



TOTAL BUSINESS SOLUTION CO., LTD.
No. 54, Room. 704, Waizayantar Tower, Waizayantar Road
Thingangyun Township, Yangon, Myanmar

MYANMAR GOLDEN EAGLE CO., LTD.

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

FOR

GLASS BOTTLES MANUFACTURING FACTORY PROJECT

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ကတိကဝတ်များ

- (က) ဤ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း အစီရင်ခံစာကို တိကျခိုင်မာမှုများနှင့် ပြည့်စုံစွာ ဆောင်ရွက်ထားပါသည်။
- (ခ) ဤအစီရင်ခံစာတွင် လုပ်ထုံးလုပ်နည်းများအပါအဝင် သက်ဆိုင်ရာဥပဒေများကို တိကျစွာ လိုက်နာ၍ ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီအစဉ်များကို ရေးဆွဲထားပါသည်။
- (ဂ) စီမံကိန်းသည် ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်း အစီရင်ခံစာ ပါကတိကဝတ်၊ ပတ်ဝန်းကျင်ထိခိုက်မှုလျော့ချရေး လုပ်ငန်းများနှင့် အစီအစဉ်များကို အပြည့်အဝ အစဉ်အမြဲလိုက်နာ ဆောင်ရွက်သွားမည် ဖြစ်ကြောင်း ကတိကဝတ်ပြုပါ သည်။
- (ဃ) လုပ်ငန်းလည်ပတ်ဆောင်ရွက်နေသည့် ကာလအတွင်း အတည်ပြုထားသည့် ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်း အားတိုးတက် နေသည့် နည်းပညာများ၊ စနစ်များနှင့် လုပ်ငန်း လိုအပ်ချက် အပေါ်မူတည်၍ ပိုမိုကောင်းမွန်သည့် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း အစီရင်ခံစာ ဖြစ်စေရန်အတွက် ပြင်ဆင်ဖြည့်စွက်ရန် ညွှန်ကြားချက်ရှိလာပါက ဆောင်ရွက်မည် ဖြစ်ကြောင်း နှင့် လုပ်ငန်းဆောင်ရွက်သူမှ ပြင်ဆင်ဖြည့်စွက်လိုပါက တင်ပြအတည်ပြုချက် ရယူ၍ ပြင်ဆင် ဆောင်ရွက်ပေးမည် ဖြစ်ပါသည်။
- (င) စီမံကိန်းပိတ်သိမ်းချိန်တွင် လူမှုဝန်းကျင်အား ထိခိုက်မှုအနည်းဆုံး ဖြစ်စေရန် စီမံဆောင်ရွက် ပေးမည်ဖြစ်ပြီး ထိခိုက်မှုများ ရှိလာပါက မူလအခြေအနေသို့ ရောက်ရှိစေရန် ဆောင်ရွက်ပေးမည် ဖြစ်ပါသည်။



Ms. Ei Shwesin
Deputy Managing Director
Myanmar Golden Eagle Co., Ltd.

အကြံပေးအဖွဲ့အစည်း၏ဝန်ခံချက်

ဤပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်း အစီရင်ခံစာအား Total Business Solution Co., Ltd. မှ ဆောင်ရွက်ထားပါသည်။ ဤအစီရင်ခံစာကို သက်ဆိုင်ရာ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်းများ အပါအဝင် သက်ဆိုင်ရာ ဥပဒေများ၊ နည်းဥပဒေများနှင့်အညီ ရေးသားထားပြီး စီမံကိန်းဖော်ဆောင်သူမှ ပေးအပ်သော အချက်အလက်များ၊ အကြံပေးအဖွဲ့အစည်း၏ ကွင်းဆင်း လေ့လာဆောင်ရွက်မှု ရလဒ်များနှင့် အများပြည်သူတို့ အသုံးပြုနိုင်သော အချက်အလက်များကို ကိုးကားကာ ပြုစု ရေးသားထားကြောင်း ကတိကဝတ်ပြုပါသည်။



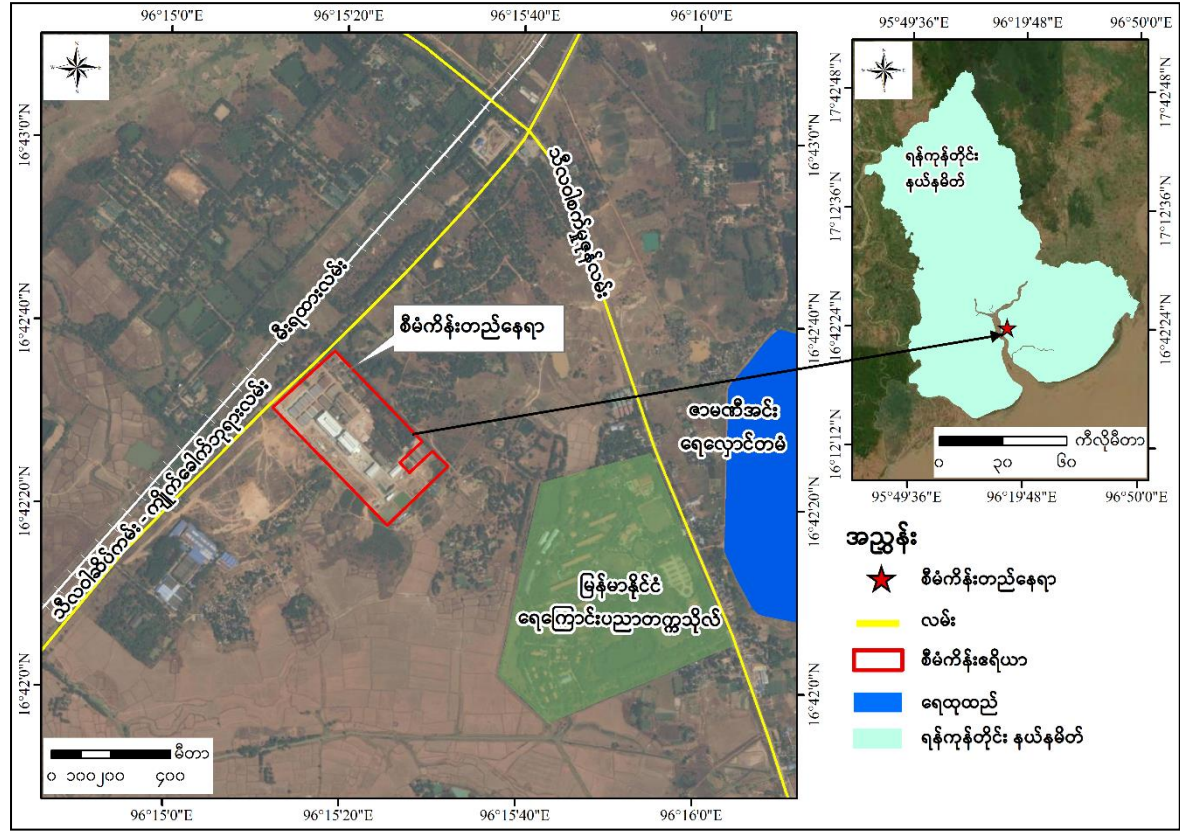
Dr. Soe Moe Kyaw Win
MANAGING DIRECTOR
TOTAL BUSINESS SOLUTION CO., LTD.



အစီရင်ခံစာအကျဉ်းချုပ်

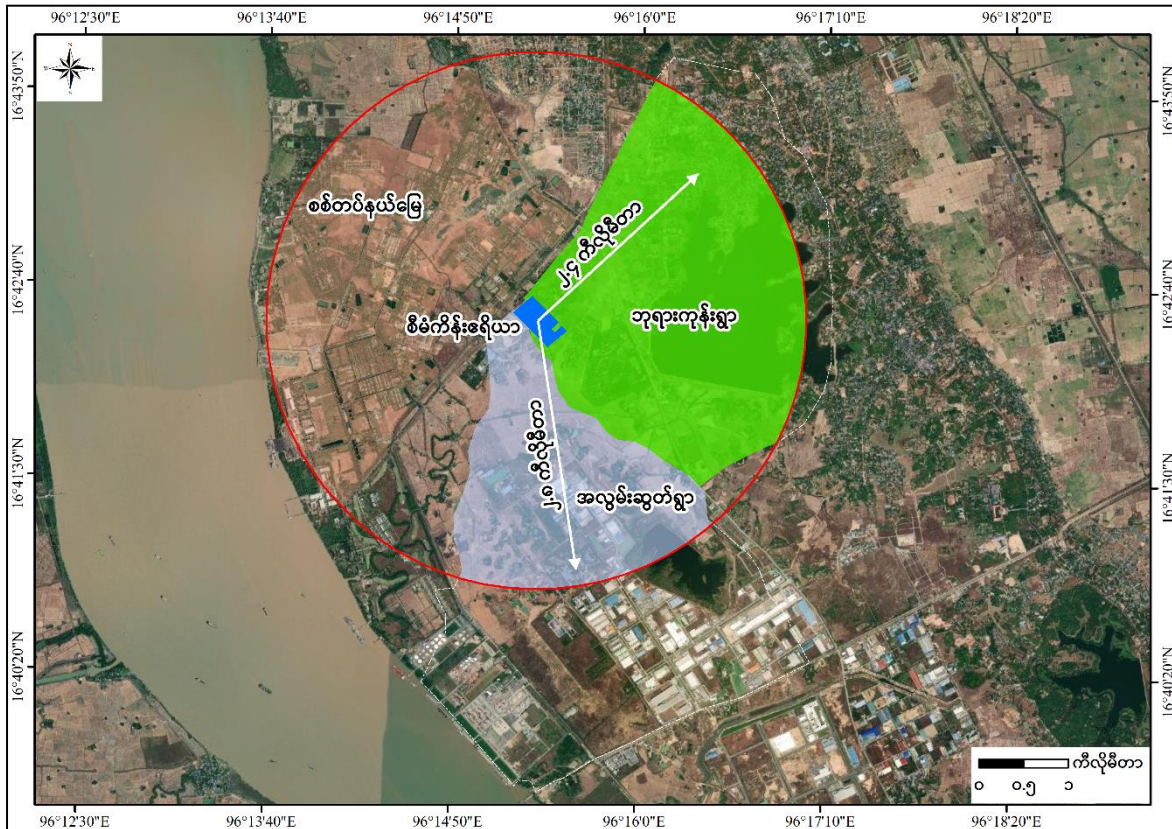
၁. စီမံကိန်းအကြောင်းအရာ

Myanmar Golden Eagle Co., Ltd. (MGE) သည် နိုင်ငံခြား ရင်းနှီးမြုပ်နှံမှု ဥပဒေ နှင့် မြန်မာနိုင်ငံ ကုမ္ပဏီများ ဥပဒေအရ ၂၀၁၆ ခုနှစ်တွင် တည်ထောင်ခဲ့ပါသည်။ ထိုင်းနိုင်ငံရှိ SSB Enterprise Co., Ltd. မှ ရင်းနှီးမြုပ်နှံမှု ၃၅ ရာခိုင်နှုန်း နှင့် ပြည်တွင်းရှိ Glass Holding Asia Co., Ltd မှ ရင်းနှီးမြုပ်နှံမှု ၆၅ ရာခိုင်နှုန်းစီတို့ဖြင့် အကျိုးတူပူးပေါင်းဆောင်ရွက်လုပ်ကိုင်နေကြခြင်း ဖြစ်ပါသည်။ စီမံကိန်းတည်နေရာမှာ ဦးပိုင် အမှတ် ၉၇၊ ရန်ကုန်-သီလဝါဂိတ်လမ်းမကြီး၊ ဘုရားကုန်းကျေးရွာ၊ သံလျင်မြို့နယ်၊ ရန်ကုန်မြို့၊ မြန်မာနိုင်ငံတွင် တည်ရှိပါသည်။ ယခု ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာသည် အဓိကအားဖြင့် ဖန်ပုလင်း ထုတ်လုပ်သည့် စက်ရုံဆောက်လုပ်ခြင်း နှင့် အဆောက်အအုံ အဟောင်းများ ပြန်လည်ပြုပြင်ခြင်း စသည်တို့အတွက် ပြင်ဆင်ရေးဆွဲထားခြင်း ဖြစ်ပါသည်။ စီမံကိန်း၏ စုစုပေါင်း မြေဧရိယာမှာ ၄၀ ဧက ဖြစ်ပြီး အဆောက်အအုံ ဧရိယာ စုစုပေါင်း မှာ ၃ ဧက ဖြစ်သည်။ စီမံကိန်းတည်နေရာကို အောက်ပါ ပုံ ၁ တွင်ပြသထားသည်။ စီမံကိန်းဖော်ဆောင်သူသည် Total Business Solution Co., Ltd (TBS) ကို ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်း အစီရင်ခံစာ ရေးဆွဲရန် တာဝန်ပေးအပ်ခဲ့ပါသည်။



ပုံ ၁ စီမံကိန်းတည်နေရာပြပုံ

အဆိုပြုဖန်ပုလင်း ထုတ်လုပ်သည့်စက်ရုံသည် ဘုရားကုန်းကျေးရွာ နှင့် အလွမ်းဆွတ်ကျေးရွာ ကြားတွင်တည်ရှိသည်။ ထို့ကြောင့် ၎င်းရွာ ၂ရွာအပေါ် စီမံကိန်းကြောင့်သက်ရောက်မှု အနည်းငယ် ရှိနိုင်သည်ဟု ခန့်မှန်းရပါသည်။ အထူးသဖြင့် ထိုကျေးရွာများ၏ လူနေဧရိယာနှင့် စိုက်ပျိုးမြေဧရိယာများ အပေါ် သက်ရောက်နိုင်သည်ဟု ယူဆရပါသည်။ သို့သော်လည်း ၎င်းကျေးရွာ ၂ခုအပေါ် သက်ရောက် နိုင်သော ဧရိယာမှာ လေ့လာမှုဧရိယာ၏ ၃ ကီလိုမီတာ အတွင်းတွင် ရှိနေပါသည်။ စီမံကိန်းနှင့် အနီးအနားရှိ ကျေးရွာများ၏ ပျမ်းမျှ အကွာအဝေးမှာ ဘုရားကုန်းကျေးရွာအတွက် ၂.၄ ကီလိုမီတာ နှင့် အလွမ်းဆွတ် ကျေးရွာအတွက် ၂.၈ ကီလိုမီတာ တို့ဖြစ်ပါသည်။ စီမံကိန်းဧရိယာနှင့် အနီးပတ်ဝန်းကျင်ရှိကျေးရွာများ၏ အကွာအဝေးကို ပုံ ၂ တွင် ဖော်ပြထားပါသည်။



ပုံ ၂ စီမံကိန်းဧရိယာနှင့် အနီးပတ်ဝန်းကျင်ကျေးရွာများ၏ အကွာအဝေးပြပုံ

၁.၁. စီမံကိန်းဖော်ဆောင်သူ

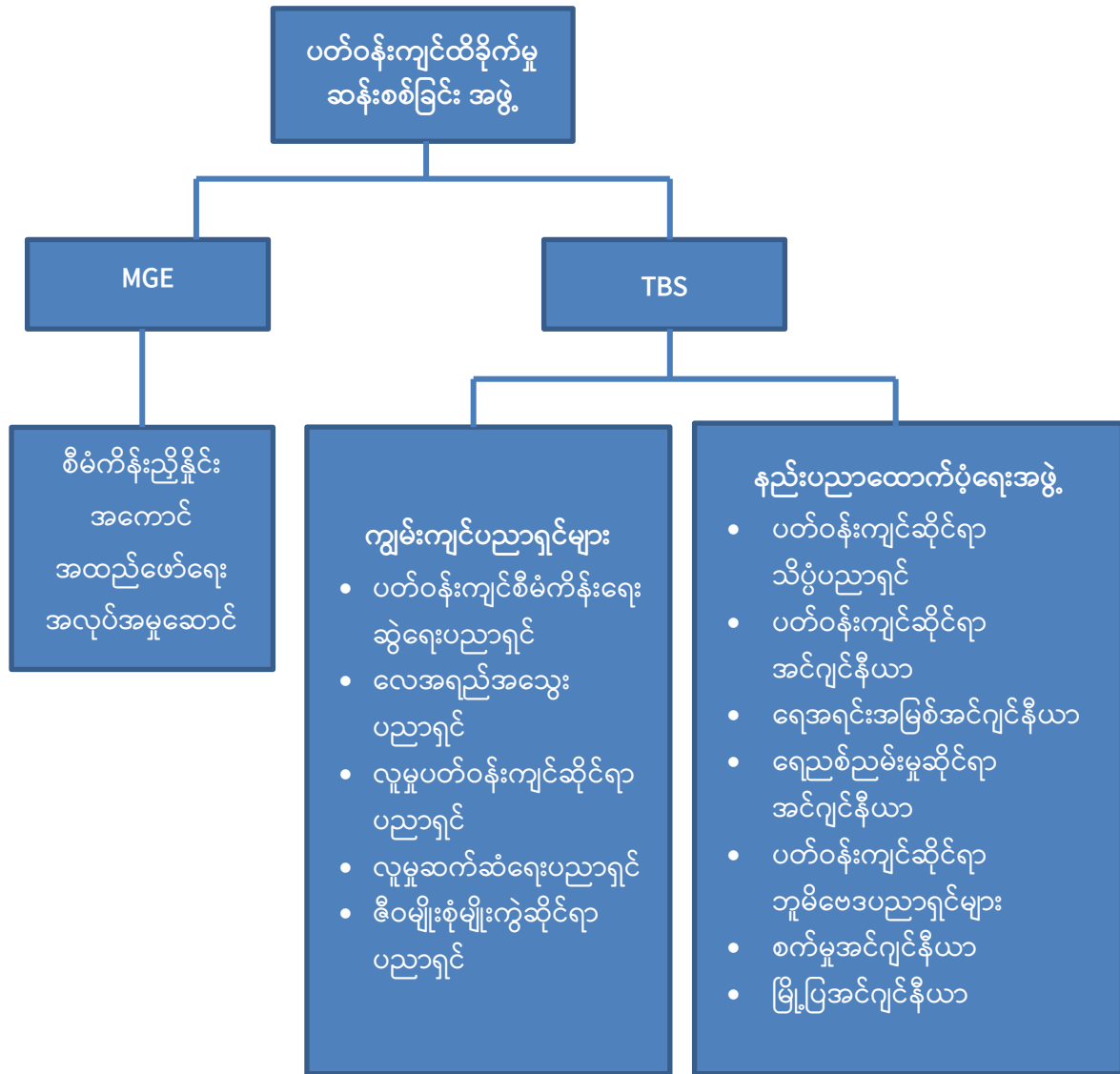
ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း အစီရင်ခံစာအတွက် စီမံကိန်းအဆိုပြုသူ၏ ဆက်သွယ်ရန် လိပ်စာကို ဇယား ၁ နှင့် စီမံကိန်းဖော်ဆောင်မှု ဖွဲ့စည်းပုံ ဇယားကို အခန်း ၁ တွင်ဖော်ပြထားပါသည်။

ဇယား ၁ စီမံကိန်းဖော်ဆောင်သူ၏ ဆက်သွယ်ရန်လိပ်စာ

အမည်	ဦးကျော်ကျော်စိန်
ရာထူး	ဦးဆောင်ညွှန်ကြားရေးမှူး
လိပ်စာ	အမှတ်-၁၇/၁၀၊ ၂၇ လမ်း၊ ၆၂ x ၆၃ ဘလောက်ကြား၊ ပြည်ကြီးမျက်မာန်ရပ်ကွက်၊ ချမ်းအေးသာစံမြို့နယ်၊ မန္တလေးမြို့။
ဖုန်းနံပါတ်	၀၉-၃၀၉၂၆၆၀၈
အီးမေးလ်	info@myanmarglass.com
ရုံးလိပ်စာ	ဦးပိုင် အမှတ် ၉၇၊ ရန်ကုန်-သီလဝါ ဘူတာရုံလမ်း၊ ဘုရားကုန်းကျေးရွာ၊ သန်လျင်မြို့နယ်၊ ရန်ကုန်၊ မြန်မာပြည်။

၁.၂. ပတ်ဝန်းကျင်ဆိုင်ရာအကြံပေးပုဂ္ဂိုလ်

Total Business Solution Co. , Ltd. (TBS) သည် ပုဂ္ဂလိကပိုင် ပြည်တွင်းကုမ္ပဏီ တစ်ခုဖြစ်ပြီး၊ မြန်မာနိုင်ငံရှိပုဂ္ဂလိကနှင့် အများပိုင်ကဏ္ဍများအတွက် အင်ဂျင်နီယာနှင့် ပတ်ဝန်းကျင်ဆိုင်ရာ ဝန်ဆောင်မှုများကို တာဝန်ယူဆောင်ရွက်ပေးလျက် ရှိပါသည်။ ဤစီမံကိန်းအတွက် ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်း အစီရင်ခံစာကို ပြင်ဆင်ရန် TBS အား ဌားရမ်းခဲ့ပါသည်။ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း လေ့လာရေးအဖွဲ့သည် အစီရင်ခံစာတွင် ဖော်ပြထားသော စီမံကိန်း၏ အဓိကပတ်ဝန်းကျင်နှင့် လူမှုရေးဆိုင်ရာ သက်ရောက်မှုများနှင့် သက်ဆိုင်သော အရည်အချင်း ပြည့်ဝပြီး အတွေ့အကြုံရှိသော ပညာရှင်များဖြင့် ဖွဲ့စည်းထားသည်။ TBS ၏ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း လေ့လာရေးအဖွဲ့၏ ဖွဲ့စည်းပုံကို ပုံ ၃ နှင့် ဇယား ၂ တွင်ဖော်ပြထားပါသည်။



ပုံ ၃ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းလေ့လာရေးအဖွဲ့၏ ဖွဲ့စည်းပုံပြဇယား

ဇယား ၂ TBS ကုမ္ပဏီ၏ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းလေ့လာရေးအဖွဲ့

စဉ်	အမည်	ပညာအရည်အချင်း	အတွေ့အကြုံ	တာဝန်များ
၁။	ဒေါက်တာစိုးမိုးကျော်ဝင်း ဦးဆောင် ညွှန်ကြားရေးမှူး ဘူမိနည်းပညာနှင့် ဘူမိပတ်ဝန်းကျင် ဆိုင်ရာ အင်ဂျင်နီယာ	ပါရဂူဘွဲ့ (ဘူမိ အင်ဂျင်နီယာ)	အရှေ့တောင်အာရှနိုင်ငံများ၊ အမေရိကန်နှင့် ကနေဒါနိုင်ငံ များ၌ ပတ်ဝန်းကျင်ဆိုင်ရာ ဆန်းစစ်ခြင်း၊ ဘူမိနည်းပညာနှင့် ဘူမိဗေဒဆိုင်ရာ အင်ဂျင်နီယာလုပ်ငန်း နယ်ပယ်များ၊ ပတ်ဝန်းကျင် ဆိုင်ရာဆန်းစစ်ခြင်း၊ သတ္တုတူးဖော်ခြင်းမှ ထွက်ရှိသော စွန့်ပစ်အမှိုက်များ စီမံခန့်ခွဲခြင်း၊ ကွင်းဆင်း တိုင်းတာ ဆောင်ရွက်ခြင်းများ၊ မြေအရည်အသွေး ကောင်းမွန် အောင်ရွက်ခြင်းများ၊ မြေပြုပြင်ခြင်းများ နှင့် မြေပြိုမှုဆိုင်ရာ လေ့လာခြင်းများတွင် ၃၀ နှစ် လုပ်ငန်း အတွေ့အကြုံ ပါသည်။	အစီရင်ခံစာအားလုံးကို ခြုံငုံသုံးသပ်ခြင်း။
၂။	ဦးမြတ်သူကျော် အထွေထွေ မန်နေဂျာ	မဟာသိပ္ပံဘွဲ့ (ပတ်ဝန်းကျင်ဆိုင်ရာစီမံ ခန့်ခွဲမှု အင်ဂျင်နီယာဘွဲ့) သိပ္ပံဘွဲ့ (သစ်တော)	ပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး စောင့်ကြပ်ကြည့်ရှု ခြင်း (လေ၊ ဆူညံသံ နှင့် တုန်ခါမှု၊ မြေဆီလွှာ၊ ရေ)နှင့် ပတ်ဝန်းကျင်ဆိုင်ရာ ဆန်းစစ်ခြင်း အစီရင်ခံစာ ပြင်ဆင် ရေးသားခြင်းများတွင် ၇နှစ်ကျော် အတွေ့အကြုံ ရှိပါသည်။	အစီရင်ခံစာအား ကနဦး ခြုံငုံသုံးသပ်ခြင်းနှင့် စီမံကိန်း လုပ်ငန်းလုပ်ငန်းဆိုင်ရာ အစီရင်ခံစာအား အဆင်ပြေ ချောမွေ့စွာ အကောင်အထည်ဖော် ရေးသားနိုင်ရန် ကြီးကြပ်ကွပ်ကဲခြင်း။
၃။	ဦးညာဏ်ရီ အကြီးတန်း စီမံကိန်းမန်နေဂျာ	သိပ္ပံဘွဲ့ (ဘူမိဗေဒ)	ကျောက်စိမ်းတူးဖော်ရေးကုမ္ပဏီများတွင် မန်နေဂျာအဖြစ် အတွေ့အကြုံ ၁၅ နှစ်။ ပတ်ဝန်းကျင်ဆိုင်ရာလေ့လာစောင့်ကြည့်ရေးနယ်ပယ်များ တွင် လုပ်ငန်း အတွေ့အကြုံ ၇ နှစ်။ အစိုးရအဖွဲ့အစည်းများ၊ ဒေသခံများနှင့် ပူးပေါင်း ဆောင်ရွက်ခြင်းလုပ်ငန်းများတွင် အတွေ့အကြုံ ၅ နှစ် ရှိပါသည်။	ကွင်းဆင်းလေ့လာမှုများကိုကြီးကြပ်ခြင်းနှင့် လူထုတွေ့ဆုံပွဲများ ဖြစ်မြောက်ရေး စီစဉ်ခြင်း။
၄။	ဒေါက်တာအောင်အောင် ဇီဝမျိုးစုံမျိုးကွဲ သတ္တဗေဒ ပညာရှင်	ပါရဂူဘွဲ့ (သတ္တဗေဒ)	တိရစ္ဆာန်များနှင့် ဇီဝမျိုးစုံမျိုးကွဲ လေ့လာခြင်းများ၊ သင်ကြားရေးနှင့် ကွင်းဆင်းသုတေသနပြုခြင်းများတွင် ၁၉ နှစ် လုပ်ငန်းအတွေ့အကြုံ ရှိပါသည်။	ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်း၊ ဇီဝမျိုးစုံမျိုးကွဲ များ ထိန်းသိမ်းခြင်းနှင့် နို့တိုက်သတ္တဝါများနှင့် ဂေဟဗေဒ။

စဉ်	အမည်	ပညာအရည်အချင်း	အတွေ့အကြုံ	တာဝန်များ
၅။	ဒေါက်တာ ပြုံးပြုံးမြင့် ဇီဝမျိုးစုံမျိုးကွဲ သတ္တဗေဒ ပညာရှင်	ပါရဂူဘွဲ့ (သတ္တဗေဒ)	တိရစ္ဆာန်များနှင့် ဇီဝမျိုးစုံမျိုးကွဲ လေ့လာခြင်းများ၊ သင်ကြားရေးနှင့် ကွင်းဆင်းသုတေသနပြုခြင်းများတွင် ၁၉ နှစ် လုပ်ငန်းအတွေ့အကြုံ ရှိပါသည်။	ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်း၊ ခန္ဓာဗေဒ၊ အပြုအမူဆိုင်ရာများ၊ ဂေဟဗေဒ၊ ဆင့်ကဲဖြစ်ပေါ်လာပုံ၊ ဇီဝကမ္မဗေဒ၊ ကာကွယ် ထိန်းသိမ်းရေးများနှင့် ငှက်များ၏ ဇီဝဗေဒ။
၆။	ဒေါက်တာ သန့်ဇော်ဝင်း ဇီဝမျိုးစုံမျိုးကွဲ ရုက္ခဗေဒ ပညာရှင်	ပါရဂူဘွဲ့ (ရုက္ခဗေဒ)	သစ်ပင်ပန်းမန်များနှင့် ဇီဝမျိုးစုံမျိုးကွဲ လေ့လာခြင်းများ၊ သင်ကြားရေးနှင့် ကွင်းဆင်းသုတေသနပြုခြင်းများတွင် ၉ နှစ် လုပ်ငန်းအတွေ့အကြုံ ရှိပါသည်။	ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်း၊ ဇီဝကမ္မဗေဒ၊ ရေပင်ဒေသ စီမံခန့်ခွဲရေး နှင့် ဇီဝအပင် လေ့လာခြင်း။
၇။	ဒေါက်တာ သန်းသန်းမြင့် ဇီဝမျိုးစုံမျိုးကွဲ အဏ္ဏဝါ ဇီဝ ပညာရှင်	ပါရဂူဘွဲ့ (သတ္တဗေဒ)	တိရစ္ဆာန်များနှင့် အဏ္ဏဝါဇီဝ လေ့လာခြင်းများ၊ သင်ကြားရေးနှင့် ကွင်းဆင်းသုတေသနပြုခြင်းများတွင် ၁၆ နှစ် လုပ်ငန်းအတွေ့အကြုံ ရှိပါသည်။	ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်း၊ အဏ္ဏဝါ ဇီဝ အဓိကအားဖြင့် ငါးမျိုးစိတ်များ လေ့လာခြင်း။
၈။	ဒေါ်နှင်းလှဝင်း ပတ်ဝန်းကျင်ဆိုင်ရာ မန်နေဂျာ	မဟာသိပ္ပံဘွဲ့ ပတ်ဝန်းကျင်ဆိုင်ရာစီမံခန့်ခွဲမှု အင်ဂျင်နီယာ သိပ္ပံဘွဲ့ (ဆေးဝါးကျွမ်းကျင်)	စီမံခန့်ခွဲမှုများ၊ ဈေးကွက်ဖြန့်ဖြူးခြင်းများနှင့် အငယ်တန်း ဝန်ထမ်းများကို လေ့ကျင့် ပေးခြင်းများတွင် ၅ နှစ် အတွေ့ အကြုံရှိပါသည်။ မြေအသုံးချမှုအစီအစဉ်များ၊ ပတ်ဝန်းကျင်ဆိုင်ရာ ဆန်းစစ်ခြင်းနှင့် အစိုးရအဖွဲ့အစည်း များနှင့် ဒေသခံပြည်သူများနှင့် ပူးပေါင်း ဆောင်ရွက်ခြင်း များတွင် အတွေ့အကြုံ ၄ နှစ် ရှိပါသည်။ ပတ်ဝန်းကျင် ဘေးအန္တရာယ်ဆိုင်ရာဆန်းစစ်ခြင်း၊ ပတ်ဝန်းကျင်ဆိုင်ရာ စောင့်ကြပ် ကြည့်ရှု တိုင်းတာမှုများနှင့် ပတ်ဝန်းကျင် ဆိုင်ရာ အစီရင်ခံစာ ပြင်ဆင်ရေးသားခြင်း များတွင် အတွေ့အကြုံ ရှိပါသည်။	အစီရင်ခံစာအား ကနဦး ခြုံငုံသုံးသပ်ခြင်း နှင့် လူထုတွေ့ဆုံပွဲများ ဖြစ်မြောက်ရေး စီစဉ်ခြင်း။
၉။	ဒေါ်ဖူးပွင့်ခိုင် ပတ်ဝန်းကျင်ဆိုင်ရာ မန်နေဂျာ	မဟာအင်ဂျင်နီယာဘွဲ့ (ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အင်ဂျင်နီယာ) အင်ဂျင်နီယာဘွဲ့ (မြို့ပြ)	ဆောက်လုပ်ရေးစီမံကိန်းများတွင် ဆိုင်အင်ဂျင်နီယာ အဖြစ် အတွေ့အကြုံ ၁ နှစ် ရှိပါသည်။ အဆောက်အဦ ဆောက်လုပ်ခြင်းဆိုင်ရာ ကုန်ကျစရိတ်ခန့်မှန်းတွက်ချက် ခြင်း အဖွဲ့တွင် အရည်အသွေး ထိန်းချုပ် အင်ဂျင်နီယာ	ရေထုညစ်ညမ်းမှုထိန်းချုပ်ခြင်း နှင့် စွန့်ပစ်အမှိုက် စီမံခန့်ခွဲမှုအပါအဝင် စီမံကိန်း အကြောင်းအရာ ရေးဆွဲခြင်း၊ ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှု အစီအစဉ်၊ ပတ်ဝန်းကျင် ဆိုင်ရာ သက်ရောက်မှု နှင့် ဆက်စပ်သက်ရောက်မှု ဆန်းစစ်ခြင်း၊ ပတ်ဝန်းကျင်

စဉ်	အမည်	ပညာအရည်အချင်း	အတွေ့အကြုံ	တာဝန်များ
			အဖြစ် အတွေ့အကြုံ ၆ လ ရှိပါသည်။ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုလုပ်ငန်းများတွင်အတွေ့အကြုံ ၃ နှစ် ရှိပါသည်။	ဆိုင်ရာ အရည်အသွေး ဆန်းစစ်ခြင်း အစီအစဉ်များ နှင့် အများပြည်သူနှင့် တွေ့ဆုံဆွေးနွေးပွဲများ စီစဉ် ဆောင်ရွက်ခြင်း တို့တွင် ပတ်ဝန်းကျင်ဆိုင်ရာ အဖွဲ့ကို ဦးဆောင်ခြင်း။
၁၀။	ဒေါ်အေးမွန်အောင် ပတ်ဝန်းကျင်ဆိုင်ရာ အင်ဂျင်နီယာ	မဟာအင်ဂျင်နီယာဘွဲ့ (ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အင်ဂျင်နီယာ) အင်ဂျင်နီယာဘွဲ့ (ဒြပ်ပစ္စည်းနှင့် သတ္တုဗေဒ)	ပလတ်စတစ်ကုန်ကြမ်းနှင့် ဓာတုပစ္စည်းများ ရောင်းဝယ်ခြင်းတွင် အရောင်ကိုယ်စားလှယ်အဖြစ် အတွေ့အကြုံ ၂ နှစ် ရှိပါသည်။ ပတ်ဝန်းကျင်ဆိုင်ရာ အစီရင်ခံစာ ရေးသားခြင်းတွင် အတွေ့အကြုံ ၃ နှစ် ရှိပါသည်။	စွန့်ပစ်အစိုင်အခဲစီမံခန့်ခွဲမှု၊ စွန့်ပစ်ရေနှင့် လေထု ညစ်ညမ်းမှု ထိန်းချုပ်ခြင်း၊ ဆူညံသံနှင့် တုန်ခါမှု ထိန်းချုပ်ခြင်းများအတွက် သက်ရောက်မှု ဆန်းစစ်ခြင်းများ လုပ်ဆောင်ရန် အဖွဲ့ခေါင်းဆောင်ကို အကူအညီပေးခြင်း။
၁၁။	ဦးထက်သီဟဖုန်းမြင့် စီမံကိန်းမန်နေဂျာ	သိပ္ပံဘွဲ့ (ဘူမိဗေဒ)	ဘူမိဗေဒဆိုင်ရာ မြေအောက်လွှာလေ့လာခြင်း၊ မြေ အသုံးချ အစီအစဉ်များဆောင်ရွက်ခြင်း၊ ပတ်ဝန်းကျင် ဆိုင်ရာ အရည်အသွေး ကွင်းဆင်းတိုင်းတာခြင်း (လေ၊ ဆူညံသံ၊ ရေမုန်ကောက်ယူခြင်း) အစိုးရ အဖွဲ့အစည်းများ၊ ဒေသခံပြည်သူများနှင့် ညှိနှိုင်း တွေ့ဆုံ ဆွေးနွေးခြင်း၊ ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု ဆိုင်ရာ စာရွက်စာတမ်းများ ပြင်ဆင်ခြင်းများတွင် အတွေ့အကြုံ (၇)နှစ်ရှိပါသည်။	အစိုးရအဖွဲ့အစည်းများနှင့် ဒေသခံများနှင့် ညှိနှိုင်း တွေ့ဆုံဆွေးနွေးခြင်း၊ လူမှုစီးပွား စစ်တမ်း ကောက်ယူခြင်း၊ လူမှုစီးပွားအချက်အလက်များ စိစစ်ခြင်း၊ လူထုတွေ့ဆုံပွဲ များကျင်းပခြင်း စသော လုပ်ငန်းများတွင် အဖွဲ့ခေါင်းဆောင်အားအဓိကကူညီ လုပ်ဆောင်ခဲ့ပါသည်။
၁၂။	ဦးဖြိုးသူကျော် အဆောက်အဦး ဒီဇိုင်းရေးဆွဲသူ	အင်ဂျင်နီယာဘွဲ့ (စက်မှုလျှပ်စစ်)	စီမံကိန်းဆိုင်ရာ ညှိနှိုင်းဆောင်ရွက်ခြင်းများ၊ စာရွက် စာတမ်းများ ပြင်ဆင်ပေးခြင်း၊ အဆောက်အဦ ပုံစံ ရေးဆွဲခြင်း များတွင် အတွေ့အကြုံ ၃ နှစ် ရှိပါသည်။ ပတ်ဝန်းကျင်ဆိုင်ရာ စောင့်ကြည့်လေ့လာမှုများ (လေနှင့် ဆူညံသံ တိုင်းတာခြင်း၊ ရေမုန်ကောက်ယူခြင်း) နှင့် ကွန်ပျူတာများ ပြုပြင် ထိန်းသိမ်းခြင်းများတွင် အတွေ့ အကြုံ ၄ နှစ် ရှိပါ သည်။	မြေပုံ နှင့် ပုံကြမ်းရေးဆွဲခြင်းများ။

စဉ်	အမည်	ပညာအရည်အချင်း	အတွေ့အကြုံ	တာဝန်များ
၁၃။	ဒေါ်ကြည်ဖြူခင်	ဝိဇ္ဇာဘွဲ့ (အင်္ဂလိပ်စာ) ဒီပလိုမာ (စီးပွားရေး ဆိုင်ရာ ဥပဒေ)	ပတ်ဝန်းကျင်ဆိုင်ရာ အတွေ့အကြုံ ၂ နှစ် ရှိပါသည်။	ဥပဒေနှင့် မူဝါဒများ ရေးဆွဲခြင်း နှင့် လူထုတွေ့ဆုံပွဲများ ကျင်းပခြင်း စသော လုပ်ငန်းများ တွင် အဓိကပါဝင် လုပ်ဆောင်ခဲ့ပါသည်။
၁၄။	ဦးဝေဖြိုးအောင် ပတ်ဝန်းကျင်ဆိုင်ရာ ဘူမိဗေဒပညာရှင်	သိပ္ပံဘွဲ့ (ဘူမိဗေဒ)	ဘူမိနည်းပညာနှင့်ဘူမိဗေဒဆိုင်ရာများတွင် အတွေ့အကြုံ ၇ နှစ် ရှိပါသည်။ ကွင်းဆင်းလေ့လာရေး အဖွဲ့ခေါင်းဆောင် အဖြစ် ၅ နှစ် ရှိပါသည်။	ပတ်ဝန်းကျင်ဆိုင်ရာအရည်အသွေးစောင့်ကြည့်ခြင်းနှင့် ကွင်းဆင်း လေ့လာဆောင်ရွက်ခြင်းများ၊ ဒရုန်းဖြင့် ကွင်းဆင်းလေ့လာ ဆောင်ရွက်ခြင်းများ ဆောင်ရွက်ရန် အတွက် အဖွဲ့ခေါင်းဆောင်ကို ကူညီပေးခြင်းနှင့် မြေအသုံးချမှု ကွင်းဆင်း လေ့လာခြင်းများ၊ မြေအသုံးချမှုမြေပုံများ ရေးဆွဲခြင်းနှင့် အခြားလိုအပ်သော စီမံကိန်းနှင့် သက်ဆိုင်သည့် မြေပုံများရေးဆွဲခြင်း။
၁၅။	ဦးဇော်မျိုးဟိန်း ပတ်ဝန်းကျင်ဆိုင်ရာ ဘူမိဗေဒပညာရှင်	သိပ္ပံဘွဲ့ (ဘူမိဗေဒ)	ပတ်ဝန်းကျင်ဆိုင်ရာ စောင့်ကြည့်လေ့လာခြင်း လုပ်ငန်းစဉ် များနှင့် ကွင်းဆင်းလေ့လာ ဆောင်ရွက်ခြင်းများတွင် အတွေ့အကြုံ ၃ နှစ် ရှိပါသည်။	ပတ်ဝန်းကျင်ဆိုင်ရာအရည်အသွေးစောင့်ကြည့်ခြင်းနှင့် ကွင်းဆင်းလေ့လာဆောင်ရွက်ခြင်းများ၊ ဒရုန်းဖြင့် ကွင်းဆင်းလေ့လာ ဆောင်ရွက်ခြင်းများ။
၁၆။	ဒေါ်သဉ္ဇာထွန်း	သိပ္ပံဘွဲ့ (သစ်တော)	ပတ်ဝန်းကျင်ဆိုင်ရာ အတွေ့အကြုံ ၂ နှစ် ရှိပါသည်။	သစ်တောရေးရာနှင့် ဇီဝမျိုးစုံမျိုးကွဲများ လေ့လာ ခြင်းနှင့် လူမှုရေးသက်ရောက်မှုများ ဆန်းစစ်ခြင်း။ ပတ်ဝန်းကျင်ထိခိုက်မှုလျော့ချခြင်းနှင့် စောင့်ကြပ် ကြည့်ရှုမှုအစီအစဉ်များရေးဆွဲခြင်း၊ ပတ်ဝန်းကျင် ဆိုင်ရာ စီမံခန့်ခွဲမှုအစီအစဉ်၊ ပတ်ဝန်းကျင် ဆိုင်ရာ သက်ရောက်မှု ဆန်းစစ်ခြင်းနှင့် လျှော့ချခြင်း၊ စသောလုပ်ငန်းများတွင် ပါဝင်ကူညီရေးသားခဲ့ ပါသည်။

၂. မူဝါဒများ၊ ဥပဒေဆိုင်ရာနှင့် ဖွဲ့စည်းဆောင်ရွက်ပုံဆိုင်ရာ လေ့လာသုံးသပ်ချက်

ဤအခန်းတွင် စီမံကိန်း၏ ပတ်ဝန်းကျင်၊ လူမှုစီးပွားရေးနှင့် သက်ဆိုင်သော မြန်မာနိုင်ငံ၏မူဝါဒများ၊ သက်ဆိုင်သော ဥပဒေများကို ဇယား ၃ တွင် အကျဉ်းချုပ်ဖော်ပြထားသည်။ စီမံကိန်းဖော်ဆောင်သူသည် ဤဥပဒေ ပြဋ္ဌာန်းချက်များကို လိုက်နာ၍ စီမံကိန်းကို အကောင်အထည်ဖော်ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။

ဇယား ၃ သက်ဆိုင်သော မြန်မာနိုင်ငံ၏ ဥပဒေနှင့် စည်းမျဉ်းစည်းကမ်းများ

စဉ်	ဥပဒေများနှင့် နည်းဥပဒေများ၏နာမည်များ	ခုနှစ်
သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေး		
၁	သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဥပဒေ	၂၀၁၂
၂	ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးနည်းဥပဒေများ	၂၀၁၄
၃	ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်းများ	၂၀၁၅
၄	မြန်မာနိုင်ငံ အမျိုးသားပတ်ဝန်းကျင်ရေးရာမူဝါဒ	၂၀၁၉
ညစ်ညမ်းမှုထိန်းချုပ်ခြင်းနှင့် ကျန်းမာရေး		
၅	အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာအရည်အသွေး)ထုတ်လွှတ်မှု(လမ်းညွှန်ချက်များ	၂၀၁၅
၆	အမျိုးသားသောက်သုံးရေအရည်အသွေးစံချိန်စံညွှန်း)မူကြမ်း(၂၀၁၉
၇	ပြည်ထောင်စုမြန်မာနိုင်ငံပြည်သူ့ကျန်းမာရေးဥပဒေ	၁၉၇၂
၈	ကူးစက်ရောဂါများ ကာကွယ်ထိန်းချုပ်ရေးဥပဒေ	၁၉၉၅
၉	ဆေးလိပ်နှင့်ဆေးရွက်ကြီးထွက် ပစ္စည်းသောက်သုံးမှုထိန်းချုပ်ရေးဥပဒေ	၂၀၀၆
၁၀	လုပ်ငန်းခွင်ဘေးအန္တရာယ်ကင်းရှင်းရေးနှင့် ကျန်းမာရေးဆိုင်ရာဥပဒေ	၂၀၁၉
၁၁	မြန်မာနိုင်ငံမီးသတ်တပ်ဖွဲ့ဥပဒေ	၂၀၁၅
၁၂	ဓာတုနှင့် ဆက်စပ်ပစ္စည်းများ အန္တရာယ်မှ တားဆီးကာကွယ်ရေး ဥပဒေ	၂၀၁၃
ဇီဝမျိုးစုံမျိုးကွဲများနှင့် သဘာဝအရင်းအမြစ်ထိန်းသိမ်းရေး		
၁၃	ဇီဝမျိုးစုံမျိုးကွဲများနှင့် သဘာဝထိန်းသိမ်းရေး နယ်မြေများ ကာကွယ်စောင့်ရှောက်ခြင်းဆိုင်ရာဥပဒေ	၂၀၁၈
၁၄	ငါးမွေးမြူခြင်းဆိုင်ရာဥပဒေ	၁၉၈၉
၁၅	ရေအရင်းအမြစ်နှင့် မြစ်ချောင်းများ ထိန်းသိမ်းရေးဥပဒေ	၂၀၀၆
၁၆	ရေအရင်းအမြစ်နှင့် မြစ်ချောင်းထိန်းသိမ်းရေးနည်းဥပဒေ	၂၀၁၃
၁၇	မြေအောက်ရေဥပဒေ	၁၉၃၀
၁၈	သစ်တောဥပဒေ	၁၉၉၂
မြေယာဥပဒေ		

စဉ်	ဥပဒေများနှင့် နည်းဥပဒေများ၏နာမည်များ	ခုနှစ်
၁၉	မြေသိမ်း အက်ဥပဒေ	၁၈၉၄
၂၀	မြန်မာနိုင်ငံ အမျိုးသား မြေအသုံးချမှု မူဝါဒ	၂၀၁၆
၂၁	နိုင်ငံပိုင်မြေငှားရမ်းခြင်း၊ လွှဲပြောင်းခြင်းနှင့် ဖက်စပ်လှုပ်ငန်းများတွင် လိုက်နာရမည့် ညွှန်ကြားချက်များ	၂၀၁၈
၂၂	လယ်ယာမြေဥပဒေ	၂၀၁၂
၂၃	လယ်ယာမြေနည်းဥပဒေ	၂၀၁၂
၂၄	မြေလွတ်၊ မြေလပ်နှင့်မြေရိုင်းများစီမံခန့်ခွဲရေးဥပဒေ	၂၀၁၈
၂၅	စာချုပ်စာတမ်းများမှတ်ပုံတင်ဥပဒေ	၂၀၁၉
၂၆	နယ်နိမိတ်တိုင်းတာပိုင်းခြား သတ်မှတ်ရေးဥပဒေ	၂၀၁၉
မြို့ပြဖွံ့ဖြိုးတိုးတက်မှုနှင့်စီမံခန့်ခွဲမှု		
၂၇	မြို့တော်စည်ပင်သာယာရေးကော်မတီ ဥပဒေ	၂၀၁၃
၂၈	မြန်မာနိုင်ငံအင်ဂျင်နီယာကောင်စီဥပဒေ	၂၀၁၃
၂၉	လျှပ်စစ်ဥပဒေ	၂၀၁၄
၃၀	ဆက်သွယ်ရေးဥပဒေ	၂၀၁၃
လူ့အခွင့်အရေး		
၃၁	တိုင်းရင်းသားလူမျိုးများ၏အခွင့်အရေးကာကွယ်စောင့်ရှောက်သည့် ဥပဒေ	၂၀၁၅
၃၂	မသန်စွမ်းသူများ၏ အခွင့်အရေးဥပဒေ	၂၀၁၅
၃၃	ကလေးသူငယ် အခွင့်အရေးများဆိုင်ရာ ဥပဒေ	၂၀၁၉
ယဉ်ကျေးမှုအမွေအနှစ်များ		
၃၄	ယဉ်ကျေးမှုအမွေအနှစ်ဒေသများ ကာကွယ်ထိန်းသိမ်းရေးဥပဒေ	၂၀၁၉
၃၅	ရှေးဟောင်းဝတ္ထုပစ္စည်းကာကွယ်စောင့်ရှောက်ရေးဥပဒေ	၂၀၁၅
၃၆	ရှေးဟောင်းအဆောက်အအုံများ ကာကွယ်ထိန်းသိမ်းရေးဥပဒေ	၂၀၁၅
အလုပ်သမား		
၃၇	အလုပ်သမားအဖွဲ့အစည်းဥပဒေ	၂၀၁၁
၃၈	အလုပ်အကိုင်နှင့်ကျွမ်းကျင်မှု ဖွံ့ဖြိုးတိုးတက်ရေး ဥပဒေ	၂၀၁၃
၃၉	အနည်းဆုံးအခကြေးငွေဥပဒေ	၂၀၁၃
၄၀	အခကြေးငွေပေးချေရေးဥပဒေ	၂၀၁၆
၄၁	အလုပ်သမားလျှော့ကြေးအက်ဥပဒေ	၁၉၂၃

စဉ်	ဥပဒေများနှင့် နည်းဥပဒေများ၏နာမည်များ	ခုနှစ်
၄၂	အလုပ်သမားရေးရာ အငြင်းပွားမှုဖြေရှင်းရေးဥပဒေ	၂၀၁၂
၄၃	ခွင့်ရက်နှင့်အလုပ်ပိတ်ရက်အက်ဥပဒေ	၁၉၅၁
၄၄	လူမှုဖူလုံရေးဥပဒေ	၂၀၁၂
မော်တော်ယာဉ်များ		
၄၅	ယာဉ်အန္တရာယ်ကင်းရှင်းရေးနှင့် မော်တော်ယာဉ်စီမံခန့်ခွဲမှုဥပဒေ	၂၀၂၀
၄၆	မော်တော်ယာဉ်နည်းဥပဒေ	၁၉၈၉
၄၇	မော်တော်ယာဉ်ဥပဒေ	၂၀၁၅
အခြားဆက်နွယ်နေသောဥပဒေများနှင့် စည်းမျဉ်းများ		
၄၈	မြန်မာအာမခံ လုပ်ငန်း ဥပဒေ	၁၉၉၃
၄၉	မြန်မာအာမခံ လုပ်ငန်း နည်းဥပဒေ	၂၀၁၇
၅၀	တိုင်းရင်းသား လူမျိုးများ အခွင့်အရေး ကာကွယ်စောင့်ရှောက်ရေး ဥပဒေ	၂၀၁၅
၅၁	မြန်မာရင်းနှီးမြုပ်နှံမှု ဥပဒေ	၂၀၁၆
၅၂	မြန်မာရင်းနှီးမြုပ်နှံမှု နည်းဥပဒေ	၂၀၁၇
၅၃	ရေနံနှင့် ရေနံထွက်ပစ္စည်းဆိုင်ရာဥပဒေ	၂၀၁၇
၅၄	ရေနံအက်ဥပဒေ	၁၉၃၄
၅၅	ပို့ကုန်သွင်းကုန်ဥပဒေ	၂၀၁၂
၅၆	ငါးမွေးမြူခြင်းဆိုင်ရာဥပဒေ	၁၉၈၉
၅၇	သဘာဝဘေးအန္တရာယ်ဆိုင်ရာ စီမံခန့်ခွဲမှုဥပဒေ	၂၀၁၃
၅၈	ရာသီဥတုပြောင်းလဲမှုဆိုင်ရာ မူဝါဒ	၂၀၁၉
၅၉	အခွန်ဆိုင်ရာစီမံအုပ်ချုပ်မှုဥပဒေ	၂၀၁၄
၆၀	ပြည်ထောင်စု၏အခွန်ကောက်ခံမှုဥပဒေ	၂၀၁၉
၆၁	မြန်မာနိုင်ငံသားများရင်းနှီးမြုပ်နှံမှုဥပဒေ	၂၀၁၃
၆၂	နိုင်ငံခြားရင်းနှီးမြုပ်နှံမှုဥပဒေ	၂၀၁၂
မြန်မာနိုင်ငံ အစိုးရ အဖွဲ့အစည်း၏မူဘောင်		
၆၃	အမျိုးသားအဆင့်နှင့် ကဏ္ဍအလိုက် စီစဉ်ဆောင်ရွက်ခြင်း	
၆၄	စီမံကိန်းနေရာတွင် စီစဉ်ပေးခြင်း	
နိုင်ငံတကာနှင့် အမျိုးသားမူဝါဒများ လမ်းညွှန်ချက်များနှင့် စံနှုန်းများ		
၆၅	အပြည်ပြည်ဆိုင်ရာ ဘဏ္ဍာရေးကော်ပိုရေးရှင်း၏ စံနှုန်းများနှင့် လမ်းညွှန်ချက်များ	၂၀၁၂

စဉ်	ဥပဒေများနှင့် နည်းဥပဒေများ၏နာမည်များ	ခုနှစ်
၆၆	ကမ္ဘာ့ဘဏ်၏ လေထုညစ်ညမ်းမှု ကာကွယ်ရေးနှင့် လျှော့ချရေး လက်စွဲစာအုပ်	၁၉၉၈
နိုင်ငံတကာသဘောတူညီချက်များ		
၆၇	အိုဇုန်းလွှာကာကွယ်ရေးအတွက် ဗီယင်နာသဘောတူညီချက်	၁၉၈၅
၆၈	အိုဇုန်းလွှာ လျော့နည်းစေသော ပစ္စည်းများဆိုင်ရာ မွန်ထရီရယ် ပရိုတိုကော	၁၉၈၇
၆၉	ကျိုတိုပရိုတိုကော	၁၉၉၇
၇၀	ကုလသမဂ္ဂ ရာသီဥတုပြောင်းလဲမှုဆိုင်ရာညီလာခံမူဘောင်	၁၉၉၂

၃. စီမံကိန်းအကြောင်းအရာအသေးစိတ်ဖော်ပြချက်

၃.၁. စီမံကိန်းတည်နေရာ

MGE သည် ခေတ်မီစက်ကိရိယာနှင့် နည်းပညာများအသုံးပြု၍ ဖန်ပုလင်း ဒီဇိုင်းမျိုးစုံ ထုတ်လုပ်ရောင်းချသော စက်ရုံလုပ်ငန်းအမျိုးအစား ဖြစ်ပါသည်။ စီမံကိန်းတည်နေရာမှာ ဦးပိုင် အမှတ် ၉၇၊ ရန်ကုန်-သီလဝါလမ်းမကြီး၊ ဘုရားကုန်းကျေးရွာ၊ သံလျင်မြို့နယ်၊ ရန်ကုန်တိုင်းဒေသကြီး၊ မြန်မာနိုင်ငံတွင် တည်ရှိပါသည်။ စီမံကိန်း လုပ်ငန်းသည် မြောက်လတ္တီတွဒ် ၁၆ ဒီဂရီ ၄၂ မိနစ် ၊ ၂၈.၈၄ စက္ကန့် နှင့် အရှေ့လောင်ဂျီတွဒ် ၉၆ ဒီဂရီ ၁၅ မိနစ် ၊ ၁၈.၇၂ စက္ကန့် ကြားတွင် တည်ရှိပါသည်။ စီမံကိန်း၏ စုစုပေါင်း မြေဧရိယာမှာ ၄၀ ဧက ဖြစ်ပြီး စုစုပေါင်း အဆောက်အအုံ ဧရိယာမှာ ၃ ဧက ဖြစ်ပါသည်။

၃.၂. အခြားရွေးချယ်စရာနည်းလမ်းများ

၃.၂.၁. စီမံကိန်းအတွက် အခြားရွေးချယ်စရာနည်းလမ်းများ

စီမံကိန်းအတွက် အဆောက်အဦတည်ဆောက်မည့် မြေနေရာ ရွေးချယ်ခြင်းနှင့် တရားဝင် လွှဲပြောင်းရယူခြင်းတို့သည် အချိန်ကြာမြင့်နိုင်ပြီး အဆိုပါ လိုအပ်သော မြေနေရာကို ရရှိရန်မှာ မသေချာပါ။ ထို့အပြင် ယခုအချိန်တွင်လည်း အဆိုပြု စီမံကိန်းသည် သက်ဆိုင်ရာအစိုးရဌာနများ၏ ဆောက်လုပ်မှု ခွင့်ပြုချက်များ အရ လုပ်ဆောင်နေပြီ ဖြစ်ပါသည်။

စီမံကိန်းဖော်ဆောင်သူသည် သက်ဆိုင်သောအစိုးရဌာနများမှ အဆောက်အဦ ဒီဇိုင်းများနှင့် လိုအပ်သော ခွင့်ပြုချက်များကို ရရှိရန်အတွက် အချိန်ကြာမြင့်စွာ ဆက်လက်ဆောင်ရွက်ရမည် ဖြစ်ပြီး လက်ရှိကာလတွင် ရရှိပြီးသော ခွင့်ပြုချက်များကို နောက်ဆက်တွဲဖော်ပြချက်များတွင် ဖော်ပြထားပါသည်။ စီမံကိန်း အကောင်အထည် ဖော်ဆောင်မှုအဆင့် မတိုင်မီ ဒီဇိုင်းနှင့်တည်ဆောက်ပုံများအတွက် ငွေကြေး ကုန်ကျမှုများ ရှိမည်ဖြစ်ပြီး စီမံကိန်းဖော်ဆောင်သူအတွက် ငွေကြေးဆုံးရှုံးမှုများ ရှိလာနိုင်ပါသည်။ ထို့ကြောင့် အဆိုပြုစီမံကိန်းအတွက် အခြားသင့်တော်သော ရွေးချယ်စရာနည်းလမ်းများ မရှိနိုင်ပါ။

ထို့ပြင် နိုင်ငံခြားနှင့် ပြည်တွင်းရင်းနှီးမြှုပ်နှံမှုများ အထူးသဖြင့် ဆောက်လုပ်ရေး လုပ်ငန်းများတွင် အတားအဆီးများ ရှိလာနိုင်ပါသည်။ အထက်ဖော်ပြပါ အကြောင်းအရာများကြောင့် လက်ရှိ အဆိုပြု

နေရာတွင်သာ စီမံကိန်းကို ဆက်လက်အကောင်အထည်ဖော်သင့်ပြီး စီမံကိန်းအတွက် တခြားမြေနေရာ ပြန်လည်ရွေးချယ်ခြင်းသည် သင့်တော်မှုမရှိနိုင်ပါ။

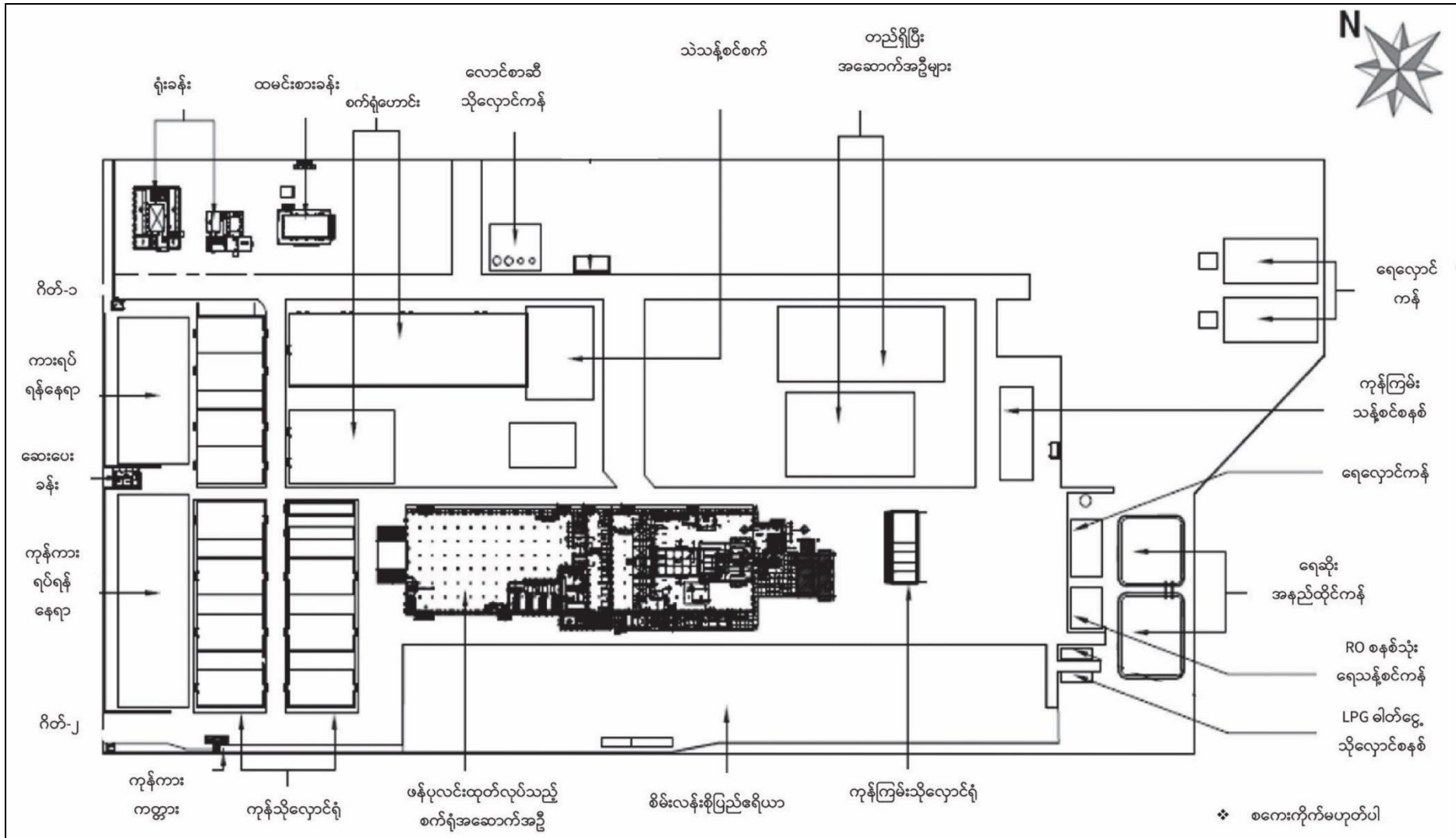
၃.၂.၂. ဖန်ပုလင်းများ ထုတ်လုပ်မှု နည်းပညာအတွက် အခြားရွေးချယ်စရာနည်းလမ်းများ

Blow & Blow Process သည် MGE စက်ရုံ၏ ဖန်ပုလင်းများထုတ်လုပ်သည့် နည်းပညာဖြစ်သည်။ ဤနည်းပညာကို ဖန်ပုလင်းအသေးများ ထုတ်လုပ်မှုတွင် အသုံးပြုသည်။ Blow & Blow Process အပြင် ဖန်ပုလင်းများထုတ်လုပ်ရာတွင် အသုံးပြုမှုများသော အခြားရွေးချယ်စရာ နည်းပညာတစ်ခုမှာ Press & Blow Process ဖြစ်သည်။ သို့သော်လည်း Press & Blow Process မှာ အကျယ်ဖန်ပုလင်းများ ထုတ်လုပ်ရာတွင်သာ အသုံးပြုရန်သင့်လျော်သောကြောင့် MGE စက်ရုံ အတွက် ဖန်ပုလင်းထုတ်လုပ်ရာတွင် အသင့်တော်ဆုံးသော နည်းလမ်းမှာ Blow & Blow Process သာဖြစ်သည်။

၃.၃. စီမံကိန်းအကြောင်းအရာဖော်ပြချက်

၃.၃.၁. စီမံကိန်းဖော်ပြချက်

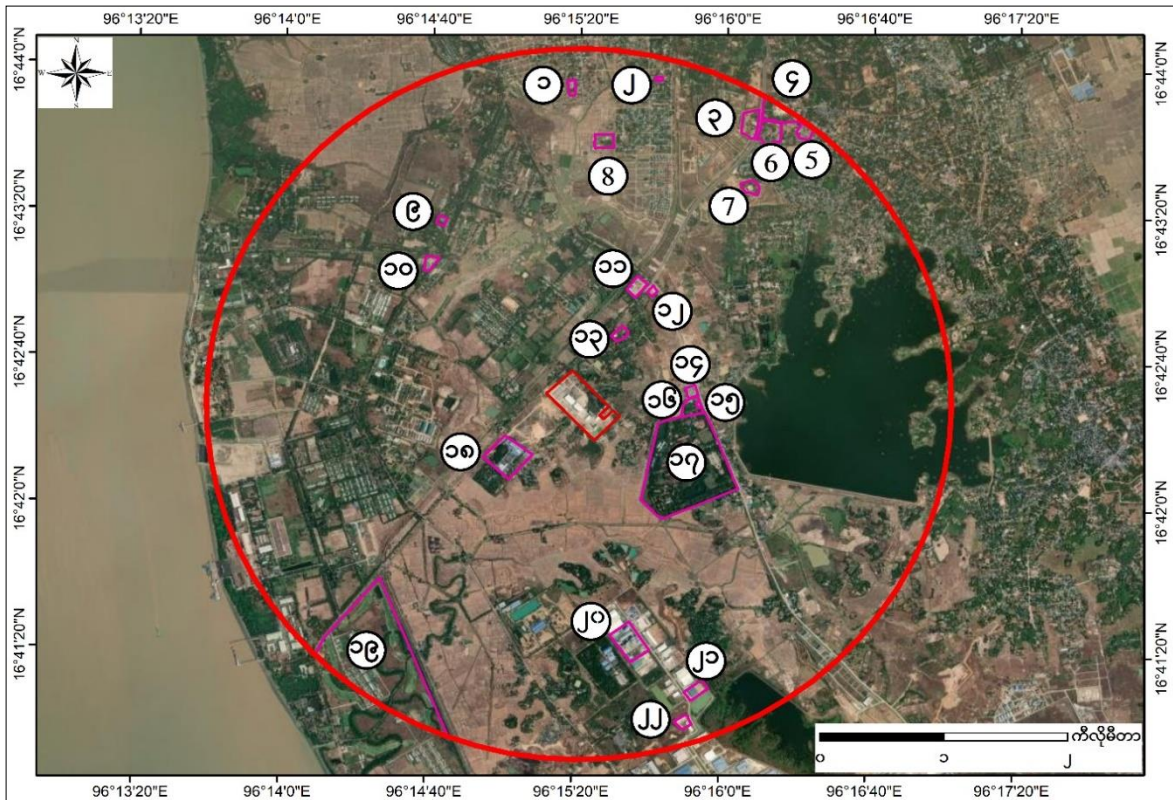
စီမံကိန်းဆိုင်ရာ ဖော်ပြချက်များနှင့် စပ်လျဉ်း၍ အဆိုပြုထားသော စီမံကိန်းသည် ဖန်ချက်စက်ရုံဟောင်း၏ ဧရိယာအတွင်းတွင် ဆောက်လုပ်မည် ဖြစ်ပြီး ဂိုထောင်၊ ရုံးခန်း နှင့် ဝန်ထမ်းအိမ်ရာ စသည့် ရှိပြီးသား အဆောက်အဦအချို့ကို ပြန်လည်ပြင်ဆင်သွားရန် စီစဉ်ထားသည်။ တစ်ချိန်တည်းမှာပင် ဖန်ပုလင်းထုတ်လုပ်ရေးလုပ်ငန်းများ ဆောင်ရွက်ရန်အတွက် နောက်ဆုံးပေါ်နည်းပညာများ အသုံးပြု၍ ဖန်ချက်စက်ရုံသစ်ကို ဆောက်လုပ်မည်ဖြစ်သည်။ ရန်ကုန်တိုင်း၊ သန်လျင်မြို့နယ် စည်ပင်သာယာရေး ကော်မတီမှ ဆောက်လုပ်ခွင့်ပြုမိန့်နှင့် သက်ဆိုင်သည့် စာရွက်စာတမ်းကို နောက်ဆက်တွဲ(က) တွင် ဖော်ပြထားသည်။ အဆိုပြုစီမံကိန်း၏ အဆောက်အဦများ တည်ဆောက်မည့် ပုံစံပြပုံကို ပုံ ၄ တွင်ဖော်ပြထားသည်။



ပုံ ၄ စီမံကိန်း၏ အဆောက်အဦများတည်ဆောက်မည့် ပုံစံပြပုံ

၃.၃.၂. စီမံကိန်း၏အနီးပတ်ဝန်းကျင်ရှိ အခြေအနေများ

စီမံကိန်းနေရာနှင့် အနီးပတ်လည် ၃ ကီလိုမီတာရှိ အဆောက်အဦများကို လေ့လာရာတွင် လူနေအိမ်များ၊ ဘာသာရေးနေရာများ၊ ဆေးရုံများ၊ စီးပွားရေးနယ်မြေဧရိယာများ၊ အစိုးရရုံးများ နှင့် ကျောင်းများကို တွေ့ရှိရပါသည်။ စီမံကိန်း၏ ၃ ကီလိုမီတာ အနီးပတ်လည်ရှိ အဆောက်အဦပြုမြေပုံ နှင့် စီမံကိန်းအနီးဧရိယာရှိ သွင်ပြင်လက္ခဏာများကို ပုံ ၅ တွင် ဖော်ပြထားပြီး အသေးစိတ် အချက်အလက် များကို အခန်း ၃ တွင်ဖော်ပြ ထားပါသည်။



မြေပုံအညွှန်း

○ လေ့လာသည့်ဧရိယာ (၃ ကီလိုမီတာ) □ စီမံကိန်းဧရိယာ

- | | |
|--|---|
| <ul style="list-style-type: none"> ၁ စရိအိုက်ယပွါဆွာမိဟိန္ဒူဘုရားကျောင်း ၂ ဆဲလ်ဗင်းစတားဟိုတယ် ၃ အောင်စင်္ကြာဓမ္မရိပ်သာဘုန်းကြီးကျောင်း ၄ ကျိုက်ခေါက်ဘုရား ၅ ဘုရားကြီးဈေး ၆ ကံသာဓမ္မရိပ်သာဘုန်းကြီးကျောင်း ၇ ကျိုက်အေးဝဘုရား ၈ ရွှေတောင်ကြီးစက်ရုံ ၉ သန်လျင်တပ်နယ်စာတိုက် ၁၀ သန်လျင်ဘုရား ၁၁ ကုန်းလမ်းပို့ဆောင်ရေးဦးစီးဌာန | <ul style="list-style-type: none"> ၁၂ စတားဟိုက်စက်သုံးဆီအရောင်းဆိုင် ၁၃ ခြေခံပညာမူလတန်းလွန်ကျောင်း(ဖန်ချက်) ၁၄ မြန်မာနိုင်ငံရေကြောင်းပညာတက္ကသိုလ်အဆောင် ၁၅ ဒီပါအေး ဒီပါအောင်ဘုရား ၁၆ ဖန်ချက်စက်ရုံတောရဘုန်းကြီးကျောင်း ၁၇ မြန်မာနိုင်ငံရေကြောင်းပညာတက္ကသိုလ် ၁၈ Leader One Myanmar ကုမ္ပဏီလီမိတက် ၁၉ မေယုဂေါက်ကလပ် ၂၀ Yojin Myanmar Cement ကုမ္ပဏီလီမိတက် ၂၁ Agri First ကုမ္ပဏီလီမိတက် ၂၂ Yamar Myanmar ကုမ္ပဏီလီမိတက် |
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ပုံ ၅ စီမံကိန်း၏ လက်ရှိ အနီးပတ်လည် အဆောက်အဦပြုမြေပုံ

၃.၄. စီမံကိန်းလုပ်ငန်းစဉ်များအကောင်အထည်ဖော်ဆောင်ခြင်း

၃.၄.၁. စီမံကိန်းအချိန်ဇယား

အဆိုပြုစီမံကိန်း၏ ဆောက်လုပ်ရေးလုပ်ငန်းများကို ၂၀၁၉ ခုနှစ်၊ ဇန်နဝါရီလတွင် စတင်လုပ်ဆောင်ခဲ့ပါသည်။ အဆိုပြုထားသည့် စီမံကိန်း၏ အဓိက ဆောက်လုပ်ရေးလုပ်ငန်းများသည် ၂၀၂၂ ခုနှစ်၊ ဧပြီလကုန်တွင် ပြီးစီးမည်ဟု ခန့်မှန်းထားပါသည်။ ထို့အပြင် ၂၀၂၂ ခုနှစ်၊ ဧပြီလ ၁၉ ရက်နေ့တွင် လုပ်ငန်းစတင်လည်ပတ်ရန် စီစဉ်ထားပြီး မေလတွင် ထုတ်လုပ်ရေးလုပ်ငန်းများကို လုပ်ဆောင်မည် ဖြစ်သည်။ တစ်ချိန်တည်းမှာပင် ဆောက်လုပ်ရေးကာလ ပြီးဆုံးချိန်တွင် အခြားအသေးစား ဆောက်လုပ်ရေးနှင့် ပြုပြင်မွမ်းမံခြင်းလုပ်ငန်းများကိုလည်း အပြီးသတ်ရန် ရည်မှန်းထားပါသည်။ ယခုအချိန်တွင် စီမံကိန်းလုပ်ငန်းမှာ ကောင်းမွန်စွာလည်ပတ်၍ ကုန်ပစ္စည်းများ ထုတ်လုပ်ရောင်းချနေပြီဖြစ်ပါသည်။ စီမံကိန်းလုပ်ငန်း တည်ဆောက်ရေးနှင့် လည်ပတ်စဉ်ကာလပြု အချိန်ဇယားကို ဇယား ၄ တွင်ဖော်ပြထားသည်။

ဇယား ၄ စီမံကိန်း လုပ်ငန်း တည်ဆောက်ရေး နှင့် လည်ပတ်စဉ်ကာလပြ အချိန်ဇယား

စဉ်	အမျိုးအစား	၂၀၁၆-၂၀၁၈	၂၀၁၉		၂၀၂၀	၂၀၂၁	၂၀၂၂			၂၀၂၃	၂၀၂၄-၂၀၆၆	၂၀၆၇-၂၀၈၆	၂၀၈၇
			ဇန်နဝါရီ	ဖေဖော်ဝါရီ-ဒီဇင်ဘာ			ဇန်နဝါရီ - မတ်	ဧပြီ-မေ	မေ- ဒီဇင်ဘာ				
၁	စီမံကိန်းစတင်ချိန်												
၂	ဆောက်လုပ်ရေးလုပ်ငန်း စတင်ချိန်												
၃	တည်ဆောက်ရေးနှင့် ပြန်လည်ပြင်ဆင်ခြင်းကာလ												
၄	ဆောက်လုပ်ရေးလုပ်ငန်းပြီးစီးသည့်အချိန်												
၅	စီမံကိန်းစမ်းသပ်လည်ပတ်ရန်အချိန်												
၆	ကုန်ပစ္စည်းများ အစမ်းထုတ်လုပ်ရန် အချိန်												
၇	စီမံကိန်းလုပ်ငန်းစီးပွားဖြစ်လည်ပတ်ချိန်												
၈	စီမံကိန်းလုပ်ငန်းသက်တမ်းတိုးလည်ပတ်ချိန်												
၉	စီမံကိန်းလုပ်ငန်းပိတ်သိမ်းရန်လျာထားချိန်												

၃.၄.၂. လုပ်သားအရေအတွက်

ဆောက်လုပ်ရေးကာလအတွင်း တစ်နေ့တာအတွက် ပျမ်းမျှ လုပ်သားဦးရေမှာ ၄၀၀ ခန့်ဖြစ်သည်။ သို့သော်လည်း ဆောက်လုပ်ရေးလုပ်ငန်းအမျိုးအစားနှင့် အချိန်ဇယားပေါ်မူတည်၍ တစ်နေ့တာအတွင်း ဆောက်လုပ်ရေးလုပ်သား စုစုပေါင်းအရေအတွက်သည် ကွဲပြားမှု ရှိနိုင်ပါသည်။

၃.၅. ထုတ်လုပ်ပုံလုပ်ငန်း အဆင့်ဆင့်

၃.၅.၁. ကုန်ကြမ်းပစ္စည်းများ

ဤဖန်ပုလင်းထုတ်လုပ်ရေးလုပ်ငန်းစဉ်အတွက် ကုန်ကြမ်းပစ္စည်းအမျိုးအစား ၂၃ မျိုးကို အဓိကအသုံးပြုသည်။ ဖန်ပုလင်းထုတ်လုပ်ရေးလုပ်ငန်းအတွက် ကုန်ကြမ်းအဖြစ် cullet, sand, soda ash, limestone, feldspar, sodium sulphate, carbon, ferric oxide ၊ selenium တို့ကို အဓိက ကုန်ကြမ်းအရင်းအမြစ်များ အဖြစ် အသုံးပြုသည်။ အခြားသော ကုန်ကြမ်းပစ္စည်းများကို စက်ရုံသန့်ရှင်းရေး လုပ်ငန်းများတွင် လည်းကောင်း၊ စက်လည်ပတ်မှုနှင့် ပြုပြင်ထိန်းသိမ်းမှုဆိုင်ရာ လုပ်ငန်းများတွင် ချောဆီလိုအပ်ချက် ဖြည့်တင်းရန်အတွက်လည်းကောင်း အသုံးပြုပါသည်။ ကုန်ကြမ်းပစ္စည်းအများစုသည် ပြည်တွင်းထွက်ကုန်များ ဖြစ်သော်လည်း အချို့မှာ အိန္ဒိယ၊ တရုတ်၊ UAE၊ အီတလီ၊ ထိုင်း အစရှိသော နိုင်ငံများမှ တင်သွင်းသည်။ ကုန်ကြမ်းစာရင်းနှင့် နေ့စဉ်သုံးစွဲမှုပမာဏကို အခန်း ၃ တွင် အသေးစိတ် ဖော်ပြထားသည်။

၃.၅.၂. ဖန်ပုလင်းထုတ်လုပ်ခြင်းလုပ်ငန်းစဉ်များ

စက်ရုံ၏ အဓိက ထုတ်လုပ်မှု လုပ်ငန်းစဉ်မှာ ဖန်ပုလင်းများ ထုတ်လုပ်ခြင်းဖြစ်ပြီး ထုတ်လုပ်မှု လုပ်ငန်းစဉ်ကို အပိုင်းငါးပိုင်း ခွဲခြားနိုင်သည်။ ၎င်းတို့မှာ ကုန်ကြမ်းပစ္စည်းများ သန့်စင်ခြင်း လုပ်ငန်းစဉ်၊ ကုန်ကြမ်းများရောစပ်သိုလှောင်ခြင်းနှင့် ဖန်ရည်ကြိုချက်ခြင်း၊ မီးဖိုတွင်း ဖန်ပုလင်းအပူချိန် ထိန်းညှိခြင်း၊ နှပ်ဖိုတွင်း ဖန်ပုလင်းအပူချိန်ထိန်းညှိခြင်း နှင့် ဂိုဒေါင်သို့ပေးပို့ခြင်း တို့ဖြစ်သည်။

(၁) ကုန်ကြမ်းပစ္စည်းများ သန့်စင်ခြင်း လုပ်ငန်းစဉ်

ဖန်ကွဲစ ကုန်ကြမ်းပစ္စည်း ကြိတ်ခွဲသန့်စင်စက်ရုံ

ကုန်ကြမ်းအဖြစ် ပြန်လည်အသုံးပြု၍ရသော ဖန်ပုလင်းများကို တစ်ဆင့်ခံကန်ထရိုက်များမှ ဝယ်ယူသည်။ ထို့နောက် ၎င်းဖန်ပုလင်းများကို တူညီသော တစ် စတုရန်းလက်မ အရွယ်အစားရရှိရန် စက်ရုံ၏ ကုန်ကြမ်းသန့်စင်စက်ရုံတွင် ကြိတ်ခွဲပါသည်။

တစ်ချိန်ထဲမှာပင် သံဖြတ်စများ၊ အလူမီနီယံ နှင့် သံဗူးငယ်များကို သံလိုက်ဖြင့် ခွဲခြားပြီး စက္ကူနှင့် သစ်သားစများကို စက်ဖြင့် စုပ်ထုတ်ပါသည်။ ၎င်းလုပ်ငန်း လည်ပတ်ခြင်းအတွက် ဝန်ထမ်းအင်အား ၂၀ ဦးကိုအသုံးပြုပြီး တစ်နေ့လျှင် ကြိတ်ခွဲပြီး ဖန်ကွဲစ ကုန်ကြမ်း ၆၀ တန်ချိန် ထုတ်လုပ်ပါသည်။

သဲဆေးကြောသန့်စင်စက်ရုံ

လုပ်ငန်းစတင်လည်ပတ်ချိန်အတွက်လိုအပ်သော သဲကုန်ကြမ်းကို မြန်မာနိုင်ငံ၊ တနင်္သာရီတိုင်း၊ ဘုတ်ပြင်းမြို့နယ် မှ ရေလမ်းဖြင့် သယ်ယူပို့ဆောင်ပါသည်။ သို့သော်လည်း ယခုအခါတွင် ပိုမိုအရည်အသွေး ကောင်းမွန်သော သဲကုန်ကြမ်းကို တနင်္သာရီတိုင်း၊ အလမန်ကျွန်း မှ နှစ်စဉ် နွေရာသီ၌မှာယူစုဆောင်း၍ တစ်နှစ်တာပတ်လုံးအသုံးပြုပါသည်။ စက်ရုံ၏နေ့စဉ် သဲကုန်ကြမ်း သုံးစွဲမှုပမာဏမှာ တန်ချိန် ၁၀၀ ခန့်ရှိပါသည်။ ယေဘုယျအားဖြင့် သဘာဝသဲများကို တစ်ရက်လျှင် တန်ချိန် ၃၀ - ၄၀ ထုတ်နိုင်သော စက်ရုံရှိ သဲဆေးကန်တွင် သန့်စင်ပြီး အရည်အသွေးစစ်ဆေးပါသည်။ ဤလုပ်ငန်းစဉ်တွင် စက်ရုံ၏ အနည်ကျ ကန်များမှ ရေများကို သဲဆေးကြောခြင်းလုပ်ငန်းအတွက် ပြန်လည် အသုံးပြုပါသည်။

(၂) ကုန်ကြမ်းများရောစပ်သိုလှောင်ခြင်းနှင့် ဖန်ရည်ကြိုချက်ခြင်း

ကုန်ကြမ်းအလေးချိန်နှင့် ရောစပ်ခြင်း

သဲ၊ ပြာ၊ ထုံးကျောက်၊ ဆိုဒီယမ်ဆာလဖိတ် စသော ကုန်ကြမ်းများကို လိုအပ်သော အချိန်အဆများ (B:C) Batch/Cullet အချိုးဖြင့်ချိန်ဆကာ ရောမွှေပါသည်။ ထိုလုပ်ငန်းစဉ်အတွက် ကုန်ကြမ်းပစ္စည်းများ ရောစပ်ခြင်း၊ အလေးချိန်ချိန်ခြင်း နှင့် မီးဖိုသို့ ပို့ဆောင်ခြင်း ဟူသော အဆင့် ၃ ဆင့်ရှိပါသည်။ (B:C) အချိန်အဆသည် ကုန်ကြမ်းများပေါ်မူတည်၍ ပြောင်းလဲနိုင်ပါသည်။ ပျမ်းမျှအားဖြင့် ၉၀ Batch လျှင် ဖန်ပုလင်းအသေး ၈,၀၀၀ သို့မဟုတ် ဖန်ပုလင်းအကြီး ၅,၀၀၀ ခန့်ထုတ်လုပ်နိုင်ပါသည်။

ဖန်ရည်ကြိုခြင်း

ဖန်ရည်ကြိုသည့်အဆင့်တွင် တိကျသောနှုန်းထားများဖြင့် ရောစပ်ထားသောကုန်ကြမ်းများကို မီးဖိုထဲသို့ ပို့ဆောင်ပါသည်။ ဓာတ်ငွေ့ထုတ်လွှတ်မှုအဆင်ပြေစေရန် မီးဖိုနှင့် မီးခိုးခေါင်းတိုင်ကို စနစ်တကျ ချိတ်ဆက်ထားပါသည်။ မီးဖိုအုတ်နံရံကို အပူဒဏ်ခံနိုင်သော အုတ်များဖြင့် ပြုလုပ်ထားပါသည်။ မီးဖိုသည် အပူချိန် ၁,၅၀၀ ဒီဂရီစင်တီဂရိတ်တွင် တစ်ရက်လျှင် ၂၄နာရီ လည်ပတ်ပါသည်။ ထို့အပြင် ဖန်ရည်ကြိုရာတွင် ကောင်းစွာပျော်ဝင်စေရန် ဓါတ်ကူအဖြစ် ဆိုဒီယမ်ကာဗွန်နိတ်ကို ထည့်ရပါသည်။

(၃) မီးဖိုတွင်း ဖန်ပုလင်းအပူချိန်ထိန်းညှိခြင်း(အပူဖြင့်)

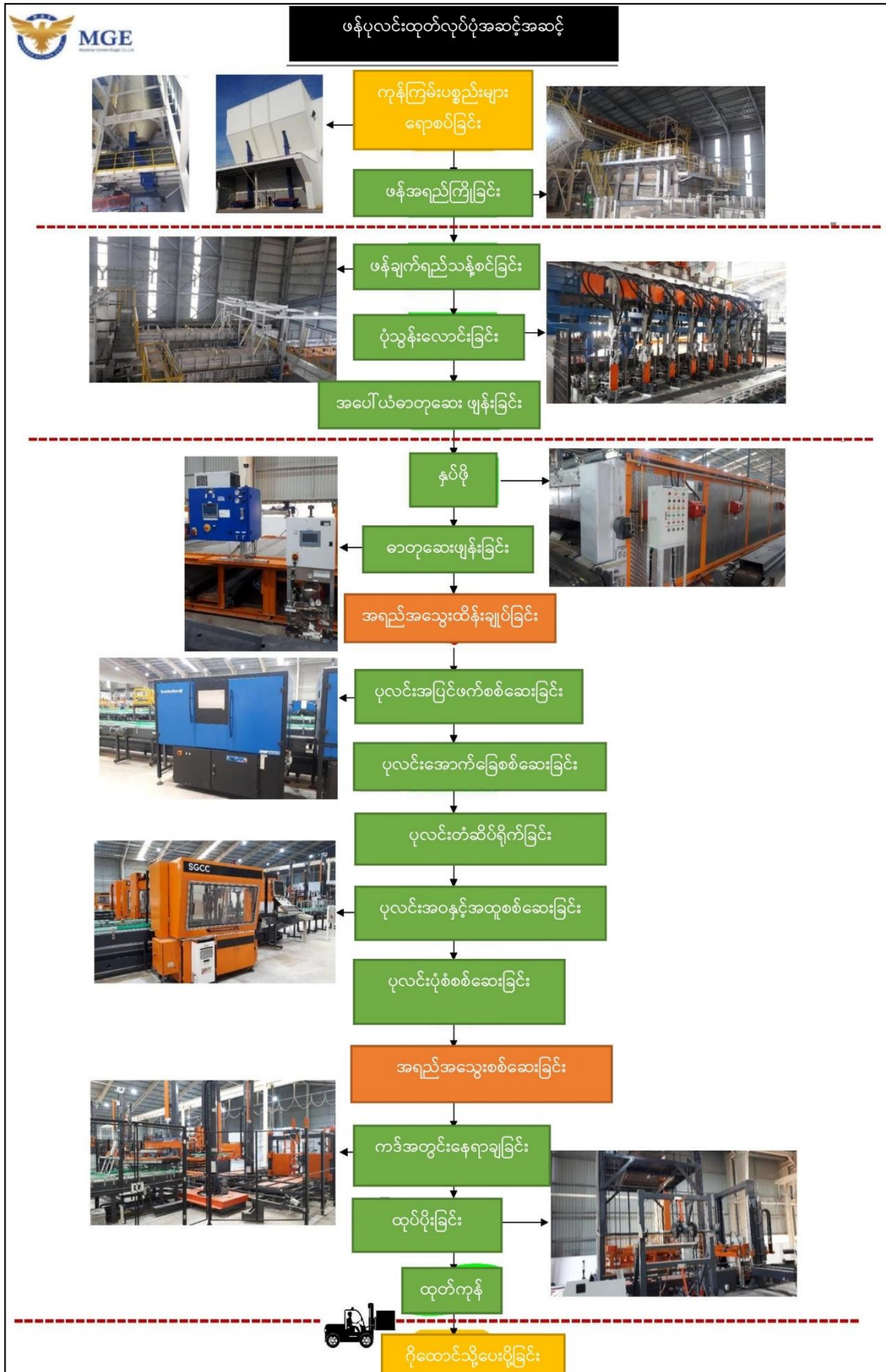
မီးဖိုတွင်း ဖန်ပုလင်းအပူချိန်ထိန်းညှိခြင်းတွင် စုစုပေါင်း အဆင့် ၃ ဆင့်ပါဝင်ပြီး အီတလီနိုင်ငံမှ ထုတ်လုပ်သော 1.5 စက်ဖြင့်လုပ်ဆောင်ပါသည်။ စက်ရုံတွင် 1.5 စက် ၄ လုံးတပ်ဆင်ထားပြီး စက်တစ်ခုစီသည် တစ်ကြိမ်လျှင် ဖန်ပုလင်း ၈ လုံး ထုတ်နိုင်ပါသည်။ ၎င်းစက်မှ တစ်မိနစ်လျှင် အထူ ၁၇၅ မီလီမီတာရှိသော ဖန်ပုလင်းပေါင်း ၁၈၄ လုံး အထိ အများဆုံးထုတ်လုပ်နိုင်ပါသည်။ ဖော်ပြပါ ဖန်ပုလင်းထုတ်လုပ်သော လုပ်ငန်းစဉ်တွင် ဖန်လုံအိမ်အာနိသင်အပေါ် သက်ရောက်မှု မရှိနိုင်သည့် fluorocarbon-152a ဓာတ်ငွေ့ကို ဖန်ပုလင်းသန့်စင်ခြင်းလုပ်ငန်းအတွက် အသုံးပြုထားပါသည်။ ဖော်ပြပါလုပ်ငန်းစဉ်တွင် အသုံးပြုမည့် ဓာတုပစ္စည်းများစာရင်းကို အခန်း (၃) ၊ ကုန်ကြမ်းပစ္စည်းများ အပိုင်းရှိ ဇယား ၃-၃ တွင် အသေးစိတ် ဖော်ပြထားပါသည်။

(င) နှပ်ဖိုတွင်း ဖန်ပုလင်းအပူချိန်ထိန်းညှိခြင်း (အအေးဖြင့်)

ဖော်ပြပါအဆင့်တွင် အပူချိန်အကူးအပြောင်းကြောင့် ဖန်ပုလင်းတွင် ဖြစ်ပေါ်နိုင်သော ပျက်စီးမှုများကိုလျော့ချနိုင်ရန် နှပ်ဖိုတွင်း ဖန်ပုလင်းအပူချိန်ထိန်းညှိခြင်း (အအေးဖြင့်) လုပ်ငန်းကို ဆက်လက်လုပ်ဆောင်ရန်လိုအပ်ပါသည်။ ၎င်းအဆင့်တွင် မီးနှပ်ခြင်း၊ ဓာတုဆေးဖြန်းခြင်း နှင့် အရည်အသွေး စစ်ဆေးခြင်း စသော အဆင့် ၃ ဆင့်ပါဝင်ပါသည်။ ဓာတုဆေးဖြန်းခြင်းလုပ်ငန်းတွင် အသုံးပြုသော ဆေးအမည်မှာ RP40 ဖြစ်၍ ဖန်ပုလင်းနံရံများ ပွန်းပဲ့ခြင်းနှင့် အညစ်အကြေးများကပ်ငြိမှုမရှိစေရန် အပေါ်ယံလွှာအဖြစ် အသုံးပြုပါသည်။

(၅) ဂိုဒေါင်သို့ပေးပို့ခြင်း

ဖန်ပုလင်းထုတ်လုပ်ခြင်း လုပ်ငန်းစဉ်၏ နောက်ဆုံးအဆင့်မှာ လိုအပ်သောထုတ်ပိုးမှုများ လုပ်ဆောင်ပြီးနောက် ဂိုဒေါင်သို့ ပစ္စည်းတင်/ချ ယာဉ်များဖြင့် ပို့ဆောင်ခြင်းဖြစ်သည်။ စက်ရုံ၏ နောက်ဆုံးထုတ်ကုန်များကို ဈေးကွက်သို့မဖြန့်ချိမီ ဂိုဒေါင်တွင် ယာယီ သိမ်းဆည်းပါသည်။ ဖန်ပုလင်းများ ထုတ်လုပ်သည့် လုပ်ငန်းစဉ် အဆင့်ဆင့်ကို ပုံ ၆ တွင် ဖော်ပြထားသည်။



ပုံ ၆ ထုတ်လုပ်ပုံလုပ်ငန်း အဆင့်ဆင့်

၃.၅.၃. ထုတ်ကုန်များ

ဤစီမံကိန်းသည်အဆင့်မြင့်နည်းပညာများ အသုံးပြု၍ ဖန်ပုလင်းများထုတ်လုပ်သည့် လုပ်ငန်းဖြစ်ပြီး လစဉ်ကုန်ကြမ်းသုံးစွဲမှုသည် ၈,၅၅၀ တန် ဝန်းကျင်ရှိသည်။ ၎င်းမှ ၇၀ ရာခိုင်နှုန်းသည် ကုန်ချောပစ္စည်းအဖြစ်ရရှိပြီး ကျန် ၃၀ ရာခိုင်နှုန်းမှာ အခြားသော လုပ်ငန်းများတွင် ပြန်လည်အသုံးချနိုင်သော ကုန်ကြမ်းထွက်ကုန်အဖြစ် ရရှိသည်။ စီမံကိန်းစက်ရုံမှ အဓိကအားဖြင့် ဖန်ပုလင်းအကြည်နှင့် အညိုရောင် ဖန်ပုလင်း နှစ်မျိုးထုတ်လုပ်မည်ဖြစ်ပါသည်။ စီမံကိန်းစက်ရုံမှ ထုတ်လုပ်သည့် ထုတ်ကုန်များကို ပုံ ၇ တွင် ဖော်ပြထားပါသည်။ စက်ရုံ၏ ကုန်ထုတ်လုပ်မှုနှုန်းသည် ပျမ်းမျှအားဖြင့် တစ်မိနစ်လျှင် ပုလင်းပေါင်း ၁၂၀ မှ ၁၈၅ ပုလင်းကြားရှိပြီး ဝယ်ယူသုံးစွဲသူများ၏ လိုအပ်ချက်ပေါ်မူတည်၍ ကုန်ထုတ်လုပ်မှုနှုန်းထားကွဲပြားနိုင်သည်။ စက်ရုံ၏ ပျမ်းမျှ ဖန်ပုလင်းများ ထုတ်လုပ်မှုနှုန်းမှာ တစ်ရက်လျှင် (တန် ၂၀၀) ပုလင်း ၄၅၀,၀၀၀ လုံးဖြစ်သည်။



ပုံ ၇ စီမံကိန်းစက်ရုံမှ ထုတ်လုပ်မည့် ထုတ်ကုန်များ

၃.၆. စီမံကိန်းလုပ်ငန်းစဉ်များ

၃.၆.၁. စီမံကိန်းလုပ်ငန်းတည်ဆောက်မှုအခြေအနေ

အဆိုပြုထားသော စီမံကိန်းတွင် တစ်ထပ်မှ နှစ်ထပ် အမြင့်အထိ ရုံးခန်း အဆောက်အအုံများ၊ အထပ်သုံးထပ်ပါစက်ရုံ ဆောက်လုပ်ခြင်းနှင့် ပြုပြင်မွမ်းမံခြင်းလုပ်ငန်းများ ပါဝင်ပါသည်။ လုပ်ငန်းစဉ်များမှာ အဓိကအားဖြင့် စက်ရုံ၊ ဂိုဒေါင်၊ ရုံးခန်း၊ စိမ်းလန်းစိုပြေသောနေရာများ နှင့် ကားပါကင် စသည်တို့တည်ဆောက်ခြင်း အပြင် အဆောက်အအုံဟောင်းများ ပြင်ဆင်ခြင်း စသည်တို့ဖြစ်ပါသည်။ စီမံကိန်းဧရိယာ၏ မြေယာအသုံးပြုမှုအညွှန်းကို အခန်း ၃ တွင်အသေးစိတ် ဖော်ပြထားပါသည်။

၃.၆.၂. ကားရပ်နားရန်နေရာ

စက်ရုံဧရိယာတွင် ကုန်ကားများနှင့် ကိုယ်ပိုင်ကားများ ရပ်နားရန်ဟူ၍ ယာဉ်ရပ်နားရန် နေရာ နှစ်မျိုးရှိသည်။ ရပ်နားရန်နေရာ စုစုပေါင်းဧရိယာသည် ကိုယ်ပိုင်ကားများအတွက် ၁,၅၀၀ စတုရန်းမီတာနှင့် ကုန်တင်ယာဉ်များအတွက် ၂,၅၀၀ စတုရန်းမီတာ အသီးသီးရှိသည်။ ပျမ်းမျှအားဖြင့် ကိုယ်ပိုင်ကား အရေအတွက် အများဆုံး ၄၅ စီးနှင့် ထရပ်ကားအရေအတွက် အများဆုံး ၁၈ စီးကို ရပ်နားရန် စီစဉ်ထားပါသည်။

၃.၆.၃. ဖန်ရည်ကျိုဖိုတည်ဆောက်ရန်အသုံးပြုသော ပစ္စည်းများ

ဖန်ပုလင်းများ ထုတ်လုပ်မှု လုပ်ငန်းစဉ်တွင် ဖန်အရည်ပျော်စေရန်အတွက် မြင့်မားသော အပူချိန် (၁,၅၀၀ ဒီဂရီစင်တီဂရိတ်) တွင် ၂၄ နာရီကြာ လည်ပတ်ရသောကြောင့် ဖန်ရည်ကျိုဖိုသည် ဤကုန်ထုတ်လုပ်မှု လုပ်ငန်းစဉ်တွင်အရေးပါသော အခန်းကဏ္ဍမှ ပါဝင်ပါသည်။ refractories ဟုခေါ်သော မြင့်မားသောအပူချိန်ကို ခံနိုင်ရည်ရှိသော ဖန်ရည်ကျိုဖို တည်ဆောက်ရန် အသုံးပြုသော ပစ္စည်းများသည် ဖန်ရည်ကျိုဖို၏ သက်တမ်းကို ထိန်းသိမ်းရန် ကူညီပေးပါသည်။

ဤလုပ်ငန်းစဉ်တွင် ဖန်ရည်ကျိုဖို တည်ဆောက်ရန်အသုံးပြုသော ပစ္စည်းများကို အသုံးပြုသည့် ရည်ရွယ်ချက်အရ အုပ်စုငါးစု ခွဲခြားထားပါသည်။ ၎င်းတို့မှာ ပစ္စည်းများတစ်ခုနှင့်တစ်ခု ပေါင်းစပ်ရန် အတွက် အသုံးပြုခြင်း၊ ပုံသွန်းလောင်းခြင်းလုပ်ငန်းများတွင် အသုံးပြုခြင်း၊ လျှပ်ကာ၊ အပူကာများအဖြစ် အသုံးပြုခြင်း၊ အလွှာများ တစ်သားတည်း ပေါင်းစပ်ဖွဲ့စည်းရန်နှင့် ကြိုတင် သွန်းလောင်းထားသော ပစ္စည်းများတပ်ဆင်ရန်အတွက် အသုံးပြုခြင်း စသည်တို့ဖြစ်ပါသည်။ ထို့အပြင် မီးဖို၏ ဇုန်တစ်ခုစီတွင် အလိုအလျှောက် အပူချိန်အာရုံခံကိရိယာများကို တပ်ဆင်ထားသည့်အပြင် မီးဖိုအတွက် အသုံးပြုသည့် မီးခံအုတ်အမျိုးအစားမှာလည်း ဇုန်တစ်ခုနှင့်တစ်ခု အပူချိန်ပေါ်မူတည်၍ ကွဲပြားပါသည်။

ထို့အပြင် ဖန်ရည်ကျိုဖို တည်ဆောက်ရန် အသုံးပြုသော အချို့ပစ္စည်းများသည် လူနှင့် ပတ်ဝန်းကျင် အထူးသဖြင့် ဖန်လုံအိမ်အာနိသင်ဆိုင်ရာ အန္တရာယ်ကို ဖြစ်ပေါ်စေနိုင်ပါသည်။ ထို့ကြောင့် အသုံးမပြုမီ ဓာတုပစ္စည်းတစ်ခုချင်းစီနှင့် သက်ဆိုင်သည့် ဓာတုပစ္စည်းဆိုင်ရာဘေးအန္တရာယ် ကင်းရှင်းရေး လမ်းညွှန်ချက်အားလုံးကို လိုက်နာရန် အရေးကြီးပါသည်။ ဖန်ရည်ကျိုဖို တည်ဆောက်ရန် အသုံးပြုသော ပစ္စည်းအမျိုးအစားများ နှင့် ၎င်းပစ္စည်းများတပ်ဆင်အသုံးပြုထားသော တည်နေရာအညွှန်းကို အခန်း ၃ တွင် အသေးစိတ်ဖော်ပြထားပါသည်။

၃.၇. ရေထောက်ပံ့မှုစနစ်

၃.၇.၁. ရေအရင်းအမြစ်

စီမံကိန်းတည်ဆောက်စဉ်နှင့် လုပ်ငန်းလည်ပတ်စဉ်ကာလ နှစ်ခုလုံးအတွက် အဓိက ရေအရင်းအမြစ်ကို အစိုးရရေပေးဝေရေးစနစ်မှ ရယူမည် ဖြစ်ပါသည်။ ဤစီမံကိန်းတွင် ဇာမဏီအင်း ရေလှောင်တံခံမှရေကို စက်ရုံအတွက် အစိုးရရေပေးဝေသော အဓိကရေအရင်းအမြစ်အဖြစ် အသုံးပြုပါသည်။ ဇာမဏီအင်း ရေလှောင်တံခံမှရေကို စက်ရုံ၏ ရေသန့်စင်စနစ်သို့ မဖြတ်သန်းမီ စီမံကိန်းဧရိယာအတွင်း ဂါလံ ၂၀၀,၀၀၀ ဆံ့သည့် ရေလှောင်ကန်များတွင် သိုလှောင်ထားပါသည်။

၃.၇.၂. ရေလိုအပ်ချက်ပမာဏ နှင့် ရေသုံးစွဲမှု

ဆောက်လုပ်ရေးကာလတွင် စီမံကိန်း၏ နေ့စဉ်ရေသုံးစွဲမှုမှာ တစ်နေ့လျှင် ၂၂၀ ကုဗမီတာရှိပြီး သောက်သုံးရေသုံးစွဲမှုမှာ ဆောက်လုပ်ရေးကာလအတွက် တစ်ရက်လျှင် ၈ ကုဗမီတာဝန်းကျင်ဖြစ်သည်။ သို့သော် သောက်သုံးရေသုံးစွဲမှုမှာ ဆောက်လုပ်ရေးလုပ်သား စုစုပေါင်းအရေအတွက်ပေါ်မူတည်၍ ပြောင်းလဲနိုင်ပါသည်။

ခန့်မှန်းခြေအားဖြင့် စီမံကိန်းလုပ်ငန်းလည်ပတ်စဉ်ကာလတွင် နေ့စဉ် ရေသုံးစွဲမှုမှာ တစ်ရက်လျှင် ပျမ်းမျှအားဖြင့် ကုဗမီတာ ၆,၅၀၀ ဝန်းကျင်ရှိနိုင်ပြီး သောက်သုံးရေ သုံးစွဲမှုမှာ တစ်နေ့လျှင် ၈ ကုဗမီတာအောက် လျော့နည်းမည်ဖြစ်သည်။

၃.၇.၃. ရေသန့်စင်မှုစနစ်

ရေသန့်စင်မှုစနစ်အနေဖြင့် စက်ရုံတွင်းတွင် အကြိုရေသန့်စင်မှုစနစ်များ အပြင် RO စနစ်သုံးရေသန့်စင်စက်များ တပ်ဆင်ထားပါသည်။ အကြိုရေသန့်စင်မှုစနစ်တွင် သဲဇကာ၊ ကာဗွန်ဇကာနှင့် softener စနစ်သုံး ရေသန့်စင်စနစ်များ ပါဝင်၍ ရေသန့်စင်နိုင်မှု နှုန်းထားမှာ တစ်နာရီလျှင် ၃၀ ကုဗမီတာ ဖြစ်ပါသည်။

အစိုးရရေပေးဝေရေးစနစ်မှ ရေကို စက်ရုံရှိရေသိုလှောင်ကန်များအတွင်း၌ မသိုလှောင်မီ သဲဇကာ နှင့် ကာဗွန်ဇကာ များကို ပထမဦးစွာ ဖြတ်သန်းစေသည်။ ထို့နောက် ၎င်းကြိုတင်သန့်စင်ပြီးရေများကို ရေစင်သို့ ပန်ဖြင့်စုပ်တင်ပြီး စက်ရုံဝင်းအတွင်း အထွေထွေ သန့်ရှင်းရေးလုပ်ငန်းများတွင် အသုံးပြုရန် ဖြန့်ဝေပါသည်။ ထို့အပြင် ရေစင်မှ ရေအချို့ကို softener စနစ်ဖြင့် သန့်စင်ပြီး ရေလှောင်ကန်၌ သိမ်းဆည်းသည်။ softener မှထွက်သောစွန့်ပစ်ရေများကိုမူ အနည်ထိုင်ကန်ထဲသို့ တိုက်ရိုက် စီးဆင်းစေပါသည်။

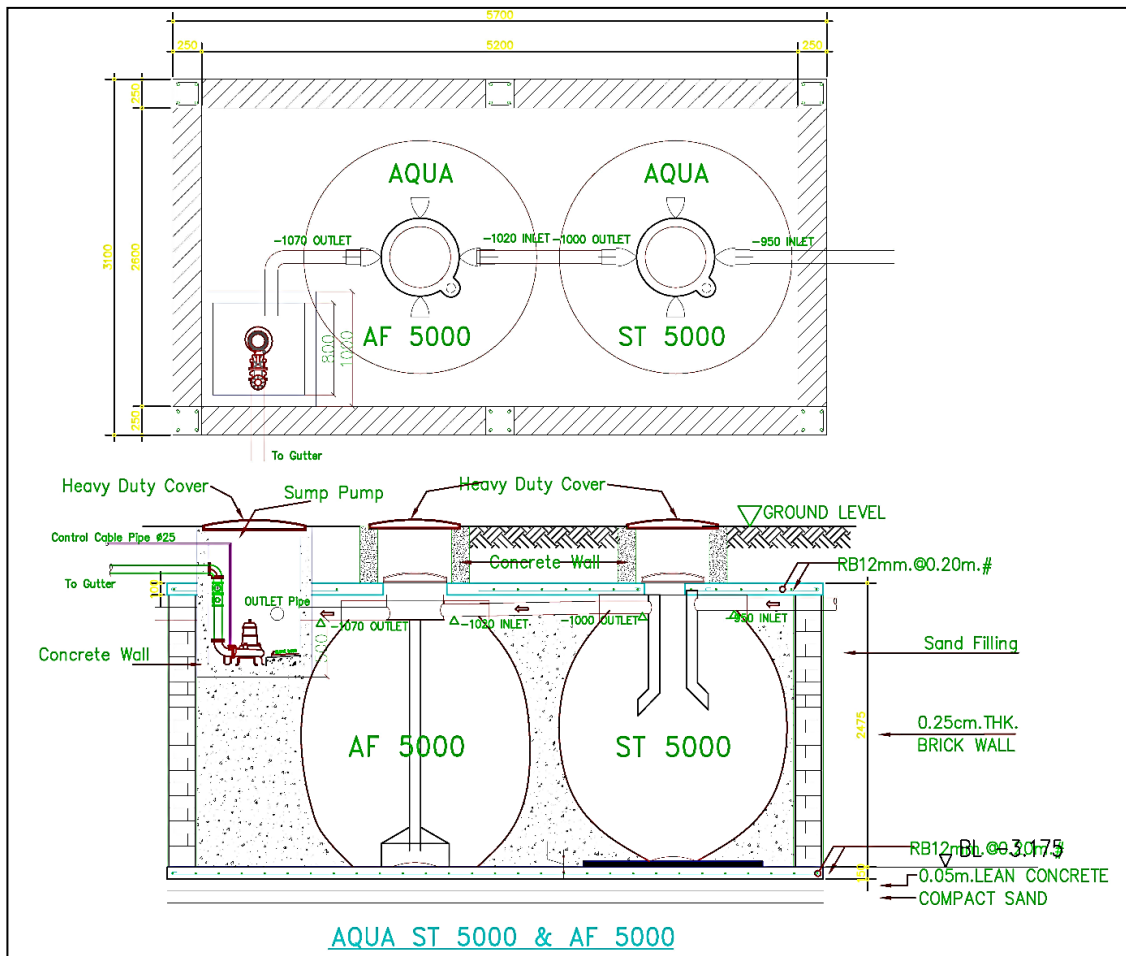
ထို့နောက် အကြိုရေသန့်စင်မှုစနစ်ကို ဖြတ်သန်းပြီးသောရေများကို စက်ရုံးတွင်း အထွေထွေလုပ်ငန်းများအတွက်လည်းကောင်း၊ ဖန်ပုလင်းထုတ်လုပ်ခြင်း လုပ်ငန်းများနှင့် RO စနစ်သုံး ရေသန့်စင်စက်ကို ဖြတ်သန်းစီးဆင်းရန်အတွက်လည်းကောင်း အသီးသီးအသုံးပြုပါသည်။ RO စနစ်၏ ရေသန့်စင်နိုင်မှု နှုန်းထားမှာ တစ်နာရီလျှင် ၅ ကုဗမီတာခန့် ဖြစ်သည်။ RO စနစ်ဖြင့် သန့်စင်ပြီးရေများကို အရေးကြီးသော ထုတ်လုပ်ရေးလုပ်ငန်းစဉ်များ အတွက် အသုံးပြုမည် ဖြစ်ပါသည်။

၃.၈. စွန့်ပစ်ရေနှင့် မိလ္လာရေ သန့်စင်မှုစနစ်

၃.၈.၁. အိမ်သုံးရေဆိုးနှင့် မိလ္လာကန်စနစ်

အိမ်သုံးရေဆိုးများသည် ထမင်းစားဆောင်များ၊ ပန်းပင်ရေလောင်းခြင်း၊ သန့်ရှင်းရေး နှင့် စက်ရုံ အိမ်သာများ၏ မိလ္လာကန်များမှ ထွက်ရှိပါသည်။

ပန်းပင်ရေလောင်းခြင်းနှင့် သန့်ရှင်းရေးလုပ်ခြင်းမှထွက်သော ရေများကို စက်ရုံရေမြောင်းစနစ် မှတစ်ဆင့် အနည်ထိုင်ကန်ထဲသို့ တိုက်ရိုက် စွန့်ထုတ်ပါသည်။ စက်ရုံ၏ အိမ်သာများ၊ နှင့် စားဖိုဆောင်များမှ ထွက်သောရေဆိုးများကို စက်ရုံရေမြောင်းစနစ်မှတစ်ဆင့် စီမံကိန်းအတွင်းရှိ မြေလွတ်တွင်စွန့်ပစ်ပါသည်။ မိလ္လာကန်စနစ်မှ ထွက်ရှိလာသော သန့်စင်ပြီးရေများကို စည်ပင် ရေနှုတ်မြောင်းထဲသို့ တိုက်ရိုက် စွန့်ထုတ်မည်ဖြစ်သည်။ မိလ္လာကန်အသေးစိတ်ပုံကို ပုံ ၈ တွင်ပြသထားသည်။



ပုံ ၈ မိလ္လာကန်အသေးစိတ်ပုံ

၃.၈.၂. စက်ရုံသုံးစွန့်ပစ်ရေပမာဏနှင့် ရေဆိုးသန့်စင်မှုစနစ်

စီမံကိန်းလည်ပတ်စဉ်ကာလ နေ့စဉ်ခန့်မှန်းရေသုံးစွဲမှုပမာဏမှာ တစ်နေ့လျှင် ကုဗမီတာ ၆,၅၀၀ ဝန်းကျင်ဖြစ်သည်။ စက်ရုံမှထွက်ရှိသော ရေဆိုးများကို အဆီခွဲထုတ်စနစ်ဖြင့် ကြိုတင်သန့်စင်ပါသည်။ အဆီခွဲထုတ်ကန်စနစ်ကို ဖြတ်သန်းပြီးသောရေဆိုးများကို အနည်ထိုင်ကန် ၂ ကန်တွင် ဆက်လက်သန့်စင် စေသည်။ အနည်ထိုင်ကန်များသည် ၅ မီတာအနက်ရှိ၍ စုစုပေါင်းရေသိုလှောင်နိုင်သော ပမာဏမှာ တစ်ကန်လျှင် ၅,၀၀၀ ကုဗမီတာစီဖြစ်ပါသည်။ အနည်ထိုင်ကန် ၎င်းအနည်ထိုင်ကန်မှရေကို ကုန်ကြမ်းများ ဆေးကြောရန် အတွက် ပြန်လည်အသုံးပြုသည်။ ထို့ပြင် အနည်စစ်ကန်၏ ရေမျက်နှာပြင်အား ထိန်းချုပ်နိုင်ရန်အတွက် ရေလျှံပေါက်များ ထားရှိတပ်ဆင်ထားပါသည်။ အနည်ထိုင်ကန်များ၏ အောက်ခြေ ရှိ အနည်အနှစ်များကို ပုံမှန်စုဆောင်းကာ စနစ်တကျစွန့်ပစ်မည်ဖြစ်ပါသည်။ ထိုသို့စွန့်ပစ်ရာတွင်လည်း အန္တရာယ်ရှိ စွန့်ပစ်အမှိုက်စီမံခန့်ခွဲမှု အစီအစဉ်များကို စနစ်တကျ တိကျစွာ လိုက်နာသွားမည်ဖြစ်ပါသည်။ ရေဆိုးသန့်စင်မှုစနစ် အဆင့်ဆင့်မှာ အောက်ပါအတိုင်းဖြစ်သည်။

(၁) အဆီခွဲထုတ်ကန်

စက်ရုံမှထွက်ရှိသော ရေဆိုးများထဲတွင် စက်ဆီ၊ ချောဆီ နှင့် ဖန်ပုလင်းများပုံသွင်းလောင်းရာတွင် စေးကပ်မှုလျော့ချရန် အသုံးပြုသော အဆီများ ရောနှောပါဝင်သည်။ ထို့ကြောင့် ၎င်း အဆီနှင့် ဆီများကို ဖယ်ရှားရန် ရေဆိုးသန့်စင်စနစ်၏ ကနဦးအဆင့်အနေဖြင့် အဆီခွဲထုတ်ကန်စနစ်ကို တပ်ဆင်ထားပါသည်။

(၂) အနည်ထိုင်ကန်

အဆီခွဲထုတ်ကန်စနစ်မှ ဖြတ်သန်းလာသော ရေဆိုးများမှ အနည်ထိုင်နိုင်သော အခဲများကို ဖယ်ရှားရန်အတွက် အနည်ထိုင်ကန်ဆောက်လုပ်၍ ရေဆိုးများကိုသန့်စင်စေသည်။ အနည်ထိုင်ကန်၏ စုစုပေါင်း သိုလှောင်နိုင်မှုပမာဏမှာ ကုဗမီတာ ၅,၀၀၀ ဝန်းကျင်ဖြစ်သည်။ နောက်ဆုံးတွင် အနည်ထိုင်ကန်တွင် သန့်စင်ပြီးရေဆိုးများကို ကုန်ကြမ်းဆေးကြောခြင်းလုပ်ငန်းများတွင် ပြန်လည် အသုံးပြုပါသည်။ ထို့ပြင် အနည်စစ်ကန်၏ ရေမျက်နှာပြင်အား ထိန်းချုပ်နိုင်ရန်အတွက် ရေလျှံပေါက်များ တပ်ဆင်ထားရှိပါသည်။

(၃) အနည်အနှစ်များ စုဆောင်းခြင်းနှင့် စွန့်ပစ်ခြင်း

စက်ရုံ၏ အနည်ထိုင်ကန်များနှင့် မိလ္လာကန်များမှထွက်သော အနည်အနှစ်များကို ပုံမှန် စုပုံထုတ်မည်ဖြစ်သည်။ အနည်အနှစ်များ ထွက်ရှိနှုန်းမြင့်မားပါက တစ်နှစ်လျှင် တစ်ကြိမ် သို့မဟုတ် နှစ်ကြိမ် အနည်ထိုင်ကန်များမှ အနည်အနှစ်များ ဆယ်ယူစွန့်ပစ်မည်ဖြစ်ပါသည်။ ၎င်းဆယ်ယူထားသော အနည်အနှစ်များကို မြေဖို့ရန်အတွက်လည်းကောင်း၊ လိုအပ်ပါက မြို့နယ်စည်ပင်သို့ ဆက်သွယ်၍ လည်းကောင်း သက်ဆိုင်ရာလမ်းညွှန်ချက်များနှင့်အညီ စွန့်ပစ်မည်ဖြစ်ပါသည်။

၃.၉. စွမ်းအင်ထောက်ပံ့မှု

၃.၉.၁. လျှပ်စစ်ဓာတ်အား

စီမံကိန်းအတွက် လျှပ်စစ်ဓာတ်အားကို အစိုးရလျှပ်စစ်ဓာတ်အားလိုင်းမှ ရယူမည်ဖြစ်သည်။ လျှပ်စစ်ဓာတ်အားထောက်ပံ့မှုအတွက် ၈ အမ်ပီအေ အားရှိသော ထရန်စဖော်မာ ၁ လုံး စီစဉ်ထားပါသည်။ ထို့အပြင် ၂,၀၀၀ ကေပီအေရှိသော ဓာတ်အားခွဲရုံ ၂ ရုံ၊ ၃,၅၀၀ ကေပီအေရှိသော ဓာတ်အားခွဲရုံ ၁ ရုံ နှင့် ၅၀ ကေပီအေရှိသော ဓာတ်အားခွဲရုံ ၁ ရုံ ကိုလည်း စက်ရုံဝန်းအတွင်း၌ တပ်ဆင်ထားပါသည်။ ထရန်စဖော်မာနှင့် ဓာတ်အားခွဲရုံ ဆိုင်ရာပုံများကို ပုံ ၉ နှင့် ပုံ ၁၀ တွင် ဖော်ပြထားပါသည်။



ပုံ ၉ ထရန်စဖော်မာ



ပုံ ၁၀ ဓာတ်အားခွဲရုံ များပြပုံ

၃.၉.၂. မီးစက်အသုံးပြုမှု

အရေးပေါ် ဓာတ်အားထောက်ပံ့မှုအတွက် Mitsubishi MGS စီးရီး ဒီဇယ်မီးစက်များကို တပ်ဆင်ထားသည်။ မီးစက်၏ စွမ်းဆောင်ရည်မှာ ၃၈၀ ဗို့ ထုတ်လွှတ်ရန် တစ်မိနစ်လျှင် ၁,၅၀၀ ခန့် လည်ပတ်နှုန်း ရှိသည်။ မီးစက်၏ အင်ဂျင်အဆင့်သတ်မှတ်ချက်သည် ပင်မစနစ် အတွက် ၁,၈၀၀ ကေဗွီအေ နှင့် အရန်စနစ် အတွက် ၁,၉၂၀ ကေဗွီအေ အသီးသီးဖြစ်သည်။ MGS-1500B မီးစက်၏ ဓာတ်ပုံနှင့် ၎င်း၏အင်ဂျင်လည်ပတ်မှုဆိုင်ရာအချက်အလက်များကို ပုံ ၁၁ နှင့် ဇယား ၅ တွင် ပြသ ထားသည်။



ပုံ ၁၁ Mitsubishi MGS စီးရီး ဒီဇယ်ဂျင်နရေတာ

ဇယား ၅ အင်ဂျင်လည်ပတ်မှုဆိုင်ရာအချက်အလက်များ

အမျိုးအမည်	ယူနစ်	ပင်မစနစ် (၁,၉၂၀ ကေဗွီအေ)	အရန်စနစ် (၁,၈၀၀ ကေဗွီအေ)
အင်ဂျင်ပါဝါ	kWh	၁၆၇၈	၁၅၂၃
၁ မီတာအတွင်း ဆူညံသံထွက်ရှိမှုနှုန်းထား	dB (A)	၁၁၁	၁၀၉
လောင်ကျွမ်းခါတ်ငွေ့ စီးဝင်နှုန်း	m ³ /min	၁၄၃	၁၂၇
အိတ်ဇေခါတ်ငွေ့ ထွက်ရှိနှုန်း	m ³ /min	၃၇၈	၃၃၄
အိတ်ဇေခါတ်ငွေ့ အပူချိန်	°C	၅၃၀	၅၂၀
ဂျင်နရေတာမှ အပူထုတ်လွှတ်နှုန်း	kW	၇၅	၆၆

၃.၉.၃. လောင်စာဆီသုံးစွဲမှုနှင့် သိုလှောင်မှုစနစ်

လောင်စာသုံးစွဲမှုအနေဖြင့် သဘာဝဓာတ်ငွေ့၊ Liquefied Petroleum Gas (LPG) နှင့် ဒီဇယ်ကို စက်ရုံလုပ်ငန်းအတွက် သိုလှောင်အသုံးပြုပါသည်။ ဒီဇယ် ကို လျှပ်စစ် ဓာတ်အား ပြတ်တောက် သောအခါ အရန်စွမ်းအင် ထောက်ပံ့ပေးသော မီးစက်အတွက် အဓိကအသုံးပြုသည့်အတွက် ဒီဇယ်သုံးစွဲမှုနှုန်းသည် အဓိကအားဖြင့် လျှပ်စစ်ဓာတ်အားရရှိမှုကာလအပေါ် မူတည်သည်။ Generator ၏ ပျမ်းမျှ ဒီဇယ် သုံးစွဲမှု သည် တစ်နာရီလျှင် ၄၅၀ မှ ၅၀၀ လီတာ ဝန်းကျင်ဖြစ်သည်။ ထို့ပြင် ဖော့ကလစ်၊ ကားကရိန်း၊ မြေတူးစက် နှင့် ထရပ်ကား ကဲ့သို့ ယာဉ် များ အတွက် ဒီဇယ်ဆီလိုအပ်သည်။ ယာဉ် များ ၏ ဒီဇယ် သုံးစွဲ မှု နှုန်း သည် တစ်နာရီလျှင် ၆၇၆ လီတာ ဝန်းကျင် ရှိ သည်။ ၎င်းအပြင် ဖန်ရည်ကြိုမီးဖိုအတွက် သဘာဝဓာတ်ငွေ့ ပြတ်လပ်လျှင် အသုံးပြုနိုင်ရန် အရန်အဖြစ် တစ်နာရီလျှင် ဒီဇယ် ၁,၃၀၀ လီတာခန့် လိုအပ်နိုင်ပါသည်။ စက်ရုံတွင်း၌ ဂါလံ ၁၂၅,၀၀၀ နှင့် ဂါလံ ၂၆,၀၀၀ အသီးသီးဆုံသော ဒီဇယ်သိုလှောင်ကန်နှစ်ခု နှင့် အရံသိုလှောင်ကန် အလွတ် နှစ်ခုရှိပါသည်။

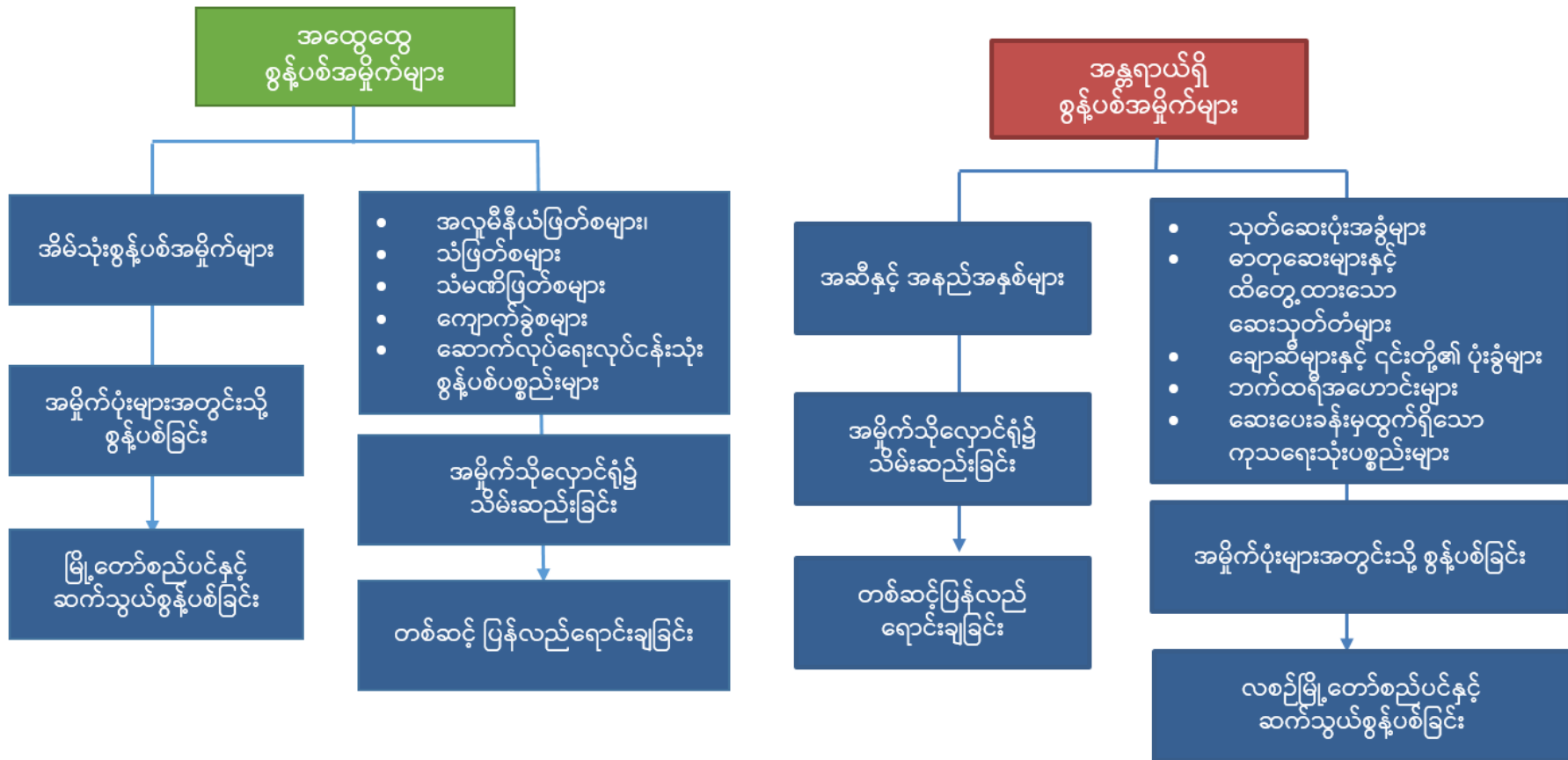
ဒီဇယ်အပြင် သဘာဝဓာတ်ငွေ့ကို ဖန်ရည်ကြိုမီးဖို ၂၄ နာရီ ကြာလည်ပတ်နိုင်ရန် အတွက် အဓိကလောင်စာရင်းမြစ်အဖြစ် အသုံးပြုပါသည်။ မီးဖို၏ ပျမ်းမျှ သဘာဝဓာတ်ငွေ့ သုံးစွဲမှုမှာ တစ်နာရီလျှင် ၁,၂၀၀ လီတာ ဝန်းကျင်ဖြစ်သည်။ သဘာဝ ဓာတ်ငွေ့ကို စက်ရုံဧရိယာ အတွင်း၌ မသိုလှောင်ဘဲ မြန်မာ့ရေနံနှင့် သဘာဝဓာတ်ငွေ့လုပ်ငန်းလက်အောက်ရှိ ရတနာ ဓာတ်ငွေ့ဆိုင်မှတစ်ဆင့် ပိုက်လိုင်းများဖြင့် ၂၄ နာရီ ပတ်လုံး တိုက်ရိုက်သွယ်ယူ အသုံးပြုပါသည်။

LPG ဓာတ်ငွေ့ ကန်များ ကို သဘာဝဓာတ်ငွေ့ ပြတ်တောက်ပါက အရံအဖြစ် အသုံးပြုနိုင်ရန် စက်ရုံ အတွင်းတွင် သိုလှောင်ထားရှိပါသည်။ စက်ရုံ၏ ပျမ်းမျှ LPG သုံးစွဲမှုမှာ တစ်နာရီလျှင် ၂,၂၀၀ ကီလိုဂရမ် ခန့်ရှိနိုင်၍ ၎င်းမှ ၁၇၆ ကီလိုဂရမ်ကို မီးဖိုအတွက် အသုံးပြုပါသည်။

၃.၁၀. အစိုင်အခဲစွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှု

၃.၁၀.၁. စွန့်ပစ်အမှိုက်ပမာဏနှင့် အစိုင်အခဲစွန့်ပစ်မှုစနစ်

စီမံကိန်းနေရာတွင် အမှိုက်ပုံးများ လုံလောက်စွာ ထားရှိမည် ဖြစ်ပြီး ထိုအမှိုက်များကို စနစ်တကျ စုဆောင်းထားပြီး မြို့နယ် စည်ပင်သာယာရေးကော်မတီ၏ လမ်းညွှန်ချက်များအတိုင်း စွန့်ပစ်မည် ဖြစ်ပါသည်။ အန္တရာယ်ရှိ စွန့်ပစ်အမှိုက်များ နှင့် အန္တရာယ်မရှိသောစွန့်ပစ်အမှိုက် နှစ်မျိုးလုံးအတွက် အစိုင်အခဲ စွန့်ပစ်ပစ္စည်း စီမံခန့်ခွဲမှုစနစ်အား အောက်ပါပုံ ၁၂ တွင် ဖော်ပြထားပြီး စက်ရုံ၏အသေးစိတ် အမှိုက်စီမံခန့်ခွဲမှုစနစ်အား အခန်း ၃ တွင်ဖော်ပြထားပါသည်။



ပုံ ၁၂ စွန့်ပစ်ပစ္စည်းများ စီမံခန့်ခွဲမှုစနစ်

၃.၁၁. အလုပ်ချိန် နှင့် ဝန်ထမ်းအင်အား

ရုံးပိုင်းတွင်မူ ဝန်ထမ်းများ၏ အလုပ်ချိန်သည် တနင်္လာမှ သောကြာအတွင်း နံနက် ၈:၀၀ မှ ညနေ ၅:၃၀ ထိဖြစ်ပြီး အားလပ်ချိန်မှာ နေ့လည် ၁၂:၀၀ မှ ၁:၀၀ အထိဖြစ်သည်။ စနေ၊ တနင်္ဂနွေနှင့် အခြား အစိုးရ ရုံးပိတ်ရက်များကို ပိတ်ရက်အဖြစ်ထားရှိပါသည်။ လက်ရှိတွင် ဝန်ထမ်းဦးရေစုစုပေါင်းမှာ ၄၀၀ ခန့်ရှိ၍ လုပ်ငန်းစတင်လည်ပတ်ချိန်၌ ကုန်ထုတ်လုပ်မှုနှုန်းထားကိုမူတည်၍ အပြောင်းအလဲရှိနိုင်ပါသည်။

စက်ရုံ၏ ကုန်ထုတ်လုပ်မှုဌာနသည် အဆိုင်းနှစ်ဆိုင်းဖြင့် ၂၄ နာရီလည်ပတ်သည်။ ပထမအဆိုင်းကို မနက် ၈:၀၀ မှ ည ၈:၀၀ နာရီအထိ သတ်မှတ်၍ ဒုတိယအဆိုင်းကို ည ၈:၀၀ နာရီမှ မနက် ၈:၀၀ နာရီအထိ သတ်မှတ်ထားရှိပါသည်။ ကုန်ထုတ်ဌာန ၂၄ နာရီပတ်လုံးလည်ပတ်နိုင်ရန် အဖွဲ့သုံးဖွဲ့ခွဲ၍ သက်ဆိုင်ရာ အဆိုင်းအလိုက် တာဝန်ထမ်းဆောင်ကြပါသည်။ ကုန်ထုတ်လုပ်မှုအခြေအနေအပေါ် မူတည်၍ အဖွဲ့တစ်ဖွဲ့လျှင် ဝန်ထမ်းဦးရေ ၄၄ ဦး ထားရှိမည်ဖြစ်သည်။ ကုန်ထုတ်ဌာနအဖွဲ့ဝင် ဝန်ထမ်းများအားလုံးသည် နေ့ဆိုင်းလေးရက်ဆင်း တစ်ရက်နား၊ ထို့နောက် ညဆိုင်းလေးရက်ဆင်း သုံးရက်နား စနစ်ဖြင့် ပုံမှန်လည်ပတ်၍ အလုပ်ဆင်းမည်ဖြစ်သည်။

၃.၁၂. ဝန်ထမ်းဖူလုံရေးအထောက်အပံ့များ

စက်ရုံဝင်းအတွင်း နေ့ဆိုင်းနှင့် ညဆိုင်းတာဝန်ကျ ဝန်ထမ်းများနေထိုင်ရန် ဝန်ထမ်းအိမ်ရာ စီစဉ်ပေးထားမည်ဖြစ်သည်။ ထို့အပြင် ဝန်ထမ်းများ၏ စွမ်းဆောင်ရည်ပေါ်မူတည်၍ ဘောနပ်စ်ပေးခြင်း၊ ရုံးဖယ်ရိက္ခာများစီစဉ်ပေးခြင်း၊ ယူနီဖောင်း၊ ကျန်းမာရေးအစောင့်အရှောက်များပေးခြင်း စသည်ဖြင့် အခြားထောက်ပံ့မှုများလည်း ဆောင်ရွက်ပေးမည်ဖြစ်သည်။

လုပ်ငန်းခွင်အတွင်းတွင်လည်း ဝန်ထမ်းများ အနားယူရန် နေရာများ၊ စားဖိုဆောင်များ၊ သန့်ရှင်းသော အိမ်သာများနှင့် အခြားလူမှုရေးအထောက်အပံ့များ ထောက်ပံ့ပေးထားမည်ဖြစ်သည်။ ထို့အပြင် စက်ရုံတွင်း ဆေးခန်း ထားရှိရန်လည်း စီစဉ်ထားသည်။ ဆေးခန်းတွင် အလုပ်ချိန်အတွင်း ဆရာဝန်တစ်ဦးထားရှိပေးမည်ဖြစ်သည့်အပြင် တာဝန်ကျ သူနာပြုတစ်ဦးကိုလည်း ၂၄ နာရီ ထားရှိပေးမည် ဖြစ်ပါသည်။

ထို့အပြင် ကုန်ထုတ်လုပ်ရေး လုပ်သားများအတွက် တစ်ကိုယ်ရည်သုံးကာကွယ်ရေးပစ္စည်းများ နှင့် ရှေးဦးသူနာပြုပစ္စည်းများကို လုပ်ငန်းခွင်အတွင်း သင့်လျော်သော နေရာများတွင် ထားရှိပေးသွားမည် ဖြစ်သည်။

၄. ပတ်ဝန်းကျင်ဆိုင်ရာအခြေခံအချက်အလက်များ

စီမံကိန်း၏လေ့လာသည့် ဧရိယာအတွင်းတွင် သဘာဝပတ်ဝန်းကျင်၊ လူမှုစီးပွားပတ်ဝန်းကျင်၊ ပတ်ဝန်းကျင်အရည်အသွေးတိုင်းတာမှုနှင့် ဇီဝဗေဒဆိုင်ရာလေ့လာမှုများ စသည့် ပတ်ဝန်းကျင်ဆိုင်ရာ အခြေခံအချက်အလက်များကို တိုင်းတာခဲ့ပြီး အနှစ်ချုပ်ကို ဇယား ၆ တွင်ဖော်ပြထားပါသည်။

ဇယား ၆ ပတ်ဝန်းကျင်ဆိုင်ရာ အခြေခံအချက်အလက်များ ကောက်ယူခြင်း အနှစ်ချုပ်

စဉ်	အမျိုးအစား	အကြောင်းအရာ
သဘာဝပတ်ဝန်းကျင်		
၁	ရာသီဥတု	ဒေသဆိုင်ရာ အစိုးရရုံးအချက်အလက်များအရ စီမံကိန်းတည်ရှိရာ သန်လျင်မြို့နယ်သည် ၂၀၁၉ တစ်နှစ်လုံးတွင် ပျမ်းမျှအမြင့်ဆုံးအပူချိန်မှာ ၄၈ ဒီဂရီစင်တီဂရိတ် နှင့် ပျမ်းမျှအနိမ့်ဆုံး အပူချိန်မှာ ၂၂.၅ ဒီဂရီစင်တီဂရိတ် ရှိပါသည်။
၂	မြေမျက်နှာသွင်ပြင်	စီမံကိန်းတည်ရှိရာ သန်လျင်မြို့နယ်သည် ပင်လယ်ရေမျက်နှာပြင်အထက် ၂၃.၉ မီတာ မြင့်ပါသည်။ သန်လျင်မြို့နယ်သည် အရှေ့ဘက်တွင် သုံးခွမြို့နယ်နှင့် ခရမ်းမြို့နယ်၊ တောင်ဘက်တွင် ကျောက်တန်းမြို့နယ်၊ အနောက်ဘက်တွင် ရန်ကုန်မြစ် နှင့် မြောက်ဘက်တွင် ပဲခူးမြစ်တို့နှင့် နယ်နမိတ် ထိစပ်လျက်ရှိပါသည်။ သန်လျင်မြို့နယ်တွင် မြောက်မှတောင်သို့ သွယ်တန်းလျက်ရှိသော သန်လျင်-ကျောက်တန်းမော်တော်ကားလမ်း နှင့် ရေဝေရေလဲဧရိယာတို့ တည်ရှိပါသည်။ မြို့နယ်၏ အရှေ့မှ အနောက်ဘက်သည် မြေနိမ့်လွင်ပြင်ဖြစ်ပါသည်။
၃	ဘူမိဗေဒ၊ မြေဆီလွှာနှင့် ငလျင်	မြန်မာနိုင်ငံ၏ ဘူမိဗေဒဆိုင်ရာမြေပုံ (၂၀၁၄) အရ စီမံကိန်းဧရိယာသည် နုန်းမြေ ဆန်သော ကျောက်လွှာအမျိုးအစားဖြစ်ပါသည်။ ၎င်းကျောက်လွှာများကို ဒေသဆိုင်ရာ ပထဝီအနေထားများအရ အရှေ့ဘက်စစ်တောင်းမြစ်နှင့် အနောက်ဘက် ဧရာဝတီ မြစ်ကြားရှိ ပဲခူးရိုးမ၏ တောင်တန်းများနှင့် မြစ်ဝကျွန်းပေါ်ဒေသများတွင် တွေ့ရပါသည်။ မြန်မာနိုင်ငံလုံးဆိုင်ရာ ငလျင်ဇုန်မြေပုံအရ ရန်ကုန်တိုင်းဒေသကြီးသည် ပြင်းထန်၍ အင်အား အသင့် အတင့်ရှိသော ငလျင်ဇုန်နေရာတွင်တည်ရှိပါသည်။ ငလျင်လှုပ်မှု မှတ်တမ်းများ အရ ရန်ကုန်တိုင်းဒေသကြီးအတွင်း အနည်းငယ်မှ အလယ်အလတ်အဆင့် ရှိသော ငလျင် ဇုန်အတွင်းတွင်တည်ရှိပါသည်။
၄	ဇလဗေဒ	သီလဝါအထူးစီးပွားရေးဇုန်အနီးရှိ အဓိကမြစ်မှာ ရန်ကုန်မြစ်ဖြစ်ပြီး၊ ဇုန်ပတ်ဝန်းကျင်တွင် ဒီရေမြစ် ၆ ခုနှင့် သေးငယ်သော ချောင်းများရှိပါသည်။ ထို့အပြင် ဇုန်၏ပတ်ဝန်းကျင်တွင် ဇာမဏီအင်း ရေသိုလှောင်ကန်၊ ဘန်ဘွေးကုန်းရေသိုလှောင်ကန်နှင့် သီလဝါရေသိုလှောင်ကန်ဟူ၍ ရေသိုလှောင်ကန် ၃ ကန် ရှိပါသည်။
လူမှုစီးပွားဆိုင်ရာ ပတ်ဝန်းကျင်		
၅	မြေအသုံးပြုမှု	မြေအသုံးပြုမှုကို စီမံကိန်း၏ ၃ ကီလိုမီတာ အတွင်းတွင် လေ့လာခဲ့ပါသည်။ လေ့လာရာတွင် မြေလွတ်၊ စက်မှုဧရိယာ၊ လယ်ကင်း၊ လမ်း၊ လူနေဧရိယာ၊ ဘာသာရေးဧရိယာ၊ အစိုးရမြေဧရိယာ၊ စပါးခင်း နှင့် ရေထုထည် ကဲ့သို့သော မြေအသုံးပြုမှု အမျိုးအစား ၉ မျိုး တွေ့ရှိရပါသည်။ လေ့လာတွေ့ရှိချက်အရ အစိုးရမြေဧရိယာသည် ၃ ကီလိုမီတာ အတွင်းတွင် အကြီးဆုံးအပိုင်းဖြစ်ပြီး ဘာသာရေးဧရိယာသည် အသေးဆုံးအပိုင်း ဖြစ်ပါသည်။

စဉ်	အမျိုးအစား	အကြောင်းအရာ
၆	လူဦးရေနှင့် အသက်အုပ်စု	စီမံကိန်းတည်ရှိရာမြို့နယ်ဖြစ်သော သန်လျင် တွင် စုစုပေါင်းရပ်ကွက် ၁၇ ခု၊ ကျေးရွာအုပ်စု ၂၈ ခု၊ ရွာ ၅၇ ရွာ နှင့် အိမ်ခြေ ၆၂,၁၂၃ ရှိပြီး လူဦးရေ စုစုပေါင်းမှာ ၆၆,၈၀၀ ဦးရှိသည်ကို တွေ့ရသည်။ စုစုပေါင်းလူဦးရေအားလုံးတွင် အသက် ၁၈ နှစ်နှင့် အထက်အမျိုးသမီးဦးရေသည် အနည်းငယ် များနေသည်ကို တွေ့ရှိရပါသည်။
၇	လူမျိုးများနှင့် ကိုးကွယ်မှု	စီမံကိန်းဧရိယာတွင် ဗမာလူမျိုးများ အဓိကနေထိုင်ကြပါသည်။ ဗမာလူမျိုး (၂၅၀,၅၁၄) ယောက် တွေ့ရပြီး ရခိုင်လူမျိုးမှာ ဒုတိယအကြီးဆုံးဖြစ်ပြီး (၁,၀၅၇) ယောက်ရှိသည်။ စီမံကိန်းမြို့နယ်များတွင် လူဦးရေအများဆုံးမှာ ဗုဒ္ဓဘာသာ ဖြစ်ပြီး ကျန်သော လူမျိုးမှာ ဟိန္ဒူ နှင့် မူဆလင်များ ဖြစ်သည်။ ခရစ်ယာန်ဘာသာ ကိုးကွယ်သူ များလည်း ရှိပြီး လူဦးရေ ၉၀၁ ခန့် အထိရှိသည်။
၈	ပညာရေး	စီမံကိန်းမြို့နယ်များတွင် ပညာရေးစင်တာများစွာရှိပြီး မူလတန်းကျောင်း (၃၃)ခု၊ မူလတန်းကြိုကျောင်း (၁)ခု၊ အထက်တန်းကျောင်း (၁၁)ခု၊ အလယ်တန်းကျောင်း (၄) ခု နှင့် အလယ်တန်းလွန်ကျောင်း (၅) ခု ရှိသည်။
၉	အသက်မွေးမှု (အလုပ်အကိုင်၊ ဝင်ငွေ၊ ကျန်းမာရေး၊ အခြေခံအဆောက်အအုံ၊ လျှပ်စစ် နှင့် ရေအသုံးပြုမှု)	စီမံကိန်းမြို့နယ်အတွင်းတွင် အလုပ်အကိုင်များစွာ ရှိပါသည်။ အထွေထွေလုပ်သားဦးရေမှာ အများဆုံးဖြစ်ပြီး လခစားဝန်ထမ်းဦးရေမှာ ဒုတိယအများဆုံး ဖြစ်ပါသည်။ ကုန်သွယ်ရေးလုပ်ငန်းနှင့် စက်မှုလုပ်ငန်း လုပ်ကိုင်သူဦးရေမှာ အရေအတွက် အတူနီးပါး ဖြစ်သည်။ အဓိကဝင်ငွေရရှိမှုမှာ ပုဂ္ဂလိကကုမ္ပဏီများနှင့် အစိုးရရုံး လုပ်ငန်းများမှ ဖြစ်ပါ သည်။ စီမံကိန်းမြို့နယ်များတွင် ဈေးများ၊ စက်ရုံများကဲ့သို့အခြေခံ အဆောက်အအုံများ ရှိပါသည်။ ထို့အတူ INGO နှင့် လူမှုရေးအသင်းအဖွဲ့များ၊ NGO ကဲ့သို့သော မီးသတ်တပ်ဖွဲ့၊ မိခင်နှင့်ကလေးစောင့်ရှောက်ရေးအသင်း၊ ကြက်ခြေနီအသင်း၊ စစ်မှုထမ်းဟောင်းအဖွဲ့ နှင့် မြန်မာအမျိုးသမီးရေးရာအဖွဲ့ စသည့် လူမှုအဖွဲ့အစည်းများ ရှိပါသည်။ လူအများစုမှာ ဗုဒ္ဓဘာသာ ဖြစ်သောကြောင့် ဘုန်းကြီးကျောင်း၊ သီလရှင်ကျောင်း နှင့် ဓမ္မာရုံကဲ့သို့ သာသနာ့ နယ်မြေများစွာလည်း ရှိပါသည်။ ရန်ကုန်တိုင်းဒေသကြီးအတွင်းတွင် အစိုးရ ဓါတ်အားလှိုင်းများ ရှိပါသည်။
၁၀	သယ်ယူပို့ဆောင်ရေး	စီမံကိန်းမြို့နယ်များတွင် သွားလာရန် အဆင်ပြေသော လမ်းများ ရှိပါသည်။
ပတ်ဝန်းကျင်ဆိုင်ရာ အခြေခံအရည်အသွေး တိုင်းတာမှု		
၁၁	လေထုအရည်အသွေး	ကာဗွန်ဒိုင်အောက်ဆိုဒ်၊ ကာဗွန်မိုနောက်ဆိုဒ်၊ နိုက်ထရိုဂျင်ဒိုင် အောက်ဆိုဒ်၊ ဆာလဖာဒိုင်အောက်ဆိုဒ်၊ မီသိန်း၊ အငွေ့ပြန်လွယ်သော အော်ဂဲနစ် ဩဇာပေါင်းများ၊ အိုဇုန်း၊ လေထုထဲရှိအမှုန်အမွှားများ၊ အပူချိန် နှင့် စိုထိုင်းစ ကဲ့သို့သော လေထုအရည်အသွေးများကို သန်လျင်မြို့နယ်၏ စီမံကိန်း ဝန်းကျင်တွင် ၃ နေရာခွဲ၍ တိုင်းတာခဲ့ပါသည်။ ရလဒ်များကို

စဉ်	အမျိုးအစား	အကြောင်းအရာ
		<p>အမျိုးသား ပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး ထုတ်လုပ်မှု လမ်းညွှန်ချက်များ (၂၀၁၅) နှင့် နှိုင်းယှဉ်ခဲ့သည်။</p> <p>အမှတ် A1 တွင် တိုင်းတာခဲ့သော လေထုအရည်အသွေးမှာ အမျိုးသား ပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး ထုတ်လုပ်မှု လမ်းညွှန်ချက်များ (၂၀၁၅) အတွင်းတွင် ရှိပါသည်။</p> <p>အမှတ် A2 တွင် တိုင်းတာခဲ့သော လေထုအရည်အသွေးများမှာ အမျိုးသား ပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး ထုတ်လုပ်မှု လမ်းညွှန်ချက်များ (၂၀၁၅)အတွင်းတွင် ရှိပါသည်။ အထူးသဖြင့် အမှတ် A2 တွင် တိုင်းတာခဲ့သော လေထုအရည်အသွေးများဖြစ်သည့် လေထုထဲရှိအမှုန်အမွှားများ နှင့် အငွေ့ပြန်လွယ်သော အော်ဂဲနစ် ဒြပ်ပေါင်းများ သည် လူနေရပ်ကွက်များ၊ စက်မှုဇုန်များနှင့် အနည်းငယ်အကွာတွင် တည်ရှိသောကြောင့် ထိခိုက်မှု အနည်းဆုံး ဖြစ်စေနိုင်လောက်အောင် နည်းပါးပါသည်။</p> <p>အမှတ် A3 တွင် တိုင်းတာခဲ့သော လေထုအရည်အသွေးများမှာ အမျိုးသား ပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး ထုတ်လုပ်မှု လမ်းညွှန်ချက်များ (၂၀၁၅) အတွင်းတွင် ရှိနေပါသည်။</p>
၁၂	လေတိုက်နှုန်းနှင့် လေတိုက်ရာအရပ်	<p>သံလျင်မြို့နယ် စီမံကိန်းဧရိယာအနီးရှိ နေရာ ၃ခုတွင် လေတိုက်နှုန်းနှင့် လေတိုက်ရာအရပ်တို့ကို တိုင်းတာခဲ့ပါသည်။</p> <p>အမှတ် A1 အတွက် ကွင်းဆင်းတိုင်းတာချက်များအရ စီမံကိန်းဧရိယာ အနီးတွင် လူနေရပ်ကွက်မရှိသော်လည်း စီမံကိန်းအတွင်း လေတိုက်နှုန်းမှာ တစ်စက္ကန့် လျှင် ၁.၂ မီတာအဖြစ်ဖြင့် တောင် မှ အနောက်တောင်အရပ် သို့ လေတိုက်နှုန်း ၁၉၉ ဒီဂရီဖြင့် တိုက်ခတ်ပါသည်။</p> <p>အမှတ် A2 အတွက် လေတိုက်နှုန်းမှာ တစ်စက္ကန့်လျှင် ၁.၀ မီတာနှုန်းဖြင့် တောင်အရပ်သို့ လေတိုက်နှုန်း ၁၉၁ ဒီဂရီဖြင့် တိုက်ခတ်ပါသည်။</p> <p>အမှတ် A3 အတွက် လေတိုက်နှုန်းမှာ တစ်စက္ကန့်လျှင် ၀.၉ မီတာနှုန်းဖြင့် တောင်မှ အနောက်တောင် အရပ်သို့ လေတိုက်နှုန်း ၁၉၄ ဒီဂရီဖြင့် တိုက်ခတ်ပါသည်။</p>
၁၃	ရေအရည်အသွေး	<p>ရေအရည်အသွေးအား စီမံကိန်းအနည်စစ်ကန်မှ စွန့်ပစ်ရေ၊ ဝန်ထမ်းများမှ အထွေထွေစွန့်ပစ်ရေ၊ မြေအောက်ရေနှင့် ရေသန့်စက်မှ ထွက်ရှိသော ရေအား တိုင်းတာစစ်ဆေးခဲ့ပါသည်။</p> <p>တိုင်းတာချက်များအရ အနည်စစ်ကန်မှ စွန့်ပစ်ရေ၏ ဓာတ်ခွဲရလဒ်များသည် အမျိုးသား ပတ်ဝန်းကျင်ဆိုင်ရာအရည်အသွေး ထုတ်လွှတ်မှုလမ်းညွှန်ချက် (၂၀၁၅) အရ ဖန်နှင့် ကြွေထည်ပစ္စည်း ထုတ်လုပ်ရေးလုပ်ငန်းစဉ်များ၏ ရေဆိုးစွန့်ပစ်မှုအဆင့် အတွင်းတွင်ရှိပါသည်။</p> <p>ဝန်ထမ်းများမှ ထွက်ရှိသော အထွေထွေနှင့် အိမ်သုံးစွန့်ပစ်ရေဆိုး အရည်အသွေး ရလဒ်များကို အမျိုးသား ပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး ထုတ်လွှတ်မှု လမ်းညွှန်ချက် (၂၀၁၅)အရ ဖန်နှင့် ကြွေထည်ပစ္စည်း ထုတ်လုပ်ရေး လုပ်ငန်းစဉ် များ၏ ရေဆိုးစွန့်ပစ်မှုအဆင့်တို့ဖြင့် နှိုင်းယှဉ်ထားပါသည်။ စွန့်ပစ်ရေဆိုး ရလဒ်အများစုသည် သတ်မှတ်စံနှုန်းအတွင်း ကျရောက်သော်လည်း</p>

စဉ်	အမျိုးအစား	အကြောင်းအရာ
		<p>phosphorus မှာ သတ်မှတ်စံနှုန်းထက် အနည်းငယ် မြင့်တက်နေကြောင်း တွေ့ရှိရပါသည်။ ထိုသို့ကျော်လွန်ခြင်းမှာ စွန့်ပစ်ရေမူနာအား သန့်စင်ခြင်း မပြုလုပ်မီ စီမံကိန်း၏ စားသောက်ဆောင်မှ ကောက်ယူခဲ့ခြင်းကြောင့် ဖြစ်နိုင်ပါသည်။</p> <p>မြေအောက်ရေရလဒ်များအား အမျိုးသား ပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး ထုတ်လုပ်မှု လမ်းညွှန်ချက် (၂၀၁၅) နှင့် နှိုင်းယှဉ်ဖော်ပြထားပါသည်။ နှိုင်းယှဉ်ချက်များအရ ရလဒ်များသည် သတ်မှတ်စံနှုန်းအတွင်းတွင် ကျရောက် လျက်ရှိကြောင်း တွေ့ရှိရပါသည်။</p> <p>စီမံကိန်းအတွင်း တပ်ဆင်ထားသော ရေသန့်စက်မှ သန့်စင်ပြီးရေအား ကမ္ဘာ့ကျန်းမာရေးအဖွဲ့၏ သောက်သုံးရေ လမ်းညွှန်ချက်နှင့် နှိုင်းယှဉ်လေ့လာ ခဲ့ရာ ရေအရည်အသွေးများမှာ သတ်မှတ်စံနှုန်းအတွင်း ကျရောက်လျက်ရှိ ကြောင်း တွေ့ရှိရပါသည်။</p>
၁၄	ဆူညံသံ	<p>ဆူညံသံကို စီမံကိန်းဧရိယာအတွင်း N1, N2 နှင့် N3 ဟူ၍ ၃ နေရာခွဲ၍ တိုင်းတာခဲ့ပါသည်။ ရလဒ်များကို လူနေအိမ်နှင့် ပညာရေးဆိုင်ရာ အဆောက်အအုံများ ဆူညံသံအဆင့်၏ အမျိုးသား ပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး ထုတ်လုပ်မှု လမ်းညွှန်ချက်များ (၂၀၁၅) နှင့် နှိုင်းယှဉ် ထားပါသည်။</p> <p>N1 စီမံကိန်းဧရိယာ နှင့် N2 ဖန်ချက်စက်ရုံတောရကျောင်းရှိ နေ့အချိန် တိုင်းတာသော ရလဒ်များမှာ လမ်းညွှန်ချက်ထက်အနည်းငယ် ကျော်လွန်နေသော်လည်း ညအချိန် တိုင်းတာသောရလဒ်များမှာ အတွင်းတွင် ရှိနေပါသည်။ သီလဝါလမ်းမကြီးဘေးရှိ N3 နေရာ၌နေ့အချိန်နှင့် ညအချိန် တိုင်းတာသော ရလဒ်မှာလည်း လမ်းညွှန်ချက်အတွင်းတွင် ရှိနေပါသည်။</p>
၁၅	တုန်ခါမှု	<p>တုန်ခါမှုကို စီမံကိန်းဧရိယာအတွင်း ၃ နေရာခွဲ၍ တိုင်းတာခဲ့ပါသည်။ ရလဒ်များကို ဂျာမန် တုန်ခါမှုစံသတ်မှတ်ချက် DIN 4150-3 နှင့် နှိုင်းယှဉ်ထားပါသည်။ ထိခိုက်လွယ်သော အဆောက်အအုံ၊ လူနေအိမ်နှင့် စီးပွားရေးဆိုင်ရာ အဆောက်အအုံများကဲ့သို့သော အဆောက်အအုံများတွင် တုန်ခါမှု သက်ရောက်မှုကို ဆုံးဖြတ်ရန် နှိုင်းယှဉ်ထားပါသည်။</p> <p>ကွင်းဆင်း တိုင်းတာချက်များအရ နေရာအားလုံးရှိ အရည်အသွေးရလဒ်များမှာ စံသတ်မှတ်ချက်အတွင်းတွင် ရှိပါသည်။</p>
၁၆	အလင်းရောင်	<p>အလင်းရောင်တိုင်းတာမှုကို စီမံကိန်းဧရိယာတွင် ၅ နေရာခွဲ၍ တိုင်းတာခဲ့ပါ သည်။ ရလဒ်များကို လုပ်ငန်းဆောင်ရွက်မှုများအပေါ်တွင် အခြေခံ၍ နိုင်ငံ တကာဘဏ္ဍာရေးကော်ပိုရေးရှင်း အလင်းရောင်ဆိုင်ရာ လမ်းညွှန်ချက်များနှင့် နှိုင်းယှဉ်ထားပါသည်။ တိုင်းတာချက်များအရ ယာယီရုံးခန်း၊ စက်ရုံနှင့် အလုပ်ရုံ နေရာတို့တွင် အလင်းရောင်စံသတ်မှတ်ချက်နှင့် ပြည့်မီပြီး စားသောက်ဆောင်နှင့် အဓိကရုံးခန်းအတွက် အလင်းရောင်ရှိမှု စံသတ်မှတ်ချက်ထက် ပြည့်မီ ကျော်လွန်နေကြောင်း တွေ့ရှိရပါသည်။</p>
၁၇	အပူချိန်	<p>အပူချိန်တိုင်းတာမှုကို စီမံကိန်းဧရိယာတွင် ၅ နေရာခွဲ၍ တိုင်းတာခဲ့ပါသည်။ ရလဒ်များကို နိုင်ငံတကာဘဏ္ဍာရေးကော်ပိုရေးရှင်း လမ်းညွှန်ချက်များနှင့် နှိုင်းယှဉ်ကြည့်ရာ အလုပ်ရုံမှလွဲ၍</p>

စဉ်	အမျိုးအစား	အကြောင်းအရာ
		ကျန်ရစ်အားလုံးသည် လမ်းညွှန်ချက်အရ ၃၂ ဒီဂရီ စင်တီဂရိတ် သတ်မှတ်ချက်အတွင်းတွင် ရှိနေပါသည်။ အလုပ်ရုံတွင်မူ လမ်းညွှန်ချက်၏ အပူချိန်ထက် အနည်းငယ် မြင့်နေပါသည်။
၁၈	ယာဉ်သွားလာမှု ကောက်ယူခြင်း	ယာဉ်သွားလာမှုများကို ရုံးဖွင့်ရက်နှင့် ရုံးပိတ်ရက်များတွင် မနက် ၇နာရီ မှ ည ၇နာရီ အထိ လေ့လာသည့် ဧရိယာ၌ ၃ နေရာတွင် ကောက်ယူခဲ့ပါသည်။ ရလဒ်များမှာ TC-1, TC-2, TC-3 တွင် ရှင်းလင်းသောယာဉ်သွားလာမှု အခြေအနေတွင် အသီးသီးရှိပါသည်။
ဇီဝဗေဒဆိုင်ရာ ပတ်ဝန်းကျင်		
၁၉	အပင်များကို လေ့လာခြင်း	သီလဝါအထူးစီးပွားရေးဇုန်ဘီ၏ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း အစီရင်ခံစာအရ စီမံကိန်း ဧရိယာကို အပိုင်း (၄) ပိုင်းခွဲ၍ လေ့လာထားပါသည်။ ၎င်းတို့မှာ (၁) ပြန့်ကျဲနေသော သစ်ပင်များဖြင့် အသီးအရွက်များပေါက်ရာ ဧရိယာ၊ (၂) စိုက်ပျိုးမြေ၊ (၃) ရေနေသတ္တဝါ များ နှင့် (၄) လူနေထိုင်ရာ ဧရိယာစသည်တို့ဖြစ်ပါသည်။ သက်ဆိုင်ရာ လေ့လာချက်များအရ စီမံကိန်း ဧရိယာအတွင်းတွင် အဓိက အပင်အမျိုးအစား ၇ မျိုး ရှိ၍ အပင်မျိုးစိတ် ၁၅၈ စိတ် တွေ့ရပါသည်။ အသေးစိတ်အချက်အလက်များကို အခန်း (၄) တွင်ဖော်ပြထားပါသည်။
၂၀	သတ္တဝါများကို လေ့လာခြင်း	သီလဝါအထူးစီးပွားရေးဇုန်ဘီ ၏ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း အစီရင်ခံစာအရ စီမံကိန်းဧရိယာ၏ ဂေဟဗေဒကို လေ့လာသောအခါ လိပ်ပြာမျိုးစိတ် ပေါင်း ၇၁ ခု၊ ပုဇင်းမျိုးစိတ် ၄ ခု၊ ငှက်မျိုးစိတ် ၆၇ စိတ်၊ နို့တိုက် သတ္တဝါ မျိုးစိတ် ၇ စိတ် ၊ ကုန်းနေရေနေ နှင့် တွားသွားသတ္တဝါ မျိုးစိတ် ၁၃ စိတ် နှင့် ငါးမျိုးစိတ် ၄၆ စိတ် ကိုတွေ့ရှိရပါသည်။

၅. ဖြစ်နိုင်ချေရှိသော သဘာဝပတ်ဝန်းကျင်ထိခိုက်နိုင်မှုနှင့်လျော့ချခြင်း

၅.၁. ထိခိုက်မှုဆန်းစစ်ခြင်း

အမျိုးသား သဘာဝပတ်ဝန်းကျင်မူဝါဒ (၁၉၉၉) အရ ဖြစ်နိုင်ခြေရှိသော ပတ်ဝန်းကျင်ထိခိုက်မှု အန္တရာယ်ကို ဆန်းစစ်လေ့လာရာတွင် ယေဘုယျအားဖြင့် အဆိုပြုထားသော စီမံကိန်း၏ ပတ်ဝန်းကျင်နှင့် လူမှုစီးပွားအပေါ်အခြေခံ၍ ဆန်းစစ်တွက်ချက်ရပါမည်။ အဆိုပါလေ့လာဆန်းစစ်မှုတွင် ကာလတို၊ ကာလရှည်ဖြစ်နိုင်ချေရှိသော လေထုညစ်ညမ်းမှု၊ ရေထုညစ်ညမ်းမှုနှင့် အသံဆူညံမှု စသော အချက်များ၊ ဒေသခံပြည်သူများအပေါ် သက်ရောက်မှု၊ အသက်ရှင်နေထိုင်မှုနှင့် ကျန်းမာရေး စံချိန်စံညွှန်းများအပြင် အခြားသောစိတ်ပိုင်းဆိုင်ရာအပေါ် သက်ရောက်မှုအချက်အလက်များ ပါဝင် ပါသည်။

စီမံကိန်းဖော်ဆောင်မှုများကြောင့် သဘာဝပတ်ဝန်းကျင်အပေါ် ကောင်းကျိုးသက်ရောက်မှုနှင့် ဆိုးကျိုး သက်ရောက်မှုများတွက်ချက်ရာတွင် ရုပ်ပိုင်းဆိုင်ရာ၊ လူမှုစီးပွား၊ ဇီဝမျိုးစုံမျိုးကွဲ၊ ကျန်းမာရေး စသည်တို့အပေါ် အခြေခံပါသည်။ စီမံကိန်းလုပ်ငန်းစဉ်များနှင့် လိုအပ်ချက်များသည် သဘာဝပတ်ဝန်းကျင် ၏ အရင်းအမြစ်ကို သုံးစွဲရသောကြောင့် ပတ်ဝန်းကျင်အပေါ် ထိခိုက်မှုများ ဖြစ်ပေါ်စေသည်။

၅.၂. သိသာသော သက်ရောက်မှု အကဲဖြတ်ခြင်း

စီမံကိန်းကြောင့် ဖြစ်ပေါ်လာသော သိသာသော ဆိုးကျိုး သို့မဟုတ် ကောင်းကျိုး ဆိုင်ရာ ပတ်ဝန်းကျင်အပေါ်သက်ရောက်မှုများကို ဖြစ်နိုင်ချေ၊ သက်ရောက်မှုပမာဏ၊ သက်ရောက်နိုင်မည့် နေရာ နှင့် အချိန်ကာလ စသည့် အဆင့်သတ်မှတ်ချက် အတိုင်းအတာကို အသုံးပြုပြီး ခွဲခြားထားပါသည်။ ဖြစ်နိုင်ချေရှိသော သက်ရောက်မှု တစ်ခုချင်းစီကို အကဲဖြတ်ရာတွင် အသုံးပြုရန် အဆင့်သတ်မှတ်ချက်များ ကို ဇယား ၇ တွင် ဖော်ပြထားပါသည်။

ဇယား ၇ သိသာသော သက်ရောက်မှုဆန်းစစ်တွက်ထုတ်ခြင်း

ဖြစ်နိုင်ချေ	အချိန်ကာလ
၁. ဖြစ်နိုင်ချေအလွန်နည်းပါး ၂. ဖြစ်နိုင်ချေအနည်းငယ် ၃. ဖြစ်နိုင်ချေရှိ အသင့်အတင့် ၄. ဖြစ်နိုင်ချေရှိ အလွန်များ ၅. ဖြစ်နိုင်ရန်သေချာ	၁. အလွန်တိုတောင်းသောအချိန်ကာလ(၁နှစ်အတွင်း) ၂. တိုတောင်းသောအချိန်ကာလ (၂-၅ နှစ်အတွင်း) ၃. အလယ်အလတ်အချိန်ကာလ(၆-၁၅နှစ်အတွင်း) ၄. အချိန်ကာလကြာမြင့်စွာ (၁၅ နှစ်) ၅. အစဉ်အမြဲ
သက်ရောက်မှု ပမာဏ	နယ်ပယ်အတိုင်းအတာ
၁. ပတ်ဝန်းကျင်အပေါ်သိသာသောထိခိုက်မှုမရှိ ၂. ပတ်ဝန်းကျင်အပေါ် ထိခိုက်မှုအနည်းငယ်ရှိ ၃. ပတ်ဝန်းကျင်အပေါ်ထိခိုက်မှု အသင့်အတင့် ရှိ ၄. ပတ်ဝန်းကျင်အပေါ် ဆိုးရွားစွာ ထိခိုက်မှုရှိ ၅. ပတ်ဝန်းကျင်အပေါ်ရေရှည်ဆိုးရွားစွာ ထိခိုက်မှုရှိ	၁. စီမံကိန်းဧရိယာအတွင်းသက်ရောက်မှု ၂. စီမံကိန်းအနီးဒေသခံပြည်သူအဆင့် သက်ရောက်မှု ၃. ဒေသတွင်းသက်ရောက်မှု ၄. နိုင်ငံအဆင့်သက်ရောက်မှု ၅. နိုင်ငံတကာအဆင့်သက်ရောက်မှု

ဖြစ်နိုင်ခြေရှိသော သက်ရောက်မှုများကို အကဲဖြတ်လေ့လာရာတွင် အောက်ပါ ဖော်ပြပါအတိုင်း အသုံးပြုထားပါသည်။

သိသာထင်ရှားမှု ရမှတ် (SP) = (ပမာဏ + နယ်ပယ်အတိုင်းအတာ + ကြာချိန်) × ဖြစ်နိုင်ခြေ

ပတ်ဝန်းကျင်အပေါ်တွင် ဖြစ်နိုင်ခြေရှိသော သက်ရောက်မှုများကို ထိခိုက်မှုမရှိ၊ အနည်းငယ်၊ အသင့်အတင့် နှင့် အမြင့်ဆုံး စသည့် သိသာသော သတ်မှတ်ချက်များအပေါ်အခြေခံပြီး အဆင့် ၄ ဆင့် ခွဲခြားနိုင်သည်။ ဖြစ်နိုင်ချေရှိသော ပတ်ဝန်းကျင် ထိခိုက်မှု အဆင့်များကို ဇယား ၈ တွင် တွေ့နိုင်ပါသည်။ တည်ဆောက်ချိန်၊ ပိတ်သိမ်းချိန်နှင့် လုပ်ငန်းဆောင်ရွက်စဉ်ကာလများတွင် ဖြစ်ပေါ်နိုင်သော ပတ်ဝန်းကျင် အပေါ် သက်ရောက်မှု ဖြစ်နိုင်ခြေများအား ဆန်းစစ်ခန့်မှန်းခြင်းများကို ဇယား ၉ နှင့် ဇယား ၁၀ တွင် ဖော်ပြထားပါသည်။

ဇယား ၈ ဖြစ်နိုင်ချေ ရှိသော သဘာဝပတ်ဝန်းကျင်အပေါ်သက်ရောက်မှု အဆင့်များ

သတ်မှတ်ချက်	ပတ်ဝန်းကျင်ဆိုင်ရာသတ်မှတ်မှု ပမာဏ
<၁၅	ထိခိုက်မှုမရှိ
၁၅-၃၀	အနည်းငယ်
၃၁-၆၀	အသင့်အတင့်
>၆၀	အမြင့်ဆုံး

ဇယား ၉ စီမံကိန်းတည်ဆောက်ချိန်နှင့် ပိတ်သိမ်းချိန်ကာလတွင် ဖြစ်ပေါ်နိုင်သော ပတ်ဝန်းကျင်အပေါ်သက်ရောက်မှု ဖြစ်နိုင်ချေများအားဆန်းစစ်ခန့်မှန်းခြင်း

ဖြစ်နိုင်ချေရှိသော သက်ရောက်မှု	သက်ရောက်နိုင်သောအရင်းအမြစ်	စောင့်ကြည့်ရမည့် အချက်များ	ပမာဏ	နယ်ပယ်အတိုင်း အတာ	အချိန်ကာလ	ဖြစ်နိုင်ချေ	သတ်မှတ်ချက်	အကဲဖြတ်မှုရလဒ်
ဖြစ်နိုင်ချေရှိသော ဆိုးကျိုးသက်ရောက်မှုများ								
လေထုအရည်အသွေး	တည်ဆောက်ခြင်းနှင့် ပိတ်သိမ်းခြင်း လုပ်ဆောင်မှုများ၊ ဒီဇယ်မီးစက်များ၊ စက်ယန္တရားနှင့် မော်တော်ယာဉ်များ မောင်းနှင်မှု	CO ₂ , NO ₂ , PM ₁₀ , PM _{2.5} , SO ₂ , VOCs	၃	၂	၂	၄	၂၈	အနည်းငယ်
ဆူညံသံနှင့် တုန်ခါမှု	အရေးပေါ် ဒီဇယ်မီးစက် အသုံးပြုမှု၊ တည်ဆောက်ရေးလုပ်ငန်းသုံး ကိရိယာများ အသုံးပြုမှုနှင့် ဝန်ချီစက် မော်တော်ယာဉ်များ သုံးစွဲမှု	ဆူညံသံနှင့် တုန်ခါမှု	၃	၁	၂	၄	၂၄	အနည်းငယ်
ရေထုအရည်အသွေး	မြေပေါ်ရေစီးဆင်းခြင်းနှင့် အိမ်သုံးစွန့်ပစ်ရေ	စွန့်ပစ်ရေထဲရှိ အော်ဂဲနစ် ဓါတ် ပေါင်းများ	၂	၂	၂	၃	၁၈	အနည်းငယ်
မြေအသုံးချမှု	အဆောက်အဦ တည်ဆောက်ရာတွင် သီးပင် စားပင်နှင့် အပေါ်ယံမြေဆီလွှာ ဖယ်ရှားခြင်း	မြေအသုံးချမှုပြောင်းလဲခြင်း	၁	၁	၄	၄	၂၄	အနည်းငယ်
မြေထုအရည်အသွေး	တည်ဆောက်မှုလုပ်ငန်း	လောင်စာဆီ နှင့် အခြားအညစ် အကြေးများ ယိုစိမ့်မှု	၃	၂	၂	၃	၂၁	အနည်းငယ်
စွန့်ပစ်အစိုင်အခဲ	တည်ဆောက်မှုလုပ်ငန်းနှင့် အလုပ်သမားများမှ စွန့်ပစ်အစိုင်အခဲ	စွန့်ပစ်ပစ္စည်းအကြွင်းအကျန်များနှင့် အိမ်သုံးစွန့်ပစ်ပစ္စည်းများ	၃	၂	၂	၄	၂၈	အနည်းငယ်
ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းမှု	အလုပ်သမားများ၏ ကျန်းမာရေးနှင့် တည်ဆောက်ချိန်နှင့် ပိတ်သိမ်းချိန်ကာလ အတွင်း မတော်တဆထိခိုက်မှုများ	ကူးစက်ရောဂါဖြစ်ပွားမှုနှင့် ရုပ်ပိုင်းဆိုင်ရာ ထိခိုက်မှု အခြား	၂	၁	၂	၄	၂၀	အနည်းငယ်

ဖြစ်နိုင်ချေရှိသော သက်ရောက်မှု	သက်ရောက်နိုင်သောအရင်းအမြစ်	စောင့်ကြည့်ရမည့် အချက်များ	ပမာဏ	နယ်ပယ်အတိုင်းအတာ	အချိန်ကာလ	ဖြစ်နိုင်ချေ	သတ်မှတ်ချက်	အကဲဖြတ်မှုရလဒ်
ယဉ်ကျေးမှုအမွေအနှစ်	အမွေအနှစ်ဆိုင်ရာဧရိယာများအနီးရှိ တည်ဆောက်ရေးလုပ်ငန်းများ	ရှေးဟောင်းသုတေသနအဆောက်အဦများနှင့် ရိုးရာအဆောက်အဦများ	၁	၁	၂	၁	၄	ထိခိုက်မှုမရှိ
ဂေဟစနစ်	တည်ဆောက်မှုလုပ်ငန်း	အပင်နှင့် သတ္တဝါ	၃	၁	၂	၃	၁၈	အနည်းငယ်
ဖြစ်နိုင်ချေရှိသော ကောင်းကျိုးသက်ရောက်မှုများ								
ဖြစ်နိုင်ချေရှိသော ကောင်းကျိုးသက်ရောက်မှု	တည်ဆောက်မှုလုပ်ငန်း၊ ကုန်ကြမ်းများနှင့် ကိရိယာများဝယ်ယူမှု	အလုပ်အကိုင်နှင့် အခွင့်အလမ်းများ	၄	၃	၂	၃	၂၇	အနည်းငယ်

ဇယား ၁၀ စီမံကိန်းလည်ပတ်ချိန်ကာလတွင် ဖြစ်ပေါ်နိုင်သော ပတ်ဝန်းကျင်အပေါ်သက်ရောက်မှု ဖြစ်နိုင်ချေများအားဆန်းစစ်ခန့်မှန်းခြင်း

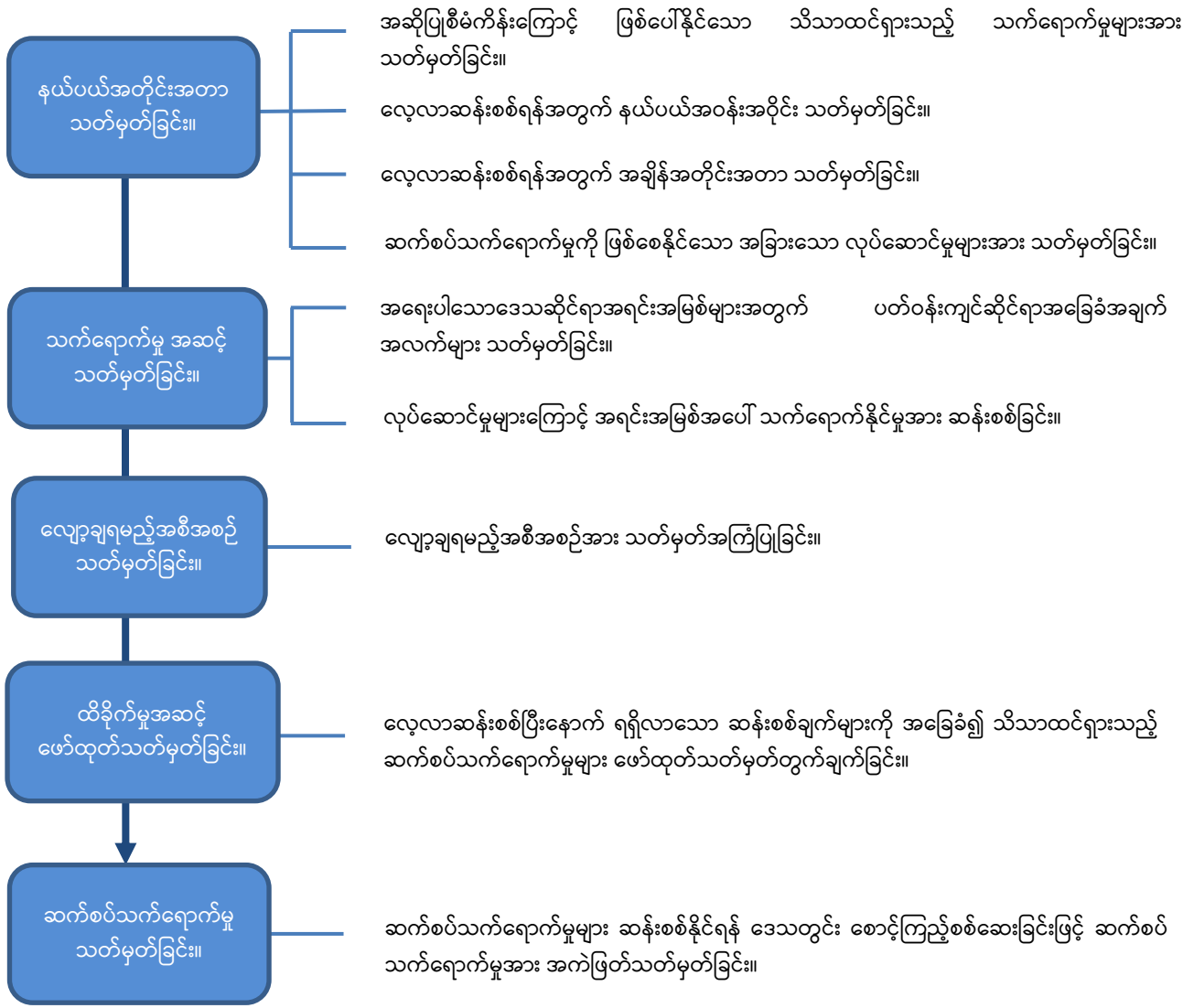
ဖြစ်နိုင်ချေရှိသော သက်ရောက်မှု	သက်ရောက်နိုင်သောအရင်းအမြစ်	စောင့်ကြည့်ရမည့် အချက်များ	ပမာဏ	နယ်ပယ်အတိုင်း အတာ	အချိန်ကာလ	ဖြစ်နိုင်ချေ	သတ်မှတ်ချက်	အကဲဖြတ်မှုရလဒ်
ဖြစ်နိုင်ချေရှိသော ဆိုးကျိုးသက်ရောက်မှုများ								
လေထုအရည်အသွေး	ဒီဇယ်ဘွိုင်လာအသုံးပြုခြင်း၊ ဒီဇယ်မီးစက်နှင့် မော်တော်ယာဉ်အသုံးပြုမှု၊ ဖန်ပုလင်း ထုတ်လုပ်ခြင်း လုပ်ငန်းအတွက် အသုံးပြုသော ဖန်ရည်ကြိုမီးဖိုမှ လေထုညစ်ညမ်းစေသော ဓါတ်ငွေ့များထွက်ရှိခြင်း။	CO ₂ , NO ₂ , CO, CH ₄ , O ₃ , PM ₁₀ , PM _{2.5} , SO ₂ , VOCs, HCl, HF	၄	၃	၄	၄	၄၄	အသင့်အတင့်
ဆူညံသံနှင့် တုန်ခါမှု	အရေးပေါ် ဒီဇယ်မီးစက် အသုံးပြုမှု၊ မော်တော်ယာဉ်များ သုံးစွဲမှု၊ ဖန်ပုလင်း ပုံသွင်းခြင်း လုပ်ငန်းအတွက် အသုံးပြုသော စက်ကိရိယာများမှ ဆူညံသံများထွက်ပေါ်နိုင်ခြင်း။	ဆူညံသံနှင့် တုန်ခါမှု	၂	၁	၄	၂	၁၄	ထိခိုက်မှုမရှိ
ရေထုအရည်အသွေး	မသန့်စင်ရသေးသော စွန့်ပစ်ရေ စွန့်ထုတ်မှုနှင့် သင့်လျော်သော ရေဆိုးသန့်စင်မှုစနစ်မရှိခြင်း	BOD, COD, Antibiotics, Oil and Grease, Total Nitrogen (TN), Total Phosphorous (TP), Total solid (TS), Total Oxygen Demand, Total coliform bacteria, Heavy metals	၃	၃	၄	၄	၄၀	အသင့်အတင့်
မြေထုအရည်အသွေး	သယ်ယူပို့ဆောင်မှုများနှင့် ရေဆိုးစွန့်ထုတ်မှုများ	လောင်စာဆီ၊ ရေနံနှင့် အခြားအညစ်အကြေးများ ယိုစိမ့်မှု၊ မသန့်စင်ရသေး သော စွန့်ပစ်ရေ စွန့်ထုတ်မှု	၃	၂	၄	၃	၂၇	အနည်းငယ်

ဖြစ်နိုင်ချေရှိသော သက်ရောက်မှု	သက်ရောက်နိုင်သောအရင်းအမြစ်	စောင့်ကြည့်ရမည့် အချက်များ	ပမာဏ	နယ်ပယ်အတိုင်း အတာ	အချိန်ကာလ	ဖြစ်နိုင်ချေ	သတ်မှတ်ချက်	အကဲဖြတ်မှုရလဒ်
စွန့်ပစ်အစိုင်အခဲ	ဖန်ပုလင်းထုတ်လုပ်ခြင်း လုပ်ငန်းနှင့် အလုပ်သမားများမှ ထွက်သောစွန့်ပစ်အစိုင်အခဲ	စွန့်ပစ်ပစ္စည်းအမျိုးအစားနှင့်ပမာဏ။	၃	၂	၄	၃	၂၇	အနည်းငယ်
ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းမှု	စီမံကိန်းလည်ပတ်ချိန် ကာလအတွင်း အလုပ်သမားများ၏ ကျန်းမာရေးအခြေအနေ	ကူးစက်ရောဂါဖြစ်ပွားမှုနှင့် အခြားရုပ်ပိုင်းဆိုင်ရာထိခိုက်မှု	၃	၂	၄	၃	၂၇	အနည်းငယ်
ဂေဟစနစ်	ရေဆိုးနှင့် စွန့်ပစ်အစိုင်အခဲများ စွန့်ပစ်ခြင်း	အပင်နှင့် သတ္တဝါများအပေါ် သက်ရောက်မှုများ	၃	၃	၄	၃	၃၀	အနည်းငယ်
ဖြစ်နိုင်ချေရှိသော ကောင်းကျိုးသက်ရောက်မှုများ								
ဖြစ်နိုင်ချေရှိသော ကောင်းကျိုး သက်ရောက်မှု	စီမံကိန်းလုပ်ငန်း လည်ပတ်ချိန်ကာလအတွင်း ကုန်ကြမ်းများနှင့် ကိရိယာများဝယ်ယူမှု၊ လူ့စွမ်းအားအရင်းအမြစ်လိုအပ်ချက်များ	အလုပ်အကိုင်နှင့် စီးပွားရေးဆိုင်ရာ အခွင့်အလမ်းများ၊ လိုအပ်သော ကုန်ကြမ်းပစ္စည်းများနှင့် စက်ပစ္စည်းကိရိယာများကို ဝယ်ယူခြင်း	၃	၃	၄	၄	၄၀	အသင့်အတင့်
စွန့်ပစ်အစိုင်အခဲ	အသုံးပြုပြီး ဖန်ပုလင်းများကို ပြန်လည်ကြိတ်ခွဲ၍ ဖန်ကွဲကုန်ကြမ်းအဖြစ်အသုံးပြုခြင်း	မြန်မာနိုင်ငံ၏စဉ်ဆက်မပြတ်ဖွံ့ဖြိုးတိုးတက်ရေးရည်မှန်းချက်ပန်းတိုင်များကို တစ်ဖက်တစ်လမ်းမှ ပြည့်မီစေနိုင်သော ကုန်ထုတ်လုပ်မှု စနစ်ကို အသုံးပြုခြင်း	၃	၃	၄	၄	၄၀	အသင့်အတင့်

၆. ဆက်စပ်သက်ရောက်မှုများ ဆန်းစစ်ခြင်း

၆.၁. နည်းလမ်း

အဆိုပြုစီမံကိန်း၏ ဆက်စပ်သက်ရောက်မှုအား လေ့လာဖြေရှင်းရန်အတွက် အဆင့် ၅ ဆင့် ဖြင့် လုပ်ဆောင်မည်ဖြစ်ပါသည်။ ၎င်းတို့မှာ နယ်ပယ်အတိုင်းအတာ သတ်မှတ်ခြင်း၊ သက်ရောက်မှုအဆင့် သတ်မှတ်ခြင်း၊ လျော့ရမည့်အစီအစဉ်သတ်မှတ်ခြင်း၊ ထင်ရှားသော သက်ရောက်မှုဆန်းစစ်ခြင်း နှင့် ထိခိုက်မှုအဆင့် တွက်ချက်တို့ဖြစ်ပါသည်။ ၎င်းတို့အား ပုံ ၁၃ တွင်ဖော်ပြထားပါသည်။



ပုံ ၁၃ ဆက်စပ်သက်ရောက်မှုများအား ဆန်းစစ်ခြင်း နည်းလမ်း

၆.၂. လေ့လာအရည်အသွေးဆိုင်ရာ ဆက်စပ်သက်ရောက်မှု တွက်ချက်ခြင်း

ဝန်းကျင်လေ့လာအရည်အသွေးအပေါ် စီမံကိန်းနှင့် အခြားဆက်စပ်သက်ရောက်မှုများအား အောက်ဖော်ပြပါ ဇယား ၁၁ တွင် စိစစ်တွက်ချက်ဖော်ပြထားပါသည်။

ဇယား (၁၁) ဝန်းကျင်လေအရည်အသွေးအပေါ် ဆက်စပ်သက်ရောက်မှုများ

အဆိုပြုစီမံကိန်းမှ ထိခိုက်သက်ရောက်မှု			ပြင်ပ သက်ရောက်မှု	သက်ရောက်မှုအဆင့် နှင့် အကြောင်းပြချက်
ထိခိုက် သက်ရောက်မှု	သက်ရောက်နိုင်မှု အခြေအနေ (မရှိပါ/ ရှိနိုင်သည်/ ရှိသည်)	သက်ရောက်မှု နယ်ပယ်/ ဧရိယာ	သက်ရောက်မှု ဖြစ်စေ နိုင်သော (ယခင်/ အခု/ အနာဂတ်) လုပ်ဆောင်မှုများ	
ထုတ်လွှတ် အခိုးအငွေ့များ ကြောင့်လေထု ညစ်ညမ်းမှု	သက်ရောက်မှုရှိသည်။ (ဖန်ရည်ကြိုခြင်း လုပ်ငန်းစဉ်မှ ထုတ်လွှတ် အခိုးအငွေ့များ ထွက်ရှိ ခြင်း။)	လေတိုက်ခတ်မှု လားရာ အပေါ် မှုတည်၍ စီမံကိန်း မှ ၃ ကီလိုမီတာ အတွင်းရှိ နေရာများ။	သီလဝါအထူးစီးပွား ရေးဇုန်အတွင်းရှိ အခြားသော စက်ရုံ များနှင့် မော်တော် ယာဉ်များမှ ထွက်ရှိ သော ထုတ်လွှတ် အခိုးအငွေ့များ။	သိသာထင်ရှားပါသည်။ (ထိခိုက်နိုင်မှုမှာ ကြီးမား ၍ ဒေသတွင်း ပျံ့နှံ့နိုင် သော်လည်း စနစ်ကျသော စီမံခန့်ခွဲမှု ပြုလုပ် ပါက လက်ခံနိုင်သော ပမာဏအတွင်းသာ ရှိနိုင် ပါသည်။)
အမှုန်အမွှားများ ကြောင့် လေထု ညစ်ညမ်းမှု	သက်ရောက်မှု ရှိနိုင်ပါ သည်။ (ကုန်ကြမ်းသန့်စင်ခြင်း နှင့် စုဆောင်းခြင်းမှ အနီးပတ်ဝန်းကျင်သို့ ဖုန်မှုန့်နှင့် အမှုန်အမွှား များ ပျံ့နှံ့ခြင်း။)	လေတိုက်ခတ်မှု လားရာအရ ကုန် ကြမ်းပစ္စည်း သိုလှောင်မှုနှင့် သန့်စင်ခြင်း လုပ်ငန်းစဉ်၏ အနီး ဝန်းကျင် နေရာများ။	သီလဝါအထူးစီးပွား ရေးဇုန်တွင် အသုံးပြု သောယာဉ်များနှင့် အနီးဝန်းကျင်ရှိ စက်ရုံ များ၏ တည်ဆောက် ရေးလုပ်ငန်းများမှ ထွက်ရှိသော ဖုန်မှုန့် နှင့် အမှုန်အမွှားများ။	သိသာထင်ရှားမှုမရှိပါ။ (ထိခိုက်မှုဖြစ်ပေါ်နိုင်သော် လည်း၊ တည်ဆောက်ရေး လုပ်ငန်းစဉ် နည်းပါးခြင်း၊ အချိန် တိုတောင်းခြင်းနှင့် လူနေ ထူထပ်သည့် နေရာ များနှင့် ဝေးကွာခြင်းတို့ ကြောင့် ထိခိုက်နိုင်မှု နည်းပါးပါသည်။)

သိသာထင်ရှားမှုအဆင့် = အဆိုပြုစီမံကိန်း၏ သက်ရောက်မှုအဆင့် (ရှိနိုင်သည်/ ရှိသည်) + ပြင်ပသက်ရောက်မှု ရှိခြင်း။

သိသာထင်ရှားမှု မရှိ အဆင့် = အဆိုပြုစီမံကိန်း၏ သက်ရောက်မှုအဆင့် (ရှိနိုင်သည်/ မရှိပါ) + ပြင်ပသက်ရောက်မှု မရှိခြင်း။

၆.၃. ရေအရည်အသွေးဆိုင်ရာ ဆက်စပ်သက်ရောက်မှု တွက်ချက်ခြင်း

ဝန်းကျင်ရေအရည်အသွေးအပေါ် စီမံကိန်းနှင့် အခြားဆက်စပ်သက်ရောက်မှုများအား အောက် ဖော်ပြပါ ဇယား ၁၂ တွင် စိစစ်တွက်ချက်ဖော်ပြထားပါသည်။

ဇယား ၁၂ ဝန်းကျင်ရေအရည်အသွေးအပေါ် ဆက်စပ်သက်ရောက်မှုများ

အဆိုပြုစီမံကိန်းမှ ထိခိုက်သက်ရောက်မှု			ပြင်ပ သက်ရောက်မှု	
ထိခိုက် သက်ရောက်မှု	သက်ရောက်နိုင်မှု အခြေအနေ (မရှိပါ/ ရှိနိုင်သည်/ ရှိသည်)	သက်ရောက်မှု နယ်ပယ်/ ဧရိယာ	သက်ရောက်မှုဖြစ်စေ နိုင်သော (ယခင်/ အခု/ အနာဂတ်) လုပ်ဆောင်မှုများ	သက်ရောက်မှုအဆင့် နှင့် အကြောင်းပြချက်
မြေပေါ်ရေရှိမှု အပေါ်သက်ရောက်မှု	သက်ရောက်မှုရှိနိုင် ပါသည်။ (စီမံကိန်းမှ လိုအပ် သော ရေအား ဇာမဏီ အင်းမှ ရယူအသုံးပြု ခြင်း။)	စီမံကိန်းဧရိယာ၏ ၃ ကီလိုမီတာ ပတ်လည်အတွင်း ရှိ နေရာများ။	သီလဝါအထူးစီးပွားရေးဇုန် အတွင်းရှိ စက်ရုံများနှင့် စီးပွားရေးဖွံ့ဖြိုးရေး ကဏ္ဍ များ အနေဖြင့် ဇာမဏီ အင်းမှ ရေကို ရယူ အသုံးပြုခြင်း။	သိသာထင်ရှားပါသည်။ (ထိခိုက်နိုင်မှုမှာ ကြီးမား၍ ဒေသတွင်း ပျံ့နှံ့နိုင်သော် လည်း အခြားတခြားနည်း အသုံးပြုမှုနှင့် သင့်လျော်သော ထိခိုက်မှု လျော့နည်းမည့် နည်းလမ်းများ အသုံးပြုပါက ထိုသက်ရောက်မှုအား ထိန်းချုပ်နိုင်ပါသည်။)
မြေပေါ်ရေ အရည်အသွေး ပြောင်းလဲခြင်း	သက်ရောက်မှု ရှိနိုင် ပါသည်။ (အရေးပေါ် ရေကြီး ရေလျှံခြင်း ဖြစ်စဉ် တွင် စီမံကိန်းအနည် ထိုင်ကန်မှ စွန့်ပစ်ရေ များ အနီးအနားသို့ စီးဝင်ခြင်း။)	စီမံကိန်း ပတ်ဝန်း ကျင်ရှိ ဧရိယာနှင့် အနီးအနားရှိ ရေ ထုထည်	သီလဝါအထူးစီးပွားရေး ဇုန်အတွင်းရှိ စက်ရုံများ နှင့် အနီးပတ်ဝန်းကျင်ရှိ လူနေ ထူထပ်သော ဧရိယာများမှ စွန့်ပစ်ရေ အား မသင့်လျော်သော နည်းလမ်းဖြင့် စွန့်ပစ်ခြင်း။	သိသာထင်ရှားပါသည်။ (ထိခိုက်နိုင်မှုမှာ ကြီးမား၍ ဒေသတွင်း ပျံ့နှံ့နိုင်သော် လည်း စနစ်ကျသော ရေဆိုး သန့်စင်စနစ်များ၊ ရေကြီး ရေလျှံမှုထိန်းချုပ်ရေးစနစ်များ နှင့် ကောင်းမွန်သော မိလ္လာ ကန်များ ထားရှိခြင်းအားဖြင့် ထိန်းချုပ်နိုင်ပါသည်။)
မြေအောက်ရေရှိမှု အပေါ် သက်ရောက်မှု	သက်ရောက်မှု မရှိပါ။ (စီမံကိန်းမှ လိုအပ် သော ရေအား ဇာမဏီ အင်းမှ ရယူအသုံးပြု ခြင်း)	-	မြေအောက်ရေအား ကျေးရွာများမှ တစ်ကိုယ်ရေနှင့် အိမ်သုံး လိုအပ်ချက်များ အတွက် ထုတ်ယူ အသုံးပြုပါသည်။	သိသာထင်ရှားမှုမရှိပါ။ (စီမံကိန်းနှင့် သီလဝါအထူး စီးပွားရေးဇုန်ရှိအခြားသော စက်ရုံများသည် မြေပေါ်ရေ ကိုသာ အဓိက အသုံးပြုခြင်း ကြောင့် မြေအောက်ရေ အရင်းအမြစ်ရရှိမှုအပေါ် သိသာသော ထိခိုက်မှု မရှိပါ။)

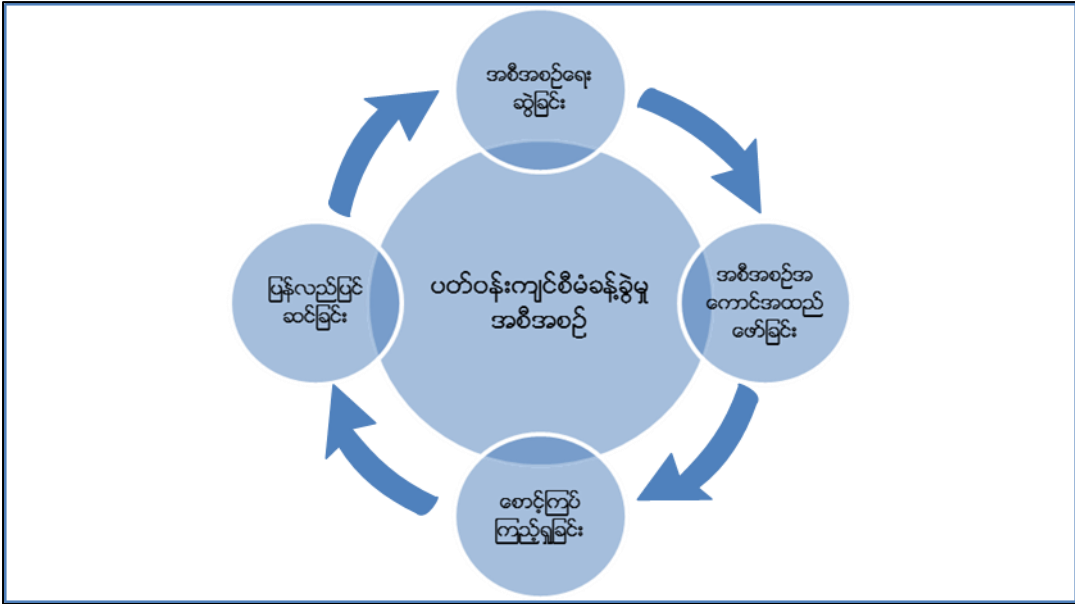
<p>မြေအောက်ရေ အရည်အသွေး ပြောင်းလဲခြင်း</p>	<p>သက်ရောက်မှု မရှိပါ။ (စီမံကိန်းအတွင်း သင့်လျော်သော ယာယီ အမှိုက်သိုလှောင်ရုံနှင့် ရေဆိုး သန့်စင်စနစ် ထားရှိပါသဖြင့် စီမံကိန်းမှ စွန့်ပစ်ရေ စိမ့်ထွက်ခြင်းကြောင့် မြေအောက်ရေ ထိခိုက် မှု မရှိနိုင်ပါ။)</p>	<p>-</p>	<p>မြေအောက်ရေ အရည်အသွေးကို ထိခိုက်စေသော သိသာထင်ရှားသည့် ညစ်ညမ်းမှု အရင်းအမြစ် မရှိပါ။</p>	<p>သိသာထင်ရှားမှုမရှိပါ။ (စီမံကိန်းနှင့် သီလဝါအထူးစီးပွားရေးဇုန်ရှိ အခြားသော စက်ရုံများတွင် သင့်လျော်သော ရေဆိုးသန့်စင်စနစ်နှင့် အမှိုက်စီမံခန့်ခွဲမှု အစီအစဉ်များအား ထားရှိဆောင်ရွက်ခြင်းကြောင့် မြေအောက်ရေ အရည်အသွေး အပေါ် ဆိုးကျိုး သက်ရောက်မှု မရှိနိုင်ပါ။)</p>
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သိသာထင်ရှားမှုအဆင့် = အဆိုပြုစီမံကိန်း၏ သက်ရောက်မှုအဆင့် (ရှိနိုင်သည်/ ရှိသည်) + ပြင်ပသက်ရောက်မှု ရှိခြင်း။

သိသာထင်ရှားမှု မရှိ အဆင့် = အဆိုပြုစီမံကိန်း၏ သက်ရောက်မှုအဆင့် (ရှိနိုင်သည်/ မရှိပါ) + ပြင်ပသက်ရောက်မှု မရှိခြင်း။

၇. ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်

ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်သည် စီမံကိန်း၏ထုတ်လုပ်မှု လုပ်ငန်းကြောင့် ပတ်ဝန်းကျင်အပေါ် သက်ရောက်မှု မရှိစေရန် သက်ဆိုင်ရာ အာဏာပိုင် အဖွဲ့အစည်းများ၏ ချမှတ်ထားသော သဘာဝပတ်ဝန်းကျင်ဆိုင်ရာ ဥပဒေ၊ စည်းမျဉ်းများ နှင့်အညီ သင့်လျော်သော လျှော့ချရေးအစီအစဉ်များကို အကောင်အထည်ဖော် ဆောင်ရွက်ခြင်းဖြစ်ပါသည်။ ထိုသို့ အကောင်အထည်ဖော် ဆောင်ရွက်ရာ၌ အောက်တွင် ဖော်ပြထားသော ပုံ ၁၄ စက်ဝိုင်းအတိုင်း စီမံခန့်ခွဲမှုအစီအစဉ် Plan-Do-Check-Act (PDCA) အချက်လေးချက် ပေါ်မူတည်ပြီး ပြုလုပ်ရပါမည်။



ပုံ ၁၄ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုပြမြေပုံ

➤ **Plan (P) - အစီအစဉ်ရေးဆွဲခြင်း**

စီမံကိန်းကြောင့် ပတ်ဝန်းကျင်အပေါ်ထိခိုက်မှု ဖြစ်စေနိုင်သော လေထုညစ်ညမ်းမှု၊ အသံဆူညံမှု၊ ရေဆိုးစွန့်ပစ်မှု၊ အမှိုက်စွန့်ပစ်မှု၊ ကျန်းမာရေး နှင့် ဘေးအန္တရာယ်ကင်းရှင်းမှု စသော ထိခိုက်မှုများ လျော့ပါးရေး အတွက် အချိန်ဇယား အစီအစဉ်များ ရေးဆွဲရပါမည်။

➤ **Do (D) - အကောင်အထည်ဖော်ဆောင်ခြင်း**

ပတ်ဝန်းကျင်ထိခိုက်မှု အတွက် ရေးဆွဲထားသော လျော့ချရေး အစီအစဉ်များကို စီမံကိန်းမှ တာဝန်ရှိသူများက အကောင်အထည်ဖော် ဆောင်ရွက်ရပါမည်။

➤ **Check (C)- စောင့်ကြပ်ကြည့်ရှုခြင်းနှင့်စစ်ဆေးခြင်း**

လျော့ချရေး အစီအစဉ်များ အကျိုးသက်ရောက်မှု ရှိမရှိကို စောင့်ကြပ်ကြည့်ရှုခြင်းနှင့် စစ်ဆေးခြင်းများ ပြုလုပ်ရပါမည်။ စောင့်ကြည့်မှုအတွက် စီမံကိန်းဖော်ဆောင်သူ အပါအဝင် သက်ဆိုင်ရာ အနီးပတ်ဝန်းကျင်ရှိ ပုဂ္ဂိုလ်များ၊ အုပ်ချုပ်ရေးပိုင်း ဆိုင်ရာ ပုဂ္ဂိုလ်များ အစရှိသော သက်ဆိုင်ရာ အဖွဲ့အစည်းများ စုပေါင်း၍ လေ့လာစောင့်ကြည့်မှု ပြုလုပ်ရပါမည်။ ၎င်းစောင့်ကြည့်မှုကိုလည်း အစီရင်ခံစာ ပြုစုပြီး သက်ဆိုင်ရာ ဝန်ကြီးဌာနသို့ တင်ပြရမည်ဖြစ်သည်။

➤ **Act (A)- ပြန်လည်ပြင်ဆင်ခြင်း**

စောင့်ကြပ်ကြည့်ရှုခြင်း အစီအစဉ်တွင် လက်ရှိဖြစ်ပေါ်သော ပတ်ဝန်းကျင် ထိခိုက်မှုများနှင့် ကိုက်ညီမှု မရှိခဲ့လျှင် လျော့ချရေး အစီအစဉ်များကို ပြန်လည်ပြင်ဆင်ခြင်းများ ပြုလုပ်ရပါမည်။

၇.၁. ပတ်ဝန်းကျင်ထိခိုက်မှု လျော့နည်းသက်သာရေးအစီအစဉ်

ပတ်ဝန်းကျင်ထိခိုက်မှုလျော့နည်းသက်သာရေးအစီအစဉ်အား စီမံကိန်း တည်ဆောက်စဉ်၊ ပိတ်သိမ်းစဉ်နှင့် လည်ပတ်စဉ်ကာလဟူ၍ ခွဲခြား၍ အောက်ဖော်ပြပါ ဇယား ၁၂ တွင် ဖော်ပြထားပါသည်။

ဇယား ၁၂ ပတ်ဝန်းကျင်ထိခိုက်မှုအား လျော့နည်းသက်သာစေရေးအစီအစဉ်အကျဉ်းချုပ်

စဉ်	ထိခိုက်နိုင်မှု	လျော့နည်းသက်သာစေရေးနည်းလမ်းများ	တာဝန်ယူမည့် အဖွဲ့အစည်း	နှစ်စဉ် ရန်ပုံငွေ (ကျပ်)
တည်ဆောက်စဉ်နှင့် ဖျက်သိမ်းစဉ်ကာလ				
၁။	<p>လေအရည်အသွေး</p> <ul style="list-style-type: none"> - တည်ဆောက်ရေးနှင့် ဖျက်သိမ်းရေးလုပ်ငန်းစဉ်၊ ဒီဇယ်မီးစက်နှင့် မော်တော်ယာဉ် အသုံးပြုမှုကြောင့် လေထုညစ်ညမ်းသော ဓာတ်ငွေ့များ ထွက်ရှိခြင်း။ 	<p>လေအရည်အသွေး</p> <ul style="list-style-type: none"> - မော်တော်ယာဉ်များအား ပုံမှန်စစ်ဆေးထိန်းသိမ်းခြင်း။ - ဆောက်လုပ်ရေး ဧရိယာအနီးအနားတွင် ရေဖြန်းပေးခြင်း၊ အကာအကွယ်များ (Safety Nets) တပ်ဆင်ထားရှိခြင်း။ - တည်ဆောက်ရေးလုပ်ငန်းသုံး (ဘိလပ်မြေ၊ သဲ စသော) ပစ္စည်းများအား အဖုံးအကာများဖြင့် သယ်ဆောင်ခြင်း။ - တည်ဆောက်ရေးလုပ်ငန်းသုံးအမှိုက်များ မီးရှို့ခြင်းအား တားမြစ်ခြင်း။ 	ဆောက်လုပ်ရေးကန်ထရိုက်တာ၏ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအသင်း။	စီမံကိန်းတည်ဆောက်ရေးကုန်ကျစရိတ်များတွင် ပါဝင်ပါသည်။
၂။	<p>ဆူညံသံနှင့် တုန်ခါမှု</p> <ul style="list-style-type: none"> - တည်ဆောက်ရေးလုပ်ငန်းသုံးစက်ပစ္စည်းနှင့် ယာဉ်များမှ ဆူညံသံနှင့် တုန်ခါမှုများ ထွက်ရှိခြင်း။ 	<p>ဆူညံသံနှင့် တုန်ခါမှု</p> <ul style="list-style-type: none"> - ဆူညံသံထွက်နိုင်သော တည်ဆောက်ရေးလုပ်ငန်းများအား နေ့အချိန်တွင်သာ ပြုလုပ်ခြင်း။ - ဆူညံသံထွက်ရှိမှု ပြင်းထန်သည့် နေရာများတွင် လုပ်ကိုင်သော လုပ်သားများအား တစ်ကိုယ်ရည်သုံး အကာအကွယ်ပစ္စည်း (နားကြပ်များ) ထောက်ပံ့ပေးခြင်း။ - ဆူညံသံနှင့် တုန်ခါမှုများသော နေရာများတွင် လုပ်ကိုင်သော လုပ်သားများအား အလဲအလှယ်ပြုလုပ်ပေးခြင်း။ - ဆူညံသံထွက်ရှိမှုနည်းသော မီးစက်အား အသုံးပြုခြင်း။ - မီးစက်များအား လူနေဧရိယာနှင့် ဝေးသောနေရာများ တွင် ထားရှိခြင်း။ - ဆောက်လုပ်ရေး ပစ္စည်းများ၊ မော်တော်ယာဉ်နှင့် ဒီဇယ်မီးစက်များအား ပုံမှန် စောင့်ကြပ်ကြည့်ရှုခြင်း။ 	ဆောက်လုပ်ရေးကန်ထရိုက်တာ၏ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအသင်း။	စီမံကိန်းတည်ဆောက်ရေးကုန်ကျစရိတ်များတွင် ပါဝင်ပါသည်။

စဉ်	ထိခိုက်နိုင်မှု	လျော့နည်းသက်သာစေရေးနည်းလမ်းများ	တာဝန်ယူမည့် အဖွဲ့အစည်း	နှစ်စဉ် ရန်ပုံငွေ (ကျပ်)
၃။	<p>ရေထုအရည်အသွေး</p> <ul style="list-style-type: none"> - တည်ဆောက်ရေးလုပ်သားများနှင့် ဆောက်လုပ်ရေး ဧရိယာများမှ ဖြတ်သန်းစီးဆင်းလာသော မိုးရေများနှင့် ဖြတ်သန်းရေများ။ 	<p>ရေထုအရည်အသွေး</p> <ul style="list-style-type: none"> - ဆောက်လုပ်ရေးလုပ်သားများအတွက် လုံလောက်သော အိမ်သာများ၊ ရေချိုးခန်းများ ထောက်ပံ့ပေးခြင်း။ - မြို့တော်စည်ပင်သာယာရေး လမ်းညွှန်ချက်များနှင့်အညီ မိလ္လာရေဆိုးများအား စုဆောင်းခြင်းနှင့် စွန့်ပစ်ခြင်း။ - စီမံကိန်းဧရိယာနှင့် ဝန်ထမ်းအိမ်ရာများမှ ထွက်ရှိသော စွန့်ပစ်ရေများအား အနည်စစ်ကန်နှင့် မိလ္လာကန်များဖြင့် သန့်စင်ပြီးမှ စွန့်ပစ်ခြင်းနှင့် စွန့်ပစ်ရေစွန့်ပစ်သည့် နည်းလမ်းအား စောင့်ကြပ်ကြည့်ရှုခြင်း။ - တည်ဆောက်ရေးနှင့် ပိတ်သိမ်းရေးလုပ်ငန်းစဉ်များမှ ဓာတုပစ္စည်းများနှင့် အဆီများ ဖိတ်စင်မှုမရှိစေရန် သင့်လျော်သော စက်ပစ္စည်းများအား အသုံးပြုခြင်း။ - ဒေသအတွင်း မြေအောက်ရေလျော့ချခြင်း ကာကွယ်ဖို့ အတွက် အခြားနည်းရေးအသုံးပြုမှုအား လုပ်ဆောင်ခြင်း။ - ဒေသတွင်း မြေအောက်ရေ အရည်အသွေးများအား ပုံမှန် စောင့်ကြပ်ကြည့်ရှုခြင်း။ 	<p>ဆောက်လုပ်ရေးကန်ထရိုက်တာ၏ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အသင်း။</p>	<p>စီမံကိန်းတည်ဆောက်ရေး ကုန်ကျစရိတ်များတွင် ပါဝင်ပါသည်။</p>
၄။	<p>မြေအသုံးချမှု</p> <ul style="list-style-type: none"> - တည်ဆောက်ရေးလုပ်ငန်းစဉ်နှင့် ဖြိုဖျက်ခြင်း လုပ်ငန်းစဉ်မှ မြေအသုံးချမှုပုံစံ ပြောင်းလဲခြင်း။ 	<p>မြေအသုံးချမှု</p> <ul style="list-style-type: none"> - ဖန်ချက်စက်ရုံဟောင်းတွင် စီမံကိန်းတည်ရှိခြင်းကြောင့် သိသာထင်ရှားသော မြေအသုံးချမှုပုံစံ ပြောင်းလဲမှု မရှိပါ။ 	<p>ဆောက်လုပ်ရေးကန်ထရိုက်တာ၏ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အသင်း။</p>	<p>စီမံကိန်းတည်ဆောက်ရေး ကုန်ကျစရိတ်များတွင် ပါဝင်ပါသည်။</p>

စဉ်	ထိခိုက်နိုင်မှု	လျော့နည်းသက်သာရေးနည်းလမ်းများ	တာဝန်ယူမည့် အဖွဲ့အစည်း	နှစ်စဉ် ရန်ပုံငွေ (ကျပ်)
၅။	<p>မြေအရည်အသွေး</p> <ul style="list-style-type: none"> - တည်ဆောက်ရေးလုပ်ငန်းစဉ်နှင့် အမျိုးမျိုးသော စွန့်ပစ်ပစ္စည်းများမှ လောင်စာဆီနှင့်အဆီ ယိုဖိတ်ခြင်းကြောင့် မြေထုညစ်ညမ်းခြင်း။ - ယာယီစွန့်ပစ်ပစ္စည်း စွန့်ပစ်သည့်နေရာမှ စိမ့်ထွက်ရေများ ထွက်ရှိခြင်း။ 	<p>မြေအရည်အသွေး</p> <ul style="list-style-type: none"> - တည်ဆောက်ရေးလုပ်ငန်းသုံးယာဉ်များနှင့် စက်ပစ္စည်းများအား ပုံမှန်စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးခြင်း။ - စိမ့်ထွက်ရေများ မြေသို့စိမ့်ဝင်ခြင်းမရှိစေရန် ယာယီစွန့်ပစ်ပစ္စည်းစွန့်ပစ်သည့်နေရာအား စနစ်တကျ တည်ဆောက်ခြင်း။ - လောင်စာဆီများအား စနစ်တကျ သိုလှောင်ထားရှိခြင်း။ - မြို့တော်စည်ပင်သာယာရေး၏ စည်းကမ်းချက်များနှင့်အညီ တည်ဆောက်ရေးလုပ်ငန်းစဉ်ထွက် အမှိုက်များအား စနစ်တကျ သိုလှောင်၍ စွန့်ပစ်ခြင်း။ 	ဆောက်လုပ်ရေးကန်ထရိုက်တာ၏ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအသင်း။	စီမံကိန်းတည်ဆောက်ရေးကုန်ကျစရိတ်များတွင် ပါဝင်ပါသည်။
၆။	<p>စွန့်ပစ်အမှိုက်</p> <ul style="list-style-type: none"> - တည်ဆောက်ရေးလုပ်ငန်းစဉ်နှင့် လုပ်သားများမှ တည်ဆောက်ရေးအမှိုက်များနှင့် အထွေထွေအမှိုက်များ ထွက်ရှိခြင်း။ 	<p>စွန့်ပစ်အမှိုက်</p> <ul style="list-style-type: none"> - မြို့တော်စည်ပင်သာယာရေးလမ်းညွှန်ချက်နှင့်အညီ တည်ဆောက်ရေးလုပ်ငန်းစဉ်များနှင့် မြေနေရာ ရှင်းလင်းခြင်းလုပ်ငန်းများမှ ထွက်ရှိသော စွန့်ပစ်ပစ္စည်းများအား သင့်လျော်သော စွန့်ပစ်သည့်နေရာတွင် စွန့်ပစ်ခြင်း။ - မြို့တော်စည်ပင်သာယာရေး၏ လမ်းညွှန်ချက်နှင့်အညီ တည်ဆောက်ရေးအမှိုက်များအား ခွဲခြားသတ်မှတ်၍ စွန့်ပစ်ခြင်း။ - အန္တရာယ်မရှိသော အမှိုက်များ ဖြစ်သည့် ပလတ်စတစ်၊ ဖန်နှင့် စားကြွင်းစားကျန်များအား ခွဲခြား၍ မြို့တော်စည်ပင်သာယာရေး၏ လမ်းညွှန်ချက်နှင့်အညီ စွန့်ပစ်ခြင်း။ 	ဆောက်လုပ်ရေးကန်ထရိုက်တာ၏ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအသင်း။	စီမံကိန်းတည်ဆောက်ရေးကုန်ကျစရိတ်များတွင် ပါဝင်ပါသည်။

စဉ်	ထိခိုက်နိုင်မှု	လျော့နည်းသက်သာရေးနည်းလမ်းများ	တာဝန်ယူမည့် အဖွဲ့အစည်း	နှစ်စဉ် ရန်ပုံငွေ (ကျပ်)
		<ul style="list-style-type: none"> - အန္တရာယ်ရှိအမှိုက်များအား ခွဲခြား စုဆောင်းခြင်းနှင့် မြို့တော်စည်ပင်သာယာရေးကော်မတီ၏ လမ်းညွှန်ချက်နှင့်အညီ စွန့်ပစ်ခြင်း။ 		
၇။	<p>လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေး</p> <ul style="list-style-type: none"> - ဆောက်လုပ်ရေးအလုပ်သမားများ၏ မတော်တဆဖြစ်ရပ်များ - အဆောက်အအုံအမြင့်များတွင် လုပ်ငန်းများတွင် ဆောင်ရွက်ခြင်း။ - စက်ပစ္စည်းများ၏ မျက်နှာပြင်အပူချိန် မြင့်မားခြင်းနှင့် အမှုန်အမွှားများထွက်ရှိခြင်း။ 	<p>လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေး</p> <ul style="list-style-type: none"> - စီမံကိန်းအဆိုပြုသူ၏ ဘေးအန္တရာယ်ကင်းရှင်းရေး မူဝါဒ။ - ကန်ထရိုက်တာ၏ ဘေးအန္တရာယ်ကင်းရှင်းရေး အစီအစဉ်။ - လုပ်သားများအား တစ်ကိုယ်ရည်သုံးအကာအကွယ် ပစ္စည်း ထောက်ပံ့ခြင်း။ - လုပ်သားများအား ဘေးအန္တရာယ်ကင်းရှင်းရေးဆိုင်ရာ အသိပညာများ မြှင့်တင်ပေးခြင်း။ - ဘေးအန္တရာယ်ကင်းရှင်းရေး ကြီးကြပ်သူခန့်အပ်ထားခြင်း။ - ကန်ထရိုက်တာမှ အလုပ်သမားများအား ဘေးအန္တရာယ်ကင်းရှင်းရေး အစီအစဉ်နှင့် ပြစ်ဒဏ်များ ချမှတ်ပေးခြင်း။ - ကန်ထရိုက်တာမှ ဆွေးနွေးပွဲများ၊ အကြံပြုပွဲများ ထားရှိပေးခြင်း။ 	ဆောက်လုပ်ရေးကန်ထရိုက်တာ၏ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအသင်း။	စီမံကိန်းတည်ဆောက်ရေးကုန်ကျစရိတ်များတွင် ပါဝင်ပါသည်။
၈။	<p>ယဉ်ကျေးမှုအမွေအနှစ်</p> <ul style="list-style-type: none"> - တည်ဆောက်ရေးနှင့် ပိတ်သိမ်းရေးလုပ်ငန်းစဉ်များကြောင့် အမြင်ပသာဒနှင့် တုန်ခါမှုဆိုင်ရာ ထိခိုက်မှု။ 	<p>ယဉ်ကျေးမှုအမွေအနှစ်</p> <ul style="list-style-type: none"> - အဆိုပြုစီမံကိန်းသည် ဖန်ချက်စက်ရုံဟောင်းတွင် တည်ရှိပြီး အမြင့်ဆုံးအဆောက်အဦးမှာ ၁၁ မီတာ ရှိပါသည်။ - ထို့ကြောင့် ယဉ်ကျေးမှုအမွေအနှစ်အပေါ် သိသာထင်ရှားသော ထိခိုက်မှု မရှိနိုင်ပါဟု ယူဆရပါသည်။ 	ဆောက်လုပ်ရေးကန်ထရိုက်တာ၏ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအသင်း။	စီမံကိန်းတည်ဆောက်ရေးကုန်ကျစရိတ်များတွင် ပါဝင်ပါသည်။
၉။	<p>ဂေဟစနစ်</p>	<p>ဂေဟစနစ်</p>	ဆောက်လုပ်ရေးကန်ထရိုက်တာ၏ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအသင်း။	စီမံကိန်းတည်ဆောက်ရေးကုန်ကျစရိတ်များတွင် ပါဝင်ပါသည်။

စဉ်	ထိခိုက်နိုင်မှု	လျော့နည်းသက်သာစေရေးနည်းလမ်းများ	တာဝန်ယူမည့် အဖွဲ့အစည်း	နှစ်စဉ် ရန်ပုံငွေ (ကျပ်)
	<ul style="list-style-type: none"> - ဆောက်လုပ်ရေးနှင့် ဖြိုဖျက်ရေးလုပ်ငန်းများမှ တည်ဆောက်ရေးလုပ်ငန်းများကြောင့် အပင်နှင့် သတ္တဝါမျိုးစိတ်များအား ထိခိုက်ခြင်း။ 	<ul style="list-style-type: none"> - သစ်ပင်ခုတ်ခြင်း၊ ရှင်းလင်းခြင်းများအား အနည်းဆုံးဖြစ်အောင် ဆောင်ရွက်ရန်နှင့် သစ်ပင်များအား ပြန်လည်စိုက်ပျိုးခြင်း။ - အဆီနှင့် ဆောက်လုပ်ရေး အမှိုက်များအား စနစ်တကျ စုဆောင်းစွန့်ပစ်ခြင်း။ - တည်ဆောက်ရေးအမှိုက်နှင့် စွန့်ပစ်ရေများအား သင့်လျော်စွာ စွန့်ပစ်ခြင်း။ 		
လုပ်ငန်းလည်ပတ်စဉ်ကာလ				
၁။	<p>လေထုအရည်အသွေး</p> <ul style="list-style-type: none"> - လောင်စာလောင်ကျွမ်းခြင်းနှင့် ဖန်ရည်ကျိုမီးဖိုလည်ပတ်ခြင်းမှ ဖုန်မှုန့်နှင့်အခြားသော ဓာတ်ငွေ့များ ထွက်ရှိခြင်း။ 	<p>လေထုအရည်အသွေး</p> <ul style="list-style-type: none"> - သင့်လျော်သော ထုတ်လုပ်အခိုးအငွေ့ထုတ်လွှတ်မှု ထိန်းချုပ်ခြင်း နည်းလမ်းများအား တပ်ဆင်ဆောင်ရွက်ခြင်း။ - ဖန်ရည်ကျိုမီးဖို၏ မီးခိုးခေါင်းတိုင်တွင် သင့်လျော်သော လေစစ်စနစ်အား တပ်ဆင်ခြင်း။ - မီးစက်နှင့် မော်တော်ယာဉ်များအား ပုံမှန်ထိန်းသိမ်းခြင်း။ - ဆာလဖာပါဝင်မှုနည်းသော ဒီဇယ်လောင်စာအား အသုံးပြုခြင်း။ - စီမံကိန်းဧရိယာပတ်ဝန်းကျင်ရှိ လေအရည်အသွေးအား ပုံမှန် စောင့်ကြပ်ကြည့်ရှုခြင်း။ - သင့်လျော်သော လေအဝင်အထွက်စနစ်အား ဆောင်ရွက်ခြင်း။ 	MGE ၏ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အသင်း	၂,၀၀၀,၀၀၀
၂။	<p>ဆူညံသံနှင့် တုန်ခါမှု</p> <ul style="list-style-type: none"> - အရေးပေါ် မီးစက်၊ ကုန်ကြမ်းစုဆောင်းခြင်း၊ စက်ပစ္စည်းများ ကိုင်တွယ်အသုံးပြုခြင်းကြောင့် ဆူညံသံနှင့် တုန်ခါမှု ထွက်ရှိခြင်း။ 	<p>ဆူညံသံနှင့် တုန်ခါမှု</p> <ul style="list-style-type: none"> - ဆူညံသံအနည်းဆုံးထွက်ရှိရန် အဆောက်အဦး ဒီဇိုင်းများ၊ လိုအပ်သော အထောက်အပံ့ပစ္စည်းများ တပ်ဆင်ခြင်း။ - စက်ပစ္စည်းများအား ပုံမှန် စောင့်ကြပ်ထားရှိခြင်း။ 	MGE ၏ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အသင်း	၁,၀၀၀,၀၀၀

စဉ်	ထိခိုက်နိုင်မှု	လျော့နည်းသက်သာစေရေးနည်းလမ်းများ	တာဝန်ယူမည့် အဖွဲ့အစည်း	နှစ်စဉ် ရန်ပုံငွေ (ကျပ်)
		<ul style="list-style-type: none"> - ဆူညံသံထွက်ရှိမှုများသော လုပ်ငန်းများအား နေ့အချိန်တွင်သာ ဆောင်ရွက်ခြင်း။ - ဆူညံသံထွက်ရှိသော မီးစက်အား ရွေးချယ်အသုံးပြုခြင်း။ - မီးစက်အား လူနေဧရိယာနှင့် ဝေးကွာသော နေရာများတွင် တပ်ဆင်အသုံးပြုခြင်း။ 		
၃။	<p>ရေနှင့် မြေအောက်ရေအရည်အသွေး</p> <ul style="list-style-type: none"> - စီမံကိန်းလည်ပတ်စဉ်ကာလတွင် စွန့်ပစ်ရေများ ထွက်ရှိခြင်း။ 	<p>ရေနှင့် မြေအောက်ရေအရည်အသွေး</p> <ul style="list-style-type: none"> - သင့်လျော်သော စွန့်ပစ်ရေသန့်စင်ခြင်းစနစ်အား တပ်ဆင်ထားရှိခြင်း။ - သန့်စင်ပြီးရေများအား ပြန်လည်အသုံးပြုခြင်း။ (ဥပမာ- အိမ်သာ၊ ပန်းခြံများတွင် ပြန်လည်အသုံးပြုခြင်း) - မြေအောက်ရေလျော့နည်းခြင်းအား ကာကွယ်နိုင်ရန် အတွက် အခြားနည်းရေးအသုံးပြုအား ဆောင်ရွက်သွားပါမည်။ 	MGE ၏ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အသင်း	၁,၀၀၀,၀၀၀
၄။	<p>မြေအရည်အသွေး</p> <ul style="list-style-type: none"> - သယ်ယူပို့ဆောင်ရေးယာဉ်၊ မီးစက်၊ လောင်စာဆီ သိုလှောင်ရုံနှင့် ရေဆိုးသန့်စင်စနစ်မှ အဆီနှင့် ညစ်ညမ်းရေများ ထွက်ရှိခြင်း။ 	<p>မြေအရည်အသွေး</p> <ul style="list-style-type: none"> - သယ်ယူပို့ဆောင်ရေးယာဉ်အား ပုံမှန် စစ်ဆေးခြင်းနှင့် စောင့်ကြပ်ထိန်းသိမ်းခြင်း။ - လုပ်ငန်းသုံးစွန့်ပစ်ရေများအား သင့်လျော်သော စွန့်ပစ်ရေသန့်စင်ခြင်းစနစ်အား တပ်ဆင်အသုံးပြုခြင်း။ - သင့်လျော်သော အထွေထွေစွန့်ပစ်ရေသန့်စင်ခြင်း စနစ်အား တပ်ဆင်ထားရှိခြင်း။ - သင့်လျော်သော အစိုင်အခဲစွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှု စနစ်အား တပ်ဆင်အသုံးပြုခြင်း။ - ယာယီအစိုင်အခဲစွန့်ပစ်ပစ္စည်းနှင့် အနည်အနှစ် သိုလှောင်ရုံအား အမိုးအကာနှင့် မစိမ့်ဝင်နိုင်သော အခင်းများ ထားရှိခြင်း။ 	MGE ၏ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အသင်း	စွန့်ပစ်အစိုင်အခဲအမှိုက် နှင့် စွန့်ပစ်ရေ စီမံခန့်ခွဲမှု စနစ်တွင် ပါဝင်ပါမည်။

စဉ်	ထိခိုက်နိုင်မှု	လျော့နည်းသက်သာစေရေးနည်းလမ်းများ	တာဝန်ယူမည့် အဖွဲ့အစည်း	နှစ်စဉ် ရန်ပုံငွေ (ကျပ်)
		<ul style="list-style-type: none"> - ဖန်ချက်စက်ရုံ၏ ရေဆိုးသန့်စင်စနစ်မှ အနည်အနှစ်များ အား မြေကြီးသို့ တိုက်ရိုက်စွန့်ပစ်ခြင်းအား ရှောင်ရှားခြင်း။ 		
၅။	<p>စွန့်ပစ်အစိုင်အခဲ</p> <ul style="list-style-type: none"> - အန္တရာယ်ရှိသော အမှိုက်များ (ဘက်ထရီ၊ မီးလုံး၊ သုတ်ဆေးနှင့် သုတ်ဆေးပုံးများ၊ ဓာတုပစ္စည်းအကြွင်းအကျန်နှင့် ၎င်းပုံများ) - အန္တရာယ်မရှိသော အမှိုက်များ (စက္ကူ၊ ပလတ်စတစ်၊ ဖန်၊ အလူမီနီယမ်ဗူး၊ စားကြွင်းစားကျန်၊ ရော်ဘာများ) ထွက်ရှိခြင်း။ 	<p>စွန့်ပစ်အစိုင်အခဲ</p> <ul style="list-style-type: none"> - မစွန့်ပစ်မီ စွန့်ပစ်အစိုင်အခဲများအား သီးခြား စုဆောင်း၍ အမှိုက်သိုလှောင်ကန်များတွင် သိုလှောင်ထားခြင်း။ - ပြန်လည်အသုံးပြု၍ရသော အမှိုက်များအား တူညီသော နည်းလမ်း (သို့) အခြားသော နည်းလမ်းဖြင့် ပြန်လည်အသုံးပြုခြင်း။ - အန္တရာယ်ရှိသော အမှိုက်များအား လျော့ချခြင်း၊ ပြန်လည်အသုံးပြုခြင်း (reduce, reuse, recycle) နှင့် မြို့တော်စည်ပင်သာယာရေးကော်မတီ၏ စည်းကမ်းချက်နှင့် အညီ စွန့်ပစ်ခြင်း။ 	MGE ၏ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အသင်း	၁,၀၀၀,၀၀၀
၆။	<p>လုပ်ငန်းခွင်ကျွန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေး</p> <ul style="list-style-type: none"> - ဖန်ကွဲစများ ပျံ့လွင့်ခြင်းနှင့် ထုတ်လုပ်ရေးဆိုင်ရာ လုပ်ငန်းများကြောင့် ရုပ်ပိုင်းဆိုင်ရာ ထိခိုက်မှုများ ဖြစ်ပေါ်နိုင်ခြင်း။ 	<p>လုပ်ငန်းခွင်ကျွန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေး</p> <ul style="list-style-type: none"> - အစိုဓာတ်စုပ်ယူနိုင်သော အခင်းများ၊ အန္တရာယ်ရှိသော နေရာများသော သတိပေးဆိုင်ဘုတ်များ တပ်ဆင်ထားရှိခြင်း။ - ကုန်ကြမ်းပစ္စည်းများနှင့် ထုတ်ကုန်များအား သယ်ယူပို့ဆောင်ရာတွင် အရည်အချင်းရှိသော ဝန်ထမ်းများကို ခန့်အပ်ထားရှိခြင်း။ - မတော်တဆဖြစ်ရပ်များအား ကာကွယ်နိုင်ရန် သတ်မှတ်ထားသော ပမာဏထက် ကျော်လွန်သယ်ဆောင်ခြင်းအား မပြုလုပ်ရန်။ - တစ်ကိုယ်ရည်သုံးအကာအကွယ်ပစ္စည်းများအား ထောက်ပံ့ပေးခြင်း။ 	MGE ၏ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အသင်း	၁,၀၀၀,၀၀၀

စဉ်	ထိခိုက်နိုင်မှု	လျော့နည်းသက်သာစေရေးနည်းလမ်းများ	တာဝန်ယူမည့် အဖွဲ့အစည်း	နှစ်စဉ် ရန်ပုံငွေ (ကျပ်)
၇။	<p>ဂေဟစနစ်</p> <ul style="list-style-type: none"> - စီမံကိန်းမှ စွန့်ပစ်ရေနှင့် စွန့်ပစ်အစိုင်အခဲများအား နည်းစနစ်မကျစွာ စွန့်ပစ်ခြင်း။ 	<p>ဂေဟစနစ်</p> <ul style="list-style-type: none"> - ဂေဟစနစ်အပေါ် သက်ရောက်မှုလျော့နည်းသက်သာစေရန်အတွက် ထွက်ရှိလာသော စွန့်ပစ်ရေများအား သင်လျော်သော ရေဆိုးသန့်စင်စနစ်ဖြင့် သန့်စင်ခြင်း။ - စီမံကိန်းအဆိုပြုသူသည် သဘာဝသယံဇာတ အရင်းအမြစ်များအား စနစ်မကျစွာ စီမံခန့်ခွဲခြင်းနှင့် အသုံးပြုခြင်း။ - ဒေသမျိုးရင်းအပင်များအား ထိန်းသိမ်းခြင်းနှင့် ပြန်လည်စိုက်ပျိုးခြင်း။ - အစိမ်းရောင်နေရာများနှင့် ဧရိယာများသည် အင်းဆက်နှင့် သတ္တဝါများအတွက် ကောင်းမွန်သော စားကျက်အဖြစ် ထားရှိခြင်း။ 	MGE ၏ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အသင်း	၅၀၀,၀၀၀

၇.၂. စောင့်ကြပ်ကြည့်ရှုမည့် အစီအစဉ်

စီမံကိန်းတည်ဆောက်စဉ်/ပိတ်သိမ်းစဉ်နှင့် လည်ပတ်စဉ်အတွက် ရေးဆွဲထားသော စောင့်ကြပ်ကြည့်ရှုရေး အစီရင်ခံစာအား ဇယား ၁၃ နှင့် ၁၄ တွင် အသီးသီး ဖော်ပြထားပါသည်။

ဇယား (၁၃) စီမံကိန်း တည်ဆောက်စဉ်နှင့် ပိတ်သိမ်းစဉ်ကာလအတွင်း ပတ်ဝန်းကျင်ဆိုင်ရာ စောင့်ကြပ်ကြည့်ရှုမည့် အစီအစဉ်များ

အကြောင်းအရာ	စောင့်ကြပ်ကြည့်ရှုမည့်အရာ	စောင့်ကြပ်ကြည့်ရှုမည့်နေရာ		အကြိမ်အရေအတွက်	နှစ်စဉ်ရန်ပုံငွေ လျာထားချက် (ကျပ်)
		တည်ဆောက်ရေးအဆင့်	ပိတ်သိမ်းဖျက်သိမ်းရေးအဆင့်		
လေအရည်အသွေး	PM ₁₀ , PM _{2.5} , SO ₂ , NO ₂ , O ₃ & CO, CO ₂ , CH ₄ , VOC, Humidity ,Temperature	<u>စီမံကိန်းဧရိယာ</u> 16°42'34.68"N , 96°15'18.69"E <u>ဖန်ချက်စက်ရုံတောရ ဘုန်းကြီးကျောင်း</u> 16° 42' 27.89" N, 96° 15' 53.99" E <u>သီလဝါစက်မှုဇုန်လမ်း</u> 16° 41' 47.49" N, 96° 16' 11.50" E	<u>စီမံကိန်းဧရိယာ</u> 16° 42' 34.68" N, 96° 15' 18.69" E	တည်ဆောက်ရေး(သို့) ပိတ်သိမ်း/ ဖျက်သိမ်းရေး ကာလလျှင် တစ်ကြိမ်	၁,၀၀၀,၀၀၀
ရေထုအရည်အသွေး	BOD, COD, Oil & grease, pH, Total nitrogen, Total phosphorus, Temperature, DO, Turbidity, TDS, TSS, Iron, Lead, Free Cyanide, Arsenic	<u>အနည်စစ်ကန်မှ လုပ်ငန်းသုံး စွန့်ပစ်ရေ</u> 16°42'21.65"N, 96°15'27.01"E <u>စားသောက်ဆောင်မှ အထွေထွေ သုံးရေ</u> 16°42'33.75"N, 96°15'21.08"E <u>RO သောက်သုံးရေ</u>	<u>အနည်စစ်ကန်မှ လုပ်ငန်းသုံး စွန့်ပစ်ရေ</u> 16°42'21.65"N, 96°15'27.01"E	တည်ဆောက်ရေး(သို့) ပိတ်သိမ်း/ ဖျက်သိမ်းရေး ကာလလျှင် တစ်ကြိမ်	၅၀၀,၀၀၀

အကြောင်းအရာ	စောင့်ကြပ်ကြည့်ရှုမည့်အရာ	စောင့်ကြပ်ကြည့်ရှုမည့်နေရာ		အကြိမ်အရေအတွက်	နှစ်စဉ်ရန်ပုံငွေ လျာထားချက် (ကျပ်)
		တည်ဆောက်ရေးအဆင့်	ပိတ်သိမ်းဖျက်သိမ်းရေးအဆင့်		
		16°42'20.80"N, 96°15'25.18"E			
ဆူညံသံ	ဆူညံသံ (dB (A) scale)	<u>စီမံကိန်းဧရိယာ</u> 16°42'23.97"N, 96°15'25.93"E <u>ဖန်ချက်စက်ရုံတောရ ဘုန်းကြီးကျောင်း</u> 16°42'27.66"N, 96°15'53.72"E <u>သီလဝါစက်မှုဇုန်လမ်း</u> 16°41'47.78"N, 96°16'11.35"E	<u>စီမံကိန်းဧရိယာ</u> 16°42'23.97"N, 96°15'25.93"E	တည်ဆောက်ရေး(သို့) ပိတ်သိမ်း/ ဖျက်သိမ်းရေး ကာလလျှင် တစ်ကြိမ်	၃၀၀,၀၀၀
တုန်ခါမှု	Radial, Transverse, Vertical	<u>စီမံကိန်းဧရိယာ</u> 16°42'25.50"N, 96°15'19.87"E <u>ဖန်ချက်စက်ရုံတောရ ဘုန်းကြီးကျောင်း</u> 16°42'28.17"N, 96°15'54.14"E <u>Thilawa Industrial Road</u> 16°41'47.21"N, 96°16'11.50"E	<u>Project site</u> 16°42'25.50"N, 96°15'19.87"E	တည်ဆောက်ရေး(သို့) ပိတ်သိမ်း/ ဖျက်သိမ်းရေး ကာလလျှင် တစ်ကြိမ်	၅၀၀,၀၀၀
စွန့်ပစ်အမှိုက်	စွန့်ပစ်အမှိုက်ပမာဏနှင့် အမျိုးအစား	ယာယီစွန့်ပစ်အမှိုက် သိုလှောင်ရုံ	ယာယီစွန့်ပစ်အမှိုက် သိုလှောင်ရုံ	အပတ်စဉ်	၅၀၀,၀၀၀
လုပ်ငန်းခွင်ကျန်းမာရေး နှင့် ဘေးအန္တရာယ် ကင်းရှင်းရေး	ထိခိုက်မှုနှင့် မတော်တဆဖြစ်မှု	စီမံကိန်းပတ်ဝန်းကျင်နှင့် တည်ဆောက်ရေးဧရိယာ	စီမံကိန်းပတ်ဝန်းကျင်နှင့် တည်ဆောက်ရေးဧရိယာ	လစဉ်	၅၀၀,၀၀၀

ဇယား (၁၄) စီမံကိန်းလည်ပတ်စဉ်ကာလအတွင်း ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်

အကြောင်းအရာ	စောင့်ကြပ်ကြည့်ရှုမည့်အစီအစဉ်	စောင့်ကြပ်ကြည့်ရှုမည့်နေရာ	အကြိမ်အရေအတွက်	နှစ်စဉ်အသုံးပြုစရိတ် (ကျပ်)
လေအရည်အသွေး	PM ₁₀ , PM _{2.5} , SO ₂ , NO ₂ , O ₃ & CO, CO ₂ , CH ₄ , VOC, Humidity, Temperature	<u>စီမံကိန်းဧရိယာ</u> 16°42'34.68"N, 96°15'18.69"E	ခြောက်လလျှင် တစ်ကြိမ်	၂,၀၀၀,၀၀၀
		<u>ဖန်ချက်စက်ရုံတောရဘုန်းကြီးကျောင်း</u> 16° 42' 27.89" N, 96° 15' 53.99" E		
ရေအရည်အသွေး	pH, Temperature, TDS, Conductivity, Salinity, Turbidity, TSS, BOD, COD, Free Cyanide, Phosphorous, Arsenic, Iron, Lead, Total Nitrogen	<u>အနည်ထိုင်ကန်ရှိ လုပ်ငန်းသုံးစွန့်ပစ်ရေ</u> 16°42'21.65"N, 96°15'27.01"E	ခြောက်လလျှင် တစ်ကြိမ်	၁,၀၀၀,၀၀၀
		<u>အထွေထွေစွန့်ပစ်ရေ</u> 16°42'31.23"N, 96°15'12.90"E		
		<u>အနီးအနားရှိ အဝီစိတွင်း</u> 16°42'36.17"N, 96°15'29.54"E		
ဆူညံသံ	Noise level (dB (A) scale)	<u>စီမံကိန်းဧရိယာ</u> 16°42'23.97"N, 96°15'25.93"E	ခြောက်လလျှင် တစ်ကြိမ်	၆၀၀,၀၀၀
တုန်ခါမှု	Radial, Transverse, Vertical	<u>စီမံကိန်းဧရိယာ</u> 16°42'25.50"N, 96°15'19.87"E	ခြောက်လလျှင် တစ်ကြိမ်	၁,၀၀၀,၀၀၀

အကြောင်းအရာ	စောင့်ကြပ်ကြည့်ရှုမည့်အစီအစဉ်	စောင့်ကြပ်ကြည့်ရှုမည့်နေရာ	အကြိမ်အရေအတွက်	နှစ်စဉ်အသုံးပြုစရိတ် (ကျပ်)
စွန့်ပစ်အမှိုက်	စွန့်ပစ်အမှိုက်ပမာဏနှင့်အမျိုးအစား	ယာယီအမှိုက်စွန့်ပစ်ကန်	အပတ်စဉ်	၅၀၀,၀၀၀
လုပ်ငန်းခွင် ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေး	ထိခိုက်မှုနှင့် မတော်တဆ ဖြစ်ရပ်များ	စီမံကိန်းဧရိယာနှင့် အနီးပတ်ဝန်းကျင်	လစဉ်	၅၀၀,၀၀၀

၈. အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးခြင်း။

၈.၁. နယ်ပယ်တိုင်းတာသတ်မှတ်ခြင်းအစီရင်ခံစာတွင် အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးရခြင်း

ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း (၂၀၁၅)အရ စီမံကိန်း၏ နယ်ပယ်တိုင်းတာ သတ်မှတ်ခြင်းအစီရင်ခံစာ အတွက် အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးပွဲ ပြုလုပ်ရခြင်းမှာ လိုအပ်သော အခန်းကဏ္ဍ တစ်ခုဖြစ်ပါသည်။ ထို့ကြောင့်စီမံကိန်းအဆိုပြုသူနှင့် ၎င်း၏အတိုင်ပင်ခံ များသည် စီမံကိန်း ဖွံ့ဖြိုးတိုးတက်မှု အစီအစဉ်များနှင့် ပတ်သက်၍ တာဝန်ရှိသူများ၊ ဒေသခံပြည်သူများနှင့် အာဏာပိုင် အဖွဲ့အစည်းများကြားတွင် တိုင်ပင်ဆွေးနွေးပွဲများ ပြုလုပ်ခဲ့ပါသည်။ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် လိုအပ်ချက်၏ တစ်စိတ်တစ်ပိုင်းအနေဖြင့် စီမံကိန်း အဆိုပြုသူသည် စီမံကိန်းဖွံ့ဖြိုးတိုးတက်မှုများအကြောင်း သက်ဆိုင်သူများအား အောက်ပါအတိုင်း တိုင်ပင်ဆွေးနွေး တင်ပြခဲ့ပါသည်။

၁။ စီမံကိန်းနှင့် သက်ဆိုင်သော ဒေသခံပြည်သူများ၏ အချက်အလက်များ၊ လုပ်ငန်း ဆောင်ရွက်ခြင်းနှင့် သက်ဆိုင်သော ပတ်ဝန်းကျင်နှင့် လူမှုစီးပွားဆိုင်ရာ သက်ရောက်မှုများ နှင့် ၎င်းတို့ကို လျော့နည်းသွားစေရန် လျှော့ချရမည့်အချက်များ။

၂။ စီမံကိန်းလုပ်ငန်းကြောင့် ထိခိုက်နိုင်သည့် ဒေသခံပြည်သူများ၊ အဖွဲ့အစည်းများ နှင့် တစ်ဦးချင်းစီ၏ အမြင်များ၊ စိုးရိမ်မှုများနှင့် သဘောထားများကို ထည့်သွင်းစဉ်းစားခြင်းနှင့် ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှုအစီအစဉ်အစီရင်ခံစာတွင် အသေးစိတ်ပြန်လည်ထည့်သွင်းမည်ဖြစ်ကြောင်း ပြောကြားခြင်း။

၃။ လိုအပ်သည့် ကိစ္စရပ်များအတွက် သက်ဆိုင်ရာ အစိုးရဌာနများ၏ ဆွေးနွေးခြင်း နှင့် အကဲဖြတ်ခြင်းဆိုင်ရာ အကြံပြုချက်များကို စနစ်တကျ လိုက်နာဆောင်ရွက်မည်ဖြစ်ကြောင်း ပြောကြားခြင်း။

MGE ၏ ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်း အစီရင်ခံစာအတွက် အများပြည်သူနှင့် တိုင်ပင် ဆွေးနွေးမှုများနှင့် သက်ဆိုင်သည့် အချက်အလက်များကို အခန်း (၈) အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေး ခြင်း အခန်းတွင် အသေးစိတ် ဖော်ပြထားပါသည်။

၉. နိဂုံးချုပ်နှင့် အကြံပြုခြင်း

၉.၁. နိဂုံးချုပ်

ဤပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း အစီရင်ခံစာသည် အဆိုပြုစီမံကိန်း၏ တည်ဆောက်စဉ်၊ လုပ်ငန်းလည်ပတ်စဉ်နှင့် ပိတ်သိမ်းစဉ်ကာလများတွင် ဖြစ်ပေါ်နိုင်သော ပတ်ဝန်းကျင်၊ လူမှုရေးနှင့် ကျန်းမာရေးဆိုင်ရာ သက်ရောက်မှုများကို အကဲဖြတ်ဆန်းစစ်ခြင်းများ ဆောင်ရွက်ထားပါသည်။ လေ့လာချက်များကို စီမံကိန်းအကြောင်းအရာ၊ သက်ဆိုင်ရာ အရင်းအမြစ်မျိုးစုံမှ သတင်းအချက်အလက် များ၊ စီမံကိန်းဧရိယာရှိ ပတ်ဝန်းကျင်နှင့် လူမှုစီးပွားဆိုင်ရာ ကွင်းဆင်းဖော်ပြချက်များ၊ စီမံကိန်းအတွင်းနှင့် အနီးနားရှိ အစိုးရကဏ္ဍများနှင့် အဖွဲ့အစည်းများတွင် ပါဝင်သော ဆက်စပ်ပတ်သက်သူများနှင့် ဆွေးနွေး တင်ပြချက်များနှင့် အဆိုပြုစီမံကိန်းနှင့် ပတ်သက်သော ပတ်ဝန်းကျင်နှင့် နည်းပညာဆိုင်ရာ အတွေ့အကြုံ

ရှိသော အကြံပေးပုဂ္ဂိုလ်များအပေါ် အခြေခံ၍ ပြင်ဆင်ရေးဆွဲထားပါသည်။ ရရှိလာသော လေ့လာချက်များ အရ အဓိကကျသော အကြောင်းအရာများ အပိုဒ် ၉.၁ ပါအတိုင်း နိဂုံးချုပ်ဖော်ပြထားပါသည်။

၉.၂. အကြံပြုချက်များ

ဤပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းလေ့လာခြင်းသည် ပတ်ဝန်းကျင်နှင့် လူမှုရေးဆိုင်ရာ ပြဿနာများ၊ လျှော့ချရေးနည်းလမ်းများနှင့် စောင့်ကြပ်ကြည့်ရှုမှုအစီအစဉ်များကို ရှင်းလင်းစွာ ဖော်ပြထားပါသည်။ စီမံကိန်းအဆိုပြုသူသည် ဤအစီရင်ခံစာတွင် ဖော်ပြထားသော လျှော့ချရေးအစီအစဉ်များ၊ စီမံခန့်ခွဲမှုအစီအစဉ်များနှင့် စောင့်ကြပ်ကြည့်ရှုရေးအစီအစဉ်များအားလုံးကို အကောင်အထည်ဖော်ဆောင်ရွက်ရမည်ဖြစ်သည်။ ထို့အပြင် စီမံကိန်းအကောင်အထည် ဖော်ဆောင်သူသည် ပတ်ဝန်းကျင်ဆိုင်ရာ လမ်းညွှန်ချက်များ၊ ဥပဒေအတိုင်း ရေးဆွဲရန်လိုအပ်သော လျှော့ချရေးနည်းလမ်း ဆောင်ရွက်ခြင်းနှင့် အခြားသော သက်ဆိုင်ရာ လိုအပ်ချက်များကို အစဉ်မပြတ်လိုက်နာရမည်ဖြစ်သည်။

EXECUTIVE SUMMARY

1. Background of the Project

Myanmar Golden Eagle Co., Ltd. (MGE) was established in 2016 under the Foreign Investment Law and Myanmar Companies Act. Type of investment business is joint venture with the share ratio of thirty-five percentage (35%) from SSB Enterprise Co., Ltd. (Thailand) and sixty-five percentage (65%) from Glass Holding Asia Co., Ltd. (Local). It is located at U Paing No 97, Yangon-Thilawa Terminal Road, Phayagone Village, Thanlyin, Township, Yangon, Myanmar. This Environmental Assessment (EIA) report mainly focuses on the development of new glass bottles manufacturing factory and renovation of some existing buildings. The total land areas of the project is 40 acres with total building areas of 3 acres. The location of the project site is shown in Figure 1. The project proponent has engaged Total Business Solution Co., Ltd. (TBS) to study the EIA of the project.

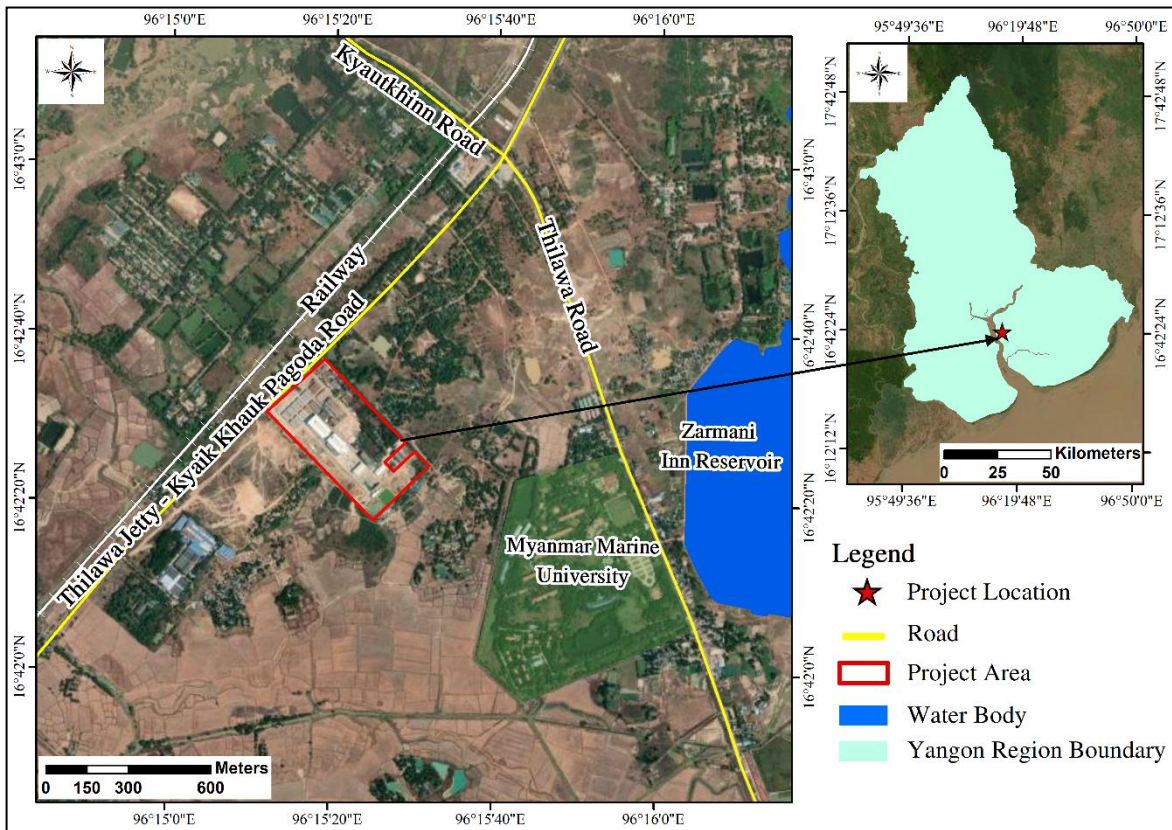


Figure 1 Location Map of the Project Area

The proposed glass bottles manufacturing factory is located between the Phayagone Village and Ah Lun Soke Village. Therefore, it is expected to occur some impact on the two villages. In consequence, residential area and some agricultural areas of these villages are possible to assume as the area of influence. On the other hand, the area of influence especially the two villages is within the 3 km radius of the study area. The overall distance between the project and nearby villages are 2.4 km for Hpa Yar Kone Village and 2.8 km for Ah Lun Soke Village. The distance between the project area and nearby villages are described in Figure 2.

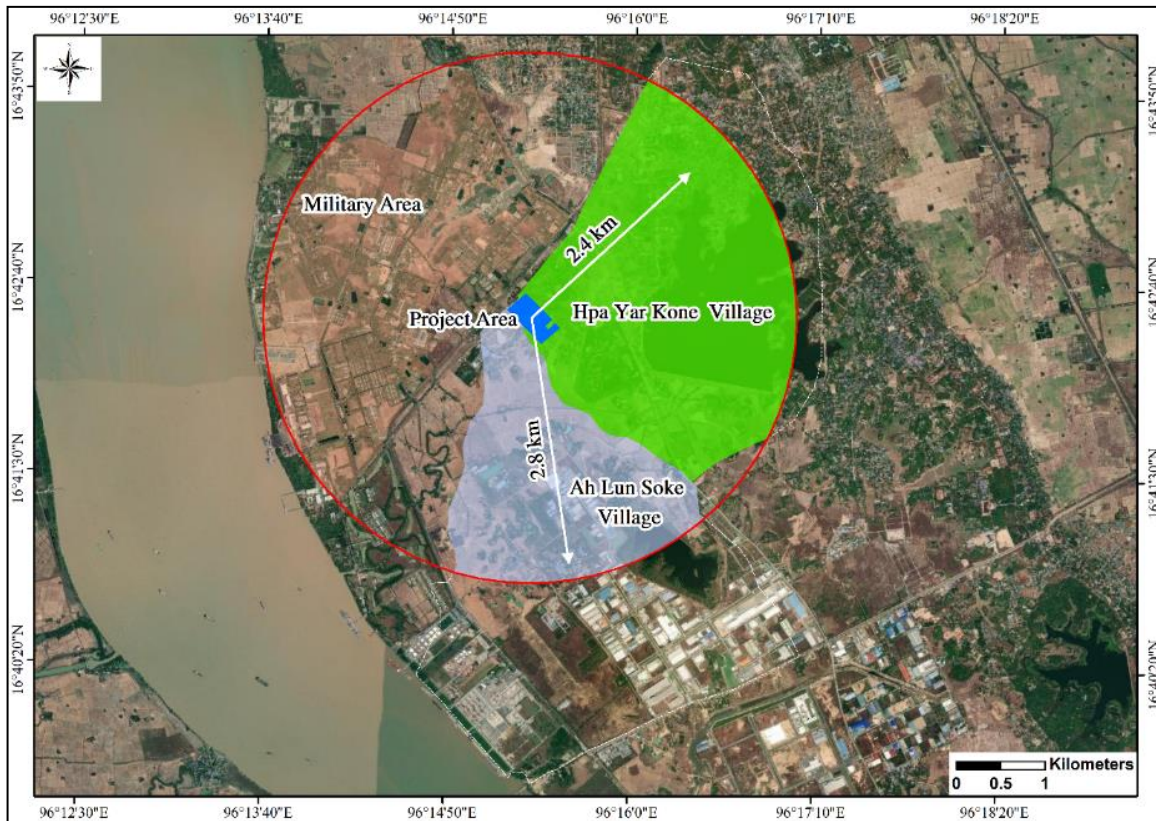


Figure 2 Distance between Project and Nearby Villages

1.1. Project Proponent

The contact and representative of the project proponent regarding to this EIA is mentioned in Table 1 and the organization chart of the project proponent is shown in Chapter 1.

Table 1 Contact of Project Proponent's Representative

Name	Mr. Kyaw Kyaw Sein
Designation	Managing Director
Address	No. 17/10,27 street, Between 62 and 63 blocks, Pyigyimatman Ward, Chan Aye Thar San Township, Mandalay, Myanmar.
Tel	09-30926608
e-mail	info@myanmarglass.com
Office Address	U Paing No 97, Yangon-Thilawa Terminal Road, Phayagone Village, Thanlyin, Township, Yangon, Myanmar.

1.2. EIA Consultant

TBS is a locally own company that provides engineering and environmental services to private and public sectors in Myanmar. TBS has been engaged to prepare the EIA for this project. The EIA study team consists of qualified and experienced professionals in various technical areas relevant to the major environmental and social impacts of the project identified in the report. The organizational structure for conducting and managing the EIA study team is shown in Figure 3 and Table 2.

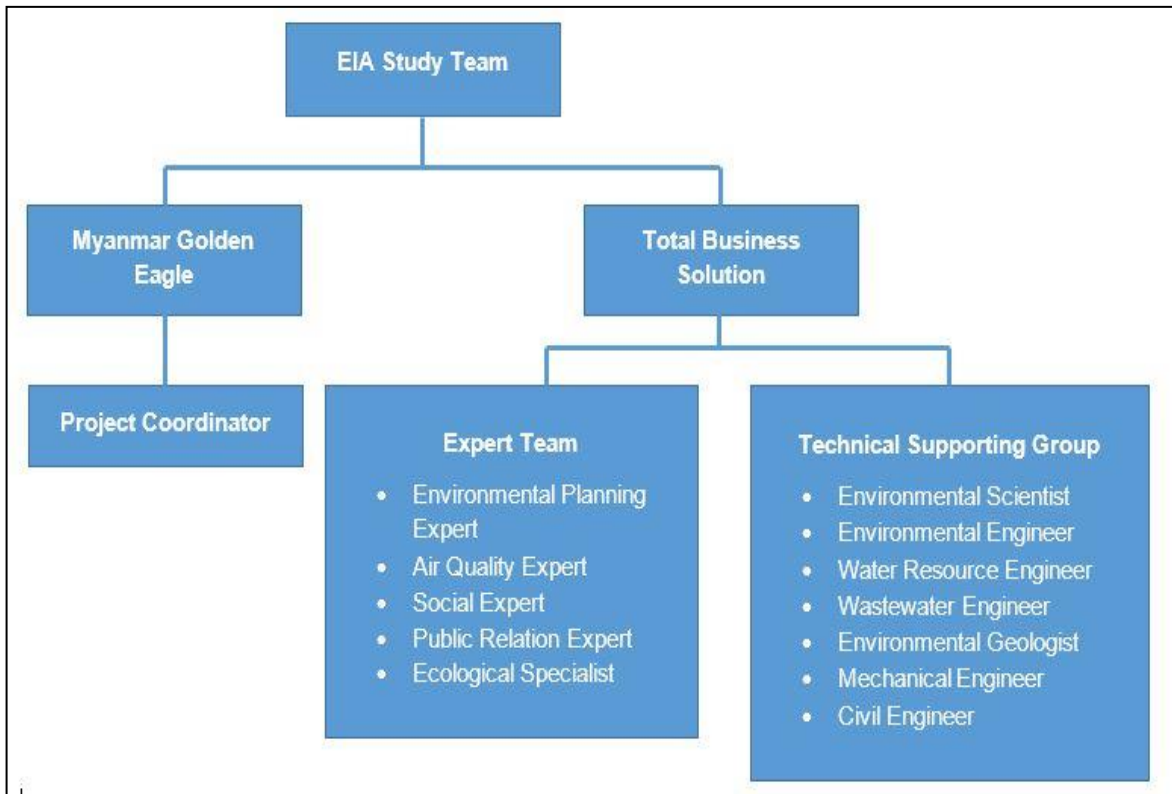


Figure 3 Organization structure of EIA Study Team

Table 2 EIA Study Team

No.	Name	Education	Experience	Responsibility
1.	Dr. Soe Moe Kyaw Win Managing Director Principal of Geotechnical and Geo environmental Engineer	Ph.D. (Geotechnical Engineering) M.Sc. (Geotechnical Engineering) B.Sc. (Geology)	30-year experiences in the areas of environmental assessment, geotechnical and geological engineering in Southeast Asian, U.S.A and Canada. Environmental assessments, mine waste management, site investigation, instrumentation, ground improvement, land reclamation and landslide investigation.	Final review of the report
2.	Mr. Myatthu Kyaw General Manager	M.Sc. (Environmental Engineering and Management) B.Sc. (Forestry)	Over 7 years' experience in environmental quality monitoring (air, noise and vibration, soil, water), environmental impact assessment industry.	Overall review the report and manage for the smooth implementation of report preparation of the project
3.	Mr. Nyan Yee Senior Project Manager	B.Sc. (Geology)	Over 10 years' experience in jade mining company Over 10 years' experience in Environmental Impact Assessment report preparation and Monitoring sector. Over 5 years' experience in coordination with the government sectors and public communication	Manage the survey team and field related activities and arrange the PCM by coordinating with client and relevant government departments
4.	Dr. Aung Aung	Ph.D. (Zoology) M.Sc. (Zoology) B.Sc. (Zoology)	Over 19-year experiences in teaching, researcher in Zoology field and biodiversity conservation.	Environmental impact assessment and Biodiversity conservation focus on mammalogy and ecology.
5.	Dr. Pyone Pyone Myint	Ph.D. (Zoology) M.Sc. (Zoology) B.Sc. (Zoology)	Over 19-year experiences in teaching and field research in Zoology field and Biodiversity observation.	Environmental impact assessment and biodiversity observation mainly in anatomy, behavior, ecology, evolution, physiology, conservation, or other aspects of bird biology.
6.	Dr. Thant Zaw Win	Ph.D. (Taxonomy) M.Sc. (Botany) B.Sc. (Botany)	Over 9-year experiences in teaching and field research in Botany field and biodiversity observation.	Environmental impact assessment and phytochemical analysis, wetland management, specialist in plant biology.

No.	Name	Education	Experience	Responsibility
7.	Dr. Than Than Myint	Ph.D. (Zoology) M.Sc. (Zoology) B.Sc. (Zoology)	Over 16-year experiences in teaching and field research in Zoology field and marine biology observation.	Environmental impact assessment and marine biodiversity observation mainly in fish biology.
8.	Ms. Hnin Lai Win Environmental Manager	M.Sc. (Environmental Engineering and Management) B.Pharm. (Pharmacy)	5-year experiences in management and marketing and training of junior staff in medical field Over 4-year experiences in land use planning, environmental impact assessment and managing environmental projects. Environmental management plan, environmental monitoring, environmental risk assessment, facilitated the public consulting meetings, marketing, coordination with government organizations and local community.	Overall review the report
9.	Ms. Phoo Pwint Khine Environmental Manager	M.E (Environmental Engineering and Management) B.E (Civil)	1 year experience as a site engineer in construction project. 6 months' experience as a QC/QS at building estimate team. Over 3 years' experience in environmental field	Lead the Environmental Team to prepared the overall Environmental Management Plan including Water and Wastewater Pollution Control and Management as well as Solid Waste Management, Environmental Impact Assessment, Cumulative Impact Assessment, Environmental Quality Analysis and arrange the Public Consultation Meetings
10.	Ms. Aye Mon Aung Environmental Engineer	M.E (Environmental Engineering and Management) B.E (Materials and Metallurgy)	Over 1 year experience as sale representative in plastic raw materials and chemical trading 3 years experience in environmental report preparation	Support the team leader to conduct and calculate the impact assessment for solid waste management, wastewater and air pollution control as well as noise and vibration control of the project
11.	Mr. Htet Thiha Phone Myint	B.Sc. (Geology)	7 years' experiences in geological field, soil analysis, environmental	Support the team leader to deal with government organizations and local

No.	Name	Education	Experience	Responsibility
	Project Manager		management land use observation Environmental site survey, impacts monitoring (air, noise, water sampling), coordination with government organizations and local community, socioeconomic survey and documentation in environmental management projects.	community, conducting Social Survey, Social data Analysis as well as arrange the Public Consultation Meetings
12.	Mr. Phyo Thu Kyaw Auto CAD Drafter	B.E. (Mechatronic)	3 years' experiences in project coordination, documentation, Auto CAD drafter and graphic design and IT technician. Over 3 years experiences in environmental monitoring such as air and noise monitoring, water sampling and installing, maintaining and repair of computer system and office equipment.	Support the team leader to prepare the engineering drawing and mappings
13.	Ms. Kyi Phyu Khin	ABE (Level 6 – UK) BA (English) Diploma in Business Law (YU)	1 years' experiences in management field specialized in business law	Prepared the Law and Regulation section as well as public consultation meeting of the project
14.	Mr. Wai Phyo Aung Survey Manager	B.Sc (Geology)	8 years' working experiences in geological and geotechnical engineering. 4 years' as a team leader in survey team.	Support the survey team for Environmental Quality Monitoring and Drone Survey Conduct the land used survey and prepared the land use map and necessary mapping of the project
15.	Mr. Zaw Myo Hein Environmental Geologist	B.Sc (Geology)	3 year's experience in environmental monitoring processes and conducting site survey	Prepared and conducted the Environmental Quality Monitoring Survey, Drone Survey and Environmental Quality Analysis of the project
16.	Ms. Thinzar Htun Environmental Scientist	B.Sc (Forestry)	2 year's experience in environmental report examination and socio survey	Prepare the Environmental Management Plan, Project Description, Environmental Quality

No.	Name	Education	Experience	Responsibility
			5 months experiences in environmental report preparation field	Monitoring Plan and Sub-plan as well as arrange the Public Consultation Meetings

2. OVERVIEW OF THE POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

The activities carried out under the project are subject to these legal requirements. Summarized relevant laws and regulations for the project are expressed in Table 3. It is sure that the project proponent will comply with all the following laws and regulations.

Table 3 Relevant Myanmar Laws and Regulations

No.	Name of Laws and Regulations	Year
Environmental Conservation		
1.	Environmental Conservation Law	2012
2.	Environmental Conservation Rules	2014
3.	Environmental Impact Assessment Procedure	2015
4.	National Environmental Policy	2019
Pollution Control and Health		
5.	National Environmental Quality (Emission) Guidelines	2015
6.	National Drinking Water Quality Standards	2019
7.	Public Health Law	1972
8.	The Prevention and Control of Communicable Diseases Law	1995
9.	The Control of Smoking and Consumption of Tobacco Product	2006
10.	Occupational Safety and Health Law	2019
11.	Myanmar Fire Brigade Law	2015
12.	Prevention of Hazard from Chemical and Related Substances Law	2013
Biodiversity and Resource Conservation		
13.	Conservation of Biodiversity and Natural Protected Area Law	2018
14.	The Law relating to Aquaculture	1989
15.	Conservation of Water Resource and River Law	2006
16.	Conservation of Water Resource and River Rules	2013
17.	Underground Water Act	1930
18.	Forest Law	1992
Land Acquisition		
19.	The Land Acquisition Act	1894
20.	Myanmar National Land Use Policy	2016
21.	State-owned land leasing of buildings; Instruction to be followed in transfers and joint ventures	2018

No.	Name of Laws and Regulations	Year
22.	Farmland Law	2012
23.	Farmland Rules	2012
24.	Vacant, Fallow and Virgin Land Management Law	2018
25.	Registration of Deeds Law	2019
26.	The Boundaries Law	2019
Urban Development and Management		
27.	Development Committee Law	2013
28.	Myanmar Engineering Council Law	2013
29.	The Electricity Law	2014
30.	The Telecommunications Law	2013
Human Rights		
31.	Protection of the Right of National Race Law	2015
32.	Rights of the Persons with Disabilities Law	2015
33.	Child Rights Law	2019
Cultural Heritages		
34.	The Protection and Preservation of Cultural Heritage Region Law	2019
35.	The Protection and Preservation Antique Object Law	2015
36.	The Protection and Preservation of Ancient Monument Law	2015
Labour		
37.	Labour Organization Law	2011
38.	The Employment and Skill Development Law	2013
39.	The Minimum Wage Law	2013
40.	Payment of Wage Law	2016
41.	Workers' Compensation Act	1923
42.	The Settlement of Labour Dispute Law	2012
43.	The Leave and Holiday Act	1951
44.	Social Security Law	2012
Motor Vehicles		
45.	Vehicle Safety and Motor Vehicle Management Law	2020
46.	The Myanmar Motor Vehicle Rules	1989
47.	The Motor Vehicle Law	2015
Other Related Law and Regulation		
48.	Myanmar Insurance Law	1993
49.	Myanmar Insurance Rule	2017
50.	The Ethnic Right Protection Law	2015

No.	Name of Laws and Regulations	Year
51.	Myanmar Investment Law	2016
52.	Myanmar Investment Rule	2017
53.	The Petroleum and Petroleum Product Law	2017
54.	The Petroleum Act	1934
55.	The Export and Import Law	2012
56.	The Fisheries Law	1989
57.	Natural Disaster Management Law	2013
58.	Climate Change Policy	2019
59.	Commercial Tax Law	2014
60.	The Union Tax Law	2019
61.	Myanmar Citizens Investment Law	2013
62.	Foreign Investment Law	2012
Myanmar Government Institutional Framework		
63.	Arrangement at National and Sector Level	
64.	Arrangement at the Project Area	
International and National Policies Guidelines and Standards		
65.	IFC's Standards and Guidelines	2012
66.	World Bank Pollution Prevention and Abatement Handbook	1998
International Conventions		
67.	Vienna Convention for the Protection of the Ozone Layer	1985
68.	Montreal Protocol on Substances that Deplete the Ozone Layer	1987
69.	Kyoto Protocol	1997
70.	United Nations Framework Convention on Climate Change (UNFCCC)	1992

3. PROJECT DESCRIPTION AND ALTERNATIVES

3.1. Project Information

The proposed project is a factory that produces various types of glass bottles by using advanced technology. The proposed glass bottles manufacturing factory is located at U Paing No 97, Yangon-Thilawa Terminal Road, Phayagone Village, Thanlyin, Township, Yangon, Myanmar. The location of the project is 16° 42' 28.84" N and 96° 15' 18.72" E. The total land areas of the project is 40 acres with total building areas of 3 acres.

3.2. Alternative Ways

3.2.1. Project Alternative

Looking for the land to accommodate the scale and size of the project and completing official transaction on it may take a long period. In addition, it is not a guarantee that such land would be available. It is also worth noting that the proposed project is already underway in terms of seeking developmental approvals in various government departments. The project proponent would spend another long period of time on design and approvals of the plans by the relevant government departments. The project design and planning before the stage of implementation would call for cost; already encountered in the proposed development i.e. whatever has been done and paid to date would be counted as a loss to the proponent. This would also lead to a situation like No Action Alternative. The other consequence is that it would discourage both foreign and local investors especially in the construction sector. In consideration of the above concerns and assessment of the current proposed site, relocation is not a viable option.

3.2.2. Glass Bottles Manufacturing Technology Alternative

Blow & Blow Process is the applied glass bottles manufacturing technology of the MGE factory. This technology is applied for the production of narrow containers where the parison is formed by compressed air. As an alternative for the Blow & Blow Process, the technology of Press & Blow Process is also popular for glass bottles production. However it is used for large diameter finish containers only in which the parison is shaped by pressing the glass against the blank mold with the metal plunger. Therefore, Blow & Blow Process is the most suitable glass bottles manufacturing technology for MGE factory.

3.3. Description of Project

3.3.1. Site Description

Regarding the site description, as the proposed project is planned to construct within the existing compound of old glass bottles manufacturing factory, it is also planned to renovate some existing buildings to apply as the warehouse, office building and accommodation for staff. At the same time, the main factory building for glass bottles manufacturing process will be constructed by applying the latest technology. Document related to the construction permit from the City Development Committee, Thanlyin Township, Yangon Division is also described in Appendix A. The master layout plan of the proposed project site is shown in Figure 4.

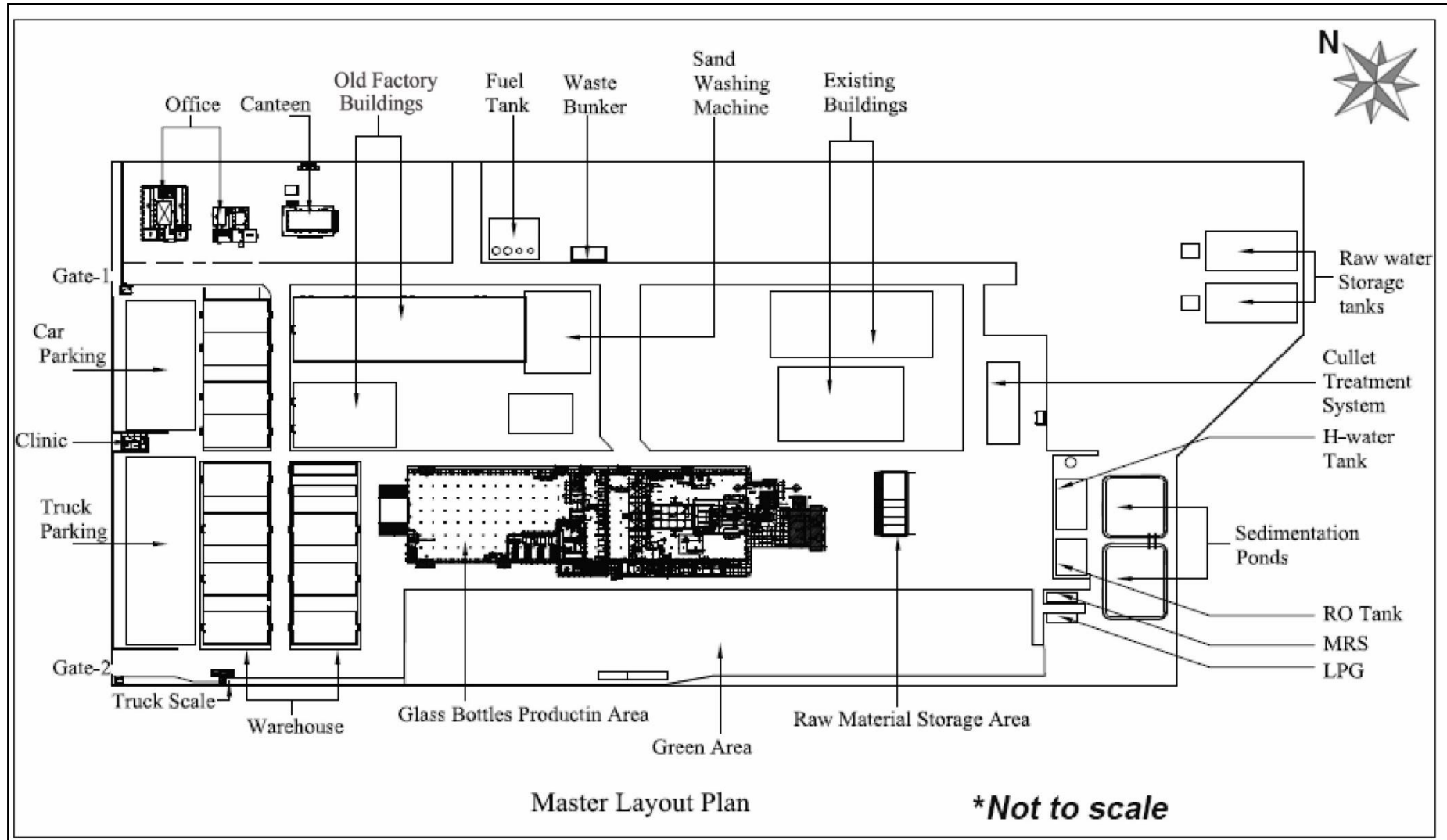


Figure 4 Master Layout Plan of Proposed Project

3.3.2. Compounds Adjacent to Project

The existing land use around three kilometers adjacent to the project site is composed of a mix of residential areas, religious places, commercial areas, government offices and schools. Location map of buildings, houses, roads and offices adjacent to three kilometers of the project site is presented in Figure 5

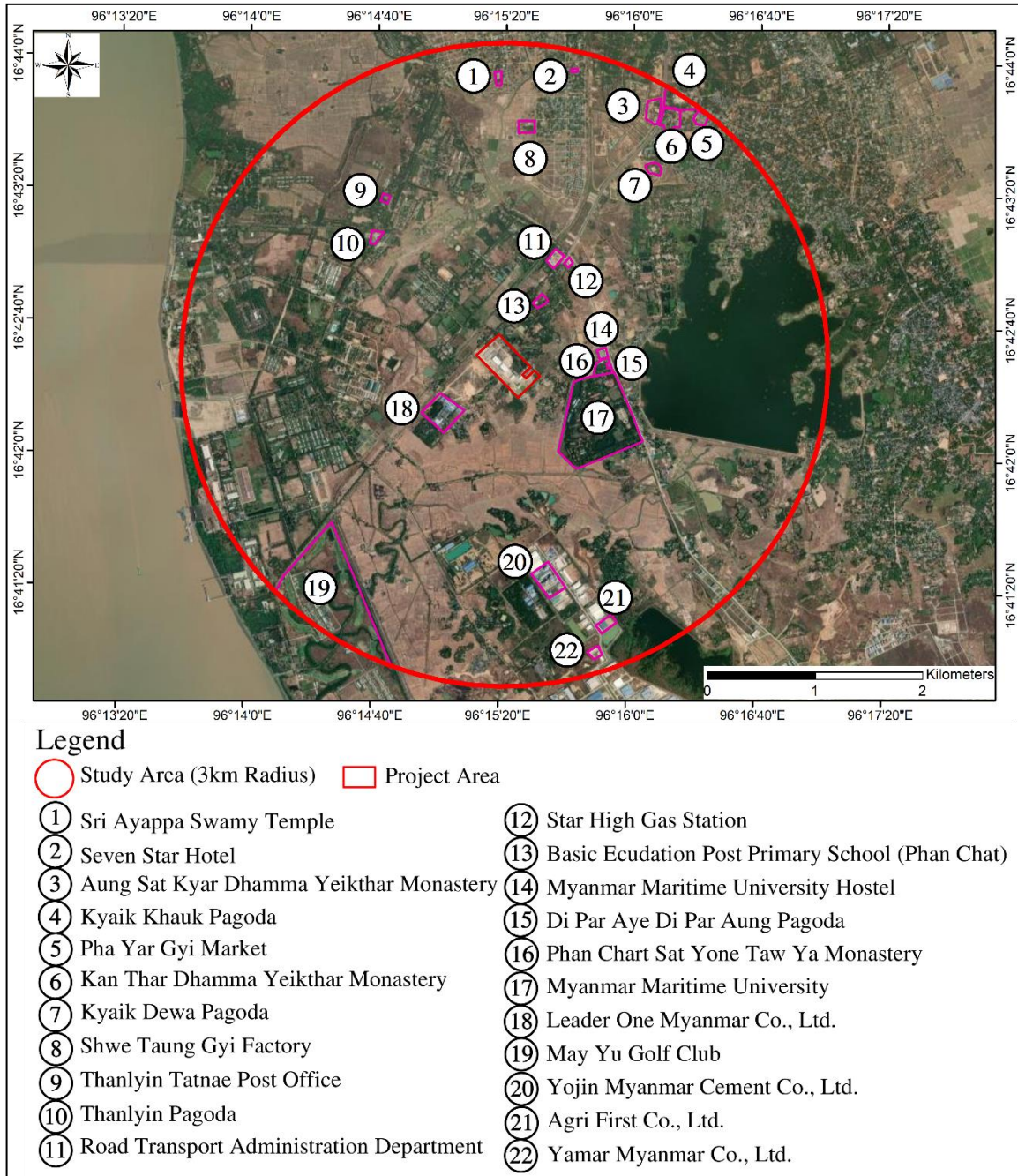


Figure 5 Location of Adjacent Features within 3 km to the Project Site

3.4. Project Implementation

3.4.1. Project Implementation Schedule

Necessary documentation and official registration process are conducted during the initial period. Then, construction activities of the proposed project were started on January 2019. The main construction activities of the proposed project was completed at the end of April 2022. At the same time, finishing work for other minor construction and renovation activities were also conducted at the end of construction period. Besides, the initial operation was started from May to December 2022, followed by the trial production period by the year 2023. Commercially production will be from 2024 to 2066 with 20 years of extension from 2067 to 2086. The decommission phase projected to be in 2087.

In general, MGE will be responsible for the overall management of project implementation, both construction and operation. Project implementation (construction) will be the responsibility of MGE with the advice from a construction-consulting firm. The tentative schedule of the propose project is shown in Table 4.

Table 4 Project Implementation Schedule

No	Activities	2016-2018	2019		2020	2021	2022			2023	2024-2066	2067-2086	2087
			Jan	Feb to Dec			Jan to Mar	Apr	May to Dec				
1	Initial Period												
2	Starting Time for Construction												
3	Renovation and Construction Period												
4	Finishing Time for Construction												
5	Starting Time for Initial Operation												
6	Trial Period for Production												
7	Commercially Production Period												
8	Extension Period												
9	Decommission Period												

3.4.2. Number of Construction Workers

The total numbers of workers are approximately 400 workers per day for construction period. However, total numbers of construction workers in each day will vary depend on the type of construction work and schedule.

3.5. Glass Bottles Manufacturing Process

3.5.1. Raw Material

Regarding the raw cullet, sand, soda ash, limestone, feldspar, sodium sulphate, carbon and ferric oxide for amber and selenium for flint are used as the Raw Materials (RM) sources for glass bottle production. In this glass bottles manufacturing process, twenty-three types of raw material are used for various purposes such as chemical usage for manufacturing process, factory cleaning purpose and lubricant for machines operation and maintenance purposes. Although the majority of RM are derived from local products, some are imported from overseas such as India, China, UAE, Italy, Thailand and so on. List of raw materials and its daily consumption amount are presented in Chapter 3.

3.5.2. Production Process

The main production process of the factory is manufacturing of glass bottles and it can be divided into five main sections. They are raw material treatment process, batch and furnace section, hot end, cold end, and warehouse delivery.

(1) Raw Material Treatment Process

Cullet Treatment Plant

Recyclable glass bottles are collected from the local subcontractors as a main source of cullet. Then, the collected glass bottles are crushed at cullet treatment plant of the factory to produce the uniform size of cullet with the dimension of 1 square inches. At the same time, small pieces of iron, aluminium, and cans are separated by magnets while that of paper and wooden pieces are vacuum by cyclone (vacuum machine). Twenty numbers of manpower is used for this operation process. The capacity of the cullet treatment plant is 60 tons per day.

Sand Washing Plant

Regarding the main source of raw sand, it is transported from Bote Pyin Township, Tanintharyi Division, Myanmar for initial operation state. After the initial state, raw sand is purchased from Ale-man Kyun, Tanintharyi Division, Myanmar for better quality. Raw sand is transported to MGE through the waterway only in summer and it is stored in the factory compound for the whole year. Expected amount of daily raw sand consumption of the factory is around 100 tons. Generally, natural sand is washed and screened at sand washing plant of the factory with the capacity of 30-40 tons per day. In this process, recycled water from sedimentation pond of the factory is used for sand washing purpose.

(2) Batch Plant and Furnace

Raw Material Weighting and Mixing

Raw cullet, sand, soda ash, limestone, feldspar, sodium sulphate, carbon and ferric oxide for amber and selenium for flint are weighted and mixed into the mixer according to the desired B:C. Generally, B:C will vary depend on the desired transparency percentage for each type of material, which are vary from 30 percentage to 80 percentage.

There are three main steps for the process of batch, namely; RM mixing, conveying and scrapping. In general, around 88-90 batches of mixed raw material are required to produce the 5,000 (big) or 8,000 (small) numbers of glass bottles daily.

Melting

In this melting process, properly mixed raw materials are delivered to the furnace with specific rate. The furnace zone is connected with the well-designed chimney system to support gas emission from melting process. Brick wall of the furnace is made of insulation bricks with high resistance to heat. The furnace runs for 24 hours a day at a temperature of 1,500 °C and emits several polluted substances to air. At the same time, sodium carbonate (Na_2CO_3) is also added to melt the mixture completely.

(3) Hot End

There are altogether three main steps in hot end process. All stages related to hot end process is conducted with the help of the I.S machine, which is produced in Italy. It is installed four numbers of I.S machines in the factory and each machine consists of eight sections for glass bottle formation. Every section consists of two gob feeders (double gob).

In this process, it is essential to use not only the solid and liquid types of chemicals but also fluorocarbon-152a with zero percentage to greenhouse effect is used as alternative of fluorinated greenhouse gases for glass bottle formation. Chemicals which are used in hot end process are described in Chapter 3. The maximum production speed of the I.S machine around 168-184 bottles/min for thickness 175 ml.

(4) Cold End

After hot end coating, formed bottles are sent to cold end process to reduce transit abrasion. Annealing, chemical coating and inspection for quality control are three main steps in this cold end process. The name of chemical used in the cold end coating is coating RP40 which provides an excellent protection from mechanical solicitations and scratches while giving a proper slippery surface to the bottle.

(5) Warehouse Delivery

Once the necessary inspection and packing is completed, palletizing is done to stack. The final step of the whole glass bottles manufacturing process is the warehouse delivery. In this process, final products of the factory is stored at the warehouse before distributing to the market. Process flow chart of the glass bottles manufacturing process is shown in Figure 6.

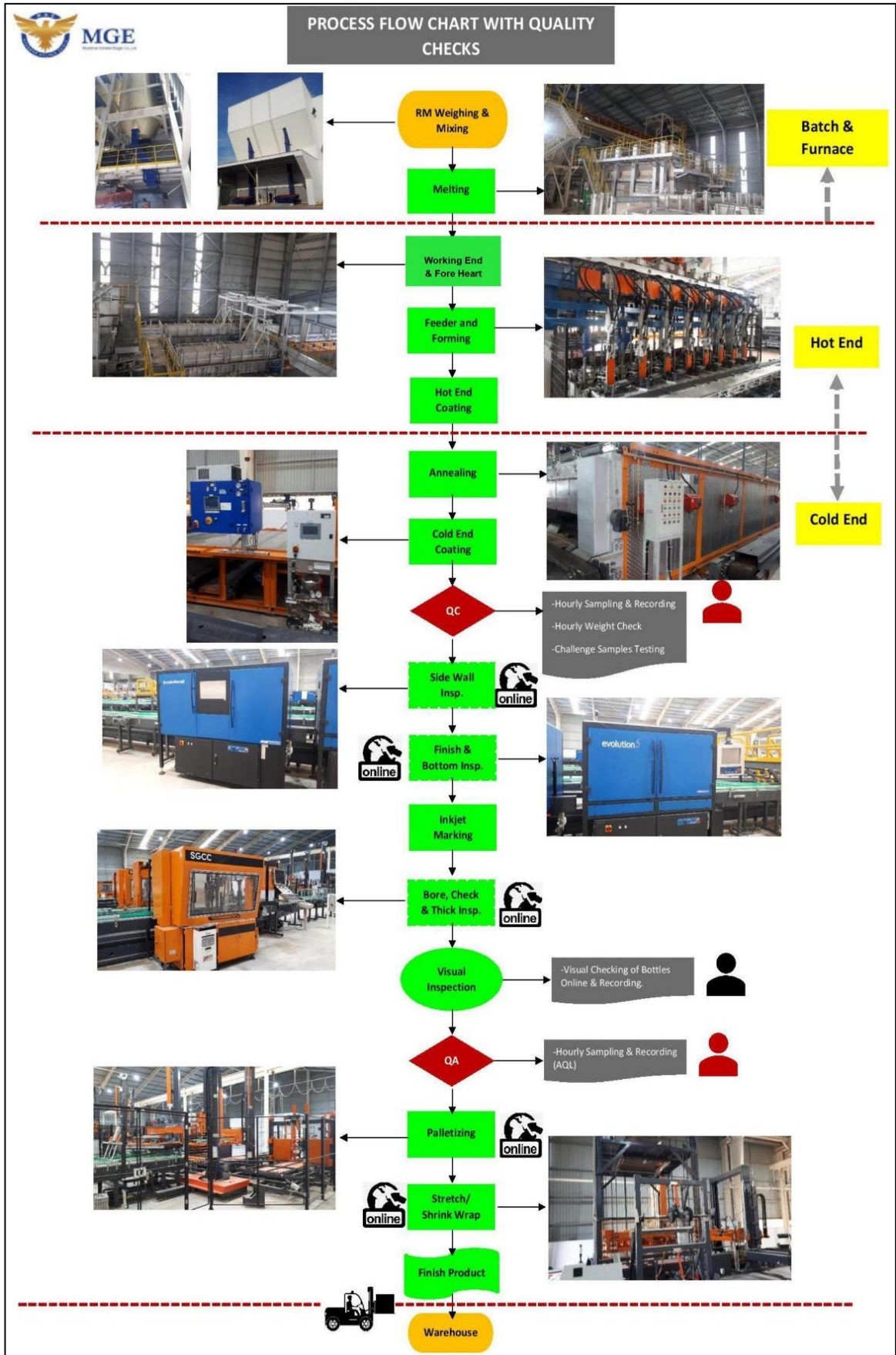


Figure 6 Production Processes Flow Chart

3.5.3. Products

In this process, monthly raw material consumption is around 8,550 tons and 70 percentage of it will be packed as a product while the rest 30 percentage becomes by-products. In general, it is available to produce two types of glass bottles, namely; amber (brown color glass material) and flint (transparent glass material). Picture of products samples are shown in Figure 7. The expected production rate of the factory is between 120 to 185 bottles per minute and it can vary based on the customers' requirements. The average glass bottles production rate of the factory is 450,000 bottles per day (200 tons/day).



Figure 7 Photo of Products

3.6. Project Components

3.6.1. Project Development

The proposed project includes construction of one to two storey building and renovation activities. According to the master layout plan, it can be classified into six types. They are factory, warehouse, office, green areas, carpark and old building areas. Detailed description for land use prescription of the project area is shown in Chapter 3.

3.6.2. Parking Lots

There are two types of parking lots in the project area for both trucks and private cars. The total areas of parking lot for private cars and trucks are around 1,500 square meters and 2,500 square meters respectively. It is designed to park 45 numbers of private cars and 18 numbers of trucks in maximum.

3.6.3. Refractory Materials

As the glass bottles manufacturing process takes place at a high temperature (up to 1,500°C) with 24-hour operation time, furnace for glass melting purpose plays a vital role in this manufacturing process.

Materials that can resist high temperatures, called glass furnace refractories can help to maintain the physical properties of the furnace lifetime. In this process, refractories are classified into five groups according to the purpose of usage.

They are refractories for bonded purpose, fused cast, insulation, monolithic and pre-cast purposes. Moreover, temperature sensors are installed at each zone of the furnace and type of insulation bricks used for furnace are differ from one zone to another.

On the other hand, certain refractories can cause negative impacts on both human and environment especially the hazard of greenhouse effect. Therefore, it is important to follow all the instructions from Material Safety Data Sheets (MSDS) related to each chemical before using. List of refractories used in furnace as well as types of refractories and its location in furnace are shown in Chapter 3.

3.7. Water Supply System

3.7.1. Water Source

For both construction and operation periods, the main water supply source will come from government water supply system. In this project, city water from Zarmani Inn Reservoir is used as the main source of government water supply for the factory. In general, city water from Zarmani Inn Reservoir is stored in the existing water tanks with the capacity of 200,000 gallons within the project area before passing through the factory's Water Treatment Plant (WTP).

3.7.2. Quantity of Water Demand and Consumption

During the construction period, daily raw water consumption of the project is 220 cubic meters per day and that of drinking water consumption is around 8 cubic meters per day. The drinking water consumption will vary depend on the total numbers of construction workers.

Regarding the operation period, the estimated daily raw water consumption will be around 6,500 cubic meters per day and that of drinking water consumption will be less than 8 cubic meters per day.

3.7.3. Water Treatment Plant

It is installed the series of sand filter, carbon filter and softener as a pretreatment system of Reverse Osmosis (RO) plant for factory water treatment system. The capacity of factory WTP is 30 cubic meters per hour.

Firstly, city water from existing water storage tanks of the factory is passed through the sequencing sand and carbon filters before being stored in the pre-treated city water tank. Then, pre-treated water is pumped up to the water tower to pressurize water for distribution. The distributed water from water tower is used for general cleaning purposes within the factory compound.

At the same time, a certain amount of water from water tower is also treated by softener and stored in the soft water storage tank while reject water from softener is drained

directly into the sedimentation pond. The treated soft water is used for production process, indoor factory process and RO influent.

Finally, a certain amount of treated soft water is also treated by RO plant and the capacity of NANGANG RO filter is 5 cubic meters per hour. Finally, the RO permeate water will be used for certain production process and drinking purposes of the factory.

3.8. Wastewater Treatment Plant

3.8.1. Domestic Wastewater

The domestic wastewater is generated from canteens, gardening, cleaning, and sewage water from factory toilets. The water from gardening and cleaning is directly discharged into the sedimentation pond via gutter drainage system. The wastewater from the factory's toilets, kitchen and canteen is treated by underground bio tank. Effluent from bio tank will also discharge into the municipal drainage system directly. The detailed drawing of the septic tank is shown in Figure 8.

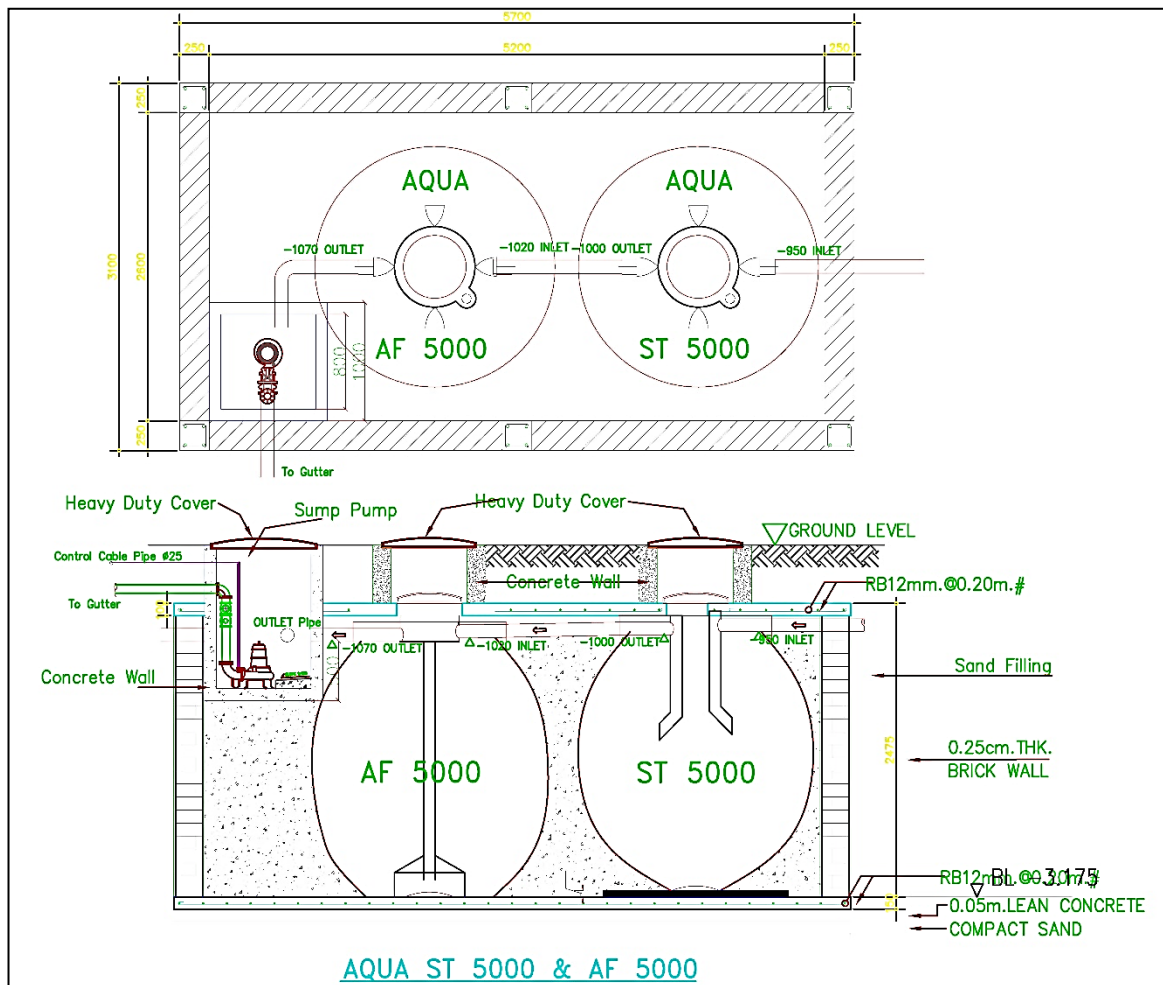


Figure 8 Detailed Drawing of the Septic Tank

3.8.2. Industrial Wastewater

The expected daily water consumption for processing purposes is around 6,500 cubic meters per day. The wastewater from the production process is pre-treated by oil separation system. Then, the pre-treated wastewater is discharged into the sedimentation pond. There are altogether two numbers of wastewater storage ponds. The total volume of wastewater storage ponds is 5,000 cubic meters for each. The depth of the ponds are 5 meters. At the same time, diluted water from sedimentation ponds are also used as the recycle water for raw material washing purposes. However, excessive water overflow points are also installed at the sedimentation ponds to control the water level. Regarding the sludge or sediment disposal system of the sedimentation ponds, the accumulated sludge at the bottom of the ponds will be collected and disposed regularly by following the hazardous waste disposal management plan of the factory. The details of the process are as follows:

(1) Oil Separation Tank

Oil separation is the very first step of WWTP where the oil remover is installed. The purpose of the oil separation tank is to remove grease and oil from the raw wastewater in order to get better working efficiency for next treatment process.

(2) Sedimentation Ponds

The sedimentation pond is used to remove the settleable solids. From there, the accumulated sludge is transferred to land disposal while water from this pond is also recycled for raw material production process. The total volume of sedimentation ponds is around 5,000 cubic meters. Finally, effluent treated water from sedimentation ponds is used as a recycle water. However, excessive water overflow points are also installed at the sedimentation ponds to control the water level.

(3) Sludge Collection and Disposal Method

Accumulated sludge from sedimentation ponds and septic tank will be pumped out regularly according to the designed calculation. Normally, desludging is required once a year or twice a year in case of large sludge volume. Sludge is generally done by sending to the private company for further treatment process.

3.9. Power Supply

3.9.1. Electricity

Electricity used in operation process is from township main grid line. There is a transformer with the capacities of 8 Megavolt-ampere (MVA) with On Load Tap Changer (OLTC) is situated within the factory compound. It is also installed two OLTC with 2,000 Kilovolt-ampere (kVA), one OLTC with 3,500 Kilovolt-ampere (kVA) and one OLTC with 50 Kilovolt-ampere (kVA) for station use. Photos of transformer and OLTC are shown in Figure 9 and Figure 10.



Figure 9 Photo of Transformer



Figure 10 Photo of On Load Tap Changer

3.9.2. Generator

Mitsubishi MGS series diesel generator set is installed for emergency use in case the government electricity breaks down. The capacity of the generator is 1,500 revolution per minute for 380 volts. Engine rating of the generator is 1,800 kVA for prime and 1,920 kVA for stand-by. The photos of the MGS 1500B generators and its engine operation data are shown in Figure 11 and Table 5.



Figure 11 Photo of Generator

Table 5 Generator's Engine Operating Data

Item	Units	Stand-by (1,920 kVA)	Prime (1,800 kVA)
Gross Engine Power with fan basic	kWh	1678	1523
Noise Level at 1 m (excluding: intake, exhaust & fan)	dB (A)	111	109
Combustion air inlet flow rate	m ³ /min	143	127
Exhaust gas flow rate	m ³ /min	378	334
Exhaust gas temperature	°C	530	520
Heat rejection to atmosphere from generator	kW	75	66

3.9.3. Fuel Consumption and Storage System

Regarding the fuel consumption, natural gas, Liquefied Petroleum Gas (LPG) and diesel are stored and applied for the factory operation. Diesel is mainly used for generator which provide the backup power when electricity outage occurs. Therefore, the rate of diesel consumption is mainly dependent on the duration of electricity access at the factory. The average diesel consumption of the generator is around 450 L/h. Moreover, diesel is also necessary for vehicals which are used in operation process such as forklift, wheel loader, excavator and dump truck. The diesel consumption rate of the vehicals is around 676 L/d. In addition, in case of natural gas shortage, around 1,300 L/h of diesel is also essential for furnace operation process.

There are two numbers of diesel storage tanks with the capacity of 125,000 gallons(big) and 26,000 gallons(small) respectively. Currently, it is used one big tank and

one small tank for diesel storage purposes while the rest tanks are empty and installed for bucket purpose.

One the other hand, natural gas is used as a main fuel sources for 24 hours furnace operation. The average natural gas consumption of the furnace is around 1,200 L/h. There is no storage area for natural gas within the storage area and natural gas is directly supply from the MOGE through the Yadanar gas station, Thanlyin. At the same time diesel and LPG tanks are stored within the factory as the back up systems for natural gas. the average LPG consumption of the factory is about 2,200 kg/h. Among them, 176 kg/h of LPG is used for furnace.

3.10. Solid Waste Management

3.10.1. Hazardous and Non-hazardous Wastes

The project site will have sufficient bins, which will be systematically collected and disposed of in accordance with the guidelines of the Thanlyin Township Development Committee. The solid waste management system for both hazardous and non-hazardous wastes are shown in the following Figure 12 and the detail waste management system of the factory is also described in Chapter 3.

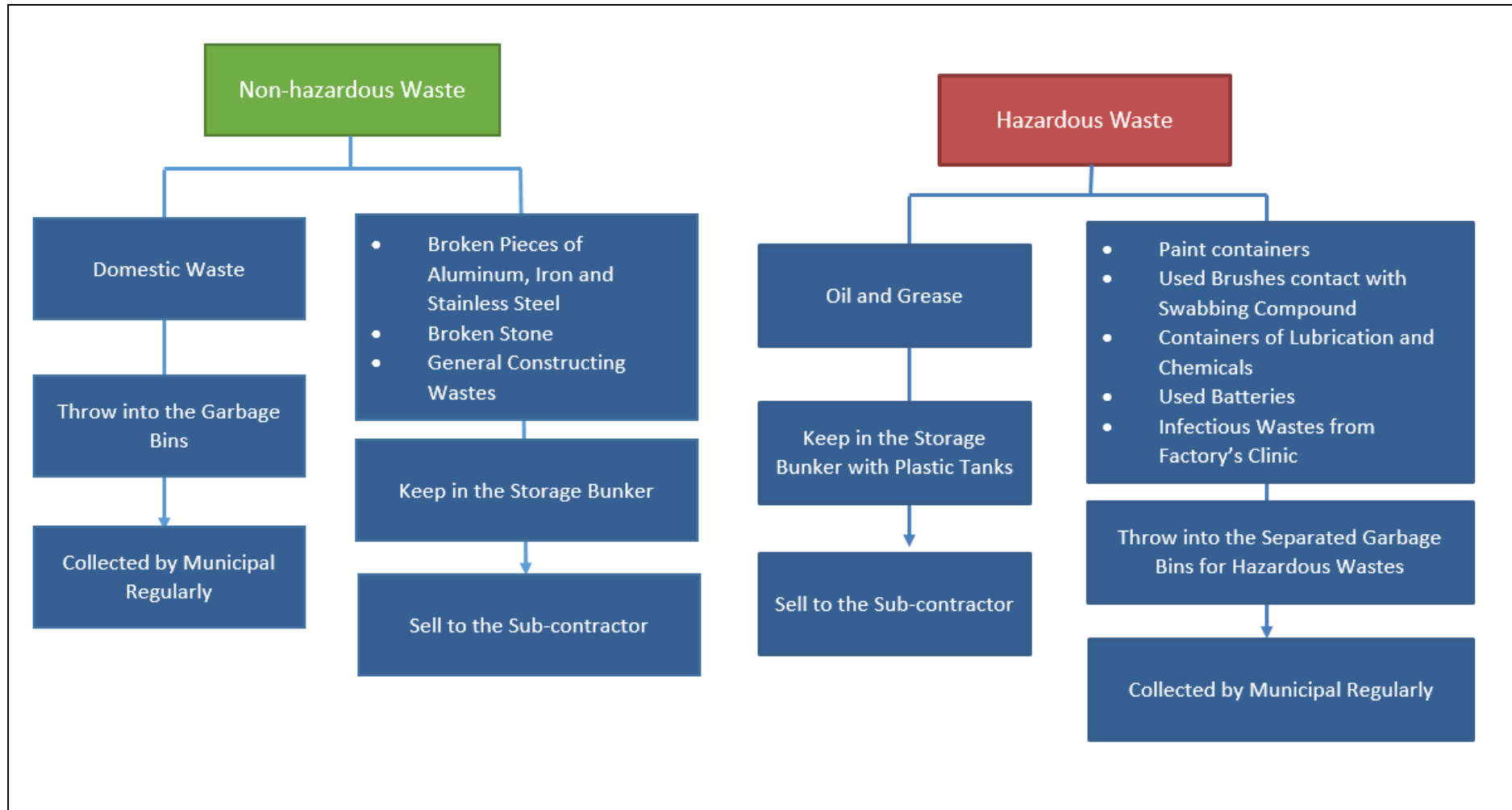


Figure 12 Waste Management System

3.11. Employment

Generally, specific working time for main office staff is from 8:00 am to 5:30 pm from Monday to Friday and the break time is 12:00 to 1:00 pm. Weekends and other gazette holidays are closed. Currently, there are altogether 400 employees at the office and human resource can vary depend on the production rate of the factory's operation stage.

On the other hand, the production department is operated for 24 hours with two shifts, three teams. Namely, 8:00 am to 8:00 pm and 8:00 pm to 8:00 am. It is required three teams for full coverage and the total numbers of workers in one team can be more than 44 people depend on the production condition. All members from both shifts have to work for four day shifts and one day off, then four night shifts and three day off repeatedly.

3.12. Support Facilities for Workers

Regarding the facilities, the factory will provide accommodation within the factory compound for shifted staff. At the same time, it is also provided the ferry and other allowance such as uniform, bonus, etc. to the staff.

Regarding the workplace, it is also provide rest places, canteen, and good sanitation facilities for workers. In addition, it is also planned to provide the factory clinic. The clinic will have one doctor for working hours and a nurse for 24 hours stand by with rostered shifts. For the production workers, Personal Protective Equipment (PPE) and first aid kits will also be supplied at work place.

4. Description of Surrounding Environment

The surrounding environment were conducted the condition of natural environment, socio-economic environment, environmental baseline survey and biological environment in the study area as presented in Table 6.

Table 6 Current Environmental and Social Condition in the Study Area

No.	Item	Description
Natural Environment		
1.	Climate	This data was provided from GAD (2019), Thanlyin Township. During the course of a year, the average maximum temperature is 48 °C and the average minimum temperature is 22.5 °C.
2	Topography	Thanlyin Township is situated about 23.9 meter of Mean Sea Level (MSL). Thanlyin Township is bordered by Thone Gwa and Kayan Townships in the east, Kyauktan Township in the south, Yangon River in the west and Bago River in the north. From north to south straighten, Thanlyin-Kyauktan motorcar road and watershed are situated in the Thanlyin Township. The flat low land is located from east to west of the township.
3	Geology, soil and seismicity	According to the geological map (2014), the project is located in the recent alluvium. The regional geomorphic features of the entire area include ridges and deltaic lands lying south of the Pegu Yoma between the Sittaung River in the east and the Irrawaddy River in the west. This area is in a north-south trending sedimentary basin containing thick sedimentary deposits from the Tertiary to Quaternary periods. According to the seismic zone map, the Yangon is located in the strong and moderate zone. Therefore, earthquake resistant design should be evaluated. Moreover, systematic ground improvement methods should be designed. Based on the

No.	Item	Description
		seismicity records, Yangon can be assumed as low to medium seismicity region.
4	Hydrology	<p>The main river around project area is the Yangon River, which is a large tidal river in the region running on the west side of the project. Moreover, around the project area, there are six tidal rivers and small streams. Four of them, namely: Ah Lun Sake Creek, Shwe Pyauk Creek, Pa Lan Creek, and small creek flow into the Yangon River.</p> <p>In the south area of the project, Gway Creek and Kayat Creek flow into the Hmawwun River, which flows from east to west and reaches the Yangon River. In addition, there are three major water reservoirs near the project area, namely: Zarmani Inn Reservoir, Bant Bwaykone Reservoir and Thilawa Reservoir</p>
Socio-economic environment		
5	Land use	The study area consists of around three kilometers radius of the project. It is characterized by nine land use types such as bare land, commercial area, government area, industrial area, paddy field, religious area, residential, road and water body. As a result of the study, government area is the largest portion within the three kilometers marginal area where religious area occupies the smallest portion.
6	Population and Age group	The project is within the southern part of Yangon Region and all people are from rural civilization. It can be clearly seen that there are 17 wards, 28 village tracts and 57 villages in project township, Thanlyin. It has over 62,123 houses and the total population of the project township is 66,800. The female group is slightly higher for total population and above 18 years.
7	Ethnicity and Religious	<p>Bamar people mainly live in project township. Bamar is about 250,514 and second largest group is Rakhine 1,057 people.</p> <p>Buddhism is the dominant religion in the project township. The remaining population are composed of Muslim and Hindu. The remaining religions of Christian is about 901.</p>
8	Education	There are many education centers in project Township such as 33 primary schools, 1 pre-primary schools, 11 high schools, 4 middle schools, and 5 middle schools (Branch).
9	Livelihood (employment, income, health, infrastructure and electricity)	<p>There are many occupations in study township. Other workers (not specified in list) are highest population followed by wageworker in project township. Trading and industrial/handicraft is almost the same in the list.</p> <p>Main source of in-come was from the wageworkers who work in private companies and government offices.</p> <p>The common case is tuberculosis and, followed by HIV/AIDS where diarrhea is very rare of mortality in the study area.</p> <p>There are some social infrastructures especially many shops and grocery stores in study township. In addition, societies such as NGO and social organizations are found within the study township. Various religious places such as monastery, nunnery and religious hall are situated in the study township because majority people are Buddhist.</p> <p>There are Government electricity grids to study township in Yangon region. Moreover, water supply is provided by YCDC.</p>
10	Transportation	There are good access road for transportation in the study township.

No.	Item	Description
Environmental Baseline Survey		
11	Air Quality	<p>Air quality monitoring such as CO₂, CO, NO₂, SO₂, CH₄, VOC, O₃, PM₁₀ and PM_{2.5} Temperature, Humidity were conducted at 3 stations around project site of Thanlyin township. The results were compared with the NEQEG (2015).</p> <p>At station A1, all air quality results are within the NEQEG (2015).</p> <p>All air parameter results for station A2 are also within the NEQEG (2015). Especially, PM_{2.5}, PM₁₀, and VOCs values are low enough to cause minimal impact because the station A2 is located somewhat away from the residential and industrial areas.</p> <p>All air parameter results for station A3 are within the NEQEG (2015).</p>
12	Wind Speed and Direction	<p>Wind speed and direction were conducted at 3 stations around project site of Thanlyin township.</p> <p>According to the field survey results for A1, there is no residential area near the project while the wind speed within the project site is around 1.2 meter per second with South-Southeast (SSE) prevailing wind direction of 199 degree.</p> <p>The wind speed values for station A2 is around 1.0 meter per second with South prevailing wind direction of 191 degree.</p> <p>The wind speed value for station A3 is around 0.9 meter per second with SSW prevailing wind direction of 194 degree.</p>
13	Water Quality	<p>The water sample were collected from sedimentation ponds (process wastewater), general wastewater from workers, ground water and RO wate.</p> <p>All wastewater parameters from sedimentation ponds are within effluent level for manufacturer of glass and ceramics from NEQEG guideline.</p> <p>Regarding general wastewater, all parameters are also compared with the effluent level for manufacturer of glass and ceramics from NEQEG guideline. Although most parameters are within the standard, the phosphorus level insignificantly rises more than the stipulated guideline. The reason is the wastewater sample is collected from the effluent point of the factory canteen before the treatment process.</p> <p>The ground water quality data was compared with NEQEG (2015). According to water result, all parameters are within the guideline standard.</p> <p>The treated water quality data was compared with WHO Drinking Water Guideline . All RO permeate water parameters are within the guidelines.</p>
14	Noise Level	<p>Noise level measurement was conducted at three stations.</p> <p>According to the monitoring results for N1, both average noise levels for day and night times in the project area are exceeded the acceptable limit of the residential, institutional and education purpose.noise level standard.</p> <p>The results of average LAeq values for daytime is exceeded while that of nighttime values are within the NEQEG (2015) in Station N2 of residential, institutional and education purpose.</p> <p>Noise level from station N3 was compared with NEQEG (2015) of residential, institutional and education purpose noise level and the results of daytime and nighttime LAeq for N3, beside Thilawa Road are within the guideline.</p>

No.	Item	Description
15	Vibration	Vibration measurement was conducted at three stations. The measured results were compared with German standard DIN 4150-3, which adopts frequency versus Peak Particle Velocity (PPV) plot to determine vibration effects on the structures such as sensitive building, residential and commercial buildings. According to the field survey results, evaluation results of vibration level for all stations are within the standard.
16	Light	Light measurement was conducted at five locations in the project site. The results are compared with IFC standard based on their activities. According to the field survey results, although the temporary office, Factory and Work shop are within the IFC limit, the light intensity of canteen and main office exceed the guideline standard.
17	Temperature	Temperature measurement was conducted at five locations in the project site. When the results are compared with IFC standard value, all results are within the IFC guideline value of 32 °C except workshop which temperature is slightly higher than the guideline.
18	Traffic Counting	Traffic Counting (TC) was done manually during 7:00 am to 7:00 pm at three stations. The results were shown that TC-1, TC-2 and TC-3 have free flow traffic condition.
Biological Environmental		
19	Floral survey	Regarding with habit types, the study area is divided into four main groups. They are (1) patches of mixed vegetation with scattered trees, (2) cultivated land, (3) aquatic habitat, and (4) human habitation area in the study area. According to the EIA report for TSEZ Development Project (Industrial Area of Zone B), there were 158 flora species recorded around the study area (described in Chapter 4) with 7 types of habitat species.
20	Fauna survey	According to the EIA report for TSEZ Development Project (Industrial Area of Zone B), there are 71 species of butterflies, 4 species of dragonflies and damselflies, 67 species of bird, 7 species of mammals, 13 species of amphibians and reptiles as well as 46 species of fish had been recorded in the study area.

5. Potential Environmental Impact and Mitigation Measurement

5.1. Impact Analysis

According to National Environmental Policy Act (1969), an environmental impact analysis is generally conducted to assess the potential impact of a proposed project on the natural and social environment. This may include an assessment of both the short-term and long-term effects on the physical environment, such as air, water and noise pollution; as well as effects on local services, living and health standards, and aesthetics.

The impact analysis is the identification or assessing of potential positive and negative impacts on the environment (physical, socio-economic, biodiversity, health, etc.) based on the project activities. Project activities and requirements consume environmental resources and produce nuisances to the surrounding environment. They are the sources, or root causes of environmental impacts, if not adequately controlled or managed, certainly cause significant changes to the environmental components

5.2. Significance of the Impact

The potential significant negative or positive environmental impacts caused by the project are identified by using a ranking scale such as occurrence and severity. Occurrence includes probability and duration of occurrence while severity means magnitude and extent of impacts. The ranking scale to use in assessing of each potential impact is shown in Table 7.

Table 7 Evaluation of Impact Assessment

Probability	Duration
1. Very improbable impact	1. A very short duration (0-1 year)
2. Improbable impact	2. A short duration (2-5 years)
3. Probable impact	3. Medium-term (6-15 years)
4. Highly probable impact	4. Long-term >15 years
5. Definitely impact	5. A permanent period
Magnitude	Extent
1. Insignificant impact	1. Site-specific impact
2. Low impact	2. Local impact
3. Moderate impact	3. Regional impact
4. High impact	4. National Impact
5. Very high impact	5. International Impact

The following formula is used to assess the environmental significance of each potential impact.

$$\text{Significance Points (SP)} = (\text{Magnitude} + \text{Extent} + \text{Duration}) \times \text{Probability}$$

Environmental significance of the potential environmental impacts can be differentiated based on the significance points into negligible, low, moderate, and high significance. Potential environmental impacts rating can be seen in Table 8. Evaluation and prediction of the significant impact for construction, decommission and operation phases are presented in Table 9 and Table 10.

Table 8 Potential Environmental Impacts Rating

Significance Points	Environmental Significance
<15	Negligible
15 - 30	Low
31- 60	Moderate
>60	High

Table 9 Evaluation and Prediction of Significant Impact for Construction and Decommission Phase

Potential Impact	Activities and Source	Components	Magnitude	Extent	Duration	Probability	Score	Significant
Potential Negative Impacts								
Air Quality	Construction and decommission activities, diesel generator and vehicle movement	CO ₂ , NO ₂ , PM ₁₀ , PM _{2.5} , SO ₂	3	2	2	4	28	Low
Noise and Vibration	Emergency use of diesel generator and the operation of construction equipment and heavy vehicles	Noise and vibration	3	1	2	4	24	Low
Water and Ground Water Quality	Surface runoff, domestic wastewater	Organic Matter in wastewater	2	2	2	3	18	Low
Land	Removal of vegetation and top soil Installation of infrastructure	Land use change	1	1	4	4	24	Low
Soil Quality	Civil work	Leakage of fuel, oil and other various wastes	3	2	2	3	21	Low
Solid Waste	Civil work and wastes from workers	Residue waste and domestic waste	3	2	2	4	28	Low
Occupational Health and Safety	Workers' health and accident during construction and decommission	Infectious disease; such as AIDS/HIV, Hepatitis B/C, etc. and other physical injuries	2	1	2	4	20	Low

Cultural Heritage	Civil works near cultural heritage areas	Archeological sites and traditional building	1	1	2	1	4	Negligible
Ecosystem	Civil works	Flora and Fauna	3	1	2	3	18	Low
Potential Positive Impacts								
Local Economy such as Employment and Means of Livelihood	Civil works, raw materials and equipment purchasing	Employment and business opportunities	4	3	2	3	27	Low

Table 10 Evaluation and Prediction of Significant Impact for Operation Phase

Potential Impacts	Activities and Source	Components	Magnitude	Extent	Duration	Probability	Score	Significant
Potential Negative Impacts								
Air Quality	Diesel generator and vehicle movement Machines and equipment for glass bottles manufacturing process eg furnace	CO ₂ , CO, CH ₄ , O ₃ , PM ₁₀ , PM _{2.5} , SO ₂ , NO ₂ , VOCs , HCl, HF	4	3	4	4	44	Moderate
Noise and Vibration	Transportation vehicles, high pressure in the cooling-mold process and emergency used diesel generator	Noise and vibration	2	1	4	2	14	Negligible
Water and Ground Water Quality	Discharge of untreated wastewater and improper wastewater treatment system	BOD, COD, Antibiotics, Oil and Grease, Total Nitrogen (TN), Total Phosphorous (TP), Total solid (TS), Total Oxygen Demand, Total coliform bacteria, Heavy metals	3	3	4	4	40	Moderate
Soil Quality	Logistic transportation and wastewater discharge	Leakage of fuel, oil and other various wastes, and improper wastewater discharge	3	2	4	3	27	Low
Solid Waste	Factory by products, office, staff apartments	Type and amount of waste	3	2	4	3	27	Low
Occupational health and safety	Workers' health in operation area	Infectious disease; such as AIDS/HIV, Hepatitis B/C, etc. and other physical injuries	3	2	4	3	27	Low
Ecosystem	Wastewater and solid waste discharge	Impacts on aquatic ecosystem and habitats	3	3	4	3	30	Low

Potential Impacts	Activities and Source	Components	Magnitude	Extent	Duration	Probability	Score	Significant
Potential Positive Impacts								
Local Economy such as Employment and Means of Livelihood	Materials and manpower requirement for factory operation	Job and business opportunities Purchasing raw materials and equipment	3	3	4	4	40	Moderate
Solid Waste	used glass containers are recycled into cullet	Apply the sustainable glass bottles production process to fulfill the SDGs	3	3	4	4	40	Moderate

6. Cumulative Impact Assessment

6.1. Methodology and Approach

In order to address the cumulative impact of the proposed project, five specific steps will be conducted, namely; Scoping, Analysis of impacts, Identification of mitigation measures, Evaluation of significant impacts and Follow-up as shown in Figure 13.

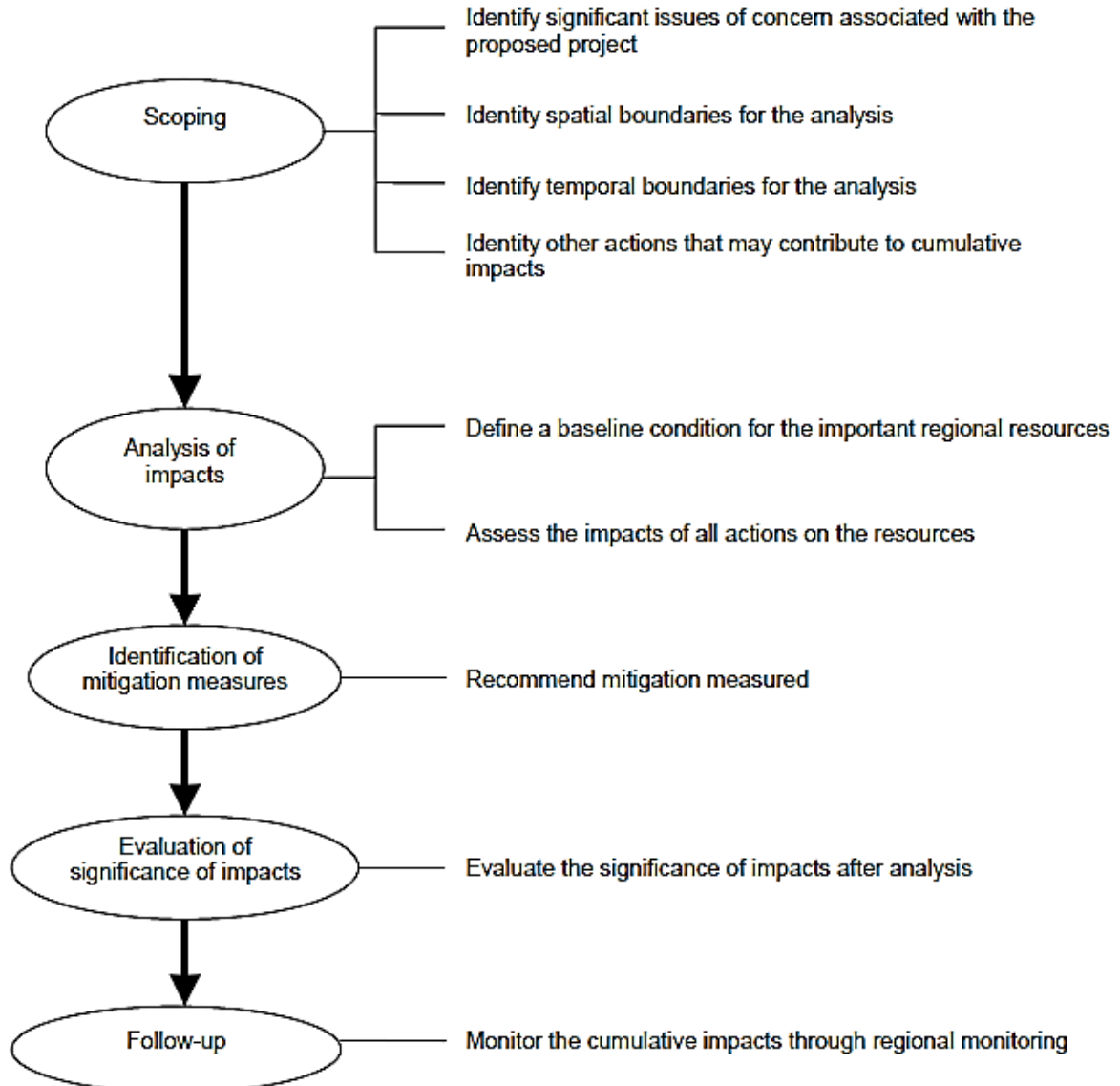


Figure 13 The overall cumulative Impact Assessment Framework

6.2. Assessment on Air Quality.

The assessment table of Air Quality cumulative impact is shown in table 11.

Table 11 The assessment of Air Quality

Proposed Project			Externatl Effect	Is the magnitude of the negative impact likely to be Significant or Insignificant? Why?
Will the project actions result in any of the following impacts? (1)	Yes/ No/ Maybe and reasons for the question (1)	If Yes or Maybe, the resource or area to be affected	Other past, present, or future actions that may contribute to the impact	
Impact of air quality due to gases	Yes: air quality in the surrounding area may deteriorate due to gaseous emissions from glass melting process by applying high capacity furnace.	Area lying within the 3 km radius of the study area especially the area under the prevailing wind direction	The combination of gaseous emission from other factories, situated in Thilawa Special Economic Zone and traffic	Significant : the magnitude of the impact may be large and may extend regionally or affect many receptors; however, mitigation of the impact is possible with systematic environmental management solutions
Impact of air quality due to particulate matters	May be: air quality in the adjacent area especially under the prevailing wind direction may deteriorate due to the dispersion of particulate matters from raw material (sands and cullet) washing and storage process.	Area adjacent to the raw material storage location and area under the prevailing wind direction	The combination of the vehicles coming to the Thilawa Special Economic Zone and construction activities from nearby projects	Insignificant : Although particulate matters can disperse due to mentioned activities, the maginitude can be low due to the limited construction activites , short time duration, and separation length or distance between the crowded area and emission sources

Significant: The proposed project may have “ Yes or May be “ impact and presence of external effect are considered as Significant for the cumulative impact assessment.

Insignificant: The proposed project may have “May be or No “ impact and absence of external effect are considered as insignificant for the cumulative impact assessment.

6.3. Assessment on Water Quality

The assessment table of Air Quality cumulative impact is shown in table 12.

Table 12 Assessment of Air Quality

Proposed Project			Externatl Effect	Is the magnitude of the negative impact likely to be Significant or Insignificant? Why?
Will the project actions result in any of the following impacts? (1)	Yes/ No/ Maybe and reasons for the question (1)	If Yes or Maybe, the resource or area to be affected	Other past, present, or future actions that may contribute to the impact	
Change in quantity of surface water or nearby water body	May be: As the project apply raw water from Zarmani Inn Reservoir, it may have some impact on the surfacewater in long term in the absence of proper mitigation measures.	Area lying within the 3 km radius of the study area	The combination effect of other present factories and economic development in Thilawa Special Economic Zone may contribute to such impact in the area	Significant : the magnitude of the impact may be large and may extend regionally in long term,however, considering the alternative way or proper mitigation measure like recycle the wastewater for secondary purposes is possible to control the such impact in the area.
Change in quality of surface water or nearby water body	May be: As the project is planned to recycle the wastewater for production process, there is no wastewater discharge into the nearby surfacewater body. However, in case of flooding in the project area, wastewater from sedimentation ponds may overflow to the nearby environment	Area adjacent to the project site and nearby water body	The combination effect of unproper discharge of wastewater form other factories in Thilawa Special Economic Zone and domestic wastewater from nearby crowded area may contribute to such impact in the area	Significant : the magnitude of the impact may be large and may extend regionally or affect many receptors; however, mitigation of the impact is possible with systematic environmental management solutions including effective wastewater treatment system, proper flood control system and good sanitation facilities.
Alter the quantity of ground water	No: Maybe: the daily requirement of water for the proposed project will be met entirely from the surface of surface water (Zarmani Inn Resivor). There is no ground water withdrawal activities for the proposed project	-	Ground water is withdrawn only for the domestic uses at the villages.	Insignificant : The change will be very nominal, affecting only a part of the plateau; it will not affect many other resources as both proposed project and other factories from Special Economic Zone apply surface water sources only.

Alter the quality of ground water	<p>No: ground water is unlikely to be affected by seepage and leaching by the proposed project as the project installed the proper wastewater treatment system and Solid waste management system</p>	-	There is no significant pollution emission sources which may cause deterioration of ground water in the area.	<p>Insignificant : Not only the proposed project but also the main pollution emitted sources like Thilawa Economic Zone also develop the centralized wastewater treatment plant and systematic solid waste management plan for all factories and projects within the compound. Therefore, it is not expected to occur deterioration of ground water in the area.</p>
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Significant: The proposed project may have “ Yes or May be “ impact and presence of external effect are considered as Significant for the cumulative impact assessment.

Insignificant: The proposed project may have “May be or No “ impact and absence of external effect are considered as insignificant for the cumulative impact assessment.

7. Environmental Management Plan

The objective of the environmental management plan is to manage potential environmental issues by implementing proper mitigation measures and monitoring plan in compliance with the relevant laws and regulations stipulated by national authorities. Environmental management plan based on the basic principles of management is known as the P.D.C.A cycle (see Figure 7-1 14). Environmental management plan consists of four related tasks as described below:

❖ Plan (P):What need to be done

The planning phase includes reviewing applicable environmental policies (see Chapter 2), identifying the project activities that can cause adverse effects on the environment (see Chapter 5), implementing mitigation measures to manage the impacts of those activities and designing effective programs of proper environmental management plan.

❖ Do (D):Implement the plan

MGE as described in this chapter will implement the monitoring measures based on the mitigation plan and environmental management plan for the potential environmental impacts appropriately.

❖ Check (C):Monitor and evaluate the results of implementation

The effectiveness of the mitigation measures will be monitored, evaluated and documented.

❖ Act (A):Taking corrective actions to improve the results, if found inadequate

If nonconformities or weakness in the environmental management plan were benchmarked, corrective actions are needed to plan for mitigating the existing environmental impacts.

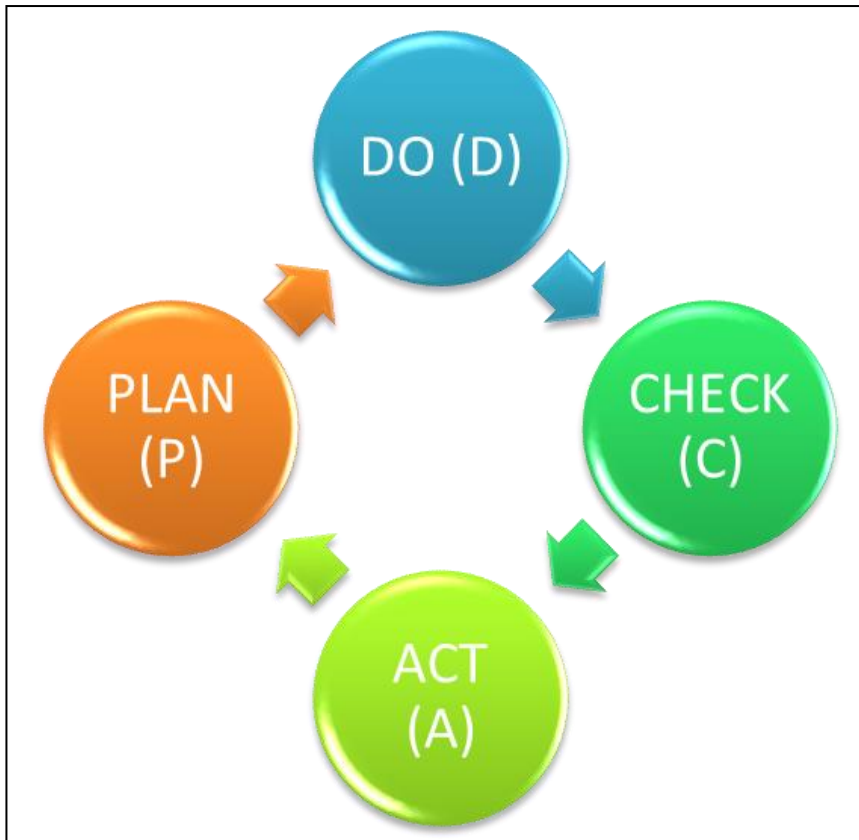


Figure 14 P.D.C.A. Cycle

7.1. Environmental Impact Mitigation Measures

The possible environmental impact mitigation measures for construction/ decommission and operation phase is shown in Table 13.

Table 13 Environmental Impact Mitigation Measures

No.	Potential Impact Assessment	Mitigation Measures	Responsible Team	Annual Cost (MMK)
During Construction/Decommissioning Phase				
1.	<p><u>Air Quality</u></p> <ul style="list-style-type: none"> - Emission of air pollutants from the use of construction and decommissioning activities, diesel generators and vehicles movement 	<p><u>Air Quality</u></p> <ul style="list-style-type: none"> - The transportation vehicles will be maintained regularly. - Spraying water and usage of safety nets at and around the construction areas will be performed. - Construction material such as cement and sand, etc. will be carried with covers. - Burning construction waste will be strictly prohibited. 	Environmental Management Team of contractor	Included in the project construction cost
2.	<p><u>Noise and Vibration</u></p> <ul style="list-style-type: none"> - Noise and vibration from the use of diesel generators and the operation of construction equipment and heavy vehicles 	<p><u>Noise and Vibration</u></p> <ul style="list-style-type: none"> - Civil work generating high noise levels will be carried out only at daytime. - Adequate earplugs or ear muffs will be provided to the workers in excessive noise areas. - Workers in excessive noise areas and on a vibrating surface will be assigned with alternative shift. - Low-noise level generators will be used in order to reduce the impact from the diesel engine generators. - Diesel generators are placed away from the residential area. - Construction equipment, truck and diesel generators will be maintained regularly in order to avoid excessive vibration and noise. 	Environmental Management Team of contractor	Included in the project construction cost
3.	<p><u>Water Quality</u></p> <ul style="list-style-type: none"> - Surface runoff through construction site and domestic wastewater from construction workers 	<p><u>Water Quality</u></p> <ul style="list-style-type: none"> - Sufficient number of toilets and bathing facilities for construction workers are provided. 	Environmental Management Team of contractor	Included in the project construction cost

		<ul style="list-style-type: none"> - Sewage will be collected into septic tanks and will be properly discharged in line with YCDC laws and regulations. - Wastewater from the project site and domestic wastewater from worker camps were treated by sedimentation pond and septic tanks before discharging. Regular monitoring of wastewater discharge system is recommended. - Conduct proper equipment usage and management system to prevent leakage of chemical and oil from construction and decommission processes. - Alternative way for ground water consumption is conducted to avoid the ground water reduction of the regional area. - Check and monitor the ground water quality near the project area regularly. 		
4.	<p><u>Land</u></p> <ul style="list-style-type: none"> - Land use changes from not only construction works (site clearing and installation of infrastructures) but also decommission works (demolition of infrastructure and site clearing). 	<p><u>Land</u></p> <ul style="list-style-type: none"> - Since the proposed project area is in the old glass bottles manufacturing factory, the significant impact on land use changes will not be expected. 	Environmental Management Team of contractor	Included in the project construction cost
5.	<p><u>Soil Quality</u></p> <ul style="list-style-type: none"> - Soil contamination such as leakage of fuel and oil from the construction vehicles or machineries and other various wastes on the ground - The temporary solid waste disposal site can cause leakage of leachate to the surrounding soil. 	<p><u>Soil Quality</u></p> <ul style="list-style-type: none"> - The construction vehicles or machineries will be regularly maintained in order to prevent leakage of fuel and oil to the soil. - The temporary solid waste disposal site are constructed properly in order to prevent leakage of leachate to the surrounding soil. - Fuel oil will be properly stored. - Construction waste will be systematically collected and disposed according to YCDC Rules and Regulations. 	Environmental Management Team of contractor	Included in the project construction cost

6.	<p><u>Solid Waste</u></p> <ul style="list-style-type: none"> - Construction wastes from civil work and domestic wastes from construction workers. 	<p><u>Solid Waste</u></p> <ul style="list-style-type: none"> - Solid waste from the removal of top soil and old structures and faulty construction activities will be disposed at a suitable landfill site in accordance with the approval of YCDC. - Construction wastes will be classified and sorted out at sources for disposal in line with YCDC rules and regulation. - Non-hazardous wastes such as plastic, garbage, glass and food waste will be separated and managed according to YCDC rules and regulation. - Hazardous waste disposal in or off the construction site will be prohibited. - Hazardous waste will be stored, collected and disposed in compliance with the approval of YCDC. 	<p>Environmental Management Team of contractor</p>	<p>Included in the project construction cost</p>
7.	<p><u>Occupational health and safety</u></p> <ul style="list-style-type: none"> - Construction workers may slip and fall due to the careless. - Working at height of building during roofing and painting may cause accident. - Increased temperature of equipment surface may hurt due to careless. - Dusty in the ambient air of the working zone can cause side effect on respiratory system. 	<p><u>Occupational health and safety</u></p> <ul style="list-style-type: none"> - The project proponent will establish safety policy. - The contractor will prepare safety plan. - The contractor will provide PPE and first aid kit to the construction workers. - The contractor will raise awareness of safety guidelines to the construction workers. - The contractor will assign safety supervisors at the work site. - The contractor will provide incentives to workers who obey the safety practices and penalty to workers who disobey the safety practices. - The contractor will arrange morning talks and toolbox meeting. 	<p>Environmental Management Team of contractor</p>	<p>Included in the project construction cost</p>

8.	<p><u>Cultural Heritage</u></p> <ul style="list-style-type: none"> - Visual and vibration impacts from construction and decommission activities 	<p><u>Cultural Heritage</u></p> <ul style="list-style-type: none"> - . The proposed project is constructed within the existing glass bottles manufacturing factory and the highest building level is only 11 m from the floor level. - Therefore it is expected no significant impact on the cultural heritage. 	<p>Environmental Management Team of contractor</p>	<p>Included in the project construction cost</p>
9.	<p><u>Ecosystem</u></p> <ul style="list-style-type: none"> - Civil works from the construction and demolition activities can cause impacts on fauna and flora 	<p><u>Ecosystem</u></p> <ul style="list-style-type: none"> - Cutting tree and clearance of vegetation must be at a minimum and the trees will be planted. - Oil, grease and construction waste will be stored properly to prevent the leakage on the ground or water bodies. - Construction waste and wastewater will be properly disposed and discharged. 	<p>Environmental Management Team of contractor</p>	<p>Included in the project construction cost</p>
During Operation Phase				
1.	<p><u>Air Quality</u></p> <ul style="list-style-type: none"> - Emission of particulate matters such as PM₁₀, PM_{2.5} and gaseous pollutants such as CO₂, NO₂, CO, CH₄, O₃, SO₂, VOCs from fuel combustion and operation process of the furnaces. 	<p><u>Air Quality</u></p> <ul style="list-style-type: none"> - Design and manage the emissions control equipment at the factory to achieve an appropriate control efficiency. - Install air filter at the emission point of the furnace chimney. - Generators and vehicles will be maintained regularly. - Low Sulphur content diesel fuel should be used for the operation of generators, stoves and vehicles in order to reduce gaseous emission. - Air quality around the project site should be monitored regularly. - Implement proper ventilation system. - Provide raw materials transportation to the furnaces with covered vehicles or conveyors. 	<p>Environmental Management Team of MGE</p>	<p>2,000,000</p>

2.	<p><u>Noise and Vibration</u></p> <ul style="list-style-type: none"> - Noise and vibration from the use of emergency used generators, raw material preparation, material handling and vehicles movement on site. 	<p><u>Noise and Vibration</u></p> <ul style="list-style-type: none"> - Design and construct the factory with lowest noise emissions. - Maintain all equipment and machinery regularly. - Limit the noisy activities only in daytime, if possible. - The soundproof generators or low noise generators should be used for emergency use. - The generators should be placed far away from the residents and local people. - Install noise insulators at the residential area. 	Environmental Management Team of MGE	1,000,000
3.	<p><u>Water and Ground Water Quality</u></p> <ul style="list-style-type: none"> - The wastewater from operation phase; cooling and cullet cleaning and general activities of workers. 	<p><u>Water and Ground Water Quality</u></p> <ul style="list-style-type: none"> - The proper wastewater treatment system are installed to treat grey water and black water. - The treated grey water from wastewater treatment plant should be reused for another purpose such as toilets, watering for landscaping, gardening etc. - The alternative way for ground water consumption is conducted to avoid the ground water reduction of the regional area. 	Environmental Management Team of MGE	1,000,000
4.	<p><u>Soil Quality</u></p> <ul style="list-style-type: none"> - Soil contamination such as leakage of fuel and oil from the transportation vehicles and diesel generators/storage tanks and improper wastewater discharge 	<p><u>Soil Quality</u></p> <ul style="list-style-type: none"> - Transportation vehicles should be examined or maintained regularly. - Proper wastewater treatment systems including sludge management system for process wastewater should be installed. - Good sanitation facilities including proper sewage disposal system should be conducted. - Solid waste management system should be installed properly in order to prevent improper waste disposal. Therefore, the potential negative impact on soil contamination will be low. 	Environmental Management Team of MGE	Included in solid waste management and wastewater management

		<ul style="list-style-type: none"> - Provide cover and linear foundation at the temporary solid wastes and sludge storage areas. - Avoid direct land disposal of sludge or sediments from wastewater treatment system of the glass bottles manufacturing factory. 		
5.	<p><u>Solid Waste</u></p> <ul style="list-style-type: none"> - Small amount of hazardous waste such as dry cells, batteries, fluorescent lamp, paints and its container, chemicals residue and its container will be generated. - Non-hazardous waste such as paper, plastic bag and plastic bottles, glass, aluminum cans, tin cans, food wastes, rubber, etc. will be generated. 	<p><u>Solid Waste</u></p> <ul style="list-style-type: none"> - Solid waste will be separately collected with different types of waste bins and the collected waste will be kept at a temporary solid waste storage yard before collecting by YCDC. - Some waste such as aluminum and tin can, plastic bottles etc should be recycled or reused for the same purpose or in different ways. - The remaining waste including hazardous waste after 3 Rs (Reduce, Reuse, and Recycle) will be disposed in line with the approval of YCDC. 	Environmental Management Team of MGE	1,000,000
6.	<p><u>Occupational health and safety</u></p> <ul style="list-style-type: none"> - Physical injuries such as eye injuries from broken and flying glass particles, sever cutting injuries form flat glass breaks during handling, electrical hazards form the use of electrical equipment. 	<p><u>Occupational health and safety</u></p> <ul style="list-style-type: none"> - The moisture-absorbent mats with beveled edges should be used to prevent slips and falls on the slippery floor and signboard should be displayed as the caution. - Qualified forklift operators and handlers should be used during loading and unloading of materials. - It should not be overloaded than the prescribed load on loading and unloading equipment and vehicles in order to prevent accidents. - PPE will be provided to the workers during renovating the buildings. - Material safety data sheets (MSDS), eyewash station, emergency alarm button and “No Smoking” sign board are provided on the wall of chemical storage room. 	Environmental Management Team of MGE	1,000,000

		<ul style="list-style-type: none"> - In addition, PPE such as protective gloves, clothing, eye protection, ear plugs, and face shield will be provided to the workers who handled chemical glue and to the workers who worked in outsole grinding room. - First aid kit and medical clinic will be provided to the workers. - Occupational safety and emergency first aid training will be also provided to the workers. 		
8.	<p><u>Ecosystem</u></p> <ul style="list-style-type: none"> - Improper discharge and disposal of wastewater and solid waste from the project 	<p><u>Ecosystem</u></p> <ul style="list-style-type: none"> - The generated wastewater must pass through proper wastewater treatment plant to reduce impact on ecosystem. - The project proponent will systematically manage and use the natural resources such as land and water in this area. - Maintaining and replanting of certain native plant species such as trees as landscaping or fencing may provide a home for the faunal assemblages such as insects, amphibians, reptiles, and birds. - Green belt space or small green space may provide a good habitat for insects and recreation of all the inhabitants. - Awareness program of prohibiting exotic species which releasing to nearby water body should be carried out by local authorities. 	Environmental Management Team of MGE	500,000

7.2. Environmental Monitoring Plan

The summary of environmental monitoring plans for construction/ decommission and operation phase are shown in Table 14 and Table 15.

Table 14 Environmental Monitoring Plan for Construction and Decommission Phase

Monitoring Item	Monitoring Parameter	Monitoring Location		Frequency	Annual Estimated Cost (MMK)
		Construction Phase	Decommission Phase		
Air Quality	PM ₁₀ , PM _{2.5} , SO ₂ , NO ₂ , O ₃ & CO, CO ₂ , CH ₄ , VOC, Humidity ,Temperature	<u>Project site</u> 16°42'34.68"N 96°15'18.69"E	<u>Project site</u> 16° 42' 34.68" N 96° 15' 18.69" E	Once in Construction/ Decommission Phase	1,000,000
		<u>Phan Chat Sat Yone Taw Ya Monastery</u> 16° 42' 27.89" N 96° 15' 53.99" E			
		<u>Thilawa Industrial Road</u> 16° 41' 47.49" N 96° 16' 11.50" E			
Water Quality	BOD, COD, Oil & grease, pH, Total nitrogen, Total phosphorus, Temperature, DO, Turbidity, TDS, TSS, Iron, Lead, Free Cyanide, Arsenic	<u>Process Wastewater from Factory sedimentation Pond</u> 16°42'21.65"N 96°15'27.01"E	<u>Process Wastewater from Factory sedimentation Pond</u> 16°42'21.65"N 96°15'27.01"E	Once in Construction/ Decommission Phase	500,000
		<u>Domestic Wastewater from Factory Canteen</u> 16°42'33.75"N 96°15'21.08"E			
		<u>Treated Water from RO Permeate Water Tank</u> 16°42'20.80"N 96°15'25.18"E			
Noise	Noise level (dB (A) scale)	<u>Project site</u> 16°42'23.97"N 96°15'25.93"E	<u>Project site</u> 16°42'23.97"N 96°15'25.93"E	Once in Construction/ Decommission Phase	300,000

Monitoring Item	Monitoring Parameter	Monitoring Location		Frequency	Annual Estimated Cost (MMK)
		Construction Phase	Decommission Phase		
		<u>Phan Chat Sat Yone Taw Ya Monastery</u> 16°42'27.66"N 96°15'53.72"E			
		<u>Thilawa Industrial Road</u> 16°41'47.78"N 96°16'11.35"E			
Vibration	Radial, Transverse, Vertical	<u>Project site</u> 16°42'25.50"N 96°15'19.87"E	<u>Project site</u> 16°42'25.50"N 96°15'19.87"E	Once in Construction/ Decommission Phase	500,000
		<u>Phan Chat Sat Yone Taw Ya Monastery</u> 16°42'28.17"N 96°15'54.14"E			
		<u>Thilawa Industrial Road</u> 16°41'47.21"N 96°16'11.50"E			
Solid Waste	Amount and type of solid waste	Temporary waste disposal site	Temporary waste disposal site	Weekly	500,000
Occupational Health and Safety	Incident/ accident records	Around the project site and construction site	Around the project site and construction site	Monthly	500,000

Table 15 Environmental Monitoring Plan for Operation Phase

Monitoring Item	Monitoring Parameter	Monitoring Location	Frequency	Estimated Annual Cost (MMK)
Air Quality	PM ₁₀ , PM _{2.5} , SO ₂ , NO ₂ , O ₃ & CO, CO ₂ , CH ₄ , VOC, Humidity, Temperature	<u>Project site</u> 16°42'34.68"N, 96°15'18.69"E	Twice a year	2,000,000
		<u>Phan Chat Sat Yone Taw Ya Monastery</u> 16° 42' 27.89" N, 96° 15' 53.99" E		
Water Quality	pH, Temperature, TDS, Conductivity, Salinity, Turbidity, TSS, BOD, COD, Free Cyanide, Phosphorous, Arsenic, Iron, Lead, Total Nitrogen	<u>Process Wastewater from Factory sedimentation Pond</u> 16°42'21.65"N, 96°15'27.01"E	Twice a year	1,000,000
		<u>Wastewater from Factory's Drainage Channels</u> 16°42'31.23"N, 96°15'12.90"E		
		<u>Nearby Tube Well</u> 16°42'36.17"N, 96°15'29.54"E		
Noise	Noise level (dB (A) scale)	<u>Project site</u> 16°42'23.97"N, 96°15'25.93"E	Twice a year	600,000
Vibration	Radial, Transverse, Vertical	<u>Project site</u> 16°42'25.50"N, 96°15'19.87"E	Twice a year	1,000,000
Solid Waste	Amount and type of solid waste	Temporary waste disposal site	Weekly	500,000
Occupational Health and Safety	Incident/accident records and providing	Around the project site and construction site	Monthly	500,000

8. Public Consultation and Disclosure

8.1. Purposes of the consultation during the Preparation of the Scoping Report

Public consultation meeting is regarded as a necessary part of the EIA Scoping Report study. MGE and its consultants have to organize a public consultation meeting among regulators, local community, local authority and other relevant organizations on the project development and plans. As a part of EIA Scoping requirement, MGE publicized about the project developments to the concerned stakeholders as follows;

1. Information of the stakeholders about the project, environmental and social issues related to project operation, and mitigation measures to minimize environmental and social impacts.
2. Considering 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.
3. Participation and partnership where issues are needed to join for discussing and assess.

Detailed information related to public consultation meeting for the EIA Scoping of MGE is described in public consultation section, chapter 8.

9. Conclusions and Recommendations

9.1. Conclusions

This EIA report has provided an assessment of the potential environmental, social and health impact associated with the construction, operation and decommissioning phases of the proposed project. This study was prepared on the basis of the project information, relevant information from various sources, surveys of environmental and socio-economic setting of the project area, rounds of consultations with stakeholders in the government sector and communities in and around the vicinity of the project site, and experiences of the consultant in technical and environmental aspects of the proposed projects. Based on the study results, the major factors are concluded as shown in Section 9.1.

9.2. Recommendations

This EIA study has clearly identified the environmental and social issues, mitigation measures and monitoring plan. It is recommended that the project proponent must implement all the mitigation measures, management plan and monitoring plan described in this report. In addition, the project proponent must continuously follow the requirements of the environmental guidelines, applying mitigation measures to ensure the compliance with the legal requirements and other relevant recommended criteria.

TABLE OF CONTENTS

ကတိကဝတ်များ.....	I
အကြံပေးအဖွဲ့အစည်း၏ဝန်ခံချက်.....	I
အစီရင်ခံစာအကျဉ်းချုပ်.....	I
EXECUTIVE SUMMARY	I
TABLE OF CONTENTS	LI
LIST OF TABLES.....	LIX
LIST OF FIGURE	LXIII
LIST OF APPENDICES.....	LXVIII
ABBREVIATIONS	LXIX
CHAPTER 1 INTRODUCTION	1-1
1.1. PURPOSE OF THE EIA REPORT.....	1-2
1.2. PROJECT PROPONENT	1-2
1.3. EIA CONSULTANT	1-4
1.4. THE EIA REQUIREMENT	1-8
CHAPTER 2 OVERVIEW OF THE POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK	2-1
2.1. INTRODUCTION	2-1
2.2. RELEVANT MYANMAR LAWS AND REGULATIONS	2-1
2.3. ENVIRONMENTAL CONSERVATION	2-4
2.3.1. Environmental Conservation Law (2012)	2-4
2.3.2. Environmental Conservation Rules (2014).....	2-4
2.3.3. Environmental Impact Assessment Procedure (2015)	2-5
2.3.4. National Environmental Policy (2019)	2-9
2.4. POLLUTION CONTROL AND HEALTH.....	2-10
2.4.1. National Environmental Quality (Emission) Guidelines (2015)	2-10
2.4.2. National Drinking Water Quality Standards (2019).....	2-15
2.4.3. Public Health Law (1972).....	2-17
2.4.4. The Prevention and Control of Communicable Diseases Law (1995)	2-17
2.4.5. The Control of Smoking and Consumption of Tobacco Product (2006)	2-18
2.4.6. Occupational Safety and Health Law (2019).....	2-18
2.4.7. Myanmar Fire Brigade Law (2015).....	2-21
2.4.8. Prevention of Hazard from Chemical and Related Substances Law (2013).....	2-21
2.5. BIODIVERSITY AND RESOURCES CONSERVATION	2-22
2.5.1. Conservation of Biodiversity and Natural Protected Area Law (2018).....	2-22
2.5.2. The Law relating to Aquaculture (1989)	2-22
2.5.3. Conservation of Water Resources and River Law (2006)	2-22

2.5.4.	Conservation of Water Resources and River Rules (2013).....	2-23
2.5.5.	Underground Water Act (1930).....	2-23
2.5.6.	Forest Law (1992).....	2-24
2.6.	LAND ACQUISITION.....	2-24
2.6.1.	The Land Acquisition Act (1894).....	2-24
2.6.2.	Myanmar National Land Use Policy (2016).....	2-25
2.6.3.	State-owned land leasing of buildings; Instruction to be followed in transfers and joint ventures (Instruction No.3/2018)	2-27
2.6.4.	Farmland Law (2012).....	2-28
2.6.5.	Farmland Rules (2012).....	2-29
2.6.6.	Vacant, Fallow and Virgin Land Management Law (2018).....	2-29
2.6.7.	Registration of Deeds Law (2019).....	2-29
2.6.8.	The Boundaries Law (2019).....	2-30
2.7.	URBAN DEVELOPMENT AND MANAGEMENT	2-30
2.7.1.	Development Committee Law (2013).....	2-30
2.7.2.	Myanmar Engineering Council Law (2013)	2-30
2.7.3.	The Electricity Law (2014)	2-31
2.7.4.	The Telecommunications Law (2013)	2-32
2.8.	HUMAN RIGHTS	2-33
2.8.1.	Protection of the Right of National Race Law (2015)	2-33
2.8.2.	Rights of the Persons with Disabilities Law (2015).....	2-33
2.8.3.	Child Rights Law (2019).....	2-33
2.9.	CULTURAL HERITAGES.....	2-33
2.9.1.	The Protection and Preservation of Cultural Heritage Region Law (2019)	2-33
2.9.2.	The Protection and Preservation of Antique Object Law (2015).....	2-33
2.9.3.	The Protection and Preservation of Ancient Monument Law (2015)	2-33
2.10.	LABOUR	2-34
2.10.1.	Labour Organization Law (2011).....	2-34
2.10.2.	The Employment and Skill Development Law (2013).....	2-35
2.10.3.	The Minimum Wage Law (2013)	2-36
2.10.4.	Payment of Wage Law (2016)	2-37
2.10.5.	Workers' Compensation Act	2-40
2.10.6.	The Settlement of Labour Dispute Law (2012).....	2-41
2.10.7.	The Leave and Holiday Act (1951).....	2-41
2.10.8.	Social Security Law (2012)	2-42

2.11. MOTOR VEHICLES	2-44
2.11.1. The Vehicle Safety and Motor Vehicle Management Law (2020).....	2-44
2.11.2. The Myanmar Motor-Vehicle Rules (1989)	2-44
2.11.3. The Motor Vehicle Law (2015).....	2-45
2.12. OTHER RELATED LAW AND REGULATION	2-45
2.12.1. Myanmar Insurance Law (1993)	2-45
2.12.2. Myanmar Insurance Rule (2017).....	2-46
2.12.3. The Ethnic Right Protection Law (2015)	2-46
2.12.4. Myanmar Investment Law (2016).....	2-47
2.12.5. Myanmar Investment Rule (2017).....	2-49
2.12.6. The Petroleum and Petroleum Product Law (2017)	2-49
2.12.7. The Petroleum Act (1934).....	2-50
2.12.8. The Export and Import Law (2012)	2-53
2.12.9. The Fisheries Law	2-53
2.12.10. Natural Disaster Management Law (2013).....	2-53
2.12.11. Climate Change Policy (2019)	2-54
2.12.12. Commercial Tax Law (2014).....	2-54
2.12.13. The Union Tax Law (2019)	2-54
2.12.14. Myanmar Citizens Investment Law (2013).....	2-55
2.12.15. Foreign Investment Law (2012)	2-55
2.13. MYANMAR GOVERNMENT INSTITUTIONAL FRAMEWORK	2-56
2.13.1. Arrangement at National and Sector Level	2-56
2.13.2. Arrangement at the Project Area.....	2-56
2.14. INTERNATIONAL AND NATIONAL POLICIES, GUIDELINES AND STANDARDS	2-57
2.14.1. IFC's Standards and Guidelines	2-57
2.14.2. World Bank's Pollution Prevention and Abatement Handbook (1988).....	2-58
2.15. INTERNATIONAL CONVENTIONS	2-58
2.15.1. Vienna Convention for the Protection of the Ozone Layer (1985)	2-58
2.15.2. Montreal Protocol on Substances that Deplete the Ozone Layer (1987)...	2-59
2.15.3. Kyoto Protocol	2-59
2.15.4. United Nations Framework Convention on Climate Change (UNFCCC)...	2-60
CHAPTER 3 PROJECT DESCRIPTION AND ALTERNATIVE	3-1
3.1. BACKGROUND OF THE PROJECT	3-1
3.2. ALTERNATIVE WAYS	3-3
3.2.1. Relocation Alternative	3-3

3.2.2.	The No Action Alternative	3-3
3.2.1	Glass Bottles Manufacturing Technology Alternative	3-3
3.2.2	Applied Chemical and Materials Alternative	3-4
3.2.3	Alternative for Furnace.....	3-4
3.2.4	Alternative for Access Road.....	3-6
3.2.5	Alternative for Raw Sand	3-6
3.3.	DESCRIPTION OF PROJECT	3-7
3.3.1.	Objectives of the Proposed Project.....	3-7
3.3.2.	Site Description.....	3-7
3.3.3.	Project Size	3-9
3.3.4.	Designed Data of the Proposed Project.....	3-9
3.3.5.	Compound Nearby Adjacent Project Site.....	3-16
3.4.	PROJECT IMPLEMENTATION	3-17
3.4.1.	Project Implementation Schedule	3-17
3.4.2.	Number of Construction Workers.....	3-19
3.5.	GLASS BOTTLES MANUFACTURING PROCESS	3-19
3.5.1.	Raw Material.....	3-19
3.5.2.	Production Process.....	3-20
3.5.3.	Products	3-29
3.6.	PROJECT COMPONENTS	3-29
3.6.1.	Project Development	3-29
3.6.2.	Refractory Materials.....	3-32
3.6.3.	List of Machines and Vehicles for Production Process.....	3-34
3.6.4.	Water Supply System	3-36
3.6.5.	Wastewater Treatment System.....	3-39
3.6.6.	Power Supply.....	3-42
3.6.7.	Solid Waste Generation	3-46
3.7.	EMPLOYMENT.....	3-47
3.8.	SUPPORT FACILITIES FOR WORKERS	3-47
CHAPTER 4	EXISTING ENVIRONMENTAL AND SOCIAL CONDITION	4-1
4.1.	SETTING THE STUDY LIMIT	4-1
4.1.1.	Geographical Study Limit.....	4-1
4.1.2.	Contextual Study Limit	4-2
4.2.	DESCRIPTION OF THE PHYSICAL COMPONENT	4-3
4.2.1.	Overview of the Study Area	4-3
4.2.2.	Climate and Meteorology	4-3

4.2.3.	Topography	4-5
4.2.4.	Geology	4-6
4.2.5.	Soil Condition.....	4-8
4.2.6.	Seismology	4-9
4.2.7.	Hydrology	4-11
4.3.	NATURAL HAZARDS	4-14
4.3.1.	Flood.....	4-14
4.3.2.	Cyclone.....	4-14
4.3.3.	Earthquake	4-14
4.3.4.	Natural Hazard occur in the Project Township	4-15
4.4.	SOCIO-ECONOMIC ENVIRONMENT	4-15
4.4.1.	Land use.....	4-15
4.4.2.	Demography	4-18
4.4.3.	Ethnicity	4-19
4.4.4.	Religious Information	4-20
4.4.5.	Education Information	4-20
4.4.6.	Main Economic Activities	4-22
4.4.7.	Employment.....	4-22
4.4.8.	Health	4-23
4.4.9.	Infrastructure and Services	4-23
4.4.10.	Transportation.....	4-24
4.4.11.	Cultural and visual characteristics.....	4-25
4.5.	BIOLOGICAL CHARACTERISTICS.....	4-27
4.5.1.	Floral Study	4-29
4.5.2.	Faunal Study.....	4-36
4.5.3.	Discussion	4-66
4.6.	ENVIRONMENTAL BASELINE DATA.....	4-67
4.6.1.	Air Quality	4-67
4.6.2.	Wind Speed and Direction	4-79
4.6.3.	Water Quality	4-85
4.6.4.	Noise Level	4-92
4.6.5.	Vibration Level	4-98
4.6.6.	Light.....	4-103
4.6.7.	Temperature	4-107
4.6.8.	Traffic Counting	4-109

CHAPTER 5 POTENTIAL ENVIRONMENTAL IMPACT AND MITIGATION MEASUREMENT	5-1
5.1. METHODOLOGY AND APPROACH.....	5-1
5.1.1. Scope of EIA.....	5-1
5.1.2. Impact Analysis.....	5-1
5.1.3. Preliminary EIA Process	5-1
5.1.4. Summary of Environmental, Social and Health Impact Assessment	5-2
5.1.5. Methodology of Significant Impact Assessment.....	5-2
5.3. POTENTIAL ENVIRONMENTAL, SOCIAL AND HEALTH IMPACT DURING CONSTRUCTION AND DECOMMISSION PHASE	5-5
5.3.1. Air Quality	5-5
5.3.2. Noise and Vibration	5-6
5.3.3. Water and Ground Water Quality	5-6
5.3.4. Land.....	5-7
5.3.5. Soil Quality	5-7
5.3.6. Solid Waste	5-8
5.3.7. Occupational Health and Safety.....	5-9
5.3.8. Cultural Heritage.....	5-9
5.3.9. Ecosystem	5-10
5.3.10. Local Economy such as Employment and Means of Livelihood.....	5-10
5.4. POTENTIAL ENVIRONMENTAL, SOCIAL AND HEALTH IMPACTS DURING OPERATION PHASE	5-13
5.4.1. Air Quality	5-13
5.4.2. Noise and Vibration	5-14
5.4.3. Water and Ground Water Quality	5-14
5.4.4. Soil Quality	5-15
5.4.5. Solid Waste	5-15
5.4.6. Occupational Health and Safety.....	5-16
5.4.7. Ecosystem	5-17
5.4.8. Local Economy such as Employment and Means of Livelihood.....	5-17
5.4.9. Solid Waste	5-18
CHAPTER 6 CUMULATIVE IMPACT ASSESSMENT	6-1
6.1. METHODOLOGY AND APPROACH.....	6-2
6.1.1. Scope of the CIA.....	6-2
6.1.2. Analysis of Impacts.....	6-3
6.1.3. Identification of mitigation measures.....	6-3

6.1.4.	Evaluation of Significance of Impacts	6-3
6.1.5.	Follow-up for CIA	6-3
6.2.	CUMULATIVE IMPACT ASSESSMENT	6-4
6.2.1.	Assessment on Air Quality	6-4
6.2.2.	Assessment on Water and Ground Water Quality	6-5
CHAPTER 7	ENVIRONMENTAL MANAGEMENT PLAN	7-1
7.1.	INTRODUCTION	7-1
7.2.	SCOPE OF THE ENVIRONMENTAL MANAGEMENT PLAN	7-1
7.3.	LEGAL REQUIREMENTS AND INSTITUTIONAL REQUIREMENT	7-2
7.4.	SUMMARY OF PROJECT DESCRIPTION	7-3
7.5.	SUMMARY OF IMPACTS AND MITIGATION MEASURES.....	7-5
7.6.	ENVIRONMENTAL MONITORING PLAN	7-13
7.7.	SUB PLAN FOR ENVIRONMENTAL MONITORING IMPLEMENTATION	7-17
7.7.1.	Sub Plan for Air Quality Management.....	7-17
7.7.2.	Sub Plan for Water Quality Management.....	7-18
7.7.3.	Sub Plan for Vibration Control and Management.....	7-19
7.7.4.	Sub Plan for Noise Level Management.....	7-20
7.7.5.	Sub Plan for Solid Waste Management	7-21
7.7.6.	Sub Plan for Occupational Health and Safety Management	7-22
7.8.	FACTORY MANAGEMENT PLAN	7-22
7.8.1.	Air Pollution Management.....	7-22
7.8.2.	Wastewater management.....	7-23
7.8.3.	Noise and Vibration Management System.....	7-24
7.8.4.	Solid Waste Management System	7-24
7.8.5.	Occupational Health and Safety.....	7-27
7.8.6.	Emergency Response Plan	7-30
7.8.7.	Disaster Management Plan.....	7-30
7.8.8.	Training Programs	7-30
7.9.	RECORDING AND REPORTING	7-31
7.9.1.	Internal Monitoring and Inspection Report	7-31
7.9.2.	Incident, Accident and Emergency Report.....	7-31
7.9.3.	Reporting on Training Program.....	7-31
7.9.4.	EMP for Good Working Practices and Good Safety Practices	7-32
7.10.	GRIEVANCE REDRESS MECHANISM.....	7-32
7.11.	CORPORATE SOCIAL RESPONSIBILITY PROGRAM.....	7-34
7.11.1.	CSR Implementation Team.....	7-34
7.12.	PENALTIES.....	7-36

7.13. OVERALL BUDGET FOR IMPLEMENTATION OF THE EMP.....	7-38
CHAPTER 8 PUBLIC CONSULTATION AND DISCLOSURE	8-1
8.1. OBJECTIVE OF PUBLIC CONSULTATION	8-1
8.2. APPROACH TO PUBLIC MEETING	8-1
8.3. PUBLIC ANNOUNCE	8-2
8.4. SUMMARY OF PUBLIC CONSULTATION	8-2
8.5. DISCUSSING AND FEEDBACKS RECEIVED FROM MEETING	8-4
8.6. ACTION TAKEN BY FACTORY AND FUTURE PLANS.....	8-10
CHAPTER 9 CONCLUSION AND RECOMMENDATION	9-1
9.1. CONCLUSIONS	9-1
9.2. RECOMMENDATIONS.....	9-2
REFERENCES	

LIST OF TABLES

Table 1-1 Contact of Project Proponent.....	1-2
Table 1-2 Contact of Project Proponent’s Representative	1-2
Table 1-3 List of TBS’s Staff	1-5
Table 1-4 Criteria for EIA Type Economic Activities.....	1-8
Table 2-1 Relevant Laws and Regulations	2-2
Table 2-2 General and Specific Guideline Values for Air Quality	2-11
Table 2-3 Site Runoff and Wastewater Discharges (Construction Phase)	2-12
Table 2-4 General and Specific Wastewater Effluent Guidelines for Operation phase.	2-12
Table 2-5 Effluent Standard for Leachate from Landfill of General Waste	2-14
Table 2-6 Effluent Standards for Sludge	2-14
Table 2-7 General Guideline Values for Noise Level	2-15
Table 2-8 Guideline Value for Vibration (German standard DIN 4150-3)	2-15
Table 2-9 General Guideline Values for Odor	2-15
Table 2-10 National Drinking Water Quality Standards.....	2-16
Table 3-1 Project Size	3-9
Table 3-2 Features of Adjacent Area to the Project Site	3-17
Table 3-3 List of Raw Materials and its Annual Consumption for Production	3-19
Table 3-4 Production Speed of I.S Machine	3-23
Table 3-5 Land Use Prescription of the Project.....	3-30
Table 3-6 Types of Refractories and Location in Furnace.....	3-32
Table 3-7 List of Machines and Vehicles	3-34
Table 3-8 Generator’s Engine Operating Data.....	3-43
Table 3-9 Type of Non-Hazardous Wastes and Expected Generation Amount	3-46
Table 3-10 Type of Hazardous Wastes and its Amount of Generation	3-46
Table 4-1 Summary of Manufacturing Process and Project AOI.....	4-1
Table 4-2 Thanlyin Township Brief Regional Data	4-3
Table 4-3 Temperature and Rainfall Data in Project Township (2016-2019).....	4-5
Table 4-4 Geological Feature around the Yangon Area.....	4-7
Table 4-5 Hydrological Data on Yangon River	4-12
Table 4-6 Summarized of Natural Hazard Occurrence of Project Township	4-15
Table 4-7 Types and Percentages of Land Use.....	4-16
Table 4-8 Population in the Project Township.....	4-19

Table 4-9 Population by Age Group and Gender Disaggregation in the Project Township.....	4-19
Table 4-10 Ethnicity in the Project Township	4-20
Table 4-11 Foreigner Population in the Project Township.....	4-20
Table 4-12 Population by Religion in the Project Township	4-20
Table 4-13 Primary School Enrolment in the Project Township	4-20
Table 4-14 Completion of Basic Education in the Project Township	4-21
Table 4-15 Ratio of Teacher and Student in the Project Township	4-21
Table 4-16 Education Centers in the Project Township	4-22
Table 4-17 Occupations in the Project Township.....	4-22
Table 4-18 Annual In-come per Capita in the Project Township	4-22
Table 4-19 Work Force and Unemployment Population in the Project Township.....	4-23
Table 4-20 Public Health Facility in the Project Township.....	4-23
Table 4-21 Common Diseases in the Project Township	4-23
Table 4-22 Social Infrastructure in the Project Township	4-24
Table 4-23 Social Organizations in the Project Township	4-24
Table 4-24 Religious Places in the Project Township	4-24
Table 4-25 Other Religious Places in the Project Township	4-24
Table 4-26 Cultural Heritage Infrastructure in the Project Township	4-25
Table 4-27 List of Religious Places in the Study Area	4-26
Table 4-28 List of Recorded Plant species from Glass bottles manufacturing factory..	4-30
Table 4-29 List of IUCN Red List species	4-31
Table 4-30 List of Medicinal plant species	4-32
Table 4-31 List of Edible plant species	4-32
Table 4-32 List of Ornamental plant species.....	4-32
Table 4-33 List of Recorded Damselflies (order- Odonata) from Glass bottles manufacturing factory.....	4-37
Table 4-34 List of recorded Butterfly species (order Lepidoptera) from Glass bottles manufacturing factory.....	4-41
Table 4-35 List of recorded Butterfly species (order Lepidoptera) from Glass bottles manufacturing factory.....	4-42
Table 4-36 List of recorded Fish species from Glass bottles manufacturing factory	4-47
Table 4-37 List of recorded Fish species from Glass bottles manufacturing factory	4-48
Table 4-38 Recorded Amphibian and Reptile species from Glass bottles manufacturing factory	4-52

Table 4-39 Recorded Terrestrial Bird species from Glassbottles manufacturing factory	4-54
Table 4-40 Recorded Terrestrial Bird Species from Glass Bottles Manufacturing Factory	4-55
Table 4-41 Description of Air Quality Monitoring Parameters	4-67
Table 4-42 Air Quality Measurement Data	4-68
Table 4-43 Station A1 Air Quality Results from Haz-Scanner	4-69
Table 4-44 Station A2 Air Quality Results from Haz-Scanner	4-73
Table 4-45 Station A3 Air Quality Results from Haz-Scanner	4-76
Table 4-46 Station A1 Wind Speed and Wind Quality Results from AQM-09.....	4-80
Table 4-47 Station A2 Wind Speed and Wind Quality Results from AQM-09.....	4-81
Table 4-48 Station A3 Wind Speed and Wind Quality Results from AQM-09.....	4-83
Table 4-49 Water Quality Parameters Tested by TM Waterproof Pocket tester.....	4-86
Table 4-50 Water Quality Parameters Tested in ALARM Ecological Laboratory.....	4-86
Table 4-51 Water Quality Measurement Data.....	4-88
Table 4-52 Result of Process Wastewater Analysis Tested with TM Waterproof Pocket Tester.....	4-89
Table 4-53 Result of Process Wastewater Analysis Tested by ALARM Ecological Laboratory	4-89
Table 4-54 Result of General Wastewater Analysis Tested by TM Waterproof Pocket Tester	4-90
Table 4-55 Result of General Wastewater Analysis Tested by ALARM Ecological Laboratory	4-90
Table 4-56 Result of Ground Water Analysis Tested by TM Waterproof Pocket Tester	4-91
Table 4-57 Result of Ground Water Analysis Tested by ALARM Ecological Laboratory	4-91
Table 4-58 Result of RO Permeate Water Analysis Tested by MGE	4-92
Table 4-59 Noise Level Monitoring Data.....	4-93
Table 4-60 Result of Noise Level Measurement for N1	4-95
Table 4-61 Result of Noise Level Measurement for N2	4-96
Table 4-62 Result of Noise Level Measurement for N3	4-97
Table 4-63 German Standards DIN 4150-3 for Vibration	4-99
Table 4-64 Vibration Measurement Data	4-100
Table 4-65 Result of the Vibration Level Measurement for V1	4-101
Table 4-66 Result of the Vibration Level Measurement for V2.....	4-102
Table 4-67 Result of the Vibration Level Measurement for V3.....	4-103
Table 4-68 IFC Illuminance Standard	4-104
Table 4-69 Light and Temperature Measurement Data	4-105

Table 4-70 Light Measurement Result	4-106
Table 4-71 Temperature Measurement Result	4-109
Table 4-72 Passenger Car Equivalents Factor (PCD)	4-110
Table 4-73 Design Service Volume	4-110
Table 4-74 Level of Service	4-111
Table 4-75 Detail of Three TC Stations.....	4-111
Table 4-76 Existing Traffic Counting Condition near Proposed Project Site.....	4-113
Table 5-1 Evaluation of Impact Assessment.....	5-4
Table 5-2 Potential Environmental Impacts Rating	5-4
Table 5-3 Evaluation and Prediction of Significant Impacts for Construction and Decommission Phase.....	5-11
Table 5-4 Evaluation and Prediction of Significant Impacts for Operation Phase.....	5-19
Table 6-1 Questionnaire Checklist for Cumulative Impact Assessment on Air Quality...	6-5
Table 6-2 Questionnaire Checklist for Cumulative Impact Assessment on Water and Ground Water Quality.....	6-6
Table 7-1 List of EMP Team Members	7-3
Table 7-2 Summary of Project Description	7-4
Table 7-3 Summary of Impacts and Mitigation Measures	7-6
Table 7-4 Environmental Monitoring Plan during Construction and Decommissioning Phases	7-14
Table 7-5 Environmental Monitoring Plan during Operation Phase.....	7-16
Table 7-6 Different Waste types and their color coding system of the factory.....	7-25
Table 7-7 Emergency Contact List of the Factory	7-30
Table 7-8 CSR Fund Contribution.....	7-34
Table 7-9 CSR Program of the Proposed Project	7-35
Table 7-10 Penalties and Punishment According to Myanmar Environmental Impact Assessment Procedure	7-36
Table 7-11 Overall Budget for Implementation of the EMP	7-38
Table 8-1 Agenda of the Public Consultation Meeting	8-2
Table 8-2 Meeting Context	8-3
Table 8-3 Discussion and Feedbacks received from Meeting.....	8-6
Table 8-4 Percentage of Participants and Attendance of Public Consultation.....	8-10

LIST OF FIGURE

Figure 1-1 Location Map of the Project Site.....	1-1
Figure 1-2 Organization Chart of MGE	1-3
Figure 1-3 Organization structure of EIA Study Team	1-4
Figure 2-1 EIA Process (Scoping)	2-7
Figure 2-2 EIA Process (EIA Investigation and Review)	2-7
Figure 2-3 EIA Process (Review and Approval).....	2-8
Figure 2-4 EIA Process (Appeal)	2-8
Figure 2-5 National Environmental Policy Myanmar	2-9
Figure 2-6 Scoping EIA process outline diagram	2-57
Figure 3-1 Location Map of the Project Site.....	3-1
Figure 3-2 Glass Bottle Manufacturing Factory.....	3-2
Figure 3-3 Distance between Project and Nearby Villages	3-2
Figure 3-4 Flow Diagram of Blow & Blow Process.....	3-4
Figure 3-5 End Fired Furnace.....	3-5
Figure 3-6 Cross Fired Furnace.....	3-5
Figure 3-7 The Primary and Alternative Access Roads to the Factory.....	3-6
Figure 3-8 Master Layout Plan of Proposed Project	3-8
Figure 3-9 Perspective View of the Furnace	3-9
Figure 3-10 Engineering Drawing of Furnace Plant	3-10
Figure 3-11 Front Elevation View of the Factory.....	3-11
Figure 3-12 Ground Floor Plan of the Factory	3-12
Figure 3-13 Second Floor Plan of the Factory	3-13
Figure 3-14 Third Floor Plan of the Factory	3-14
Figure 3-15 Roof Floor Plan of the Factory.....	3-15
Figure 3-16 Location of Adjacent Features within three kilometer to the Project Site...	3-16
Figure 3-17 Project Construction and Operation Schedule	3-18
Figure 3-18 Cullet Treatment Plant.....	3-21
Figure 3-19 Sand Washing Plant.....	3-21
Figure 3-20 Batch Plant	3-22
Figure 3-21 Furnace and Chimney	3-23
Figure 3-22 I.S Machine	3-24
Figure 3-23 Annealing Lehr Machine.....	3-25

Figure 3-24 Cold End Line	3-25
Figure 3-25 Inspection Machines	3-26
Figure 3-26 M1 Inspection Machine for Side Wall Inspection	3-27
Figure 3-27 Production Processes Flow Chart	3-28
Figure 3-28 Photo of Products	3-29
Figure 3-29 Parking Lots Drawing	3-31
Figure 3-30 MGE Factory Water Supply System	3-38
Figure 3-31 Detailed Drawing of the Septic Tank.....	3-39
Figure 3-32 Process Flow Diagram of MGE Watery Supply and Wastewater Treatment System	3-41
Figure 3-33 Photo of Transformer.....	3-42
Figure 3-34 Photo of On Load Tap Changer.....	3-42
Figure 3-35 Generator	3-43
Figure 3-36 Diesel Storage Tank.....	3-44
Figure 3-37 LPG Storage Tank.....	3-45
Figure 3-38 Locations of Fuel Storage Tanks	3-45
Figure 3-39 Flow Diagram of MGE Solid Waste Management System.....	3-47
Figure 4-1 Koppen climate classification map of Myanmar	4-4
Figure 4-2 Topographic Map.....	4-6
Figure 4-3 Geological Map of Project Area	4-7
Figure 4-4 Soil Map of Yangon Region	4-8
Figure 4-5 Seismic Zone Map of Myanmar	4-10
Figure 4-6 Seismicity Map of Yangon Region.....	4-11
Figure 4-7 Location of Rivers and Elephant Point.....	4-13
Figure 4-8 Land Use Map	4-16
Figure 4-9 Existing Land Use Photos within Study Area	4-18
Figure 4-10 Photos of Some Tourist Sites and Attractive Places in the Project Township.....	4-26
Figure 4-11 Location Map of Religious Places in the Study Area.....	4-27
Figure 4-12 Roadside Plantation of Tree Type Habitat (Kyaik- Khauk Pagoda Road) .	4-29
Figure 4-13 Recorded Plant species.....	4-36
Figure 4-14 Recorded damselfly species.....	4-38
Figure 4-15 List of Recorded Dragonflies (order- Odonata) from Glass bottles manufacturing factory.....	4-39
Figure 4-16 Recorded dragonfly species	4-40

Figure 4-17 Recorded Butterfly Species	4-43
Figure 4-18 Recorded Butterfly Species	4-44
Figure 4-19 Recorded butterfly species	4-45
Figure 4-20 Recorded butterfly species	4-46
Figure 4-21 Recorded butterfly species	4-47
Figure 4-22. Recorded Fish Specie	4-52
Figure 4-23 Species composition (%) in different Orders of Fish species	4-52
Figure 4-24 Recorded Amphibian and Reptile Species	4-53
Figure 4-25 Species Composition (%) in Different Orders of Terrestrial Bird	4-55
Figure 4-26. Species composition (%) in different Orders of water birds	4-57
Figure 4-27 Recorded Terrestrial Birds.....	4-63
Figure 4-28 Recorded Water Birds	4-65
Figure 4-29 Location Map of Air Monitoring Stations	4-68
Figure 4-30 Information of AQM Measurement Stations	4-69
Figure 4-31 CO ₂ and CH ₄ Measurement Results for Station A1	4-70
Figure 4-32 CO Measurement Results for Station A1	4-70
Figure 4-33 NO ₂ Measurement Results for Station A1.....	4-71
Figure 4-34 O ₃ Measurement Results for Station A1	4-71
Figure 4-35 PM ₁₀ and PM _{2.5} Measurement Results for Station A1	4-72
Figure 4-36 SO ₂ and VOCs Measurement Results for Station A1	4-72
Figure 4-37 CO ₂ and CH ₄ Measurement Results for Station A2	4-73
Figure 4-38 CO Measurement Results for Station A2.....	4-74
Figure 4-39 NO ₂ Measurement Results for Station A2.....	4-74
Figure 4-40 O ₃ Measurement Results for Station A2	4-74
Figure 4-41 PM ₁₀ and PM _{2.5} Measurement Results for Station A2.....	4-75
Figure 4-42 SO ₂ and VOCs Measurement Results for Station A2	4-75
Figure 4-43 CO ₂ and CH ₄ Measurement Results for Station A3	4-76
Figure 4-44 CO Measurement Results for Station A3.....	4-77
Figure 4-45 NO ₂ Measurement Results for Station A3.....	4-77
Figure 4-46 O ₃ Measurement Results for Station A3	4-78
Figure 4-47 PM ₁₀ and PM _{2.5} Measurement Results for Station A3.....	4-78
Figure 4-48 SO ₂ and VOCs Measurement Results for Station A3	4-79
Figure 4-49 Diagram of Wind Class Frequency Distribution in Station A1	4-80
Figure 4-50 Diagram of Wind Speed and Direction Measured in Station A1	4-81

Figure 4-51 Diagram of Wind Speed and Direction Measured in Station A2.....	4-82
Figure 4-52 Diagram of Wind Class Frequency Distribution in Station A2	4-83
Figure 4-53 Diagram of Wind Speed and Direction Measured in Station A3.....	4-84
Figure 4-54 Diagram of Wind Class Frequency Distribution in Station A3	4-85
Figure 4-55 Location Map of Water Sampling Points.....	4-87
Figure 4-56 Information of Water Quality Sampling	4-88
Figure 4-57 Location Map of Noise Level Monitoring Stations	4-93
Figure 4-58 Noise Level Monitoring Stations	4-94
Figure 4-59 Noise Measurement Results in Day-time, N1	4-95
Figure 4-60 Noise Measurement Results in Night-time, N1	4-95
Figure 4-61 Noise Measurement Results in Day-time, N2	4-96
Figure 4-62 Noise Measurement Results in Night-time, N2	4-97
Figure 4-63 Noise Measurement Results in Day-time, N3	4-98
Figure 4-64 Noise Measurement Results in Night-time, N3	4-98
Figure 4-65 Location Map of Vibration Measurement Stations	4-99
Figure 4-66 Information of Vibration Level Measurement	4-100
Figure 4-67 Vibration Measurement Result for V1	4-101
Figure 4-68 Vibration Measurement Result for V2.....	4-102
Figure 4-69 Vibration Measurement Result for V3.....	4-103
Figure 4-70 Location Map of Light Measurement Stations.....	4-105
Figure 4-71 Light Measurement Activities.....	4-106
Figure 4-72 Light Measurement Result in Bar Chart.....	4-107
Figure 4-73 Location Map of Temperature Measurement Stations	4-108
Figure 4-74 Temperature Measurement Activities	4-108
Figure 4-75 Temperature Measurement Results in Bar Chart	4-109
Figure 4-76 Location Map of Traffic Counting.....	4-112
Figure 4-77 Traffic Survey Collection Activities.....	4-113
Figure 6-1 Location Map of Project Site and Nearby Areas	6-2
Figure 6-2 Overall Cumulative Impact Assessment Framework.....	6-4
Figure 7-1 P.D.C.A. Cycle	7-2
Figure 7-2 Organization Structure of the EMP Team	7-3
Figure 7-3 Location Map of Planned Air Quality Monitoring Stations	7-18
Figure 7-4 Location Map of Planned Water Quality Sampling and Monitoring Points ..	7-19
Figure 7-5 Location Map of Planned Vibration Level Monitoring Points	7-20

Figure 7-6 Location Map of Planned Noise Level Monitoring Points	7-21
Figure 7-7 Air Pollution Management of the Project.....	7-22
Figure 7-8 Process Flow Diagram of Domestic Wastewater Treatment System	7-23
Figure 7-9 Process Flow Diagram of Domestic Wastewater Treatment System	7-24
Figure 7-10 Process Flow Diagram of Used Water Discharge System	7-24
Figure 7-11 Segregated Waste Collection Bins	7-25
Figure 7-12 Temporary Waste Disposal Site for Non Hazardous Wastes.....	7-26
Figure 7-13 Temporary Waste Disposal Site for Hazardous Wastes	7-27
Figure 7-14 Medical Facilities	7-28
Figure 7-15 Fire Management System.....	7-29
Figure 7-16 Examples of Occupational Safety and Emergency First Aid Training	7-31
Figure 7-17 Grievance Redress Flowchart	7-34
Figure 7-18 Propose CSR Implementation Team	7-35
Figure 8-1 Photos of PCM Activities	8-5
Figure 8-2 Photos of Participants from PCM Activities.....	8-5

LIST OF APPENDICES

- APPENDIX A MGE Company Certificates and Licenses
- APPENDIX D Material Safety Data Sheet of Refractories used in Furnace
- APPENDIX E Data from Department of Meterology and Hydrology
- APPENDIX F Air Quality including Wind Speed and Direction Results by TBS Co., Ltd.
- APPENDIX G-1 Water Quality Results by Alarm Ecological Laboratory
- APPENDIX G-2 Water Quality Results by TBS Co., Ltd. (In-situ)
- APPENDIX G-3 Water Quality Results by MGE Co., Ltd.
- APPENDIX H Noise Level Results by TBS Co., Ltd.
- APPENDIX I Vibration Level Results by TBS Co., Ltd.
- APPENDIX J Light Measurement Results by TBS Co., Ltd.
- APPENDIX K Temperature Measurement Results by TBS Co., Ltd.
- APPENDIX L Traffic Counting Results by TBS Co., Ltd
- APPENDIX M Documents and Photos Related to PCM

ABBREVIATIONS

°C	Celsius
ADB	Asia Development Bank
AQM	Air Quality Monitor
B:C	Batch to Cullet ratio
BCR	Building Coverage Ratio
BOD5	Biochemical Oxygen Demand
BOD5	Biological Oxygen Demand
CH4	Methane
CIA	Cumulative Impact Assessment
CN	Cyanide
CO	Carbon Monoxide
CO2	Carbon Dioxide
COD	Chemical Oxygen Demand
COVID-19	Coronavirus Disease 2019
CQHP	Committee for Quality Control of High-Rise Building Construction Projects
CSR	Corporate Social Responsibility
dB	Decibels
DO	Dissolved Oxygen
ECC	Environmental Compliance Certificate
ECD	Environmental Conservation Department
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMS	Environmental Management System
ENE	East-Northeast
ESIA	Environmental and Social Impact Assessment
ESMMP	Environmental and Social Management and Monitoring Plan
GAD	General Administration Department
GPS	Global Positioning System
HCN	Hydrogen Cyanide
IEC	International Electro technical Commission
IEE	Initial Environmental Examination
IFC	International Finance Corporation
IGES	Institute of Global Environmental Strategies
ISO	International Organization for Standardization
IUCN	International Union for Conservation of Nature
kVA	Kilovolt-ampere
Leq/LAeq	Equivalent Continuous Sound Level
LOD	Lower Limit of Detection

LOS	Level of Service
LPG	Liquefied Petroleum Gas
Lux	Light Intensity
MCLG	Maximum Contaminant Level Goal
MGE	Myanmar Golden Eagle Co., Ltd.
MIMU	Myanmar Information Management Unit
MNBC	Myanmar National Building Code
MNDWQS	Myanmar National Drinking Water Quality Standard
MOECAF	Ministry of Environmental Conservation and Forestry
MOGE	Myanmar Oil and Gas Enterprise
MONREC	Ministry of Natural Resources and Environmental Conservation
MSDS	Material Safety Data Sheets
MSL	Mean Sea Level
MVA	Megavolt-ampere
ND	Not Detected
NECC	National Environmental Conservation Committee
NEQEG	National Environmental Quality Emission Guideline
NG	No Guideline
NLA	Net Lettable Area
NO2	Nitrogen Dioxide
NOx	Nitrogen Oxide
O3	Ozone
OHS	Occupational Health and Safety
P	Phosphorous
PAPs	Project Affected Persons
PCD	Passenger Car Equivalent
PCU	Passenger Car Unit
PDCA	Plan-Do-Check-Act
PM	Particulate Matter
PPAH	Pollution Prevention and Abatement Handbook
PPE	Personal Protective Equipment
PPV	Peak Particle Velocity
RM	Raw Materials
RO	Reverse Osmosis
SDGs	Sustainable Development Goals
SO2	Sulfur Dioxide
TBS	Total Business Solution Co., Ltd.
TC	Traffic Counting
TDC	Township Development Committee
TDS	Total Dissolved Solids
ToR	Terms of Reference

TSP	Total Suspended Particle
TSS	Total Suspended Solid
USEPA	United State of Environmental Protection Agency
V	Traffic Volume
VOCs	Volatile Organic Compounds
WB	World Bank
WHO	World Health Organization
WTP	Water Treatment Plant
WW	Wastewater
WWTP	Wastewater Treatment Plant

CHAPTER 1 INTRODUCTION

Myanmar Golden Eagle Co., Ltd. (MGE) was established in 2016 under the Foreign Investment Law and Myanmar Companies Act. Type of investment business is joint venture with the share ratio of thirty-five percentage (35%) from SSB Enterprise Co., Ltd. (Thailand) and sixty-five percentage (65%) from Glass Holding Asia Co., Ltd. (Local). It is located at U Paing No 97, Yangon-Thilawa Terminal Road, Phayagone Village, Thanlyin, Township, Yangon, Myanmar. This Environmental Assessment (EIA) report mainly focuses on the development of new glass bottles manufacturing factory and renovation of some existing buildings. The total land area of the project is 40 acres with total building areas of 3 acres. The location of the project site is shown in Figure 1-1. The project proponent has engaged Total Business Solution Co., Ltd. (TBS) to study the EIA of the project.

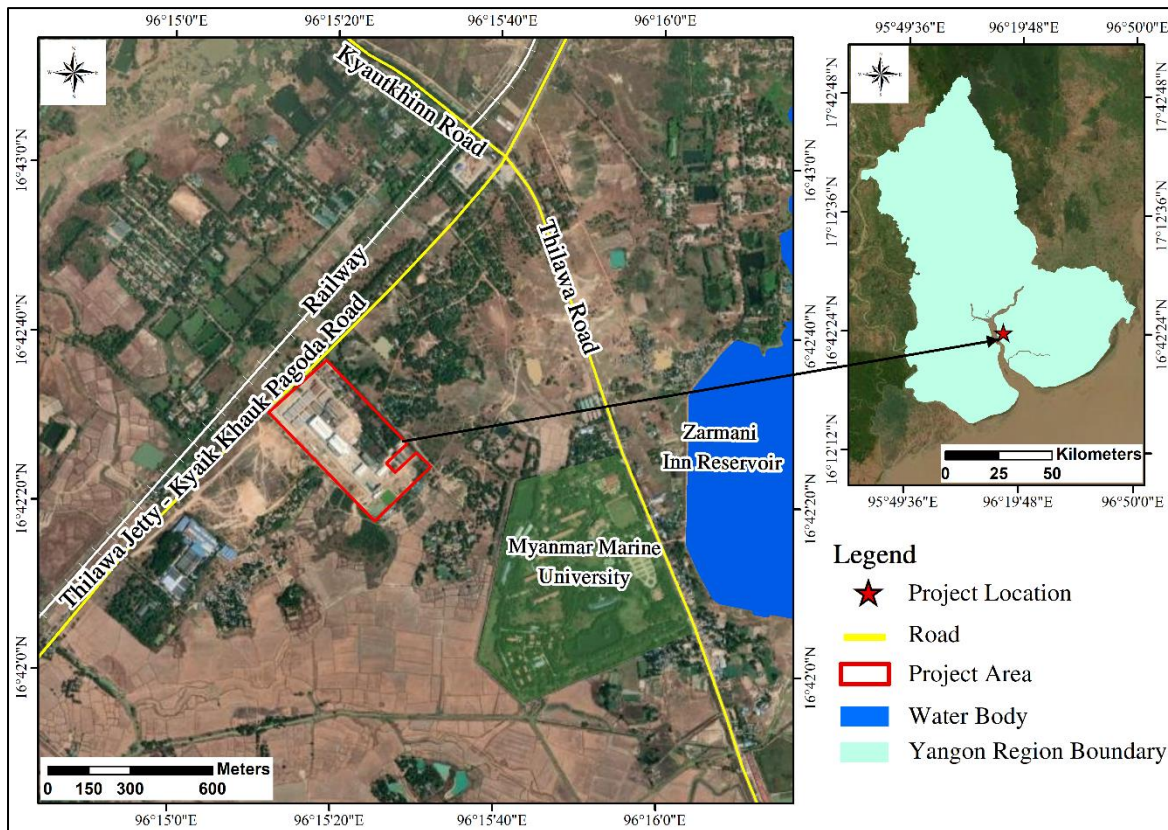


Figure 1-1 Location Map of the Project Site

1.1. PURPOSE OF THE EIA REPORT

The main purposes of the EIA report are as follows.

- To make an assessment of potential environmental impacts and socio-economic opportunities associated with a proposed project.
- To prepare the mitigation measurement plans related to environmental and social concern.
- To conduct the public consultation meeting including all stakeholders to collect the suggestions and comments related to the project.
- To compare the environmental quality monitoring results with the relevant environmental standards and guidelines and to conduct mitigation measurements for exceeded parameters.
- Approval letter of ECD for MGE scoping report is also shown in Appendix N.

1.2. PROJECT PROPONENT

The contact and representative of the project proponent regarding to this EIA report is mentioned in Table 1-1 and Table 1-2. All relevant document and certificates related to MGE is also described in Appendix A. The organization chart of the project proponent is shown in Figure 1-2.

Table 1-1 Contact of Project Proponent

Name	Mr. Kyaw Kyaw Sein
Designation	Managing Director
Address	No. 17/10,27 street, Between 62 and 63 blocks, Pyigyimyatman Ward, Chan Aye Thar San Township, Mandalay, Myanmar.
Tel	09-30926608
e-mail	info@myanmarglass.com

Table 1-2 Contact of Project Proponent's Representative

Name	Mr. Lwin Ko
Designation	Project Coordinator
Address	U Paing No. 97, Yangon- Thilawa Terminal Road, Phayagone Village, Thanlyin Township, Yangon, Myanmar.
Tel	+95 9421029173
e-mail	lwin.ko@myanmarglass.com

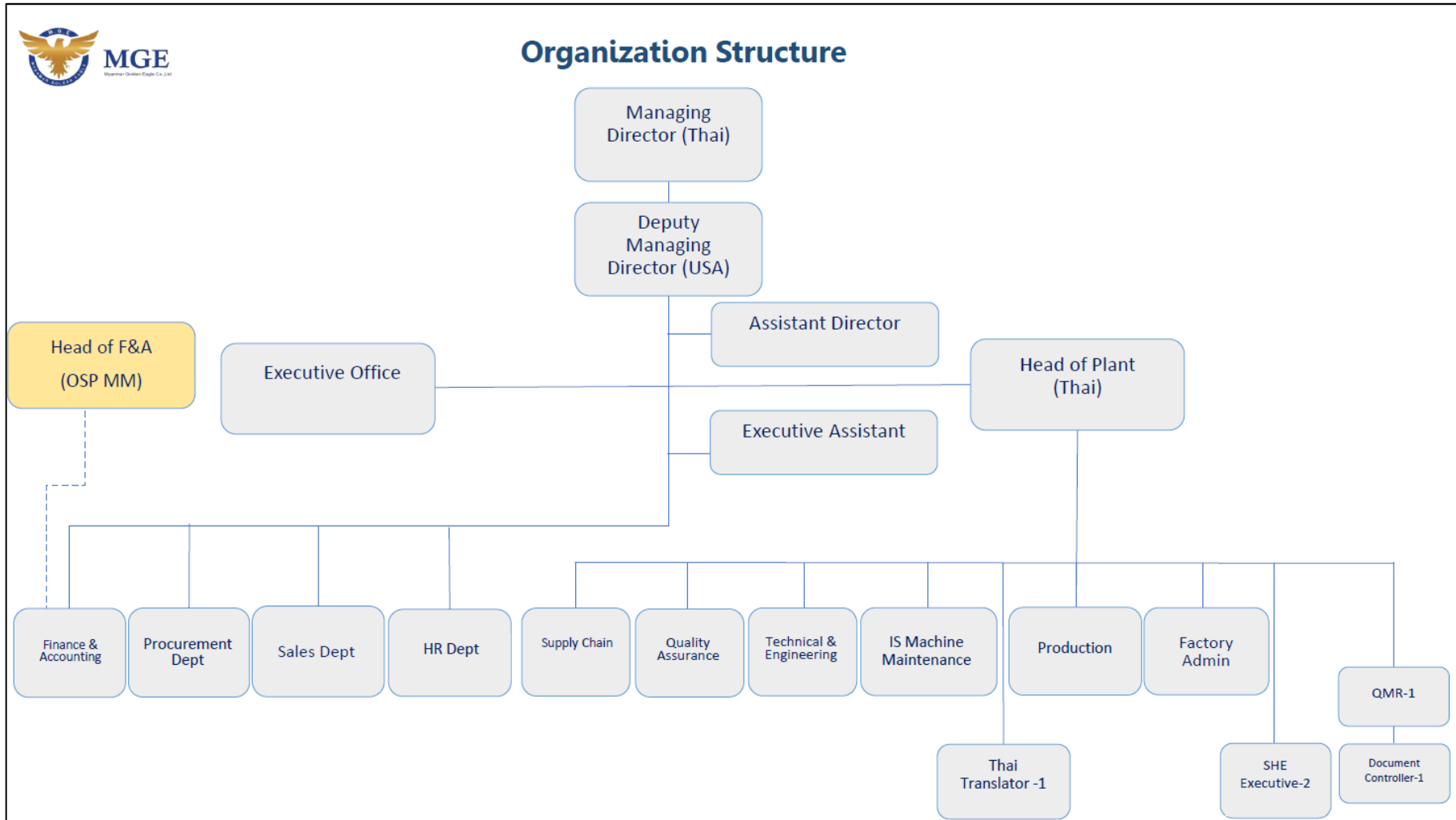


Figure 1-2 Organization Chart of MGE

1.3. EIA CONSULTANT

TBS is a locally own company which provides engineering and environmental services to private and public sectors in Myanmar. Since its inception in 2012, it has worked on various projects such as port and industrial estate development, power transmission, flood control, drainage and sewerage system, Environmental Impact Assessment (EIA), Initial Environmental Examination (IEE) and Environmental Management Plan (EMP).

TBS has been engaged to prepare the EIA for MGE project. The EIA study team consists of qualified and experienced professionals in various technical areas relevant to major environmental and social impacts of the project identified in the report. All relevant document and certificates related to TBS is also described in Appendix B. The organizational structure for conducting and managing the EIA study is shown in Figure 1-3 and the summary of the EIA study team including education and brief experience is shown in Table 1-3.

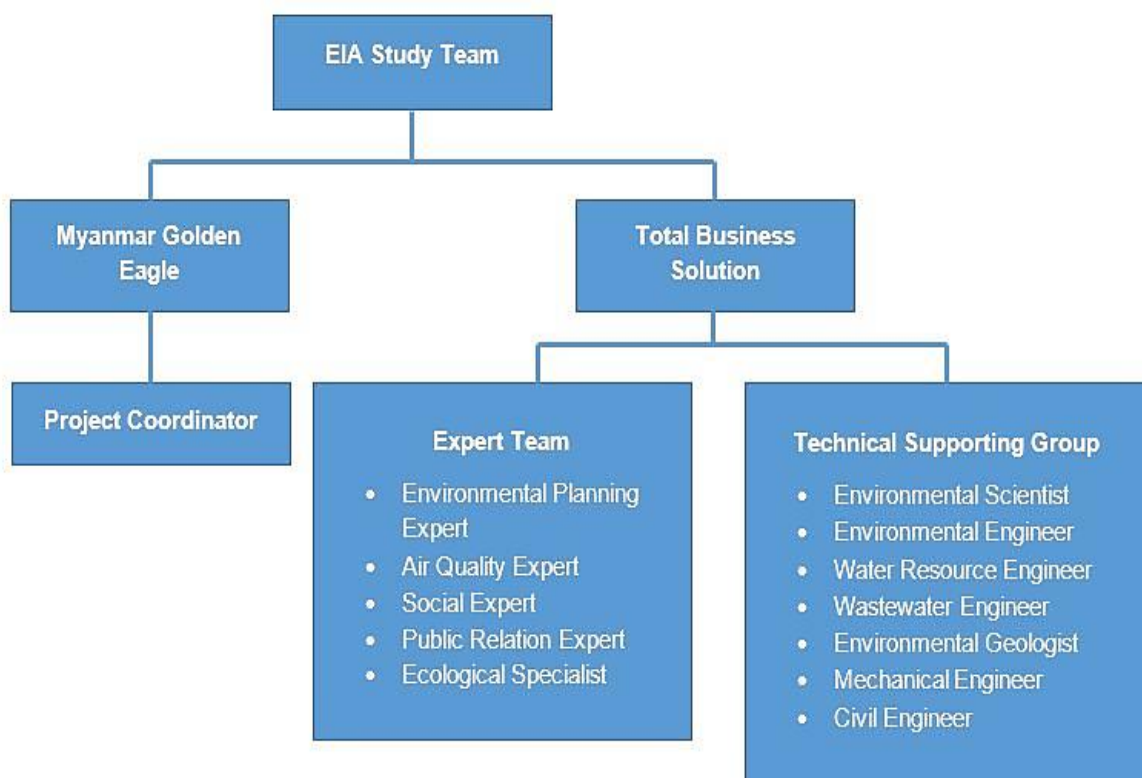


Figure 1-3 Organization structure of EIA Study Team

Table 1-3 List of TBS's Staff

No.	Name	Education	Experience	Responsibility
1.	Dr. Soe Moe Kyaw Win Managing Director Principal of Geotechnical and Geo environmental Engineer	Ph.D. (Geotechnical Engineering) M.Sc. (Geotechnical Engineering) B.Sc. (Geology)	30-year experiences in the areas of environmental assessment, geotechnical and geological engineering in Southeast Asian, U.S.A and Canada. Environmental assessments, mine waste management, site investigation, instrumentation, ground improvement, land reclamation and landslide investigation.	Final review of the report
2.	Mr. Myatthu Kyaw General Manager	M.Sc. (Environmental Engineering and Management) B.Sc. (Forestry)	Over 7 years' experience in environmental quality monitoring (air, noise and vibration, soil, water), environmental impact assessment industry.	Overall review the report and manage for the smooth implementation of report preparation of the project
3.	Mr. Nyan Yee Senior Project Manager	B.Sc. (Geology)	Over 10 years' experience in jade mining company Over 10 years' experience in Environmental Impact Assessment report preparation and Monitoring sector. Over 5 years' experience in coordination with the government sectors and public communication	Manage the survey team and field related activities and arrange the PCM by coordinating with client and relevant government departments
4.	Dr. Aung Aung	Ph.D. (Zoology) M.Sc. (Zoology) B.Sc. (Zoology)	Over 19-year experiences in teaching, researcher in Zoology field and biodiversity conservation.	Environmental impact assessment and Biodiversity conservation focus on mammalogy and ecology.
5.	Dr. Pyone Pyone Myint	Ph.D. (Zoology) M.Sc. (Zoology) B.Sc. (Zoology)	Over 19-year experiences in teaching and field research in Zoology field and Biodiversity observation.	Environmental impact assessment and biodiversity observation mainly in anatomy, behavior, ecology, evolution, physiology, conservation, or other aspects of bird biology.
6.	Dr. Thant Zaw Win	Ph.D. (Taxonomy) M.Sc. (Botany) B.Sc. (Botany)	Over 9-year experiences in teaching and field research in Botany field and biodiversity observation.	Environmental impact assessment and phytochemical analysis, wetland management, specialist in plant biology.

No.	Name	Education	Experience	Responsibility
7.	Dr. Than Than Myint	Ph.D. (Zoology) M.Sc. (Zoology) B.Sc. (Zoology)	Over 16-year experiences in teaching and field research in Zoology field and marine biology observation.	Environmental impact assessment and marine biodiversity observation mainly in fish biology.
8.	Ms. Hnin Lai Win Environmental Manager	M.Sc. (Environmental Engineering and Management) B.Pharm. (Pharmacy)	5-year experiences in management and marketing and training of junior staff in medical field Over 4-year experiences in land use planning, environmental impact assessment and managing environmental projects. Environmental management plan, environmental monitoring, environmental risk assessment, facilitated the public consulting meetings, marketing, coordination with government organizations and local community.	Overall review the report
9.	Ms. Phoo Pwint Khine Environmental Manager	M.E (Environmental Engineering and Management) B.E (Civil)	1 year experience as a site engineer in construction project. 6 months' experience as a QC/QS at building estimate team. Over 3 years' experience in environmental field	Lead the Environmental Team to prepared the overall Environmental Management Plan including Water and Wastewater Pollution Control and Management as well as Solid Waste Management, Environmental Impact Assessment, Cumulative Impact Assessment, Environmental Quality Analysis and arrange the Public Consultation Meetings
10.	Ms. Aye Mon Aung Environmental Engineer	M.E (Environmental Engineering and Management) B.E (Materials and Metallurgy)	Over 1 year experience as sale representative in plastic raw materials and chemical trading 3 years experience in environmental report preparation	Support the team leader to conduct and calculate the impact assessment for solid waste management, wastewater and air pollution control as well as noise and vibration control of the project
11.	Mr. Htet Thiha Phone Myint	B.Sc. (Geology)	7 years' experiences in geological field, soil analysis, environmental	Support the team leader to deal with government organizations and local

No.	Name	Education	Experience	Responsibility
	Project Manager		management land use observation Environmental site survey, impacts monitoring (air, noise, water sampling), coordination with government organizations and local community, socioeconomic survey and documentation in environmental management projects.	community, conducting Social Survey, Social data Analysis as well as arrange the Public Consultation Meetings
12.	Mr. Phyo Thu Kyaw Auto CAD Drafter	B.E. (Mechatronic)	3 years' experiences in project coordination, documentation, Auto CAD drafter and graphic design and IT technician. Over 3 years experiences in environmental monitoring such as air and noise monitoring, water sampling and installing, maintaining and repair of computer system and office equipment.	Support the team leader to prepare the engineering drawing and mappings
13.	Ms. Kyi Phyu Khin	ABE (Level 6 – UK) BA (English) Diploma in Business Law (YU)	1 years' experiences in management field specialized in business law	Prepared the Law and Regulation section as well as public consultation meeting of the project
14.	Mr. Wai Phyo Aung Survey Manager	B.Sc (Geology)	8 years' working experiences in geological and geotechnical engineering. 4 years' as a team leader in survey team.	Support the survey team for Environmental Quality Monitoring and Drone Survey Conduct the land used survey and prepared the land use map and necessary mapping of the project
15.	Mr. Zaw Myo Hein Environmental Geologist	B.Sc (Geology)	3 year's experience in environmental monitoring processes and conducting site survey	Prepared and conducted the Environmental Quality Monitoring Survey, Drone Survey and Environmental Quality Analysis of the project
16.	Ms. Thinzar Htun Environmental Scientist	B.Sc (Forestry)	2 year's experience in environmental report examination and socio survey	Prepare the Environmental Management Plan, Project Description, Environmental Quality

No.	Name	Education	Experience	Responsibility
			5 months experiences in environmental report preparation field	Monitoring Plan and Sub-plan as well as arrange the Public Consultation Mettings

1.4. THE EIA REQUIREMENT

According to the Myanmar Environmental Conservation Law (2012) and the EIA Procedure (2015), the glass bottles manufacturing projects with all types of activities need to undergo an EIA study if the Ministry required that. The project follows this EIA requirement.

On October 2021, the project proponent engaged TBS (the Consultant) to conduct the EIA for the project. Its contents will follow all relevant guidelines and procedures of the Environmental Conservation Department (ECD), particularly those prescribed in the EIA Procedure (2015).

Table 1-4 Criteria for EIA Type Economic Activities

No	Type of Economic Activity	Criteria for EIA Type Economic Activities
Manufacturing of Glass and Ceramics		
1.	Glass, Glass Fibre or Mineral Fibre Manufacturing Plants	All activities where the Ministry requires that the project shall undergo EIA
2.	Manufacturing of Glass and Ceramics	All activities where the Ministry requires that the project shall undergo EIA

CHAPTER 2

OVERVIEW OF THE POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

2.1. INTRODUCTION

This chapter contains information on relevant policies, legislations and institutional framework of Myanmar that are relevant to the environmental and socio-economic aspects of the project. The activities carried out under the project are subject to these legal requirements.

The project proponent will formulate an environmental management policy to guide its environmental management during construction/decommission phase and operation phases of the project. Such a policy will support the following activities:

- Development a comprehensive Environmental, Health and Safety (EHS) management system for implementing the environmental management plan (EMP);
- Implementing EMP during the construction phase, nominate project contractors will be required to prepare and implement contract specific EHS measures for construction phase of the proposed condominium;
- During the operation phase, EHS management will be an integral part of the operational management of the proposed project;
- Encourage public participation in EHS management related to surrounding communities and
- Maintain information generated in EHS management and prepare EHS performance reports as required by the corporate management and the relevant authorities of the Government,

The project proponent will establish and activate EHS Management system at the commencement of construction.

2.2. RELEVANT MYANMAR LAWS AND REGULATIONS

Policies, legislation and guidelines in Myanmar that are of relevance to the project are listed in Table 2-1. The project proponent will comply with all the following laws and regulations.

Table 2-1 Relevant Laws and Regulations

No.	Name of Laws and Regulations	Year
Environmental Conservation		
1.	Environmental Conservation Law	2012
2.	Environmental Conservation Rules	2014
3.	Environmental Impact Assessment Procedure	2015
4.	National Environmental Policy	2019
Pollution Control and Health		
5.	National Environmental Quality (Emission) Guidelines	2015
6.	National Drinking Water Quality Standards	2019
7.	Public Health Law	1972
8.	The Prevention and Control of Communicable Diseases Law	1995
9.	The Control of Smoking and Consumption of Tobacco Product	2006
10.	Occupational Safety and Health Law	2019
11.	Myanmar Fire Brigade Law	2015
12.	Prevention of Hazard from Chemical and Related Substances Law	2013
Biodiversity and Resource Conservation		
13.	Conservation of Biodiversity and Natural Protected Area Law	2018
14.	The Law relating to Aquaculture	1989
15.	Conservation of Water Resource and River Law	2006
16.	Conservation of Water Resource and River Rules	2013
17.	Underground Water Act	1930
18.	Forest Law	1992
Land Acquisition		
19.	The Land Acquisition Act	1894
20.	Myanmar National Land Use Policy	2016
21.	State-owned land leasing of buildings; Instruction to be followed in transfers and joint ventures	2018
22.	Farmland Law	2012
23.	Farmland Rules	2012
24.	Vacant, Fallow and Virgin Land Management Law	2018
25.	Registration of Deeds Law	2019
26.	The Boundaries Law	2019
Urban Development and Management		
27.	Development Committee Law	2013
28.	Myanmar Engineering Council Law	2013
29.	The Electricity Law	2014
30.	The Telecommunications Law	2013
Human Rights		
31.	Protection of the Right of National Race Law	2015

No.	Name of Laws and Regulations	Year
32.	Rights of the Persons with Disabilities Law	2015
33.	Child Rights Law	2019
Cultural Heritages		
34.	The Protection and Preservation of Cultural Heritage Region Law	2019
35.	The Protection and Preservation Antique Object Law	2015
36.	The Protection and Preservation of Ancient Monument Law	2015
Labour		
37.	Labour Organization Law	2011
38.	The Employment and Skill Development Law	2013
39.	The Minimum Wage Law	2013
40.	Payment of Wage Law	2016
41.	Workers' Compensation Act	1923
42.	The Settlement of Labour Dispute Law	2012
43.	The Leave and Holiday Act	1951
44.	Social Security Law	2012
Motor Vehicles		
45.	Vehicle Safety and Motor Vehicle Management Law	2020
46.	The Myanmar Motor Vehicle Rules	1989
47.	The Motor Vehicle Law	2015
Other Related Law and Regulation		
48.	Myanmar Insurance Law	1993
49.	Myanmar Insurance Rule	2017
50.	The Ethnic Right Protection Law	2015
51.	Myanmar Investment Law	2016
52.	Myanmar Investment Rule	2017
53.	The Petroleum and Petroleum Product Law	2017
54.	The Petroleum Act	1934
55.	The Export and Import Law	2012
56.	The Fisheries Law	1989
57.	Natural Disaster Managemnet Law	2013
58.	Climate Change Policy	2019
59.	Commercial Tax Law	2014
60.	The Union Tax Law	2019
61.	Myanmar Citizens Investment Law	2013
62.	Foreign Investment Law	2012
Myanmar Government Institutional Framework		
63.	Arrangement at National and Sector Level	
64.	Arrangement at the Project Area	

No.	Name of Laws and Regulations	Year
International and National Policies Guidelines and Standards		
65.	IFC's Standards and Guidelines	2012
66.	World Bank Pollution Prevention and Abatement Handbook	1998
International Conventions		
67.	Vienna Convention for the Protection of the Ozone Layer	1985
68.	Montreal Protocol on Substances that Deplete the Ozone Layer	1987
69.	Kyoto Protocol	1997
70.	United Nations Framework Convention on Climate Change (UNFCCC)	1992

2.3. ENVIRONMENTAL CONSERVATION

2.3.1. Environmental Conservation Law (2012)

The Pyidaungsu Hluttaw enacted this law by Law No. 9 of 2012 on March 30, 2012. The legal mechanism for environmental conservation in Myanmar is stipulated under this law. Relevant sections for project developments are list below.

Section 7(o) states that “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 states that “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 describes that 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 in order 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.

According to Section 24, The Ministry may, in issuing the prior permission, stipulate terms and conditions relating to environmental conservation. It may conduct inspection whether or not it is performed in conformity with such terms and conditions or inform the relevant Government departments, Government organizations to carry out inspections.

Section 29 stipulates, “No one shall violate any prohibition contained in the rules, notifications, orders, directives and procedures issued under this Law”.

2.3.2. Environmental Conservation Rules (2014)

Environmental Conservation Rules was promulgated in 2014 and provides a platform to bridge the Environmental Conservation Law (2012) with more specific and practical rules and guidelines including the EIA Procedure (2015) and National Environmental Quality (Emission) Guidelines (NEQEG, 2015). Specific provisions are stipulated in the EIA Procedure (2015) and the environmental quality standards.

Under Section 69, sub-Section (a) states that 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. Sub-Section (b) states that 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.

2.3.3. Environmental Impact Assessment Procedure (2015)

The objectives of the EIA Procedure (2015) are to provide a common framework for EIA reporting and to ensure that the EIA reporting is in line with legal requirements, good practices and professional standards. Concrete steps to be followed in conducting an EIA are stipulated in the EIA Procedure (2015). EIA procedure assigns responsibility to Project Proponent for all adverse impacts as described in Section 102 to 105:

Section 102 states that the Project Proponent shall bear full legal and financial responsibility for: (a) all of the Project Proponent's actions and omissions and those of its contractors, subcontractors, officers, employees, agents, representatives, and consultants employed, hired, or authorized by the Project acting for or on behalf of the Project, in carrying out work on the Project; and (b) Project Affected Persons (PAPs) until they have achieved socio-economic stability at a level not lower than that in effect prior to the commencement of the Project, and shall support programs for livelihood restoration and resettlement in consultation with the PAPs, related government agencies, and organizations and other concerned persons for all Adverse Impacts.

Section 103 states that the Project Proponent shall fully implement the Environmental Management Plan (EMP), all Project commitments, and conditions, and is liable to ensure that all contractors and subcontractors of the Project comply fully with all applicable Laws, the Rules, this Procedure, the EMP, Project commitments and conditions when providing services to the Project.

Section 104 states that the Project Proponent shall be responsible for, and shall fully and effectively implement, all requirements set forth in the Environmental Compliance Certificate (ECC), applicable Laws, the Rules, this Procedure and standards.

Section 105 states that the Project Proponent shall timely notify and identify in writing to the Ministry, providing detailed information as to the proposed Project's potential Adverse Impacts.

Monitoring process is described from Section 106 to 110.

Section 106 states that the Project Proponent shall, during all phases of the Project (pre-construction, construction, operation, decommissioning, closure and post-closure), engage in continuous, proactive and comprehensive self-monitoring of the Project and activities related thereto, all Adverse Impacts, and compliance with applicable laws, the Rules, this Procedure, standards, the ECC, and the EMP.

Section 107 states that the Project Proponent shall notify and identify in writing to the Ministry any breaches of its obligations or other performance failures or violations of the ECC and the EMP as soon as reasonably possible and in any event, in respect of any breach which would have a serious impact or where the urgent attention of the Ministry is

or may be required, within not later than twenty-four (24) hours, and in all other cases within seven (7) days of the Project Proponent becoming aware of such incident.

Section 108 states that the Project Proponent shall submit monitoring reports to the Ministry not less frequently than every six (6) months, as provided in a schedule in the EMP, or periodically as prescribed by the Ministry.

Section 109 states that the monitoring reports shall include:

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

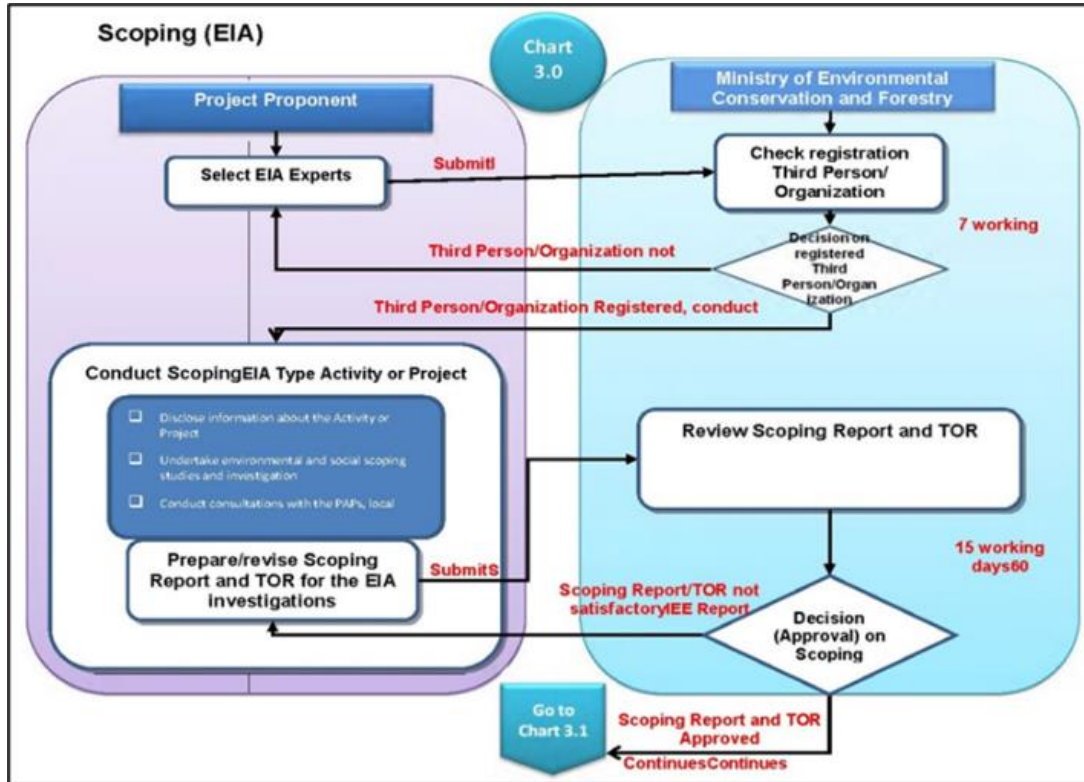
Section 110 states that within ten (10) days of completing a monitoring report as contemplated in Article 108 and Article 109 in accordance with the EMP schedule, the Project Proponent shall make such report (except as may relate to National Security concerns) publicly available on the Project's website, at public meeting places (e.g. libraries, community halls) and at the Project offices. Any organization or person may request a digital copy of a monitoring report and the Project shall, within ten (10) days of receiving such request, submit a digital copy via email or as may otherwise be agreed upon with the requestor.

Section 113 states that for purposes of monitoring and inspection, the Project Proponent: (a) shall grant to the Ministry and/or its representatives, at any time during normal working hours, access to the Project's offices and to the Project site and any other location at which the Project activities or activities related to the Project are performed; and (b) from time to time as and when the Ministry may reasonably require, shall grant the Ministry access to the Project's offices and to the Project site and any other location at which the Project activities or activities related to the Project are performed.

Section 115 states that in the event of an emergency, or where, in the opinion of the Ministry, there is or may exist a violation or risk of violation of the compliance by the Project with all applicable environmental and social requirements, the Project shall grant full and immediate access to the Ministry at any time as may be required by the Ministry.

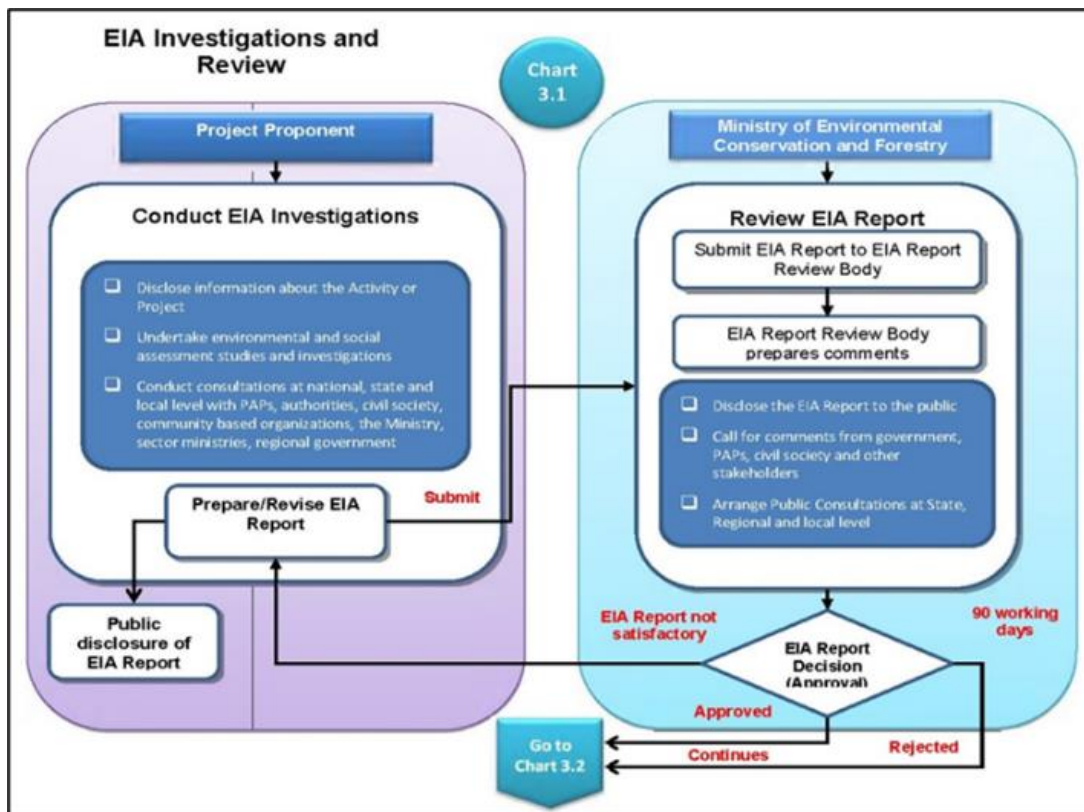
Section 117 state that the Project Proponent shall further ensure that the Ministry's rights of access hereunder shall extend to access by the Ministry to the Project's contractors and subcontractors.

The following figures show the procedures for scoping, EIA investigations and review, EIA review and approval, and appeal, respectively.



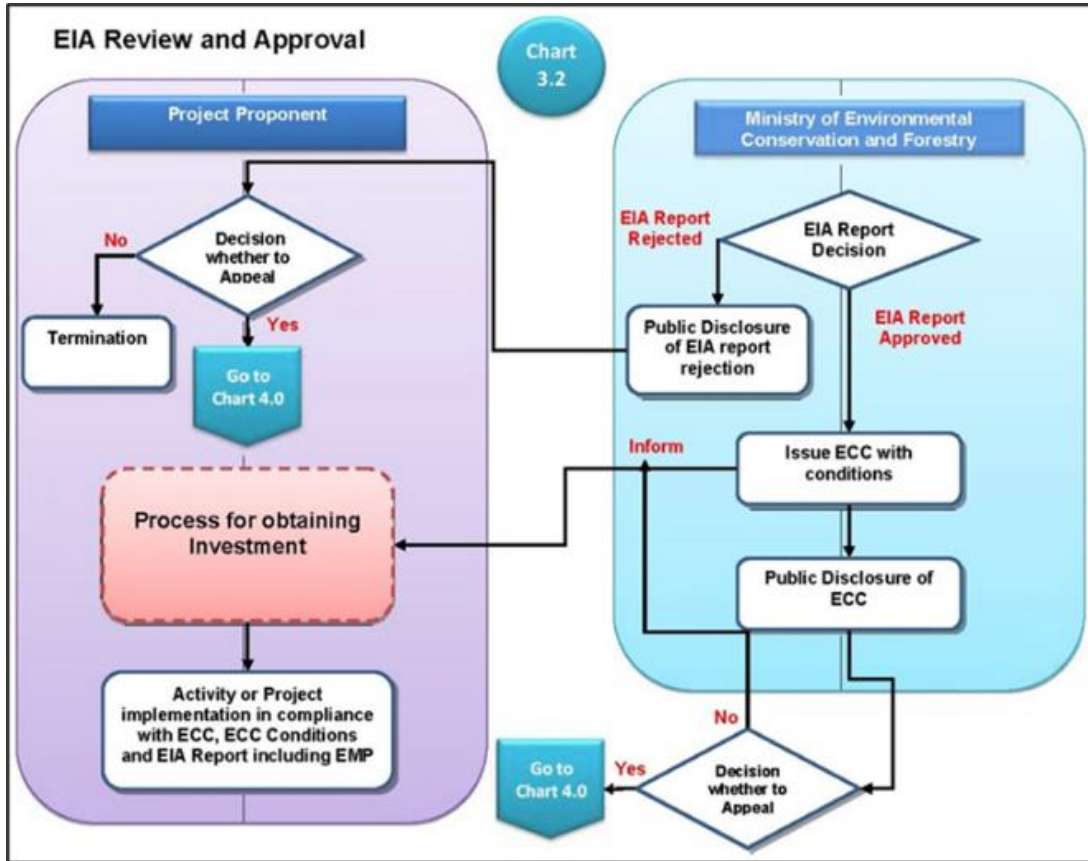
Source: EIA Procedure (2015)

Figure 2-1 EIA Process (Scoping)



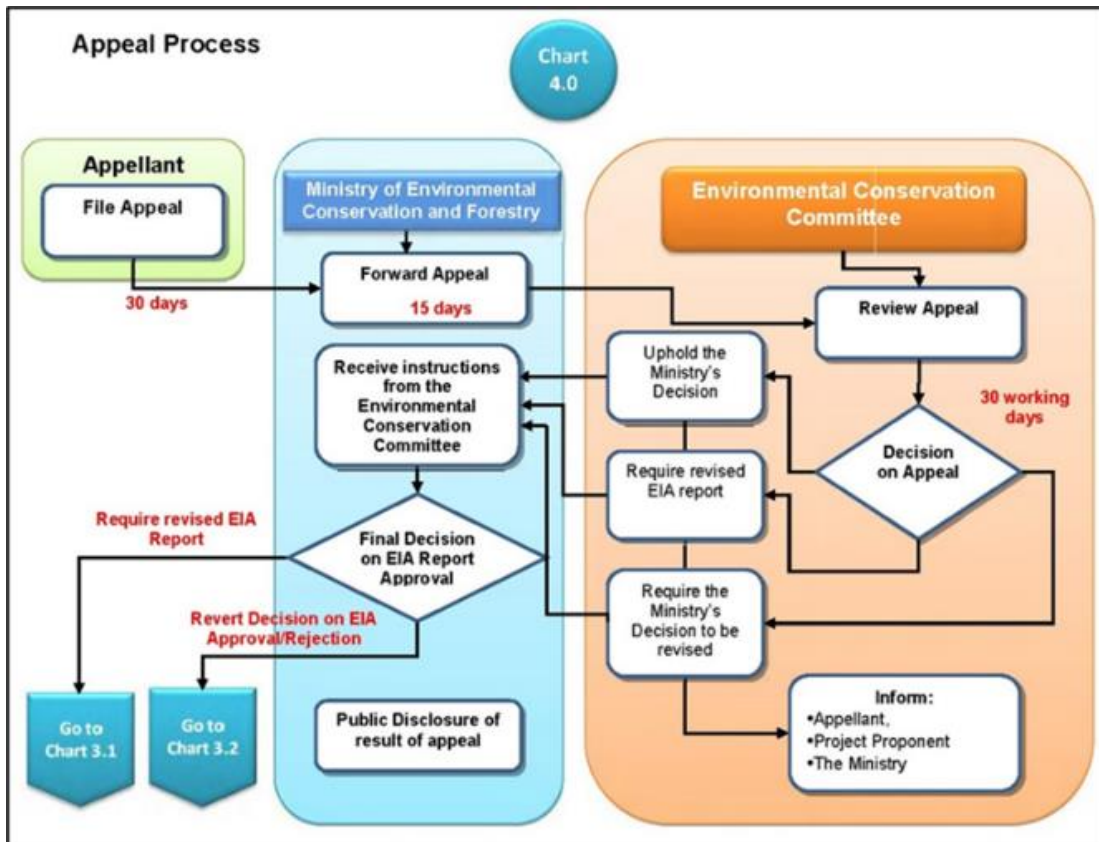
Source: EIA Procedure (2015)

Figure 2-2 EIA Process (EIA Investigation and Review)



Source: EIA Procedure (2015)

Figure 2-3 EIA Process (Review and Approval)



Source: EIA Procedure (2015)

Figure 2-4 EIA Process (Appeal)

2.3.4. National Environmental Policy (2019)

National Environmental Policy of Myanmar was enacted by the Republic of the Union of Myanmar in 2019. In this policy, Section 8 states that the Government of the Republic of the Union of Myanmar is committed to putting this National Environmental Policy into action through a Strategic Framework and a series of master plans. The Strategic Framework applies the National Environmental Policy principles to priority thematic areas and sectors. It also provides environmental governance requirements for effective implementation, including institutional strengthening, monitoring and enforcement, public participation, dispute resolution and financing. The Strategic Framework provides guidance for preparing master plans for States and Regions and for the priority thematic areas and sectors. The master plans will contain specific activities, timeframes, budgets and performance targets for achieving the Strategic Framework objectives and, ultimately, the National Environmental Policy vision. The linkages between the National Environmental Policy, Strategic Framework, and Master Plans are depicted in Figure 2-5.



Figure 2-5 National Environmental Policy Myanmar

2.4. POLLUTION CONTROL AND HEALTH

2.4.1. National Environmental Quality (Emission) Guidelines (2015)

In Myanmar, the NEQEG was established in December 2015 with financial and technical assistance from the Asian Development Bank (ADB). It provides the basis for regulation and control of noise and vibration, air emissions, and liquid discharges from various sources in order to prevent pollution for purposes of protection of human and ecosystem health.

According to the NEQEG (2015), all projects subject to the EIA Procedure (2015) have to comply with and refer to applicable national guidelines/standards or international standards adopted by MONREC. In addition, project proponents shall be responsible for monitoring their compliance with general and applicable industry-specific guidelines as specified in the EMP and ECC. In addition, the project proponent is responsible for monitoring the environmental quality based on developed EMP as specified in the following sections.

The national and international guideline values that are considered relevant to this project are presented below.

2.4.1.1. Air Quality

2.4.1.1.1 Ambient Standards

The NEQEG requires that “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”. As national ambient quality guidelines and standards have not been established as of November 2016, the standards required to be met in Myanmar is equivalent to the values set in WHO Air Quality Guidelines. NEQEG also require that contribution concentration of emissions from each project does not exceed 25 percent of the applicable air quality standards¹. Table 2-2 shows the ambient standards concerning air quality applicable to the project and specific guideline values for glass bottles production process.

¹ During the EIA preparation, the predicted contribution concentration will be calculated with a simulation model and the obtained results will be compared with the amount equvaling 25 percent of the applicable air quality standard

Table 2-2 General and Specific Guideline Values for Air Quality

Parameters	Unit	Averaging Period	NEQEG
General Guideline Values for all Projects			
Nitrogen dioxide	$\mu\text{g}/\text{m}^3$	1-year	40
		1-hour	200
Ozone	$\mu\text{g}/\text{m}^3$	8-hour maximum daily	100
Particulate Matter PM ₁₀	$\mu\text{g}/\text{m}^3$	1-year	20
		24-hour	50
Particulate Matter PM _{2.5}	$\mu\text{g}/\text{m}^3$	1-year	10
		24-hour	25
Sulfur dioxide	$\mu\text{g}/\text{m}^3$	24-hour	20
		10-minute	500
Specific Guideline Values for Manufacture of Glass & Ceramics Projects and Glass, Glass & Mineral Fiber Manufacturing Projects			
Parameters	Unit	NEQEG Guideline Values	
Arsenic	mg/Nm^3	1	
Cadmium	mg/Nm^3	0.2	
Fluorides	mg/Nm^3	5	
Hydrogen chloride	mg/Nm^3	30	
Lead	mg/Nm^3	5	
Nitrogen dioxide	mg/Nm^3	1,000	
Other heavy metals (total)	mg/Nm^3	5 ^b	
Particulates	Natural gas	mg/Nm^3	100 ^c
	Other fuels		50 ^c
Sulfur dioxide	mg/Nm^3	700-1,500 ^d	

a Milligrams per normal cubic meter at specified temperature and pressure

b 1 mg/Nm³ for Selenium

c Where toxic metals are present, not to exceed 20 mg/Nm³ ; to achieve dust emissions of 50 mg/Nm³ installation of secondary treatments (bag fillers or electrostatic precipitators) is necessary

d 700 mg/Nm³ for natural gas firing, 1,500 mg/Nm³ for oil firing

Source: NEQEG (2015)

2.4.1.2. Water Quality

The site runoff and wastewater discharges during construction phase is shown in Table 2-3. Both general guideline values and specific guideline values for glass production process of operation phase are shown in Table 2-4.

Table 2-3 Site Runoff and Wastewater Discharges (Construction Phase)

Parameter	Unit	Guideline Value ^a
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 ²	100 mL	400
Total nitrogen	mg/l	10
Total phosphorus	mg/l	2
Total suspended solids	mg/l	50

Source: NEQEG (2015)

Table 2-4 General and Specific Wastewater Effluent Guidelines for Operation phase

Parameter	Unit	Guideline Value ^a
General National Guidelines for (Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges (General Application)) ³		
5-day Biochemical oxygen demand	mg/l	50
Ammonia	mg/l	10
Arsenic	mg / l	0.1
Cadmium	mg/l	0.1
Chemical oxygen demand	mg/l	250
Chlorine (total residual)	mg/l	0.2
Chromium (hexavalent)	mg/l	0.1
Chromium (total)	mg/l	0.5
Copper	mg/l	0.5
Cyanide (free)	mg/l	0.1
Cyanide (total)	mg/l	1
Fluoride	mg/l	20
Heavy metals (total)	mg/l	10
Iron	mg/l	3.5
Lead	mg/l	0.1
Mercury	mg/l	0.01

² Coliforms refer to a group of bacteria which are found in the intestines of warm blooded animals and therefore are present in sewage, and on/in soils, surface waters and vegetation. Total coliforms is an indicator organism which, although by itself is not considered to cause disease in man or animals, usually indicates the presence of pathogenic or disease-causing organisms. By measuring the number of total coliforms present in a sample a judgment can be made as to the water's usability for a given purpose.

³ Pollution prevention and abatement handbook (1998). Toward cleaner production. World Bank Group in collaboration with United Nations Environment Programme and the United Nations Industrial Development Organization.

Parameter	Unit	Guideline Value ^a
Nickel	mg/l	0.5
Oil and grease	mg/l	10
pH	S.U. ^a	6-9
Phenols	mg/l	0.5
Selenium	mg/l	0.1
Silver	mg/l	0.5
Sulphide	mg/l	1
Temperature increase	mg/l	<3 ^b
Total coliform bacteria	mg/l	400
Total phosphorus	mg/l	2
Total suspended solids	mg/l	50
Zinc	mg/l	2
Specific Effluent Level for Manufacture of Glass & Ceramics Projects and Glass, Glass & Mineral Fiber Manufacturing Projects		
Antimony	mg/L	0.3
Arsenic	mg/L	0.1
Boric acid	mg/L	2
Chemical oxygen demand	mg/L	130
Fluorides	mg/L	5
Lead	mg/L	0.1
Oil and grease	mg/L	10
pH	S.U. ^a	6-9
Temperature increase	°C	<3 ^b
Total suspended solids	mg/L	30

Source: NEQEG (2015)

a Standard Unit

b At the edge of 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 the point of discharge

2.4.1.3. Solid Waste Management Facilities

The leachate generated from landfill of general waste and industrial waste is regulated by the effluent standards shown in Table 2-5.

Table 2-5 Effluent Standard for Leachate from Landfill of General Waste

Parameter	Unit	Hazardous Waste Landfills		Municipal Solid Waste Landfills	
		Daily max	Monthly average	Daily max.	Monthly average
5-day Biochemical oxygen demand	mg/l	220	56	140	37
Ammonia	mg/l	10	4.9	10	4.9
Aniline	mg/l	0.024	0.015	-	-
Arsenic	mg/l	1.1	0.54	-	-
α-Terpineol	mg/l	0.042	0.019	0.033	0.016
Benzoic acid	mg/l	0.119	0.073	0.12	0.071
Chromium (total)	mg/l	1.1	0.46	-	-
Naphthalene	mg/l	0.059	0.022	-	-
p-Cresol	mg/l	0.024	0.015	0.025	0.014
pH	-	6-9	6-9	6-9	6-9
Phenol	mg/l	0.048	0.029	0.026	0.015
Pyridine	mg/l	0.072	0.025	-	-
Total suspended solids	mg/l	88	27	88	27
Zinc	mg/l	0.535	0.296	0.2	0.11

* NEQEG (2015)

2.4.1.4. Waste (Wastewater Treatment Facility)

Sludge generated at the wastewater treatment facility is dehydrated and landfilled or incinerated. Sludge is regulated by the effluent standards shown in Table 2-6.

Table 2-6 Effluent Standards for Sludge

Parameter	Unit	National standard*
Arsenic	mg/kg	75
Cadmium	mg/kg	85
Chromium (total)	mg/kg	3,000
Copper	mg/kg	4,300
Lead	mg/kg	840
Mercury	mg/kg	57
Molybdenum	mg/kg	75
Nickel	mg/kg	420
Selenium	mg/kg	100
Total coliform bacteria	g	1,000
Zinc	mg/l	7,500

* NEQEG (2015) (Refer to "Use and disposal of sewage sludge. 2006. 40CFR Part 503, USEPA")

2.4.1.5. Noise and Vibration

The noise level is regulated by the NEQEG for each receptor as shown Table 2-7.

The vibration result is compared with German Standard from DIN 4150. The German Standard Guidelines are shown in Table 2-8.

Table 2-7 General Guideline Values for Noise Level

Receptor	Unit	National Guideline Values (NEQEG)		IFC/WB EHS Guidelines	
		Daytime 7:00-22:00 (10:00-22:00 for Public holidays)	Nighttime 22:00-7:00 (10:00-22:00 for public holidays)	Daytime 7:00-22:00	Night time 22:00- 7:00
Residential/ Institutional/ Educational	dBA	55	45	55	45
Industrial/ Commercial	dBA	70	70	70	70

Source: NEQEG (2015), IFC General EHS Guidelines (2007)

Table 2-8 Guideline Value for Vibration (German standard DIN 4150-3)

Structure Type	Peak Particle Velocity (mm/s)		
	4-8 Hz	8-30 Hz	30-100 Hz
Commercial	20	20-40	40-50
Residential	5	5-15	15-20
Very sensitive	3	3-8	8-10

2.4.1.6. Odor

General guideline values for odor are described in Table 2-9. According to NEQEG, odor level in the populated areas should not exceed 5 to 10 odorant units.

Table 2-9 General Guideline Values for Odor

Parameter	National Guideline Values (NEQEG)
Odor Level	should not exceed 5 to 10 odorant units at the edge of populated areas in the vicinity of a project

Source: NEQEG (2015), IFC General EHS Guidelines (2007)

2.4.2. National Drinking Water Quality Standards (2019)

Myanmar National Drinking Water Quality Standards (2019/MNDWQS) is standards for drinking water quality in Myanmar and ECD requires comparing the tested water quality results against the standard values. For this project, it is considered necessary to be applied both surface water and underground water. The values required under MNDWQS (2019) are shown below Table 2-10. In addition to the 16 items presented below, E. coli and Cadmium are normally required by ECD to be measured for underground water.

Table 2-10 National Drinking Water Quality Standards

Parameters	Unit	Standard Values*	WHO Guideline Values ⁴
Total Coliforms	Acceptable/No Objectionable	3	None specified (recommended median value – 0 per 100 ml)
Fecal Coliforms	Acceptable/No Objectionable	0	Must not be detectable in any 100 ml sample (recommended median value – 0 per 100 ml)
Taste	acceptable/no objectionable taste		Non set (recommended median value –3 DN)
Odor	acceptable/no objectionable odor		Non set (recommended median value –3 DN)
Color	True Color Unit (TCU)	15	None set (recommended median value – 15)
Turbidity	Nephelometric Turbidity Unit (NTU)	5	Non set (recommended median value – 5)
Arsenic	mg/L	0.05	0.01 mg/l
Lead	mg/L	0.01	0.01 mg/l
Nitrate	mg/L	50	50 mg/l
Manganese	mg/L	0.4	0.4 mg/l
Chloride	mg/L	250	Non set (recommended median value-250)
Hardness	mg/L as CaCO ₃	500	Non set (recommended median value-500)
Iron	mg/L	1	None set (recommended median value- 0.3)
pH	-	6.5 to 8.5	None set (recommended median value- 6.5 - 8.5)
Sulphate	mg/L	250	None set (recommended median value-250)
Total Dissolved Solids (TDS)	mg/L	1,000	None set (recommended median value-1,000)

Source: *MNDWQS (2019)

⁴ World Health Organization (WHO), 2018. A Global Overview of National Regulations and standards for Drinking-Water Quality

2.4.3. Public Health Law (1972)

This law was enacted by the Myanmar State and Revolution Council with the notification number 1/1972. Chapter 2, In Section 3 of the law describes about the protection of public health. There are six Sections under Chapter 2. Those Sections describe that the government was working to improve the public health, to protect the public health and the following devices to perform for advices, inspection, supervision, repair, prohibition.

- environmental Health Services
- about the sell and produced food of the people
- about the usage of household and cosmetic products
- about the infectious diseases
- about the private hospital
- about the usage of medicine for the people

In Section 5, Organizations formed under this law, those assigned by these groups, Government departments and subordinate agencies assigned under this law, Issues related to environmental health, Food issues, Matters relating to home appliances and cosmetics for the general public, Issues related to infectious diseases, Matters related to private clinic, For matters relating to medicines used by the working people, factories, business departments, shops, the fronts of the building have the right to inspect and instruct the buildings at any time.

2.4.4. The Prevention and Control of Communicable Diseases Law (1995)

This law was enacted by the State Law and Order Restoration Council with the notification no. 1/95 on 20th March 1995. The main purpose of this law is to prevent the outbreak of Communicable Diseases. The Department of Health shall implement the following project activities in Section 3:

- (a) immunization of children by injection or orally;
- (b) immunization of those who have attained majority, by injection or orally, when necessary;
- (c) carrying out health educative activities relating to Communicable Disease.

In Section 4, it is stated that when a Principal Epidemic Disease or a Notifiable Disease occurs:

- immunization and other necessary measures shall be undertaken by the Department of Health, in order to control the spread thereof;
- the public shall abide by the measures undertaken by the Department of Health under sub-Section (a).

In Section 9, The head of the household or a member of the household should immediately report any of the following to the nearest health center or hospital:

- (a) rat fall;
- (b) outbreaks appear to be exacerbated during pregnancy and in children.

- (c) outbreak of a communicable disease.

Moreover, according to Section 11, in order to prevent and control the spread of a Principal Epidemic Disease, the Health Officer may undertake the following measures:

- investigation of a patient or any other person required;
- medical examination;
- causing laboratory investigation of stool, urine, sputum and blood samples to be carried out;
- causing investigation by injection to be carried out; and
- carrying out other necessary investigations.

2.4.5. The Control of Smoking and Consumption of Tobacco Product (2006)

This law was enacted by the State Peace and Development Council Law with the notification No. 5/2006 on 4th May 2006. Section 9 states that, "The person-in-charge shall:

- (a) keep the caption and mark referring that it is a non-smoking area at the place mentioned in Section 6 in accordance with the stipulations;
- (b) arrange the specific place where smoking is allowed as mentioned in Section 7 and keep the caption and mark also referring that it is a specific place where smoking is allowed, in accordance with the stipulations;
- (c) supervise and carry out measures so that no one shall smoke at the non-smoking area; and;
- (d) accept inspection when the supervisory body comes to the place for which he is responsible

2.4.6. Occupational Safety and Health Law (2019)

This law was enacted by Pyidaungsu Hluttaw with the notification No. 8/2019 in the Union of Myanmar on 15th March 2019. The objectives of occupational health and safety law are:

In Section 12. (a) In accordance with the stipulations of the Ministry, the person in charge of occupational safety and health shall be appointed to closely monitor the safety and health of the workers according to the type of work. (b) the same number of employers according to the type of business in the business not less than the number of workers prescribed by the Ministry to make the workplace safe and healthy; Each occupational safety and health committee, consisting of workers' representatives, shall be formed in accordance with the provisions of the Ministry. This should take into account the occupational safety and health of women due to the nature of the workplace.

In Section 14. This law provides for occupational safety and health to ensure a safe and healthy workplace. Rules and regulations issued under this law; Order Instructions Procedures must be followed.

In Section 16. Inspection officers shall inspect the safety and health conditions of the workplaces related to this Law and instruct the relevant employer to follow the instructions. And report to the Chief Inspector.

In Section 17. In accordance with the Code of Conduct, inspectors have the authority to conduct the following actions for occupational safety and health:

- (a) showing any identification card of the Inspector General of any workplace related to this Law and entering at any time without a warrant; The right to inspect and inquire;
- (b) workplace and process records; Documents Access to evidence; Copying rights; If necessary, the right to keep as evidence;
- (c) working conditions that may endanger occupational safety and health; Access to photos and video of the process;
- (d) noise; light, heat, cold, particles. The right to assess the amount and time of exposure to fumes and hazardous materials in the work environment with the assistance of an expert in the relevant field; Access to records;
- (e) the right to inquire during the working hours of any person working in the workplace with the assistance of a recognized doctor in connection with the occurrence or availability of occupational diseases;
- (f) due to work injury; Medical information about a worker receiving medical treatment or death due to occupational disease; To submit the information requested by the Department in the prescribed form from the report of the autopsy with the specified security level. Right to request from the person in charge of the clinics.

In Section 18. Inspection officers are required to report any injuries to the workplace for any of the following reasons: Occupational diseases; Dangerous event; An order to suspend the entire or part of the work site shall be issued to the employer with the approval of the Chief Inspector and if necessary, the relevant departments shall be notified:

- (a) due to unsafe working conditions, whether the workers are working safely or not. Due to the presence of hazardous materials and hazardous equipment in the workplace; Workplace, it is not appropriate to continue the work due to the placement of the machine part or the equipment.
- (b) should not continue to operate due to violation or non-compliance with any provision of this Law;
- (c) due to the actions of another person; Due to failure to act; whether due to negligence or not. It can be dangerous for those who work in the workplace due to carelessness.
- (d) the need to evacuate workers for safety reasons due to the imminent risk of occupational injury.

In Section26.

- (a) workplace Procedures and risk assessments of the equipment and equipment used in them shall be made as necessary.
- (b) work environment needs to be measured and evaluated as necessary.
- (c) arrange for the workers to be examined by a certified physician in accordance with the requirements for occupational diseases.
- (d) sub-section (a); based on the findings under (b) and (c), arrangements shall be made to ensure that the workplace is safe and healthy.
- (e) appropriate personal protective clothing prescribed by the Department for the

workers; Provide adequate supplies and equipment free of charge.

- (f) preventive measures and measures to be taken in case of emergency.
- (g) having clinics in the business, not less than the number of workers prescribed by the Ministry; Appointing registered doctors and nurses; provide necessary medicine and supplies.
- (h) managers of the relevant type of business or department, including himself; Workers Members of the Occupational Safety and Health Committee shall attend safety and health training prescribed by the Ministry.
- (i) arrangements should be made as soon as possible to report any incident to the Occupational Safety and Health Officer or Manager if an employee encounters an occupational injury or life-threatening situation.
- (j) equipment used in the workplace or process; Care must be taken to ensure the safety and health of those in the workplace due to equipment or waste.
- (k) terminating the process immediately in the event of an imminent situation of workplace injury; relocate workers and make necessary life saving and rescue arrangements. Where possible, workers may be relocated to other suitable safe workplaces.
- (l) occupational safety and health directives; Danger warning signs; Milk Posters and directional signs must be posted in accordance with the regulations.
- (m) arrangements shall be made to comply with the advance warnings when entering or leaving the restricted work area, which may cause danger.
- (n) knowledge; technology, disseminate or disseminate the Occupational Safety and Health Handbook and Guidelines issued by the relevant Ministries for the acquisition of skills to workers as well as those related to the workplace
- (o) rehearsing a fire safety plan; Training on proper use of firefighting equipment.
- (p) the Chief Inspector and the inspection officers entered the work site; inquiry Documents Requesting evidence or confiscation of evidence must be permitted.
- (q) if he is employed in hazardous work and work place, he shall be allowed to work only within the specified working hours.
- (r) Be responsible for occupational safety and health costs.

In Section 27. An employer may not dismiss or demote an employee for any of the following reasons:

- (a) medical examination record of the registered doctor for injuries in the workplace; Prior to obtaining a medical record from a physician recognized for occupational disease;
- (b) complaining about a case that is unsafe or dangerous to health;
- (c) carrying out the duties of the Occupational Safety and Health Committee;
- (d) failure to continue working in situations where there is a risk of occupational injury or occupational disease.

In Section 34. The employer is responsible for the following matters:

- (a) occupational injury; Dangerous event; In case of serious work injury, the Department shall be notified.

2.4.7. Myanmar Fire Brigade Law (2015)

Myanmar Fire Brigade Law was enacted by the Pyidaungsu Hluttaw on 17th March 2015. The objectives of this law are described below.

- to prevent destruction of State-owned property, private property, cultural heritage and the lives and property of the public by fire and other natural disaster;
- to organize the Fire brigade systematically and to train members of the fire brigade;
- to carry out extinguishing fire, prevention and search and rescue when fire, other natural disaster, epidemic disease or any kind of sudden disaster occurs;
- to educate, organize and incite extensively so as to achieve public cooperation when any disaster occurs;
- to participate and help, if necessary, for the State safety, peace of the public and the rule of law.

Section 25 states that any factory, industry, bus stop, airport, port, hotels, motels, guest houses, high rise mixed used buildings, markets, offices, organizations, concerning fire risk owners or management person in accordance with fire department guidance:

- (a) no one can default to compose reserved fire force.
- (b) no one can absence to place fire safety equipment.

2.4.8. Prevention of Hazard from Chemical and Related Substances Law (2013)

This law was enacted by Pyidaungsu Hluttaw with notification number 28/ 2013 on 26th August 2013. The objectives of this law are expressed below.

- To protect from being damaged the natural environment resources and being hazardous any living beings by chemical and related substances;
- To supervise systematically in performing the chemical and related substances business with permission for being safety;
- To perform the system of obtaining information and to perform widely educative and research for using the chemical and related substance systematically;
- To perform the sustainable development for the occupational safety, health and environmental conservation.

Section 15 states that a person has to obtain a license before starting the respective chemical and related substances business. The followings are listed under Section 15.

- (a) Workplace shall be inspected for the safety and the power of resistance of the machinery and equipment by the respective Supervisory Board and Board of Inspection;
- (b) Workplace shall be attended by the person who serve in the work to the respective foreign trainings or the trainings and the expert trainings on prevention of hazard from the chemical and related substances opened by the government department and the government organizations.

Section 17 states that a person who has obtained a license shall put the insurance in accordance with the prescriptive stipulations to be able to pay the compensation, if the impact and damage is occurred on the Human Being and Animals or the environment in respect of the chemical and related substances businesses.

According to Section 22, a person who has obtained the registration certificate shall abide the regulations consisted in the registration certificate furthermore shall also abide the order and instructions issued occasionally by the Central Supervisory Board.

2.5. BIODIVERSITY AND RESOURCES CONSERVATION

2.5.1. Conservation of Biodiversity and Natural Protected Area Law (2018)

This law designates national parks and other protected areas to be Scientific Reserve, National Park Marine National Park, Nature Reserve, Wildlife Sanctuary, Geophysically Significant Reserve, or Other Nature Reserve designated by the Minister. In Section 29, the Director General, with the approval of the Ministry:

- (a) the license shall be issued in accordance with the prescribed requirements and in accordance with the prescribed requirements in relation to the application for a zoo or botanical garden business license.
- (b) the business license may be revoked or revoked for a limited period if the business license holder violates the terms and conditions.

In Section 35. The Administrator shall be in charge of the conservation area or an administrative order may impose a fine of not less than 30,000 kyats to a maximum of 100,000 kyats on the perpetrator of any of the following acts, either in a zoo or botanical park run or managed by the government:

- (a) entering a place which is strictly prohibited;
- (b) making a film or video for commercial purposes without permission;
- (c) extracting a natural plant or a cultivated plant; Collect or destroy in any way.

In Section 39. (d) soil mass within the nature reserve; water body, deliberately polluting the air; Damage to water currents or water poisoning; Passing electricity and using chemicals or explosives;

2.5.2. The Law relating to Aquaculture (1989)

This law was enacted in the state law and order restoration council law Notification No. 24/89 on September 7, 1989. According to Section (29b) of this law, project proponents shall not obstruct navigation and water flow or polluted water within fisheries waters or abet such acts. In Section 29 (b), no person shall do the following: -

- obstructing navigation and flowing of water or polluting the water within the fisheries waters or abetting such acts;

2.5.3. Conservation of Water Resources and River Law (2006)

This law was enacted on 2nd October 2006 then amended in 2017 with Pyidaungsu Hluttaw Law No.11. Section 8 states that no person shall carry out any act or channel shifting with the aim to ruin the water resources and rivers and creeks.

Section 11 states that no person shall:

- (a) dispose of engine oil, chemical, poisonous material and other materials, which may cause environmental damage, or dispose of explosives from the bank or from a vessel, which is plying, vessel, which has berthed, anchored, stranded or sunk.
- (b) catch aquatic creatures within river-creek boundary, bank boundary or waterfront boundary with poisonous materials or explosives.
- (c) dispose of disposal soil and other materials from panning for gold, gold mineral dredging or resource production in the river and creek, into the river and creek or into the water outlet gully, which can flow into the river and creek.

Section 19 states that no one shall dispose of any substance into the river-creek that may cause damage to waterway or change of watercourse from the bank or vessel, which is plying, vessel which has berthed, anchored, stranded or sunk. Section 21 (b) states that no one shall: drill well or pond or dig earth without the permission of the Directorate.

Moreover, Section 22 states that no one shall, without the permission of the directorate, pile sand, shingle and other heavy materials for business purposes in the bank area and waterfront area. Section 24 (b) states that no one shall violate the conditions prescribed by the Directorate so as not to cause water pollution and change of watercourse in rivers and creeks.

2.5.4. Conservation of Water Resources and River Rules (2013)

Ministry of Transportation enacted Conservation of Water Resources and River Rules on 27th January 2013. The project proponent must, in accordance with the Rules:

- construct the toilets far away from the river bank and sewage discharge to septic tank, under sub-rule (c) of rule 8;
- avoid discharging sewage, engine oil, chemical, poisonous material, hazardous materials and other materials which may cause water pollution, under sub-rule (d) of rule 8; and
- pay to prevent water pollution and to conserve the environment if water pollution and environmental impact is generated as a result of the project, under rule 9.

2.5.5. Underground Water Act (1930)

This law was enacted in Burma act notification number IV on 21st June 1930. Section 3 of the law states that no person shall sink a tube for the purpose of obtaining underground water expect under and in accordance with the terms of a license granted by the water officers.

Every person owning a tube which was in existence before the extension of this act to the local area concerned shall apply to the water officer for a license for the said tube and such license shall be granted free of charge.

In Section 6, the governor may make rules:

- (a) Prescribing the conditions subject to which licenses may be granted by the water officer under Section 3;
- (b) Prescribing the form of and the procedure for granting such licenses and the fees payable for the issue thereof;

(c) Prescribing the information to be supplied to the water officer under Section 5.

2.5.6. Forest Law (1992)

Ministry of Environmental Conservation and Forestry implements this Law on 3rd November 1992. The objectives of this law are described below. According to the sub-section 12 (a) anyone within the jurisdiction of the forest area and government-administered land:

- if he wants to carry out any development business or business project, he must obtain the prior approval of the Ministry

2.6. LAND ACQUISITION

2.6.1. The Land Acquisition Act (1894)

In accordance with this law, the government holds rights to take over the land provided that compensation is made to the original entitled person. No private ownership of land is permitted and all land must be leased from the Union State.

In Section 19, (1) in making the reference, the Collector shall state for the information of the Court, in writing under his hand,

- (a) the situation and extent of the land, with particulars of any trees, buildings or standing crops thereon;
- (b) the names of the persons whom he has reason to think interested in such land;
- (c) the amount awarded for damages and paid or tendered under sections 5 and 17, or either of them, and the amount of compensation awarded under section 11; and
- (d) if the objection were to the amount of the compensation, the grounds on which the amount of compensation was determined.

(2) to the said statement shall be attached a schedule giving the particulars of the notices served upon, and of the statements in writing made or delivered by, the parties interested respectively.

In Section 21, the scope of the inquiry in every such proceeding shall be restricted to a consideration of the interests of the persons affected by the objection.

Section 23 stipulates that the determining the amount of compensation to be awarded for land acquired under this Act, the Court shall take into consideration:

- first, the market value of the land at the date of the publication of the notification under section 4, sub-section (1);
- secondly, the damage sustained by the person interested by reason of the taking of any standing crops or trees which may be on the land at the time of the Collector's taking possession thereof;
- thirdly, the damage (if any) sustained by the person interested, at the time of the Collector's taking possession of the land, by reason of severing such land from his other land;
- fourthly, the damage (if any) sustained by the person interested, at the time of the Collector's taking possession of the land, by reason of the acquisition injuriously affecting his other property, moveable or immoveable, in any other manner, or his

earnings;

- fifthly, if in consequence of the acquisition of the land by the Collector the person interested is compelled to change his residence or place of business, the reasonable expenses (if any) incidental to such change; and
- sixthly, the damage (if any) bona fide resulting from diminution of the profits of the land between the time of the publication of the declaration under section 6 and the time of the Collector's taking possession of the land.

In Section 52, No suit or other proceeding shall be commenced or prosecuted against any person for anything done in pursuance of this Act, without giving to such person a month's previous notice in writing of the intended proceeding, and of the cause thereof, nor after tender of sufficient amends.

In Section 53, Save in so far as they may be inconsistent with anything contained in this Act, the provisions of the Code of Civil Procedure shall apply to all proceedings before the Court under this Act.

2.6.2. Myanmar National Land Use Policy (2016)

In Section 6, the objective of the National Land Use Policy are as follows:

- a. to promote sustainable land use management and protection of cultural heritage areas, environment, and natural resources for the interest of all people in the country;
- b. to strengthen land tenure security for the livelihood improvement and food security of all people in both urban and rural areas of the country;
- c. to recognize and protect customary land tenure right and procedures of the ethnic nationalities;
- d. To develop transparent, fair, affordable and independent dispute resolution mechanisms in accordance with rule of law;
- e. to promote people centered development, participatory decision making, responsible investment in land resources and accountable land use administration in order to support the equitable economic development of the country;
- f. to develop a National Land Law in order to implement the above objectives of National Land Use Policy.

In Section 7, the guiding principles of the national land use policy are as follows:

- a. to enhance sustainable land use in development and implementation of policies and legal framework related to land and natural resource management;
- b. to ensure transparency, responsibility and accountability in land and natural resource governance;
- c. to promote people's participation and collaboration particularly ethnic nationalities, women and smallholder farmers in decision making related to land and natural resource management;
- d. to recognize and protect private and communal property rights of citizens as included in the constitution;
- e. to make effort promoting appropriate international good practices in land and natural resource governance.

In Section 8, the basic principles of the National Land Use Policy are as follows:

- a. to legally recognize and protect legitimate land tenure rights of people, as recognized by the local community, with particular attention to vulnerable groups such as smallholder farmers, the poor, ethnic nationalities and women;

- b. to strengthen rule of law and good governance, including simplifying procedures, ensuring transparency, and increasing accountability and responsibility;
- c. to promote effective land information management, including easy public access to information;
- d. to adopt international best practices such as voluntary guidelines on the responsible governance of tenure of land, fisheries and forests in the context of national food security and human rights standards;
- e. to promote inclusive public participation and consultation in decision making processes related to land use and land resource management;
- f. to promote effective market based solutions, such as formal recognition of land tenure rights or use of new tax mechanisms, to address land management issues such as discouraging land speculation;
- g. to review and revise the National Land Use Policy to meet changing socioeconomic needs to the country as necessary;
- h. to develop and implement fair procedures relating to land acquisition, compensation, relocation, rehabilitation, restitution, and reclaiming land tenure and housing rights of internal displaced persons and returning refugees caused by civil war, land confiscation, natural disasters and other causes;
- i. to ensure easy access to judicial review or other dispute resolution mechanisms that are independent, fair, transparent and affordable;
- j. to prioritize the interest of public citizens over private companies in land use decision making;
- k. to ensure equal opportunities for men and women over land resources, tenure rights and participatory decision making;
- l. to permit freedom of crop selection and adoption of cultivation technologies in a way that will not negatively affect the environment;
- m. to develop law and procedures for addressing the issues of landlessness and affordable housing;
- n. to decentralize decision making related to land;
- o. to strictly and transparently enforce contracts related to land in compliance to the law;
- p. to address the impacts of climate change and natural disasters.

In Section 37, when land acquisition is done for social and economic development, sustainable land use for the future generations shall be taken into consideration.

In Section 38, when managing the relocation, compensation, rehabilitation and restitution related activities that result from land acquisition and allocation, unfair land confiscation or displacement due to the civil war, clear international best practices and human rights standards shall be applied, and participation by township, ward or village tract level stakeholders, civil society, representatives of ethnic nationalities and experts shall be ensured.

In Section 42, the following shall be carried out when resolving land disputes:

- a. arranging the establishment of special courts that will hear special cases related to land law with specially trained judges and law officers if necessary;
- b. establishing independent monitoring bodies with participation of all stakeholders and appointing monitors that have no direct interest, to observe settlement of land disputes;
- c. determining the processes to settle land disputes between businessmen and farmers, or through independent arbitration;

- d. establishing an independent tripartite arbitration processes to settle land disputes, comprised of Government departments, organizations, farmers and privates sectors;
- e. establishing accurate and clear procedural processes in relevant departments and organizations to improve easy access to, and use of, independent arbitration tribunals, courts and other dispute resolution mechanisms by farmers and other land users in accordance with existing laws.

2.6.3. State-owned land leasing of buildings; Instruction to be followed in transfers and joint ventures (Instruction No.3/2018)

In Section 3, State-owned land Law as buildings; Ownership changes in accordance with the rules, but due to the weakness of the various departments to transfer the property name; Despite the official notification from the relevant department, due to various reasons, the remaining weaknesses in the name of Myanmar citizen or foreigner registered before Myanmar independence were found in the township land registry.

In Section 4, State-owned land Leasing of buildings by contracting between the Public-Private Partnership (PPP) and Privatization of Government Buildings; Build-Operate Transfer-BOT In the case of Joint Venture (JV) and Joint Venture, for the long-term mutual benefit of both the State and relevant departments as well as the private investors to operate. Union level organizations to develop the original production / service of the relevant Ministry; Union Ministries; Region or State level organizations shall perform the following activities:

- (a) state owned land; the buildings are owned by the Ministry. Ownership records that belong to a government department or organization; State Records; related cases for compensation must be systematically maintained after submitting to the Union Government.
- (b) land Building Apartment Shop Living room Factory Whether the workshop and warehouse are state-owned; Ministry to be operated; Government departments and organizations shall be responsible for ensuring that the owner has the right to sign and lease.
- (c) the Ministry in carrying out activities on state-owned lands; Government Department Priority should be given to activities related to the original business development of the organization.
- (d) feasibility study shall be conducted according to the type of work to be carried out and the feasibility must be calculated. In conducting such analysis, Union level organizations; Union Ministries, the potential outcomes for the region or state level organizations and the potential outcomes for the investors; Job opportunities and benefits must be fully described. Once the business is licensed, the social and environmental impact assessments that may be caused by the work to be carried out shall be carried out in accordance with the assessments obtained.
- (e) directive No. 30-11-2018 of the President's Office dated 30-11-2018 if the private businesspersons submit the project proposal submitted by the government without invitation. Must be done in accordance with 2/2018.
- (f) relevant existing laws in drafting the contract to be signed; In addition to the rules and regulations, the Notification No. dated 1-6-2018 of the President's Office; must be complied with in accordance with 41/2018.
- (g) state-owned land in determining the rent; the fixed price of the area where the buildings are located shall be determined. If it is a priority business to develop the investment of the State and to support the economy of the State, the rent may be considered at a fixed price.
- (h) in determining the lease term of the contract, the lease period may be set up to five years by the decision of the relevant Ministry Management Committee meeting for

- the remaining lease matters except for those who wish to lease for more than five years for the benefit of the State and the State.
- (i) in case of long-term lease for more than five years, the details of the lease shall be calculated and submitted to the President's Office with detailed calculation and opinion, together with the economic and financial analysis, including the estimated investment period.
 - (j) if there is a building (warehouse) on state-owned land, the cost of that part shall be taken into account in calculating the rent.
 - (k) the investor, person, organization, or company shall pay the stamp duty and trade due to the registration in accordance with the law and the stamp duty and trade in accordance with the existing stamp duty law.
 - (l) the sub-lender or investor in the contract shall transfer to any other person; Leasing No joint venture. If there is a reason to make a sub-lease in relation to long-term investment matters, the Deed of Assignment Agreement (draft) shall be submitted to the President's Office with the opinion of the relevant Ministry together with sufficient reason as to the reason for the re-transfer.
 - (m) in the case of a large project with a large amount of investment and foreign currency and technical expertise, which may be of great benefit to the State, the relevant department / organization shall submit to the Union Government through the Economic Committee in accordance with the procedures and obtain the agreement.
 - (n) three months before the expiration of the lease term, if the relevant department is satisfied that the implementation of the lessee's business is in accordance with the original objectives of the contract; In case of long-term lease for more than five years, whether the tenant wants to renew one year before the end of the contract period or not. You must ask in writing. If the relevant department does not wish to renew, the lessee shall be notified in writing in accordance with the above stipulations.
 - (o) changing the shape of the building during the lease period. Reorganization; Expansion; In case of reduction, it must be submitted to the President's Office together with the opinion of the relevant Ministry / Organization.
 - (p) if the investor is not able to carry out the investment business specified in the contract; The contract must state that if the leased land or building and the building are not used for any other purpose, the leased department / organization shall terminate the contract without permission and have the right to reclaim the leased land or building.
 - (q) if the relevant department / organization considers that it should be changed from the original business for the benefit of the State, it shall proceed in accordance with the Directive No. 1/2017 dated 10-4-2017 of the President's Office after obtaining permission to submit to the President's Office.

2.6.4. Farmland Law (2012)

Under the Farmland Law (2012):

- farmers have the rights to sell, pawn, lease, exchange, or donate, in whole or in part, for farming in accordance with prescribed disciplines;
- in case of repossession of farmland in the interest of the State or Public, confiscated farms are to be compensated without any loss; and
- if the farm contains a building, such buildings shall also be compensated

2.6.5. Farmland Rules (2012)

In accordance with Farmland Rules (2012), Township Farmland Management Committee shall calculate the amount of grievance and compensation to be given by the State or the Public. It also states that when farmlands are converted into different forms of land based on the interest of the State or Public, the State or Public needs to make compensation to the farmers immediately.

2.6.6. Vacant, Fallow and Virgin Land Management Law (2018)

In accordance with the Vacant, Fallow and Virgin Land Management Law (2018), the Central Committee shall make the following matters.

- if the person who has the right to cultivate or utilize submits that he has suffered from the dispute, obstruction, trespass or mischief by local cultivators in implementing the business, coordinate with relevant departments or organizations first. If the coordination does not lead to a settlement, the matter shall be brought up to the Court in accord with the law.
- if the land has previously been cultivated by local cultivators (i.e. local farmers) within the area of permitted vacant, fallow or virgin land, even if they do not have the legal rights to cultivate, negotiate or act by their own volition, their rights to cultivate will be respected.
- if there are local cultivators (i.e. local farmer) who already had the right to cultivate on the permitted vacant, fallow and virgin lands, cause to continue to carry out according to law with bilateral agreement.
- by the sub sections (a), (b) and (c), Central Committee shall make a decision to amend permission or to make suitable compensation based on the agreement of the both sides.

2.6.7. Registration of Deeds Law (2019)

This law was enacted in Pyidaungsu Hluttaw notification number 9 on 20th March 2019. Section 16 of the law states that the following deeds are defined as documents for which registration is compulsory according to this law:

- (a) Deeds, which convey ownership of immovable property.
- (b) With regard to immovable property or attached items with a value of Ks 100,000 and above: their sale and *[furthermore]* non-testamentary documents that are made in order to create any right, title or interest by declaration, assignment, limitation, relinquishment or extinction; a judgment, decree or order made by a court with regard to the rights from such documents.
- (c) Mortgage deeds, with the exception of a mortgage by deposit of title deeds, with a value of Ks. 100,000 and above signed by the mortgagor and certified as correct by at least two witnesses; deeds that extinguish the mortgage.
- (d) Lease agreements for immovable property from year to year, or for any term exceeding one year, or reserving a yearly rent.
- (e) Deeds in which companies or organizations mortgage, transfer or convey by other means full or partial ownership of, or an interest in, immovable property to a trustee.
- (f) Kitimat adoption deeds.
- (g) Deeds specified by the Union government from time to time.

According to section 18; deeds that are submitted for registration at the Registration of Deeds Office-

- (a) Shall be written in the Myanmar language.
- (b) A translation signed by a notary public must be submitted if the deeds are not in the Myanmar language.
- (c) Shall be written and signed (as opposed to: initiated) by the parties.

Any amendment, addition, omission or deletion having been made to any contents of the deeds shall be signed or initiated by the parties.

2.6.8. The Boundaries Law (2019)

This law was enacted in Pyidaungsu Hluttaw notification number 11 on 25th March 2019. This law shall be called the boundaries law and be affected from the date of order by President of Republic of the Union of Myanmar. Aims of the law are described below.

- (a) To be carried out boundary survey, specify amendment of paddy field, plot, village, village tract, town, township, district, autonomy region, state and division of Myanmar.
- (b) To maintain and protect of survey post or boundary post from damage or change.
- (c) To amend survey post or boundary post which damage by weather, disaster or any other causes.

2.7. URBAN DEVELOPMENT AND MANAGEMENT

2.7.1. Development Committee Law (2013)

Development Committees of the major cities mean the organizations formed to carry out development works within a specified time limit in respective regions and states except for Yangon City and Mandalay City where specific laws exist.

That includes development committees either for a township or for additional townships collectively for the purpose of development works. Development Committees' duties and functions include among others:

2.7.2. Myanmar Engineering Council Law (2013)

This law was enacted by the Pyidaungsu Hluttaw Law with the notification No. 37, 2013 on 28th November 2013. The purpose of the law is to ensure safety in technical and engineering works of the project. The project proponent needs to take into account the following sections. According to Section 34 Any person who has obtained a registration certificate shall comply with any provision of this Law; Rules and regulations issued under this law; Any prohibition, including orders and directives; The Executive Committee may impose one of the following administrative penalties:

- (a) warning,
- (b) ordering the payment of appropriate fines,
- (c) revocation of registration certificate for a limited period,
- (d) cancellation of registration certificate.

According to Section 37, any person without the registered certificate issued by the Council, except for engineering civil service personnel appointed by the government departments and government organizations carrying out public works, shall not practice engineering and technical works which may endanger public safety and which are stipulated under the rules made in this law.

2.7.3. The Electricity Law (2014)

This law was enacted by the Pyidaungsu Hluttaw with the notification No.44 on 27th October 2014. There are 16 chapters included in this law. According to the chapter 2 – section 3, the objectives of the law are described below.

- (a) To achieve further development in the electric power sector, to meet the State electric power demand and to supervise the electrical businesses by managing the electrical matters systematically in line with the Union Government policies;
- (b) To encourage the production and distribution of large scale electric power that has the right to be managed by the Union in addition the production and distribution of both small and medium scale electric power in Regions and States;
- (c) To enable to use electric power safely and broadly;
- (d) To carry out the electrical business in accordance with the specified standards;
- (e) To encourage the local and foreign investment in the electrical business;
- (f) To enact fair, transparent and appropriate rules and regulations in order to prescribe the rates of electric power fee which are consistent with current times;
- (g) To have the right to use the electric power which has the standardized voltage, current, and frequency by the users of electric power and to protect from causing damages to the electrical equipment of users due to the electric power which is not consistent with standardization;
- (h) To adhere in accord with the international environmental protection treaties which Myanmar has ratified.

In addition to, the prohibitions of law are described in Chapter 12- Section 44 to 53 as the following:

- Section 44 states that no person shall operate the electrical business without permit.
- Section 45 states that no permit holder shall operate any other electrical business except the business contained in the permit.
- Section 46 states that no person shall operate the electrical installation and repair without obtaining the electrical professional certificate.
- Section 47 states that no person shall operate the generation, transmission, connection of electric power without obtaining the electrical safety certificate.
- Section 48 states that no person shall operate the importing, manufacturing in the country, exporting, distributing and selling of the electrical equipment which are not consistent with the prescribed norm and standard.

- Section 49 states that no permit holder shall operate the electrical business in collaboration with any other entity without the approval of the relevant department and organization.
- Section 50 states that no permit holder shall sell, mortgage, lease, exchange or transfer by any other means the permit the whole or any part of the business contained in the permit without the approval of the relevant Government department or Government organization which has issued the permit.
- Section 51 states that no person shall operate the construction of building, planting of trees or other activities within the area of the electric line.
- Section 52 states that no person shall connect, waste, utilize the electric power without the permission of the permit holder.
- Section 53 states that no person shall divert the electric current, cut-off the electric power line, destroy any equipment being used in any electrical business.

2.7.4. The Telecommunications Law (2013)

This law was enacted by the Pyidaungsu Hluttaw with notification No.31 on 8th October 2013. This law shall be applied to: (a) any person, department and organization within the territory which includes the land, water and airspace of the Republic of the Union of Myanmar and (b) Myanmar citizens who are anywhere beyond the limits of the Republic of the Union of Myanmar. This law is composed of 19 chapters.

The objectives of the Telecommunications Law are described below.

- (a) To enable to support the modernization and development of the nation with telecommunications technology;
- (b) To enable to bring out Telecommunications Service that will be able to provide high quality and worth services to the users by allowing fair and transparent competitions from domestic and abroad in the telecommunications sectors which are developing;
- (c) To enable to give more opportunities to the general public to use Telecommunications Services by expanding the telecommunications network in the entire country along with the telecommunications technology which is developing;
- (d) To enable to protect the telecommunications service providers and users in accord with law;
- (e) To enable to supervise telecommunications service, network facilities and telecommunications equipment, which require license for national peace and tranquility and for public security.

According to this law, the holder of a license must obey the law and rules, procedures, notifications, orders and directives issued under this law. Moreover, Section 65 states that whoever provides Telecommunications Services without a service license shall, on conviction, be punished with imprisonment for a term not exceeding five years and may be liable to a fine.

2.8. HUMAN RIGHTS

2.8.1. Protection of the Right of National Race Law (2015)

The purpose of the law is to disclose to residents that belong to one of the national ethnic groups about the project fully and to cooperate with them. In Section 5 of the law, it is stated that the purpose is to disclose all about the project fully to the residents who belong to one of the national races and to cooperate with the residents who are national races.

2.8.2. Rights of the Persons with Disabilities Law (2015)

This law aims to protect and respect the rights of persons with disabilities in Myanmar in a way that is recognized internationally under the UN Convention.

With regards to mobility and accessibility, Article 28 stipulates that the National Committee shall carry out negotiation and implementation for easy accessibility and mobility for persons with disabilities by cooperating with relevant Union Ministries, Municipal Committee (or Township Development Committee), States and Regional Governments, NGO and Private Organizations and entities which work on disability.

2.8.3. Child Rights Law (2019)

This law was enacted by Pyidaungsu Hluttaw with Notification No. 22 on July 23, 2019. It is applicable to all the people within the country who may be citizens or foreigners who hold the permanent resident and commit crime on board with nation flag.

2.9. CULTURAL HERITAGES

2.9.1. The Protection and Preservation of Cultural Heritage Region Law (2019)

This law was enacted by Pyidaungsu Hluttaw Notification No. 6/2019 on February 28, 2019. The purpose of the law is to ensure protection of cultural heritage and the cultural heritage area from damages caused by natural and man-made disasters.

Section 22 states that no person shall construct a building, which is not in conformity with the conditions prescribed region wise by the Ministry of Culture in the cultural heritage region.

2.9.2. The Protection and Preservation of Antique Object Law (2015)

This law was enacted by Pyidaungsu Hluttaw Notification No. 43/2015 on July 22, 2015. The purpose of the law is to ensure the protection of antique object and its information if it was found in the project area. According to the law, the person who finds any object which has no owner or custodian shall promptly inform the relevant Ward or Village-Tract Administrator if he knows or it seems reasonable to assume that the said object is an antique object (Section 12).

2.9.3. The Protection and Preservation of Ancient Monument Law (2015)

This law was enacted by Pyidaungsu Hluttaw Notification No. 51/2015 on August 26, 2015. The purpose of the law is to ensure the protection of ancient monument and information about it if it was in the project area.

According to Section 12, the person who found the ancient buildings over 100 years on the ground or under the ground or on the water or under the water to the owner or without maintained person that buildings may be known or assumed the ancient buildings must inform early to the respective ward administrator or village administrator. Section 15 states that the person who made the following things in the regarded area of the ancient buildings should apply to the department in advance allowance;

- (a) extension of villages, wards and towns;
- (b) the new building construction or extensions or preparation or fencing or annexes including hotels, factories, residential buildings;
- (c) oil and gas, gem or digging for mineral exploration, connecting to oil and gas pipe line, connection to grid lines, construction of communication tower, road construction, bridge construction, airport construction, dam like the construction or extension of principle buildings;
- (d) connection of electric line in the ground, connection to communication and other underground workings;
- (e) digging or extension of well, lake, channel, husbandry pond;
- (f) surface damaging like gold bars, excavation, making bricks, digging of well, pond, creek, drain, chasm, valley, landfills, adjusting ground, mine explosion, mining, gravel, sand extraction, demolition of hill and mountain;
- (g) fencing or installation of the private area or community;
- (h) construction of unfix discipline building regarded by the ministry in each regionally near the ancient buildings and environmental view.

Section 20 (f) describes discarding chemical substance and rubbish which can affect an ancient monument and the environment.

2.10. LABOUR

2.10.1. Labour Organization Law (2011)

The purpose of the law is to ensure protection of employees' rights, developing a good relationship between the employees and employer and enabling to form and carry out labour organizations systematically and independently.

Section 18 - The labour organization has the right to demand the relevant employer to re-appoint a worker if the employer dismisses such worker and if there is cause to believe that the reasons of such dismissal were based on labour organization membership or activities, or were not in conformity with the labour laws.

Section 19 - The labour organizations have the right to send representatives to the Conciliation Body in settling a dispute between the employer and the worker. Similarly, they have the right to send representatives to the Conciliation Tribunals formed with the representatives from the various levels of labour organizations.

Section 20 - In discussing with the Government, the employer and the complaining workers in respect of worker's rights or interests contained in the labour laws, the representatives of the labour organization also have the right to participate and discuss.

Section 21 - The labour organizations have the right to participate in solving the collective bargains of the workers in accord with the labour laws.

Section 22 - The labour organizations shall carry out peacefully in carrying out holding of meetings, going on strike and carrying out other collective activities in accord with their procedures, regulations, by-laws and any directives prescribed by the relevant Labour Federation.

According to Chapter (14) item 48 (b) of Myanmar Child Rights Law (2019), minimum workable age for the children is 14 years old. The law states that minimum workable age of the children should be not less than with minimum age for free education defined by the government.

2.10.2. The Employment and Skill Development Law (2013)

This law was enacted by the Pyidaungsu Hluttaw Notification No. 29/2013 on August 30, 2013. The purpose of the law is to ensure the employer provides on-the-job trainings systematically and send employees to outside training, and to develop the employment skill of the workers.

Section 5 (a) (1) - The employer shall conclude an employment agreement within thirty days after appointing a worker to do any work. However, it does not concern with appointment of permanent staff at the Government department, Government organization;
(2) If the pre-orientation period and probation period are prescribed before the appointment, such trainee shall not concern with stipulation in sub-section (1).

- (b) The employment agreement shall include the followings:
- i. category of employment;
 - ii. period of probation;
 - iii. wage, salary;
 - iv. place of employment;
 - v. term of agreement;
 - vi. working hour;
 - vii. holiday, day-off and leave;
 - viii. over-time;
 - ix. messing arrangement during working hour;
 - x. accommodation;
 - xi. medical treatment;
 - xii. arrangement for ferry and travelling;
 - xiii. terms and conditions to be abided by the workers;
 - xiv. term of period agreed by the worker to continue to work after attending the training if the worker has to attend the training sent by the employer;
 - xv. resignation from work and termination of work;
 - xvi. termination of agreement;

- xvii. obligation from work and termination of work;
 - xviii. termination of employment agreement by mutual consent of employer and worker;
 - xix. other matters;
 - xx. prescribing, amending and adding the terms and condition of the agreement;
 - xxi. miscellaneous.
- (c) workplace terms and conditions included in the employment agreement shall be in conformity with any existing law and benefits of the worker shall not be less than benefits contained in any existing law;
 - (d) the Ministry shall issue notification to pay stipulated compensation to worker by the employer if the work is completed earlier than the period concluded in the employment agreement or if all or any part of the work is terminated due to unexpected cause or if a matter to terminate the work arises for any other cause;
 - (e) the employment agreement concluded under sub-section (a) shall apply to daily wage earners and piece-workers temporarily at the Government organization;
 - (f) the employer and the worker or workers may amend, by mutual agreement, conditions and benefits contained in the employment agreement as may be necessary in accord with the existing law;
 - (g) the copy of employment agreement concluded between the employer and worker shall be sent to the relevant labour exchange office by the employer within the stipulated time and obtain approval;
 - (h) the employment agreements concluded before coming into force of this Law shall be valid until the original term terminates.

Section 14 states that the employer shall carry out training programmers for increasing employment skill of the workers who are intended to appoint or who are working presently in his work in accord with the policy of the Skill Development Body according to the requirement of the work.

Section 30 (a) states that the employer of the industry and service shall pay money not less below 0.5% of salary, total wages paid to the level of worker supervisor and the workers below such level in such work monthly without fail as the contribution to the fund. (b) The contribution paid under sub-section (a) shall not be deducted from the wage or salary of the workers.

2.10.3. The Minimum Wage Law (2013)

This law was enacted by Pyidaungsu Hluttaw with Notification No. 7/2013 on March 22, 2013. The purpose of the law is to ensure that the employer gives payment not less than the wage, which is notified, at the workplace.

Section 12 describes the duties of the employer in which:

- (a) shall not pay wage to the worker less than the minimum wage stipulated under this Law;
- (b) may pay more than the minimum wage stipulated under this Law;

- (c) shall not have the right to deduct any other wage except the wage for which it has the right to deduct as stipulated in the notification issued under this Law;
- (d) shall pay the minimum wage to the workers working in the commerce, production business and service in cash. Moreover, if the specific benefits, interests or opportunities are to be paid, it may be paid in cash in accord with the stipulations or jointly in some cash and in some produce prescribed in local price according to the desire of the worker;
- (e) may pay jointly in some cash and some produce prescribed in local price according to the local custom or desire of the majority of workers or collective agreement in paying the minimum wage to the workers and working in the agriculture and livestock breeding business. Such payment shall be for any personal use and benefit of the worker and his family and the value shall also be considerable and fair.

Section 13 describes the duties of the employer in which:

- (a) shall inform the workers the rates of minimum wage relating to the business among the rates of minimum wage stipulated under this Law and advertise it at the workplace to enable to be seen by the relevant workers;
- (b) shall record the lists, schedules, documents and wages of the workers correctly in accord with the stipulation;
- (c) shall report the lists, schedules and documents recorded under sub-section (b) to the relevant department in accord with the stipulations;
- (d) shall accept the inspection when summoned by the inspection. Moreover, he shall produce the said lists and documents when so required;
- (e) shall allow the entry and inspection of the inspector workplaces of commerce, production and service, agriculture and livestock breeding and give necessary assistances;
- (f) shall give them holiday for medical treatment in accord with the stipulations if the workers cannot work due to sickness;
- (g) shall give holiday without deducting from the minimum wage, in accord with the stipulations if the funeral matter of the family of worker or his parent occurs.

2.10.4. Payment of Wage Law (2016)

This law was prescribed by Pyidaungsu Hluttaw on January 25, 2016. The purpose of the law is to improve the way of payment and avoid delay in payment to the employees.

In Chapter (2) Section 3, the employer must:

- (a) pay in local currency or foreign currency recognized by the Central Bank of Myanmar. This may be in cash, check or deposit into the bank account of Employee.
- (b) pay can be in the form of:
 - (1) in cash or half in cash and half in things set according to the local price to those employees working in trade, manufacturing and service sectors.
 - (2) in cash or half in cash and half in things set as local price according to local traditions or common agreement to those working in agriculture and livestock sectors.

- (c) an employee shall receive the payment for 60 days when he/she is in Alternative Civil Service.

In Section 4 describes that an employer must pay for-

- (a) part-time, daily, weekly or other part-time job, temporary or piecework when the work is done or at the agreed time.
- (b) according to the Article (a), the period shall not exceed one month.
- (c) wages for the permanent work must pay per monthly basis.
- (d) must pay at the end of the payment period when there are not more than 100 workers.
- (e) if there are 100 workers and above, pay must not be administered later than 5 days after the end of the payment period.
- (f) upon termination, wages must be paid within 2 days from the date of termination.
- (g) if a resignation letter is submitted, wages must be paid at the ending day of the payment period.
- (h) if an employee dies, wages must be paid to the legally recognized heir within 2 working days after the day he/she has died.
- (i) all wages must be paid during the working day.

Section 5 states that the employer may be subject to unforeseen circumstances, including natural disasters. If it is difficult to pay in accordance with the provision of subsection (c), it shall be submitted to the Department with good reason as to when the wages will be changed with the consent of the workers.

Section 14 states that the worker has the right to enjoy overtime wages stipulated by the law if he works over time

Chapter (3) Describe the followings;

In Section 7, the employer:

- (a) can deduct from the fee for the period of non-working time except for paid leave and public holidays according to the relevant law.
- (b) accommodation and transportation expenses arranged by the employer not included in the fee; food expenses; electricity price, water tax and income tax to be paid by the worker; wrong and overpayments can be deducted.
- (c) advance payment at the request of the worker; cash out; savings or legal contributions for workers can be deducted from wages.
- (d) may deduct from the employee's wages as decided by the court or the arbitral tribunal or the arbitral tribunal.

In Section 8, the employer shall not deduct for any purpose except deduction from wages in accordance with the provisions of section 7 and section 11.

In Section 9, the employer shall not deduct more than 50% of the total wages deducted from the wages, except for deductions for the employee's failure to perform his duties when deducted from wages under section 7.

In Section 10, the employer:

- (a) before the deduction from the fee shall be determined as, a fine to be paid under section 11 and the deduction shall be obtained with the prior approval of the Department.
- (b) the permission in sub-section (a) shall be given to the relevant workshop; It should be posted in a public place in the office.
- (c) the deductible indemnity shall not exceed the value of the damage or loss due to the work or failure of the worker.
- (d) in deducting from the fee under section 11:
 - (1) the wage shall not be deducted from the work without giving the worker any right to settle.
 - (2) no more than 5% per month shall be deducted from the employee's monthly salary.
- (e) the fine shall not be deducted from the worker under 16 years of age as a fine.
- (f) the period for payment of the prescribed fine may be carried out in accordance with the agreement between the employer and the employee.
- (g) the deductible for loss of property shall be deducted within the prescribed period within the prescribed period by the negotiation agreement with the township mediation body formed by law.
- (h) the money deducted from the fee shall be recorded in the record and kept systematically.
- (i) the monthly report shall be submitted to the Department in respect of the amount deducted from the fee.
- (j) Section 11; The fines deducted under sub-section (b) shall be used for the benefit of the workers in consultation with the officially registered labor organization at the factory.

In Section 11, the employer may impose a penalty for compensation for the following actions or omissions of the employee:

- (a) Deliberate negligence of the worker whether due to negligence or not. damage to property or money that the employer has explicitly entrusted to the care of the worker, whether due to dishonesty or misconduct, is a direct consequence of the employee's negligence and misconduct.
- (b) violation of any of the workplace conditions prescribed by a fine in the employment contract.

In Section 12, the worker:

- (a) in case of the following circumstances; by a legally registered labor organization; you can ask the employer to resolve the matter by the factory coordination committee:
 - i. Being deducted from the receivables without good cause;
 - ii. Failure to pay fees beyond the due date.
- (b) if the request is made under sub-section (a) but the employer does not resolve it, it may submit to the inspecting officer within six months from the date of

deduction or failure to pay.

Section 13. (a) states that the inspecting officer shall comply with section 12; The submission under sub-section (b) may be scrutinized and, if necessary, the relevant persons may be examined and an appropriate order may be issued.

- (c) if the employer or employee is not satisfied with the order made under sub-section (a), he may appeal to the Chief Inspector within 30 days.
- (d) the Chief Inspector may examine the appeal under sub-section (b), hear the employer and the employee and make an appropriate order.
- (e) the order issued by the Chief Inspector is final

2.10.5. Workers' Compensation Act

Workers' Compensation Act was enacted by 1923. Under Chapter (2), followings are stated.

Section 3 (1) - If personal injury is caused to a workman by accident arising out of and in the course of his employment, his employer shall be liable to pay compensation in accordance with the provisions of this Chapter.

Section 4 (1) - Subject to the provisions of this Act, the amount of compensation shall be as follows;

A. where death results from the injury-

- (i) in the case of an adult, a sum equal to 36 times the worker's monthly wages calculated in accordance with this Act:

Provided that the minimum and the maximum payment in such a case shall be the amount of compensation prescribed by notification made by the Ministry of Labour with the approval of the Government respectively, and

- (ii) in the case of a minor- the amount of compensation prescribed by notification made by the Ministry of Labour with the approval of the Government;

B. where permanent total disablement results from the injury-

- (i) in the case of an adult, a sum equal to 36 times 140 per cent of the worker's monthly wages calculated in accordance with this Act:

Provided that the minimum and the maximum payment in such a case shall be the amount of compensation prescribed by notification made by the Ministry of Labour with the approval of the Government respectively, and

- (ii) in the case of a minor- the amount of compensation prescribed by notification made by the Ministry of Labour with the approval of the Government;

C. where permanent partial disablement results from the injury-

- (i) in the case of an injury specified in Schedule I, such percentage of the compensation which would have been payable in the case of permanent total disablement as is specified therein as being the percentage of the loss of earning capacity caused by that injury, and

(ii) in the case of an injury not specified in Schedule I, such percentage of the compensation payable in the case of permanent total disablement as is proportionate to the loss of earning capacity permanently caused by the injury;

2.10.6. The Settlement of Labour Dispute Law (2012)

This law was enacted by Pyidaungsu Hlututaw Notification No. 5/2012 on March 28, 2012. The purpose of the law is to ensure negotiation and discussion between employees and project proponent, abiding by the decision of the Tribunal.

Section 38. Date of appointment of the Mediation Committee to mediate any employer or employee claim. Either on time or Do not fail to attend without a valid reason, either through a representative or a representative.

- i. no employer or employee shall fail to form a coordinating committee in accordance with the provisions of section 3. Failure to do so shall not be repeated within 60 days from the date of conviction by the relevant court.

Section 39. No employer shall abruptly change the terms of reference of the employee rules and regulations imposed by the co-workers prior to the dispute, or dismiss them without good reason, while the arbitral tribunal or tribunal is examining the dispute.

- (a) no worker shall attempt to reduce productivity or to the detriment of the remaining workers while the dispute is being resolved.

Section 40. No one shall be subjected to arbitrary interference with his privacy, family, home or correspondence, nor to attacks upon his honor and reputation.

Section 51. If an employer commits any act or omission to reduce the employee's benefits without due process during the settlement of the dispute, the arbitral tribunal or the arbitral tribunal; Financial benefits decided by the tribunal must be paid in full. This money shall be collected as if it were land tax arrears by an official from the department assigned by the Ministry.

Sub-section 51(a) A bilateral agreement signed before an arbitral tribunal and an arbitral tribunal or arbitral tribunal; Failure to comply with the decisions of the tribunal; Failure to comply with any prohibition in this Law; If the non-payment period is more than 30 days, or by an official assigned by the relevant department or ministry. The aggrieved party must sue.

2.10.7. The Leave and Holiday Act (1951)

The objective of the Act is to allow workers to take leaves and holiday allowances, religious or social activities with allowances, and benefits for health allowances. Concerned workers include daily waged workers, temporary workers, and permanent workers.

The key objectives of this Act are to allow workers (daily wage worker/temporary worker/permanent worker) to have a leave and holiday allowances, religious or social activities with earn allowance, and health insurance allowances.

The rights of workers to leave and have a holiday are described below.

- causal Leave (6 days)
- earned Leave (10 days)

- medical Leave (30 days)
- maternity leave
- public Holiday (21 days)

2.10.8. Social Security Law (2012)

The purpose of the Social Security Law (2012) is to ensure the project proponent supports development of workers' social security and to enable them to fulfill their health needs. According to the Section 11. (a) The following establishments shall be applied with the provisions for compulsory registration for social security system and benefits contained in this Law if they employ minimum number of workers and above determined by the Ministry of Labour in co-ordination with the Social Security Board:

- i. industries which carry out business whether or not they utilize mechanical power or a certain kind of power, businesses of manufacturing, repairing and servicing, or engineering businesses, factories, warehouses and establishments;
- ii. government departments, Government organizations and regional administrative organizations which carry out business;
- iii. development organizations;
- iv. financial organizations;
- v. companies, associations, organizations, and their subordinate departments and branch offices which carry out business;
- vi. shops, commercial establishments, public entertaining establishments;
- vii. government departments and Government organizations which carry out business or transport businesses owned by regional administrative body, and transport businesses carried out with the permission of such department, body or in joint venture with such department or body;
- viii. constructions carried out for a period of one year and above under employment agreement;
- ix. businesses carried out with foreign investment or citizen investment or joint ventured businesses;
- x. businesses relating to mining and gem contained in any existing law;
- xi. businesses relating to petroleum and natural gas contained in any existing law;
- xii. ports and out-ports contained in any existing law;
- xiii. businesses and organizations carried out with freight handling workers;
- xiv. Ministry of Labour and its subordinate departments and organizations;
- xv. establishments determined by the Ministry of Labour, from time to time, that they shall be applied

Section 15. (a) The following funds are included in the Social Security Fund:

- i. health and social care fund;
- ii. family assistance fund;

- iii. invalidity benefit, superannuation benefit, and survivors' benefit fund;
- iv. unemployment benefit fund;
- v. other social security fund for social security system of compulsory registration and contribution stipulated by the Ministry of Labour, in co-ordination with the Social Security Board, under clause (ii) of sub-section (e) of section 13;
- vi. other social security fund stipulated that contribution may be paid after voluntary registration under clause (ii) of sub-section (e) of section 13;
- vii. Social Security Housing Plan fund.

Section 15 (b) - The employers and workers of establishments shall pay contributions after effecting compulsory registration to the fund contained in clauses (i), (iii), (iv) and (v) of sub-section (a).

Sub-Section 18 (b) - The employer shall deduct contributions to be paid by worker from his wages together with contribution to be paid by him and pay to the social security fund. The employer shall also incur the expense for such contribution.

Sub-Section 48 (b) - The employers may effect insurance by registering voluntarily for the workers who are not applied to provisions of compulsory registration for employment injury benefit insurance system and by paying stipulated contribution to employment injury benefit insurance fund.

Section 75. The employers of establishments applied by this Law:

- (a) shall prepare and keep the following records and lists correctly and submit to the relevant township social security office in accord with the stipulations:
 - i. records and lists of workers' daily attendance;
 - ii. records on appointment of new workers, employing worker by changing of work, termination, dismissal and resignation;
 - iii. records on promotion and paying remuneration;
 - iv. records and lists of employer, manager, and administrator and records on change of them;
 - v. shall inform the relevant township social security office if the following matters arise:
 - vi. changes in number of workers and address of establishment;
 - vii. change of employer, change of business, suspension of work, and close-down of work;
 - viii. employment injury, decease and contracting diseases;

(c) shall submit records of work and lists if requested by inspectorate or official assigned by the Social Security Head Office and various levels of Regional Social Security Office under this Law.

2.11. MOTOR VEHICLES

2.11.1. The Vehicle Safety and Motor Vehicle Management Law (2020)

This law was enacted by Pyidaungsu Hluttaw No.6/2020 on May 26, 2020. The purposes of this law are;

- to inspect and register the vehicles in accordance with the law;
- to check whether the drivers of each type of vehicle meet the prescribed qualifications and issue a driver's license;
- to reduce air pollution, soil contamination, water contamination and noise which are caused by motor vehicles;
- to manage systematically to reduce accidents caused by motor vehicles;
- to be able to inspect and supervise in accordance with the stipulations for safe traffic.
- to reduce traffic congestion and to effectively use advanced technology transportation system to ensure vehicle safety.
- to reduce the loss of life and socio-economic loss and injuries of the people due to the risk of traffic accident and to facilitate the movement of road users.

2.11.2. The Myanmar Motor-Vehicle Rules (1989)

These rules apply only to motor vehicles as defined in the Myanmar Motor-vehicle Act, 1906, and do not apply to vehicles propelled on rails, such as tramcars or to any class of vehicle exempted by the Lieutenant Governor from that definition.

According to Section 3, every person driving a motor-vehicle shall have ready and available for immediate use a suitable horn or, in the case of a motor-cycle, a suitable horn or bell, capable of giving audible and sufficient warning of his approach and position, and shall sound the same whenever expedient to prevent danger to any of the public.

According to Section 8, the person in charge of the motor vehicle shall obey all directions of police officers posted or stationed at crossings or other places for the regulation of traffic.

According to Section 10, a motor-vehicle shall not be driven in a street or public place recklessly or negligently, or at a speed or in a manner which is likely to endanger human life, or to cause hurt or injury to any person or animal, or to damage any goods carried in any vehicle or by any person, or which would be otherwise than reasonable and proper, having regard to all the circumstances of the case including the nature, condition and use of the street or public place and to the amount of traffic which is actually on it at the time, or which may reasonably be expected to be on it.

According to Section 41, the owner of a heavy motor-vehicle or trailer shall at all times use his best endeavors to prevent the emission of smoke or any unnecessary noise or rattle on the motor-vehicle or trailer and shall take care that no burning fuel falls from the vehicle on the road.

2.11.3. The Motor Vehicle Law (2015)

This motor vehicle law was enacted by the Pyidaungsu Hluttaw with notification number 55/2015 on 7th September in 2015. The objectives of the law are described below.

- To register motor vehicles which are safely accessible to the public place after inspecting in accord with the stipulations;
- To issue a driving license to drivers after examining whether or not they meet the prescribed qualifications according to the types of motor vehicles;
- To be easy to access road users and to protect the safety of vehicle and road;
- Not to be traffic jam and to use the effective Intelligent Transportation System for the safety of vehicle;
- To perform the reduction of environmental affect arising from a motor vehicle.

Section 45 states that no one is allowed to drive, request someone to drive, or park, motor vehicles in public places under the following conditions:

- (a) The motor vehicle is not registered.
- (b) The registration has been suspended, revoked or expired; the registration card is not displayed.
- (c) The registration card has been revoked or is expired.”

2.12. OTHER RELATED LAW AND REGULATION

2.12.1. Myanmar Insurance Law (1993)

This law was enacted by the State Law and Order Restoration Council on 23rd July in 1993. The objectives of the law are described below.

- To overcome financial difficulties by effecting mutual agreement of insurance against social and economic losses which the people may encounter, due to common perils;
- To promote the habit of savings individually by effecting life assurance, thus contributing to the accumulation of resource, of the State;
- To win the trust and confidence of the people in the insurance system by providing effective insurance safeguards which may become necessary in view of the social and economic developments.

In Section 15; owners of motor vehicles shall affect compulsory Third Party Liability Insurance with the Myanmar Insurance. An entrepreneur or an organization operating an enterprise which may cause loss to State-owned property or which may cause damage to the life and property of the public or which may cause pollution to the environment shall affect compulsory General Liability Insurance with the Myanmar Insurance under this law according to Section 16.

2.12.2. Myanmar Insurance Rule (2017)

This rule was prescribed by Ministry of Planning and Finance with notification 30/2017 in 30th Mar. 2017. In this law, the investor must comply with the conditions of the Permit and other applicable laws when making an Investment and shall fully assist while negotiating with the Authority for settling the grievances of the local community that have been affected due to Investments in Section 203.

According to Section 206, If the Investor is desirous to appoint a foreigner as senior management, technician expert or consultant according to Section 51

- (a) the investor shall submit such foreigner's passport, expertise evidence or degree and profile to the Commission Office for approval.

Section 73 was described that every Investor that holds the Permit or Tax Incentives must have taken out the relevant insurance out of the following types of insurance at any insurance business that holds the license in the Union based on the nature of the business:

- (a) Property and Business Interruption Insurance;
- (b) Engineering Insurance;
- (c) Professional Liability Insurance;
- (d) Professional Accident Insurance;
- (e) Marine Insurance; and,
- (f) Workmen Compensation Insurance

2.12.3. The Ethnic Right Protection Law (2015)

This law was enacted by the Pyidaungsu Hluttaw with notification number 8/2015 on 24th February in 2015. The objectives of this law are described below.

- To obtain equal citizen's rights for all ethnic groups;
- To live eternally together with amicable relations among ethnic groups on the basic of genuine Union Spirit;
- To preserve and develop language, literature, fine art, culture, custom, national character and historical heritage of ethnic groups;
- To promote solidarity, mutual amity and respect, and mutual assistance among ethnic groups;
- To promote socio-economic development including education, health, economy, transport and communication, so forth, of less-developed ethnic groups; and,
- To fully obtain the rights prescribed in the Constitution by ethnic groups.

This law was enacted to 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 according to the Section 5.

2.12.4. Myanmar Investment Law (2016)

This law was enacted by the Pyidaungsu Hluttaw with the notification number 40/2016 on 18th October in 2016. The objectives of this law are described below.

- to develop responsible investment businesses which do not cause harm to the natural environment and social environment in the interest of the Union and its citizens;
- to protect the investors and their investment businesses in accordance with the Law;
- to create job opportunities for the people;
- to develop human resources;
- to develop highly functioning production, service, and trading sectors;
- to develop the technology, the agriculture, livestock and industrial sectors;
- to develop various professional field, including infrastructures around the Union;
- to enable the citizens to be able to work alongside with the international community;
- to develop businesses and investment businesses that meet international standards

In Section 50(d), the land use right is included which means the investor shall register the land lease contract at the Office of Registry of Deeds in accordance with the Registration Act. In Section 51, the investor:

- may appoint of any citizen who is a qualified person as senior manager, technical and operational expert, or advisor in his investment within the Union in accordance with the laws;
- shall appoint them to replace, after providing for capacity building programs in order to be able to appoint citizens to positions of management, technical and operational experts, and advisors;
- shall appoint only citizens for works which does not require skill;
- shall appoint skilled citizen and foreign workers, technicians, and staff by signing an employment contract between employer and employee in accordance with the labor laws and rules;
- shall ensure to obtain the entitlements and rights in the labor laws and rules, including minimum wages and salaries, leave, holidays, overtime fees, damages, compensation of the workman, social welfare, and other insurance related to workers in stipulating the rights and duties of employers and employees and occupational terms and conditions in the employment contract;
- shall settle disputes arising among employers, among workers, between employers and workers, and technicians or staff in the investment in accordance with the applicable laws.

According to Section 65, the more important to the projects investors' responsibilities was directed in sub-Section (f) to (q);

- (f) shall not make any significant alteration of topography or elevation of the land on which he is entitled to lease or to use, without the approval of the

Commission;

- (g) shall abide by the applicable laws, rules, procedures and best standards practiced internationally for this investment so as not to cause damage, pollution, and loss to the natural and social environment and not to cause damage to cultural heritage;
- (h) shall list and keep proper records in books of accounting and annual financial statements, and necessary financial matters relating to the investments performed by a Permit or an Endorsement in accordance with internationally and locally recognized accounting standards;
- (i) shall close and discontinue the investment only after payment of compensation to employees in accordance with applicable laws for any breach of employment contracts, closure of investment, sale and transfer of investment, discontinuation of investment, or reduction of workforce;
- (j) shall pay wages and salaries to employees in accordance with applicable laws, rules, procedures, directives and so forth during the period of suspension of investment for a credible reason;
- (k) shall pay compensation and indemnification in accordance with applicable laws to the relevant employee or his successor for injury, disability, disease and death due to the work;
- (l) shall supervise foreign experts, supervisors and their families, who employ in its investment, to abide by the applicable laws, rules, orders and directives, and the culture and traditions of Myanmar;
- (m) shall respect and comply with the labor laws;
- (n) shall have the right to sue and to be sued in accordance with the laws;
- (o) shall pay effective compensation for loss incurred to the victim, if there is damage to the natural environment and socioeconomic losses caused by logging or extraction of natural resources, which are not related to the scope of the permissible investment, except from carrying out the activities required to conduct investment in a Permit or an Endorsement.
- (p) shall allow the Commission to inspect in any places, when the Commission informs the prior notice to inspect the investment;
- (q) shall take in advance a Permit or an Endorsement of the Commission for the investments, which need to obtain prior approval under the Environmental Conservation Law and the procedures of environmental impact assessment, before undertaking the assessment. Such investments shall be submitted the situation of environmental and social impact assessment to the Commission during the permitted investment period.

Moreover, this law was instructed the investor shall insure the types of insurance stipulated in the provision of the rules at any insurance enterprise, which is entitled to carry out insurance businesses within the Union in Section 73.

2.12.5. Myanmar Investment Rule (2017)

This rule was prescribed by Ministry of Planning and Finance with notification 30/2017 in 30th Mar. 2017. In this law, the investor must comply with the conditions of the Permit and other applicable laws when making an Investment and shall fully assist while negotiating with the Authority for settling the grievances of the local community that have been affected due to Investments in Section 202 and 203.

According to Section 206, If the Investor is desirous to appoint a foreigner as senior management, technician expert or consultant according to Section 51;

- (a) the investor shall submit such foreigner's passport, expertise evidence or degree and profile to the Commission Office for approval.

Section 212 was described that every Investor that holds the Permit or Tax Incentives must have taken out the relevant insurance out of the following types of insurance at any insurance business that holds the license in the Union based on the nature of the business:

- (a) property and business interruption insurance;
- (b) engineering insurance;
- (c) professional liability insurance;
- (d) professional accident insurance;
- (e) marine insurance; and,
- (f) workmen compensation insurance

2.12.6. The Petroleum and Petroleum Product Law (2017)

This law was enacted by the Pyidaungsu Hluttaw with notification number 20/2017 on 1st August in 2017. The objectives of this law are expressed below.

- to carry out the petroleum and petroleum product businesses activities systematically in accordance with the provisions of the law, stipulated standards, procedures and conditions;
- to enable the petroleum and petroleum product business activities to carry out safely without environmental impact;
- to establish free and fair competition in carrying out petroleum and petroleum product business activities;
- to secure energy requirement and energy security of the Union;
- to obtain tax revenue of the Union.

Section 9 states that the Ministry of Transport and Communications shall carry out the following functions relating to the projects in which sub-Section (a) and (e) to any petroleum and petroleum product;

- (a) issuing license to vehicles, vessels and barges that carry any petroleum and petroleum product;
- (b) determining procedures and conditions to be abided by in carrying out transport business except transport by pipeline.

Moreover, in Section 10, The Ministry of Natural Resources and Environmental Conservation shall carry out the following functions relating to any petroleum and petroleum product;

- (a) issuing license for the right to store for the storage tanks and warehouses;
- (b) issuing transport permit for the vehicles, vessels and barges that shall carry any petroleum and petroleum product;
- (c) determining the period, form and terms and conditions, manners of applying license, permitting authority and fees to be assessed, for license under sub-Section (a) and permit under sub-Section (b);
- (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;
- (e) determining, in coordination with ministries concerned, procedures and conditions relating to standard and quality of storage tanks and warehouse, and tanks of vehicles, vessels and barges that carry any petroleum and petroleum product.

Section 11 states that 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 sensible place in salient words or signs near the receptacle.

2.12.7. The Petroleum Act (1934)

This act was enacted to consolidate and amend the law relating to the import, transport, storage, production, refining and blending of petroleum and other inflammable substances with the reference of India Act, 1934. This act came into force on 30th March 1937.

Under Chapter III, according to Section 23, general penalty for offences under this Act,

(1) whoever-

- (a) in contravention of any of the provisions of Chapter I or of any of the rules made thereunder, imports, transports, stores, produces, refines or blends any petroleum, or
- (b) contravenes any rule made under section 4 or section 5, or
- (c) breaks the condition of any license held by him, issued under section 4, or
- (d) being for the time being in control or in charge of any place where petroleum is being imported, stored, produced, refined or blended or is under transport, refuses, or neglects to show to any officer authorized under section 13 any receptacle, plant or appliance used in such place in connection with petroleum, or in any way obstructs or fails to render reasonable assistance to such officer during an inspection, or

- (e) being for the time being in control or in charge of any place where petroleum is being imported, transported, stored, produced, refined or blended, refuses or neglects to show to any officer authorized under section 14 any petroleum in such place, or to give him such assistance as he may require for the inspection of such petroleum, or refuses to allow him to take samples of the petroleum, or
- (f) being required, under section 27, to give information of any accident, fails to give such information as so required by that section,

shall be punishable with fine, which may extend from a minimum of five hundred thousand kyats to a maximum of five million kyats.

- (2) if any person, having been convicted of an offence punishable under sub-section (1), is again guilty of any offence punishable under that sub-section, he shall be punishable for every such subsequent offence with fine, which may extend from a minimum of one million kyats to a maximum of ten million kyats.

According to Section 24, Confiscation of petroleum and receptacles. –

- (1) in any case in which an offence under clause (a) or clause (b) or clause (c) of sub-section (1) of section 23 has been committed, the convicting Magistrate may direct that-
 - (a) the petroleum in respect of which the offence has been committed, or
 - (b) where the offender is convicted of importing, transporting or storing petroleum exceeding the quantity he is permitted to import, transport or store, as the case may be, the whole of the petroleum in respect of which the offence was committed,

shall, together with the receptacles in which it is contained, be confiscated.

- (2) this power may also be exercised by the High Court in the exercise of its appellate or provisional powers.

According to Section 25, jurisdiction - offences punishable under this Act shall be triable by a Magistrate of the first class, or by a Magistrate of the second class who has been specially empowered by the President of the Union in this behalf

According to Section 26, Power of entry and search -

- (1) the President of the Union may, by notification in the Gazette, authorize any officer by name or by virtue of office to enter and search any place where he has reason to believe that any petroleum is being imported, transported, stored, produced, refined or blended otherwise than in accordance with the provisions of this Act and the rules made thereunder, and to seize, detain or remove any or all of the petroleum in respect of which in his opinion an offence under this Act has been committed.
- (2) the provisions of the Code of Criminal Procedure (V of 1898) relating to searches shall, so far as they are applicable, apply to searches by officers authorized under this section.

- (3) the Governor may make rules regulating the procedure of authorized officers in the exercise of their powers under this section subject, however, to the provisions of sub-section (2).

According to Section 27, reports of accidents with petroleum - Where any accident by explosion or fire, which is attended with loss of human life or serious injury to person or property, occurs as the result of the ignition of petroleum or petroleum vapor, or occurs in or near any place where petroleum is kept and under circumstances making it likely that it was the result of such ignition, the person for the time being in charge of the petroleum shall forthwith give information to the nearest Magistrate or to the officer-in-charge of the nearest police station.

According to Section 28, inquiries into serious accidents with petroleum –

- (1) the inquiry mentioned in section 176 of the Code of Criminal Procedure (V of 1898) shall be held in all cases where any person has been killed by an accident which the Magistrate has reason to believe was the result of the ignition of petroleum or petroleum vapour.
- (2) any Magistrate empowered to hold an inquest may also hold an inquiry under the said section into the cause of any accident which he has reason to believe was the result of the ignition of petroleum or petroleum vapour, if such accident was attended by serious injury to person or property, notwithstanding that no person was killed thereby.
- (3) repealed
- (4) the result of all inquiries held in pursuance of this section shall be submitted as soon as may be to the President of the Union.

Under Chapter IV, according to Section 29, Provisions relating to rules –

- (1) in making any rules under this Act, the President of the Union may-
 - (a) provide for any matter ancillary to such rules for which in his opinion provision is necessary to protect the public from danger arising from the import, transport, storage, production, refining or blending of petroleum, and
 - (b) make special provision for the special circumstances of any place.
- (2) every power to make rules conferred by this Act is subject to the condition of previous publication.
- (3) all rules made under this Act shall be published in the Gazette.

according to Section 30, Power to apply Act to other substances. –

- (1) the President of the Union may, by notification in the Gazette, apply any or all of the provisions of this Act and of the rules made thereunder with such modifications as he may specify, to any dangerously inflammable substance, other than an explosive, and thereupon the provisions so applied shall have effect as if such substance had been included in the definition of petroleum.

- (2) the President of the Union may make rules providing specially for the testing of any substance to which any of the provisions of this Act have been applied by notification under sub-section (1), and such rules may supplement any of the provisions of Chapter II in order to adapt them to the special needs of such tests.

According to Section 31, Power to limit powers of local authorities over petroleum.
- Where any enactment confers powers upon any local authority in respect of the transport or storage of petroleum, the President of the Union may, by notification in the Gazette-

- (a) limit the operation of such enactment, or
- (b) restrict the exercise of such powers, in any manner he deems fit.

Section 32 is omitted.

2.12.8. The Export and Import Law (2012)

This law was enacted by the Pyidaungsu Hluttaw with the notification number 17/2012 on 17th September in 2012. The main objectives of this law are to successfully implement the State economic principles, to enable to establish the policies to support the State development, to cause the State's import and export policies and activities to be in compliance with the international trade standards. According to the Section 7, No licensee shall violate the terms of permit.

2.12.9. The Fisheries Law

This law was enacted by the State Law and Order Restoration Council with the notification number 24/1989 on 7th September in 1989. According to the Section 29,

- fish farming without license;
- obstructing the flow of water and currents in the fishery waters or encouraging or polluting the water;
- importing live fish from abroad without prior permission of the Department; Domestic and export;
- raising fish prohibited by the Department

2.12.10. Natural Disaster Management Law (2013)

This law was enacted by the Pyidaungsu Hluttaw Law with the notification No. 21, 2013 in 31st July 2013. Section 13 describes that, "the department, organization or person that has been assigned under this Law:

- (a) Shall undertake the following functions after laying down the plan in accord with the natural disaster management plans in order to reduce damage and losses that are likely to be caused by the natural disaster;
 - Preparatory and preventive measures for natural disaster risk reduction before the natural strikes;
 - Emergency responses including search and rescue when the natural strikes;

- Rehabilitation and reconstruction activities for improving better living standard in past disaster period and conservation of the environment that has been affected by natural disaster;
- (b) Shall give prioritize and protect children, the elderly, the disabled and women (especially pregnant women and suckling mothers) in carrying out the functions contained in sub-section (a);
- (c) Shall refrain from the act that causes injuring human dignity in supporting the victims.

2.12.11. Climate Change Policy (2019)

The policy is adopted by the Republic of the Union of Myanmar in 2019. The purpose of the Climate Change Policy is to provide long-term direction and guidance to: (a) take and promote climate change action on adaptation and mitigation in Myanmar; (b) integrate climate change adaption and mitigation consideration into Myanmar's national priorities and across all levels and sectors in an iterative and progressive manner; and (c) take decision to create and maximize opportunities for sustainable, low carbon, climate resilient development, ensuring benefits for all.

2.12.12. Commercial Tax Law (2014)

This law was prescribed on 31st March 1990 and it was amended on 24th March 2014, March 24. According to this law, section 4(a) of chapter II was shown in which Charging Tax and Having Responsibility to Pay Tax: "The tax shall be charged on the goods produced in the country as mentioned in the Schedule." In section 5, the tax due under section 4 shall be responsible to be paid by the relevant producer, service provider or importer.

In the schedule 7, the tax percentage on the services including railways, waterway, airway, and road transport business are 5 percent based on the total receipts in respect of passenger fares.

2.12.13. The Union Tax Law (2019)

This law was enacted in Pyidaungsu Hluttaw notification number 30 on 24th September 2019. This law includes the following sectors;

(a) Changes to the income tax law

Key changes to the income tax law are as follows;

- Conditional amnesty
- Cash rewards received as a result of the seizure of unlawful property
- Powers granted to the ministry of planning and finance (ministry)

(b) Changes to the special commodity tax law

Under the Union Tax Law 2019, the special commodity list remains the same except for the following;

- Cigarettes and cheroots
- Alcoholic beverages
- Natural gas

- Gemstones
- (c) Changes to the commercial tax law
- (d) Gemstones tax

2.12.14. Myanmar Citizens Investment Law (2013)

This law was enacted by the Pyidaungsu Hluttaw with the notification number No. 18/2013 on 29th July 2013. The aim of the law is aimed at the people to enjoy sufficiently and to enable the surplus to export after exploiting abundant resources of the country; causing to open up of more employments for the people as the business develop and expand, causing to develop human resources; causing to develop in every region of the country including infrastructures; causing to rise economic enterprises and investment business owned by Myanmar citizens, which are able to keep abreast with other countries.

Chapter 5 of the Law, Article 5 states that any type of economic activities may be applied by the citizens for investment, except otherwise restricted or prohibited business under this law, or any existing Law.

Article 6 states the investments, which shall be stipulated as the restricted or prohibited business. These are Businesses, which can;

- Affect the traditional culture and customs of the national races within the Union.
- Affect public's environment, causing noise in the residential area.
- Affect public health.
- Cause damage to the natural environment and ecosystem.
- Affect the land and marine animals, trees, flowers, crops, antique heritage, resources
- Bring the hazardous or poisonous waste into the Union.
- The factory which produce or the business which use hazardous chemicals under international agreements.

2.12.15. Foreign Investment Law (2012)

This law was enacted by the Pyidaungsu Hluttaw with the notification number No. 21/2012 on 2nd November 2012. The objectives of the law are described below.

- (1) To produce the minerals of the state for the sufficient enjoyment of the public and to export the surplus;
- (2) Job creation for the people in line with the progress and expansion of work;
- (3) To develop human resources to develop the infra-structure such as banking and finance work, highway roads, cross-country highway, national electricity and energy works;
- (4) To develop high-tech including modern data collection technology;
- (5) To develop communication network international standard railway, maritime and airway transport in the whole country;
- (6) To encourage the citizen to be able to do in competition with foreigners; and,
- (7) To develop the investment work in line with the international standard.

2.13. MYANMAR GOVERNMENT INSTITUTIONAL FRAMEWORK

2.13.1. Arrangement at National and Sector Level

At national Level, National Environmental Conservation Committee (NECC) serves as a mechanism for inter-ministerial coordination. Authorities and functions of NECC are prescribed in Articles 7 to 13 of the EC Rules of the Republic of the Union of Myanmar.

One of NECC's main functions related to this project is to oversee the management of the EIA process by Ministry of Environmental Conservation and Forestry (MOECAF) through ECD. ECD will serve as a coordinator among various departments in relevant sectors to ensure that the EIA and implementation of EMP will address environment and social issues of concerns by departments in relevant sectors.

The EIA process for this project will be administered by the central ECD in coordination with the regional ECD and various governmental organizations at the regional, township, and district levels.

2.13.2. Arrangement at the Project Area

The Scoping EIA process is shown in Figure 2-6.

The project proponent must appoint a registered Third Person or Organization to carry out the EIA investigation and reporting. Prior to commencement of the EIA, the project proponent shall inform the Department in writing as to the identity of the duly registered person(s) and/ or organization it has selected to undertake the EIA investigation and reporting. Within seven (7) working days of its receipt of information about the identity of the person(s) and/ or organization selected by the project proponent to undertake the EIA, the Department will confirm in accordance with the Ministry approval whether such persons or organization are in good standing with the Department.

Based on the Scoping, the project Proponent shall prepare the ToR for the EIA investigations in accordance with applicable guidelines issued or adopted by the Ministry.

The project proponent shall submit the completed Scoping Report and ToR to the Department for review and approval. Within fifteen working days of receiving the complete scoping report and ToR, the Department, in accordance with Ministry guidance, shall either

- (a) Approve the Scoping Report and ToR with or without conditions, or
- (b) Require the Project Proponent to revise the Scoping Report and/ or ToR in accordance with comments of the ECD.

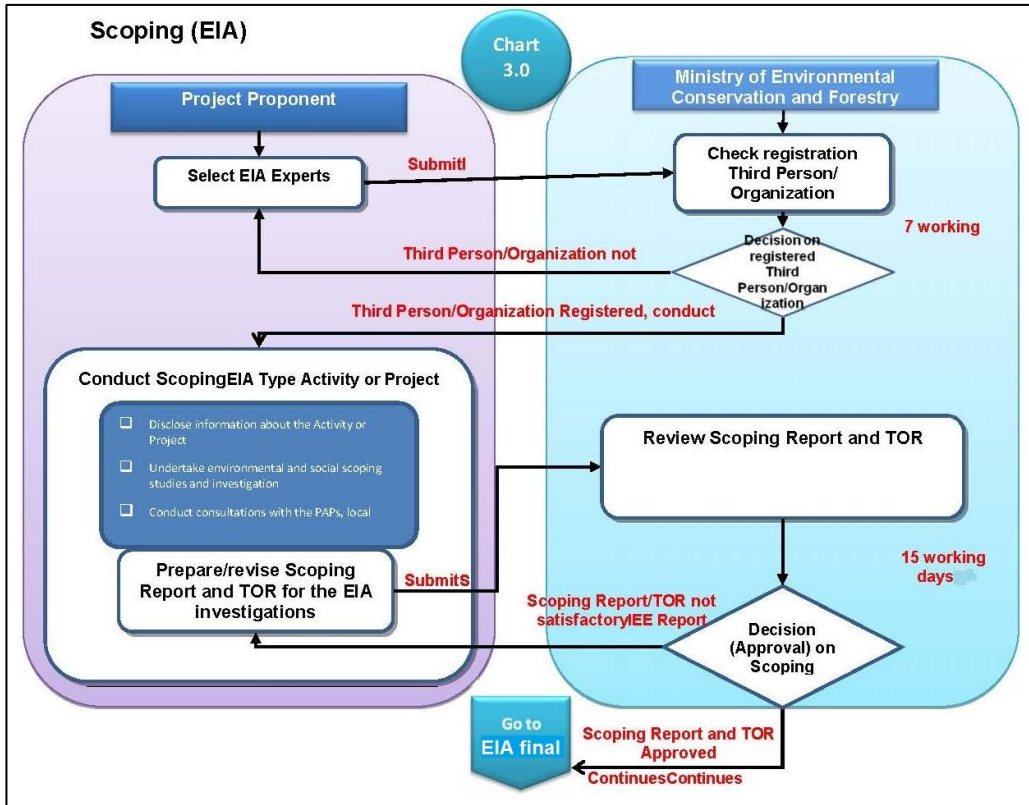


Figure 2-6 Scoping EIA process outline diagram

2.14. INTERNATIONAL AND NATIONAL POLICIES, GUIDELINES AND STANDARDS

International and national policies, guidelines and standards relevant to environmental and social impacts of projects that are referred to by most countries are those issued by World Health Organization (WHO), the United States Environmental Protection Agency (USEPA), the World Bank, and the International Finance Corporation (IFC). The policies, guidelines and standards of the WB and IFC are cross-referenced and complementary as the IFC is an organization of the WB Group. They are also adopted by most development organizations such as the Asian Development Bank, and Japan Bank for International Cooperation. It should be noted that the guidelines and standards recommended by the WB and IFC, especially those related to environmental pollution, also provide due consideration to the guidelines and standards of USEPA and WHO.

Only those international policies, guidelines, and standards relevant to this Project are discussed.

2.14.1. IFC's Standards and Guidelines

IFC's standards and guidelines relevant to this project are described as follows;

- Performance Standards (PS) on Environmental and Social Sustainability (January 1, 2012)
- Environmental, Health and Safety-General Guidelines (April 30, 2007)

IFC describes eight PS on Environmental and Social Sustainability which Project proponent needs to comply throughout the IFC investment life. The eight PS are;

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

PS 8: Cultural Heritage

All the environmental and social aspects of development projects will be covered by the above eight PS.

2.14.2. World Bank's Pollution Prevention and Abatement Handbook (1988)

Toward Clear Production

The WB's Pollution Prevention and Abatement Handbook (PPAH) is a comprehensive document providing guidelines for industrial pollution control, and it recommends emission and ambient quality standards to be applied in environmental management. These recommends standards have taken into account the standards enforced by U.S.EPA and those recommended by WHO. They are referred to in the IFC's EHS Guidelines.

2.15. INTERNATIONAL CONVENTIONS

In the following section, only international conventions relevant to the proposed project are described.

2.15.1. Vienna Convention for the Protection of the Ozone Layer (1985)

The Vienna Convention for the Protection of the Ozone Layer is a treaty on the framework for international cooperation concerning the protection of the ozone layer. This is a framework convention that lays out principles agreed upon by many parties. It does not require countries to take control actions to protect the ozone layer. This would come later in the form of the Montreal Protocol.

This Convention was adopted in 1985 following international discussion of scientific discoveries in the 1970s and 1980s highlighting the adverse effect of human activity on ozone levels in the stratosphere and the discovery of the 'ozone hole'. Its objectives are to promote cooperation on the adverse effects of human activities on the ozone layer.

Myanmar ratified Vienna Convention for the protection of Ozone Layer on 24 November, 1993. Country Programme preparation was approved in 1994. Today, the Vienna Convention is still making progress. The countries involved meet once every three years to make decisions on important issues including on Research and Systematic observations as well as financial and administrative matters.

2.15.2. Montreal Protocol on Substances that Deplete the Ozone Layer (1987)

The Montreal Protocol on Substances that Deplete the Ozone Layer (the Montreal Protocol) is an international agreement made in 1987 and entered into force in 1989. It was designed to stop the production and import of ozone depleting substances and reduce their concentration in the atmosphere to help protect the earth's ozone layer. This Protocol sits under the Vienna Convention for the Protection of the Ozone Layer.

The parties to the Protocol meet once a year to make decisions aimed at ensuring the successful implementation of the agreement. These include adjusting or amending the Protocol, which has been done six times since its creation. The most recent amendment, the Kigali Amendment, called for the phase-down of hydrofluorocarbons (HFCs) in 2016. These HFCs were used as replacements for a batch of ozone-depleting substances eliminated by the original Montreal Protocol. Although they do not deplete the ozone layer, they are known to be powerful greenhouse gases and, thus, contributors to climate change.

Myanmar ratified the Montreal Protocol on 24 November, 1993. Country Programme preparation was approved in 1994. The Montreal Protocol provided a set of practical, actionable tasks that were universally agreed on. The Protocol has successfully met its objectives thus far and continues to safeguard the ozone layer today. The ozone layer is well on its way to recovery because of the collaborative effort of nations around the world.

2.15.3. Kyoto Protocol

The Kyoto Protocol, also known as the Kyoto Accord, is an international treaty among industrialized nations that sets mandatory limits on greenhouse gas emissions.

The greenhouse effect is the warming effect of the sun on greenhouse gases, such as carbon dioxide, that act to trap this heat in our atmosphere. The more of these gases that exists, the more heat is prevented from escaping into space and, consequently, the more the earth heats.

Although the greenhouse effect is necessary for survival on earth, an overabundance of greenhouse gas emissions increases global warming beyond what is desirable. The purpose of the Kyoto Protocol is to stabilize human-generated emissions at a level that will not inflict further harm on the atmosphere. The initial treaty was signed in Kyoto, Japan in 1997. That agreement outlined emissions targets. Implementation required participating members to create policies and measures to reduce and offset domestic emissions and increase absorption of greenhouse gases. Other specifications included requirements for accountability, compliance and reporting. That agreement expired at the end of 2012. Members agreed upon an extension of the protocol, effective from 2013 to 2020.

The Kyoto Protocol is overseen by the United Nations Framework Convention on Climate Change (UNFCCC). As of late 2013, all UN member states except for Andorra, Canada, South Sudan and the United States had signed and ratified the treaty. All 28 nations in the European Union have also signed the accord.

2.15.4. United Nations Framework Convention on Climate Change (UNFCCC)

Climate change is widely recognized as one of the greatest global threats that the planet faces today. In an effort to address this threat, the international community negotiated and adopted the United Nations Framework Convention on Climate Change (UNFCCC) on 9th May 1992 and it entered into force on 21st March 1994. UNFCCC was signed by Myanmar on 12th June 1992. Moreover, Myanmar ratified the UNFCCC on 25th November 1994 and it entered into force in Myanmar on 23rd February 1995.

The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.

The ultimate goal of the UNFCCC is to stabilize “greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system”. Article 3 of the UNFCCC establishes a set of foundational principles that should guide Parties in achieving this goal. Notably for Myanmar, Article 3(1) states that the Parties “should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities”. Article 3(2) then states that “the specific needs and special circumstances of developing country Parties, especially those that are particularly vulnerable to the adverse effects of climate change, and of those Parties, especially developing country Parties, that would have to bear a disproportionate or abnormal burden under the Convention, should be given full consideration”. Accordingly, the UNFCCC divides countries into two separate groups – Annex I includes developed countries, and Annex II includes developing countries.

Solving the climate change problem is the responsibility of not only global but also the local governments, businesses, citizens and civil society. Therefore, it is necessary to coordinate and cooperate to achieve the purpose of this Convention and the relevant legal information in accordance with the relevant provisions.

CHAPTER 3 PROJECT DESCRIPTION AND ALTERNATIVE

3.1. BACKGROUND OF THE PROJECT

The MGE project is a factory that produces various types of **glass bottles** by using advanced technology. The proposed glass bottles manufacturing factory is located at U Paing No 97, Yangon-Thilawa Terminal Road, Phayagone Village, Thanlyin, Township, Yangon, Myanmar. The location of the project is 16° 42' 28.84" N and 96° 15' 18.72" E. The total land area of the project is 40 acres with total building areas of 3 acres. Location map of the factory and photo of MGE factory are described in Figure 3-1 and Figure 3-2.

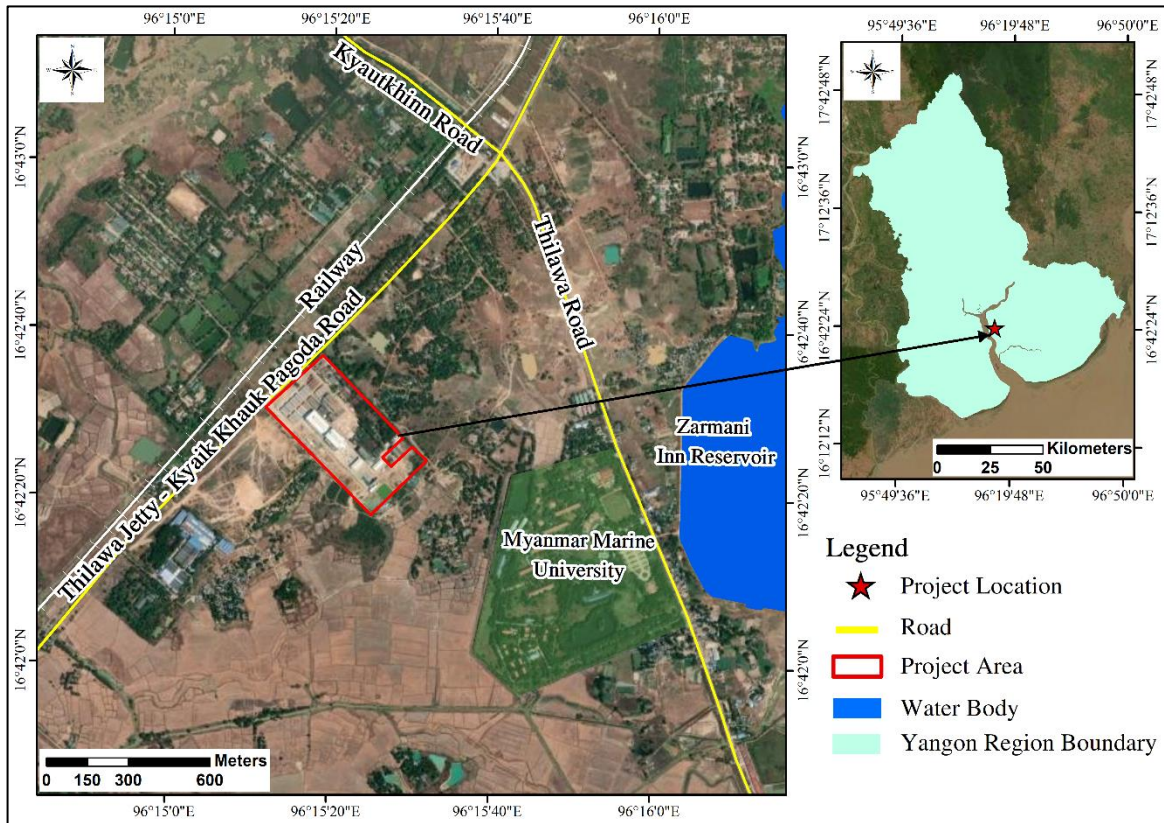


Figure 3-1 Location Map of the Project Site



Figure 3-2 Glass Bottle Manufacturing Factory

The proposed glass bottles manufacturing factory is located between the Phayagone Village and Ah Lun Soke Village. Therefore, it is expected to occur some impact on the two villages. In consequence, residential area and some agricultural areas of these villages are possible to assume as the area of influence. On the other hand, the area of influence is within the 3 km radius of the study area and the crowded areas of the two villages are also within the 3 km radius of the study area. The overall distance between the project and nearby villages are 2.4 km for Hpa Yar Kone Village and 2.8 km for Ah Lun Soke Village. The distance between the project area and nearby villages are described in Figure 3-3.

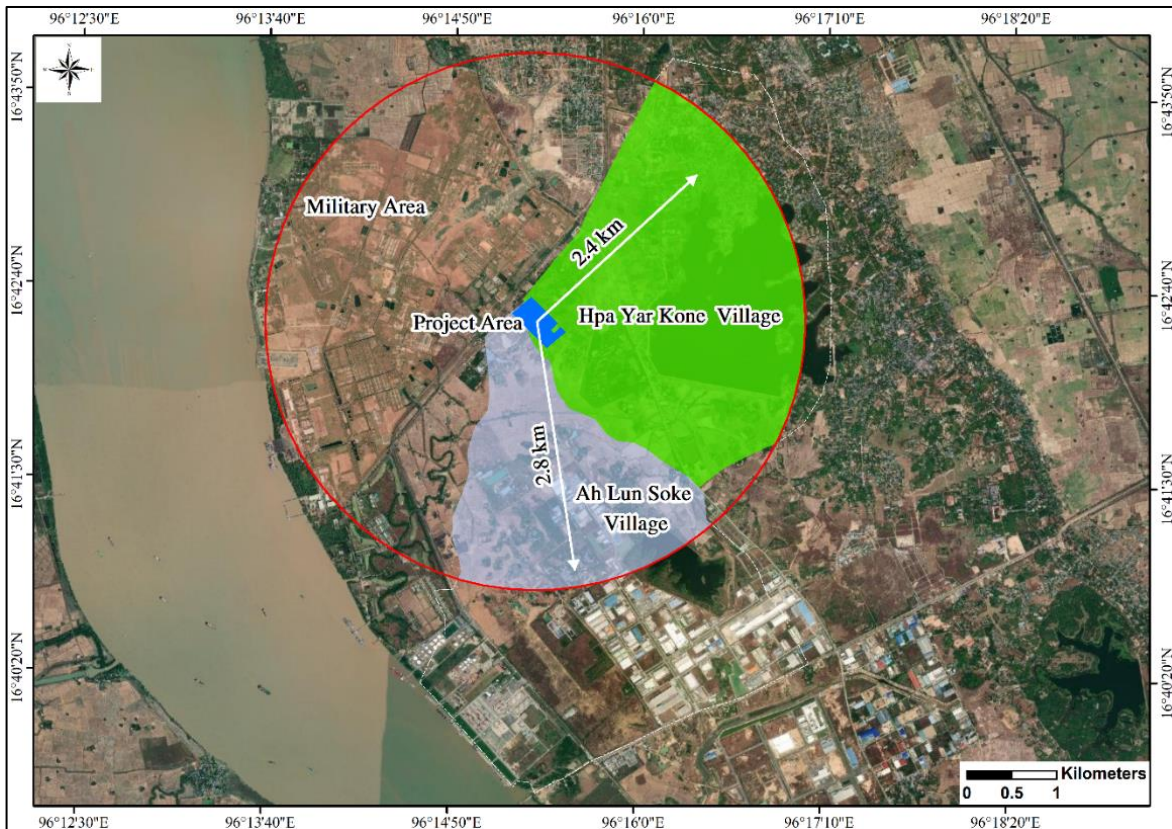


Figure 3-3 Distance between Project and Nearby Villages

3.2. ALTERNATIVE WAYS

3.2.1. Relocation Alternative

Relocation option to a different site is an option available for the project implementation. This means that the proponent has to look for the land if relocation is necessary. Currently, there is no relocation alternative for the proposed development project. Looking for the land to accommodate the scale and size of the project and completing official transaction on it may take a long period. In addition, it is not a guarantee that such land would be available. It is also worth noting that the proposed project is already underway in terms of seeking developmental approvals in various government departments.

The project proponent would spend another long period of time on design and approvals of the plans by the relevant government departments. The project design and planning before the stage of implementation would call for cost; already encountered in the proposed development i.e. whatever has been done and paid to date would be counted as a loss to the proponent. This would also lead to a situation like No Action Alternative (as explained below). The other consequence is that it would discourage both foreign and local investors especially in the construction sector. In consideration of the above concerns and assessment of the current proposed site, relocation is not a viable option.

3.2.2. The No Action Alternative

The No Action Alternative in respect to the proposed project implies that the status quo is maintained. This option is most suitable alternative from an extreme environmental perspective as it ensures non-interference with the existing conditions.

3.2.1 Glass Bottles Manufacturing Technology Alternative

Blow & Blow Process is the applied glass bottles manufacturing technology of the MGE factory. This technology is applied for the production of narrow containers where the parison is formed by compressed air. As an alternative for the Blow & Blow Process, the technology of Press & Blow Process is also popular for glass bottles production. However it is used for large diameter finish containers only in which the parison is shaped by pressing the glass against the blank mold with the metal plunger. Therefore, Blow & Blow Process is the most suitable glass bottles manufacturing technology for MGE factory. The process flow diagram of Blow & Blow Process is shown in Figure 3-4.

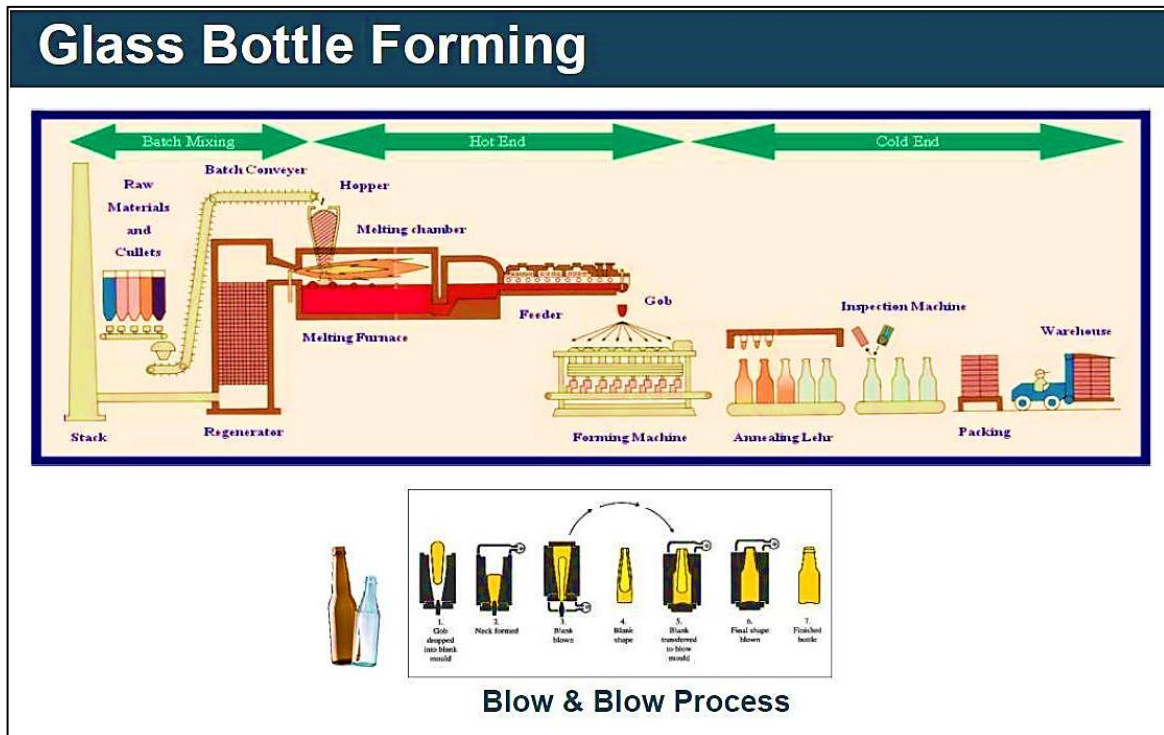


Figure 3-4 Flow Diagram of Blow & Blow Process

3.2.2 Applied Chemical and Materials Alternative

In glass bottles production process, it is essential to use several types of chemical for various purposes such as lubricant for non-sticking to the mold, HFC 152a gas for glass bottles cleaning process and so on. All the chemicals used in glass bottles production process is described in section 3.5, chapter (3). In general, fluorated gas used in glass manufacturing process can emit green house gas into the atmosphere, which may lead to global warming. However, MGE used hydrofluorocarbon-HFC 152a instead of HFC-134a in gas duster or glass bottles cleaning process. HFC 152a has very low global warming potential and zero negative impact to ozone layer compared to its counter parts. Therefore, applied chemical using in MGE is more sustainable than other alternative chemicals.

Regarding the refractory material for furnace construction, current refractory materials used in MGE factory such as insulation bricks, refractories for bonding purposes are standard items for furnace. Therefore, there is no alternative ways for the refractory materials.

3.2.3 Alternative for Furnace

According to the suggestion from well-experienced experts, the furnace capacity is considered based on the volume or demand from customer. Currently, MGE installed an **End-Fired Single-Pass Regenerators Furnace**, capable to produce a **total of 300 Metric tons of glass bottles**. It is essential to use Soda Lime Glass for the manufacture of Flint and Amber Color containers. Moreover, End-Fired Single-Pass Regenerators Furnace is the **eco-friendly furnace**. It is **simple, flexible & economical to operate**.

Natural gas is used as main fuel for initial firing and **1000kVA Electrical Booster** for long-term operation to reduce the air pollution.

The main concept is that backed up by an easy-care design with a state-of-art glass flow simulation to ensure effective glass melting and conditioning. The furnace installed in MGE factory can produce high quality glass for containers manufacturing. Therefore, End-Fired Single-Pass Regenerators Furnace is the most suitable way for the current situation of MGE factory rather than other alternative approach. The sample photo of end fired furnace is shown in Figure 3-5.

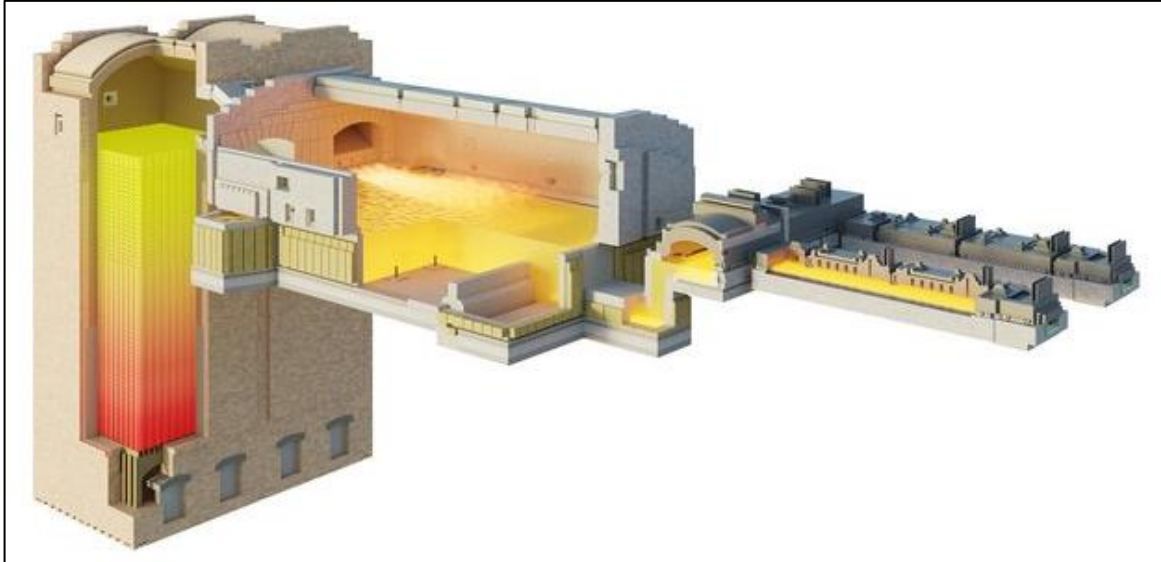


Figure 3-5 End Fired Furnace

Another alternative way of furnace type for glass bottle manufacturing process is that cross fired furnace which will be built with larger melting surfaces because of the lateral arrangement of the port necks. In general, thermal efficiency of cross furnace is around 10 % higher than the end fired type. Compared to the cross fired furnace, end fired furnace has lower energy consumption. The sample photo of cross fired furnace is shown in Figure 3-6.

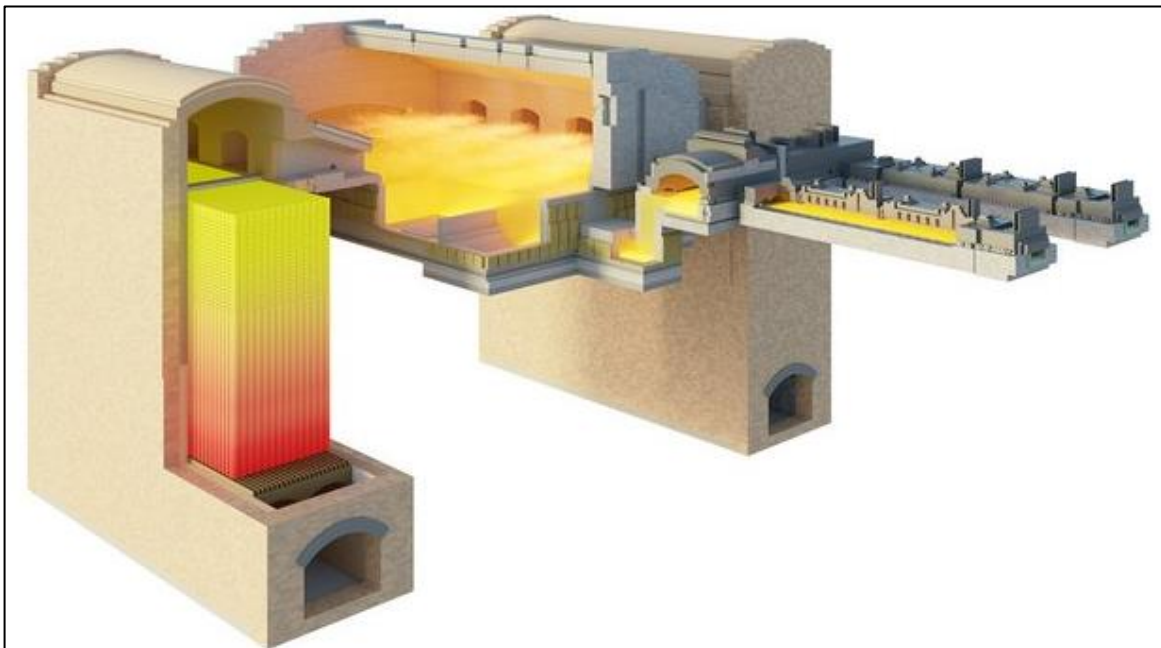


Figure 3-6 Cross Fired Furnace

3.2.4 Alternative for Access Road

The factory is situated in Thanlyin Township, East District of Yangon Region. Currently, Kyaik Khauk Pagoda Road (approximately 10.2 km) via Thanlyin Bridge No.1 is the primary access road to the factory. The alternative access road has been considered for the factory: namely: Thanlyin Bridge No.2 - No.6 Road (approximately 16.1 km) via Thanlyin Bridge No.2. The primary and alternative access roads to the factory is shown in Figure 3-7.

The primary access road is selected due to the following reasons.

- For the existing access road, it has been used since the operation of old factory and adequate capacity to carry the current traffic flow.
- The length of the primary route to the downtown area of the Yangon City is shorter than the alternative access road. Therefore, by using the primary road, it will save time consuming and avoid traffic congestion when distributing the final products to the respective buyers.

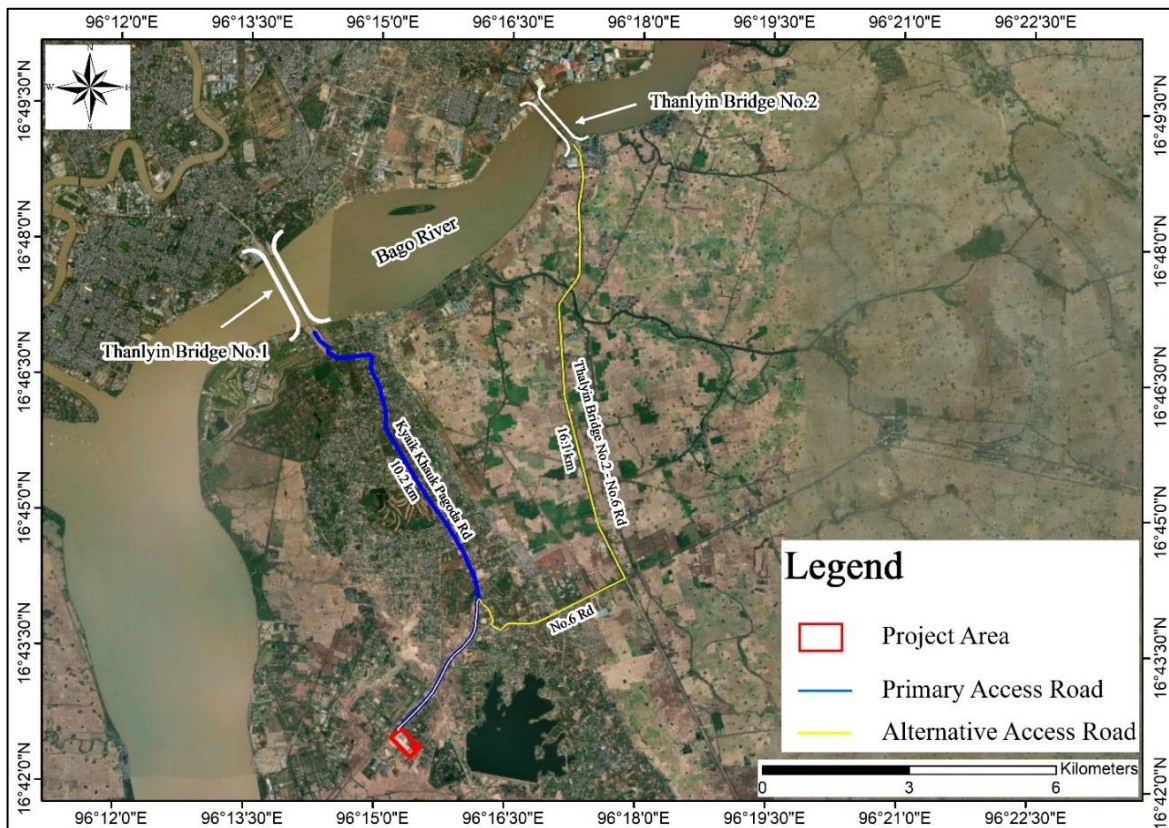


Figure 3-7 The Primary and Alternative Access Roads to the Factory

3.2.5 Alternative for Raw Sand

The old factory brought raw sand from both Ale-Man Kyun, Tanintharyi Region (white sand) and Nga Pu Taw Township, Ayeyarwaddy Division (brown sand). The new factory, MGE has bought the required raw sand only from the **Ale-Man Kyun, Tanintharyi Region** since the glass manufacturing process of new factory needs white sand for its operation.

Besides, the factory has alternative source for raw sand from Bokeyyin Township, Tanintharyi Region. However, the sand from Ale-Man Kyun is more preferred due to its high quality and less impurity to clarify and has sufficient quantity to supply for the factory.

3.3. DESCRIPTION OF PROJECT

3.3.1. Objectives of the Proposed Project

The main objectives of the galss bottle-manufacturing project of the MGE factory are as bellows:

- To be the first and mass producing glass container manufacturer in Myanmar.
- To be the leading glass container supply in Myanmar in term of volume and quality.
- To create work opportunities for the local people.
- Using the technical know-how and expertise of Osotspa Group to implement into quality glass container manufacturing facility with local business network of the local partner GHA.

3.3.2. Site Description

Regarding the site description, as the proposed project is constructed within the existing compound of old glass bottles manufacturing factory, renovation for some existing buildings to apply as the warehouse, office building and accommodation for staff are conducted.

At the same time, the main factory building for glass bottles manufacturing process has been constructed by applying the latest technology. In addition, the some existing glass bottles manufacturing buildings are maintained as its original form. The master layout plan of the proposed project site is shown in Figure 3-8. Document related to the construction permit from the City Development Committee, Thanlyin Township, and Yangon Division is aslo described in Appendix A.

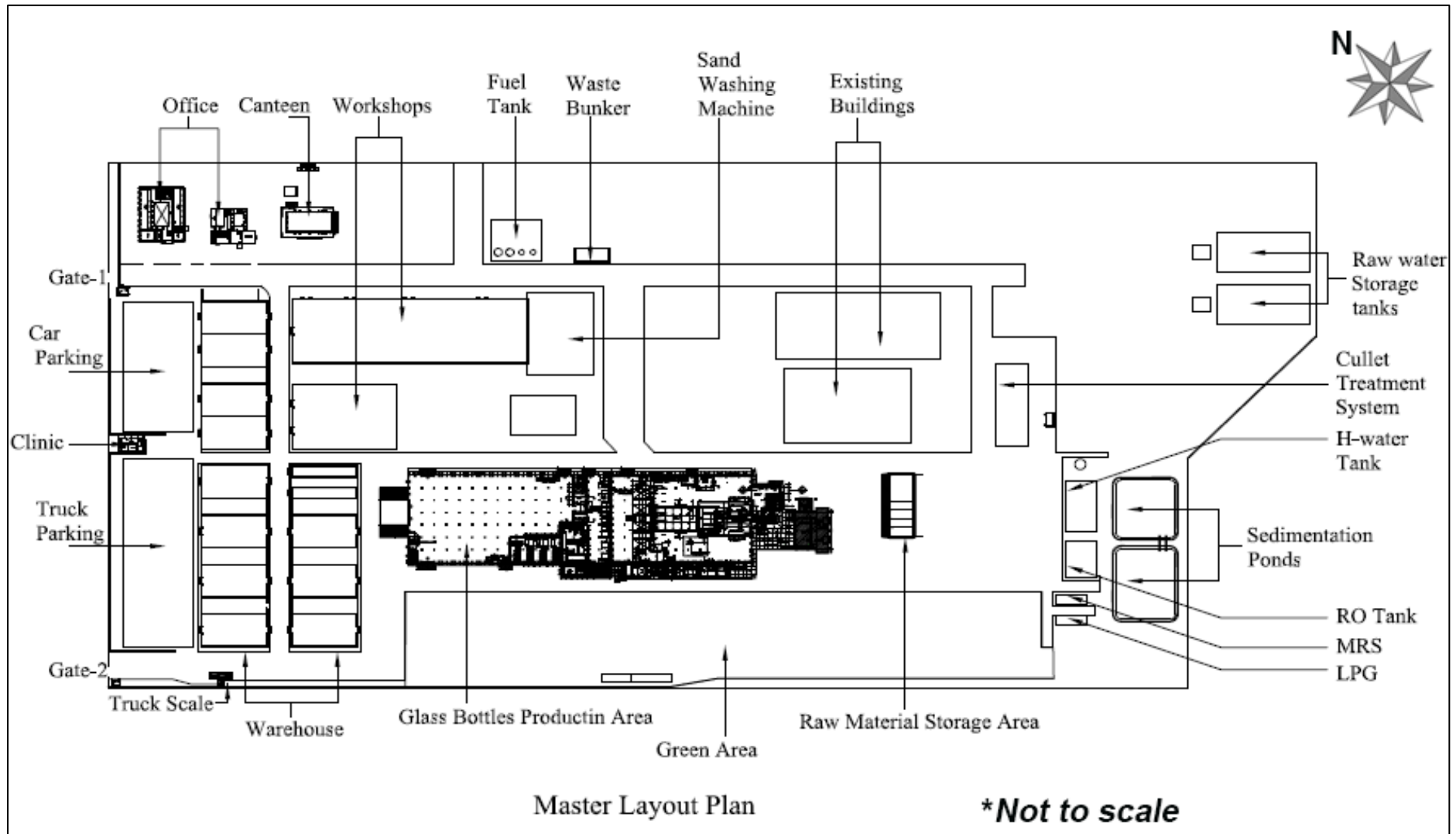


Figure 3-8 Master Layout Plan of Proposed Project

3.3.3. Project Size

The brief description of the proposed project is shown in the following Table 3-1.

Table 3-1 Project Size

Project Name	Myanmar Golden Eagle Company Limited
Type of investment	Joint venture with the share ratio of 35% from SSB Enterprise Co., Ltd. (Thailand) and 65% from Glass Holding Asia Co., Ltd. (Local).
Capital Investment	USD - 37 Million (53,650,000,000 Myanmar Kyats)
Products	Amber (brown color glass material) and flint (transparent glass material) glass bottles
Project Area	40 Acres
Raw Materials	23 types of raw materials including cullet, sand, soda ash, limestone, feldspar, sodium sulphate, carbon, ferric oxide and so on
Production Rate	450,000 bottles (200 Tons)
Staff Population	110 nos

3.3.4. Designed Data of the Proposed Project

Generally, there are several types of buildings in the project, namely, office, canteen buildings, accommodation, warehouses, factory and furnace. Regarding the detailed design data of the MGE, both glass bottles manufacturing factory and furnace are described in this section. The factory is a three-storey steel structure building with the total area of about 73,400 square feet. Perspective and detailed plan view of the furnace as well as each floor plan and roof plan of the factory are shown from Figure 3-9 to Figure 3-15 .

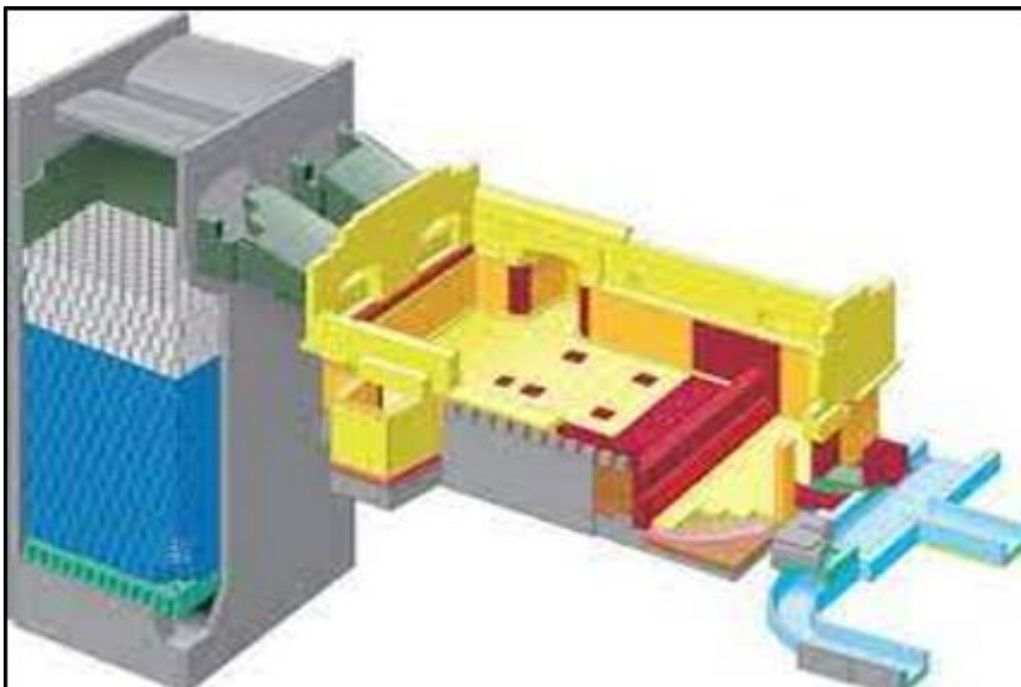


Figure 3-9 Perspective View of the Furnace

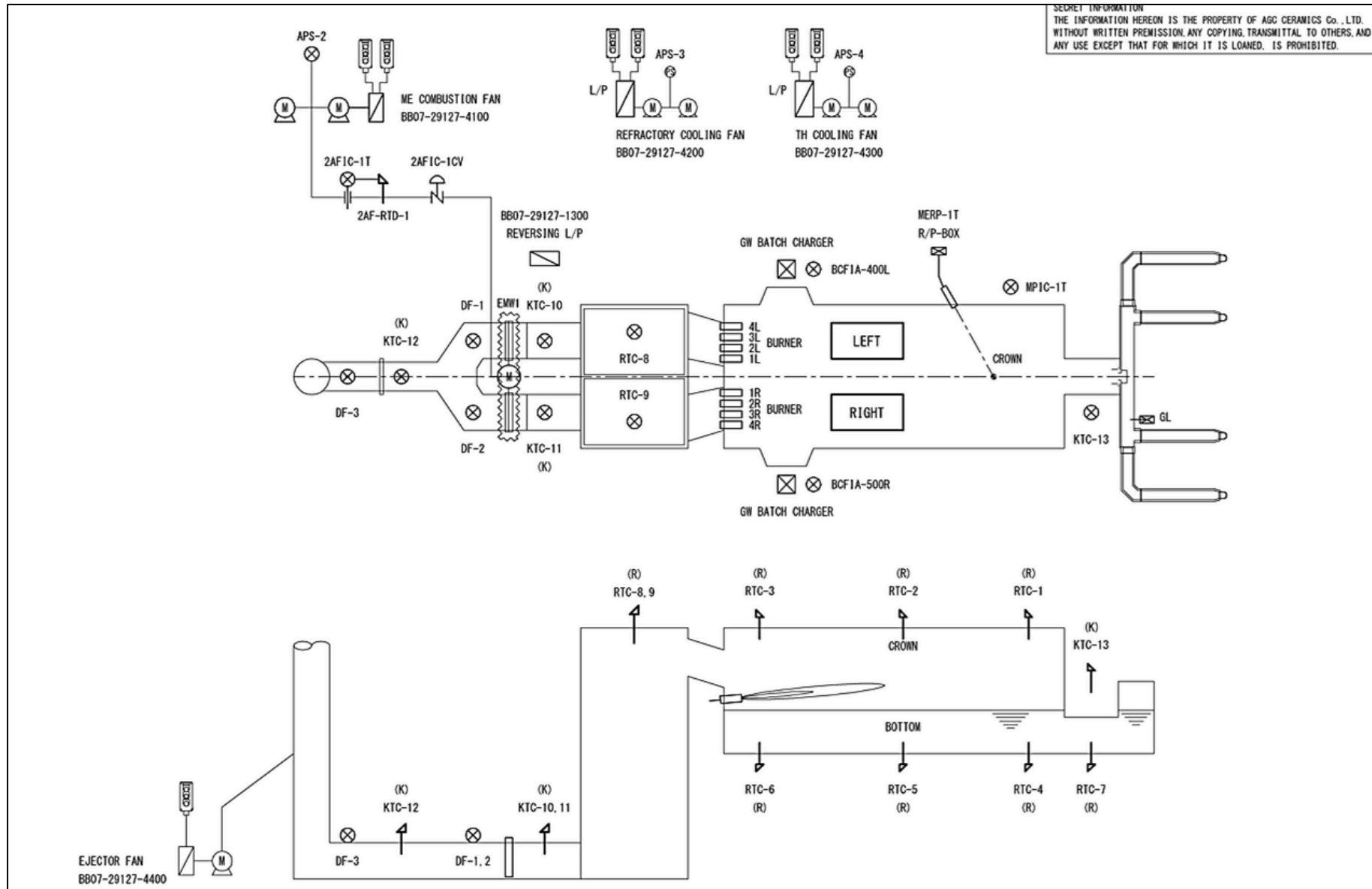


Figure 3-10 Engineering Drawing of Furnace Plant

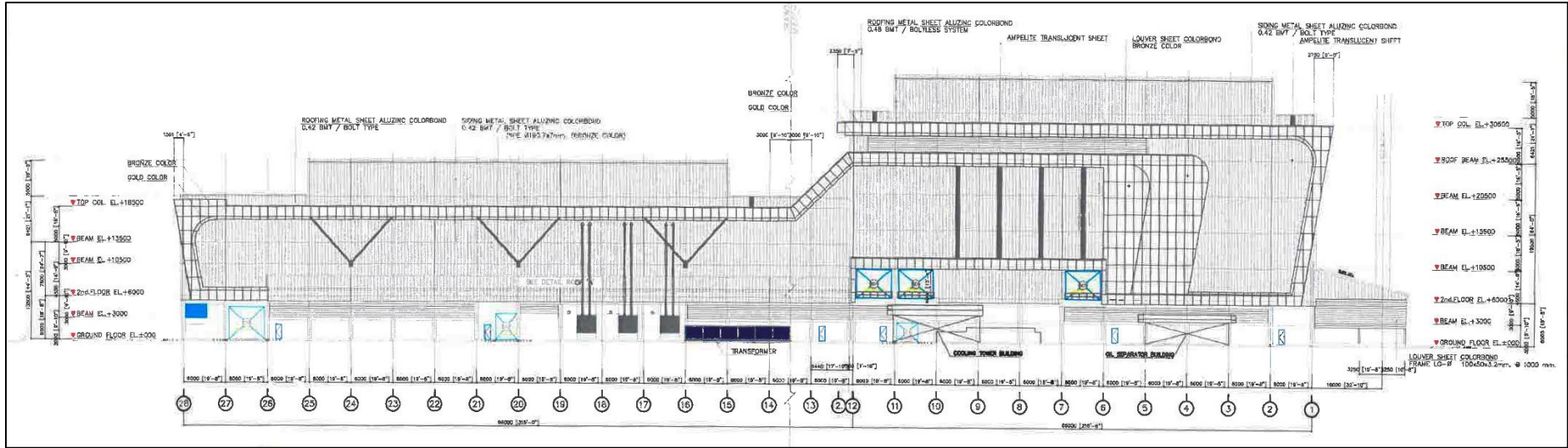


Figure 3-11 Front Elevation View of the Factory

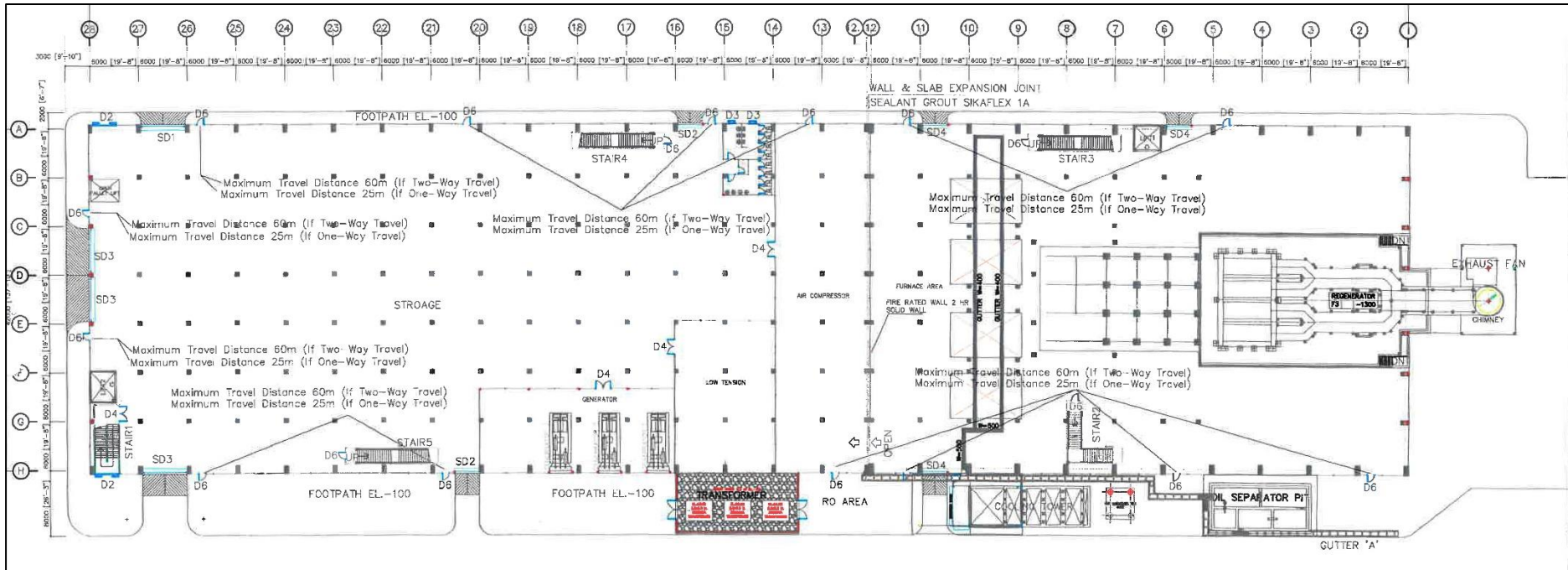


Figure 3-12 Ground Floor Plan of the Factory

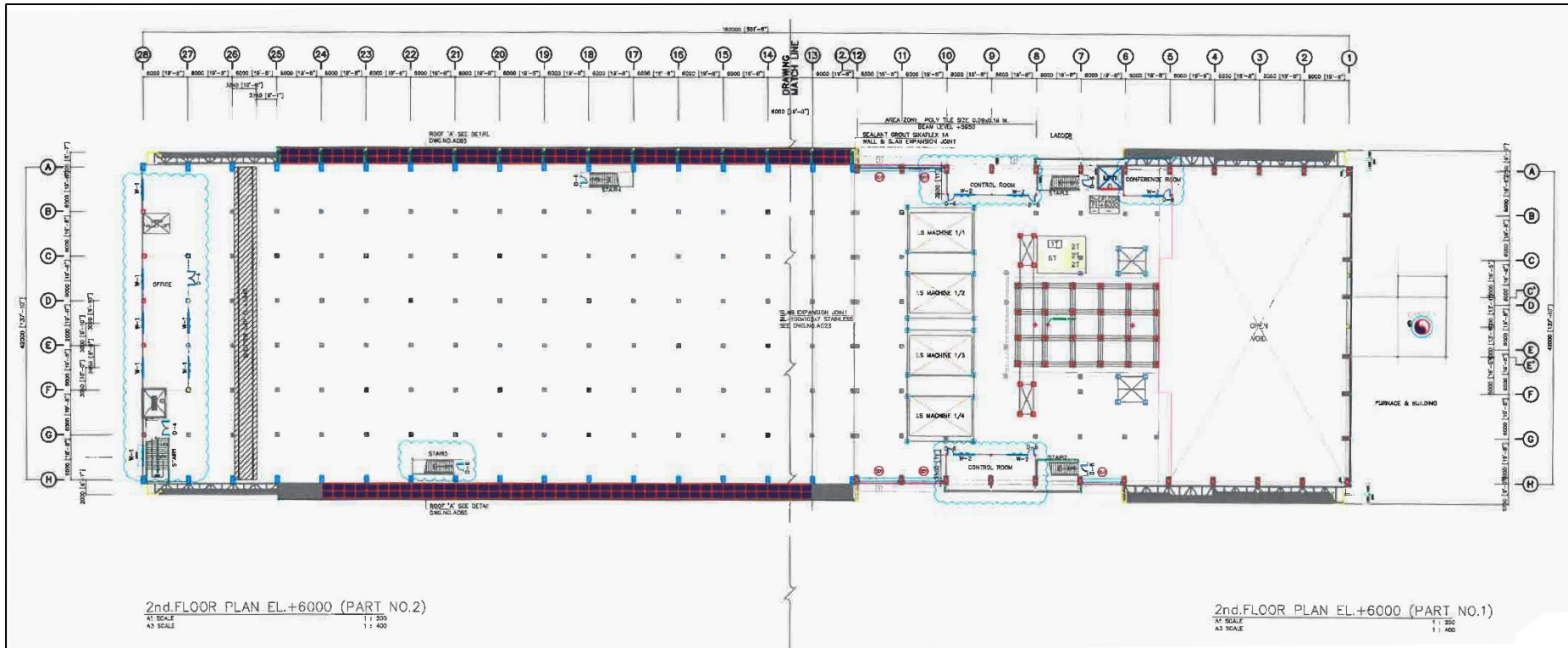


Figure 3-13 Second Floor Plan of the Factory

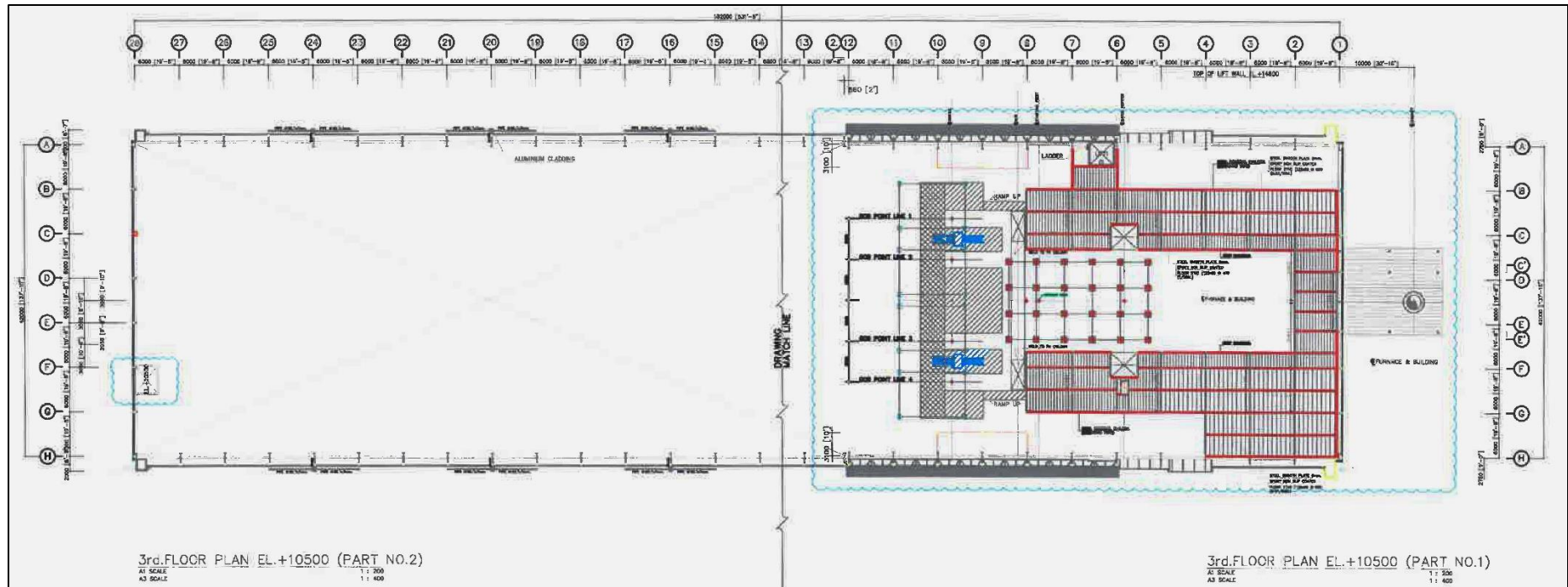


Figure 3-14 Third Floor Plan of the Factory

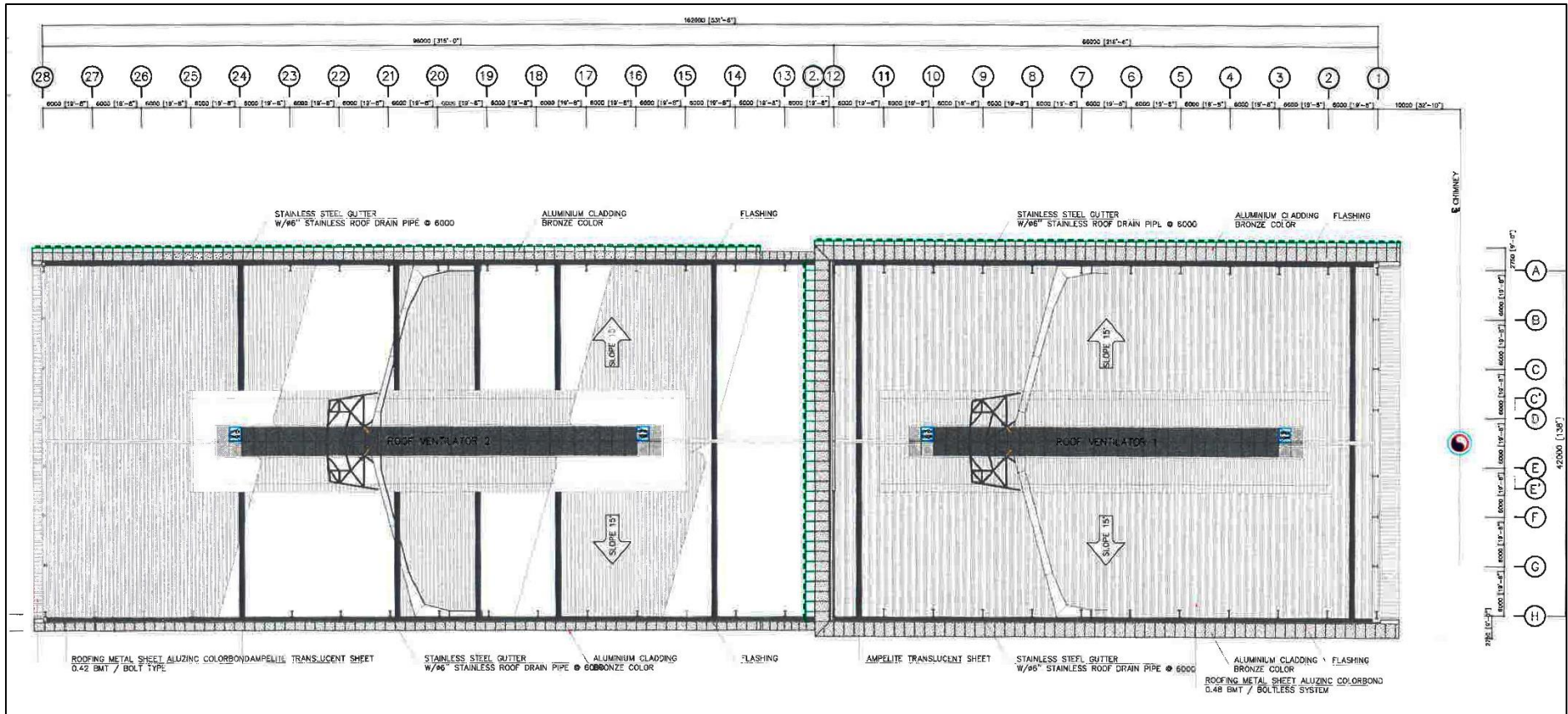


Figure 3-15 Roof Floor Plan of the Factory

3.3.5. Compound Nearby Adjacent Project Site

The existing land use around three kilometers adjacent to the project site is composed of a mix of residential areas, religious places, commercial areas, government offices and schools. Location map of buildings, houses, roads and offices adjacent to three kilometers of the project site is presented in Figure 3-16. The existing features of adjacent areas to the project site are also shown in Table 3-2.

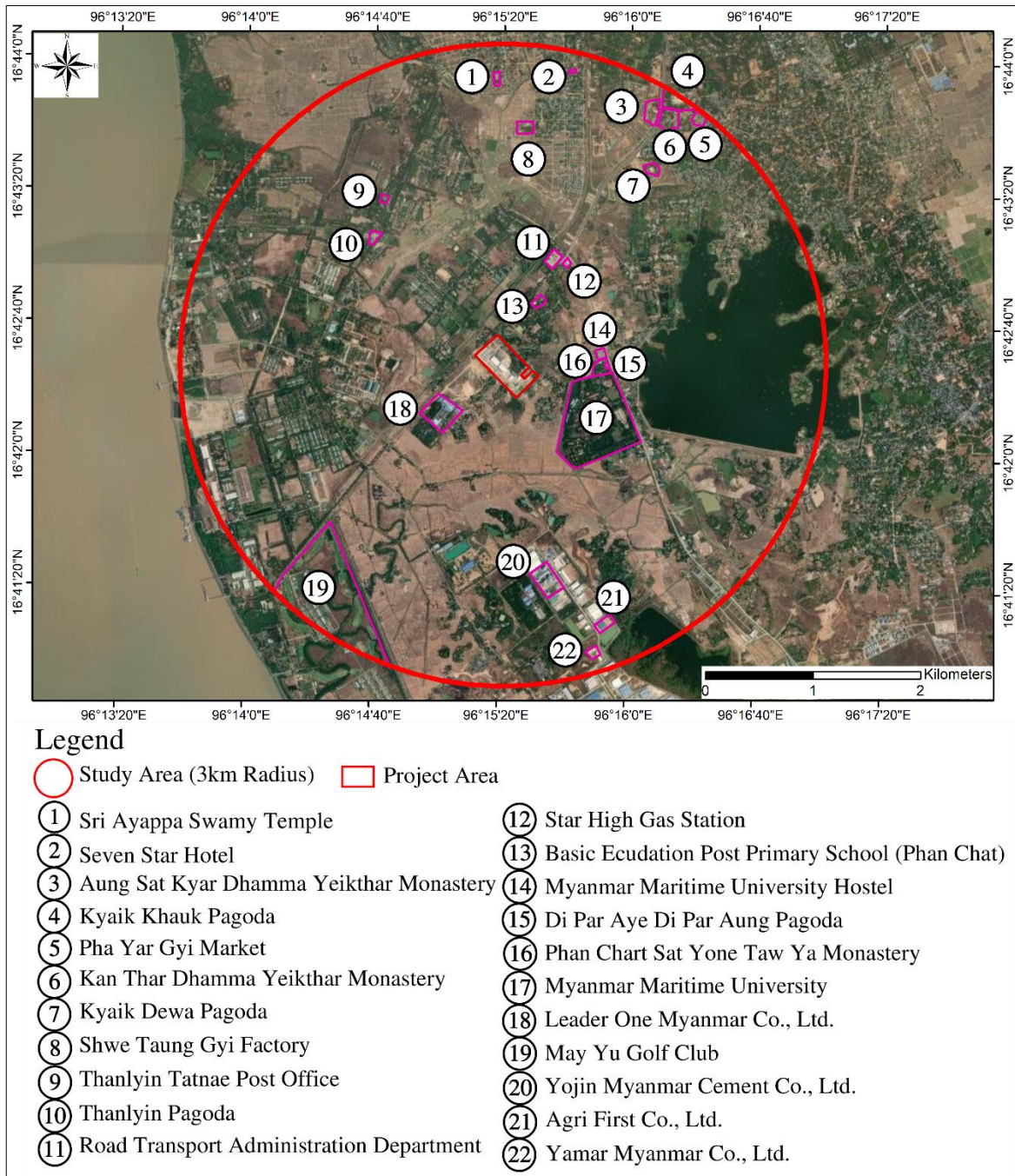


Figure 3-16 Location of Adjacent Features within three kilometer to the Project Site

Table 3-2 Features of Adjacent Area to the Project Site

Geographic Location	No.	Name	Nature
North	1	Sri Ayappa Swamy Temple	Religious Area
	2	Seven Star Hotel	Commercial Area
	8	Shwe Taung Gyi Factory	Industrial Area
North East	3	Aung Sat Kyar Dhamma Ycikthar Monastery	Religious Area
	4	Kyaik Khauk Pagoda	Religious Area
	5	Pha Yar Gyi Market	Commercial Area
	6	Kan Thar Dhamma Yeikthar Manastery	Religious Area
	7	Kyaik Dewa Pagoda	Religious Area
	11	Road Transport Administration Department	Government Area
	12	Star High Gas Station	Commercial Area
	13	Basic Education Post Primary School (Phan Chat)	Government Area
East	14	Myanmar Maritime University Hostel	Government Area
	15	Di Par Aye Di Par Aung Pagoda	Religious Area
	16	Phan Chat Sat Yone Taw Ya Monastery	Religious Area
South East	17	Myanmar Maritime University	Government Area
South	20	Yojin Myanmar Cement Co.,Ltd	Commercial Area
	21	Agri First Co.,Ltd	Commercial Area
	22	Yamar Myanmar Co.,Ltd	Commercial Area
South West	19	May Yu Golf Club	Commercial Area
	18	Leader One Myanmar Co.Ltd.	Commercial Area
North West	9	Thanlyin Tatnae Post Office	Government Area
	10	Thanlyin Pagoda	Religious Area

3.4. PROJECT IMPLEMENTATION

3.4.1. Project Implementation Schedule

Necessary documentation and official registration process are conducted during the initial period. Then, construction activities of the proposed project were started on January 2019. The main construction activities of the proposed project was completed at the end of April 2022. At the same time, finishing work for other minor construction and renovation activities were also conducted at the end of construction period. Besides, the initial operation was started from May to December 2022, followed by the trial production period by the year 2023. Commercially production will be from 2024 to 2066 with 20 years of extension from 2067 to 2086. The decommission phase projected to be in 2087.

In general, MGE will be responsible for the overall management of project implementation, both construction and operation. Project implementation (construction) will be the responsibility of MGE with the advice from a construction-consulting firm. The construction and operation schedule of the propose project is shown in Figure 3-17.

No	Activities	2016-2018	2019		2020	2021	2022			2023	2024-2066	2067-2086	2087
			Jan	Feb to Dec			Jan to Mar	Apr	May to Dec				
1	Initial Period												
2	Starting Time for Construction												
3	Renovation and Construction Period												
4	Finishing Time for Construction												
5	Starting Time for Initial Operation												
6	Trial Period for Production												
7	Commercially Production Period												
8	Extension Period												
9	Decommission Period												

Figure 3-17 Project Construction and Operation Schedule

3.4.2. Number of Construction Workers

The average number of worker is approximately 400 workers per day for construction period. However, total numbers of construction workers in each day varied depend on the type of construction work and schedule.

3.5. GLASS BOTTLES MANUFACTURING PROCESS

3.5.1. Raw Material

In this factory, there are two colors of glass materials, namely; amber and flint. Raw cullet, sand, soda ash, limestone, feldspar, sodium sulphase, carbon and ferric oxide for amber and selenium for flint are used as the Raw Materials (RM) sources for glass bottle production. The ratio of Batch to Cullet (B: C) will vary depend on the desired transparency percentage for each type of material. The transparency percentage of each glass material can vary from 30 percentage to 80 percentage.

In this glass bottles manufacturing process, twenty-three types of raw material are used for various purposes. For example, chemical usage for manufacturing process, factory cleaning purpose and lubricant for machines operation and maintenance purposes. Although the majority of RM are derived from local products, some are imported from several countries such as India, China, UAE, Italy, Thailand and so on. List of raw materials and its average consumption amount based on the B: C ratio of 70 percentage for amber and 50 percentage for flint are presented in Table 3-3. Material Safety Data Sheets (MSDS) of some raw materials are described in Appendix C.

Table 3-3 List of Raw Materials and its Annual Consumption for Production

No	Raw Material	Chemical Consumption	Type of Chemical	Expected Annual Consumption
Raw Material Treatment Process				
1.	Soda Ash	805 ton/ month	Solid	2,000 ton
2.	Selenium	0.31 ton/ month	Solid	1 ton
3.	Feldspar	376 ton/ month	Solid	3,550 ton
4.	Sodium Sulphase (Na ₂ SO ₄)	94 ton/ month	Solid	730 ton
5.	Carbon (C)	4.3 ton/ month	Solid	38 ton
6.	Iron Oxide (Fe ₂ O ₃)	4.82 ton/ month	Solid	16 ton
7.	Fluorocarbon 152A (DFE)	25 kg/day	Gas	2,852 kg
8.	Colmonoy	1.1 kg/day	Solid	50 kg
9.	Brown Aluminium Oxide A120	10 kg/day	Solid	2,000 KG
10.	Sand	2583.07 ton/ month	Solid	-
11.	Limestone	784.18 ton/ month	Solid	-
12.	Cullet	4647.21 ton/month	Solid	-
Hot End Process				
13.	IS Lubricant : Glass HTS 250IS	0.28 drum/day	Liquid	40 drum

No	Raw Material	Chemical Consumption	Type of Chemical	Expected Annual Consumption
14.	Shear Spray Bio glass DLS 67F	0.28 drum/day	Liquid	40 drum
15.	Swabbing Compound Condaglass 370	0.28 drum/day	Liquid	40 drum
16.	Light Mineral Oil 15 USP	0.56 drum/day	Liquid	80 drum
17.	Resigraph TW 400	0.28 set/day	Liquid	41 set
18.	IHI Turbo Oil	4 drum / 3 year	Liquid	5 drum
19.	Hot End Coating Startins	0.56 drum/day	Liquid	80 drum
20.	Only-One	0.19 drum/day	Liquid	28 drum
21.	Hydrolube HMAX68	0.07 drum/day	Liquid	9 drum
22.	Condaglass S24	0.07 drum/day	Liquid	9 drum
23.	Gear TDM 85W140	0,07 drum/day	Liquid	10 drum
24.	Degreaser PB-301	0.22 pail/day	Liquid	32 drum
Cold End Process				
25.	Cold End Coating P4218	0.28 drum/day	Liquid	40 drum
26.	Mold Cleaner Solution MDC-2	5 kg/day	Liquid	1,240 KG

3.5.2. Production Process

The main production process of the factory is manufacturing of glass bottles and it can be divided into five main sections. They are raw material treatment process, batch and furnace section, hot end, cold end, and warehouse delivery.

3.5.2.1. Raw Material Treatment Process

3.5.2.1.1 Cullet Treatment Plant

Recyclable glass bottles are collected from the local subcontractors as a main source of cullet. Then, the collected glass bottles are crushed at cullet treatment plant of the factory to produce the uniform size of cullet with the dimension of 1 square inches. At the same time, small pieces of iron, aluminium, and cans are separated by magnets while that of paper and wooden pieces are vacuum by cyclone (vacuum machine). Twenty numbers of manpower is used for this operation process. The capacity of the cullet treatment plant is 60 tons per day and photos of the plant is shown in Figure 3-18.



Figure 3-18 Cullet Treatment Plant

3.5.2.1.2 Sand Washing Plant

Regarding the main source of raw sand, it is transported from Bote Pyin Township, Tanintharyi Division, Myanmar for initial operation state. After the initial state, raw sand is purchased from Ale-man Kyun, Tanintharyi Division, Myanmar for better quality. Raw sand is transported to MGE through the waterway only in summer and it is stored in the factory compound for the whole year. Expected amount of daily raw sand consumption of the factory is around 100 tons. Generally, natural sand is washed and screened at sand washing plant of the factory with the capacity of 30-40 tons per day. In this process, recycled water from sedimentation pond of the factory is used for sand washing purpose. Photos of the sand washing plant is shown in Figure 3-19.



Figure 3-19 Sand Washing Plant

3.5.2.2. Batch Plant and Furnace

3.5.2.2.1 Raw Material Weighting and Mixing

Raw cullet, sand, soda ash, limestone, feldspar, sodium sulphate, carbon and ferric oxide for amber and selenium for flint are weighted and mixed into the mixer according to the desired B:C. Generally, B:C will vary depend on the desired transparency percentage for each type of material, which are vary from 30 percentage to 80 percentage.

There are three main steps for the process of batch, namely; RM mixing, conveying and scrapping. In general, around 88-90 batches of mixed raw material are required to produce the 5,000 (big) or 8,000 (small) numbers of glass bottles. The photo of batch plant is shown in Figure 3-20.



Figure 3-20 Batch Plant

3.5.2.2.2 Furnace Melting

In this melting process, properly mixed raw materials are delivered to the furnace with specific rate. The furnace zone is connected with the well-designed chimney system to support gas emission from melting process. Brick wall of the furnace is made of insulation bricks with high resistance to heat. The furnace runs for 24 hours per day at a temperature of 1,500 °C and emits **several polluted substances to air**. At the same time, sodium carbonate (Na_2CO_3) is also added to melt the mixture completely. The photos of furnace and chimney are shown in Figure 3-21. **Natural gas is used as a main fuel sources for 24 hours furnace operation**. The average natural gas consumption of the furnace is around 1,200 L/h. At the same time diesel and LPG tanks are stored within the factory as the back up systems for natural gas. the average diesel and LPG consumption of the factory are about 1,300 L/h and 176 kg/h respectively.



Figure 3-21 Furnace and Chimney

3.5.2.3. Hot End

There are altogether three main steps in hot end process. All stages related to hot end process is conducted with the help of the I.S machine, which is produced in Italy. It is installed four numbers of I.S machines in the factory and each machine consists of eight sections for glass bottle formation. Every section consists of two gob feeders (double gob).

In this process, it is essential to use not only the solid and liquid types of chemicals but also fluorocarbon-152a with zero percentage to greenhouse effect is used as alternative of fluorinated greenhouse gases for glass bottle formation. Chemicals used in hot end process are described in Table 3-3. The production speed of the I.S machine and photo of I.S machine are shown in Table 3-4 and Figure 3-22.

Table 3-4 Production Speed of I.S Machine

No	Thickness (ml)	Weight (g)	Cycle/min	Production Speed (bottle/min)
1.	700	475	7.5-8.5	120-136
2.	640	470	7.5-8.5	120-136
3.	350	275	9.5-10.5	152-168
4.	175	170	10.5-11.5	168-184

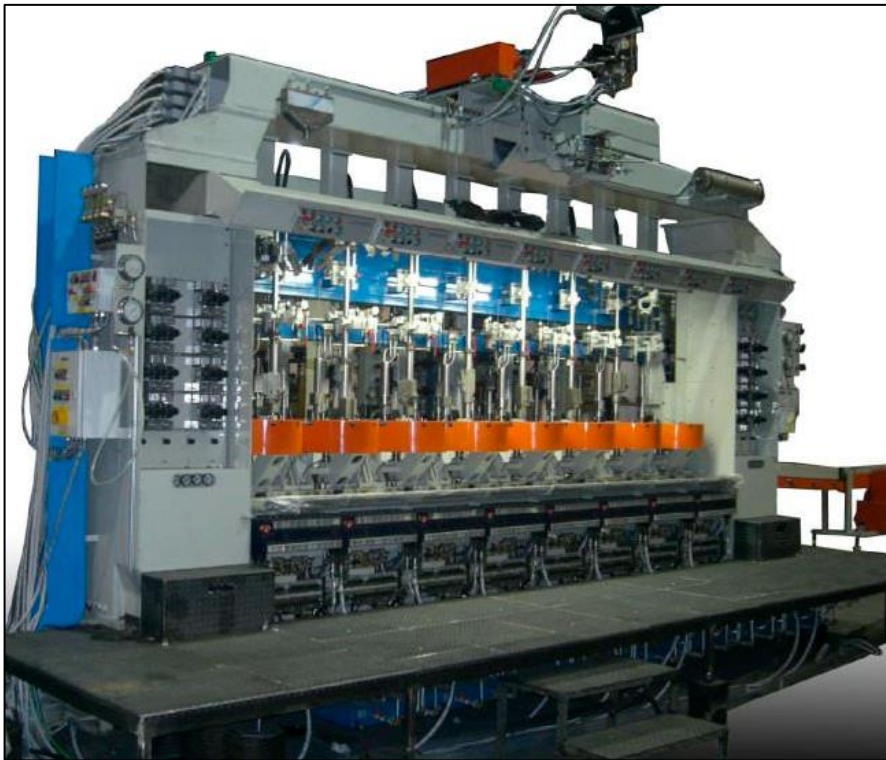


Figure 3-22 I.S Machine

3.5.2.3.1 Working End and Fore Heart

The very first step of the hot end process is working end and fore heart. The mixture from melting process passes through the fore heart at a control temperature to form the texture of honey like glass, called gobs.

3.5.2.3.2 Feeder and Forming

In this stage, gobs of glass are fed into the blank mold of the formation machine drop by drop, followed by the blow mold process to form its final shape.

3.5.2.3.3 Hot End Coating

Once the formation process is completed, the hot bottles are ready for hot end coating process. In this process, several types of chemicals such as shear spray bio glass, swabbing compound condaglass, startin, light mineral oil and resigraph are used for hot end coating purpose. At the same time, other lubricants such as gear oil, hydrolube and some chemicals are also used for both operation and maintenance of the machines. At the end of the hot end process, eight people are assigned to check manually the formed bottles.

3.5.2.4. Cold End

After hot end coating, formed bottles are sent to cold end process to reduce transit abrasion. Annealing, chemical coating and inspection for quality control are three main steps in this cold end process. The name of chemical used in the cold end coating is coating RP40 which provides an excellent protection from mechanical solicitations and scratches while giving a proper slippery surface to the bottle.

3.5.2.4.1 Annealing

In order to cool down bottles temperature, the formed bottles from hot end process are transferred to the annealing machine. This machine helps to eliminate internal stresses of the bottles, which can cause cracking and shattering. The photo of annealing lehr machine is shown in Figure 3-23.



Figure 3-23 Annealing Lehr Machine

3.5.2.4.2 Cold End Coating

Before bottles are passed through the cold end line, those bottles are applied by cold end coater with the help of annealing machine. As a result, it will reduce transit abrasion. The photo of cold end line is shown in Figure 3-24.

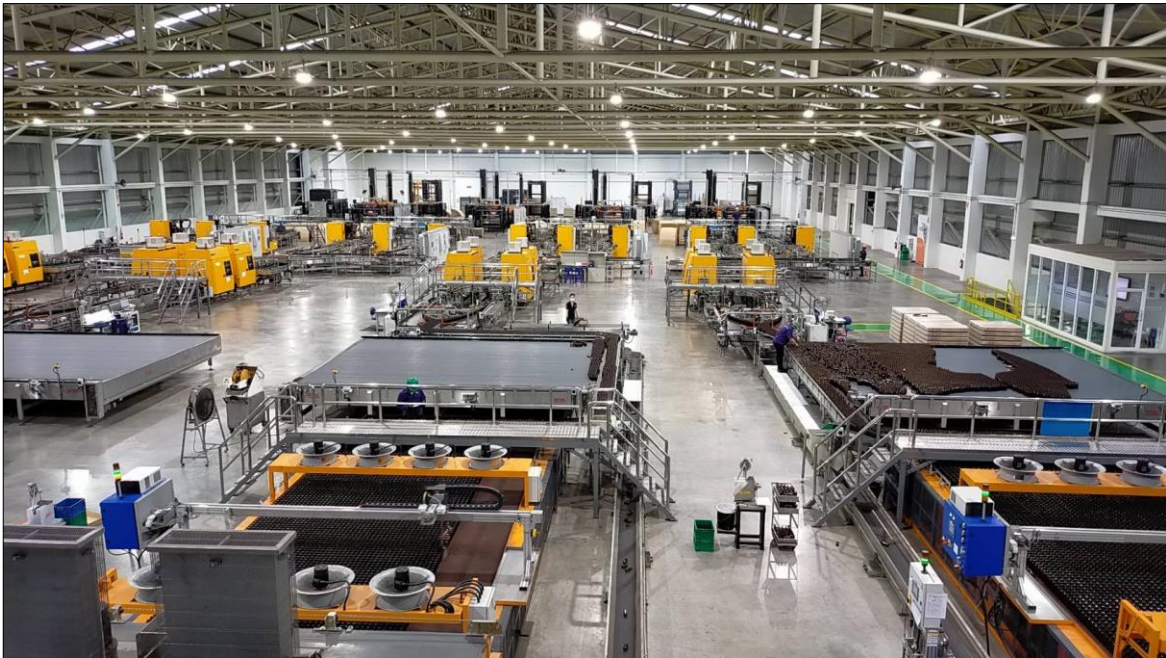


Figure 3-24 Cold End Line

3.5.2.4.3 Quality Control

In this process, it is conducted quality inspection manually for the final product by four numbers of quality control inspectors. Hourly sampling, recording, weight checking and samples testing will be included in this stage.

3.5.2.4.4 Side Wall Inspection

Right after the quality control process, body inspection especially for sidewall is performed for each glass bottle by using Evolution 12 (EV 012) machine.

3.5.2.4.5 Finish and Bottom Inspection

Bottom inspection and finishing of the glass bottles will be included in this process. The bottom inspection for glass bottles will be carried out by Evolution 5 (EV 05) machine. Photos EV012 and EV05 inspection machines are shown in Figure 3-25.



Figure 3-25 Inspection Machines

3.5.2.4.6 Inkjet Marking

After machine-based inspection with EV 012 and EV 05, the bottles need to pass the inkjet marking process. From then onwards, the bottles will be transferred to the final machine inspection process.

3.5.2.4.7 Bore, Check and Thick Inspection

The final inspection machine called M1 is conducted to check the bore size, bottle thickness and shape of glass bottles especially the thread and shoulder. Photos inspection machines is shown in Figure 3-26.



Figure 3-26 M1 Inspection Machine for Side Wall Inspection

3.5.2.4.8 Visual Inspection

Finally, vision-based inspection is backed up by an experienced workforce for visual checking and recording of the bottles. There are altogether eight workers are used for product selection of this process.

3.5.2.4.9 Quality Assurance

After visual inspection, it is also provided two people for quality assurance process with the purpose of hourly sampling and recording.

3.5.2.4.10 Palletizing

Once the necessary inspection is completed, palletizing is done to stack and transfer the final products onto the pallets. Final packing and palletizing can provide maximum protection during transit.

3.5.2.4.11 Stretch or Shrink Wrap

After palletizing, pallets are shrink wrapped for protection against dust and contamination.

3.5.2.4.12 Finish Product

Finally, glass bottles are ready to transfer to the warehouse as the finish product.

3.5.2.5. Warehouse Delivery

The final step of the whole glass bottles manufacturing process is the warehouse delivery. In this process, final products of the factory is stored at the warehouse before distributing to the market. Detailed production process is shown in Figure 3-27.

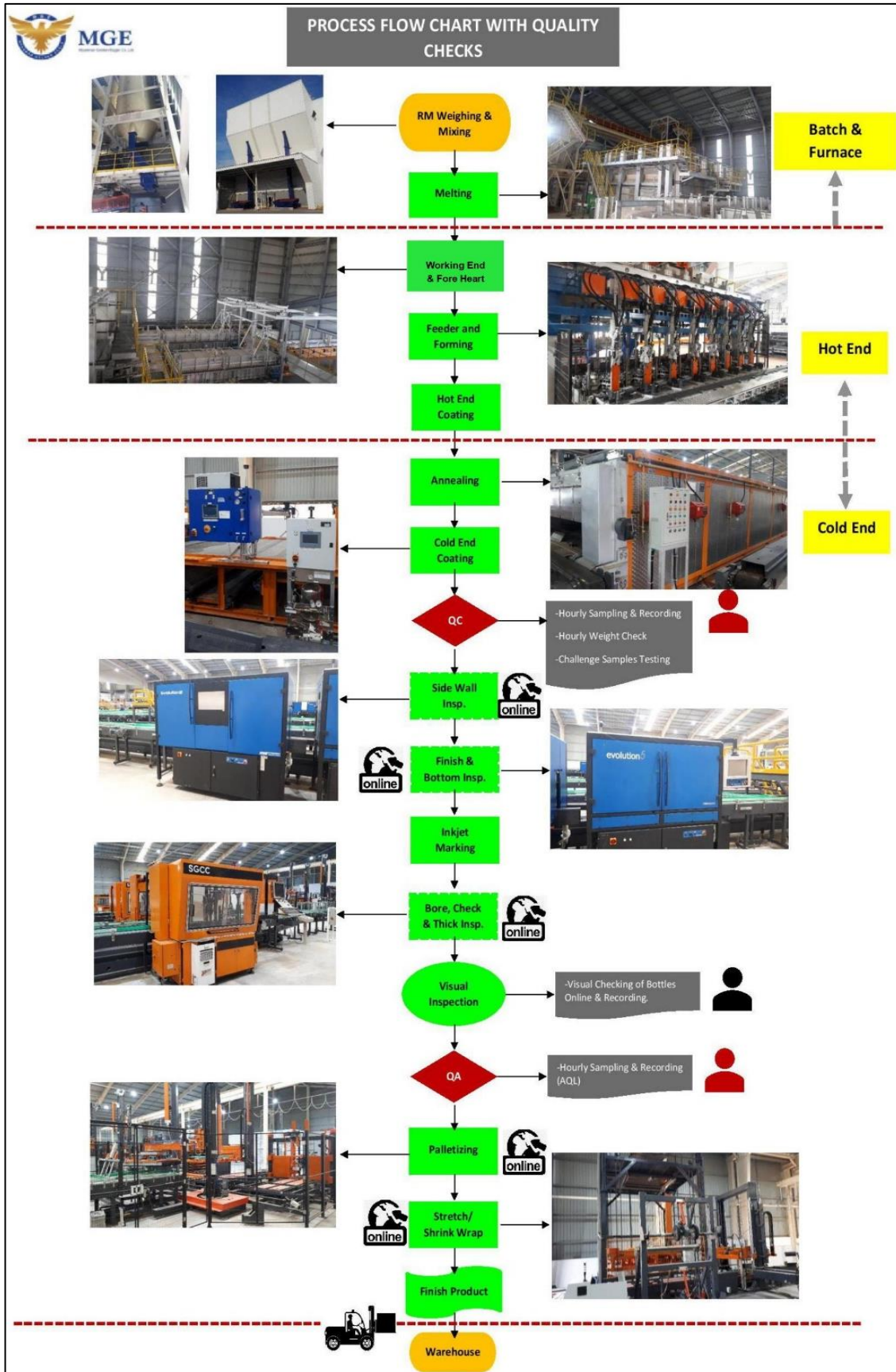


Figure 3-27 Production Processes Flow Chart

3.5.3. Products

In this process, monthly raw material consumption is around 8,550 tons and 70 percentage of it will be packed as a product while the rest 30 percentage becomes by-products. In general, it is available to produce two types of glass bottles, namely; amber (brown color glass material) and flint (transparent glass material). Picture of products samples are shown in Figure 3-28. The expected glass bottles production rate of the factory is between 120 to 185 bottles per day and it can vary based on the customers' requirements. The average glass bottles production rate of the factory is 450,000 bottles per day (200 tons/day).



Figure 3-28 Photo of Products

3.6. PROJECT COMPONENTS

3.6.1. Project Development

The proposed project includes construction of one to two storey building and renovation activities. According to the master layout plan, it can be classified into six types. They are factory, warehouse, office, green areas, carpark and old building areas. Land use prescription of the project area is shown in Table 3-5.

Table 3-5 Land Use Prescription of the Project

No.	Particulars	Type of buildings	Total Area	
			Unit	Dimension
1.	Total Land area		m ²	161,874
2.	Land for new Construction area	Factory	m ²	10,376
		Raw material preparation plant	m ²	6,235
		Sand washing plant	m ²	1,110
		Total	m ²	17,721
3.	Land for the renovation area	Warehouse	m ²	9,000
		Accommodation	m ²	3,400
		Office	m ²	1,785
		Existing buildings area	m ²	900
		Total	m ²	15,085
4.	Building height	Low zone of the factory	m	6
		Height zone of the factory	m	11
		Other buildings including office	m	3-4
5.	Green area	Garden	m ²	18,900
		Permeable area	m ²	106,668
		Total	m ²	125,568
6.	Car parking lots	Truck parking	m ²	2,500
		Car parking	m ²	1,500
		Total	m ²	3,500

3.6.1.1. Parking Lots

There are two types of parking lots in the factory area for trucks and private cars. The total area of parking lot for private cars and trucks is around 1,500 square meters and 2,500 square meters respectively. It is designed to park 45 numbers of private cars and 18 numbers of trucks in maximum. The location of the parking lot is shown in Figure 3-29.

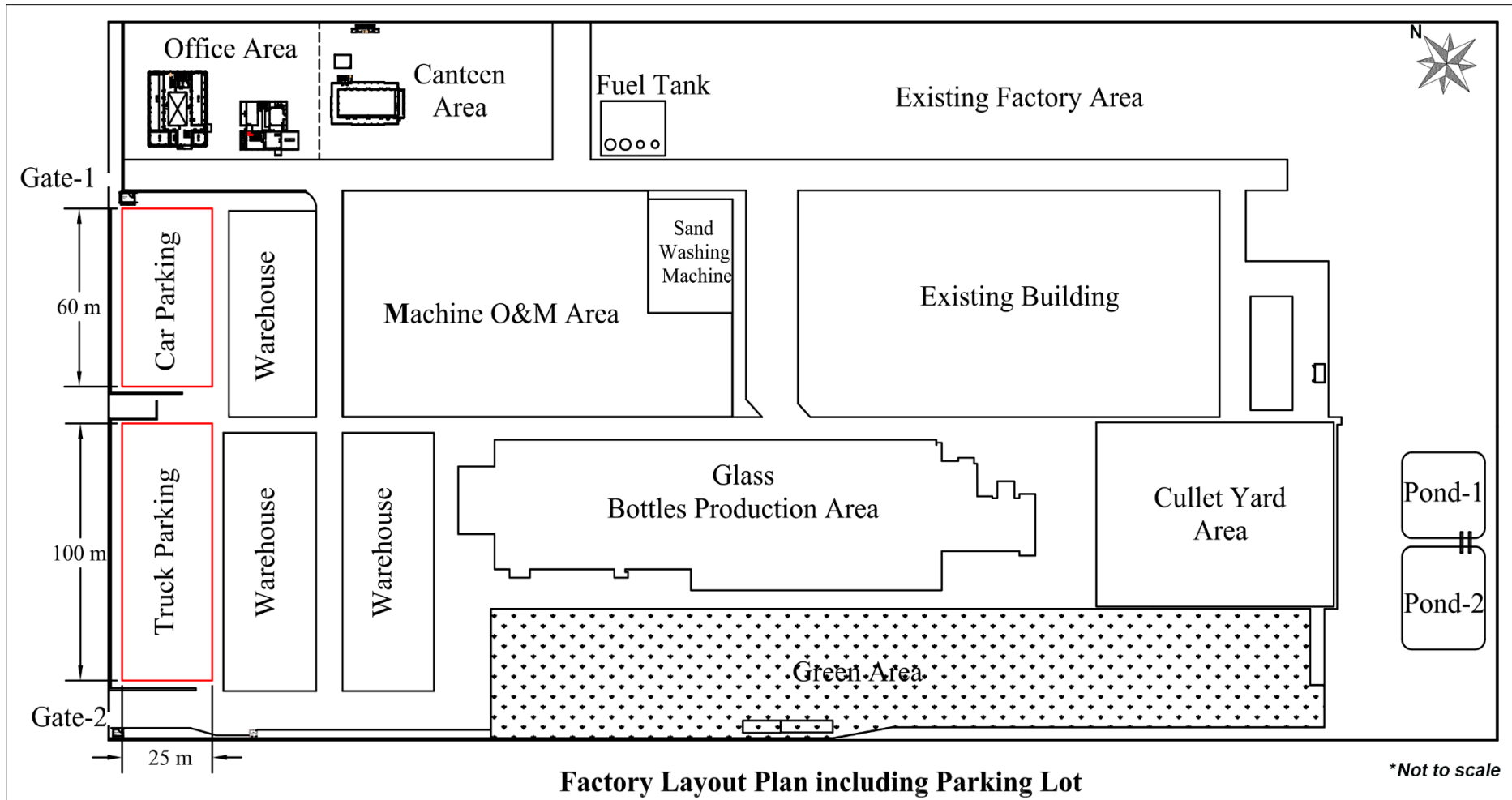


Figure 3-29 Parking Lots Drawing

3.6.2. Refractory Materials

As the glass bottles manufacturing process takes place at a high temperature (up to 1,500°C) with 24-hour operation time, furnace for glass melting purpose plays a vital role in this manufacturing process. Materials that can resist high temperatures, called glass furnace refractories can help to maintain the physical properties of the furnace lifetime. The refractories for furnace are used for various purposes such as contact with the glass, superstructures, and regenerator material, etc. In this process, refractories are classified into five groups according to the purpose of usage. They are refractories for bonded purpose, fused cast, insulation, monolithic and pre-cast purposes. Moreover, temperature sensors is installed at each zone of the furnace and type of insulation bricks used for furnace is differ from one zone to another.

On the other hand, certain refractories can cause negative impacts on both human and environment especially the hazard of greenhouse effect. Therefore, it is important to follow all the instructions from Material Safety Data Sheets (MSDS) related to each chemical before using. List of refractories used in furnace as well as types of refractories and its location in furnace are shown in Table 3-6. MSDS for all refractories are shown in Appendix D.

Table 3-6 Types of Refractories and Location in Furnace

No	Refractory Type	Classification	General Location in Furnace
1.	G-AS-60	Bonded	Melter and working end Crown, Melter refining and working end Superstructure, etc.
2.	G-AS-60J		
3.	G-AS-60Z		
4.	G-MG-95S		
5.	G-MG-98		
6.	G-RG-34		
7.	G-SK-34		
8.	G-SK-36		
9.	G-ZM-B		
10.	G-ZR-65		
11.	OCL SLC SDS		
12.	RG-35		
13.	ZB-1681	Fused cast	Melter sideblocks, Melter tuckstones, Melter pavings, Melter superstructure, etc.
14.	ZB-1691		
15.	ZB-1711		
16.	Insulating Fire Bricks (A4, A5, A6, B1,B2,B4, B5, B6,B7)	Insulation	Insulation purposes, Superstructure of the furnace , Bonding of insulating fire bricks, etc.
17.	Insulation Bricks		
18.	ISB Silica Brick		
19.	AK Coat		
20.	ASD-F		
21.	BS paper		

No	Refractory Type	Classification	General Location in Furnace
22.	BSAB00- Mille Board		
23.	BSBS001- Mille Board		
24.	DENKA ALCEN		
25.	P-SDS		
26.	Rokceram		
27.	Superwool HT Board		
28.	TMT-1000, 1000S		
29.	TMT-1300		
30.	TMT-1500S, 1500SP, 1500STR		
31.	TMT-1500S		
32.	CA-13S Spec		
33.	CLC-A649-RE		
34.	GSM Spec		
35.	HMS Cement Spec		
36.	LC-10S		
37.	LC-12N		
38.	M-34		
39.	M-37		
40.	M-SA		
41.	P RF-AZS2		
42.	RGM Spec		
43.	TMT-1000 Spec		
44.	TMT-1500 Spec		
45.	ZM-2500D Spec		
46.	ZM-2500EKI Spec		
47.	ZM-2500W		
48.	ZMM Spec		
49.	ZR-3500D Spec		
50.	ZR-3500EKI Spec		
51.	ZR-3500W		
52.	P/CLC-A539-RE	Pre-cast block	Readymade cover block installation, etc.
53.	P/CLC-A610-RE		
54.	P/CLC-A649-RE		
55.	P/CLC-A650-RE		

3.6.3. List of Machines and Vehicles for Production Process

Regarding the operation process, all machines used for glass bottles manufacturing is connected to the grid electricity system except furnace and vehicals. In case of electricity outage, generator is used to continue to operate the process. Meanwhile, furnace uses natural gas for 24 hours operation. Diesel and LPG are also stored as the back-up fuel for furnace. List of machines and vehicales for glass bottle production process is shown inTable 3-7.

Table 3-7 List of Machines and Vehicles

No	Type	Quantity	Fuel Type	Source of Energy
1.	Furnace	1	28,800 L/d (1,200 L/h)	Natural Gas
			1,300 L/h (Back-up)	Diesel
			176 kg/h (Back-up)	LPG
2.	Forklift	6	33 L/d	Diesel
3.	Wheel Loader	2	367 L/d	
4.	Excavator	1	236 L/d	
5.	Dump Truck	1	40 L/d	
6.	Generator	1	450-500 L/h (Back-up)	Diesel
Machines used in Batch and Cullet Treatment Process				
No	Type	Quantity	Source of Energy	
Batch Plant Equipment				
1.	Vibrator Motor	5	Grid electricity	
2.	Vibratory Feeder	8		
3.	Bucket Elevator	4		
4.	Diverter Gate	4		
5.	Screw Feeder	9		
6.	Slide Valve	10		
7.	Bag Empty Station	2		
8.	Level probe	15		
9.	Bin Activator	2		
10.	Moisture Probe	2		
11.	Hopper Scale	4		
12.	Flow Meter	1		
13.	Ball Valve	1		
14.	Pneumatic Hammer	1		
15.	Belt Conveyor	5		
16.	Magnetic Separator	2		
17.	Scraper conveyor	1		
18.	Hammer Crusher	1		
19.	Cabinet	1		

No	Type	Quantity	Fuel Type	Source of Energy
Batch Charging Equipment				
20.	Oscillating Batch Charger	3		Grid electricity
21.	Local Electrical Panel for Pusher and Oscillating	2		
22.	Electrical Vibrator Feeder	2		
23.	Local Electrical Panel	2		
Cullet Treatment Plant				
24.	Hopper/Tray Feeder set/ Support	3		Grid electricity
25.	Complete Belt Conveyor Set (Glass cullet)	14		
26.	Complete Belt Conveyor Set (Al)	1		
27.	Belt Scale System	1		
28.	Cyclone Machine	1		
29.	Eddy Current	1		
30.	Electrical Control Panel(1 LOT= 2 SETS)	1		
31.	Hammer Mill	1		
32.	Magnetic Belt Separator and Motor	2		
33.	Rotary Screen	1		
34.	Permanent Magnetic With Support	1		
35.	Spare Part	1		
36.	Magnetic Separator unit for Cullet Conveyor	1		
37.	Combined coating measurement system	1		
38.	Truck scale	1		
39.	Tilt Table	1		
40.	Crushing Machine	1		
41.	Grinding Machine	1		
42.	Sand Washing Machine	1		
Furnace Equipment for Working End / Forehearth				
43.	Firing Equipment for Working End / Forehearth	1		Grid electricity
44.	Complete Firing Main Unit for Working End and Forehearth	1		
45.	We Combustion Blower			
46.	We Combustion Blower	2		
47.	Electrical Local Panel	1		
48.	Pressure Switch	1		
49.	We Cooling air Fan	1		
50.	Electrical Local Panel	1		
51.	Temperature sensor and Control System			

No	Type	Quantity	Fuel Type	Source of Energy
52.	WE TC for crown each zone including Conventional cable each 50M		5	
53.	WE Main gas flow meter		5	
Furnace Equipment for for Melter (ME)				
54.	Burner equipment			Grid electricity
55.	Burner hardware (NG firing burner with holder, flex hose and accessories)		8	
56.	Spare burner gun		4	
57.	Oil burner gun Back up		8	
58.	Firing Unit for ME (Equipment Assembly)			
59.	Firing Complete Unit		1	
60.	Cooling Air Unit		2	
61.	ME combustion Equipment			
62.	Transmitter of D/P		1	
63.	Orifice Plate		1	
64.	Resistance Bulb		1	
65.	Flow Control Damper		1	
66.	ME Combustion Fan (600m3/min x 200mmAq)		2	
67.	Local Electric Panel		1	

3.6.4. Water Supply System

3.6.4.1. Water Source

For both construction and operation periods, the main water supply source will come from government water supply system. In this project, raw water from Zarmani Inn Reservoir is used as the main source of government water supply for the factory. In general, raw water from Zarmani Inn Reservoir is stored in the existing water tanks with the capacity of 200,000 gallons within the project area before passing through the factory's Water Treatment Plant (WTP).

3.6.4.2. Quantity of Water Demand and Consumption

During the construction period, daily raw water consumption of the project is 220 cubic meters per day and that of drinking water consumption is around 8 cubic meters per day for construction period. The drinking water consumption will vary depend on the total numbers of construction workers. Regarding the operation period, the estimated daily raw water consumption will be around 6,500 cubic meters per day and that of drinking water consumption will be less than 8 cubic meters per day.

3.6.4.3. Water Treatment Plant

It is installed the series of sand filter, carbon filter and softener as a pretreatment system of Reverse Osmosis (RO) plant for factory water treatment system. The capacity of factory WTP is 30 cubic meters per hour. The technical drawing of WTP is shown in Figure 3-30. Firstly, city water from existing water storage tanks of the factory is passed through the sequencing sand and carbon filters before being stored in the pre-treated city water tank. Then, pre-treated water is pumped up to the water tower to pressurize water for distribution. The distributed water from water tower is used for general cleaning purposes within the factory compound.

At the same time, a certain amount of water from water tower is also treated by softener and stored in the soft water storage tank while reject water from softener is drained directly into the sedimentation pond. The treated soft water is used for production process such as scoop spray system of the IS machine, indoor factory process and RO influent.

Finally, a certain amount of treated soft water is also treated by RO plant and the capacity of NANGANG RO filter is 5 cubic meters per hour. Finally, the RO permeate water will be used for production process especially for the shear spray system of the IS machine.

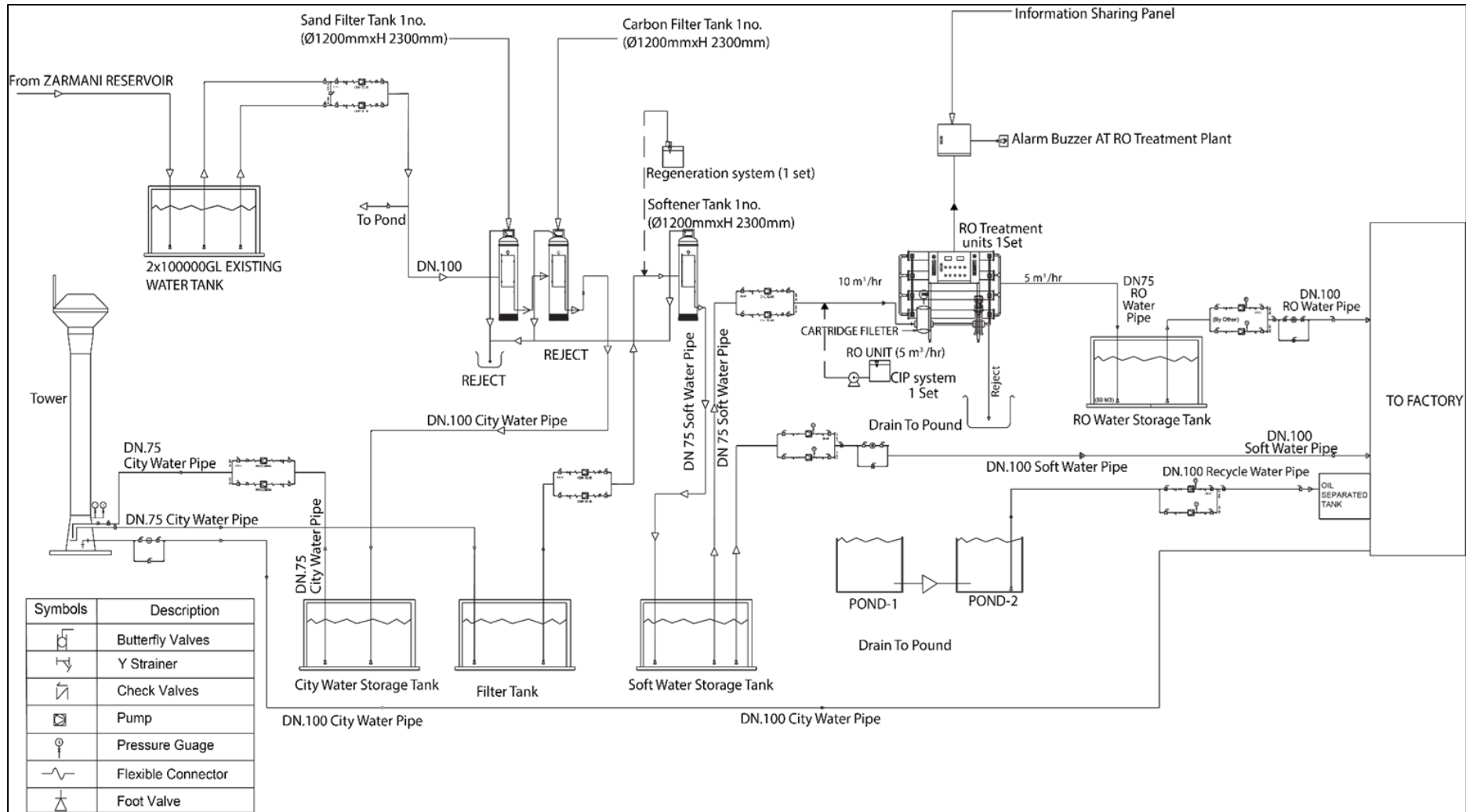


Figure 3-30 MGE Factory Water Supply System

3.6.5. Wastewater Treatment System

3.6.5.1. Domestic Wastewater

The domestic wastewater is generated from, gardening, general cleaning, canteens and sewage water from factory toilets.

The water from gardening and general cleaning is discharged into the municipal drainage channel via gutter and factory's drainage system.

The wastewater from the factory's toilets, kitchen and canteen is treated by underground bio tank. Effluent from bio-tank outlet is spread outward as a drainfield while sludge from bio-tank will be collected by municipal vacuum truck for further treatment process. The arrangement of a drain field pipes is installed as underground type and designed to prevent wastewater from being ingested by animals and to prevent runoff.

In addition, fine screens are installed at the inlet of the domestic wastewater pipeline to collect the residual food waste from canteen before transferring into the underground bio tanks. Fine screens are cleaned regularly and wastes from fine screen especially food waste are collected at the garbage bins. After that it is transferred to the municipal waste disposal area of Thanlyin Township. The detailed drawing of the bio-septic tank is shown in Figure 3-31.

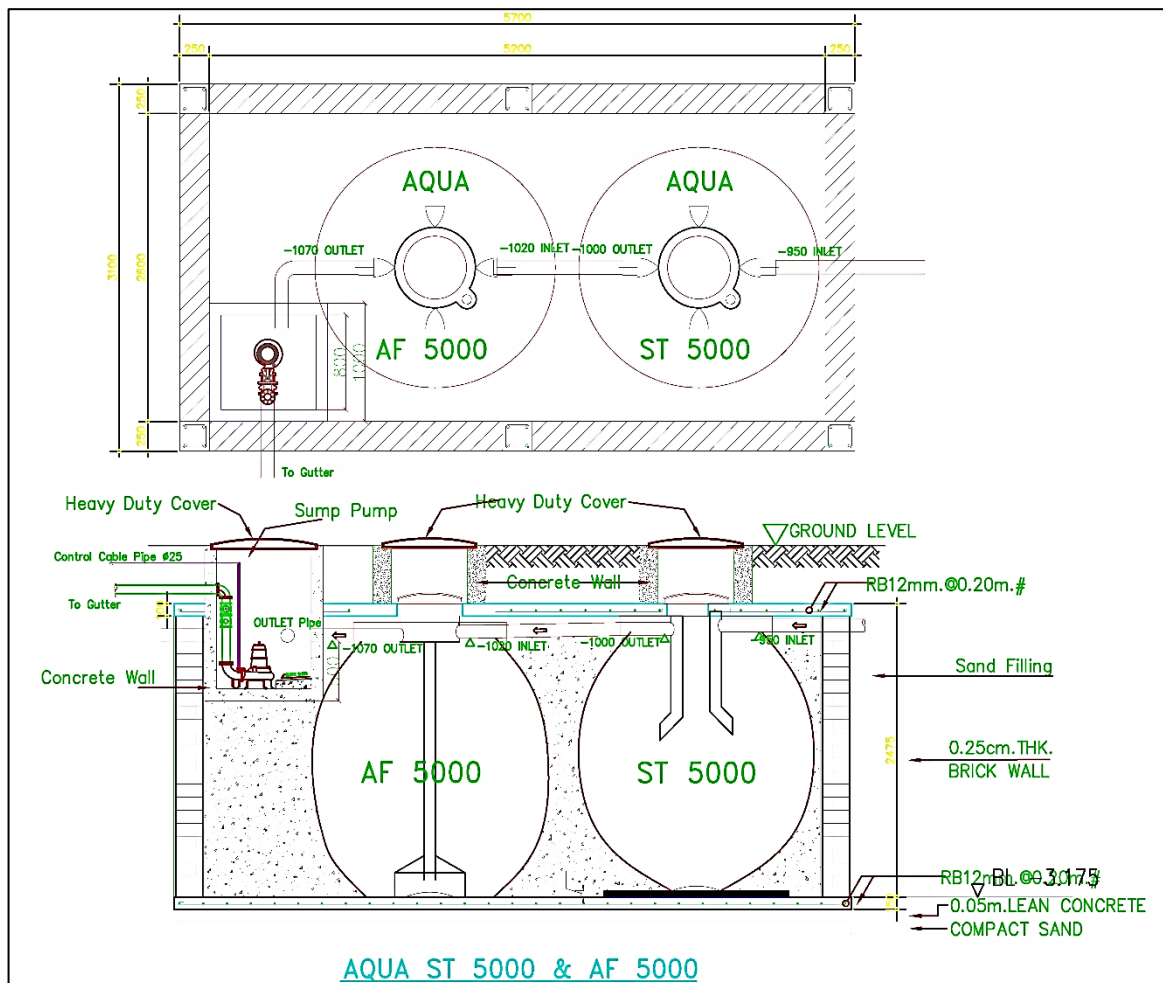


Figure 3-31 Detailed Drawing of the Septic Tank

3.6.5.2. Industrial Wastewater

The expected daily water consumption for processing purposes is around 6,500 cubic meters per day. The wastewater from the production process is pre-treated by oil separation system. Then, the pre-treated wastewater is discharged into the sedimentation pond. There are altogether two numbers of wastewater sedimentation ponds. The total volume of sedimentation ponds is 5,000 cubic meters for each. The depth of the ponds are 5 meters. At the same time, all wastewater from sedimentation ponds are also used as the recycled water for raw material washing purposes. However, excessive water overflow points are also installed at the sedimentation ponds to control the water level. The overall flow diagram of WWT system of the factory is shown in Figure 3-32.

The detailed of the process wastewater treatment process are as follows:

(1) Oil Separation Tank

Oil separation is the very first step of WWTP where the oil remover is installed. The purpose of the oil separation tank is to remove grease and oil from the raw wastewater in order to get better working efficiency for next treatment process. At the same time, collected oil from oil separator is sold to the sub contractor.

(2) Sedimentation Ponds

The sedimentation pond is used to remove the settleable solids. From there, the accumulated sludge is transferred to land disposal while water from this pond is also recycled for raw material washing process. The total volume of sedimentation ponds is around 5,000 cubic meters. Finally, effluent treated water from sedimentation ponds is used as a recycle water. Besides, excessive water overflow points are also installed at the sedimentation ponds to control the water level.

(3) Sludge Collection and Disposal Method

Accumulated sludge from sedimentation ponds and septic tank (bio tank) will be pumped out regularly according to the design calculation. Normally, desludging is required once a year or twice a year in case of large sludge volume. It is planned to use the sludge from sedimentation ponds for landfill process within the factory compound. The process flow diagram of MGE wastewater treatment system are shown in Figure 3-33.

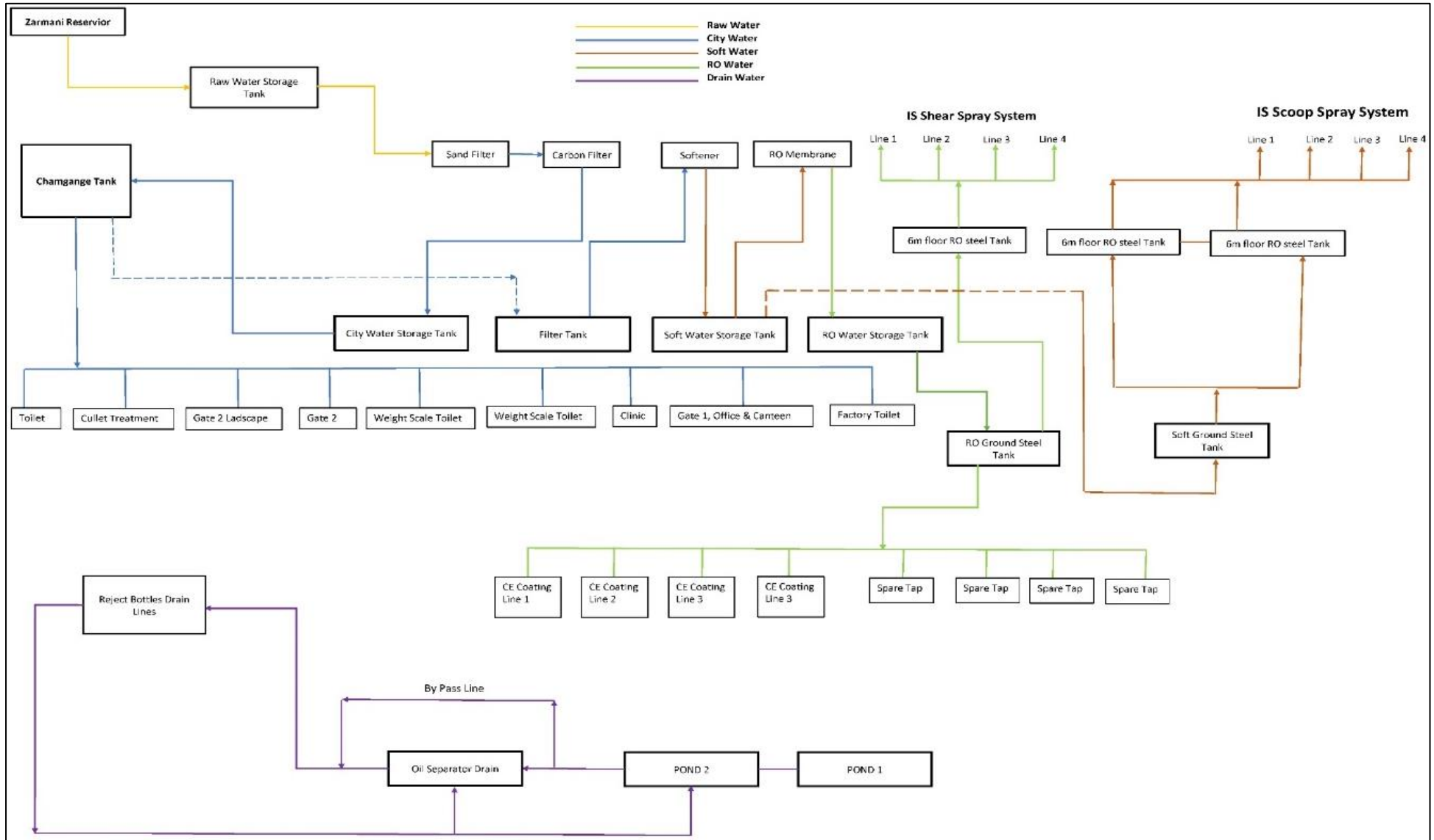


Figure 3-32 Process Flow Diagram of MGE Watery Supply and Wastewater Treatment System

3.6.6. Power Supply

3.6.6.1. Electricity

Electricity used in operation process is from township main grid line. There is a transformer with the capacities of 8 Megavolt-ampere (MVA) with On Load Tap Changer (OLTC) is situated within the factory compound. It is also installed two OLTC with 2,000 Kilovolt-ampere (kVA), one OLTC with 3,500 Kilovolt-ampere (kVA) and one OLTC with 50 Kilovolt-ampere (kVA) for station use. Photos of transformer and OLTC are shown in Figure 3-33 and Figure 3-34.



Figure 3-33 Photo of Transformer



Figure 3-34 Photo of On Load Tap Changer

3.6.6.2. Generator

Mitsubishi MGS series diesel generator set is installed for emergency use in case the government electricity breaks down. The capacity of the generator is 1,500 revolution per minute for 380 volts (1,500rpm/380V). Engine rating of the generator is 1,800 kVA for prime and 1,920 kVA for stand-by. The photos of the MGS 1500B generators and its engine operation data are shown in Figure 3-35 and Table 3-8. Generator license and other necessary documents of MGE from relevant government sectors are also described in Appendix A.



Figure 3-35 Generator

Table 3-8 Generator's Engine Operating Data

Item	Units	Stand-by (1,920 kVA)	Prime (1,800 kVA)
Gross Engine Power with fan basic	kWh	1678	1523
Noise Level at 1 m (excluding: intake, exhaust & fan)	dB (A)	111	109
Combustion air inlet flow rate	m ³ /min	143	127
Exhaust gas flow rate	m ³ /min	378	334
Exhaust gas temperature	°C	530	520
Heat rejection to atmosphere from generator	kW	75	66

3.6.6.3. Fuel Consumption and Storage System

Regarding the fuel consumption, diesel, natural gas and Liquefied Petroleum Gas (LPG) are stored and applied for the factory operation. Diesel is mainly used for generator which provide the backup power when electricity outage occurs. Therefore, the rate of diesel consumption is mainly dependent on the duration of electricity access at the factory. The average diesel consumption of the generator is around 450-500 L/h. Moreover, diesel is also necessary for vehicals which are used in operation process such as forklift, wheel loader, excavator and dump truck. The diesel consumption rate of the vehicals is around 676 L/d. In addition, in case of natural gas shortage, around 1,300 L/h of diesel is also essential for furnace operation process. There are two numbers of diesel storage tanks with the capacity of 125,000 gallons(big) and 26,000 gallons(small) respectively. In addition, two extra numbers of empty diesel storage tanks are also installed for buck up purpose.

One the other hand, natural gas is used as a main fuel sources for 24 hours furnace operation. The average natural gas consumption of the furnace is around 1,200 L/h. There is no storage area for natural gas within the storage area and natural gas is directly supplied from the Government Gas Production Project, Yadana Gas Field under the control of Myanmar Oil and Gas Enterprise (MOGE). At the same time diesel and LPG tanks are stored within the factory as the back up systems for natural gas. the average LPG consumption of the factory is about 2,200 kg/h. Among them, 176 kg/h of LPG is used for furnace.The photos of fuel storage tanks are shown in Figure 3-36 and Figure 3-37.



Figure 3-36 Diesel Storage Tank



Figure 3-37 LPG Storage Tank

Both diesel and LPG storage tanks are constructed by complying the relevant law and regulation strictly. The horizontal distances from LPG storage tanks to the office and factory buildings are 0.71 km and 0.23 km respectively. For the diesel storage tanks, it is located 0.07 km from office and 0.09 km from the factory. The locations of fuel storage tanks are shown in Figure 3-38. All the documents related to fuel storage and fuel export-import permits of MGE from relevant government sectors are also described in Appendix A.

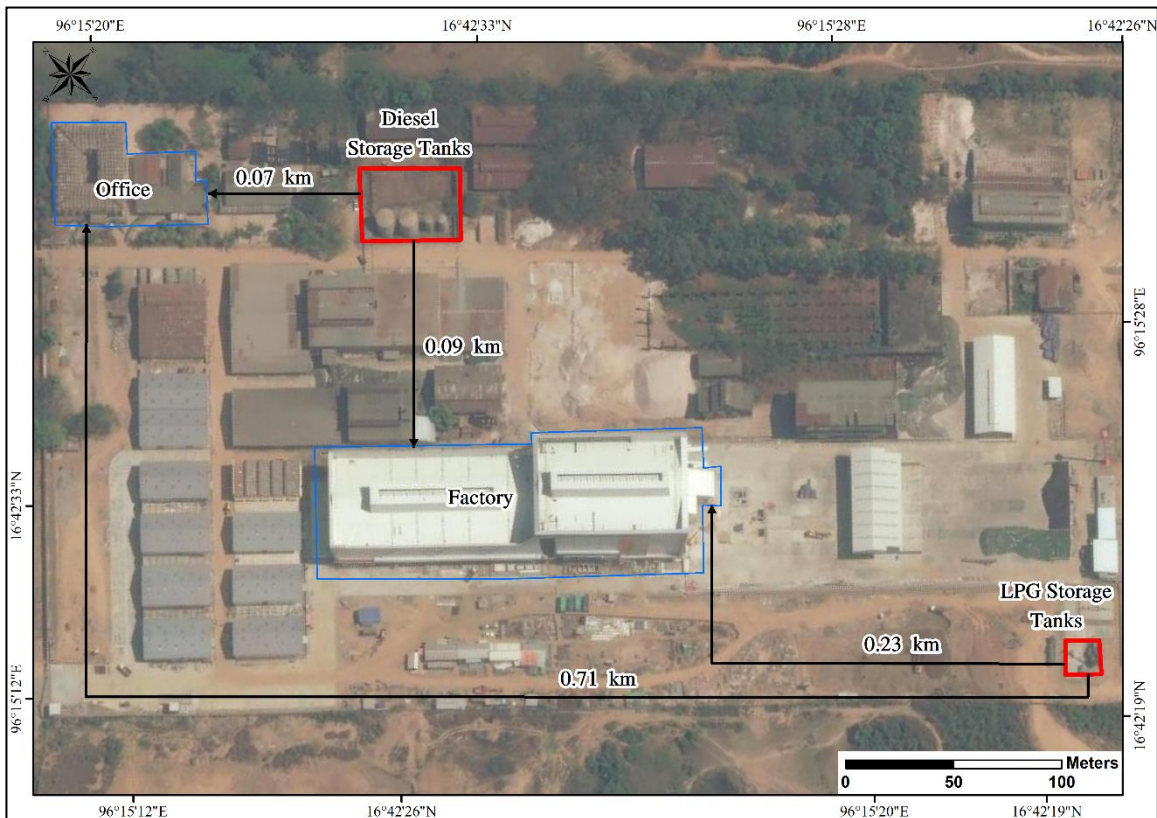


Figure 3-38 Locations of Fuel Storage Tanks

3.6.7. Solid Waste Generation

3.6.7.1. Non-Hazardous Wastes

Non-hazardous wastes can be classified into three main types, namely; general waste including used tissue,paper,food bags, etc from office, domestic wastes especially food wastes from canteen and recycle wastes including broken pieces of wood, glass, plastic and metal from production process.

According to the IGES (2016)⁵, the estimated amount of waste generation from each person is 0.4 kilogram per person per day. There are 400 workers during operation phase and the waste generation is approximately 160 kilograms per day. Regarding glass bottles manufacturing process, non-hazardous wastes are mainly come from the initial raw material preparation and cleaning process.Type of non-hazardous wastes are shown in Table 3-9.

Table 3-9 Type of Non-Hazardous Wastes and Expected Generation Amount

No	Type of Non-Hazardous Waste	Waste Amount
1.	General wastes	160 kg/day
2.	Domestic wastes	100 kg/month
3.	Recycle wastes	21 tons/months

3.6.7.2. Hazardous Wastes

Several types of hazardous wastes are generated from production process. Types of hazardous wastes are shown in Table 3-10. Generally, it is planned to sell some hazardous wastes such as used brush, containers as well as oil and grease to sub-contractors while other infectious wastes are collected by Township Municipal trucks for final disposal by complying the law, regulation and guidelines related to hazardous waste disposal. Flow diagram of MGE Solid Waste Management System is shown in Figure 3-39.

Table 3-10 Type of Hazardous Wastes and its Amount of Generation

No	Type of Hazardous Waste	Waste Amount
Production Process		
1.	Used brush contact with swabbing compound from glass bottles production process	1.7 kg/day
2.	Container/Cans of lubrication and chemical from glass bottles production process	
3.	Grease and oil from process wastewater	1,500 L /year
Factory Clinic		
4.	Infectious wastes	1 to 5 kg/day

⁵ IGES (June, 2016), Quick Study On Waste Management in Myanmar

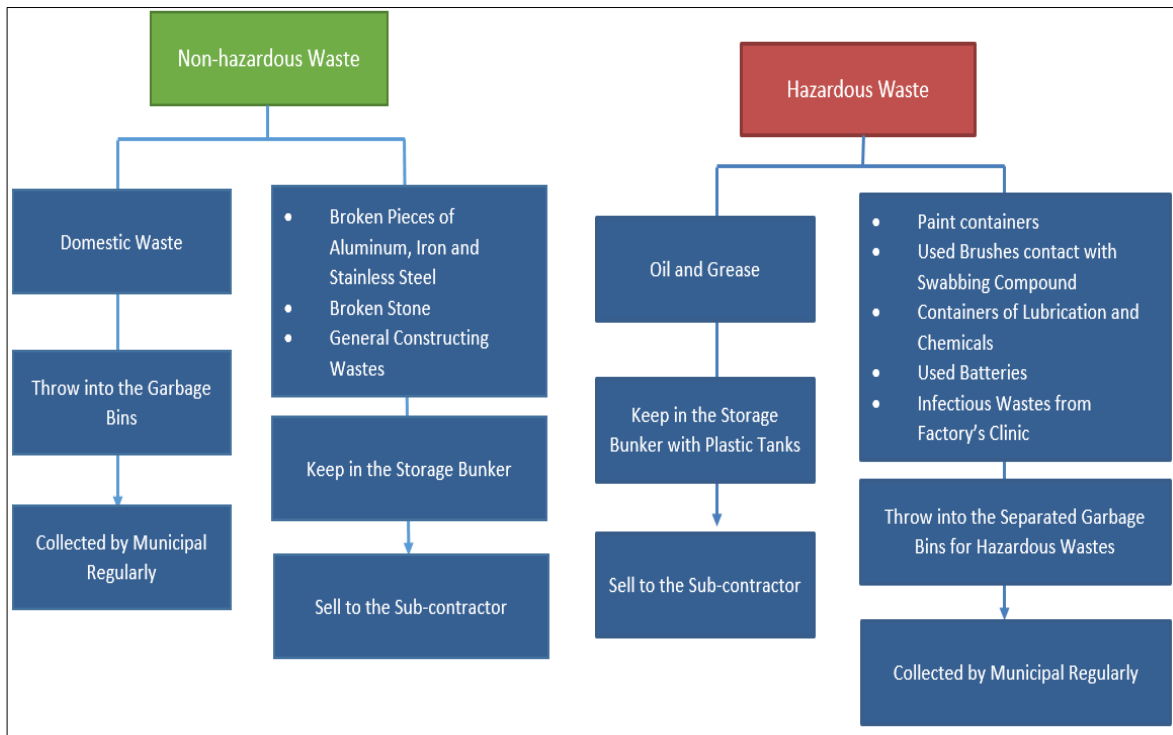


Figure 3-39 Flow Diagram of MGE Solid Waste Management System

3.7. EMPLOYMENT

Generally, specific working time for main office staff is from 8:00 am to 5:30 pm from Monday to Friday and the break time is 12:00 to 1:00 pm. Weekends and other gazette holidays are closed. Currently, there are altogether 400 employees at the office and human resource can vary depend on the production rate of the factory's operation stage.

On the other hand, the production department is operated for 24 hours with two shifts, three teams. Namely, 8:00 am to 8:00 pm and 8:00 pm to 8:00 am. It is required three teams for full coverage and the total numbers of workers in one team can be more than 44 people depend on the production condition. All members from both shifts have to work for four day shifts and one day off, then four night shifts and three day off repeatedly.

3.8. SUPPORT FACILITIES FOR WORKERS

Regarding the facilities, the factory will provide accommodation within the factory compound for shifted staff. At the same time, it is also provided the ferry and other allowance such as uniform, bonus, etc. to the staff.

Regarding the workplace, it is also provide rest places, canteen, and good sanitation facilities for workers. In addition, it is also planned to provide the factory clinic. The clinic will have one doctor for working hours and a nurse for 24 hours stand by with rostered shifts. For the production workers, Personal Protective Equipment (PPE) and first aid kits will also be supplied at work place.

CHAPTER 4

EXISTING ENVIRONMENTAL AND SOCIAL CONDITION

4.1. SETTING THE STUDY LIMIT

In this study, it is necessary to establish baseline information on the environmental and socio-economic settings of an area which could receive directly and/or indirectly impacts from the project construction and operation. The baseline information serves two purposes. Firstly, it is used in conjunction with the information on the project, for identification of potential impacts of the project and assessment of their significance. Secondly, it serves as the benchmark for evaluating the environmental and social management performance of the project's construction and operation. This chapter describes the environmental and socio-economic settings of the study area based on available information collected during the field survey and secondary data from the Township General Administration Department (GAD), 2019.

4.1.1. Geographical Study Limit

The geographical study limit is defined as the area surrounding the project site from which the collection of baseline information collection should be performed. The project is located at Yangon-Thilawa Terminal Road, Phayagone Village, Thanlyin, Township, Yangon, Myanmar. The project site is approximately 40 acres. The surrounding comprises paddy fields, residential area, academic institution and industrial facilities. Due to the nature of the manufacturing process and type of technology use, the area of influence (AOI) by the project or geographical study limit for EIA study is considered to be 3-km radius. To be more specific, the summary of glass manufacturing process, its potential impacts and AOI by the project is illustrated in Table 4-1.

Table 4-1 Summary of Manufacturing Process and Project AOI

Manufacturing Process	Potential impact	Potential AOI by the project
Raw material transport	Likelihood of road accidents which may harm to local residents	Since raw material will be transported by the different suppliers via different access roads to the project site, the project AOI will be access roads around the project site.
Raw material treatment process	Generation of noise and vibration, and workplace injury	The project AOI for raw material treatment process will be within the project site.
Batch and furnace section (including weighting mixing and melting)	Generation of air emission, noise and vibration, and workplace injury	The project AOI for batch and furnace will be around the project site as the melting process can generate stack emission.

Hot end and cold end	Generation of noise and vibration, and workplace injury (heat injury)	The project AOI for hot and cold end process will be inside the factory building
warehouse delivery	Generation of noise and vibration, and workplace injury (accidental fall and injury caused by forklift)	The project AOI for hot and cold end process will be inside the factory buildingT

4.1.2. Contextual Study Limit

The EIA guidelines have defined the contextual study limit for project surrounding environment to consist of five groups of components: (i) physical components, (ii) biological components, (iii) socio-economic components, (iv) cultural components and (v) visual characteristics.

i. Physical Component

- Overview of the study area
- Meteorology
- Topography
- Geology
- Soil Condition
- Seismology
- Hydrology
- Surface water quality
- Groundwater quality
- Air quality
- Noise and Vibration
- Water Quality
- Traffic Survey

ii. Biological Components

- Terrestrial resources
 - Flora
 - Fauna

iii. Socio-economic components

- Land use
- Population and Demography
- Ethnicity
- Religions
- Level of education
- Main economic activities
- Employment
- Health condition
- Infrastructure
 - Electricity and energy consumption
 - Public transport service
 - Community and social organization

- Tourist site, culture and religious properties

The following sections briefly describe each component with details in appendices as appropriate. The methods of information collection are also described as necessary.

4.2. DESCRIPTION OF THE PHYSICAL COMPONENT

4.2.1. Overview of the Study Area

The proposed project site is located in Thanlyin Township. The total area of Thanlyin Township is about 143.56 square miles. A brief regional profile is presented in Table 4-2.

Table 4-2 Thanlyin Township Brief Regional Data

Township	Quarter
Number of wards	17
Total population	263,779
Area	143.56 square miles
Latitude and Longitude	16° 40' 59" N and 96° 13' 25" E
Ethnicities	Kachin, Kayar, Kayin, Chin, Mon, Burma, Rakhine, Shan
Main economic activities	Agriculture

Source: GAD of Thanlyin Township (2019)

4.2.2. Climate and Meteorology

4.2.2.1. Methodology for data Collection and Analysis

The description of climate conditions of the study area invariably has to be at provincial level using general climatic data recorded at Kabaraye meteorological station, which is nearest station to the project area.

4.2.2.2. Description of Climatic Conditions

The project area has tropical monsoon climate characterized by three seasons. The summer season normally begins in March and April. During this period, the weather is relatively warm and humid. During March and April, a transition period prevails during which the northeast monsoon begins to withdraw and the air mass movements bring warm air to the country from southeast directions. Some light rainfalls, known as the pre-monsoon rain, could be expected during this period.

The rainy season follows the summer season normally from May and lasts until the end of October. Intense rainfalls can be normally occurred in June, July, August and September as clearly indicated by the number of days with rainfalls and the monthly amount of rainfalls.

The winter season follows the rainy season and normally begins in November and lasts in February. During this period, the weather is relatively cold and dry due to the northeast monsoon. There is practically very little or no rain during this period. Climate classification map of Myanmar is shown in Figure 4-1.

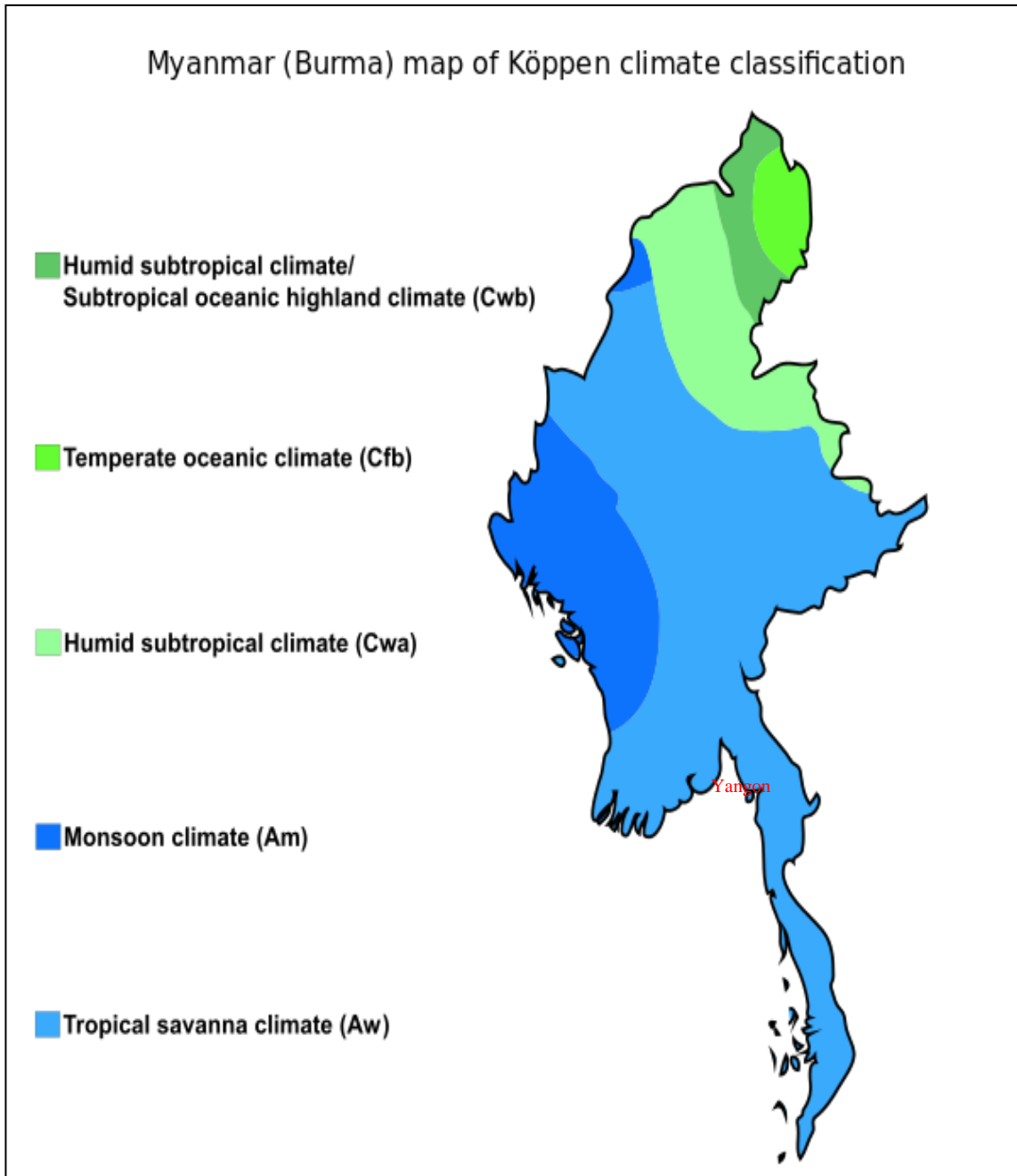


Figure 4-1 Köppen climate classification map of Myanmar

4.2.2.3. Climatic Conditions of the Project Township

The study area has a warm moist climate characterized by three seasons. The summer season normally begins in March to May. The rainy season normally begins in June to October. The winter season follows the rainy season, normally from November to February. Reference from 2016 to 2019 of yearly temperature and rainfall data are presented in Table 4-3. This data was provided from GAD (2019), Thanlyin Township. During the course of a year, the average maximum temperature is 48 °C and the average minimum temperature is 22.5 °C.

According to the data from Department of Meteorology and Hydrology (2020), the average of humidity in the summer, rainy and winter season of Yangon City are about 66.5%, 85.75% and 69.5% respectively.

Moreover, the average maximum and minimum temperature of Yangon City are 37°C and 24°C in summer, 31°C and 24 °C rainy and 33 °C and 20°C in winter season respectively.

In addition to, the total annual rainfall is about 94.25 inches in a year. The wind direction was collected at from Kabar Aye Station. The average wind speed of Yangon City are 1.8 meter per second, 1.7 meter per second and 1.6 meter per second in summer, rainy and winter season.

The results of meteorological data such as humidity, rainfall and temperature, wind direction and wind speed are presented in Appendix E.

Table 4-3 Temperature and Rainfall Data in Project Township (2016-2019)

No.	Year	Rainfall		Temperature	
		Raining day	Total rainfall (Inches)	Summer season (Mix °C)	Winter season (Min °C)
1	2016	101	105.64	48	25
2	2017	134	123.57	43	22.5
3	2018	120	124.64	44	22.5
4	2019	96	83.72	42	-

Source: GAD of Thanlyin Township (2019)

4.2.3. Topography

Thanlyin Township is bordered by Thone Gwa and Kayan Townships in the east, Kyauktan Township in the south, Yangon River in the west and Bago River in the north. From north to south straighten, Thanlyin-Kyauktan motorcar road and watershed are situated in the Thanlyin Township. The flat low land is located from east to west of the township. The township is situated about 23.9 meter of Mean Sea Level (MSL). The topographic map of Thanlyin Township is shown in Figure 4-2. According to the topographic map, the elevation of project area is approximately 0 to 30 meter.

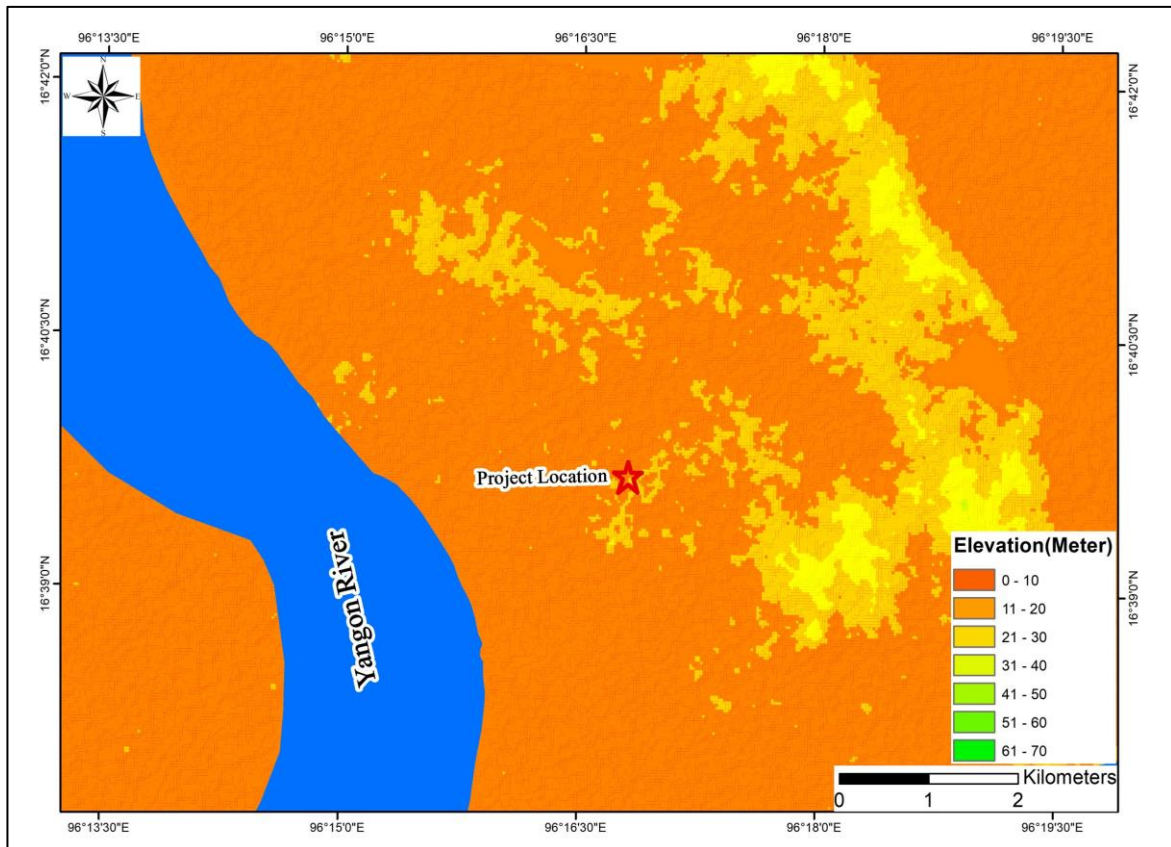


Figure 4-2 Topographic Map

4.2.4. Geology

According to the geological map (2014), the project is located in the recent alluvium as presented in Figure 4-3. The regional geomorphic features of the entire area include ridges and deltaic lands lying south of the Pegu Yoma between the Sittaung River in the east and the Irrawaddy River in the west. This area is in a north-south trending sedimentary basin containing thick sedimentary deposits from the Tertiary to Quaternary periods.

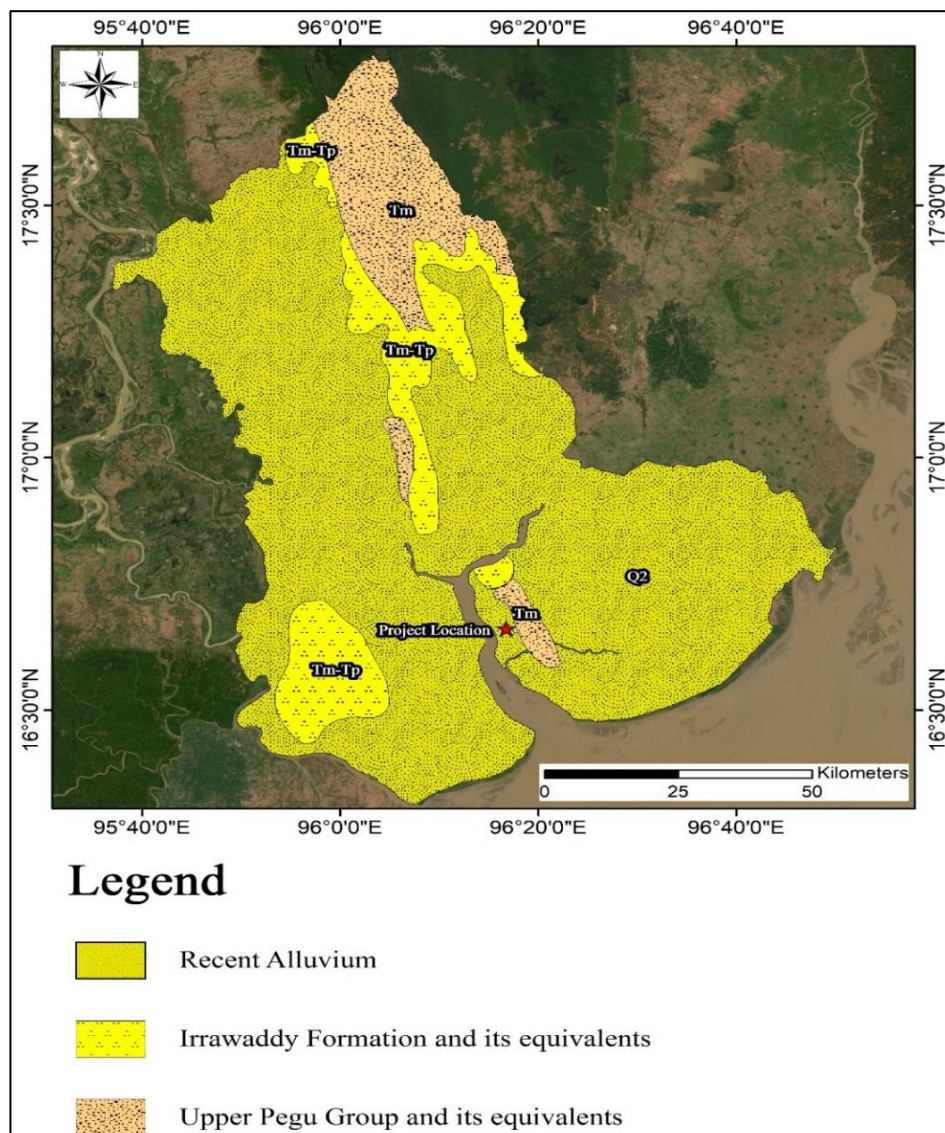
The Tertiary deposits are strongly folded into narrow end echelon anticlinal folds such as the Yangon Ridge, the Thanlyin-Kyauktan Ridge, and the Twentay-Kawhmu Ridge. All these ridges are trending south towards the Gulf of Martaban. Rocks of the Tertiary Period contain well-consolidated marine sandstone and shale of the Pegu Group and semi-consolidated, continental deltaic and marginal marine deposits of the Irrawaddy Formation. The synclinal valley or through west of the Yangon Anticlinal Ridge is filled with unconsolidated deposits from the Quaternary Period.

There forms a wedge-shaped alluvial accumulation, ranging in thickness from a few feet near the ridge up to 100 meter in the synclinal valley. The wedge-shaped form of these sediments extends both in the east-west and north-south directions and shows thickening toward the south and west. These sediments include clay, silt, sand, and very coarse-grained gravel. Geological feature around the Yangon area is shown in Table 4-4.

Table 4-4 Geological Feature around the Yangon Area

Lythostratigraphic Unit	Geological Age	Physical Feature
Recent Alluvial	Recent	Clay and silt with trace sand
Valley-filled deposits	Pleistocene	Clay, silt, sand and very coarse-grained gravel
Danyingone Clay	Pliocene	Reddish brown, grey to blue, laminated clay with interbedded sand rock
Arzarnigone Sand-rock		Yellowish grey to bluish grey sand rock, fine to coarse grained sometime very coarse grained, sometime very coarse to gritty with intercalated clay and mudstone/siltstone
Besapet Alternation	Miocene	Alternation of shale and argillaceous sandstone
Thadugan Sandstone		Well consolidated, joint argillaceous sandstone
Hlwaga Shale	Oligocene	Generally indurated shale

Source: Data from Geology Department (2014)

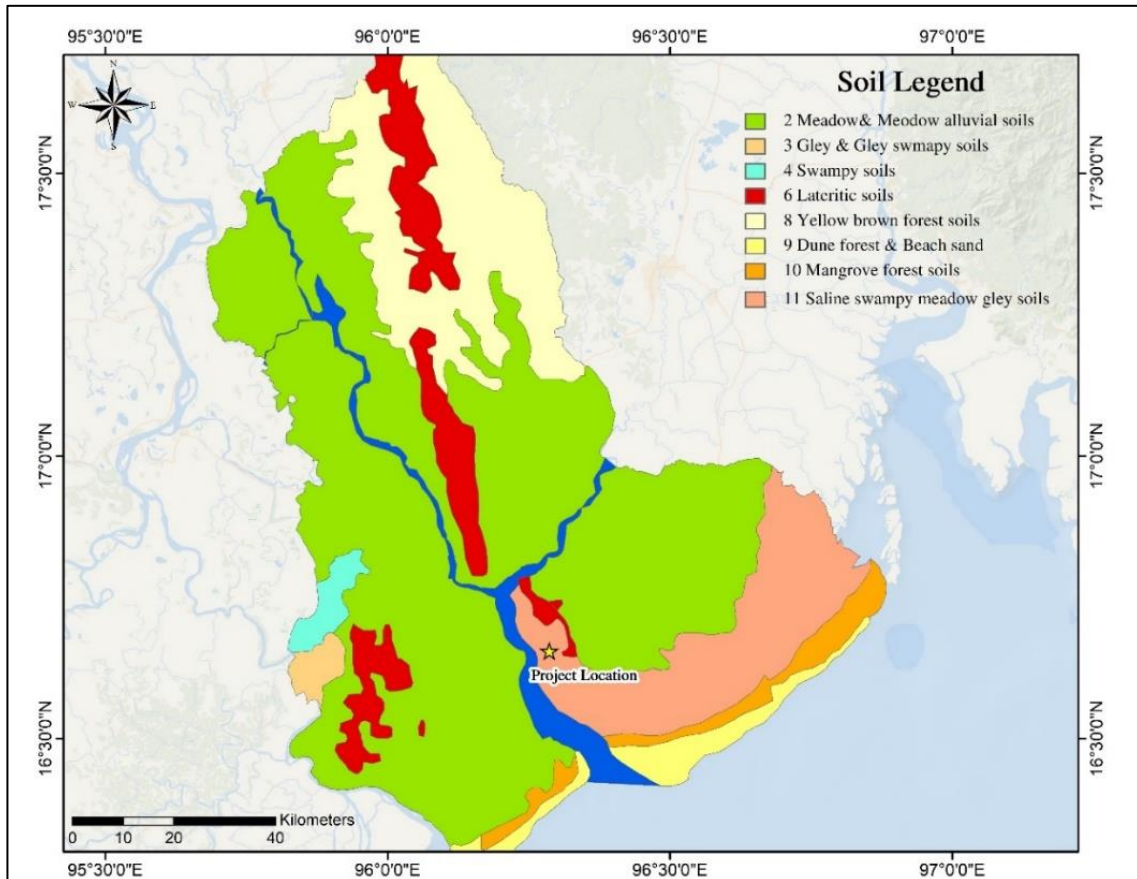


Source: Myanmar Geosciences Society, 2014

Figure 4-3 Geological Map of Project Area

4.2.5. Soil Condition

Project area is located in Thanlyin Township, Southern District of Yangon Region. According to the information from Lwin, A., & Khaing, M.M. (2012)⁶, the soil conditions of Yangon are meadow and meadow alluvial soils, gley and gley swampy soils, swampy soils, lateritic soils, yellow brown forest soils, dune forest and beach sand, mangrove forest soils and saline swampy meadow gley soils. The soil map of the Yangon region is shown in Figure 4-4. According to the soil Map (Lwin, A., & Khaing, M.M., 2012), the soil type of the project area is saline swampy meadow gley soil. Generally, this soil type in Ayeyarwady Delta and along the river bands of the Gulf of Motama and the marine flat lowlands influenced by the tidal seawater, which is always salty.



Source: Land use division, Myanmar Agriculture Service (2002)

Figure 4-4 Soil Map of Yangon Region

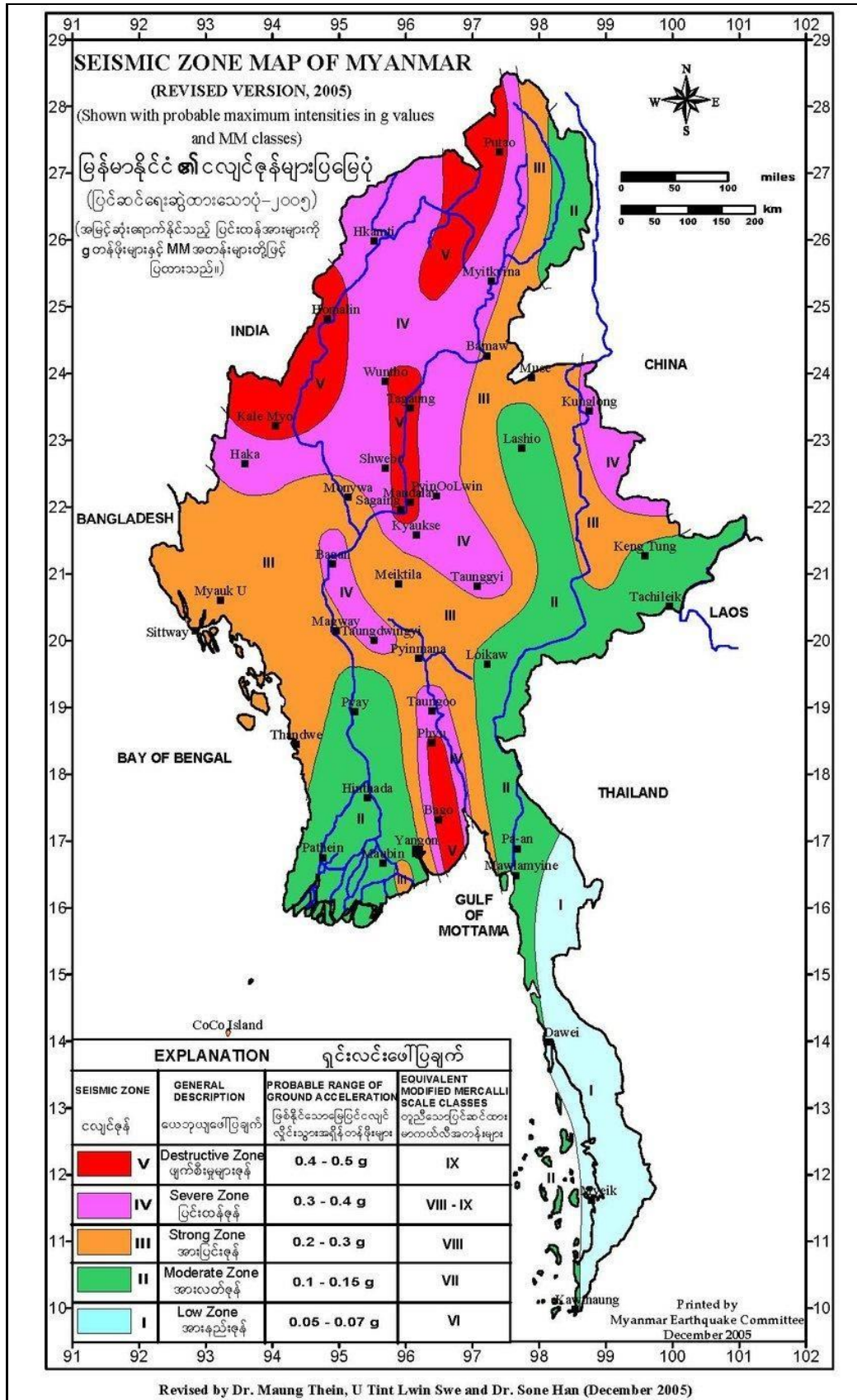
⁶ Lwin, A., & Khaing, M. M. (2012). Yangon River Geomorphology Identification and its Environmental Impacts Analysis by Optical and Radar Sensing Techniques. *ISPRS - International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, XXXIX-B8, 175–179. <https://doi.org/10.5194/isprsarchives-xxxix-b8-175-2012>

4.2.6. Seismology

In Myanmar, five seismic zones are demarcated and named (from low to high) Zone I (Low Zone), Zone II (Moderate Zone), Zone III (Strong Zone), Zone IV (Severe Zone), and Zone V (Destructive Zone), mainly following the nomenclature of the European Macro seismic Scale (EMS) 1992 (E.M.S. – 92) (Grunthal), source from hazard profile of Myanmar, July, 2009. For each zone, a probable range of ground acceleration in g values and equivalent Modified Mercalli (MM) Scale (Harry Wood and Frank Neumann, 1931) classes are given. The highest intensity zone designated for Myanmar is the Destructive Zone (with probable intensity range of 0.4 – 0.5 g) which is equivalent to MM class IX. There are four areas in that zone; namely, Bago-Phyu, Mandalay-Sagaing-Tagaung, Putao-Tanaing, and Kale Myo - Homalin areas.

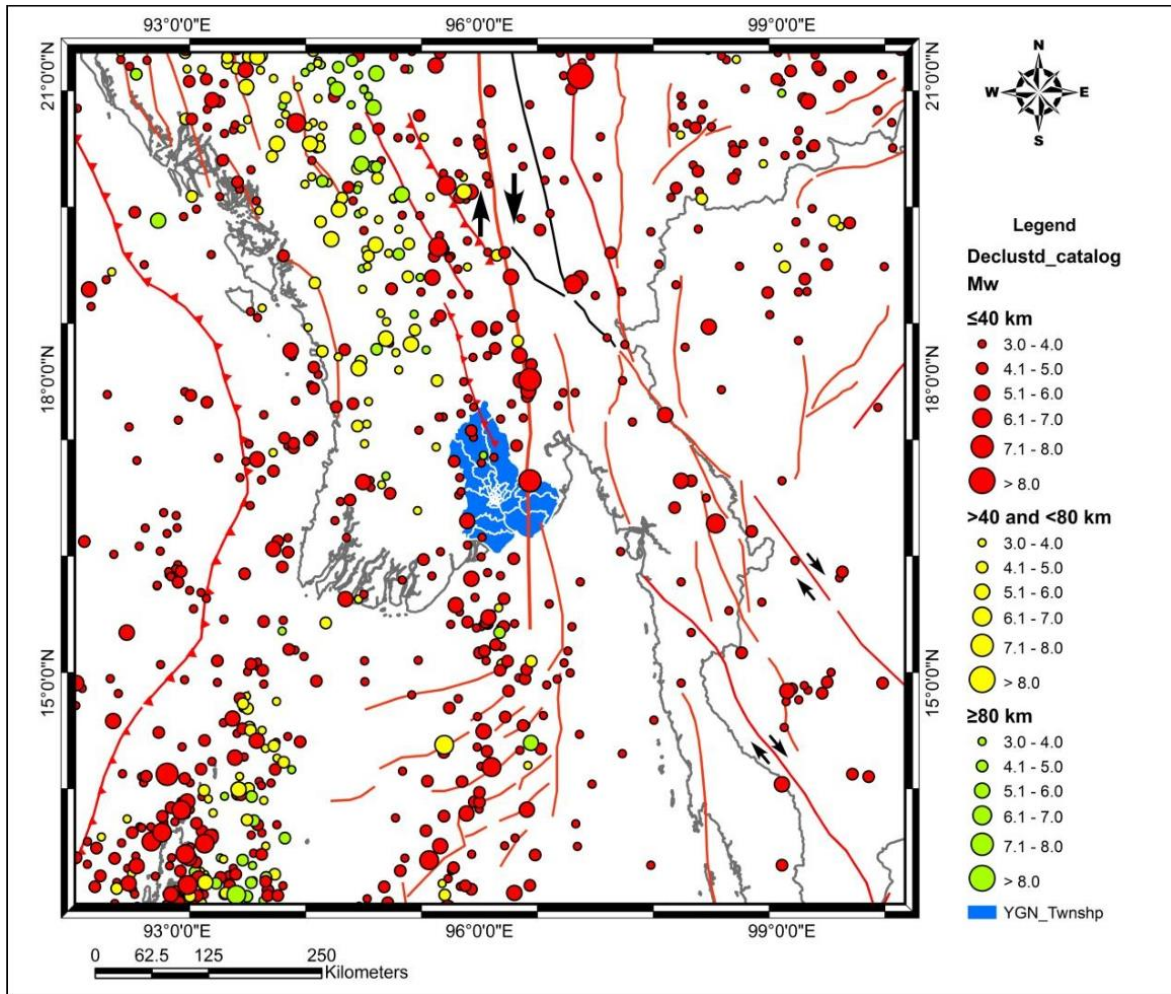
The latter two, however, would not have major earthquake hazards as they are only sparsely populated. Yangon straddles the boundary between Zone II and Zone III, with the old and new satellite towns in the eastern part in Zone III, and the original city in Zone II. A probable maximum range of ground acceleration in values and equivalent Modified Mercalli Scale classes are given for each zone. The seismic zone map of Myanmar is presented in Figure 4-5. According to the seismic zone map, the Yangon is located in the strong and moderate zone. Therefore, earthquake resistant design should be evaluated.

Moreover, systematic ground improvement methods should be designed. Based on the seismicity records, Yangon can be assumed as low to medium seismicity region. The Seismicity Map of Yangon Region is described in Figure 4-6.



Source: Meteorology and Hydrology Department, Yangon, Myanmar

Figure 4-5 Seismic Zone Map of Myanmar



Source: ANSS earthquake catalog, 1963- 2009

Figure 4-6 Seismicity Map of Yangon Region

4.2.7. Hydrology

The main river around project area is the Yangon River, which is a large tidal river in the region running on the west side of the project. The data on the tide levels of the Yangon River as observed at elephant point by the Ministry of Port Authority (MPA) are shown in Table 4-5. The elephant point is located at the mouth of the Yangon River, 32 km south from the Yangon Port. The data of MPA are converted in accordance with Myanmar's standard sea level. Around the project area, there are six tidal rivers and small streams. Four of them, namely: Ah Lun Sake Creek, Shwe Pyauk Creek, Pa Lan Creek, and small creek flow into the Yangon River.

In the south area of the project, Gway Creek and Kayat Creek flow into the Hmawwun River, which flows from east to west and reaches the Yangon River. In addition, there are three major water reservoirs near the project area, namely: Zarmani Inn Reservoir, Bant Bwaykone Reservoir and Thilawa Reservoir⁷. The location of rivers and elephant point is presented in Figure 4-7.

Table 4-5 Hydrological Data on Yangon River

Description	Data surrounding on Elephant point (m)
Highest HWL (September 1930)	+4.390
MWL in Bo AungKyaw Wharf	+0.856
MWL in Pilaket Creek	+0.591
Zero of Tide Gauge in Yangon	-2.265
Lowest LWL (February 1888)	-2.265
High Tide Duration	1.2 hr

Source: JICA Preparatory Study on TSEZ Infrastructure Development in the Republic of the Union of Myanmar (March, 2014)

⁷Source: TSEZ Zone B ESIA report, (JICA Preparatory Study on TSEZ Infrastructure Development in the Republic of the Union of Myanmar (March 2014))



Source: EIA Report for TSEZ Development Project (Industrial Area of Zone B), 2016

Figure 4-7 Location of Rivers and Elephant Point

4.3. NATURAL HAZARDS

The “Hazard Profile of Myanmar⁸” prepared in July 2009. It describes that there are nine types of disasters in Myanmar, as follows: 1) Cyclone, 2) Drought/Dry Zone, 3) Earthquake, 4) Flood, 5) Forest Fire, 6) Landslide, 7) Storm, and 8) Tsunami. Among these, some notable natural hazards are described below.

4.3.1. Flood

Flood in Greater Yangon can be classified into three types: river flood, localized flood inundation in urban areas due to the combination of factors such as cloudburst, poor infiltration rate, poor drainage infrastructure (possibly due to climate change, heat island phenomenon); and in rural areas due to decrepit dams, dikes and levees, and flood due to cyclone and storm surge.

Large-scale floods rarely happen since the area is protected due to the construction of banks along the Yangon River and the Bago River. The bank elevation is more than 3.83 meter. However, small-scale floods around the proposed project may occur due to the influence of high tide at lowland areas near the Yangon River.

4.3.2. Cyclone

Cyclones that originate from the Bay of Bengal generally move westward to India and then turn toward Bangladesh and Myanmar. Severe cyclones tend to occur either during the pre-monsoon season from April to May or during the post-monsoon season from October to November. Cyclones have three destructive forces, namely: i) storm surge, ii) heavy rainfall, and iii) strong winds. According to the “Hazard Profile of Myanmar”, 1,248 tropical storms formed in the Bay of Bengal during the period from 1887 to 2005, of which 80 storms (6.4% of the total) hit Myanmar’s coast. In total, 12 cyclones caused severe damage in Myanmar mainly due to the accompanying storm surge, and the highest death or missing toll was at 138,373 caused by Cyclone Nargis in May 2008. Cyclone Nargis also hit Greater Yangon and floodwater spread on a number of townships around Yangon City. Most of the inundated areas during Cyclone Nargis were the Dala, Twantay, Htantabin, and Hlegu areas.

4.3.3. Earthquake

In the Bay of Bengal, west of Myanmar, there is the Andaman Trench, where the Indian Plate is moving northward and subducting underneath the Burma Plate from west to east. In east Myanmar, there is the Sagaing Fault, which is the boundary between the Burma Plate and Sunda Plate. Hence, a magnitude 7.0+ earthquake has occurred more than 16 times, and six earthquakes of around magnitude 7.0 hit the main cities along the Sagaing Fault such as Yangon, Bago, and Mandalay from 1930 to 1956. Significantly, Yangon experienced six huge earthquakes around the 1930s.

⁸ Dept. of Meteorology and Hydrology, Union of Myanmar. (2009). Hazard profile of Myanmar.

4.3.4. Natural Hazard occur in the Project Township

According to the data provided from GAD (2019), Thanlyin Township is situated about 476 centimeters water level gauge of Bago River. The information for natural hazard occurrence of the project township is described in Table 4-6.

Table 4-6 Summarized of Natural Hazard Occurrence of Project Township

No.	Type	Frequency	Mortality rate	Loss of Building
1	Home collapsed due to heavy rain	1	None	1
2	The roof of the house collapsed due to the tornado	1	None	5
3	House fire damage	1	None	4
Total		3	None	10

Source: GAD of Thanlyin Township (2019)

4.4. SOCIO-ECONOMIC ENVIRONMENT

4.4.1. Land use

4.4.1.1. Methodology

Information about land use was collected from secondary sources in combination with primary data collection. The primary data collection helps to verify and fill gaps of the secondary information.

4.4.1.2. Data Collection and Classification of Land Use Types

4.4.1.2.1 Secondary Data Collection

Secondary data on land use was compiled from the following sources.

- Satellite image of Google earth Pro (<http://earth.google.com>)
- Geographic Information System (GIS) of Thanlyin

4.4.1.2.2 Primary Data Collection

Primary data collection about land use survey was conducted on 24th November to 1st December 2021 in the project site and three-kilometer radius area of the project. This was used to verify the land use information in the initial land use maps. The results were used to recheck, revise and modify the accuracy of each type of land use on initial map. The final land use map was then generated which is shown in Figure 4-8.

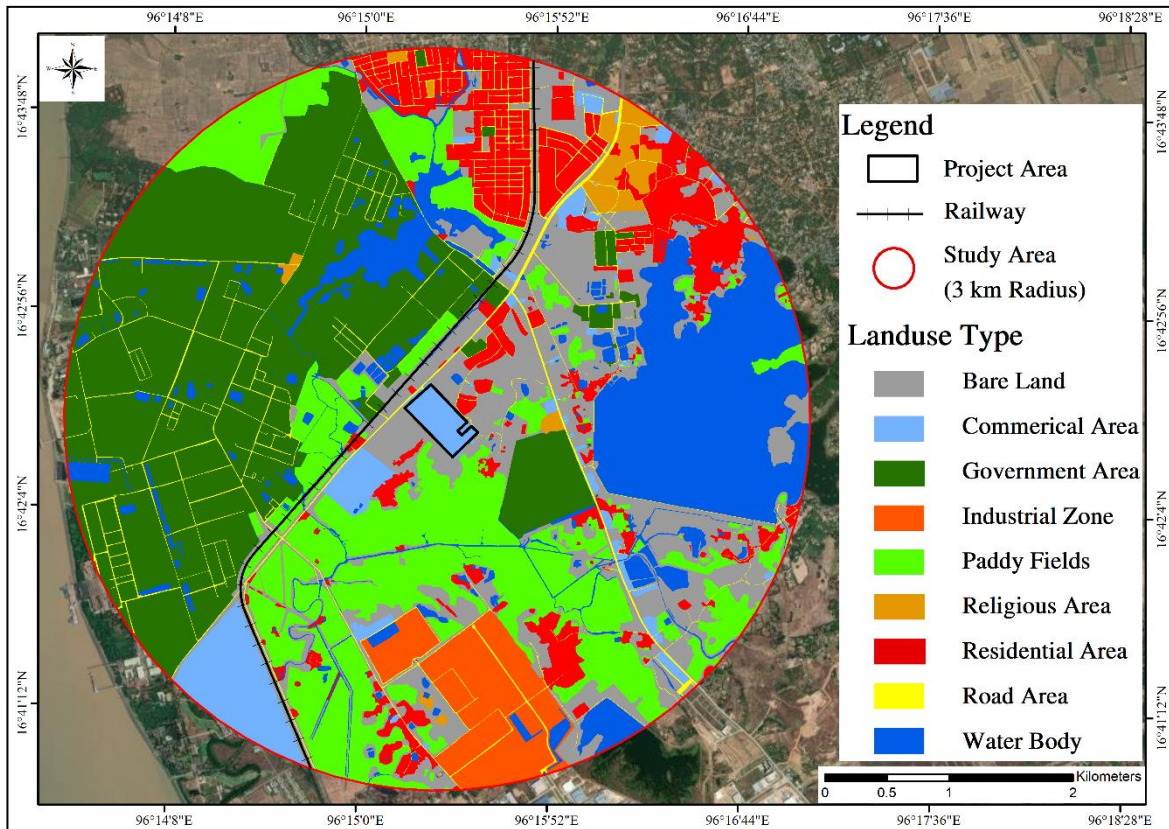


Figure 4-8 Land Use Map

4.4.1.3. Result of the Study

The study area consists of around three kilometers radius of the project. It is characterized by ten types of land use. As a result of the study, government area is the largest portion within three kilometers marginal area where religious area occupies the smallest portion. The summary table for land use percentage and existing land use photos within the study area are shown in Table 4-7 and Figure 4-9.

Table 4-7 Types and Percentages of Land Use

No.	Name	Area (Ha)	Percentage (%)
1.	Bare Land	466.95	16.52
2.	Commercial Area	123.08	4.35
3.	Government Area	790	27.95
4.	Industrial Area	119.88	4.24
5.	Paddy Field	532.50	18.84
6.	Religious Area	37.77	1.33
7.	Residential	261.63	9.25
8.	Road	79.31	2.80
9.	Water	415.13	14.68
Total		2,826.41	100

Source: Field survey by TBS 24th November to 1st December 2021



Commercial Area



Government Building



Religious Area



Figure 4-9 Existing Land Use Photos within Study Area

4.4.2. Demography

The project area is located beside the main road of Thilawa Jetty-Kyaik Khauk Pagoda Road, which is situated within the Thanlyin Township. Therefore, the secondary data for socio-economic characteristic are collected from GAD of Thanlyin Township (2019).

4.4.2.1. Population

Population is mainly divided into two parts as rural and urban areas. However, this project is within the southern part of Yangon Region and all people are from rural civilization. Table 4-8 shows that the population in the project township. It can be clearly seen that there are 17 wards, 28 village tracts and 57 villages. It has over 62,123 houses and the total population of the project township is 66,800.

Table 4-8 Population in the Project Township

No.	Township	House	Household	Ward	Village Tract	Village
1.	Thanlyin	62,123	66,800	17	28	57
Total		62,123	66,800	17	28	57

Source: GAD of Thanlyin Township (2019)

4.4.2.2. Age group and Gender Issues

In Myanmar, population is disaggregated by age for election purposes (i.e. under and over 18 years old). Based on the data provided by GAD, there are two age groups such as under 18 years and above 18 years, including over 85 years old. Population by age group in Project Township is shown in Table 4-9. The female group is slightly higher at above 18 years and total population. For the gender issues, our Myanmar nation has equal gender rights for all of female as well as male and there may be no gender problems. Female has the right for heading the economics, social and political administration. In household levels, female and male can make equal decisions in children education, health and even cultural and religious practices. Male heads can make some important decisions but they respect to females.

However, in some cases, women's rights are violence and they are allowed only in cooking, housekeeping and babysitting while men can lead in family business and governance.

Table 4-9 Population by Age Group and Gender Disaggregation in the Project Township

No.	Township	>18 Years		<18 Years		Population		Grand Total
		Male	Female	Male	Female	Male	Female	
1.	Thanlyin	95,037	106,029	31,578	31,141	126,609	137,170	263,779
Total		95,037	106,029	31,578	31,141	126,609	137,170	263,779

Source: GAD of Thanlyin Township (2019)

4.4.3. Ethnicity

According to data from Township GAD, Bamar people mainly live in Project Township. As Yangon Region is a place where varieties of people meet, different ethnicities can be found in project Township. Bamar is about 250,514 and second largest group is Rakhine, 1,057. Although Burmese is the most widely spoken language in project township, ethnic groups have managed to retain individual languages. The number of ethnicity and foreigner population in the project township were shown in Table 4-10 and Table 4-11.

Table 4-10 Ethnicity in the Project Township

No.	Township	Ka Chin	Ka Yah	Ka Yin	Chin	Mon	Bamar	Rakine	Shan	Total
1.	Thanlyin	30	-	836	65	30	250,514	1,057	51	252,583
Total		30	-	836	65	30	250,514	1,057	51	252,583

Source: GAD of Thanlyin Township (2019)

Table 4-11 Foreigner Population in the Project Township

No.	Township	Chinese	India	Bangladesh	Pakistan	Others	Total
1.	Thanlyin	369	4,602	-	-	6,225	11,196
Total		369	4,602	-	-	6,225	11,196

Source: GAD of Thanlyin Township (2019)

4.4.4. Religious Information

Buddhism is the dominant religion in the project township. The remaining population are composed of Muslim and Hindu. The remaining religions of Christian is about 901. It is presented in Table 4-12.

Table 4-12 Population by Religion in the Project Township

No.	Township	Buddhism	Christian	Hindu	Muslim	Nat	Others	Total
1.	Thanlyin	252,051	901	4,602	6,225	-	-	263,779
Total		252,051	901	4,602	6,225	-	-	263,779

Source: GAD of Thanlyin Township (2019)

4.4.5. Education Information

4.4.5.1. Enrollment

According to township GAD information, in Project Township, the primary school enrollment rate of 5 years old children is average in 100%. It means all the students can access to education. It is presented in Table 4-13.

Table 4-13 Primary School Enrolment in the Project Township

No.	Township	5 Years old Children			School Enrollment			Percentage
		Male	Female	Total	Male	Female	Total	
1.	Thanlyin	2,267	2,209	4,476	2,267	2,209	4,476	100%
Total		2,267	2,209	4,476	2,267	2,209	4,476	100%

Source: GAD of Thanlyin Township (2019)

4.4.5.2. Completion of Basic Education

In project's township, for 2018-2019, high school of basic education level that are low with matriculation examination. The completion percentage is about 28% in Thanlyin Township. It was shown in Table 4-14. On the other hand, students dropped out after primary and during middle school education.

Table 4-14 Completion of Basic Education in the Project Township

No.	Township	2017 – 2018 year				2018 - 2019			
		Sitting Exam	Student	Passed	Percentage (%)	Sitting Exam	Student	Passed	Percentage (%)
1.	Thanlyin	4,228	3,834	1,376	35.89	4,667	4,340	1,251	28.82
Total		4,228	3,834	1,376	35.89	4,667	4,340	1,251	28.82

Source: GAD of Thanlyin Township (2019)

4.4.5.3. Ratio

Many people have even had higher education at the college and university level in the project township. Some elders received only informal rudimentary education from the monks at temples. Almost all residents have received basic education. The average ratio of teacher and students is 1:36. Manpower of education sector of the project township as described in Table 4-15.

Table 4-15 Ratio of Teacher and Student in the Project Township

No	Education Level	Total Number of Teachers	Total Number of Students	Teacher to Student Ratio
1.	University	1,011	41,206	1:40
2.	B.E.H.S (Branch)	89	2,915	1:33
3.	B.E.H.S	540	18,908	1:35
4.	B.E.M.S (Branch)	82	3,305	1:40
5.	B.E.M.S	75	2,627	1:35
6.	Post Primary	264	9,086	1:34
7.	Primary	175	3,679	1:21
8.	Pre Primary	5	100	1:20
9.	Monastic	194	6,989	1:34
Grand Total		2,435	88,815	1:36

Source: GAD of Thanlyin Township (2019)

4.4.5.4. Education Infrastructure

There are many education centers in Project Township. Among them, primary and post primary schools are the most in the township. There are four higher education centers such as East Yangon University, Marine University, Technological University and Co-operative University in the Thanlyin Township. The student can access to Project Township for their higher education. Education centers cover in the project township is described in Table 4-16.

Table 4-16 Education Centers in the Project Township

No	Township	Monastic School	Pre - B.E.P.S	B.E.P.S	Post B.E.P.S	B.E.M.S	B.E.M.S (Branch)	B.E.H.S	B.E.H.S (Branch)	Collage	University
1.	Thanlyin	14	1	33	24	4	5	11	3	-	4
Total		14	1	33	24	4	5	11	3	-	4

Source: GAD of Thanlyin Township (2019)

4.4.6. Main Economic Activities

Thanlyin is situated in the southern part of the Yangon Region. Currently, the economic situation is developed due to the good transportation. Agriculture is the main work for local people and rice is the main product of Thanlyin Township and it is mostly export to Yangon City.

4.4.7. Employment

Based on the information from GAD, there are many occupations in Project Township. Trading is the highest followed by other business workers in the project township. Government staff and agriculture are almost the same in the list. It is presented in Table 4-17.

Table 4-17 Occupations in the Project Township

No	Township	Government Staff	Service	Agriculture	Livestock	Trading	Industrial/Handicraft	Fisher	Wage Worker	Other	Total
1.	Thanlyin	3,926	5,246	3,804	528	60,884	6,121	0	35,068	29,859	145,436
Total		3,926	5,246	3,804	528	60,884	6,121	0	35,068	29,859	145,436

Source: GAD of Thanlyin Township (2019)

4.4.7.1. Income and poverty

According to information from GAD, average in-come per capita of project township was over 1.9 to 2.3 million from 2016 to 2019. It was described in Table 4-18. Main source of in-come was from the wagers who work in private companies and government offices.

Table 4-18 Annual In-come per Capita in the Project Township

No	Township	2016 - 2017	2017 - 2018	2018 - 2019
1.	Thanlyin	1,928,975	2,236,321	2,321,840
Total		1,928,975	2,236,321	2,321,840

Source: GAD of Thanlyin Township (2019)

Table 4-19 Work Force and Unemployment Population in the Project Township

No	Township	People able to Work	Working People	Unemployment People	Unemployment Percentage
1.	Thanlyin	159,899	145,436	14,463	9.04%
Total		159,899	145,436	14,463	9.04%

Source: GAD of Thanlyin Township (2019)

4.4.8. Health

The latest data are provided by the GAD showing in Table 4-20, there are many public health facilities in the project township including three healthcare centers by government. Table 4-21 presents the detail cases of information on the common diseases that have been happened within the project area including updated pandemic COVID-19 information. The common case is diarrhea and, followed by tuberculosis. The case of HIV/AIDS is 105 and mortality rate is 4 persons between 2018- 2019. According to the Ministry of Health and Sport information on 30th January 2022, the pandemic COVID-19 has been happened about 534,671 cases in the project township with 19,310 cases of deaths. However, until the end of January 2022, the incensement for new cases of COVID-19 is only one percentage while there is no cases of deaths since 24th, January 2022.

Table 4-20 Public Health Facility in the Project Township

No.	Township	Hospital		Clinic		Health Care Department		Total
		Gov	Private	Gov	Private	Rural	Sub-Rural	
1.	Thanlyin	2	1	0	59	5	22	89
Total		8	1	1	59	15	59	143

Source: GAD of Thanlyin Township (2019)

Table 4-21 Common Diseases in the Project Township

No.	Township	Malaria		Diarrhea		Tuberculosis		Dysentery		Hepatitis		HIV/AIDS (2018-19)	
		Occurrence	Mortality	Occurrence	Mortality	Occurrence	Mortality	Occurrence	Mortality	Occurrence	Mortality	Occurrence	Mortality
1.	Thanlyin	5	-	1,161	-	533	-	180	-	-	-	105	4
Total		5	-	1,161	-	533	-	180	-	-	-	105	4

Source: GAD of Thanlyin Township (2019)

4.4.9. Infrastructure and Services

4.4.9.1. Public Infrastructures

There are some social infrastructures especially variety of shops and factories in project township. In addition, societies such as INGO and social organizations are found within the study township. Moreover, there are many NGO such as Reserved Fire Brigade, Mother and Child Welfare Association, Red Cross, Retired Military and Myanmar Women Affair in Project Township. Various religious places such as monasteries, nunneries and religious halls are situated in the project township because majority people are Buddhist.

Detail list of these social infrastructures and religious places in Study Township were shown in Table 4-22 to Table 4-25.

Table 4-22 Social Infrastructure in the Project Township

No.	Township	Bazaar	Grocery Store	Shopping Mall and commercial building	Company	Factory in the TSEZ	Factory	Work Shop	Bank	Hotel
1.	Thanlyin	7	18	2	10	73	11	61	8	8
Total		9	33	2	20	100	15	65	12	8

Source: GAD of Thanlyin Township (2019)

Table 4-23 Social Organizations in the Project Township

No.	Township	INGO	Social Organization
1.	Thanlyin	3	7
Total		3	7

Source: GAD of Thanlyin Township (2019)

Table 4-24 Religious Places in the Project Township

No.	Township	Pagoda	Stupa	Monastery	Nunnery	Religious Hall
1.	Thanlyin	1	152	216	48	68
Total		7	303	480	109	225

Source: GAD of Thanlyin Township (2019)

Table 4-25 Other Religious Places in the Project Township

No.	Township	Church	Mosque	Hindu Temple	Chinese Temple
1.	Thanlyin	10	10	30	4
Total		12	12	39	5

Source: GAD of Thanlyin Township (2019)

4.4.9.2. Electricity and Energy Consumption

There are government electricity grids to project township in Yangon region.

4.4.10. Transportation

As there is no airport in Project Township, tourists cannot reach township directly by air. However, the waterways, the railways and highways that connect town to town are accessible. There are 15 bridges in township and motor vehicles are allowed to pass through.

4.4.11. Cultural and visual characteristics

4.4.11.1. Tourist Site and Attractive Places

There are four cultural heritage infrastructure in the project township such as Kyaik Khauk Pagoda, Ancient Portuguese Church, Wun Gyi Pa Day Tha Yar Zar Temple and Dar Gar Ngar Par Tha Khin according to the GAD (2019). The Kyaik Hmaw Wun Pagoda and temple is located on a small island in the river at Kyauktan village about 15 kilometers south of Thanlyin Township. The description of cultural heritage infrastructures and some photos are described in Table 4-26 and Figure 4-10. Not many religious places do not exist within 3-kilometer radius of the study area since the project area is situated near the industrial area. The religious places in the study area are shown in and Table 4-27 and Figure 4-11.

Table 4-26 Cultural Heritage Infrastructure in the Project Township

No.	Infrastructure	Location	Cultural Zone	Location
1.	Kyaik Khauk Pagoda	Pha Yar Kone Village	Ancient Monumental Zone	Pha Yar Kone
2.	Ancient Portuguese Church	Taik Kyi Kone, Myanmar Yaenan Ward	-	-
3.	Wun Gyi Pa Day Tha Yar Zar Temple	Near Kyaik Khauk Pagoda, Pha Yar Kone Village	Ancient Monumental Zone	Pha Yar Kone
4.	Dar Gar Ngar Par Tha Khin	Dar Gar Ward	-	-
5.	Kyaik Hmaw Wun Ye Lai Pagoda	West Ward	-	-
6.	Thone Law Ka Htut Khaung Man Aung Yadanar Pagoda	No. (1) Ward, Tadamyo	-	-

Source: GAD of Thanlyin Township (2019)



⁹Myanmar Digital News, <https://www.mdn.gov.mm/my/smiungwngchntteearng-kiukkheksettiteea-buddhpuujniypaitteaatng-msiusngkn-ykluppuujeaamny>

¹⁰ Ngar Par Tha Khin Dar Gar Taw Thanlyin City, <https://www.facebook.com/Punchpeerdaragah/reviews/>



Figure 4-10 Photos of Some Tourist Sites and Attractive Places in the Project Township

Table 4-27 List of Religious Places in the Study Area

No	Name	Latitude	Longitude
1	Di Par Aye Di Par Aung Pagoda	16°42'28.28"N	96°15'53.50"E
2	Kyite Dewa Pagoda	16°43'27.09"N	96°16'7.02"E
3.	Unknown Name Pagoda-1	16°43'31.46"N	96°16'2.53"E
4.	Unknown Name Pagoda-2	16°43'35.26"N	96°16'7.19"E
5.	Kyaik Khauk Pagoda	16°43'49.42"N	96°16'15.15"E
6.	Unknown Name Pagoda-3	16°41'12.90"N	96°15'20.41"E
7.	Unknown Name Monastery	16°41'14.21"N	96°15'18.75"E
8.	Unknown Name Hindi Temple-1	16°43'10.96"N	96°14'42.56"E
9.	Unknown Name Hindi Temple-2	16°43'53.99"N	96°15'16.75"E
10.	Unknown Name Hindi Temple-3	16°43'54.23"N	96°15'17.36"E
11.	Unknown Name Pagoda-4	16°42'24.86"N	96°14'34.41"E

¹¹¹¹ Swan Arr Shin, <https://theesaychin.com/ym/archives/26790>

¹² The Irrawaddy Covering Burma and Southeast Asia, <https://burma.irrawaddy.com/lifestyle/2017/06/24/137256.html>

¹³ Renown Travel, <https://www.renown-travel.com/burma/yangon/thanlyin.html>

¹⁴ Tadamyo A Lwan Pyay, <https://tadamyo.weebly.com/>

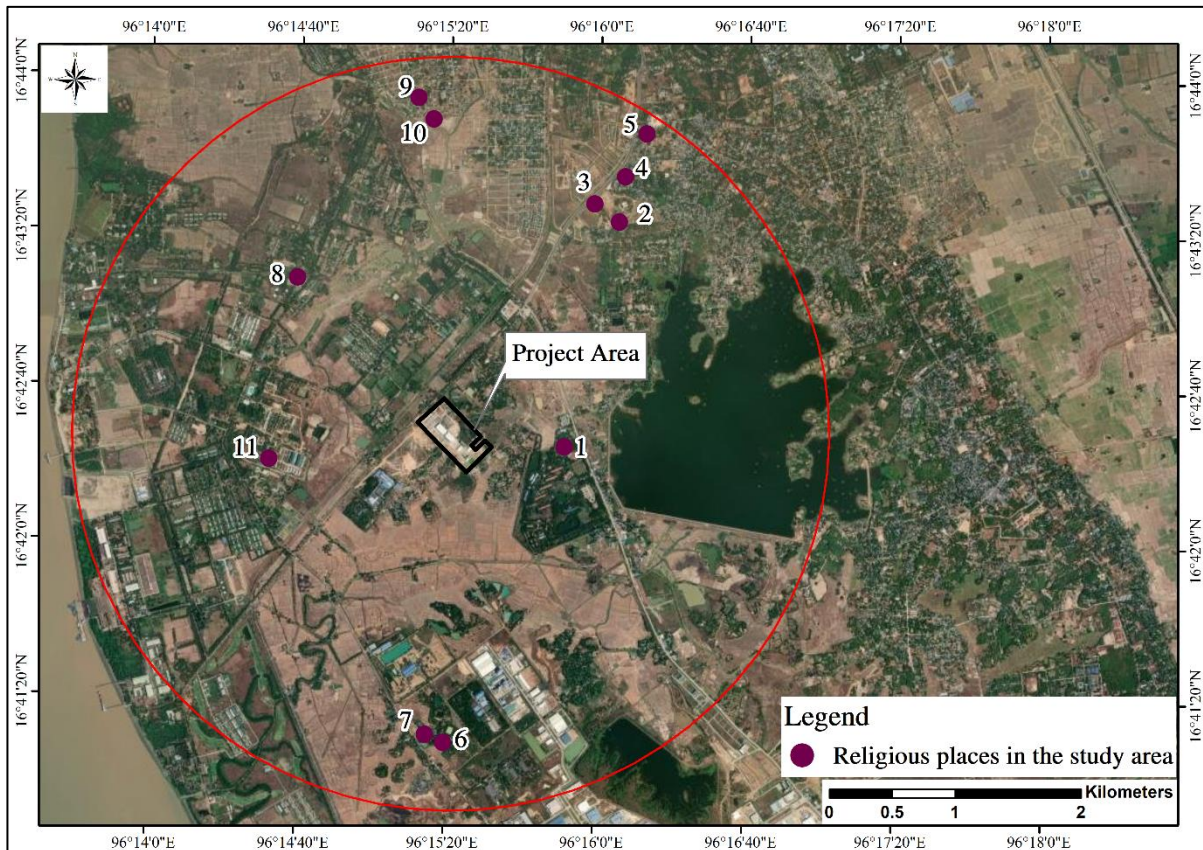


Figure 4-11 Location Map of Religious Places in the Study Area

4.5. BIOLOGICAL CHARACTERISTICS

Glass bottle manufacturing factory situates at the plot no. (97), Thilawa Economic Zone at the eastern side of Kyaik – Khaik Pagoda Road and railway alongside. The study area had been already fragmented due to land use of industrial development and urbanization. The ecological survey team consisting of five taxonomists had been carried out the field study for data collection of flora and fauna at the core zone, direct impact area and that of indirect impact area where is three km apart from core zone. The scope of the survey team focused;

- To represent the habitats of direct and indirect impact areas of the glass factory
- To clarify the habitat types and assemblages of biodiversity
- To identify the recorded flora and fauna with systematic position
- To reveal the concerning species (Threatened Level) in the study area regarding with IUCN Red List of conservation aspect
- To describe the key species for ecosystem services such as edible, ornamental and medicinal purposes
- To designate and recommend the threats and mitigation measures if the natural ecosystem is degradation and fragmentation



Figure 1. Biodiversity surveying map of Glass bottle manufacturing factory



Figure 2. Direct and indirect impact area of study area

4.5.1. Floral Study

4.5.1.1. Methodology

The floral study had been carried out in the core zone and the outer boundary of the project area, Glass Bottle Production Factory, Plot no. (97), Yangon Region, Myanmar. The floral communities of core zone had been recorded and those of the outer boundaries, the indirect impact area were also studied. The morphological characters of plant species and habitat have been studied with photograph records and in field notebook. Some specimens had been carried for further identification with the references of: Backer and Bakhuizen (1963,1965, 1968), Hooker (1875-1897), Hu Qi-ming *et al.*, (2007-2009), Kress (2003) and Nath Nair (1962).

4.5.1.2. Results

Among total of 50 species including 24 trees, 1 small tree, 9 shrubs, 15 herbs and 1 bamboo species had been recorded regarding with habitat types. Recorded 6 species of medicinal plants, 9 species of edible plants and 5 species of ornamental plants were noted with the aspect of ecosystem services in this study area. Threatened level of 17 species were also recorded with their conservation status of IUCN Red List. Detailed list of the species relevant to its habitat types are shown from Table 4-28 to Table 4-32 and Figure 4-13.



Figure 4-12 Roadside Plantation of Tree Type Habitat (Kyaik- Khauk Pagoda Road)

Table 4-28 List of Recorded Plant species from Glass bottles manufacturing factory

No.	Family	Scientific Name	Vernacular Name	Habit
1.	Amaranthaceae	<i>Alternanthera sessilis</i> (L.) R.Br.	Pazun sar	Herb
2.	Amaranthaceae	<i>Amaranthus viridis</i> L.	Hinnu new yie	Herb
3.	Anacardiaceae	<i>Mangifera indica</i>	Thayet	Tree
4.	Arecaceae	<i>Leopoldinia</i> sp.	Ohn	Tree
5.	Araceae	<i>Colocasia esculenta</i> (L.) Schott.	Pain	Herb
6.	Arecaceae	<i>Calamus</i> sp.	Not known	Tree
7.	Asteraceae	<i>Eclipta prostrata</i>	Gyaik hman	Herb
8.		<i>Leucanthemum vulgare</i> Lam.	Monlar yie	Herb
9.	Bignoniaceae	<i>Markhamia stipulata</i>	Ma hlwa	Tree
10.		<i>Tabebuia aurea</i> Benth. & Hook.	Not known	Tree
11.	Caesalpinaceae	<i>Bauhinia acuminata</i>	Swe-daw	Small Tree
12.		<i>Cassia accidentalis</i>	Dangwe	Shrub
13.	Casuarinaceae	<i>Casuarina</i> sp.	Not known	Tree
14.	Combretaceae	<i>Terminalia catappa</i> .	Banda	Tree
15.	Ericaceae	<i>Arctostaphylos</i> sp.	Not known	Herb
16.	Euphorbiaceae	<i>Acalypha rhomboidei</i> L.	Not known	Herb
17.		<i>Euphorbia prostrata</i> L.	Kyawe kyaung minsae	Herb
18.	Fabaceae	<i>Acacia confusa</i> Merr.	Taiwan acacia	Tree
19.	Fabaceae	<i>Glycine max</i> (L.) Merr.	Soya bean	Herb
20.	Fabaceae	<i>Indigofera glandulosa</i> Wendl.	Not known	Shrub
21.	Fabaceae	<i>Acrocarpus fraxinifolius</i> Arn.	Ye Tamar	Tree
22.	Fabaceae	<i>Mimosa pudica</i> L.	Ti ka yone	Herb
23.		<i>Pithecellobium dulce</i> .	Tayoke magyi	Tree
24.	Lamiaceae	<i>Tectona grandis</i> L.f.	Kyun	Tree
25.	Lythraceae	<i>Sonneratia caseolaris</i> (L.) Engl.	Lamu	Tree
26.	Magnoliaceae	<i>Magnolia grandiflora</i> <u>K.Koch</u>	Tatie mawe	Tree
27.	Malvaceae	<i>Ceiba pentandra</i>	Le moh pin	Tree
28.	Meliaceae	<i>Aglia odorata</i> Lour.	Not known	Shrub
29.	Meliaceae	<i>Melia azedarach</i> L.	Pantamar	Tree
30.		<i>Sandoricum koetjape</i>	Thitto	Tree
31.	Mimosaceae	<i>Acacia auriculiformis</i>	Malaysia-padauk	Tree
32.		<i>Albizia lebbek</i>	Kok ko	Tree
33.	Moraceae	<i>Ficus benjamina</i> .	Nyaung thabye	Tree
34.	Myrtaceae	<i>Acmena</i> sp.	Not known	Shrub
35.		<i>Psidium guajava</i>	Mar la ka	Tree
36.	Oxalidaceae	<i>Averrhoa bilimbi</i> L.	Zaung yar	Tree

No.	Family	Scientific Name	Vernacular Name	Habit
37.	Piperaceae	<i>Peperomia</i> sp.	Not known	Herb
38.	Poaceae	<i>Bambusa</i> sp.	War	Bamboo
39.	Polygonaceae	<i>Fallopia convolvulus</i> L.	Not known	Herb
40.	Polygonaceae	<i>Persicaria</i> sp. (L.) Mill.	Not known	Herb
41.	Rhamnaceae	<i>Ziziphus jujuba</i> Mill.	Zi	Tree
42.	Rubiaceae	<i>Garcinia jasminoides</i>	Zizawa	Shrub
43.		<i>Ixora coccinea</i> L.	Ponna yate	Shrub
44.		<i>Morinda citrifolia</i> L.	Yeyo	Tree
45.	Simaroubaceae	<i>Ailanthus altissima</i> Mill. Swingle	Not known	Tree
46.	Solanaceae	<i>Physalis virginiana</i> Mill.	Not known	Herb
47.		<i>Solanum indicum</i> L.	Khayan-kazaw	Shrub
48.	Urticaceae	<i>Laportea interrupta</i> L.	Phat yar	Herb
49.	Verbenaceae	<i>Lantana camara</i> L.	Seinna ban	Shrub
50.	Zygophyllaceae	<i>Zygophyllum fabago</i> L.	Not known	Shrub

Table 4-29 List of IUCN Red List species

No.	Family	Scientific Name	Vernacular Name	Category
1.	Amaranthaceae	<i>Alternanthera sessilis</i> (L.) R.Br.	Pazun sar	LC
2.	Anacardiaceae	<i>Mangifera indica</i>	Thayet	DD
3.	Asteraceae	<i>Eclipta prostrata</i>	Gyaik hman	LC
4.	Bignoniaceae	<i>Markhamia stipulata</i>	Ma hlwa	LC
5.	Caesalpinaceae	<i>Cassia accidentalis</i>	Dangwe	LC
6.	Combretaceae	<i>Terminalia catappa</i>	Banda	LC
7.	Fabaceae	<i>Mimosa pudica</i> L.	Ti ka yone	LC
8.		<i>Pithecellobium dulce</i> .	Tayoke magyi	LC
9.	Lamiaceae	<i>Tectona grandis</i> L.f.	Kyun	LC
10.	Lythraceae	<i>Sonneratia caseolaris</i> (L.) Engl.	Lamu	EN
11.	Magnoliaceae	<i>Magnolia grandiflora</i> <u>K.Koch</u>	Tatie mawe	EN
12.	Malvaceae	<i>Ceiba pentandra</i>	Le moh pin	LC
13.	Meliaceae	<i>Sandoricum koetjape</i>	Thitto	LC
14.	Mimosaceae	<i>Albizia lebbek</i>	Kok ko	LC
15.	Oxalidaceae	<i>Averrhoa bilimbi</i> L.	Zaung yar	EN
16.	Rhamnaceae	<i>Ziziphus jujuba</i> Mill.	Zi	LC
17.	Solanaceae	<i>Solanum indicum</i> L.	Khayan-kazaw	LC

EN = Endangered VU = Vulnerable LC = Least Concern DD = Data Deficient

Table 4-30 List of Medicinal plant species





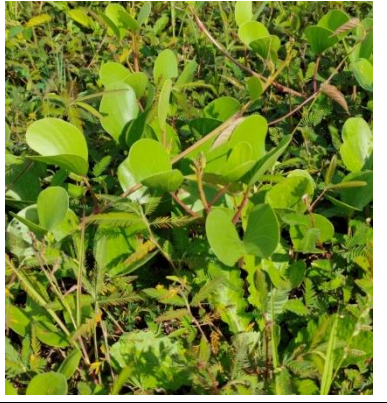







No.	Family	Scientific Name	Vernacular Name
1.	Asteraceae	<i>Leucanthemum vulgare</i> Lam.	Monlar yie
2.	Fabaceae	<i>Mimosa pudica</i> L.	Ti ka yone
3.	Amaranthaceae	<i>Amaranthus viridis</i> L.	Hinnu new yie
4.	Oxalidaceae	<i>Averrhoa bilimbi</i> L.	Zaung yar
5.	Euphorbiaceae	<i>Euphorbia prostrata</i> L.	Kyawe kyaung minsae
6.	Rubiaceae	<i>Morinda citrifolia</i> L.	Yeyo


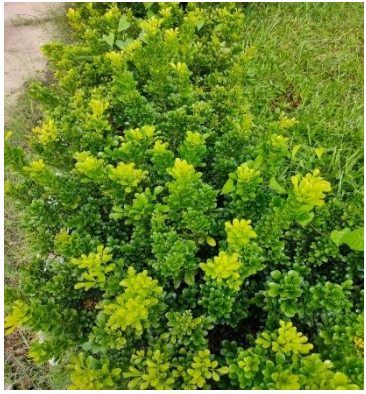




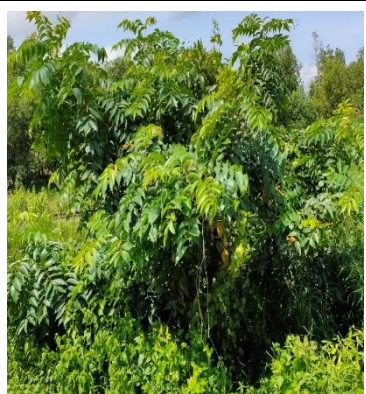



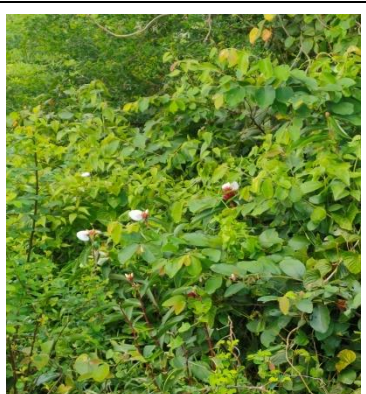
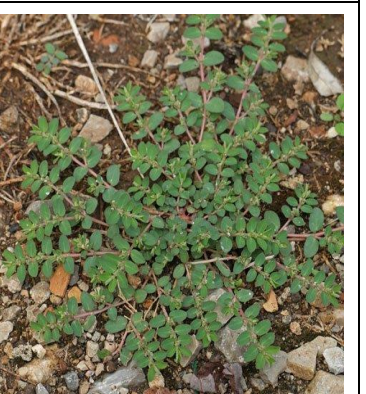
Table 4-31 List of Edible plant species








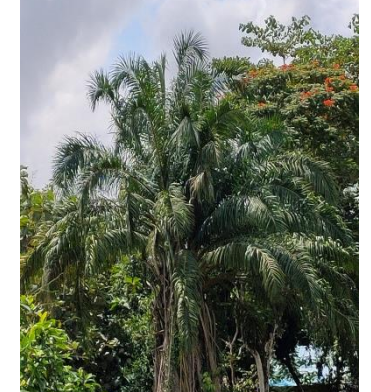

No.	Family	Scientific Name	Vernacular Name
1.	Fabaceae	<i>Glycine max</i> (L.) Merr.	Soya bean
2.	Asteraceae	<i>Leucanthemum vulgare</i> Lam.	Monlar yie
3.	Fabaceae	<i>Mimosa pudica</i> L.	Ti ka yone
4.	Amaranthaceae	<i>Amaranthus viridis</i> L.	Hinnu new yie
5.	Meliaceae	<i>Melia azedarach</i> L.	Pantamar
6.	Rhamnaceae	<i>Ziziphus jujuba</i> Mill.	Zi
7.	Oxalidaceae	<i>Averrhoa bilimbi</i> L.	Zaung yar
8.	Euphorbiaceae	<i>Euphorbia prostrata</i> L.	Kyawe kyaung minsae
9.	Rubiaceae	<i>Morinda citrifolia</i> L.	Yeyo

Table 4-32 List of Ornamental plant species

No.	Family	Scientific Name	Vernacular Name
1.	Fabaceae	<i>Acrocarpus fraxinifolius</i> Arn	Ye Tamar
2.	Rhamnaceae	<i>Ixora coccinea</i> L.	Ponna yate
3.	Verbenaceae	<i>Lantana camara</i> L.	Seinna ban
4.	Fabaceae	<i>Acacia confusa</i> Merr.	Taiwan acacia
5.	Magnoliaceae	<i>Magnolia grandiflora</i> <u>K.Koch</u>	Tatie mawe

		
Glycine max	Indigofera glandulosa Wendl.	Arctostaphylos spp.
		
Leucanthemum vulgare Lam	Arctostaphylos spp	Mimosa pudica L.
		
Fallopia convolvulus L.	Laportea interrupta L.	Amaranthus viridis
		
Physalis virginiana Mill.	Acalypha rhomboidei L.	Acrocarpus fraxinifolius Arn.

		
<i>Melia azedarach</i> L.	<i>Aglaia odorata</i> Lour.	<i>Acmena</i> spp.
		
<i>Ixora coccinea</i> L.	<i>Zizyphus mauritiana</i> Lam	<i>Lantana camara</i> L.
		
<i>Ailanthus altissima</i> (Mill.)	<i>Acacia confuse</i> Merr.	<i>Sonneratia caseolaris</i> (L.) Engl.
		
<i>Averrhoa bilimbi</i> L.	<i>Magnolia sieboldii</i> K.Koch	<i>Euphorbia prostrata</i> L.

		
<p><i>Tectona grandis</i> L.f.</p>	<p><i>Peperomia</i> sp.</p>	<p><i>Tabebuia aurea</i> Benth. & Hook.</p>
		
<p><i>Bambusa</i> sp.</p>	<p><i>Calamus</i> sp</p>	<p><i>Morinda citrifolia</i> L.</p>
		
<p><i>Persicaria</i> sp. (L.) Mill</p>	<p><i>Leopoldinia</i> sp.</p>	<p><i>Colocasia esculenta</i> (L.) Schott.</p>



		
<p><i>Casuarina</i> sp.</p>	<p><i>Alternanthera sessilis</i></p>	<p><i>Psidium guajava</i></p>

Figure 4-13 Recorded Plant species

4.5.2. Faunal Study

4.5.2.1. Methodology

The field study for the core zone and the outer boundary had been conducted to record the diversity of fauna by five participants of ecologists and local helpers. The study had well completed for flora and fauna assemblages of the core zone and its outer boundary and then the further information of wild those could not capture urgently were filled up by the confirmation of local people (interviewing) with field guides.

4.5.2.2. Survey methods (point count, line transects, capture and mark)

Surveys and investigations have been conducting for EIA with the aid of topographic maps, compass and field equipment such as GPS to be assessed the spatial location of surveyed point, digital camera, binoculars and references. Signs and tracks of the animals are to be assessing using the random point count method. Fishery study has been carried out with the help of local fishers and vendors nearby. Recorded specimens are to be taxonomically identified within the survey area by using field guides, photographs and prepare for desk study analysis.

Birds: Avian fauna was identified and enumerated according to the Fixed Radius Point Count Census Method based on counting individuals from a defined location and estimating the distance to the individual contact. A point was selected from where all birds contact recorded and the distance estimated about 25 m for each contact.

Other fauna: The most obvious others group of animals studied on the project area were insects (butterflies, dragonflies and damselflies), fishes, amphibians and reptiles. Surveying the occurrence of insects, amphibians and reptiles was conducted through the use of stationary observation sites and walking transects for identification and utilizing the point count method. The project area of core zone and outer area of industrial zone are not favorable habitat for mammal. Fish species were recorded by the help of fishermen at Zarmini Inn and vendors of the study area.

4.5.2.3. Results

Ecological survey had recorded 44 species of insects including butterflies and dragonflies, 26 species of fishes, 12 species of amphibians and reptiles (herpetofauna) and 38 species of terrestrial birds and 17 water birds. There were 3 species of fishes, 1 species of snake and 3 species of birds recorded as with their conservation status of IUCN Red List. Some common species of mammals were recorded base on interview survey during study period.

4.5.2.3.1 Insects

Total of 26 species of butterflies, 12 species of dragonflies and 6 species of damselflies had been recorded in this survey. (Table 4-33 to Table 4-35 and Figure 4-14 to Figure 4-21).

4.5.2.3.2 Fishes

Total of 26 fish species had been given in Table 4-36 and Figure 4-22.

4.5.2.3.3 Amphibians and Reptiles

There were 12 species of amphibians and reptiles (herpetofauna) under seven families in Table 4-38 and Figure 4-24.

4.5.2.3.4 Avian Fauna (Terrestrial and water birds)

Terrestrial birds of 38 species (Table 4-39 and Figure 4-25 to Figure 4-27) and 17 species of water birds under three families (Table 4-40 and Figure 4-26 to Figure 4-28) had been recorded and already mentioned with their conservation status of IUCN in which three species were concerned in conservation aspect.

Table 4-33 List of Recorded Damselflies (order- Odonata) from Glass bottles manufacturing factory

No.	Family	Scientific Name	Common name	Status	IUCN
1.	Coenagrionidae	Agriocnemis pygmaea (Male)	Pigmy dartlet	Very Common	Least Concern
2.		Agriocnemis pygmaea (Female)	Pigmy dartlet	Very Common	Least Concern
3.		Ceragrion coramandelium	Coromandel marsh dartlet	Very Common	Least Concern
4.		Ischnura senegalensis (Male)	Senegal golden dartlet	Locally Common	Least Concern
5.		Ischnura senegalensis (Female)	Senegal golden dartlet	Locally Common	Least Concern
6.		Pseudagrion microcephalum	Blue dart	Common	Least Concern







	
<i>Agriocnemis pygmaea</i> (Male)	<i>Agriocnemis pygmaea</i> (Female)
	
<i>Ceragrion coramandelium</i>	<i>Ischnura senegalensis</i> (Male)
	
<i>Ischnura senegalensis</i> (Female)	<i>Pseudagrion microcephalum</i>

Figure 4-14 Recorded damselfly species







	
<p><i>Brachythemis contaminata</i> (Male)</p>	<p><i>Brachythemis contaminata</i> (Female)</p>
	
<p><i>Crocothemis servilia</i> (Male)</p>	<p><i>Crocothemis servilia</i> (Female)</p>
	
<p><i>Diplacodes trivialis</i> (Male)</p>	<p><i>Diplacodes trivialis</i> (Female)</p>

Figure 4-15 List of Recorded Dragonflies (order- Odonata) from Glass bottles manufacturing factory







	
<i>Neurothemis tullia</i> (Male)	<i>Neurothemis tullia</i> (Female)
	
<i>Rhodothemis rufa</i> (Male)	<i>Rhodothemis rufa</i> (Female)
	
<i>Rhyothemis Phyllis</i>	<i>Acisoma panarpoides</i>

Figure 4-16 Recorded dragonfly species

Table 4-34 List of recorded Butterfly species (order Lepidoptera) from Glass bottles manufacturing factory

No.	Family	Scientific Name	Common Name	Status
1	Papilionidae	<i>Papilio memmon</i>	Great mormon	Very Common
2		<i>Papilio polytes romulus</i>	Common mormon	Very Common
3		<i>Graphium doson axion</i>	Common jay	Uncommon
4	Pieridae	<i>Appias libythea</i>	Striped albatross	Common
5		<i>Appias lycinda</i>	Chocolate albatross	Common
6		<i>Catopsilia pomona</i>	Common emigrant	Common
7		<i>Catopsilia pyranthe</i>	Mottled emigrant	Common
8		<i>Eurema blanda</i>	Three sport grass yellow	Common
9		<i>Eurema hecabe</i>	Large grass yellow	Common
10		<i>Hebomia glaucippe glaucippe</i>	Great orange tip	Common
11		<i>Leptosia nina nina</i>	Psyche	Common
12		Nymphalidae	<i>Danaus Chrysippus</i>	Plain tiger
13	<i>Danaus genutia</i>		Common tiger	Common
14	<i>Elymnias hypermnestra</i>		Common plamfly	Common
15	<i>Hypolimnas bolina</i>		Great eggfly	Common
16	<i>Hypolimnas misippus</i>			Common
17	<i>Junonia almana</i>		Gray pansy	Common
18	<i>Junonia atlites</i>		Peacock pansy	Common
19	<i>Junonia lemonias</i>		Lemon pansy	Common
20	<i>Neptis hylas</i>		Common sailor	Common
21	<i>Tirumala limniace</i>		Blue tiger	Common
22	Lycaenidae		<i>Castalius rosimon</i>	Common pierrot
23		<i>Celastrina argiolus</i>	Holly Blue	Common
24		<i>Celastrina echo</i>	Echo Azure	Common

Table 4-35 List of recorded Butterfly species (order Lepidoptera) from Glass bottles manufacturing factory

No.	Family	Scientific Name	Common Name	Status
25.	Hesperiidae	<i>Pelopidas mathias</i>	Dark small branded swift	Common
26.		<i>Potanthus omaha</i>	Lesser dart	Common

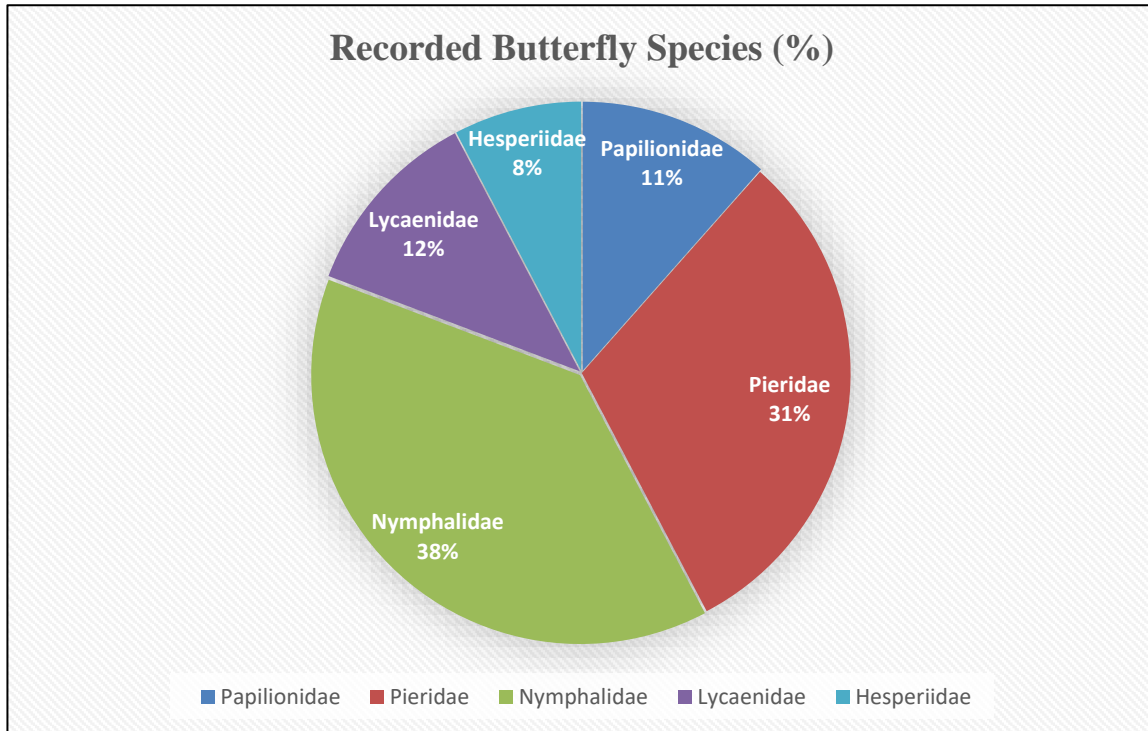


Figure 7. Species composition (%) in families of butterfly







	
<i>Papilio memnon</i>	<i>Papilio polytes romulus</i>
	
<i>Graphium doson axion</i>	<i>Appias libythea</i>
	
<i>Appias lyncida</i>	<i>Catopsilia pomona</i>

Figure 4-17 Recorded Butterfly Species






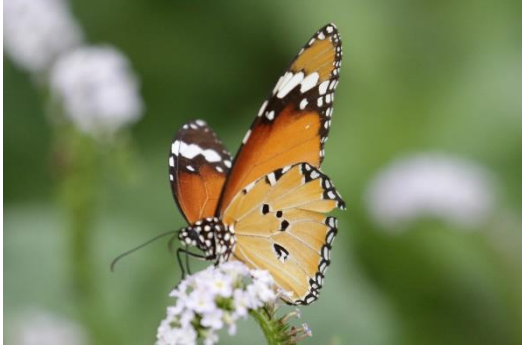
	
<p><i>Catopsilia pyranthe</i></p>	<p><i>Eurema blanda</i></p>
	
<p><i>Eurema hecabe</i></p>	<p><i>Hebomia glaucippe glaucippe</i></p>
	
<p><i>Leptosia nina nina</i></p>	<p><i>Danaus Chrysippus</i></p>

Figure 4-18 Recorded Butterfly Species







	
<i>Danaus genutia</i>	<i>Elymnias hypermnestra</i>
	
<i>Hypolimnias bolina</i>	<i>Hypolimnias misippus</i>
	
<i>Junonia almana</i>	<i>Junonia atlites</i>

Figure 4-19 Recorded butterfly species







	
<p><i>Junonia lemonias</i></p>	<p><i>Neptis hylas</i></p>
	
<p><i>Tirumala limniace</i></p>	<p><i>Castalius rosimon</i></p>
	
<p><i>Celastrina argiolus</i></p>	<p><i>Celastrina echo</i></p>

Figure 4-20 Recorded butterfly species

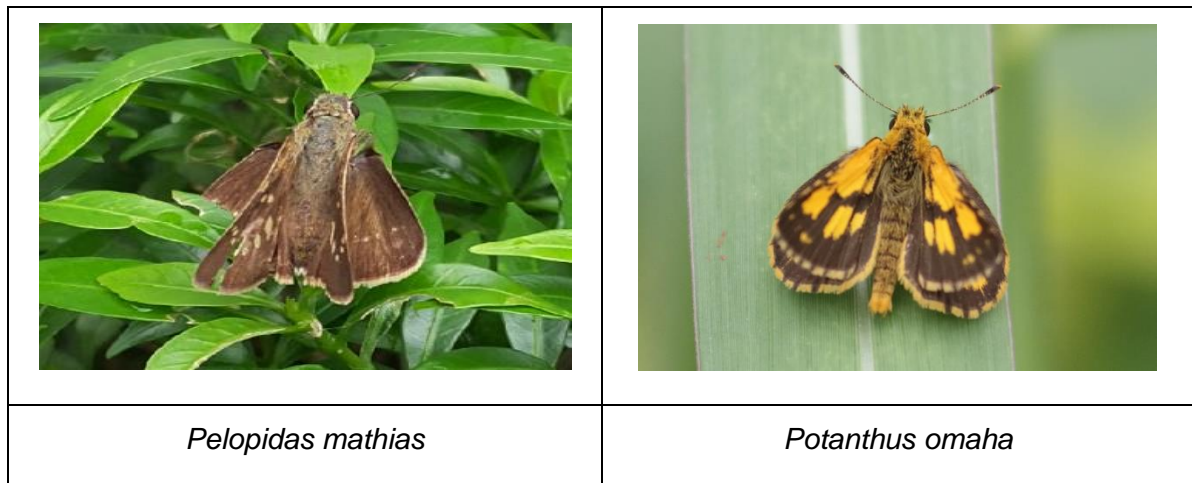


Figure 4-21 Recorded butterfly species

Table 4-36 List of recorded Fish species from Glass bottles manufacturing factory

No	Order	Family	Scientific name	Common name	Vernacular Name	IUC N
1.	Osteoglossiformes	Notopteridae	<i>Notopterus notopterus</i>	Bronze feather back	Nga-phe	LC
2.	Clupeiformes	Clupeidae	<i>Tenuulosa ilisha</i>	Hilia shad	Nga-tha-lauk	LC
3.			<i>Tenuulosa toli</i>	Toli shad	Nga-tha-lauk-yauk-pha	VU
4.		Cichilidae	<i>Oreochromis niloticus</i>	Nile tilapia	Tilapia	LC
5.	Cypriniformes	Cyprinidae	<i>Amblypharyngodon mola</i>	Mola carplet	Nga-bel-phyu	LC
6.			<i>Osteobrama belangeri</i>	Carplet	Nga-phar-ma	NT
7.			<i>Puntius sophore</i>	Pool barb	Nga-khone-ma	LC
8.		Cobitidae	<i>Lepidocephalichthys berdmorei</i>	Burmese loach	Nga-tha-lae-doh	NE
9.	Siluriformes	Bagridae	<i>Mystus bleekeri</i>	Day's mystus	Nga-zin-yaing	LC
10.			<i>Mystus cavasius</i>	Gangetic Mystus	Nga-zin-yaing	LC
11.			<i>Hemibagrus menoda</i>	Menoda catfish	Nga-eike	LC
12.		Siluridae	<i>Ompok bimaculatus</i>	Indian butter catfish	Nga-nu-than	NT
13.			<i>Wallago attu</i>	Freshwater shark	Nga-but	VU
14.		Pangasiidae	<i>Pangasius pangasius</i>	Pangas catfish	Nga-dan	LC






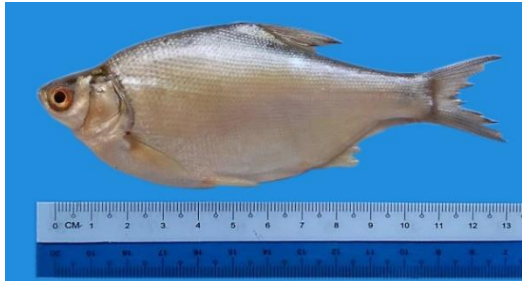


15.		Clariidae	<i>Clarias batrachus</i>	Walking catfish	Nga-khu	NE
16.		Heteropneustidae	<i>Heteropneustes fossilis</i>	Stinging catfish	Nga-gyee	LC
17.	Beloniformes	Belonidae	<i>Xenentodon cancila</i>	Fresh water gar fish	Nga-phaung-yoe	LC
18.	Synbranchiformes	Mastacembelidae	<i>Macrogathus aral</i>	One-striped spiny eel	Nga-mway-htoe - pyaung-chaw	LC
19.			<i>Macrogathus zebrinus</i>	Burmese spiny eel	Nga-mway-htoe-kyansit	LC









LC=Least Concern, NE=Non-Evaluated, NT= Near Threatened, VU=Vulnerable









Table 4-37 List of recorded Fish species from Glass bottles manufacturing factory

No	Order	Family	Scientific name	Common name	Vernacular Name	IUCN
20.	Perciformes	Latidae	<i>Lates calcarifer</i>	Barramundi	Ka-ka-dit	NE
21.	Gobiiformes	Gobiidae	<i>Glossogobius giuris</i>	Tank goby	Ka-tha-poe	LC
22.			<i>Apocryptes bato</i>	Mudskipper	Nga- phyan	NE
23.	Anabantiformes	Anabantidae	<i>Anabas testudineus</i>	Climbing perch	Nga-byay-ma	LC
24.		Channidae	<i>Channa punctatus</i>	Spotted snake head	Nga-pa-naw	LC
25.			<i>Channa striatus</i>	Striped snake head	Nga-yant	LC
26.		Osphronemidae	<i>Trichopodus pectoralis</i>	Snakeskin Gourami	Sa-la-beya	LC

LC=Least Concern, NE=Non-Evaluated, NT= Near Threatened, VU=Vulnerable

	
<p><i>Notopterus notopterus</i></p>	<p><i>Tenulosa ilisha</i></p>
	
<p><i>Tenulosa toli</i></p>	<p><i>Oreochromis niloticus</i></p>
	
<p><i>Amblypharyngodon mola</i></p>	<p><i>Osteobrama belangeri</i></p>
	
<p><i>Puntius sophore</i></p>	<p><i>Lepidocephalichthys berdmorei</i></p>

 <p>A photograph of a fish, <i>Mystus bleekeri</i>, lying on a blue textured surface. A ruler is placed below the fish for scale, showing it is approximately 15 cm long.</p>	 <p>A photograph of a fish, <i>Mystus cavasius</i>, lying on a blue textured surface. A ruler is placed below the fish for scale, showing it is approximately 18 cm long.</p>
<p><i>Mystus bleekeri</i></p>	<p><i>Mystus cavasius</i></p>
 <p>A photograph of a fish, <i>Hemibagrus menoda</i>, lying on a blue textured surface. A ruler is placed below the fish for scale, showing it is approximately 15 cm long.</p>	 <p>A photograph of a fish, <i>Ompok bimaculatus</i>, lying on a blue textured surface. A ruler is placed below the fish for scale, showing it is approximately 13 cm long.</p>
<p><i>Hemibagrus menoda</i></p>	<p><i>Ompok bimaculatus</i></p>
 <p>A photograph of a fish, <i>Wallago attu</i>, lying on a white textured surface. A ruler is placed below the fish for scale, showing it is approximately 25 cm long.</p>	 <p>A photograph of a fish, <i>Pangasius pangasius</i>, lying on a blue textured surface. A ruler is placed below the fish for scale, showing it is approximately 20 cm long.</p>
<p><i>Wallago attu</i></p>	<p><i>Pangasius pangasius</i></p>
 <p>A photograph of a fish, <i>Clarias batrachus</i>, lying on a white textured surface. A ruler is placed below the fish for scale, showing it is approximately 20 cm long.</p>	 <p>A photograph of a fish, <i>Heteropneustes fossilis</i>, lying on a white textured surface. A ruler is placed below the fish for scale, showing it is approximately 15 cm long.</p>
<p><i>Clarias batrachus</i></p>	<p><i>Heteropneustes fossilis</i></p>

	
<i>Xenentodon cancila</i>	<i>Macrognathus aral</i>
	
<i>Macrognathus zebrinus</i>	<i>Lates calcarifer</i>
	
<i>Glossogobius giuris</i>	<i>Apocryptes bato</i>
	
<i>Anabas testudineus</i>	<i>Channa punctatus</i>

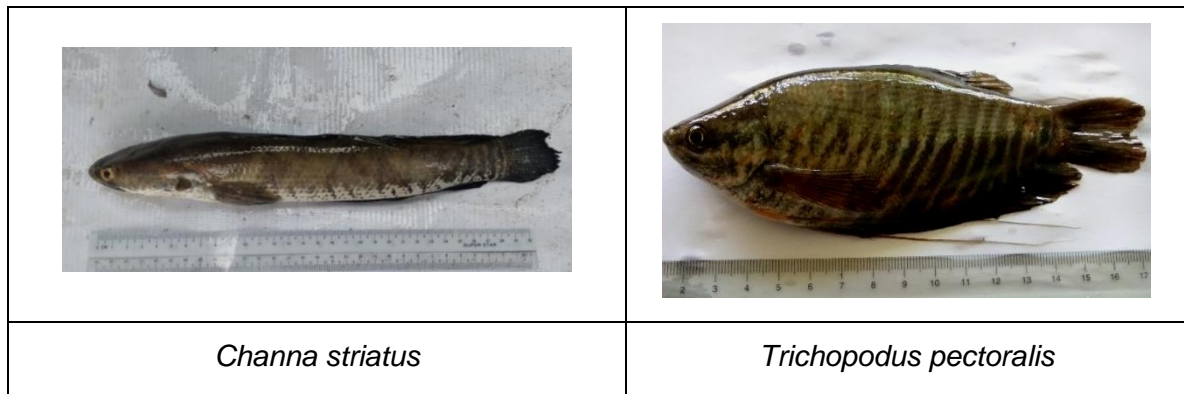


Figure 4-22. Recorded Fish Specie

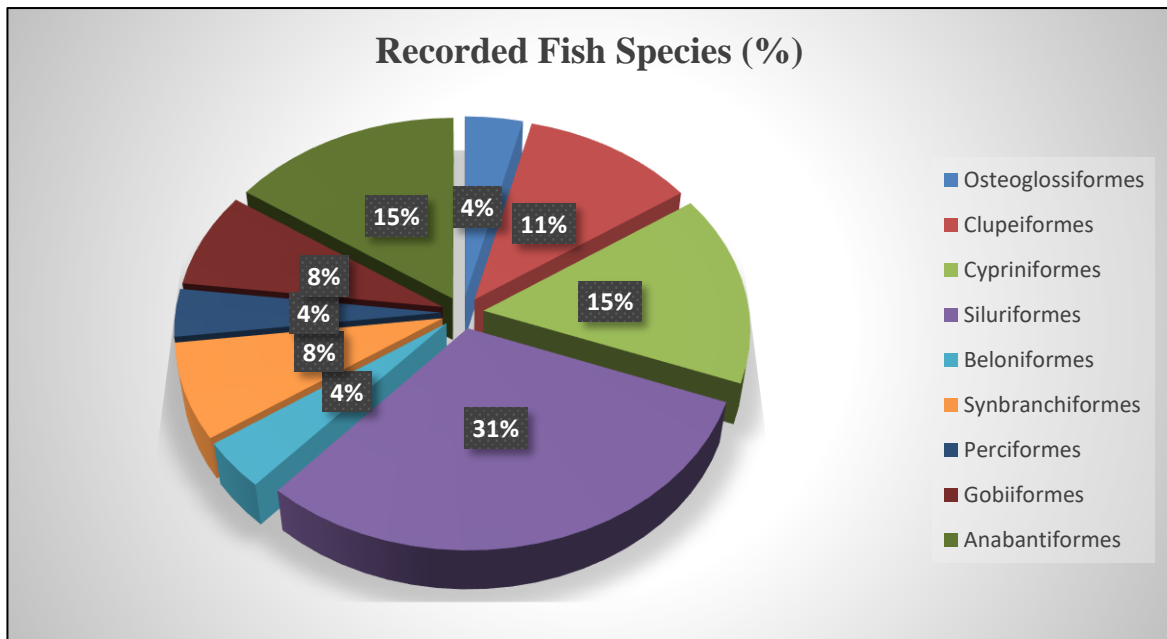


Figure 4-23 Species composition (%) in different Orders of Fish species

Table 4-38 Recorded Amphibian and Reptile species from Glass bottles manufacturing factory

No.	Family	Scientific Name	Common Name	IUCN	Remark
1.	Bufonidae	<i>Duttaphrynus melanostictus</i>	Common Toad	LC	Observed
2.		<i>Duttaphrynus parvus</i>	Dwarf toad	LC	Observed
3.	Microhylidae	<i>Kaloula pulchra</i>	Painted Bullfrog	LC	Observed
4.	Rhacophoridae	<i>Polypedates leucomystax</i>	Common Indian tree frog	LC	Observed
5.	Agamidae	<i>Calotes mystaceus</i>	Blue crested lizard	NE	Observed
6.		<i>Calotes versicolor</i>	Oriental garden lizard	NE	Observed
7.	Colubridae	<i>Amphiesma stolatum</i>	Buff-striped Keelback	NE	Interviewed
8.		<i>Ptyas mucosa</i>	Indian Rat Snake	NE	Interviewed

No.	Family	Scientific Name	Common Name	IUCN	Remark
9.		<i>Xenochrophis piscator</i>	Checkered Keelback	NE	Interviewed
10.	Elapidae	<i>Bungarus fasciatus</i>	Banded Krait	LC	Interviewed
11.		<i>Ophiophagus hannah</i>	King Cobra	VU	Interviewed
12.	Viperidae	<i>Daboia russelii</i>	Russell's Viper	NE	Interviewed

LC=Least Concern, NE=Non-Evaluated, NT= Near Threatened, VU=Vulnerable

	
<i>Duttaphrynus melanostictus</i>	<i>Duttaphrynus parvus</i>
	
<i>Kaloula pulchra</i>	<i>Polypedates leucomystax</i>
	
<i>Calotes mystaceus</i>	<i>Calotes versicolor</i>

Figure 4-24 Recorded Amphibian and Reptile Species

Table 4-39 Recorded Terrestrial Bird species from Glass bottles manufacturing factory

No.	Order	Family	Common Name	Scientific Name	IUCN Status
1.	Columbiformes	Columbidae	Rock Pigeon	<i>Columba livia</i>	LC
2.			Red Collared Dove	<i>Streptopelia tranquebarica</i>	LC
3.			Spotted Dove	<i>S. chinensis</i>	LC
4.	Caprimulgiformes	Apodidae	Asian Palm-swift	<i>Cypsiurus balasiensis</i>	LC
5.	Cuculiformes	Cuculidae	Greater Coucal	<i>Centropus sinensis</i>	LC
6.			Asian Koel	<i>Eudynamys scolopaceus</i>	LC
7.			Plaintive Cuckoo	<i>Cacomantis merulinus</i>	LC
8.			Common Hawk-Cuckoo	<i>Hierococcyx varius</i>	LC
9.	Accipitriformes	Accipitridae	Black-Shouldered Kite	<i>Elanus caeruleus</i>	LC
10.			Black-eared Kite	<i>Milvus lineatus</i>	LC
11.			Crested Serpent-Eagle	<i>Spilornis cheela</i>	LC
12.			Lesser Fish-Eagle	<i>Icthyophaga humilis</i>	NT
13.			Himalayan Buzzard	<i>Buteo burmanicus</i>	LC
14.	Coraciformes	Meropidae	Little Green Bee-Eater	<i>Merops orientalis</i>	LC
15.			Chestnut-headed Bee-Eater	<i>M. leschenaulti</i>	LC
16.		Alcedinidae	White-Throated Kingfisher	<i>Hlacyon smyrnensis</i>	LC
17.			Black-capped Kingfisher	<i>H. pileata</i>	LC
18.	Piciformes	Megalaimidae	Coppersmith Barbet	<i>Megalaima haemacephala</i>	LC
19.	Passeriformes	Oriolidae	Black-naped Oriole	<i>Oriolus chinensis</i>	LC
20.		Aegithinidae	Common Iora	<i>Aegithina tiphia</i>	LC
21.		Rhipiduridae	White-throated Fantail	<i>Rhipidura albicollis</i>	LC
22.		Dicruridae	Black Drongo	<i>Dicrurus macrocercus</i>	LC
23.		Laniidae	Brown Shrike	<i>Lanius cristatus</i>	LC
24.		Corvidae	House Crow	<i>Corvus splendens</i>	LC
25.			Large-billed Crow	<i>C. macrorhynchos</i>	LC
26.		Cisticolidae	Yellow-bellied Prinia	<i>Prinia flaviventris</i>	LC
27.			Plain Prinia	<i>P. inornata</i>	LC

Table 4-40 Recorded Terrestrial Bird Species from Glass Bottles Manufacturing Factory

No.	Order	Family	Common Name	Scientific Name	IUCN Status
28.			Common Tailorbird	<i>Orthotomus sutorius</i>	LC
29.		Acrocephalidae	Thick-billed Warbler	<i>Acrocephalus aedon</i>	LC
30.			Barn Swallow	<i>Hirundo rustica</i>	LC
31.		Pycnonotidae	Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>	LC
32.			Red-Vented Bulbul	<i>P. cafer</i>	LC
33.			Streak-Eared Bulbul	<i>P. blanfordi</i>	LC
34.			Dusky Warbler	<i>Phylloscopus fuscatus</i>	LC
35.			White-throated Babbler	<i>Turdoides gularis</i>	Endemic
36.			Asian Pied Starling	<i>Gracupica contra</i>	LC
37.			Common Myna	<i>Acridotheres tristis</i>	LC
38.			Jungle Myna	<i>A. fuscus</i>	LC

LC=Least Concern, NE=Non-Evaluated, NT= Near Threatened, VU=Vulnerable

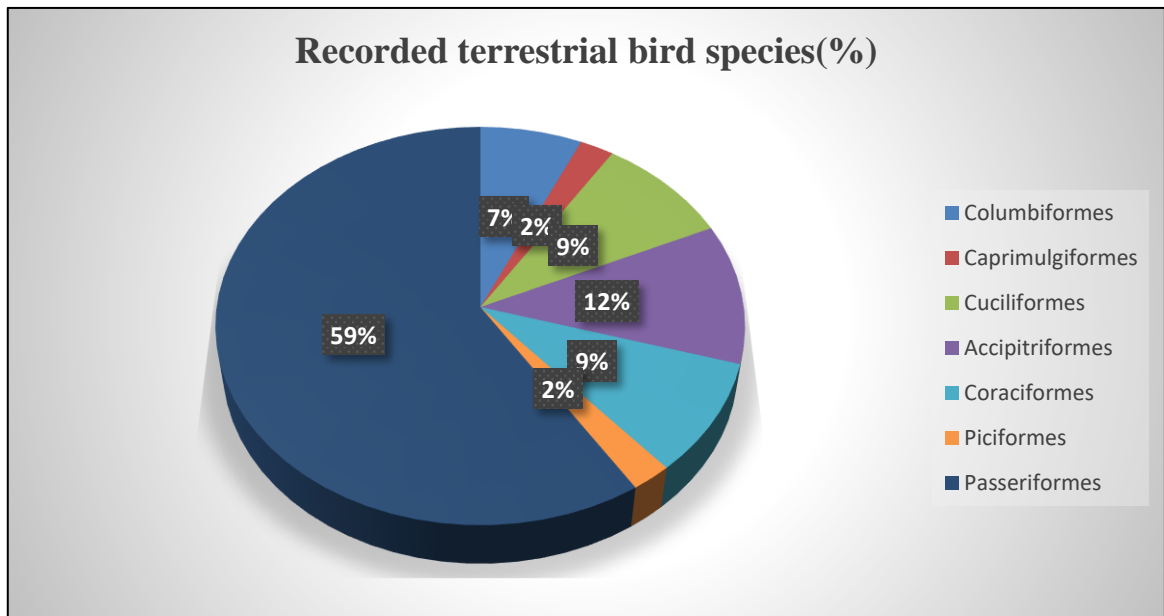


Figure 4-25 Species Composition (%) in Different Orders of Terrestrial Bird

Table.12 Recorded Water Bird Species from Glass Bottles Manufacturing Factory

No.	Order	Family	Common Name	Scientific Name	IUCN Status
1.	Guriformes	Rallidae	White-breasted Waterhen	<i>Amauronia phoenicurus</i>	LC
2.	Ciconiiformes	Ciconiidae	Painted Stork	<i>Mycteria leucocephala</i>	NT
3.	Pelecaniformes	Ardeidae	Indian Pond-Heron	<i>Ardeola grayii</i>	LC
4.			Eastern Cattle Egret	<i>Bubulcus coromandus</i>	LC
5.			Little Egret	<i>Egretta garzetta</i>	LC
6.			Intermediate Egret	<i>Mesophoyx intermedia</i>	LC
7.			Great Egret	<i>Ardea alba</i>	LC
8.			Purple Heron	<i>A. purpurea</i>	LC
9.		Phalacrocoracidae	Little Cormorant	<i>Microcarba niger</i>	LC
10.	Charadriiformes	Charadriidae	Lesser Sandplover	<i>Charadrius mongolus</i>	LC
11.			Grey-headed Lapwing	<i>Vanellus cinereus</i>	LC
12.			Red-wattled Lapwing	<i>V. indicus</i>	LC
13.		Jacanidae	Bronze-winged Jacana	<i>Metopidius indicus</i>	LC
14.		Scolopacidae	Whimbrel	<i>Numenius phaeopus</i>	LC
15.			Common Sandpiper	<i>Actitis hypoleucos</i>	LC
16.			Common Redshank	<i>Tringa totanus</i>	LC
17.		Laridae	Little Tern	<i>Sternula albifrons</i>	LC

LC=Least Concern, NE=Non-Evaluated, NT= Near Threatened, VU=Vulnerable

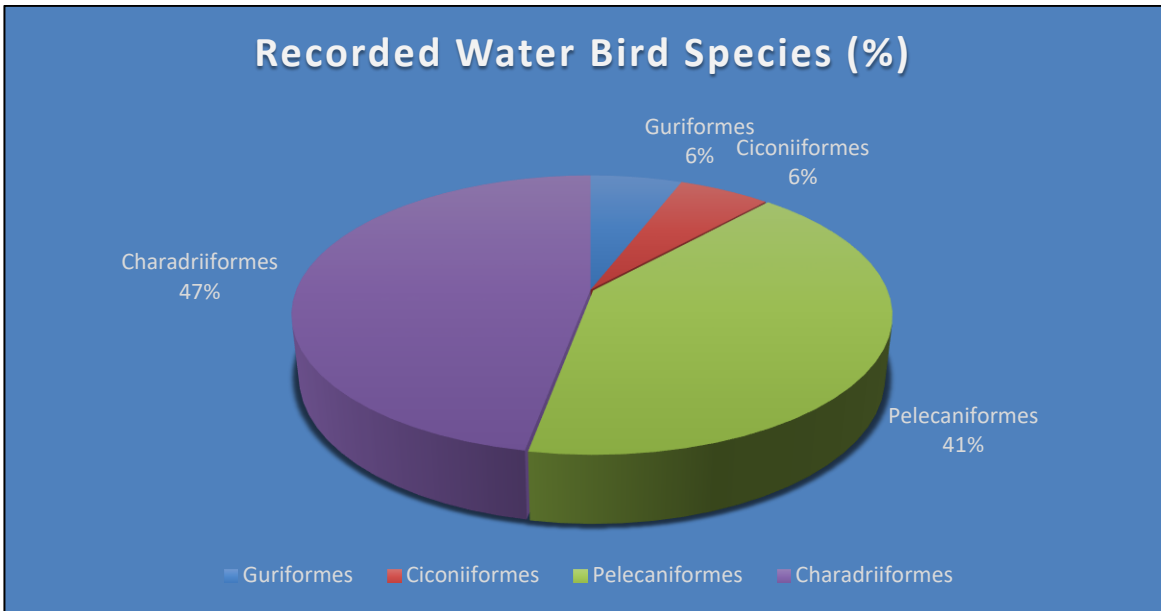















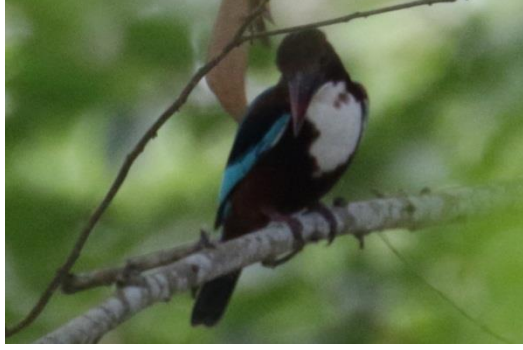





















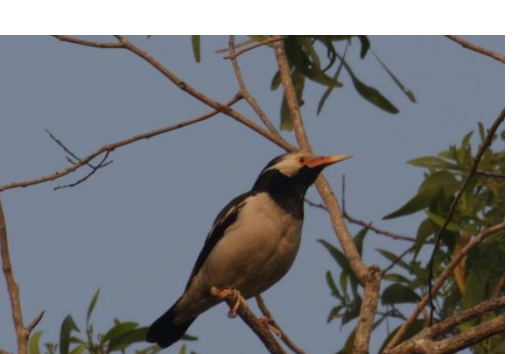
Figure 4-26. Species composition (%) in different Orders of water birds









	
<p><i>Columba livia</i> (Rock Pigeon)</p>	<p><i>Streptopelia tranquebarica</i> (Red Collared Dove)</p>
	
<p><i>S. chinensis</i> (Spotted Dove)</p>	<p><i>Cypsiurus balasiensis</i> (Asian Palm-swift)</p>

	
<i>Centropus sinensis</i> (Greater Coucal)	<i>Eudynamys scolopaceus</i> (Asian Koel)
	
<i>Cacomantis merulinus</i> (Plaintive Cuckoo)	<i>Hierococcyx varius</i> (Common Hawk-Cuckoo)
	
<i>Elanus caeruleus</i> (Black-Shouldered Kite)	<i>Milvus lineatus</i> (Black-eared Kite)
	
<i>Spilornis cheela</i> (Crested Serpent-Eagle)	<i>Ichthyophaga humilis</i> (Lesser Fish-Eagle)

	
<p><i>Buteo burmanicus</i> (Himalayan Buzzard)</p>	<p><i>Merops orientalis</i> (Little Green Bee-Eater)</p>
	
<p><i>M. leschenaultia</i> (Chestnut-headed Bee-Eater)</p>	<p><i>Hlacyon smyrnensis</i> (White-throated Kingfisher)</p>
	
<p><i>H. pileata</i> (Black-capped Kingfisher)</p>	<p><i>Megalaima haemacephala</i> (Coppersmith Barbet)</p>
	
<p><i>Oriolus chinensis</i> (Black-naped Oriole)</p>	<p><i>Aegithina tiphia</i> (Common Iora)</p>

	
<p><i>Rhipidura albicollis</i> (White-throated Fantail)</p>	<p><i>Dicrurus macrocercus</i> (Black Drongo)</p>
	
<p><i>Lanius cristatus</i> (Brown Shrike)</p>	<p><i>Corvus splendens</i> (House Crow)</p>
	
<p><i>C. macrorhynchos</i> (Large-billed Crow)</p>	<p><i>Prinia flaviventris</i> (Yellow-bellied Prinia)</p>
	
<p><i>P. inornata</i> (Plain Prinia)</p>	<p><i>Orthotomus sutorius</i> (Common Tailorbird)</p>

	
<i>Acrocephalus aedon</i> (Thick-billed Warbler)	<i>Hirundo rustica</i> (Barn Swallow)
	
<i>Pycnonotus jocosus</i> (Red-whiskered Bulbul)	<i>P. cafer</i> (Red-Vented Bulbul)
	
<i>P. blanfordi</i> (Streak-Eared Bulbul)	<i>Phylloscopus fuscatus</i> (Dusky Warbler)
	
<i>Turdoides gularis</i> (White-throated Babbler)	<i>Gracupica contra</i> (Asian Pied Starling)

	
<p><i>Acridotheres tristis</i> (Common Myna)</p>	<p><i>A. fuscus</i> (Jungle Myna)</p>
	
<p><i>Copsychus saularis</i> (Oriental Magpie-Robin)</p>	<p><i>Ficedula albicilla</i> (Taiga Flycatcher)</p>
	
<p><i>Saxicola caprata</i> (Pied Bushchat)</p>	<p><i>S. maurus</i> (Eastern Stonechat)</p>
	
<p><i>Dicaeum cruentatum</i> (Scarlet-backed Flowerpecker)</p>	<p><i>Cinnyris jugularis</i> (Olive-backed Sunbird)</p>













	
<p><i>Lonchura punctulata</i> (Scaly-breasted Munia)</p>	<p><i>L. atricapilla</i> (Chestnut Munia)</p>
	
<p><i>Passer domesticus</i> (House Sparrow)</p>	<p><i>P. montanus</i> (Eurasian Tree-Sparrow)</p>
	
<p><i>Motacilla alba</i> (White Wagtail)</p>	<p><i>Anthus rufulus</i> (Paddyfield Pipit)</p>

Figure 4-27 Recorded Terrestrial Birds

	
<p><i>Amaurornis phoenicurus</i> (White-breasted Waterhen)</p>	<p><u><i>Mycteria leucocephala</i></u> (Painted Stork)</p>

	
<p><i>Ardeola grayii</i> (Indian Pond-Heron)</p>	<p><i>Bubulcus coromandus</i> (Eastern Cattle Egret)</p>
	
<p><i>Egretta garzetta</i> (Little Egret)</p>	<p><i>Mesophoyx intermedia</i> (Intermediate Egret)</p>
	
<p><i>Ardea alba</i> (Great Egret)</p>	<p><i>A. purpurea</i> (Purple Heron)</p>
	
<p><i>Microcarba niger</i> (Little Cormorant)</p>	<p><i>Charadrius mongolus</i> (Lesser Sandplover)</p>








	
<p><i>Vanellus cinereus</i> (Grey-headed Lapwing)</p>	<p><i>V. indicus</i> (Red-wattled Lapwing)</p>
	
<p><i>Metopidius indicus</i> (Bronze-winged Jacana)</p>	<p><i>Numenius phaeopus</i> (Whimbrel)</p>
	
<p><i>Actitis hypoleucos</i> (Common Sandpiper)</p>	<p><i>Tringa totanus</i> (Common Redshank)</p>
	
<p><i>Sternula albifrons</i> (Little Tern)</p>	

Figure 4-28 Recorded Water Birds

4.5.3. Discussion

Thanlyan glass manufacturing factory located at Thilawa economic development zone may affect the ecosystem of direct impact area leading to habitat degradation and fragmentation by the purposes of land use. On the other hand, it would increase the economic growth, the chances of employments and recycling the raw material of discarded glass pieces is the issue for ecosystem friendship. Recycling of waste water to be deposited at the settlement tank is according to environmental ethic at glass bottle manufacturing factory, Thanlyan. And then such a physical treatment what is the next step of processing sediments and the proper way of releasing it will be critical one for environmental safety.

Habitat type of this area is important for the ecological values those supporting fauna assemblages such as insects and birds. Distributed habitats were trees and herb and collected plant species were involved in some categories of IUCN Red List of Threatened Species (ver. 2020-2). There were three plant species of Endangered (EN): *Sonneratia caseolaris* (lamu), *Magnolia grandiflora* (Tatie mawe) and *Averrhoa bilimbi* (Zaung yar) in the study area. The plant species can support not only food, shelter, pollination for animals but also shading, medicine, edible and ornament and spiritual values for human being. The present study recorded 6 species of medicinal plants, 9 species of medicinal plants and 5 species of ornamental plants with aspect of ecosystem service in this area.

Shrub and herb on the alongside of railway, the secondary impact area is peculiar habitat for insect diversity such as 26 species of butterfly, 12 species of dragonfly and 6 species of damselfly. Trees and small tree of the core area and roadside plantation provided the feeding and breeding habitat for the diversity of 38 terrestrial bird species while seasonal wetland such as paddy field of the indirect impact area supporting very well habitat for 17 species of water birds in the project area. Among them two species of nearly threatened (NT) were *Ichthyophaga humilis* (lesser fish eagle) and *Myctenia leucocephala* (painted stroke) while *Turdoides gularis* (white throated babbler) was noted as endemic in this study. The total of 26 fish species including two vulnerable (VU) species: *Tenulosia toil* (Nga –tha- lauk- yauk- pha) and *Wallago attu* (Nga-but) while *Ompok bimaculatus* (Nga-nu –than) was nearly threatened (NT) species with the aspect of conservation. As an aquatic ecosystem survey, *Oreochromis niloticus* (Nile tilapia) is exotic species and it may compete with the feeding and breeding ground of indigenous species at Zarmini Inn. A total of 12 species of herpetofauna (amphibian, reptile and lizard) were recorded and some species of them were based on interview survey. Very common mammal species such as squirrels, mouse, rat were also noted in the study area (interview survey).

The natural habitat of the indirect impact area had been already cleared because of exploitation of land use for economic development zone and it may be no more

threatened for biodiversity. The vicinity around the glass manufacturing factory had road side and landscape plantation (patches of rain forest consisting of trees) and alongside of the railway may be the urban forest where the feeding and breeding ground for the faunal diversity. The fencing plantation at the southeastern part of this factory area should be growing for the rehabilitating for faunal assemblages such as birds and insects.

4.6. ENVIRONMENTAL BASELINE DATA

4.6.1. Air Quality

4.6.1.1. Methodology

Air quality monitoring were conducted within and around the project site of MGE from 13th to 16th June, 2023. The air monitoring data was collected with Haz-Scanner (Model-EPAS). Air quality monitoring method and parameters conducted by Haz-Scanner are shown in Table 4-41. To reveal the existing status of baseline air quality, the average air quality was compared with the air emission levels from NEQEG (2015) of Glass, Glass and Mineral Fiber Manufacturing, Minnesota Department of Health, NAQQS of US.EPA and Alberta, Agriculture, Food and Development.

Table 4-41 Description of Air Quality Monitoring Parameters

Item	Description	Specification
Particle Modules	Monitor Method	Continuously, automatically and real-time
	Working Principle	Light scattering technique
	Measurement Data	PM _{2.5} and PM ₁₀
	Measuring Range	0 -10 mg/m ³
Gas modules	Monitor Method	Continuously, automatically and real-time
	Working Principle	High precision electrochemical sensor
	Gas Monitor	CO ₂ , CO, NO ₂ , SO ₂ , CH ₄ , VOC, Ozone
Meteorological parameters	Measuring Range	Temperature: -40°C to 60°C Precision: ±0.3°C
		Humidity: 0 to 100% RH Precision: ±2%
		Wind Direction: 0 – 360° Precision: ±5°
		Wind Speed: 0 – 30 m/s Precision: ± 0.3 m/s

4.6.1.2. Location of Air Monitoring Points

Air quality is measured at three locations within and around the project site. Air monitoring station A1 is conducted within the project area while that of station A2 and station A3 are conducted at Phan Chat Sat Yone Taw Ya Monastery and Thilawa Road respectively. Location map of the air monitoring points is shown in Figure 4-29. Summarized data of air monitoring process are shown in Table 4-42 and air monitoring activities are shown in Figure 4-30.

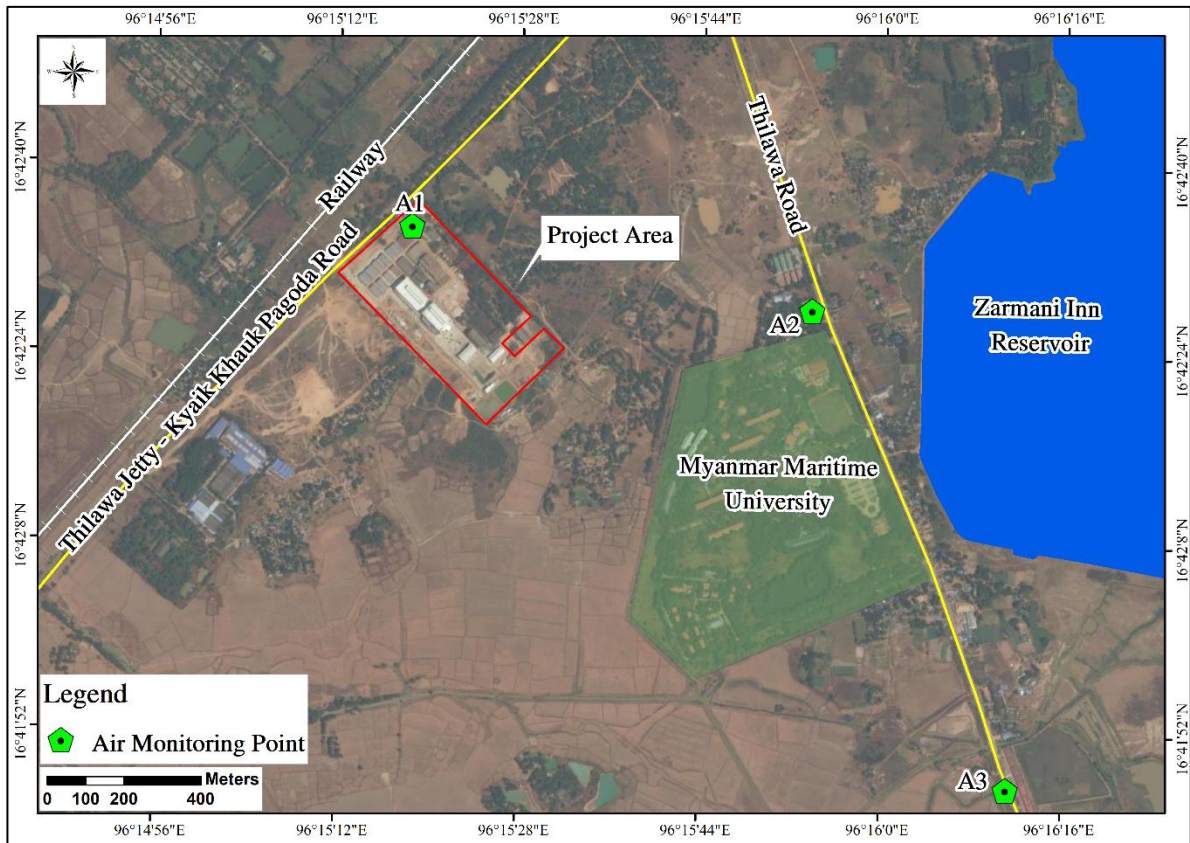


Figure 4-29 Location Map of Air Monitoring Stations

Table 4-42 Air Quality Measurement Data

Station	Location	Reference Coordinate	Air Quality Measurement Date
A1	Project Site	16°42'34.68"N 96°15'18.69"E	13th – 14th June, 2023
A2	Phan Chat Sat Yone Taw Ya Monastery	16° 42' 27.89" N 96° 15' 53.99" E	14th – 15th June, 2023
A3	Thilawa Industrial Road	16°41'47.49"N 96°16'11.50"E	15th – 16th June, 2023

Source: Field survey by TBS on June 2023



A1 (Project Site)



Source: Field survey by TBS on June 2023

Figure 4-30 Information of AQM Measurement Stations

4.6.1.3. Air Quality Results

4.6.1.3.1 Result for Station A1

Results of air measured by Haz-Scanner are compared with guideline values of NEQEG (2015) and the results are shown in Table 4-43. It is also illustrated the graph of air quality results from Figure 4-31 to Figure 4-36. All air quality results for station A1 are within the NEQEG (2015). Details of measurements results by TBS are shown in Appendix F.

Table 4-43 Station A1 Air Quality Results from Haz-Scanner

No.	Parameters	Result	Unit	Sampling Duration		Guideline Limit	Avg.Period	Remark
1.	Carbon dioxide (CO ₂)	298	ppm	8	hours	10,000 ppma	8-hour	Within the Guideline
2.	Carbon monoxide (CO)	0.07	ppm	8	hours	9 ppmb	8-hour	
3.	Methane (CH ₄)	663	ppm	8	hours	1,000 ppmc	8-hour	
4.	Nitrogen dioxide (NO ₂)	155	µg/m ³	1	hour	*200 µg/m ³	1-hour	
5.	Ozone (O ₃)	96	µg/m ³	8	hours	*100 µg/m ³	8-hour daily maximum	
6.	Particulate Matter (PM ₁₀)	25	µg/m ³	24	hours	*50 µg/m ³	24-hour	
7.	Particulate Matter (PM _{2.5})	13	µg/m ³	24	hours	*25 µg/m ³	24-hour	
8.	Sulphur dioxide (SO ₂)	5	µg/m ³	24	hours	*20 µg/m ³	24-hour	
9.	Volatile Organic Compound (VOCs)	2.0	µg/m ³	24	hours	NG	-	
10.	Humidity	81	%	24	hours	-	-	

No.	Parameters	Result	Unit	Sampling Duration		Guideline Limit	Avg.Period	Remark
11.	Temperature	28	°C	24	hours	-	-	

Source: Field survey by TBS on June 2023

*National Environmental Quality Emission Guideline (2015), a Minnesota Department of Health, b NAQQS of US.EPA, c Alberta, Agriculture, Food and Development, NG, No Guideline

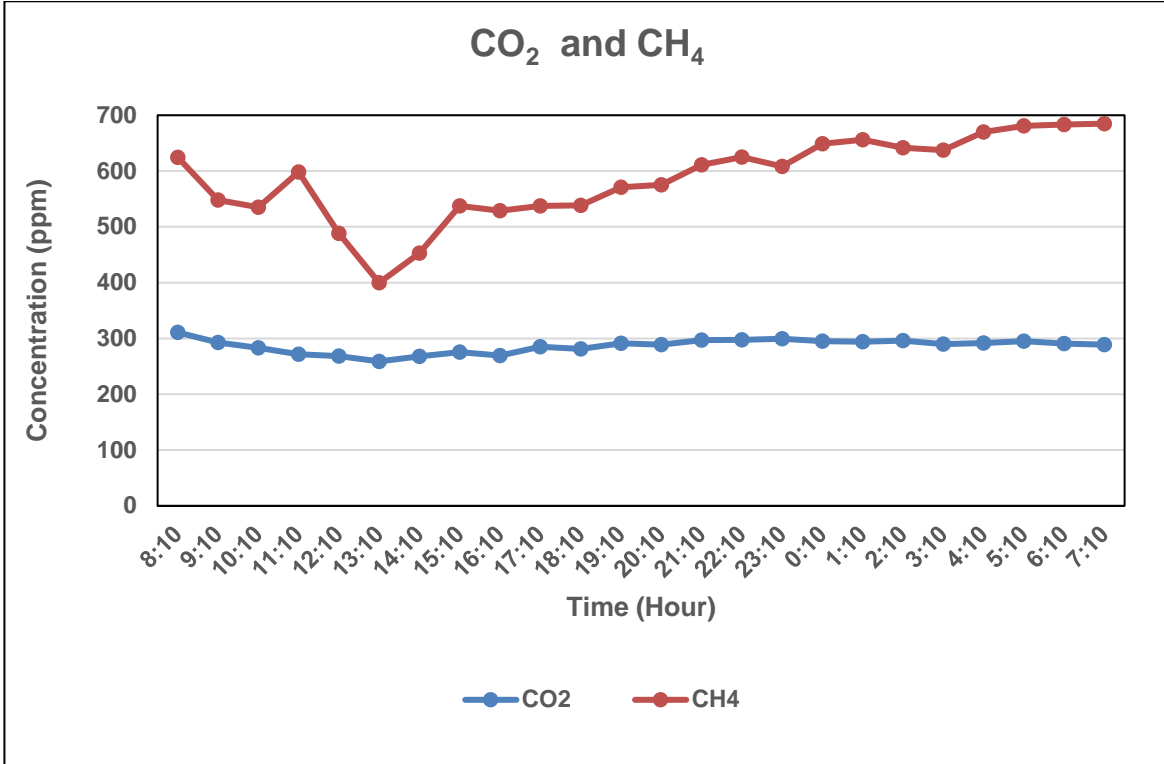


Figure 4-31 CO₂ and CH₄ Measurement Results for Station A1

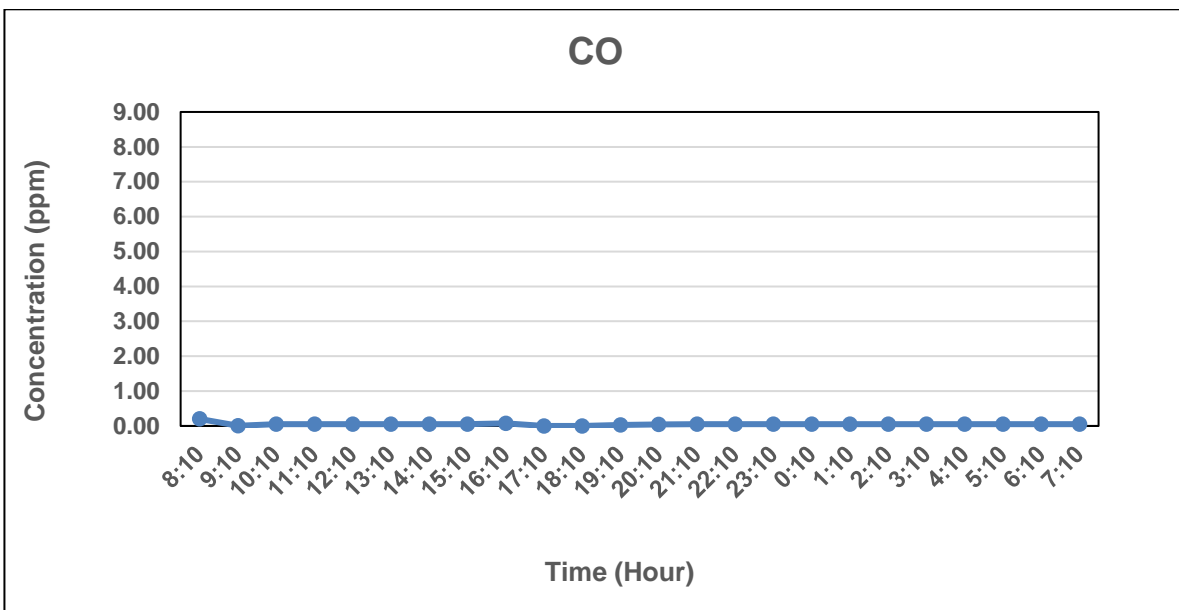


Figure 4-32 CO Measurement Results for Station A1

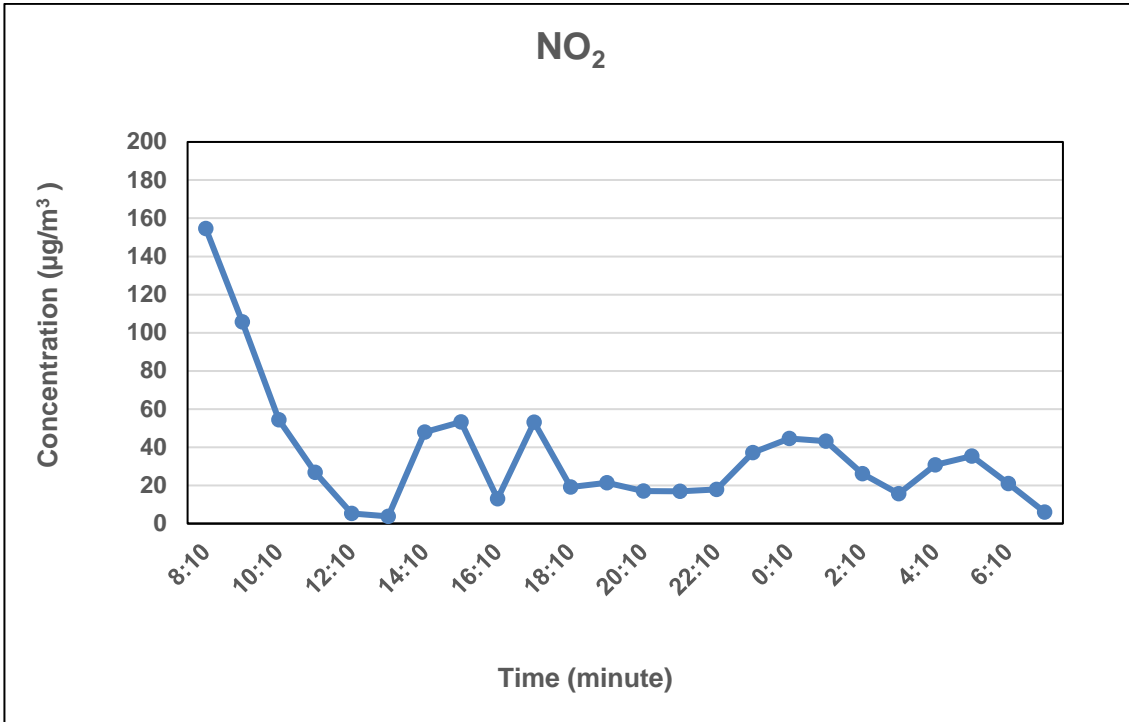


Figure 4-33 NO₂ Measurement Results for Station A1

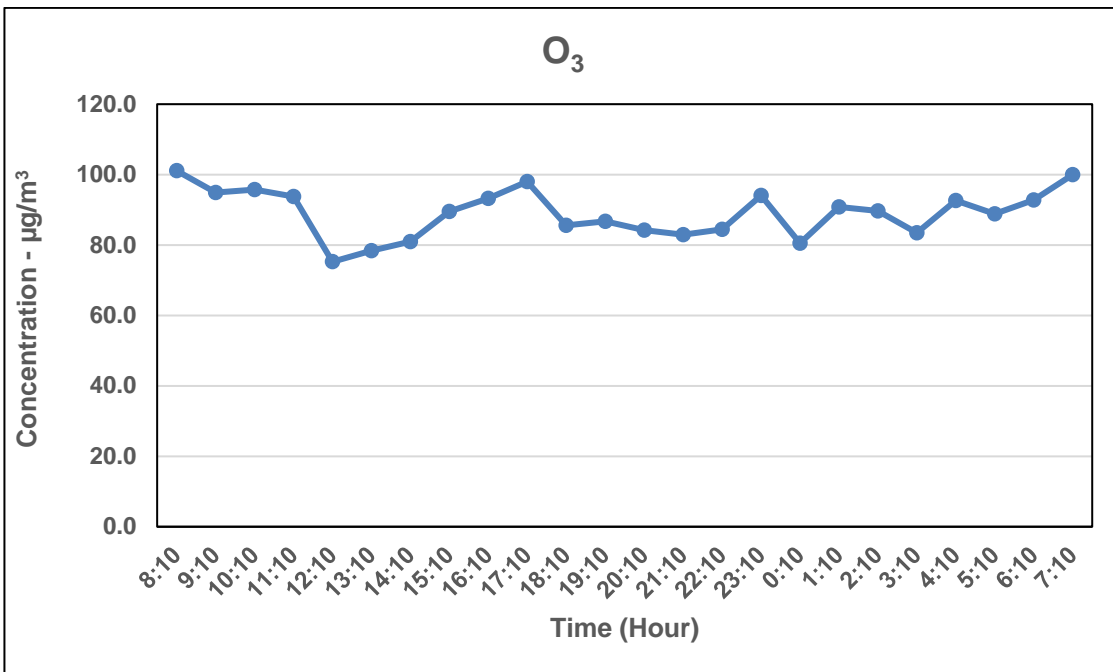


Figure 4-34 O₃ Measurement Results for Station A1

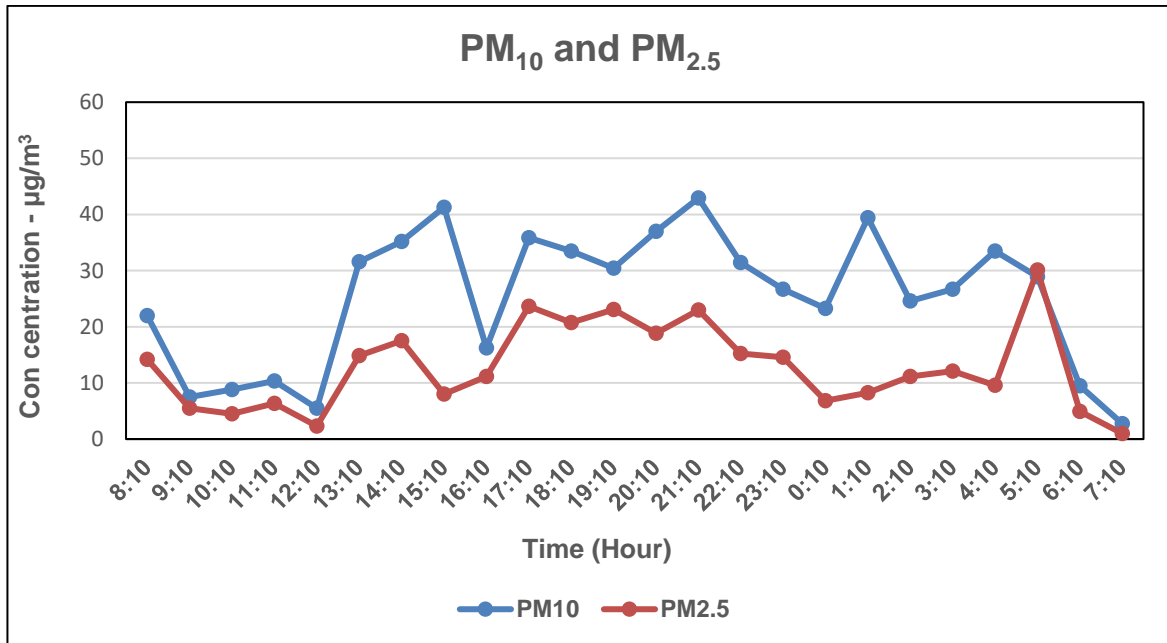


Figure 4-35 PM₁₀ and PM_{2.5} Measurement Results for Station A1

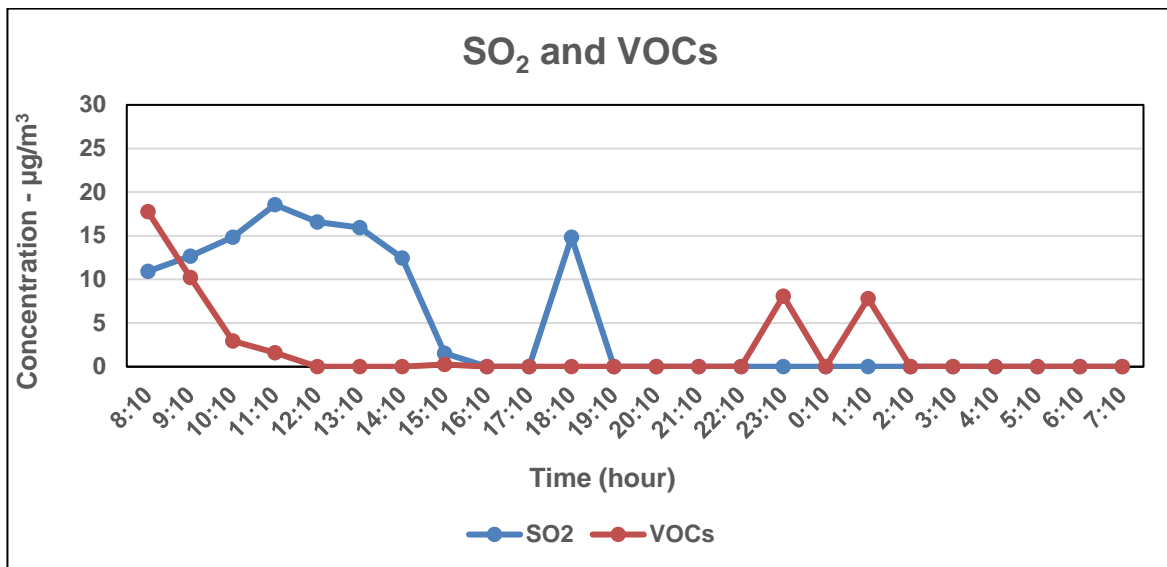


Figure 4-36 SO₂ and VOCs Measurement Results for Station A1

4.6.1.3.2 Result for Station A2

Results of air measured by Haz-Scanner for station A2 are compared with NEQEG (2015). The results are shown in Table 4-44. It is also illustrated the graph form of air quality results from Figure 4-37 to **Error! Reference source not found.** All air parameter results for station A2 are within the NEQEG (2015). Details of measurements results by TBS are shown in Appendix F.

Table 4-44 Station A2 Air Quality Results from Haz-Scanner

No.	Parameters	Result	Unit	Sampling Duration		Guideline Limit	Avg.Period	Remark
1.	Carbon dioxide (CO ₂)	287	ppm	8	hours	10,000 ppma	8-hour	Within the Guideline
2.	Carbon monoxide (CO)	0.06	ppm	8	hours	9 ppmb	8-hour	
3.	Methane (CH ₄)	510	ppm	8	hours	1,000 ppmc	8-hour	
4.	Nitrogen dioxide (NO ₂)	112	µg/m ³	1	hour	*200 µg/m ³	1-hour	
5.	Ozone (O ₃)	87	µg/m ³	8	hours	*100 µg/m ³	8-hour daily maximum	
6.	Particulate Matter (PM ₁₀)	20	µg/m ³	24	hours	*50 µg/m ³	24-hour	
7.	Particulate Matter (PM _{2.5})	13	µg/m ³	24	hours	*25 µg/m ³	24-hour	
8.	Sulphur dioxide (SO ₂)	1.4	µg/m ³	24	hours	*20 µg/m ³	24-hour	
9.	Volatile Organic Compound (VOCs)	0	µg/m ³	24	hours	NG	-	
10.	Humidity	78	%	24	hours	-	-	
11.	Temperature	29	°C	24	hours	-	-	

Source: Field survey by TBS on June 2023

*National Environmental Quality Emission Guideline (2015), a Minnesota Department of Health, b NAQQS of US.EPA, c Alberta, Agriculture, Food and Development, NG, No Guideline

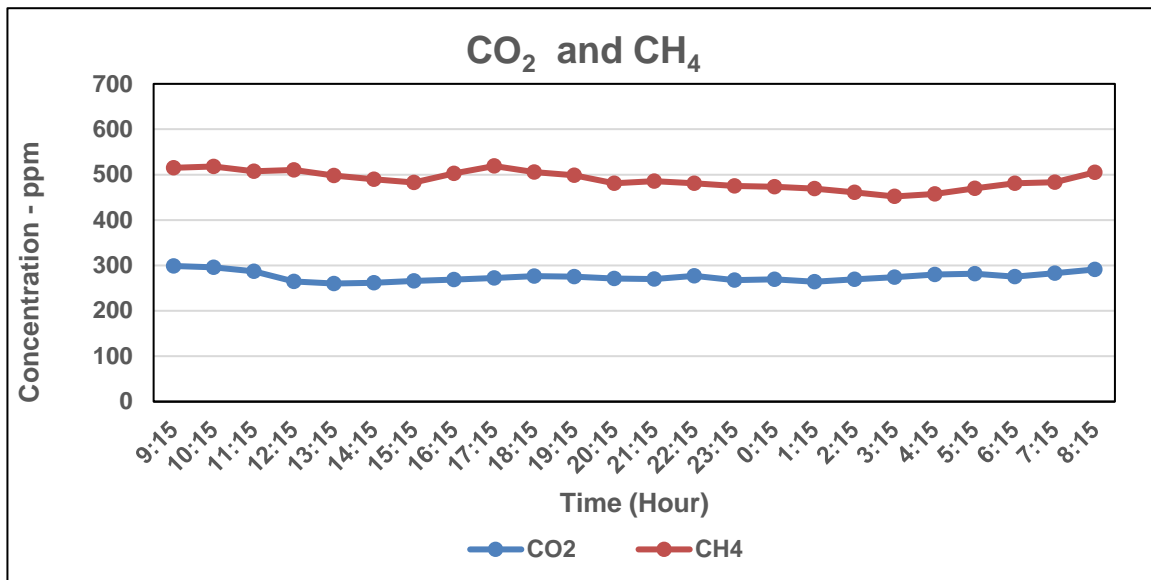


Figure 4-37 CO₂ and CH₄ Measurement Results for Station A2

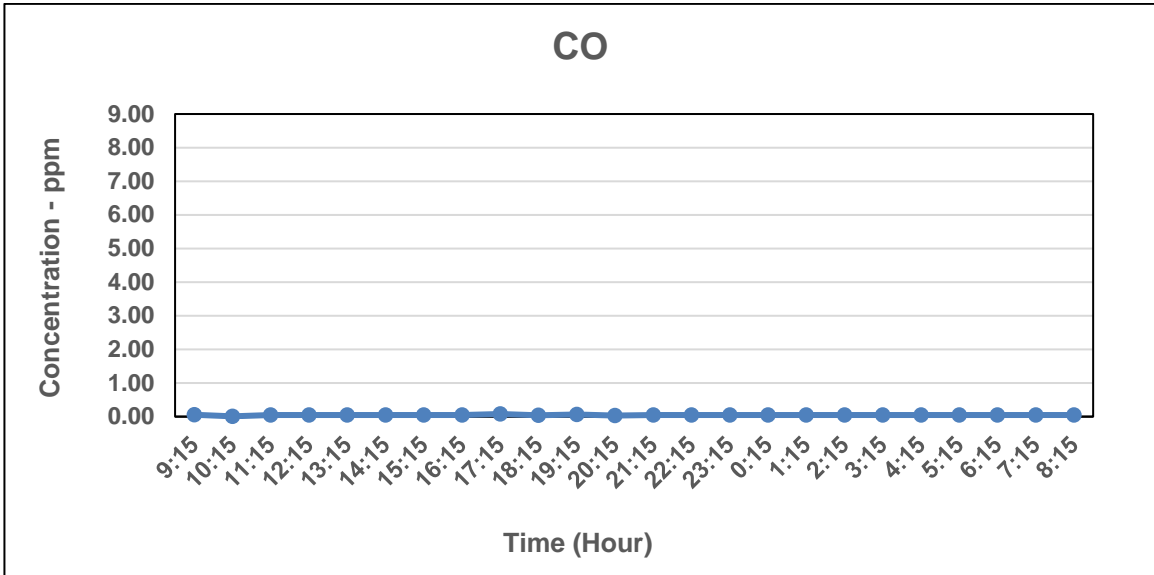


Figure 4-38 CO Measurement Results for Station A2

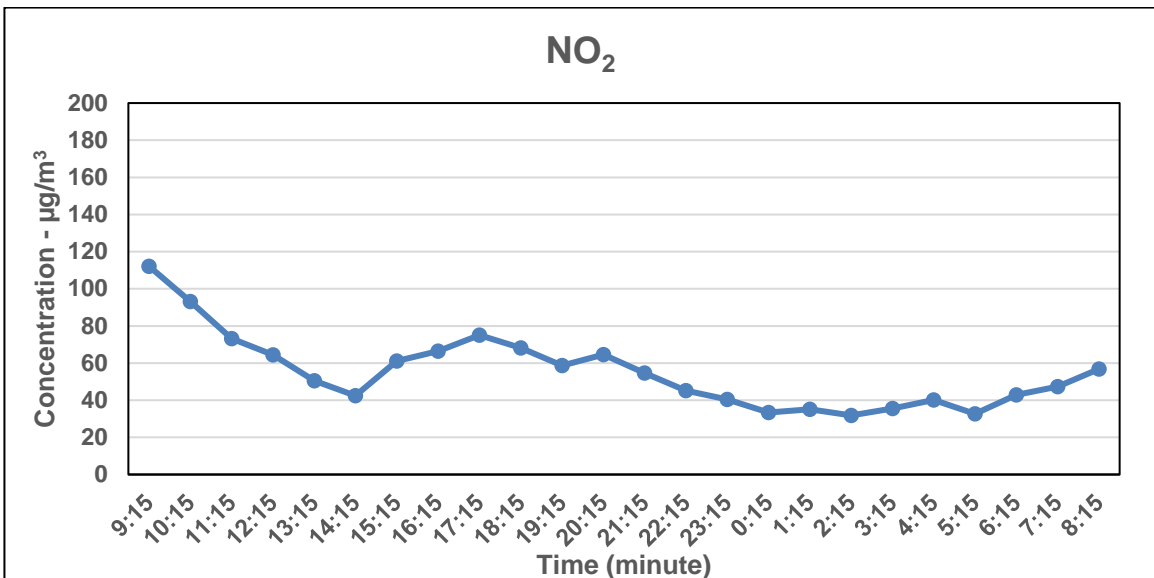


Figure 4-39 NO₂ Measurement Results for Station A2

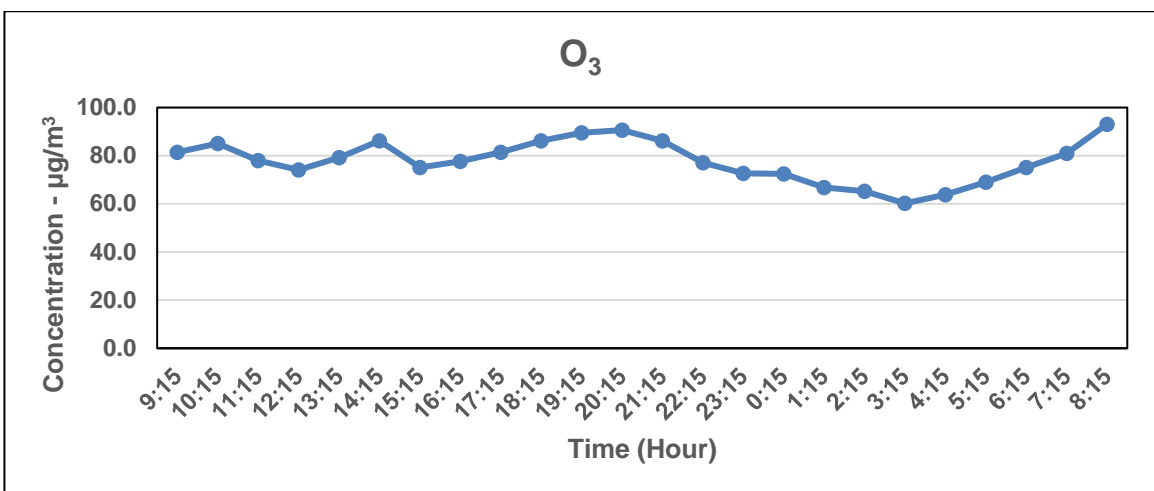


Figure 4-40 O₃ Measurement Results for Station A2

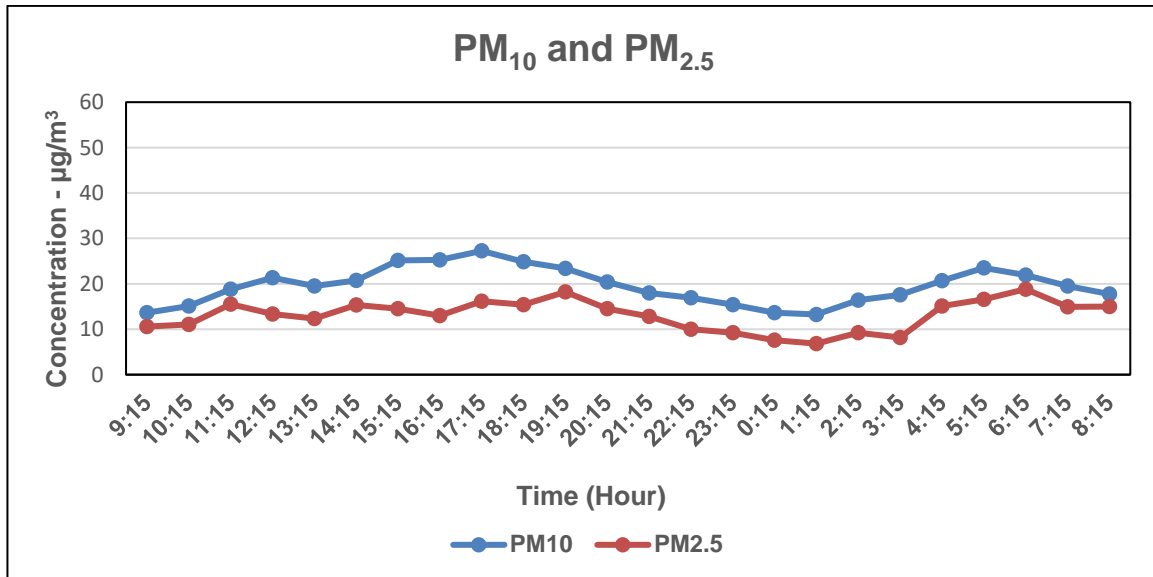


Figure 4-41 PM₁₀ and PM_{2.5} Measurement Results for Station A2

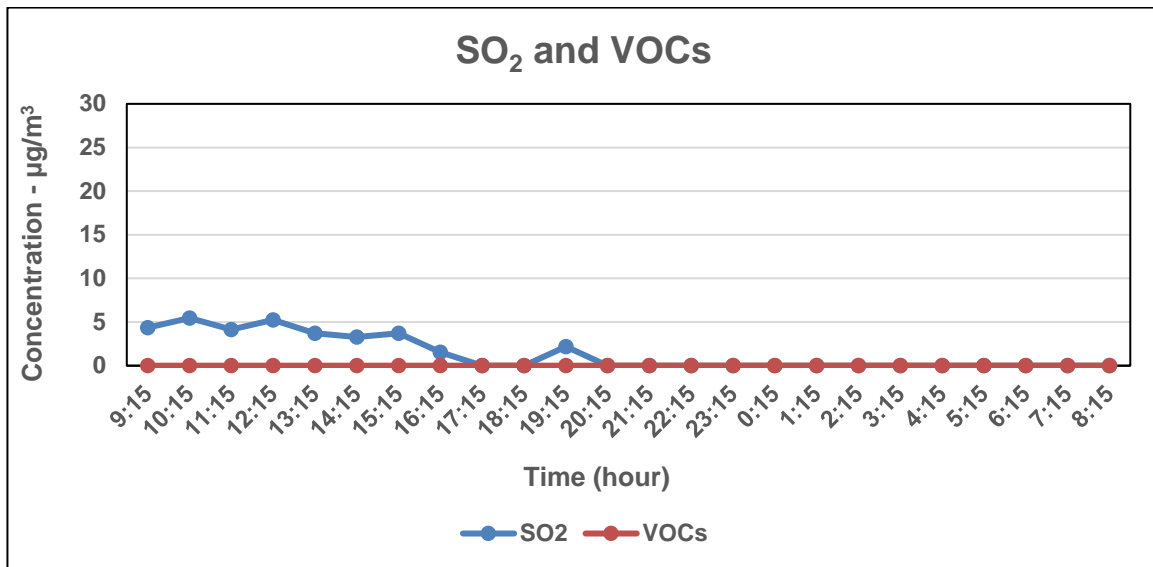


Figure 4-42 SO₂ and VOCs Measurement Results for Station A2

4.6.1.3.3 Result for Station A3

Results of air measured by Haz-Scanner are compared with guideline values of NEQEG (2015) and the results are shown in Table 4-45. It is also illustrated the graph form of air quality results from Figure 4-43 to Figure 4-48. All air parameter results for station A3 are within the NEQEG (2015) although an acceptable level of road dust emission is occurred by wind or passing vehicles around the station A3. Details of measurements results by TBS are shown in Appendix F.

Table 4-45 Station A3 Air Quality Results from Haz-Scanner

No.	Parameters	Result	Unit	Sampling Duration		Guideline Limit	Avg.Period	Remark
1.	Carbon dioxide (CO ₂)	466	ppm	8	hours	10,000 ppma	8-hour	Within the Guideline
2.	Carbon monoxide (CO)	0.14	ppm	8	hours	9 ppmb	8-hour	
3.	Methane (CH ₄)	573	ppm	8	hours	1,000 ppmc	8-hour	
4.	Nitrogen dioxide (NO ₂)	122	µg/m ³	1	hour	*200 µg/m ³	1-hour	
5.	Ozone (O ₃)	98	µg/m ³	8	hours	*100 µg/m ³	8-hour daily maximum	
6.	Particulate Matter (PM ₁₀)	41	µg/m ³	24	hours	*50 µg/m ³	24-hour	
7.	Particulate Matter (PM _{2.5})	19	µg/m ³	24	hours	*25 µg/m ³	24-hour	
8.	Sulphur dioxide (SO ₂)	16	µg/m ³	24	hours	*20 µg/m ³	24-hour	
9.	Volatile Organic Compound (VOCs)	0	µg/m ³	24	hours	NG	-	
10.	Humidity	79	%	24	hours	-	-	
11.	Temperature	29	°C	24	hours	-	-	

Source: Field survey by TBS on June 2023

*National Environmental Quality Emission Guideline (2015), a Minnesota Department of Health, b NAQQS of US.EPA, c Alberta, Agriculture, Food and Development, NG, No Guideline

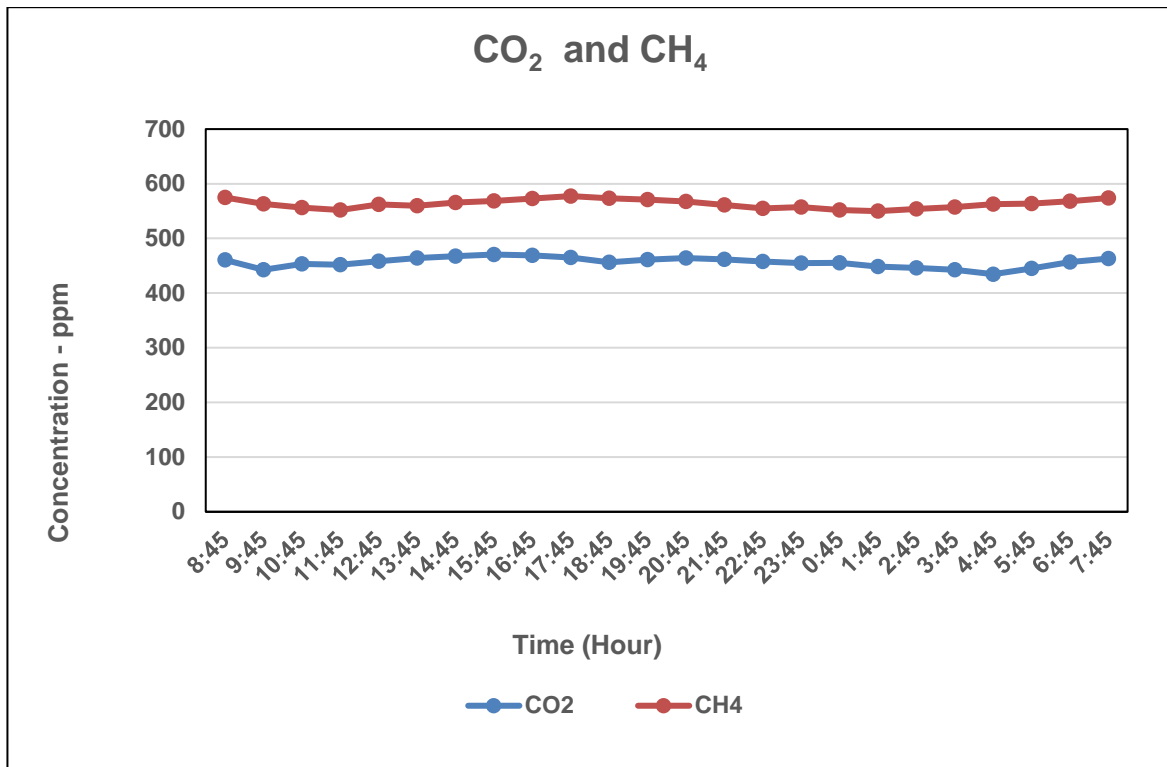


Figure 4-43 CO₂ and CH₄ Measurement Results for Station A3

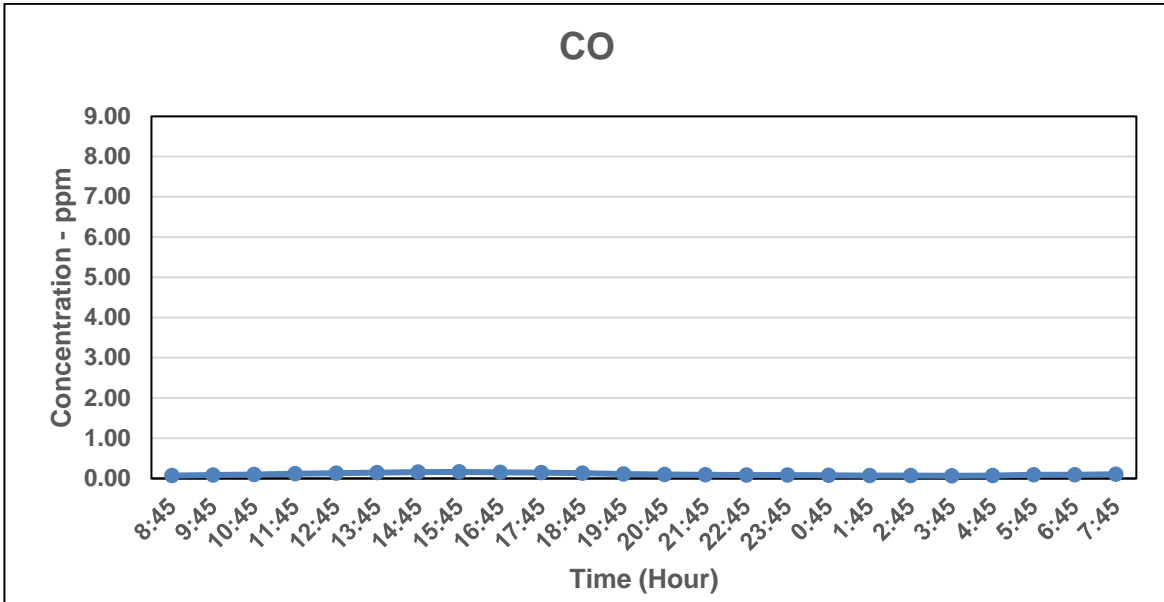


Figure 4-44 CO Measurement Results for Station A3

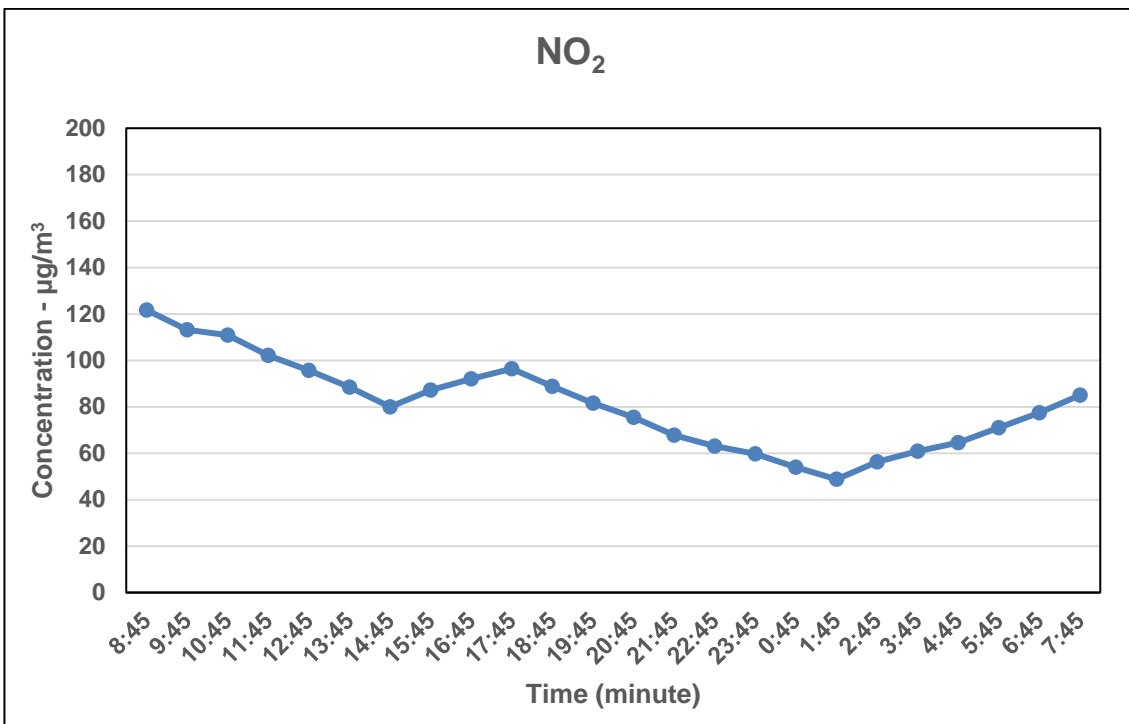


Figure 4-45 NO₂ Measurement Results for Station A3

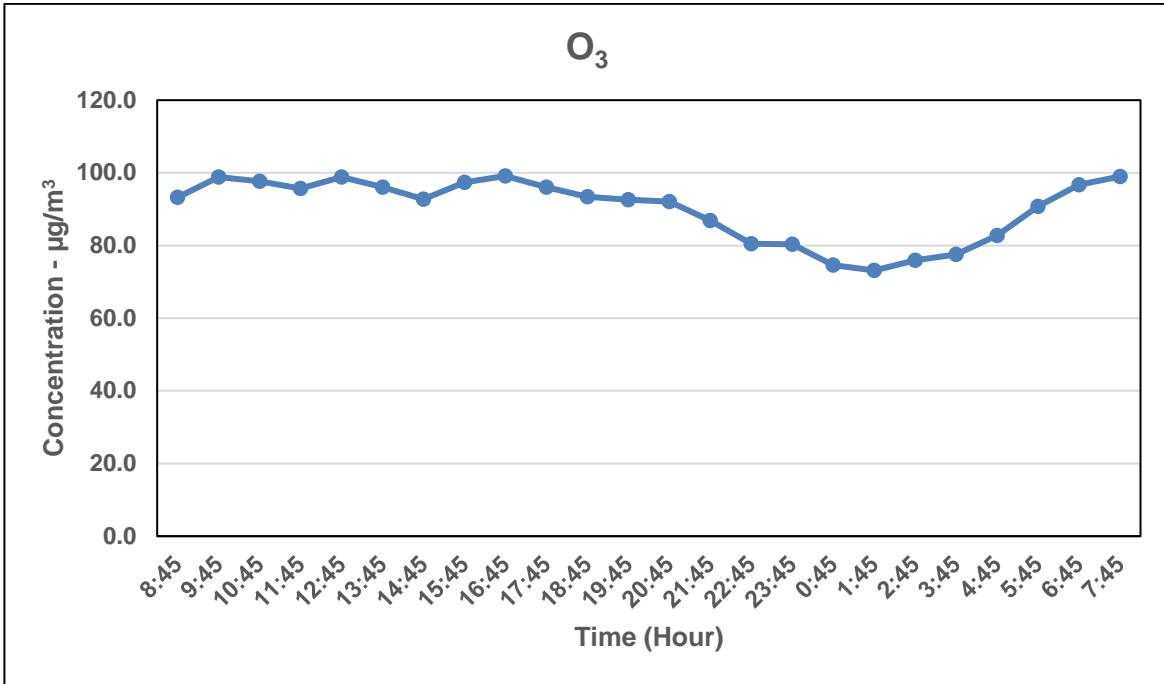


Figure 4-46 O₃ Measurement Results for Station A3

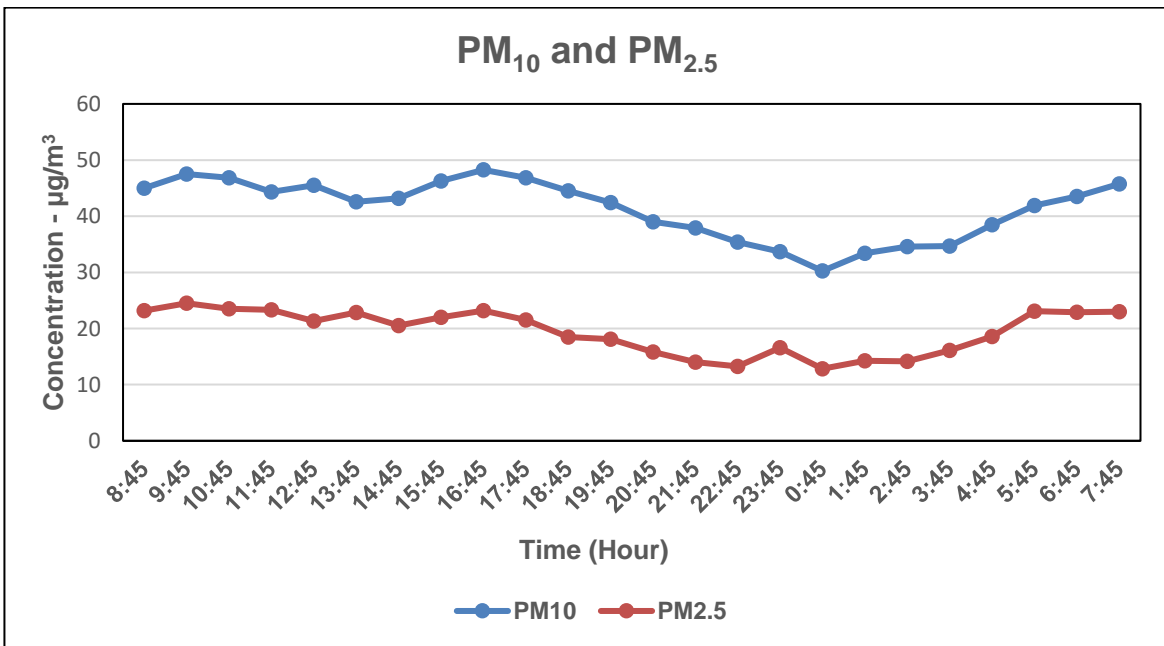


Figure 4-47 PM₁₀ and PM_{2.5} Measurement Results for Station A3

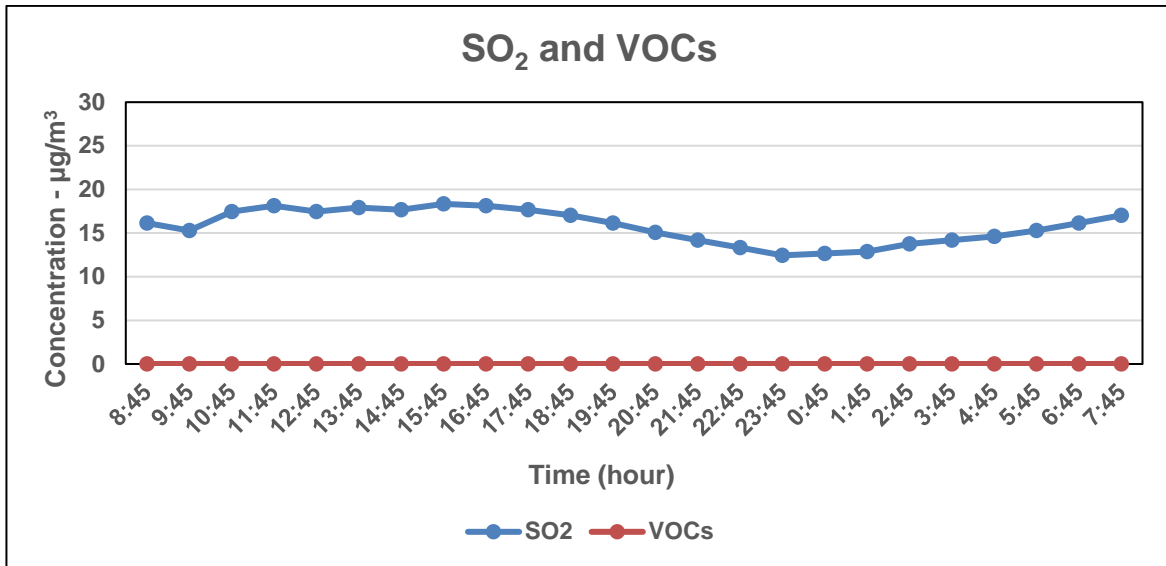


Figure 4-48 SO₂ and VOCs Measurement Results for Station A3

4.6.2. Wind Speed and Direction

4.6.2.1. Survey Method and Location of Monitoring Stations

Wind speed and direction are measured at 1.5 meter above ground level with the same dates and locations for the air quality monitoring stations. Moreover, it is also collected wind speed and direction data with the same instrument for air quality monitoring process. Location map of wind speed and direction monitoring stations is shown in Figure 4-29. Summarized dates of wind speed and direction monitoring process and monitoring activities are shown in Table 4-42 and Figure 4-30 respectively.

4.6.2.2. Survey Results

4.6.2.2.1 Result for Station A1

According to the field survey results, there is no residential area near the project while the wind speed within the project site is around 1.2 meter per second with South-Southwest (SSW) prevailing wind direction of 199 degree. The wind speed of over 6 meter per second may generates dust to the surrounding area¹⁵; however, all wind speed results within the project and nearby environment is lower than this value. As a result, it may reduce air pollution problems due to the construction or operation of the project to a certain level.

Wind speed and wind direction are also measured at the same location of air quality measuring points. The results of wind speed and wind direction are described in Table 4-46. The wind class frequency distribution and wind rose diagram are shown in Figure 4-50 and Figure 4-49. Details of measurements results are shown in Appendix F.

¹⁵ <https://tucson.ars.ag.gov/isco/isco12/VolumeIV/WindErosionProcesses.pdf>

Table 4-46 Station A1 Wind Speed and Wind Quality Results from AQM-09

No.	Parameters	Result	Unit	Sampling Duration	
1	Wind Speed	1.2	m/s	24	hours
2	Wind Direction	199	SSW	24	hours

Source: Field survey by TBS on June 2023

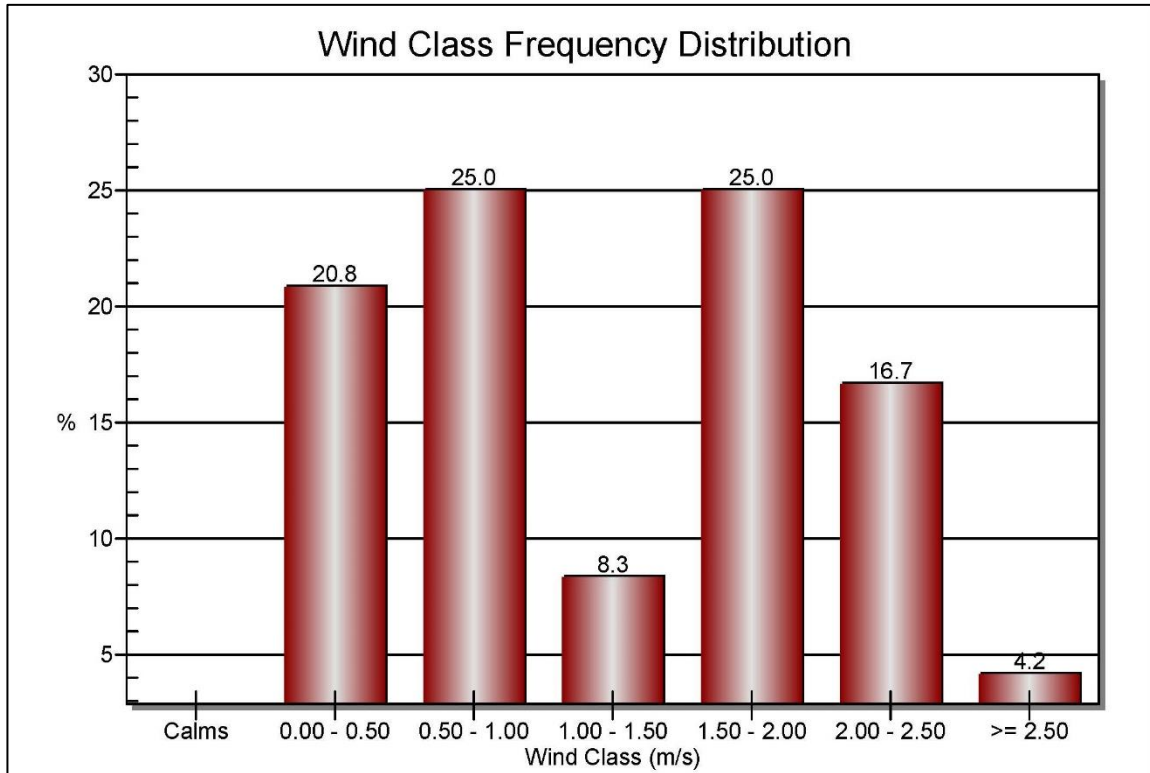


Figure 4-49 Diagram of Wind Class Frequency Distribution in Station A1

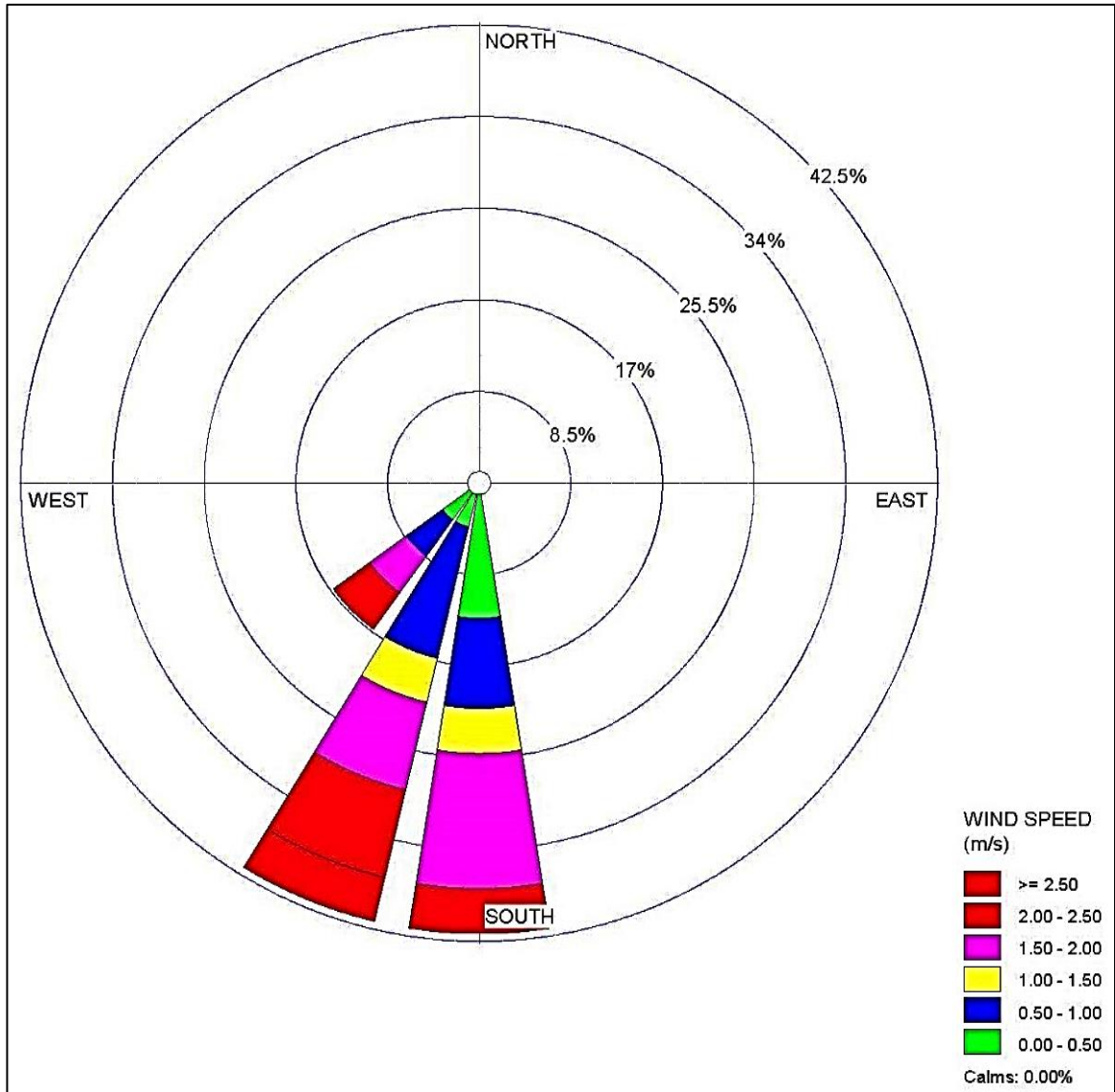


Figure 4-50 Diagram of Wind Speed and Direction Measured in Station A1

4.6.2.2.2 Result for Station A2

The results of wind speed and wind direction are described in Table 4-47. The wind rose diagram and wind class frequency distribution are shown in Figure 4-51 and Figure 4-52. Details of measurements results by TBS are shown in Appendix F.

According to the field survey results, wind speed values for station A2 is around 1.0 meter per second with South (S) prevailing wind direction of 191 degree.

Table 4-47 Station A2 Wind Speed and Wind Quality Results from AQM-09

No.	Parameters	Result	Unit	Sampling Duration	
1	Wind Speed	1.0	m/s	24	hours
2	Wind Direction	191	S	24	hours

Source: Field survey by TBS on June 2023

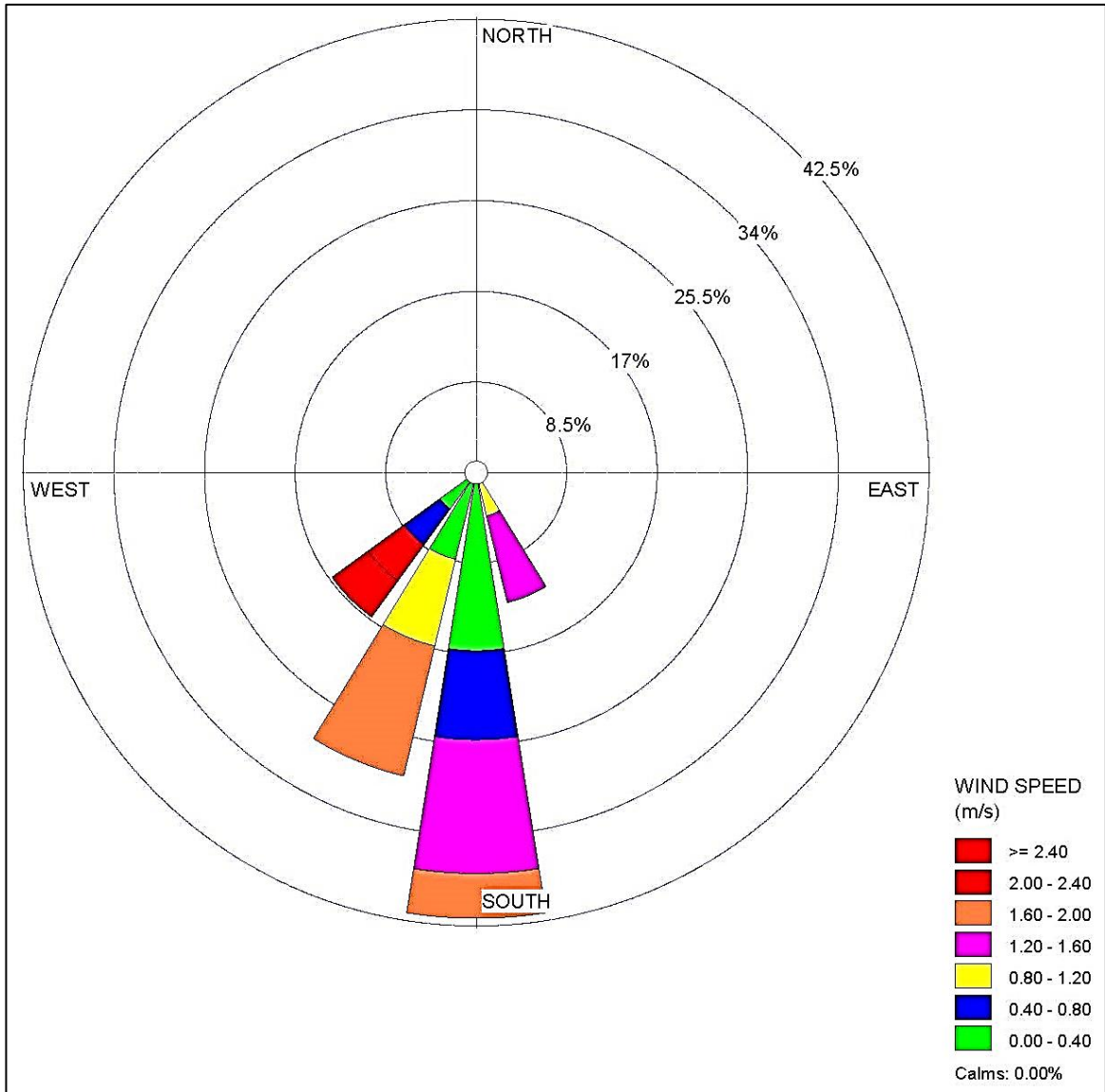


Figure 4-51 Diagram of Wind Speed and Direction Measured in Station A2

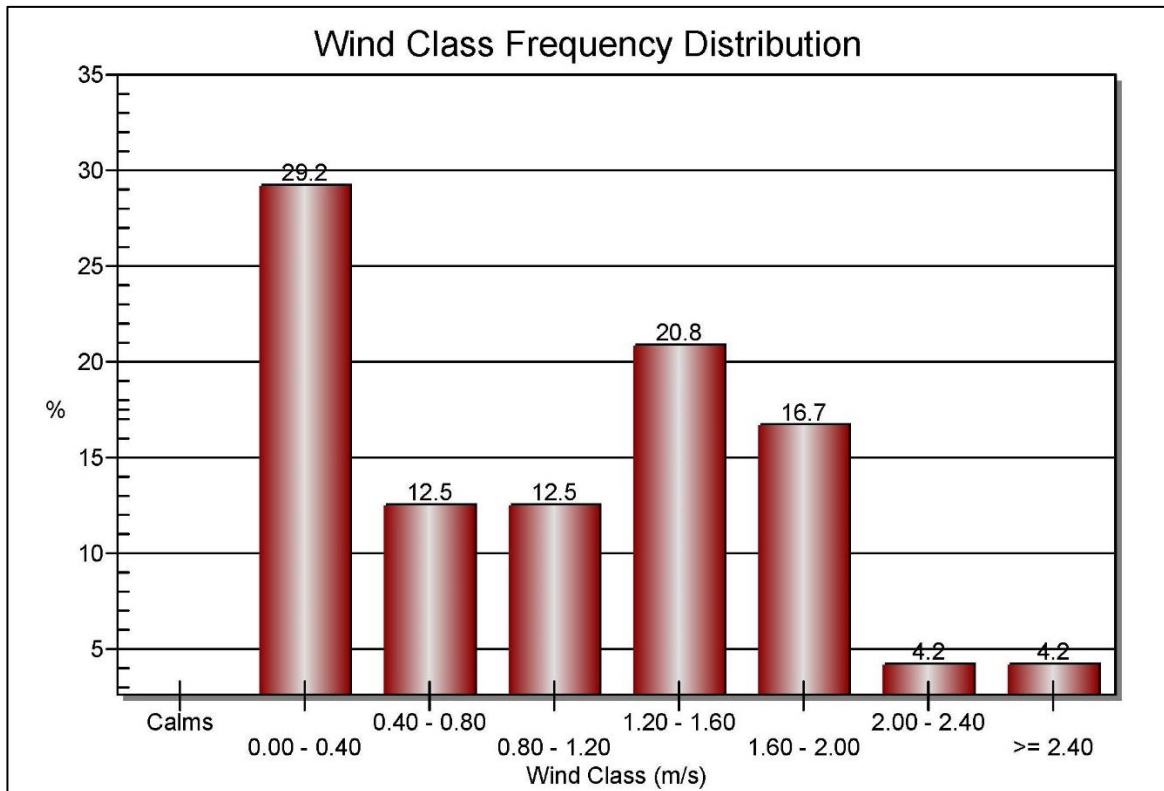


Figure 4-52 Diagram of Wind Class Frequency Distribution in Station A2

4.6.2.2.3 Result for Station A3

The results of wind speed and wind direction are described in Table 4-48. The wind rose diagram and wind class frequency distribution are shown in Figure 4-53 and Figure 4-54. Details of measurements results by TBS are shown in Appendix F.

According to the field survey results, the wind speed value for station A3 is around 0.9 meter per second with South-Southwest (SSW) prevailing wind direction of 194 degree. As the station A3 is located beside the Thilawa Road, it may generate dust to the surrounding area. However, station A3 wind speed result is low enough to cause minimal impact, as it is significantly lower than the limited wind speed (over 6 meter per second)¹⁶.

Table 4-48 Station A3 Wind Speed and Wind Quality Results from AQM-09

No.	Parameters	Result	Unit	Sampling Duration	
1	Wind Speed	0.9	m/s	24	hours
2	Wind Direction	194	SSW	24	hours

Source: Field survey by TBS on June 2023

¹⁶ ¹⁶ <https://tucson.ars.ag.gov/isco/isco12/VolumeIV/WindErosionProcesses.pdf>

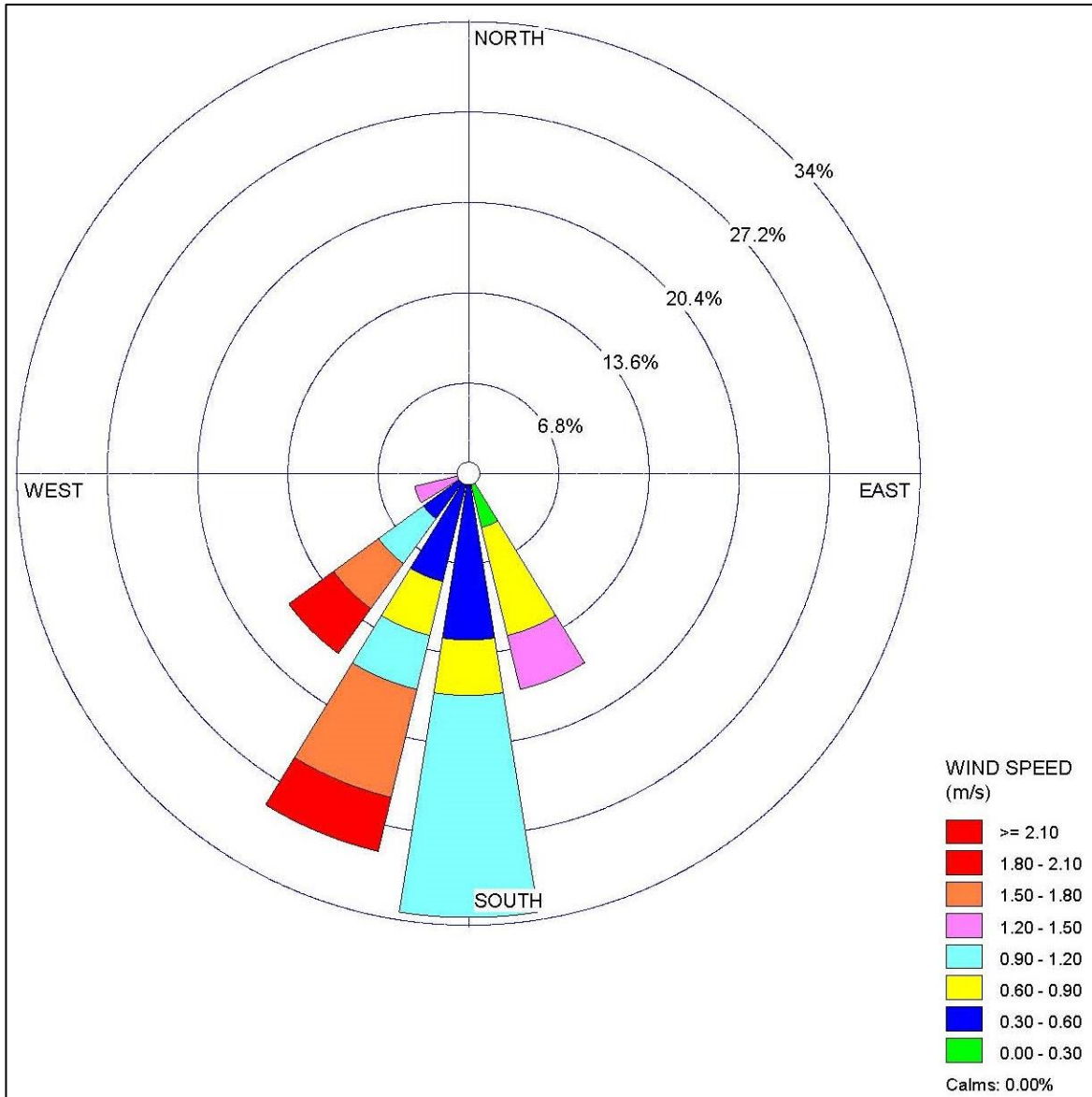


Figure 4-53 Diagram of Wind Speed and Direction Measured in Station A3

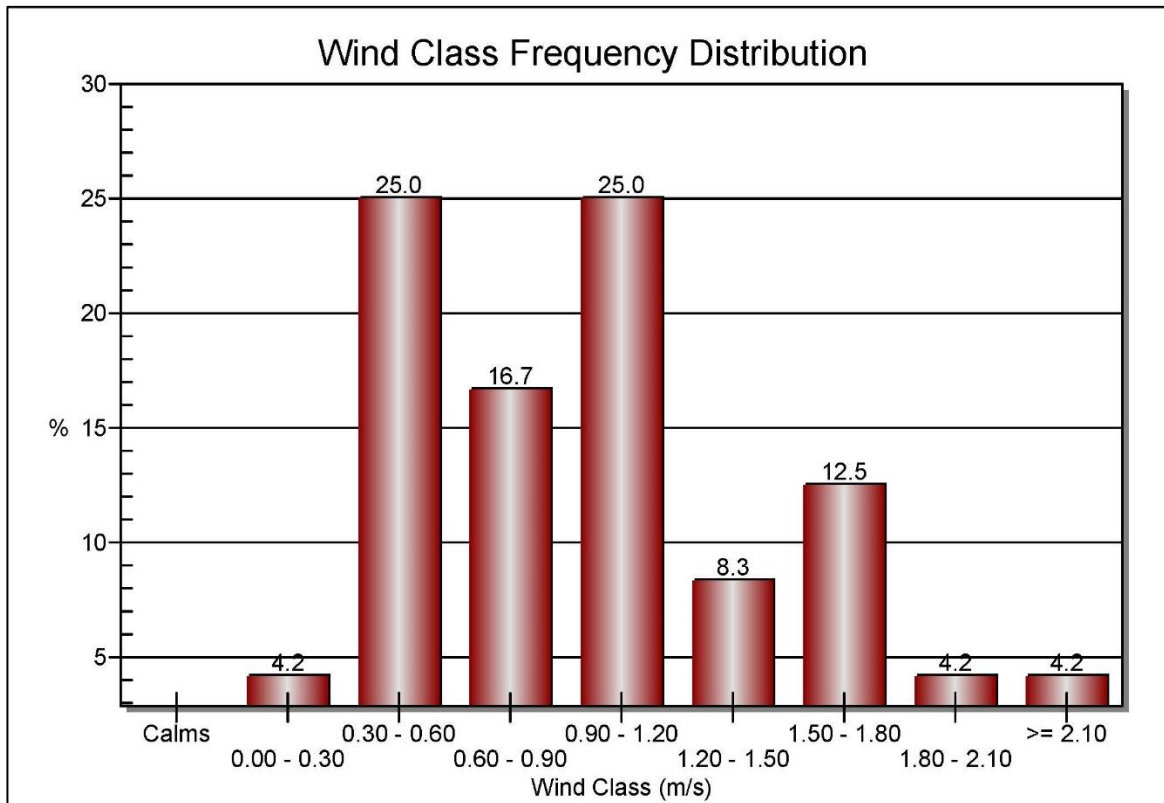


Figure 4-54 Diagram of Wind Class Frequency Distribution in Station A3

4.6.3. Water Quality

4.6.3.1. Methodology

The method for sample collection and treatment follow the quality assurance and quality control of International Organization for Standardization and International Electro technical Commission (ISO/IEC) 17025:2005 accreditation for laboratory to ensure that the water samples are free from contamination. The sample collectors have to wear starch-free rubber gloves at all time while collecting water samples. The water samples bottles must be rinsed with the sampling water before use.

In this study, some water quality parameters such as pH, temperature, Total Dissolved Solids (TDS), conductivity, and salinity are measured insitu using TM Waterproof Pocket tester as presented in Table 4-49.

For other essential parameters, the samples are sent to the ALARM Ecological Laboratory and Biological Oxygen Demand (BOD₅), Chemical Oxygen Demand (COD), free cyanide, total phosphorous, iron, lead, total nitrogen and arsenic are tested as presented in Table 4-50.

In this report, water quality result is compared with the effluent level for manufacturer of Glass, Glass and Mineral Fibers from NEQEG (2015). It is also compared with World Health Organization (WHO) Drinking Water Guideline and Myanmar National Drinking Water Quality Standard (MNDWQS) (2019).

Table 4-49 Water Quality Parameters Tested by TM Waterproof Pocket tester

No.	Parameter	Description	Remark
1.	pH	A measure of how acidic/basic water is. The range goes from 0 to 14, with 7 being neutral.	<7 indicate acidity >7 indicates a base
2.	TDS	A measure of amount of dissolved mineral constituents in water.	High TDS may affect the taste of water.
3.	Temperature	An impact on inorganic constituents and chemical contaminants in water.	High temperature influence taste, odor, color and corrosion.
4.	Conductivity	Conductivity is a measure of the ability of water to pass an electrical current. Conductivity in water is affected by the presence of inorganic dissolved solids such as chloride, nitrate, sulfate, and phosphate anions (ions that carry a negative charge) or sodium, magnesium, calcium, iron, and aluminum cations (ions that carry a positive charge)	Purified water is said to have low conductivity/high resistivity.
5.	Salinity	The saltiness or amount of salt dissolved in a body of water	Brackish water can cause negative impact on production process

Table 4-50 Water Quality Parameters Tested in ALARM Ecological Laboratory

No.	Parameter	Description	Remark
1.	BOD ₅	A measure of amount of oxygen required to remove waste organic matter from water under decomposition by aerobic bacteria that live only in oxygen present environment.	High BOD leads low Dissolved Oxygen (DO).
2.	COD	A measure of amount of oxygen required during the decomposition of organic matter and the oxidation of inorganic chemicals.	High BOD leads low DO
3.	Free Cyanide	Cyanide is toxic. Free cyanide is the most toxic form as it is the sum of the cyanide present as either hydrogen cyanide (HCN) or cyanide (CN)-.	Maximum contaminant level goal (MCLG) of 0.2 mg/L.
4.	Total Phosphorous (P)	Phosphorus is an essential element for plant life, but too much of it can reduce DO in water by an increase of mineral and organic nutrients.	High concentration leads to hypoxic zone or dead zone.
5.	Iron	A measure of amount of dissolved iron in water. High concentration of iron will cause metallic taste and metallic odor.	> 3ppm can affect color and odor of water.
6.	Lead	A measure of amount of dissolved iron in water. A cumulative poison, toxic in small concentration.	Loss of appetite, anemia, abdominal pain and death.
7.	Total Nitrogen	Total Nitrogen is an essential nutrient for plants and animals but an excess amount of it may reduce DO.	High concentration leads to hypoxic zone or dead zone.
8.	Arsenic	Arsenic is a highly toxic in its inorganic form.	Acute and long-term effects on human

4.6.3.2. Location of Water Sampling Points

Regarding water quality monitoring, it is collected the three types of single grab water samples around the proposed project site. They are process wastewater from sedimentation ponds, wastewater from discharge point of factory's drainage channel and ground water from the nearby project area.

The location of all water-sampling stations are shown in Figure 4-55. Water quality measuring data are shown in Table 4-51 and photos of water sampling activities within the project area are shown in Figure 4-55.

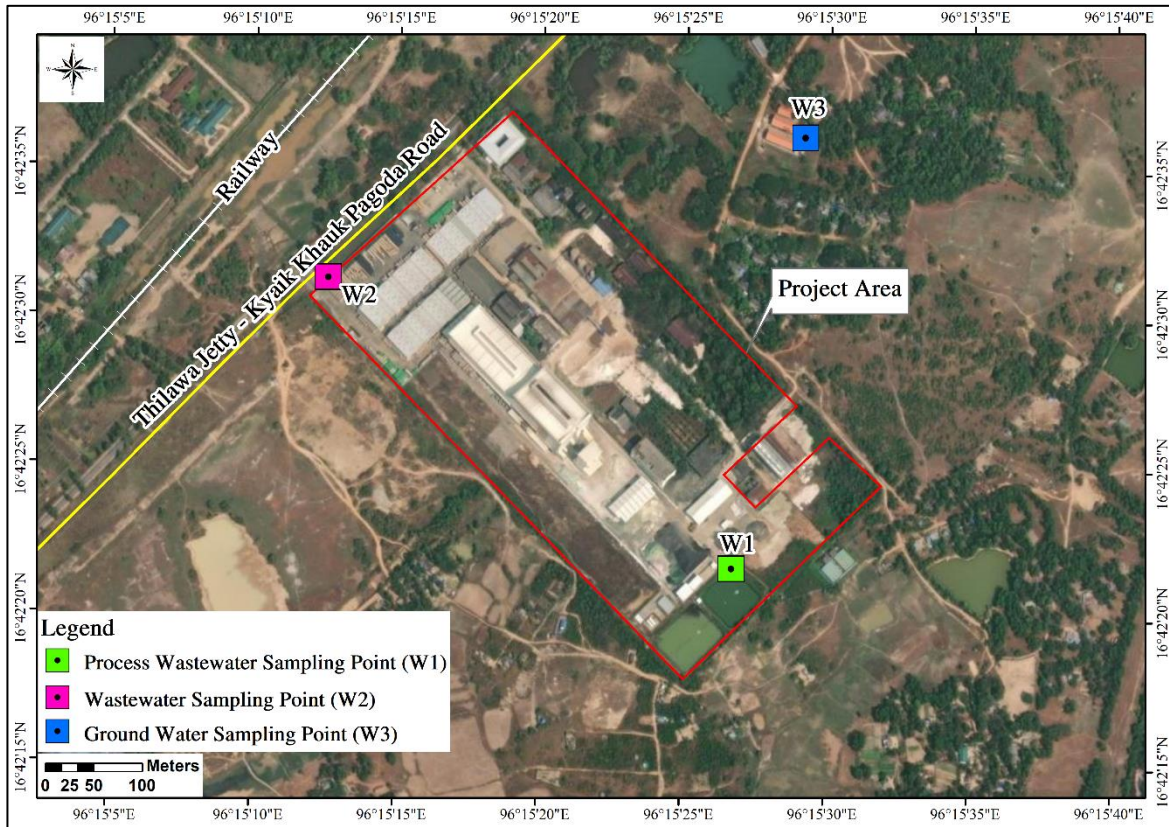


Figure 4-55 Location Map of Water Sampling Points

Table 4-51 Water Quality Measurement Data

Station	Location	Type	Reference Coordinate	Measurement Date
W1	Process Wastewater from Factory Sedimentation Pond	Process Wastewater	16° 42' 21.65" N 96° 15' 27.01" E	11 th July, 2023
W2	Wastewater from Factory's Drainage Channel	Surface Water	16° 42' 31.23" N 96° 15' 12.90" E	11 th July, 2023
W3	Nearby Tube Well	Ground Water	16° 42' 36.17" N 96° 15' 29.54" E	14 th June, 2023

Source: Field survey by TBS on July 2023



Source: Field survey by TBS on July 2023

Figure 4-56 Information of Water Quality Sampling

4.6.3.3. Water Quality Results

4.6.3.3.1 Process Wastewater Quality Result

Process wastewater is generated from cullet chute, spray cooling shear blade and I.S machine floor cleaning of glass bottles manufacturing process. Process wastewater quality data is compared with the effluent level for manufacturer of Glass, Glass and Mineral Fibers from NEQEG (2015). According to the monitoring results, all process wastewater parameters are within the NEQEG (2015) guideline. Result of process wastewater is shown in Table 4-52 and Table 4-53. The details of the results are presented in Appendix G-1 and G-2.

Table 4-52 Result of Process Wastewater Analysis Tested with TM Waterproof Pocket Tester

No.	Parameters	Results	Units	NEQEG (2015)	Water Testing Instrument	Remark
1.	PH	8.67	S.U	6.0-9.0	TM Waterproof Pocket Tester	Within the NEQEG
2.	Temperature	86.9	°F	(<3°C)*		
3.	TDS	231	ppm	NG		-
4.	Conductivity	327	µs/cm	NG		
5.	Salinity	0.1	ppt	NG		

Source: Field survey by TBS on June and July 2023

Note: NEQEG = National Environmental Quality Emission Guideline (2015)

Table 4-53 Result of Process Wastewater Analysis Tested by ALARM Ecological Laboratory

No	Parameters	Results	Units	NEQEG (2015)	Remarks
1.	Turbidity	19	FAU/NTU	NG	Within the limit
2.	TSS	12	mg/L	50	
3.	BOD ₅	18	mg/L	50	
4.	COD	33	mg/L	250	
5.	Free Cyanide	<0.01	mg/L	0.01	
6.	Phosphorous	1.8	mg/L	≤2	
7.	Arsenic	0.005	mg/L	≤0.1	
8.	Iron	0.4	mg/L	≤3.5	
9.	Lead	ND	mg/L	≤0.1	
10.	Total Nitrogen	31	mg/L	NG	

Note: NEQEG = National Environmental Quality Emission Guideline (2015)

* 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 m from the discharge point

NG= No Guideline, ND= Not Detected, LOD= Lower Limit of Detection

4.6.3.3.2 General Wastewater Quality Result

All surface runoff from factory compound, general cleaning process and gardening process are generated as the general wastewater. General wastewater is directly discharged into the factory drainage channel before discharging into the municipal drainage system. According to the laboratory experimental results, all general wastewater quality parameters are within the standard values of NEQEG (2015) except the phosphorus. This exceeding can be mainly due to the directly discharge of used water from general cleaning process such as hand washing, floor and road cleaning.

The results of wastewater are shown in Table 4-54 and Table 4-55. The details of the current results are presented in Appendix G-1 and G-2.

Table 4-54 Result of General Wastewater Analysis Tested by TM Waterproof Pocket Tester

No.	Parameters	Results	Units	NEQEG (2015)	Water Testing Instrument	Remark
1.	pH	8.12	S.U	6.0-9.0	TM Waterproof Pocket Tester	Within the NEQEG
2.	Temperature	82.6	°F	(<3°C)*		
3.	TDS	402	ppm	NG		
4.	Conductivity	555	µs/cm	NG		
5.	Salinity	0.3	ppt	NG		

Source: Field survey by TBS on June and July 2023

Note: NEQEG = National Environmental Quality Emission Guideline (2015)

Table 4-55 Result of General Wastewater Analysis Tested by ALARM Ecological Laboratory

No	Parameters	Results	Units	NEQEG (2015)	Remarks
1.	Turbidity	<5	FAU/NTU	NG	Within the limit
2.	TSS	4	mg/L	50	
3.	BOD ₅	42	mg/L	50	
4.	COD	96	mg/L	250	
5.	Free Cyanide	<0.01	mg/L	0.01	
6.	Phosphorous	2.1	mg/L	≤2	Exceed
7.	Arsenic	0.005	mg/L	≤0.1	Within the limit
8.	Iron	0.3	mg/L	≤3.5	
9.	Lead	ND	mg/L	≤0.1	
10.	Total Nitrogen	21	mg/L	NG	

Note: NEQEG = National Environmental Quality Emission Guideline (2015)

* 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 m from the discharge point

NG= No Guideline, ND= Not Detected, LOD= Lower Limit of Detection

4.6.3.3.3 Ground Water Quality Result

In order to examine the ground water contamination within and near the project area, ground water sample is collected from the nearby tube well, which is 0.5 km away from the project site. According to the insitu and laboratory results of ground water, all parameters are within the NEQEG (2015). Ground water results are shown in Table 4-56 to Figure 4-67. The details of the results measured by TBS are presented in Appendix G-1, G-2 and G-3.

Table 4-56 Result of Ground Water Analysis Tested by TM Waterproof Pocket Tester

No.	Parameters	Results	Units	NEQEG (2015)	Water Testing Instrument	Remark
1.	pH	7.44	S.U	6.0-9.0	TM Waterproof Pocket Tester	Within the NEQEG (2015)
2.	Temperature	86.54	°F	(<3°C)*		
3.	TDS	1.65	ppt	NG		
4.	Conductivity	2.30	ms/cm	NG		
5.	Salinity	1.2	ppt	NG		

Source: Field survey by TBS on June and July 2023

Note: WHO = World Health Organization, NEQEG = National Environmental Quality Emission Guideline (2015), MNDWQS = Myanmar National Drinking Water Quality Standard (2019)

Table 4-57 Result of Ground Water Analysis Tested by ALARM Ecological Laboratory

No	Parameters	Results	Units	NEQEG (2015)	Remark
1.	Turbidity	7	FAU/NTU	NG	Within the NEQEG (2015)
2.	TSS	8	mg/L	50	
3.	BOD ₅	6.5	mg/L	50	
4.	COD	16	mg/L	250	
5.	Free Cyanide	<0.01	mg/L	0.01	
6.	Phosphorous	1.2	mg/L	≤2	
7.	Arsenic	0.005	mg/L	≤0.1	
8.	Iron	0.2	mg/L	≤3.5	
9.	Lead	ND	mg/L	≤0.1	
10.	Total Nitrogen	306	mg/L	NG	
11.	Sulfate	13.9	mg/L	NG	

Note: WHO = World Health Organization, NEQEG = National Environmental Quality Emission Guideline (2015), MNDWQS = Myanmar National Drinking Water Quality Standard (2019)

* 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 m from the discharge point

NG= No Guideline, ND= Not Detected, LOD= Lower Limit of Detection

4.6.3.3.4 RO Permeate Water Quality Result

The treated water quality data was compared with WHO Drinking Water Guideline and MNDWQS (2019). All RO permeate water parameters are within the MNDWQS (2019). RO permeate water results are shown in Table 4-58. The details of the results measured by MGE are presented in Appendix G-1, G-2 and G-3.

Table 4-58 Result of RO Permeate Water Analysis Tested by MGE

No	Parameters	Results	Units	WHO Drinking Water Guideline	Remarks	
1.	Calcium Hardness (CaCO ₃)	1.5	mg/L	-	Within the Drinking Standard of MNDWQS (2019)	
2.	Magnesium Hardness (CaCO ₃)	1.0	mg/L	-		
3.	Chlorine (Total)	0.00	mg/L	-		
4.	Color	0.00	PCU	Platinum-cobalt units		
5.	Conductivity	46		-		
6.	Copper	0.00	mg/L	-		
7.	Ion	0.17	mmol/L	-		
8.	Iron (Fe)	0.00	ppm	<0.3 ppm		
9.	Nitrite	0.00	mg/L	-		
10.	pH	7.7	mg/L	6.5-8.5		
11.	Phosphorus	0.00	mg/L	-		Within the Drinking Standard of MNDWQS (2019)
12.	Silicon (Si)	0.00	mg/L	-		
13.	TDS (Total Dissolved Solid)	23	ppm	<1000 ppm		
14.	Total Alkalinity	78	mg/L	-		
15.	Total Hardness	2.50	mg/L	<500 mg/L		
16.	Turbidity	0.00	NTU	<5 NTU		

Note: WHO = World Health Organization

* 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 m from the discharge point

4.6.4. Noise Level

4.6.4.1. Methodology

The noise level will be expected to be high due to the noise impacts of current partial operation activities and traffic vehicles. Noise level on the receptors mainly depend on the wind speed and direction. Naturally wind blowing from the noise source towards the noise sensitive location will increase levels and the stronger the wind, the greater the effect. Therefore, in order to reduce the noise pollution to the nearby receptors, it is required to install the noise barriers at this direction.

The data was recorded every one minute using the Digital Sound Level Meter (Benetech, GM1356), which complies with standard of IEC PUB 651 Type 2 and ANSI S1.4 Type 2. Equivalent Continuous Sound Level (Leq/LAeq) is calculated for daytime and nighttime 24-hr average from the measured data.

4.6.4.2. Location of Noise Monitoring Stations

The noise measurement was conducted during 13th- 16th June 2023 around 1 kilometer and three kilometers radius of the project area. Location and coordinate of noise level measurement is shown in Table 4-59. The location map for noise monitoring station is described in Figure 4-57 and detail information of noise level measurement is described in Figure 4-58. The details of the measurements are presented in Appendix H.

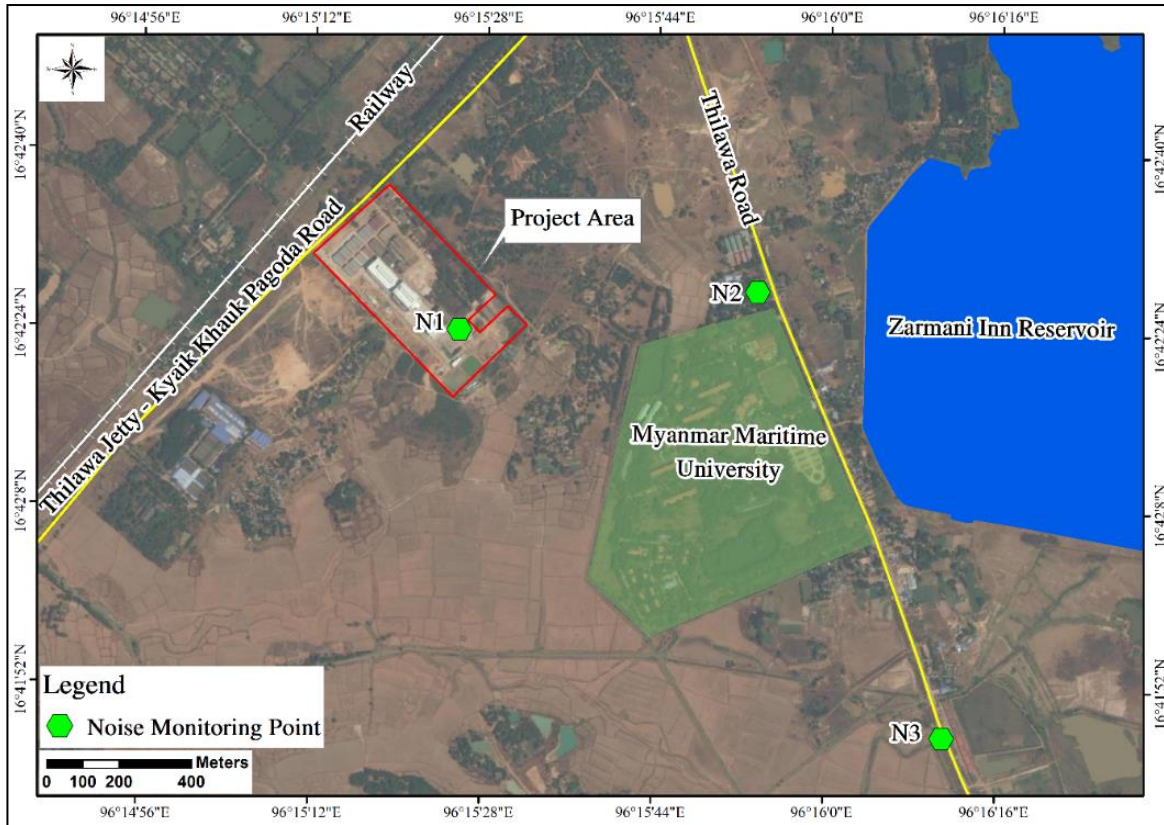


Figure 4-57 Location Map of Noise Level Monitoring Stations

Table 4-59 Noise Level Monitoring Data

Station	Location	Reference Coordinate	Noise Measurement Date
N1	Project Site	16° 42' 23.97" N 96° 15' 25.93" E	13th – 14th June, 2023
N2	Phan Chat Sat Yone Taw Ya Monastery	16° 42' 27.66" N 96° 15' 53.72" E	14th – 15th June, 2023
N3	Thilawa Industrial Road	16° 41' 47.78" N 96° 16' 11.35" E	15th – 16th June, 2023

Source: Field survey by TBS on June 2023



Source: Field survey by TBS on June 2023

Figure 4-58 Noise Level Monitoring Stations

4.6.4.3. Noise Level Monitoring Results

4.6.4.3.1 Results for Station N1

The average noise levels expressed in LAeq (1 hour) were compared with maximum limit set by NEQEG (2015) noise level standard for residential, institutional and education as shown in Table 4-60. According to the monitoring results for N1, both average noise levels for day and night times in the project area are exceeded the acceptable limit of the industrial or commercial noise level. The main reason of noise level exceeding is that the raw material processing process especially the cullet treatment activity. Therefore, the operation time for raw material processing process is limited to reduce the noise pollution. The results in daytime and nighttime at station N1 are shown in Figure 4-59 and Figure 4-60.

Table 4-60 Result of Noise Level Measurement for N1

Station	Sampling Date	One Hour LAeq (dBA)	
		Day Time	Night Time
		7:00 to 22:00	22:00 to 7:00
N1	13 th – 14 th June, 2023	76.4	81.3
NEQEG (2015)	Residential, institutional, education	55	45
	Industrial, commercial	70	70

Source: Field survey by TBS on June 2023

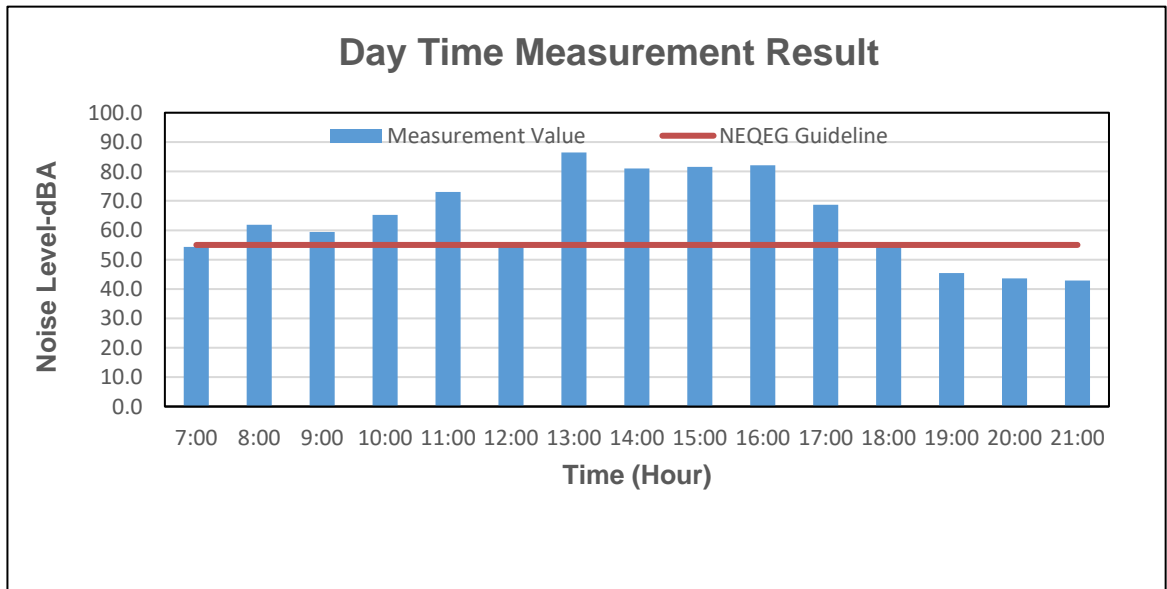


Figure 4-59 Noise Measurement Results in Day-time, N1

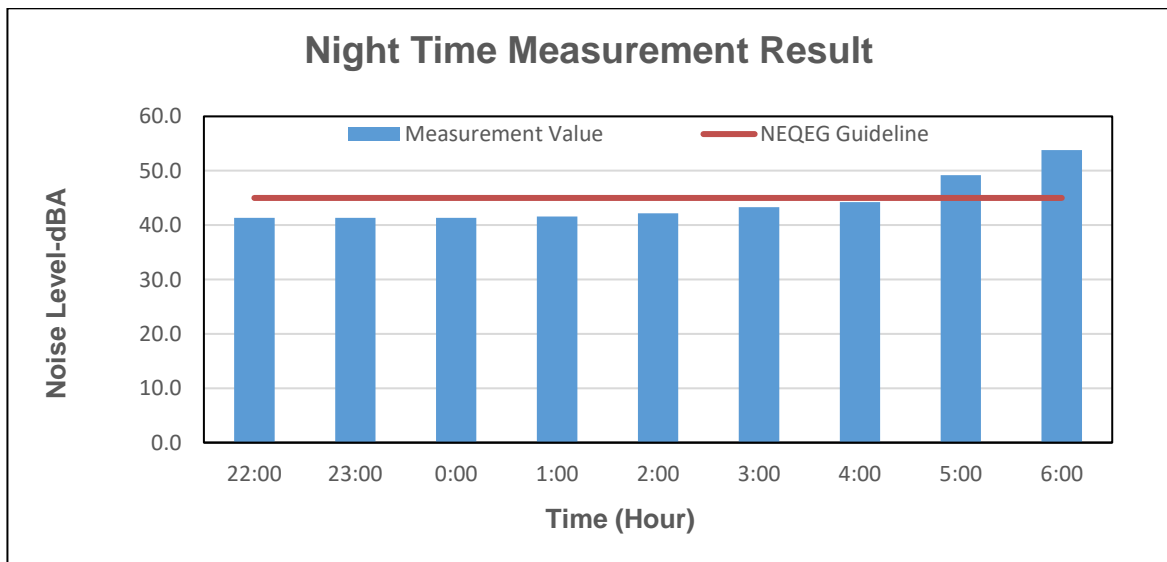


Figure 4-60 Noise Measurement Results in Night-time, N1

4.6.4.3.2 Results for Station N2

According to the monitoring results, noise level for N2 were compared with NEQEG (2015) noise level standard for residential, institutional and education. The results of average LAeq values for both daytime and nighttime are a little bit exceeded the NEQEG (2015) in Station N2. It is mainly due to the religious activities or ceremony near the monastery which can cause a higher level of noise. However that kind of activities are only for occasional. The results in daytime and nighttime at station N2, nearby monastery compound are shown in Figure 4-61 and Figure 4-62 as well as Table 4-61.

Table 4-61 Result of Noise Level Measurement for N2

Station	Sampling Date	One Hour LAeq (dBA)	
		Day Time	Night Time
		7:00 to 22:00	22:00 to 7:00
N2	14 th – 15 th June, 2023	56	45
NEQEG (2015)	Residential, institutional, education	55	45
	Industrial, commercial	70	70

Source: Field survey by TBS on June 2023

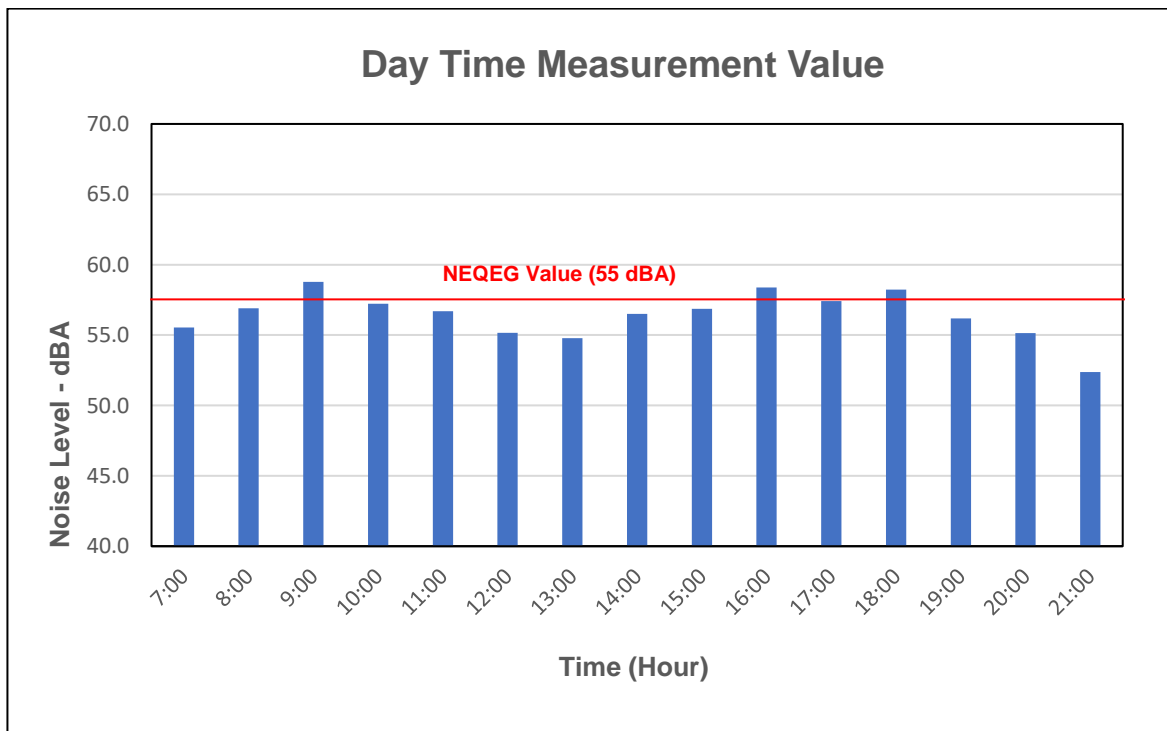


Figure 4-61 Noise Measurement Results in Day-time, N2

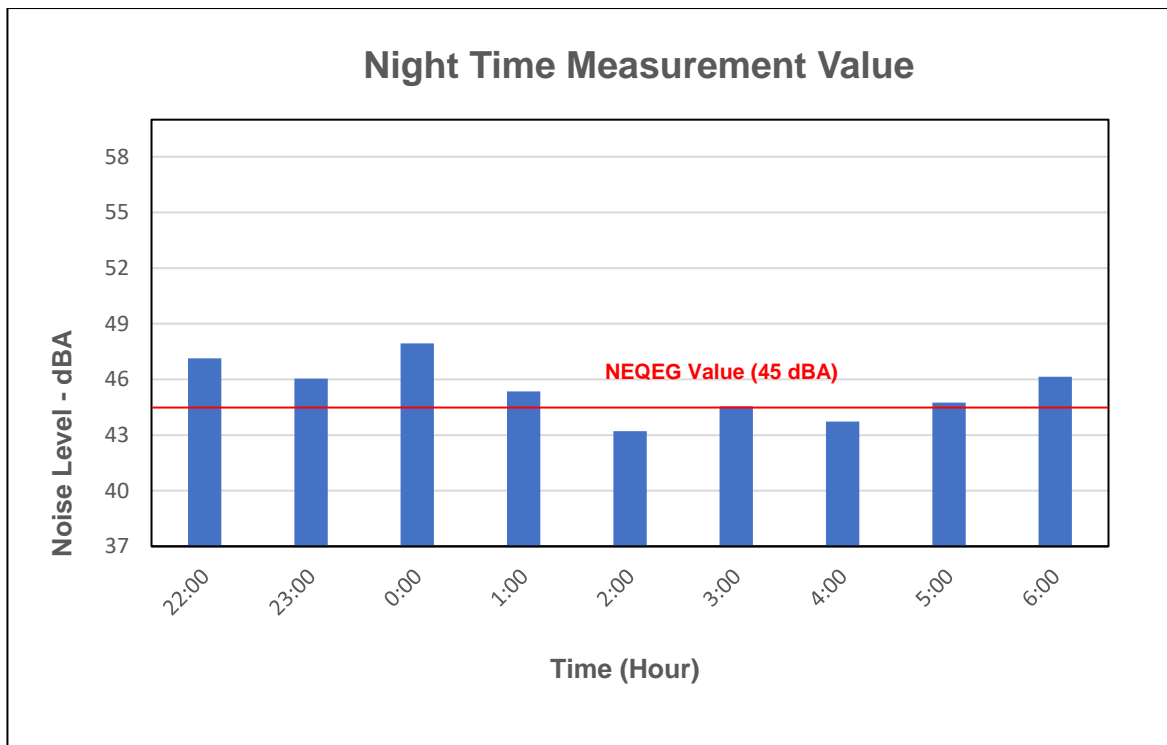


Figure 4-62 Noise Measurement Results in Night-time, N2

4.6.4.3.3 Results for Station N3

Noise level from station N3 was compared with NEQEG (2015) of industrial or commercial noise level as shown in Table 4-62. The results of daytime and nighttime LAeq for N3, beside Thilawa Road are within the guideline. The results in daytime and nighttime at station N3 are shown in Figure 4-63 and Figure 4-64.

Table 4-62 Result of Noise Level Measurement for N3

Station	Sampling Date	One Hour LAeq (dBA)	
		Day Time	Night Time
		7:00 to 22:00	22:00 to 7:00
N3	15 th – 16 th Jun, 2023	55.1	45.7
NEQEG (2015)	Residential, institutional, education	55	45
	Industrial, commercial	70	70

Source: Field survey by TBS on June 2023

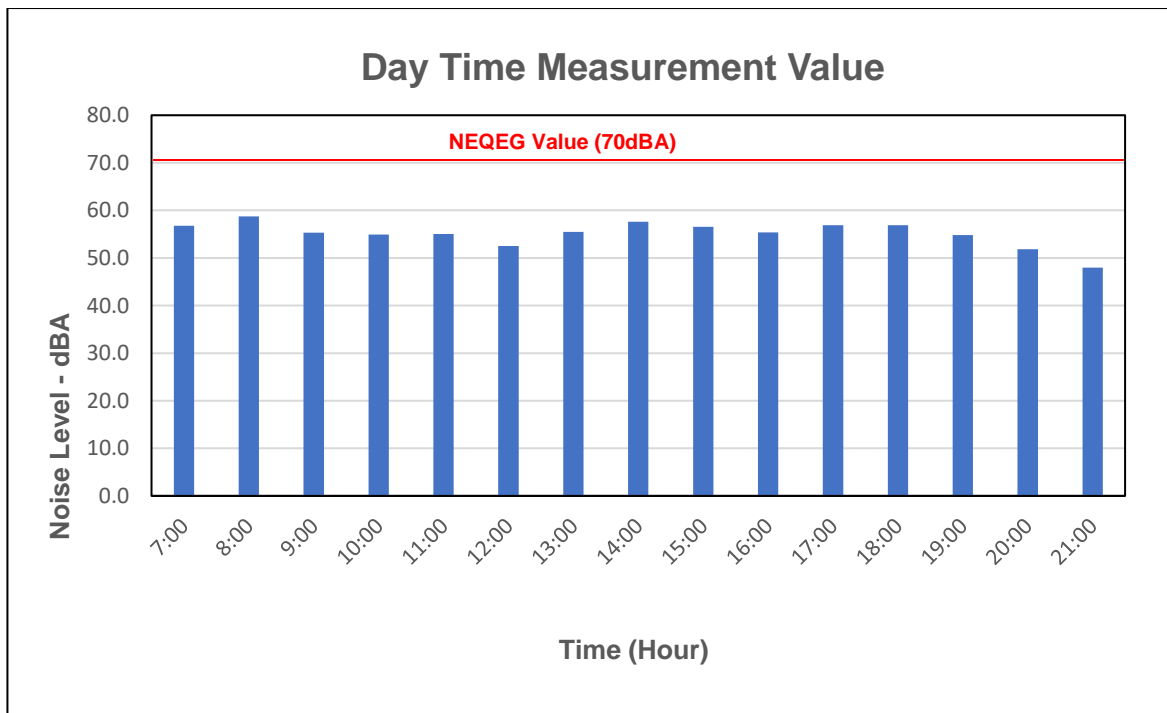


Figure 4-63 Noise Measurement Results in Day-time, N3

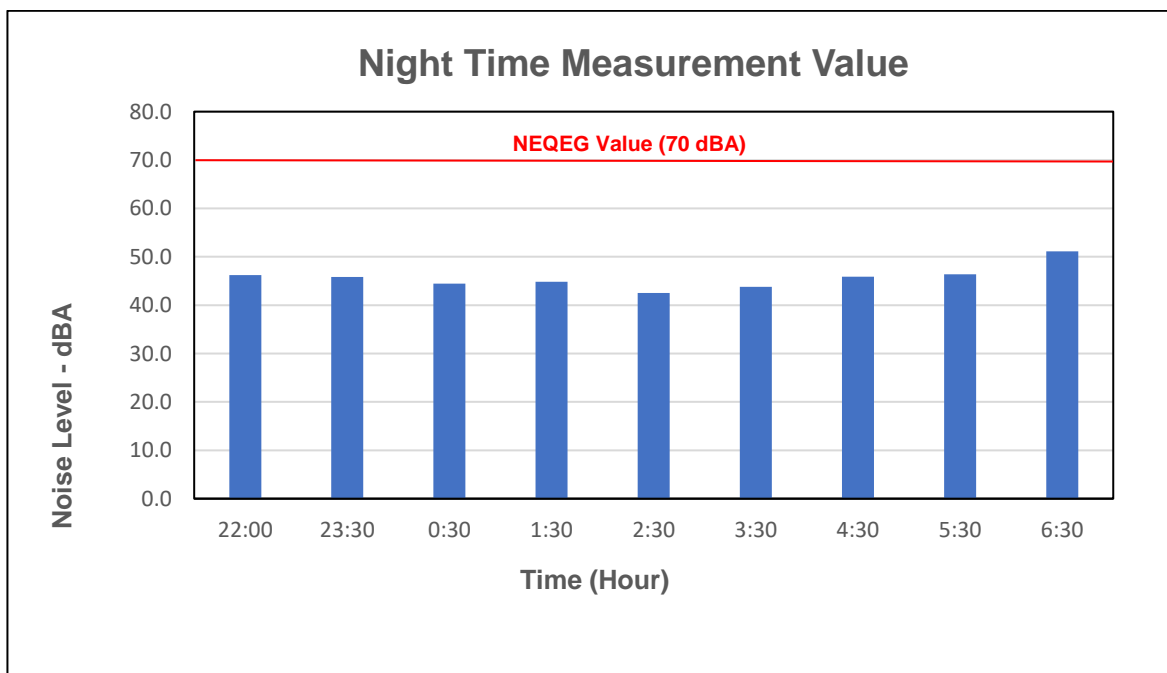


Figure 4-64 Noise Measurement Results in Night-time, N3

4.6.5. Vibration Level

4.6.5.1. Methodology

Vibration measurements were conducted at three monitoring points. Nomis Seismograph (Mini Supergraph II) was used for ground vibration measurements. The seismograph monitors vertical, transverse and radial particle velocity in millimeter per second and frequency. The measured results were compared with German standard DIN 4150-3, which adopts frequency versus Peak Particle Velocity (PPV) plot to determine

vibration effects on the structures such as sensitive building, residential and commercial buildings are shown in Table 4-63.

Table 4-63 German Standards DIN 4150-3 for Vibration

Structure Type	Peak Particle Velocity (mm/s)		
	4-8 Hz	8-30 Hz	30-100 Hz
Commercial	20	20-40	40-50
Residential	5	5-15	15-20
Very sensitive	3	3-8	8-10

4.6.5.2. Location of Vibration Level Measuring Stations

Vibration measurement was conducted at the study area during 13th – 16th June 2023 around the 1 km and three kilometer radius of project area. For vibration level measuring, there are altogether three stations, namely, within the project area, nearby monastery (Phan Chat Sat Yone Taw Ya) and beside the Thilawa Road. Field measurements were carried out for 24 hours at each station. Location map of the vibration level measuring stations is shown in Figure 4-65. Summarized dates of vibration level measuring process are shown in Table 4-64 and vibration level measuring activities are shown in Figure 4-66. The details of the measurements are presented in Appendix I.

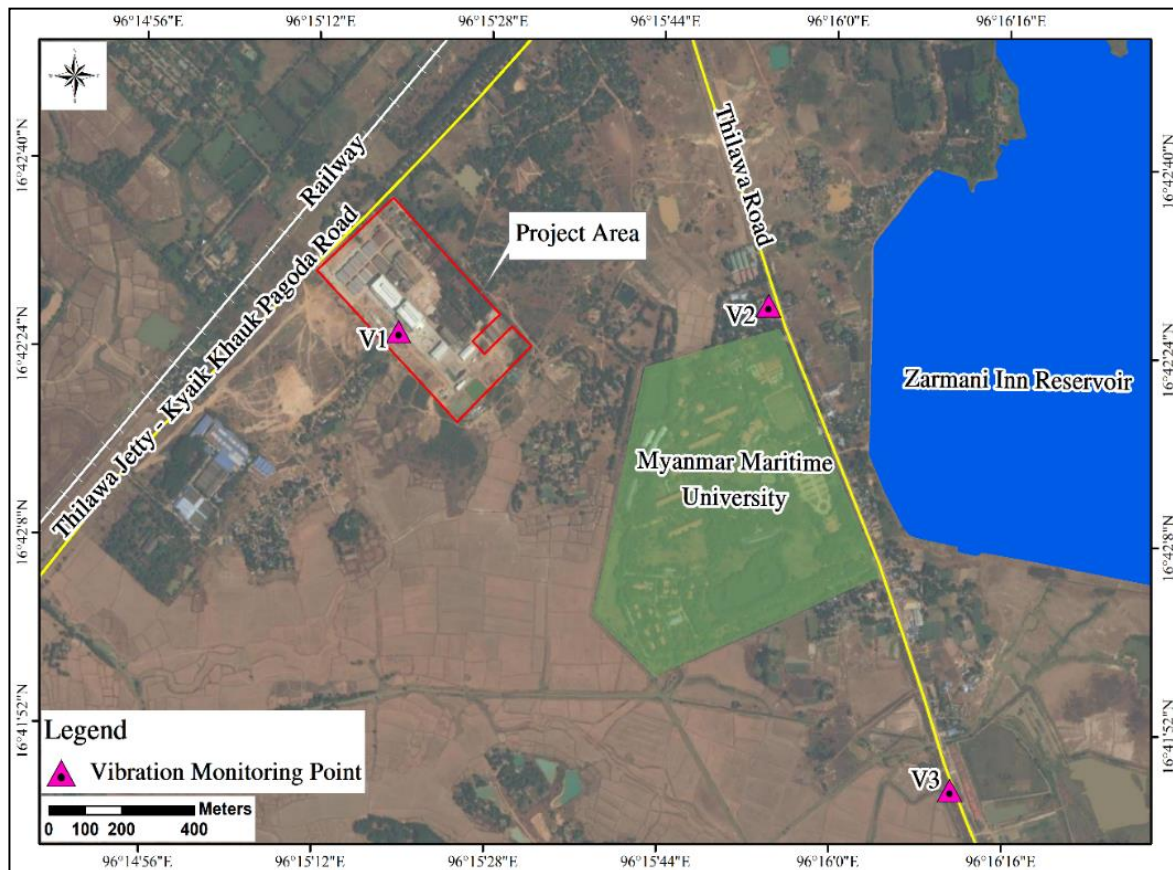
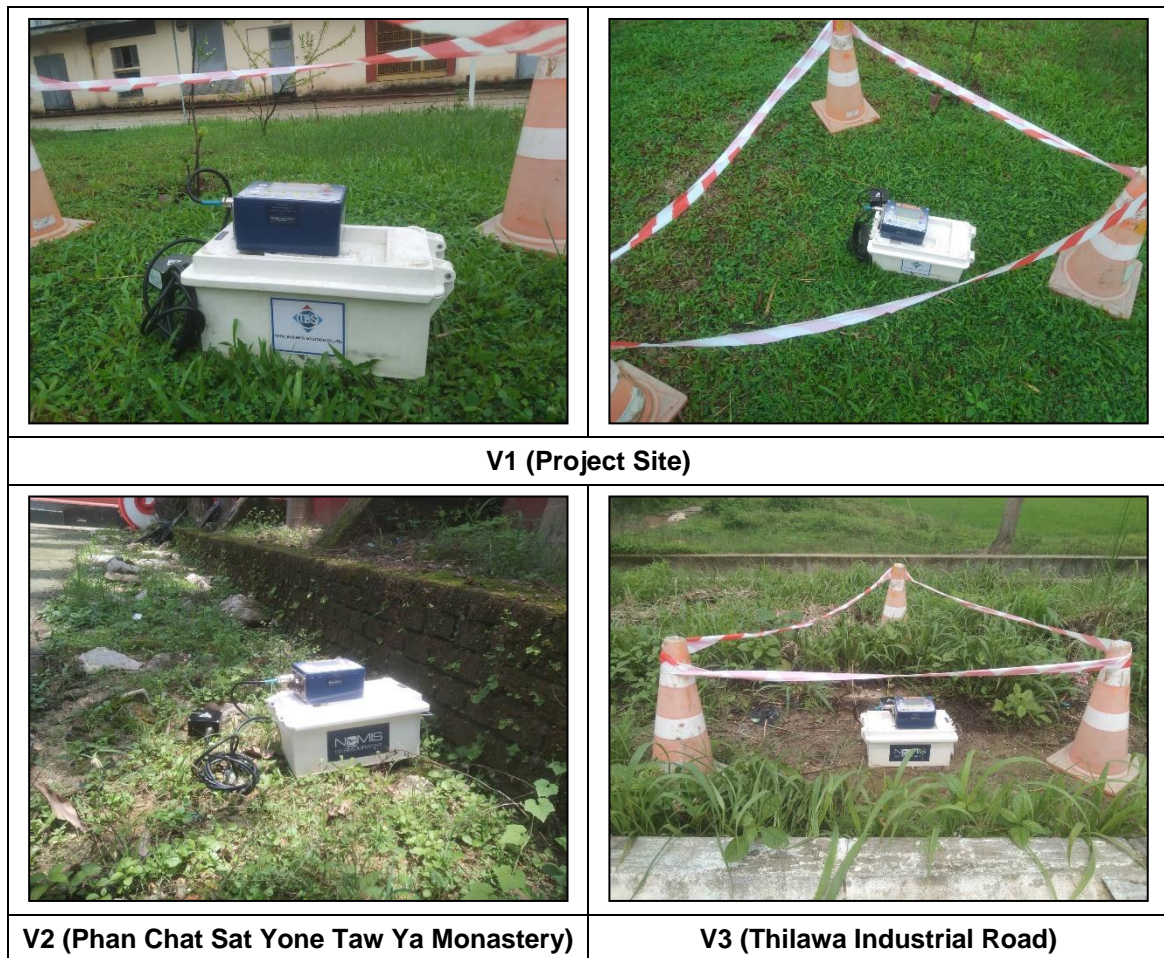


Figure 4-65 Location Map of Vibration Measurement Stations

Table 4-64 Vibration Measurement Data

Station	Location	Reference Coordinate	Vibration Measurement Date
V1	Project Site	16° 42' 25.50" N 96° 15' 19.87" E	13th – 14th June, 2023
V2	Phan Chat Sat Yone Taw Ya Monastery	16° 42' 28.17" N 96° 15' 54.14" "E	14th – 15th June, 2023
V3	Thilawa Industrial Road	16° 41' 47.21" N 96° 16' 11.50" "E	15th – 16th June, 2023

Source: Field survey by TBS on June 2023



Source: Field survey by TBS on June 2023

Figure 4-66 Information of Vibration Level Measurement

4.6.5.3. Survey Results

4.6.5.3.1 Results for Station V1

According to the field survey results, evaluation results of vibration level for station V1 are within the standard. Therefore, it is expected that there is no negative impact due to the operation of the project. Vibration level result is shown in Table 4-65. The graph of vibration measurement is presented in Figure 4-67.

Table 4-65 Result of the Vibration Level Measurement for V1

Station	Sampling Date	Result			German Standards DIN 4150-3	Sources of Vibration
		Direction	Frequency (Hz)	Peak Particle Velocity (PPV) (mm/s)	PPV for Commercial area (mm/s)	
V1	13th – 14th June, 2023	Radial	28.70	0.58	20-40	Site activities Vehicles activities and operation equipment
		Transverse	43.66	0.66	20-40	
		Vertical	26.13	0.43	20-40	

Source: Field survey by TBS on June 2023

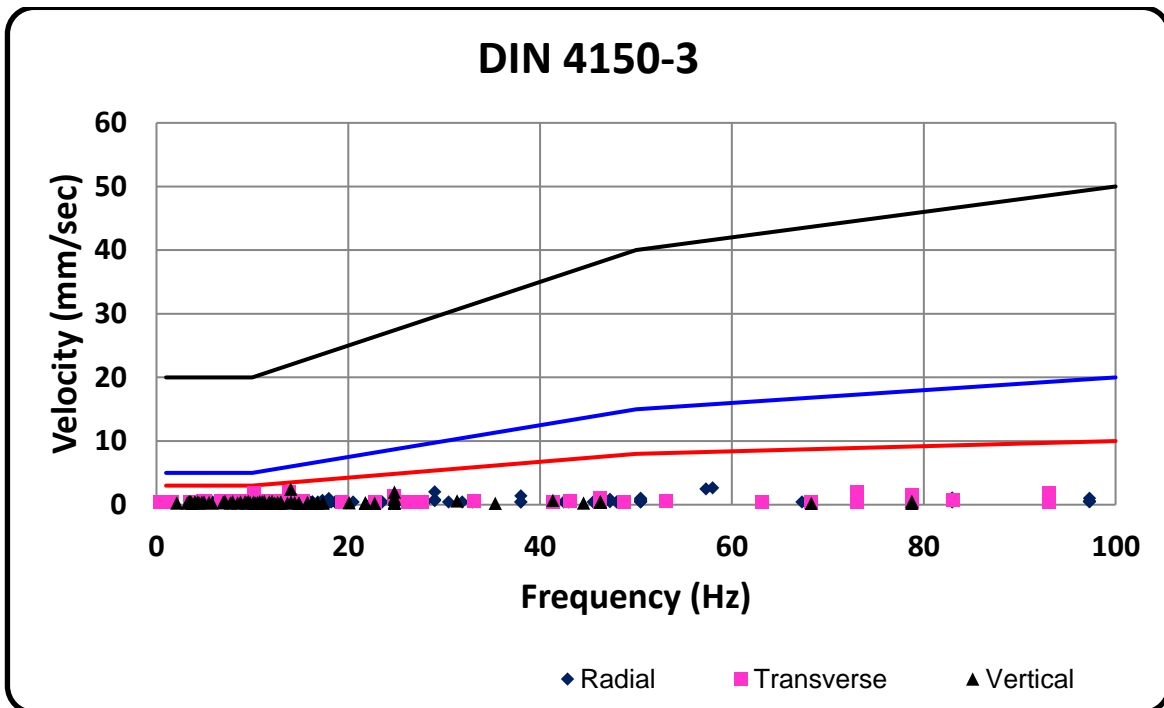


Figure 4-67 Vibration Measurement Result for V1

4.6.5.3.2 Results for Station V2

The results are compared with the German Standard. According to the field survey results, evaluation results of vibration level for all stations are within the standard. The main source of vibration is mainly from the vehicle movement around the station. Vibration level result is shown in Table 4-66. The graph of vibration measurement is presented in Figure 4-68.

Table 4-66 Result of the Vibration Level Measurement for V2

Station	Sampling Date	Result			German Standards DIN 4150-3	Sources of Vibration
		Direction	Frequency (Hz)	Peak Particle Velocity (PPV) (mm/s)	PPV for very Sensitive area (mm/s)	
V2	14th – 15th June, 2023	Radial	50.42	0.34	8-10	Vehicles movement around the monitoring station
		Transverse	43.62	0.26	3-8	
		Vertical	24.26	0.27	3-8	

Source: Field survey by TBS on June 2023

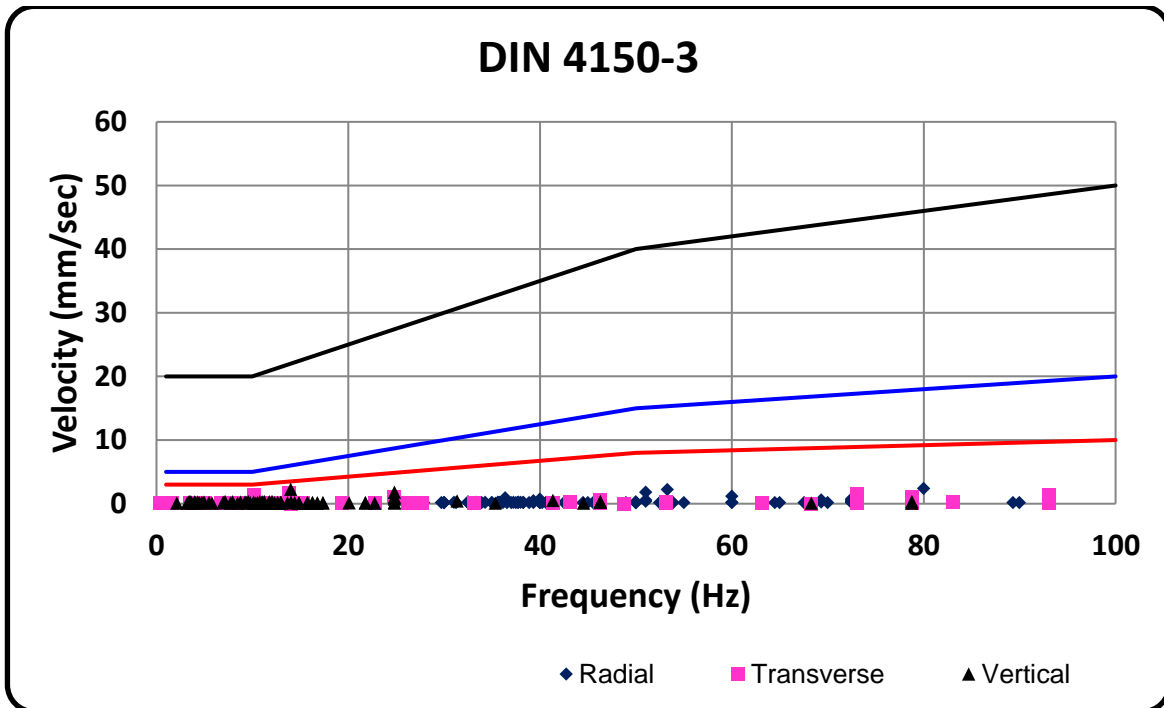


Figure 4-68 Vibration Measurement Result for V2

4.6.5.3.3 Results for Station V3

The results are compared with the German Standard. According to the field survey results, evaluation results of vibration level for all stations are within the standard. However, station V3 is conducted immediately after the Thilawa Road, the main source of vibration is from the vehicles movement on the main road. Vibration level result is shown in Table 4-67. The graph of vibration measurement is presented in Figure 4-69.

Table 4-67 Result of the Vibration Level Measurement for V3

Station	Sampling Date	Result			German Standards DIN 4150-3	Sources of Vibration
		Direction	Frequency (Hz)	Peak Particle Velocity (PPV) (mm/s)	PPV for Commercial area (mm/s)	
V3	15th – 16th June, 2023	Radial	62.63	0.61	40-50	Vehicles movement on Thilawa Road
		Transverse	31.87	0.63	20-40	
		Vertical	26.47	0.45	20-40	

Source: Field survey by TBS on June 2023

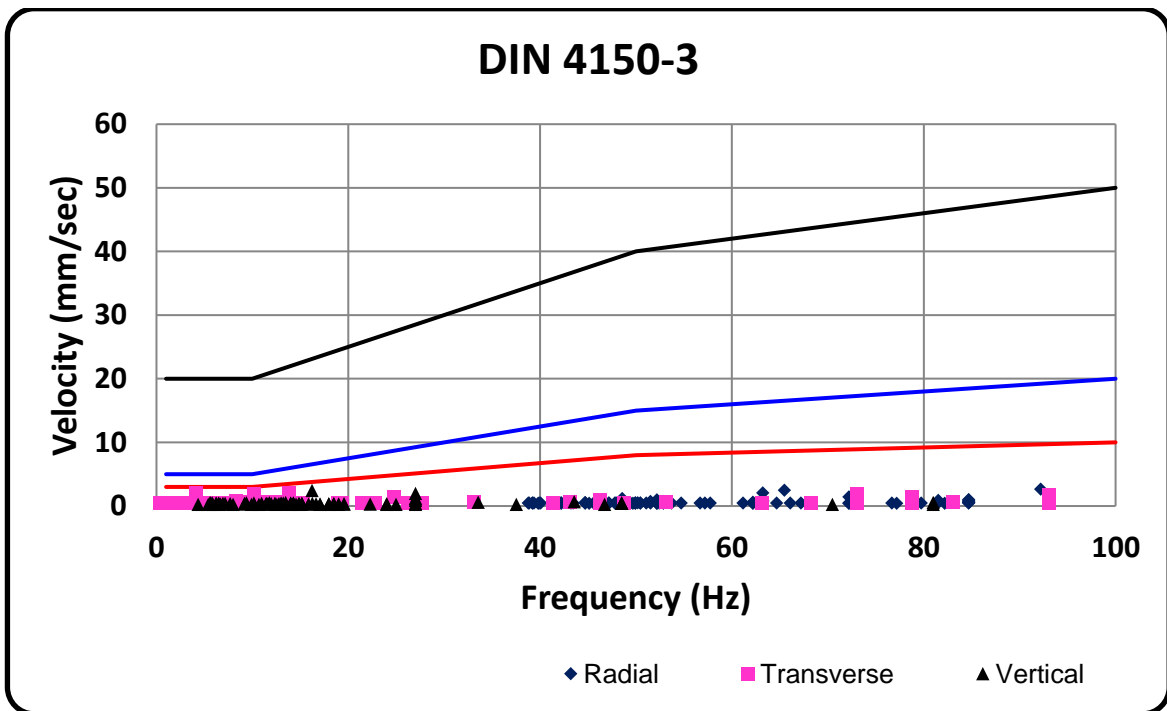


Figure 4-69 Vibration Measurement Result for V3

4.6.6. Light

4.6.6.1. Methodology

Light measurement was conducted at five locations in the project site with Victor 1010 A Digital Lux Meter. The results were compared with International Finance Corporation (IFC) Environmental Health and Safety (EHS) guideline as shown in Table 4-68.

Table 4-68 IFC Illuminance Standard¹⁷

No.	Locations	Light Intensity (Lux)
1.	Emergency light	10
2.	Outdoor non-working areas	20
3.	Simple orientation and temporary visits (machine storage, garage, warehouse)	50
4.	Workspace with occasional visual tasks only (corridors, stairways, lobby, elevator, auditorium, etc.)	100
5.	Medium precision work (simple assembly, rough machine works, welding, packing, etc.)	200
6.	Precision work (reading, moderately difficult assembly, sorting, checking, medium bench and machine works, etc.), offices	500
7.	High precision work (difficult assembly, sewing, color inspection, fine sorting, etc.)	1,000 – 3,000

4.6.6.2. Location of Light Measuring Stations

Light measurement was conducted at five locations in the project site, namely; main office, temporary office, canteen, factory and work shop on 13th June 2023 . Location map of the light measuring stations is shown in Figure 4-70. Summarized dates of light and temperature measuring process are shown in Table 4-69. Light measuring activities are also shown in Figure 4-71. The details of the light measuring results are presented in Appendix J.

¹⁷ *International Finance Corporation (Environmental Health and Safety Guideline) General

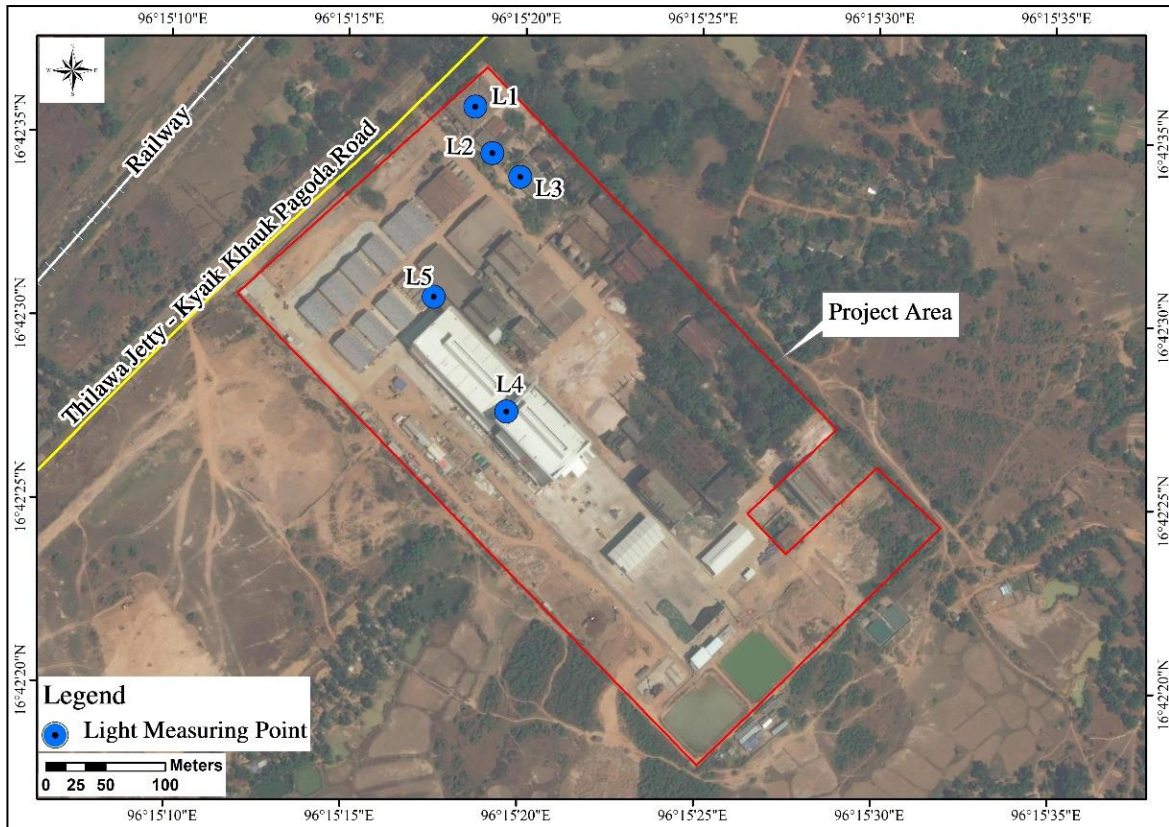


Figure 4-70 Location Map of Light Measurement Stations

Table 4-69 Light and Temperature Measurement Data

Station	Location	Reference Coordinate	Measurement Date
L1 T1	Main Office	16° 42' 35.80" N 96° 15' 18.90" E	13 rd June 2023
L2 T2	Temporary Office	16° 42' 34.54" N 96° 15' 19.40" E	
L3 T3	Canteen	16° 42' 33.90" N 96° 15' 20.20" E	
L4 T4	Factory	16° 42' 27.50" N 96° 15' 19.90" E	
L5 T5	Work Shop	16° 42' 30.60" N 96° 15' 17.80" E	

Source: Field survey by TBS on June 2023

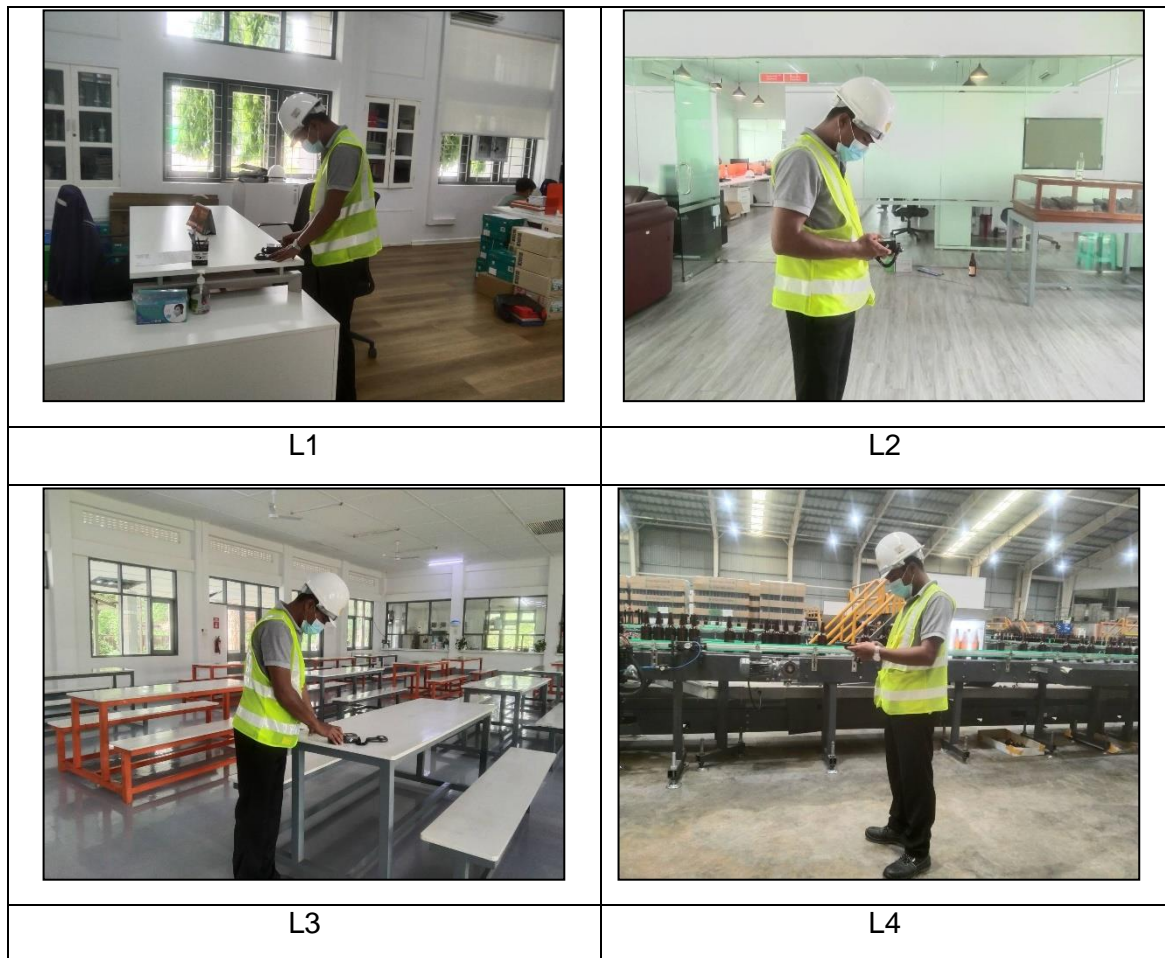


Figure 4-71 Light Measurement Activities

4.6.6.3. Survey Result

The results are compared with IFC guideline based on their activities. According to the field survey results, site office, and temporary office need to install more light intensity while that of factory, work shop and canteen are above the limit of IFC guidelines. The results of lightening in five location are shown in Table 4-70 and that of bar chart is also shown in Figure 4-72.

Table 4-70 Light Measurement Result

No	Site Description	Measurement Data (Lux)	IFC EHS Guideline (Lux)
L1.	Main Office	350	200
L2.	Temporary Office	207	200
L3.	Canteen	141	50
L4.	Factory	986	1,000
L5.	Work Shop	1018	1,000

Source: Field survey by TBS on June 2023

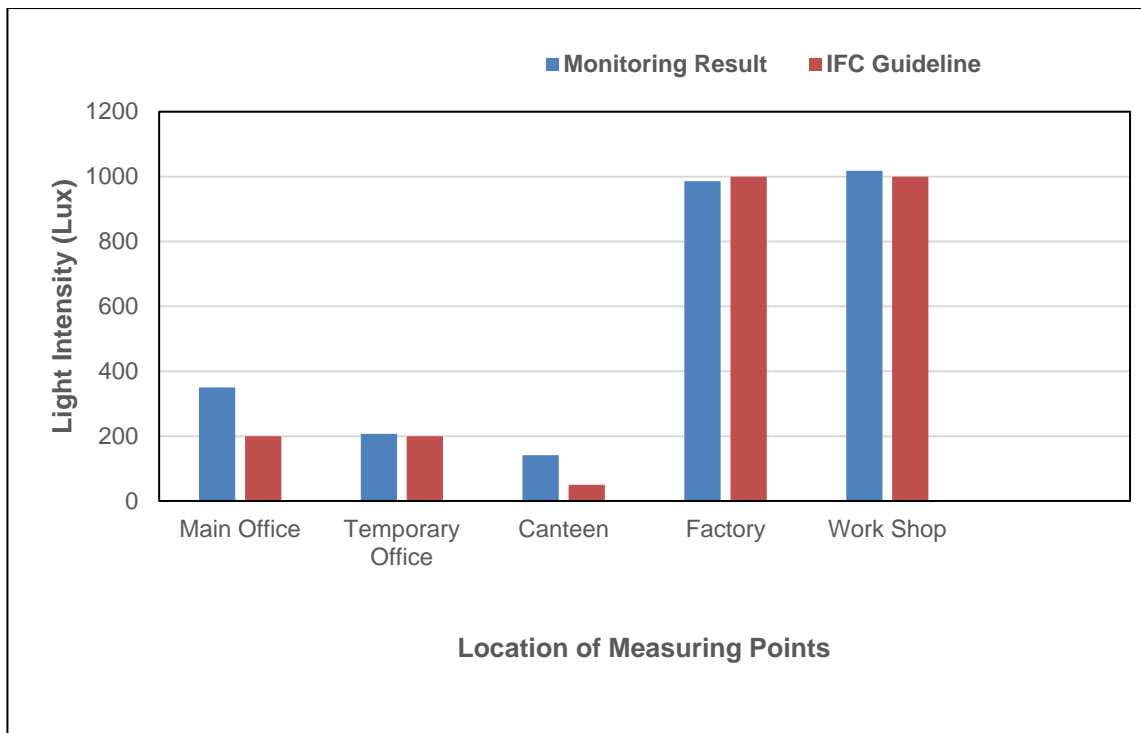


Figure 4-72 Light Measurement Result in Bar Chart

4.6.7. Temperature

4.6.7.1. Survey Method and Location of Monitoring Stations

Temperature is measured at five points in the project area with AR862D + Smart Sensor Model Infrared Thermometer. All locations for the temperature measuring stations and monitoring date are the same as the light measuring activities. Summarized dates of light and temperature measuring process are shown in Table 4-69.

The results were compared with IFC guideline value. Location map of the temperature measuring stations is shown in Figure 4-73. Temperature measurement activity is also shown in Source: Field survey by TBS on June 2023

Figure 4-74. The details of the temperature measuring results are presented in Appendix K.

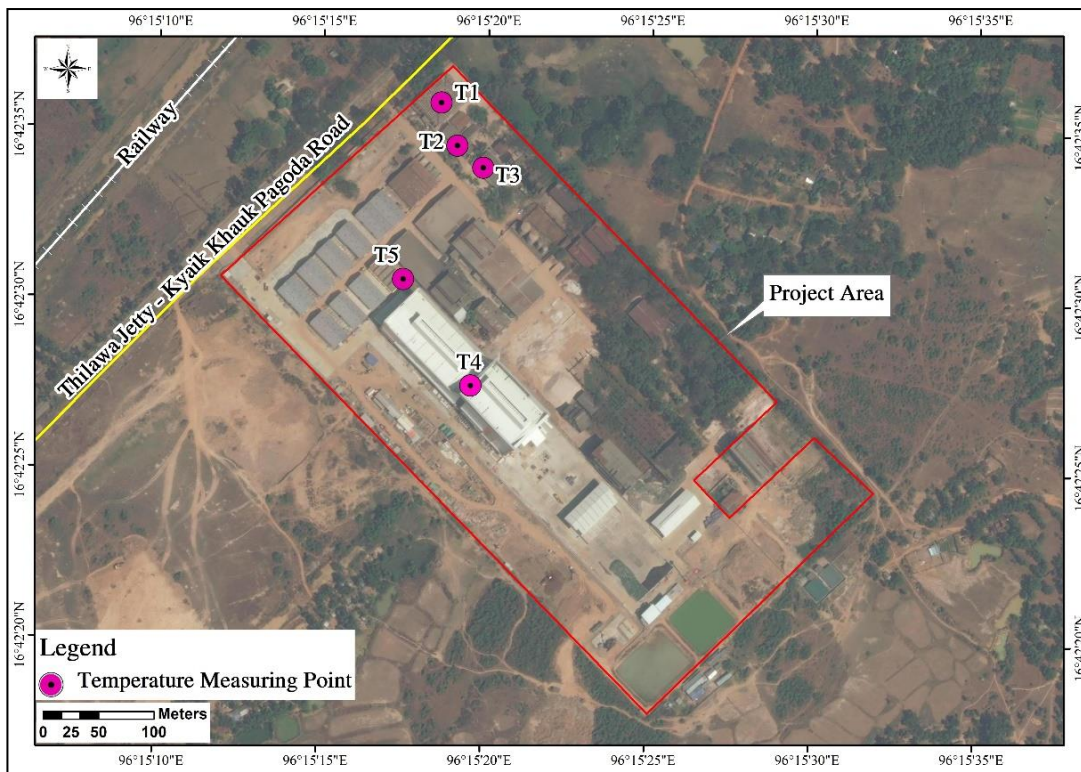
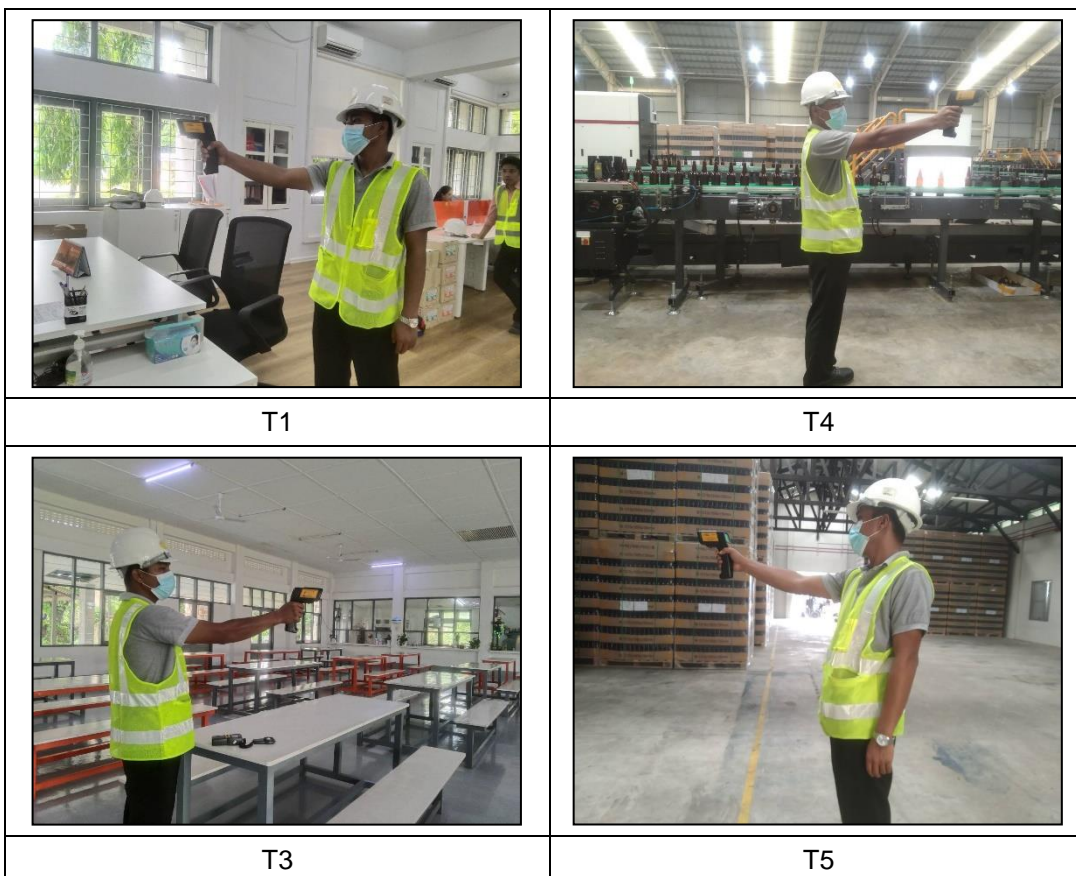


Figure 4-73 Location Map of Temperature Measurement Stations



Source: Field survey by TBS on June 2023

Figure 4-74 Temperature Measurement Activities

4.6.7.2. Survey Result

When the results are compared with IFC guideline value, all results are within the IFC guideline value of 32 °C. The results are described in Table 4-71 and bar chart is shown in Figure 4-75.

Table 4-71 Temperature Measurement Result

No	Site Description	Measured Value (°C)	(IFC) Guideline Value* (°C)
T1	Main Office	27.5	32
T2	Temporary Office	26.4	
T3	Canteen	28.3	
T4	Factory	31.7	
T5	Work Shop	31.1	

*IFC (Environmental Health and Safety Guideline General)

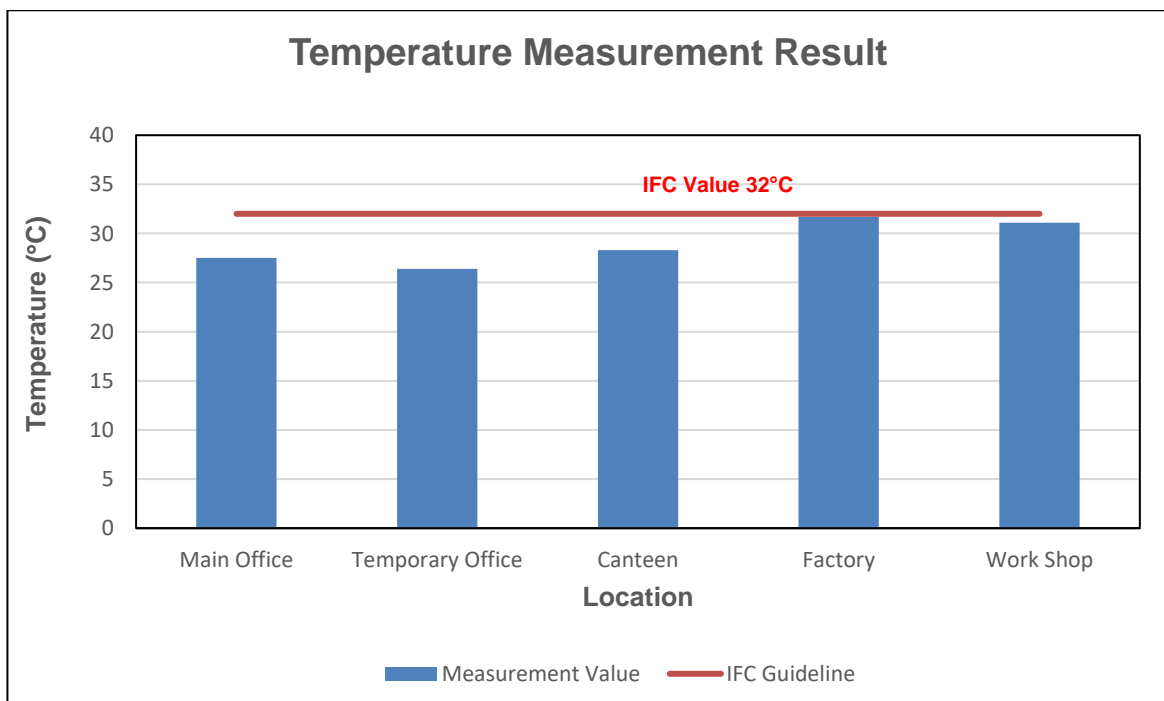


Figure 4-75 Temperature Measurement Results in Bar Chart

4.6.8. Traffic Counting

4.6.8.1. Methodology

Traffic Counting (TC) was done both manually by several surveyors during 6:00 am to 6:00 pm at three stations. During the survey, the number and types of vehicles passing the stations were recorded. The traffic counting data were used to calculate the V/C ratios. Traffic condition is normally assessed in terms of road capacity relative to traffic volume. The V/C ratio is commonly used to consider as a baseline traffic flow condition and will be further utilized to evaluate the consequences of the impact of the project on local transportation.

The V/C ratios is calculated as per following procedures:

- (1) Convert the number of vehicles from observation to Passenger Car Unit (PCU) by using Passenger Car Equivalents (PCD) factors specified for each type of vehicles as described in Table 4-72. This is used as "Traffic Volume" or "V"
- (2) Choose an applicable carrying capacity of "C" for the road (as in Table 4-73).
- (3) V/C ratio can be calculated using the following formula.

$$V/C = \frac{\text{Traffic Volume}}{\text{Carrying Capacity of Respective Road}}$$

V/C ratio can be used to compare with the values defined by the Department of Highways, Thailand as shown in Table 4-74 for indication of current traffic condition.

Table 4-72 Passenger Car Equivalents Factor (PCD)

No.	Types of Vehicles	Passenger Car Equivalents Factor (PCD)
1.	Bicycle/Tricycle	0.20
2.	Motorcycle	0.33
3.	Motor-tricycle	1.00
4.	Passenger Car/Taxi	1.00
5.	Light Truck	1.00
6.	Light Bus	1.50
7.	Medium Bus	1.50
8.	Medium Truck	2.10
9.	Heavy Bus	2.10
10.	Heavy Truck	2.50

Source: Department of Highways, Thailand

Table 4-73 Design Service Volume

No.	Types of Carriageway	Total Design Service Volumes for Different Categories of Urban Roads		
		Arterial*	Sub-Arterial**	Collector***
1.	2-Lane (One way)	2,400	1,900	1,400
2.	2-Lane (Two way)	1,500	1,200	900
3.	3-Lane (One way)	3,600	2,900	2,200
4.	4-Lane Undivided (Two way)	3,000	2,400	1,800
5.	4-Lane Divided (Two way)	3,600	2,900	-
6.	6-Lane Undivided (Two way)	4,800	3,800	-
7.	6-Lane Divided (Two way)	5,400	4,300	-
8.	8-Lane Divided (Two way)	7,200	-	-

* No frontage access, no standing vehicles and very little cross traffic.

** Frontage development, side roads, bus stops, no standing vehicles, waiting restrictions

*** Roads with free frontage access, parked vehicles and cross traffic

Source: IRC 106:1990

Table 4-74 Level of Service

Level of Service (LOS)	Volume/Capacity Ratio (V/C)	Nature of flow
A	<0.30	Free Flow
B	0.30-0.50	Reasonably free flow
C	0.50-0.70	Stable flow
D	0.70-0.90	Approaching unstable flow
E	1.00	Unstable flow
F	>1.00	Forced flow

Source: Gajjar R., and Mohandas D. (2016)

4.6.8.2. Location of Traffic Counting Stations

The traffic conditions were analyzed to establish as a baseline data. Traffic counting were carried out at three stations within the study area on 11th July, 2023 for TC1, and TC2 as well as 12th July, 2023 for TC3 from 6:00 am to 6:00 pm. Results for all traffic counting stations are calculated based on the maximum hourly values of PCU. The details of three TC stations are shown in Table 4-75. The locations map of these three TC stations and photos of traffic counting activities are described in Figure 4-76 and Figure 4-77. The detail of traffic counting survey report is shown in Appendix L.

Table 4-75 Detail of Three TC Stations

No	Station	Location	Coordinates
1	TC 1 (A)	Maritime University Junction to Thilawa Jetty	16°42'36.57"N 96°15'16.75"E
2	TC 1 (B)	Thilawa Jetty to Maritime University Junction	16°42'35.76"N 96°15'17.66"E
3	TC 2 (A)	Maritime University Junction to Thanlyin Circular Road	16°43'1.90"N 96°15'39.69"E
4	TC 2 (B)	Thanlyin Circular Road to Maritime University Junction	16°43'2.14"N 96°15'39.92"E
5	TC 3 (A)	Maritime University Junction to Thilawa Industrial Zone	16°43'0.55"N 96°15'41.11"E
6	TC 3 (B)	Thilawa Industrial Zone to Maritime University Junction	16°43'0.78"N 96°15'41.61"E

Source: Field survey by TBS on June 2023

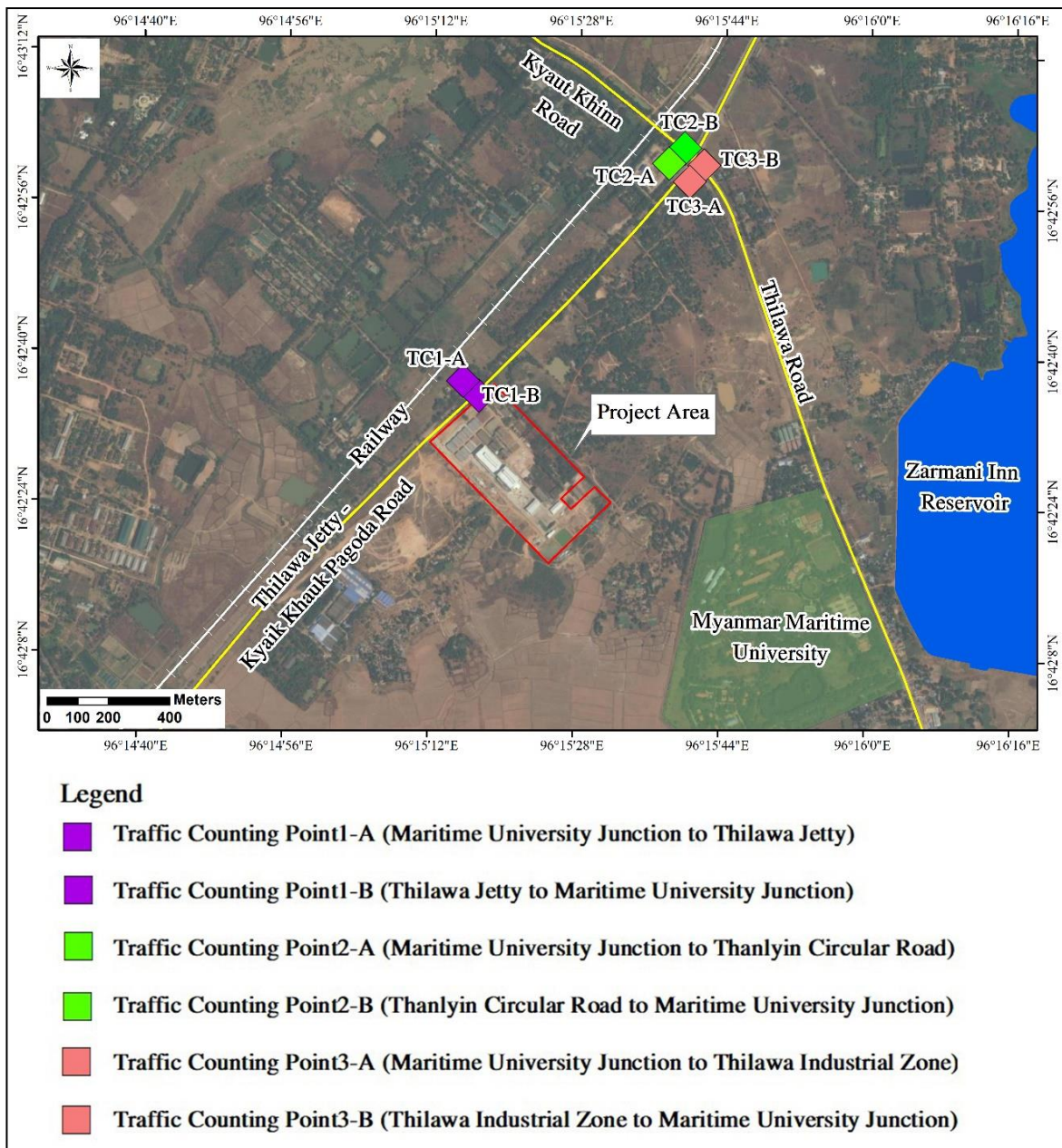


Figure 4-76 Location Map of Traffic Counting





Figure 4-77 Traffic Survey Collection Activities

4.6.8.3. Survey Results

The results of traffic counting are presented in Table 4-76. Based on the data from Department of Highway, Thailand, there were 10 categories of vehicles such as (i) bicycle/tricycle, (ii) motorcycle, (iii) motor-tricycle, (iv) passenger car/taxi, (v) light truck, (vi) light bus, (vii) medium bus, (viii) medium truck, (ix) heavy bus and (x) heavy truck.

Table 4-76 Existing Traffic Counting Condition near Proposed Project Site

Description	Results	
11 th July, 2023	TC-1A	TC-1B
Traffic volume: 12 hrs of working hour (PCU/hour)	226	214
Carrying capacity (C) (PCU/hour)	1500	1500
Average V/C ratio	0.15	0.14
Traffic condition	Free flow (A)	
11 th July, 2023	TC-2A	TC-2B
Traffic volume: 12 hrs of working hour (PCU/hour)	123	108
Carrying capacity (C) (PCU/hour)	1200	1200
Average V/C ratio	0.1	0.09
Traffic condition	Free flow (A)	
12 th July, 2023	TC-3A	TC-3B
Traffic volume: 12 hrs of working hour (PCU/hour)	384	397
Carrying capacity (C) (PCU/hour)	2400	2400
Average V/C ratio	0.16	0.17
Traffic condition	Free flow (A)	

Source: Field survey by TBS on June 2023

4.6.8.3.1 Traffic Conditions TC-1

Traffic survey for TC-1 is conducted in front of the project site on 11th June 2023 during 6 am to 6 pm of 12-hour period. Table 4-76 shows the traffic condition of Maritime University Junction to Thilawa Jetty or vice versa. The total number of vehicles passing were around 1,579 and 1,436 for TC-1A and TC-1B respectively. The majority of vehicles were passenger cars and taxi. The total volume of traffic was recorded about 226 and 214

PCU per hour (peak volume). The average V/C ratio at that period were 0.15 and 0.14 for A and B. The results show that both TC-1A and TC-1B have free flow (A) traffic condition.

4.6.8.3.2 Traffic Conditions TC-2

Traffic survey for TC-1 is conducted in front of the project site on 11th June 2023 during 6 am to 6 pm of 12-hour period. Table 4-76 shows the traffic condition of Maritime University Junction to Thanlyin Circular Road or vice versa. The total number of vehicles passing were around 992 and 962 for TC-2A and TC-2B respectively. The majority of vehicles were passenger cars and taxi. The total volume of traffic was recorded about 123 and 108 PCU per hour (peak volume). The average V/C ratio at that period were 0.1 and 0.09 for A and B. The results show that both TC-2A and TC-2B have free flow (A) traffic condition.

4.6.8.3.3 Traffic Conditions TC-3

Traffic survey for TC-1 is conducted in front of the project site on 12th June 2023 during 6 am to 6 pm of 12-hour period. Table 4-76 shows the traffic condition of Maritime University Junction to Thilawa Industrial Zone or vice versa. The total number of vehicles passing were around 2,578 and 2,617 for TC-3A and TC-3B respectively. The majority of vehicles were passenger cars and taxi. The total volume of traffic was recorded about 384 and 397 PCU per hour (peak volume). The average V/C ratio at that period were 0.16 and 0.17. The results show that both TC-3A and TC-3B have free flow (A) traffic condition.

CHAPTER 5

POTENTIAL ENVIRONMENTAL IMPACT AND MITIGATION MEASUREMENT

5.1. METHODOLOGY AND APPROACH

5.1.1. Scope of EIA

According to EIA Procedure (2015) by MOECAP, EIA reports requires to include impact and risk assessment and mitigation measures covering each project phase such as construction, operation and decommissioning phases. In addition, the identification and assessment of potential environmental impacts should include potential impacts on physical, biological, social, socio-economic, health, cultural, and visual impacts. The EMP will be implemented to ensure that the project will have minimum and acceptable environmental impacts during its construction, decommission and operation phases. It should be noted that the term environmental impact is now generally used to cover not only natural environmental but also social environment or social impacts as well as occupational health and safety. This scope of environmental impacts is adopted from EIA procedure.

Environmental impact means the probable effects or consequence on the natural and built environment, and people and communities of a proposed project or businesses or activities or undertaking. Impacts can be direct or indirect, cumulative, and positive or adverse or both. For purposes of this procedure, environmental impacts include occupational, social, cultural, socio-economical, public and community health, and safety issues.

5.1.2. Impact Analysis

According to National Environmental Policy Act (1969), an environmental impact analysis is generally conducted to assess the potential impact of a proposed project on the natural and social environment. This may include an assessment of both the short-term and long-term effects on the physical environment, such as air, water and noise pollution; as well as effects on local services, living and health standards, and aesthetics.

The impact analysis is the identification or assessing of potential positive and negative impacts on the environment (physical, socio-economic, biodiversity, health, etc.) based on the project activities. Project activities and requirements consume environmental resources and produce nuisances to the surrounding environment. They are the sources, or root causes of environmental impacts, if not adequately controlled or managed, certainly cause significant changes to the environmental components.

5.1.3. Preliminary EIA Process

In the scoping stage of EIA process, a preliminary EIA is to be carried out to;

- 1.. Identify project's construction, operation and decommission activities that will cause significant primary impacts
- 2.. Propose tentative mitigation measures to minimize environmental impacts and risks
- 3.. Prepare Term of Reference (ToR) for EIA

5.1.4. Summary of Environmental, Social and Health Impact Assessment

This chapter provides an assessment of potential impacts arising from the project. The methodological approach used for the project impact assessment is adopted from Department of Environmental Affairs, Republic of South Africa (September 2012) and Impact Assessment Agency of Canada (November 1994).

5.1.5. Methodology of Significant Impact Assessment

The project activities are considered as sources that are capable of changing one or more environmental or social components. The assessment of impacts from the project activities includes the identification of the potential significant environmental impacts of the project. The evaluation of significant impact assessment considers four major factors such as probability, magnitude, extent and duration of impacts on the environment with the consideration of potential positive or negative impact.

5.1.5.1. Probability of the Impact

The probability of the impact is the likelihood of impact occurrence from the development project to the environment. If there is a high probability that the identified significant adverse environmental effects will occur, obviously they are possible to cause significant impact. Conversely, if there is a low probability of occurrence, the significant adverse environmental effects are improbable. Five levels of probabilities of impact occurrence are considered to calculate significance points as follows:

1. very improbable (probably will not happen)
2. improbable (some possibility, but low likelihood)
3. probable (distinct possibility)
4. highly probable (most likely)
5. definite (impact will occur regardless of any prevention measures)

5.1.5.2. Magnitude of the Impact

Magnitude of the impact is determined based on the severity of impact. In case of very high magnitude, the situation turns to be irreversible. High, moderate, low magnitude and insignificant impacts are thus considered to be reversible and acceptable by the public with proper mitigation plan. In addition, the insignificant impact will have no effects on the environment. There are five levels of magnitude to determine significant points as follows:

1. Insignificant impact (the severity of impact is insignificant and will have no effect on the environment)
2. Low impact (the severity of impact is low and will have small effect on the environment)
3. Moderate impact (the severity of impact is moderate that cause some impacts on the environment)
4. High impact (the severity of impact is significantly high but the impact can be reversible)
5. Very high impact (the severity of impact is very high and that impact results into irreversible)

5.1.5.3. Extent of the Impact

The extent of the impact expresses the spatial influence of the effects produced by an intervention on the environment. This refers to either a distance or an area over which a component will undergo changes. The five levels of extent of the impact due to the project are as follows:

1. Site-specific (the impact affects only a very restricted area in the proximity of the project site)
2. Local (the impact affects a relatively restricted area located within, near or at a limited distance from the project site)
3. Regional (the impact affects a region of area or small number of components located a significant distance from the project site)
4. National (the impact affects a large geographic area or some of components located a significant distance from the project area)
5. International (the impact affects to international level on the environment)

5.1.5.4. Duration of the Impact

The duration of the impact describes the period of time during which a component undergoes changes due to the impact. It is not necessarily equivalent to the period of time during which the direct source of impact is active. It must also take into consideration the frequency when the impact is intermittent. It will be characterized as follow:

1. A very short duration (the impacts on the environment are occurred within 0-1 year)
2. A short duration (the environmental impacts are occurred within 2-5 years)
3. Medium-term (the environmental impacts are occurred within 6-15 years)
4. Long-term (the environmental impacts are happened over 15 years)
5. A permanent period (the impacts are experienced continuously for the life of the facility or even beyond if the effect is irreversible)

5.1.5.5. Significance of the Impact

The potential significant negative or positive environmental impacts caused by the project are identified by using a ranking scale such as occurrence and severity. Occurrence includes probability and duration of occurrence while severity means magnitude and extent of impacts. The ranking scale to use in assessing of each potential impact is shown in Table 5-1.

Table 5-1 Evaluation of Impact Assessment

Probability	Duration
1. Very improbable impact	1. A very short duration (0-1 year)
2. Improbable impact	2. A short duration (2-5 years)
3. Probable impact	3. Medium-term (6-15 years)
4. Highly probable impact	4. Long- term>15 years
5. Definitely impact	5. A permanent period
Magnitude	Extent
1. Insignificant impact	1. Site-specific impact
2. Low impact	2. Local impact
3. Moderate impact	3. Regional impact
4. High impact	4. National Impact
5. Very high impact	5. International Impact

The following formula is used to assess the environmental significance of each potential impact.

$$\text{Significance Points (SP)} = (\text{Magnitude} + \text{Extent} + \text{Duration}) \times \text{Probability}$$

Environmental significance of the potential environmental impacts can be differentiated based on the significance points into negligible, low, moderate, and high significance. Potential environmental impacts rating can be seen in Table 5-2.

Table 5-2 Potential Environmental Impacts Rating

Significance Points	Environmental Significance
<15	Negligible
15 - 30	Low
31- 60	Moderate
>60	High

5.3. POTENTIAL ENVIRONMENTAL, SOCIAL AND HEALTH IMPACT DURING CONSTRUCTION AND DECOMMISSION PHASE

The following are predicted impacts during construction and decommission phases of the project;

- Air Quality
- Noise and Vibration
- Water Quality
- Land
- Soil Quality
- Solid Waste
- Occupational Health and Safety
- Cultural Heritage
- Ecosystem
- Local Economy such as Employment and Means of Livelihood

The project construction stage can produce a considerable amount of potential environmental related issues, but most of the impacts on the local community will be transient since the impacts will be occurred only during construction or decommission phase. Majority of the impacts created in construction phase will be transient in nature. However, proper planning on construction site, waste disposal, and health and safety procedures should be effectively managed. The construction activities would consist of installation of necessary machinery, building construction, and alternative activities of M & E processes. Therefore, the potential negative impacts on environment would be at the minimum level. In Table 5-3, it shows the evaluation and prediction of potential environmental impacts' significance during construction phase and decommission phase.

5.3.1. Air Quality

5.3.1.1. Impact Assessment

The project will construct different types of buildings such as glass bottles manufacturing factory and office buildings that will need substantial amount of construction materials. The transportation of construction materials can elevate air emission (NO₂, SO₂, CO₂, PM_{2.5}, PM₁₀, etc.) from heavy-duty vehicles during the construction phase. In addition, the dusty construction activities (soil excavation work, movement of vehicles, blasting of rocks, drilling for installation piping work of mechanical, electrical, etc.) can cause emission of fugitive dust to the ambient air during construction stage. Moreover, the diesel generator for emergency use can emit air pollutants (NO₂, SO₂, CO₂, etc.) to the surrounding environment.

During decommission stage, the civil work such as demolition of the buildings can emit fugitive dust and the transportation of demolished materials can also cause air emission near surrounding area of project. However, the potential negative impact on air quality will be low. Since the construction and decommission phase is a short-term, the overall extent and duration of the impact would be low. Therefore, the significance is considered to be low with the proper mitigation measures.

5.3.1.2. Mitigation Measures

- To mitigate air pollutants emission from the transportation vehicles, a regular maintenance is needed.
- In order to reduce fugitive dust emission from the civil work activities, spraying water and usage of safety nets at and around the construction areas are recommended.
- Instead of using pure diesel generators, retrofit emission devices or diesel fuel with lower sulfur content should be utilized in order to reduce the emission of air pollutants from the diesel generators.

5.3.2. Noise and Vibration

5.3.2.1. Impact Assessment

During construction phase, the operation of heavy equipment, earth moving machinery for site clearing, pile driver operation, excavation equipment, cranes, operation of concrete mixer, equipment transportation, emergency generator and other related construction work can cause noise and vibration disturbance to the surrounding community.

During decommission phase, the operation of heavy equipment, earth-moving machinery for site clearing, equipment transportation, emergency generator and other civil work can cause noise and vibration disturbance to the surrounding community. As the project site is situated away from the residential area, these nuisance noise and vibration will be low at a limited distance from the project site.

5.3.2.2. Mitigation Measures

- Civil work generating high noise levels should be carried out only at daytime.
- Civil work that is necessary to be carried out at nighttime need to have proper noise control equipment or facilities.
- Workers in excessive noise areas are needed to be provided with adequate earplugs or earmuffs.
- Consider/substitute alternative methods of construction to reduce noise, such as using drill piling instead of percussion piling.
- Low-noise level generator should be selected in order to reduce impact from the diesel engine generators.
- The proposed mitigation measures will be needed to include as conditions in the construction contracts for implementation by the contractors.
- Install noise barriers near the residential and sensitive areas, which can impact directly from the project site construction and decommission activities.

5.3.3. Water and Ground Water Quality

5.3.3.1. Impact Assessment

Regarding the raw water sources, surface water from Zarmani Inn Reservoir is used as an alternative way for ground water consumption. During construction and decommission phase, water required for all construction and decommission activities and domestic purpose will be used mainly from government water supply system. Polluted storm water runoff from the construction site and improper discharge of domestic wastewater from the worker camp can deteriorate surrounding water bodies such as

surface water and ground water. The amount of water usage and wastewater generation mainly depend on the number of construction workers during day shift. The domestic wastewater generated from the construction site will be from toilet and washing activities of the employees. However, the impact on water quality will be low since the domestic wastewater from the worker camp will be properly treated or discharged with the help of underground septic tank and good housekeeping and proper equipment usage will be practiced to prevent leakage of chemical and oil in storm water runoff.

5.3.3.2. Mitigation Measures

- Sufficient number of toilets and bathing facilities for construction workers must be provided.
- Sewage and grey water should be collected into septic tanks and treated properly.
- Wastewater from the project site and domestic wastewater from worker camps were treated by sedimentation pond and septic tanks before discharging. Regular monitoring of wastewater discharge system is recommended.
- Conduct proper equipment usage and management system to prevent leakage of chemical and oil from construction and decommission processes.
- Alternative way for ground water consumption is conducted to avoid the ground water reduction of the regional area.
- Check and monitor the ground water quality near the project area regularly.

5.3.4. Land

5.3.4.1. Impact Assessment

During construction, the site clearing was carried out at the project site to implement the installation of infrastructure. During decommissioning phase, demolition of infrastructure and site clearing were carried out at the project site. However, these land use changes due to the project activities can be assumed as low impact to the surrounding environment since the project is developed within the same compound of the old glass bottles manufacturing factory.

5.3.4.2. Mitigation Measures

Since the proposed project area is in the old glass bottles manufacturing factory, there may be not much change in land use and so, mitigation measures may not be necessary.

5.3.5. Soil Quality

5.3.5.1. Impact Assessment

Construction and decommissioning activities can create soil contamination such as leakage of fuel and oil from the construction vehicles or machineries and other various wastes on the ground. In addition, the temporary solid waste disposal site can cause leakage of leachate to the surrounding soil at the project site. However, the potential impact on soil quality will be low since the probability to cause soil contamination is low.

5.3.5.2. Mitigation Measures

- The construction vehicles or machineries should be maintained in order to prevent leakage of fuel and oil to the soil.
- The temporary solid waste disposal site should be constructed properly in order to prevent leakage of leachate to the surrounding soil.
- Contact the YCDC to dispose solid wastes whenever it is necessary.

5.3.6. Solid Waste

5.3.6.1. Impact Assessment

- Non-Hazardous Waste

Residual wastes were generated during the buildings' construction and decommissioning phase. Source of solid waste will be from the removal of top soil and old structures, faulty construction activities as well as other construction and decommission wastes such as small concrete spills, scrap wood and metals. Other non-hazardous wastes consist of domestic solid waste can be discharged from workers such as plastic, garbage, glass and food waste.

- Hazardous Waste

Hazardous wastes from the construction and decommission stages such as treated timber, concrete additives, asbestos, contaminated soils, preservative, adhesives, paint, fluorescent light tubes, and lead-acid batteries can cause potential negative environmental impacts due to improper management of solid waste.

However, the construction project team will manage solid wastes properly during construction and decommission stage in accordance with the approval of YCDC. Therefore, the potential negative impacts will be low since the solid wastes are treated by refuse compaction system during construction and decommission stages.

5.3.6.2. Mitigation Measures

- Solid waste from the removal of top soil and old structures and faulty construction activities will be disposed at a suitable landfill site in accordance with the approval of YCDC.
- Establish and operate an efficient waste management system.
- Construction wastes should be classified and sorted out at sources for disposal. The disposal methods will depend on the types of wastes: direct reuse in the construction, sale as recycle materials, landfill for inert materials and specific treatment method for each type of hazardous materials.
- Non-hazardous wastes such as plastic, garbage, glass and food waste should be separated and managed according to YCDC guidelines and regulation.
- Hazardous waste disposal in or off the construction site will be prohibited.
- Hazardous waste management systems include waste classification, separation, collection, storage, transfer and disposal in compliance with applicable regulations of the government, if any.

- Hazardous wastes should be disposed at a designated site inside or outside the project area as appropriate. The method of disposal needs to follow the best international practices.

5.3.7. Occupational Health and Safety

5.3.7.1. Impact Assessment

The potential impacts on health and safety during construction and decommission phase are listed below.

- Slips and falls due to the careless workers.
- Working at height of building during roofing and painting.
- Increased temperature of equipment surface.
- Dusty in the ambient air of the working zone.
- Moving machinery can cause temporary hazards such as vehicle traffic and accident in moving and lifting equipment.
- Risk from handling or being exposed to hazardous materials that will be used at the construction site.

However, the impact on occupational health and safety of the project will be low since the project will manage properly associated with the occupational health and safety of workers. The potential activities to cause infectious disease are also not expected since construction workers will be hired mostly from the local community.

5.3.7.2. Mitigation Measures

- Safety policy of the project proponent
- Safety plan of the contractor
- Provision of safety gadgets to the workers
- Raising awareness of safety guidelines to the workers
- Assignment of safety supervisors at the work site
- Incentives to workers who obey the safety practices
- Penalty to workers who disobey the safety practices
- Arrangement of morning talks and toolbox meeting
- Preparation of health and safety matrix

5.3.8. Cultural Heritage

5.3.8.1. Impact Assessment

The project is located at Thanlyin Township which is the industrial area. The cultural heritage as Kyaik Khauk Pagoda is within 3 km distance from the project site. However, the proposed project is constructed within the existing glass bottles manufacturing factory and the highest building level is only 11 m from the floor level. Therefore, the activities that can cause potential negative impacts on cultural heritage especially visual aspect and vibration impacts on nearby existing building are not expected during construction and decommission stages.

5.3.8.2. Mitigation Measures

- Since no potential negative impact on cultural heritage are expected, there is no mitigation measures.

5.3.9. Ecosystem

5.3.9.1. Impact Assessment

There may be no significant impacts on surrounding ecosystem since the project is located in old glass bottles manufacturing factory and there are no protected areas, reserved forests and wetlands, threatened species and national parks near the project area. Although civil works from the construction and demolition activities of the project may generate impacts on fauna and flora, the scale of impact is expected to be negligible.

The clearing of the site in preparation for the construction phase represents a permanent and irreversible commitment of land resources. The land use of the project may lose the vegetative coverage of weeds and small herbs in the construction area. The major threats of the project may be the habitats of insect including butterflies, dragonflies and damselflies because of the clearance of weeds and small vegetation such as shrubs and herbs.

The use of heavy construction equipment during transportation of the building materials and site clearance will make noise and dust those leading to the disturbance for the faunal assemblages. Noise and dust emission made by heavy vehicles and machinery are inevitable both during the site clearance and construction phases. Several situated at the indirect impact area (outside the three kilometers) of the project site provides the aquatic habitat for some indigenous fish species and amphibians, but it may be threatened by so many exotic species, plastic and trash pollution.

5.3.9.2. Mitigation Measures

- Cutting tree and clearance of vegetation must be at a minimum and the trees should be planted again.
- Oil, grease and hazardous waste must be stored properly to prevent the leakage on the ground or water bodies.

5.3.10. Local Economy such as Employment and Means of Livelihood

There will be positive impacts on local economy due to getting job opportunities. Moreover, the necessary materials and equipment may be purchased from local shops during construction and decommission stages of the project. Therefore, potential positive impacts on their job opportunities and livelihood are expected.

Table 5-3 Evaluation and Prediction of Significant Impacts for Construction and Decommission Phase

Potential Impact	Activities and Source	Components	Magnitude	Extent	Duration	Probability	Score	Significant
Potential Negative Impacts								
Air Quality	Construction and decommission activities, diesel generator and vehicle movement	CO ₂ , NO ₂ , PM ₁₀ , PM _{2.5} , SO ₂	3	2	2	4	28	Low
Noise and Vibration	Emergency use of diesel generator and the operation of construction equipment and heavy vehicles	Noise and vibration	3	1	2	4	24	Low
Water and Ground Water Quality	Surface runoff, domestic wastewater	Organic Matter in wastewater	2	2	2	3	18	Low
Land	Removal of vegetation and top soil Installation of infrastructure	Land use change	1	1	4	4	24	Low
Soil Quality	Civil work	Leakage of fuel, oil and other various wastes	3	2	2	3	21	Low
Solid Waste	Civil work and wastes from workers	Residue waste and domestic waste	3	2	2	4	28	Low
Occupational Health and Safety	Workers' health and accident during construction and decommission	Infectious disease; such as AIDS/HIV, Hepatitis B/C, etc. and other physical injuries	2	1	2	4	20	Low
Cultural Heritage	Civil works near cultural heritage areas	Archeological sites and traditional building	1	1	2	1	4	Negligible
Ecosystem	Civil works	Flora and Fauna	3	1	2	3	18	Low

Potential Positive Impacts								
Local Economy such as Employment and Means of Livelihood	Civil works, raw materials and equipment purchasing	Employment and business opportunities	4	3	2	3	27	Low

5.4. POTENTIAL ENVIRONMENTAL, SOCIAL AND HEALTH IMPACTS DURING OPERATION PHASE

The following are predicted impacts during operation phase of glass bottles manufacturing factory, staff apartment, warehouses and office buildings;

- Air Quality
- Noise and Vibration
- Water Quality
- Soil Quality
- Solid Waste
- Offensive Odor
- Occupational Health and Safety
- Ecosystem
- Local Economy such as Employment and Means of Livelihood

Not all the impacts during operation phase are affected directly to local communities and impacts' significance during operation phase is presented in Table 5-4.

5.4.1. Air Quality

5.4.1.1. Impact Assessment

During the operation phase, gaseous pollutants such as CO₂, CO, SO_x NO₂, HCl and HF would be generated from fuel combustion and operation process of the furnaces. Moreover, dust and particulate matter PM₁₀ and PM_{2.5} will be emitted from raw material crushing, screening and preparation process. In addition to this, the vehicle engines and other combustion-driven equipment such as generators would emit PM₁₀, PM_{2.5}, CO₂, NO₂, CO and VOCs. These all activities would be created throughout the life of the factory. The impact on air quality is considered to be moderately significant with controls of design and appropriate mitigation.

5.4.1.2. Mitigation Measures

- Design and manage the emissions control equipment at the factory to achieve an appropriate control efficiency.
- Install air filter at the emission point of the furnace chimney.
- Generators and vehicles will be maintained regularly.
- Low Sulphur content diesel fuel should be used for the operation of generators, stoves and vehicles in order to reduce gaseous emission.
- Air quality around the project site should be monitored regularly.
- Implement proper ventilation system.
- Provide raw materials transportation to the furnaces with covered vehicles or conveyors.

5.4.2. Noise and Vibration

5.4.2.1. Impact Assessment

During the operation phase of glass bottles manufacturing factory, workers may be experienced to noise that can cause hearing loss or hearing impairment. The high pressure in the cooling-mold process may generate noise emissions. Moreover, the sources of noise will be from the use of emergency used generators, raw material preparation, material handling and vehicles movement on site. However, the magnitude will be at a low range with mitigation measures.

5.4.2.2. Mitigation Measures

- Design and construct the factory with lowest noise emissions.
- Maintain all equipment and machinery regularly.
- Limit the noisy activities only in daytime, if possible.
- The soundproof generators or low noise generators should be used for emergency use.
- The generators should be placed far away from the residents and local people.
- Install noise insulators at the residential area.

5.4.3. Water and Ground Water Quality

5.4.3.1. Impact Assessment

Regarding the raw water sources, surface water from Zarmani Inn Reservoir is used as an alternative way for ground water consumption. During the operation phase, cooling and cullet cleaning will used the most significant amount of water. However, closed-water process systems should be used to minimize the losses of water. The discharges from the glass bottles manufacturing factory will include glass solids, soluble glass-making materials, some organic compounds, and other chemicals for the cooling-water system. Therefore, the potential impact on water quality is expected to be moderate level under proper WWT system.

5.4.3.2. Mitigation Measures

Proper wastewater treatment systems will be installed to treat grey water and black water. Treated grey water from wastewater treatment plant should be reused for another purpose such as toilets, watering for landscaping, gardening, etc. The discharged wastewater should be monitored at the effluent point regularly.

Alternative way for ground water consumption is conducted to avoid the ground water reduction of the regional area.

Check and monitor the ground water quality near the project area regularly.

5.4.4. Soil Quality

5.4.4.1. Impact Assessment

During the operation phase, the transportation vehicles used for loading and unloading of materials can cause leakage of fuel and oil and other various wastes on the ground, which lead to soil contamination. In addition, the improper discharge of domestic and process wastewater will lead to soil contamination.

Especially, detention of process wastewater from glass bottles manufacturing process may lead to potential negative impact on soil contamination for long-term duration. It is expected to occur low level of soil contamination due to glass bottles manufacturing process under proper mitigation measures.

5.4.4.2. Mitigation Measures

- Transportation vehicles should be examined or maintained regularly.
- Proper wastewater treatment systems including sludge management system for process wastewater should be installed.
- Good sanitation facilities including proper sewage disposal system should be conducted.
- Solid waste management system should be installed properly in order to prevent improper waste disposal. Therefore, the potential negative impact on soil contamination will be low.
- Provide cover and linear foundation at the temporary solid wastes and sludge storage areas.
- Avoid direct land disposal of sludge or sediments from wastewater treatment system of the glass bottles manufacturing factory.

5.4.5. Solid Waste

5.4.5.1. Impact Assessment

Glass bottles manufacturing factory generate relatively low amounts of waste. Cleaning and maintenance in receiving areas of the raw materials can decrease the amount of waste and proper collection systems should be installed to collect the materials spills and add to the raw materials. Small amount of hazardous waste such as dry cells, batteries, fluorescent lamp, paints and its container, chemicals residue and its container will be generated. Non-hazardous waste such as paper, plastic bag and plastic bottles, glass, aluminum cans and tin cans, food wastes, rubber, etc. will be generated. Improper disposal of the solid wastes can cause negative impact on the environment.

5.4.5.2. Mitigation Measures

- Solid waste will be collected separately with different types of waste bins and the collected waste will be kept at three temporary solid waste disposal rooms before collecting by YCDC.

- The amount and type of waste should be monitored regularly to maintain the capacity of temporary wastes storage area.
- Some waste such as aluminum and tin can, plastic bottles, etc. should be recycled or reused for the same purpose or in different ways to reduce the amount of waste. For example, sale as recycle material to sub-contractors.
- The remaining waste including hazardous waste after 3Rs (Reduce, Reuse, and Recycle) will be disposed in accordance with the approval of YCDC.

5.4.6. Occupational Health and Safety

5.4.6.1. Impact Assessment

Physical hazards such as eye injuries from broken and flying glass particles, sever cutting injuries from flat glass breaks during handling, electrical hazards from the use of electrical equipment in operation of glass bottles manufacturing, fall on slippery floors, improper product loading and unloading of raw material may occur in the proposed project factory. In addition, accidents can be occurred from the buildings' renovation activities. However, the potential negative impact on occupational health and safety can be low with the help of proper management plan.

5.4.6.2. Mitigation Measures

- The moisture-absorbent mats with beveled edges should be used to prevent slips and falls on the slippery floor.
- Signboard should be displayed as the caution.
- Qualified forklift operators and handlers should be used during loading and unloading of materials.
- It should not be overloaded than the prescribed load on loading and unloading equipment and vehicles in order to prevent accidents.
- Personal Protective Equipment (PPE) should be provided to the workers during handling the glass materials.
- The automation of flat-glass handling and provision of cut-resisting gloves and long aprons to workers should be provided when handling flat glass.
- Conduct the medical check up for all factory staff regularly to avoid the spreading of transmitted diseases from the factory's workers to the local communities.

5.4.7. Ecosystem

5.4.7.1. Impact Assessment

Environmental impacts of the development project with multiple units designed of Glass Manufacturing Factory will change on land such as the project area of core zone. The clearing of the site in preparation for the construction represents a permanent and irreversible commitment of land resources and eliminating all other land use options such as biodiversity. The land use of the project may lose the vegetative coverage and most of the woody type in the construction area.

Noise pollution will be major threats of the project to avian fauna, bird community and insect including butterflies, dragonflies and because of the processing and running of the engine machine and the clearance of floral assemblages. Anthropogenic wastes such as trash including glass and plastics released from the inhabitants of this project may impact and lead to environmental pollution and concern for long term purposes. Industrial wastes of chemicals and detergents releasing from this manufacturing factory may also affect the soil and water body nearby. However, the possibility of negative impacts on ecosystem can reduce up to low level by following the proper mitigation measurements.

5.4.7.2. Mitigation Measures

According to the land use policy the project should be careful to manage, calculate, use and carry out systematically the sustainable development of natural resources. Impact mitigation calls for protecting and restoring as much of the original condition on the project site as possible. Maintaining and replanting of certain native plant species (trees and shrubs) as landscaping in a small area may provide a home for the faunal assemblages such as insects, amphibians, reptiles and birds those will re-inhabit in this area. Plant covering building design will be also compensation as urban forest for fauna assemblages in this project (World Economic Forum). Urban forest design in building is popular trend of practice in some developed countries and it is not only for habitat utilization of animals but also for the green environment which can control the global warming. Fencing plants, the landscape vegetation and woody types of vegetative coverage in the indirect impact area may provide the habitat loss of this project.

5.4.8. Local Economy such as Employment and Means of Livelihood

The socio-economic impacts are considered as positive because more jobs opportunities are created during operation phases of the project. The employees both skilled and unskilled for the glass bottles manufacturing factory will be mostly recruited from the local community. The project proponent will implement the following practices during operation phase:

- Promote the fair treatment, non-discrimination and equal opportunity for workers;

- The project proponent plans to increase the production capacity and nearby communities will get benefit by being the source of work force for the project;
- Ensure total compliance with national labor and employment laws;
- To avoid exploitation of child labor by contractor, sub-contractor and supply chain;
- Promote safe and healthy working conditions;
- Project proponent should try to mitigate or minimize negative impacts while enhancing and maximizing the positive impacts to their optimum.

5.4.9. Solid Waste

Regarding the raw material consumption, used glass containers are recycled into cullet in the production process. Normally, cullet has a significant environmental benefit. For example, using cullet in the production process helps to reduce the need for raw materials and save on the energy consumption. In addition, using cullet as a feed in the glass bottles manufacturing can also reduce CO₂ emission. Therefore, adding cullet to the feed mixture may lead to the sustainable production rather than its counterpart and help to fulfill the Sustainable Development Goals (SDGs). Overall, moderate level of positive impact is expected in the solid waste sector of the factory.

Table 5-4 Evaluation and Prediction of Significant Impacts for Operation Phase

Potential Impacts	Activities and Source	Components	Magnitude	Extent	Duration	Probability	Score	Significant
Potential Negative Impacts								
Air Quality	Diesel generator and vehicle movement Machines and equipment for glass bottles manufacturing process eg furnace	CO ₂ , CO, CH ₄ , O ₃ , PM ₁₀ , PM _{2.5} , SO ₂ , NO ₂ , VOCs , HCl, HF	4	3	4	4	44	Moderate
Noise and Vibration	Transportation vehicles, high pressure in the cooling-mold process and emergency used diesel generator	Noise and vibration	2	1	4	2	14	Negligible
Water and Ground Water Quality	Discharge of untreated wastewater and improper wastewater treatment system	BOD, COD, Antibiotics, Oil and Grease, Total Nitrogen (TN), Total Phosphorous (TP), Total solid (TS), Total Oxygen Demand, Total coliform bacteria, Heavy metals	3	3	4	4	40	Moderate
Soil Quality	Logistic transportation and wastewater discharge	Leakage of fuel, oil and other various wastes, and improper wastewater discharge	3	2	4	3	27	Low
Solid Waste	Factory by products, office, staff apartments	Type and amount of waste	3	2	4	3	27	Low
Occupational health and safety	Workers' health in operation area	Infectious disease; such as AIDS/HIV, Hepatitis B/C, etc. and other physical injuries	3	2	4	3	27	Low
Ecosystem	Wastewater and solid waste discharge	Impacts on aquatic ecosystem and habitats	3	3	4	3	30	Low

Potential Impacts	Activities and Source	Components	Magnitude	Extent	Duration	Probability	Score	Significant
Potential Positive Impacts								
Local Economy such as Employment and Means of Livelihood	Materials and manpower requirement for factory operation	Job and business opportunities Purchasing raw materials and equipment	3	3	4	4	40	Moderate
Solid Waste	used glass containers are recycled into cullet	Apply the sustainable glass bottles production process to fulfill the SDGs	3	3	4	4	40	Moderate

CHAPTER 6

CUMULATIVE IMPACT ASSESSMENT

According to the EIA Procedure (2015), the Cumulative Impact Assessment (CIA) is one of the main components in the Final EIA Report. It consists of two main sections, namely methodology and approach as well as cumulative impact assessment.

The Canadian Environmental Assessment Agency (CEAA) defined CIA as “cumulative effects are changes to the environment that are caused by an action in combination with other past, present, and future human action” (Hegmann et al, 1993:3)¹⁸. Currently, the project is under trial operation phase and the baseline environmental quality in an area presented in Chapter 4. Combination of both the moderated impacts results from EIA section Chapter 5 and other nearby existing activities can be considered as the cumulative impact.

MGE is developed to produce various types of glass bottles and is located at U Paing No-97, Yangon-Thilawa Terminal Road, Phayagone Village, Thanlyin, Township, Yangon. Generally, the area of Hpa Yar Kone village tract and A Lun Soke village tract are considered as the part of AOI (within 3 km) for the MGE glass bottles manufacturing factory.

However, these village tracts are situated between the proposed project and Thilawa Special Economic Zone, which is over 4 km south-east from the project site. Therefore, it is also important to consider the impact on this villages are mainly related to both proposed project and Thilawa Special Economic Zone.

The location map of project site and its AOI (3 km) as well as near by Thilawa special economic zones are shown in Figure 6-1.

¹⁸ Hegmann, G, C Cocklin, R Creasey, S Dupuis, A Kennedy, L Kingsley, W Ross, H Spaling and D Stalker 1999. Cumulative Effects Assessment Practitioner’s Guide. Hull, Quebec: Canadian Environmental Assessment Agency.

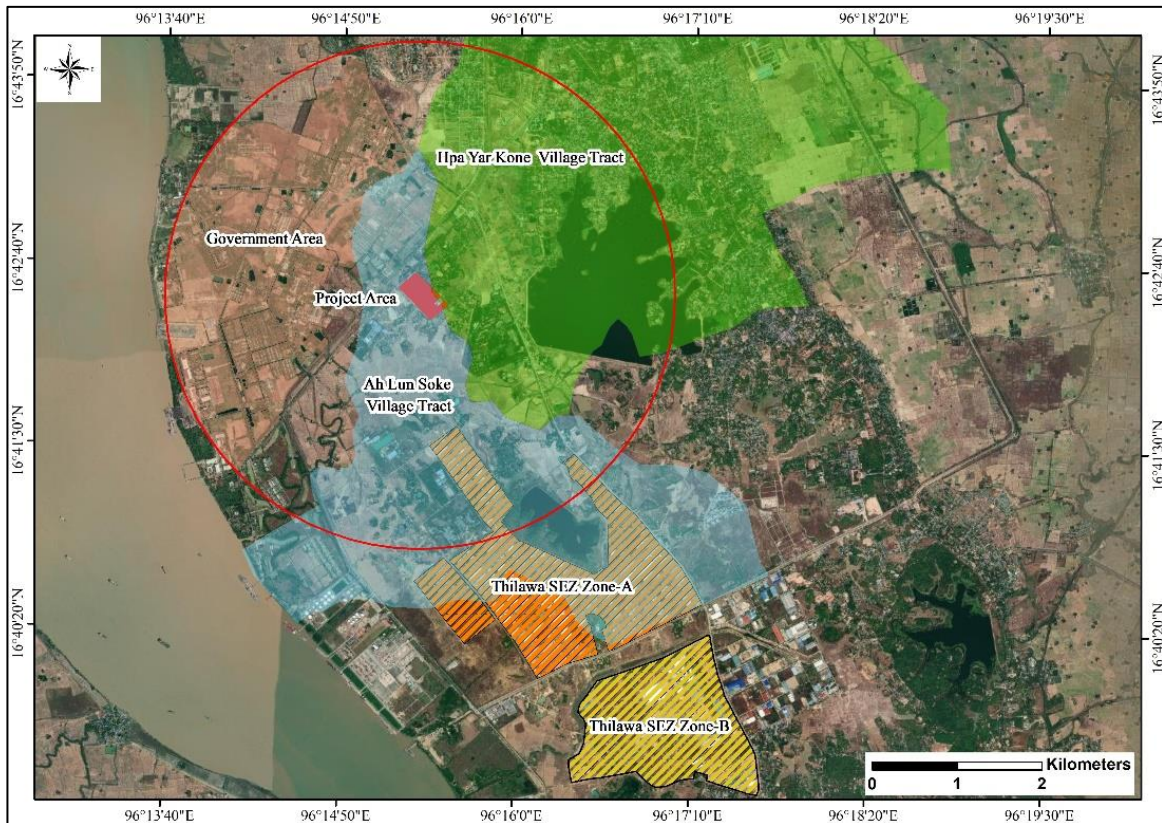


Figure 6-1 Location Map of Project Site and Nearby Areas

6.1. METHODOLOGY AND APPROACH

In order to address the cumulative impact of the proposed project, five specific steps will be conducted, namely; Scoping, Analysis of impacts, Identification of mitigation measures, Evaluation of significant impacts and Follow-up¹⁹.

6.1.1. Scope of the CIA

In the scoping stage, significant issues of concern associated with the proposed project, spatial boundaries for the analysis, temporal boundaries for the analysis and other actions that may contribute to cumulative impacts will be clearly identified in the scoping report first. The MGE is developed to produce various types of glass bottles and it is under the trial operation period at the moment.

The followings are crucial when preparing the CIA of the project:

- ❖ Identify environmental impacts of the proposed project
- ❖ Information of the nearby projects such as types, nature and capacity in the vicinity of the study area
- ❖ Identify the potential environmental impacts of nearby or future projects that can be cumulative within the study area

¹⁹ Dutta, P., Mahatha, S., & De, P. (2004). A methodology for cumulative impact assessment of opencast mining projects with special reference to air quality assessment. *Impact Assessment and Project Appraisal*, 22(3), 235-250.

6.1.2. Analysis of Impacts

Impacts analyzing stage will be conducted by defining and monitoring the environmental baseline condition for the important regional resources as well as by assessing the impacts of all actions on the resources. However, based on the impact assessment (Chapter 5), it can be noticed that the project will have less negative impacts on the environment while moderate level of negative impacts on air and water quality can occur as the maximum impact level. Hence it can be assumed that the cumulative impacts of the MGE will be mainly on air quality as well as water and ground water quality. Besides, other moderate level of positive impacts on solid waste and local economy such as employment and means of livelihood are also observed in impact assessment (Chapter 5).

6.1.3. Identification of mitigation measures

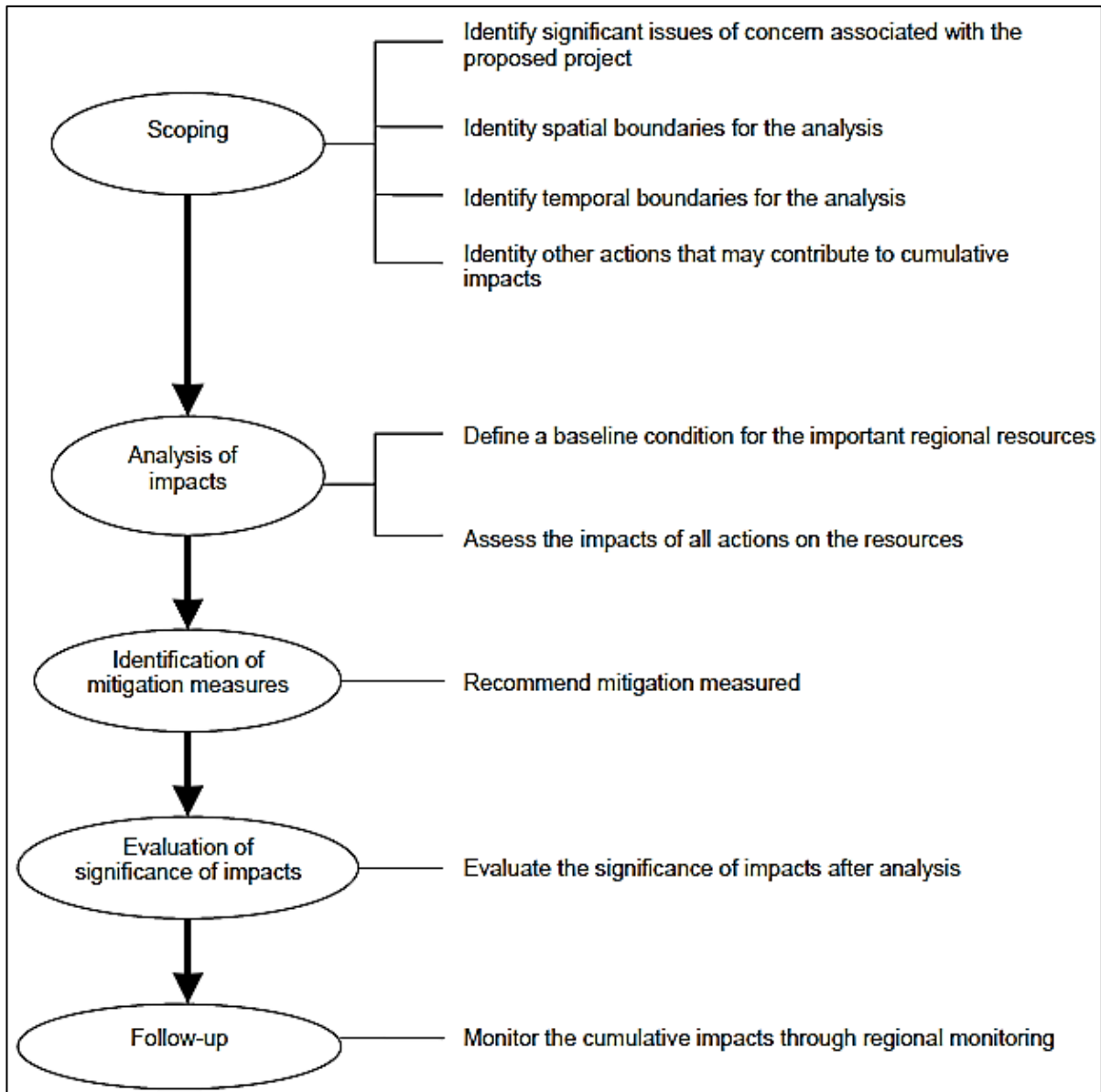
For identification of mitigation measures stage, it will draw up the recommended mitigation measurement plan based on the field survey and previous analysis results. The relevant mitigation measurements plans based on the analysis results for the proposed project is also described in Chapter 7. (7.3 and 7.4)

6.1.4. Evaluation of Significance of Impacts

In this stage, significance impacts on Selection of Valued Environmental Components (VECs) will be evaluated. Based on the impact assessment in Chapter 5, it can be assumed that the cumulative impacts of the MGE will be mainly on air quality as well as water and ground water quality. Therefore, these two parameters are selected as two VECs to evaluate the cumulative impacts of this project.

6.1.5. Follow-up for CIA

Finally, regional monitoring or regional data collection will be proceeded to follow up the cumulative impacts assessment. In this stage, questionnaire checklist will be applied for identification of environmental impact of MGE glass manufacturing factory and cumulative impacts. Overall cumulative impact assessment framework is shown in Figure 6-2.



Source: A methodology for cumulative impact assessment of opencast mining projects with special reference to air quality assessment Article (2004).

Figure 6-2 Overall Cumulative Impact Assessment Framework

6.2. CUMULATIVE IMPACT ASSESSMENT

6.2.1. Assessment on Air Quality

Regarding the air quality impact assessment, not only the proposed project but also the combination of other past, present, or future actions that may contribute to the impact are considered for the cumulative impact assessment. In this stage, questionnaire checklist will be apply for identification of the significant magnitude or insignificant magnitude of cumulative impacts. Overall cumulative impact assessment framework for air quality is shown in Table 6-1.

Table 6-1 Questionnaire Checklist for Cumulative Impact Assessment on Air Quality

Proposed Project			External Effect	Is the magnitude of the negative impact likely to be Significant or Insignificant? Why?
Will the project actions result in any of the following impacts? (1)	Yes/ No/ Maybe and reasons for the question (1)	If Yes or Maybe, the resource or area to be affected	Other past, present, or future actions that may contribute to the impact	
Impact of air quality due to gases	Yes: air quality in the surrounding area may deteriorate due to gaseous emissions from glass melting process by applying high capacity furnace.	Area lying within the 3 km radius of the study area especially the area under the prevailing wind direction	The combination effect of gaseous emission from other factories, situated in Thilawa Special Economic Zone and traffic	Significant : the magnitude of the impact may be large and may extend regionally or affect many receptors; however, mitigation of the impact is possible with systematic environmental management solutions
Impact of air quality due to particulate matters	May be: air quality in the adjacent area especially under the prevailing wind direction may deteriorate due to the dispersion of particulate matters from raw material (sands and cullet) washing and storage process.	Area adjacent to the raw material storage location and area under the prevailing wind direction	The combination effect of the vehicles coming to the Thilawa Special Economic Zone and construction activities from nearby projects	Insignificant : Although particulate matters can disperse due to mentioned activities, the magnitude can be low due to the limited construction activities, short time duration, and separation length or distance between the crowded area and emission sources

Significant: The proposed project may have “ Yes or May be “ impact and presence of external effect are considered as Significant for the cumulative impact assessment.

Insignificant: The proposed project may have “May be or No “ impact and absence of external effect are considered as insignificant for the cumulative impact assessment.

6.2.2. Assessment on Water and Ground Water Quality

Regarding the water and ground water quality impact assessment, not only the proposed project but also the combination of other past, present, or future actions that may contribute to the impact are considered for the cumulative impact assessment. In this stage, questionnaire checklist will be apply for identification of the significant magnitude or insignificant magnitude of cumulative impacts. Overall cumulative impact assessment framework for water and ground water quality is shown in Table 6-2.

Table 6-2 Questionnaire Checklist for Cumulative Impact Assessment on Water and Ground Water Quality

Proposed Project			External Effect	Is the magnitude of the negative impact likely to be Significant or Insignificant? Why?
Will the project actions result in any of the following impacts? (1)	Yes/ No/ Maybe and reasons for the question (1)	If Yes or Maybe, the resource or area to be affected	Other past, present, or future actions that may contribute to the impact	
Change in quantity of surface water or nearby water body	May be: As the project apply raw water from Zarmani Inn Reservoir, it may have some impact on the surfacewater in long term in the absence of proper mitigation measures.	Area lying within the 3 km radius of the study area	The combination effect of other present factories and economic development in Thilawa Special Economic Zone may contribute to such impact in the area	Significant : the magnitude of the impact may be large and may extend regionally in long term,however, considering the alternative way or proper mitigation measure like recycle the wastewater for secondary purposes is possible to control the such impact in the area.
Change in quality of surface water or nearby water body	May be: As the project is planned to recycle the wastewater for production process, there is no wastewater discharge into the nearby surfacewater body. However, in case of flooding in the project area, wastewater from sedimentation ponds may overflow to the nearby environment	Area adjacent to the project site and nearby water body	The combination effect of improper discharge of wastewater form other factories in Thilawa Special Economic Zone and domestic wastewater from nearby crowded area may contribute to such impact in the area	Significant : the magnitude of the impact may be large and may extend regionally or affect many receptors; however, mitigation of the impact is possible with systematic environmental management solutions including effective wastewater treatment system, proper flood control system and good sanitation facilities.
Alter the quantity of ground water	No: Maybe: the daily requirement of water for the proposed project will be met entirely from the surface of surface water (Zarmani Inn Resivor). There is no ground water withdrawal activities for the proposed project	-	Ground water is withdrawn only for the domestic uses at the villages.	Insignificant : The change will be very nominal, affecting only a part of the plateau; it will not affect many other resources as both proposed project and other factories from Special Economic Zone apply surface water sources only.

Alter the quality of ground water	No: ground water is unlikely to be affected by seepage and leaching by the proposed project as the project installed the proper wastewater treatment system and Solid waste management system	-	There is no significant pollution emission sources which may cause deterioration of ground water in the area.	Insignificant : Not only the proposed project but also the main pollution emitted sources like Thilawa Economic Zone also develop the centralized wastewater treatment plant and systematic solid waste management plan for all factories and projects within the compound. Therefore, it is not expected to occur deterioration of ground water in the area.
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Significant: The proposed project may have “ Yes or May be “ impact and presence of external effect are considered as Significant for the cumulative impact assessment.

Insignificant: The proposed project may have “May be or No “ impact and absence of external effect are considered as insignificant for the cumulative impact assessment.

CHAPTER 7

ENVIRONMENTAL MANAGEMENT PLAN

7.1. INTRODUCTION

This chapter presents the Environmental Management Plan (EMP) of manufacturing of various kinds of glass bottles. The EMP will be implemented during the construction phase and operation phase to ensure that the environmental condition is acceptable during construction and operation phases. This EMP provides the procedures and processes, which will apply to the project production activities to check and monitor compliance and effectiveness of the mitigation measure to MGE has committed. In addition, this EMP was prepared in line with applicable environmental laws and regulations.

7.2. SCOPE OF THE ENVIRONMENTAL MANAGEMENT PLAN

The objective of the environmental management plan is to manage potential environmental issues by implementing proper mitigation measures and monitoring plan in compliance with the relevant laws and regulations stipulated by national authorities. Environmental management plan based on the basic principles of management is known as the P.D.C.A cycle (see Figure 7-1). Environmental management plan consists of four related tasks as described below:

❖ **Plan (P):What need to be done**

The planning phase includes reviewing applicable environmental policies (see Chapter 2), identifying the project activities that can cause adverse effects on the environment (see Chapter 5), implementing mitigation measures to manage the impacts of those activities and designing effective programs of proper environmental management plan.

❖ **Do (D):Implement the plan**

MGE as described in this chapter will implement the monitoring measures based on the mitigation plan and environmental management plan for the potential environmental impacts appropriately.

❖ **Check (C):Monitor and evaluate the results of implementation**

The effectiveness of the mitigation measures will be monitored, evaluated and documented.

❖ **Act (A):Taking corrective actions to improve the results, if found inadequate**

If nonconformities or weakness in the environmental management plan were benchmarked, corrective actions are needed to plan for mitigating the existing environmental impacts.

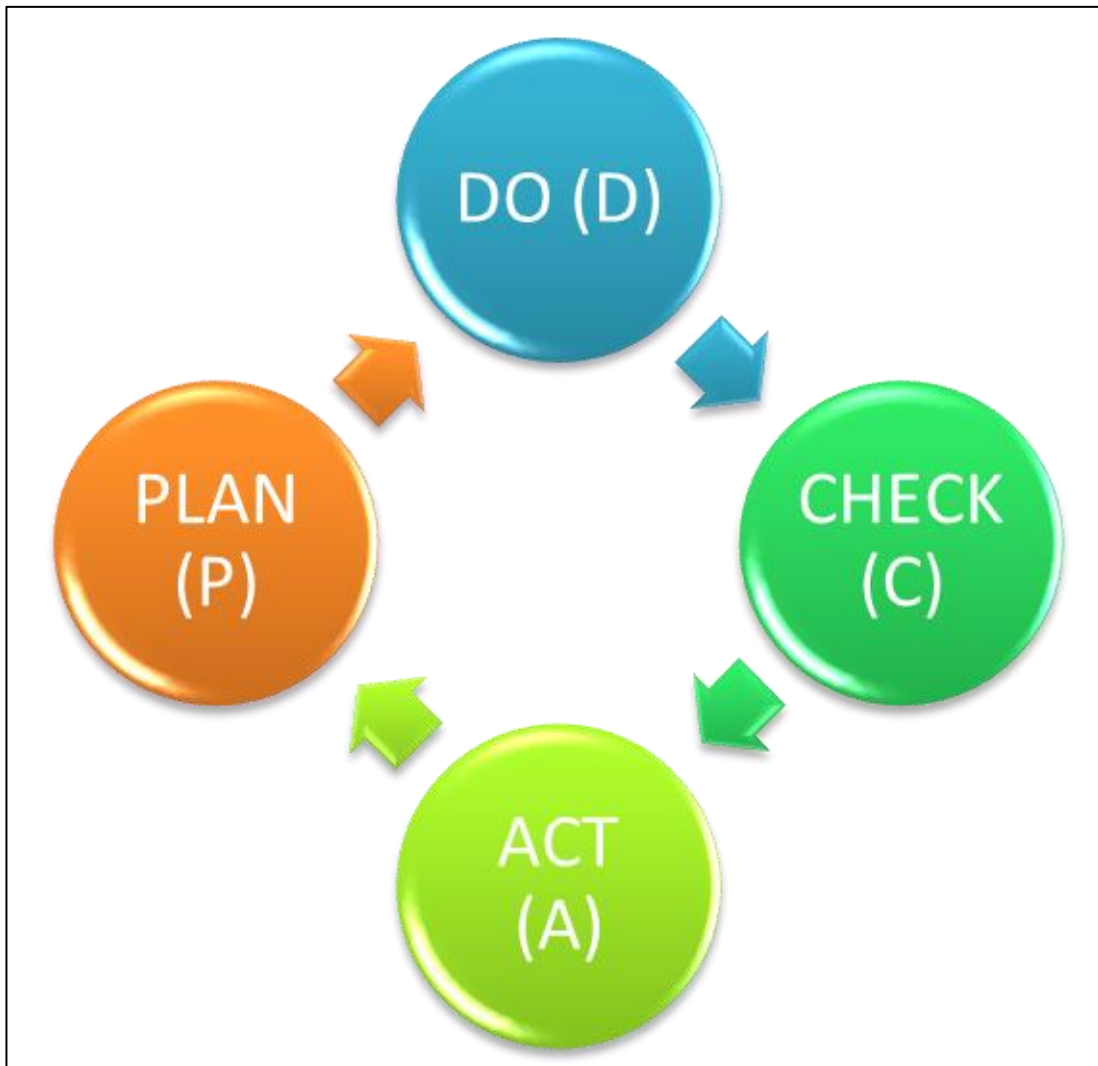


Figure 7-1 P.D.C.A. Cycle

7.3. LEGAL REQUIREMENTS AND INSTITUTIONAL REQUIREMENT

TBS will prepare the EMP for the proposed project in line with Environmental Conservation Law (2012), Environmental Conservation Rule (2014), Myanmar National Environmental Policy (2019) and EIA procedure (2015). The project proponent will follow and implement the prepared EMP.

The project proponent will manage the development of the proposed project. The project proponent should appoint Health, Safety and Environment (HSE) team throughout the duration of the project phases. HSE team is responsible for implementation and monitoring of EMP and monitoring plan as well as coordination with local authorities and the nearby communities.

Project proponent has the main responsibility to implement the EMP. A small EMP cell consisting of 6 members has been formed; the general manager should be an EMP cell leader. Other cell member will be consisting into technicians together with employees. If possible, some of these cell members should deploy for doing monitoring and inspection works effectively. Organization structure of EMP implementation team and list of team members are shown in Figure 7-2 and Table 7-1.

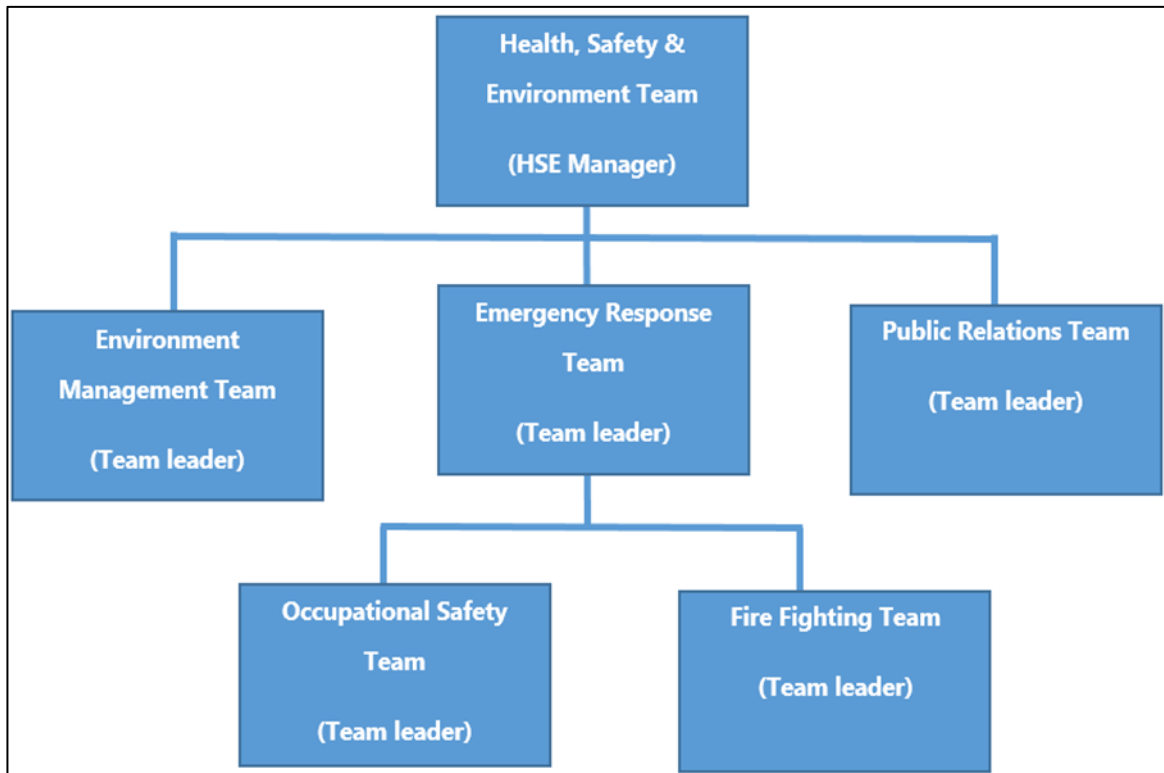


Figure 7-2 Organization Structure of the EMP Team

Table 7-1 List of EMP Team Members

No.	Name	Position	Responsibility
1	Mr. Edmundo F. Alvarez	HSE Manager	Supervise the overall environmental management system of the factory including finance, health and safety. Government office and legal resolution of the factory.
2	Mr. Zaw Myint Than	Environmental Management Team Leader	Conduct systematic environmental management plan including regular environmental monitoring and maintenance of the factory.
3	Mr. Lwin Ko	Public Relations Team Leader	Address the public relation issues including receiving suggestions and complaints from workers, local people, and complaints regarding the proposed project.
4	Mr. Zarni Min Zaw	Emergency Response Team Leader	Provide updated emergency response plan and awareness trainings program to staff.
5	Mr. Aung Ko Lynn	Fire Fighting Team Leader	Make regular inspection for fire hazard material and participate in firefighting awareness trainings.
6	Mr. Naing Lynn Htoon	Occupational Safety Team Leader	Check and submit occupational safety and accident report regularly.

7.4. SUMMARY OF PROJECT DESCRIPTION

Detailed project description is described in Chapter 3. The summary of project description by project phase (construction, operation and decommissioning) is shown in Table 7-2.

Table 7-2 Summary of Project Description

No.	Project Phase	Project Activities
1	Construction Phase	As the proposed project is constructed within the existing compound of old glass bottles manufacturing factory, renovation for some existing buildings to apply as the warehouse, office building and accommodation for staff are conducted. Generally, there are several types of buildings in the project, namely, office, canteen buildings, accommodation, warehouses, factory and furnace. In addition, the some existing glass bottles manufacturing buildings are maintained as its original form.
2	Operation Phase	The main factory building for glass bottles manufacturing process has been constructed by applying the latest technology. Currently, MGE installed an End-Fired Single-Pass Regenerators Furnace, the eco-friendly furnace. It is simple, flexible & economical to operate.
3	Decommissioning Phase	<p>Scenario i: If the project proponent extent/renew the permission to continue the manufacturing of various kinds of glass bottles, the environmental impact evaluation and management plan would be identical to the operation phase.</p> <p>Scenario ii: The project proponent would not extent/renew the permission. The new proponent would apply for permission and resume the factory operation. For this case, the environmental impact evaluation and management plan would be identical to the operation phase.</p> <p>Scenario iii: If the project proponent doesn't extent/renew the permission, the structures of the MGE's buildings would be left in its original form and no business activities would be performed. For this case, the proponent is recommended to follow the procedures guided by the relevant authority. Moreover, the proponent needs to inform the factory workers about the decommission plan, clear all the payment payable to workers, and compensate them-if necessary.</p> <p>Scenario iv: The project proponent would not extent/renew the permission. The structures of the MGE's buildings would be partially or wholly demolished for new business activity. For this case, the environmental impact evaluation would be identical to construction phase and the demolition contractor is advised to follow the management plan described in construction phase.</p>

7.5. SUMMARY OF IMPACTS AND MITIGATION MEASURES

The detail of potential impact assessment and mitigation measurements are described in Chapter 5 and the summary of potential impacts and mitigation measures for the proposed project is shown in Table 7-3.

Table 7-3 Summary of Impacts and Mitigation Measures

No.	Potential Impact Assessment	Mitigation Measures	Responsible Team	Annual Cost (MMK)
During Construction/Decommissioning Phase				
1.	<p><u>Air Quality</u></p> <ul style="list-style-type: none"> - Emission of air pollutants from the use of construction and decommissioning activities, diesel generators and vehicles movement 	<p><u>Air Quality</u></p> <ul style="list-style-type: none"> - The transportation vehicles will be maintained regularly. - Spraying water and usage of safety nets at and around the construction areas will be performed. - Construction material such as cement and sand, etc. will be carried with covers. - Burning construction waste will be strictly prohibited. 	Environmental Management Team of contractor	Included in the project construction cost
2.	<p><u>Noise and Vibration</u></p> <ul style="list-style-type: none"> - Noise and vibration from the use of diesel generators and the operation of construction equipment and heavy vehicles 	<p><u>Noise and Vibration</u></p> <ul style="list-style-type: none"> - Civil work generating high noise levels will be carried out only at daytime. - Adequate earplugs or ear muffs will be provided to the workers in excessive noise areas. - Workers in excessive noise areas and on a vibrating surface will be assigned with alternative shift. - Low-noise level generators will be used in order to reduce the impact from the diesel engine generators. - Diesel generators are placed away from the residential area. - Construction equipment, truck and diesel generators will be maintained regularly in order to avoid excessive vibration and noise. 	Environmental Management Team of contractor	Included in the project construction cost
3.	<p><u>Water Quality</u></p> <ul style="list-style-type: none"> - Surface runoff through construction site and domestic wastewater from construction workers 	<p><u>Water Quality</u></p> <ul style="list-style-type: none"> - Sufficient number of toilets and bathing facilities for construction workers are provided. - Sewage will be collected into septic tanks and will be properly discharged in line with YCDC laws and regulations. 	Environmental Management Team of contractor	Included in the project construction cost

		<ul style="list-style-type: none"> - Wastewater from the project site and domestic wastewater from worker camps were treated by sedimentation pond and septic tanks before discharging. Regular monitoring of wastewater discharge system is recommended. - Conduct proper equipment usage and management system to prevent leakage of chemical and oil from construction and decommission processes. - Alternative way for ground water consumption is conducted to avoid the ground water reduction of the regional area. - Check and monitor the ground water quality near the project area regularly. 		
4.	<p><u>Land</u></p> <ul style="list-style-type: none"> - Land use changes from not only construction works (site clearing and installation of infrastructures) but also decommission works (demolition of infrastructure and site clearing). 	<p><u>Land</u></p> <ul style="list-style-type: none"> - Since the proposed project area is in the old glass bottles manufacturing factory, the significant impact on land use changes will not be expected. 	Environmental Management Team of contractor	Included in the project construction cost
5.	<p><u>Soil Quality</u></p> <ul style="list-style-type: none"> - Soil contamination such as leakage of fuel and oil from the construction vehicles or machineries and other various wastes on the ground - The temporary solid waste disposal site can cause leakage of leachate to the surrounding soil. 	<p><u>Soil Quality</u></p> <ul style="list-style-type: none"> - The construction vehicles or machineries will be regularly maintained in order to prevent leakage of fuel and oil to the soil. - The temporary solid waste disposal site are constructed properly in order to prevent leakage of leachate to the surrounding soil. - Fuel oil will be properly stored. - Construction waste will be systematically collected and disposed according to YCDC Rules and Regulations. 	Environmental Management Team of contractor	Included in the project construction cost
6.	<p><u>Solid Waste</u></p> <ul style="list-style-type: none"> - Construction wastes from civil work and domestic wastes from construction workers. 	<p><u>Solid Waste</u></p> <ul style="list-style-type: none"> - Solid waste from the removal of top soil and old structures and faulty construction activities will be disposed at a suitable landfill site in accordance with the approval of YCDC. 	Environmental Management Team of contractor	Included in the project construction cost

		<ul style="list-style-type: none"> - Construction wastes will be classified and sorted out at sources for disposal in line with YCDC rules and regulation. - Non-hazardous wastes such as plastic, garbage, glass and food waste will be separated and managed according to YCDC rules and regulation. - Hazardous waste disposal in or off the construction site will be prohibited. - Hazardous waste will be stored, collected and disposed in compliance with the approval of YCDC. 		
7.	<p><u>Occupational health and safety</u></p> <ul style="list-style-type: none"> - Construction workers may slip and fall due to the careless. - Working at height of building during roofing and painting may cause accident. - Increased temperature of equipment surface may hurt due to careless. - Dusty in the ambient air of the working zone can cause side effect on respiratory system. 	<p><u>Occupational health and safety</u></p> <ul style="list-style-type: none"> - The project proponent will establish safety policy. - The contractor will prepare safety plan. - The contractor will provide PPE and first aid kit to the construction workers. - The contractor will raise awareness of safety guidelines to the construction workers. - The contractor will assign safety supervisors at the work site. - The contractor will provide incentives to workers who obey the safety practices and penalty to workers who disobey the safety practices. - The contractor will arrange morning talks and toolbox meeting. 	Environmental Management Team of contractor	Included in the project construction cost
8.	<p><u>Cultural Heritage</u></p> <ul style="list-style-type: none"> - Visual and vibration impacts from construction and decommission activities 	<p><u>Cultural Heritage</u></p> <ul style="list-style-type: none"> - . The prosed project is constructed within the existing glass bottles manufacturing factory and the highest building level is only 11 m from the floor level. - Therefore it is expected no significant impact on the cultural heritage. 	Environmental Management Team of contractor	Included in the project construction cost

7.	<p><u>Ecosystem</u></p> <ul style="list-style-type: none"> - Civil works from the construction and demolition activities can cause impacts on fauna and flora 	<p><u>Ecosystem</u></p> <ul style="list-style-type: none"> - Cutting tree and clearance of vegetation must be at a minimum and the trees will be planted. - Oil, grease and construction waste will be stored properly to prevent the leakage on the ground or water bodies. - Construction waste and wastewater will be properly disposed and discharged. 	<p>Environmental Management Team of contractor</p>	<p>Included in the project construction cost</p>
During Operation Phase				
1.	<p><u>Air Quality</u></p> <ul style="list-style-type: none"> - Emission of particulate matters such as PM₁₀, PM_{2.5} and gaseous pollutants such as CO₂, NO₂, CO, CH₄, O₃, SO₂, VOCs from fuel combustion and operation process of the furnaces. 	<p><u>Air Quality</u></p> <ul style="list-style-type: none"> - Design and manage the emissions control equipment at the factory to achieve an appropriate control efficiency. - Install air filter at the emission point of the furnace chimney. - Generators and vehicles will be maintained regularly. - Low Sulphur content diesel fuel should be used for the operation of generators, stoves and vehicles in order to reduce gaseous emission. - Air quality around the project site should be monitored regularly. - Implement proper ventilation system. - Provide raw materials transportation to the furnaces with covered vehicles or conveyors. 	<p>Environmental Management Team of MGE</p>	<p>2,000,000</p>
2.	<p><u>Noise and Vibration</u></p> <ul style="list-style-type: none"> - Noise and vibration from the use of emergency used generators, raw material preparation, material handling and vehicles movement on site. 	<p><u>Noise and Vibration</u></p> <ul style="list-style-type: none"> - Design and construct the factory with lowest noise emissions. - Maintain all equipment and machinery regularly. - Limit the noisy activities only in daytime, if possible. - The soundproof generators or low noise generators should be used for emergency use. 	<p>Environmental Management Team of MGE</p>	<p>1,000,000</p>

		<ul style="list-style-type: none"> - The generators should be placed far away from the residents and local people. - Install noise insulators at the residential area. 		
3.	<p><u>Water and Ground Water Quality</u></p> <ul style="list-style-type: none"> - The wastewater from operation phase; cooling and cullet cleaning and general activities of workers. 	<p><u>Water and Ground Water Quality</u></p> <ul style="list-style-type: none"> - The proper wastewater treatment system are installed to treat grey water and black water. - The treated grey water from wastewater treatment plant should be reused for another purpose such as toilets, watering for landscaping, gardening etc. - The alternative way for ground water consumption is conducted to avoid the ground water reduction of the regional area. 	Environmental Management Team of MGE	1,000,000
4.	<p><u>Soil Quality</u></p> <ul style="list-style-type: none"> - Soil contamination such as leakage of fuel and oil from the transportation vehicles and diesel generators/storage tanks and improper wastewater discharge 	<p><u>Soil Quality</u></p> <ul style="list-style-type: none"> - Transportation vehicles should be examined or maintained regularly. - Proper wastewater treatment systems including sludge management system for process wastewater should be installed. - Good sanitation facilities including proper sewage disposal system should be conducted. - Solid waste management system should be installed properly in order to prevent improper waste disposal. Therefore, the potential negative impact on soil contamination will be low. - Provide cover and linear foundation at the temporary solid wastes and sludge storage areas. - Avoid direct land disposal of sludge or sediments from wastewater treatment system of the glass bottles manufacturing factory. 	Environmental Management Team of MGE	Included in solid waste management and wastewater management
5.	<p><u>Solid Waste</u></p> <ul style="list-style-type: none"> - Small amount of hazardous waste such as dry cells, batteries, fluorescent lamp, paints and its container, chemicals 	<p><u>Solid Waste</u></p> <ul style="list-style-type: none"> - Solid waste will be separately collected with different types of waste bins and the collected 	Environmental Management Team of MGE	1,000,000

	<p>residue and its container will be generated.</p> <ul style="list-style-type: none"> - Non-hazardous waste such as paper, plastic bag and plastic bottles, glass, aluminum cans, tin cans, food wastes, rubber, etc. will be generated. 	<p>waste will be kept at a temporary solid waste storage yard before collecting by YCDC.</p> <ul style="list-style-type: none"> - Some waste such as aluminum and tin can, plastic bottles etc should be recycled or reused for the same purpose or in different ways. - The remaining waste including hazardous waste after 3 Rs (Reduce, Reuse, and Recycle) will be disposed in line with the approval of YCDC. 		
6.	<p><u>Occupational health and safety</u></p> <ul style="list-style-type: none"> - Physical injuries such as eye injuries from broken and flying glass particles, sever cutting injuries from flat glass breaks during handling, electrical hazards from the use of electrical equipment. 	<p><u>Occupational health and safety</u></p> <ul style="list-style-type: none"> - The moisture-absorbent mats with beveled edges should be used to prevent slips and falls on the slippery floor and signboard should be displayed as the caution. - Qualified forklift operators and handlers should be used during loading and unloading of materials. - It should not be overloaded than the prescribed load on loading and unloading equipment and vehicles in order to prevent accidents. - PPE will be provided to the workers during renovating the buildings. - Material safety data sheets (MSDS), eyewash station, emergency alarm button and “No Smoking” sign board are provided on the wall of chemical storage room. - In addition, PPE such as protective gloves, clothing, eye protection, ear plugs, and face shield will be provided to the workers who handled chemical glue and to the workers who worked in outsole grinding room. - First aid kit and medical clinic will be provided to the workers. - Occupational safety and emergency first aid training will be also provided to the workers. 	Environmental Management Team of MGE	1,000,000

8.	<p><u>Ecosystem</u></p> <ul style="list-style-type: none"> - Improper discharge and disposal of wastewater and solid waste from the project 	<p><u>Ecosystem</u></p> <ul style="list-style-type: none"> - The generated wastewater must pass through proper wastewater treatment plant to reduce impact on ecosystem. - The project proponent will systematically manage and use the natural resources such as land and water in this area. - Maintaining and replanting of certain native plant species such as trees as landscaping or fencing may provide a home for the faunal assemblages such as insects, amphibians, reptiles, and birds. - Green belt space or small green space may provide a good habitat for insects and recreation of all the inhabitants. - Awareness program of prohibiting exotic species which releasing to nearby water body should be carried out by local authorities. 	<p>Environmental Management Team of MGE</p>	<p>500,000</p>
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7.6. ENVIRONMENTAL MONITORING PLAN

Environmental monitoring plan is important for the effective execution and successful implementation of EMP. Environmental monitoring is a tool to judge environmental conditions and trends which support the proposed project's implementation, and develop information for reporting to national policymakers and the public. According to article 108 of EIA procedure (2015), the project proponent shall submit monitoring reports to the Ministry not less frequently than every six months, as provided in a schedule in the EMP.

Regarding the construction and decommission phases of the project, all the monitoring measures was carried out by the project proponent. In addition, project contractor especially the construction contractor also has the responsibility to incorporate the monitoring activities with the project proponents. Detailed environmental monitoring plan including the location of monitoring points with map, frequency of measurements and monitoring parameters for construction and decommission phases are shown in Table 7-4.

When it comes to the operation phase, project proponent established the EMP Team of the factory and also assigned the specific duties for each team members to conduct the environmental monitoring activities. Organization structure of EMP implementation team and list of team members are shown in Figure 7-2 and Table 7-1, Article (7.3), Chapter 7. During the operation stage, Environmental Monitoring Team will take all the responsibility to conduct the monitoring activities under the control of HSE Manager. However, for the occupational health and safety concern, Occupational Safety Team will take the responsibility to implement the plan by cooperating with the Emergency Response Team. Detailed environmental monitoring plan including the location of monitoring points with map, frequency of measurements and monitoring parameters for operation stage of the factory are shown in Table 7-5.

Table 7-4 Environmental Monitoring Plan during Construction and Decommissioning Phases

Monitoring Item	Monitoring Parameter	Monitoring Location		Frequency	Annual Estimated Cost (MMK)
		Construction Phase	Decommission Phase		
Air Quality	PM ₁₀ , PM _{2.5} , SO ₂ , NO ₂ , O ₃ & CO, CO ₂ , CH ₄ , VOC, Humidity ,Temperature	<u>Project site</u> 16°42'34.68"N 96°15'18.69"E	<u>Project site</u> 16° 42' 34.68" N 96° 15' 18.69" E	Once in Construction/ Decommission Phase	1,000,000
		<u>Phan Chat Sat Yone Taw Ya Monastery</u> 16° 42' 27.89" N 96° 15' 53.99" E			
		<u>Thilawa Industrial Road</u> 16° 41' 47.49" N 96° 16' 11.50" E			
Water Quality	BOD, COD, Oil & grease, pH, Total nitrogen, Total phosphorus, Temperature, DO, Turbidity, TDS, TSS, Iron, Lead, Free Cyanide, Arsenic	<u>Process Wastewater from Factory sedimentation Pond</u> 16°42'21.65"N 96°15'27.01"E	<u>Process Wastewater from Factory sedimentation Pond</u> 16°42'21.65"N 96°15'27.01"E	Once in Construction/ Decommission Phase	500,000
		<u>Domestic Wastewater from Factory Canteen</u> 16°42'33.75"N 96°15'21.08"E			
		<u>Treated Water from RO Permeate Water Tank</u> 16°42'20.80"N 96°15'25.18"E			
Noise	Noise level (dB (A) scale)	<u>Project site</u> 16°42'23.97"N 96°15'25.93"E	<u>Project site</u> 16°42'23.97"N 96°15'25.93"E	Once in Construction/ Decommission Phase	300,000
		<u>Phan Chat Sat Yone Taw Ya Monastery</u>			

Monitoring Item	Monitoring Parameter	Monitoring Location		Frequency	Annual Estimated Cost (MMK)
		Construction Phase	Decommission Phase		
		16°42'27.66"N 96°15'53.72"E <u>Thilawa Industrial Road</u> 16°41'47.78"N 96°16'11.35"E			
Vibration	Radial, Transverse, Vertical	<u>Project site</u> 16°42'25.50"N 96°15'19.87"E <u>Phan Chat Sat Yone Taw Ya Monastery</u> 16°42'28.17"N 96°15'54.14"E <u>Thilawa Industrial Road</u> 16°41'47.21"N 96°16'11.50"E	<u>Project site</u> 16°42'25.50"N 96°15'19.87"E	Once in Construction/ Decommission Phase	500,000
Solid Waste	Amount and type of solid waste	Temporary waste disposal site	Temporary waste disposal site	Weekly	500,000
Occupational Health and Safety	Incident/ accident records	Around the project site and construction site	Around the project site and construction site	Monthly	500,000

Table 7-5 Environmental Monitoring Plan during Operation Phase

Monitoring Item	Monitoring Parameter	Monitoring Location	Frequency	Estimated Annual Cost (MMK)
Air Quality	PM ₁₀ , PM _{2.5} , SO ₂ , NO ₂ , O ₃ & CO, CO ₂ , CH ₄ , VOC, Humidity, Temperature	<u>Project site</u> 16°42'34.68"N, 96°15'18.69"E	Twice a year	2,000,000
		<u>Phan Chat Sat Yone Taw Ya Monastery</u> 16° 42' 27.89" N, 96° 15' 53.99" E		
Water Quality	pH, Temperature, TDS, Conductivity, Salinity, Turbidity, TSS, BOD, COD, Free Cyanide, Phosphorous, Arsenic, Iron, Lead, Total Nitrogen	<u>Process Wastewater from Factory sedimentation Pond</u> 16°42'21.65"N, 96°15'27.01"E	Twice a year	1,000,000
		<u>Wastewater from Factory's Drainage Channels</u> 16°42'31.23"N, 96°15'12.90"E		
		<u>Nearby Tube Well</u> 16°42'36.17"N, 96°15'29.54"E		
Noise	Noise level (dB (A) scale)	<u>Project site</u> 16°42'23.97"N, 96°15'25.93"E	Twice a year	600,000
Vibration	Radial, Transverse, Vertical	<u>Project site</u> 16°42'25.50"N, 96°15'19.87"E	Twice a year	1,000,000
Solid Waste	Amount and type of solid waste	Temporary waste disposal site	Weekly	500,000
Occupational Health and Safety	Incident/accident records and providing	Around the project site and construction site	Monthly	500,000

7.7. SUB PLAN FOR ENVIRONMENTAL MONITORING IMPLEMENTATION

According to Article 63, Section 8, Sub-section 8.6 of EIA Procedure (2015), the environmental monitoring Sub-Plan is required to include in EMP implementation. Each monitoring Sub-Plan shall include objectives, legal requirement, overview maps, implementation schedule, management actions, monitoring plans, projected budgets and responsibilities. The environmental monitoring Sub-Plan for air quality, water quality, noise and vibration, solid waste management as well as occupational health and safety are as follows.

7.7.1. Sub Plan for Air Quality Management

1) Summary of Monitoring Sub Plan

Monitoring Parameter	Particulate Matters (PM ₁₀) and (PM _{2.5}), Carbon dioxide (CO ₂), Carbon monoxide (CO), Nitrogen dioxide (NO ₂), Sulphur dioxide (SO ₂), Methane (CH ₄), Ozone (O ₃), Volatile organic compound (VOCs), Humidity, Temperature, Wind speed and Wind direction
Methodology	Haz-Scanner EPAS with LCD real time display
Monitoring Frequency	Twice a year (dry and wet seasons)
Estimated Annual Budgets	2,000,000 MMK
Responsibility	Environmental Management Team of the Factory
Relevant Law and Regulation	National Environmental Quality (Emission) Guidelines (2015)
Monitoring Location	Project site: 16° 42' 34.68" N and 96° 15'18.69" E
	Phan Chat Sat Yone Taw Ya Monastery: 16° 42' 27.89" N, 96° 15' 53.99" E

2) Location

Location map of planned air quality monitoring stations are presented in Figure 7-3.

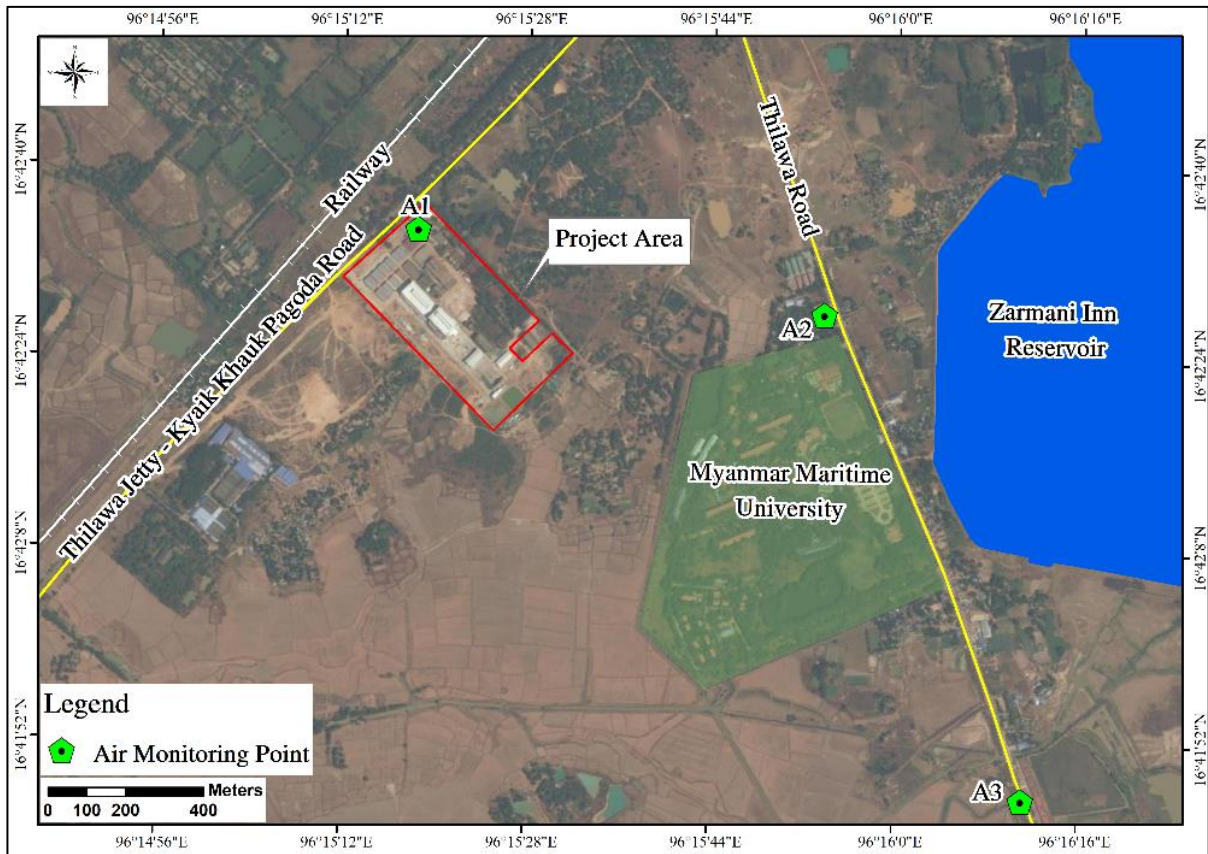


Figure 7-3 Location Map of Planned Air Quality Monitoring Stations

7.7.2. Sub Plan for Water Quality Management

1) Summary of Monitoring Sub Plan

Monitoring Parameter	pH, Temperature, TDS, Conductivity, Salinity, Turbidity, TSS, BOD, COD, Free Cyanide, Phosphorous, Arsenic, Iron, Lead, Total Nitrogen
Methodology	USEPA Method for Chemical Analysis of Water and Wastewater In Situ Measurement
Monitoring Frequency	Twice a year (dry and wet seasons)
Estimated Annual Budgets	1,000,000 MMK
Responsibility	Environmental Management Team of the Factory
Relevant Law and Regulation	National Environmental Quality (Emission) Guidelines (2015) National Drinking Water Quality Standard (2019-Draft)
Monitoring Location:	Process Wastewater-W1 : 16° 42' 21.65" N and 96° 15' 27.01" E Domestic Wastewater-W2: 16° 42' 31.23" N and 96° 15' 12.90"E Ground Water-W3 :16° 42' 36.17" N and 96° 15' 29.54" E

2) Location

Location map of planned water quality sampling and monitoring points are presented in Figure 7-4.

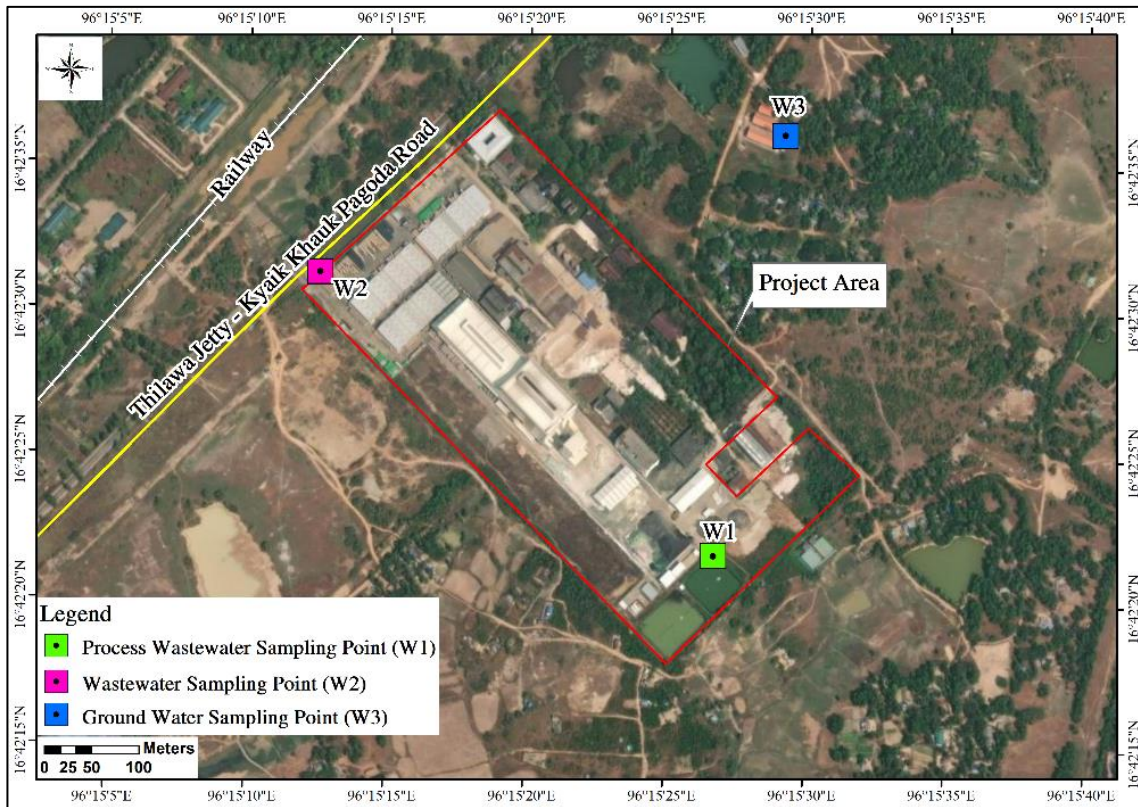


Figure 7-4 Location Map of Planned Water Quality Sampling and Monitoring Points

7.7.3. Sub Plan for Vibration Control and Management

1) Summary of Monitoring Sub Plan

Monitoring Parameter	Radial, Transverse and Vertical Particle Velocity in millimeter per second and frequency
Methodology	Nomis Seismograph (Mini Super graph II) for ground vibration measurements
Monitoring Frequency	Twice a year (dry and wet seasons)
Estimated Annual Budgets	1,000,000 MMK
Responsibility	Environmental Management Team of the Factory
Relevant Law and Regulation	German Standards from DIN 4150-3
Monitoring Location	Project site-V1: 16°42'25.50"N, 96°15'19.87"E

2) Location

Location map of planned vibration level monitoring points are presented in Figure 7-5.

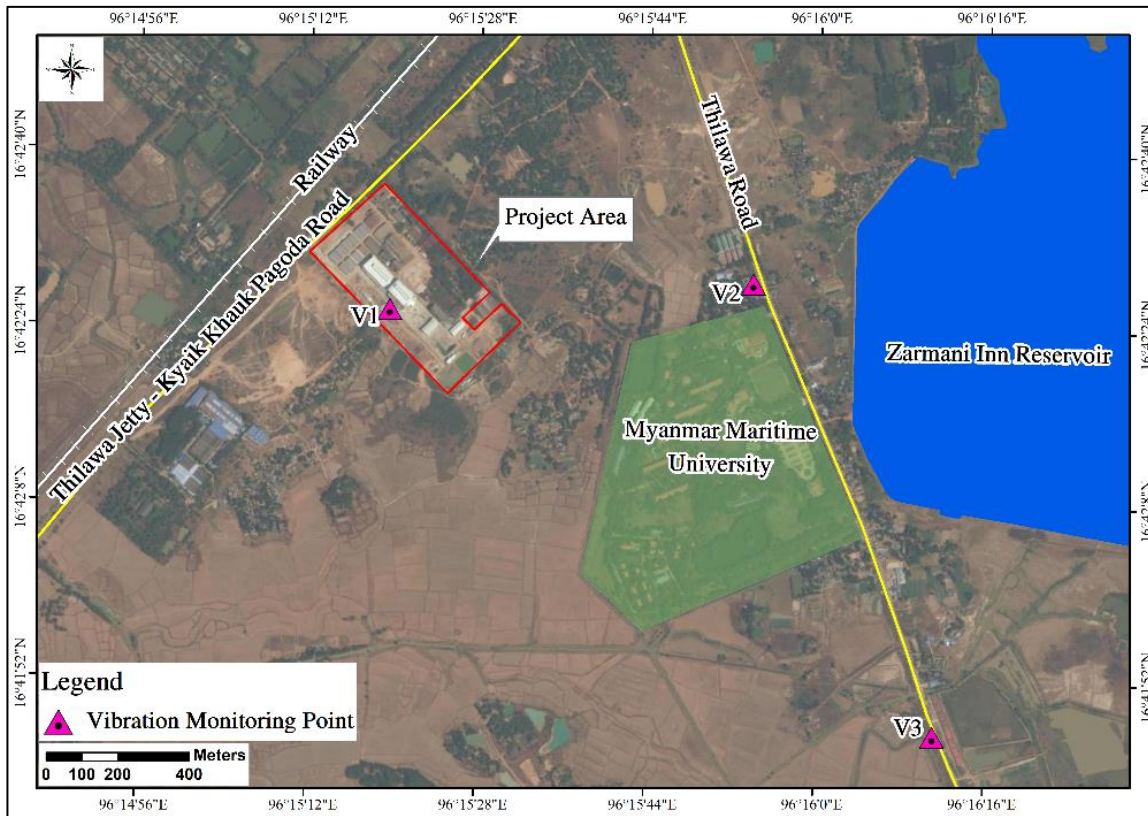


Figure 7-5 Location Map of Planned Vibration Level Monitoring Points

7.7.4. Sub Plan for Noise Level Management

1) Summary of Monitoring Sub Plan

Monitoring Parameter	Day and night time noise level
Methodology	ISO approved noise level measuring meter for noise level monitoring
Monitoring Frequency	Twice a year (dry and wet seasons)
Estimated Annual Budgets	600,000 MMK
Responsibility	Environmental Management Team of the Factory
Relevant Law and Regulation	National Environmental Quality (Emission) Guidelines (2015)
Monitoring Location	Project site-N1: 16°42'23.97"N, 96°15'25.93"E

2) Location

Location map of planned noise level monitoring points are presented in Figure 7-6.

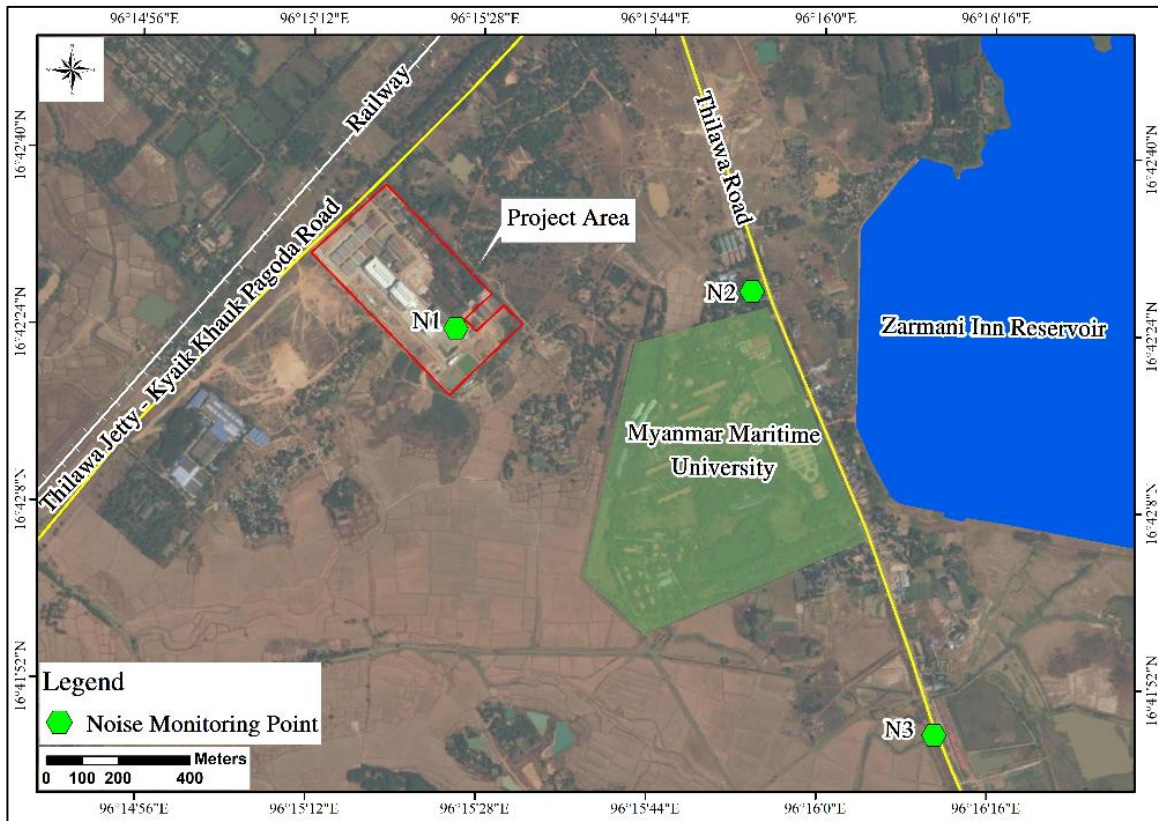


Figure 7-6 Location Map of Planned Noise Level Monitoring Points

7.7.5. Sub Plan for Solid Waste Management

1) Summary of Monitoring Sub Plan

Monitoring Parameter	Regular records on the following parameters Volume of solid wastes from factory Type of solid wastes form factory
Methodology	Direct measure the volume of solid after classifying different types of solid wastes
Monitoring Frequency	Weekly
Estimated Annual Budgets	500,000 MMK
Responsibility	Environmental Management Team of the Factory
Relevant Law and Regulation	Environmental Conservation Law and Rules
Monitoring Location	Temporary solid wastes station within the project site

7.7.6. Sub Plan for Occupational Health and Safety Management

1) Summary of Monitoring Sub Plan

Monitoring Parameter	All accident cases related to the factory Health condition of communities in the factory All sickness related to work in the factory
Methodology	Collect records and evaluate health condition of the communities in the factory to prevent diseases or virous spreading and careless accidents
Monitoring Frequency	Monthly
Estimated Annual Budgets	500,000 MMK
Responsibility	Occupational Health and Safety Team of the factory
Relevant Law and Regulation	Occupational Safety and Health Law (2019) Public Health Law (1972)
Mornitoring Location	Within the project site

7.8. FACTORY MANAGEMENT PLAN

7.8.1. Air Pollution Management

Regarding the air pollution management system, regular monitoring of environmental quality including air quality of the project is also conducted to control emission of the factory. In order to reduce the air pollution especially for greenhouse gas emission, MGE used hydrofluorocarbon-HFC 152a instead of HFC-134a in gas duster or glass bottles cleaning process. HFC 152a has very low global warming potential and zero negative impact to ozone layer compared to its counter parts.

In addition to this, systematic ventilation system is provided for workers at operation area. Large windows, mobile fans and exhaust fans are provided for workers in the factory. It is also provided both N 95 masks for cutting workers to reduce expiratory air flow and qualified masks for all workers to prevent pandemic. The current condition of air pollution management system is shown in Figure 7-7.

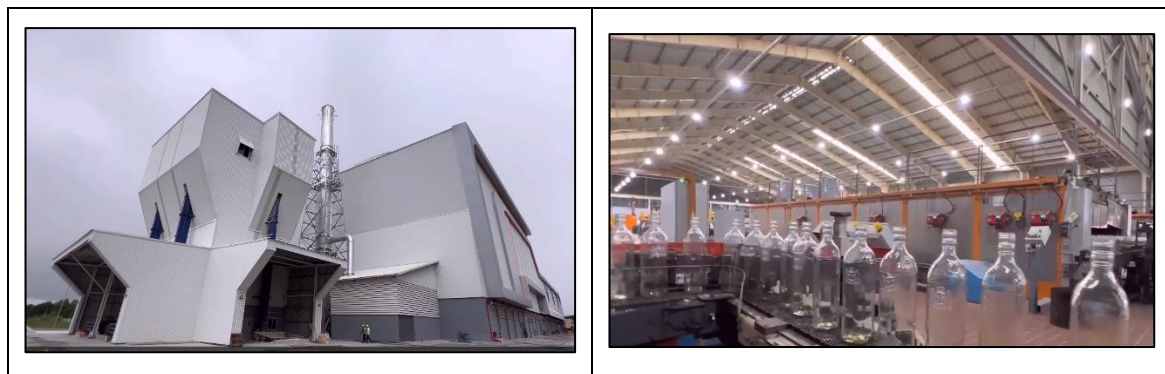


Figure 7-7 Air Pollution Management of the Project

7.8.2. Wastewater management

In factory, three type of wastewater is generated. They are process wastewater from glass bottles manufacturing process, domestic wastewater from factory's toilet and canteen as well as wastewater from general cleaning and surface runoff.

Regarding process wastewater, wastewater from the production process is pre-treated by oil separation system. Then, the pre-treated wastewater is discharged into the sedimentation ponds. At the same time, all wastewater from sedimentation ponds are also used as the recycled water for raw material washing purposes. However, excessive water overflow points are also installed at the sedimentation ponds to control the water level. The process flow diagram of process wastewater treatment system are shown in Figure 3-33.

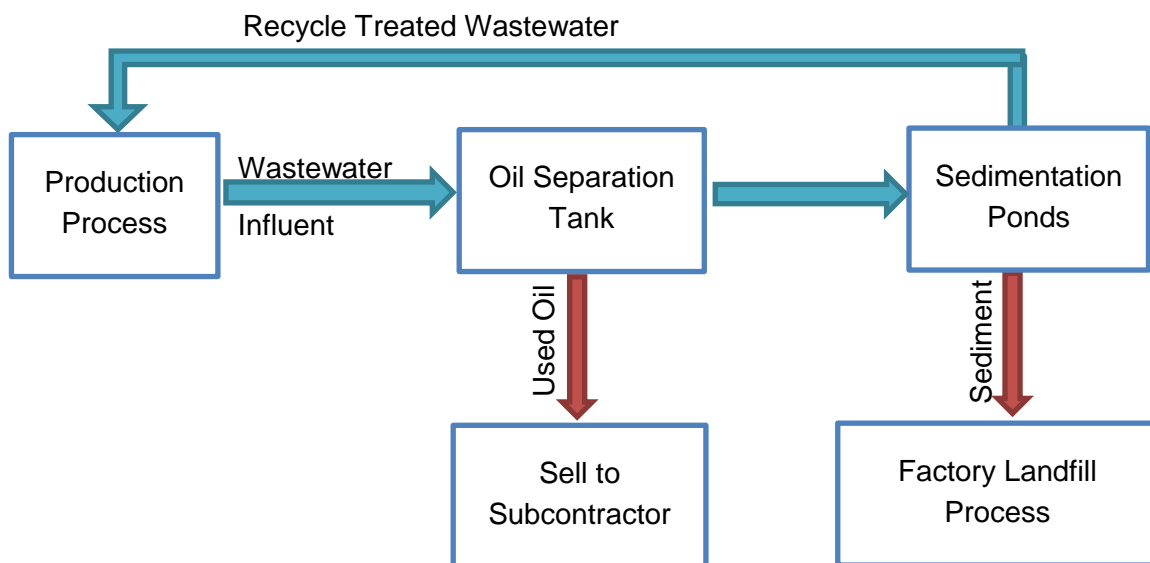


Figure 7-8 Process Flow Diagram of Domestic Wastewater Treatment System

Domestic wastewater from factory's toilet and canteen is treated at underground bio-tank first. After that, effluent from bio-tank is spread forward through the underground drain field pipe while accumulative sludge from bio-tank is collected by municipal vacuum truck regularly. Underground drain field pipe is designed to prevent wastewater from being ingested by animals and to prevent runoff. At the same time, ground water quality from the nearest tube well from the project area is also monitored to control the ground water contamination due to the proposed project. The process flow diagram of domestic wastewater treatment system are shown in Figure 3-33

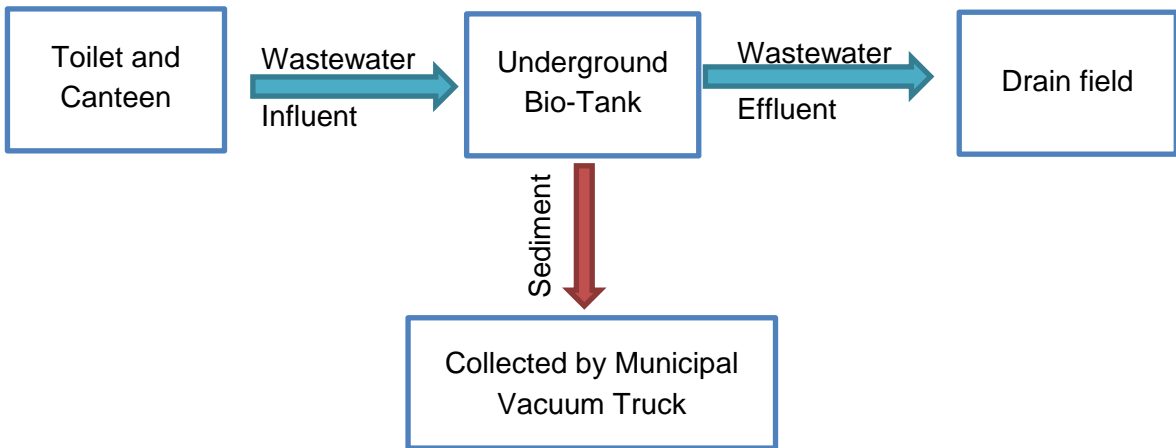


Figure 7-9 Process Flow Diagram of Domestic Wastewater Treatment System

Generally, rain water runoff and the used water from gardening and general cleaning are discharged into the municipal drainage channel via gutter and factory's drainage system. The process flow diagram of used water discharge system are shown in Figure 3-33.

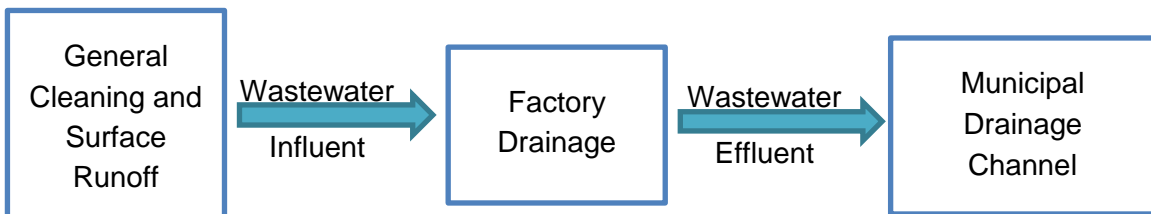


Figure 7-10 Process Flow Diagram of Used Water Discharge System

7.8.3. Noise and Vibration Management System

Most of the production process except hot end process produce insignificant level of noise and vibration. The workers who are likely to be exposed to noise and vibration are provided PPE including gloves, safety shoes, earplugs and subjected to medical examination periodically. The duration and magnitude of exposure to noise and vibration are limited by providing appropriate work schedules with adequate rest periods.

7.8.4. Solid Waste Management System

Firstly, solid wastes from all departments are segregated into four main categories and collected at segregated trust bins. These four categories of solid wastes are as follows.

1. General Waste
2. Recyclable wastes
3. Hazardous wastes
4. Infecious Waste

Photos of segregated waste collection bins of the factory is shown in Figure 7-11. Different waste types and their color coding system of the factory are also described in Table 7-6.



Figure 7-11 Segregated Waste Collection Bins

Table 7-6 Different Waste types and their color coding system of the factory

No.	Waste	Buffer area needed or not	Preparation	Safety alert	Responsible person
1.	Recyclable Waste (Recyclable Waste) 1.Used Can 2.Empty Carton 3.Wooden pallet/Frame 4.Paper layer pad 5. Empty PP rice / malt Bag 6.Chemical Drums	Send to temporary waste disposal area directly	No special preparation	1.Cut resistance gloves 2.Safety shoes	Chemical and Related Substances Management Team
2	Broken glass	Collect with 200 lit Plastic bin at work area	Collect with 200 lit Plastic bin and place on wooden pallet	1.Eye protection 2.Cut resistance gloves 3.Safety shoes	Chemical and Related Substances Management Team
3.	General Waste (Bio/Non-Biodegradable) 1.Used scrap plastic / Paper sheet 2.Used crown and cap 3.Waste label from labeler 4.Used label from bottle washer 5.Ink cartage item 6.General waste	Collect with 200 lit Plastic waste bin at work area	Collect all waste and put inside the plastic bag from 200 lit plastic waste bin	1.Cut resistance gloves 2.Safety shoes	Chemical and Related Substances Management Team
4.	Hazardous waste		All waste container must be sealed prior to any transport.	1.Eye protection 2.Cut resistance gloves 3.Safety shoes 4.Face mask or respiratory protection where required.	Chemical and Related Substances Management Team

5.	Spent grain	No special preparation	-	Contracted supplier	
6.	Waste water sludge	No special preparation	-	Environmental Quality Monitoring Team	
7.	Un-Schedule Waste	Upon received status	-	-	

The temporary waste disposal site especially for both hazardous and non hazardous wastes, is constructed on the reinforce concrete slab in order to prevent the leakage form the waste. It is also provided the proper roof system for all waste storage rooms which are separated to each other by brick walls. One story temporary storage station building is also locked to prevent unnecessary spreading of wastes. There are two numbers of storage rooms for hazardous waste and one wide storage room for general wastes.

The total area of temporary solid waste disposal site is around 1,600 square-foot. The current condition of temporary waste disposal site and a photo of collected wastes are described in Figure 7-12 and Figure 7-11.



Figure 7-12 Temporary Waste Disposal Site for Non Hazardous Wastes



Figure 7-13 Temporary Waste Disposal Site for Hazardous Wastes

7.8.5. Occupational Health and Safety

7.8.5.1. Medical Facilities

Workers can injure due to falling on slippery floors and improper use of machine and tools. Food-borne diseases like diarrhea, food poisoning and seasonal diseases such as influenza (Flu) and dengue fever may be occurred among the workers. The crowded conditions in the factory create ideal conditions for transmission of infectious diseases.

It is also provided the factory clinic. The clinic will have one doctor for working hours and a nurse for 24 hours stand by with rostered shifts. Current condition of factory's clinic photos are provided as shown in Figure 7-14. In addition, clean and healthy facilities such as hygienic eating areas, ventilated working areas, rest places, canteen, and good sanitation facilities for workers will be provided for the workers in the factory. For the production workers, Personal Protective Equipment (PPE) and first aid kits will also be supplied at work place.

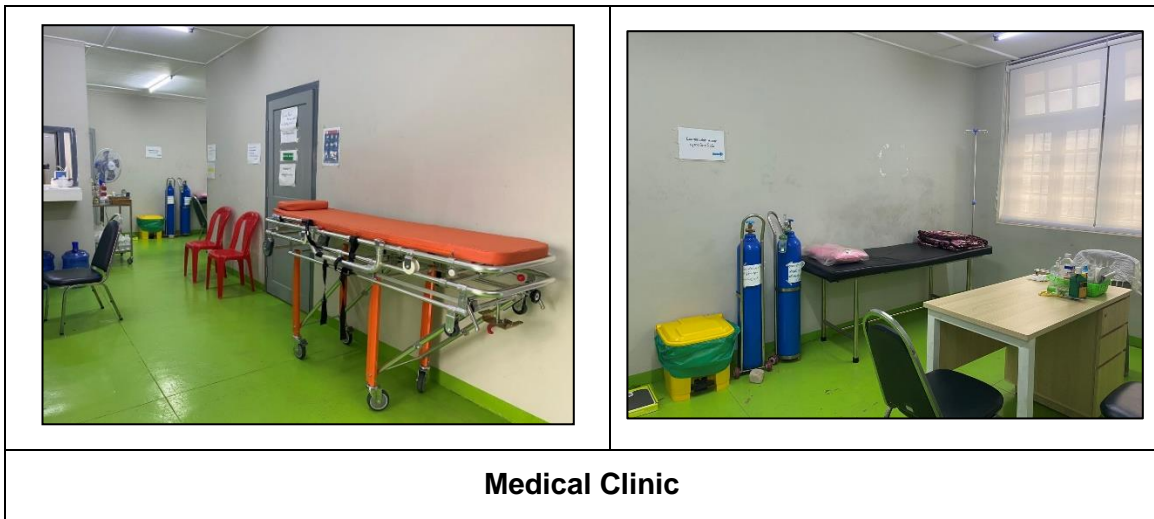


Figure 7-14 Medical Facilities

7.8.5.2. Firefighting Plan

In order to prevent fire, the factory installed fire detectors, alarm systems, sprinkler systems and provision of fire-fighting equipment based on the requirements of Myanmar's fire codes. Safety manager has to arrange fire-fighting training once a year and conduct fire drill monthly. Safety manager has to establish emergency exit ways and muster points in the factory compound with clear marking. In addition, safety manager has to provide access to emergency services of the nearby hospitals and direct communication link with local fire brigades and other relevant government authorities.

Regarding the fire safety plan, MGE will implement the following activities.

- ❖ Install the automatic ceiling water springler system in the factory building.
- ❖ Provide sufficient firefighting equipment around and within the factory to prevent fire in case of emergency. Especially, sufficient amount of fire extinguishers is installed in the factory building according to the instruction from the Fire Department.
- ❖ Construct the common water storage tank for the factory within the project compound.
- ❖ Monitor strictly to follow the defined fire safety rules for all employees. For example, designate the smoking area and make the rules for preventing of fire problems due to misuse of electricity.

The current condition of fire management system of MGE is shown in Figure 7-15.



Figure 7-15 Fire Management System

7.8.6. Emergency Response Plan

The HR Department responsible person may control the emergency response plan, which will be a part of the factory Occupational Health, Safety and Environmental program (OHSE). Factory emergency response plan will include the following facts:

- Fully equipped first aid facilities
- Fire-fighting equipment
- Access to emergency services of the nearby hospital
- Direct communication link with industrial or township fire brigades and other relevant government authorities
- Training all staff for workplace safety.

Health and environmental management also play a major role in emergency response plan. In each floor of the building, emergency exits, fire extinguishers, fire hydrants, emergency alarms and medical kits are provided.

Under the emergency response plan, it is also provided emergency contact list. In which, the list of people to contact in the event of emergency, phone numbers of responsible person and responsible organization will be included. The emergency contact list of the factory is shown in Table 7-7. In addition, the emergency contact numbers display boards which include ambulance contact, NGOs, fire department, hospital, general administration department and industrial zone committee are placed at the place that is visible to the public.

Table 7-7 Emergency Contact List of the Factory

No.	Name	Responsible Team
1	Mr.Edmundo F. Alvarez	HSE Manager
2	Mr. Lwin Ko	Public Relations Team Leader
3	Mr.Zarni Min Zaw	Emergency Response Team Leader

7.8.7. Disaster Management Plan

The assembly points will be identified well in advance before encountering any disasters. These points will be in big open spaces as the workers will be displaced for a short term. During the disaster, the necessary arrangement will be provided such as water, first aid, food, lighting, etc.

7.8.8. Training Programs

MGE provides awareness trainings, firefighting training and occupational safety & emergency first aid training to the workers annually. The examples of firefighting training and occupational safety and emergency first aid training achieved by the workers are shown in Figure 7-16.



Figure 7-16 Examples of Occupational Safety and Emergency First Aid Training

7.9. RECORDING AND REPORTING

Keeping records and reporting are important management tools for ensuring sustainable operation.

There will be two types of monitoring reports after environmental monitoring and site inspection. The first type is for internal use to provide feedback to the Environmental Management system. Finally, annual review should be prepared and an environmental monitoring report should be submitted to the MONREC/ECD every 6 month under the EIA Procedure (2015).

7.9.1. Internal Monitoring and Inspection Report

The EMP responsible cell members may conduct daily, weekly or monthly general inspections of the project area and facilities. The objectives are to identify non-compliances to EMP.

7.9.2. Incident, Accident and Emergency Report

In cases of incident and accident, prompt reporting has been carried out. This must be in the form of verbal reporting followed by written statement, after emergency and contingency procedures have been undertaken. The written statement should be more comprehensive and should be included the location and cause of accident, the time, extent and intensity and how actions for emergency and contingency procedures taken. Reporting on incidents may not be necessary; it is actually the duty of the security staff to take action.

7.9.3. Reporting on Training Program

There must be a regular monitoring and inspection of all training programs provided such as firefighting training, first aid training and training for quick response and preparedness such as drills and mock drills.

EMP cell members conducting monitoring and inspection works must be able to interpret and assess the overall condition of the training processes especially assessment of the effectiveness and applicability of each training.

A report on the training program including assessment on its effectiveness must submit at the end of each training program.

7.9.4. EMP for Good Working Practices and Good Safety Practices

The factory shall follow, as practical as possible environmental health and safety standard and guidelines. The factory has own program for capacity building and training covering good working practices and good safety practices. The factory shall also follow EHS guidelines and international standards for the ecofriendly operation of the factory as already mentioned earlier.

7.10. GRIEVANCE REDRESS MECHANISM

The purpose of a Grievance Redress Mechanism (GRM) is to provide a forum to the internal and external stakeholders to voice their concerns, queries and issues with MGE project. Grievance mechanism would provide the stakeholders with project personnel or channel through which their queries will be channeled as well as ensure timely responses to each query. The main objectives of the GRM are as follows:

- To allow stakeholders the opportunity to raise comments/concerns;
- To structure and manage the handling of comments, responses and grievances, and allow monitoring of the effectiveness of the mechanism; and
- To ensure that comments, responses, and grievances are handled in a fair and transparent manner, in line with the applicable reference framework.

Grievance Redress Committee (GRC) will be established for MGE development and operation. Structure of GRC will include various levels to assure accessibility for PAPs. GRC will include following representatives.

- Representative of MGE
- Public relation manager assigned by MGE
- Government administrative department
- Social welfare officer
- Community leader
- Women representative
- Member of a recognized non-governmental organization

Representatives from Townships and from Complainants' wards will be called to participate in the GRC meetings for review of cases pertaining to their jurisdictions. Depending on the type of complaint, GRC may also ask representatives of the relevant technical department to be present for the meeting.

Additionally, complainants or their representatives will be informed in advance of the review meeting and requested to be present, or send their representatives, for the same.

7.10.1.1. Grievance Redress Procedure

Consultation and participation of the PAPs should serve to minimize the occurrence of major grievances. The PAP may request the village leader or the independent monitoring agency (NGO or university) to assist in processing his complaint. Project staff will make efforts to address all complaints on site as they arise to preclude their elevation to higher level.

There are different options to raise grievance such as:

- Option 1: Filling the grievance form and submit to mailbox which is located in front of the factory
- Option 2: Email to the provided address
- Option 3: Direct call to contact number
- Option 4: Social Media

However, in order to ensure that the affected people have avenues for redressing their grievances, a three stepped procedure has been established for the Project.

- (1) As a first step, all complaints and grievances by the PAPs would be addressed through consultation and in participatory manner at the first instance they are brought to the notice of ward head or township administration. The ward head or township administration, in consultation with the project staff, will try to address complaints within 15 days.
- (2) If the complaint is not resolved within 15 days from the date it is brought to the ward head or township administration or if the PAPs is not satisfied with the response, he/she can bring the complaints to the head of the MGE. The head of MGE will address the complaint in 15 days from the time it is received.
- (3) However, if the complaint is not resolved within 15 days from the date it is brought to the head of the MGE or if the PAPs is not satisfied with the response, he/she can bring the complaints to the notice of the GRC. The GRC will address the grievances within 3 weeks from the date they are received.

In case the grievances could not be resolved at the GRC level within 3 weeks from the date they are brought to its notice, or if the PAP is not satisfied with the decision of the GRC he or she can seek legal recourse in the court of law at any time on their own will.

The GRC and the procedures for resolving complaints and grievances will be made public through an effective public information campaign. The grievance redress procedure shall also be explained in the project's Public Information Booklet.

One of its roles and responsibilities of the ward heads, township administration and GRC is to ensure that any queries, or concerns made by the affected households and local communities are properly heard, logged (regardless of whether it was lodged verbally or in writing), and resolved in a transparent and timely manner. Complaints received at the ward and township levels will be documented and conveyed to the GRC in their monthly reports for their information. Documentation of grievances and complaints at the township administration level will record the date they are received, action taken to resolve the complaint with date, and how and when the decision is conveyed to the complainant.

GRC will set up a database to manage and monitor grievances which will show name and contact details of the complainant, date and nature of complaint, any follow up actions, resolutions and how and where resolutions were communicated to the complainant, and status of actions.

This set-up aims to address any concerns promptly, effectively, and transparently and at no cost and retribution, to the affected households. All costs incurred in grievance resolution will be covered out of the project funds.

The MGE will provide the necessary training and guidance in setting up the GRC and grievance mechanism to GRC members. The formalized GRC composition with clear roles and responsibilities; procedure and process will be reflected in the Implementation Plan. Grievance redress flowchart is shown in Figure 7-17.

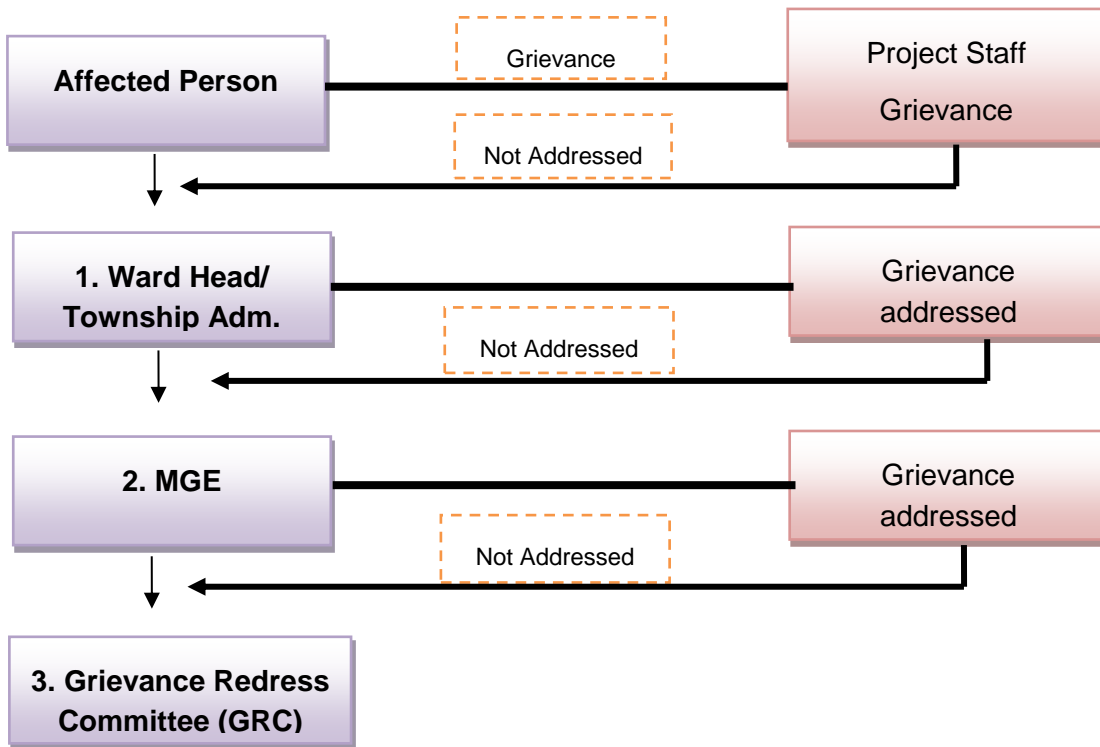


Figure 7-17 Grievance Redress Flowchart

Main contact personnel for Grievance Redress

Myanmar Golden Eagle Co., Ltd.

Mr. Kyaw Kyaw Sein

Managing Director

Phone: 09-30926608

Email: info@myanmarglass.com

7.11. CORPORATE SOCIAL RESPONSIBILITY PROGRAM

The purposes of implementing CSR program are to develop good relations between the public and project proponents as well as to promote high standard of living near the project area. MGE will provide CSR fund which is (2%) of the net profit to following sections. The detailed contribution for CSR fund is shown in Table 7-8.

Table 7-8 CSR Fund Contribution

No	Partial	Contribution%
1.	Education	0.5%
2.	Health	1%
3.	Regional Development	0.5%

7.11.1. CSR Implementation Team

There are three main components in the CSR Implementation Team. They are financial support team, management team and CSR program implementation team members. Propose CSR Implementation Team Structure is shown in Figure 7-18.

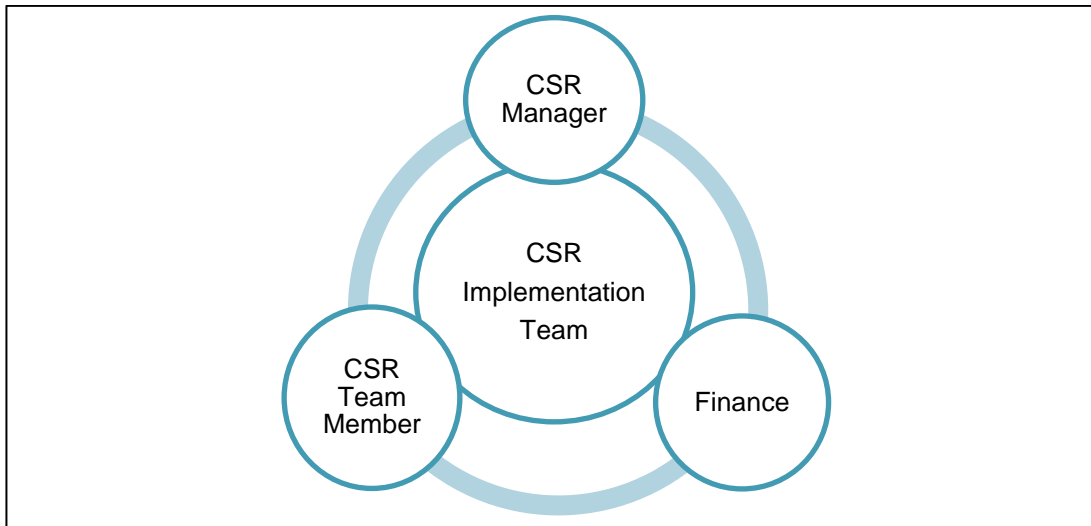


Figure 7-18 Propose CSR Implementation Team

7.11.1.1. CSR Manager

To become more efficient and affective CRS program, CSR Manager is required. The manager can be arranging the CSR program and can suggest to donate in required places. He may be checked out the amount of using CSR fund that the factory really follows as their commitment.

7.11.1.2. Finance

Finance department require to management the fund of CSR.

7.11.1.3. CSR Team Member

All employees from the factory can be the member of CSR Team. Members can be participated in every CSR activity and can give advices to improve CSR activities. CSR Program of the Proposed Project is shown in Table 7-9.

Table 7-9 CSR Program of the Proposed Project

Item	Activities	Expected Budget	Objectives
Health	<ul style="list-style-type: none"> • Providing medical supplyment for staff and their families • Providing the employees' health examination • To support the protection of the environment as well as from the fire around the Factory 	1 %	To ensure that workers working in the workplace and their families are in good health
Education	<ul style="list-style-type: none"> • Promoting the awareness of education and human right • Providing educational grand for the employee's children 	0.5 %	To become a better society To improve the education level of the workers' families To develop the skill of the employees

	<ul style="list-style-type: none"> • Providing the support in education sector around the project area 		
Regional Development	<ul style="list-style-type: none"> • Doing donation clothes and money to local organizations and poor people nearby project area 	0.5 %	<p>To enable local charitable organizations to operate well,</p> <p>To enable employees to cooperate actively in the common work that is being done in the region,</p> <p>To avoid and understand human rights among workers</p> <p>To prevent sexual harassment and oppression in the workplaces</p>

7.12. PENALTIES

If the factory is not complied or not carried out the Environmental Monitoring Program or emission parameters are exceeding the standard of NEQG (2015), WB and IFC Guideline, the factory will get penalties according to EIA Procedure (2015). Penalties and punishment that stated in EIA Procedure (2015) are described in below Table 7-10.

Table 7-10 Penalties and Punishment According to Myanmar Environmental Impact Assessment Procedure

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

No.	Non-Compliance	Penalties	Specific Administrative Punishment of the Ministry
6.	Operating/implementing without a permit, or approval by the Ministry of an EMP or EMP-OP	1,000 to 5,000 US\$ or equivalent Myanmar Kyat + 50 to 500 US\$ / day until cured or equivalent Myanmar Kyat	Criminal prosecution
7.	Non-compliance with an Enforcement Notice or Suspension Notice issued by the Ministry	2,000 to 10,000 US\$ or equivalent Myanmar Kyat + 100-500 US\$ / day until cured or equivalent Myanmar Kyat	Suspension of Approval of EMP, EMP-CP or EMP-OP in whole or in part – Revocation of Approval of EMP, EMP-CP or EMP-OP in whole or in part
8.	Failure to notify to the Ministry of any knowledge of any event of an imminent threat of environmental damage	1,000 to 5,000 US\$ or equivalent Myanmar Kyat	Issue Enforcement Notice – Suspension of Approval of EMP, EMP-CP or EMP-OP in whole or in part – Revocation of Approval of EMP, EMP-CP or EMP-OP in whole or in part
9.	Failure to take reasonable steps to prevent an imminent threat of damage to the environment, social, human health, livelihoods, or property, where applicable based on the EMP, EMP-CP or EMP-OP	2,500 to 10,000 US\$ or equivalent Myanmar Kyat	Issue Enforcement Notice – Suspension of Approval of EMP, EMP-CP or EMP-OP in whole or in part – Revocation of Approval of EMP, EMP-CP or EMP-OP in whole or in part
10.	Failure to comply with conditions in the ECC and allowable Emission Limit Values	1,000 to 10,000 US\$ or equivalent Myanmar Kyat	Issue Enforcement Notice – Suspension of Approval of EMP, EMP-CP or EMP-OP in whole or in part – Revocation of Approval of EMP, EMP-CP or EMP-OP in whole or in part
11.	Failure to pay compensation amounts required in respect of social impacts	1,000 to 10,000 US\$ or equivalent Myanmar Kyat	Issue Enforcement Notice – Suspension of Approval of EMP, EMP-CP or EMP-OP in whole or in part – Revocation of Approval of EMP, EMP-CP or EMP-OP in whole or in part
12.	Failure to fully restore social conditions upon resettlement	1,000 to 10,000 US\$ or equivalent Myanmar Kyat	Issue Enforcement Notice – Suspension of Approval of EMP, EMP-CP or EMP-OP in whole or in part – Revocation of Approval of EMP, EMP-CP or EMP-OP in whole or in part

Notes: 1. All penalty amounts set forth in this Annex are denominated in United States Dollars (US\$) and are subject to annual inflation adjustment

2. Abbreviations are as follows:

EMP = Environmental Management Plan

EMP-CP = Environmental Management Plan - Construction Phase

EMP-OP = Environmental Management Plan - Operation Phase

7.13. OVERALL BUDGET FOR IMPLEMENTATION OF THE EMP

The budget for EMP fund will cover the initial cost and recurring expenses for implementation of EMP. Table 7-11 shows annual budget allocation for proposed environmental, health and safety management plan.

Table 7-11 Overall Budget for Implementation of the EMP

No	Proposed EMP	Estimated Annual Budget (MMK)
Environmental Works		
1	Environmental mitigation measures	5,500,000
2	Environmental monitoring program during construction/ decommissioning phase	2,800,000
3	Environmental monitoring program during operation phase	5,600,000
4	Capacity building and training	1,000,000
5	Emergency case	1,000,000
Health and Safety Works		
6	Personal protective equipment	700,000
7	Medical for clinic and other medical facilities	1,000,000
8	Fire Fighting Equipment	1,000,000
Training Program to the Workers		
9	Firefighting Training	500,000
10	Occupational Safety and Emergency First Aid Training	500,000

CHAPTER 8

PUBLIC CONSULTATION AND DISCLOSURE

This chapter presents results of public consultation conducted in scoping stage, and plans for future public consultation and information disclosures during the remaining period of the EIA. This chapter is prepared based on the suggestions in EIA Procedure (29th December 2015). During the public consultation, Myanmar Golden Eagle Co., Ltd (MGE) and TBS (consultant) presented the project background, operation processes, environmental conditions, summary of impacts assessment and proposed mitigation measures. Suggestions and comments from the regulators, authorities and stakeholders were collected in the report. The public consultation held at 21st August, 2023 at Myanmar Golden Eagle Factory. The details of the public consultation presented below and summary table of attendance sheets, photos of participants and presentation slide are included in **APPENDIX M**.

8.1. OBJECTIVE OF PUBLIC CONSULTATION

Public consultation meeting is regarded as a necessary part of the EIA study. MGE and its consultants have to organize a public consultation meeting among regulators, local community, local authority and other relevant organizations on the project development and plans. As a part of requirement, MGE publicized about the project developments to the concerned stakeholders as follows;

- Information of the stakeholders about the project, environmental and social issues related to project operation, and mitigation measures to minimize environmental and social impacts.
- Considering 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.
- Participation and partnership where issues are needed to join for discussing and assess.

8.2. APPROACH TO PUBLIC MEETING

The approach to the public meeting was adopted as below:

- TBS coordinated with MGE to inform and consult about the date and venue of the public consultation meeting.
- TBS prepared and issued the invitation letter for the public consultation meeting.
- MGE sent the invitation letter to the relevant government sectors, identified stakeholders and nearby factories from 14th to 19th August, 2023.
- Informed to all of the concerned stakeholders 7 days prior to EIA study of public consultation meeting.
- The Power Point presentation of MGE Glass Bottles manufacturing factory are presented and written in Myanmar language. Further elaboration are focused on environmental monitoring and mitigation measures.
- The meeting was opened for discussion of MGE and TBS consultants were responsible for answering questions from the participants and addressing public concern raised in the meeting regarding the project development plan.

- Public Consultation for EIA report was conducted on 21st August, 2023 by following the EIA procedure. The methodology and approach of public consultation meeting is presented below.

8.3. PUBLIC ANNOUNCE

Regarding the public announcement, all the information related to the public consultation and public disclosure of the proposed EIA project is announced on the official notice board of the MGE and Township General Administration Office. In addition to this, MGE sent the invitation letter to the relevant government sectors, identified stakeholders and nearby factories one week before the PCM. Currently, MGE is developing a private website and it is also planned to launch the full EIA scoping report to the public through company website in order to collect the suggestions and comments from all stakeholders. Photos related to PCM invitation activities, invitation received form and invitation letters are described in Appendix M.

8.4. SUMMARY OF PUBLIC CONSULTATION

Public consultation conducted on 21st August, 2023 at MGE factory from 10:00 AM to 11:45 AM. The participants in the public consultation were the project proponent, TBS (consultant performing the EIA study), Environmental Conservation Department, Directorate of Industrial Supervision and Inspection, Social Security Board, Township Development Committee, General Administration Office and local people. Agenda of the public consultation meeting is shown in Table 8-1.

Table 8-1 Agenda of the Public Consultation Meeting

No	Activity	Time
1	Registration	9:30AM-10:00AM
2	Opening Speech from MGE	10:00AM-10:10AM
3	Power Point Presentation of Project description and summary of the company profile	10:10AM-10:40AM
4	Power Point Presentation of existing environmental conditions, potential impacts, mitigation measures and environmental management plan	10:40AM-11:20AM
5	Glass bottle production process video	11:20AM-11:30AM
6	Discussion time – comments and suggestion by the concerned stakeholders	11:30AM-11:45AM

Public consultation was started with the presentation about the project, followed by questions, answers and discussion. Ms. Aye Mon Aung from TBS performed as a master of ceremonies (MC) at public consultation. The opening speech was introduced by Mr. Edmundo F. Alvorez (General Manager) of MGE Co., Ltd. Then, Ms Phoo Pwint Khine (Environmental Manager) and Ms. Thinzar Htun (Environmental Scientist) from TBS gave the presentation for the project. Ms. Phoo Pwint Khine explained about the summary of the MGE company profile and the potential impact assessment. She presented the glass bottle production process, impact assessment methods and the results to the audiences for the better understanding of the production process and its management. Afterwards, Ms.

Thinzar Htun explained about the mitigation measures, monitoring plan and project's CSR plan.

At the end of presentation section, the discussion continued with questions and answers section. The details of the meeting including the meeting time, date, name of participants who attended the meeting are shown in Table 8-2. The attended sheet of the meeting, photos of participants and power point presentation slides are also attached in **APPENDIX M**.

Table 8-2 Meeting Context

Meeting Date	21st August, 2023		
Meeting Time	10:00 AM – 11:45 AM		
Place	MGE Factory		
Government authorities (Total of 16 People)			
No.	Name	Position	Organization
1.	Mr. Myo Zaw Win	Assistant Director	Environmental Conservation Department
2.	Mr. Thant Htoo Aung	Deputy Staff Officer	Environmental Conservation Department
3.	Ms. Wai Wai Lwin	Health Assistant -1	Township Public Health Department, Thalyin
4.	Mr. Ye Naing Htun	Health Assistant	Pha Yar Kone Village Health Department
5.	Mr. Aung Myo Htun	Staff Officer	District Fire Service Department
6.	Mr. Ye Htut Aung	Sergeant	District Fire Service Department
7.	Ms. Thin Thiri	Assistant Director	Directorate of Industrial Supervision and Inspection
8.	Ms. Si Si Win	Assistant Supervisor	Directorate of Industrial Supervision and Inspection
9.	Mr. Bhone Kyaw Thu	Village Administrator	Pha Yar Kone Village
10.	Ms. Kyi Hlaing	Staff Officer	Social Security Board
11.	Ms. Min Min Swe	Deputy Staff Officer	Social Security Board
12.	Mr. Akar Htun	Deputy Township Officer	General Administration Office
13.	Mr. Khin Maung Win	Assistant Engineer	Township Development Committee, Thanlyin Township
14.	Mr. Zaw Thu	Deputy Staff Officer	Township Development Committee, Thanlyin Township
15.	Mr. Htun Wai	100 Houses Group Elder	A Lwan Sut Village
16.	Mr. Moe Thint	100 Houses Group Elder	Phayar Gone Village
Local Residents (Total of 17 Persons)			
1.	Mr. Khin Maung Than	Villager	Phayar Gone Village
2.	Mr. Thein Oo		
3.	Mr. San Maung		

4.	Mr. Than Oo		
5.	Ms. Lai Lai Win		
6.	Ms. Ei Ei Chaw		
7.	Ms.Sa Pa Win	Villager	Aung Chan Thar Village
8.	Ms. Myint Aye	Villager	Aye Thit Sar Township
9.	Ms. Swe Mar Aung		
10.	Mr. Kyaine Bo	Villager	A Lwan Sut Village
11.	Mr. Myint Lwin		
12.	Mr. Khin Htwe		
13.	Mr. Wai Lynn		
14.	Mr. Wai Naing		
15.	Mr. Aung Naing Win		
16.	Ms. Thaingi Win	Villager	Pan Chat Compound
17.	Ms. Win Myint		
Other Stakeholders (Total of 13 Persons)			
1.	Mr. Edmundo F. Alvorez	General Manager	MGE
2.	Mr.Piboon Khemthong	Plant Manager	
3.	Ms. Lwin Ko	Project Coordinator	
4.	Mr. Aung Kyaw Moe	Admin Manager	
5.	Mr. Zaw Myint Than	SHE Executive	
6.	Ms. Kyar Nyo Thin Pyunt	Translator	
7.	Mr. Htet Thiha Hpone Myint	Project Manager	TBS
8.	Mr. Wai Phyo Aung	Surveyor Manager	
9.	Mr. Zaw Myo Hein	Environmental Geologist	
10.	Ms. Phoo Pwint Khine	Environmental Manager	
11.	Ms. Aye Mon Aung	Environmental Engineer	
12.	Ms. Thinzar Htun	Environmental Scientist	
13.	Mr. Min Aung	Factory Head	Silicate Factory

8.5. DISCUSSING AND FEEDBACKS RECEIVED FROM MEETING

After the presentation, discussion section was started for questions and answers. Most of questions were about project planning and environmental issues. Photos of PCM activities are shown in Figure 8-1 and Figure 8-2. **Error! Reference source not found.** shows all detailed discussion and feedbacks received from public consultation meeting.





Figure 8-1 Photos of PCM Activities





Figure 8-2 Photos of Participants from PCM Activities

Table 8-3 Discussion and Feedbacks received from Meeting

No.	Discussion/Feedbacks	Photo
1.	<p>Discussion Section By Mr. Htun Wai (100 Houses Group Elder) A Lwan Sut Village</p> <ul style="list-style-type: none"> This is my first time and any observation about project was carried out before the public consultation meeting. Therefore, I will discuss later with the related stakeholders. 	 <p>Mr. Htun Wai (100 Houses Group Elder, A Lwan Sut Village)</p>
2.	<p>Discussion Section By Mr. Moe Tint (100 Houses Group Elder) Phayar Gone Village</p> <ul style="list-style-type: none"> There are three farmers around the project site doing agricultural activities for a living. In last rainy season, the adjacent one acre agricultural lands were ruined by the wastewater discharged from the factory drainage pipe. This pipe line is located outside of the factory and its length is about 20 feet. However, there is no problem in this rainy season since the waterway was conducted by the farmer not to enter their agriculture land. 	 <p>Mr. Moe Tint (100 Houses Group Elder, Phayar Gone Village)</p>

<p>Answer By Mr. Aung Kyaw Moe (Admin Manager) Myanmar Golden Eagle. Co.,Ltd.</p> <ul style="list-style-type: none">• In factory, the wastewater is not discharged to the surrounding environment and reused within the operation process by passing through two sedimentation ponds constructed in the west of the factory.• The wastewater is mainly produced from the cooling stage and it does not contain any hazardous chemical.• As the factory, the quantity of recycled wastewater from two sedimentation ponds is not sufficient to be used in operation processes so that the surface water from Zarmani Inn Water Dam is reserved.• Therefore, the spillage of water from sedimentation ponds in rainy season may be the potential causes of this case.• Another thing is that the proposed factory was rented from the old glass factory and it started to run the preoperation stage in May, 2022. Therefore, as the proposed factory no wastewater will be discharged in the last rainy season; the early stage of operation.• As the proposed factory, all discussions are recorded and the factory's drainage system will be checked up to carry out the necessary maintenance activities if needed.	 <p>Mr. Aung Kyaw Moe (Admin Manager, MGE)</p>
<p>Answer By Ms. Phoo Pwint Khine (Environmental Manager) Total Business Solution</p> <ul style="list-style-type: none">• As the environmental consultating team, the water quality monitorings will be regularly conducted.• Regarding the wastewater discharge, the possible causes (spillage of wastewater from sedimentation in rainy season or having the wastewater discharge point) will be carefully considered and the effective management actions will be identified by discussing with the project proponents and surrounding residents.	 <p>Ms. Phoo Pwint Khine (Environmental Manager, TBS)</p>

<p>3.</p>	<p>Discussion Section By Mr. Myo Zaw Win (Assistant Director) Environmental Conservation Department</p> <ul style="list-style-type: none"> • This EIA report is conducted after finishing the scoping report and all the contents presented in the discussion are complete. • In consideration of impacts, the internal and external impacts are needed to be considered. • If some errors occur within the operation of 1,500°C furnace, the potential impact can cause not only within the factory but also the external environment. Therefore, it is important to perform the emergency response plan. • As the two fuels; LPG and diesel are used and stored in the proposed factory, the detailed of fuel storage description and plan are needed to be conducted. • Although the proposed factory was rented from the old glass factory, the summary of preconstruction and construction stage are required to be described in line with EIA procedure, Article 63 (H). • Regarding the water source, the water usage of project is 900 cubic meter per day and it receives from Zarmani Inn Water Dam. Therefore, one considerable thing is that the Zarmani Inn can supply the sufficient water amount to the project in dry seasons or cannot. • In the south of the project, Thilawa Dam and in southeast, Magway Gone Dam are located. Therefore, it is needed to know the sea level of the project in order to determine the final storage site of project wastewater. • To know the impact on surface water, it is needed to monitor the surface water quality from Zarmani Inn. • A Lwan Sut Village is located between the project site and Thilawa Special Economic Zone (A) and it can be recognized the potential for impacts. Therefore, the groundwater quality of A Lwan Sut Village should monitor. • Flood management plan, earthquake management plan, emergency response management plan and machines maintenance plan should be managed and performed within the factory 	 <p>Mr. Myo Zaw Win (Assistant Director, ECD)</p>
	<p>Answer By Ms. Phoo Pwint Khine (Environmental Manager) Total Business Solution</p> <ul style="list-style-type: none"> • All discussion will be considered and included in developing of EIA report. 	

<p>4.</p>	<p>Discussion Section By Mr. Thant Htoo Aung (Deputy Staff Officer) Environmental Conservation Department</p> <ul style="list-style-type: none"> • In EIA report, the commitment section is required to included and the project proponent makes the signature after reviewing the management plans described in the EIA report. • As the project site is not located within the Thilawa Special Economic Zone, the noise level should be compared with the standards for residential area. • The chemical storage system and MSDS should be included in the EIA report since the proposed project use the chemical in operation phase. • Moreover, the occupational health and safety plan and Grievance Redress Mechanism should be carefully carried out within the factory. 	 <p>Mr. Thant Htoo Aung (Deputy Staff Officer, ECD)</p>
	<p>Answer By Ms. Phoo Pwint Khine (Environmental Manager) Total Business Solution All discussion will be considered and included in developing of EIA report.</p>	

Total 46 participants attended the public consultation followed by describing in percentage, 28 % which represented the government authorities, 37 % which represented local residents and 35 % which represented the other stakeholders as shown in Table 8-4.

Table 8-4 Percentage of Participants and Attendance of Public Consultation

Community	Number of participants	Total percentage
Government authorities	13	28%
Local Residents	17	37%
Other Stakeholders	16	35%
Total	46	100 %

8.6. ACTION TAKEN BY FACTORY AND FUTURE PLANS

Proposed project will take the action for most of the suggestions and comments from the public consultation meeting. Moreover, all the mitigation measures described earlier will duly implement by the factory.

CHAPTER 9

CONCLUSION AND RECOMMENDATION

9.1. CONCLUSIONS

This EIA report has provided an assessment of the potential environmental, social and health impact associated with the construction, operation and decommissioning phases of the proposed project. The EIA study was prepared according to the ToR from approval scoping report, suggestions and comments from scoping stage PCM, basis of the project information, relevant information from various sources, surveys of environmental and socio-economic setting of the project area, rounds of consultations with stakeholders in the government sector and communities in and around the vicinity of the project site, and experiences of the consultant in technical and environmental aspects of construction Projects. According to the overall analysis and impact examination of the report, the following major factors are concluded as follows;

- ❖ Regarding to environmental baseline studies, air, water, vibration and noise level were measured within and around the project area especially for the area of influence. According to the insitu and laboratory experimental results of water quality measurement, the values of wastewater parameters for both production process and general cleaning activities are within NEQEG (2015). In addition, in order to examine the impact on ground water quality, water sample is collected from the nearby tube well and the results are also within the acceptable limit of the standard guideline. For the vibration results, it was compared with German Standard from Din 4150-3 and there is no exceed of vibration level for both inside and outside of the project. Regarding air quality results including project site and around the project areas are within the NEQEG (2015) while that of noise levels measuring results for both daytime and nighttime, were exceed the NEQEQ 2015. However, all the necessary mitigation measures and EMP are conducted to control and manage the environmental pollution.
- ❖ For the living environment, the major impact on the environmental will be controlled or take mitigation measures around the project site. Although the key environmental issues such as generation air pollutants, noise and vibration, deterioration of water quality and road traffic can cause during construction, operation and decommissioning phases, the significant of the impacts on the living environment will be low. In addition, the appropriate mitigation measures, environmental management plan and environmental monitoring plan will be properly implemented. For the social environment, there will be positive impacts on local economy due to getting job opportunities and necessary materials and equipment may be purchased from local shops.
- ❖ In order to control and maintain the environmental pollution, not only the proper EMP but also environmental monitoring on air quality, water quality, solid waste, occupational health and safety, noise and vibration will be performed and the monitoring reports will be submitted to the Ministry every six month.

9.2. RECOMMENDATIONS

This EIA study has clearly identified the environmental and social issues, mitigation measures and monitoring plan. It is recommended that the project proponent must implement and follow all the mitigation measures, management plan and monitoring plan described in this report in complies with the EIA Procedures (2015). In addition, the project proponent must continuously follow the requirements of the environmental guidelines, applying mitigation measures to ensure the compliance with the legal requirements and other relevant recommended criteria.

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APPENDIX A

MGE Company Certificates and Licenses



ကုမ္ပဏီမှတ်ပုံတင်လက်မှတ်
Certificate of Incorporation

မြန်မာ ရွှေလင်းယုန် ကုမ္ပဏီ လီမိတက်
MYANMAR GOLDEN EAGLE COMPANY LIMITED
Company Registration No. 110074506

မြန်မာနိုင်ငံကုမ္ပဏီများအက်ဥပဒေ ၁၉၁၄ ခုနှစ် အရ
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အဖြစ် ဖွဲ့စည်းမှတ်ပုံတင်ခွင့် ပြုလိုက်သည်။

This is to certify that
MYANMAR GOLDEN EAGLE COMPANY LIMITED
was incorporated under the Myanmar Companies Act 1914 on 2 June
2016 as a Private Company Limited by Shares.

ကုမ္ပဏီမှတ်ပုံတင်အရာရှိ
Registrar of Companies

ရင်းနှီးမြှုပ်နှံမှုနှင့်ကုမ္ပဏီများညွှန်ကြားမှုဦးစီးဌာန
Directorate of Investment and Company Administration



Former Registration No. 710/2016-2017(YGN)



**တိုင်းဒေသကြီးညွှန်ကြားရေးမှူးရုံး
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ရက်စွဲ၊ ၂၀၂၃ ခုနှစ်၊ မတ်လ ၂၄ ရက်

သို့

မန်နေဂျင်းဒါရိုက်တာ

Myanmar Golden Eagle Co., Ltd.

အကြောင်းအရာ။ Myanmar Golden Eagle Co., Ltd. မှ ဖန်ပုလင်းအမျိုးမျိုးထုတ်လုပ်ရေး လုပ်ငန်းအတွက် တင်ပြလာသည့် နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်း အစီရင်ခံစာ (SR) အား အတည်ပြုကြောင်း အကြောင်းကြားခြင်း

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- (၁) ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၊ ညွှန်ကြားရေးမှူးချုပ်ရုံး၊ နေပြည်တော်၏ ၂၈-၂-၂၀၂၃ ရက်စွဲပါစာအမှတ်၊ EIA-၁/၈/အတည်ပြု (SR)(၅၂၀/၂၀၂၃)
 - (၂) ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၊ ညွှန်ကြားရေးမှူးချုပ်ရုံး၊ နေပြည်တော်၏ ၂၈-၂-၂၀၂၃ ရက်စွဲပါစာအမှတ်၊ EIA-၁/၈/အတည်ပြု (SR)(၅၂၁/၂၀၂၃)


၁။ ရန်ကုန်တိုင်းဒေသကြီး၊ သန်လျင်မြို့နယ်၊ ဘုရားကုန်းကျေးရွာ၊ ဦးပိုင်အမှတ် (၉၇) ၊ မြေဧရိယာ (၄၀) ဧကပေါ်တွင် Myanmar Golden Eagle Co., Ltd. မှ ဖန်ပုလင်းအမျိုးမျိုးထုတ်လုပ်ရေး လုပ်ငန်းအတွက် ကုမ္ပဏီမှ ပြင်ဆင်တင်ပြလာသည့် နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်းအစီရင်ခံစာ (Scoping Report) ကို ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနမှ လုပ်ထုံးလုပ်နည်းနှင့်အညီ စိစစ်ခဲ့ပြီး ပြည်ထောင်စုဝန်ကြီးရုံးမှ ဥပဒေ၊ လုပ်ထုံးလုပ်နည်းနှင့်အညီ ပြန်ကြားရန် အကြောင်းကြားချက်အရ နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်းအစီရင်ခံစာ (Scoping Report) အား အတည်ပြုကြောင်းနှင့် ဆက်လက်အကြောင်းကြားနိုင်ရန် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန (ရုံးချုပ်) မှ ရန်ကုန်တိုင်း ဒေသကြီး၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနသို့ ရည်ညွှန်း (၁) နှင့် ရည်ညွှန်း (၂) ပါ စာများဖြင့် အကြောင်းကြားလာပါသည်။

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၂။ သို့ဖြစ်ပါ၍ Myanmar Golden Eagle Co., Ltd. မှ ဖန်ပုလင်းအမျိုးမျိုးထုတ်လုပ်ရေး လုပ်ငန်းနှင့်စပ်လျဉ်း၍ နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်းအစီရင်ခံစာ (Scoping Report) အား အတည်ပြုကြောင်းနှင့် ကုမ္ပဏီမှ အောက်ပါအချက်များကို လိုက်နာဆောင်ရွက်သွားရန် အကြောင်းကြားအပ်ပါသည်-

- (က) အတည်ပြုအကြောင်းကြားစာ လက်ခံရရှိကြောင်း ရန်ကုန်တိုင်းဒေသကြီး၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနသို့ ပြန်လည်တင်ပြသွားရန်၊
- (ခ) အဆိုပြုတင်ပြလာသည့် နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်း အစီရင်ခံစာနှင့် ဆောင်ရွက်မည့် လုပ်ငန်းတာဝန်များ (Terms of Reference - TOR) ကို အခြေခံ၍ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာကို ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း အပိုဒ် ၅၅၊ ၅၆၊ ၅၇၊ ၅၈၊ ၅၉၊ ၆၀၊ ၆၁၊ ၆၂၊ ၆၃၊ ၆၄၊ ၆၅ ပါ ဖော်ပြချက်များနှင့်အညီ ပြုစုရေးဆွဲတင်ပြသွားရန်၊
- (ဂ) အဆိုပါသတ်မှတ်ချက်များနှင့်အညီ ရေးဆွဲပြုစုထားသည့် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာကို သယံဇာတနှင့်သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန သို့ တင်ပြအတည်ပြုချက်ရယူသွားရန်။

မှတ်ချက်။ ဤအတည်ပြုကြောင်းစာသည် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဆိုင်ရာ လိုက်နာဆောင်ရွက်ရန်ဖြစ်ပါသည်။ လုပ်ငန်းဆောင်ရွက်ခွင့်ပြုမိန့်မှာ သက်ဆိုင်ရာဌာန၏ မူဝါဒ၊ ဥပဒေ၊ နည်းဥပဒေများ၊ လုပ်ထုံးလုပ်နည်း၊ လမ်းညွှန်ချက်များနှင့်အညီ လိုက်နာဆောင်ရွက်ရန်ဖြစ်ပါသည်။


 (ကျော်ဆန်းနိုင်)
 ညွှန်ကြားရေးမှူး
 ဝန်ကြီးဌာန

မိတ္ထူကို
 ညွှန်ကြားရေးမှူးချုပ်ရုံး၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၊ နေပြည်တော်
 ရုံးလက်ခံ၊ မျှောစာတွဲ၊ အမှုတွဲချုပ်



မြို့နယ်စည်ပင်သာယာရေးအဖွဲ့
သန်လျင်မြို့
စာအမှတ်၊ ၁၇၇၁ / ဆ-၁ / သလ-၁ (၀၀၂)
ရက်စွဲ ၂၀၂၀ ပြည့်နှစ်၊ စက်တင်ဘာလ ၃ ရက်

မြန်မာ့စီးပွားရေးကော်ပိုရေးရှင်း၊ စစ်ထောက်ချုပ်ရုံး၊ ကာကွယ်ရေးဝန်ကြီးဌာန
ရန်ကင်း-သီလဝါသွားကားလမ်းမ၊
ဘုရားကုန်းကျေးရွာ၊ သန်လျင်မြို့နယ်၊

အကြောင်းအရာ။ Furnance Building၊ Raw Material၊ Batch House၊ Cooling Tower၊ Oil Separator၊ Extension Toilet၊ Guard House and Truck Scale၊ Cullet Extension အဆောက်အအုံများ ဆောက်လုပ်ခွင့်ပြုကြောင်း အကြောင်းကြားခြင်း

ရည်ညွှန်းချက်။ ရန်ကင်းတိုင်းဒေသကြီးစည်ပင်သာယာရေးအဖွဲ့၏ (၂၁. ၈. ၂၀၂၀) ရက်စွဲပါစာအမှတ်၊ ၃၃၀၉/ ဆ-၂ / ရကစ(၀၃၀)

သန်လျင်မြို့နယ်၊ ဘုရားကုန်းကျေးရွာ၊ ရန်ကင်း-သီလဝါသွားကားလမ်းမနေ မြန်မာ့စီးပွားရေးကော်ပိုရေးရှင်း၊ စစ်ထောက်ချုပ်ရုံး၊ ကာကွယ်ရေးဝန်ကြီးဌာန မှ တင်ပြလာသော Furnance Building(RC with Pile) (၅၃၁.၅'x ၁၃၇.၈'x ၁၀၂.၅')၊ Raw Material (RC with Pile) (၁၃၇.၈'x ၄၉.၂၁၅'x ၂၆.၂၅')၊ Batch House (Steel with Pile) (၈၇.၈၆'x ၅၄.၃'x ၈၃.၉')၊ Cooling Tower (RC with Pile) (၆၈.၉'x ၁၆.၄'x ၁၆.၄')၊ Oil Separator (RC with Pile) (၃၉.၃၇'x ၁၈'x ၈.၃၃')၊ Extension Toilet (RC) (၁၁.၆'x ၂၃.၃'x ၁၂.၈')၊ Guard House and Truck Scale (RC with Pile) (၁၂.၆၃'x ၁၁'x ၁၃.၁')၊ Cullet Extension (RC) (၁၃၈.၇၈'x ၅၀.၂'x ၂၂.၉၆၇') အတိုင်းအတာတို့ရှိ အဆောက်အအုံများ ဆောက်လုပ်ရာတွင် အောက်ပါအတိုင်း တိကျစွာလိုက်နာ ဆောင်ရွက်ရန် အကြောင်းကြားပါသည်-

- (က) မြို့နယ်စည်ပင်သာယာရေးအဖွဲ့မှ ခွင့်ပြုထားသည့် Drawing ပုံစံ၊ Design (ဒီဇိုင်း) အတိုင်းအတာအတိုင်း ဆောက်လုပ်ရန်၊
- (ခ) အဆောက်အအုံဆောက်လုပ်ရန်အတွက် ပန္နက်ရိုက်သည့်အခါ မြို့နယ်စည်ပင်သာယာရေးအဖွဲ့ တာဝန်ရှိအင်ဂျင်နီယာ၏ ကြီးကြပ်မှုဖြင့်သာ အဆောက်အအုံ ပန္နက်ရိုက်ရန်၊


Kyin Pu Main/2

-၂-

- (ဂ) မိမိပိုင်မြေကွက်ဧရိယာအတွင်း သတ်မှတ်ပုံစံအတိုင်း ဆောက်လုပ်ပြီး ပတ်ဝန်းကျင် နေထိုင်သူများ ထိခိုက်မှုမရှိအောင် ဆောက်လုပ်သူမှ တာဝန်ယူရမည်။
- (ဃ) အဆောက်အအုံတည်ဆောက်ရာတွင် အသုံးပြုသော တည်ဆောက်ရေးလုပ်ငန်းသုံး ပစ္စည်းများ ဆယ်တင်ပစ္စည်းများအား လမ်းနယ်နိမိတ်အတွင်း စုပုံခြင်းမပြုရ။
- (င) အဆောက်အအုံ၏ အစိတ်အပိုင်းတစ်ခုခုကို ခွင့်ပြုပုံစံမှ ပြင်ဆင်ဆောက်လုပ်လိုပါက အဖွဲ့သို့ ပြန်လည်တင်ပြပြီး ခွင့်ပြုချက်ရမှသာ ပြင်ဆင်ဆောက်လုပ်ရမည်။
- (စ) အဆောက်အအုံ၏ အစိတ်အပိုင်းတစ်ခုခုသည် လမ်းနယ်နိမိတ်(သို့မဟုတ်) ရေမြောင်း အပေါ်သို့ မြေပေါ်မှလည်းကောင်း၊ လေထဲမှလည်းကောင်း ကျူးကျော်၍ ဆောက်လုပ် ခြင်းမပြုရ။
- (ဆ) အဆောက်အအုံ၏ ခွင့်ပြုထားသည့် အတိုင်းအတာ၊ စံချိန်စံညွှန်းနှင့်အညီ တည်ဆောက် ခြင်းကို ဆောင်ရွက်ရမည်။ သတ်မှတ်စံချိန်စံညွှန်းနှင့်အညီ ဆောက်လုပ်ခြင်းမပြုသည့် အဆောက်အအုံ တစ်ခုလုံးဖြစ်စေ၊ တစ်စိတ်တစ်ဒေသဖြစ်စေ ပြန်လည်ဖြိုဖျက်စေရ မည်။
- (ဇ) ဆောက်လုပ်ခွင့်ပြုသည့် သတ်မှတ်ကာလ(၆)လအတွင်း ပြီးစီးအောင် ဆောက်လုပ်ရ မည်။ သတ်မှတ်ကာလကျော်လွန်ပါက သက်တမ်းတိုးမြှင့်ခွင့်လျှောက်ထားရမည်။
- (ဈ) အထက်ပါစည်းကမ်းချက်များကို မလိုက်နာပါက အဆောက်အအုံတစ်ခုလုံးကိုဖြစ်စေ၊ တစ်စိတ်တစ်ဒေသဖြစ်စေ ဖျက်သိမ်းခြင်းနှင့် တည်ဆဲဥပဒေအရ အရေးယူခြင်းကိုခံရ မည်။


(Handwritten Signature)
 အမှုဆောင်အရာရှိ
 (သိုက်စိုးဒုတိယညွှန်ကြားရေးမှူး)

မိတ္တူကို
 ရုံးလက်ခံ/မျှောစာတွဲ။

 Central Leading Board	ဓာတုပစ္စည်းနှင့်ဆက်စပ်ပစ္စည်းများအန္တရာယ်မှ တားဆီးကာကွယ်ရေး ဗဟိုကြီးကြပ်ရေးအဖွဲ့	ပုံစံ	၂
		လုပ်ငန်း	၆
		အရေအတွက် (မျိုး)	၂
		သက်တမ်း	၂ နှစ်

ဓာတုပစ္စည်းနှင့်ဆက်စပ်ပစ္စည်းများဆိုင်ရာ လုပ်ငန်းလိုင်စင်

လိုင်စင်အမှတ် ၀၀၀၆၉၆
(နည်းဥပဒေ ၁၈)




ရက်စွဲ၊ ၂၀၂၁ ခုနှစ်၊ အောက်တိုဘာလ ၁၂ ရက်


၁။ ၆-၅-၂၀၂၁ ရက်စွဲပါ လျှောက်လွှာအမှတ် ၁၀၃၃ ဖြင့် လုပ်ငန်းလိုင်စင်
လျှောက်ထားသော Myanmar Golden Eagle Co., Ltd. ကုမ္ပဏီ/
လုပ်ငန်းမှ ဦး/ဇော် ဦးကျော်ကျော်စိန် (ဘ) ဦးလှမောင် နိုင်ငံသား
စိစစ်ရေးကတ်ပြားအမှတ်/နိုင်ငံခြားသားမှတ်ပုံတင်အမှတ် ၁၃/လရန(နိုင်)၀၀၀၄၄၇ အား
ဤ လုပ်ငန်းလိုင်စင်ကို ထုတ်ပေးလိုက်သည်။

၂။ ခွင့်ပြုသည့်လုပ်ငန်းအမျိုးအစား
 သိုလှောင်ခြင်း၊ သုံးစွဲခြင်း၊ တင်သွင်းခြင်း၊ သယ်ယူပို့ဆောင်ခြင်း၊ လက်ဝယ်ထားရှိခြင်း၊ ဝယ်ယူ
 ခြင်း။

၃။ လုပ်ငန်းလုပ်ကိုင်ခွင့်ပြုသည့် ဓာတုပစ္စည်းနှင့် ဖန်ချက်စက်ရုံ(သန်လျင်)၊ သီလဝါလမ်းမ
ဆက်စပ်ပစ္စည်းများ၏ အမျိုးအမည်များ ကြီး၊ ဘုရားကုန်းကျေးရွာ၊ သန်လျင်မြို့
ထားရှိမည့်နေရာ နယ်၊ ရန်ကုန်တိုင်းဒေသကြီး။
(ပြည့်စုံစွာဖော်ပြရန်)

၄။ လုပ်ငန်းလိုင်စင်သက်တမ်းကုန်ဆုံးမည့်နေ့ရက် ၁၂-၀၀-၂၀၂၃




 ဥက္ကဋ္ဌ
 ဗဟိုကြီးကြပ်ရေးအဖွဲ့

စည်းကမ်းချက်များ

လိုင်စင်ရရှိသူသည် အောက်ဖော်ပြပါ စည်းကမ်းချက်များကို လိုက်နာဆောင်ရွက်ရမည်-

- ၁။ ဓာတုပစ္စည်းနှင့်ဆက်စပ်ပစ္စည်းများအန္တရာယ်မှ တားဆီးကာကွယ်ရေးဥပဒေအရ ထုတ်ပြန်သော နည်းဥပဒေ၊ အမိန့်ကြော်ငြာစာ၊ အမိန့်၊ ညွှန်ကြားချက်နှင့် လုပ်ထုံးလုပ်နည်းများပါ စည်းကမ်းချက်များကို လိုက်နာဆောင်ရွက်ခြင်း၊
- ၂။ လိုင်စင်ကို လုပ်ငန်းခွင်၏ မြင်သာသည့်နေရာ၌ ချိတ်ဆွဲထားခြင်း၊
- ၃။ လုပ်ငန်းနှင့်သက်ဆိုင်သည့် သင်တန်းများ တက်ရောက်ပြီးကြောင်း အထောက်အထားများကို မြင်သာသည့်နေရာ၌ ချိတ်ဆွဲထားခြင်း၊
- ၄။ အန္တရာယ်ရှိသည့်အကြောင်းအရာများ ဖော်ပြထားသော စာတန်း သို့မဟုတ် ရုပ်ပုံအမှတ်အသား တံဆိပ်များ ချိတ်ဆွဲထားခြင်း၊
- ၅။ လုံခြုံရေးကိရိယာ၊ ကိုယ်ခန္ဓာကာကွယ်ရေးကိရိယာနှင့် ဝတ်စုံများ လုံလောက်စွာထားရှိခြင်း၊
- ၆။ မတော်တဆဖြစ်ပွားမှု လျော့နည်းစေရန်နှင့် ကင်းရှင်းစေရန် ဆောင်ရွက်ထားခြင်း၊
- ၇။ ထိခိုက်ဆုံးရှုံးမှုအတွက် လျော်ကြေးပေးနိုင်ရန် အာမခံထားခြင်း၊
- ၈။ အန္တရာယ်ကင်းရှင်းစေရေး ညွှန်ကြားချက်များ လိုက်နာခြင်း၊
- ၉။ အလုပ်လုပ်ကိုင်သူများ၏ ကျန်းမာရေးစစ်ဆေးချက်မှတ်တမ်းများ ထိန်းသိမ်းထားခြင်း၊
- ၁၀။ အန္တရာယ်ရှိသည့် ပစ္စည်းများသိုလှောင်ခွင့်ရပါက သက်ဆိုင်ရာမြို့နယ် အထွေထွေအုပ်ချုပ်ရေး ဦးစီးဌာနသို့ ခွင့်ပြုသည့်အကြောင်းကြားစာ မိတ္တူပေးပို့ခြင်း၊
- ၁၁။ မီးဘေးအန္တရာယ်ဖြစ်စေတတ်သည့်ပစ္စည်း သို့မဟုတ် ပေါက်ကွဲစေတတ်သည့်ပစ္စည်းများ အသုံးပြုသောလုပ်ငန်းဖြစ်ပါက သက်ဆိုင်ရာမီးသတ်ဦးစီးဌာန၏ လမ်းညွှန်သဘောတူညီချက် ကြိုတင်ရယူခြင်း၊
- ၁၂။ ပြည်တွင်းတွင် သယ်ယူပို့ဆောင်သည့်အခါ သတ်မှတ်ထားသည့် စည်းကမ်းချက်များနှင့်အညီ ခွင့်ပြုထားသော ပမာဏနှင့် နေရာသို့ သယ်ဆောင်ခြင်း၊
- ၁၃။ ခွင့်ပြုသည့်နေရာ ပြောင်းလဲသယ်ယူပို့ဆောင်လိုပါက ဗဟိုကြီးကြပ်ရေးအဖွဲ့ထံမှ ခွင့်ပြုချက် ထပ်မံရယူခြင်း၊
- ၁၄။ စက်ပစ္စည်းကိရိယာများ၏ လုံခြုံစိတ်ချမှု၊ ခံနိုင်ရည်ရှိမှုနှင့် ဘေးအန္တရာယ်ထိခိုက်နိုင်မှု ရှိ၊ မရှိကို သက်ဆိုင်ရာကြီးကြပ်ရေးအဖွဲ့နှင့် စစ်ဆေးရေးအဖွဲ့များ၏ စစ်ဆေးမှုခံယူခြင်း၊
- ၁၅။ စွန့်ပစ်ပစ္စည်းများကို စနစ်တကျသန့်စင်ပြီးမှ စွန့်ပစ်ခြင်း သို့မဟုတ် စနစ်တကျ စုပုံထားခြင်း၊
- ၁၆။ လုပ်ငန်းကြောင့် ပတ်ဝန်းကျင်ထိခိုက်မှုမရှိစေရန် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးနှင့် သက်ဆိုင်သည့် ဥပဒေများ၊ နည်းဥပဒေများနှင့်အညီ လိုက်နာဆောင်ရွက်ခြင်း၊
- ၁၇။ ထည့်သွင်းထုပ်ပိုးထားသည့် ပစ္စည်းများပေါ်တွင် အန္တရာယ်သတိပေး အမှတ်အသားတံဆိပ်ကပ်ခြင်း၊
- ၁၈။ လုပ်ငန်းလုပ်ကိုင်သည့် ဓာတုပစ္စည်းနှင့် ဆက်စပ်ပစ္စည်းများ၏ အာနိသင်၊ အရည်အသွေးနှင့် စံချိန်စံညွှန်းတို့ကို မမှန်မကန်ကြော်ငြာ၍ မရောင်းချခြင်း။



ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်
ပြည်ထဲရေးဝန်ကြီးဌာန
မီးသတ်ဦးစီးဌာန

စာအမှတ်၊ ၁၂၈ / ၁၀၀ / ၅၂ / ဦး ၁
ရက်စွဲ၊ ၂၀၂၁ ခုနှစ်၊ ဇွန်လ ၁၉ ရက်

Myanmar Golden Eagle Co.,Ltd
သီလဝါလမ်းမကြီး၊ ဘုရားကုန်းကျေးရွာ
သန်လျင်မြို့နယ်

အကြောင်းအရာ။ အဆောက်အဦးမီးဘေးလုံခြုံရေး(Fire Safety)အတွက် စစ်ဆေးခြင်း

၁။ အထက်အကြောင်းအရာပါကိစ္စနှင့်စပ်လျဉ်း၍ အထပ်မြင့်အဆောက်အဦ မဆောက်လုပ်မီ မီးဘေးလုံခြုံရေးအတွက် Myanmar Golden Eagle Co.,Ltd သန်လျင်မြို့နယ်မှ တင်ပြလာသော အဆောက်အဦပုံစံအား မီးသတ်ဦးစီးဌာနမှ စစ်ဆေးပြီးဖြစ်ပါသည်။ မီးဘေးလုံခြုံရေးအတွက် လိုက်နာဆောင်ရွက်ရန် ညွှန်ကြားချက် (၁၂)ချက်ကို ဤစာနှင့်အတူ ပူးတွဲပေးပို့ပါသည်။

၂။ လျှောက်ထားသူဘက်မှ ညွှန်ကြားချက်အတိုင်း ပြည့်စုံစွာ လိုက်နာဆောင်ရွက်သွားမည်ဆိုပါက အောက်ဖော်ပြပါ အဆောက်အဦဆောက်လုပ်ခြင်းအတွက် ဤဌာနအနေဖြင့် ကန့်ကွက်ရန်မရှိကြောင်း အကြောင်းကြားပါသည်-

- (က) လျှောက်ထားသူအမည် Myanmar Golden Eagle Co.,Ltd
- (ခ) အဆောက်အဦဆောက်မည့်နေရာ သီလဝါလမ်းမကြီး၊ ဘုရားကုန်းကျေးရွာ၊ သန်လျင်မြို့နယ်။
- (ဂ) အဆောက်အဦအမျိုးအစား RCC (၂)ထပ် (ဖန်ချက်စက်ရုံ)

၃။ ဤအဆောက်အဦအတွက် ပူးတွဲပါမီးဘေးလုံခြုံရေး ညွှန်ကြားချက်အတိုင်း ဆောင်ရွက်ပြီးစီးချိန်တွင် မီးဘေးလုံခြုံရေး စစ်ဆေးထောက်ခံချက်လက်မှတ် (Fire Safety Certificate) ထုတ်ပေးရန် မီးသတ်ဦးစီးဌာနသို့ လျှောက်ထားရမည်။

၄။ ထိုသို့လျှောက်ထားလာသည့်အခါ မီးသတ်ဦးစီးဌာနမှ ဆောက်လုပ်ပြီးအဆောက်အဦအား လုပ်ထုံးလုပ်နည်းနှင့်အညီ ထပ်မံစစ်ဆေးပြီးပူးတွဲပါ မီးဘေးလုံခြုံရေးဆိုင်ရာညွှန်ကြားချက်(၁၂)ချက်အား ပြည့်စုံစွာ လိုက်နာဆောင်ရွက်လျှင် မီးဘေးလုံခြုံရေးစစ်ဆေးထောက်ခံချက် (Fire Safety Certificate) အား ထုတ်ပေးသွားမည်ဖြစ်ပါသည်။

၅။ မီးဘေးလုံခြုံရေးညွှန်ကြားချက်များအား လိုက်နာဆောင်ရွက်ရန် ပျက်ကွက်မှုတစ်စုံတစ်ရာ စစ်ဆေးတွေ့ရှိလျှင် မီးဘေးလုံခြုံရေးစစ်ဆေးထောက်ခံချက် (Fire Safety Certificate)ထုတ်ပေးခြင်း မပြုပါ။ ထို့အပြင် မြန်မာနိုင်ငံမီးသတ်တပ်ဖွဲ့ဥပဒေအရ အရေးယူခြင်းခံရမည်ဖြစ်ပါသည်။

အထပ်မြင့်အဆောက်အအုံစစ်ဆေးရေးဆိုင်ရာ
စီမံခန့်ခွဲမှုအဖွဲ့ဝန်ထုတ်ပေးရန်
၇၉၄၃၅၀၃ / (.....)ကို
ဇာန်လလွှဲပြီး ချုပ်ငြိမ်း လက်ခံရရှိပါသည်။

ညွှန်ကြားရေးမှူးချုပ်(ကိုယ်စား)
(သိန်းထွန်းဦး၊ ညွှန်ကြားရေးမှူး)
၂

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မိတ္တူကိုင်

ဌာနမှူး၊ အင်ဂျင်နီယာဌာန (အဆောက်အအုံ)၊ ရန်ကုန်မြို့တော်စည်ပင်သာယာရေးကော်မတီ၊
တိုင်းဒေသကြီးမီးသတ်ဦးစီးမှူးရုံး၊ ရန်ကုန်တိုင်းဒေသကြီး၊
တောင်ပိုင်းခရိုင်မီးသတ်ဦးစီးမှူးရုံး၊ သန်လျင်မြို့နယ်၊
မြို့နယ်မီးသတ်ဦးစီးမှူးရုံး၊ သန်လျင်မြို့နယ်၊
မျှောစာတွဲ/လက်ခံစာတွဲ။



ရန်ကုန်တိုင်းဒေသကြီး၊ သန်လျင်မြို့နယ်၊ ဘုရားကုန်းကျေးရွာ၊ သီလဝါလမ်းမကြီးတွင် ဆောက်လုပ်သည့်
RCC (၂) ထပ် ဖန်ချက်စက်ရုံ အဆောက်အဦ ဆောက်လုပ်ခြင်းလုပ်ငန်းများအတွက် မီးသတ်ဦးစီးဌာန၏
မီးဘေးလုံခြုံမှုနှင့် အရေးပေါ် လွတ်မြောက်မှုဆိုင်ရာ သဘောထားများ

အရေးပေါ်လွတ်မြောက်မှုဆိုင်ရာလုပ်ငန်းများ (Means of Egress)

၁။ အဆောက်အဦ အပြင်ဘက်ပတ်လမ်း (Access Road)သည် မီးသတ်ကားများဝင်နိုင်သည့်
(၄)မီတာ ကျယ်သည့်လမ်းဖြစ်ရန်၊ ၎င်းလမ်းတစ်လျှောက်နှင့် အဆောက်အဦအကြား မြေကျန်အနည်းဆုံး
(၂)မီတာရှိရန်၊ ၎င်းလမ်းတစ်လျှောက် အမြင့်(၄.၅)မီတာအတွင်း မည်သည့်အတားအဆီးမျှမရှိရန်နှင့်
မီးသတ်ကားများဝင်နိုင်သည့် လမ်းအရှည်သည် (၄၆)မီတာကျော်ပါက မီးသတ်ကားများ ပြန်ကွေ့နိုင်
ရန် လုံလောက်စွာကျယ်သောနေရာ ရှိရမည်။ မီးသတ်ကားများရပ်သည့်နေရာ (Accessway)သည်
အကျယ်(၆)မီတာရှိရန်နှင့် လမ်းခံနိုင်ရည်သည် တန်(၄၀) ခံနိုင်ရမည်။

၂။ အဆောက်အဦ၏ ထွက်ပေါက်လှေကား (Exit Stairs) များအား အတည်ပြုထားသော
Drawing တွင်တင်ပြထားသည့်အတိုင်း ဆောက်လုပ်ရမည်။

၃။ အဆောက်အဦရှိလှေကားများတွင် လှေကားထစ်တစ်ထစ်၏ အမြင့်(Riser)နှင့် လှေကား
ထစ်တိုင်း၏ အကျယ်(Tread)သည် အတည်ပြုထားသော Drawingတွင် တင်ပြထားသည့်အတိုင်း
ဆောက်လုပ်ရမည်။

၄။ လှေကားခွင်များအတွင်း လေဝင်/လေထွက်ကောင်းမွန်စေရန် သဘာဝလေဝင်/လေထွက်
စနစ်အသုံးပြုပါက လှေကားခွင်ကြမ်းခင်းဧရိယာ၏ အနည်းဆုံး(၁၅%)အား လေဝင်လေထွက်ပေါက်
ပြုလုပ်ထားရှိရန် (သို့မဟုတ်) Mechanical Ventilation System တပ်ဆင်ရမည်။

၅။ လှေကားခွင်သို့ဝင်ရောက်သည့် တံခါးများအား အနည်းဆုံး(၃) ပေအကျယ်၊ (၇)ပေ အမြင့်ရှိရန်၊
အလိုအလျောက်ပိတ်စေသောကိရိယာ Self Closing Device တပ်ဆင်ထားရန်နှင့် မီးလောင်မှုဒဏ်
(၁)နာရီခံနိုင်သောတံခါး(Min: 1hr Fire Rated Door)တပ်ဆင်ရမည်။

၆။ အဆောက်အဦအတွင်းလေဝင်လေထွက်ကောင်းမွန်စေရေးအတွက် Natural Ventilation
(သို့) Mechanical Ventilation ရရှိအောင် ဆောင်ရွက်ထားရှိရမည်။

၇။ အရေးပေါ်လွတ်မြောက်မှုဆိုင်ရာလုပ်ငန်းများ (Means of Egress) အတွက် အောက်ပါစနစ်များ
တပ်ဆင်ထားရှိရမည်-

- (က) အရေးပေါ်အသံနှင့်အမြင်ဆိုင်ရာအချက်ပေးစနစ် (Audio / Visual Advisory System)။
အဆောက်အဦတစ်ခုလုံးတွင် တပ်ဆင်ရမည်။
- (ခ) ထွက်ပေါက်နှင့် လွတ်မြောက်ပေါက်လမ်းညွှန် သင်္ကေတဆိုင်ရာတံခါးများ (Exit &
Indication Sign)။ အဆောက်အဦရှိ မီးဘေးလွတ်မြောက်ရာ လမ်းကြောင်းများ၊ ထွက်
ပေါက်များအနီးနှင့် လူသွားစကြိုများ တစ်လျှောက်တွင် တပ်ဆင်ရမည်။

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(ဂ) အရေးပေါ်သုံးမီးထွန်းစနစ် (Emergency Lighting System with UPS back up)။

အထူးသဖြင့် လူသွားစင်္ကြံများနှင့် အရေးပေါ်လှေကားခွင်များအတွင်း တပ်ဆင်ရမည်။

(ဃ) အရေးပေါ်သုံးလျှပ်စစ်ဓါတ်အားပေးစနစ်(Emergency Generator)။ အဆောက်အဦတွင်

တပ်ဆင်ထားရှိသော မီးဘေးလုံခြုံရေးစနစ်များအားလုံးနှင့် ချိတ်ဆက်ထားရှိရမည်။

မီးဘေးလုံခြုံရေးဆိုင်ရာလုပ်ငန်းများ(Fire Safety)

၈။ မီးဘေးလုံခြုံရေးဆိုင်ရာလုပ်ငန်းများ (Fire Safety) အတွက် အောက်ပါစနစ်များ တပ်ဆင်ထားရှိရမည်-

(က) မီးလှန့်အချက်ပေးစနစ်များ(Fire Alarm System)။ အဆောက်အဦ၏အထပ်တိုင်းတွင် အတည်ပြုထားသော Drawing တွင် တင်ပြထားသည့်အတိုင်း တပ်ဆင်ထားရှိရမည်။

(ခ) လက်ဖြင့်ကိုင်တွယ်အသုံးပြုနိုင်သော အပေါ့စားမီးသတ်ပစ္စည်းကိရိယာများ(Portable Hand - Operated Approved Appliances) ။ အဆောက်အဦ အထပ်တိုင်းတွင် အတည်ပြုထားသော Drawing တွင်တင်ပြထားသည့်အတိုင်း တပ်ဆင်ထားရှိရမည်။

(ဂ) မီးသတ်ရေပက်ပိုက်ခွေ(Fire Hose Reel)။ အတည်ပြုထားသော Drawing တွင် တင်ပြထားသည့်အတိုင်း အဆောက်အဦ အထပ်တိုင်းရှိ ထွက်ပေါက်များအနီးတွင် တပ်ဆင်ထားရှိရမည်။ Hose Reel(၁)ခုစီ၏ ရေစီးနှုန်း(0.4L/s) ရှိရမည်ဖြစ်ပြီး အနည်းဆုံး ရေဖိအား 2.5 bar ရရှိအောင် စီစဉ်ထားရှိရမည်။

(ဃ) အလိုအလျောက်ရေဖျန်းစနစ် (Automatic Sprinkler System) ။ အတည်ပြုထားသော Drawing တွင် တင်ပြထားသည့်အတိုင်း တပ်ဆင်ထားရှိရမည်။

(င) မီးထောက်လှမ်းရေးစနစ်များ(Fire Detection System)။ အဆောက်အဦ၏ အထပ်တိုင်း တွင် အသုံးပြုသောလုပ်ငန်း သဘောသဘာဝပေါ်တွင်မူတည်၍ မီးခိုးထောက်လှမ်းမှု ကိရိယာများ (Smoke Detectors)နှင့် အပူထောက်လှမ်းမှုကိရိယာများ (Heat Detectors) များအား Drawing တွင် တင်ပြထားသည့်အတိုင်း တပ်ဆင်ထားရှိရမည်။

(စ) မီးသတ်ပိုက်စနစ်များ ။ မီးငြိမ်းသတ်ရေးစနစ်အားလုံးအတွက် တပ်ဆင်သွယ်တန်း အသုံးပြုသောပိုက်များကို Gray Cast Iron (သို့) Black Steel ပိုက်များ အသုံးပြုရန်ဖြစ်ပြီး ပိုက်ဆက်ကို Instantaneous Coupling (British Standard) များတပ်ဆင်ဆောင်ရွက်ပေးရမည်။

(ဆ) မီးလှန့်အချက်ပြပုံး (Fire Alarm Control Panel)။ အဆောက်အဦတွင် တပ်ဆင်ထားသော အရေးပေါ်လွတ်မြောက်မှုဆိုင်ရာစနစ်များနှင့် မီးဘေးလုံခြုံရေးဆိုင်ရာစနစ်များ စုစည်းထိန်းသိမ်းကွပ်ကဲရန် Panel Board အား အတည်ပြုထားသော Drawing ၌ တင်ပြထားသည့် သတ်မှတ်နေရာတွင် တပ်ဆင်ထားရှိရမည်။

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- (ဇ) မီးဘေးလုံခြုံရေးဆိုင်ရာစနစ်များကို ပိတ်ထားခြင်းရှိ/မရှိအား သိရှိနိုင်စေရန်နှင့် မီးလောင်မှုဖြစ်ပွားပါက လျင်မြန်စွာတုံ့ပြန်ဆောင်ရွက်နိုင်ရန်အတွက် မီးသတ်ဦးစီးဌာနနှင့် (၂၄)နာရီပတ်လုံး ချိတ်ဆက်ဆောင်ရွက်ထားသည့် Online အသုံးပြု မီးလှန့်အချက်ပေးစောင့်ကြည့်ရေးစနစ် (Online Alarm Mornitoring System) သို့မဟုတ် မီးသတ်အရေးပေါ်အကြောင်းကြားစနစ် (Emergency Alert Mornitoring Services-EAMS) သို့မဟုတ် အလားတူစနစ်မျိုးကို အဆောက်အဦတွင် တပ်ဆင်ထားသည့် မီးလှန့်အချက်ပြပုံ (Fire Alarm Control Panel) နှင့် ချိတ်ဆက်၍ အတည်ပြုထားသော Drawing တွင် တင်ပြထားသည့် သတ်မှတ်နေရာတွင် တပ်ဆင်ထားရှိရမည်။
- (ဈ) **မီးငြိမ်းသတ်ရန်ရေရရှိရေး (Water Supply for Fire Fighting)** အနည်းဆုံး လိုအပ်ချက်ဖြစ်သည့် မီးငြိမ်းသတ်နိုင်သော ရေပမာဏဂါလန်ကို အတည်ပြုထားသော Drawing တွင် တင်ပြထားသည့်အတိုင်း သိုလှောင်စီမံထားရှိရမည်။
- (ည) **မီးသတ်ရေငုတ်(Hydrant)** အဆောက်အဦ၏ ပြင်ပချဉ်းကပ်လမ်းဘေးတွင် မီးသတ်ရေငုတ်များ ထားရှိရမည်။ မီးသတ်ရေငုတ်(Fire Hydrant) တစ်ခုနှင့် တစ်ခုကြား မီတာ (၁၀၀) ထက် ပိုမဝေးရန်နှင့် အနည်းဆုံးရေဖိအား (3.5 to 5.5)bar ထွက်ရှိအောင် စီစဉ်ထားရမည်။
- (ဋ) အဆောက်အဦတွင် တပ်ဆင်အသုံးပြုထားသည့် မီးငြိမ်းသတ်ရေးစနစ်များအား Diesel Driving Pump ဖြင့် Auto System အသုံးပြု ချိတ်ဆက်ထားရှိရမည်။

အထွေထွေ

၉။ အရေးပေါ်လွတ်မြောက်မှုဆိုင်ရာလုပ်ငန်းများနှင့် မီးဘေးလုံခြုံရေးဆိုင်ရာလုပ်ငန်းများအတွက် Drawing အား ရေးဆွဲထားရှိပြီး တပ်ဆင်ရမည့်စနစ်များ၊ တပ်ဆင်ရမည့်နေရာ သတ်မှတ်ချက်များနှင့် စံချိန်စံညွှန်းများကို မီးသတ်ဦးစီးဌာန၏ အတည်ပြုချက်ရယူရမည်။

၁၀။ အထပ်မြင့်အဆောက်အဦများ မီးဘေးလုံခြုံရေးအတွက် စစ်ဆေးအကြံပြုခြင်းဆိုင်ရာ ဝန်ဆောင်ခများကို အဆောက်အဦ၏ အထပ်အားလုံးရှိ ဧရိယာစတုရန်းမီတာပေါင်းအတွက် တစ်စတုရန်းမီတာလျှင် (၅၀၀/-)ကျပ်နှုန်းပေးဆောင်ရမည်။

၁၁။ တည်ဆောက်ဆဲကာလလုပ်ငန်းခွင်အတွင်း မီးဘေးလုံခြုံရေးအစီအမံများဆောင်ရွက်ထားရှိရန်နှင့် မီးသတ်ဦးစီးဌာနမှ အခါအားလျော်စွာ စစ်ဆေးအကြံပြုချက်များကို လိုက်နာဆောင်ရွက်ရမည်။

၁၂။ မီးသတ်ဦးစီးဌာနသို့ တင်ပြထားသည့် ဖန်ချက်စက်ရုံ အဆောက်အဦအဖြစ်သာ အသုံးပြုရန်နှင့် အတည်ပြုထားသည့် Drawing အတိုင်းလိုက်နာဆောင်ရွက်ပါရန်၊ အခြားအဆောက်အဦအဖြစ်ပြောင်းလဲအသုံးပြုလိုပါက မီးသတ်ဦးစီးဌာနသို့ ပြန်လည်တင်ပြ၍ ခွင့်ပြုချက် တောင်းခံသွားရမည်။

051

သန်လျင်မြို့နယ်စည်ပင်သာယာရေးအဖွဲ့

အန္တရာယ်ရှိစေနိုင်သော လုပ်ငန်းလိုင်စင်

၂၀၂၂-၂၀၂၃ ခု ဘဏ္ဍာရေးနှစ် (၁) နှစ် (၁-၄-၂၀၂၂ မှ ၃-၂-၂၀၂၃ ထိ) (၁-နှစ်ကာလ)

မှတ်ပုံတင်စာရင်းအမှတ် _____



သန်လျင်မြို့၊ အလွမ်းရွက် ရပ်ကွက်၊ သီလဝါ လမ်း၊ အမှတ် (-) တွင်
နေထိုင်သူအား အလွမ်းရွက် ရပ်ကွက်၊ သီလဝါ လမ်း၊ အမှတ် (-) တွင်
လုပ်ငန်းဆောင်ရွက်ခြင်းကို ရန်ကုန်တိုင်းဒေသကြီး၊ စည်ပင်သာယာရေး ဥပဒေအရခွင့်
ပြုသည်။

- (၁) လုပ်ငန်းလုပ်ကိုင်သူအမည် ဦးလျော်ကျော်စိန်
- (၂) နိုင်ငံသားအမှတ် သု၊ လရနု နိုင် ၁ ၀၀၀၄၄၇
- (၃) နေရပ်လိပ်စာ သီလဝါလမ်း၊ အလွမ်းရွက်
- (၄) လုပ်ငန်းအမျိုးအစား နေပြင်တော်ရုံ
- (၅) လုပ်ငန်း/ဆိုင်အမည်
- (၆) ခွင့်ပြုသည့်ဘဏ္ဍာရေးနှစ် ၂၀၂၂-၂၀၂၃ ခု ဘဏ္ဍာရေးနှစ်
- (၇) လိုင်စင်နံပါတ် ၁၀၀၀၀၀၀၀၀၀
- (၈) ငွေသွင်းချလံအမှတ် ၈၁
- (၉) လိုင်စင်ထုတ်ပေးသည့်ရက်စွဲ


မှတ်ချက်။ ဤလုပ်ငန်း/ဆိုင်ခွင့်ပြုချက်သည် (၃၁.၃.၂၀၂၃) ရက်နေ့တွင်
သက်တမ်းကုန်ဆုံးသည်။

အမှုဆောင်အရာရှိ
မြို့နယ်စည်ပင်သာယာရေးအဖွဲ့
သန်လျင်မြို့


အန္တရာယ်ရှိစေနိုင်သော လုပ်ငန်းတွင် အကျုံးဝင်သည့်
လုပ်ငန်းလုပ်ထိုင်သူများ ထိုက်နာရန်စည်းကမ်းချက်များ

- ၁။ လုပ်ငန်းမှ ထွက်ရှိသည့် စွန့်ပစ်ပစ္စည်းများကို အမှိုက်ပုံးထားရှိပြီး စနစ်တကျ စွန့်ပစ်ရန်။
- ၂။ လုပ်ငန်းပတ်ဝန်းကျင်အနီးအနားတွင် မီးလောင်လွယ်သည့်ပစ္စည်းများ မထားရန်။
- ၃။ လုပ်ငန်းမှ ထွက်သည့်အနံ့အသက်၊ အမှုန်အမွှားများ ပတ်ဝန်းကျင်သို့ မပျံ့နှံ့စေရေး ဆောင်ရွက်ရန်။
- ၄။ မီးသတ်ပစ္စည်းကိရိယာများ ပြည့်စုံစွာ ထားရှိရန်။
- ၅။ လုပ်ငန်းသုံးကိရိယာများ စနစ်တကျ ထားရှိရန်။
- ၆။ လုပ်ငန်းအား မိမိပိုင်နယ်နိမိတ်အတွင်းသာရောင်းချရန်နှင့် လုပ်ငန်းကြောင့် ပတ်ဝန်းကျင်ရှိသူများအား အနှောင့်အယှက် မဖြစ်စေရေး ဂရုပြုဆောင်ရွက်ရန်။
- ၇။ လုပ်ငန်းထွက် စွန့်ပစ်ပစ္စည်းများကို အမှိုက်သိမ်းယာဉ်ပေါ်သို့ စနစ်တကျ ထုတ်ပိုး စွန့်ပစ်ရန်။
- ၈။ အများပြည်သူအသုံးပြုရန် သတ်မှတ်ထားသည့် လမ်းမြေပေါ်တွင် ကျူးကျော်ခြင်း မပြုရန်။
- ၉။ အဖွဲ့မှ လုပ်ငန်းလိုအပ်ချက်အရ အခါအားလျော်စွာ သတ်မှတ်ပေးသည့် စည်ကမ်းချက်များအား တိကျစွာ လိုက်နာဆောင်ရွက်ရန်။

မြို့နယ်စည်ပင်သာယာရေးအဖွဲ့
သန်လျင်မြို့

 Central Leading Board	ဓာတုပစ္စည်းနှင့်ဆက်စပ်ပစ္စည်းများအန္တရာယ်မှ တားဆီးကာကွယ်ရေး ဗဟိုကြီးကြပ်ရေးအဖွဲ့	ပုံစံ	၈
		ဓာတုပစ္စည်း အရေအတွက်	၁၈ (မျိုး)
		သက်တမ်း	၂ နှစ်

ဓာတုပစ္စည်းနှင့်ဆက်စပ်ပစ္စည်းများ မှတ်ပုံတင်လက်မှတ်
 မှတ်ပုံတင်လက်မှတ်အမှတ်စဉ် ၀၀၁၄၂
 (နည်းဥပဒေ ၂၅)


 ရက်စွဲ၊ ၂၀၂၂ ခုနှစ်၊ မတ်လ ၃ ရက်

၁။ ၁၁ - ၂ - ၂၀၂၂ ရက်စွဲပါ လျှောက်လွှာအမှတ် ၀၀၁၄၇ ဖြင့်
 မှတ်ပုံတင်ခွင့်ပြုရန် လျှောက်ထားသော ဓာတုပစ္စည်းနှင့် ဆက်စပ်ပစ္စည်းများအား မြန်မာနိုင်ငံ အတွင်း
 အသုံးပြုရန် မှတ်ပုံတင်ပြီးဖြစ်သည်။

၂။ တာဝန်ခံလျှောက်ထားသူ၏အမည် ဦးကျော်ကျော်စိန်

၃။ နိုင်ငံသားစိစစ်ရေးကတ်ပြားအမှတ် ၁၃/လရန(နိုင်)၀၀၀၄၄၇

 သို့မဟုတ် နိုင်ငံခြားသားမှတ်ပုံတင်အမှတ် _____

၄။ အမြဲတမ်းနေရပ်လိပ်စာ C-1, Zone C, 1st Flr, Golden City Business Center,
 Yankin Rd, Yankin Tsp, Yangon.


၅။ ဆက်သွယ်ရန်ဖုန်းနံပါတ် သို့မဟုတ် ၀၉ ၄၃၂၀၀၂၀၂ | ၀၉ ၇၇၂၂၀၀၂၀၂
 ဖက်စ်(Fax)နံပါတ် သို့မဟုတ် e-mail လိပ်စာ info@myanmarglass.com


၆။ လုပ်ငန်းလိပ်စာ ဖန်ချက်စက်ရုံ(သန်လျင်)၊ သီလဝါလမ်းမကြီး၊
 ဘုရားကုန်းကျေးရွာ၊ သန်လျင်မြို့နယ်၊
 ရန်ကုန်တိုင်းဒေသကြီး။

၇။ ဆက်သွယ်ရန်လုပ်ငန်းဖုန်းနံပါတ် သို့မဟုတ် ၀၉ ၄၃၂၀၀၂၀၂ | ၀၉ ၇၇၂၂၀၀၂၀၂
 ဖက်စ်(Fax)နံပါတ် သို့မဟုတ် e-mail လိပ်စာ info@myanmarglass.com

၈။ မှတ်ပုံတင်ခွင့်ပြုသောဓာတုပစ္စည်းနှင့် နောက်ဆက်တွဲပါအတိုင်းဖြစ်ပါသည်။
 ဆက်စပ်ပစ္စည်းများ _____
 (နောက်ဆက်တွဲစာရင်းအရ) _____

၉။ သက်တမ်းကုန်ဆုံးမည့် နေ့ရက် ၃ - ၃ - ၂၀၂၄


 ဥက္ကဋ္ဌ
 ဗဟိုကြီးကြပ်ရေးအဖွဲ့



စည်းကမ်းချက်များ

မှတ်ပုံတင်လက်မှတ်ရရှိသူသည် အောက်ဖော်ပြပါ စည်းကမ်းချက်များကို လိုက်နာဆောင်ရွက်ရမည်-

- ၁။ ဓာတုပစ္စည်းနှင့်ဆက်စပ်ပစ္စည်းများအန္တရာယ်မှ တားဆီးကာကွယ်ရေးဥပဒေအရ ထုတ်ပြန်သော နည်းဥပဒေ၊ အမိန့်ကြော်ငြာစာ၊ အမိန့်၊ ညွှန်ကြားချက်နှင့် လုပ်ထုံးလုပ်နည်းများပါ စည်းကမ်းချက်များကို လိုက်နာခြင်း၊
- ၂။ မှတ်ပုံတင်ထားသည့်စာရင်းတွင် ပါရှိသော်လည်း အသုံးမပြုလိုသော ပစ္စည်းများရှိပါက ဗဟိုကြီးကြပ်ရေးအဖွဲ့သို့ အသိပေးတင်ပြခြင်း၊
- ၃။ မှတ်ပုံတင်ထားသည့်စာရင်းတွင် မပါရှိသည့်ပစ္စည်းများ အသုံးပြုခြင်း၊ မှတ်ပုံတင်ထားသည့် ပစ္စည်းများ၏ ကုန်အမှတ်တံဆိပ် သို့မဟုတ် အမျိုးအမည် ပြောင်းလဲခြင်း၊ ပါဝင်မှုပမာဏ ပြောင်းလဲခြင်း၊ အရည်အသွေးအာမခံချက်နှင့် စံချိန်စံညွှန်းပြောင်းလဲခြင်းနှင့် အမျိုးသားအဆင့် ဓာတုပစ္စည်းနှင့် ဆက်စပ်ပစ္စည်းများစာရင်းတွင် မပါရှိသည့်ပစ္စည်းသစ်များ အသုံးပြုရန်ရှိပါက မှတ်ပုံတင်လက်မှတ် ထပ်မံလျှောက်ထားခြင်း၊
- ၄။ လုပ်ငန်းနှင့်စပ်လျဉ်းသည့် အန္တရာယ်များကို တင်ပြခြင်း၊
- ၅။ လုပ်ငန်းလုပ်ကိုင်ရာတွင် အန္တရာယ်ကင်းရှင်းစေရန် ဆောင်ရွက်ထားရှိခြင်း၊
- ၆။ ပတ်ဝန်းကျင်ထိခိုက်မှုမရှိစေရန် စွန့်ပစ်ပစ္စည်းများကို စနစ်တကျသန့်စင်ပြီးမှ စွန့်ပစ်ခြင်း သို့မဟုတ် စနစ်တကျ စုပုံထားခြင်း။



ဓာတုပစ္စည်းနှင့်ဆက်စပ်ပစ္စည်းများအန္တရာယ်မှ
တားဆီးကာကွယ်ရေး
မဟိုကြီးကြပ်ရေးအဖွဲ့

ကုမ္ပဏီ/လုပ်ငန်းအမည် Myanmar Golden Eagle Co.,Ltd.
မှတ်ပုံတင်ခွင့်ပြုသည့် ဓာတုပစ္စည်းနှင့် ဆက်စပ်ပစ္စည်းများအမည်စာရင်း


စဉ်	ဓာတုပစ္စည်းနှင့်ဆက်စပ်ပစ္စည်းအမျိုးအမည်	တစ်နှစ်အသုံးပြုရန် ခန့်မှန်းပမာဏ (ကီလိုဂရမ် သို့မဟုတ် လီတာ)
1.	Soda Ash (Sodium Carbonate)	3,600,000 Kg
2.	Limestone (Calcium Carbonate, Quartz)	1,650,000 Kg
3.	Feldspar	1,500,000 Kg
4.	Sodium Sulphate (Na ₂ SO ₄)	300,000 Kg
5.	Carbon (C)	60,000 Kg
6.	Red Iron Oxide (Fe ₂ O ₃)	45,000 Kg
7.	Brown Aluminium Oxide	6,000 Kg
8.	Glass HTS 250 IS UV	16,000 Kg
9.	Bioglass DLS 67 F	16,000 Kg
10.	Condaglass 370	16,000 Kg
11.	Light Mineral Oil 15 USP	32,000 Lit
12.	Resigraph TW 400	82 Box
13.	Polyethene Wax Emulsion (Bohemi P4218M)	4,800 Kg
14.	Monobutyltin Trichloride (Startin S)	8,000 Kg
15.	Hydrolub HMax 68	3,852 Lit



စဉ်	ဓာတုပစ္စည်းနှင့်ဆက်စပ်ပစ္စည်းအမျိုးအမည်	တစ်နှစ်အသုံးပြုရန် ခန့်မှန်းပမာဏ (ကီလိုဂရမ် သို့မဟုတ် လီတာ)
16.	Condaglass S24	540 Kg
17.	Gear TDM 85W 140	4,300 Lit
18.	Alkaline Cleaner	1,280 Lit

မှတ်ချက်။ လုပ်ငန်းလိုအပ်ချက်အရ တစ်နှစ်အသုံးပြုရန် ခန့်မှန်းပမာဏမှာပြောင်းလဲမှုရှိနိုင်ပါသည်။



 Central Leading Board	ဓာတုပစ္စည်းနှင့်ဆက်စပ်ပစ္စည်းများအန္တရာယ်မှ တားဆီးကာကွယ်ရေး ဗဟိုကြီးကြပ်ရေးအဖွဲ့	ပုံစံ	၈
		ဓာတုပစ္စည်း အရေအတွက်	၅ (မျိုး)
		သက်တမ်း	၂နှစ်

ဓာတုပစ္စည်းနှင့်ဆက်စပ်ပစ္စည်းများ မှတ်ပုံတင်လက်မှတ်

မှတ်ပုံတင်လက်မှတ်အမှတ်စဉ် ၀၀၁၅၈
(နည်းဥပဒေ ၂၇)

ဓာတ်ပုံ

ရက်စွဲ၊ ၂၀၂၂ ခုနှစ်၊ ဧပြီလ ၂၉ ရက်

၁။ ၆-၄-၂၀၂၂ ရက်စွဲပါ လျှောက်လွှာအမှတ် ၀၀၁၈၅၅ ဖြင့်
မှတ်ပုံတင်ခွင့်ပြုရန် လျှောက်ထားသော ဓာတုပစ္စည်းနှင့် ဆက်စပ်ပစ္စည်းများအား မြန်မာနိုင်ငံ အတွင်း
အသုံးပြုရန် မှတ်ပုံတင်ပြီးဖြစ်သည်။

၂။ တာဝန်ခံလျှောက်ထားသူ၏အမည် ဦးကျော်ကျော်စိန်

၃။ နိုင်ငံသားစိစစ်ရေးကတ်ပြားအမှတ် ၁၃/လရန(နိုင်)၀၀၀၄၄၇

 သို့မဟုတ် နိုင်ငံခြားသားမှတ်ပုံတင်အမှတ် _____

၄။ အမြဲတမ်းနေရပ်လိပ်စာ C-1, Zone C, 1st Flr, Golden City Business Center,
Yankin Rd, Yankin Township, Yangon.

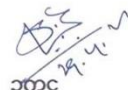
၅။ ဆက်သွယ်ရန်ဖုန်းနံပါတ် သို့မဟုတ် ၀၉ ၄၃၂၀၀၂၀၂ , ၀၉ ၇၇၂၂၀၀၂၀၂
ဖက်စ်(Fax)နံပါတ် သို့မဟုတ် e-mail လိပ်စာ info@myanmarglass.com


၆။ လုပ်ငန်းလိပ်စာ ဖန်ချက်စက်ရုံ(သန်လျင်)၊ သီလဝါလမ်းမကြီး၊
ဘုရားကုန်းရပ်ကွက်၊ သန်လျင်မြို့နယ်၊
ရန်ကုန်တိုင်းဒေသကြီး။

၇။ ဆက်သွယ်ရန်လုပ်ငန်းဖုန်းနံပါတ် သို့မဟုတ် ၀၉ ၄၃၂၀၀၂၀၂ , ၀၉ ၇၇၂၂၀၀၂၀၂
ဖက်စ်(Fax)နံပါတ် သို့မဟုတ် e-mail လိပ်စာ _____

၈။ မှတ်ပုံတင်ခွင့်ပြုသောဓာတုပစ္စည်းနှင့် နောက်ဆက်တွဲပါအတိုင်းဖြစ်ပါသည်။
ဆက်စပ်ပစ္စည်းများ _____
(နောက်ဆက်တွဲစာရင်းအရ) _____

၉။ သက်တမ်းရှည်ခံရန်အတွက် နေ့ရက် ၂၉ - ၄ - ၂၀၂၄


 ဥက္ကဋ္ဌ
 ဗဟိုကြီးကြပ်ရေးအဖွဲ့



စည်းကမ်းချက်များ

မှတ်ပုံတင်လက်မှတ်ရရှိသူသည် အောက်ဖော်ပြပါ စည်းကမ်းချက်များကို လိုက်နာဆောင်ရွက်ရမည်-

- ၁။ ဓာတုပစ္စည်းနှင့်ဆက်စပ်ပစ္စည်းများအန္တရာယ်မှ တားဆီးကာကွယ်ရေးဥပဒေအရ ထုတ်ပြန်သော နည်းဥပဒေ၊ အမိန့်ကြော်ငြာစာ၊ အမိန့်၊ ညွှန်ကြားချက်နှင့် လုပ်ထုံးလုပ်နည်းများပါ စည်းကမ်းချက်များကို လိုက်နာခြင်း၊
- ၂။ မှတ်ပုံတင်ထားသည့်စာရင်းတွင် ပါရှိသော်လည်း အသုံးမပြုလိုသော ပစ္စည်းများရှိပါက ဗဟိုကြီးကြပ်ရေးအဖွဲ့သို့ အသိပေးတင်ပြခြင်း၊
- ၃။ မှတ်ပုံတင်ထားသည့်စာရင်းတွင် မပါရှိသည့်ပစ္စည်းများ အသုံးပြုခြင်း၊ မှတ်ပုံတင်ထားသည့် ပစ္စည်းများ၏ ကုန်အမှတ်တံဆိပ် သို့မဟုတ် အမျိုးအမည် ပြောင်းလဲခြင်း၊ ပါဝင်မှုပမာဏ ပြောင်းလဲခြင်း၊ အရည်အသွေးအာမခံချက်နှင့် စံချိန်စံညွှန်းပြောင်းလဲခြင်းနှင့် အမျိုးသားအဆင့် ဓာတုပစ္စည်းနှင့် ဆက်စပ်ပစ္စည်းများစာရင်းတွင် မပါရှိသည့်ပစ္စည်းသစ်များ အသုံးပြုရန်ရှိပါက မှတ်ပုံတင်လက်မှတ် ထပ်မံလျှောက်ထားခြင်း၊
- ၄။ လုပ်ငန်းနှင့်စပ်လျဉ်းသည့် အန္တရာယ်များကို တင်ပြခြင်း၊
- ၅။ လုပ်ငန်းလုပ်ကိုင်ရာတွင် အန္တရာယ်ကင်းရှင်းစေရန် ဆောင်ရွက်ထားရှိခြင်း၊
- ၆။ ပတ်ဝန်းကျင်ထိခိုက်မှုမရှိစေရန် စွန့်ပစ်ပစ္စည်းများကို စနစ်တကျသန့်စင်ပြီးမှ စွန့်ပစ်ခြင်း သို့မဟုတ် စနစ်တကျ စုပုံထားခြင်း။



ဓာတုပစ္စည်းနှင့်ဆက်စပ်ပစ္စည်းများအန္တရာယ်မှ
တားဆီးကာကွယ်ရေး
ဗဟိုကြီးကြပ်ရေးအဖွဲ့

ကုမ္ပဏီ/လုပ်ငန်းအမည် Myanmar Golden Eagle Co., Ltd.

မှတ်ပုံတင်ခွင့်ပြုသည့် ဓာတုပစ္စည်းနှင့် ဆက်စပ်ပစ္စည်းများအမည်စာရင်း

စဉ်	ဓာတုပစ္စည်းနှင့်ဆက်စပ်ပစ္စည်းအမျိုးအမည်	တစ်နှစ်အသုံးပြုရန် ခန့်မှန်းပမာဏ (ကီလိုဂရမ် သို့မဟုတ် လီတာ)
1.	Index Fluid	20 Lit
2.	Methyl Red	0.025 Kg
3.	Sulfuric Acid	2.5 Lit
4.	Bromonaphthalene	1 Lit
5.	Tetrabromoethane	2 Kg

မှတ်ချက်။ လုပ်ငန်းလိုအပ်ချက်အရ တစ်နှစ်အသုံးပြုရန် ခန့်မှန်းပမာဏမှာပြောင်းလဲမှုရှိနိုင်ပါသည်။



PETROLEUM 12.

Fee Ks 66,000 /-

The Republic of the Union of Myanmar

Ministry of Natural Resources and Environmental Conservation



Department of Mines

Fax & Phone. 067409376

"L" - Licence

(ARTICLE 5 OF SCHEDULE 1)

License to import dangerous petroleum and to store Petroleum in Installations.

Licence No. 221 / 1 / 462 L

Dated 24th Jan, 2017

License is hereby to Glass Factory valid only for the importation of 14,000 Gallons of petroleum in the place described below and shown on the plan attached here to subject to the provisions to the Petroleum Act, 1934 and the rules made there under and to the further condition to the attached of this license.

This licence shall be renewable for one year in the absence of contravention of the provision of the Petroleum Act, 1934, or of the rules framed there under or of any condition of this licence.

This license shall remain in force till the 31st day of December 2017.

Sr.	Description	Capacity in Gallons
1.	Dangerous petroleum in bulk (L.P.G)	(14,000 x 1)
2.	Non- Dangerous petroleum in bulk (H.S.D)	-
	Total	14,000

Khin Latt Gyi
2017/01/24
Khin Latt Gyi
Deputy Director General
Chief Inspector of Explosives

Plan No. 908/221/Approval/1987, dated 5.2.1987
ID- (18.6.1987)

DESCRIPTION OF THE PLACE REFERRED TO ABOVE

The Licensed premises are situated "Glass Factory" Payagone Village, Thanlyin Township, Yangon Region and consist of a gas-tight tank (tanks) of a capacity of 14,000 gallons above ground.

N.B_ Petroleum Rule 107 requires that a copy of the conditions on the back of this license together with a copy of Rules 90 to 106 relating to storage of petroleum shall be exhibited in a conspicuous place in every licensed installation or storage shed. A copy of the above rules and of the conditions are issued free with this license for the above purpose.

This license is liable to be cancelled of the licensed premises when inspected are not found conforming to the description and conditions attached hereto and contravention of any of the rules and conditions under which this license is granted is also punishable with fine which may extend to five hundred kyats for a first offence and which may extend to two thousand kyat's for any subsequent offence.

Date of renewal	Date of expiry	Signature of licensing authority
01 JAN 2018	31 DEC 2018	 Director General
01 JAN 2019	31 DEC 2019	 Director General
01 JAN 2020	31 DEC 2020	 Director General
01 JAN 2021	31 DEC 2021	 Director General
01 JAN 2022	31 DEC 2022	 Director General

(Note – Conditions are attached)

PETROLEUM 12.

Fee Ks 1,470,000 /-

The Republic of the Union of Myanmar

Ministry of Natural Resources and Environmental Conservation



Department of Mines

Fax & Phone .067409376

"L" - Licence

(ARTICLE 5 OF SCHEDULE 1)

License to import dangerous petroleum and to store Petroleum in Installations.

Licence No. 221 / 1 / 40 L

Dated 24th Jan , 2017

License is hereby to ~~...Glass Factory...~~ valid only for the importation of ~~302,000~~ Gallons of petroleum in the place described below and shown on the plan attached here to subject to the provisions to the Petroleum Act, 1934 and the rules made there under and to the further condition to the attached of this license.

This licence shall be renewable for ~~one~~ year in the absence of contravention of the provision of the Petroleum Act, 1934, or of the rules framed there under or of any condition of this licence.

This license shall remain in force till the 31st day of December 2017.

Sr.	Description	Capacity in Gallons
1.	Dangerous petroleum in bulk (M.S)	-
2.	Non- Dangerous petroleum in bulk (H.S.D/F.O)	(52,000 x 1) + (250,000 x 1)
	Total	302,000

Khin Latt Gyi
23/1/2017
Khin Latt Gyi
Deputy Director General
Chief Inspector of Explosives

ID- (24.4.1969)

DESCRIPTION OF THE PLACE REFERRED TO ABOVE

The Licensed premises are situated ...Glass Factory" Payagone Village, Thanlyin Township, Yangon Region, and consist of a gas-tight tank (tanks) of a capacity of 302,000 gallons above ground.

N.B_ Petroleum Rule 107 requires that a copy of the conditions on the back of this license together with a copy of Rules 90 to 106 relating to storage of petroleum shall be exhibited in a conspicuous place in every licensed installation or storage shed. A copy of the above rules and of the conditions are issued free with this license for the above purpose.

This license is liable to be cancelled of the licensed premises when inspected are not found conforming to the description and conditions attached hereto and contravention of any of the rules and conditions under which this license is granted is also punishable with fine which may extend to five hundred kyats for a first offence and which may extend to two thousand kyat's for any subsequent offence.

Date of renewal	Date of expiry	Signature of licensing authority
01 JAN 2018	31 DEC 2018	 Director General
01 JAN 2019	31 DEC 2019	 Director General
01 JAN 2020	31 DEC 2020	 Director General
01 JAN 2021	31 DEC 2021	 Director General
01 JAN 2022	31 DEC 2022	 Director General

(Note – Conditions are attached)



Form (3)
P000373

THE REPUBLIC OF THE UNION OF MYANMAR

Myanmar Investment Commission


PERMIT

Permit No. 329/2021 Date 26 May 2021

This Permit is issued by the Myanmar Investment Commission in accordance with Section 25 (c) of the Myanmar Investment Law.

- (1) Investor Name U KYAW KYAW SEIN
- (2) Citizenship MYANMAR
- (3) Residential Address C-1, Zone-C, 1ST FLOOR, GOLDEN CITY BUSINESS CENTRE, YANKIN ROAD, YANKIN TOWNSHIP, YANGON
- (4) Name and Address of Principal Organization MYANMAR GOLDEN EAGLE COMPANY LIMITED, PLOT NO.97, PHAYAR KONE VILLAGE AND A LWAN SWAT VILLAGE, THANLYN TOWNSHIP, YANGON REGION
- (5) Place of Incorporation MYANMAR
- (6) Type of Business PRODUCTION, DISTRIBUTION AND SALES OF GLASS BOTTLES
- (7) Place(s) of Investment Project PLOT NO.97, PHAYAR KONE VILLAGE AND A LWAN SWAT VILLAGE, THANLYN TOWNSHIP, YANGON REGION
- (8) Foreign Capital Amount US\$ 31.02 MILLION
- (9) Period for Foreign Capital to be brought in WITHIN TWO YEARS FROM THE DATE OF ISSUANCE OF MIC PERMIT
- (10) Total Amount of Capital (Kyat) EQUIVALENT IN KYAT OF US\$ 37 MILLION (INCLUDING US\$ 31.02 MILLION)
- (11) Construction/Preparation Period 2 YEARS
- (12) Validity of Permit 50 YEARS
- (13) Form of Investment JOINT VENTURE
- (14) Name of Company Incorporated in Myanmar MYANMAR GOLDEN EAGLE COMPANY LIMITED




Chairman
Myanmar Investment Commission



ပုံစံ (၃)

ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်
မြန်မာနိုင်ငံရင်းနှီးမြှုပ်နှံမှုကော်မရှင်
ခွင့်ပြုမိန့်

ခွင့်ပြုမိန့်အမှတ် ၃၂၉/၂၀၂၁

၂၀၂၁ ခုနှစ်၊ မေလ ၁၆ ရက်

မြန်မာနိုင်ငံရင်းနှီးမြှုပ်နှံမှုကော်မရှင်သည် မြန်မာနိုင်ငံရင်းနှီးမြှုပ်နှံမှုဥပဒေ ပုဒ်မ ၂၅ (ဂ)
အရ ဤခွင့်ပြုမိန့်ကိုထုတ်ပေးလိုက်သည် -

- (၁) ရင်းနှီးမြှုပ်နှံသူအမည် ဦးကျော်ကျော်စိန်
- (၂) နိုင်ငံသား မြန်မာ
- (၃) နေရပ်လိပ်စာ စီ-၁၊ ဇုန်-စီ၊ ပထမထပ်၊ GOLDEN CITY BUSINESS CENTRE၊ ရန်ကင်းလမ်း၊ ရန်ကင်းမြို့နယ်၊ ရန်ကုန်မြို့
- (၄) ပင်မအဖွဲ့အစည်းအမည်နှင့်လိပ်စာ MYANMAR GOLDEN EAGLE COMPANY LIMITED၊ ဦးပိုင်အမှတ်-၉၇၊ ဘုရားကုန်းကျေးရွာနှင့် အလွမ်းဆွတ်ကျေးရွာ၊ သန်လျင်မြို့နယ်၊ ရန်ကုန်တိုင်းဒေသကြီး
- (၅) ဖွဲ့စည်းရာအရပ် မြန်မာနိုင်ငံ
- (၆) ရင်းနှီးမြှုပ်နှံသည့်လုပ်ငန်းအမျိုးအစား ဖန်ပုလင်းအမျိုးမျိုးထုတ်လုပ်ရောင်းချခြင်းလုပ်ငန်း
- (၇) ရင်းနှီးမြှုပ်နှံသည့်အရပ်ဒေသ(များ) ဦးပိုင်အမှတ်-၉၇၊ ဘုရားကုန်းကျေးရွာနှင့် အလွမ်းဆွတ်ကျေးရွာ၊ သန်လျင်မြို့နယ်၊ ရန်ကုန်တိုင်းဒေသကြီး
- (၈) နိုင်ငံခြားမတည်ငွေရင်းပမာဏ အမေရိကန်ဒေါ်လာ ၃၁.၀၂ သန်း
- (၉) နိုင်ငံခြားမတည်ငွေရင်းယူဆောင်လာရမည့်ကာလ ခွင့်ပြုမိန့်ရသည့်နေ့မှ ၂ နှစ်အတွင်း
- (၁၀) စုစုပေါင်းမတည်ငွေရင်းပမာဏ(ကျပ်) အမေရိကန်ဒေါ်လာ ၃၇၀ သန်းနှင့် ညီမျှသော မြန်မာကျပ်ငွေ(အမေရိကန် ဒေါ်လာ ၃၁.၀၂ သန်း အပါအဝင်)
- (၁၁) တည်ဆောက်မှု/ပြင်ဆင်မှုကာလ ၂ နှစ်
- (၁၂) ရင်းနှီးမြှုပ်နှံမှုခွင့်ပြုသည့်သက်တမ်း ၅၀ နှစ်
- (၁၃) ရင်းနှီးမြှုပ်နှံမှုပုံစံ ဖက်စပ်နိုင်ငံခြားရင်းနှီးမြှုပ်နှံမှု
- (၁၄) မြန်မာနိုင်ငံတွင် ဖွဲ့စည်းမည့် ကုမ္ပဏီအမည်

MYANMAR GOLDEN EAGLE COMPANY LIMITED

(Handwritten signature and name)

ဥက္ကဋ္ဌ
မြန်မာနိုင်ငံရင်းနှီးမြှုပ်နှံမှုကော်မရှင်

3/30/2021



**The Government of The Republic of the Union of Myanmar
Ministry of Commerce
Department of Trade**

CERTIFICATE OF EXPORTER/IMPORTER REGISTRATION

1. Enterprise Name: MYANMAR GOLDEN EAGLE COMPANY LIMITED.
2. Registration No: 110074506(07/06/2016)
3. Registration Term: Five Year
4. Start Date: 02/06/2021
5. End Date: 01/06/2026
6. Address: C1,ZONE C,1ST FLOOR,, Yankin Road, Golden City Business Center,Yankin Township,
Yangon Region, MYANMAR
7. Business Registration No : 110074506(02/06/2016)
8. Type of Business : Trading (Myanmar Company)
9. Type of Service : Amend
10. Contact No :
+95-1-2315956,+95-1-2315954,+95-9-30926607 +95-1-2315289 myanmargoldeneagle2017@gmail.com
Telephone No. Fax No. E-mail

11. Remarks : -

12. Terms and Conditions :

I hereby register the above mentioned enterprise as Exporter/Importer subject to the following terms and conditions:

- (a) Line of goods permitted - all items except prohibited and restricted items.
- (b) The enterprise must abide by the Export/Import rules and Regulations prescribed for the registered Exporters/Importers.



**Thaung Naing
(Director)**

OAPTK-00901-2021

APPENDIX B
Transitional Consultant Registration Certificate of TBS Co., Ltd.



THE REPUBLIC OF THE UNION OF MYANMAR
Ministry of Natural Resources and Environmental Conservation



CERTIFICATE FOR TRANSITIONAL CONSULTANT REGISTRATION
(ကြားကာလအကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်းအထောက်အထားလက်မှတ်)

No. 00010 Date 31 JAN 2023

The Ministry of Natural Resources and Environmental Conservation, hereby, issues this certificate to the organization under Environmental Impact Assessment Procedure, Notification No. 616/2015. (ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း၊ အမိန့်ကြော်ငြာစာအမှတ်၊ ၆၁၆/၂၀၁၅ အရ သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာနသည် ဤအထောက်အထားလက်မှတ်ကို ထုတ်ပေးလိုက်သည်။)

- (a) Name of Organization (အဖွဲ့အစည်းအမည်) Total Business Solution Co., Ltd
- (b) Name of the representative in the organization (အဖွဲ့အစည်းကိုယ်စားလှယ်၏အမည်) Dr. Soe Moe Kyaw Win
- (c) Citizenship of the representative in the organization (အဖွဲ့အစည်းကိုယ်စားလှယ်၏နိုင်ငံသား) Myanmar
- (d) Identity Card /Passport Number of the representative person in the organization (အဖွဲ့အစည်းကိုယ်စားလှယ်၏ မှတ်ပုံတင်/ နိုင်ငံကူးလက်မှတ် အမှတ်) 12/SaKhaNa (N) 057507
- (e) Address of organization (ဆက်သွယ်ရန်လိပ်စာ) No. 54, Room No. 704, Waizayantar Tower, Waizayantar Road, Thingangyun Township, Yangon.
Telephone (office): 09 253556719
E mail: tbs.myanmar@gmail.com, praneet.tbs@gmail.com
- (f) Type of Consultancy (အကြံပေးလုပ်ကိုင်မှုအမျိုးအစား) Organization
- (g) Duration of validity (သက်တမ်းကုန်ဆုံးရက်) 30th June, 2023.

EXTENSION
သက်တမ်းတိုးမြှင့်ခြင်း
The VALIDITY of this certificate is extended for two months from (1.7.2023) to (31.8.2023)
ဤလက်မှတ်အား (၁-၇-၂၀၂၃) ရက်နေ့မှ (၃၁-၈-၂၀၂၃) ရက်နေ့အထိ (၂)လ သက်တမ်းတိုးမြှင့်သည်။
For Director General (Sa Aung Thu, Director) Environmental Conservation Department



(Signature)
Director General

Environmental Conservation Department
Ministry of Natural Resources and Environmental Conservation

ဤအထောက်အထားလက်မှတ်သည် ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်းနှင့် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းပြုလုပ်သည့် တတိယပုဂ္ဂိုလ် သို့မဟုတ် အဖွဲ့အစည်းများလုပ်ငန်းလိုင်စင်ဆိုင်ရာ လုပ်ထုံးလုပ်နည်း ထုတ်ပြန်သည့်ရက်မှစ၍ (၆) လ ပြည့်မြောက်သည့်နေ့တွင် ပျက်ပြယ်မည် ဖြစ်သည်။

Areas of Expertise Permitted (ခွင့်ပြုသည့် ကျွမ်းကျင်မှုနယ်ပယ်များ)

- | | |
|---------------------------|---|
| 1. Geology and Soil; | 2. Risk Assessment and Hazard Management; |
| 3. Air Pollution Control; | 4. Water Pollution Control; |
| 5. Waste Management; | 6. Facilitation of Meeting. |
| 7. | 8. |
| 9. | 10. |
| 11. | 12. |
| 13. | 14. |

စည်းကမ်းချက်များ

- ၁။ ကြားကာလအကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်းအထောက်အထားလက်မှတ်ရရှိသူသည်-
- (က) ဤအထောက်အထားလက်မှတ်ကို ဖျက်ဆီးခြင်း၊ ပြင်ဆင်ခြင်း၊ မသက်ဆိုင်သူတစ်ဦးဦးသို့ ငှားရမ်းခြင်း၊ အမည်ခံ အသုံးပြုစေခြင်းနှင့် တစ်ဆင့်လွှဲပြောင်းကိုင်ဆောင်စေခြင်းမပြုရ။
 - (ခ) ဤအထောက်အထားလက်မှတ်ကို သတ်မှတ်သည့် စည်းကမ်းတောင်းအတွင်း လုပ်ငန်းလုပ်ကိုင်ခွင့် အငြင်းပွားမှုများ၊ စောဒကတက်မှုများနှင့်စပ်လျဉ်း၍ တာဝန်ယူဖြေရှင်းရမည်။ ယင်းသို့ ဖြေရှင်းနိုင်ခြင်း မရှိပါက အထောက်အထားလက်မှတ် ရုပ်ဆိုင်းခြင်း သို့မဟုတ် ပယ်ဖျက်ခြင်း ခံရမည်။
 - (ဂ) ဤအထောက်အထားလက်မှတ်တွင် ခွင့်ပြုထားသည့် ကျွမ်းကျင်မှုနယ်ပယ်များအတွက်သာ တာဝန်ယူ လေ့လာဆန်းစစ်ရေးဆွဲခွင့်ရှိသည်။
 - (ဃ) မိမိအဖွဲ့အစည်းတွင် ပါဝင်သည့် အကြံပေးပုဂ္ဂိုလ်များ ပြောင်းလဲမှု တစ်စုံတစ်ရာရှိပါက ကြားကာလ အကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်း အထောက်အထားလက်မှတ် ရရှိထားသူဖြင့်သာ အစားထိုး ပြောင်းလဲရမည်။
 - (င) အဖွဲ့အစည်းဖြစ်ပါက အဖွဲ့အစည်းတွင် ဒါရိုက်တာဘုတ်အဖွဲ့ (Board of Director)၊ အကြံပေးပုဂ္ဂိုလ် (Consultant) များ ပြောင်းလဲလိုလျှင် တည်ဆဲဥပဒေများနှင့်အညီ ဆောင်ရွက်ပြီး ရက်ပေါင်း ၃၀ အတွင်း ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနသို့ မပျက်မကွက် အကြောင်းကြားရမည်။
 - (စ) ဝန်ကြီးဌာနက အခါအားလျော်စွာ သတ်မှတ်သည့် စည်းကမ်းချက်များကိုလိုက်နာရမည်။
 - (ဆ) ဖော်ပြပါ စည်းကမ်းချက်တစ်ရပ်ရပ်ကို ဖောက်ဖျက်ခြင်း၊ လိုက်နာရန်ပျက်ကွက်ခြင်း တစ်စုံတစ်ရာ ပေါ်ပေါက်ပါက အထောက်အထားလက်မှတ် ရုပ်ဆိုင်းခြင်း သို့မဟုတ် ပယ်ဖျက်ခြင်း ခံရမည်။
- ၂။ အထောက်အထားလက်မှတ်ရရှိသူသည် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနက ခွင့်ပြုထားသော ပတ်ဝန်းကျင် ဆန်းစစ်ခြင်းအမျိုးအစားကိုသာ ဆောင်ရွက်ရမည်။
- ၃။ အထောက်အထားလက်မှတ်ရရှိသူသည် မြန်မာနိုင်ငံ၏ တည်ဆဲဥပဒေတစ်ရပ်ရပ်ကို ဖောက်ဖျက်ကြောင်း သို့မဟုတ် ဆန်းစစ်ခြင်းလုပ်ငန်းများ ဆောင်ရွက်ရာတွင် သိသာထင်ရှားသော မှားယွင်းမှုများ ပါရှိနေပြီး သတ်မှတ် စံချိန်စံညွှန်း သို့မဟုတ် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဥပဒေ၊ နည်းဥပဒေများ၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းမှု ဆန်းစစ်ခြင်း ဆိုင်ရာ လုပ်ထုံးလုပ်နည်းတို့အရ စိစစ်သုံးသပ်ပြီး ကနဦးသဘောထားမှတ်ချက်နှင့်အညီ ပြန်လည်ပြင်ဆင်ခြင်း မရှိကြောင်း ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၏ သတ်မှတ်ဆုံးဖြတ်ခြင်းခံရလျှင် အထောက်အထားလက်မှတ် ရုပ်ဆိုင်းခြင်း သို့မဟုတ် ပယ်ဖျက်ခြင်း ခံရမည်။
- ၄။ အထောက်အထားလက်မှတ်ရရှိသော အဖွဲ့အစည်းသည် သက်ဆိုင်ရာစီမံကိန်းအတွက် လေ့လာဆန်းစစ်ရေးဆွဲ ဆောင်ရွက်ရန် တတိယအဖွဲ့အစည်းအတည်ပြုချက်ရယူရာ၌ မိမိအဖွဲ့အစည်းတွင် မှတ်ပုံတင်ထားသည့် အကြံပေး ပုဂ္ဂိုလ်များ၏ အမည်စာရင်းကိုသာ တင်ပြရမည်။
- ၅။ အထောက်အထားလက်မှတ်ရရှိသော အဖွဲ့အစည်းသည် မိမိအဖွဲ့အစည်းက လက်လှမ်းမမီသော ကျွမ်းကျင်မှု နယ်ပယ်များအတွက် လေ့လာဆန်းစစ်ရေးဆွဲ ဆောင်ရွက်နိုင်ရန် ကြားကာလအကြံပေးလုပ်ကိုင်သူ မှတ်ပုံတင်ခြင်း အထောက်အထားလက်မှတ် ရရှိပြီးဖြစ်သည့် တစ်သီးပုဂ္ဂလလုပ်ကိုင်သူ (Freelancer) ကို သက်ဆိုင်ရာစီမံကိန်း အတွက်သာ ငှားရမ်းဆောင်ရွက်ရမည်။

(၁.၁.၂၀၂၃) မှ (၃၀.၆.၂၀၂၃) အထိ သက်တမ်းတိုးရန် ပါဝင်သည့် Total Business
Solution Company Limited အဖွဲ့တွင် ပါဝင်သည့် အဖွဲ့ဝင်စာရင်း

သက်တမ်းတိုးထုတ်ပေးသည့် ရက်စွဲ။ ၃၁-၁-၂၀၂၃

No.	Members	Remarks
1.	Mr. Praneet Prasongnitjakit	ကုမ္ပဏီမှ နှုတ်ထွက်ထား
2.	Dr. Hpone Myint	ကုမ္ပဏီမှ နှုတ်ထွက်ထား
3.	Mr. Aung Nyein Chan	ကုမ္ပဏီမှ နှုတ်ထွက်ထား
4.	Mr. Lin Htet Sein	ကုမ္ပဏီမှ နှုတ်ထွက်ထား
5.	Dr. Soe Moe Kyaw Win	အဖွဲ့ဝင်အသစ်
6.	U Myat Thu Kyaw	အဖွဲ့ဝင်အသစ်
7.	Daw Hnin Lai Win	အဖွဲ့ဝင်အသစ်
8.	Daw Phoo Pwint Khine	အဖွဲ့ဝင်အသစ်
9.	Daw Aye Mon Aung	အဖွဲ့ဝင်အသစ်
10.	Daw Kyi Phyu Khin	အဖွဲ့ဝင်အသစ်
11.	U Htet Thiha Phone Myint	အဖွဲ့ဝင်အသစ်
12.	U Wai Phyo Aung	အဖွဲ့ဝင်အသစ်
13.	U Zaw Myo Hein	အဖွဲ့ဝင်အသစ်



APPENDIX C
Material Safety Data Sheet of Raw Materials



บริษัท สยามโตชู จำกัด
TOCHU THAILAND CO., LTD.
388 M.6, Niyom-Klorngsuan Rd., Klongniyomyatra,
Bangoo, Samutprakran 10560, Thailand
Tel. +66 (0) 2317-5381-8 Fax. +66 (0) 2317-5151
<http://www.tochuthailand.com>

Material Safety Data Sheet

Product Name (Chemical Name, etc.)	Brown Aluminium Oxide	
Harmonized System Code	28181010.00	
Characteristics	Single product or compound:	Single product
	Chemical name:	Aluminum Oxide
	Composition & Content:	Central value Al ₂ O ₃ 94.5% TiO ₂ 1.5-3.8% Fe ₂ O ₃ ≤0.25% SiO ₂ ≤1.2%
	Chemical or structural formula:	Al ₂ O ₃
	File No. in Official Gazette:	
	(Chemical Substances Control Law, Safety and Chemical Substances Control Law: (1)-(23)	
	CAS No 1344-28-1 UN Classification & No. Not applicable	
Hazardous and Harmful Material Classification	Classification:	Dust
	Hazard:	Not hazardous
	Harmful:	Being small dust-like particles, the material scatters easily. Continuous inhalation is detrimental to lung function.
	Environmental impact:	No impact
First-aid Action	In the eyes: Do not rub the affected eye or close it tight, flush eyes with large amount of water. If irritation persists, get medical attention. Contact with the skin: Wash off thoroughly with soap and water. Inhalation: If there is gross inhalation of dust causing coughing and shortness of breath, remove victim to fresh air. If breathing has stopped, perform artificial respiration, seek medical attention. Swallowed: Rinse mouth thoroughly. Induce vomiting by inserting a finger in the throat. If large amounts are swallowed, arrange for immediate examination by a physician.	
Actions in case of Fire	Extinguishing method:	N/A, will not burn.
	Extinguishing agent:	Will not burn. May be used to extinguish fires.
Actions in case of Leakage	Small amounts:	Suction with a vacuum cleaner, etc.
	Large amounts:	Cover the area to prevent scattering. Reuse or dispose of after collecting in a drum or can, etc.
Handling and Storage Precautions	Handling:	Take precautions not to inhale the dust.
	Storage:	Store indoors to prevent absorption of moisture.



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Measures to prevent Exposure	Manageable	3.95mg/m ³
	Concentration:	
Physical & Chemical Properties	Allowable	Set by Japan Society for Occupational Health (1993): Inhaled Dust Volume 1mg/m ³ (Class 2 Dust) Total Dust Volume 4mg/m ³ (Class 2 Dust) ACGIH (1993~1994 version): 10mg/m ³ (TWA)
	Facilities:	The material is a dust which scatters easily. Provide local ventilation.
	Protective Gear	Respiratory protection: Anti-dust mask Goggles: Goggles Protective gloves: Rubber gloves Protective Clothing: General work clothes
	Appearance:	Gray
	BP:	N/A
	Vapor Pressure:	N/A
Hazard Data (Stability/Reactivity)	Volatility: - PH	7.6
	MP:	2040°C
	Specific Density:	3.95g/cm ³
	Initial Boiling Point:	N/A
Harm data (including Cases of harm to the human body, epidemiological data)	Solubility in water:	Insoluble
	Firing Point:	N/A
	Ignition Point:	N/A
	Explosion Limit: upper limit (-%) lower limit (-%)	
	Inflammability:	Will not burn
	Natural Ignition, Reaction with Water:	None
	Oxidizing Quality:	N/A
	Self Reactive/Explosive:	None
	Dust Explosion:	None
	Stability/Reactivity:	Inactive and stable
Others:	-	
Harm data (including Cases of harm to the human body, epidemiological data)	Skin corrosivity:	No data
	Skin/Eye Irritability:	Repeated contact may irritate sensitive skin. May cause inflammation of the ear if exposed. Provide measures to prevent this.
	Sensitizing:	No data
	Acute Toxicity (incl. 50% lethal dose):	No data
	Sub-acute Toxicity:	No data
	Chronic Toxicity:	No data
	Carcinogenicity:	Data uncertain
	Mutagenicity (microorganism, chromosome disorder):	No data
	Reproductive Toxicity:	No data
	Teratogenicity:	No data
Others (Reacts with water to produce harmful gas, etc.):	No data	



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Environmental Impact Data	Degradability: No data Cumulation: No data Ichthyotoxicity: No data Others: -
Disposal precautions	Treat as industrial waste sludge.
Applicable Laws & Regulations	Regulations on Preventing Dust-related Disorders (Sep. 1, 1988, Ministry of Labor Ordinance #26) Ministerial Ordinance for the Execution of Pneumoconiosis Act (Jan. 14, 1985, Ministry of Labor Ministerial Ordinance #2
Others	The manufacturer does not guarantee the content data and physical/chemical properties. This product does not contain Class 1 and Class 2 Specified Chemical Material according to PRTR Act.



SAFETY DATA SHEET

Product : **GEAR TDM 85W140**
Code : C01474 Version : 6.0 Revision : 04-November-2020

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Trade name or designation of the mixture GEAR TDM 85W140
Registration number -
Synonyms None.
Product code C01474

1.2. Relevant identified uses of the substance or mixture and uses advised against

Identified uses See Technical Data Sheet.
Uses advised against Not available.

1.3. Details of the supplier of the safety data sheet

Supplier

Company name CONDAT
Address Avenue Frédéric Mistral - B.P. 16
38670 CHASSE-SUR-RHONE
FR
Division Products Regulatory Affairs Department
Telephone Tel.: 33 (0)4 78.07.38.38
Fax: 33 (0)4 78.07.38.00
e-mail arp@condat.fr
Contact person Products Regulatory Affairs Department
1.4. Emergency telephone number Emergency Tel. (Office hours): 33 (0) 4 78 07 37 18

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

The mixture has been assessed and/or tested for its physical, health and environmental hazards and the following classification applies.

Classification according to Regulation (EC) No 1272/2008 as amended

Health hazards
Skin sensitisation Category 1 H317 - May cause an allergic skin reaction.

2.2. Label elements

Label according to Regulation (EC) No. 1272/2008 as amended

Contains: Reaction products of bis(4-methylpentan-2-yl)dithiophosphoric acid with phosphorus oxide, propylene oxide and amines, C12-14 alkyl (branched)

Hazard pictograms



Signal word Warning

Hazard statements
H317 May cause an allergic skin reaction.

Precautionary statements

Prevention
P261 Avoid breathing mist/vapours.



SAFETY DATA SHEET

Product : **GEAR TDM 85W140**
Code : C01474 Version : 6.0 Revision : 04-November-2020

P280 Wear protective gloves.
Response
P302 + P352 IF ON SKIN: Wash with plenty of water.
P363 Wash contaminated clothing before reuse.
Storage
Store away from incompatible materials.
Disposal
P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

Supplemental label information

2.3. Other hazards This mixture does not meet vPvB / PBT criteria of Regulation (EC) No 1907/2006, Annex XIII.

SECTION 3: Composition/information on ingredients

3.2. Mixtures

General information

Chemical name	%	CAS-No. / EC No.	REACH Registration No.	Index No.	Notes
Reaction products of bis(4-methylpentan-2-yl)dithiophosphoric acid with phosphorus oxide, propylene oxide and amines, C12-14 alkyl (branched)	1 - < 3	N/D 931-384-6	01-2119493620-38-xxxx	-	-
Classification:	Acute Tox. 4;H302, Skin Sens. 1;H317, Eye Dam. 1;H318, Aquatic Chronic 2;H411				
9-Octadecen-1-amine, (9Z)-	< 1	112-90-3 204-015-5	-	612-283-00-3	-
Classification:	Acute Tox. 4;H302, Asp. Tox. 1;H304, Skin Corr. 1B;H314, Eye Dam. 1;H318, STOT SE 3;H335, STOT RE 2;H373, Aquatic Acute 1;H400(M=10), Aquatic Chronic 1;H410(M=10)				

List of abbreviations and symbols that may be used above

CLP: Regulation No. 1272/2008. "-" = Not available or this substance does not meet the criteria for classification according to Regulation (EC) 1272/2008 as amended.

#: This substance has been assigned Union workplace exposure limit(s).

M: M-factor

PBT: persistent, bioaccumulative and toxic substance.

vPvB: very persistent and very bioaccumulative substance.

All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

Composition comments Occupational Exposure Limits for constituents are listed in Section 8. The full text for all H-statements is displayed in section 16.

- Contains : Mineral oil
DMSO Extract < 3% according to IP 346 Method.

SECTION 4: First aid measures

General information

Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Wash contaminated clothing before reuse.

4.1. Description of first aid measures

Inhalation

Move to fresh air. Call a physician if symptoms develop or persist.



SAFETY DATA SHEET

Product : **GEAR TDM 85W140**
Code : C01474 Version : 6.0 Revision : 04-November-2020

Skin contact Remove contaminated clothing immediately and wash skin with soap and water. In case of eczema or other skin disorders: Seek medical attention and take along these instructions.

Eye contact Rinse with water. Get medical attention if irritation develops and persists.

Ingestion Rinse mouth thoroughly. If swallowed, do NOT induce vomiting. Get medical attention if symptoms occur.

4.2. Most important symptoms and effects, both acute and delayed Frequent or prolonged contact may defat and dry the skin, leading to discomfort and dermatitis. May cause an allergic skin reaction. Dermatitis. Rash.

4.3. Indication of any immediate medical attention and special treatment needed Provide general supportive measures and treat symptomatically. Keep victim under observation. Symptoms may be delayed.

SECTION 5: Firefighting measures

General fire hazards Will burn if involved in a fire. No unusual fire or explosion hazards noted.

5.1. Extinguishing media

Suitable extinguishing media Foam. Dry chemicals. Carbon dioxide (CO₂). Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media Do not use water jet as an extinguisher, as this will spread the fire.

5.2. Special hazards arising from the substance or mixture See also section 10.

5.3. Advice for firefighters

Special protective equipment for firefighters Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

Special fire fighting procedures In case of fire and/or explosion do not breathe fumes. Cool containers exposed to heat with water spray and remove container, if no risk is involved.

Specific methods In the event of fire and/or explosion do not breathe fumes.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

For non-emergency personnel Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Avoid breathing mist/vapours. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.

For emergency responders Keep unnecessary personnel away. Use personal protection recommended in Section 8 of the SDS.

6.2. Environmental precautions Local authorities should be advised if significant spillages cannot be contained. Avoid discharge into drains, water courses or onto the ground.

6.3. Methods and material for containment and cleaning up The product is immiscible with water and will spread on the water surface.

Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Absorb in vermiculite, dry sand or earth and place into containers.

Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination.

Never return spills to original containers for re-use.

SDS UK 3 / 9

Quick-FDS [19394-39543-18500-012323] - 2021-02-04 - 10:59:03



SAFETY DATA SHEET

Product : **GEAR TDM 85W140**
Code : C01474 Version : 6.0 Revision : 04-November-2020

6.4. Reference to other sections For personal protection, see section 8 of the SDS. For waste disposal, see section 13 of the SDS.

SECTION 7: Handling and storage

7.1. Precautions for safe handling Avoid breathing mist/vapours. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated contact with skin. Avoid prolonged exposure. Wear appropriate personal protective equipment. Observe good industrial hygiene practices. Wash hands after handling. Handle in accordance with good industrial hygiene and safety practices. Adequate ventilation should be provided so that exposure limits are not exceeded.

7.2. Conditions for safe storage, including any incompatibilities Keep away from heat and sources of ignition. Store in closed original container in a dry place. Store away from incompatible materials (see Section 10 of the SDS).

7.3. Specific end use(s) Not available.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits No exposure limits noted for ingredient(s).

Biological limit values No biological exposure limits noted for the ingredient(s).

Recommended monitoring procedures Follow standard monitoring procedures.

Derived no effect levels (DNELs) Not available.

Predicted no effect concentrations (PNECs) Not available.

8.2. Exposure controls

Appropriate engineering controls Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Ensure adequate ventilation, especially in confined areas.

Individual protection measures, such as personal protective equipment

General information Personal protection equipment should be chosen according to the CEN standards and in discussion with the supplier of the personal protective equipment.

Eye/face protection Wear safety glasses with side shields (or goggles). Face shield is recommended.

Skin protection

- Hand protection Use protective gloves made of: Nitrile. Polyvinyl chloride (PVC).

- Other Wear appropriate chemical resistant clothing. Use of an impervious apron is recommended.

Respiratory protection In case of insufficient ventilation, wear suitable respiratory equipment.

Thermal hazards Wear appropriate thermal protective clothing, when necessary.

Hygiene measures Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Contaminated work clothing should not be allowed out of the workplace.

Environmental exposure controls Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. Fume scrubbers, filters or engineering modifications to the process equipment may be necessary to reduce emissions to acceptable levels.

SDS UK 4 / 9

Quick-FDS [19394-39543-18500-012323] - 2021-02-04 - 10:59:03



SAFETY DATA SHEET

Product : **GEAR TDM 85W140**
Code : C01474 Version : 6.0 Revision : 04-November-2020

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance

Physical state	Liquid.
Form	Liquid.
Colour	Red.
Odour	Oily.
Odour threshold	Not available.
pH	Not applicable.
Melting point/freezing point	Not available.
Initial boiling point and boiling range	Not available.
Flash point	> 200.0 °C (> 392.0 °F) Open cup
Evaporation rate	Not available.
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Vapour pressure	Not available.
Vapour density	Not available.
Relative density	0.887 g/cm ³
Relative density temperature	15 °C (59 °F)
Solubility(ies)	
Solubility (water)	Insoluble.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	389 mm ² /s
Viscosity temperature	40 °C (104 °F)
Explosive properties	Not available.
Oxidising properties	Not oxidising.
9.2. Other information	
pH in aqueous solution	Not applicable.
Pour point	-15 °C (5 °F)

SECTION 10: Stability and reactivity

10.1. Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
10.2. Chemical stability	Material is stable under normal conditions.
10.3. Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.
10.4. Conditions to avoid	Avoid temperatures exceeding the decomposition temperature. Avoid temperatures exceeding the flash point. Contact with incompatible materials.

SDS UK 5 / 9

Quick-FDS [19394-39543-18500-012323] - 2021-02-04 - 10:59:03



SAFETY DATA SHEET

Product : **GEAR TDM 85W140**
Code : C01474 Version : 6.0 Revision : 04-November-2020

10.5. Incompatible materials Strong oxidising agents.
10.6. Hazardous decomposition products Carbon oxides. Phosphorus compounds. Sulphur compounds.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity Elevated temperatures or mechanical action may form vapours, mist, or fumes which may be irritating to the eyes, nose, throat, or lungs. Ingestion of large amounts may produce gastrointestinal disturbances including irritation, nausea, and diarrhoea.

Skin corrosion/irritation Frequent or prolonged contact may defat and dry the skin, leading to discomfort and dermatitis.

Serious eye damage/eye irritation Not classified.

Respiratory sensitisation Not classified.

Skin sensitisation May cause an allergic skin reaction.

Germ cell mutagenicity Not classified.

Carcinogenicity Not classified.

Reproductive toxicity Not classified.

Specific target organ toxicity - single exposure Not classified.

Specific target organ toxicity - repeated exposure Not classified.

Aspiration hazard Not classified.

Mixture versus substance information No information available.

Other information Not available.

SECTION 12: Ecological information

12.1. Toxicity Based on available data, the classification criteria are not met for hazardous to the aquatic environment.

Components	Species	Test Results
9-Octadecen-1-amine, (9Z)- (CAS 112-90-3)		
Aquatic		
<i>Acute</i>		
Algae	EC50	Algae > 0.1 mg/l, 72 Hours
Crustacea	EC50	Daphnia 0.011 mg/l, 48 Hours
Fish	LC50	Fish 1.3 mg/l, 96 Hours
		0.9 mg/l, 96 Hours
<i>Chronic</i>		
Crustacea	NOEC	Daphnia 0.013 mg/l, 21 days

12.2. Persistence and degradability No data is available on the degradability of this product.

12.3. Bioaccumulative potential No data available.

Partition coefficient n-octanol/water (log Kow) Not available.



SAFETY DATA SHEET

Product : **GEAR TDM 85W140**
Code : C01474 Version : 6.0 Revision : 04-November-2020

Bioconcentration factor (BCF) Not available.
12.4. Mobility in soil No data available.
Mobility in general The product is immiscible with water and will spread on the water surface.
12.5. Results of PBT and vPvB assessment This mixture does not meet vPvB / PBT criteria of Regulation (EC) No 1907/2006, Annex XIII.
12.6. Other adverse effects No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Residual waste Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).
Contaminated packaging Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.
EU waste code Waste codes should be assigned by the user based on the application for which the product was used. Unused product : 13 02 05*
Disposal methods/information Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Do not discharge into drains, water courses or onto the ground. Dispose of contents/container in accordance with local/regional/national/international regulations.
Special precautions Dispose in accordance with all applicable regulations.

SECTION 14: Transport information

ADR

14.1. - 14.6.: Not regulated as dangerous goods.

IATA

14.1. - 14.6.: Not regulated as dangerous goods.

IMDG

14.1. - 14.6.: Not regulated as dangerous goods.

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable.

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

EU regulations

Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex I and II, as amended

Not listed.

Regulation (EC) No. 850/2004 On persistent organic pollutants, Annex I as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 1 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 2 as amended

Not listed.

SDS UK 7 / 9

Quick-FDS [19394-39543-18500-012323] - 2021-02-04 - 10:59:03



SAFETY DATA SHEET

Product : **GEAR TDM 85W140**
Code : C01474 Version : 6.0 Revision : 04-November-2020

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 3 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex V as amended

Not listed.

Regulation (EC) No. 166/2006 Annex II Pollutant Release and Transfer Registry, as amended

Not listed.

Regulation (EC) No. 1907/2006, REACH Article 59(10) Candidate List as currently published by ECHA

Not listed.

Authorisations

Regulation (EC) No. 1907/2006, REACH Annex XIV Substances subject to authorization, as amended

Not listed.

Restrictions on use

Regulation (EC) No. 1907/2006, REACH Annex XVII Substances subject to restriction on marketing and use as amended

Not listed.

Directive 2004/37/EC: on the protection of workers from the risks related to exposure to carcinogens and mutagens at work, as amended.

Not listed.

Other EU regulations

Directive 2012/18/EU on major accident hazards involving dangerous substances, as amended

9-Octadecen-1-amine, (9Z)- (CAS 112-90-3)

Other regulations

The product is classified and labelled in accordance with Regulation (EC) 1272/2008 (CLF Regulation) as amended. This Safety Data Sheet complies with the requirements of Regulation (EC) No 1907/2006, as amended.

National regulations

Young people under 18 years old are not allowed to work with this product according to EU Directive 94/33/EC on the protection of young people at work, as amended. Follow national regulation for work with chemical agents in accordance with Directive 98/24/EC, as amended.

15.2. Chemical safety assessment

No Chemical Safety Assessment has been carried out.

SECTION 16: Other information

List of abbreviations

ADN: European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways.
ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road.
CAS: Chemical Abstract Service.
CEN: European Committee for Standardization.
IATA: International Air Transport Association.
IBC: Intermediate Bulk Container.
IMDG: International Maritime Dangerous Goods.
MARPOL: International Convention for the Prevention of Pollution from Ships.
PBT: Persistent, bioaccumulative, toxic.
RID: Regulations concerning the International Carriage of Dangerous Goods by Rail.
STEL: Short term exposure limit.
TWA: Time Weighted Average.
vPvB: Very persistent and very bioaccumulative.

References

Not available.



SAFETY DATA SHEET

Product : **GEAR TDM 85W140**
Code : C01474 Version : 6.0 Revision : 04-November-2020

Information on evaluation method leading to the classification of mixture

Full text of any H-statements not written out in full under Sections 2 to 15

Revision information
Training information

The classification for health and environmental hazards is derived by a combination of calculation methods and test data, if available.

H302 Harmful if swallowed.
H304 May be fatal if swallowed and enters airways.
H314 Causes severe skin burns and eye damage.
H317 May cause an allergic skin reaction.
H318 Causes serious eye damage.
H335 May cause respiratory irritation.
H373 May cause damage to organs through prolonged or repeated exposure.
H400 Very toxic to aquatic life.
H410 Very toxic to aquatic life with long lasting effects.
H411 Toxic to aquatic life with long lasting effects.
None.
Follow training instructions when handling this material.

CONDAT cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available. This document complements the technical sheets but does not replace them. The information contained herein is based on our knowledge of the concerned product on the date indicated. It is offered in good faith. Furthermore, the regulatory requirements referred to must not be considered as exhaustive. They do not exempt in any form the user from knowing and applying all regulations related to the possession and use of the product. The user takes as their sole responsibility the implementation of precautions relating to storage and their use of the product.

SDS UK 9 / 9

Quick-FDS [19394-39543-18500-012323] - 2021-02-04 - 10:59:03



SAFETY DATA SHEET

Product : **HYDROLUB HMAX 68**
Code : C01973 Version : 1.5 Revision : 22-January-2021

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Trade name or designation of the mixture HYDROLUB HMAX 68
Registration number -
Synonyms None.
Product code C01973

1.2. Relevant identified uses of the substance or mixture and uses advised against

Identified uses Hydraulic fluid
Uses advised against Not available.

1.3. Details of the supplier of the safety data sheet

Supplier

Company name CONDAT
Address 104 Avenue Frédéric Mistral - B.P. 16
38670 CHASSE SUR RHONE
FR
Division Products Regulatory Affairs Department
Telephone Tel.: 33 (0)4 78.07.38.38
Fax: 33 (0)4 78.07.38.00
e-mail arp@condat.fr
Contact person Products Regulatory Affairs Department

1.4. Emergency telephone number

Emergency telephone number:
24H/24H [China] : 86 4001 2001 74
24H/24H [Australia] : + 61 1 800 686 951
24H/24H [Asia-Pacific] : 1-760-476-3960
24H/24H [Europe] : 1-760-476-3961
24H/24H : 1-866-519-4752
[USA-Canada-Mexico] :
24H/24H [Americas] : 1-760-476-3962
24H/24H [Middle East&Africa] 1-760-476-3959
:
Emergency phone (Access code): 333637

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

The mixture has been assessed and/or tested for its physical, health and environmental hazards and the following classification applies.

Classification according to Regulation (EC) No 1272/2008 as amended

This mixture is not classified as hazardous according to the criteria for classification of the Regulation (EC) 1272/2008 as amended.

2.2. Label elements

Label according to Regulation (EC) No. 1272/2008 as amended

Hazard pictograms None.
Signal word None.
Hazard statements The mixture does not meet the criteria for classification.

SDS UK 1 / 8

Quick-FDS [19394-39585-15567-010621] - 2021-02-04 - 10:59:45



SAFETY DATA SHEET

Product : **HYDROLUB HMAX 68**
Code : C01973 Version : 1.5 Revision : 22-January-2021

Precautionary statements

Prevention Observe good industrial hygiene practices.
Response Wash hands after handling.
Storage Store away from incompatible materials.
Disposal Not available.
Supplemental label information None.

2.3. Other hazards This mixture does not meet vPvB / PBT criteria of Regulation (EC) No 1907/2006, Annex XIII.

SECTION 3: Composition/information on ingredients

3.2. Mixtures

The components are not hazardous or are below required disclosure limits.

List of abbreviations and symbols that may be used above

CLP: Regulation No. 1272/2008. "-" = Not available or this substance does not meet the criteria for classification according to Regulation (EC) 1272/2008 as amended.

#: This substance has been assigned Union workplace exposure limit(s).

M: M-factor

PBT: persistent, bioaccumulative and toxic substance.

vPvB: very persistent and very bioaccumulative substance.

All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

Composition comments Occupational Exposure Limits for constituents are listed in Section 8. The full text for all H-statements is displayed in section 16.

- Contains : Mineral oil
DMSO Extract < 3% according to IP 346 Method.

SECTION 4: First aid measures

General information Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

4.1. Description of first aid measures

Inhalation Move to fresh air. Call a physician if symptoms develop or persist.
Skin contact Wash off with soap and water. Get medical attention if irritation develops and persists.
Eye contact Rinse with water. Get medical attention if irritation develops and persists.
Ingestion Rinse mouth thoroughly. If swallowed, do NOT induce vomiting. Get medical attention if symptoms occur.

4.2. Most important symptoms and effects, both acute and delayed Frequent or prolonged contact may defat and dry the skin, leading to discomfort and dermatitis.

4.3. Indication of any immediate medical attention and special treatment needed Treat symptomatically.

SECTION 5: Firefighting measures

General fire hazards Will burn if involved in a fire. No unusual fire or explosion hazards noted.

5.1. Extinguishing media

Suitable extinguishing media Foam. Dry chemicals. Carbon dioxide (CO₂). Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

SDS UK 2 / 8

Quick-FDS [19394-39585-15567-010621] - 2021-02-04 - 10:59:45



SAFETY DATA SHEET

Product : **HYDROLUB HMAX 68**
Code : C01973 Version : 1.5 Revision : 22-January-2021

Unsuitable extinguishing media Do not use water jet as an extinguisher, as this will spread the fire.

5.2. Special hazards arising from the substance or mixture See also section 10.

5.3. Advice for firefighters
Special protective equipment for firefighters Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

Special fire fighting procedures In case of fire and/or explosion do not breathe fumes. Cool containers exposed to heat with water spray and remove container, if no risk is involved.

Specific methods In the event of fire and/or explosion do not breathe fumes.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

For non-emergency personnel Keep unnecessary personnel away. Wear appropriate protective equipment and clothing during clean-up. For personal protection, see section 8 of the SDS.

For emergency responders Keep unnecessary personnel away. Use personal protection recommended in Section 8 of the SDS.

6.2. Environmental precautions Local authorities should be advised if significant spillages cannot be contained. Avoid discharge into drains, water courses or onto the ground.

6.3. Methods and material for containment and cleaning up The product is immiscible with water and will spread on the water surface.

Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Absorb in vermiculite, dry sand or earth and place into containers.

Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination.

Never return spills to original containers for re-use.

6.4. Reference to other sections For personal protection, see section 8 of the SDS. For waste disposal, see section 13 of the SDS.

SECTION 7: Handling and storage

7.1. Precautions for safe handling Avoid prolonged or repeated contact with skin. Avoid prolonged exposure. Wash hands after handling. Handle in accordance with good industrial hygiene and safety practices. Adequate ventilation should be provided so that exposure limits are not exceeded.

7.2. Conditions for safe storage, including any incompatibilities Keep away from heat and sources of ignition. Store in closed original container in a dry place. Store away from incompatible materials (see Section 10 of the SDS).

7.3. Specific end use(s) Not available.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits No exposure limits noted for ingredient(s).

Biological limit values No biological exposure limits noted for the ingredient(s).

Recommended monitoring procedures Follow standard monitoring procedures.

Derived no effect levels (DNELs) Not available.

SDS UK 3 / 8

Quick-FDS [19394-39585-15567-010621] - 2021-02-04 - 10:59:45



SAFETY DATA SHEET

Product : **HYDROLUB HMAX 68**
Code : C01973 Version : 1.5 Revision : 22-January-2021

Predicted no effect concentrations (PNECs)	Not available.
8.2. Exposure controls	
Appropriate engineering controls	Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Ensure adequate ventilation, especially in confined areas.
Individual protection measures, such as personal protective equipment	
General information	Personal protection equipment should be chosen according to the CEN standards and in discussion with the supplier of the personal protective equipment.
Eye/face protection	Wear safety glasses with side shields (or goggles).
Skin protection	
- Hand protection	Use protective gloves made of: Nitrile. Polyvinyl chloride (PVC).
- Other	Normal work clothing (long sleeved shirts and long pants) is recommended.
Respiratory protection	In case of insufficient ventilation, wear suitable respiratory equipment.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
Hygiene measures	Wash hands after handling. Handle in accordance with good industrial hygiene and safety practices.
Environmental exposure controls	Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. Fume scrubbers, filters or engineering modifications to the process equipment may be necessary to reduce emissions to acceptable levels.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance	
Physical state	Liquid.
Form	Liquid.
Colour	Blonde.
Odour	Slight.
Odour threshold	Not available.
pH	Not applicable.
Melting point/freezing point	Not available.
Initial boiling point and boiling range	Not available.
Flash point	> 195.0 °C (> 383.0 °F) ASTM D 92.
Evaporation rate	Not available.
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Vapour pressure	Not available.
Vapour density	Not available.
Relative density	0.89

SDS UK 4 / 8

Quick-FDS [19394-39585-15567-010621] - 2021-02-04 - 10:59:45



SAFETY DATA SHEET

Product : **HYDROLUB HMAX 68**
Code : C01973 Version : 1.5 Revision : 22-January-2021

Relative density temperature 15 °C (59 °F)
Solubility(ies)
Solubility (water) Insoluble
Solubility (solvents) Soluble in hydrocarbons
Partition coefficient (n-octanol/water) Not available.
Auto-ignition temperature Not available.
Decomposition temperature Not available.
Viscosity 61 - 75 mm²/s
Viscosity temperature 40 °C (104 °F)
Explosive properties Not available.
Oxidising properties Not oxidising.
9.2. Other information
Pour point < -12 °C (< 10.4 °F)

SECTION 10: Stability and reactivity

10.1. Reactivity The product is stable and non-reactive under normal conditions of use, storage and transport.
10.2. Chemical stability Material is stable under normal conditions.
10.3. Possibility of hazardous reactions No dangerous reaction known under conditions of normal use.
10.4. Conditions to avoid Avoid temperatures exceeding the decomposition temperature. Avoid temperatures exceeding the flash point. Contact with incompatible materials.
10.5. Incompatible materials Strong oxidising agents.
10.6. Hazardous decomposition products Carbon oxides. Sulphur compounds.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity Elevated temperatures or mechanical action may form vapours, mist, or fumes which may be irritating to the eyes, nose, throat, or lungs.
Ingestion of large amounts may produce gastrointestinal disturbances including irritation, nausea, and diarrhoea.
Skin corrosion/irritation Frequent or prolonged contact may defat and dry the skin, leading to discomfort and dermatitis.
Serious eye damage/eye irritation Not classified.
Respiratory sensitisation Not classified.
Skin sensitisation Not classified.
Germ cell mutagenicity Not classified.
Carcinogenicity Not classified.
Reproductive toxicity Not classified.
Specific target organ toxicity - single exposure Not classified.
Specific target organ toxicity - repeated exposure Not classified.
Aspiration hazard Not classified.

SDS UK 5 / 8

Quick-FDS [19394-39585-15567-010621] - 2021-02-04 - 10:59:45



SAFETY DATA SHEET

Product : **HYDROLUB HMAX 68**
Code : C01973 Version : 1.5 Revision : 22-January-2021

Mixture versus substance information No information available.

Other information Not available.

SECTION 12: Ecological information

12.1. Toxicity Based on available data, the classification criteria are not met for hazardous to the aquatic environment.

12.2. Persistence and degradability Not available.

12.3. Bioaccumulative potential

Bioconcentration factor (BCF) Not available.

12.4. Mobility in soil No data available.

Mobility in general The product is immiscible with water and will spread on the water surface.

12.5. Results of PBT and vPvB assessment This mixture does not meet vPvB / PBT criteria of Regulation (EC) No 1907/2006, Annex XIII.

12.6. Other adverse effects No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Residual waste Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

Contaminated packaging Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

EU waste code

16 03 06 Waste codes should be assigned by the user based on the application for which the product was used. Unused product :

Disposal methods/information Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Do not discharge into drains, water courses or onto the ground.

Special precautions Dispose in accordance with all applicable regulations.

SECTION 14: Transport information

ADR

14.1. - 14.6.: Not regulated as dangerous goods.

IATA

14.1. - 14.6.: Not regulated as dangerous goods.

IMDG

14.1. - 14.6.: Not regulated as dangerous goods.

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable.

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture
EU regulations

SDS UK 6 / 8

Quick-FDS [19394-39585-15567-010621] - 2021-02-04 - 10:59:45



SAFETY DATA SHEET

Product : **HYDROLUB HMAX 68**
Code : C01973 Version : 1.5 Revision : 22-January-2021

Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex I and II, as amended

Not listed.

Regulation (EC) No. 850/2004 On persistent organic pollutants, Annex I as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 1 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 2 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 3 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex V as amended

Not listed.

Regulation (EC) No. 166/2006 Annex II Pollutant Release and Transfer Registry, as amended

Not listed.

Regulation (EC) No. 1907/2006, REACH Article 59(10) Candidate List as currently published by ECHA

Not listed.

Authorisations

Regulation (EC) No. 1907/2006, REACH Annex XIV Substances subject to authorization, as amended

Not listed.

Restrictions on use

Regulation (EC) No. 1907/2006, REACH Annex XVII Substances subject to restriction on marketing and use as amended

Not listed.

Directive 2004/37/EC: on the protection of workers from the risks related to exposure to carcinogens and mutagens at work, as amended.

Not listed.

Other EU regulations

Directive 2012/18/EU on major accident hazards involving dangerous substances, as amended

Not listed.

Other regulations

The product is classified and labelled in accordance with Regulation (EC) 1272/2008 (CLF Regulation) as amended. This Safety Data Sheet complies with the requirements of Regulation (EC) No 1907/2006, as amended.

National regulations

Follow national regulation for work with chemical agents in accordance with Directive 98/24/EC, as amended.

15.2. Chemical safety assessment

No Chemical Safety Assessment has been carried out.

SECTION 16: Other information

List of abbreviations

ADN: European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways.
ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road.
CAS: Chemical Abstract Service.
CEN: European Committee for Standardization.
IATA: International Air Transport Association.
IBC: Intermediate Bulk Container.



SAFETY DATA SHEET

Product : **HYDROLUB HMAX 68**
Code : C01973 Version : 1.5 Revision : 22-January-2021

IMDG: International Maritime Dangerous Goods.
MARPOL: International Convention for the Prevention of Pollution from Ships.
PBT: Persistent, bioaccumulative, toxic.
RID: Regulations concerning the International Carriage of Dangerous Goods by Rail.
STEL: Short term exposure limit.
TWA: Time Weighted Average.
vPvB: Very persistent and very bioaccumulative.
Not available.

References

Information on evaluation method leading to the classification of mixture

The classification for health and environmental hazards is derived by a combination of calculation methods and test data, if available.

Full text of any H-statements not written out in full under Sections 2 to 15

None.

Revision information

None.

Training information

Follow training instructions when handling this material.

CONDAT cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available. This document complements the technical sheets but does not replace them. The information contained herein is based on our knowledge of the concerned product on the date indicated. It is offered in good faith. Furthermore, the regulatory requirements referred to must not be considered as exhaustive. They do not exempt in any form the user from knowing and applying all regulations related to the possession and use of the product. The user takes as their sole responsibility the implementation of precautions relating to storage and their use of the product.

SDS UK 8 / 8

Quick-FDS [19394-39585-15567-010621] - 2021-02-04 - 10:59:45

SAFETY DATA SHEET



Fluorocarbon 152a

Version 4.0

Revision Date 16.02.2016

Document no. 130000000099

This SDS adheres to the standards and regulatory requirements of Thailand and may not meet the regulatory requirements in other countries.

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

Product name : Fluorocarbon 152a

Other names : 1,1-Difluoroethane
HFC-152a
FC-152a
R-152a
R152a
152a
hydrofluorocarbon 152a

Recommended use of the chemical and restriction on use

Recommended use : Propellant, For industrial use only.

Manufacturer, importer, supplier

Company : The Chemours (Thailand) Company Limited
Street address : 6-7th Floor, M. Thai Tower, All Seasons Place, 87 Wireless Road, Lumpini,
Phatumwan, Bangkok
10330
Telephone : +66-2-6594000
Telefax : +66-2-6594005

Manufacturer's details

Company : The Chemours Chemical (Shanghai) Co., Ltd.
Street address : Room 526, 5/F, Building No. 1, No. 239 Gang Ao Road, China (Shanghai) Pilot
Free Trade Zone, People's Republic of China,

Emergency telephone number : 1800-010-157

2. HAZARDS IDENTIFICATION

Product hazard classification

Flammable gases : Category 1
Gases under pressure : Liquefied gas
Acute aquatic toxicity : Category 3

Endpoints which are not classified, cannot be classified or are not applicable are not shown.

Label content

Pictogram :



Signal word : Danger

SAFETY DATA SHEET



Fluorocarbon 152a

Version 4.0

Revision Date 16.02.2016

Document no. 130000000099

Hazardous warnings : Extremely flammable gas.
Contains gas under pressure; may explode if heated.
Harmful to aquatic life.

Precautionary statements : Keep away from heat/sparks/open flames/hot surfaces. No smoking.
Avoid release to the environment.
Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
Eliminate all ignition sources if safe to do so.
Protect from sunlight. Store in a well-ventilated place.
Dispose of contents/ container to an approved waste disposal plant.

Other hazards

Misuse or intentional inhalation abuse may cause death without warning symptoms, due to cardiac effects.
Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. Rapid evaporation of the liquid may cause frostbite. May cause cardiac arrhythmia.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical nature : Substance

Components

Chemical Name	CAS-No.	Concentration
1,1-Difluoroethane (1,1-Difluoroethane)	75-37-6	100 %

4. FIRST AID MEASURES

Never give anything by mouth to an unconscious person. If symptoms persist, call a physician.

Inhalation : Move to fresh air. Keep patient warm and at rest. Artificial respiration and/or oxygen may be necessary.

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes. Take off all contaminated clothing immediately. Consult a physician. Wash contaminated clothing before re-use. Treat for frostbite if necessary by gently warming affected area.

Eye contact : Rinse thoroughly with plenty of water, also under the eyelids. Call a physician.

Ingestion : No information available.

Most important symptoms/effects, acute and delayed : Anaesthetic effects, Light-headedness, irregular heartbeat with a strange sensation in the chest, heart thumping, apprehension, feeling of fainting, dizziness or weakness

Protection of first-aiders : If potential for exposure exists refer to Section 8 for specific personal protective equipment.

Notes to physician : Do not give adrenaline or similar drugs.

5. FIREFIGHTING MEASURES

Suitable extinguishing media : Water spray, water fog, Dry chemical, Alcohol-resistant foam, Carbon dioxide (CO₂)

SAFETY DATA SHEET



Fluorocarbon 152a

Version 4.0

Revision Date 16.02.2016

Document no. 130000000099

- Specific hazards** : Pressure build-up.
Hazardous thermal decomposition products: Hydrogen fluoride Exposure to decomposition products may be a hazard to health.
- Special protective equipment for firefighters** : In the event of fire, wear self-contained breathing apparatus. Use personal protective equipment. Wear neoprene gloves during cleaning up work after a fire. Exposure to decomposition products may be a hazard to health.
- Specific extinguishing methods** : No information available.
- Further information** : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Cool containers/tanks with water spray.

6. ACCIDENTAL RELEASE MEASURES

- Personal precautions, protective equipment and emergency procedures** : Evacuate personnel to safe areas. Ventilate the area. Refer to protective measures listed in sections 7 and 8.
- Environmental precautions** : Should not be released into the environment. In accordance with local and national regulations.
- Methods and materials for containment and cleaning up** : Evaporates.
Ventilate area using forced ventilation, especially low or enclosed places where heavy vapors might collect.
- Additional advice** : Self-contained breathing apparatus (SCBA) is required if a large release occurs. Avoid open flames and high temperatures.

7. HANDLING AND STORAGE

Handling

- Technical measures/Precautions** : Provide sufficient air exchange and/or exhaust in work rooms. For personal protection see section 8.
- Precautions for safe handling** : Vapours may form explosive mixtures with air. Take measures to prevent the build up of electrostatic charge. Keep away from heat and sources of ignition. When using do not smoke.

Storage

- Suitable storage conditions** : Keep container tightly closed in a dry and well-ventilated place. Store in original container.
Advice on common storage: No materials to be especially mentioned.
Storage period: > 10 yr
Storage temperature: < 52 °C
The product has an indefinite shelf life when stored properly.
Keep at temperature not exceeding 52°C.

SAFETY DATA SHEET



Fluorocarbon 152a

Version 4.0

Revision Date 16.02.2016

Document no. 130000000099

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

No information available.

Engineering measures : Ensure adequate ventilation, especially in confined areas.

Biological occupational exposure limits : No information available.

Personal protective equipment

Respiratory protection : For rescue and maintenance work in storage tanks use self-contained breathing apparatus. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.

Hand protection : Heat insulating gloves
Protective gloves, Heat insulating gloves, The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Eye protection : Safety glasses

Skin protection : Impervious clothing

Hygiene measures : Handle in accordance with good industrial hygiene and safety practice.

Protective measures : When using do not smoke.
Self-contained breathing apparatus (SCBA) is required if a large release occurs.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance (Physical state, form, colour, etc.)

Physical state : gaseous
Form : Liquefied gas
Colour : clear, colourless

Odour : slight ether-like

Odour Threshold : No information available.

pH : neutral

Melting point/freezing point

Freezing point : -117 °C (1,013 hPa)

Initial boiling point and boiling range

Boiling point : -25 °C (1,013 hPa)

Flash point : < -50 °C
closed cup

Evaporation rate : No information available.

Flammability (solid, gas) : No information available.

SAFETY DATA SHEET



Fluorocarbon 152a

Version 4.0

Revision Date 16.02.2016

Document no. 130000000099

Upper/lower flammability or explosive limits

Upper explosion limit : 16.9 vol%
Lower explosion limit : 3.9 vol%

Vapour pressure : 5,166 hPa (20 °C)
5,960 hPa (25 °C)
6,888 hPa (30 °C)
7,584 hPa (38 °C)
11,750 hPa (50 °C)

Vapour density : No information available.

Density

Density : 0.9 g/cm³ (25 °C)
(as liquid)
1.033 g/cm³ (-30 °C)
(as liquid)
0.0033 g/cm³ (-24.7 °C) (1,013 hPa)
0.0027 g/cm³ (25 °C) (1,013 hPa)
0.0029 g/cm³ (0 °C) (1,013 hPa)
1.011 g/cm³ (-24.7 °C)
(as liquid)

Specific gravity
(Relative density) : 2.4

Solubility(ies)

Water solubility : 0.2 g/l (25 °C) (1,013 hPa)

Partition coefficient: n-octanol/water : No information available.

Auto-ignition temperature

Ignition temperature : 454 °C

Decomposition temperature : No information available.

Viscosity

Viscosity, kinematic : no data available
Viscosity, dynamic : no data available

Molecular weight : No information available.

10. STABILITY AND REACTIVITY

Reactivity : Decomposes on heating.

Chemical stability : Stable under normal conditions.

SAFETY DATA SHEET



Fluorocarbon 152a

Version 4.0

Revision Date 16.02.2016

Document no. 130000000099

- Possibility of hazardous reactions** : Vapours may form flammable mixture with air.
- Conditions to avoid** : Temperature: > 52°C
- Materials to avoid** : Incompatible products, Alkali metals, Alkaline earth metals, Powdered metals, Powdered metal salts
- Hazardous decomposition products** : Hazardous decomposition products
Carbon monoxide, Carbon dioxide (CO₂), Halogenated compounds, Hydrogen halides, Hydrogen fluoride, Carbonyl fluoride

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Inhalation

- 1,1-Difluoroethane : LC50/4 h/Rat(gas): > 437500 ppm
The substance or mixture has no acute inhalation toxicity
No Observed Adverse Effect Concentration/Dog(gas): 50000 ppm
Cardiac sensitization
Low Observed Adverse Effect Concentration (LOAEC)/Dog(gas):
150000 ppm
Cardiac sensitization

Skin corrosion/irritation

No information available.

Serious eye damage/eye irritation

No information available.

Respiratory or skin sensitisation

- 1,1-Difluoroethane : Species: Rat
Result: Does not cause respiratory sensitisation.
Classification: Does not cause respiratory sensitisation.

Germ cell mutagenicity

- 1,1-Difluoroethane : Animal testing did not show any mutagenic effects. Did not cause genetic damage in cultured bacterial cells. Tests on mammalian cell cultures showed mutagenic effects.

Carcinogenicity

- 1,1-Difluoroethane : Not classifiable as a human carcinogen.
Animal testing did not show any carcinogenic effects.

Reproductive toxicity

- 1,1-Difluoroethane : Reproductive toxicity: No toxicity to reproduction
Animal testing showed no reproductive toxicity.
Teratogenicity: Animal testing showed no developmental toxicity.

Specific Target Organ Toxicity

Specific target organ toxicity - single exposure

- 1,1-Difluoroethane : The substance or mixture is not classified as specific target organ toxicant, single exposure.

Specific target organ toxicity - repeated exposure

SAFETY DATA SHEET



Fluorocarbon 152a

Version 4.0

Revision Date 16.02.2016

Document no. 130000000099

1,1-Difluoroethane : The substance or mixture is not classified as specific target organ toxicant, repeated exposure.

Aspiration hazard

1,1-Difluoroethane : No aspiration toxicity classification

Other

Fluorocarbon 152a : Rapid evaporation of the liquid may cause frostbite.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects

Acute and prolonged toxicity to fish

1,1-Difluoroethane : LC50/96 h/Fish: 295.78 mg/l

Toxicity to aquatic plants

1,1-Difluoroethane : EC50/96 h/Algae: 47.76 mg/l

Acute toxicity to aquatic invertebrates

1,1-Difluoroethane : EC50/48 h/Daphnia (water flea): 146.7 mg/l

Persistence and degradability

1,1-Difluoroethane : Result: Not biodegradable

Bioaccumulation

No information available.

Mobility in soil

No information available.

Hazardous to the ozone layer

Fluorocarbon 152a : Ozone-Depletion Potential: 0

Other adverse effects

Fluorocarbon 152a : IPCC - AR4 (Fourth Assessment Report of the Intergovernmental Panel on Climate Change) - 2007
Global warming potential (GWP): 120

13. DISPOSAL CONSIDERATIONS

Waste disposal methods : Can be used after re-conditioning.

Contaminated packaging : Empty pressure vessels should be returned to the supplier.
Disposable containers: Dispose of in accordance with local regulations.

14. TRANSPORT INFORMATION

IMDG

UN number : 1030
Proper shipping name : 1,1-DIFLUOROETHANE
Class : 2.1
Marine pollutant : no

SAFETY DATA SHEET



Fluorocarbon 152a

Version 4.0

Revision Date 16.02.2016

Document no. 130000000099

IATA

UN number : 1030
Proper shipping name : 1,1-DIFLUOROETHANE
Class : 2.1

Matters needing attention : Not applicable
for transportation

15. REGULATORY INFORMATION

List of Hazardous Substances under Thailand Hazardous Substance Act B.E. 2535 (Rev. list B.E. 2556): 1,1-Difluoroethane

16. OTHER INFORMATION

References

SDS Number: 130000000099

Revision Date/Version

Date of first preparation : 01.10.2007
Revision Date : 17.02.2016
Version : 4.0

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Significant change from previous version is denoted with a double bar.

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The above information relates only to the specific material(s) designated herein and may not be valid for such material(s) used in combination with any other materials or in any process or if the material is altered or processed, unless specified in the text.

APPENDIX D
Material Safety Data Sheet of Refractories used in Furnace

DALMIA CEMENT BHARAT LTD REFRACTORY WORKS RAJGANGPUR-770017	MATERIAL SAFETY DATA SHEET	Format No. RFTG 006 Page 1 of 3 Rev. No. 0 Date: 01.06.17
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1. PRODUCT & COMPANY IDENTIFICATION

PRODUCT IDENTIFICATION

Trade Name : OCL SLC SDS
Chemical Family : Ceramic (Inorganic)
Chemical Name and Synonyms : Silicon-di-oxide (Silica)
Formula : SiO₂

COMPANY IDENTIFICATION

Company name: Dalmia Cement (Bharat) Ltd, Refractory division
Full address: Dalmia Cement (Bharat) Ltd, Refractory division, Rajgangpur,
Sundergarh, Odisha
Pincode: 770017

2. COMPOSITIONAL INFORMATION

As per specification

3. HAZARDS IDENTIFICATION

Fire and Explosion Hazard Data

Flash Point: Not applicable because, the product is not flammable.
Flammable Limits: Not applicable because, the product is not flammable.
Extinguishing Media: Not applicable because, the product is not flammable.
Unusual Fire and Explosion Hazards: Not applicable.

Reactivity Data

Stability: Stable at room temperature
Incompatibility: Not known
Hazardous Decomposition : The product doesn't decompose into any hazardous component in room temperature.

Hazardous Polymerisation : The product doesn't polymerize

Health Hazard Information

Primary Routes of Entry :

Inhalation ? Yes if the material is in powder form
Skin ? Yes if the material is in powder form
Ingestion? Yes if the material is in powder form
Carcinogenicity Assessment: None of the hazardous ingredients are listed as human carcinogens

DALMIA CEMENT BHARAT LTD REFRACTORY WORKS RAJGANGPUR-770017	MATERIAL SAFETY DATA SHEET	Format No. RFTG 006 Page 1 of 3 Rev. No. 0 Date: 01.06.17
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4. FIRST AID MEASURES

Eyes: If any dust falls on eyes, then immediately flush eyes with plenty of water.
Consult a physician if there is any irritation.
Skin: Wash all exposed skin areas with soap and water. Consult a physician if there is any irritation.

5. FIRE FIGHTING MEASURES

Product is not inflammable in nature.

6. ACCIDENT RELEASE MEASURES

Covered under point 4 above.

7. HANDLING, STORAGE & USE PROCEDURES

Normal Storage and Handling. Avoid conditions which would generate airborne dust. Measures to be taken during use to prevent water /moisture absorption in the products. Protect the material from moist condition to avoid its quality deterioration.

8. EXPOSURE CONTROL/PERSONAL PROTECTION

Respiratory Protection: Approved air purifying particulate respirator is recommended when working in dusty conditions.
Ventilation: Proper exhaust system is recommended
Protective Gloves: To avoid repeated contact with skin, protective gloves are recommended
Eye Protection: Approved safety goggles should be used
Other Protective Equipment: As per application requirement

9. PHYSICAL & CHEMICAL PROPERTIES

As per specification

10. STABILITY & REACTIVITY

Stability: Stable
Incompatibility: Not known
Hazardous Decomposition : The product doesn't decompose into any hazardous component in room temperature.
Hazardous Polymerisation: The product doesn't polymerize

DALMIA CEMENT BHARAT LTD REFRACTORY WORKS RAJGANGPUR-770017	MATERIAL SAFETY DATA SHEET	Format No. RFTG 006 Page 1 of 3 Rev. No. 0 Date: 01.06.17
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11. TOXICOLOGICAL INFORMATION

Non-toxic as such. Precautions under point number 8 should be followed. In case of grinding/cutting of bricks, dust is generated. It may affect skin, eye, & lunge. Recommended to use personal protective equipment as mentioned in point 8.

12. ECOLOGICAL INFORMATION

As per our knowledge, there is no deteriorating effect on ecology as such.

13. DISPOSAL CONSIDERATION

It is inorganic non- metallic material. It can be used for land fill purpose.

14. TRANSPORT INFORMATION

Existing methods of transport for refractories hollow / solid products may be followed, avoiding jerk on the wooden palletes / crates. Use forklift or hoist or overhead crane for handling of crate.

15. REGULATORY INFORMATION

None

16. DISPOSAL OF PACKAGING MATERIAL:

Plastic/polythene packaging materials are to be stored in an isolated place so that it can be recycled/used. Since plastic/polythene are non-bio degradable materials, they are not to be disposed in land fills

17. OTHER INFORMATION

None

Name of the Designer:

Signature:

Date:

Signature

Issued and approved by,

Copy no:

Date: 03.06.09
First Edition

Material Safety Data Sheet

ISB Silica Brick

1 Identification of the substance / preparation and of the company / undertaking

Product name : ISB Silica Brick Manufactured/supplied by: Luoyang Ref. CO
 Chemical product name : Refractories
 Synonyms : ISB Silica Brick
 Chemical Formula : Al Material
 Emergency telephone number : 0086-10-64986317

2 Composition / information on Ingredients

	Guarantee
SiO ₂ %	≥91
Bulk Density g/cm ³	≤1.2
Cold Crushing Strength Mpa	≥5
Reheating liner change %	±0.5
thermal conductivity ratio kcal/mh 350℃	≤0.58

* Occupational exposure limit(s), if available, are listed in section 8

3 Hazards identification

The preparation is classified as dangerous according to Directive 1999/45/EC and its amendments.

Classification : light yellow Solid
 Additional Hazards : Dust from this product at any stage in its use or during tear-out after service may, especially on long exposure, lead to breathing difficulty unless respiratory protection is employed.

Effects and symptoms(后果)

Inhalation : To escape hot dust
 Ingestion : Rub organ
 Skin Contact : Rub skin
 Eye Contact : Rub eye
 Aggravating conditions : Not applicable

4 First-aid measures

Inhalation : Remove to fresh air. If breathing stops or is laboured, give artificial respiration. Seek immediate medical attention.
 Ingestion : Unlikely to occur, however, if product is ingested, contact a physician or poison center immediately. Do not induce vomiting unless instructed to do so by medical personnel.
 Skin Contact : Wash thoroughly with soap and water. Consult a physician if irritation persists.
 Eye contact : Flush eyes with clean water. Seek immediate medical attention if irritation persists.
 Notes to physician : Not applicable
 Protection of first-aiders : Not applicable

:Fired bauxite brick(LZ80)

5 Fire-fighting measures

Extinguishing Media:
 Suitable : Not applicable
 Not suitable : Not applicable
 Unusual fire/explosion hazards : Not applicable
 Hazardous thermal (de) composition products : Not applicable

Date of issue : 2018/08/21 Page 1 of 4

Special Fire-fighting procedures : Not applicable
 Protection of fire-fighters : Not applicable

6 Accidental release measures

Personal precautions : Not applicable
 Environmental precautions and clean up methods : As supplied, product may be disposed of in an approved landfill, in accordance with federal, state and local regulations.

Note: See section 8 for personal protective equipment and section 13 for waste disposal.

7 Handling and storage

Handling : Use safe practices when transporting palletized product.
 Storage : Product is normally supplied as brick shapes on wooden pallets. Store in a dry place away from extreme heat or open flames.

Packaging materials:
 Recommended use : wooden pallet can be recycle.
 Not suitable : Not applicable

8 Exposure controls / personal protection

Engineering measures : Use adequate ventilation to meet exposure controls and when initially burning in.
 Hygiene measures : Wash hands, forearms, and face thoroughly after handling compounds and before eating, smoking, using lavatory, and at the end of the day.

Occupational exposure limits :

<u>Ingredient Name</u>	<u>Occupational Exposure Limits</u>
Carbon monoxide	Not applicable
nitrogen	Not applicable
Carbon dioxide	Not applicable

Personal protective equipment:

Respiratory system : Use approved respirator for mineral dusts when working with bricks or tearing-out used refractory linings.
 Skin and body : Full suit.
 Hands : Gloves
 Eyes : Safety glasses with side shields.
 Other : Safety shoes should be worn in case of accidentally dropped bricks.

9 Physical and chemical properties

Physical state : Solid refractory shape (usually brick shaped)
 Color : light yellow solid
 Odor : Not applicable
 Odor threshold : Not applicable
 Boiling point : Not applicable
 Density : $\leq 1.2g/cm^3$
 Vapor Pressure : Not applicable
 Evaporation rate (butyl acetate=1) : Not applicable
 Solubility : Not applicable
 Octanol/water partition coefficient : Not applicable
 pH : Not applicable
 Flash point : Not applicable
 Fire Hazards in Presence of Various Substances : Not applicable

Date of issue : 2018/08/21 Page 2 of 4

Autoignition temperature : Not applicable
Explosive properties : Not applicable
Lower explosion limit : Not applicable
Viscosity : Not applicable

10 Stability and reactivity

Stability : Not applicable
Conditions to avoid : Not applicable
Material to avoid : Not applicable
Hazardous Decomposition Products : Not applicable

11 Toxicological information

Local effects:

Skin irritation : Not applicable
Eye irritation : Not applicable
Sensitization : Not applicable

Routes of Entry : Not applicable
Target Organs : Not applicable

Acute toxicity :

<u>Ingredient Name</u>	<u>Test</u>	<u>Result</u>	<u>Route</u>	<u>Species</u>
Not applicable	Not applicable	Not applicable	Not applicable	Not applicable

Chronic toxicity : Not applicable
Specific effects : Not applicable

<u>Ingredient Name</u>	<u>Carcinogenic Effects</u>	<u>Mutagenic Effects</u>	<u>Developmental toxicity</u>	<u>Impairs fertility</u>
Not applicable	Not applicable	Not applicable	Not applicable	Not applicable

12 Ecological information

Ecotoxicity Data :

<u>Ingredient Name</u>	<u>Species</u>	<u>Period</u>	<u>Result</u>
Not applicable	Not applicable	Not applicable	Not applicable

Ecological information:

Mobility : Not applicable
Soil/water Partition Coefficient (Koc) : Not applicable
Persistence/degradability : Not applicable
Bioaccumulative potential : Not applicable

<u>Ingredient Name</u>	<u>Persistence / degradability</u>						<u>Bioaccumulative potential</u>		
	<u>BOD₅</u>	<u>COD</u>	<u>ThOD</u>	<u>Aquatic Half-life</u>	<u>Photolysis</u>	<u>Biodegradability</u>	<u>LogP_{ow}</u>	<u>BCF</u>	<u>Potential</u>
Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable

13 Disposal considerations

Method of disposal : As supplied, product may be disposed of in an approved landfill, in accordance with federal, state and local regulations.
Waste classification : Not applicable
European Waste Catalogue (EWC) : Not applicable
Hazardous waste : Not applicable

14 Transport information

Date of issue : 2018/08/21 Page 3 of 4

Local/International transport regulations:

Regulatory Information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
SABS 0228 Class						
Land-Road/Railway	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
IMDG Class						
Sea	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
IATA-DGR Class						
Air	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable

15 Regulatory information

SABS 0263/EU Regulations

Hazard symbol(s) : Not applicable

Indication of Danger:

Risk phrases : To dressed secure face guard, safety helmet and thick gloves
 Safety phrases : when dressing secure guard, safety helmet and thick gloves it is safety
 Contains : Not applicable
 Product use : Not applicable

16 Composition / Information on ingredients

Substance / Mixture	CAS-No	Mixture Concentration (%)	ISHL-No	PRTR-No
Chemical identity				
Silicon oxide	15468-32-3	>90	312	-
Aluminum oxide	1344-28-1	<3	189	-
Iron oxide	1309-37-1	<2	192	-

*ISHL : Industrial Safety and Health Law (Japan)

17 Other Information

Other special considerations : None identified

History:

Date of printing : TBA
 Date of issue : TBA
 Date of previous issue : Not applicable
 Validated by :

Notice to reader:

- The information and recommendation on this data sheet are to the best of our knowledge and belief accurate and reliable, but do not constitute a warrant. None of our representatives or agents are authorized to give any guarantee or warranty or make any representation in addition or contrary to the above, and we do not accept liability for claims of any kind for any loss including, without limitation, consequential loss, injury or damage arising from the use of the information or recommendations, or of the products which are subject to the subject matter hereof. These products are sold subject to our standard conditions of sale and tender, copies of which are available on request.
- This Material Safety Data Sheet contains confidential proprietary information and is not to be disclosed to the general public or to competitors except as required by law.

Author:

Date of issue : 2018/08/21 Page 4 of 4

SAFETY DATA SHEET

AGC
AGC CERAMICS CO., LTD.

First Issued 07/ Sep/2016
Product Name < P/CLC-A539-RE, P/CLC-A610-RE, P/CLC-A649-RE, P/CLC-A650-RE > Page 1 of 7

1. IDENTIFICATION OF SUBSTANCE / PREPARATION AND OF THE COMPANY

Product Name Pre-cast block
P/CLC-A539-RE, P/CLC-A610-RE, P/CLC-A649-RE, P/CLC-A650-RE
Company Identification AGC Ceramics Co., Ltd Quality Assurance G
Address 5-6-1, Urmei, Takasago-city, Hyogo, Japan
Phone number 81-79-447-7318
Fax number 81-79-447-3190
Emergency phone number 81-79-447-7318
Recommended use of the chemical and restriction on use Use: Various kiln and furnace, Incinerator

2. HAZARDS IDENTIFICATION

GHS classification

Physical Hazards	Explosive substance	Not Applicable
	Flammable gas	Not Applicable
	Flammable aerosol	Not Applicable
	Oxidizing gas	Not Applicable
	High-pressure gas	Not Applicable
	Flammable liquid	Not Applicable
	Flammable solid	Not classified
	Self-reactive substance	Not Applicable
	Pyrophoric liquid	Not Applicable
	Pyrophoric solid	Not classified
	Self-heating substance and mixtures	Not classified
	Substances and mixtures, which in contact with water, emit flammable gases	Not classified
	Oxidizing liquid	Not Applicable
	Oxidizing solid	Classification Not possible
	Organic peroxide	Not Applicable
	Corrosive to metal	Classification Not possible
	Health Hazards	Acute toxicity (oral)
Acute toxicity (dermal)		Classification Not possible
Acute toxicity (inhalation: gas)		Not Applicable
Acute toxicity (inhalation: vapor)		Classification Not possible
Acute toxicity (inhalation: dust, mist)		Classification Not possible
Skin corrosion/irritation	Category 2	
Serious eye damage/eye irritation	Category 1	

SAFETY DATA SHEET

AGC
 AGC CERAMICS CO., LTD.

First Issued 07/ Sep/2016
 Product Name < P/CLC-A539-RE, P/CLC-A610-RE, P/CLC-A649-RE, P/CLC-A650-RE > Page 2 of 7

2. HAZARDS IDENTIFICATION

	Respiratory sensitizer	Classification Not possible
	Skin sensitizer	Classification Not possible
	Germ cell mutagenicity	Classification Not possible
	Carcinogenicity	Category 1A
	Toxic to reproduction	Classification Not possible
	Impact on breast-feeding	Classification Not possible
	Specific target organ systemic toxicity (single exposure)	Category 1 (respiratory system)
	Specific target organ systemic toxicity (repeated exposure)	Category 1 (respiratory system, kidney)
	Aspiration-Hazard	Classification Not possible
Environmental Hazards	Acute hazards to the aquatic environment	Classification Not possible
	Chronic hazards to the aquatic environment	Classification Not possible
	Hazardousness to the ozone layer	Classification Not possible

Pictogram or Symbol



Signal word	Danger
Hazard Statement	Irritation of the skin Causes serious eye damage May cause cancer Causes damage to organs Respiratory system Causes damage to organs through prolonged or repeated exposure (respiratory system and kidney)

Precautionary statements

<Prevention>	Do not eat, drink or smoke when using this product. Do not handle until all safety precautions have been read and understood. Use only in a well-ventilated area. Wash hands after handling. Use personal protective equipments as required. Don't breathe dust/fume/gas/mist/vapor.
<Response>	If swallowed: Rinse mouth. Do NOT induce vomiting.

SAFETY DATA SHEET

AGC
AGC CERAMICS CO., LTD.

First Issued 07/ Sep/2016
Product Name < P/CLC-A539-RE, P/CLC-A610-RE, P/CLC-A649-RE, P/CLC-A650-RE > Page 3 of 7

2. HAZARDS IDENTIFICATION

Take off contaminated clothing and wash before reuse.

If in eyes: Rinse cautiously with water for several minutes.
Remove contact lenses, if easy to do.
Continue rinsing.
If you feel unwell, get medical advice/attention.

If inhaled: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

If on skin (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
If skin irritation or rash occurs, get medical advice / attention.

If exposed or concerned: Get medical advice/attention.

<Storage> Store indoors, way from water.

<Disposal> The product is suitable for processing at an appropriate government waste disposal facility. Use of these methods is subject to user compliance with applicable laws and regulations and consideration of product characteristics at time of disposal.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Substance/Mixture	Mixture			
Apply to Japan				
Chemical identity	CAS-No	Concentration (%)	ISHL-No	PRTR-No
Aluminum oxide	1344-28-1	35-70	189	-
Silica	14808-60-7	25-60	312	-
Calcium oxide	1305-78-8	1-10	190	-
Titanium dioxide	13463-67-7	<3	191	-
Ferric oxide	1309-37-1	<2	192	-

* ISHL: Industrial Safety and Health Law (Japan)

* PRTR: Pollutant Release and Transfer Register Law (Japan)

4. FIRST AID MEASURES

If inhaled: If inhaled plenty of dust, immediately remove victim to fresh air. If the victim shows breathing abnormality, immediately get medical advice/attention.

If on skin: Wash with plenty of water and soap.

If in eyes: Immediately rinse with clean water or eyewash for at least 15 minutes.
Get medical advice/attention.

If swallowed: Rinse mouth with water. Immediately get medical advice/attention.

SAFETY DATA SHEET

AGC
AGC CERAMICS CO., LTD.

First Issued 07/ Sep/2016
Product Name < P/CLC-A539-RE, P/CLC-A610-RE, P/CLC-A649-RE, P/CLC-A650-RE > Page 4 of 7

5. FIRE FIGHTING MEASURES

Suitable extinguishing media: The product is not flammable. Use extinguishing media appropriate to surrounding fire conditions.

Unsuitable extinguishing media: No information

Specific hazards arising from the chemical: Nothing particular

Special precautions for fire-fighters: Nothing particular

Firefighters equipment: Firefighters should wear proper protective equipment.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures: Recover dust to prevent diffusion. Wear proper protective equipment and avoid contacting dust with eyes and skin and inhaling dust.

Environmental precautions: No information

7. HANDLING & STORAGE

Advice on safe handling: Must wear a dust respirator, safety glasses and so on. Handle avoiding raise of dust.

Storage conditions: Store indoors, way from water.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters: Dust: $E = 3.0/(1.19 \times Q+1) \text{ mg/m}^3$ Q: content (%) of free silicic acid in dust.
ISHL(Japan) In case of all silica in the product to be free silicic acid, $E = 0.04-0.10 \text{ mg/m}^3$.
As most is fixed as solid mineral, the figure should be much larger than this figure.

Exposure Limits:

Japan Society for Occupational Health
Inhalant dust 0.5 mg/m^3 total dust 2 mg/m^3 (aluminum oxide)
Inhalant dust 0.03 mg/m^3 (inhalant crystalline silica)
Second dust :Inhalant dust 1 mg/m^3 total dust 4 mg/m^3 (titanium dioxide)
Second dust :Inhalant dust 1 mg/m^3 total dust 4 mg/m^3 (ferric oxide)

ACGIH
TWA 10 mg/m^3 (aluminum oxide)
TWA 0.025 mg/m^3 A2 (crystalline silica)
TWA 2 mg/m^3 (calcium oxide)
TWA 10 mg/m^3 A4 (titanium dioxide)
TWA 5 mg/m^3 (ferric oxide)

Appropriate engineering controls: According to dust protection regulation, make available local exhaust ventilation, dust collector and so on.

Individual protection measures:

SAFETY DATA SHEET

AGC
AGC CERAMICS CO., LTD.

First Issued 07/ Sep/2016
Product Name < P/CLC-A539-RE, P/CLC-A610-RE, P/CLC-A649-RE, P/CLC-A650-RE > Page 5 of 7

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Respiratory protection: Use a dust respirator.
Hand protection: Wear protective gloves.
Eye protection: Wear dust goggles.
Skin and body protection: Wear long sleeve clothes to protect skin.
Hygiene measures: Wash hands after handling.

9. PHYSICAL & CHEMICAL PROPERTIES

Physical form, color etc: Solid, gray
Odor: No odor
pH: No data
Melting point: >1500°C
Boiling point, Flash point, Auto-ignition point: Not flammable solid
Specific gravity: No data
Solubility: Insoluble in organic solvents

10. STABILITY & REACTIVITY

Stability: Stable under normal conditions.
Possibility of hazardous reactions: React with strong acids and hydrogen fluoride.
Conditions to avoid: Diffusion of dust.
Material to avoid: Strong acids and hydrogen fluoride.
Hazardous decomposition products: Nothing particular

11. TOXICOLOGICAL INFORMATION

When there is only data for a mixture available for a substance, GHS classification of the substance as a pure substance is performed.

As reference, data of each ingredient are shown below.

Acute Toxicity (oral): Mouse LD₅₀ 3059 mg/kg (Category 5) (calcium oxide)
Skin Corrosion/Irritation: Since it has corrosivity on skin is very irritating to damp skin, and is designated to UN classification class 8-III.(Category 1C) (calcium oxide)
Redness and moderate irritation on humans. (Category 2) (ferric oxide)
Serious Eye Damage / Eye Irritation: It categorized into Category 1 based on the corrosive to eye, and corrosion of the skin / stimulative GHS classification being Category 1C.
(Category 1) (calcium oxide)
Corrosive in humans. (Category 1) (ferric oxide)

SAFETY DATA SHEET

AGC
AGC CERAMICS CO., LTD.

First Issued 07/ Sep/2016
Product Name < P/CLC-A539-RE, P/CLC-A610-RE, P/CLC-A649-RE, P/CLC-A650-RE > Page 6 of 7

11. TOXICOLOGICAL INFORMATION

Carcinogenicity: Mild by rabbit test. (Category 2B) (titanium dioxide)
May cause cancer. IARC68: 1, NTP RoC: K, Japan Society for Occupational Health: 1. (Category 1A) (crystalline silica)

Specific Target Organ / Systemic Toxicity (Single Exposure): Upper respiratory irritation (Category 3, respiratory tract irritation) (aluminum oxide)
Short-term exposure affects the respiratory system in humans in case of high inhalation concentration. (Category 1) (crystalline silica)
There is a statement that the inflammation of a respiratory tract and pneumonitis are caused from dust inhalation and it was set as category 1 (respiratory systems), and if it drinks by mistake, a pulse will be quick and will become weak, breathing is quick and becomes shallow, body temperature falls, it becomes difficult to breathe by cancer of glottis, and will be in a shock states. There is the description which also produces esophageal, the stomach perforation (HSDB (2005)), but it was Priority2, it classified into Category 2 (Category whole body toxicity, digestive organ). (calcium oxide)
Fume stimulates an respiratory tract (Category 3) (titanium dioxide)
The coughing and also closeness were seen in humans (Category 3) (ferric oxide)

Specific Target Organ / Systemic Toxicity (Repeated Exposure): By occupational exposure of aluminas, pulmonary fibrosis was occurred. (Category 1, lung) (aluminum oxide)
Respiratory system and kidney are affected in humans. (Category1, respiratory system and kidney) (crystalline silica)
Ulcers and perforations of nasal septum.(Category 1) (calcium oxide)
Pneumoconiosis changes became clear by x-ray test, although not accompanied by change of the lung function of very few of the laborers with occupational exposure for 20 years or more. (Category 1) (titanium dioxide)
Although abnormalities are found on a chest x-rays test in humans, it is clinically satisfactory. If it accumulates in lungs, it will become siderosis, but it is benign and does not progress to fibrosis. Metal fevers may be occurred by exposure. (Category 1, respiratory system) (ferric oxide)

Aspiration-Hazard: Aspiration pneumonia to human beings. (Category 1)(calcium oxide)

12. ECOLOGICAL INFORMATION

Bio-accumulative potential (aqueous environmental hazard) (chronic): Relevant toxicity is not indicated in the water solubility, but being metal compound, its behavior in water is uncertain.(Category 4) (titanium dioxide)

SAFETY DATA SHEET

AGC
AGC CERAMICS CO., LTD.

First Issued 07/ Sep/2016
Product Name < P/CLC-A539-RE, P/CLC-A610-RE, P/CLC-A649-RE, P/CLC-A650-RE > Page 7 of 7

13. DISPOSAL CONSIDERATIONS

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Waste must be sent to an approved incinerator or disposed in an approved waste facility.

14. TRANSPORT INFORMATION

International Law restriction

UN Classification : Not regulated

UN Number : Not regulated

Regulations rule of Japan

Land transport : It follows the transportation method established in "Fire Service Law (Japan)" and "Industrial Safety and Health Law(Japan)", etc.

Marine transport : It follows the transportation method established in Law "The ship safety law (Japan)".

Air freight : It follows the transportation method established in law "Aviation Act law (Japan)".

Transport with containers having necessary strength.

In case of transport, ascertain that the chemical is not leaking from the container and give attention not to turn over, fall down and damage the product.

15. REGULATORY INFORMATION

Industrial Safety and Health Law (Japan): This product contain hazardous substances which must be notified of the names and the like.

This product contain hazardous substances which must be displayed of the names and the like.

Pneumoconiosis Law (Japan): Enforcement regulation 2 Appended Table

Work in dusty environment (aluminum oxide, silica)

Marine Pollution Prevention Act: Noxious liquid substances (Z-type substances) (Enforcement Order Appendix Table 1) (titanium oxide)

Water Pollution Control Law: Specified substance 44 (aluminum and its compounds)

16. OTHER INFORMATION

This information is based on our present state of knowledge and is intended to describe our products from the point of view of the safety requirements. It should not be construed as guaranteeing specific properties.

End of Safety Data Sheet

APPENDIX E

Data from Department of Meteorology and Hydrology

DAILY RELATIVE HUMIDITY (%) at (06:30) hrs M.S.T

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	86	91	74	92	96	92	92	92	96	96	96	92
2	73	91	82	92	92	96	96	92	92	96	96	92
3	77	86	82	92	88	92	92	96	96	100	96	96
4	91	91	78	92	96	92	96	92	92	92	92	88
5	91	90	91	96	96	92	100	96	96	96	96	91
6	86	90	91	92	84	92	96	88	96	96	92	91
7	82	96	91	83	88	96	96	100	88	96	92	91
8	91	91	82	88	84	100	96	96	88	96	100	91
9	82	91	91	96	88	96	92	96	92	96	100	96
10	91	82	86	92	92	100	92	87	96	96	100	91
11	91	91	91	92	84	96	92	92	96	96	91	91
12	95	78	91	92	84	92	88	96	96	92	91	91
13	90	82	91	83	89	96	92	100	96	96	83	91
14	91	91	82	83	88	96	100	96	92	96	92	91
15	91	96	91	80	84	96	96	96	96	92	92	86
16	91	96	92	88	84	92	96	96	88	96	92	91
17	90	95	92	80	85	88	92	96	92	100	92	91
18	81	96	96	92	89	96	96	96	93	96	92	91
19	91	91	91	92	92	96	96	92	92	92	91	100
20	91	82	92	96	92	92	92	96	92	100	91	91
21	91	82	96	92	96	92	92	96	96	96	91	96
22	91	91	92	84	91	92	96	100	96	92	91	96
23	91	91	91	84	92	96	96	96	92	92	91	91
24	91	91	91	92	92	92	92	100	100	96	91	96
25	81	82	82	83	88	92	92	92	96	92	92	100
26	95	82	91	77	89	96	96	96	92	92	91	91
27	80	82	86	84	88	96	92	96	92	96	87	91
28	95	82	96	92	92	96	92	88	96	96	91	100
29	90	77	83	88	92	100	92	96	96	96	91	96
30	90		96	92	92	92	96	92	96	96	91	91
31	82		92		96		96	96		96		82

Source: Department of Meteorology and Hydrology (2020)

DAILY RAINFALL (mm)

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	0	0	0	0	45	47	Trace	14	25	2	3	0
2	0	0	0	0	8	20	10	5	17	Trace	0	0
3	0	0	0	0	0	11	0	3	0	1	0	0
4	0	0	0	0	3	7	12	Trace	0	71	27	0
5	0	0	0	0	0	13	21	11	Trace	19	0	0
6	0	0	0	0	0	15	28	9	Trace	0	0	0
7	0	0	0	0	0	24	7	15	Trace	2	0	0
8	0	0	0	0	0	21	55	16	8	37	10	0
9	0	0	0	0	0	6	2	6	Trace	2	29	0
10	0	0	0	0	0	21	Trace	Trace	Trace	0	0	0
11	0	0	0	0	0	62	2	5	2	0	0	0
12	0	0	0	0	0	40	0	13	12	0	0	0
13	0	0	0	0	0	5	47	18	2	2	0	0
14	0	0	0	0	0	3	11	37	3	0	0	0
15	0	0	0	0	0	52	4	3	8	0	0	0
16	0	0	0	0	0	17	18	33	0	2	0	0
17	0	0	0	0	0	2	62	21	3	80	0	0
18	0	0	0	0	Trace	13	7	24	0	22	0	0
19	0	0	0	0	48	35	2	28	27	0	0	0
20	0	0	0	0	10	35	0	26	27	6	0	0
21	0	0	0	0	23	8	1	2	7	28	0	0
22	0	0	0	0	40	2	17	13	20	0	0	0
23	0	0	0	0	0	8	Trace	28	72	0	0	0
24	0	0	0	0	0	41	6	18	32	0	0	0
25	0	0	0	0	0	1	0	6	0	0	0	0
26	0	0	0	0	0	48	16	6	29	0	0	0
27	0	0	0	0	0	26	Trace	22	0	0	0	0
28	0	0	0	3	35	22	0	11	0	0	0	0
29	0	0	0	3	1	66	18	5	34	0	0	0
30	0		0	Trace	Trace	Trace	18	2	8	Trace	0	0
31	0		0		8		46	6		1		0

"Trace" : The amounts of rainfall which cannot be measured.

"1mm" = 0.04 inch

Source: Department of Meteorology and Hydrology (2020)

DAILY MAXIMUM TEMPERATURE (°C)

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	33.6	35.0	37.2	39.2	36.8	33.2	30.5	33.2	32.5	29.0	33.8	34.5
2	34.0	35.2	37.3	38.5	36.9	33.0	32.2	32.0	32.2	30.0	34.0	34.8
3	34.5	34.0	36.0	38.6	38.0	35.7	30.2	32.5	33.0	31.2	33.0	34.2
4	33.6	32.5	25.0	40.5	38.5	34.5	29.2	30.0	34.0	29.3	31.5	33.5
5	34.5	33.5	35.0	41.0	40.2	32.0	32.0	29.2	32.2	29.3	33.2	32.8
6	33.8	34.0	35.2	38.5	40.2	30.8	30.2	33.8	34.5	32.5	33.8	33.2
7	32.6	35.2	36.0	39.2	41.2	31.5	30.5	31.0	32.2	31.5	34.5	33.9
8	34.0	36.2	36.5	39.0	39.6	30.2	33.0	32.5	30.5	30.5	33.8	32.2
9	34.5	35.0	37.5	38.8	39.7	33.0	33.0	32.7	32.7	32.0	33.2	32.8
10	34.0	35.0	36.0	38.0	41.0	32.0	33.0	32.5	33.8	32.7	32.8	32.5
11	33.0	35.7	37.0	40.0	40.8	32.0	32.6	31.0	30.5	33.5	33.4	32.8
12	32.5	35.5	37.7	39.2	41.0	32.8	33.5	31.0	32.0	32.5	34.0	33.2
13	32.3	33.5	38.2	39.6	40.0	34.2	31.0	30.8	31.6	31.7	34.2	33.0
14	34.0	32.0	39.5	38.8	40.2	34.0	29.6	28.2	33.5	31.5	34.6	33.2
15	34.2	32.3	39.0	39.6	40.8	29.5	32.0	30.0	34.0	33.0	34.5	34.3
16	33.6	33.6	39.5	39.5	41.0	31.0	31.0	31.5	33.0	32.2	34.7	35.5
17	34.5	35.0	39.0	38.7	38.8	29.7	30.8	33.0	33.2	31.5	34.5	34.0
18	34.0	35.5	37.6	39.3	35.6	32.0	32.0	29.0	34.0	34.2	34.0	34.2
19	34.3	35.5	38.2	39.5	31.3	30.6	33.5	30.5	30.8	29.8	33.7	33.2
20	34.2	35.0	37.4	42.2	31.2	31.3	33.0	30.0	27.2	27.5	33.6	34.0
21	35.2	36.3	36.0	41.2	32.0	33.5	31.5	32.0	28.0	31.5	34.2	32.0
22	34.2	36.5	36.6	40.1	35.3	34.0	32.2	30.2	31.5	32.7	34.6	31.5
23	35.0	36.5	38.3	41.5	36.2	33.0	32.0	29.5	32.4	33.5	33.5	32.0
24	34.2	36.4	37.0	39.8	35.2	33.8	32.0	32.0	29.8	31.5	34.8	33.0
25	30.6	36.0	38.5	40.2	37.0	33.0	34.7	31.5	32.5	34.0	34.5	35.5
26	30.5	35.5	36.7	39.6	37.0	32.0	33.3	33.2	33.5	32.2	34.0	34.2
27	30.0	34.8	37.0	37.5	36.7	30.0	32.5	32.2	33.8	32.3	35.0	35.0
28	31.8	35.3	37.0	35.0	33.0	28.0	32.0	32.0	33.6	32.2	33.0	34.5
29	32.5	37.0	38.0	32.0	33.0	33.0	29.5	34.2	30.5	33.5	34.0	34.8
30	34.0		37.2	38.5	32.0	34.0	32.5	32.2	29.0	30.5	34.0	33.5
31	34.0		38.0		31.4		32.2	33.8		27.5		33.5

Source: Department of Meteorology and Hydrology (2020)

DAILY WIN DIRECTION AT (06:30) hrs M.S.T

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	NE	SE	NW	NE	SE	S	S	NE	SE	SE	NE	SW
2	NE	SW	SE	SW	NE	S	NE	SW	SE	SE	SE	SE
3	NE	S	S	SE	SE	SE	SE	SW	SE	SE	Clam	SE
4	SW	S	SW	NW	SE	NE	SE	SE	N	SE	SE	SE
5	NE	SE	SE	SE	SE	S	SE	SW	SW	SE	E	SE
6	NE	SW	SE	NE	SW	SE	SE	E	S	SE	W	SE
7	NE	SW	S	S	SW	SW	NE	SW	SE	NE	SE	W
8	NE	SW	NW	SE	S	SE	S	S	NE	NE	N	S
9	NE	SW	S	S	SW	SE	SW	SW	S	SW	NE	SW
10	SW	S	SE	S	S	SE	SW	SW	S	SE	NW	SE
11	SW	SW	S	S	S	SW	S	NE	SE	SE	W	NE
12	NE	SW	SW	SE	SE	SW	SE	SE	SE	SE	SE	SW
13	SE	S	S	SE	NE	SW	SE	SW	NW	SE	SE	SW
14	S	SW	NE	Clam	Clam	SE	SE	SW	SE	SE	NE	NE
15	SW	SE	S	Clam	Clam	SW	SE	SE	SE	S	NE	SE
16	NE	S	SW	SW	NE	SW	NE	SE	SE	SE	W	E
17	SW	SE	W	SW	SW	SW	W	SE	SE	SW	W	W
18	NE	SW	NW	S	NE	SW	SW	SE	NE	S	W	W
19	S	SE	SE	W	SW	SE	SE	SE	W	SE	NE	NE
20	SE	NW	SW	N	SE	SE	SW	SE	SE	SE	NE	SE
21	NE	NE	SW	NE	SE	SE	SE	S	SE	S	NE	SE
22	NE	SE	S	S	NW	SE	NE	SW	SE	SE	S	SE
23	NE	SW	SE	SW	SE	SW	S	SW	SE	SE	NE	SE
24	SE	SW	SE	SW	S	SW	NE	SW	SE	SE	NE	Clam
25	SW	SE	SE	SE	SW	SE	Clam	SW	SE	S	SE	NE
26	S	NE	NE	SW	NE	SE	NE	S	Clam	NE	NE	NE
27	SW	SE	NW	SE	S	S	NW	E	SE	SE	S	SW
28	SE	E	W	SE	SE	SW	SW	S	SW	SE	NE	NE
29	NE	SW	S	NE	W	SW	SE	SE	NE	NW	NW	SE
30	SW		SW	SW	SE	SE	SE	Clam	SW	E	NE	W
31	SW		SE		SW		SE	SE		NE		SW

Source: Department of Meteorology and Hydrology (2020)

APPENDIX F
Air Quality including Wind Speed and Direction Results by TBS
Co., Ltd.



TOTAL BUSINESS SOLUTION CO., LTD.

No. 54, Room No. 704, Waizayantar Tower, Waizayantar Road, Thingangyun Township, Myanmar Tel: + 959 401 604 493, E-mail: tbs.myanmar@gmail.com

Air Quality Measurement Result

Client တိုင်းတာလိုသူ အမည်	Myanmar Golden Eagle Co., Ltd.	Latitude လတ္တီတွဒ်	16° 42' 34.68" N
Project Location စီမံကိန်းတည်နေရာ	U Paing No. 97, Yangon – Thilawa Terminal Road, Phayagone Village, Thanlyin Township, Yangon, Myanmar.	Longitude လောင်ဂျီတွဒ်	96° 15' 18.69" E
Sampling Equipment တိုင်းတာသည့် စက်ပစ္စည်း	Haz-Scanner™ Model-EPAS	Sampling Duration တိုင်းတာသည့် ကြာချိန်	24-hour
Measurement Location တိုင်းတာသည့်တည်နေရာ	Within Project Area	Station Height (from ground) မြေပြင်မှ စက်တည်အမြင့်	5 ft / 1.5 m
Project Number စီမံကိန်းအမှတ်	TBS-199	Sampling I.D လေ့လာမှုအမှတ်စဉ်	TBS-084/1
		Measurement Date တိုင်းတာသည့်နေ့ရက်	13 th – 14 th June, 2023

Air Sampling Results/ လေထုတိုင်းတာစမ်းသပ်မှုအဖြေ

No. စဉ်	Parameters တိုင်းတာသည့် အရည်အသွေး	Result ရလဒ်	Unit ယူနစ်	Sampling Duration ပျမ်းမျှကာလ		Guideline Limit ထုတ်လွှတ်မှုစံနှုန်း	Avg.Period ပျမ်းမျှကာလ
1.	Carbon dioxide (CO ₂) ကာဗွန်ဒိုင်အောက်ဆိုဒ်	298	ppm	8	hours	10,000 ppm ^a	8-hour
2.	Carbon monoxide (CO) ကာဗွန်မိုနောက်ဆိုဒ်	0.07	ppm	8	hours	9 ppm ^b	8-hour
3.	Methane (CH ₄) မီသိန်း	663	ppm	8	hours	1,000 ppm ^c	8-hour
4.	Nitrogen dioxide (NO ₂) နိုက်ထရိုဂျင်ဒိုင်အောက်ဆိုဒ်	155	µg/m ³	1	hour	*200 µg/m ³	1-hour
5.	Ozone (O ₃) အိုဇုန်း	96	µg/m ³	8	hours	*100 µg/m ³	8-hour daily maximum
6.	Particulate Matter (PM ₁₀) လေထုထဲရှိ အမှုန်အမွှား	25	µg/m ³	24	hours	*50 µg/m ³	24-hour
7.	Particulate Matter (PM _{2.5}) လေထုထဲရှိ အမှုန်အမွှား	13	µg/m ³	24	hours	*25 µg/m ³	24-hour
8.	Sulphur dioxide (SO ₂) ဆာလဖာဒိုင်အောက်ဆိုဒ်	5	µg/m ³	24	hours	*20 µg/m ³	24-hour
9.	Volatile Organic Compound (VOCs)	2.0	µg/m ³	24	hours	NG	-
10.	Humidity (စိုထိုင်းစ)	81	%	24	hours	-	-
11.	Temperature (အပူချိန်)	28	°C	24	hours	-	-
12.	Wind Speed (လေတိုက်နှုန်း)	1.2	m/s	24	hours	-	-
13.	Wind Direction (လေတိုက်ရာအရပ်)	199	-	24	hours	-	-

*National Environmental Quality Emission Guideline (2015), ^a Minnesota Department of Health, ^b NAQQS of US.EPA, ^c Alberta, Agriculture, Food and Development, NG, No Guideline

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Analyzed by

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Survey Manager

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Reviewed by

U Myatthu Kyaw
General Manager

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Approved by

Dr. Soe Moe Kyaw Win
Managing Director

Dr. Soe Moe Kyaw Win
MANAGING DIRECTOR
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TOTAL BUSINESS SOLUTION CO., LTD.

No. 54, Room No. 704, Waizayantar Tower, Waizayantar Road, Thingangyun Township, Myanmar Tel: + 959 401 604 493, E-mail: tbs.myanmar@gmail.com

Air Quality Measurement Result

Client တိုင်းတာလိုသူ အမည်	Myanmar Golden Eagle Co., Ltd.	Latitude လတ္တီတွဒ်	16° 42' 27.89" N
Project Location စီမံကိန်းတည်နေရာ	U Paing No. 97, Yangon – Thilawa Terminal Road, Phayagone Village, Thanlyin Township, Yangon, Myanmar.	Longitude လောင်ဂျီတွဒ်	96° 15' 53.99" E
Sampling Equipment တိုင်းတာသည့် စက်ပစ္စည်း	Haz-Scanner™ Model-EPAS	Sampling Duration တိုင်းတာသည့် ကြာချိန်	24-hour
Measurement Location တိုင်းတာသည့်တည်နေရာ	Phan Chat Sat Yone Taw Ya Monastery	Station Height (from ground) မြေပြင်မှ စက်တည်အမြင့်	5 ft / 1.5 m
Project Number စီမံကိန်းအမှတ်	TBS-199	Sampling I.D လေ့လာမှုအမှတ်စဉ်	TBS-084/2
		Measurement Date တိုင်းတာသည့်နေ့ရက်	14 th – 15 th June, 2023

Air Sampling Results/ လေထုတိုင်းတာစမ်းသပ်မှုအဖြေ

No. စဉ်	Parameters တိုင်းတာသည့် အရည်အသွေး	Result ရလဒ်	Unit ယူနစ်	Sampling Duration ပျမ်းမျှကာလ		Guideline Limit ထုတ်လွှတ်မှုစံနှုန်း	Avg.Period ပျမ်းမျှကာလ
1.	Carbon dioxide (CO ₂) ကာဗွန်ဒိုင်အောက်ဆိုဒ်	287	ppm	8	hours	10,000 ppm ^a	8-hour
2.	Carbon monoxide (CO) ကာဗွန်မိုနောက်ဆိုဒ်	0.06	ppm	8	hours	9 ppm ^b	8-hour
3.	Methane (CH ₄) မီသိန်း	510	ppm	8	hours	1,000 ppm ^c	8-hour
4.	Nitrogen dioxide (NO ₂) နိုက်ထရိုဂျင်ဒိုင်အောက်ဆိုဒ်	112	µg/m ³	1	hour	*200 µg/m ³	1-hour
5.	Ozone (O ₃) အိုဇုန်း	87	µg/m ³	8	hours	*100 µg/m ³	8-hour daily maximum
6.	Particulate Matter (PM ₁₀) လေထုထဲရှိ အမှုန်အမွှား	20	µg/m ³	24	hours	*50 µg/m ³	24-hour
7.	Particulate Matter (PM _{2.5}) လေထုထဲရှိ အမှုန်အမွှား	13	µg/m ³	24	hours	*25 µg/m ³	24-hour
8.	Sulphur dioxide (SO ₂) ဆာလဖာဒိုင်အောက်ဆိုဒ်	1.4	µg/m ³	24	hours	*20 µg/m ³	24-hour
9.	Volatile Organic Compound (VOCs)	0	µg/m ³	24	hours	NG	-
10.	Humidity (စိုထိုင်းစ)	78	%	24	hours	-	-
11.	Temperature (အပူချိန်)	29	°C	24	hours	-	-
12.	Wind Speed (လေတိုက်နှုန်း)	1.0	m/s	24	hours	-	-
13.	Wind Direction (လေတိုက်ရာအရပ်)	191	-	24	hours	-	-

*National Environmental Quality Emission Guideline (2015), ^a Minnesota Department of Health, ^b NAQGS of US.EPA, ^c Alberta, Agriculture, Food and Development, NG, No Guideline

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Air Quality Measurement Result

Client တိုင်းတာလိုသူ အမည်	Myanmar Golden Eagle Co., Ltd.	Latitude လတ္တီတွဒ်	16° 41' 47.49" N
Project Location စီမံကိန်းတည်နေရာ	U Paing No. 97, Yangon – Thilawa Terminal Road, Phayagone Village, Thanlyin Township, Yangon, Myanmar.	Longitude လောင်ဂျီတွဒ်	96° 16' 11.50" E
Sampling Equipment တိုင်းတာသည့် စက်ပစ္စည်း	Haz-Scanner™ Model-EPAS	Sampling Duration တိုင်းတာသည့် ကြာချိန်	24-hour
Measurement Location တိုင်းတာသည့်တည်နေရာ	Beside Thilawa Road	Station Height (from ground) မြေပြင်မှ စက်တည်အမြင့်	5 ft / 1.5 m
Project Number စီမံကိန်းအမှတ်	TBS-199	Sampling I.D လေ့လာမှုအမှတ်စဉ်	TBS-084/3
		Measurement Date တိုင်းတာသည့်နေ့ရက်	15 th – 16 th June, 2023

Air Sampling Results/ လေထုတိုင်းတာစမ်းသပ်မှုအဖြေ

No. စဉ်	Parameters တိုင်းတာသည့် အရည်အသွေး	Result ရလဒ်	Unit ယူနစ်	Sampling Duration ပျမ်းမျှကာလ		Guideline Limit ထုတ်လွှတ်မှုစံနှုန်း	Avg.Period ပျမ်းမျှကာလ
1.	Carbon dioxide (CO ₂) ကာဗွန်ဒိုင်အောက်ဆိုဒ်	466	ppm	8	hours	10,000 ppm ^a	8-hour
2.	Carbon monoxide (CO) ကာဗွန်မိုနောက်ဆိုဒ်	0.14	ppm	8	hours	9 ppm ^b	8-hour
3.	Methane (CH ₄) မီသိန်း	573	ppm	8	hours	1,000 ppm ^c	8-hour
4.	Nitrogen dioxide (NO ₂) နိုက်ထရိုဂျင်ဒိုင်အောက်ဆိုဒ်	122	µg/m ³	1	hour	*200 µg/m ³	1-hour
5.	Ozone (O ₃) အိုဇုန်း	98	µg/m ³	8	hours	*100 µg/m ³	8-hour daily maximum
6.	Particulate Matter (PM ₁₀) လေထုထဲရှိ အမှုန်အမွှား	41	µg/m ³	24	hours	*50 µg/m ³	24-hour
7.	Particulate Matter (PM _{2.5}) လေထုထဲရှိ အမှုန်အမွှား	19	µg/m ³	24	hours	*25 µg/m ³	24-hour
8.	Sulphur dioxide (SO ₂) ဆာလဖာဒိုင်အောက်ဆိုဒ်	16	µg/m ³	24	hours	*20 µg/m ³	24-hour
9.	Volatile Organic Compound (VOCs)	0	µg/m ³	24	hours	NG	-
10.	Humidity (စိုထိုင်းစ)	79	%	24	hours	-	-
11.	Temperature (အပူချိန်)	29	°C	24	hours	-	-
12.	Wind Speed (လေတိုက်နှုန်း)	0.9	m/s	24	hours	-	-
13.	Wind Direction (လေတိုက်ရာအရပ်)	194	-	24	hours	-	-

*National Environmental Quality Emission Guideline (2015), ^a Minnesota Department of Health, ^b NAQGS of US.EPA, ^c Alberta, Agriculture, Food and Development, NG, No Guideline

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U Myatthu Kyaw
General Manager

MYATTHU KYAW
GENERAL MANAGER
TOTAL BUSINESS SOLUTION CO.,LTD.

Approved by

Dr. Soe Moe Kyaw Win
Managing Director

Dr. Soe Moe Kyaw Win
MANAGING DIRECTOR
TOTAL BUSINESS SOLUTION CO., LTD.

APPENDIX G-1

Water Quality Results by Alarm Ecological Laboratory

ALARM Ecological Laboratory

Water Testing Result Report



Report Number: EL-WR-23-01651

Date : June 22, 2023

Client Information

Client Name : Myanmar Golden Eagle Co., Ltd
Organization : Total Business Solution
Client ID : -
Registration Date & Time : 14.6.2023;
3:15 PM
Contact : 09-767005603
Email : htetthiha.tbs@gmail.com
Testing Purpose : For Standard

Sample Information

Sample ID : 9784
Sample Name : Water Sample 1
Sample Type / Source : Raw
Sampling Date & Time : 16.6.23 ;
8:45AM
Sample Location : Thanlyin
Latitude : 16° 42' 36.17" N
Longitude : 96° 15' 29.54" E

Testing Results

*This laboratory analysis report is based solely on the sample submitted by the client unless client took our sampling service.
This report shall not be reproduced except in full, without written approval of the laboratory*

Sr.	Quality Parameters	Results	Units	Drinking Standards	Remarks
1	TSS ³	8	mg/L	≤50 ^d	Normal
2	Turbidity ³	7	FAU	≤5 ^c	Turbid
3	BOD ₅ ⁶	6.5	mg/L	-	-
4	COD ³	16	mg/L	-	-
5	Cyanide ³	<0.01	mg/L	-	-
6	Phosphorous ³	1.2	mg/L	-	-
7	Iron ⁷	0.2	mg/L	≤1 ^c	Normal
8	Arsenic ⁸	0.005	mg/L	≤0.05 ^a	Normal
9	Lead ⁷	ND	mg/L	≤0.01 ^c	LOD = 0.1 mg/L
10	Sulfate ³	13.9	mg/L	≤ 250 ^c	Normal
11	Total Nitrogen ³	3.6	mg/L	-	-

²"ND" = Not Detected

"LOD" = Lower limit of detection

"-" = No Reference Standard

Tested by

Checked by

Approved by

Daw May Myat Khine
Lab. Technician II
Ecological Laboratory
ALARM

Daw Lin Myat Aung
Lab. Technician I
Ecological Laboratory
ALARM

Dr. Aye Aye Win
Laboratory In-Charge
Ecological Laboratory
(ALARM)

No.237, Corner of Shu Khin Thar Street & 7 Street, (3) Block, South Oakkalapa Township, Yangon.

Tel: 09-407496078, Email: aelab.2022@gmail.com

ALARM Ecological Laboratory

Water Testing Result Report



Report Number: EL-WR-23-01737

Date : July 24, 2023

Client Information

Client Name : Myanmar Golden Eagle Co., Ltd
Organization : Total Business Solution Co., Ltd
Client ID : -
Registration Date & Time : 11.7.2023; 12:50 PM
Contact : 09-401604493
Email : phookhine.tbs@gmail.com
Testing Purpose : For Standard

Sample Information

Sample ID : 9875
Sample Name : DWW
Sample Type / Source : Waste
Sampling Date & Time : 11.7.2023;
10:30 AM
Sample Location : Thanlyin
Latitude : 16° 42' 31.23" N
Longitude : 96° 15' 12.90" E

Testing Results

*This laboratory analysis report is based solely on the sample submitted by the client unless client took our sampling service.
This report shall not be reproduced except in full, without written approval of the laboratory*

Sr.	Quality Parameters	Results	Units	Emission Standards	Remarks
1	Turbidity ³	< 5	FAU	-	-
2	TSS ³	4	mg/L	≤50 ^d	Normal
3	BOD ₅ ⁶	42	mg/L	≤ 50 ^d	Normal
4	COD ³	96	mg/L	≤ 250 ^d	Normal
5	Free Cyanide ³	< 0.01	mg/L	≤ 0.1 ^d	Normal
6	Phosphorous ³	2.1	mg/L	≤2 ^d	Above the limit
7	Arsenic ³	0.005	mg/L	≤ 0.1 ^d	Normal
8	Iron ⁷	0.3	mg/L	≤ 3.5 ^d	Normal
9	Lead ⁷	ND	mg/L	≤ 0.1 ^d	LOD = 0.1 mg/L
10	Total Nitrogen ³	21	mg/L	-	-

2"ND" = Not Detected

"LOD" = Lower limit of detection

" - " = No Reference Standard

Tested by

Checked by

Approved by

Daw May Mya Khine
Lab. Technician II
Ecological Laboratory
ALARM

Daw Lin Mya Myat Aung
Lab. Technician I
Ecological Laboratory
ALARM

Dr. Aye Aye Win
Laboratory Technician
Ecological Laboratory
(ALARM)

No.237, Corner of Shu Khin Thar Street & 7 Street, (3) Block, South Oakkalapa Township, Yangon.
Tel: 09-407496078, Email: aelab.2022@gmail.com

ALARM Ecological Laboratory

Water Testing Result Report



Report Number: EL-WR-23-01738

Date : July 24, 2023

Client Information

Client Name : Myanmar Golden Eagle Co., Ltd
Organization : Total Business Solution Co., Ltd
Client ID : -
Registration Date & Time : 11.7.2023; 12:50 PM
Contact : 09-401604493
Email : phookhine.tbs@gmail.com
Testing Purpose : For Standard

Sample Information

Sample ID : 9876
Sample Name : PWW
Sample Type / Source : Waste
Sampling Date & Time : 11.7.2023;
10:45 AM
Sample Location : Thanlyin
Latitude : 16° 42' 21.65" N
Longitude : 96° 15' 27.01" E

Testing Results

This laboratory analysis report is based solely on the sample submitted by the client unless client took our sampling service.

This report shall not be reproduced except in full, without written approval of the laboratory

Sr.	Quality Parameters	Results	Units	Emission Standards	Remarks
1	Turbidity ³	19	FAU	-	-
2	TSS ³	12	mg/L	≤50 ^d	Normal
3	BOD ₅ ⁶	18	mg/L	≤ 50 ^d	Normal
4	COD ³	33	mg/L	≤ 250 ^d	Normal
5	Free Cyanide ³	< 0.01	mg/L	≤ 0.1 ^d	Normal
6	Phosphorous ³	1.8	mg/L	≤2 ^d	Normal
7	Arsenic ⁸	0.005	mg/L	≤ 0.1 ^d	Normal
8	Iron ⁷	0.4	mg/L	≤ 3.5 ^d	Normal
9	Lead ⁷	ND	mg/L	≤ 0.1 ^d	LOD = 0.1 mg/L
10	Total Nitrogen ³	31	mg/L	-	-

2"ND" = Not Detected

"LOD" = Lower limit of detection

" - " = No Reference Standard

Tested by

Checked by

Approved by

Daw May Myat Khine
Lab. Technician II
Ecological Laboratory
ALARM

Daw Lin Myat Aung
Lab. Technician I
Ecological Laboratory
ALARM

Dr. Aye Win
Laboratory In-Charge
Ecological Laboratory
(ALARM)

No.237, Corner of Shu Khin Thar Street & 7 Street, (3) Block, South Oakkalapa Township, Yangon.

Tel: 09-407496078, Email: aelab.2022@gmail.com

APPENDIX G-2
Water Quality Results by TBS Co., Ltd. (In-situ)



TOTAL BUSINESS SOLUTION CO., LTD.

No. 54, Room No. 704, Waizayantar Tower, Waizayantar Road, Thingangyun Township, Myanmar Tel: + 959 401 604 493, E-mail: tbs.myanmar@gmail.com

Water Testing Result Form

ရေနမူနာစမ်းသပ်သည့်ရလဒ်

Client တိုင်းတာလိုသူ အမည်	Myanmar Golden Eagle Co.,Ltd.	Testing Date/Time စမ်းသပ်သည့် နေ့ရက်	11.7.2023
Project Location စီမံကိန်း တည်နေရာ	U Paing No. 97, Yangon – Thilawa Terminal Road, Phayagone Village, Thanlyin Township, Yangon, Myanmar.	Testing Time စမ်းသပ်သည့် အချိန်	10:30 am
Measurement Location တိုင်းတာသည့် တည်နေရာ	Process Water Storage Pound	Testing ID စမ်းသပ်သည့် နံပါတ်	TBS – 011/2023
Testing Name စမ်းသပ်သည့်အမည်	PWW	Testing Type စမ်းသပ်သည့် အမျိုးအစား	Process Wastewater
		Latitude/ Longitude လတ္တီကျု/ လောင်ဂျီကျု	16° 42' 21.65" N 96° 15' 27.01" E

Sr. စဉ်	Parameters တိုင်းတာသည့် နေရာ	Unit ယူနစ်	Result ရလဒ်	NEQEG Guideline	National Drinking Water Guideline		Water Testing Instrument	Remark
					Value	Units		
1.	PH	S.U	8.67	6.0-9.0	6.5-8.5	mg/L	Oakton PCTS Tester™ Waterproof Pocket Tester	
2.	Temperature	°F	86.9	-	-			
3.	TDS	ppm	231	-	1000	mg/L		
4.	Conductivity	µs/cm	327	-	-			
5.	Salinity	ppt	0.1	-	-			

Remark: This quality report cannot be edited without the permission of TBS.

“ND”= Not Detected
Tested by

“LOD”= Lower limit of detection
Check by

“_” No Reference Standard
Approved by

Field Technician

U Wai Phyto Aung
Survey Manager

Wai Phyto Aung
Survey Manager

TOTAL BUSINESS SOLUTION CO., LTD.

Analyzed by

U Myatthu Kyaw
General Manager

MYATTHU KYAW
GENERAL MANAGER

TOTAL BUSINESS SOLUTION CO.,LTD.

Reviewed by

Dr. Soe Moe Kyaw Win
Managing Director

Dr. Soe Moe Kyaw Win
MANAGING DIRECTOR

TOTAL BUSINESS SOLUTION CO., LTD.



TOTAL BUSINESS SOLUTION CO., LTD.

No. 54, Room No. 704, Waizayantar Tower, Waizayantar Road, Thingangyun Township, Myanmar Tel: + 959 401 604 493, E-mail: tbs.myanmar@gmail.com

Water Testing Result Form

ရေနမူနာစမ်းသပ်သည့်ရလဒ်

Client တိုင်းတာလိုသူ အမည်	Myanmar Golden Eagle Co.,Ltd.	Testing Date/Time စမ်းသပ်သည့် နေ့ရက်	11.7.2023
Project Location စီမံကိန်း တည်နေရာ	U Paing No. 97, Yangon – Thilawa Terminal Road, Phayagone Village, Thanlyin Township, Yangon, Myanmar.	Testing Time စမ်းသပ်သည့် အချိန်	10:15 am
Measurement Location တိုင်းတာသည့် တည်နေရာ	Factory Drainage Outlet	Testing ID စမ်းသပ်သည့် နံပါတ်	TBS – 010/2023
Testing Name စမ်းသပ်သည့်အမည်	DWW	Testing Type စမ်းသပ်သည့် အမျိုးအစား	Domestic Wastewater
		Latitude/ Longitude လတ္တီကျု/ လောင်ဂျီကျု	16° 42' 31.23" N 96° 15' 12.90" E

Sr. စဉ်	Parameters တိုင်းတာသည့် နေရာ	Unit ယူနစ်	Result ရလဒ်	NEQEG Guideline	National Drinking Water Guideline		Water Testing Instrument	Remark
					Value	Units		
1.	PH	S.U	8.12	6.0-9.0	6.5-8.5	mg/L	Oakton PCTS Tester™ Waterproof Pocket Tester	
2.	Temperature	°F	82.6	-	-			
3.	TDS	ppm	402	-	1000	mg/L		
4.	Conductivity	µs/cm	555	-	-			
5.	Salinity	ppt	0.3	-	-			

Remark: This quality report cannot be edited without the permission of TBS.

“ND”= Not Detected
Tested by

“LOD”= Lower limit of detection
Check by

“_” No Reference Standard
Approved by

Field Technician

U Wai Phyto Aung
Survey Manager

Wai Phyto Aung
Survey Manager

TOTAL BUSINESS SOLUTION CO., LTD.

Analyzed by

U Myatthu Kyaw
General Manager

MYATTHU KYAW
GENERAL MANAGER

TOTAL BUSINESS SOLUTION CO.,LTD.

Reviewed by

Dr. Soe Moe Kyaw Win
Managing Director

Dr. Soe Moe Kyaw Win
MANAGING DIRECTOR

TOTAL BUSINESS SOLUTION CO., LTD.



TOTAL BUSINESS SOLUTION CO., LTD.

No. 54, Room No. 704, Waizayantar Tower, Waizayantar Road, Thingangyun Township, Myanmar Tel: + 959 401 604 493, E-mail: tbs.myanmar@gmail.com

Water Testing Result Form

ရေနမူနာစမ်းသပ်သည့်ရလဒ်

Client တိုင်းတာလိုသူ အမည်	Myanmar Golden Eagle Co., Ltd.	Testing Date/Time စမ်းသပ်သည့် နေ့ရက်	14.6.2023
Project Location စီမံကိန်း တည်နေရာ	U Paing No. 97, Yangon – Thilawa Terminal Road, Phayagone Village, Thanlyin Township, Yangon, Myanmar.	Testing Time စမ်းသပ်သည့် အချိန်	8:15 am
Measurement Location တိုင်းတာသည့် တည်နေရာ	Ground Water Storage Tank	Testing ID စမ်းသပ်သည့် နံပါတ်	TBS – 009/2023
Testing Name စမ်းသပ်သည့်အမည်	GW	Testing Type စမ်းသပ်သည့် အမျိုးအစား	Ground Water
		Latitude/ Longitude လတ္တီကျု/ လောင်ဂျီကျု	16° 42' 36.17" N 96° 15' 29.54" E

Sr. စဉ်	Parameters တိုင်းတာသည့် နေရာ	Unit ယူနစ်	Result ရလဒ်	NEQEG Guideline	National Drinking Water Guideline		Water Testing Instrument	Remark
					Value	Units		
1.	PH	S.U	7.44	6.0-9.0	6.5-8.5	mg/L	Oakton PCTS Tester™ Waterproof Pocket Tester	
2.	Temperature	°F	86.54	-	-			
3.	TDS	ppt	1.65	-	1000	mg/L		
4.	Conductivity	ms/cm	2.30	-	-			
5.	Salinity	ppt	1.2	-	-			

Remark: This quality report cannot be edited without the permission of TBS.

“ND”= Not Detected
Tested by

“LOD”= Lower limit of detection
Check by

“_” No Reference Standard
Approved by

Field Technician

Analyzed by

Reviewed by

U Wai Phyto Aung
Survey Manager

U Myatthu Kyaw
General Manager

Dr. Soe Moe Kyaw Win
Managing Director

Wai Phyto Aung
Survey Manager

MYATTHU KYAW
GENERAL MANAGER

Dr. Soe Moe Kyaw Win
MANAGING DIRECTOR

TOTAL BUSINESS SOLUTION CO., LTD.

TOTAL BUSINESS SOLUTION CO., LTD.

TOTAL BUSINESS SOLUTION CO., LTD.

APPENDIX G-3
Water Quality Results by MGE Co., Ltd.



M.M.A (MYAT MYINTMO AUNG) ENVIRONMENTAL ENGINEERING CO., LTD
NO. 514, BOHMU BA HTOO ROAD, WARD 42 NORTH DAGON TOWNSHIP YANGON,
MYANMAR.
Phone: +95 97 7777 3133, +95 97 9797 3555; +95 9221 5876
Email: aunglin@mma-myanmar.com; aunglin7@gmail.com

Date	2-Dec-2021		
Water Analysis Report	272		
Type of Water	RO Treated Water		
Label on Water	MGE_SHL		
Contact Person	U Min Aung		
Contact Number	09420583413		
Items	Water Sample Result	Unit	WHO Drinking Water Guideline
Calcium Hardness (CaCO ₃)	1.5	mg/l	
Magnesium Hardness (CaCO ₃)	1.0	mg/l	
Chlorine (Total)	0.00	mg/l	
Color	0.00	PCU	Platinum-cobalt units
Conductivity	46	µS/cm	
Copper	0.00	mg/l	
Iron	0.17	mmol/l	
Iron (Fe)	0.00	ppm	<0.3 ppm
Nitrite	0.00	mg/l	
pH	7.7		6.5 ~ 8.5
Phosphorus	0.00	mg/l	
Silicon (Si)	0.00	mg/l	
TDS (Total Dissolved Solid)	23	ppm	<1000 ppm
Total Alkalinity	78	mg/l	
Total Hardness	2.50	mg/l	<500 mg/l
Turbidity	0.00	NTU	<5 NTU

Test by:

Signature:

Name: Min Chit Thu

Positions: Lab Technician

Approved by

Signature:

Name: Khaing Lin Myat

Positions: Technical Officer

APPENDIX H
Noise Level Results by TBS Co., Ltd.



TOTAL BUSINESS SOLUTION CO., LTD.

No. 54, Room No. 704, Waizayantar Tower, Waizayantar Road, Thingangyun Township, Myanmar Tel: + 959 401 604 493, E-mail: tbs.myanmar@gmail.com

Noise1 Level Measurement Result

Client တိုင်းတာလိုသူ အမည်	Myanmar Golden Eagle Co., Ltd.	Start Date တိုင်းတာသည့်နေ့ရက်	13 th – 14 th June, 2023
Project Location စီမံကိန်း တည်နေရာ	U Paing No. 97, Yangon – Thilawa Terminal Road, Phayagone Village, Thanlyin Township, Yangon, Myanmar.	Sampling Duration တိုင်းတာသည့်ကြာချိန်	24-hour
Measurement Location တိုင်းတာသည့် တည်နေရာ	Within Project Area	Sampling Type တိုင်းတာသည့် အမျိုးအစား	Noise Level
Project Number စီမံကိန်းအမှတ်	TBS-199	Sampling Equipment တိုင်းတာသည့် စက်ပစ္စည်း	Bentech GM - 1356
		Latitude/ လတ္တီကျု Longitude/ လောင်ဂျီကျု	16° 42' 23.97" N 96° 15' 25.93" E

Noise1 Results (dBA) per Hour			
Day Time (07:00Hr-22:00Hr)	Leq 1(Hour)	Night Time (22:00Hr-07:00Hr)	Leq 1(Hour)
07:00-08:00	79.3	22:00-23:00	82.0
08:00-09:00	61.3	23:00-00:00	82.4
09:00-10:00	63.2	00:00-01:00	81.8
10:00-11:00	65.6	01:00-02:00	80.7
11:00-12:00	65.7	02:00-03:00	79.3
12:00-13:00	77.3	03:00-04:00	82.0
13:00-14:00	80.9	04:00-05:00	82.4
14:00-15:00	81.5	05:00-06:00	81.3
15:00-16:00	81.9	06:00-07:00	80.1
16:00-17:00	81.9	-	-
17:00-18:00	81.7	-	-
18:00-19:00	81.5	-	-
19:00-20:00	81.2	-	-
20:00-21:00	81.5	-	-
21:00-22:00	81.4	-	-
Day Time (AVG)	76.4	Night Time (AVG)	81.3
National Environmental Quality (Emission) Guidelines, 2015			
Residential, institutional, educational	55	Residential, institutional, educational	45
Industrial Commercial	70	Industrial Commercial	70

Remark: This noise quality result cannot be edited without the permission of TBS.

Analyzed by

Reviewed by

Approved by

U Wai Phyo Aung
Survey Manager

U Myatthu Kyaw
General Manager

Dr. Soe Moe Kyaw Win
Managing Director

Wai Phyo Aung
Survey Manager
TOTAL BUSINESS SOLUTION CO., LTD.

MYATTHU KYAW
GENERAL MANAGER
TOTAL BUSINESS SOLUTION CO., LTD.

Dr. Soe Moe Kyaw Win
MANAGING DIRECTOR
TOTAL BUSINESS SOLUTION CO., LTD.



TOTAL BUSINESS SOLUTION CO., LTD.

No. 54, Room No. 704, Waizayantar Tower, Waizayantar Road, Thingangyun Township, Myanmar Tel: + 959 401 604 493, E-mail: tbs.myanmar@gmail.com

Noise2 Level Measurement Result

Client တိုင်းတာလိုသူ အမည်	Myanmar Golden Eagle Co., Ltd.	Start Date တိုင်းတာသည့်နေ့ရက်	14 th – 15 th June, 2023
Project Location စီမံကိန်း တည်နေရာ	U Paing No. 97, Yangon – Thilawa Terminal Road, Phayagone Village, Thanlyin Township, Yangon, Myanmar.	Sampling Duration တိုင်းတာသည့်ကြာချိန်	24-hour
Measurement Location တိုင်းတာသည့် တည်နေရာ	Phan Chat Sat Yone Taw Ya Monastery	Sampling Type တိုင်းတာသည့် အမျိုးအစား	Noise Level
Project Number စီမံကိန်းအမှတ်	TBS-199	Sampling Equipment တိုင်းတာသည့် စက်ပစ္စည်း	Bentech GM - 1356
		Latitude/ လတ္တီကျု Longitude/ လောင်ဂျီကျု	16° 42' 27.66" N 96° 15' 53.72" E

Noise2 Results (dBA) per Hour			
Day Time (07:00Hr-22:00Hr)	Leq 1(Hour)	Night Time (22:00Hr-07:00Hr)	Leq 1(Hour)
07:00-08:00	55.5	22:00-23:00	47.1
08:00-09:00	56.9	23:00-00:00	46.0
09:00-10:00	58.8	00:00-01:00	47.9
10:00-11:00	57.2	01:00-02:00	45.4
11:00-12:00	56.7	02:00-03:00	43.2
12:00-13:00	55.2	03:00-04:00	44.5
13:00-14:00	54.8	04:00-05:00	43.7
14:00-15:00	56.5	05:00-06:00	44.7
15:00-16:00	56.9	06:00-07:00	46.1
16:00-17:00	58.4	-	-
17:00-18:00	57.4	-	-
18:00-19:00	58.2	-	-
19:00-20:00	56.2	-	-
20:00-21:00	55.1	-	-
21:00-22:00	52.4	-	-
Day Time (AVG)	56.4	Night Time (AVG)	45.4
National Environmental Quality (Emission) Guidelines, 2015			
Residential, institutional, educational	55	Residential, institutional, educational	45
Industrial Commercial	70	Industrial Commercial	70

Remark: This noise quality result cannot be edited without the permission of TBS.

Analyzed by

Reviewed by

Approved by

U Wai Phyo Aung
Survey Manager

U Myatthu Kyaw
General Manager

Dr. Soe Moe Kyaw Win
Managing Director

Wai Phyo Aung
Survey Manager
TOTAL BUSINESS SOLUTION CO., LTD.

MYATTHU KYAW
GENERAL MANAGER
TOTAL BUSINESS SOLUTION CO., LTD.

Dr. Soe Moe Kyaw Win
MANAGING DIRECTOR
TOTAL BUSINESS SOLUTION CO., LTD.



TOTAL BUSINESS SOLUTION CO., LTD.

No. 54, Room No. 704, Waizayantar Tower, Waizayantar Road, Thingangyun Township, Myanmar Tel: + 959 401 604 493, E-mail: tbs.myanmar@gmail.com

Noise3 Level Measurement Result

Client တိုင်းတာလိုသူ အမည်	Myanmar Golden Eagle Co., Ltd.	Start Date တိုင်းတာသည့်နေ့ရက်	15 th – 16 th Jun, 2023
Project Location စီမံကိန်း တည်နေရာ	U Paing No. 97, Yangon – Thilawa Terminal Road, Phayagone Village, Thanlyin Township, Yangon, Myanmar.	Sampling Duration တိုင်းတာသည့်ကြာချိန်	24-hour
Measurement Location တိုင်းတာသည့် တည်နေရာ	Beside Thilawa Road	Sampling Type တိုင်းတာသည့် အမျိုးအစား	Noise Level
Project Number စီမံကိန်းအမှတ်	TBS-199	Sampling Equipment တိုင်းတာသည့် စက်ပစ္စည်း	Bentech GM - 1356
		Latitude/ လတ္တီကျု Longitude/ လောင်ဂျီကျု	16° 41' 47.78" N 96° 16' 11.35" E

Noise3 Results (dBA) per Hour			
Day Time (07:00Hr-22:00Hr)	Leq 1(Hour)	Night Time (22:00Hr-07:00Hr)	Leq 1(Hour)
07:00-08:00	56.8	22:00-23:00	46.2
08:00-09:00	58.7	23:00-00:00	45.8
09:00-10:00	55.3	00:00-01:00	44.4
10:00-11:00	54.9	01:00-02:00	44.9
11:00-12:00	55.1	02:00-03:00	42.5
12:00-13:00	52.5	03:00-04:00	43.8
13:00-14:00	55.5	04:00-05:00	45.9
14:00-15:00	57.6	05:00-06:00	46.4
15:00-16:00	56.6	06:00-07:00	51.1
16:00-17:00	55.4	-	-
17:00-18:00	56.9	-	-
18:00-19:00	56.9	-	-
19:00-20:00	54.8	-	-
20:00-21:00	51.8	-	-
21:00-22:00	48.0	-	-
Day Time (AVG)	55.1	Night Time (AVG)	45.7
National Environmental Quality (Emission) Guidelines, 2015			
Residential, institutional, educational	55	Residential, institutional, educational	45
Industrial Commercial	70	Industrial Commercial	70

Remark: This noise quality result cannot be edited without the permission of TBS.

Analyzed by

Reviewed by

Approved by

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Survey Manager

U Myatthu Kyaw
General Manager

Dr. Soe Moe Kyaw Win
Managing Director

Wai Phyo Aung
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MYATTHU KYAW
GENERAL MANAGER
TOTAL BUSINESS SOLUTION CO., LTD.

Dr. Soe Moe Kyaw Win
MANAGING DIRECTOR
TOTAL BUSINESS SOLUTION CO., LTD.

APPENDIX I
Vibration Level Results by TBS Co., Ltd.



TOTAL BUSINESS SOLUTION CO., LTD.

No. 54, Room No. 704, Waizayantar Tower, Waizayantar Road, Thingangyun Township, Myanmar Tel: + 959 401 604 493, E-mail: tbs.myanmar@gmail.com

Vibration Level Measurement Result

Client တိုင်းတာလိုသူ အမည်	Myanmar Golden Eagle Co., Ltd.	Date တိုင်းတာသည့် နေ့ရက်	13 th – 14 th June, 2023
Project Location စီမံကိန်း တည်နေရာ	U Paing No. 97, Yangon – Thilawa Terminal Road, Phayagone Village, Thanlyin Township, Yangon, Myanmar.	Monitoring Period တိုင်းတာသည့် ကြာချိန်	24-hour
Measurement Location တိုင်းတာသည့် တည်နေရာ	Within Project Site	Sampling Type တိုင်းတာသည့် အမျိုးအစား	Vibration Level
Project Number စီမံကိန်းအမှတ်	TBS-199	Sampling Equipment တိုင်းတာသည့် စက်ပစ္စည်း	Nomis Seismograph (Mini Supergraph II)
		Latitude/ လတ္တီကျု Longitude/ လောင်ဂျီကျု	16° 42' 25.50" N 96° 15' 19.87" E

Station ပိုင်း	Result ရလဒ်		
	Direction ဦးတည်ချက်	Frequency ကြိမ်နှုန်း (Hz)	Peak particle velocity အလျင် (mm/s)
V1	Radial	28.70	0.58
	Transverse	43.66	0.66
	Vertical	26.13	0.43
German standard DIN 4150-3			
Type	Peak Particle Velocity (mm/s)		
	1-10 Hz	10-50 Hz	50-100 Hz
Commercial	20	20-40	40-50
Residential	5	5-15	15-20
Very sensitive	3	3-8	8-10

Remark: This quality report cannot be edited without the permission of TBS.

Analyzed by

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Approved by

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Dr. Soe Moe Kyaw Win
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TOTAL BUSINESS SOLUTION CO., LTD.

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Vibration Level Measurement Result

Client တိုင်းတာလိုသူ အမည်	Myanmar Golden Eagle Co., Ltd.	Date တိုင်းတာသည့် နေ့ရက်	14 th – 15 th June, 2023
Project Location စီမံကိန်း တည်နေရာ	U Paing No. 97, Yangon – Thilawa Terminal Road, Phayagone Village, Thanlyin Township, Yangon, Myanmar.	Monitoring Period တိုင်းတာသည့် ကြာချိန်	24-hour
Measurement Location တိုင်းတာသည့် တည်နေရာ	Phan Chat Sat Yone Taw Ya Monastery	Sampling Type တိုင်းတာသည့် အမျိုးအစား	Vibration Level
Project Number စီမံကိန်းအမှတ်	TBS-199	Sampling Equipment တိုင်းတာသည့် စက်ပစ္စည်း	Nomis Seismograph (Mini Supergraph II)
		Latitude/ လတ္တီကျု Longitude/ လောင်ဂျီကျု	16° 42' 28.17" N 96° 15' 54.14" E

Station ပိုင်း	Result ရလဒ်		
	Direction ဦးတည်ချက်	Frequency ကြိမ်နှုန်း (Hz)	Peak particle velocity အလျင် (mm/s)
V2	Radial	50.42	0.34
	Transverse	43.62	0.26
	Vertical	24.26	0.27
German standard DIN 4150-3			
Type	Peak Particle Velocity (mm/s)		
	1-10 Hz	10-50 Hz	50-100 Hz
Commercial	20	20-40	40-50
Residential	5	5-15	15-20
Very sensitive	3	3-8	8-10

Remark: This quality report cannot be edited without the permission of TBS.

Analyzed by

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Survey Manager

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Vibration Level Measurement Result

Client တိုင်းတာလိုသူ အမည်	Myanmar Golden Eagle Co., Ltd.	Date တိုင်းတာသည့် နေ့ရက်	15 th – 16 th June, 2023
Project Location စီမံကိန်း တည်နေရာ	U Paing No. 97, Yangon – Thilawa Terminal Road, Phayagone Village, Thanlyin Township, Yangon, Myanmar.	Monitoring Period တိုင်းတာသည့် ကြာချိန်	24-hour
Measurement Location တိုင်းတာသည့် တည်နေရာ	Beside Thilawa Road	Sampling Type တိုင်းတာသည့် အမျိုးအစား	Vibration Level
Project Number စီမံကိန်းအမှတ်	TBS-199	Sampling Equipment တိုင်းတာသည့် စက်ပစ္စည်း	Nomis Seismograph (Mini Supergraph II)
		Latitude/ လတ္တီကျု Longitude/ လောင်ဂျီကျု	16° 41' 47.21" N 96° 16' 11.50" E

Station ပိုင်း	Result ရလဒ်		
	Direction ဦးတည်ချက်	Frequency ကြိမ်နှုန်း (Hz)	Peak particle velocity အလျင် (mm/s)
V3	Radial	62.63	0.61
	Transverse	31.87	0.63
	Vertical	26.47	0.45
German standard DIN 4150-3			
Type	Peak Particle Velocity (mm/s)		
	1-10 Hz	10-50 Hz	50-100 Hz
Commercial	20	20-40	40-50
Residential	5	5-15	15-20
Very sensitive	3	3-8	8-10

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Analyzed by

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Survey Manager

Wai Phyto Aung
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Reviewed by

U Myatthu Kyaw
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MYATTHU KYAW
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Managing Director

Dr. Soe Moe Kyaw Win
MANAGING DIRECTOR
TOTAL BUSINESS SOLUTION CO., LTD.

APPENDIX J
Light Measurement Results by TBS Co., Ltd.



TOTAL BUSINESS SOLUTION CO., LTD.

No. 54, Room No. 704, Waizayantar Tower, Waizayantar Road, Thingangyun Township, Myanmar Tel: + 959 401 604 493, E-mail: tbs.myanmar@gmail.com

Light Measurement Result

Client တိုင်းတာလိုသူ အမည်	Myanmar Golden Eagle Co.,Ltd.	Date တိုင်းတာသည့် နေ့ရက်	13.6.2023
Project Location စီမံကိန်း တည်နေရာ	U Paing No. 97, Yangon – Thilawa Terminal Road, Phayagone Village, Thanlyin Township, Yangon, Myanmar.	Start Time/ စတင်သည့်အချိန်	10:00 AM
Measurement Location တိုင်းတာသည့် တည်နေရာ	Inside the Factory Compound	End Time/ ပြီးစီးသည့်အချိန်	11:20 AM
Project Number စီမံကိန်းအမှတ်	TBS-199	Sampling Type တိုင်းတာသည့် အမျိုးအစား	Light
		Sampling Equipment တိုင်းတာသည့် စက်ပစ္စည်း	Victor 1010A

No. စဉ်	Site Description တိုင်းတာသည့် နေရာ	Location/တည်နေရာ		Result ရလဒ်	Unit ယူနစ်
		Latitude/ လတ္တီတွဒ်	Longitude/ လောင်ဂျီတွဒ်		
L1.	Main Office	16° 42' 35.80" N	96° 15' 18.90" E	350	Lux
L2.	Temporary Office	16° 42' 34.54" N	96° 15' 19.40" E	207	Lux
L3.	Canteen	16° 42' 33.90" N	96° 15' 20.20" E	141	Lux
L4.	Factory	16° 42' 27.50" N	96° 15' 19.90" E	986	Lux
L5.	Work Shop	16° 42' 30.60" N	96° 15' 17.80" E	1018	Lux

Remark: This quality report cannot be edited without the permission of TBS.

Analyzed by

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TOTAL BUSINESS SOLUTION CO., LTD.

TOTAL BUSINESS SOLUTION CO.,LTD.

TOTAL BUSINESS SOLUTION CO., LTD.

APPENDIX K

Temperature Measurement Results by TBS Co., Ltd.



TOTAL BUSINESS SOLUTION CO., LTD.

No. 54, Room No. 704, Waizayantar Tower, Waizayantar Road, Thingangyun Township, Myanmar Tel: + 959 401 604 493, E-mail: tbs.myanmar@gmail.com

Temperature Measurement Result

Client တိုင်းတာလိုသူ အမည်	Myanmar Golden Eagle Co.,Ltd.	Date တိုင်းတာသည့် နေ့ရက်	13.6.2023
Project Location စီမံကိန်း တည်နေရာ	U Paing No. 97, Yangon – Thilawa Terminal Road, Phayagone Village, Thanlyin Township, Yangon, Myanmar.	Start Time/ စတင်သည့်အချိန်	10:00 AM
Measurement Location တိုင်းတာသည့် တည်နေရာ	Inside the Factory Compound	End Time/ ပြီးစီးသည့်အချိန်	11:20 AM
Project Number စီမံကိန်းအမှတ်	TBS-199	Sampling Type တိုင်းတာသည့် အမျိုးအစား	Temperature
		Sampling Equipment တိုင်းတာသည့် စက်ပစ္စည်း	Infrared Thermometer

No. စဉ်	Site Description တိုင်းတာသည့် နေရာ	Location/တည်နေရာ		Result ရလဒ်	Unit ယူနစ်
		Latitude/ လတ္တီတွဒ်	Longitude/ လောင်ဂျီတွဒ်		
T1.	Main Office	16° 42' 35.80" N	96° 15' 18.90" E	27.5	°C
T2.	Temporary Office	16° 42' 34.54" N	96° 15' 19.40" E	26.4	°C
T3.	Canteen	16° 42' 33.90" N	96° 15' 20.20" E	28.3	°C
T4.	Factory	16° 42' 27.50" N	96° 15' 19.90" E	31.7	°C
T5.	Work Shop	16° 42' 30.60" N	96° 15' 17.80" E	31.1	°C

Remark: This quality report cannot be edited without the permission of TBS.

Analyzed by

Reviewed by

Approved by

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General Manager

Dr. Soe Moe Kyaw Win
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MYATTHU KYAW
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TOTAL BUSINESS SOLUTION CO.,LTD.

Dr. Soe Moe Kyaw Win
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TOTAL BUSINESS SOLUTION CO., LTD.

APPENDIX L
Traffic Counting Results by TBS Co., Ltd

TRAFFIC COUNTING SHEET

D/M/Y - 11 / 7 / 2023 Project Myanmar Golden Eagle Co., Ltd. TC (1) A From Maritime University Junction To Thilawa Jetty

Vehicle Name	6 am - 7 am	7 am - 8 am	8 am - 9 am
Bicycle/ Tricycle	4	11	12
Motorecycle	18	41	19
Motor-tricycle	2	11	14
Passenger Car/Taxi	18	33	29
Light Truck	4	11	14
Light Bus	5	9	8
Medium Bus	7	15	17
Medium Truck	4	3	10
Heavy Bus	2	4	6
Heavy Truck	1	3	7

Remark -

TRAFFIC COUNTING SHEET

D/M/Y - 11 / 7 / 2023 Project Myanmar Golden Eagle Co., Ltd. TC (1) A From Maritime University Junction To Thilawa Jetty

Vehicle Name	9 am - 10 am	10 am - 11 am	11 am - 12 pm
Bicycle/ Tricycle	14	4	6
Motorecycle	14	5	21
Motor-tricycle	2	8	13
Passenger Car/Taxi	44	48	34
Light Truck	34	26	18
Light Bus	7	5	1
Medium Bus	18	13	3
Medium Truck	28	32	40
Heavy Bus	6	8	5
Heavy Truck	12	10	6

Remark -

TRAFFIC COUNTING SHEET

D/M/Y - 11 / 7 / 2023 Project Myanmar Golden Eagle Co., Ltd. TC (1) A From Maritime University Junction To Thilawa Jetty

Vehicle Name	12 pm - 1 pm	1 pm - 2 pm	2 pm - 3 pm
Bicycle/ Tricycle	12	18	7
Motorcycle	15	7	23
Motor-tricycle	1	10	8
Passenger Car/Taxi	17	35	28
Light Truck	21	30	24
Light Bus	4		1
Medium Bus	3		2
Medium Truck	29	40	21
Heavy Bus	5	6	7
Heavy Truck	14	11	8

Remark -

TRAFFIC COUNTING SHEET

D/M/Y - 11 / 7 / 2023 Project Myanmar Golden Eagle Co., Ltd. TC (1) A From Maritime University Junction To Thilawa Jetty

Vehicle Name	3 pm - 4 pm	4 pm - 5 pm	5 pm - 6 pm
Bicycle/ Tricycle	13	15	5
Motorcycle	4	13	13
Motor-tricycle	7	4	3
Passenger Car/Taxi	24	37	13
Light Truck	17	27	14
Light Bus	3	8	5
Medium Bus	4	14	8
Medium Truck	18	17	21
Heavy Bus	4	5	3
Heavy Truck	12	4	4

Remark -

TRAFFIC COUNTING SHEET

D/M/Y - 11 / 7 / 2023 Project Myanmar Golden Eagle Co., Ltd. TC (1) B From Thilawa Jetty To Maritime University Junction

Vehicle Name	6 am - 7 am	7 am - 8 am	8 am - 9 am
Bicycle/ Tricycle	3	2	14
Motorecycle	18	30	21
Motor-tricycle	11	4	11
Passenger Car/Taxi	14	28	37
Light Truck	7	17	23
Light Bus	5	7	3
Medium Bus	8	14	16
Medium Truck	4	6	13
Heavy Bus	3	5	7
Heavy Truck	1	4	6

Remark -

TRAFFIC COUNTING SHEET

D/M/Y - 11 / 7 / 2023 Project Myanmar Golden Eagle Co., Ltd. TC (1) B From Thilawa Jetty To Maritime University Junction

Vehicle Name	9 am - 10 am	10 am - 11 am	11 am - 12 pm
Bicycle/ Tricycle	8	4	12
Motorecycle	4	23	16
Motor-tricycle	2	4	3
Passenger Car/Taxi	37	26	31
Light Truck	18	24	14
Light Bus	7	1	
Medium Bus	15	3	4
Medium Truck	17	14	18
Heavy Bus	6	8	5
Heavy Truck	4	7	13

Remark -

TRAFFIC COUNTING SHEET

D/M/Y - 11 / 7 / 2023 Project Myanmar Golden Eagle Co., Ltd. TC (1) B From Thilawa Jetty To Maritime University Junction

Vehicle Name	12 pm - 1 pm	1 pm - 2 pm	2 pm - 3 pm
Bicycle/ Tricycle	8	10	3
Motorcycle	4	18	6
Motor-tricycle	13	2	5
Passenger Car/Taxi	18	29	39
Light Truck	11	13	26
Light Bus	3	1	
Medium Bus	2		4
Medium Truck	15	19	23
Heavy Bus	4	6	7
Heavy Truck	5	1	11

Remark -

TRAFFIC COUNTING SHEET

D/M/Y - 11 / 7 / 2023 Project Myanmar Golden Eagle Co., Ltd. TC (1) B From Thilawa Jetty To Maritime University Junction

Vehicle Name	3 pm - 4 pm	4 pm - 5 pm	5 pm - 6 pm
Bicycle/ Tricycle	15	18	13
Motorcycle	4	25	17
Motor-tricycle	14	7	4
Passenger Car/Taxi	45	40	33
Light Truck	22	18	10
Light Bus		12	4
Medium Bus	6	18	1
Medium Truck	21	28	19
Heavy Bus	6	5	7
Heavy Truck	14	9	5

Remark -

TRAFFIC COUNTING SHEET

D/M/Y - 11 / 7 / 2023 Project Myanmar Golden Eagle Co., Ltd. TC (P) A From Maritime University Junction To Thanlyin Circular Road

Vehicle Name	6 am - 7 am	7 am - 8 am	8 am - 9 am
Bicycle/ Tricycle	18	28	34
Motorcycle	8	13	18
Motor-tricycle		8	5
Passenger Car/Taxi	7	14	22
Light Truck	14	16	11
Light Bus		1	4
Medium Bus	2	4	1
Medium Truck	2	13	8
Heavy Bus			
Heavy Truck			

Remark -

TRAFFIC COUNTING SHEET

D/M/Y - 11 / 7 / 2023 Project Myanmar Golden Eagle Co., Ltd. TC (P) A From Maritime University Junction To Thanlyin Circular Road

Vehicle Name	9 am - 10 am	10 am - 11 am	11 am - 12 pm
Bicycle/ Tricycle	17	21	10
Motorcycle	16	9	11
Motor-tricycle	3	6	2
Passenger Car/Taxi	13	28	16
Light Truck	17	34	25
Light Bus	3	7	2
Medium Bus			1
Medium Truck	14	18	11
Heavy Bus			
Heavy Truck			

Remark -

TRAFFIC COUNTING SHEET

D/M/Y - 11 / 7 / 2023 Project Myanmar Golden Eagle Co., Ltd. TC (2) A From Maritime University Junction To Thanlyin Circular Road.

Vehicle Name	12 pm - 1 pm	1 pm - 2 pm	2 pm - 3 pm
Bicycle/ Tricycle	19	26	11
Motorcycle	7	12	15
Motor-tricycle	4	1	8
Passenger Car/Taxi	36	17	9
Light Truck	27	14	11
Light Bus			1
Medium Bus			1
Medium Truck	12	6	16
Heavy Bus			
Heavy Truck			

Remark -

TRAFFIC COUNTING SHEET

D/M/Y - 11 / 7 / 2023 Project Myanmar Golden Eagle Co., Ltd. TC (2) A From Maritime University Junction To Thanlyin Circular Road.

Vehicle Name	3 pm - 4 pm	4 pm - 5 pm	5 pm - 6 pm
Bicycle/ Tricycle	8	13	7
Motorcycle	22	18	4
Motor-tricycle	7	4	1
Passenger Car/Taxi	19	28	11
Light Truck	15	9	7
Light Bus			
Medium Bus			
Medium Truck	17	9	5
Heavy Bus			
Heavy Truck			

Remark -

TRAFFIC COUNTING SHEET

D/M/Y - 11 / 7 / 2023 Project Myanmar Golden Eagle Co., Ltd. TC (R) B From Thantgin Circular Road To Maritime University Junction

Vehicle Name	6 am - 7 am	7 am - 8 am	8 am - 9 am
Bicycle/ Tricycle	12	15	9
Motorcycle	7	11	8
Motor-tricycle	1	8	4
Passenger Car/Taxi	11	34	24
Light Truck	8	18	28
Light Bus			2
Medium Bus	3	6	1
Medium Truck	7	11	14
Heavy Bus			
Heavy Truck			

Remark -

TRAFFIC COUNTING SHEET

D/M/Y - 11 / 7 / 2023 Project Myanmar Golden Eagle Co., Ltd. TC (R) B From Thantgin Circular Road To Maritime University Junction

Vehicle Name	9 am - 10 am	10 am - 11 am	11 am - 12 pm
Bicycle/ Tricycle	17	13	7
Motorcycle	13	10	5
Motor-tricycle	5	7	10
Passenger Car/Taxi	33	38	20
Light Truck	16	17	14
Light Bus			3
Medium Bus	2	5	1
Medium Truck	7	15	9
Heavy Bus			
Heavy Truck			

Remark -

TRAFFIC COUNTING SHEET

D/M/Y - 11 / 7 / 2023 Project Myanmar Golden Eagle Co., Ltd. TC (2) B From Thanlyin Circular Road To Maritime University Junction

Vehicle Name	12 pm - 1 pm	1 pm - 2 pm	2 pm - 3 pm
Bicycle/ Tricycle	14	12	10
Motorcycle	3	11	7
Motor-tricycle	4	6	8
Passenger Car/Taxi	8	32	19
Light Truck	3	13	16
Light Bus		5	1
Medium Bus	2	1	
Medium Truck	4	20	24
Heavy Bus			
Heavy Truck			

Remark -

TRAFFIC COUNTING SHEET

D/M/Y - 11 / 7 / 2023 Project Myanmar Golden Eagle Co., Ltd. TC (2) B From Thanlyin Circular Road To Maritime University Junction

Vehicle Name	3 pm - 4 pm	4 pm - 5 pm	5 pm - 6 pm
Bicycle/ Tricycle	15	11	17
Motorcycle	12	6	3
Motor-tricycle	8	13	6
Passenger Car/Taxi	25	31	11
Light Truck	9	8	7
Light Bus		7	3
Medium Bus	1	3	2
Medium Truck	17	14	1
Heavy Bus			
Heavy Truck			

Remark -

TRAFFIC COUNTING SHEET

D/M/Y - 12 / 7 / 2023 Project Myanmar Golden Eagle Co., Ltd. TC (3) A From Maritime University Junction To Thilawa Industrial Zone

Vehicle Name	6 am - 7 am	7 am - 8 am	8 am - 9 am
Bicycle/ Tricycle	10	14	17
Motorcycle	52	41	24
Motor-tricycle	14	18	21
Passenger Car/Taxi	88	134	114
Light Truck	34	38	32
Light Bus	31	44	31
Medium Bus	11	23	15
Medium Truck	13	25	34
Heavy Bus	5	7	9
Heavy Truck	1	4	2

Remark -

TRAFFIC COUNTING SHEET

D/M/Y - 12 / 7 / 2023 Project Myanmar Golden Eagle Co., Ltd. TC (3) A From Maritime University Junction To Thilawa Industrial Zone

Vehicle Name	9 am - 10 am	10 am - 11 am	11 am - 12 pm
Bicycle/ Tricycle	11	8	3
Motorcycle	14	11	4
Motor-tricycle	8	6	2
Passenger Car/Taxi	96	101	77
Light Truck	36	19	36
Light Bus	11	13	10
Medium Bus	7	2	4
Medium Truck	35	43	17
Heavy Bus	6	11	9
Heavy Truck	4	7	1

Remark -

TRAFFIC COUNTING SHEET

D/M/Y - 12 / 7 / 2023 Project Myanmar Golden Eagle Co., Ltd. From Maritime University Junction To Thilawa Industrial Zone

Vehicle Name	12 pm - 1 pm	1 pm - 2 pm	2 pm - 3 pm
Bicycle/ Tricycle	7	11	10
Motorcycle	4	7	1
Motor-tricycle	14	15	4
Passenger Car/Taxi	52	66	99
Light Truck	25	28	23
Light Bus	4	11	8
Medium Bus	1	5	3
Medium Truck	18	31	38
Heavy Bus	13	8	10
Heavy Truck	5	3	1

Remark -

TRAFFIC COUNTING SHEET

D/M/Y - 12 / 7 / 2023 Project Myanmar Golden Eagle Co., Ltd. From Maritime University Junction To Thilawa Industrial Zone

Vehicle Name	3 pm - 4 pm	4 pm - 5 pm	5 pm - 6 pm
Bicycle/ Tricycle	12	15	10
Motorcycle	20	11	8
Motor-tricycle	8	13	3
Passenger Car/Taxi	77	56	38
Light Truck	39	31	24
Light Bus	13	17	11
Medium Bus	5	8	14
Medium Truck	31	23	18
Heavy Bus	12	11	7
Heavy Truck	13	5	2

Remark -

TRAFFIC COUNTING SHEET

D/M/Y - 12/7/2023 Project Myanmar Golden Eagle Co., Ltd. TC (3) B From Thilawa Industrial Zone To Maritime University Junction

Vehicle Name	6 am - 7 am	7 am - 8 am	8 am - 9 am
Bicycle/ Tricycle	7	13	11
Motorcycle	11	21	13
Motor-tricycle	9	14	18
Passenger Car/Taxi	34	42	54
Light Truck	28	21	18
Light Bus	22	18	27
Medium Bus	6	10	13
Medium Truck	4	7	18
Heavy Bus	5	10	8
Heavy Truck	1	6	7

Remark -

TRAFFIC COUNTING SHEET

D/M/Y - 12/7/2023 Project Myanmar Golden Eagle Co., Ltd. TC (3) B From Thilawa Industrial Zone To Maritime University Junction

Vehicle Name	9 am - 10 am	10 am - 11 am	11 am - 12 pm
Bicycle/ Tricycle	9	13	8
Motorcycle	8	12	2
Motor-tricycle	13	17	7
Passenger Car/Taxi	87	94	70
Light Truck	36	40	28
Light Bus	21	10	5
Medium Bus	13	6	7
Medium Truck	38	30	24
Heavy Bus	7	10	5
Heavy Truck	4	1	3

Remark -

TRAFFIC COUNTING SHEET

D/M/Y - 19/7/2023 Project Myanmar Golden Eagle Co., Ltd. TC (3) B From Thilawa Industrial Zone To Maritime University Junction

Vehicle Name	12 pm - 1 pm	1 pm - 2 pm	2 pm - 3 pm
Bicycle/ Tricycle	10	1	7
Motorcycle	4	2	8
Motor-tricycle	12	9	10
Passenger Car/Taxi	81	97	108
Light Truck	35	31	14
Light Bus	18	14	18
Medium Bus	4	7	5
Medium Truck	20	33	48
Heavy Bus	11	8	7
Heavy Truck	7	2	5

Remark -

TRAFFIC COUNTING SHEET

D/M/Y - 19/7/2023 Project Myanmar Golden Eagle Co., Ltd. TC (3) B From Thilawa Industrial Zone To Maritime University Junction

Vehicle Name	3 pm - 4 pm	4 pm - 5 pm	5 pm - 6 pm
Bicycle/ Tricycle	8	12	10
Motorcycle	3	7	5
Motor-tricycle	5	13	17
Passenger Car/Taxi	134	128	124
Light Truck	42	39	32
Light Bus	23	48	37
Medium Bus	7	27	23
Medium Truck	37	35	24
Heavy Bus	8	10	6
Heavy Truck	6	2	5

Remark -

APPENDIX M
Documents and Photos Related to PCM

Myanmar Golden Eagle Company Limited (ဖန်ဂုလင်းအမျိုးမျိုး ထုတ်လုပ်ခြင်း နှင့် ဖြန့်ဖြူးရောင်းချခြင်းလုပ်ငန်း) ၏ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း အစီရင်ခံစာအတွက် အများပြည်သူနှင့် တွေ့ဆုံဆွေးနွေးပွဲ တက်ရောက်သူစာရင်း

ဌာနဆိုင်ရာ

စဉ်	အမည်	ရာထူး	ဌာန	ဖုန်းနံပါတ်	လက်မှတ်
၁။	ဦးဖိုးငွေစိန်	ဗဟိုစာရင်းအုပ်ကြီး	ပတ်ဝန်းကျင်ထိခိုက်မှု	၀၇-၄၅၂၂၄၅၇၄၂	
၂။	ဦးသန်းလွင်	ဥပဒေရေးရာ	"	၀၇-၇၇၂၆၆၇၇၇၇	
၃။	ဦးအောင်လွင်	HA - 1	ဖြန့်ဖြူးရောင်းချရေးဌာန	၀၇-၄၅၂၀၆၂၂၅၆	
၄။	ဦးရဲဦးဝင်း	HA	ဥပဒေရေးရာ	၀၇-၄၅၀၅၂၇၂၈	
၅။	ဦးအောင်ကျော်	ဦးစီးဌာန	အထွေထွေဌာန	၀၇-၇၇၇၈၅၅၅၅	
၆။	ဦးကျော်စွာ	ဗဟိုစာရင်းအုပ်ကြီး	"	၀၇-၄၅၂၅၇၇၇၇	
၇။	ဦးအောင်ကျော်	ဗဟိုစာရင်းအုပ်ကြီး	စက်မှုဌာန	၀၇-၄၅၂၅၇၅၇၅	
၈။	ဦးအောင်ကျော်	ဦးစီးဌာန	"	၀၇-၇၇၆၇၇၅၅၅	

Myanmar Golden Eagle Company Limited (ဖန်ဂုလင်းအမျိုးမျိုး ထုတ်လုပ်ခြင်း နှင့် ဖြန့်ဖြူးရောင်းချခြင်းလုပ်ငန်း) ၏ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း အစီရင်ခံစာအတွက် အများပြည်သူနှင့် တွေ့ဆုံဆွေးနွေးပွဲ တက်ရောက်သူစာရင်း

ဌာနဆိုင်ရာ

စဉ်	အမည်	ရာထူး	ဌာန	ဖုန်းနံပါတ်	လက်မှတ်
၁။	ဦးကျော်စွာ	ဗဟိုစာရင်းအုပ်ကြီး	ဥပဒေရေးရာ	၀၉၄၄၂၃၀၀၀၀၀	
၂။	ဦးအောင်ကျော်	ဦးစီးဌာန	ဥပဒေရေးရာ	၀၇၄၅၇၅၅၅၅၅	
၃။	ဦးအောင်ကျော်	ဦးစီးဌာန	"	၀၇-၇၇၇၈၅၅၅၅	
၄။	ဦးအောင်ကျော်	ဦးစီးဌာန	ဥပဒေရေးရာ	၀၇၇၀၄၄၄၄၄	
၅။	ဦးအောင်ကျော်	ဦးစီးဌာန	ဥပဒေရေးရာ	၀၇၄၅၇၅၅၅၅၅	
၆။	ဦးအောင်ကျော်	ဦးစီးဌာန	ဥပဒေရေးရာ	၀၇၄၅၇၅၅၅၅၅	
၇။	ဦးအောင်ကျော်	ဦးစီးဌာန	ဥပဒေရေးရာ	၀၇-၇၇၇၈၅၅၅၅	
၈။	ဦးအောင်ကျော်	ဦးစီးဌာန	ဥပဒေရေးရာ	၀၇-၄၅၇၅၇၅၇၅	

Myanmar Golden Eagle Company Limited (ဖန်ဂုလင်းအမျိုးမျိုး ထုတ်လုပ်ခြင်း နှင့် ဖြန့်ဖြူးရောင်းချခြင်းလုပ်ငန်း) ၏ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း အစီရင်ခံစာအတွက် အများပြည်သူနှင့် တွေ့ဆုံဆွေးနွေးပွဲ တက်ရောက်သူစာရင်း

ဒေသခံပြည်သူ

စဉ်	အမည်	နေရပ်လိပ်စာ	အလုပ်အကိုင်	ဖုန်းနံပါတ်	လက်မှတ်
၁	ဒီဗလီအောင်သိန်း	အလွမ်းဆွတ်	ကျွဲသစ်	၀၉ ၆၀၇၇၂၀၅၆၀	
၂	ဦးဘိုးဦး	အလွမ်းဆွတ်	အရောင်စင်	၀၉ ၉၅၅၅၅၅၅၀	
၃	ဦးစန်းမောင်	အလွမ်းဆွတ်	လယ်	၀၉ ၆၆၆၆၆၆၆၆	
၄	ဦးသန်းစိန်	"	ကောင်စင်		
၅	ဒေါ်ခင်အေး	ကော့ညွှန်သာ	အဖွဲ့အစည်း	၀၉-၄၉၀၇၄၀၇၄	
	ဒေါ်ခင်အေး	ကော့ညွှန်သာ	အဖွဲ့အစည်း	၀၉-၆၇၈၈၃၇၅၅	
	ဒေါ်ခင်အေး	"	"	"	
	Lwin Ko	MGE	Project Coordinator	၀၉၄၂ ၁၀၂၅၇၃	

Myanmar Golden Eagle Company Limited (ဖန်ဂုလင်းအမျိုးမျိုး ထုတ်လုပ်ခြင်း နှင့် ဖြန့်ဖြူးရောင်းချခြင်းလုပ်ငန်း) ၏ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း အစီရင်ခံစာအတွက် အများပြည်သူနှင့် တွေ့ဆုံဆွေးနွေးပွဲ တက်ရောက်သူစာရင်း

ဒေသခံပြည်သူ

စဉ်	အမည်	နေရပ်လိပ်စာ	အလုပ်အကိုင်	ဖုန်းနံပါတ်	လက်မှတ်
၁၀	ဒေါ်မြင့်အေး	အေးသာယာ	မြို့သူ	၀၉-၆၉၃၉၈၃၇၇၀	
၁၁	ဒေါ်အေးအေးအောင်	အေးသာယာ	"	၀၉-၆၉၄၈၄၆၄၆၄	
၁၂	ဖေဖော်ဝင်း	ဖန်ချက်	မြို့သူ	၀၉ ၇၀၃၅၇၅၁၀	
	ဒေါ်အေးအေး	"	ရန်ကင်း		
	ဦးကျော်စင်	အလွမ်းဆွတ်	လယ်	၀၉၂၆၂၆၇၅၀၅၅	
	ဦးစောစော	"	အောင်မြင်စေ	၀၉၆၆၃၆၃၆၃၆	
	ဦးစောစော	"	"	၀၉၄၆၁၂၁၇၃၃၁	
	ဒေါ်ခင်အေး	"	အေးသာယာ	၀၉၄၂၀၀၃၇၆၆	

Myanmar Golden Eagle Company Limited (ဖန်လင်းအမျိုးမျိုး ထုတ်လုပ်ခြင်း နှင့် ပြန့်ပွားရေးလုပ်ငန်း) ၏ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း အစီရင်ခံစာအတွက် အများပြည်သူနှင့် တွေ့ဆုံဆွေးနွေးပွဲ တက်ရောက်သူစာရင်း

ဒေသခံပြည်သူ

စဉ်	အမည်	နေရပ်လိပ်စာ	အလုပ်အကိုင်	ဖုန်းနံပါတ်	လက်မှတ်
၆	ဦးလှိုင်စိန်	မန္တလေး			
	ဦးမြင့်လွင်	ဒဂုံလမ်းဆုံ	ဆေးကုသရေး	၀၉၄၂၆၀၂၇၀၂	(၇)
	ဦးခင်စော	ဒဂုံလမ်းဆုံ	ရေလုပ်သား	၀၉၆၇၇၆၈၀၇၅၄	
	Edmundo F. Alvarez	MGE	GM	-	,
	Piboon Khemthong	MGE	Plant Manager	၀၉၇၅၂၄၆၅၃၆၅	,
	Aung Kyaw Moe	MGE	Admin Manager	၀၉၅၄၀၈၂၅	,
	Zaw Myint Than	MGE	SHE Executive	၀၉၇၅၀၂၈၃၀၅၆	,
	Kyar Nye Thin Aye	MGE	Translator	၀၉၀၇၆၀၉၀၀၄၀၀	,

Attended List Registration by Local Residents



Attended List Registration by Government Officers





TOTAL BUSINESS SOLUTION CO., LTD

- ✦ ၂၀၁၂ ခုနှစ်တွင် စတင်တည်ထောင်ခဲ့ပါသည်။
- ✦ TBS မှ တာဝန်ယူဆောင်ရွက် ပေးနေသော လုပ်ငန်းများ မှာ
 - ✓ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ငန်းများ
 - ✓ တွမ်အိမ်ဂျင်နီယာဆိုင်ရာ လုပ်ငန်းများ
 - ✓ ဆောက်လုပ်ရေးဆိုင်ရာ စီမံခန့်ခွဲမှု နှင့် စစ်ဆေးရေးလုပ်ငန်းများ
 - ✓ သတ္တုတူးဖော်ရေး အစီအစဉ် နှင့် သတ္တုတွင်းပိတ်သိမ်းရေး လုပ်ငန်း များ



ကြားကာလအကြံပေးလုပ်ကိုင်ရန်အဖွဲ့ အစည်းမှတ်ပုံတင်ခြင်း အထောက်အထားလက်မှတ်

ရွေးချယ်မှုအခြေအနေအထားအရာများ

- ✦ ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်း အစီရင်ခံစာ ပြုလုပ်ခြင်းဆိုင်ရာ ရည်ရွယ်ချက် ကိုတင်ပြခြင်း။
- ✦ စီမံကိန်း နှင့် အဓိက သက်ဆိုင်သော ဥပဒေများအပေါ် မူတည်၍ တင်ပြခြင်း။
- ✦ စီမံကိန်း အကြောင်းအရာ ကို တင်ပြခြင်း။
- ✦ စီမံကိန်းကြောင့် ပတ်ဝန်းကျင်အပေါ် ဆိုက်ကွဲ သက်ရောက်မှုလျော့ချခြင်း အစီအစဉ်များကို တင်ပြခြင်း။
- ✦ ဆော့ကြပ်ကြည့်ရှုမည့် အစီအစဉ်များ
- ✦ လူမှုအကျိုးစီးပွားပေါင်းစပ်မှု (CSR) အစီအစဉ်များကို တင်ပြခြင်း။
- ✦ ပတ်ဝန်းကျင် ဆိုင်ရာ အချက်အလက်များ လေ့လာခြင်း နှင့် တွေ့ရှိချက်များကို တင်ပြခြင်း။
- ✦ စီမံကိန်းကြောင့် ပတ်ဝန်းကျင်အပေါ် အကျိုးသက်ရောက်မှုများအား အကျဉ်းချုပ် ဆန်းစစ်မှု အစီအစဉ်များတင်ပြခြင်း။
- ✦ စီမံကိန်းလုပ်ငန်း နှင့် အခြားသော ဆက်စပ်သက်ရောက်မှု ဆိုင်ရာ အကျဉ်းချုပ်ဆန်းစစ်မှု အခြေအနေအထားတင်ပြခြင်း။

ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း အစီရင်ခံစာရေးဆွဲခြင်း၏ရည်ရွယ်ချက်

- ✦ အဆိုပြုစီမံကိန်းကြောင့် ဖြစ်ပေါ်နိုင်သော ပတ်ဝန်းကျင် နှင့် လူမှုရေးဆိုင်ရာ သက်ရောက်ထိခိုက်မှု များကို သိရှိရန်အတွက် ခန့်မှန်းအကဲဖြတ်နိုင်ခြင်း။
- ✦ စီမံကိန်းအစီအစဉ်နှင့် စီမံကိန်းအစီအစဉ်တွင် ပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များ (၂၀၁၅) ဖြင့် နှိုင်းယှဉ်၍ လိုအပ်သော ပတ်ဝန်းကျင်ထိခိုက်မှုလျော့ချရေးအစီအစဉ်များ စီမံဆောင်ရွက်နိုင်ခြင်း။
- ✦ ပတ်ဝန်းကျင်နှင့် လူမှုရေးဆိုင်ရာ ကိစ္စရပ်များအပေါ် သက်ရောက်နိုင်မည့် ဆိုးကျိုးများ ဝေဖန်ချက်ရန် အစီအစဉ်များ ရေးဆွဲနိုင်ခြင်း။
- ✦ အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးခြင်းများ ပြုလုပ်ပြီး အကြံပြုချက်သဘောထားများကို ရယူနိုင်ခြင်း။

စီမံကိန်းနှင့် အဓိကသက်ဆိုင်သော ဥပဒေ မူဘောင်များ

စီမံကိန်းနှင့်အဓိကသက်ဆိုင်သောဥပဒေ မူဘောင်များ

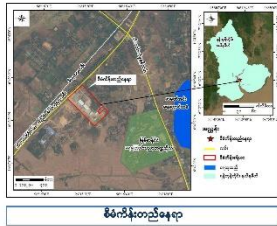
- ✦ မြန်မာနိုင်ငံ အမျိုးသားပတ်ဝန်းကျင်ရေးရာ မူဝါဒ (၅ ရက်၊ ၅ ဇူလိုင်၊ ၂၀၁၅ ခုနှစ်)
- ✦ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဥပဒေ (၃၀ ရက်၊ မတ်လ၊ ၂၀၁၂ ခုနှစ်)
- ✦ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဥပဒေ (၅ ရက်၊ ၅ ဇူလိုင်၊ ၂၀၁၄ ခုနှစ်)
- ✦ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ငန်းလုပ်နှုန်းခြင်း ၂၅ ရက်၊ ဇူလိုင်လ၊ ၂၀၁၅ ခုနှစ်)
- ✦ အမျိုးသားသောက်သုံးရေး အရည်အသွေးစံချိန်စံညွှန်း (၂၀၁၄-၅ ကြိမ်)
- ✦ အမျိုးသား ပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး ထုတ်လွှတ်မှု လမ်းညွှန်ချက်များ (၅ ရက်၊ ဇူလိုင်လ၊ ၂၀၁၅ ခုနှစ်)

စီမံကိန်းအကြောင်းအရာများ



စီမံကိန်းတည်နေရာ

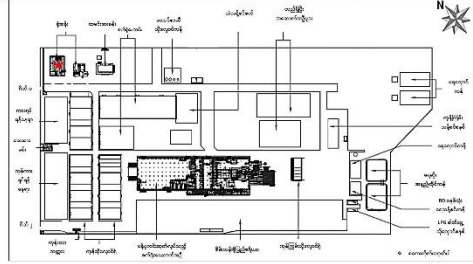
- ❖ ဦးစိုင်း အမှတ် ၅၇၊ ရန်ကင်း-သီလဝါဂိတ် လမ်းမကြီး၊ ဘုရားကုန်းကျေးရွာ၊ သန်လျင် မြို့နယ်၊ ရန်ကင်းမြို့၊ မြန်မာနိုင်ငံ ။
- ❖ မြောက်လတ္တီတွဒ် ၁၆ ဒီဂရီ ၄၂ မိနစ် ၊ ၂၈.၈၄ စက္ကန့် နှင့် အရှေ့လောင်ဂျီတွဒ် ၉၆ ဒီဂရီ ၁၅ မိနစ် ၊ ၁၈.၅၂ စက္ကန့် ကြား တွင်တည်ရှိသည်။
- ❖ စုစုပေါင်းမြေဧရိယာ (၄၁)ဧက ဖြစ်သည်။



စီမံကိန်းတည်နေရာ



စီမံကိန်းစက်ရုံဖွဲ့စည်းတည်ဆောက်ပုံ



စီမံကိန်း ဧရိယာအတွင်းရှိ အဆောက်အအုံများ



ရုံးအဆောက်အအုံ

စက်ရုံအဆောက်အအုံ

တာဝန်ခံရုံးခန်းမ

စားဆောက်ခန်း

ကုန်ပစ္စည်းသိုလှောင်ရုံ

ယာယီအမှိုက်သိုလှောင်ရုံ



စီမံကိန်း အကြောင်းအရာ အကျဉ်းချုပ်

စီမံကိန်းအမည်	Myanmar Golden Eagle Company Limited
လိပ်စာ	ဦးစိုင်း အမှတ် ၅၇၊ ရန်ကင်း-သီလဝါဂိတ်လမ်းမကြီး၊ ဘုရားကုန်းကျေးရွာ၊ သန်လျင်မြို့နယ်၊ ရန်ကင်းမြို့
စတင်တည်ထောင်သည့်နေ့စွဲ	၂၀၁၆ ခုနှစ်
လုပ်ငန်းအမျိုးအစား	ဖန်ပုလင်းအဖျိုးဖျိုးထုတ်လုပ်ရေး/ဖြုတ်လုပ်ငန်း
စီမံကိန်းဧရိယာ	စက်ရုံ ဧရိယာ စုစုပေါင်း ၄၁ ဧက
ဆက်သွယ်ရန်	ဦးကျော်စောကုန် (၀၉-၃၁၂၆၆၆၀၈)
ကုန်ကြမ်း	ကုန်ကြမ်းစုစည်းအမျိုးအစား ၂၃ မျိုး (ပြန်လည်ပြုတ်ခြင်းဆိုင်ရာသော့ဖွဲ့အဖွဲ့အစည်းများ သို့မဟုတ် မြေကြီးကုန်၊ သဲဆောက်မိုက် နှင့် သီလီနီယံ အစရှိသော ကုန်ကြမ်းများ နှင့် ဖန်ပုလင်းဖြုတ်လုပ်ရာတွင်အသုံးပြုသော စတုဂံစုစည်းများ)
ထုတ်ကုန်	ဖန်ပုလင်းအကြည် နှင့် အညိုရောင် ဖန်ပုလင်း
ဝန်လမ်းညွှန်ချ	၁၁၀ ဦးခန့်
အလုပ်ချိန်	မနက် ၈:၀၀ နာရီ မှ ညနေ ၅:၃၀ နာရီ အထိ (တနင်္ဂနွေ မှ သောကြာ) စက်ရုံလည်ပတ်ချိန် ၂၄ နာရီပတ်လုံး (မနက် ၈:၀၀ မှ ည ၈:၀၀ နာရီ၊ ည ၈:၀၀ နာရီမှ မနက် ၈:၀၀ နာရီ)



စီမံကိန်း အကောင်အထည် ဖော်ဆောင်မည့် အချိန်ဇယား

စဉ်	အမျိုးအစား	၂၀၁၆	၂၀၁၇	၂၀၁၈	၂၀၁၉	၂၀၂၀	၂၀၂၁	၂၀၂၂	၂၀၂၃	၂၀၂၄	၂၀၂၅
၁	စီမံကိန်းအစီအစဉ်										
၂	စတင်တည်ထောင်ရေး										
၃	လည်ပတ်ရေးအစီအစဉ်										
၄	စတင်လည်ပတ်ရေးအစီအစဉ်										
၅	စီမံကိန်းအစီအစဉ်အစဉ်အဆုံး										
၆	ကုန်စည်ထုတ်										
၇	စီမံကိန်းအစီအစဉ်အစဉ်အဆုံး										
၈	စီမံကိန်းအစီအစဉ်အစဉ်အဆုံး										



ဖန်ပုလင်းထုတ်လုပ်ပုံဆင့်ဆင့်



ထုတ်ကုန်တင်ပို့မှုအခြေအနေပြဇယား

ထုတ်ကုန်အမျိုးအစား	ပျမ်းမျှထုတ်ကုန်ပမာဏ (နေ့စဉ်)
ဖန်ပုလင်းအကြည်များ	၄၅၀,၀၀၀ လုံး (တန့် ၂၀၀ ခန့်)
ဖန်ပုလင်းအညိုများ	၄၅၀,၀၀၀ လုံး (တန့် ၂၀၀ ခန့်)



❖ လက်ရှိကာလတွင် ပြည်တွင်း လုပ်ငန်းရှင်များသို့ တိုက်ရိုက်တင်ပို့ရောင်းချမည်ဖြစ်ပြီး၊
❖ အရှေ့တောင်အာရှနိုင်ငံများသို့ ဈေးကွက်ဖြန့်ဖြူးကုတ်သွားမည့်အစဉ်များလည်းရှိပါသည်။



လျှပ်စစ်ဓာတ်အား အသုံးပြုမှုများ

- လျှပ်စစ်ဓာတ်အားဖြင့် အသုံးပြုခြင်းအတွက် လျှပ်စစ်ဓာတ်အားကို အစိုးရလျှပ်စစ်ဓာတ်အားလိုင်းမှ စတင်စနစ်အား ရှိသော ထရန်စဖော်မာဖြင့် ရယူ သုံးစွဲမည် ဖြစ်ပါသည်။
- အရေးပေါ်အခြေအနေနှင့် လျှပ်စစ်ဓာတ်အား ပြတ်တောက်ချိန်တွင် ၁,၈၀၀ ဂေဟစနစ် အား ရှိသော ဒီဇယ်လောင်စာသုံးစီးကတ် ကို တပ်ဆင်သုံးစွဲမည် ဖြစ်ပါသည်။



စတင်စနစ် ထရန်စဖော်မာ



ဒီဇယ် စီးကတ်



လောင်စာဆီသိုလှောင်မှု



LPG သိုလှောင်ကန်



ဒီဇယ်သိုလှောင်ကန်



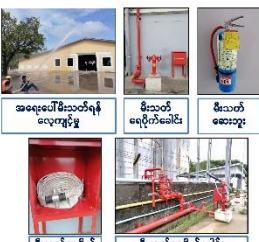
ရထား သဘာဝဓါတ်ငွေ့ ထုတ်လုပ်ရေး စီမံကိန်း

- ဒီဇယ် လောင်စာဆီစွန့်စွန့်မှုကို ဝန်ထမ်းများ၏ လုပ်ငန်းခွင်တွင် ၂,၂၀၀ လီတာခန့် ခန့် ဖြစ်ပါသည်။
- ၂၀၀ လီတာခန့် ခန့် သိုလှောင်မှု ဖြစ်ပါသည်။
- ဒီဇယ် လောင်စာဆီစွန့်စွန့်မှုကို ဝန်ထမ်းများ၏ လုပ်ငန်းခွင်တွင် ၂,၂၀၀ လီတာခန့် ခန့် ဖြစ်ပါသည်။
- ဒီဇယ် လောင်စာဆီစွန့်စွန့်မှုကို ဝန်ထမ်းများ၏ လုပ်ငန်းခွင်တွင် ၂,၂၀၀ လီတာခန့် ခန့် ဖြစ်ပါသည်။



မီးဘေးအန္တရာယ်အတွက် စီစဉ်ထားရှိမှု

- မီးဘေးအန္တရာယ်အတွက် ပစ္စည်းများအနေဖြင့် မီးသတ်ဆေးဘူး၊ မီးသတ်ရေပိုက်စနစ်၊ မီးသတ်ရေပိုက် စသည်တို့ကို မီးသတ်ဦးစီးဌာန၏ လမ်းညွှန်ချက်နှင့်အညီ စီစဉ်ထားရှိပါသည်။
- ၎င်းအပြင် စက်ရုံတွင်း အရေးပေါ် မီးငြိမ်းသတ်ရန်အတွက် အမှုဆောင်အဖွဲ့၏ လိုအပ်သည့် အလုံအလျောက် ရေဖြိုခန်း၊ ဓနစ်ကို တပ်ဆင်ထားရှိပါသည်။
- ဝန်ထမ်းများကိုလည်း မီးသတ်ပစ္စည်းများ ကျွမ်းကျင်စွာ အသုံးပြုနိုင်ရန် စက်ရုံအရေပေါ် မီးသတ်အဖွဲ့ ဖွဲ့စည်း၍ စီမံကိန်းသင်တန်းများ လေ့ကျင့်သင်ကြား ပေးထားပါသည်။



အရေးပေါ်မီးသတ်ရန် လေ့ကျင့်မှု

မီးသတ် ရေပိုက်စနစ်

မီးသတ် ဆေးဘူး

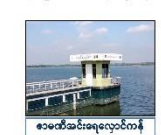
မီးသတ်ရေပိုက်

မီးသတ်ရေပိုက်စနစ်



ရေအသုံးပြုမှုအစီအစဉ်များ

- စက်ရုံ၏ ရေသုံးစွဲမှုပမာဏမှာ ဖျမ်းဖျူအားဖြင့် တစ်နေ့လျှင် (၉၀၀) ကုဗမီတာခန့် သုံးစွဲမှုရှိပါသည်။
- စီမံကိန်းလည်ပတ်ရန်လိုအပ်သော ရေကို အမေရိကန်ဒေါ်လာနှင့် ငွေသုံးစွဲမှုရှိပါသည်။ စက်ရုံတွင်းရှိ ဂါလံ ၂ သိန်းခန့် ရေလှောင်ကန်တွင် သိုလှောင်ထားပါသည်။
- ကုန်ထုတ်လုပ်ငန်းဆိုင်ရာရေအတွက် ၁ နာရီလျှင် ၃၀ ကုဗမီတာ သန့်စင်ရန်သော RO ရေသန့်စင်စနစ်တပ်ဆင်ထားပါသည်။
- ထို့အပြင် သောက်သုံးရေအတွက် ၂၀ လီတာခန့် သောက်ရေသန့် ဖျာဖြိုမှုများကို လိုလောက်စွာ ထောက်ပံ့ပေးထားပါသည်။



စက်ရုံအရေလှောင်ကန်



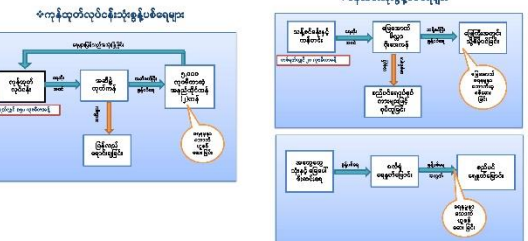
RO ရေသန့်စင်စက်



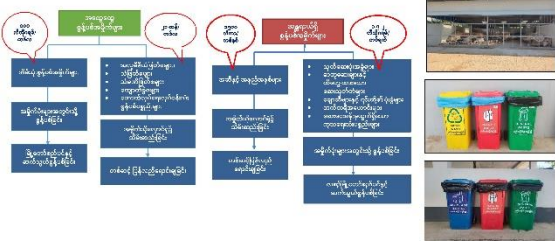
သောက်သုံးရေ



ရေဆိုး စွန့်ထုတ်မှု နှင့် သန့်စင်မှုစနစ်



စွန့်ပစ်အမှိုက်များ



ဝန်ထမ်းများအတွက် စီစဉ်ထားရှိမှု

- စီမံကိန်းလုပ်ငန်းအတွက် လိုအပ်သော လုပ်ငန်းများတွင် တာဝန်ထမ်းဆောင်ရန် အသစ်များကို ဦးစားပေးခန့်အပ်ခြင်း။
- ဝန်ထမ်းများ ကြံ့မြဲရေးအတွက် ယေရိုဗားစီစဉ်ထားရှိခြင်း။
- လုပ်ငန်းကျွမ်းကျင်မှုဆိုင်ရာနှင့် နည်းပညာဆိုင်ရာ သင်တန်းများ လေ့ကျင့် သင်ကြားပေးခြင်း။
- စာမေးပေးခြင်းဖြင့် ကျန်းမာရေးအတွက် စက်ရုံတွင်းဆေးပေးခန်း ထားရှိခြင်းနှင့် လိုအပ်ပါက ဆေးခန်းသို့ ပို့ဆောင်ပေးခြင်း။
- အလုပ်တာဝန်ပေး လိုအပ်သော တစ်ကောင်စီရရှိရန် အကာအကွယ် ပစ္စည်းများ (PPE) ပံ့ပိုးပေးခြင်း။
- စက်ရုံဝန်ထမ်းများအတွက် နေ့လည်စာ စီစဉ်ပေးခြင်း။
- ဝန်ထမ်းများအတွက်အခြားသောလိုအပ်ချက်များရှိပါကလုပ်ငန်း အခြေအနေပေါ် မူတည်၍ မြည့်ဆည်း ဆောင်ရွက်ပေးသွားမည် ဖြစ်ပါသည်။



ဆေးပေးခန်း



ရုံးပယ်ရုံ



ပတ်ဝန်းကျင်ဆိုင်ရာ အခြေခံ အချက်အလက်များ တင်ပြခြင်း

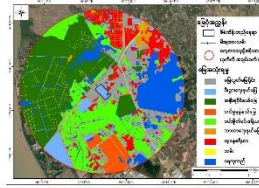


ပတ်ဝန်းကျင်အရည်အသွေးတိုင်းတာသည့်နယ်ပယ်များ

- ◆ မြေအသုံးချမှုအခြေအနေလေ့လာခြင်း
- ◆ လူမှုစီးပွားဆိုင်ရာ အချက်အလက်များ လေ့လာခြင်း
- ◆ လေထုအရည်အသွေး တိုင်းတာခြင်း
- ◆ ရေထုအရည်အသွေး တိုင်းတာခြင်း
- ◆ ဆူညံသံ တိုင်းတာခြင်း
- ◆ တုန်ခါမှု တိုင်းတာခြင်း
- ◆ အလင်း နှင့် အပူချိန် တိုင်းတာခြင်း
- ◆ အပင်နှံ့သတ္တဝါဆိုင်ရာ ပတ်ဝန်းကျင် အခြေအနေလေ့လာခြင်း



မြေအသုံးချမှု လေ့လာခြင်း



စီမံကိန်းဧရိယာအား မြေအသုံးချမှု အခြေအနေဖြင့် ဖြေရှင်းခြင်း

စဉ်	အမည်	ဧရိယာ (ပတ်တာ)	ပူးတွဲနှုန်း (%)
၁	မြေလွတ် မြေပိုင်း	၄၆၀.၀၀	၁၆.၅၂
၂	စီးပွားရေး နယ်မြေ	၁၂၉.၀၀	၄.၇၅
၃	အိမ်ထောင်ရေးနယ်မြေ	၇၅၀.၀၀	၂၇.၆၈
၄	စက်မှုနှင့်အခြား	၁၁၅.၀၀	၄.၂၄
၅	စက်မှုနှင့်အခြား	၆၅၂.၀၀	၂၃.၈၄
၆	ဘာသာရေးနယ်မြေ	၃၇.၇၇	၁.၃၃
၇	လူနေအိမ်ရာ	၂၆၁.၆၃	၉.၂၅
၈	လမ်း	၇၅၃.၁၁	၂၇.၀၀
၉	ရေထုလွှာ	၄၁၅.၁၃	၁၄.၆၈
	စုစုပေါင်း	၂၈၆၆.၆၁	၁၀၀



လူမှုစီးပွားဆိုင်ရာ အချက်အလက်များ လေ့လာခြင်း

စဉ်	အမျိုးအမည်	မော်ဒယ်များ	စဉ်	အမျိုးအမည်	မော်ဒယ်များ
၁	တိုင်းဒေသကြီး-ခရိုင်-မြို့နယ်	ရန်ကင်းတိုင်းဒေသကြီး၊ မကွေးတိုင်းဒေသကြီး၊ ရန်ကင်းမြို့နယ်	၁၀	ဆက်သွယ်ရေး	ရိုက်ကွင်း
၂	မြို့တော်	၅-၁၅	၁၁	စက်မှု/လုပ်ငန်း	၄၅/၆၁
၃	မြို့နယ်အရပ်ရပ်	၁၅-၂၅	၁၂	အလုပ်သမားအိမ်ရာ	၁၅၅/၁၅၅
၄	မြို့နယ်အရပ်ရပ်	၁၅-၂၅	၁၃	အလုပ်သမားအိမ်ရာ	၁၅၅/၁၅၅
၅	မြို့နယ်အရပ်ရပ်	၁၅-၂၅	၁၄	အလုပ်သမားအိမ်ရာ	၁၅၅/၁၅၅
၆	မြို့နယ်အရပ်ရပ်	၁၅-၂၅	၁၅	အလုပ်သမားအိမ်ရာ	၁၅၅/၁၅၅
၇	မြို့နယ်အရပ်ရပ်	၁၅-၂၅	၁၆	အလုပ်သမားအိမ်ရာ	၁၅၅/၁၅၅
၈	မြို့နယ်အရပ်ရပ်	၁၅-၂၅	၁၇	အလုပ်သမားအိမ်ရာ	၁၅၅/၁၅၅
၉	မြို့နယ်အရပ်ရပ်	၁၅-၂၅	၁၈	အလုပ်သမားအိမ်ရာ	၁၅၅/၁၅၅
၁၀	မြို့နယ်အရပ်ရပ်	၁၅-၂၅	၁၉	အလုပ်သမားအိမ်ရာ	၁၅၅/၁၅၅



လေထုအရည်အသွေး တိုင်းတာခြင်း



လေထုအရည်အသွေး တိုင်းတာသည့် ဖြေရှင်းခြင်း

စီမံကိန်းဧရိယာ (A1)	ရန်ကင်းတိုင်းဒေသကြီး (A2)	သီလင်းတောင် စီမံကိန်းဧရိယာ (A3)
16° 42' 34.68" N 96° 15' 13.88" E	16° 42' 27.88" N 96° 15' 53.99" E	16° 41' 47.48" N 96° 16' 11.50" E

ရလဒ်များကို အမျိုးသား ပတ်ဝန်းကျင် ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များ (၂၀၁၅) နှင့် နှိုင်းယှဉ်ခဲ့ပါသည်။



လေထုအရည်အသွေး တိုင်းတာခြင်း ရလဒ်များ

စဉ်	တိုင်းတာသည့် အရည်အသွေး	ရလဒ်			ယူနစ်	"လက်လွှတ်မှု"နှုန်း	ဖြစ်ပွားမှုအလွယ်
		(A1)	(A2)	(A3)			
၁	ကာဗွန်ဒိုင်အောက်ဆိုက် (CO ₂)	၂၅၀	၂၅၀	၂၅၀	ppm	-	-
၂	ကာဗွန်မိုနောက်ဆိုက် (CO)	၀.၀၅	၀.၀၅	၀.၀၅	ppm	-	-
၃	ဓာတ်ငွေ့ (CH ₄)	၀.၅၀	၀.၅၀	၀.၅၀	ppm	-	-
၄	နိုက်ထရိုဒိုင်အောက်ဆိုက် (NO ₂)	၂၅၀	၂၅၀	၂၅၀	ppm	၂၅၀	၁ hour
၅	နိုက်ဓာတ် (NO _x)	၅၀	၅၀	၅၀	ppm	၁၀၀	၈ hours
၆	ဆေးပစ္စည်း အမှန်အရာ (PM10)	၂၅၀	၂၅၀	၂၅၀	ppm	၂၅၀	၂၄ hours
၇	ဆေးပစ္စည်း အမှန်အရာ (PM2.5)	၂၅၀	၂၅၀	၂၅၀	ppm	၂၅၀	၂၄ hours
၈	ဆေးပစ္စည်း အမှန်အရာ (SO ₂)	၅	၅	၅	ppm	၅၀	၂၄ hours
၉	Volatile Organic Compound (VOCs)	၂	၀	၀	ppm	-	-
၁၀	ဆေးပစ္စည်း	၁၂	၁၀	၀.၅၀	ppm	-	၂၄ hours
၁၁	ဆေးပစ္စည်း	၁၅	၁၅	၁၅	ppm	-	၂၄ hours
၁၂	နိုက်ထရိုဓာတ် (Humidity)	၈၀	၇၀	၇၅	%	-	-
၁၃	အပူချိန် (Temperature)	၂၈	၂၅	၂၅	°C	-	-



ရေအရည်အသွေး တိုင်းတာခြင်း

ရေအရည်အသွေးတိုင်းတာခြင်းကို စီမံကိန်းဧရိယာ အတွင်း အလိုအလျောက်တိုင်းတာမေးမြန်းသည့် စက်ဖြင့် တိုင်းတာခြင်းအပြင် ဝါးကွဲစနစ်ဖြင့်စစ်ဆေးရန်လည်း စီမံကိန်းမှ ရေမှန်ရာ တောင်ယူခဲ့ပါသည်။

လွင်းခြင်းနှင့် ဖြေရှင်းခြင်း	အထူးထူးခြားခြင်း ဖြေရှင်းခြင်း (WS)	ပြေဆေးရန် (WS)
လွင်းခြင်းနှင့် ဖြေရှင်းခြင်း	အထူးထူးခြားခြင်း ဖြေရှင်းခြင်း	ပြေဆေးရန် (WS)



ရေမှန်ရာတောင်ယူသည့် ဖြေရှင်းခြင်း



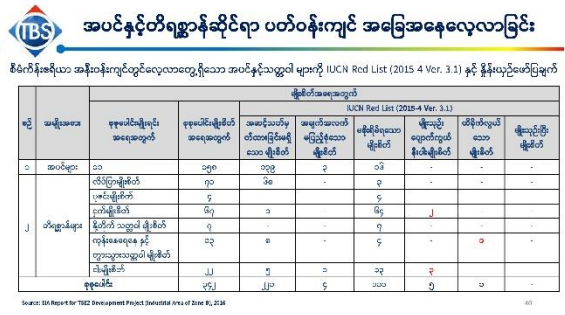
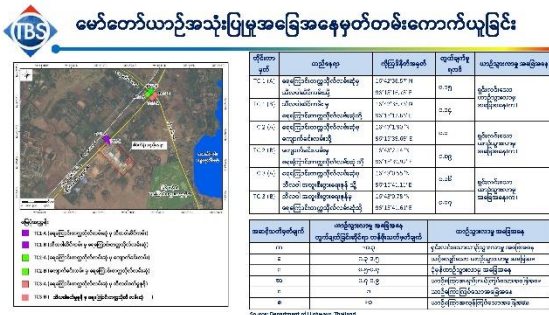
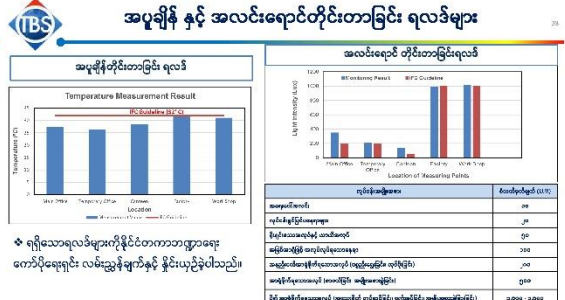
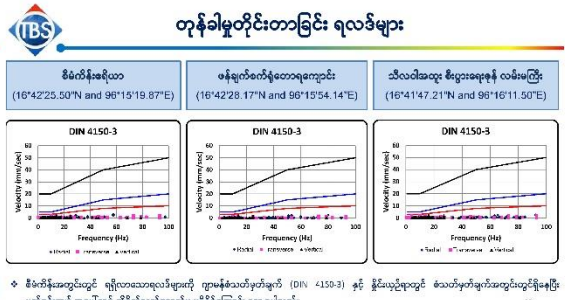
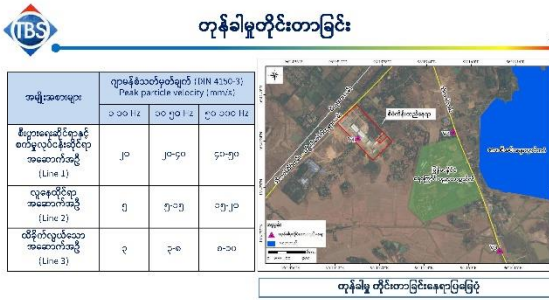
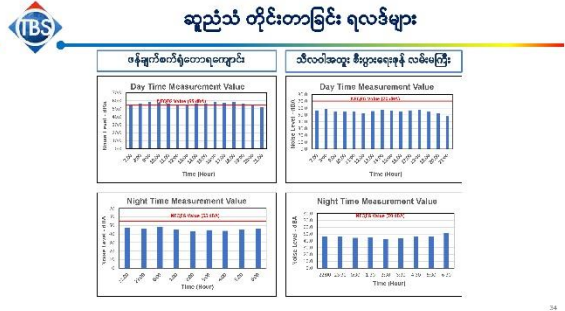
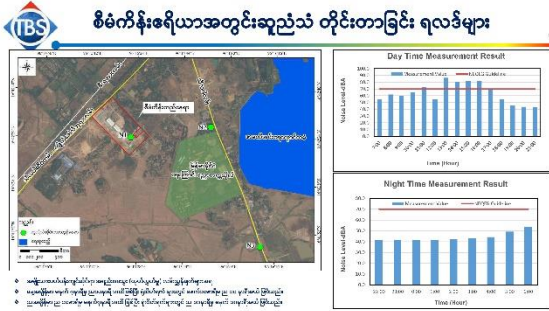
စွန့်ပစ်ရေဆိုးအရည်အသွေး တိုင်းတာခြင်း ရလဒ်များ

စဉ်	တိုင်းတာသည့် အရည်အသွေး	ရလဒ်		ယူနစ်	အမျိုးသားပတ်ဝန်းကျင် ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များ (၂၀၁၅)
		လွင်းခြင်းနှင့် ဖြေရှင်းခြင်း	အထူးထူးခြားခြင်း ဖြေရှင်းခြင်း		
၁	ပူနစ် (pH)	၈.၀၅	၈.၀၅	S.U	၆-၉
၂	အပူချိန် (Temperature)	၈.၀၅	၈.၀၅	°F	(°C)
၃	ပူနစ် (Turbidity)	၀.၅	၀.၅	FAL/NTU	NG
၄	ပျော်ဝင်အရည်များ (Total Dissolved Solids)	၂၅၀	၅၀	ppm	NG
၅	ပျော်ဝင်အရည်များ (Total Suspended Solids)	၅	၅	ppm	၅၀
၆	နိုက်ထရိုဓာတ် (Free Cyanide)	၀.၀၅	၀.၀၅	ppm	၅၀
၇	နိုက်ထရိုဓာတ် (Phosphorus)	၀.၀၅	၀.၀၅	ppm	၅၀
၈	နိုက်ထရိုဓာတ် (Iron)	၀.၀၅	၀.၀၅	ppm	၅၀
၉	နိုက်ထရိုဓာတ် (Lead)	၀.၀၅	၀.၀၅	ppm	၅၀
၁၀	နိုက်ထရိုဓာတ် (Total Nitrogen)	၀.၀၅	၀.၀၅	ppm	NG



မြေအောက်ရေ အရည်အသွေးတိုင်းတာခြင်း ရလဒ်များ

စဉ်	တိုင်းတာသည့် အရည်အသွေး	ရလဒ်	ယူနစ်	ထုတ်လွှတ်မှုနှုန်း
၂	အပူချိန် (Temperature)	၈.၀၅	°F	(°C)
၃	ပူနစ် (Turbidity)	၀.၅	FAL/NTU	NG
၄	ပျော်ဝင်အရည်များ (Total Dissolved Solids)	၀.၅	ppm	၅၀
၅	ပျော်ဝင်အရည်များ (Total Suspended Solids)	၀	ppm	၅၀
၆	နိုက်ထရိုဓာတ် (Free Cyanide)	<၀.၀၅	ppm	၅၀
၇	နိုက်ထရိုဓာတ် (Phosphorus)	၀.၅	ppm	၅၀
၈	နိုက်ထရိုဓာတ် (Iron)	၀.၀၅	ppm	၅၀
၉	နိုက်ထရိုဓာတ် (Lead)	၀.၀၅	ppm	၅၀
၁၀	နိုက်ထရိုဓာတ် (Total Nitrogen)	၀.၀၅	ppm	NG
၁၁	လျှပ်စီးစွမ်းရည် (Conductivity)	၂၅၀	ms/cm	NG
၁၂	အဆေးပစ္စည်း (Salinity)	၀.၅	ppm	NG
၁၃	နိုက်ထရိုဓာတ် (Free Cyanide)	၀.၀၅	ppm	၅၀
၁၄	နိုက်ထရိုဓာတ် (Phosphorus)	၀.၀၅	ppm	၅၀
၁၅	နိုက်ထရိုဓာတ် (Iron)	၀.၀၅	ppm	၅၀
၁၆	နိုက်ထရိုဓာတ် (Lead)	၀.၀၅	ppm	၅၀
၁၇	နိုက်ထရိုဓာတ် (Total Nitrogen)	၀.၀၅	ppm	NG



အပင်နှင့်တိရစ္ဆာန်ဆိုင်ရာ ပတ်ဝန်းကျင် အခြေအနေလေ့လာခြင်း

မျိုးသုဉ်း ပျောက်လွယ်နိုးပါးမျိုးစိတ်များ		ထိခိုက်လွယ်သော တွားသွားသတ္တဝါ မျိုးစိတ်							
<table border="1"> <tr> <th>ငှက်မျိုးစိတ်များ</th> <th>ငါးမျိုးစိတ်များ</th> </tr> <tr> <td> ပုခွန်ငှက်</td> <td> ငါးနုသား</td> </tr> <tr> <td> စောဘူတောင်ငှက်</td> <td> ငါးဘက်</td> </tr> <tr> <td></td> <td> ပျံဖားငါး</td> </tr> </table>	ငှက်မျိုးစိတ်များ	ငါးမျိုးစိတ်များ	 ပုခွန်ငှက်	 ငါးနုသား	 စောဘူတောင်ငှက်	 ငါးဘက်		 ပျံဖားငါး	 တောငြိုမြေပဟက်
ငှက်မျိုးစိတ်များ	ငါးမျိုးစိတ်များ								
 ပုခွန်ငှက်	 ငါးနုသား								
 စောဘူတောင်ငှက်	 ငါးဘက်								
	 ပျံဖားငါး								

စီမံကိန်းကြောင့် ပတ်ဝန်းကျင် ထိခိုက်မှု အကဲဖြတ်ဆန်းစစ်ခြင်း

စီမံကိန်းတည်ဆောက်စဉ်ကာလ

အရင်းအမြစ်များအသုံးပြုမှု	လုပ်ငန်းစဉ်	သက်ရောက်မှု
<ul style="list-style-type: none"> ဆောက်လုပ်ရေးလုပ်ငန်းစဉ်များ စီမံကိန်းစဉ် ဖြေရှင်းမှုများ လွှဲပြောင်းရေးလုပ်ငန်းများ ရေအရင်းအမြစ် 	<ul style="list-style-type: none"> ပရိုဂရမ်ကြိုတင်ခန့်မှန်းခြင်း ပရိုဂရမ်အကောင်အထည်ဖော်ခြင်း ကန့်သတ်ချက်များ 	<ul style="list-style-type: none"> အလုပ်လုပ်နေစဉ် အန္တရာယ်ရှိမှုများ လူမှုရေးပြဿနာများ ဆောက်လုပ်ရေးလုပ်ငန်းစဉ်များ လူမှုရေးပြဿနာများ ဆောက်လုပ်ရေးလုပ်ငန်းစဉ်များ လူမှုရေးပြဿနာများ

စီမံကိန်းလည်ပတ်စဉ်ကာလ-၁

အရင်းအမြစ်များအသုံးပြုမှု	လုပ်ငန်းစဉ်	သက်ရောက်မှု
<ul style="list-style-type: none"> ရေရရှိအသုံးပြုမှု မိန့်ပေးလုပ်ငန်းစဉ်များ လေထုညစ်ညမ်းမှု ကုန်ကြမ်းများသယ်ယူပို့ဆောင်ရေး စီမံကိန်းလည်ပတ်ရေး စာတုပစ္စည်းများအသုံးပြုမှု 	<ul style="list-style-type: none"> သေဆုံးခြင်း မိန့်ပေးလုပ်ငန်းစဉ်များ ကုန်ကြမ်း မိန့်ပေးလုပ်ငန်းစဉ်များ မိန့်ပေးလုပ်ငန်းစဉ်များ 	<ul style="list-style-type: none"> ရေရရှိမှု သက်တောင့်စွဲခံနိုင်စွမ်း လူမှုရေးပြဿနာများ လူမှုရေးပြဿနာများ လူမှုရေးပြဿနာများ စာတုပစ္စည်းများအသုံးပြုမှု

စီမံကိန်းလည်ပတ်စဉ်ကာလ-၂

အရင်းအမြစ်များအသုံးပြုမှု	လုပ်ငန်းစဉ်	သက်ရောက်မှု
<ul style="list-style-type: none"> ရွှမ်းအင်အသုံးပြုမှု လူမှုရေးအရင်းအမြစ် စက်ယာဉ်များအသုံးပြုမှု သယ်ယူပို့ဆောင်ရေးလုပ်ငန်းများ 	<ul style="list-style-type: none"> မိန့်ပေးလုပ်ငန်းစဉ်များ အရည်အသွေးစစ်ဆေးခြင်း ထုတ်လုပ်ခြင်း ရွှမ်းအင်အရင်းအမြစ် 	<ul style="list-style-type: none"> လေထုညစ်ညမ်းမှု လုပ်ငန်းစဉ်များ ဝန်ထမ်းများအန္တရာယ်ရှိမှုများ အရည်အသွေးစစ်ဆေးခြင်း ပလတ်စတစ် ပြုတ်ပိုင်းများ မိန့်ပေးလုပ်ငန်းစဉ်များ လေထုညစ်ညမ်းမှု ယာဉ်ပမာဏများ

စီမံကိန်းပိတ်သိမ်းစဉ်ကာလ

အရင်းအမြစ်များအသုံးပြုမှု	လုပ်ငန်းစဉ်	သက်ရောက်မှု
<ul style="list-style-type: none"> မြေစိုစွတ်ခြင်း (စီမံကိန်းလုပ်ငန်းစဉ်အတွင်း) စီမံကိန်းလည်ပတ်စဉ်ကာလအတွင်း စီမံကိန်းလည်ပတ်စဉ်ကာလအတွင်း စီမံကိန်းလည်ပတ်စဉ်ကာလအတွင်း 	<ul style="list-style-type: none"> မိန့်ပေးလုပ်ငန်းစဉ်များ အရည်အသွေးစစ်ဆေးခြင်း အရည်အသွေးစစ်ဆေးခြင်း အရည်အသွေးစစ်ဆေးခြင်း 	<ul style="list-style-type: none"> စီမံကိန်းလည်ပတ်စဉ်ကာလအတွင်း စီမံကိန်းလည်ပတ်စဉ်ကာလအတွင်း စီမံကိန်းလည်ပတ်စဉ်ကာလအတွင်း စီမံကိန်းလည်ပတ်စဉ်ကာလအတွင်း

သက်ရောက်မှုအဆင့်သတ်မှတ်ခြင်း

အဆင့်	အဆင့်	အဆင့်	အဆင့်
၁. မြေစိုစွတ်ခြင်း	၂. အရည်အသွေးစစ်ဆေးခြင်း	၃. လူမှုရေးအရင်းအမြစ်	၄. စက်ယာဉ်များအသုံးပြုမှု
၅. သယ်ယူပို့ဆောင်ရေးလုပ်ငန်းများ	၆. လူမှုရေးအရင်းအမြစ်	၇. အရည်အသွေးစစ်ဆေးခြင်း	၈. စက်ယာဉ်များအသုံးပြုမှု
၉. လူမှုရေးအရင်းအမြစ်	၁၀. အရည်အသွေးစစ်ဆေးခြင်း	၁၁. စက်ယာဉ်များအသုံးပြုမှု	၁၂. သယ်ယူပို့ဆောင်ရေးလုပ်ငန်းများ

စီမံကိန်းတည်ဆောက်စဉ်နှင့် ပိတ်သိမ်းစဉ်ကာလ သက်ရောက်မှု အဆင့်သတ်မှတ်ခြင်း

အဆင့်	အဆင့်	အဆင့်	အဆင့်	အဆင့်	အဆင့်	အဆင့်	အဆင့်
၁. မြေစိုစွတ်ခြင်း	၂. အရည်အသွေးစစ်ဆေးခြင်း	၃. လူမှုရေးအရင်းအမြစ်	၄. စက်ယာဉ်များအသုံးပြုမှု	၅. သယ်ယူပို့ဆောင်ရေးလုပ်ငန်းများ	၆. လူမှုရေးအရင်းအမြစ်	၇. အရည်အသွေးစစ်ဆေးခြင်း	၈. စက်ယာဉ်များအသုံးပြုမှု
၉. လူမှုရေးအရင်းအမြစ်	၁၀. အရည်အသွေးစစ်ဆေးခြင်း	၁၁. စက်ယာဉ်များအသုံးပြုမှု	၁၂. သယ်ယူပို့ဆောင်ရေးလုပ်ငန်းများ	၁၃. လူမှုရေးအရင်းအမြစ်	၁၄. အရည်အသွေးစစ်ဆေးခြင်း	၁၅. စက်ယာဉ်များအသုံးပြုမှု	၁၆. သယ်ယူပို့ဆောင်ရေးလုပ်ငန်းများ



စီမံကိန်းမှ ပတ်ဝန်းကျင် ထိခိုက်မှုများကို စောင့်ကြပ်ကြည့်ရှုမည့် အစီအစဉ်များ



စီမံကိန်းလည်ပတ်စဉ်ကာလအတွင်း စောင့်ကြပ်ကြည့်ရှုမည့် အစီအစဉ်များ

စဉ်	အမျိုးအမည်	စောင့်ကြပ်ကြည့်ရှုမည့် ပါရာမီတာ	စောင့်ကြပ်ကြည့်ရှုမည့် ရေရာ	အကြိမ်အရ အသွယ်	နစ်နာမှုနှင့် ပျက်စီးမှု(ကန့်)
၁။	ပေစာရည်အသွယ်	pH, DO, EC, TDS, COD, BOD, CO ₂ , CH ₄ , NH ₄ ⁺ , NO ₃ ⁻ , Humidity, Temperature	စီမံကိန်းအရင်းအမြစ် (A) (14°42'34.14"N, 96°15' 8.59"E) မရေစက်ခန်း အရင်းအမြစ် (B) (16°42' 27.89" N, 96° 15' 53.99" E)	စောင့်ကြပ်ကြည့်ရှုမည့် ဝက်ကြီး	၂,၀၀၀,၀၀၀
၂။	မရေစက်ခန်း	SOD, COD, Bilephorus, pH, Total Nitrogen, Total Phosphorus, Temperature, SS, Turbidity, DS, EIS, Iron, Lead, Free Cyanide, Arsenic	စီမံကိန်းအရင်းအမြစ် (A) (14°42'34.14"N, 96°15' 8.59"E) စီမံကိန်းအရင်းအမြစ် (B) (16°42'27.89"N, 96°15'53.99"E) စီမံကိန်းအရင်းအမြစ် (C) (16°42'38.17"N, 96°15'23.17"E)	စောင့်ကြပ်ကြည့်ရှုမည့် ဝက်ကြီး	၁,၀၀၀,၀၀၀
၃။	ရေညှစ်	ရေညှစ်ပတ်စပတ်များ (SR (A), (B), (C))	စီမံကိန်းအရင်းအမြစ် (A) (14°42'34.14"N, 96°15' 8.59"E)	စောင့်ကြပ်ကြည့်ရှုမည့် ဝက်ကြီး	၈၀၀,၀၀၀
၄။	တံခွန်	တံခွန်ပတ်စပတ်များ (SR (A), (B), (C))	စီမံကိန်းအရင်းအမြစ် (A) (14°42'34.14"N, 96°15' 8.59"E)	စောင့်ကြပ်ကြည့်ရှုမည့် ဝက်ကြီး	၁,၀၀၀,၀၀၀
၅။	ရေပေးစနစ်အစီအစဉ်	ရေပေးစနစ် အစီအစဉ်	ယာယီအစီအစဉ်	အစီအစဉ်	၅၀၀,၀၀၀
၆။	လုပ်ငန်းစဉ် ကျန်းမာရေး	လုပ်ငန်းစဉ် အစီအစဉ်	စီမံကိန်းအရင်းအမြစ် (A) (14°42'34.14"N, 96°15' 8.59"E)	လက်	၅၀၀,၀၀၀



လူမှုအကျိုးတူပေးပေါင်းပါဝင်မှု (CSR) အစီအစဉ်များ



လူမှုအကျိုးတူပေးပေါင်းပါဝင်မှု (CSR) အစီအစဉ်များ



❖ ဖြန့်ဖြူးပေးမှု (၂၀၂၀) ခုနှစ်တွင် လူမှုအကျိုးတူပေးပေါင်းပါဝင်မှု (CSR) အတွက် အသုံးပြုခြင်း ၂% ကို (CSR) အတွက် အသုံးပြုခြင်း။



လူမှုအကျိုးတူပေးပေါင်းပါဝင်မှု နှင့် ဒေသဖွံ့ဖြိုးရေးအတွက် ပါဝင်မည့် အစီအစဉ်များ



လူမှုအကျိုးတူပေးပေါင်းပါဝင်မှု အမျိုးအမည်	စောင့်ကြည့်ရှုမည့်အရာများ	ရည်ရွယ်ချက်
ကျန်းမာရေး	• ဒေသခံများအတွက် ကျန်းမာရေး စောင့်ရှောက်မှုများ	• ဒေသခံများအတွက် ကျန်းမာရေးစောင့်ရှောက်မှုများ ပေးပို့နိုင်ရန်
ပညာရေး	• ပညာရေးအဖွဲ့အစည်း နှင့် လူမှုအဖွဲ့အစည်းများ ဆက်သွယ်မှုများ ပြုလုပ်ပေးခြင်း	• ပိုမိုကောင်းမွန်သော လူမှုအဖွဲ့အစည်း ဖြစ်လာရန်၊ လူငယ်တို့၏ ပညာရေးအဖွဲ့အစည်းများ ဖြစ်ပေါ်စေရန်
သဘာဝပတ်ဝန်းကျင် ထိန်းသိမ်းရေး	• စီမံခန့်ခွဲမှု၊ စောင့်ရှောက်မှု၊ ပြုပြင်ထိန်းသိမ်းမှုများ ပြုလုပ်ခြင်း	• သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းမှုအတွက် ဖြစ်ပေါ်လာနိုင်သော ဆိုးရွားမှုများကို ကာကွယ်ရန်နှင့် လျော့ချရန်၊ ပြန်လည်ထူထောင်ရေးလုပ်ငန်းများကို လျှင်မြန်စွာ ဆောင်ရွက်နိုင်ရန်

❖ လူမှုအကျိုးတူပေးပေါင်းပါဝင်မှု (၂၀၂၀) ခုနှစ်တွင် လူမှုအကျိုးတူပေးပေါင်းပါဝင်မှု (CSR) အတွက် အသုံးပြုခြင်း ၂% ကို (CSR) အတွက် အသုံးပြုခြင်း။



ကျေးဇူးတင်ပါသည်။