်းစဉ်များမှ ဖိတ်စင်မှုများကြောင့် မြေအရည်အသွေး	• စီမံကိန်းဧရိယာရှိ ရေအခြေအနေများကို အခန်း ၄၊ အပိုဒ် ၄.၃.၁၊ စာမျက်နှာ (၁၃၂) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • စီမံကိန်းအတွက် အမှန်တစ်ကယ် ရေယူမည့် အရင်းအမြစ်ကို အခန်း ၃၊ အပိုဒ် ၃.၄.၈၊ စာမျက်နှာ (၈၅) တွင် ထည့်သွင်း ဖော်ပြထား ပါသည်။ • အဆိုပြုစီမံကိန်း အတွက် ရေရယူမည့် ပိုက်လိုင်း အား ယခင် ကျောက်ဆည်စက်မှုဇုန်ရှိ စက်ရုံ များသို့ ရေရယူသည့် ပိုက်လိုင်း လမ်းကြောင်း အတိုင်း သီးခြား သွယ်တန်းထား သည့်အတွက် ရေပိုက်လိုင်းတစ်လျှောက် ထိခိုက် နိုင်မှု မရှိသည့် အခြေအနေအား အခန်း ၃၊ အပိုဒ် ၃.၄.၈၊ စာမျက်နှာ (၈၅) တွင် ထည့်သွင်း ဖော်ပြထား ပါသည်။ • မြေအရည်အသွေးနှင့်ပတ်သက်သော ဆန်းစစ် လေ့လာချက်များ၊ မြေညစ်ညမ်းမှုမဖြစ်စေရန် ကာကွယ်ထားရှိမှုများကို အခန်း ၅၊ အပိုဒ် ၅.၄.၅၊ စာမျက်နှာ (၂၀၈) တွင် ထည့်သွင်း ဖော်ပြထား ပါသည်။

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စဉ်	ပြင်ဆင်ဖြည့်စွက်တင်ပြရန် အချက်များ	ပြန်လည်ဖြည့်စွက် တင်ပြချက်များ
	ထိခိုက်နိုင်ခြေရှိသောကြောင့် မြေအရည်အသွေးနှင့် ပတ်သက်သော ဆန်းစစ်လေ့လာချက်များ၊ ထည့်သွင်းတိုင်းတာမှုများ၊ မြေညစ်ညမ်းမှု မဖြစ်စေရန် ကာကွယ်ထားရှိမှုများ စသည်တို့ကို ထည့်သွင်း ဖော်ပြပေးရန်၊	
	စီမံကိန်း အနီးဝန်းကျင်ရှိ အစိုးရပိုင် အဆောက် အဦးများ (ဥပမာ - ဆေးရုံ၊ မီးသတ်ဦးစီးဌာန၊ တက္ကသိုလ် အစရှိသဖြင့်) တည်နေရာများကို ဖော်ပြပေးရန်၊	• အဆိုပြုထားသော စီမံကိန်း အနီးဝန်းကျင်ရှိ အစိုးရပိုင် အဆောက်အဦးများနှင့် စပ်လျဉ်း၍ အခန်း ၄၊ အပိုဒ် ၄.၃.၈၊ စာမျက်နှာ (၁၈၆) တွင် ထည့်သွင်း ဖော်ပြ ထားပါသည်။
	အစီရင်ခံစာတွင် မြေအသုံးချမှုနှင့် ပတ်သက် သော (Land use Map) ထည့်သွင်း ဖော်ပြပေးရန်၊	• မြေအသုံးချမှုနှင့် ပတ်သက်သော (Land use map) ကို အခန်း ၄၊ ပုံ ၄-၁၁၊ စာမျက်နှာ (၁၂၅) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။
	သေဆုံးမှုနှင့်ပတ်သတ်သော သတင်းအချက် အလက်များကို ဖော်ပြပေးရန်၊	• သေဆုံးမှုနှင့် ပတ်သက်သော သတင်း အချက် အလက်များကို အခန်း ၄၊ အပိုဒ် ၄.၂.၄.၄.၂၊ စာမျက်နှာ (၁၃၀) တွင် ထည့်သွင်း ဖော်ပြထား ပါသည်။
	• စီမံကိန်းပတ်ဝန်းကျင်ရှိ မြင်ကွင်းဆိုင်ရာ အစိတ် အပိုင်းများကို (ဥပမာ - လယ်မြေ၊ မြေလွတ်၊ စိုက်ပျိုးမြေ၊ မြေပြန့်၊ ဘုရားများ၊ ဘုန်းကြီး ကျောင်းများ) စသည်ဖြင့် ဖော်ပြရန် လိုအပ်ပါသည်။ • သဘာဝဘေးအန္တရာယ်များ (ဥပမာ - မြေငလျင်၊ ဆူနာမီ၊ ရေဘေး၊ မီးဘေး) အစ ရှိသည်တို့ စီမံကိန်းဧရိယာတွင် ယခင်းက ဖြစ်ပွားခြင်းများ ရှိခဲ့ပါက ထည့်သွင်း ဖော်ပြပေးရန်၊	• စီမံကိန်းရှိ မြင်ကွင်းဆိုင်ရာ အစိတ်အပိုင်းများကို အခန်း ၄၊ အပိုဒ် ၄.၃.၉၊ စာမျက်နှာ (၁၈၇) တွင် ထည့်သွင်း ဖော်ပြ ထားပါသည်။ • သဘာဝဘေးအန္တရာယ်ဆိုင်ရာ အချက်အလက် များကို အခန်း ၄၊ အပိုဒ် ၄.၃.၁၀၊ စာမျက်နှာ (၁၈၈) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။
၇။	**ပတ်ဝန်းကျင်အပေါ် သက်ရောက်မှုများနှင့် လျော့နည်းစေရန် ဆောင်ရွက်မည့် လုပ်ငန်းများ**	
	• လုပ်ငန်းပိတ်သိမ်းသည့် အဆင့်တွင် လေထု ညစ်ညမ်းစေသော အရာများကို ဆန်းစစ် ဖော်ပြပေးရန်၊ (ဥပမာ - ပတ်ဝန်းကျင်သည် မူလ အခြေအနေတိုင်း ပြန်လည် ဖြစ်သွားပါက လူအင်အားသုံး၍ ပြုပြင်ခြင်းများ လိုအပ်သည် (သို့မဟုတ်) နဂိုအတိုင်း ပြန်မဖြစ်နိုင်ဟု သတ်မှတ်နိုင်သည်)	• လုပ်ငန်းပိတ်သိမ်းသည့်အဆင့် အတွက် ဆန်းစစ် မှုကို အခန်း ၅၊ အပိုဒ် ၅.၈၊ စာမျက်နှာ (၂၁၇) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။
	• ဘိလပ်မြေစက်ရုံအတွက် IFC လမ်းညွှန်ချက်များ အရ Heavy Metals များကို ပတ်ဝန်းကျင် လေထု ထဲသို့ ထုတ်လွှတ်ခြင်းသည် ကုန်ကြမ်းအမျိုး အစားနှင့် အရည်အသွေးပေါ်တွင် မူတည်ပါသည်။ ထို့ကြောင့် Heavy Metals များ ထုတ်လွှတ်နိုင် ချေနှင့် နေ့စဉ်ထုတ်လွှတ်သော (ညစ်ညမ်းပစ္စည်း များ၏ ပမာဏ/ပြင်းအား) ကို ခန့်မှန်း ထည့်သွင်း ဖော်ပြပေးရန်၊	• Heavy Metals များ ထုတ်လွှတ်နိုင်ချေနှင့် စပ်လျဉ်း၍ အခန်း ၅၊ အပိုဒ် ၅.၄.၁၊ စာမျက်နှာ (၂၀၁) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • စက်ရုံလည်ပတ်သည်နှင့် heavy metals များကို တိုင်းတာနိုင်သည့် အခြေအနေရှိပါက ၎င်းတို့ကို တိုင်းတာပြီး စောင့်ကြပ်ကြည့်ရှုခြင်း အစီရင်ခံစာ တွင် ထည့်သွင်းမည်ဖြစ်ကြောင်း ဖော်ပြချက်အား အခန်း ၅၊ အပိုဒ် ၅.၄.၁၊ စာမျက်နှာ (၂၀၁) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။

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စဉ်	ပြင်ဆင်ဖြည့်စွက်တင်ပြရန် အချက်များ	ပြန်လည်ဖြည့်စွက် တင်ပြချက်များ
	• ထုတ်လွှတ်နိုင်ချေသည် သိသာထင်ရှားနေပါက လိုအပ်သော တိုင်းတာမှုများ တင်ပြရန်နှင့် ၎င်းတို့အား စီမံကိန်းရေးဆွဲခြင်းတွင် ထည့်သွင်း ဖော်ပြရန်၊ • စက်ရုံလည်ပတ်မှု စတင်သည်နှင့် Heavy Metals များ၏ ပမာဏကို တိုင်းတာရန်နှင့် လေအရည် အသွေးစံနှုန်းများနှင့် ကိုက်ညီမှု ရှိ/မရှိ တိုင်းတာ စစ်ဆေး ဖော်ပြပေးရန်၊	
	အမှုန်အမွှားများ (particulate matter) ၏ ခန့်မှန်း ထုတ်လွှတ်မှုအဆင့်နှင့် ထုတ်လွှတ်မှုပမာဏကို တွက်ချက်ရန်၊ အမျိုးသားအဆင့် စံချိန်စံနှုန်းများနှင့် နှိုင်းယှဉ်ဖော်ပြရန်နှင့်၊ ကျော်လွန်နေပါက လိုအပ်သာ လျော့ပါးစေသော နည်းလမ်းများ ဖြည့်စွက် ဖော်ပြပေးရန်၊	• အမှုန်အမွှားများ (Particulate Matter) ၏ ခန့်မှန်းထုတ်လွှတ်မှုနှင့် အမျိုးသားအဆင့် စံချိန် စံနှုန်းများနှင့် နှိုင်းယှဉ်ဖော်ပြထားမှုအား အခန်း ၅၊ အပိုဒ် ၅.၄.၁၊ စာမျက်နှာ (၂၀၁) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။
	• စီမံကိန်းလုပ်ဆောင်ချက်များမှ ထုတ်လွှတ်သော အမှုန်အမွှားများ (Particulate Matter) ထုတ် လွှတ်မှု အဆင့်နှင့် ပမာဏကို ခန့်မှန်း တွက်ချက်ရန်နှင့် စီမံကိန်း၏ ဆက်စပ်သက်ရောက်မှုများကို သေချာ ဆန်းစစ် ဖော်ပြပေးရန်၊ • စီမံကိန်းအဆိုပြုသူသည် ပတ်ဝန်းကျင်ရှိ လေထုအရည်အသွေးကို စစ်ဆေးရန်နှင့် ကောင်းမွန်စေရန် ဒေသအာဏာပိုင်များနှင့် ပူးပေါင်း ဆောင်ရွက်သွားမည်ဖြစ်ကြောင်း ထည့်သွင်း ဖော်ပြပေးရန်၊	• စီမံကိန်းလုပ်ဆောင်ချက်များနှင့် စီမံကိန်း ပတ်ဝန်းကျင်ရှိ အခြားသော လုပ်ဆောင်ချက်များနှင့်အတူ စီမံကိန်း၏ ဆက်စပ်သက်ရောက်မှုများကို အခန်း ၅၊ အပိုဒ် ၅.၄.၁၊ စာမျက်နှာ (၂၀၀) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • စီမံကိန်း အဆိုပြုသူမှ ပတ်ဝန်းကျင်ရှိ လေထု အရည်အသွေး စစ်ဆေးရန်နှင့် ကောင်းမွန်စေရန် ဒေသအာဏာပိုင်များနှင့် ပူပေါင်းဆောင်ရွက်သွားမည် ဖြစ်ကြောင်းအား အခန်း ၅၊ အပိုဒ် ၅.၄.၁၊ စာမျက်နှာ (၂၀၃) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။
	• စီမံကိန်း၏ ရေသုံးစွဲမှုသည် ရေအရင်းအမြစ် (သင်းတွဲမြောင်း ရေအရင်းအမြစ်) နှင့် နှိုင်းယှဉ် လျှင် အနည်းဆုံးဖြစ်မည်ဟု ခန့်မှန်းထားသော်လည်း စီမံကိန်းလုပ်ဆောင်ချက်အားလုံး (ဘိလပ် မြေထုတ်လုပ်မှုလုပ်ငန်း၊ စက်ရုံပြုပြင်ထိန်းသိမ်း ရေးများ၊ အလုပ်သမားတို့၏ နေ့စဉ်အသုံးပြုမှုများ) ကို မူလရေ စီးဆင်းနှုန်းနှင့် နှိုင်းယှဉ်ပြီး ရေ အရင်းအမြစ်တူညီသော အခြား ရှိပြီးသား စီမံကိန်းများ၏ ရေသုံးစွဲမှုများ၏ သက်ရောက်မှုကို ပြည့်စုံစွာ အကဲဖြတ်/ ဆန်းစစ် ထည့်သွင်း ဖော်ပြပေးရန်၊	• စီမံကိန်းလုပ်ဆောင်ချက်အားလုံးကို မူလရေ စီးဆင်းနှုန်းနှင့် နှိုင်းယှဉ်၍ ရေသုံးစွဲမှုများ၏ သက်ရောက်မှုကို အခန်း ၅၊ အပိုဒ် ၅.၄.၂၊ စာမျက်နှာ (၂၀၃) တွင် ထည့်သွင်း ဖော်ပြထား ပါသည်။
	• လုပ်ငန်းစဉ်တစ်ခုချင်းစီမှ ညစ်ညမ်းပစ္စည်း အမျိုးအစားများကို ခွဲခြား သတ်မှတ်ရန်နှင့် ပမာဏကို ခန့်မှန်းရန်နှင့် လျော့ပါးစေသော နည်းလမ်းများ ထည့်သွင်း ဖော်ပြပေးရန်၊	• လုပ်ငန်းစဉ်တစ်ခုခြင်းစီမှ ညစ်ညမ်းပစ္စည်း အမျိုးအစားများကို ခွဲခြား သတ်မှတ်ခြင်းနှင့် လျော့ပါး စေသောနည်းလမ်းများကို အခန်း ၅၊ အပိုဒ် ၅.၄.၂၊ စာမျက်နှာ (၂၀၃) တွင် ထည့်သွင်း ဖော်ပြထား ပါသည်။

Appendix 14

စဉ်	ပြင်ဆင်ဖြည့်စွက်တင်ပြရန် အချက်များ	ပြန်လည်ဖြည့်စွက် တင်ပြချက်များ
	• Gypsum နှင့် အခြားရောစပ်မည့်ပစ္စည်းများ သိုလှောင်ရန်အတွက် (၆၀x၃၀ မီတာ) ကျယ် သော အခန်းကို တည်ဆောက်မည်ဟု ဖော်ပြထား သော်လည်း ထုတ်လုပ်မှုလုပ်ငန်းစဉ်အတွက် လိုအပ်သော အခြား ကုန်ကြမ်းပစ္စည်းများ (Coal, auxillary material, clinker) သိုလှောင်မည့် သိုလှောင်ရုံနှင့် ပတ်သက်သော အကြောင်းအရာ အသေးစိတ် (ဥပမာ အကျယ်အဝန်း၊ Layout ပုံ၊ ပုံကြမ်း စသည်) တို့ကို ဖော်ပြပေးရန်၊ • ထုတ်လုပ်ရေးလုပ်ငန်းစဉ်အတွက် အမှန်တကယ် အသုံးပြုသော ကုန်ကြမ်း သယ်ယူပုံစနစ်၊ နည်းလမ်း၊ ကုန်ကြမ်းသယ်ယူရာတွင် အသုံးပြုမည့် ယာဉ်အရေအတွက် (ခန့်မှန်း) ကို ထည့်သွင်း ဖော်ပြပေးရန်၊	• ထုတ်လုပ်မှုလုပ်ငန်းစဉ်အတွက် လိုအပ်သော အခြား ကုန်ကြမ်းပစ္စည်းများ သိုလှောင်မည့် သိုလှောင်ရုံနှင့် ပတ်သတ်သော အကြောင်းအရာ အား အခန်း ၃၊ ဇယား ၃.၁၊ စာမျက်နှာ (၆၉) နှင့် Layout ပုံအား ပုံ ၃-၂၂၊ စာမျက်နှာ (၉၈) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • ထုတ်လုပ်ရေးလုပ်ငန်းစဉ် အတွက် အမှန်တကယ် အသုံးပြုသော ကုန်ကြမ်း သယ်ယူပုံစနစ်အား အခန်း ၃၊ ဇယား ၃.၁၊ စာမျက်နှာ (၆၉) တွင် ထည့်သွင်း ဖော်ပြ ထားပါသည်။
	• ဘေးအန္တရာယ်ရှိပစ္စည်းများနှင့် သက်ဆိုင်သော အချက်အလက်များကို သီးခြား ဖော်ပြပေးရန်၊ • ဘေးအန္တရာယ်ရှိပစ္စည်းများ သိုလှောင်ထားရှိမည့် နေရာနှင့် အန္တရာယ်ရှိ ပစ္စည်းများ စီမံခန့်ခွဲ အသုံးပြုပုံ စသည့်တို့ကိုလည်း ထည့်သွင်း ဖော်ပြ ပေးရန်၊ • စက်ရုံ ဆေးရောင်သုတ်ခြင်း၊ သစ်ပင်စိုက်ပျိုးခြင်း အစီအစဉ်နှင့် ဘိလပ်မြေ စက်ရုံ အသေးစိတ် ဒီဇိုင်းရေးဆွဲရာတို့တွင် ထည့်သွင်း စဉ်းစားမှုများကို ထည့်သွင်း ဖော်ပြပေးရန်၊	• ဘေးအန္တရာယ်ရှိပစ္စည်းများနှင့် ဆိုင်သော အချက် အလက်များကို အခန်း ၅၊ အပိုဒ် ၅.၄.၄၊ စာမျက်နှာ (၂၀၇) တွင် ထည့်သွင်း ဖော်ပြထား ပါသည်။ • ဘေးအန္တရာယ်ရှိပစ္စည်းများ စီမံခန့်ခွဲ အသုံးပြုပုံ ကို အခန်း ၅၊ အပိုဒ် ၅.၄.၄၊ စာမျက်နှာ (၂၀၇) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • သစ်ပင် စိုက်ပျိုးခြင်း အစီအစဉ်အား အခန်း ၆၊ အပိုဒ် ၆.၃.၂.၁၊ စာမျက်နှာ (၂၃၇) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။
	• သီးသန့်စွန့်ပစ်ပစ္စည်းစွန့်ပစ်မှု အစီအစဉ်များကို အစီရင်ခံစာတွင် ဖော်ပြ ပေးရန်၊ • စက်ရုံလည်ပတ်မှုတွင် ထွက်ပေါ်လာသော တုန်ခါမှု (Vibration) ကို တိုင်းတာရန်နှင့် တုန်ခါမှု၏ အခြေပြုတန်ဖိုးများ (Baseline Values) များကို ဖော်ပြပေးရန်၊ • ဘိလပ်မြေစက်ရုံ၏ ဒီဇယ်ဆီသိုလှောင်ကန်များ အတွက် ပေါက်ကွဲမှုနှင့် မီးဘေးအန္တရာယ် သက်ရောက်မှုများ သုံးသပ်၍ ထည့်သွင်း ဖော်ပြပေးရန်၊ • အရေးပေါ်တုံ့ပြန်မှုနှင့် အစီအစဉ်များကို အသေးစိတ်ဖော်ပြ၍ ညွှန်းဆိုထားသည့် သက်ရောက်မှုဆန်းစစ်သည့်နည်းကို အသုံးပြု၍ တွက်ချက်ဆန်းစစ် ထည့်သွင်း ဖော်ပြပေးရန်၊	• စွန့်ပစ်ပစ္စည်းစွန့်ပစ်မှု အစီအစဉ်များကို အခန်း ၅၊ အပိုဒ် ၅.၄.၄၊ စာမျက်နှာ (၂၀၆) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • စက်ရုံလည်ပတ်မှုမှ ထွက်ပေါ်လာသော တုန်ခါမှု (Vibration) ကို တိုင်းတာ၍ Monitoring Report တွင်ထည့်သွင်း ဖော်ပြသွားပါမည်။ တုန်ခါမှု၏ အခြေပြုတန်းဖိုးများ (Baseline Values များကို အခန်း ၄၊ အပိုဒ် ၄.၃.၄၊ စာမျက်နှာ (၁၅၀) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • မီးဘေးအန္တရာယ် သက်ရောက်မှုများနှင့် စပ်လျဉ်း ၍ အခန်း ၅၊ အပိုဒ် ၅.၄.၆၊ စာမျက်နှာ (၂၀၈) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • အရေးပေါ်တုန့်ပြန်မှုနှင့် အစီအစဉ်များကို အခန်း ၆၊ အပိုဒ် ၆.၇၊ စာမျက်နှာ (၂၃၈) တွင် ထည့်သွင်း ဖော်ပြထား ပါသည်။

Appendix 14

စဉ်	ပြင်ဆင်ဖြည့်စွက်တင်ပြရန် အချက်များ	ပြန်လည်ဖြည့်စွက် တင်ပြချက်များ
	• အခြားသော အရေးပေါ်အခြေအနေများ (ငလျင်၊ ရေဘေး၊ ဓာတုပစ္စည်းယိုဖိတ်မှု) စသည်တို့ကိုလည်း ထည့်သွင်း ဖော်ပြပေးရန်၊ • သမိုင်းကြောင်းနှင့် ရှေးဟောင်း ယဉ်ကျေးမှုဆိုင်ရာ သက်ရောက်မှုနှင့် ဂေဟဗေဒဆိုင်ရာ ထိခိုက်မှုကြောင့် ရာသီဥတု အခြေအနေပေါ် သက်ရောက်မှုကို ညွှန်းဆိုထားသော သက်ရောက်မှု ဆန်းစစ်သည့် နည်းလမ်းဖြင့် ဖော်ပြရန် လိုအပ်ပါသည်။ • (၂) ညွှန်းဆိုထားသည့် ဆန်းစစ်သည့်နည်းလမ်းကို အသုံးမပြုနိုင်ပါက သင့်တော်သော အကြောင်းပြချက်ကို ဖော်ပြရန်၊ • မြေရယူမှုနှင့် ပြန်လည်နေရာချထားရေး အစီအစဉ်များ ပါဝင်ပါက ထည့်သွင်း ဖော်ပြပေးရန်၊ • အထက်ဖော်ပြပါ မြေရယူမှုနှင့် ပြန်လည်နေရာချထားရေး အစီအစဉ်များ မလိုအပ်ပါက မြေအသုံးပြုမှု (ဥပမာ-သက်ဆိုင်ရာ အဖွဲ့အစည်းမှ မြေငှားရမ်းခြင်း စသည်ဖြင့်) ဖော်ပြပေးရန်၊ • မြေအသုံးချမှုနှင့် မြေပိုင်ဆိုင်မှုများအပေါ် သက်ရောက်မှု ဆန်းစစ်ခြင်းများ ဖော်ပြပေးရန်၊ • ပြန်လည် မဖြည့်တင်းနိုင်သော အရင်းအမြစ်များ (ဥပမာ-သတ္တု) များအပေါ် သက်ရောက်မှု ဆန်းစစ် ဖော်ပြပေးရန်၊ • ဘိလပ်မြေစက်ရုံလည်ပတ်ခြင်းကြောင့် ကမ္ဘာကြီး ပူနွေးလာမှုအပေါ် ထိခိုက်မှုများကို သုံးသပ်ဖော်ပြပေးရန်၊ • အစီရင်ခံစာ၏ သက်ဆိုင်ရာအခန်းတွင် သဘာဝဘေးအန္တရာယ် ဆန်းစစ်မှုများကို ဖော်ပြပေးရန်၊ • မီးဘေးဆိုင်ရာ အရေးပေါ် လုပ်ဆောင်ရမည့် အရာများကို ဆန်းစစ်မှုတွင် ထည့်သွင်း ဖော်ပြပေးရန်၊ • ဆိုးကျိုးဖြစ်ပေါ်စေသာ ဇာခြေစ်များ/နေရာများ၏ တည်နေရာကို ဖော်ပြထားသော သက်ဆိုင်ရာ မြေပုံများ၊ ဂြိုလ်တုဓာတ်ပုံများကို ထည့်သွင်း ဖော်ပြပေးရန်၊	• အခြားအရေးပေါ် အခြေအနေများနှင့် စပ်လျဉ်း၍ အခန်း ၅၊ အပိုဒ် ၅.၄.၇၊ စာမျက်နှာ (၂၀၉) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • သမိုင်းကြောင်းနှင့် ရှေးဟောင်းယဉ်ကျေးမှု ဆိုင်ရာ သက်ရောက်မှုကို ညွှန်းဆိုထားသော သက်ရောက်မှု ဆန်းစစ်သည့် နည်းလမ်းဖြင့် ဖော်ပြထားချက်အား အခန်း ၅၊ အပိုဒ် ၅.၆၊ စာမျက်နှာ (၂၁၃) တွင် ထည့်သွင်း ဖော်ပြထား ပါသည်။ • ဂေဟဗေဒဆိုင်ရာ ထိခိုက်မှုကြောင့် ရာသီဥတု အခြေအနေပေါ် သက်ရောက်မှုကို ညွှန်းဆို ထားသော သက်ရောက်မှု ဆန်းစစ်သည့် နည်းလမ်းဖြင့် ဖော်ပြထားချက်အား အခန်း ၅၊ အပိုဒ် ၅.၄.၉၊ စာမျက်နှာ (၂၁၀) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • မြေရယူမှုနှင့် ပြန်လည်နေရာချထားရေး အစီ အစဉ်များ မပါဝင်ပါ။ • မြေအသုံးချမှုနှင့် မြေပိုင်ဆိုင်မှုများ အပေါ် သက်ရောက်မှု ဆန်းစစ်ခြင်းကို အခန်း ၅၊ အပိုဒ် ၅.၄.၈၊ စာမျက်နှာ (၂၀၉) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • ပြန်လည် မဖြည့်တင်းနိုင်သော အရင်းအမြစ်များ အပေါ် သက်ရောက်မှု ဆန်းစစ်ချက်အား အခန်း ၅၊ အပိုဒ် ၅.၄.၁၁၊ စာမျက်နှာ (၂၁၂) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • ဘိလပ်မြေစက်ရုံ လည်ပတ်ခြင်းကြောင့် ကမ္ဘာ ကြီး ပူနွေးလာမှုအပေါ် ထိခိုက်မှု သုံးသပ်ချက်ကို အခန်း ၅၊ အပိုဒ် ၅.၄.၁၊ စာမျက်နှာ (၂၀၁) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • သဘာဝဘေးအန္တရာယ် ဆန်းစစ်မှုများကို အခန်း ၅၊ အပိုဒ် ၅.၄.၇၊ စာမျက်နှာ (၂၀၉) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • မီးဘေးဆိုင်ရာ အရေးပေါ် လုပ်ဆောင်ရမည့် အရာများ ဆန်းစစ်မှုကို အခန်း ၅၊ အပိုဒ် ၅.၄.၆၊ စာမျက်နှာ (၂၀၈) တွင် ထည့်သွင်း ဖော်ပြထား ပါသည်။ • ဆိုးကျိုးဖြစ်နိုင်ခြေရှိသော နေရာများ၏ တည်နေ ရာကို ဖော်ပြထားသော သက်ဆိုင်ရာ မြေပုံများ၊ ဂြိုလ်တုဓာတ်ပုံများကို ထပ်မံဖြည့်စွက် ဖော်ပြ ထားပါသည်။

Appendix 14

စဉ်	ပြင်ဆင်ဖြည့်စွက်တင်ပြရန် အချက်များ	ပြန်လည်ဖြည့်စွက် တင်ပြချက်များ
	• အနီးဝန်းကျင်တွင် တူညီသော စီမံကိန်းများ (ဥပမာ - ဘိလပ်မြေနှင့် ကျောက်တူးဖော်ရေး) တည်ရှိပါက ပေါင်းစပ်စီမံကိန်းများသည် ပတ်ဝန်းကျင်ကို သက်ရောက်မှုများ ဖြစ်စေနိုင်သောကြောင့် ယခင် တည်ရှိပြီး စီမံကိန်းများနှင့် အနာဂတ်စီမံကိန်းများ၏ ဆက်စပ် သက်ရောက်မှုဆန်းစစ် လေ့လာရာတွင် အသေးစိတ် အချက်အလက်များကို ထည့်သွင်း ဖော်ပြပေးရန်၊ • ပုံ (၅.၁) (စာမျက်နှာ-၂၁၀) အရ စီမံကိန်း အနီးဝန်းကျင် ၂ ကီလိုမီတာ အတွင်း စက်ရုံများ တည်ရှိသောကြောင့် (Nearest Receptors) များ အတွက် ဆက်စပ် သက်ရောက်မှုများကို ဆန်းစစ်ဖော်ပြပေးရန်၊ • "ဘိလပ်မြေစက်ရုံ" လည်ပတ်ခြင်းကြောင့် ဖြစ်ပေါ်သော သက်ရောက်မှုများနှင့် ပတ်ဝန်းကျင်ပေါ် လွှမ်းမိုးမှုများကို အသေးစိတ် ဖော်ပြပေးရန်၊ • ဆက်စပ်သက်ရောက်မှုများအတွက် လျော့ပါးစေရေး နည်းလမ်းများကို ဖော်ပြပေးရန်၊	• အနီးဝန်းကျင်တွင်ရှိသော စီမံကိန်းများ၏ အသေးစိတ် အချက်အလက်များကို အခန်း ၅၊ အပိုဒ် ၅.၁၀၊ စာမျက်နှာ (၂၂၃) တွင် ထပ်မံ ဖြည့်စွက် ဖော်ပြထားပါသည်။ • Nearest Receptors များ အတွက် ဆက်စပ် သက်ရောက်မှုများကို အခန်း ၅၊ အပိုဒ် ၅.၁၀.၁၊ စာမျက်နှာ (၂၂၅) တွင် ထည့်သွင်း ဖော်ပြထား ပါသည်။ • ဘိလပ်မြေစက်ရုံ လည်ပတ်ခြင်းကြောင့် ဖြစ်ပေါ် သော သက်ရောက်မှုများနှင့် ပတ်ဝန်းကျင် အပေါ် လွှမ်းမိုးမှုများကို အခန်း ၅၊ အပိုဒ် ၅.၁၀.၁၊ စာမျက်နှာ (၂၂၅) တွင် ထည့်သွင်း ဖော်ပြထား ပါသည်။ • ဆက်စပ်သက်ရောက်မှုများ အတွက် လျော့ပါးစေ ရေး နည်းလမ်းများကို အခန်း ၅၊ အပိုဒ် ၅.၁၀၊ ဇယား ၅.၁၊ စာမျက်နှာ (၂၂၅) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။
၈။	**အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးခြင်းနှင့် သတင်းအချက်အလက် ထုတ်ပြန်ခြင်း**	
	အများပြည်သူနှင့် တွေ့ဆုံဆွေးနွေးပွဲတွင် ဆွေးနွေးအသုံးပြုခဲ့သော စီမံကိန်း အကြောင်းအရာ ပါဝင်သော Presentation material ကို နောက်ဆက်တွဲတွင် ထည့်သွင်း ဖော်ပြပေးရန်၊	• အများပြည်သူနှင့် တွေ့ဆုံဆွေးနွေးပွဲ (၂၀၁၄) တွင် ဆွေးနွေး အသုံးပြုခဲ့သော စီမံကိန်း အကြောင်းအရာ ပါဝင်သော Presentation Material အစီရင်ခံစာ၏ နောက်ဆက်တွဲ (၁) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။
	• ကျောက်ဆည်မြို့နယ်ရှိ အာဏာပို အဖွဲ့အစည်းများ၊ ရပ်ရွာလူကြီးများနှင့် ကြိုတင်ဆွေးနွေးပွဲများကို လေ့လာသည့်အဖွဲ့က ပြုလုပ်ခဲ့သည့် အစည်းအဝေး အကြောင်းအရာများကို မည့်သည့်နေရာ၊ မည်သည့်နေ့ရက်၊ မည်သည့် အချိန်တွင်၊ မည်သည့်အကြောင်းအရာများ ဆွေးနွေးခဲ့သည်၊ ဆွေးနွေးမှု ရလာဒ်များ၊ မှတ်တမ်းဓာတ်ပုံများ စသည်တို့ ထည့်သွင်း ဖော်ပြပေးရန်၊ • ထို့အပြင် EIA အစီရင်ခံစာကို ပြင်ဆင်ရာတွင် အများပြည်သူ၏ သဘောထား မှတ်ချက်များကို အစီရင်ခံစာ၏ မည်သည့်နေရာတွင် ထည့်သွင်း စဉ်းစားထား ကြောင်း ဖော်ပြပေးရန်၊	• ကျောက်ဆည်မြို့နယ်ရှိ အာဏာပိုင် အဖွဲ့အစည်း များ၊ ရပ်ရွာလူကြီးများနှင့် ကြိုတင် ဆွေးနွေးပွဲ များကို လေ့လာသည့်အဖွဲ့က ပြုလုပ်ခဲ့သည့် အစည်းအဝေး အကြောင်းအရာများကို အစီရင်ခံစာ အခန်း ၈၊ စာမျက်နှာ (၂၈၇) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • EIA အစီရင်ခံစာကို ပြင်ဆင်ရာတွင် အများပြည်သူ၏ သဘောထား မှတ်ချက်များကို ထည့်သွင်း စဉ်းစားထားမှုအား အခန်း ၈၊ အပိုဒ် ၈.၁.၅၊ စာမျက်နှာ (၂၉၉) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။
	• လက်ခံရရှိသော ဝေဖန်အကြံပြုချက်များ စာရင်းကို ဖော်ပြပေးရန် • အများပြည်သူ၏ ပြဿနာများ၊ စိုးရိမ်ပူပန်မှုများကို သိရှိရပါက စီမံကိန်း အကောင်အထည်ဖော် ဆောင်ရွက်သူသည် ထိုပြဿနာများ၊ စိုးရိမ်ပူပန်မှုများ	• အများပြည်သူနှင့် ဆွေးနွေးပွဲများ ဆောင်ရွက် စဉ်အတွင်းသာ ဆွေးနွေး အကြံပြုခဲ့ပြီး သီးခြား ဝေဖန် အကြံပြုချက်များအား လက်ခံရရှိခြင်း

Appendix 14

စဉ်	ပြင်ဆင်ဖြည့်စွက်တင်ပြရန် အချက်များ	ပြန်လည်ဖြည့်စွက် တင်ပြချက်များ
	ကိုအများပြည်သူ ကျေနပ်သဘောတူသည်အထိ မည်ကဲ့သို့ ဖြေရှင်းပေးထားသည်များကို အကြောင်းအရာ စုံစုံလင်လင်ဖြင့် အထောက်အထားများနှင့် EIA အစီရင်ခံစာတွင် ထည့်သွင်း ဖော်ပြပေးရန်၊	မရှိကြောင်း ဖော်ပြချက်အား အခန်း ၈၊ အပိုဒ် ၈.၁.၅၊ စာမျက်နှာ (၂၉၉) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • EIA အစီရင်ခံစာကို ပြင်ဆင်ရာတွင် အများပြည်သူ၏ သဘောထားမှတ်ချက်များကို ထည့်သွင်း စဉ်းစားထားမှုအား အခန်း ၈၊ အပိုဒ် ၈.၁.၅၊ စာမျက်နှာ (၂၉၉) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။
	• ထုတ်ပြန်ကြေညာသော လုပ်ငန်းစဉ် ဆောင်ရွက်ရာတွင် အများပြည်သူထံမှ သဘောထားမှတ်ချက်များကို ရယူပြီး ထိုသဘောထား မှတ်ချက်များကို ထည့်သွင်းစဉ်စား၍ EIA အစီရင်ခံစာ၏ မည်သည့် နေရာကို ပြင်ဆင်ထားကြောင်း ဖော်ပြပေးရန်၊ • သက်ဆိုင်သော အချက်အလက်များကို လွယ်ကူစွာ စစ်ဆေးနိုင်ရန် တိုင်ပင်ဆွေးနွေးခြင်းနှင့် သတင်းအချက်အလက် ထုတ်ပြန်ခြင်း (PD/PCM) တို့ကို သီးသန့်အခန်း (Separate Chapter) ဖြင့် ဖော်ပြပေးရန်၊	• EIA အစီရင်ခံစာကို ပြင်ဆင်ရာတွင် အများပြည်သူ၏ သဘောထားမှတ်ချက်များကို ထည့်သွင်း စဉ်းစားထားမှုအား အခန်း ၈၊ အပိုဒ် ၈.၁.၅၊ စာမျက်နှာ (၂၉၉) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • တိုင်ပင်ဆွေးနွေးခြင်းနှင့် သတင်းအချက်အလက် ထုတ်ပြန်ခြင်း (PD/PCM) တို့ကို သီးသန့်အခန်း (Seaparate Chapter) အနေဖြင့် အစီရင်ခံစာ အခန်း ၈၊ စာမျက်နှာ (၂၈၇) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။
၉။	**ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (EMP)**	
	• စီမံကိန်းပိတ်သိမ်းသည့်အဆင့်ကို အခန်း ၇၊ အပိုဒ် ၇.၄ (စာမျက်နှာ-၂၅၀) တွင် Decommissioning & Closure Plan သီးခြား ဖော်ပြထားသောကြောင့် ပိတ်သိမ်းသည့်အဆင့်၏ ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီအစဉ်ကို အခန်း-၆ တွင် ထည့်သွင်း ဖော်ပြရန်၊	• ပိတ်သိမ်းသည့်အဆင့်၏ ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီအစဉ်ကို အခန်း ၆၊ အပိုဒ် ၆.၁၂၊ စာမျက်နှာ (၂၇၆) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။
	• ခန့်မှန်းထားသော သက်ရောက်မှု တစ်ခုချင်းစီ အတွက် လိုက်နာရမည့် သင့်လျော်သောနည်းလမ်းများ၊ စည်းမျဉ်းစည်းကမ်းများ၊ စံချိန်စံညွှန်းများ၊ လမ်းညွှန်ချက်တန်ဖိုးများ ရည်ညွှန်းခြင်းနှင့် သက်ဆိုင်သော တာဝန်ရှိပုဂ္ဂိုလ်များ၏ တာဝန် ဝတ္တရားအသီသီးကို ဖော်ပြခြင်း စသည့်ဖြင့် ကတိကဝတ်ကို ရှင်းလင်းစွာ ဖော်ပြပေးရန်၊ • ပတ်ဝန်းကျင်၊ လူမှုရေး၊ ထို့အပြင် လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေး၊ လူထုအကျိုးပြု လုပ်ငန်းများ အစရှိသည့်တို့ အတွက် ကတိကဝတ်များ ဖော်ပြပေးရန်၊	• ခန့်မှန်းထားသော သက်ရောက်မှု တစ်ခုချင်းစီ အတွက် လိုက်နာရမည့် သင့်လျော်သော နည်းလမ်းများ၊ စည်းမျဉ်းစည်းကမ်းများ၊ စံချိန် စံညွှန်းများ၊ လမ်းညွှန်ချက်တန်ဖိုးများ ရည်ညွှန်းခြင်းနှင့် သက်ဆိုင်သော ကတိကဝတ်ကို အခန်း ၉၊ အပိုဒ် ၉.၁၊ စာမျက်နှာ (၃၀၅) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • ပတ်ဝန်းကျင်၊ လူမှုရေး၊ လုပ်ငန်းခွင်ကျန်းမာရေး နှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေး၊ လူထုအကျိုးပြု လုပ်ငန်းများ အစရှိသည်တို့ အတွက် ကတိကဝတ်ကို အခန်း ၉၊ အပိုဒ် ၉.၁၊ စာမျက်နှာ (၃၀၅) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။

Appendix 14

စဉ်	ပြင်ဆင်ဖြည့်စွက်တင်ပြရန် အချက်များ	ပြန်လည်ဖြည့်စွက် တင်ပြချက်များ
	• ကျန်းမာရေးနှင့် ဘေးအန္တရာယ် ကင်းရှင်းရေးဆိုင်ရာ စီမံခန့်ခွဲမှုများ အကောင်အထည်ဖော်ခြင်းအတွက် အခန်းကဏ္ဍနှင့် တာဝန်များကို အသေးစိတ် ဖော်ပြပေးရန်၊	• ကျန်းမာရေးနှင့် ဘေးအန္တရာယ် ကင်းရှင်းရေး ဆိုင်ရာ စီမံခန့်ခွဲမှုများ အကောင်အထည်ဖော်ခြင်း အတွက် အခန်းကဏ္ဍနှင့် တာဝန်များကို အခန်း ၆၊ အပိုဒ် ၆.၂၊ စာမျက်နှာ (၂၂၈-၂၃၁) တွင် ထည့်သွင်း ဖော်ပြထား ပါသည်။
	စီမံကိန်း၏ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဝန်ထမ်းအားလုံးအတွက် ဝန်ထမ်းပိုင်းဆိုင်ရာ သတ်မှတ်ချက်များနှင့် တာဝန်များကို အသေးစိတ် ဖော်ပြပေးရန်နှင့် လူမှုရေး၊ ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေးဆိုင်ရာ စီမံခန့်ခွဲမှုများနှင့် ဝန်ထမ်းများ၏ တာဝန်များကိုလည်း ဖော်ပြပေးရန်၊	• စီမံကိန်းနှင့် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး၊ လူမှုရေး ကျန်းမာရေးနှင့် ဘေးအန္တရာယ် ကင်းရှင်းရေး ဆိုင်ရာ စီမံခန့်ခွဲမှုများနှင့် ဝန်ထမ်းများ၏ တာဝန်များကို အခန်း ၆၊ ဇယား ၆.၁၊ စာမျက်နှာ (၂၃၀) တွင် ထည့်သွင်း ဖော်ပြထား ပါသည်။
	ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုကို အကောင်အထည်ဖော်ရန် လိုအပ်သော စွမ်းဆောင်ရည်မြင့် သင်တန်းပေးမည့် အစီအစဉ်များ (ပတ်ဝန်းကျင်ဆိုင်ရာ ကာကွယ်ရေး လုပ်ငန်းများ ဆောင်ရွက်ရန်အတွက် အပါအဝင်) ကို အသေးစိတ် ဆွေးနွေး၍ ဖော်ပြပေးရန်၊	• ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုကို အကောင်အထည် ဖော်ရန် လိုအပ်သော စွမ်းဆောင်ရည်မြင့် သင်တန်းပေးမည့် အစီအစဉ်များ (ပတ်ဝန်းကျင် ဆိုင်ရာ ကာကွယ်ရေး လုပ်ငန်းများ ဆောင်ရွက် ရန် အတွက် အပါအဝင်) ကို အခန်း ၆၊ အပိုဒ် ၆.၆.၃၊ စာမျက်နှာ (၂၆၄-၂၆၅) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။
	စီမံကိန်း၏ လူထုအကျိုးပြုလုပ်ငန်း (CSR Activities) လုပ်ဆောင်မှု အစီအစဉ်များနှင့် သတ်မှတ်ထားသော ဘတ်ဂျက်များ ထည့်သွင်း ဖော်ပြရန်၊	• စီမံကိန်း၏ လူထုအကျိုးပြုလုပ်ငန်း (CSR Activities) လုပ်ဆောင်မှု အစီအစဉ်များနှင့် ဘတ်ဂျတ်ကို အခန်း ၆၊ အပိုဒ် ၆.၉၊ စာမျက်နှာ (၂၇၅) နှင့် နောက်ဆက်တွဲ (၁၁) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။
	• အောက်ပါ အချက်များကို သီးသန့်စီမံချက် အခွဲများတွင် ထည့်သွင်း ဖော်ပြပေးရန်- • သီးသန့်စီမံချက်အခွဲများ ဖော်ပြရာတွင် ရည်ရွယ်ချက်များ၊ ဥပဒေ ဆိုင်ရာ သတ်မှတ်ချက်များ၊ အဖွဲ့အစည်းဆိုင်ရာ တာဝန်ယူမှုများ၊ မြေပုံများနှင့် လုပ်ငန်းခွင်ပြ Layout ပုံများ၊ ဓာတ်ပုံများ၊ ဂြိုလ်တုဓာတ်ပုံများ၊ အကောင်အထည်ဖော်မည့် အစီအစဉ်၊ စီမံခန့်ခွဲရေး လုပ်ငန်းများ၊ စောင့်ကြပ်ကြည့်ရှုရေး စီမံချက်များနှင့် စောင့်ကြပ်ကြည့်ရှုရမည့် အရာများ၊ ကုန်ကျစရိတ် အစရှိသည်တို့ ဖော်ပြပေးရန်၊ • စီမံကိန်းတည်ဆောက်ခြင်းနှင့် လုပ်ငန်းလည်ပတ်သည့် ကာလများတွင် အရေးပေါ်အခြေအနေများအား တုန့်ပြန်မည့် အစီအစဉ်ခွဲများ (Emergency Response Plan)၊ လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးအန္တရာယ် ကင်းရှင်းရေး အစီစဉ်ခွဲများ (Occupational Health and Safety Plan) နှင့် ယာဉ်သွားလာမှုနှင့် ယာဉ်မတော်တဆမှု လျော့နည်းစေရေး စီမံခန့်ခွဲ သည့်	• သီးသန့်စီမံချက်အခွဲများတွင် ရည်ရွယ်ချက်များ၊ ဥပဒေဆိုင်ရာ သတ်မှတ်ချက်များ၊ အဖွဲ့အစည်း ဆိုင်ရာ တာဝန်ယူမှုများ၊ မြေပုံများနှင့် လုပ်ငန်းခွင်ပြ Layout ပုံများ၊ ဓာတ်ပုံများ၊ ဂြိုလ်တုဓာတ်ပုံများ၊ အကောင်အထည်ဖော်မည့် အစီအစဉ်၊ စီမံခန့်ခွဲရေးလုပ်ငန်းများ ကို ထပ်မံ ဖြည့်စွက် ဖော်ပြထားပါသည်။ စောင့်ကြပ် ကြည့်ရှုရေးစီမံချက်များနှင့် စောင့်ကြပ်ကြည့်ရှု ရမည့် အရာများကို အစီရင်ခံစာ အခန်း ၇ တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • စီမံကိန်းတည်ဆောက်ခြင်းနှင့် လုပ်ငန်းလည်ပတ် သည့်ကာလများတွင် အရေးပေါ်အခြေအနေအား တုန့်ပြန်မည့် အစီအစဉ်ခွဲများ (Emergency Response Plan) စာမျက်နှာ (၂၆၅-၂၇၁)၊ လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးအန္တရာယ် ကင်းရှင်းရေး အစီစဉ်ခွဲများ (Occupational Health and Safety Plan) အပိုဒ် ၆.၆၊ စာမျက်နှာ (၂၆၂-၂၆၅) နှင့် ယာဉ်သွားလာမှုနှင့် ယာဉ်မတော်တဆမှု လျော့နည်းစေရေး စီမံခန့်ခွဲ သည့် အစီအစဉ်များ (Traffic Safety Management System) အပိုဒ် ၆.၁၀၊ စာမျက်နှာ (၂၇၅) စသည်

Appendix 14

စဉ်	ပြင်ဆင်ဖြည့်စွက်တင်ပြရန် အချက်များ	ပြန်လည်ဖြည့်စွက် တင်ပြချက်များ
	အစီအစဉ်များ (Traffic Safety Management System) စသည်တို့အား သီးခြားစီမံချက်များ အနေဖြင့် ရေးဆွဲပြီး ထည့်သွင်း ဖော်ပြပေးရန်၊ • မီးခိုးခေါင်းတိုင်မှ ထုတ်လွှတ်ခြင်း ပုံမှန်လေ့လာ စောင့်ကြပ်ကြည့်ရှုမှုကို လည်း ထည့်သွင်း ဖော်ပြပေးရန်၊	တို့အား သီးခြားစီမံချက်များ အနေဖြင့် အစီရင်ခံစာ အခန်း ၆ တွင် ထပ်မံ ဖြည့်စွက် ဖော်ပြထားပါသည်။ • မီးခိုးခေါင်းတိုင်မှ ထုတ်လွှတ်ခြင်း ပုံမှန်လေ့လာ စောင့်ကြပ်ကြည့်ရှုမှုကို အခန်း ၆၊ အပိုဒ် ၆.၃.၂.၁၊ စာမျက်နှာ (၂၃၈) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။
	• Bag Filter, Electrostatic Precipitator တို့ အတွက် အရေအတွက်၊ ထားမည့် နေရာ၊ အချက်အလက်များ စသည့် အကြောင်းအရာ ပြည့်စုံစွာ ဖော်ပြပေးရန်၊ • စက်ရုံရှိ စက်ပစ္စည်းယန္တရားများအတွက် ထိန်းသိမ်းပြုပြင်ရေး အစီအစဉ် ထည့်သွင်း ဖော်ပြပေးရန်၊ • မီးခိုးခေါင်းတိုင် အချက်အလက် (အရေအတွက်၊ အတိုင်းအတာ၊ ထုထည်) စသည်တို့ဖြင့် ပြည့်စုံစွာ ဖော်ပြပေးရန်၊ • Conveyor System (Specifications, Open or Closed Type စသည်) တို့ကို ထည့်သွင်း ဖော်ပြပေးရန်၊	• Bag Filter, Electrostatic Precipitator တို့ အတွက် အရေအတွက်၊ ထားမည့်နေရာ၊ အချက်အလက်များ စသည့်တို့ကို အခန်း ၆၊ အပိုဒ် ၆.၃.၂.၁၊ စာမျက်နှာ (၂၃၆) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • စက်ရုံရှိ စက်ပစ္စည်းယန္တရားများအတွက် ထိန်းသိမ်းပြုပြင်ရေး အစီအစဉ်ကို အခန်း ၆၊ အပိုဒ် ၆.၁၁၊ စာမျက်နှာ (၂၇၅) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • Conveyor System (Specifications, Open or Closed Type စသည် တို့ကို အခန်း ၆၊ အပိုဒ် ၆.၃.၂.၁၊ စာမျက်နှာ (၂၃၆) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။
	• စားသောက်ဆောင် (Canteen) မှ ရေဆိုး သန့်စင်ရန်ထားရှိမည့် wastewater treatment unit အကြောင်း ရှင်းလင်းဖော်ပြရန်၊ • Outdoor Coal Storage အတွက် သီးသန့် သန့်စင်စနစ် ထည့်သွင်း ဖော်ပြရန်၊ • Outdoor Coal Storage သည် အပြင်မှာ ထားရှိမည် ဖြစ်သည့်အတါက် မိုးရေ စသည်တို့မှ ကာကွယ်နိုင်မည်မဟုတ်ဟု ယူဆရသဖြင့် အခြား လျော့ပါးစေ ရေးနည်းလမ်းများနှင့် အခြားသော ဆောင်ရွက်နိုင်မှုများကို ထည့်သွင်း ဖော်ပြရန်၊	• စားသောက်ဆောင် (Canteen) မှ ရေဆိုး သန့်စင်ရန်ထားရှိမည့် wastewater treatment unit အကြောင်းအား အခန်း ၆၊ အပိုဒ် ၆.၃.၂.၃၊ စာမျက်နှာ (၂၄၁) တွင် ထည့်သွင်း ဖော်ပြထား ပါသည်။ • Outdoor Coal Storage မှာ ကျောက်မီးသွေး သယ်ယူစဉ် ယာယီ အသုံးပြုခြင်းဖြစ်ပြီး Coal Storage အား တည်ဆောက် ထားရှိပြီး ဖြစ်ပါသည်။ အဆိုပါ ဖော်ပြချက်နှင့်အတူ Coal Storage Layout အား အခန်း ၆၊ အပိုဒ် ၆.၃.၂.၃၊ စာမျက်နှာ (၂၄၂) တွင် ထည့်သွင်း ဖော်ပြထား ပါသည်။
	• ဘိလပ်မြေစက်ရုံရှိ ဆူညံသံထွက်ရှိနိုင်မည့် စက်ပစ္စည်းများနှင့် ထွက်ရှိနိုင်သည့် ဆူညံသံ အဆင့်များကို ဖော်ပြပေးရန်၊ • စက်ရုံအတွင်းတွင် ဆူညံသံအများဆုံး ထွက်ရှိမည့် နေရာများနှင့် ၎င်းနေရာများအတွက် မည်ကဲ့သို့ လျော့ပါးစေရေးနည်းလမ်းများ ဆောင်ရွက်ထားသည်ကို ဖော်ပြပေးရန်၊	• ဘိလပ်မြေစက်ရုံရှိ ဆူညံသံထွက်ရှိနိုင်မည့် စက်ပစ္စည်းများနှင့် ထွက်ရှိနိုင်သည့် ဆူညံသံ အဆင့်များကို အခန်း ၆၊ အပိုဒ် ၆.၃.၂.၂၊ စာမျက်နှာ (၂၄၀) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • စက်ရုံအတွင်း ဆူညံသံအများဆုံး ထွက်ရှိနိုင်မည့် နေရာများနှင့် လျော့ပါးစေ ရေးနည်းလမ်းများကို အခန်း ၆၊ အပိုဒ် ၆.၃.၂.၂၊ စာမျက်နှာ (၂၃၉) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။

Appendix 14

စဉ်	ပြင်ဆင်ဖြည့်စွက်တင်ပြရန် အချက်များ	ပြန်လည်ဖြည့်စွက် တင်ပြချက်များ
	• ဘိလပ်မြေစက်ရုံလည်ပတ်ခြင်းနှင့် ပြုပြင်ထိန်းသိမ်းရေးတို့မှ ထွက်ရှိနိုင်မည့် စွန့်ပစ်ပစ္စည်းများအားလုံး အတွက် စီမံခန့်ခွဲရေး အစီအစဉ်ကို ထည့်သွင်းဖော်ပြပေးရန်၊ • ပြန်လည်၍ အသုံးမပြုနိုင်သော စွန့်ပစ်ပစ္စည်းများ ရှိနိုင်ပါသဖြင့် စွန့်ပစ်ပစ္စည်းများ စီမံခန့်ခွဲရာတွင် အန္တရာယ် ရှိ/မရှိ စွန့်ပစ်ပစ္စည်းဟူ၍ သီးသန့် စီမံခန့်ခွဲရန်နှင့် စွန့်ပစ်ပစ္စည်းများ စုဆောင်းခြင်း၊ ယာယီ သိုလှောင်ခြင်း၊ စွန့်ပစ်ခြင်း (မည်သည့်နေရာတွင် စွန့်ပစ်ခြင်း) စသည်တို့ကို ဖော်ပြပေးရန်၊	• ဘိလပ်မြေစက်ရုံ လည်ပတ်ခြင်းနှင့် ပြုပြင် ထိမ်းသိမ်းရေးတို့မှ ထွက်ရှိနိုင်မည့် စွန့်ပစ်ပစ္စည်း အားလုံးအတွက် စီမံခန့်ခွဲရေး အစီအစဉ်ကို အခန်း ၆၊ အပိုဒ် ၆.၃.၂.၄၊ စာမျက်နှာ (၂၄၃) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • အန္တရာယ်ရှိ/ မရှိ စွန့်ပစ်ပစ္စည်းများ စီမံခန့်ခွဲမှုနှင့် စွန့်ပစ်ပစ္စည်းများ စုဆောင်းခြင်း၊ ယာယီ သိုလှောင်ခြင်း၊ စွန့်ပစ်ခြင်း စသည်တို့ကို အခန်း ၆၊ အပိုဒ် ၆.၃.၂.၄၊ စာမျက်နှာ (၂၄၃) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။
	• စက်ရုံလည်ပတ်ရေးကာလတွင် ဘေးအန္တရာယ်ရှိသော ပစ္စည်းများစွာ အသုံးပြုနိုင်ပါသဖြင့် ဘေးအန္တရာယ်ရှိ ပစ္စည်းများစာရင်း၊ အချက်အလက်များ၊ MSDS အကြောင်းအရာများကို ထည့်သွင်း ဖော်ပြပေးရန်၊ • လောင်စာဆီနှင့် ပတ်သက်သော အချက်အလက်များနှင့် အထက်ပါ ပစ္စည်းများ သိုလှောင်ရန် သတ်မှတ်ထားသော နေရာများကို ထည့်သွင်း ဖော်ပြပေးရန်၊	• ဘေးအန္တရာယ်ရှိပစ္စည်းများစာရင်း၊ အချက် အလက်များကို အခန်း ၆၊ အပိုဒ် ၆.၃.၂.၄၊ စာမျက်နှာ (၂၄၃) တွင် ထည့်သွင်း ဖော်ပြထား ပါသည်။ • လောင်စာဆီနှင့် ပတ်သက်သော အချက်အလက် များနှင့် သိုလှောင်ရန် သတ်မှတ်ထားသော နေရာ များကို အခန်း ၆၊ အပိုဒ် ၆.၃.၂.၄၊ စာမျက်နှာ (၂၄၅) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။
	ဘိလပ်မြေစက်ရုံ၏ “Greening Plan” Layout ကို ထည့်သွင်း ဖော်ပြပေးရန်၊	• ဘိလပ်မြေစက်ရုံ၏ “Greening Plan” Layout ကို အခန်း ၆၊ အပိုဒ် ၆.၃.၂.၁၊ စာမျက်နှာ (၂၃၇) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။
	CSR အစီအစဉ် အသေးစိတ် အတွက် ကုန်ကျမည့် စရိတ်များကို ထည့်သွင်း ဖော်ပြပေးရန်	• CSR အစီအစဉ် အသေးစိတ် အတွက် ကုန်ကျမည့် စရိတ်ကို အခန်း ၆၊ အပိုဒ် ၆.၉၊ စာမျက်နှာ (၂၇၅) နှင့် နောက်ဆက်တွဲ (၁၁) တွင် ထည့်သွင်း ဖော်ပြ ထားပါသည်။
	• လည်ပတ်ရေးကာလ စီမံဆောင်ရွက်မှုများတွင် အောက်ပါတို့ကို ထည့်သွင်း ဖော်ပြပေးရန်၊ • အရေးပေါ်စုရုပ် ညွှန်ပြသည့် မြေပုံ Layout Plan ကို ဖော်ပြပေးရန်၊ • မီးသတ်စီမံခန့်ခွဲမှုအတွက် မြေပုံ Layout plant ဖော်ပြရန် • စက်ရုံ Overall Layout Plan တွင် ဆေးပေးခန်း (သို့) 1st Aid Room တည်နေရာကို ဖော်ပြရန်နှင့် စက်ရုံဧရိယာကျယ်ဝန်းသောကြောင့် ဆေးပေးခန်း တစ်ခုဖြင့် လုံလောက်မှု ရှိနိုင်/မရှိနိုင် ထည့်သွင်းစဉ်းစား၍ ဖော်ပြပေးရန်၊	• အရေးပေါ်စုရုပ် ညွှန်ပြသည့် မြေပုံကို အခန်း ၆၊ အပိုဒ် ၆.၇.၃၊ စာမျက်နှာ (၂၆၆) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • မီးသတ်စီမံခန့်ခွဲမှုအတွက် အခန်း ၆၊ အပိုဒ် ၆.၇.၄၊ စာမျက်နှာ (၂၆၇) တွင် ထည့်သွင်း ဖော်ပြ ထားပါသည်။ • ဆေးပေးခန်း (သို့) 1st Aid Room တည်နေရာနှင့် လုံလောက်မှု ရှိနိုင်/မရှိနိုင်ကို အခန်း ၆၊ အပိုဒ် ၆.၇.၅၊ စာမျက်နှာ (၂၇၀) တွင် ထည့်သွင်း ဖော်ပြ ထားပါသည်။

Appendix 14

စဉ်	ပြင်ဆင်ဖြည့်စွက်တင်ပြရန် အချက်များ	ပြန်လည်ဖြည့်စွက် တင်ပြချက်များ
	• အခြားသော အရေးပေါ်ကိစ္စများဖြစ်သည့် မြေငလျင်၊ ရေကြီးခြင်းတို့ အတွက်လည်း အရေးပေါ် အစီအစဉ်များ ထည့်သွင်း ဖော်ပြပေးရန်၊	• အခြားအရေးပေါ်ကိစ္စများဖြစ်သည့် မြေငလျင်၊ ရေကြီးခြင်းတို့ အတွက် အခန်း ၆၊ ဇယား ၆.၁၁၊ စာမျက်နှာ (၂၇၁) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။
၁၀။	**ပတ်ဝန်းကျင် စောင့်ကြပ်ကြည့်ရှုရေးအစီအစဉ် (Environmental Monitoring Plan – EmoP)**	
	• စက်ရုံပိတ်သိမ်းခြင်းအဆင့်အတွက် စောင့်ကြပ် ကြည့်ရှုမည့် အချက်အလက်များကို စောင့်ကြပ်ကြည့်ရှုရေး အကျဉ်းချုပ်တွင် ဖော်ပြပေးရန်၊ • ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနသို့ တင်သွင်းမည့် စောင့်ကြပ်ကြည့်ရှုသည့် အစီရင်ခံစာတွင် အောက်ပါအချက်များကို ထည့်သွင်း ဖော်ပြပေးရန်- • တိုင်းတာရမည့် အမျိုးအစားတစ်ခုချင်းစီအတွက် တိုင်းတာရာတွင် အသုံးပြုမည့် နည်းစနစ်များ၊ စက်ကိရိယာများ၊ နမူနာ ကောက်ယူမည့် နည်းလမ်းများစသည့် အသေးစိတ် အချက်အလက်များ၊ • တိုင်းတာမည့်နေရာများ၏ ကိုဩဒိနိတ်များ၊ ပတ်ဝန်းကျင်ဆိုင်ရာ အခြေအနေများ၊ • တိုင်းတာရရှိသည့် ရလာဒ်များကို သက်ဆိုင်ရာ လမ်းညွှန်ချက် တန်ဖိုးများနှင့် နှိုင်းယှဉ်ဖော်ပြချက်များ၊ ကျော်လွန်နေပါက ကျော်လွန်နေရသည့် အကြောင်း ပြချက်များ အထောက် အထားများ၊ • စောင့်ကြပ်ကြည့်ရှုသည့် နေရာတစ်ခုချင်းစီ၏ မှတ်တမ်းဓာတ်ပုံများ၊ နမူနာကောက်ယူသည့်ပုံများနှင့် တိုင်းတာခြင်းလုပ်ငန်း ဆောင်ရွက်နေသည့် မှတ်တမ်းဓာတ်ပုံများ၊ • ထို့အပြင် စီမံကိန်းပတ်ဝန်းကျင်ရှိ စီမံကိန်းပတ်ဝန်းကျင်ရှိ ယဉ်သွားလာမှု အခြေအနေအား တစ်နှစ်လျှင် အနည်းဆုံး တစ်ကြိမ် စစ်တမ်းကောက်ယူ၍ ပိတ်ဆို့မှု ရှိ/မရှိ ဆန်းစစ်ရန်နှင့် ပိတ်ဆို့မှု မရှိစေရန် ဆောင်ရွက်ထားရှိမှုများ ကို EMoP တွင် ထည့်သွင်း ဖော်ပြပေးရန်၊ • လည်ပတ်ရေးကာလ စောင့်ကြပ်ကြည့်ရှုခြင်းတွင် အောက်ပါတို့ကို ထပ်မံ ဖြည့်စွက် ဖော်ပြပေးရန်-	• စက်ရုံပိတ်သိမ်းခြင်းအဆင့်အတွက် စောင့်ကြပ် ကြည့်ရှုမည့် အချက်အလက်များကို အခန်း ၇၊ ဇယား ၇.၁၊ စာမျက်နှာ (၂၈၂) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနသို့ တင်သွင်းမည့် စောင့်ကြပ်ကြည့်ရှုသည့် အစီရင်ခံစာတွင် • တိုင်းတာရာတွင် အသုံးပြုမည့်နည်း စနစ်များ၊ စက်ကိရိယာများ၊ နမူနာ ကောက်ယူမည့် နည်းလမ်းများ၊ • တိုင်းတာမည့်နေရာများ၊ ကိုဩဒိနိတ်များ၊ ပတ်ဝန်းကျင်ဆိုင်ရာ အခြေအနေများ၊ • တိုင်းတာရရှိသည့် ရလာဒ်များကို သက်ဆိုင်ရာ လမ်းညွှန်ချက် တန်ဖိုးများနှင့် နှိုင်းယှဉ်ဖော်ပြချက်များ၊ ကျော်လွန်နေပါက ကျော်လွန်နေရသည့် အကြောင်းပြချက်များ အထောက် အထားများ၊ • Baseline (သို့မဟုတ်) ယခင်တိုင်းတာခဲ့ သည့် ရလာဒ်များနှင့် နှိုင်းယှဉ် ဖော်ပြမှုများ၊ • စောင့်ကြပ်ကြည့်ရှုသည့် နေရာတစ်ခုချင်းစီ၏ မှတ်တမ်းဓာတ်ပုံများ၊ • စီမံကိန်းပတ်ဝန်းကျင်ရှိ ယဉ်သွားလာမှု အခြေအနေအား တစ်နှစ်လျှင် အနည်းဆုံး တစ်ကြိမ် စစ်တမ်းကောက်ယူ၍ ပိတ်ဆို့မှု မရှိစေရန် ဆောင်ရွက်ထားရှိမှုများ၊ စသည်တို့ကို ထည့်သွင်း ဖော်ပြသွားမည် ဖြစ်ကြောင်း အခန်း ၇၊ အပိုဒ် ၇.၁၊ စာမျက်နှာ (၂၈၂) တွင် ထည့်သွင်း ဖော်ပြ ထားပါသည်။ • လည်ပတ်ရေးကာလ စောင့်ကြပ်ကြည့်ရှုခြင်းတွင် အောက်ပါတို့ကို ထပ်မံ ဖြည့်စွက် ဖော်ပြထားပါသည်။

Appendix 14

စဉ်	ပြင်ဆင်ဖြည့်စွက်တင်ပြရန် အချက်များ	ပြန်လည်ဖြည့်စွက် တင်ပြချက်များ
	• စောင့်ကြပ်တိုင်းတာမည့် နေရာများကို သီးခြား “လေထုညစ်ညမ်းမှု စီမံခန့်ခွဲရေး အစီအစဉ်” တွင် မြေပုံ ပုံစံဖြင့် ဖော်ပြပေးရန်၊ • မီးခိုးခေါင်းတိုင်မှ ထုတ်လွှတ်ခြင်းသည် သက်ဆိုင်ရာဥပဒေ၊ လမ်းညွှန်ချက်များနှင့် စံချိန်စံညွှန်းများကို လိုက်နာမှု ရှိ/မရှိ စစ်ဆေးနိုင်ရန် စောင့်ကြပ်ကြည့်ရှုမှုတွင် ထည့်သွင်း ဖော်ပြပေးရန်၊ • စောင့်ကြပ်တိုင်းတာမည့် နေရာများကို သီးခြား “ရေထုညစ်ညမ်းမှု စီမံခန့်ခွဲရေး အစီအစဉ်” တွင် မြေပုံ ပုံစံဖြင့် ဖော်ပြပေးရန်၊ • စီမံကိန်း၏ ရေဆိုးစွန့်ပစ်နေရာတွင်သာမက ပတ်ဝန်းကျင်နှင့် လူများအပေါ် သက်ရောက်သော ရေထုညစ်ညမ်းမှုကို သိရှိနိုင်ရန် စီမံကိန်း အနီးအနား ဝန်းကျင်ရှိ ချောင်းများ၊ မြောင်းများ၊ ရေအရင်းမြစ်များ၊ ရေတွင်းများ စသည်တို့၏ ရေထုညစ်ညမ်းမှု အခြေအနေများကို ထည့်သွင်း ဖော်ပြရန်၊ • Continuous Emission Monitoring System (CEMS) တပ်ဆင် ဆောင်ရွက်ထားမှုရှိပါက ထည့်သွင်း ဖော်ပြပေးရန်နှင့် တပ်ဆင်ထားခြင်း မရှိပါက တပ်ဆင်ဆောင်ရွက်သွားမည့် အစီအစဉ်များကို ထည့်သွင်း ဖော်ပြပေးရန်၊ • စောင့်ကြပ်တိုင်းတာမည့် နေရာများကို သီးခြား “ဆူညံသံနှင့် တုန်ခါမှု စီမံခန့်ခွဲရေး အစီအစဉ်” တွင် မြေပုံ ပုံစံဖြင့် ဖော်ပြပေးရန်နှင့် ဆူညံသံ စီမံခန့်ခွဲမှု အစီအစဉ်” အတွက် ပေးထားသော အကြံပြုချက်အတိုင်း ဆက်လက် ဆောင်ရွက်သွားမည် ဖြစ်ကြောင်း ဖော်ပြပေးရန်၊ • စွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှု အစီအစဉ်ကို အသေးစိတ် ဖော်ပြရန်နှင့် စွန့်ပစ်ပစ္စည်းများကို အန္တရာယ် ရှိ/မရှိ ခွဲခြားရန်၊ ၎င်းတို့ကို စုဆောင်းခြင်း၊ ခွဲခြားခြင်း၊ စွန့်ပစ်ခြင်းနှင့် သုံးမည့်နည်းလမ်းများ၊ စွန့်ပစ်မည့်နေရာ စသည်တို့ကို စီမံခန့်ခွဲမှုအစီအစဉ်တွင် အသေးစိတ် ဖော်ပြရန်၊ • အစီအစဉ်အရ စောင့်ကြပ်ကြည့်ရှုမှုကို ဆောင်ရွက်မည့် အစီအစဉ်ကိုလည်း ဖော်ပြရန် လိုအပ်ပါသည်။	• စောင့်ကြပ်တိုင်းတာမည့် နေရာများကို သီးခြား “လေထုညစ်ညမ်းမှု စီမံခန့်ခွဲရေး အစီအစဉ်” တွင် မြေပုံ ပုံစံဖြင့် အခန်း ၆၊ အပိုဒ် ၆.၃.၂.၁၊ စာမျက်နှာ (၂၃၉) တွင် ထပ်မံ ဖြည့်စွက် ဖော်ပြထားပါသည်။ • မီးခိုးခေါင်းတိုင်မှ ထုတ်လွှတ်ခြင်းကို တိုင်းတာရန် အခန်း ၇၊ ဇယား ၇.၁၊ စာမျက်နှာ (၂၈၃) တွင် ထပ်မံဖြည့်စွက် ဖော်ပြထားပါသည်။ • စောင့်ကြပ်တိုင်းတာမည့် နေရာများကို သီးခြား “ရေထုညစ်ညမ်းမှု စီမံခန့်ခွဲရေး အစီအစဉ်” တွင် မြေပုံ ပုံစံဖြင့် အခန်း ၆၊ အပိုဒ် ၆.၃.၂.၃၊ စာမျက်နှာ (၂၄၃) တွင် ထပ်မံ ဖြည့်စွက် ဖော်ပြထားပါသည်။ • စီမံကိန်း အနီးအနား ဝန်းကျင်ရှိ ရေအရင်းမြစ်များ၊ ရေတွင်းများ စသည်တို့၏ အခြေအနေနှင့် စီမံကိန်းမှ ပတ်ဝန်းကျင်သို့ ရေဆိုးစွန့်ပစ်မှု မရှိခြင်း အား အခန်း ၆၊ အပိုဒ် ၆.၃.၂.၃၊ စာမျက်နှာ (၂၄၂) တွင် ထပ်မံ ဖြည့်စွက် ဖော်ပြထားပါသည်။ • Continuous Emission Monitoring System (CEMS) တပ်ဆင် ဆောင်ရွက်မှုအား အခန်း ၆၊ အပိုဒ် ၆.၃.၂.၁၊ စာမျက်နှာ (၂၃၈) တွင် ထပ်မံ ဖြည့်စွက် ဖော်ပြထားပါသည်။ • သီးခြား “ဆူညံသံနှင့် တုန်ခါမှု စီမံ ခန့်ခွဲရေး အစီအစဉ်” တွင် စောင့်ကြပ်တိုင်းတာမည့် နေရာများ၏ မြေပုံနှင့် ပေးထားသော အကြံပြု ချက်အတိုင်း ဆက်လက် ဆောင်ရွက်သွားမည် ဖြစ်ကြောင်း ဖော်ပြချက်အား အခန်း ၆၊ အပိုဒ် ၆.၃.၂.၂၊ စာမျက်နှာ (၂၄၀) တွင် ထပ်မံဖြည့်စွက် ဖော်ပြထားပါသည်။ • စွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှု အစီအစဉ် အသေးစိတ်ကို အခန်း ၆၊ အပိုဒ် ၆.၃.၂.၄၊ စာမျက်နှာ (၂၄၃) တွင် ထပ်မံ ဖြည့်စွက် ဖော်ပြထားပါသည်။ • မြေအရည်အသွေး စီမံခန့်ခွဲမှုအစီအစဉ်နှင့် စောင့်ကြပ်ကြည့်ရှုမှု အစီအစဉ် အား အခန်း ၆၊ အပိုဒ် ၆.၃.၂.၅၊ စာမျက်နှာ (၂၄၅) တွင် ထပ်မံ ဖြည့်စွက် ဖော်ပြထားပါသည်။ • အန္တရာယ်ရှိပစ္စည်းများ၊ ဓာတုပစ္စည်းများ စီမံခန့်ခွဲမှုအစီအစဉ်နှင့် စောင့်ကြပ်ကြည့်ရှုရေး အစီအစဉ် များကို အခန်း ၆၊ အပိုဒ် ၆.၃.၂.၆၊ စာမျက်နှာ (၂၄၃) တွင် ထပ်မံဖြည့်စွက် ဖော်ပြထားပါသည်။

Appendix 14

စဉ်	ပြင်ဆင်ဖြည့်စွက်တင်ပြရန် အချက်များ	ပြန်လည်ဖြည့်စွက် တင်ပြချက်များ
	• "မြေအရည်အသွေး စီမံခန့်ခွဲမှု အစီအစဉ်" ကို အသးစိတ် ဖော်ပြရန်နှင့် မြေအရည်အသွေးအား စောင့်ကြပ်ကြည့်ရှုရန် အောက်ပါတို့ကို ထည့်သွင်း စဉ်းစား ဖော်ပြပေးရန်- • ကုန်ကြမ်းပစ္စည်းများ သိုလှောင်သည့်နေရာ၊ • အန္တရာယ်ရှိပစ္စည်းများ၊ ဓာတုပစ္စည်းများ သိုလှောင်သည့်နေရာ၊ • လောင်စာဆီ သိုလှောင်သည့် နေရာ • အန္တရာယ်ရှိသောပစ္စည်းများ၊ ဓာတုပစ္စည်းများ ဘေးအန္တရာယ် ကင်းရှင်းစွာ အသုံးပြု ကိုင်တွယ်နိုင်ရန် သီးခြားအန္တရာယ်ရှိ ပစ္စည်းများအတွက် စီမံခန့်ခွဲမှု အစီအစဉ်နှင့် စောင့်ကြပ်ကြည့်ရှုရေး အစီအစဉ်များကို အောက်ပါ အချက်အလက်များကို ထည့်သွင်းစဉ်းစား ဖော်ပြရန်- • အန္တရာယ်ရှိပစ္စည်းများစာရင်း • ၎င်းတို့ကို သိုလှောင်ပုံ (သတ်မှတ်ထားသောနေရာ၊ MSDS ဖော်ပြမှု၊ စသည် တို့ဖြင့်) • အန္တရာယ်ရှိစွန့်ပစ်ပစ္စည်းများ ထွက်ရှိမှုနှင့် စွန့်ပစ်မည့် နည်းလမ်းများ • လည်ပတ်ရေးကာလ စောင့်ကြပ်ကြည့်ရှုခြင်းအတွက် စောင့်ကြပ်ကြည့်ရှုရေး အစီအစဉ်တွင် ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေး အတွက် စောင့်ကြပ်ကြည့်ရှုခြင်းများ ထည့်သွင်း ဖော်ပြရန်နှင့် အကြောင်းအရာများ (ဥပမာအားဖြင့် ဘေးအန္တရာယ်ကင်းရှင်းရေးဆိုင်ရာ အစည်းအဝေးများ၊ ပစ္စည်းကိရိယာများ စစ်ဆေးခြင်း၊ ဘေးအန္တရာယ်ကင်းရှင်းရေးဆိုင်ရာ သင်တန်းများနှင့် ဟောပြောပွဲများ၊ သင်တန်းများ၊ သန့်ရှင်းရေးနှင့် ရှေးဦးသူနာပြု ပစ္စည်းများပေးခြင်း၊ အသိအမှတ်ပြု ဆရာဝန်/သူနာပြု ထားရှိပေးခြင်း၊ မီးဘေးအန္တရာယ်ဆိုင်ရာ လေ့ကျင့်မှုများ လုပ်ဆောင်ခြင်း) စသည်တို့၏ မှတ်တမ်းများကို စောင့်ကြပ်ကြည့်ရှုရမည့် အရာများတွင် တစ်ခု အနေဖြင့် ထည့်သွင်း ဖော်ပြပေးရန်၊	• ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေး အတွက် စောင်ကြပ်ကြည့်ရှုရေး အစီအစဉ်ကို အခန်း ၇၊ ဇယား ၇.၁၊ စာမျက်နှာ (၂၈၃) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။
၁၁။	**အထွေထွေ အကြံပြုချက်**	
၁။	- ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း အဝိုဒ် (၆၂) အရ စီမံကိန်း အဆိုပြုသူမှ EIA အစီရင်ခံစာပါ EMP တွင် ဖော်ပြထားသော	- ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်းအရ စီမံကိန်း အဆိုပြုသူမှ လိုက်နာ အကောင်အထည်ဖော် ဆောင်ရွက်ရမည့် ကတိ

Appendix 14

စဉ်	ပြင်ဆင်ဖြည့်စွက်တင်ပြရန် အချက်များ	ပြန်လည်ဖြည့်စွက် တင်ပြချက်များ
	လူမှုပတ်ဝန်းကျင်ထိခိုက်မှု လျော့ပါးစေရေးလုပ်ငန်းများကို အကာင်အထည် ဖော် ဆောင်ရွက်မည် ဖြစ်ကြောင်း၊ - အစီရင်ခံစာရေးသားပြုစုသူမှ ပတ်ဝန်းကျင် ထိခိုက်မှု ဆန်းစစ်ခြင်းသည် တိကျမှုနှင့်ပြည့်စုံမှု ရှိကြောင်း၊ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း ဆိုင်ရာ လုပ်ထုံးလုပ်နည်း အပါအဝင် သက်ဆိုင် ရာဥပဒေကို တိကျစွာ လိုက်နာ၍ ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းကို ဆောင်ရွက်ထားခြင်း ဖြစ်ကြောင်း ကတိကဝတ်ကို ဖော်ပြရန်၊ - စီမံကိန်းအဆိုပြုသူနှင့် အစီရင်ခံစာ ရေးသားပြုစုသူတို့ လိုက်နာဆောင်ရွက် ရမည့် ကတိကဝတ်များကို သီးခြားခွဲခြား လက်မှတ်ရေးထိုး ဖော်ပြရန်၊	ကဝတ်အား လက်မှတ် ရေးထိုး၍ အခန်း ၁၊ အပိုဒ် ၁.၇၊ စာမျက်နှာ (၁၂) တွင် ထည့်သွင်း ဖော်ပြ ထားပါသည်။ - အစီရင်ခံစာရေးသားပြုစုသူမှ ပတ်ဝန်းကျင် ထိခိုက်မှု ဆန်းစစ်ခြင်းသည် တိကျမှုနှင့်ပြည့်စုံမှု ရှိကြောင်း၊ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း ဆိုင်ရာ လုပ်ထုံးလုပ်နည်း အပါအဝင် သက်ဆိုင် ရာဥပဒေကို တိကျစွာ လိုက်နာ၍ ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းကို ဆောင်ရွက်ထားခြင်း ဖြစ်ကြောင်း ကတိကဝတ်ကို အခန်း ၁၊ အပိုဒ် ၁.၈၊ စာမျက်နှာ (၁၃) တွင် ထည့်သွင်း ဖော်ပြ ထားပါသည်။ - စီမံကိန်းအဆိုပြုသူနှင့် အစီရင်ခံစာ ရေးသား ပြုစုသူတို့ လိုက်နာဆောင်ရွက် ရမည့် ကတိကဝတ်များကို အခန်း ၁၊ အပိုဒ် ၁.၇ နှင့် ၁.၈ တွင် သီးခြားခွဲခြား လက်မှတ်ရေးထိုး၍ ထည့်သွင်း ဖော်ပြထားပါသည်။
၂။	အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက် များ၌ ဘိလပ်မြေထုတ်လုပ်ခြင်းအတွက် သတ်မှတ်ထားသော ထုတ်လွှတ် အခိုးအငွေ့ ပါရာမီတာများကို ထည့်သွင်း တိုင်းတာဆောင်ရွက်သွားရန်၊	စက်ရုံလည်ပတ်သည်နှင့် heavy metals များကို တိုင်းတာနိုင်သည့် အခြေအနေ ရှိပါက ၎င်းတို့ကို တိုင်းတာပြီး စောင့်ကြပ်ကြည့်ရှုခြင်း အစီရင်ခံစာ တွင် ထည့်သွင်းမည်ဖြစ်ကြောင်း ဖော်ပြချက်အား အခန်း ၅၊ အပိုဒ် ၅.၄.၁၊ စာမျက်နှာ (၂၀၁) တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။
၃။	EIA အစီရင်ခံစာအား ထုတ်ပြန်ကြေညာခြင်း EIA လုပ်ထုံးလုပ်နည်း (၂၀၁၅) အပိုဒ်ခွဲ ၆၅ တွင် “စီမံကိန်း အဆိုပြုသူသည် ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း အစီရင်ခံစာကို ဦးစီးဌာနသို့ တင်သွင်းပြီး နောက် ၁၅ ရက်ထက် နောက်မကျစေပဲ၊ အစီရင်ခံစာကို လူမှုအဖွဲ့အစည်း၊ စီမံကိန်းကြောင့် ထိခိုက်ခံစားရသူများ၊ ဒေသဆိုင်ရာ လူ့အဖွဲ့အစည်းနှင့် အခြား အကျိုးသက်ဆိုင်သူများ သိရှိနိုင်စေရန် စီမံကိန်း (သို့မဟုတ်) စီမံကိန်း အဆိုပြုသူ၏ ဝက်ဘ်ဆိုဒ်များနှင့် သတင်းစာ စသည့် ပြည်တွင်း မီဒီယာများမှသော်လည်းကောင်း၊ စာကြည့်တိုက်၊ လူထုစုဝေးခန်းမ စသည့် အများပြည်သူစုဝေးနေရာများတွင် လည်းကောင်း၊ စီမံကိန်း အဆိုပြုသူ၏ ရုံးများတွင်လည်းကောင်း၊ ထုတ်ပြန်ကြေညာရမည်” ဟု ဖော်ပြပါရှိပါသည်။ သို့ဖြစ်ပါ၍ EIA အစီရင်ခံစာအား ထုတ်ပြန် ကြေငြာထားပါက ထုတ်ပြန်သည့် နည်းလမ်းများ၊ ထုတ်ပြန်ထားရှိသည့် နေရာများ စသည်ဖြင့် ဖော်ပြပါရှိရန်၊	EIA အစီရင်ခံစာ ထုတ်ပြန်ကြေငြာ ထားရှိမှုအား အခန်း ၈၊ အပိုဒ် ၈.၂၊ စာမျက်နှာ (၂၉၉) တွင် ထည့်သွင်း ဖော်ပြ ထားပါသည်။