HAKERS ENTERPRISE (MYANMAR) CO., LTD.

ENVIRONMENTAL MANAGEMENT PLAN (EMP) REPORT

September 2022

Prepared by

HEXAGONAL ANGLE
INTERNATIONAL CONSULTANTS CO.,LTD.

ကတိကဝတ်များ

(က) ဤပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် သည် တိကျခိုင်မာကြောင်းနှင့် ပြည့်စုံကြောင်း။

(ခ) ဤလုပ်ထုံးလုပ်နည်းများ အပါအဝင် သက်ဆိုင်ရာဥပဒေများကို တိကျစွာ လိုက်နာ၍ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်များကို ရေးဆွဲထားပါသည်။

(ဂ) စီမံကိန်းသည် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်ပါ ကတိကဝတ်၊ ပတ်ဝန်းကျင်ထိခိုက်မှု လျော့ချရေးလုပ်ငန်းများနှင့် အစီအစဉ်များကို အပြည့်အဝ အစဉ်အမြဲလိုက်နာဆောင်ရွက်သွားမည်ဖြစ်ပါသည်။

(ဃ) လုပ်ငန်းလည်ပတ်ဆောင်ရွက်နေသည့်ကာလအတွင်း အတည်ပြုထားသည့် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်အား တိုးတက်နေသည့်နည်ပညာများ၊ စနစ်များနှင့် လုပ်ငန်းလိုအပ်ချက်အပေါ်မူတည်၍ ပိုမိုကောင်းမွန်သည့် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်ဖြစ်စေရန်အတွက် ပြင်ဆင်ဖြည့်စွက်ရန် ညွှန်ကြားချက် ရှိလာပါက လိုက်နာဆောင်ရွက်မည် ဖြစ်ပြီး ပြင်ဆင်ဖြည့်စွက်လိုပါက တင်ပြအတည်ပြုချက်ရယူ၍ ပြင်ဆင်ဆောင်ရွက် သွားမည် ဖြစ်ပါသည်။

(င) လုပ်ငန်းပိတ်သိမ်းမည်ဆိုပါက ပတ်ဝန်းကျင်နှင့် လူမှုရေးဆိုင်ရာများ မထိခိုက်စေရန် အစီအစဉ်များ ချမှတ်ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။

(စ) ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်ပါ စောင့်ကြပ်ကြည့်ရှုမည့် အစီအစဉ်အတွက် အသုံးပြုမည့် လျာထားရန်ပုံငွေ၊ ထိခိုက်မှုလျော့ပါးစေရေးအတွက်ရန်ပုံငွေ၊ ဘေးအန္တရာယ်ကာကွယ်ရေးအစီအစဉ်၊ အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးခြင်းနှင့် ဒေသဖွံ့ဖြိုးရေးလုပ်ငန်းများအတွက် ရန်ပုံငွေ စသည့် လျာထားရန်ပုံငွေများ အတိုင်းလိုက်နာဆောင်ရွက်မည်ဖြစ်ကြောင်းနှင့် အဆိုပါလျာထား ရန်ပုံငွေသည် လုံလောက်မှုမရှိပါက ကုမ္ပဏီမှ ထပ်မံထည့်သွင်း ဆောင်ရွက်သွားမည် ဖြစ်ကြောင်း ကတိကဝတ်ပြုပါသည်။

Hakers Enterprise (Myanmar) Co., Ltd.

Mr. Lim Soon Hin
Managing Director
Hakers Enterprise (Myanmar) Co.,Ltd.

အကြံပေးအဖွဲ့အစည်း၏ဝန်ခံချက်

(က) ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် အစီရင်ခံစာ (EMP) ကို တိကျခိုင်မာမှုများနှင့် ပြည့်စုံစွာ ဆောင်ရွက်ထားပါသည်။

(ခ) အစီရင်ခံစာကို ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း၊ သက်ဆိုင်ရာ ဥပဒေများ၊ မူဘောင်များ နှင့် အညီ ရေးဆွဲထားပါသည်။

(ဂ) ပတ်ဝန်းကျင်အရည်အသွေးတန်ဖိုးများကိုလည်း အရည်အသွေးပြည့်မှီသော စက်ပစ္စည်းများ နှင့် ဓာတ်ခွဲခန်းများတွင် တိုင်းတာထားပါသည်။

(ဃ) အထည်ချုပ်လုပ်ခြင်းလုပ်ငန်း ဆောင်ရွက်ခြင်းကြောင့် ဖြစ်ပေါ်နိုင်သော သက်ရောက်မှုများကို လုပ်ငန်းဆိုင်ရာ နားလည်တတ်ကျွမ်းမှုနှင့် စုံစမ်းရရှိသော အချက်အလက်များကို အခြေခံ၍ လေ့လာဆန်းစစ် ဖော်ထုတ်ထားပါသည်။

(င) အထည်ချုပ်လုပ်ခြင်းလုပ်ငန်း ကြောင့် ဖြစ်ပေါ်နိုင်သော အဓိက သက်ရောက်မှု တစ်ခုချင်းစီတိုင်း အတွက် လျှော့ချရမည့်နည်းလမ်းများ၊ အစီအစဉ်များ နှင့် စောင့်ကြပ်ကြည့်ရှုရမည့် ကဏ္ဍများကိုလည်း တိကျမှန်ကန်စွာ ဖော်ပြထားပါသည်။

(စ) ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ် အစီရင်ခံစာ (EMP) တွင် ဖော်ပြပါရှိသော စီမံကိန်းအကြောင်းအရာဖော်ပြချက်များ၊ ရှင်းလင်းဖော်ပြချက်များသည် စီမံကိန်း တာဝန်ရှိသူများ ထံမှရရှိလာသော အချက်အလက်များပေါ်တွင် အခြေခံ၍ ရေးသား ပြုစုထားပါသည်။

(ဆ) ဤပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် အစီရင်ခံစာ (EMP) ကို ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းပြုလုပ်ရန် လိုအပ်သော လုပ်ငန်းတာဝန်များ နှင့် အညီတိကျစွာ လိုက်နာ ပြုစုထား ပါကြောင်း ဝန်ခံပါသည်။

Hexagonal Angle International Consultants Co., Ltd.
No.....
Date.14.9.22

EI EI ZAW
General Manager
Environmental & Social Specialist
Hexagonal Angle International Consultants Co.,Ltd.

အစီရင်ခံစာအကျဉ်းချုပ်

၁။ နိဒါန်း

Hakers Enterprise (Myanmar) Co., Ltd. အထည်ချုပ်လုပ်ငန်း သည် CMP စနစ်ဖြင့် အထည်ချုပ် လုပ်ငန်းကို လုပ်ကိုင်ဆောင်ရွက်သော စက်ရုံ ဖြစ်ပြီး မြေကွက်အမှတ် (ပ-၃)၊ ဦးပိုင်အမှတ် (၅၂-စီးပွားရေးဇုန်)၊ အမှတ်(၁၃)ရပ်ကွက်၊ ပုသိမ်မြို့နယ်၊ ပုသိမ်ခရိုင်၊ ဧရာဝတီတိုင်း ဒေသကြီးတွင် တည်ရှိပါသည်။

ထိုစက်ရုံ သည် ၂၀၁၃ မှစ၍ တည်ထောင်ခဲ့ပြီး ၁၀၀ ရာခိုင်နှုန်း နိုင်ငံခြားသားပိုင် လုပ်ငန်းဖြစ်ပါသည်။ စီမံကိန်း အကောင်အထည် ဖော်သူသည် အထည်ချုပ် လုပ်ငန်း အတွက် Hexagonal Angle International Consultants ကုမ္ပဏီလီမိတက်အား ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီအစဉ် ရေးဆွဲရန် ငှားရမ်းခဲ့ပါသည်။ အဆိုပါ စက်ရုံသည် ဂျာကင်ဒီဇိုင်းမျိုးမျိုးနှင့် ဘောင်းဘီပုံစံအမျိုးမျိုး တို့ကို ဝယ်ယူသူ၏ လိုအပ်ချက်အတိုင်း ထုတ်လုပ်ပြီး ပြည်ပနိုင်ငံများသို့ တင်ပို့ ရောင်းချလျက် ရှိပါသည်။

၂။ စီမံကိန်းအကြောင်းအရာ

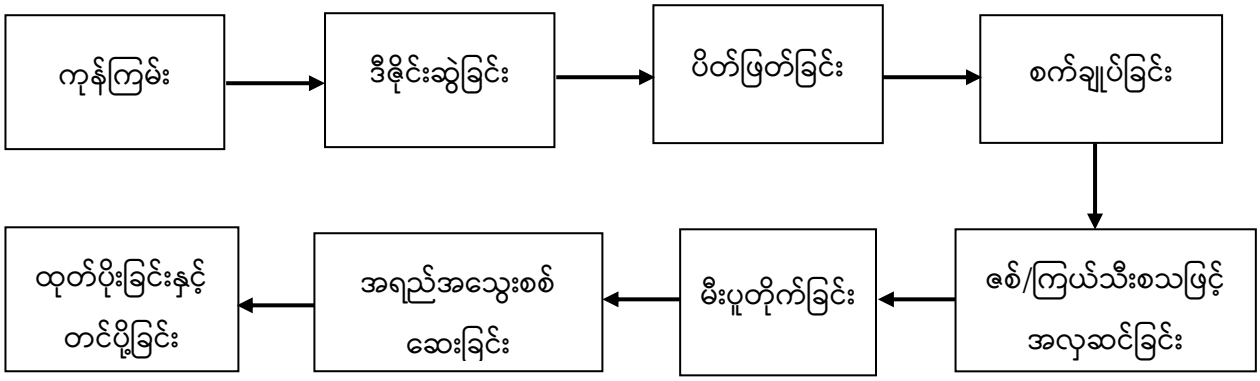
Hakers Enterprise (Myanmar) Co., Ltd. သည် မြေကွက်အမှတ် (ပ-၃)၊ ဦးပိုင်အမှတ် (၅၂-စီးပွားရေးဇုန်)၊ အမှတ်(၁၃)ရပ်ကွက်၊ ပုသိမ်မြို့နယ်၊ ပုသိမ်ခရိုင်၊ ဧရာဝတီတိုင်း ဒေသကြီးတွင် တည်ရှိပါသည်။ ဤလုပ်ငန်းသည် ၄.၅၄ ဧက ကျယ်ဝန်းပြီး ဝယ်ယူသူများ၏လိုအပ်ချက်အတိုင်း ချုပ်ထည်အမျိုးမျိုးထုတ်လုပ်ခြင်းကို စနှစ် ကျော်ကြာအောင် လုပ်ငန်းများ လည်ပတ်ခဲ့ပြီး ဖြစ်ပါသည်။

စီမံကိန်း ဧရိယာတွင် အဓိကအဆောက်အအုံတစ်ခုရှိပြီး ရုံးခန်း၊ ဆေးခန်း၊ လုပ်ငန်းလည်ပတ်သည့်နေရာနှင့် စတိုခန်းများ စသည်ဖြင့် အခန်းခွဲခြား၍ ဖွဲ့စည်း ထားပါသည်။

၂.၁။ ထုတ်လုပ်ခြင်းလုပ်ငန်း အဆင့်ဆင့်

ကုန်ကြမ်းများဖြစ်သည့် အထည်လိပ်အမျိုးမျိုး၊ ဇစ်နှင့် ကြယ်သီးစသော အလှဆင်ပစ္စည်းများကို ထိုင်ဝမ်နိုင်ငံ၊ တရုတ်နိုင်ငံနှင့် မလေးရှားနိုင်ငံများမှ တင်သွင်းပါသည်။ ပထမဦးစွာ ရရှိလာသော ကုန်ကြမ်းဖြစ်သည့် ပိတ်စများကို တစ်လွှာချင်းစီ ဖြန့်ခင်းထားရပါသည်။ ထို့နောက်တွင် အသင့်ပြုလုပ်ထားသည့် ဒီဇိုင်းဆွဲထားသော ကတ္ထူစက္ကူမှ အရာအတိုင်းမှတ်ထားသည့် စက္ကူပါးကို အလွှာလိုက်ထပ်ထားသည့် ပိတ်စများပေါ်သို့ ထပ်ခင်းပြီးနောက် ပိတ်ဖြတ်ပါသည်။ ၎င်းအဆင့်ပြီးသည့်နောက်တွင် ညှပ်စများကို ဥပမာ ကိုယ်ထည်၊ လက် နှင့် ကော်လံ စသည်ဖြင့်တူသော ဖြတ်စများကို အစည်းစည်း၍ စက်ချုပ်လိုင်းများသို့ အသီးသီးပို့ဆောင်ပါသည်။ စက်ချုပ်ပြီးသည့်အခါတွင် အထည်ကြမ်းရရှိပြီဖြစ်၍ ၎င်းတို့ကို

ဧစ်နှင့် ကြယ်သီးစဖြင့် လိုအပ်သော အလှဆင်ပစ္စည်းများ တပ်ဆင်သည့် နေရာသို့ ပို့၍ အလှဆင်ပါသည်။ သို့ရာတွင် ဂွမ်းအနွေးထည်များ ထုတ်လုပ်သည့်အခါတွင် ပထမအဆင့်အနေဖြင့် ဂွမ်းစများကို ပိတ်ဖြတ်စ (ကိုယ်ထည်၊ လက်နှင့် ကော်လံ) စသည်တို့ဖြင့် တွဲချုပ်ပြီးမှသာ စက်ချုပ်သည့် အဆင့်သို့ ပို့ဆောင်ရပါသည်။ ထို့နောက်ရရှိလာသော ကုန်ချောများကို အရည်အသွေးစစ်ဆေး၍ ထုတ်ပိုးပြီးနောက် မှာယူထားသော နိုင်ငံသို့ ပို့ဆောင်ပါသည်။ ထုတ်လုပ်မှု အဆင့်ဆင့် ကိုလည်း အောက်ပါ **ပုံ-၁** တွင် ဖော်ပြထားပါသည်။



ပုံ- ၁ အထည်ထုတ်လုပ်ခြင်းအဆင့်ဆင့်

၃။ ဥပဒေမူဝါဒများ

ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီအစဉ် ရေးဆွဲရာတွင် ပတ်ဝန်းကျင် ထိန်းသိမ်းစောင့်ရှောက် ရေး နည်းဥပဒေ ၅၀/၂၀၁၄ နှင့် ပတ်ဝန်းကျင်ထိခိုက်သက်ရောက်မှု လေ့လာဆန်းစစ်ခြင်းလုပ်ငန်းစဉ် အမှတ် ၆၁၆/၂၀၁၅ တို့နှင့်အညီ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်ကို ပြုစုရေးသား ရမည်ဖြစ်သည် ။ ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီအစဉ်သည် သဘာဝပတ်ဝန်းကျင်ကို ကာကွယ်ထိန်းသိမ်းရန် ရည်ရွယ် ရေးသားထားပြီး စီမံကိန်းကြောင့် ပတ်ဝန်းကျင်အပေါ် ဆိုးကျိုး သက်ရောက်မှုများအား လျှော့ချရန်နှင့် ကာကွယ်ရန်တို့ကို ပတ်ဝန်းကျင်ထိန်းသိမ်းစောင့်ရှောက်ရေး နည်းဥပဒေ ၅၀/၂၀၁၄၊ **အခန်း ၁၁** အပိုဒ်ခွဲ (၅၂) အရ လုပ်ဆောင်ရန် ဖြစ်ပါသည်။ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်တွင် ပါဝင်ရမည့် နည်းဥပဒေ အသေးစိတ်ကို **အခန်း (၃)** တွင်ဖော်ပြထားပါသည်။

၄။ ပတ်ဝန်းကျင်အခြေအနေ လေ့လာမှု

ပတ်ဝန်းကျင်အခြေအနေ လေ့လာရခြင်း၏ ရည်ရွယ်ချက်မှာ စီမံကိန်းအနီးအနားရှိ ပတ်ဝန်းကျင် တည်ရှိမှု အခြေအနေနှင့် လူမှုစီးပွားရေးအပေါ် အကျိုးသက်ရောက်မှုများကို လေ့လာတင်ပြရန် ဖြစ်ပါသည်။ ထိုသို့ လေ့လာရာတွင် စီမံကိန်း ဧရိယာ အနီးအနားရှိ အချက်အလက်များကို လေ့လာရာ၌ မြေပုံပေါ်ရှိ အချက်အလက်များ ၊ ဒေသဆိုင်ရာ အချက်အလက်များကို လေ့လာပြီးနောက် ကွင်းဆင်း လေ့လာခြင်းကို ပြုလုပ်ခဲ့ပါသည်။ ပတ်ဝန်းကျင်ဆိုင်ရာအရည်အသွေးတိုင်းတာမှုများ

ဖြစ်သော ပြင်ပလေထုအရည်အသွေး၊ အခန်းတွင်းလေအရည်အသွေး၊ ဆူညံသံအဆင့်၊ စွန့်ပစ်ရေအရည်သွေး၊ အလင်းနှင့်အပူချိန်တို့ကို ဧပြီလ ၂၃၊ ၂၄ ၂၀၂၁ ခုနှစ်တွင် တိုင်းတာခဲ့ကြပါသည်။ တိုင်းတာခဲ့သောရလဒ်များအရ ပြင်ပလေထုအရည်အသွေးတွင် အခြားသော လေအရည်အသွေးများသည် စံချိန်စံညွှန်းများအတွင်း ရှိသော်လည်း အမှုန်အမွှား PM $_{2.5}$ သည် စံချိန်စံညွှန်းထက် အနည်းငယ်ကျော်လွန်နေသည် ကိုတွေ့ရှိရပါသည်။ အခန်းတွင်းလေထုအရည်အသွေးတိုင်းတာခဲ့မှု ရလဒ်အရ အခြားတိုင်းတာခဲ့သော နေရာများတွင် ကောင်းမွန်သော အနေအထားရှိသော်လည်း ပိတ်ဖြတ်လိုင်းများတွင် ဖုန်အမှုန့် တည်ရှိမှုအရည်သွေးရလဒ်သည် ကျန်းမာရေး ထိခိုက်စေနိုင်သော အနေအထားတွင် တည်ရှိနေပါသည်။ စွန့်ပစ်ရေအရည်အသွေးသည်လည်း ဆီနှင့်ချောဆီ ပါဝင်မှုတစ်ခုကလွဲ၍ ကျန်ပါဝင်မှုများ အားလုံးသည် စံချိန်စံညွှန်းများအောက်တွင်သာ ရှိသည်ကို တွေ့ရှိရပါသည်။ အသံဆူညံမှုအဆင့် တိုင်းတာခဲ့မှုတွင် စက်ချုပ်လိုင်း နှင့် မိုဒီဇိုင်းဆွဲသည့်နေရာတွင် စံချိန်စံနှုန်းထက်ကျော်လွန်နေသည်ကို တွေ့ရှိရပါသည်။ အလင်းတိုင်းတာမှုရလဒ်အရ ပိတ်ဖြတ်လိုင်း၊ မီးပူတိုက်သည့်လိုင်း၊ မိုဒီဇိုင်းဆွဲသည့်အခန်း စသည့်အချို့နေရာများသည် အလင်းစံနှုန်းကို ပြည့်မှီရန် လိုအပ်နေသည်ကို တွေ့ရှိရပါသည်။ အပူချိန်တိုင်းတာခဲ့မှုရလဒ်အရ စက်ရုံအတွင်း ရုံးခန်းမှလွဲ၍ ကျန်နေရာများတွင် အပူချိန်မြင့်မားနေသည်ကို တွေ့ရှိရပါသည်။

စီမံကိန်း ဧရိယာအကျယ်မှာ ၄.၅၄ ဧက ရှိ၍ ဦးပိုင်အမှတ် (ပ-၃)၊ ကွင်းအမှတ်-၅၂၊ စီးပွားရေးဇုန် အမှတ်(၁၃)ရပ်ကွက်၊ ပုသိမ်မြို့နယ်၊ ပုသိမ်ခရိုင်၊ ဧရာဝတီတိုင်းဒေသကြီးတွင် တည်ရှိပါသည်။ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်တွင် စီမံကိန်း ဧရိယာ၏ ၅၀၀ မီတာ ပတ်လည်အတွင်းတွင် အသေးစိတ် လေ့လာခဲ့ပါသည်။ ထိုလေ့လာမှုကိုလည်း **အခန်း (၄)**တွင် အသေးစိတ် ဖော်ပြထားပါသည်။

၅။ ဖြစ်ပေါ်နိုင်သော ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း

ဤအထည်ချုပ်လုပ်ငန်းသည် CMP စနစ်ဖြင့် လုပ်ကိုင်ဆောင်ရွက်သော စက်ရုံဖြစ်ပြီး ဝယ်ယူသူများ၏ နိုင်ငံများသို့ တင်ပို့ရောင်းချပါသည်။ စနစ်တကျ လုပ်ငန်းလည်ပတ်ခြင်းနှင့် ထိရောက်သော ဘေးအန္တရာယ်ကင်းရှင်းရေး စီမံခန့်ခွဲမှုတို့ကြောင့် ပတ်ဝန်းကျင် အပေါ် ဆိုးကျိုး သက်ရောက်မှုမှာ အနည်းငယ်သာရှိပါသည်။ စက်ရုံတွင် ဝန်ထမ်းစုစုပေါင်း ၁,၇၈၈ ယောက်ရှိပြီး လုပ်သား ၁,၆၈၆ ယောက်၊ မြန်မာပညာရှင် ၃၃ ယောက်၊ နိုင်ငံခြားသား ၉ ယောက်၊ ရုံးဝန်ထမ်း ၃၄ ယောက်နှင့် လုံခြုံရေးနှင့် သန့်ရှင်းရေးမှာ ၂၆ ယောက် ရှိ၍ ဤအထည်ချုပ်လုပ်ငန်းတွင် ရေဆိုးများ ထွက်ရှိခြင်းမရှိပါ။

စက်ရုံ လည်ပတ်စဉ်တွင် ဖြစ်ပေါ်နိုင်သော ပတ်ဝန်းကျင် ထိခိုက်မှု များမှာ လေထုညစ်ညမ်းခြင်း၊ အသံဆူညံခြင်း၊ လုပ်သားများမှ စွန့်ပစ်ရေ ထွက်ရှိခြင်း၊

စွန့်ပစ်အမှိုက်များ ထွက်ရှိခြင်းနှင့် လုပ်သားများ ထိခိုက်ဒဏ်ရာ ရရှိနိုင်ခြင်း တို့ဖြစ်ပါသည်။ လျှော့ချရမည့် နည်းလမ်းများကို **အခန်း (၅)** တွင် အသေးစိတ် ဖော်ပြထားပါသည်။

ဇယား ၁ ပတ်ဝန်းကျင်အပေါ်အကျိုးသက်ရောက်မှုများ

စဉ်	သက်ရောက်မှုများ	သက်ရောက်မှုများဖြစ်စေသော ရင်းမြစ်များ	ပမာဏ (M = T + E + D + I + R)						အရေးကြီးသော အဆင့် (Imp)	သိသာထင်ရှားမှု အဆင့် (M x Imp)	သက်ရောက်မှု အဆင့်	ကောင်းကျိုး / ဆိုးကျိုး
			T	E	D	I	R	M				
၁	လေထု	စီမံကိန်းလည်ပတ်ခြင်းအဆင့်										
		• ယာဉ်ယန္တရားများ • မီးစက် • ဘွိုင်လာ • ကုန်ကြမ်းအတင်/အချ	၃	၂	၃	၁	၁	၁၀ (အလယ်အလတ်)	အလယ်အလတ်	(အလယ်အလတ် × အလယ်အလတ်)	အလယ်အလတ်	ဆိုးကျိုး
		စီမံကိန်းပိတ်သိမ်းခြင်းအဆင့်										
		• ပိတ်သိမ်းခြင်းအဆင့်မှ ဖုန်၊ အမှုန်ထွက်ခြင်း • ယာဉ်ယန္တရားများမှ ဖုန်၊ အမှုန်ထွက်ခြင်း	၃	၁	၁	၁	၁	၇ (သေးငယ်သော)	အလယ်အလတ်	(သေးငယ်သော × သေးငယ်သော)	အနည်းငယ်	ဆိုးကျိုး
၂.	အသံဆူညံမှု	စီမံကိန်းလည်ပတ်ခြင်းအဆင့်										
		• စက်ချုပ်လိုင်း/ ပိတ်ဖြတ်လိုင်း • မီးစက် • ဘွိုင်လာ	၃	၁	၃	၁	၁	၉ (အလယ်အလတ်)	အလယ်အလတ်	(အလယ်အလတ် × အလယ်အလတ်)	အလယ်အလတ်	ဆိုးကျိုး

စဉ်	သက်ရောက်မှုများ	သက်ရောက်မှုများဖြစ်စေသော ရင်းမြစ်များ	ပမာဏ (M = T + E + D + I + R)						အရေးကြီးသော အဆင့် (Imp)	သိသာထင်ရှားမှု အဆင့် (M x Imp)	သက်ရောက်မှု အဆင့်	ကောင်းကျိုး / ဆိုးကျိုး
			T	E	D	I	R	M				
		စီမံကိန်းပိတ်သိမ်းခြင်းအဆင့်										
		• အဆောက်အဦဖျက်သိမ်းခြင်းမှ ဆူညံသံထွက်ရှိခြင်း	၃	၂	၁	၁	၁	၈ (အလယ်အလတ်)	အနည်းငယ်	(သေးငယ်သော × အနည်းငယ်)	အနည်းငယ်	ဆိုးကျိုး
၃.	အနှံ	စီမံကိန်းလည်ပတ်ခြင်းအဆင့်										
		• ဓာတုပစ္စည်း အသုံးပြုခြင်း • အမှိုက်ပုံ	၃	၁	၃	၁	၁	၉ (အလယ်အလတ်)	အနည်းငယ်	(အလယ်အလတ် × အနည်းငယ်)	အနည်းငယ်	ဆိုးကျိုး
		စီမံကိန်းပိတ်သိမ်းခြင်းအဆင့်										
		• အမှိုက်ပုံ • အဆောက်အဦဖျက်သိမ်းခြင်း	၃	၁	၁	၁	၁	၇ (သေးငယ်သော)	အနည်းငယ်	(သေးငယ်သော × အနည်းငယ်)	လျှစ်လျူရှုနိုင်	လျှစ်လျူရှုနိုင်
၄	စွန့်ပစ်ရေ	စီမံကိန်းလည်ပတ်ခြင်းအဆင့်										
		• အိမ်သာ၊ လက်ဆေးဘေစင် စသည်တို့မှ ထွက်ရှိသော အိမ်သုံးစွန့်ပစ်ရေ • မိလ္လာရေ	၃	၂	၃	၁	၁	၁၀ (အလယ်အလတ်)	အလယ်အလတ်	(အလယ်အလတ် × အလယ်အလတ်)	အလယ်အလတ်	ဆိုးကျိုး

စဉ်	သက်ရောက်မှုများ	သက်ရောက်မှုများဖြစ်စေသော ရင်းမြစ်များ	ပမာဏ (M = T + E + D + I + R)						အရေးကြီးသော အဆင့် (Imp)	သိသာထင်ရှားမှု အဆင့် (M x Imp)	သက်ရောက်မှု အဆင့်	ကောင်ကျိုး / ဆိုးကျိုး
			T	E	D	I	R	M				
		စီမံကိန်းပိတ်သိမ်းခြင်းအဆင့်										
		• စက်ပစ္စည်း၊ ယာဉ်ယန္တရားများမှ ဆီယိုစိမ့်ခြင်း • လုပ်သားများထံမှ စွန့်ပစ်ရေထွက်ရှိခြင်း	၃	၁	၁	၁	၁	၇ (သေးငယ်သော)	အနည်းငယ်	(သေးငယ်သော × အနည်းငယ်)	လျှစ်လျူရှုနိုင်	လျှစ်လျူရှုနိုင်
		စီမံကိန်းလည်ပတ်ခြင်းအဆင့်										
၅	စွန့်ပစ်အမှိုက်	• အပ်ချုပ်လိုင်း၊ ပိတ်ဖြတ်လိုင်း၊ ပါကင်ထုတ်ခြင်းမှ အမှိုက်ထွက်ရှိခြင်း • အိမ်သုံးစွန့်ပစ်အမှိုက် (တစ်ရှူး၊ ပလပ်စတစ်၊ စားကြွင်းစားကျန်) • အန္တရာယ်ရှိသော ဓာတ်တုစွန့်ပစ်ပစ္စည်း	၃	၂	၃	၂	၁	၁၁ (ကြီးမား သော)	အလယ်အလတ်	(ကြီးမားသော × အလယ်အလတ်)	အဓိက	ဆိုးကျိုး

စဉ်	သက်ရောက်မှုများ	သက်ရောက်မှုများဖြစ်စေသော ရင်းမြစ်များ	ပမာဏ (M = T + E + D + I + R)						အရေးကြီးသော အဆင့် (Imp)	သိသာထင်ရှားမှု အဆင့် (M x Imp)	သက်ရောက်မှု အဆင့်	ကောင်ကျိုး / ဆိုးကျိုး
			T	E	D	I	R	M				
		စီမံကိန်းပိတ်သိမ်းခြင်းအဆင့်										
		• အဆောက်အဦဖျက်သိမ်းခြင်းမှ စွန့်ပစ်အမှိုက်ထွက်ရှိခြင်း • အိမ်သုံးစွန့်ပစ်အမှိုက်	၃	၁	၁	၂	၁	၈ (အလယ်အလတ်)	အနည်းငယ်	(အလယ်အလတ် × သေးငယ်သော)	အနည်းငယ်	ဆိုးကျိုး
၆	လုပ်ငန်းခွင်ဘေးအန္တရာယ်ကင်းရှင်းရေးနှင့် လုံခြုံရေး	စီမံကိန်းလည်ပတ်ခြင်းအဆင့်										
		• လုပ်ငန်းခွင်နေရာ • စီမံကိန်းလုပ်ငန်းအတွင်း	၃	၁	၃	၂	၁	၁၀ (အလယ်အလတ်)	အလယ်အလတ်	(အလယ်အလတ် × အလယ်အလတ်)	အလယ်အလတ်	ဆိုးကျိုး
		စီမံကိန်းပိတ်သိမ်းခြင်းအဆင့်										
		• စီမံကိန်းဖျက်သိမ်းသည့်နေရာ • စီမံကိန်းလုပ်ငန်းအတွင်း	၃	၁	၁	၂	၁	၈ (အလယ်အလတ်)	အလယ်အလတ်	(အလယ်အလတ် × အလယ်အလတ်)	အလယ်အလတ်	ဆိုးကျိုး
၇	အသက်မွေးဝမ်းကြောင်းနှင့် လူထုစီးပွား	စီမံကိန်းလည်ပတ်ခြင်းအဆင့်										
		• အလုပ်အကိုင်အခွင့်အလမ်းများ • စီမံကိန်းကြောင့် ဒေသဖွံ့ဖြိုးတိုးတက်ခြင်း	၃	၃	၃	၂	၂	၁၃ (ကြီးမားသော)	အလယ်အလတ်	(ကြီးမားသော × အလယ်အလတ်)	အဓိက	ကောင်းကျိုး

စဉ်	သက်ရောက်မှုများ	သက်ရောက်မှုများဖြစ်စေသော ရင်းမြစ်များ	ပမာဏ (M = T + E + D + I + R)						အရေးကြီးသော အဆင့် (Imp)	သိသာထင်ရှားမှု အဆင့် (M x Imp)	သက်ရောက်မှု အဆင့်	ကောင်းကျိုး / ဆိုးကျိုး
			T	E	D	I	R	M				
		စီမံကိန်းပိတ်သိမ်းခြင်းအဆင့်										
		• အဆောက်အဦဖျက်သိမ်းခြင်းမှ အလုပ်အကိုင်အခွင့်အလမ်းများ	၃	၂	၂	၁	၁	၉ (အလယ်အလတ်)	အလယ်အလတ်	(အလယ်အလတ် × အလယ်အလတ်)	အလယ်အလတ်	ဆိုးကျိုး

၆။ အများပြည်သူနှင့်တိုင်ပင်ဆွေးနွေးခြင်းနှင့် ပြည်သူတို့၏ပူးပေါင်းပါဝင်မှု

ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီအစဉ်တွင် အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးပွဲ ပြုလုပ်ခြင်း မှာလည်း လိုအပ်သော အခန်းကဏ္ဍ တစ်ခုဖြစ်ပါသည်။ အများပြည်သူနှင့် တွေ့ဆုံပွဲ ပြုလုပ်ရခြင်း၏ ရည်ရွယ်ချက်မှာ အစိုးရ ဌာန ဆိုင်ရာ အဖွဲ့အစည်း များ၊ စီမံကိန်း ကို စစ်ဆေး မည့်သူများ နှင့် ပတ်ဝန်းကျင် ပြည်သူလူထု အား စီမံကိန်းမှ အချက်အလက် များ ဖြစ်သော ထုတ်လုပ်မှု အဆင့်ဆင့် များ၊ အမှိုက် စွန့်ပစ်မှု စနစ်များနှင့် ပတ်ဝန်းကျင်အပေါ် အကျိုးသက်ရောက်မှုများကို ရှင်းလင်း တင်ပြရန် ဖြစ်ပါသည်။

အများပြည်သူနှင့် တွေ့ဆုံပွဲကို ၂၀၂၂ ခုနှစ်၊ စက်တင်ဘာလ ၈ ရက်နေ့တွင် Hakers Enterprise (Myanmar) Co., Ltd. ၏ အစည်းအဝေးခန်းမ နံပါတ် (၃) တွင် ကျင်းပပြုလုပ်ခဲ့ ကြပါသည်။ မနက် ၁၀ နာရီမှ နေ့လည် ၁၂ နာရီထိ ကျင်းပပြုလုပ်ခဲ့ကြပါသည်။

အများပြည်သူနှင့် တွေ့ဆုံပွဲကို ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၊ ပုသိမ်မြို့နယ် စည်ပင်သာယာရေး ကော်မတီ၊ မီးသတ်ဦးစီးဌာန၊ ပြည်သူ့ ကျန်းမာရေးဦးစီးဌာန၊ အလုပ်ရုံနှင့် အလုပ်သမားဥပဒေစစ်ဆေးရေးဦးစီးဌာနမှ ဝန်ထမ်းများ၊ HA Company နှင့် Hakers Enterprise (Myanmar) Co., Ltd. မှ တာဝန်ရှိသူများ တက်ရောက် ကြပါသည်။ အခမ်းအနားကို HA Company မှ ဒေါ်ခန့်ဇင်သန့်က အခမ်းအနား ဖွင့်လှစ်ကြောင်း ကြေညာခဲ့ပြီး ပတ်ဝန်းကျင်အစီရင်ခံစာ အတွက် လေ့လာတွေ့ရှိချက်များကို Senior Environmentalist ဒေါ်သန္တာကျော်မှ ရှင်းလင်းခဲ့ပါသည်။ အများပြည်သူနှင့်တွေ့ဆုံပွဲအစီအစဉ် အသေးစိတ်ကို အခန်း (၆) တွင် ရေးသားဖော်ပြထားပါသည်။

၇။ ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီအစဉ်

ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်တွင် Hakers Enterprise (Myanmar) Co., Ltd. အထည်ချုပ် လုပ်ငန်း၏ ကုန်ထုတ်လုပ်မှု လုပ်ငန်းစဉ်များ စောင့်ကြပ်ကြည့်ရှုမှုနှင့် ကိုက်ညီခြင်းရှိစေရန် ရေးဆွဲ ထားပါသည်။ ထို့အပြင် ဤအစီအစဉ်တွင် ပြဋ္ဌာန်း ဥပဒေလိုအပ်ချက် ၊ အန္တရာယ် ကင်းရှင်းရေး လုပ်ငန်းစဉ် နှင့် ပတ်ဝန်းကျင်ဆိုင်ရာ မူဝါဒများနှင့် ကိုက်ညီမှုရှိစေရန်လည်း ထည့်သွင်း ရေးဆွဲထားပါသည်။

ပတ်ဝန်းကျင်ထိခိုက်မှု စစ်ဆေးခြင်း အစီရင်ခံစာကို **အခန်း (၇)**တွင် ဖော်ပြထားပြီး ပတ်ဝန်းကျင် အပေါ် ဆိုးကျိုးသက်ရောက်မှု လျော့ကျစေနိုင်ရန် လုပ်ဆောင်ရမည့် ဆောင်ရွက်ချက်များကို အောက်ပါ **ဇယား- ၂** တွင် ဖော်ပြထားပါသည်။

ဇယား- ၂ ပတ်ဝန်းကျင် ဆိုးကျိုးသက်ရောက်မှု လျော့ချရေး စီမံချက်များ

အမျိုးအစား	ပတ်ဝန်းကျင်အပေါ် ဆိုးကျိုးသက်ရောက်မှု	လျော့ချရန်နည်းလမ်းများ	ဆောင်ရွက်ရမည့် ကာလ	တာဝန်ရှိသော အဖွဲ့အစည်း
		စီမံကိန်းလည်ပတ်ခြင်း		
ပြင်ပလေထုအရည်အသွေး (Point Source Emission)	• မီးစက်နှင့် ဘွိုင်လာအခန်းတွင်လေထုညစ်ညမ်းခြင်း • ယာဉ်ယန္တရားများ ရွှေ့လျားခြင်းမှ ဖုန်မှုန့်ထွက်ရှိခြင်း • အသက်ရှူရခက်ခဲခြင်း	• စက်ပစ္စည်းများအား အသုံးမပြုရ သည့်အချိန်တွင် ပိတ်ထားခြင်း။ • မီးစက်ထားသည့် အခန်းတွင် သင့်လျော်သော လေဝင်လေထွက်ရှိစေခြင်း။ • လေအေးပေးစက် စနစ်တွင် အိုဇုန်းလွှာ ပျက်စီးစေသော ပစ္စည်းများအား အသုံးမပြုခြင်း။ • စီမံကိန်း နေရာများတွင် အပင်စိုက်ခြင်းနှင့် မြက်ခင်းများ ထားရှိခြင်း အစီအစဉ်များ ဆောင်ရွက်ရမည်။ • လေသန့်စင်ရာတွင် ထိရောက်မှုရှိသော အပင်များအား စိုက်ပျိုးရပါမည်။	စီမံကိန်းလည်ပတ်ခြင်း ကာလတစ်လျှောက်	စီမံကိန်း အဆိုပြုသူ
ပြင်ပလေထုအရည်အသွေး (Fugitive Emission)	• ယာဉ်ယန္တရားများ ရွှေ့လျားခြင်းမှ ဖုန်မှုန့်ထွက်ရှိခြင်း • မျက်စိယားယံခြင်း • အသက်ရှူရခက်ခဲခြင်း	• ထိတွေ့မှု အလွန်အကျွံဖြစ်နိုင်သော နေရာများတွင် လေဝင်လေထွက် အား လုံလောက်စွာ တပ်ဆင် အသုံးပြုရပါမည်။ • ပစ္စည်းများအား တင်ခြင်း/ချခြင်း လုပ်ငန်းစဉ် မစမီ စီမံကိန်းနေရာ အတွင်းနှင့် အပြင်ဘက်တွင် ရေဖြန်းရန် လိုအပ်ပါသည်။ • စီမံကိန်း နေရာများတွင် အပင်စိုက်ခြင်းနှင့် မြက်ခင်းများ ထားရှိခြင်း အစီအစဉ်များ ဆောင်ရွက်ရမည်။	စီမံကိန်းလည်ပတ်ခြင်း ကာလတစ်လျှောက်	စီမံကိန်း အဆိုပြုသူ

အမျိုးအစား	ပတ်ဝန်းကျင်အပေါ် ဆိုးကျိုးသက်ရောက်မှု	လျှော့ချရန်နည်းလမ်းများ	ဆောင်ရွက်ရမည့် ကာလ	တာဝန်ရှိသော အဖွဲ့အစည်း
		• လေသန့်စင်ရာတွင် ထိရောက်မှုရှိသော လေသန့် အပင်များအား စိုက်ပျိုးရပါမည်။ ဥပမာ တောထန်း/အုန်းပွားပင်၊ ရှားစောင်းလက်ပတ်၊ အိုင်ဗီပင် စသည်တို့။ • ဝန်ထမ်းများအား တစ်ကိုယ်ရေ ကာကွယ်ရေးဝတ်စုံ (PPE) ရန် တိုက်တွန်းဆောင်ရွက်မည်။		
အခန်းတွင်း လေထုအရည်အသွေး	• ဖုန်၊အမှုန်များကြောင့် အသက်ရှူရခက်ခဲခြင်း၊ မျက်စိယားယံခြင်း၊ အဆုတ်ရောဂါဖြစ်ခြင်း • ကာဗွန်ဒိုင်အောက်ဆိုဒ်ကြောင့် ခေါင်းမူခြင်း၊ သွေးတိုးခြင်း စသည်	• ထိတွေ့မှု အလွန်အကျွံဖြစ်နိုင်သော နေရာများတွင် လေဝင်လေထွက် အား လုံလောက်စွာ တပ်ဆင် အသုံးပြုရပါမည်။ • ညစ်ညမ်းမှုဖြစ်စေသော နေရာများတွင် လေဝင်လေထွက် ကောင်းမွန်မှု ရှိအောင် ဆောင်ရွက်ရမည်။ • လေသန့်စင်ရာတွင် ထိရောက်မှုရှိသော လေသန့် အပင်များအား စိုက်ပျိုးရပါမည်။ ဥပမာ တောထန်း/အုန်းပွားပင်၊ ရှားစောင်းလက်ပတ်၊ အိုင်ဗီပင် စသည်တို့။ • အမှုန်အမွှားများ (PM) နှင့် ကာဗွန်ဒိုင်အောက်ဆိုဒ် (CO2) အာရုံခံ ကိရိယာများအား တပ်ဆင်အသုံးပြုမည်။ • ဝန်ထမ်းများအား တစ်ကိုယ်ရေ ကာကွယ်ရေးဝတ်စုံ (PPE) ရန် တိုက်တွန်းဆောင်ရွက်မည်။	စီမံကိန်းလည်ပတ်ခြင်း ကာလတစ်လျှောက်	စီမံကိန်း အဆိုပြုသူ
ပိတ်သိမ်းသည့် ကာလ				

အမျိုးအစား	ပတ်ဝန်းကျင်အပေါ် ဆိုးကျိုးသက်ရောက်မှု	လျှော့ချရန်နည်းလမ်းများ	ဆောင်ရွက်ရမည့် ကာလ	တာဝန်ရှိသော အဖွဲ့အစည်း
အခန်းတွင်း လေထုအရည်အသွေး	• ယာဉ်ယန္တရားများ ရွှေ့လျားခြင်းမှ ဖုန်မှုန်ထွက်ရှိခြင်း • မျက်စိယားယံခြင်း • အသက်ရှူရခက်ခဲခြင်း	• စီမံကိန်းတည်ဆောက်/ ဖြိုဖျက်ချိန်များတွင် စီမံကိန်းဧရိယာအတွင်း၊ အပြင်များကို ဖုန်မထစေရန် ရေဖြန်းပေးခြင်း။ • ဖုန်ထစေသော ပစ္စည်းများ • ဖုန်ထစေသော လုပ်ငန်းများဆောင်ရွက်မှုကို လေတိုက်နှုန်းပြင်းထန်နေသော အချိန်များတွင် ရပ်နားထားပြီး နောက်မှ လုပ်ဆောင်သင့်ပါသည်။ • ယာဉ်ယန္တရားများ၊ စက်ပစ္စည်းများကို ပုံမှန်ထိန်းသိမ်းခြင်းဖြင့် ဖုန်အမှုန်၊ ဓာတ်ငွေ့ထွက်ရှိခြင်းကို သိသိသာသာ တားဆီးနိုင်ပါသည်။ • အများပိုင်လမ်းများတွင် မောင်းနှင်ရာတွင် အမှိုက်၊ ဖုန်မှုန့်များတင်ဆောင်လာသော ကားများကို အဖုံးအုပ်ထားသင့်ပါသည်။ • ကားများကို အရှိန်လျှော့မောင်းခြင်းဖြင့် ဖုန်မှုန့်၊ အမှုန်အမွှား ထွက်ရှိမှုကို တားဆီးနိုင်ပါသည်။	စီမံကိန်းပိတ်သိမ်းသည့် ကာလတစ်လျှောက်	စီမံကိန်း အဆိုပြုသူ/ အဓိက ကန်ထရိုက်တာ
စီမံကိန်းလည်ပတ်ခြင်း				
ဆူညံသံ	• စိတ်ဖိစီးမှု၊ ခေါင်းကိုက်ခြင်း၊ အာရုံစိုက်ရန် ခက်ခဲခြင်း၊ မတော်တဆဖြစ်နိုင်နှုန်း မြင့်မားခြင်း၊ သွေးတိုးခြင်း၊ ရေရှည်နှလုံးသွေးကြောဆိုင်ရာ ရောဂါများဖြစ်ပွားခြင်း။	• ဆူညံသံ ထွက်ရှိမှု နည်းပါးစေသော စက်ပစ္စည်းများ ကို အသုံးပြုပါ။ • ဆူညံသံထွက်ရှိသော စက်ပစ္စည်းများကို ပုံမှန်ထိန်းသိမ်းမှု ပြလုပ်သင့်ပါသည်။	စီမံကိန်းလည်ပတ်ခြင်း ကာလတစ်လျှောက်	စီမံကိန်း အဆိုပြုသူ

အမျိုးအစား	ပတ်ဝန်းကျင်အပေါ် ဆိုးကျိုးသက်ရောက်မှု	လျှော့ချရန်နည်းလမ်းများ	ဆောင်ရွက်ရမည့် ကာလ	တာဝန်ရှိသော အဖွဲ့အစည်း
		• ဆူညံသံမြင့်မားသော နေရာတွင် တာဝန်ထမ်းဆောင်ရသော ဝန်ထမ်းများအနေဖြင့် နားအကာအကွယ်များကို ဝတ်ဆင်သင့်ပါသည်။ • မည်သည့်ဝန်ထမ်းမှ နားအကာအကွယ်မပါဘဲနဲ့ ၈၅ dB(A) ထက် ဆူညံသံမြင့်မားသော နေရာတွင် ၈ နာရီထက် ပိုမနေသင့်ပါ။ • နားအကာအကွယ် မဝတ်ဆင်ထားပါက ၁၄၀ dB (C) ထက်မြင့်မားသော အသံကို ထိတွေ့မှုမရှိသင့်ပါ။ • အသံဆူညံမှု စုပ်ယူ၊ ကာကွယ်ပေးနိုင်သော အပင်များကို စိုက်ပျိုးသင့်ပါသည်။ • အသံကာကွယ်သော ကန့်လန့်ကာကို တပ်ဆင်သင့်ပါသည်။		
ပိတ်သိမ်းသည့် ကာလ				
ဆူညံသံ	• စိတ်ဖိစီးမှု၊ ခေါင်းကိုက်ခြင်း၊ အာရုံစိုက်ရန် ခက်ခဲခြင်း၊ မတော်တဆဖြစ်နိုင်နှုန်း မြင့်မားခြင်း၊ သွေးတိုးခြင်း၊ ရေရှည်နှလုံးသွေးကြောဆိုင်ရာ ရောဂါများဖြစ်ပွားခြင်း။	• ဆူညံသံမြင့်မားသော နေရာတွင် တာဝန်ထမ်းဆောင်ရသော ဝန်ထမ်းများအနေဖြင့် နားအကာအကွယ်များ တစ်ခါဝတ်လျှင် ၁ နာရီဖြင့် တစ်နေ့လျှင် ၂ ကြိမ်ခန့် ဝတ်ဆင်သင့်ပါသည်။ • စီမံကိန်းဧရိယာရှိ ကန်ထရိုက်တာများ အားလုံးသည် ယာဉ်ယန္တရားများ၊ စက်ပစ္စည်းများမှ ထွက်ရှိလာသော ဆူညံသံများကို ထိထိရောက်ရောက် ထိန်းချုပ်သင့်ပါသည်။	စီမံကိန်းပိတ်သိမ်းသည့် ကာလတစ်လျှောက်	စီမံကိန်း အဆိုပြုသူ/ အဓိက ကန်ထရိုက်တာ

အမျိုးအစား	ပတ်ဝန်းကျင်အပေါ် ဆိုးကျိုးသက်ရောက်မှု	လျှော့ချရန်နည်းလမ်းများ	ဆောင်ရွက်ရမည့် ကာလ	တာဝန်ရှိသော အဖွဲ့အစည်း
		• ထိရောက်သော ဆူညံသံထိန်းချုပ်နည်းတွင် တည်ဆောက်ရေး ပစ္စည်းများကို ပုံမှန် စစ်ဆေးခြင်း၊ စောင့်ကြည့်ခြင်းများ ပါဝင်ပါသည်။ • တည်ဆောက်ရေးလုပ်ငန်းများကို ည ၁၀ နာရီမှ မနက် ၇ နာရီအချိန်အတွင်း ဆောင်ရွက်ခြင်းမပြုသင့်ပါ။		
		စီမံကိန်းလည်ပတ်ခြင်း		
အနှံ့	ပြင်းထန်သော အနှံ့များကို ရှုရှိုက်မိပါက ကျန်းမာရေး ထိခိုက်ခြင်း၊ မျက်စိ၊ နှာခေါင်း၊ လည်ချောင်း ယားယံခြင်း၊ အဆုတ်ရောဂါဖြစ်ခြင်း၊ ချောင်းဆိုးခြင်း၊ နှာချေခြင်း များဖြစ်ပေါ်နိုင်ပါသည်။	• လေဝင်လေထွက်ကောင်းမွန်သော၊ လုံခြုံသော နေရာများတွင် အစွန်းချွတ်ဆေးများကို သိမ်းသိုပါ။ • အစွန်းချွတ်ဆေးများကို အသုံးပြုရာတွင် ဝန်ထမ်းများသည် နှာခေါင်းစည်း၊ လက်အိတ် စသော အကာအကွယ်ပစ္စည်းများနှင့် ကိုင်တွယ်ရပါမည်။ • အလုပ်လုပ်ကိုင်ရသော နေရာများကို လေဝင်လေထွက်ကောင်းမွန်သော နေရာဖြစ်အောင် ဖန်တီးပေးရပါမည်။ • ဝန်ထမ်းများအား လုပ်ငန်းတာဝန်များ၊ အချိန်များ လွှဲပြောင်းထမ်းဆောင်စေသင့်ပါသည်။ • ငွေ့ရည်ပြန်လွယ်သော ဇီဝဖြပ်ပေါင်းဓာတ်ငွေ့ထွက်နိုင်သော အမှိုက်များကို ဟိုတယ်ဝန်းအတွင်း သီးသန့် စွန့်ပစ်သည့်နေရာ ရွေးချယ်ရပါမည်။ • အိမ်သာ၊ ရေချိုးခန်း၊ ဘေစင်၊ ကြမ်းပြင်တို့ကို နေ့စဉ်သန့်ရှင်းရေး.ပြုလုပ်ရပါမည်။	စီမံကိန်းလည်ပတ်ခြင်း ကာလတစ်လျှောက်	စီမံကိန်း အဆိုပြုသူ

အမျိုးအစား	ပတ်ဝန်းကျင်အပေါ် ဆိုးကျိုးသက်ရောက်မှု	လျှော့ချရန်နည်းလမ်းများ	ဆောင်ရွက်ရမည့် ကာလ	တာဝန်ရှိသော အဖွဲ့အစည်း
		• မိလ္လာကန်များ ယိုစိမ့်မှုမဖြစ်စေရန် ပုံမှန်စစ်ဆေးရပါမည်။ • မိလ္လာကန်များကို သက်ဆိုင်ရာ မြို့နယ်စည်ပင်သာယာရေးကော်မတီတို့နှင့် ချိတ်ဆက်၍ ပုံမှန်ရှင်းလင်းရပါမည်။		
စီမံကိန်းလည်ပတ်ခြင်း				
စွန့်ပစ်ရည်	• လုပ်ငန်းလည်ပတ်ခြင်းမှ စွန့်ပစ်ရည်မထွက်ရှိပါ။ • အိမ်သာ၊ လက်ဆေးဘေစင်မှ အိမ်သုံးစွန့်ပစ်ရည်ထွက်ရှိခြင်း • မိလ္လာရည်များမှ ဝမ်းလျှောခြင်းဖြစ်စေခြင်း။	• ရေသုံးစွဲမှုပမာဏအား လျှော့ချရန်၊ မလိုအပ်ဘဲ ရေသုံးစွဲမှု မပြုရန်၊ • ရေနှုတ်မြောင်းနှင့် ပိုက်လိုင်းစနစ်ကို စွန့်ပစ်ရည်အတွက် သီးခြားခွဲထားရပါမည်။ • မိလ္လာကန်များ ယိုစိမ့်မှုမဖြစ်စေရန် ပုံမှန်စစ်ဆေးရပါမည်။ • ဆီယိုစိမ့်မှုမဖြစ်စေရန် အိမ်တွင်းလုပ်ငန်းဆောင်တာများနှင့် မီးစက်ခန်းကို သတိထား ထိန်းချုပ်ရမည်။ ရေနှုတ်မြောင်းများကို အဖုံးတပ်ဆင်ပြီး စွန့်ပစ်ရည်များကို မိလ္လာကန်ထဲသို့ စနစ်တကျ စွန့်ပစ်ရမည်။	စီမံကိန်းလည်ပတ်ခြင်း ကာလတစ်လျှောက်	စီမံကိန်း အဆိုပြုသူ
ပိတ်သိမ်းသည့် ကာလ				

အမျိုးအစား	ပတ်ဝန်းကျင်အပေါ် ဆိုးကျိုးသက်ရောက်မှု	လျှော့ချရန်နည်းလမ်းများ	ဆောင်ရွက်ရမည့် ကာလ	တာဝန်ရှိသော အဖွဲ့အစည်း
	• ဖြိုဖျက်ရေးလုပ်သားများ အိမ်သာ၊ လက်ဆေးခြင်းမှ ထွက်ရှိလာသော စွန့်ပစ်ရည်များ၊	• ရေသုံးစွဲမှုပမာဏအား လျှော့ချရန်၊ မလိုအပ်ဘဲ ရေသုံးစွဲမှု မပြုရန်၊ • စွန့်ပစ်ရည်များကို ဘေးပတ်ဝန်းကျင်ရှိ ရေထုထဲသို့ တိုက်ရိုက်စွန့်ပစ်ခြင်းကို ရှောင်ရှားရမည်။ • ရေနူတ်မြောင်းစနစ်ကို ကောင်းမွန်အောင် ထိန်းသိမ်းရမည်	စီမံကိန်းပိတ်သိမ်းသည့် ကာလတစ်လျှောက်	စီမံကိန်း အဆိုပြုသူ/ အဓိက ကန်ထရိုက်တာ
စီမံကိန်းလည်ပတ်ခြင်း				
စွန့်ပစ်အမှိုက်	• အန္တရာယ်မရှိသောစွန့်ပစ် အမှိုက်များ • လူထုကျန်းမာရေးအတွက် ဆိုးကျူးသက်ရောက်မှုများ • သက်ရှိများအပေါ် ဆိုးရွားသော သက်ရောက်မှု များ	• အမှိုက် အစိုနှင့် အခြောက်ဟူ၍ အမျိုးအစားခွဲခြားပြီး စနစ်တကျခွဲခြားစွန့်ပစ်ပါ။ • ပြန်လည် အသုံးပြုနိုင်သော အမှိုက်များ စွန့်ပစ်နိုင်ရန်အတွက် အမှိုက်ပုံများ သီးသန့်စီစဉ်ထားရှိရမည်။ ထိုသို့ အလေ့အကျင့်ကောင်းများကို လက်တွေ့တွင် ကျင့်သုံးရပါမည်။ • ပုသိမ်မြို့၊ စည်ပင်သာယာရေးကော်မတီနှင့် ချိတ်ဆက်ပြီး အမှိုက်ကို စနစ်တကျ အပတ်စဉ်စွန့်ပစ်ရမည်။ • အမှိုက်စွန့်ပစ်မှုကိုလည်း မှတ်တမ်းထား၍ မှတ်သားထားရမည်။	စီမံကိန်းလည်ပတ်ခြင်း ကာလတစ်လျှောက်	စီမံကိန်း အဆိုပြုသူ

အမျိုးအစား	ပတ်ဝန်းကျင်အပေါ် ဆိုးကျိုးသက်ရောက်မှု	လျှော့ချရန်နည်းလမ်းများ	ဆောင်ရွက်ရမည့် ကာလ	တာဝန်ရှိသော အဖွဲ့အစည်း
	• အန္တရာယ်မရှိသောစွန့်ပစ် အမှိုက်များ • လူထုကျန်းမာရေးအတွက် ဆိုးကျိုးသက်ရောက်မှုများ • သက်ရှိများအပေါ် ဆိုးရွားသော သက်ရောက်မှု များ	• ဓာတုစွန့်ပစ်ပစ္စည်းများကို သီးခြားစွန့်ပစ်ရမည်။ ဓာတုပစ္စည်းကိုင်တွယ်ရသော ဝန်ထမ်းများကို တစ်ကိုယ်ရည်ကာကွယ်ရေး ပစ္စည်းများ ထောက်ပံ့ပေးရမည်။ စနစ်တကျ ကိုင်တွယ်ပုံ သင်တန်းများ ပေးရမည်။ • ဓာတုစွန့်ပစ်ပစ္စည်းများ ယိုစိမ့်ဖိတ်စင်မှု ဖြစ်ပါက လွှစာမှုန့်များ၊ သဲများဖြင့် ဖုံးခြင်းကို လုပ်ဆောင်ရမည်။. • မန္တလေးမြို့၊ စည်ပင်သာယာရေးကော်မတီနှင့် ချိတ်ဆက်ပြီး အမှိုက်ကို စနစ်တကျ အပတ်စဉ်စွန့်ပစ်ရမည်။ • အမှိုက်စွန့်ပစ်မှုကိုလည်း မှတ်တမ်းထား၍ မှတ်သားထားရမည်။	စီမံကိန်းလည်ပတ်ခြင်း ကာလတစ်လျှောက်	စီမံကိန်း အဆိုပြုသူ
ဖျက်သိမ်းသည့် ကာလ				
စွန့်ပစ်အမှိုက်	အမှိုက်များကို စနစ်တကျ မစွန့်ပစ်ပါက ပတ်ဝန်းကျင် သက်ရှိများအပေါ် မြေထု၊ ရေထုညစ်ညမ်းခြင်း စသော ဆိုးရွားသော သက်ရောက်မှု များရှိပါသည်။	• တစ်ရှူး၊ စားကြွင်းစာကျန်၊ ပလပ်စတစ်စသော စွန့်ပစ်အမှိုက်များကို ဟိုတယ်ဝန်းအတွင်း ယာယီ အမှိုက်ကန်တွင် စုပုံထားပြီး • ပုသိမ်မြို့၊ စည်ပင်သာယာရေးကော်မတီနှင့် ချိတ်ဆက်ပြီး အမှိုက်ကို စနစ်တကျ အပတ်စဉ်စွန့်ပစ်ရမည်။ • ဓာတုစွန့်ပစ်ပစ္စည်းများ ကို စွန့်ပစ်မည်ဆိုပါက သတိထား၍ ကိုင်တွယ်ရပါမည်။ • ဓာတုစွန့်ပစ်ပစ္စည်းများ ယိုစိမ့်ဖိတ်စင်မှု ဖြစ်ပါက လွှစာမှုန့်များ၊ သဲများဖြင့် ဖုံးခြင်းကို လုပ်ဆောင်ရမည်။.	စီမံကိန်းပိတ်သိမ်းသည့် ကာလတစ်လျှောက်	စီမံကိန်း အဆိုပြုသူ/ အဓိက ကန်ထရိုက်တာ

အမျိုးအစား	ပတ်ဝန်းကျင်အပေါ် ဆိုးကျိုးသက်ရောက်မှု	လျှော့ချရန်နည်းလမ်းများ	ဆောင်ရွက်ရမည့် ကာလ	တာဝန်ရှိသော အဖွဲ့အစည်း
		• အမှိုက်စွန့်ပစ်မှုကိုလည်း မှတ်တမ်းထား၍ မှတ်သားထားရမည်။		
စီမံကိန်းလည်ပတ်ခြင်း				
ကိုယ်လက်ထိခိုက်မှု	• ကုန်ကြမ်းပစ္စည်းတင်ချခြင်း၊ ပိတ်ဖြတ်ခြင်း၊ အပ်ချုပ်ခြင်း၊ မီးပူတိုက်ခြင်း စသော လုပ်ငန်းများကို ထပ်တလဲလဲလုပ်ဆောင်ခြင်းမှ ညောင်းညာခြင်း၊ လည်ပင်းနာခြင်း၊ ခေါင်းမူးခြင်း များဖြစ်နိုင်ခြင်း	• လေးလံသောပစ္စည်းများကို သယ်ရာတွင် တွန်းလှဲများ အသုံးပြုခြင်း။ • လေးလံသောပစ္စည်းများကို လက်လှမ်းမှီသော နေရာတွင် ထားရှိခြင်း။ • ပုခုံးပေါ်တွင် ပစ္စည်းများသယ်ယူရာတွင် ပုခုံးအကာအကွယ် ကဲ့သို့သော တစ်ကိုယ်ရည်ကာကွယ်သုံး ပစ္စည်းများကို အသုံးပြုခြင်း။ • လုပ်ငန်းခွင်နေရာတွင် ကိုယ်လက်လှုပ်ရှားမှုများ ပြုလုပ်စေခြင်း။	စီမံကိန်းလည်ပတ်ခြင်း ကာလတစ်လျှောက်	စီမံကိန်း အဆိုပြုသူ
စီမံကိန်းလည်ပတ်ခြင်းနှင့် ပိတ်သိမ်းသည့် ကာလ				
ဘေးကင်းလုံခြုံရေး နည်းစနစ်များကို လိုက်နာကျင့်သုံးရန် အားနည်းခြင်း	• အလုပ်သမားများ၏ ကျန်းမာရေးကို ထိခိုက်စေနိုင်ခြင်း	• ကန့်သန့်ထားသော မူဝါဒများ၊ ဥပဒေများကို လိုက်နာကျင့်သုံးစေခြင်း	စီမံကိန်း လည်ပတ်ကာလ/ ပိတ်သိမ်းကာလ	စီမံကိန်း အဆိုပြုသူ/ အဓိက ကန်ထရိုက်တာ
	• မတော်တဆထိခိုက်မှုများနှင့် ရုပ်ပိုင်းဆိုင်ရာ ထိခိုက်မှုများ ဖြစ်ပွားနိုင်ခြင်း	• တစ်ကိုယ်ရည်ကာကွယ်ရေး ပစ္စည်းများ ဝတ်ဆင်စေခြင်း၊ • အလုပ်သမားများကို ရှေးဦးသူနာပြုစုနည်း သင်တန်းများ တက်စေခြင်း၊ သင်ကြားထားသော ပညာများကို ပြန်လည်မျှဝေခြင်း		

အမျိုးအစား	ပတ်ဝန်းကျင်အပေါ် ဆိုးကျိုးသက်ရောက်မှု	လျှော့ချရန်နည်းလမ်းများ	ဆောင်ရွက်ရမည့် ကာလ	တာဝန်ရှိသော အဖွဲ့အစည်း
စီမံကိန်းလည်ပတ်ခြင်းနှင့် ပိတ်သိမ်းသည့် ကာလ				
အရေးပေါ် မီးဘေး ကာကွယ်ရေးနှင့် လေ့ကျင့်သင်ကြားပေးခြင်း	စီမံကိန်းဧရိယာအတွင်းနှင့် အနီးတစ်ဝိုက်တွင် မီးလောင်မှု ဖြစ်ပွားနိုင်ခြင်း။ အရေးပေါ်အခြေအနေများတွင် မီးငြိမ်းသတ်ရန် နှောင့်နှေးခြင်း။	• ဝန်ထမ်းများအားလုံး၊ အလုပ်သမားများ အားလုံးကို မီးဘေးအန္တရာယ်ကို ကာကွယ်တားဆီးနည်း၊ ငြိမ်းသတ်နည်း သင်တန်များပေးခြင်း၊ ကြိုတင်လေ့ကျင့် သင်ကြားပေးခြင်း	စီမံကိန်း လည်ပတ်ကာလ/ ပိတ်သိမ်းကာလ	စီမံကိန်း အဆိုပြုသူ/ အဓိက ကန်ထရိုက်တာ

၇.၁ စောင့်ကြပ်ကြည့်ရှုမှုအစီအစဉ်

စောင့်ကြပ်ကြည့်ရှုမှု အစီအစဉ်သည် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် ဖြစ်မြောက် အကောင်အထည်ဖော်ရန်အတွက် အရေးကြီးသည့် ကဏ္ဍမှ ပါဝင်ပါသည်။ ဤစောင့်ကြပ် ကြည့်ရှုမှု အစီအစဉ် တွင် စွန့်ပစ် အမှိုက် စီမံခန့်ခွဲမှု ၊ လုပ်သားများ၏ ကျန်းမာရေး နှင့် ဘေးအန္တရာယ် ကင်းရှင်းရေး ၊ လူမှုဝန်းကျင်အပေါ် အကျိုးသက်ရောက်မှုနှင့် လျော့ချရေးအစီအစဉ်များအပေါ် အဓိကထား၍ ရေးဆွဲထားပြီး အောက်ပါ **ဇယား-၃** တွင် ဖော်ပြထားပါသည်။

စောင့်ကြပ်ကြည့်ရှုမှု အစီအစဉ် ၏ ရည်ရွယ်ချက်မှာ -

- လုပ်ငန်းဆောင်ရွက် လည်ပတ်နေစဉ်အတွင်း ဖြစ်ပွားနိုင်သည့် ထိခိုက်မှုများကို သိရှိစေရန်။
- ပြဋ္ဌာန်းဥပဒေလိုအပ်ချက်များနှင့် ကိုက်ညီမှု ရှိစေရန်။
- အကျိုးသက်ရောက်မှု လျော့ကျစေရန် ဆောင်ရွက်မှုများ ထိထိရောက်ရောက် ရှိစေရန်။

ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် အကောင်အထည်ဖော်ရာတွင် အထောက်အကူ ဖြစ်စေရန်။

ဇယား- ၃ စောင့်ကြပ်ကြည့်ရှုရမည့် အချက်အလက်များ

ကာလ	စောင့်ကြည့်ရမည့် အချက်များ	အဆင့်	စောင့်ကြည့်ရမည့် နေရာများ	အကြိမ်အရေအတွက်	တာဝန်ရှိသောအဖွဲ့အစည်း
ပြင်ပလေထုအရည်အသွေး					
လုပ်ငန်းလည်ပတ်ကာလ	၂၄ နာရီ $PM_{2.5}$ and PM_{10}, TSP, SO_2, NO_2, CO, O_3	အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်	ဘွိုင်လာမီးခိုးခေါင်းတိုင်အနီး ၁၆ °၄၇'၄၄.၆၃"N ၉၄°၄၆'၇.၈၄"E	တစ်နှစ် ၁ ကြိမ်	Hakers Enterprise Myanmar Co., Ltd.
ပိတ်သိမ်းကာလ			စီမံကိန်းဧရိယာအတွင်း	တစ်နှစ် ၁ ကြိမ်	
အခန်းတွင်းလေထုအရည်အသွေး					
လုပ်ငန်းလည်ပတ်ကာလ	CO_2, $PM_{2.5}$ and PM_{10}, TVOC Formaldehyde	နိုင်ငံတကာ စံချိန်စံညွှန်းများ	စက်ချုပ်လိုင်းနှင့် ကုန်ပစ္စည်းထုတ်လုပ်သည့်နေရာများ	တစ်နှစ် ၂ ကြိမ်	Hakers Enterprise Myanmar Co., Ltd.
ရေအရည်အသွေး					
လုပ်ငန်းလည်ပတ်ကာလ	pH, BOD, COD, Ammonia, TSS, Iron, Oil and Grease, temperature, Total Chlorine	အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက် နှင့် ကမ္ဘာ့ကျန်းမာရေးအဖွဲ့ကြီး၏ စံချိန်စံညွှန်းများ	စက်ရုံအတွင်းမှ အိမ်သုံးစွန့်ပစ်ရည်	တစ်နှစ် ၂ ကြိမ်	Hakers Enterprise Myanmar Co., Ltd.
ပိတ်သိမ်းကာလ			စွန့်ပစ်ရည်နောက်ဆုံးထွက်ရှိသည့်နေရာ	တစ်နှစ် ၂ ကြိမ်	
အသံဆူညံမှု					
လုပ်ငန်းလည်ပတ်ကာလ	၂၄ နာရီ Noise level (dB(A) scale)	နိုင်ငံတကာ စံချိန်စံညွှန်းများ၊ အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်	မီးစက်ခန်း	တစ်နှစ် ၂ ကြိမ်	Hakers Enterprise Myanmar Co., Ltd.
			စက်ချုပ်လိုင်း		
လုပ်ငန်းလည်ပတ်ကာလ			စီမံကိန်းဧရိယာအတွင်း	တစ်နှစ် ၂ ကြိမ်	
စွန့်ပစ်အမှိုက်					
လုပ်ငန်းလည်ပတ်ကာလ	• ကုန်ပစ္စည်းထုတ်လုပ်ခြင်းမှ စွန့်ပစ်အမှိုက်ထွက်ရှိခြင်း		ကုန်ပစ္စည်းထုတ်လုပ်သည့်နေရာများ • စက်ချုပ်လိုင်း	အပတ်စဉ်	Hakers Enterprise Myanmar Co., Ltd.

ကာလ	စောင့်ကြည့်ရမည့် အချက်များ	အဆင့်	စောင့်ကြည့်ရမည့် နေရာများ	အကြိမ်အရေအတွက်	တာဝန်ရှိသောအဖွဲ့အစည်း
	• ဝန်ထမ်းများထံမှ အိမ်သုံးစွန့်ပစ်အမှိုက်ထွက်ရှိခြင်း	Within standards of Myanmar National Master Plan	• ပိတ်ဖြတ်လိုင်း • ပါကင်ထုတ်သည့်နေရာ		
			• ထမင်းစားသည့်နေရာ • အိမ်သာ • စက်ရုံဝန်း		
လုပ်ငန်းလည်ပတ်ကာလ	• ဖြိုဖျက်ရေးဝန်ထမ်းများထံမှ အိမ်သုံးစွန့်ပစ်အမှိုက်ထွက်ရှိခြင်း • ဖြိုဖျက်သည့် ပစ္စည်းများ		စီမံကိန်းဧရိယာအတွင်း	အပတ်စဉ်	
လုပ်ငန်းခွင် ဘေးအန္တရာယ်ကင်းရှင်းရေး					
လုပ်ငန်းလည်ပတ်ကာလ	မတော်တဆ ထိခိုက်မှုများ၊ ရှေးဦးသူနာပြုစုနည်း သင်တန်းပို့ချခြင်း၊ ရာသီအလိုက်ဖြစ်ပွားတတ်သော ရောဂါများ	–	စီမံကိန်းဧရိယာအတွင်းနှင့် လုပ်ငန်းလည်ပတ်သည့်နေရာများ	နေ့စဉ်	Hakers Enterprise Myanmar Co., Ltd.
ပိတ်သိမ်းကာလ		–	စီမံကိန်းဧရိယာအတွင်း		
ဘေးအန္တရာယ်များ					
လုပ်ငန်းလည်ပတ်ကာလ	မီးဘေးလေ့ကျင့်မှု၊ မီးသတ်သင်တန်းများ၊ အရေးပေါ်တုံ့ပြန်ရေး အစီအစဉ်များ	–	စီမံကိန်းဧရိယာအတွင်းနှင့် လုပ်ငန်းလည်ပတ်သည့်နေရာများ	တစ်နှစ် ၂ ကြိမ်	Hakers Enterprise Myanmar Co., Ltd.
ပိတ်သိမ်းကာလ		–	စီမံကိန်းဧရိယာအတွင်း	တစ်နှစ် ၂ ကြိမ်	

စောင့်ကြပ်ကြည့်ရှုမှု အစီအစဉ်အပြင် ပတ်ဝန်းကျင်ထိခိုက်မှုလျော့ချရေး ဖော်ဆောင်ရန် ဘဏ္ဍာငွေလျာထားမှု ရှိသင့်ပါသည်။ ထိုဘဏ္ဍာငွေ စာရင်းသည် ပတ်ဝန်းကျင်ဆိုင်ရာ ဥပဒေများ၊ နည်းလမ်းများ၊ လုပ်ထားလုပ်နည်းများနှင့် ကိုက်ညီမှု ရှိရပါမည်။

၈။ နိဂုံး

အစီရင်ခံစာရေးရခြင်း၏အဓိကရည်ရွယ်ချက်မှာ စီမံကိန်းလုပ်ငန်းလည်ပတ်မှု ကြောင့် ဖြစ်လာနိုင်သော အဓိကသက်ရောက်မှုများကို ဆန်းစစ်ရန်ဖြစ်သည်။ ထို့ကြောင့် ဖြစ်လာနိုင်သော သက်ရောက်မှုများကို ဆန်းစစ်ခြင်း၊ လျော့ချရမည့်နည်းလမ်းများနှင့် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်များကို ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း (၂၀၁၅) နှင့် အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များအတိုင်း လိုက်နာ၍ ရေးဆွဲထားပါသည်။ ထို့အပြင် စီမံကိန်းစက်ရုံတွင် ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရေးအဖွဲ့အား ဖွဲ့စည်းပြီး ပုံမှန်စောင့်ကြပ်ကြည့်ရှုရေးလုပ်ငန်းတာဝန်များအား တာဝန်ယူဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။

အခြေခံပတ်ဝန်းကျင်အရည်အသွေးတိုင်းတာခြင်းနှင့် ကွင်းဆင်းလေ့လာခြင်းများ ကိုလည်း ပြုလုပ်ခဲ့ပြီး တိုင်းတာမှုရလာဒ်များကို လေထုအညွှန်းကိန်း (AQI), အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များ၊ နိုင်ငံတကာစံနှုန်းများနှင့် နှိုင်းယှဉ်ဖော်ပြထားပါသည်။ သို့ရာတွင် ထုတ်လုပ်မှုလုပ်ငန်းစဉ်မှ စွန့်ပစ်ရေထွက်ရှိမှုမရှိသည့်အတွက် အိမ်သုံးစွန့်ပစ်ရေအရည်အသွေးကို တိုင်းတာခဲ့ ပါသည်။ တိုင်းတာတွေ့ရှိချက်များအရ အဓိက ဖြစ်ပေါ်သော ထိခိုက်မှုများမှာ လေအရည်အသွေး၊ အမှိုက်စွန့်ပစ်မှု၊ လုပ်သားများ၏ ကျန်းမာရေး တို့ဖြစ်ပါသည်။

အထည်ချုပ်လုပ်ငန်းသည် ဒေသခံများအတွက် အလုပ်အကိုင်အခွင့်အလမ်းများ ဖန်တီးပေးနိုင်၍ အလုပ်သမားများ၏ စွမ်းရည်ကိုလည်း တိုးတက်စေပါသည်။ ထို့နောက် လူမှုစီးပွား အတွက် ကောင်းကျိုးများ ဖြစ်ပေါ်စေပြီး လူမှုအကျိုးတူ ပူးပေါင်းပါဝင်မှု အစီအစဉ်များ ကိုလည်း ဆောင်ရွက်လျက် ရှိပါသည်။ ထို့ကြောင့် ဒေသအတွက် ကောင်းကျိုး ဖြစ်ရုံသာမက နိုင်ငံအတွက်လည်း အကျိုးပြုကြောင်း လေ့လာတွေ့ရှိရပါသည်။

EXECUTIVE SUMMARY

1. Introduction

The Project Proponent, Hakers Enterprise (Myanmar) Co., Ltd. is situated in Block No. (P-3), Plot No.52, Industrial Zone, Ward No. 13, Pathein Township, Pathein District, Ayeyarwady Region. The project proponent was established in 2013 and 100% foreign investment established under the Foreign Investment Law and Myanmar Companies Act. The project proponent requested Hexagonal Angle International Consultants Co., Ltd. to complete the Environmental Management Plan (EMP) for its garment.

In the factory, is manufacturing the various types of jackets and different design of pants, rely on the customer demand. The products are distributed to customers' countries.

2. Project Description

Hakers Enterprise (Myanmar) Co., Ltd. is located in Block No. (P-3), Plot No.52, Industrial Zone, Ward No. 13, Pathein Township, Pathein District, Ayeyarwady Region. Hakers Enterprise (Myanmar) Co., Ltd. is 4.54 acres wide, was established since 2013 and have been processing for about more than 8 years and producing various types of garments and others rely on the buyers' demand. In the factory, there has one main building. The office, clinic, clothes production areas, storage area for carton box and fabric storage area are comprised in the main building.

2.1 Production Process

Before manufacturing the clothing, have to prepare the pattern, a template which acts to trace on the fabric. Then, the cutting and sewing sections are followed receptively. In the cutting process, seven steps are included such as maker, fabric spreading, cutting, numbering, fusing, inspection and input. The clothes are delivered to put buttons, then ironing and final inspection afterwards. Next, the ordered products are to be packing that is considered as finishing stage. Finally, all the products are prepared to shipping. Unit process of flow chat is shown in Figure- 1.

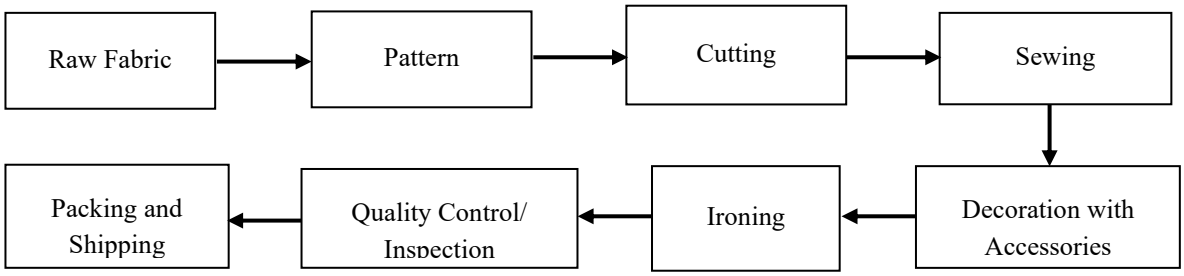


Figure- 1 Production Process Flow Chart

3. Legal Requirements

Environmental management of the Project/Factory needs to comply with legal requirements of the Environmental Management Plan prescribed in the

Environmental Conservation Rules, Notification No. 50/2014 and the EIA Procedure, Notification No. 616/2015.

An EMP is a project document to be prepared according to the requirements and guidance of the Ministry of Natural Resources and Environmental Conservation (MONREC), in order to refrain from, protect against, mitigate and monitor adverse impacts caused by the design, construction, implementation, operation, maintenance, termination, or closure of a project or business or activity; or after its closure, or by any other related cause [Environmental Conservation Rules, 50/ 2014, Chapter I, Article(s 2g)]. An EMP should include programs to manage, implement activities, and monitor changes to the environmental context. The detail of legal requirements is presented in Chapter 3.

4. Surrounding Environments

The purpose of this section is to predict how environmental and socio-economic conditions will impact because of the implementation of the proposed Project. This requires a sound understanding of the baseline conditions at the project site, which established through desktop study research, site surveys, primary data collection and projections for future developments.

The project study area defined as an area surrounding the project site from which the baseline information collection should collect. The project site is 4.54 acres, located in No. (P-3), Plot No.52, Industrial Zone, Ward No. 13, Pathein Township, Pathein District, Ayeyarwady Region, Myanmar. In the EMP report, study area is about 500-meter radius around the project site, its zone covers about 193.33acres.

Environmental baseline qualities such as outdoor air quality, indoor air quality, water quality, noise, light and temperature are measured on 23 and 24 April 2021. According to outdoor air quality measurement, among other parameters, PM2.5 result is higher than the guidelines. As a result of indoor air quality, indoor air quality measurement (PM) result is higher in some places such as cutting line. According to wastewater quality result, oil and grease result is higher than the guidelines. As a result of light and temperature measurement, light result of some measuring points such as cutting line, mold pattern needs to meet the guideline, and temperature results are also high in working area in the factory except office room. The detail of surrounding environments is presented in Chapter 4.

5. Potential Environmental Impact Assessment

In the factory, is manufacturing various types of clothing, however, it has well planned to reduce the potential environmental impacts. In the factory, will operate with total staffs of 1,788 among them, 1,686 are workers, 33 office staffs, another 34 are Myanmar technicians, 9 are foreigners, 26 are security and cleaners. Operation process does not produce any wastewater.

The potential environmental impacts specific to the project operation phase will be (a) Air pollution, (b) Noise, (c) Wastewater, (d) Solid waste and (e) Health and Safety of the workers. Potential environmental impacts and mitigation measures are presented in **Chapter 5**.

Table 1 Potential Environmental Impact During Construction Phase and Decommission Phase

No.	Impacts	Source of Impact/Activities	Magnitude of Impact (M = T + E + D + I + R)						Importance of Impact (Imp)	Significance of Impact Calculation (SI = M x Imp)	Significance of Impact	Status of Impact
			T	E	D	I	R	M				
1.	Air Pollution	Operation Phase										
		• Emission from vehicles • Generator, • Boiler • Load/Unloading in the warehouse	3	2	3	1	1	10 (Medium)	Medium	(Medium × Medium)	Moderate	Negative
		Decommission Phase										
		• Dust and PM emission from demolition activities • Gas and PM emission from motor vehicles and machines	3	1	1	1	1	7 (Small)	Medium	(Small × Medium)	Minor	Negative
2.	Noise	Operation Phase										
		• Sewing lines, Cutting lines • Generator • Boiler Room	3	1	3	1	1	9 (Medium)	Medium	(Medium ×Medium)	Moderate	Negative
		Decommission Phase										
		• Demolition of buildings and vehicles	3	2	1	1	1	8 (Medium)	Low	(Medium × Low)	Minor	Negative
3.	Odor	Operation Phase										
		• Chemical storage room and using process • Waste dumping site	3	1	3	1	1	9 (Medium)	Low	(Medium × Low)	Minor	Negative

No.	Impacts	Source of Impact/Activities	Magnitude of Impact (M = T + E + D + I + R)						Importance of Impact (Imp)	Significance of Impact Calculation (SI = M x Imp)	Significance of Impact	Status of Impact
			T	E	D	I	R	M				
		• Accommodation										
		Decommission Phase										
		• Waste dumping site • Demolition activities	3	1	1	1	1	7 (Small)	Low	(Small × Low)	Negligible	Neutral
4.	Wastewater	Operation Phase										
		• Domestic waste water from hand wash basin, kitchen, accommodation and toilets • Sewage water	3	2	3	1	1	10 (Medium)	Medium	(Medium ×Medium)	Moderate	Negative
		Decommission Phase										
		• Leakage of oil from vehicles and machinery • Domestic waste water from worker	3	1	1	1	1	7 (Small)	Low	(Small × Low)	Negligible	Neutral
5.	Solid Waste	Operation Phase										
		• Operation Waste (cutting, sewing, QC, ironing and packing sections) • Domestic Waste • Hazardous Waste (chemical container and engine oil)	3	2	3	2	1	11 (Large)	Medium	(Large ×Medium)	Major	Negative
		Decommission Phase										
		• Wastes from demolition activities (concrete, plaster,	3	1	1	2	1	8 (Medium)	Low	(Medium × Low)	Minor	Negative

No.	Impacts	Source of Impact/Activities	Magnitude of Impact (M = T + E + D + I + R)						Importance of Impact (Imp)	Significance of Impact Calculation (SI = M x Imp)	Significance of Impact	Status of Impact
			T	E	D	I	R	M				
		metal, and wood scrap, and its related) • Domestic Waste from worker										
6.	Occupational Health and Safety	Operation Phase										
		• Operation area • Cutting, sewing sections • Within the project site	3	1	3	2	1	10 (Medium)	Medium	(Medium ×Medium)	Moderate	Negative
		Decommission Phase										
		• Demolition area • Within the project site	3	1	1	2	1	8 (Medium)	Medium	(Medium ×Medium)	Moderate	Negative
7.	Livelihood and socio - economic	Operation Phase										
		• Job Opportunities • Local development due to the project implementation	3	3	3	2	2	13 (Large)	Medium	(Large ×Medium)	Major	Positive
		Decommission Phase										
		• Job Opportunities during demolition process	3	2	2	1	1	9 (Medium)	Medium	(Medium ×Medium)	Moderate	Positive

6. Public Consultation and Public Participation

Public consultation is necessary as a part of the EMP study. The project proponent and its consultant have to organize a public consultation among regulators, the local community, local authorities, and other relevant organizations on the project development and plans.

Public consultation was conducted on 8th September 2022 at the meeting room No (3) of Hakers Enterprise (Myanmar) Co., Ltd. The event was planned to be held starting from 10:00 am to 12:00 pm.

The public consultation was celebrated with 17 persons who are Assistant Director (ECD), Manager from New Green land Garment Co., Ltd and Project coordinator, Senior Environmentalist, Environmentalists of HA Company.

The public consultation was celebrated with 16 persons who are from Environmental Conservation Department, Pathein City Development Committee, Fire Department, Public Health Department, area commander, Factories and General Labor Laws Inspection department, Hakers Enterprise (Myanmar) Co., Ltd. and Marketing Associate and Project coordinator and senior environmentalist of HA Company. The ceremony was started by the introduction speech for the consultant company was given by Daw Khant Zin Thant (Marketing Associate of HA Company). Then, the findings and results were presented by Daw Thandar Kyaw (Senior Environmentalist of HA Company). The detail of public consultation meeting is presented in Chapter 6.

7. Environmental Management Plan

The Environmental Management Plan (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 which Hakers Enterprise (Myanmar) Co., Ltd. has committed. In addition, this EMP used to ensure compliance with statutory requirement and corporate safety and environmental policies.

The environmental impact assessment described in **Chapter 5**, and the proposed Environmental Mitigation Plans including mitigation measures to reduce and minimize the negative impacts for each item as shown in **Table- 2.**

Table -2 Environmental Mitigation Measures Plan

Categories	Expected Environmental and Social Impact	Mitigation Measure	Implementation	Responsible Party
Operation				
Outdoor Air Quality (Point Source Emission)	• Impact of air pollution at the boiler room and generator room. • Exhaust gas emission from vehicles movements • Shortness of breath which leads decrease visibility	• Diesel consumption of generator • Turn off equipment and machines when not in use. • Proper ventilation for generator room. • Ozone depletion substances will not be used in Air conditioning system. • Plant and grass plantation programs must be provided at project site • Grow efficient air-purifying plants	Throughout Operation Phase	Project Proponent
Outdoor Air Quality (Fugitive Emission)	• Particulate Matters ($PM_{2.5}$, PM_{10}) and Total suspended particles from moving of vehicles. • Eyes irritation • Shortness of breath which leads decrease visibility	• Install sufficient ventilation must be used in places where exposures can be excessive. • Water spraying just need inside and outside of the project site before the loading/ unloading process. • Plant and grass plantation programs must be provided at project site • Grow efficient air-purifying plants e.g. areca Palm, aloe Vera and climbing ivy etc. • Enforce to wear PPE to employees	Throughout Operation Phase	Project Proponent
Indoor Air Quality	• Dust ($PM_{2.5}$ and PM_{10}) sparks off eye/ nose/ throat irritation, respiratory tract problems and lung diseases • CO2 may drive to headache, bounding pulse, warm extremities and finally, unconsciousness	• Install sufficient ventilation must be used in places where exposures can be excessive. • Well ventilation for the source of pollutant areas • Grow efficient air-purifying plants e.g. areca Palm, aloe Vera and fern etc. • Install the fine particles (PM) and CO_2 detectors • Enforce to wear PPE to employees	Throughout Operation Phase	Project Proponent
Decommission				

Categories	Expected Environmental and Social Impact	Mitigation Measure	Implementation	Responsible Party
Indoor Air Quality	• Particulate Matters (PM2.5, PM 10) and Total suspended particles from moving of vehicles. • Eyes irritation • Shortness of breath which leads decrease visibility	• Dust will be efficiently countered by sprinkling of water during the phase. • Water spraying just need outside of the project site • Tarpaulin covering of all dusty vehicle loads transported to, from and between site locations. • Dusty activities should be re-scheduled where possible if high-wind conditions are encountered. • Restore, resurface and rehabilitate the disturbed area as soon as practicable after completion of construction or renovation. • Significant emission reduction will be achieved through regular equipment maintenance. • Cover dump trucks before traveling on public roads. • Establish and enforce speed limits to reduce airborne fugitive dust.	Throughout Decommission Phase	Project Proponent/ Contractor
Operation				
Noise	• Irritation, increased stress or nervousness • Interference in concentration • Increase the rate of accidents • High blood pressure • Long term cardiovascular diseases	• Use equipment and machines which generate low noise levels. • Regular maintenance for noise generation machines such as sewing machine, cutter, and equipment from the operation process. • Provide adequate ear protection (ear plugs or muffs) to workers working in the excessive noise areas. • No employee should be exposed to a noise level greater than 85 dB(A) for a duration of more than 8 hour per day without hearing protection. In addition, no unprotected ear should be exposed to a peak sound pressure level (instantaneous) of more than 140 dB (C). • Grow noise-absorbing plants (e.g. Areca Palm, etc.,) • Install sound (esp. echo) proof curtain	Throughout Operation Phase	Project Proponent

Categories	Expected Environmental and Social Impact	Mitigation Measure	Implementation	Responsible Party
Decommission				
	• Interference in concentration • Increase the rate of accidents • High blood pressure • Long term cardiovascular diseases	• Provide adequate ear protection (ear plugs or muffs) to workers working in the excessive noise areas. To make sure workers wear ear plug two times a day with 1hour period each time. • Provide adequate ear protection (ear plugs or muffs) to workers working in the excessive noise areas and force them to wear. • Ensure that all contractors on site have effectively controlled noise levels from equipment. • Effective noise controls include regular inspection and maintenance of all vehicles and construction equipment working onsite, • vehicles and machinery that are used intermittently should not be left idling for long periods of time. • Avoid running construction machineries at night. (22:00-07:00)	Throughout Decommission Phase	Project Proponent/ Contractor
Operation				
Odor	• Exposure to odors could result in health effects, discomfort, to more serious symptoms. • eye, nose, throat or lung irritation. • coughing, wheezing or other breathing problems. • headaches or feel dizzy or nauseous. • anxiety and stress level.	• Store the stain removers in a well-ventilated area. • Keep the stain remover containers tightly closed using PPEs. • During the stain removing activities, the employee must wear mask, chemical splash goggles and handling with chemical resistant gloves, like Nitrile glove. • Provide sufficient ventilation system for working area. • Task-shifting and task-sharing. • Provide specific storage area within the factory to collect waste that emit VOCs. • Daily cleaning the toilets, floors and basins. • Regularly check the septic tank to avoid leakage of sewage.	Throughout Operation Phase	Project Proponent

Categories	Expected Environmental and Social Impact	Mitigation Measure	Implementation	Responsible Party
		• Regularly disposal of sewage from septic tanks by township municipalities.		
Operation				
Wastewater	• There is no wastewater from operation process. • Domestic waste water from toilets and hand wash basin • Sewage water can cause diarrhea-related diseases. • Storm water runoff from roofs, roads, paths into drains after raining.	• Minimize the amount of water used • Avoid generating unnecessary wastewater • Separate the drainage and pipeline system for sewer line and surface runoff • Regularly check the septic tank to avoid leakage of sewage. • Control oil generating from the domestic activities and generator room. • All drainage systems are covered and liquid wastes are disposed to the septic to avoid soil population	Throughout Operation Phase	Project Proponent
Decommission				
	• Domestic waste water from toilets and hand wash basin • Storm water runoff from roofs, roads, paths into drains after raining.	• Minimize the amount of water used. • Avoid generating unnecessary wastewater. • Discharging wastewater directly to the natural water bodies must be avoided as much as possible. • arrange proper drainage system	Throughout Decommission Phase	Project Proponent/ Contractor
Operation				
Solid Waste	• Domestic Waste (Non-Hazardous Waste) • Impact of waste generated on related health risk and for community • Serious negative environmental impacts	• Use marked bins to segregate dry and wet waste. • Waste must be separated by type of waste and systematically disposed into containers. • Recyclable waste bins must be supplied and a good practice of waste sorting habit must introduce for wastes that can recycle. • Regular disposal to final disposal sites by Pathein City Development Committee on weekly basis • Record waste transfer by notes	Throughout Operation Phase	Project Proponent

Categories	Expected Environmental and Social Impact	Mitigation Measure	Implementation	Responsible Party
	• Chemical Wastes (Hazardous-Waste) • Impact of waste generated on related health risk and for community • Serious negative impacts on environmental and biodiversity	• Chemical wastes like thinner and wastes from clinic should be collected in separate bins and disposed properly • Provide masks and gloves for those staffs • Provide training to workers on how to handle the chemical waste. • Soaking the spilled chemicals with sawdust and sand will be done as spill response plan. • Regular disposal to final disposal sites by Pathein City Development Committee on weekly basis • Record waste transfer by notes	Throughout Operation Phase	Project Proponent
Decommission				
	• soil and water contamination. • Serious negative environmental impacts	• Food wastes, plastics and tissues will be collected in a temporary waste dumping site within the factory area and finally disposed to Pathein City Development dumping sites on weekly basis. • Hazardous chemicals like oil, chemicals and emulsions will be managed to use with care in order not to spill. • Soaking the spilled chemicals with sawdust and sand will be done as spill response plan. • The soaked sawdust, sand and containers of oil, chemicals and emulsions will be collected in separate dust bin and finally disposed to Pathein City Development dumping site. • Waste disposal will be recorded regularly.	Throughout Decommission Phase	Project Proponent/ Contractor
Operation				
Physical Injuries	• Loading and unloading in warehouse, repetitive tasks such cutting, sewing and ironing can drive ergonomic hazards, musculoskeletal disorders of the neck, shoulder,	• Use a device (forklift) to lift and reposition heavy objects • Store heavy objects at waist height • Use personal protective equipment (PPE) like shoulder pads to cushion loads carried on the shoulder	Throughout Operation Phase	Project Proponent

Categories	Expected Environmental and Social Impact	Mitigation Measure	Implementation	Responsible Party
	elbow, forearm/wrist and low back pain	• Workplace exercises include stretching exercises focusing on neck, shoulders, low back, and hand and wrist		
Operation/Decommission				
Weak of enforcement in good safety practices	• Increase the health risks for workers	• Officially set the restricted laws and regulations	Throughout both Operation and Decommission Phase	Project Proponent/ Contractor
	• Accidents and incidents can occur physical injuries within the operation area.	• Personal protective equipment (PPE) must be worn • Educate and train them for health education and workers in First Aid Kit training • Sharing the knowledge concerned with first aid		
Operation/Decommission				
Emergency and fire-fighting training program	• Increasing of fire risk in and around the project site • Delay and fire in an emergency.	• Train almost all of the workers and staffs for firefighting and mock drills for firefighting. • Educate workers for safety awareness in work place. • Sharing program to workers	Throughout both Operation and Decommission Phase	Project Proponent/ Contractor

7.1 Monitoring Program

Environmental monitoring plan is the important for the effective execution and successful implementation of EMP. Environmental monitoring focuses on the work environment which includes, waste management, health and safety of workers, safety of the facilities and the socio-economic component of the environment are shown in the following **Table- 3**. The objective of monitoring is;

- To measure impacts that occurs during the operation phase of the project
- To ensure compliance with statutory requirements
- To determine the effectiveness of mitigation measures and other measures
- To assist in the implementation of EMP

Table- 3 Environmental, Health and Safety Monitoring Program

Phases	Monitoring Parameter	Target Level	Area to be Monitored	Frequency	Responsible Organization
Outdoor air quality					
Operation	For 24 hours $PM_{2.5}$ and PM_{10}, TSP, SO_2, NO_2, CO, O_3	Within ambient standards level of NEQEG and International Standards	Near Boiler's stack 16°47'44.63"N 94°46'7.84"E	Once a year	Hakers Enterprise Myanmar Co., Ltd.
Decommission			Within the project site	Once a year	
Indoor air quality					
Operation	CO_2, $PM_{2.5}$ and PM_{10}, TVOC Formaldehyde	Within standards international limit	Both sewing lines and production area	Twice a year	Hakers Enterprise Myanmar Co., Ltd.
Water quality					
Operation	pH, BOD, COD, Ammonia, TSS, Iron, Oil and Grease, temperature, Total Chlorine	Within WHO and NEQEG	Domestic wastewater from factory	Twice a year	Hakers Enterprise Myanmar Co., Ltd.
Decommission			Wastewater discharged point	Twice a year	
Noise					
Operation	For 24 hours Noise level (dB(A) scale)	Within standards international limit/ NEQEG	Generator room	Twice a year	Hakers Enterprise Myanmar Co., Ltd.
			Operation area • Sewing Line		
Decommission			Within the project site	Twice a year	
Solid waste					
Operation	• Solid wastes from operational process such as cutting, sewing and packing. Then, paper rod and corrugated paper from raw material, thread cone.	Within standards of Myanmar National Master Plan	Production area • Sewing Line • Cutting Line • Design Room • Packing Line	Weekly	Hakers Enterprise Myanmar Co., Ltd.

Phases	Monitoring Parameter	Target Level	Area to be Monitored	Frequency	Responsible Organization
	• Domestic refuse, Paper and food scrape.		• Dining area • Accommodation • Toilet • Factory Compound		
Decommission	• Domestic waste • Demolition materials		Within the project site	Weekly	
Occupational Health and Safety					
Operation	Record of incident/accident report, first aid training report, health checkup and seasonal diseases	-	The whole factory and production sector	Daily	Hakers Enterprise Myanmar Co., Ltd.
Decommission		-	Within the project site		
Emergency Risks					
Operation	Records of mock drill, self-inspection to firefighting facilities and emergency and its response	-	The whole factory and production sector	Twice a year	Hakers Enterprise Myanmar Co., Ltd.
Decommission		-	Within the project site	Twice a year	

In addition to monitoring plan, there should be auditing plan in the form of internal and external environmental audit. The audits will assess the environmental performance of the operation in complying with environmental laws, rules and regulations.

8. Conclusion

The main objective of the study is to identify the major environmental impacts due to the implementation of the project activities in operation phase. Therefore, assessment of potential environmental impacts and preparing of environmental management plan with recommended impact mitigation measures were prepared according to the compliance with environmental impact assessment procedure (2015) and National Environmental (Emission) Guidelines. The environmental monitoring team organized by in the factory, should take the responsibility of regular monitoring.

Baseline environmental data collection and site visit activities was conducted and monitoring results were compared with Air Quality Index (AQI), National and Environmental Quality (emission) guideline and international guideline standards. Operation process does not emit waste water therefore, domestic waste water was tested. Looking through the impacts the most considerable impacts caused are due to air emissions, solid waste formed by the process and health impacts of the workers.

In conclusion, it has been figured out that, the proposed factory is going to generate local employment opportunities and enhance capabilities and working skills of employees. Consequently, their socio-economic standard is expected to be improved and undertaking corporate social responsibilities (CSR) as recommended. The study further concluded that positive impacts would be of immense benefit to the local community and national development as well.

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LIST OF ABBREVIATION

CSR	- Corporate Social Responsibility
ECC	- Environmental Compliance Certificate
EIA	- Environmental Impact Assessment
EMP	- Environmental Management Plan
NEQEG	- National Environmental Quality (Emission) Guideline
U.S EPA	- United States Environmental Protection Agency
OHS	- Occupational Health and Safety
EHS	- Environmental Health and Safety
PM_{10}	- Particulate Matter 10 micrometers or less in diameter
$PM_{2.5}$	- Particulate Matter 2.5 micrometers or less in diameter
HCHO	- Formaldehyde
BOD	- Biological Oxygen Demand
COD	- Chemical Oxygen Demand
PPE	- Personal Protective Equipment
MONREC	- Ministry of Natural Resources and Environmental Conservation
WHO	- World Health Organization
IFC	- International Finance Corporation
UNESCO	- United Nations Educational, Scientific and Cultural Organization
QGIS	- Quantum Geographic Information System

CHAPTER 1
INTRODUCTION

Hakers Enterprise Co., Ltd. (Hakers Enterprise) founded in 1986, has been a manufacturer of apparels and a developer of textile products active in research, production and marketing.

At the initial stage, Hakers Enterprise focused on manufacturing sportswear for world renowned brands, including Adidas and Reebok. The range covered swim trunks, shorts, jackets and trousers. Excellent quality and timely delivery brought the Company non-stop flow of sales and orders. In response to the diverse needs of their customers, the Chairman led the Sales and Product Development Departments to explore and implement the newest manufacturing technology, development of products, efficient production management and cross-national manufacturing management. Over the years, Hakers Enterprise has become a major manufacturer with a complete range of sportswear products.

To effectively upgrade the company's competitiveness, and to expand the scale of the business, the company has established four major overseas manufacturing regions. The two subsidiaries in Vietnam, and China manufacture products mainly for the USA market, and the other two subsidiaries in Myanmar and Laos manufacture products mainly for the EU countries with tariff agreements.

Over the decades, Hakers Enterprise has become a cross-national garment manufacturer with vertical integration in material sourcing, manufacturing, and marketing. In the future, Hakers Enterprise will continue to develop into a sustainable business in the apparel industry along with three axes: steady growth, flexible deployment and cost control.

In response to the development of fashion trends, functionality and green market in the Europe and US, the R&D Centers in Taipei are committed to provide pattern, design and marketing services.

The goal of the Hakers Enterprise is to provide efficient one-stop services to their clients. They will continue to reinforce the cross-border manufacturing efficiency and the integration of the supply chains in Asia and Southeast Asia.

The project proponent, Hakers Enterprise (Myanmar) Co.,Ltd. was established in 2013 and situated in Block No. (P-3), Plot No.52, Industrial Zone, Ward No. 13, Pathein Township, Pathein District, Ayeyarwady Region. Hakers Entrprise (Myanmar) is new investment for manufacturing of garment on CMP basic company from China. The project is issued by the Myanmar Investment Commission (MIC) to approve the permit (No.585/2013). The permit for investment in manufacturing of garment under the name of Hakers Enterprise (Myanmar) Co., Ltd. (Hakers Enterprise) as a wholly owned foreign investment from the China established under the Foreign Investment Law and Myanmar Companies Act shown in Appendix E.

Hakers Enterprise (Myanmar) Co., Ltd. shall responsible for the preservation of the environment and around the area of the project site. According to the comments of Environmental Conservation Department (ECD), the said project requires an

Environmental Management Plan (EMP) to meet the requirements of Environmental Impact Assessment procedure (2015). In addition to this, it shall carry out as per instructions made by Ministry of the Natural Resources and Environmental Conservation (MONREC) under Environmental Conservation Department (ECD) in which to conduct an Environmental Management Plan (EMP). It has to prepare and submit and perform activities in accordance with this EMP and abide by the environmental policy, Environmental Conservation Law and other environmental related rules and procedures. Therefore, Hakers Enterprise (Myanmar) commissioned the Hexagonal Angle International Consultants Co., Ltd. to implement the Environmental Management Plan (EMP) for the garment factory.

The project factory is manufacturing the various types garments and others rely on the customer demand. The products are distributed to U.K, U.S.A and Europe especially it depends on the customers' countries. EMP for the Project identifies the principal approaches, procedures and methods to control and minimize the environmental and social impacts of the factory, operation. The main objectives of the EMP are (a) to identify environmental impacts, (b) to define details of who, what, where and when environmental management and mitigation measures to be implemented and (c) to ensure that the environmental quality of the area does not deteriorate due to the project.

1.1. PROJECT PROPONENT PROFILE

The project proponent, Hakers Enterprise (Myanmar) Co., Ltd. is situated in Block No. (P-3), Plot No.52, Industrial Zone, Ward No. 13, Pathein Township, Pathein District, Ayeyarwady Region. A brief information about the project is given below:

Representative	:	Mr. Lim Soon Hin
Position	:	Managing Director
Contact No.	:	09- 895673279
Email	:	hakers.brian@gmail.com
Website	:	hakersenterprisemyanmar.com
Address		:Block No. (P 3/8), Plot No.52, Industrial Zone, WardNo13, Pathein Township, Ayeyarwady Region.

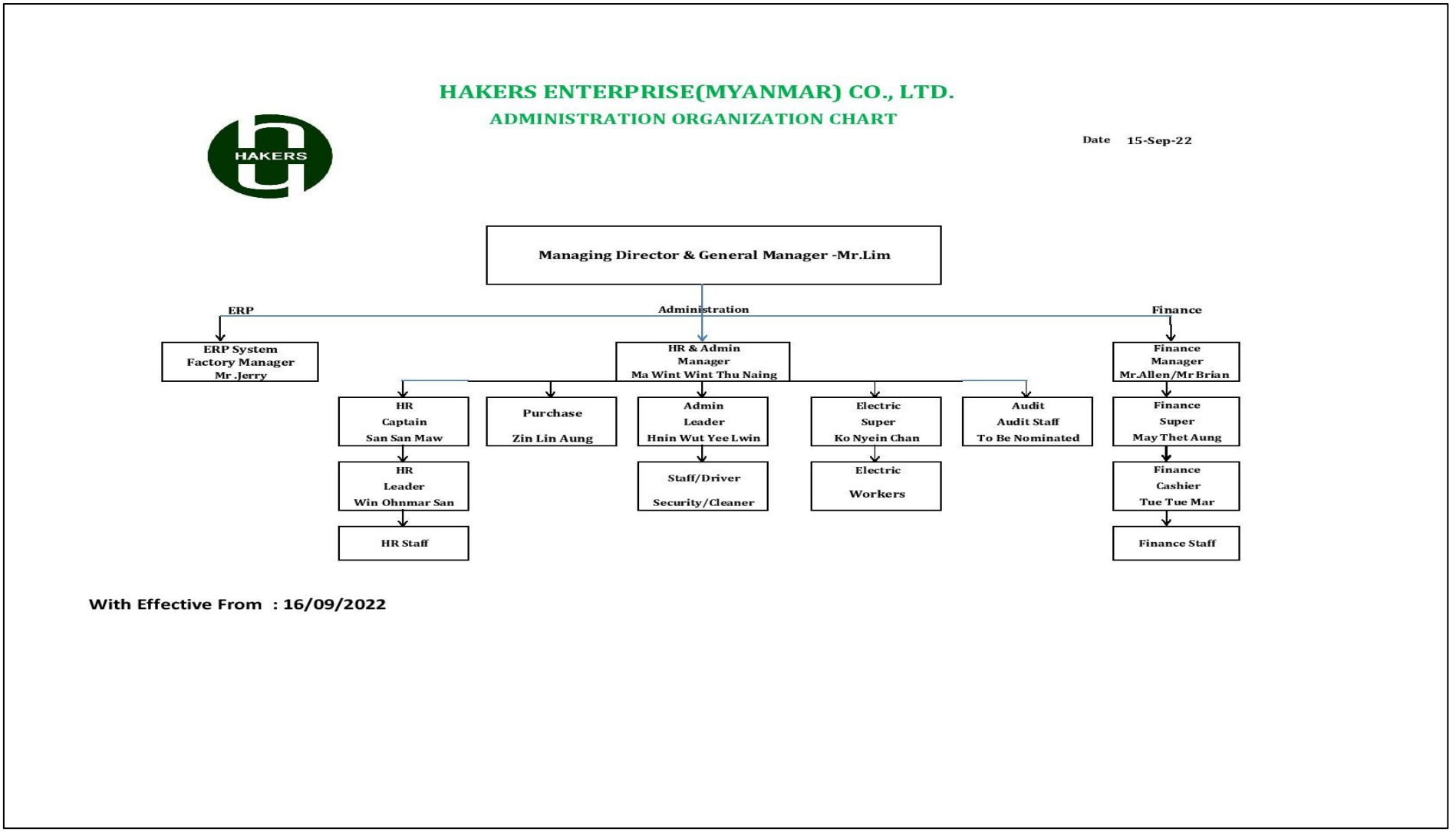

Figure 1-1 Administration Organization Chart of Hakers Enterprise (Myanmar) Co., Ltd.

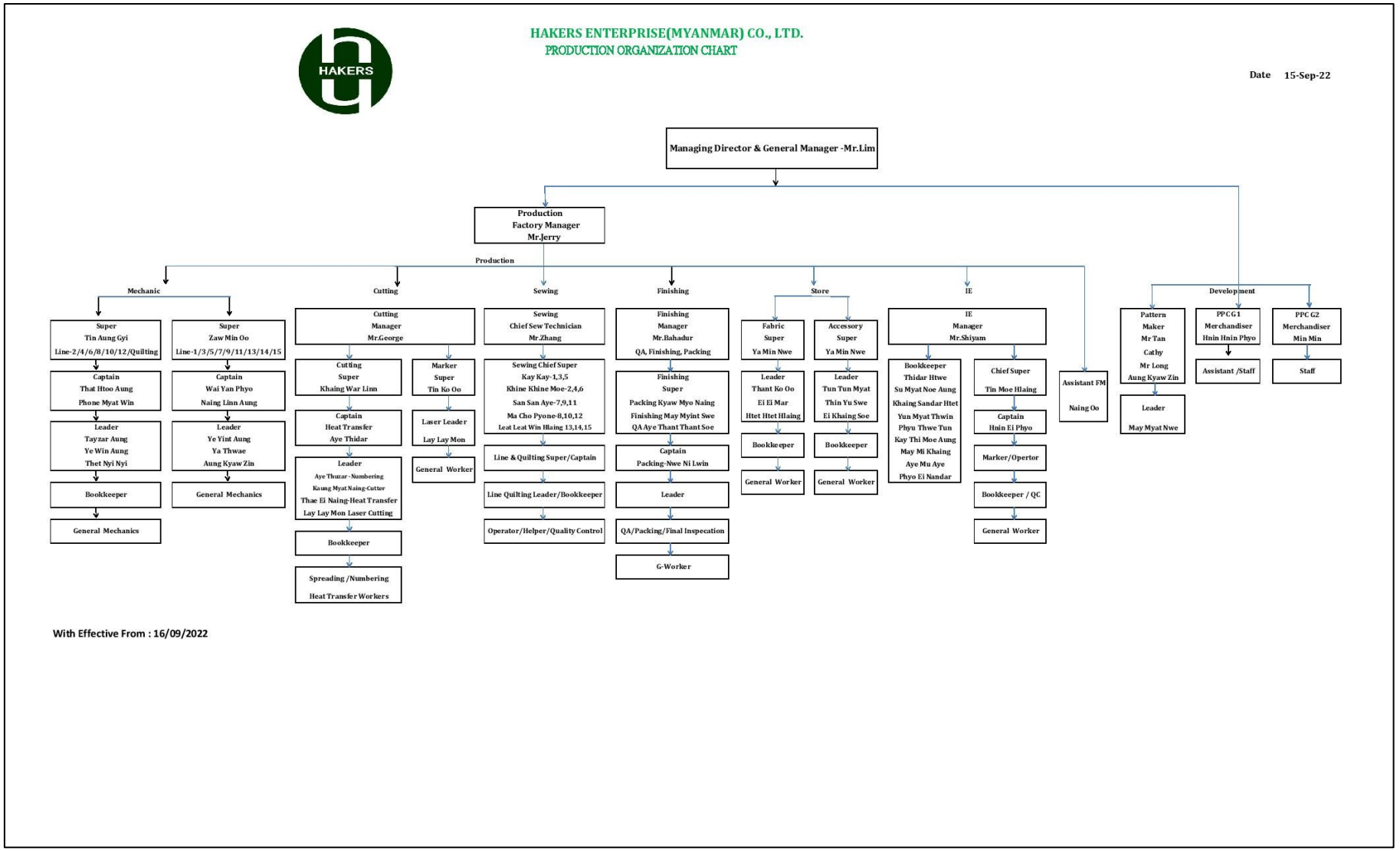

Figure 1-2 Production Organization Chart of Hakers Enterprise (Myanmar) Co., Ltd.

1.2. THE ENVIRONMENTAL CONSULTING ORGANIZATION

Hexagonal Angle International Consultants Co., Ltd. (HA) is the third-party organization, which conducted the EMP of this project. The contact name and address of the Environmental Consulting Organization described below:

Representative	:	Ms. Thu Thu Aung
Position	:	Managing Director
Mobil Phone	:	+95 9898333733
Office Phone	:	+95 9898333722
Email	:	thuthuaung@hexagonalangle.com
Address	:	No. 233/2, 1st floor, Daung Min St, 14/3 Quarter, South Okkalapa Township, Yangon, Myanmar.

1.3. BACKGROUND INFORMATION OF HA COMPANY

Its office is located at No. 233/2, 1st floor, Daung Min St, 14/3 Quarter, South Okkalapa Township, Yangon, Myanmar. The HA company was founded in September 2017 by Ms. Thu Thu Aung and the main idea is to collaborate with local experts and foreign consultants for government and development partners' transport sector projects. Since that time, our company participated in activities which are ADB's Myanmar Railway Modernization project, ADB's Ayeyarwady-Pyay Railway On-board Passenger Survey and ADB & CDIA's Ayeyarwady Urban Transport Development project. In addition, we are now supporting the Ayeyarwady Smart Car Parking System for YCDC.

Hexagonal Angle is currently extending the services to environmental and social sector. The HA company have experts and team for environmental and social services which are Environmental and Social Impact Assessment (ESIA), Environmental Impact Assessment (EIA), Initial Environmental Examination (IEE), Environmental Management Plan (EMP), Social Survey and Monitoring.

Table 1-1 present the brief experience of environmental consultants who completed the report.

Table 1-1 Environmental Consultants Profile

No	Name	Registration/ License No. By ECD (If applied)	Education	Experience	Responsible for report
1	Ms. Thu Thu Aung (Managing Director)	Applied	B.Sc. (Geology), Diploma in GIS, Certificate in Environmental Studies, MBA (Lincoln University Malaysia) Certificate in Environmental Impact Assessment	Over 13th years experiences in PPP Project Development Expert of ADB, Project Leader of road safety project of World Bank, Deputy Team Leader at Far East Mobility, Yangon Urban Transport Project of CDIA and ADB, Yangon Region, Myanmar, Environmental Risk Assessment, climate change, land use, energy sustainable for environmental benefit and environmental report preparation and project management	Overall check of the report, leadership management, and consulting, participation the stakeholder meeting,
2	Daw Ei Ei Zaw	Applied	MRes (Petroleum Geology), MSc (Petroleum Geology), BSc (Hons) Geology, Diploma in Apply Geology, Certificate in Environmental Studies, Certificate in QGIS and Data Visualization Certificate in Environmental Impact Assessment Certificate in Mercury Management	Over 6th years experiences in Geological and Soil Study, Hydrology, Land Use Plan, Environmental Impact Assessment and Analysis, Project Management, Data collection for a social survey, Coordination with government organizations and villagers, environmental risk assessment, and environmental scoping report preparation	Overall review and checking of the report, field investigation, monitor for baseline environmental quality, consulting in environmental impact assessment, mitigation measure, monitoring plan and management plan
3	U Win Naing Oo	Applied	B.A (Myanmar) Certificate in QGIS Certificate in Environmental Impact Assessment	8th years experiences in the social survey, market survey, and research, Land use Survey and Google Earth Mapping	Map preparation and production such as location map, land use map and geological map, topographic map, social survey and data collection
4.	Daw Thandar Kyaw	Applied	MSc (Petroleum Geology), BSc (Hons) Geology	2 years of experiences in the testing soil strength that carried out in the laboratory and data processing for Geotechnical Engineering report as an engineering geologist.	Report overall reviewing, consulting in environmental impact assessment and mitigation measure, field

No	Name	Registration/ License No. By ECD (If applied)	Education	Experience	Responsible for report
				4 Years of experiences in environmental reporting, environmental impacts assessment, environmental risk assessment, coordination with government organizations, community and conducting public consultation meeting, socio-economic survey, social data analysis and social impact assessment assistant in environmental field.	investigation and report writing Chapter 5,7,8
5.	U Kyaw Thet	Applied	M.Sc. (Botany), B.Sc. (Botany) (Hons) Certificate in QGIS Certificate in Environmental Impact Assessment	1-year experiences in the biodiversity management plan, biodiversity survey, flora and fauna data analysis based on survey data, ecological impact assessment, collecting the samples, environmental report preparation	Flora and Fauna data analysis based on survey data, Chapter 4 and report writing for biodiversity sector
6.	U Win Thein	Applied	B. Tech (Electronic Communication), BE (Electronic Communication), Certificate in Health and Safety Supervisor Certificate in QGIS Certificate in Environmental Impact Assessment	1-year experience in environmental quality monitoring, traffic data analysis, arrangement of public consultation meetings, and environmental report preparation	Traffic data analysis based on survey data, Environmental quality monitoring, Traffic survey and research methodology, report writing for an executive summary, chapters 2, 5,6 and 7
7.	Daw Su Myat Noe	Applied	LLB Certificate in QGIS Certificate in Environmental Impact Assessment	3rd years experiences in Project coordination, conducting and analyzing legal problems, preparing for legal requirements, Coordination with government organizations and villagers, arrangement of the public consultation meeting	Chapter 3 and overall check the law and regulation section
8.	Daw Myat Noe Pwint	Applied	2nd Year, Geology Certificate in QGIS Certificate in Environmental Impact Assessment	1-year experience in Geology and soil, Site survey measurements for environmental quality (noise, light, temperature, air quality, water quality, and vibration), Google Earth and QGIS Mapping	Survey, Analyzing data on baseline environmental quality, QGIS and Google Earth Map, Writing chapter 4 and preparing public consultation meeting

No	Name	Registration/ License No. By ECD (If applied)	Education	Experience	Responsible for report
9.	Daw Su Myat Mon	Applied	B.Sc. Forestry Project Management (Certificate) Analyzing data on biodiversity (Certificate)	Biodiversity Survey, analyzing data on Fauna & Flora based on survey, Preparing environmental reports	Survey, Writing chapter 1, executive summary, Analyzing data on Fauna & Flora based on survey and writing chapter 4

CHAPTER 2
PROJECT DESCRIPTION

2.1. PROJECT DESCRIPTION

The project area is located in Block No. (P-3), Plot No.52, Industrial Zone, Ward No. 13, Pathein Township, Pathein District, Ayeyarwady Region. It was established since 2013 and have been processing for 8 years. The project proponent leased by a local land owner. The location map of the project area as shown in Figure 2-1.

Figure 2-1 Location Map of the Project Area

2.2. SITE DESCRIPTION

The total area of the factory, is 4.54 acres and it has a main building. The main building includes office, clinic, clothes production areas, storage area for carton box and fabric storage area. In addition, the main production area such as cutting, sewing, quilting, ironing and packing are taken place in the main building. The layout plan map in the project area is shown in Figure 2-2. The generator room, transformer, air-compressor and staff houses are situated in front of the main building. The other building in the project area such as canteen areas, toilet areas, boiler room, down filling room and machine store are situated around the main building. Moreover, the hostels are provided for the technicians of the garment factory. There are 6 water motors which are for toilets, cleaning, hostel and general purposes. There are 15 administrative persons manage the production process and production capacities. They carried out for EMP, workers health and safety, firefighting and training of workers skill.

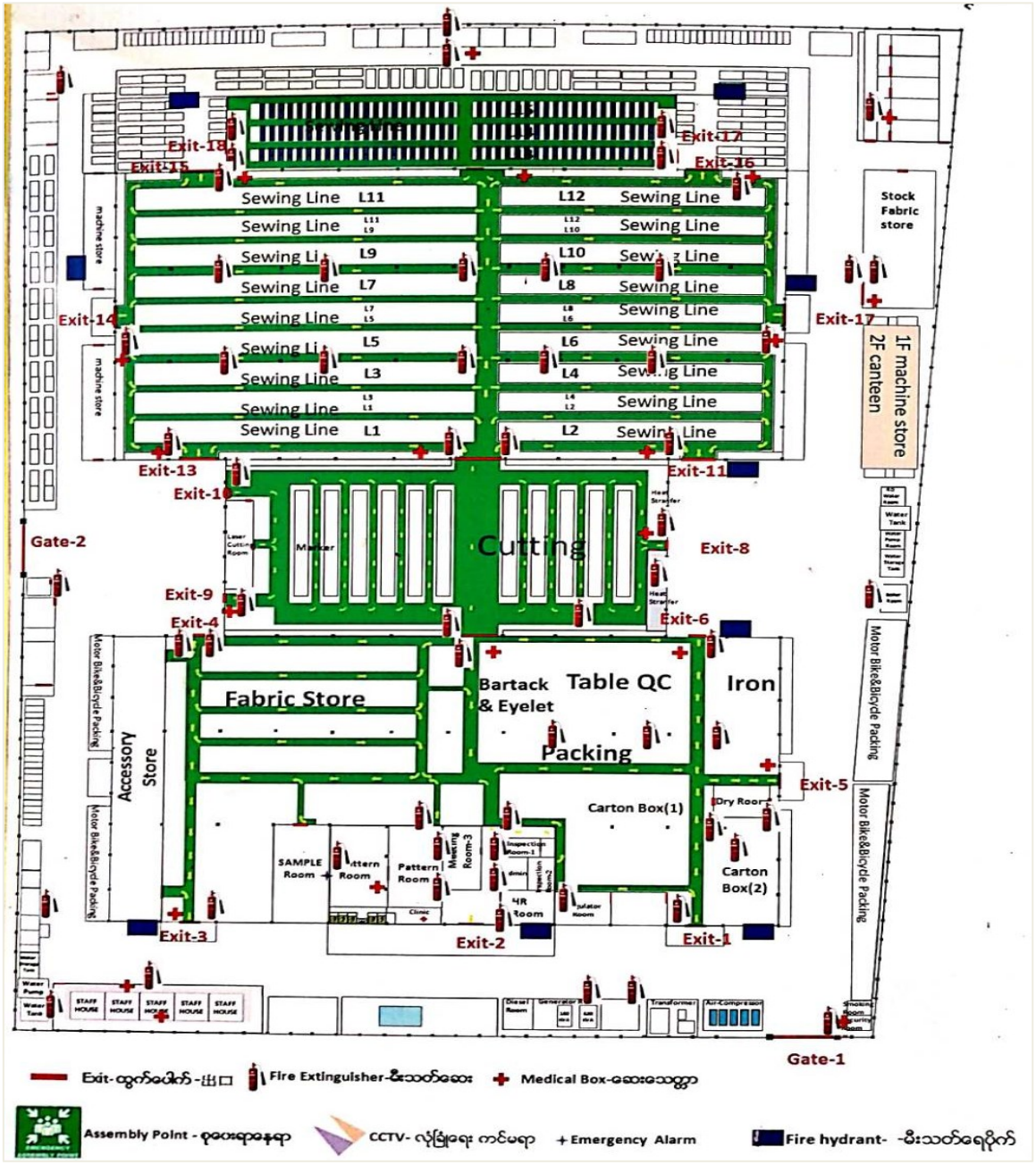

Figure 2-2 Layout Plan Map of Hakers Enterprise Factory

2.3. WORK FORCE

The total manpower of this proposed factory is 1,788 staffs, among them, operation staff is 1,686, office staffs is 33, Myanmar technicians is 34, foreigners is 9, security and cleaners are 26. The operation process is running from 7:30 am to 4:00 pm but 11:30 am to 12:30 pm is lunch break. There are two sections for the lunch break because there are many employees. The first one is from 11:30 am to 12:00 pm and the second one is from 12:00 pm to 12:30 pm. Total working hour is 8.5 hours a day but the employees have to work overtime about two hours in every day except Saturday. The factory is closed on Sunday and gazette holidays.

Operation Time and Shift

No. of working Days per year: 246 day

Operation Time	: Monday – Friday (7:30 am – 4:00 pm)
	Over time (4:00 pm – 6:00 pm)
	Saturday (7:30 am – 12:00 pm)
Lunch break	: First shift (11:30 am – 12:00 pm)
	Second shift (12:00 pm – 12:30 pm)

2.4. PRODUCTION PROCESS

In the manufacturing process, the products quantity and design are adjusted according to the customer demand. The raw fabrics are checked by the staffs from the inspection department to control the quality of fabric. Generally, the total product of the factory is 234,100 Doz per year. Before manufacturing the clothing, the pattern templates have to prepare which acts to trace on the fabric. A pattern has three or four (small, medium, large or extra-large, etc.,) sizes rely on the customer requested. Then, the cutting and sewing sections are followed receptively. The cutting process include seven steps such as fabric spreading, maker, cutting, numbering, fusing, inspection and input. If the clothes required to produce the padding jacket, those were sent to the quilting section. The clothes are delivered to put buttons, then ironing and final inspection afterwards. Next, the ordered products are to be packing that is considered as finishing stage. Finally, all the products are prepared to shipping. Both products and process flow chart are shown in Figure 2-3 and Figure 2-4.

Figure 2-3 Manufacturing Process of Hakers Enterprise Factory

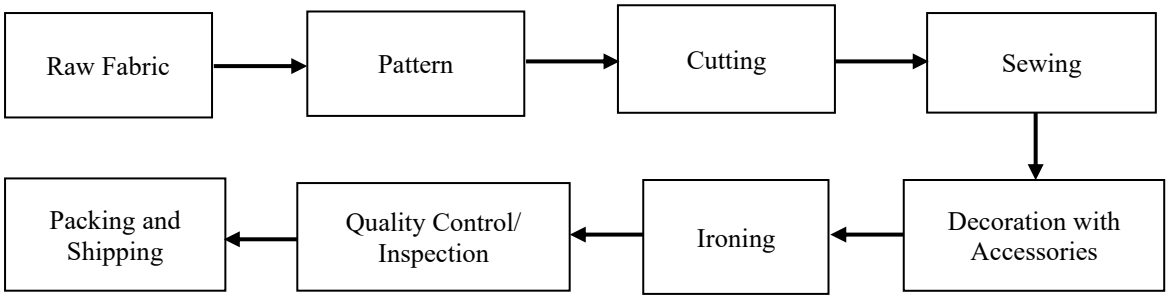

Figure 2-4 Production Process Flow Chart of Hakers Enterprise Factory

2.4.1. **Raw Material**

The main raw materials are fabric (Figure 2-5) and other necessary items like lining, interlining, nylon thread, label, hand-tag, (accessories usage, in **Error! R eference source not found.**) all are imported from Taiwan, China and Malaysia. The raw materials import from foreign are stored in the Raw Fabric Store near the main gate. Annual imported raw materials detail lists are shown in Table 2-1 and daily usage of raw materials are shown in Table 2-2.

Table 2-1 Annual imported raw materials lists of Hakers Enterprise Factory

Sr. No.	Particulars	Unit	Consumption	Year - 1
1	Paper Lining	Mtr	1	2,809,200
2	Marker Paper	Roll	1	2,809,200
3	Center Front Zipper	Pcs	1	2,809,200
4	Pocket Zipper	Pcs	2	5,618,400
5	Leg Zipper	Pcs	2	5,618,400
6	Woven Badge	Pcs	1	2,809,200
7	Velcro Tape (Hooh & Loop)	Yds	0.3	842,760
8	Bungee Cord	Yds	0.4	1,123,680
9	Label	Pcs	3	8,427,600
10	Elastic Band	Gross	0.9	2,528,280
11	Poly Drawcord	Pcs	1	2,809,200
12	Stopper	Pcs	2	5,618,400
13	Snap	Pcs	2	5,618,400
14	Eyelet	Pcs	8	22,473,600
15	SP Thread	Mtr	400	1,123,680,000
16	Nylon Thread	Mtr	150	421,380,000
17	Embroidery Thread	Mtr	45	126,414,000
18	Woven Tape	Yds	8	22,473,600
19	Seam Seal Tape	Yds	7	1,966,400
20	Poly Bag	Pcs	1	2,809,200
21	Hangtag	Pcs	1	2,809,200

Sr. No.	Particulars	Unit	Consumption	Year - 1
22	Sticker	Pcs	1	2,809,200

Table 2-2 Raw Materials Usage List per Day

Packing Date	Description	Style No.	Weight	Unit	Issue Quantity
5/4/2021	210T Taffeta with Heat Print	113557	148 Pkg	Yds	11,319
5/4/2021	9SB-C6884DT 100% Polyester	113557	814 Pkg	M	3,306
5/4/2021	T1412 100% Polyester mesh 50	113557	511 Pkg	M	4,364
5/4/2021	9SB-C6884DT 100% Polyester	113557	814 Pkg	M	4,179
5/4/2021	CZ0001 100% Polyester Microfleece	113557	814 Pkg	M	1,919
5/4/2021	FR8300 56% Polyester 44% Recycle Polyester	RMP315	707 Pkg	M	2,063
5/4/2021	FR8300 56% Polyester 44% Recycle Polyester	RMP315	707 Pkg	M	2,071
5/4/2021	FR7991 100% Recycle Polyester Taffeta	RMP315	869 Pkg	M	2,610
5/4/2021	INT002 Non-Woven Interlining 50G/SM	RMP315	340 Pkg	M	300
5/4/2021	FR8331 Weft Yarn Recycled Nylon	RMP315	192 Pkg	M	649
5/4/2021	FR8331 Weft Yarn Recycled Nylon	RMP315	192 Pkg	M	646
5/4/2021	FR 8312 Recycled Power Stretch	RMP315	192 Pkg	M	650
5/4/2021	FR 8312 Recycled Power Stretch	RMP315	192 Pkg	M	646
5/4/2021	FR7991 100% Recycle Polyester Taffeta	RMP315	869 Pkg	M	977
5/4/2021	FR7991 100% Recycle Polyester Taffeta	RMP315	869 Pkg	M	986
5/4/2021	380T 100% Poly Woven 380T	113214	148 Pkg	Yds	3,892
5/4/2021	380T 100% Poly Woven 380T	113305	148 Pkg	Yds	1,270

Figure 2-5 Fabric Raw Materials of Hakers Enterprise Factory

Figure 6 Accessories Usage

2.4.2. **Pattern Making**

Pattern is the technical drawing which is a template use as the tracing on the cloths. Pattern is created by customer requested design and size. It contains the parts such as body (front & back), sleeve, collar, hood, pocket etc., shown in Figure 2-7. While producing a pattern, the pattern making tools play the key role like pattern cutter

machine, rulers, curve rulers and squares etc. The total staff number of the pattern section is 33 staffs with a supervisor.

Figure 2-7 Patterns Making Room

2.4.3. **Cutting**

The patterns are placed on the huge paper to trace the design, size, dart and seam line before the cutting stage. Those process is known as maker, shown in Figure 2-8. Fabrics are spreading on cutting table make sure without wrinkle the fabric, afterwards the maker is lied onto it. The process is done by cutter machine, mentioned in Figure 2-9, Figure 2-8 and Figure 2-10. The production rate is according to the customer demand.

In this department, a leader is organized the whole process. The sum number of staffs are 130, among them the number of males and females are 13 and 117 respectively.

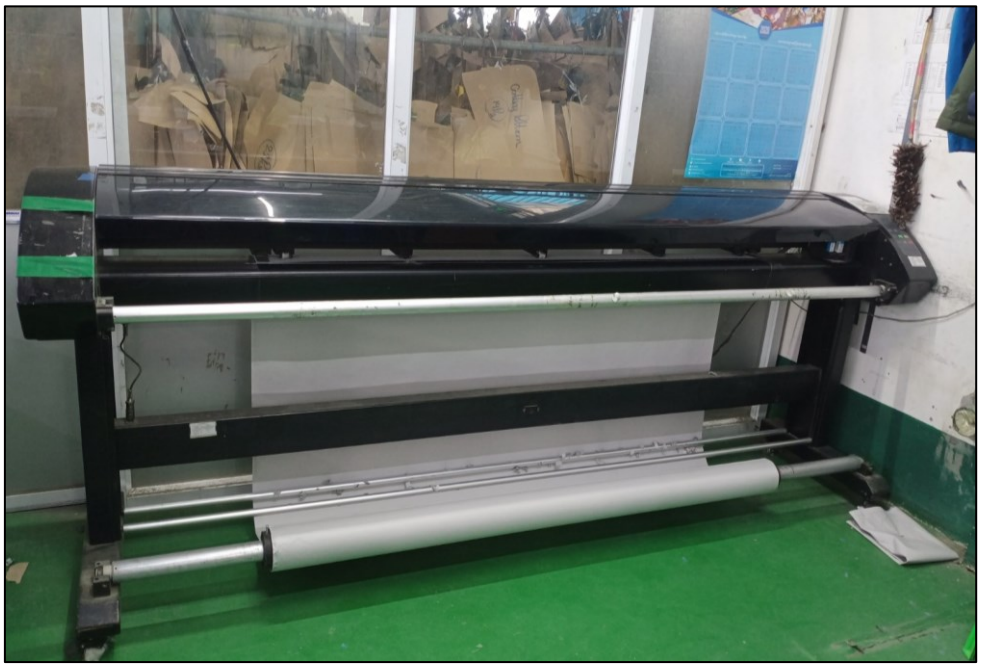

Figure 2-8 Marker Making Room

Figure 2-9 Fabric Cutting Used by Clothes Cutting Machine

Figure 2-10 Foam Fabric Cutting Used by Cutter Machine

2.4.4. **Sewing**

Sewing is one of the most important operations in which almost all of the machines are industrial sewing machines. Sewing lines are placed as the sequence that is easily separated by the design and the amount of clothing is produce per day. Some woven padding jackets must fill with foam fabric (Figure 2-11), the amount of filling rate is directed by the customer and then the sewing process is followed by, mentioned in Figure 2-12. The number of 1244 females and 48 male workers in these sewing lines are needed. Among them, there are 27 Leaders and 14 supervisors.

Figure 2-11 Filling the Foam Fabric into the Designed Cloths

Figure 2-12 Sewing Lines

2.4.5. **Ironing, Final Inspection and Packing**

After the sewing stage, the clothes must set the accessories. Almost all of the accessories (button and zip, etc.) are imported from Taiwan and China. If decorated clothes are needed to iron, they are reached to the ironing stage. In the ironing process, heat energy plays the main role. That energy is supplied by boiler which produce steam. The process is done by steam iron, shown in Figure 2-13, Figure 2-14 and Figure 2-15.

The pressed/ironed clothes are to be checked by the inspection department. Ironing, quality checking and packing sectors are known as finishing stage. In the finishing step, the qualified clothing is wrapped with plastic bags and put into the carton box. Therefore, the products are ready to be shipping. The ordered products are transported by trucks from the factory.

Figure 2-13 Ironing Lines

Figure 2-14 Final Inspection Room (Final QC)

Figure 2-15 Packing & Shipping

2.5. ESSENTIAL SOURCES PROVIDED FOR FACTORY

The main utilities are electricity, boiler, energy and water supply system.

2.5.1. **Electricity**

The operation process uses electricity which is from Pathein Industrial Zone grid line, apply for the lighting of the factory, products production, pumps for pumping

water. The operation process of the factory consumes a lot of electricity therefore it needs transformers. The transformer of the factory capacities is 500 KVA.

Three generators are reserved to ensure continuous power supply to the factory, during the power supply is failure. The capacity of three generators are 630KVA, 350 KVA and 250 KVA respectively (Figure 2-16) and the fuel of generator is diesel. Fuel consumption for three generators is around 80 gallons per day. Generators are used alternatively depending on production. Both generators are located in front of main building and in the same room.

<table>
<tr><td>  </td><td>  </td></tr>
<tr><td>500 KVA</td><td>250 KVA</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>350 KVA</td><td>630 KVA</td></tr>
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Figure 2-16 Electric Supply Systems of Hakers Enterprise Factory

2.5.2. **Boiler**

Boiler plays the crucial role, produces steam to complete the ironing and fusing processes. There are two diesel boilers that consume diesel as a fuel about 30 to 35 gallons per day and electric heating steam boiler shown in Figure 2-17 and its voltage is 380 V and power is 36 KW. Steam pressure is 0.6 Mpa and water capacity is 18 L. Two diesel boilers are not presently applied for production process and one electric boiler is currently used. The operation hours of electric boiler are divided into two sections such as 7:30 AM to 12:00 PM and 12:30 PM and 5:00 PM. Boiler is blown down after operation and blown down water amount is 1 gallon. It has two funnels and

locates in rooftop of the boiler room. Both boilers are also located in the same room beside the main building.

Diesel Boilers

Electric Heating Steam Boiler | Funnel of Boiler

Figure 2-17 Boiler System of Hakers Enterprise Factory

2.5.3. **Energy**

In the factory, applies electric energy and heat energy. Not only electricity is useful the whole production process and heat is used at the end of the process for eg., ironing and fusing. Heat energy is supported from boiler. There are two diesel boilers that uses diesel around 30 to 35 gallons per day as a fuel.

2.5.4. **Water Supply**

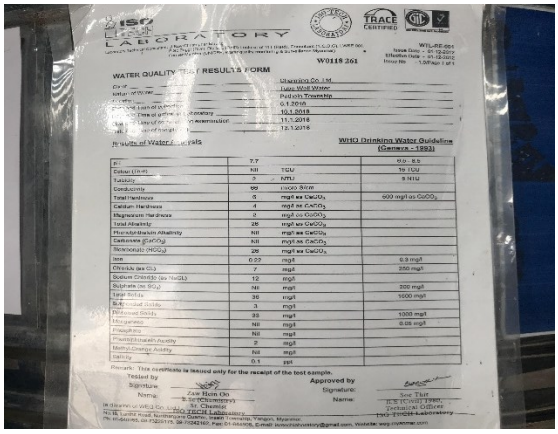
Water is extracted via tube well, therefore water is pumped up by 6 water motors. Those are stored in 2 overhead water tanks and 3 ground water tanks. Capacity of each ground water tank is 3,000 gallons that used for general purpose and firefighting. In each overhead water tank has 3 water tanks which possess the volume capacity of about 500 gallons per each and need to refill 4 to 5 times per day according to the usage of water demand. They are used for factory processes, hostel, cleaning and toilets, etc. For drinking water, the proposed factory provides the purified drinking water system

for all workers and employees that recognized by ISO and also provide 20 liters purified water bottles shown in Figure 2-18.

Ground Water Tank

Overhead Water Tank

Purified Drinking Water System



ISO Certificate of Purified Drinking Water System

20 Liters Water Bottles

Water Motor

Figure 2-18 Water Supply System of Hakers Enterprise Factory

2.6. NECESSARY EQUIPMENTS FOR PRODUCTION

There are 56 types of machines and the total quantities are 1,528. Some of them are listed in Table 2-3 and shown in Figure 2-19.

Table 2-3 The List of Using Machines

Sr.	Devices	Qty	Usage
1	Single Needle Lock Stitch	650	For sewing the clothes
2	Single Auto Machine Stitch	164	For sewing the clothes
3	Single Edge Cutter Machine with Knitting Machine	172	For sewing the clothes with thread cutting
4	Metal Button Pressing Machine	106	To put buttons at clothes with pressure
5	Pneumatic Flat Press Machine	26	To remove wrinkles from clothes
6	Button Hole Machine	25	To make holes at cloth for button
7	Trimming Machine	13	To cut the unwanted fabric and thread
8	Cloths Cutting Machine	11	For cutting the fabric
9	Laser Cutting Machine	6	To cut the fabric
10	Water Motor	6	To recharge water
11	Boiler	2	To produce steam for ironing
12	Generator	2	To support electricity when black out
13	Transformer	1	To link between grid line and main switch
14	Washing Machine	1	To clean the spot that caused by human error in garment production

Sewing Machine

Laser Cutting Machine

	
Ironing	Metal Button Pressing Machine
	
Clothes Cutting Machine	Washing Machine

Figure 2-19 Necessary Devices for Production

2.7. FACILITIES FOR THE STAFF

2.7.1. Welfare Facilities

Supporting facilities are drinking water, dining area, waste bin, rows of washbasin and toilet. Those are mentioned in Figure 2-20. Electric Fan shroud are installed in order to protect the excessive heat in the production rooms and fans are provided especially in the branding room and sewing sectors.

Purified drinking water bottles are found at the foam fabric cutting room, dining area and around the production areas. Calculate based on a per capital consumption of water requirement, the highest requirement of water is 29,190 liter/day for the 1,946 workers.

In the factory, endorses financially for the staffs' families such as Social Occasion (joy and grief).

	
Dining Area	Purified Water Bottle
	
Fan	Electric Fan Shroud

Figure 2-20 Welfare Facilities for Staffs

2.7.2. **Sanitary Facilities**

Rolls of hand wash basins along with hand wash liquid soap plus Coronavirus awareness poster is located in front of factory. Similarly, Garbage bins are provided for waste disposal near the lunch area, clinic and around the factory, compound but also in the workrooms. However, in the cutting room, the cloth scraps are collected by cart hand trolley. Then, 20 trash bins are placed in the working area and there are 15 trash bins in surrounding the lunch area.

Domestic wastes are disposed at Pathein City Development Committee. The total number of toilets are 60 for the employee 1,946 in which 51 for female and 9 for male. There are 2 septic tanks installed for the sludge and repair it again every two years. Drainage channels are installed around the factory, buildings. Domestic wastewater, storm water and drainage water discharges from the factory, drainage channel to the industrial zone channel as shown in Figure 2-21.

Hand Wash Basin near Toilets

Hand Wash Basin to prevent Covid-19 Disease

Toilet for Workers

Hand Dryer

Garbage Bins

Cart hand Trolley

Drainage Channel

Waste Storage System

Solid Waste Collecting Room

Figure 2-21 Sanitary Facilities of Hakers Enterprise Factory

2.7.3. **Occupational Health & Safety Facilities**

The safety equipment such as fire extinguishers and fire hydrant boxes are attached on the wall of the whole factory. A first aid box is provided for minor health problems and injuries of the workers. There is also a clinic in which a health officer is standby daily. Other serious injuries cases arrange to transfer the nearest hospital. Due to global pandemic, all the workers in the factory were provided personal protected equipment such as mask, hand gel, hand washed basin and vaccination. Photos are mentioned in Figure 2-22.

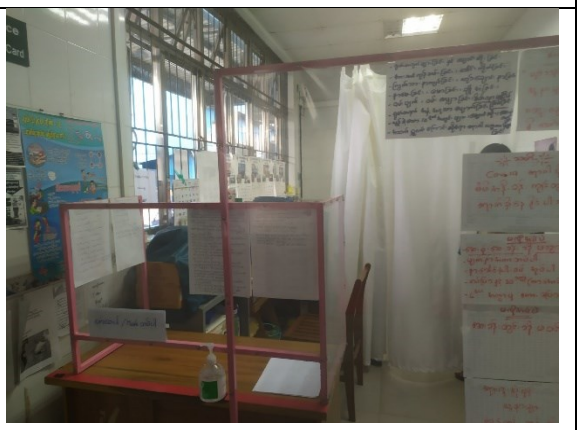
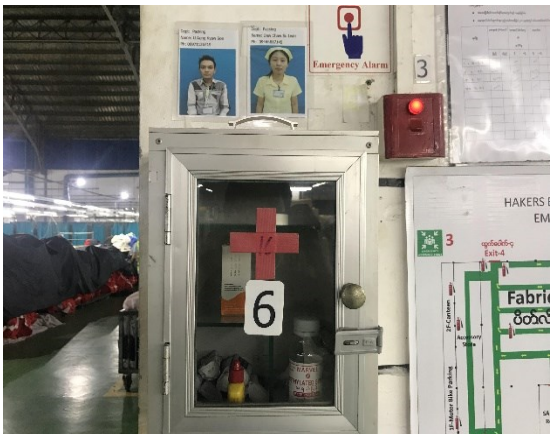
Fire Extinguisher	Notice Board for Fire Safety
	
Clinic	
	
Fire Hydrant	Fire Extinguisher
	
First Aid Box	Assembly Point

Figure 2-22 Occupational Health & Safety Facilities

2.7.4. **Training Program Facilities**

Hakers Garment factory already celebrating the emergency alarm training, fire drill and fire-fighting training program (Figure 2-23) which is a vital part of the workplace fire safety along with the first aid basic programmed (Figure 2-24) as well.

The garment factory will prepare the internal sharing section in which the accomplished people must share their knowledge and experience through the juniors concerned with the mentioned courses.

Fire-fighting Training Program's photos

Figure 2-23 Fire-fighting Training Program

First aid basic program's photos

Figure 2-24 First Aid Basic Program

2.8. GRM (Grievance Mechanism Redress)

If the residents and workers are not satisfied with the operation of the project, they are able to complain about it the relevant person by phone or in person. The factory provides suggestion box and contact phone numbers of HR manager in visible area to be able to complain about the project. Minor complaints are sort out by HR manager. Nevertheless, big issues and some complaints should be resolved in accordance with the applicable laws in Myanmar. Grievance Mechanism Redress is shown in Figure 2-25.

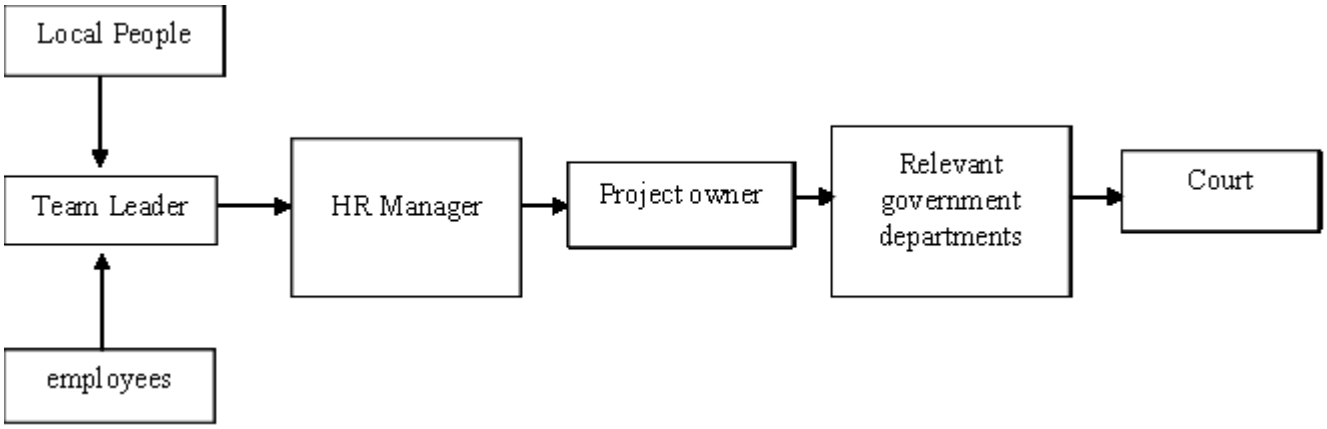


Figure 2-25 GRIEVANCE MACHANISM REDRESS

2.9. APPLICAION OF CHEMICALS

In the garment factory, the application of chemical namely thinner and DJW super dry spot lifter, are used for removing stains on clothes. Soap (washing liquid) and floor dress are used for variety of cleaning process. All the facts mentioned above and detailed information are shown in Table 2-4.

Table 2-4 Safety Data Sheet for Chemical Uses in Factory

Name	Usage	Impact	First Aid	Precaution
Thinner 	Used for removing oil-based stains on clothes.	Eyes: Causes serious irritation. Inhalation: Can cause shortness of breath. Ingested: Can cause vomiting and diarrhea. Harmful if swallowed or if inhaled. Suspected of causing cancer.	Must go to emergency hospital care.	Store and always use in a well-ventilated place. Keep container tightly closed. Use explosion-proof electrical equipment. To cover with masks and handle with rubber gloves. Wear chemical splash goggles. After using, wash hands with soap and water thoroughly.

Name	Usage	Impact	First Aid	Precaution
DJW super dry spot lifter 	Used for removing stains on clothes and especially suitable for medium thickness cloths to remove stains.	Eyes: Causes serious irritation. Inhalation: Can cause shortness of breath. Suspected of causing cancer.	Must go to emergency hospital care.	Store and always use in a well-ventilated place. Keep it tightly closed. Use explosion-proof electrical equipment. To cover with masks and handle with rubber gloves. Wear chemical splash goggles. After using, wash hands with soap and water thoroughly.

2.10. WASTE

There are two types of waste generated from Hakers Garment factory's production process. They are solid waste (production process & domestic) and air emissions.

2.10.1. Solid Waste

The wastes generated from the factory, during operation phase are cloth scrap pieces and threads scraps and cones when cutting the fabric and sewing, the raw materials also produce the waste like paper tubes for holding the fabric roll. Others are carton box, corrugated papers, domestic wastes (leftovers, plastic bottles and tissues, and sanitary pads etc.) and chemical containers and engine oil filters.

The Yangon City solid waste generation rate is 0.39 kg personal/day[1], therefore 758.94 kg of solid waste will be generated maximum of 1,946 employees during working. The waste from the production process, cloths are sold to the pillow production factories and others etc. Both domestic wastes and chemical containers are disposed to disposal site set by Pathein City Development Committee once every two day or three days. The wastes from production process are shown in Figure 2-26 and domestic waste is in Figure 2-27.

[1] The Yangon City solid waste generation rate as of 2012 is 0.39 kg per personal day (Pollution Control and Cleaning Department, Yangon City Development Committee,2014).

Figure 2-26 Solid Wastes from Production Process

Figure 2-27 Domestic Wastes Collected by Garbage Bins

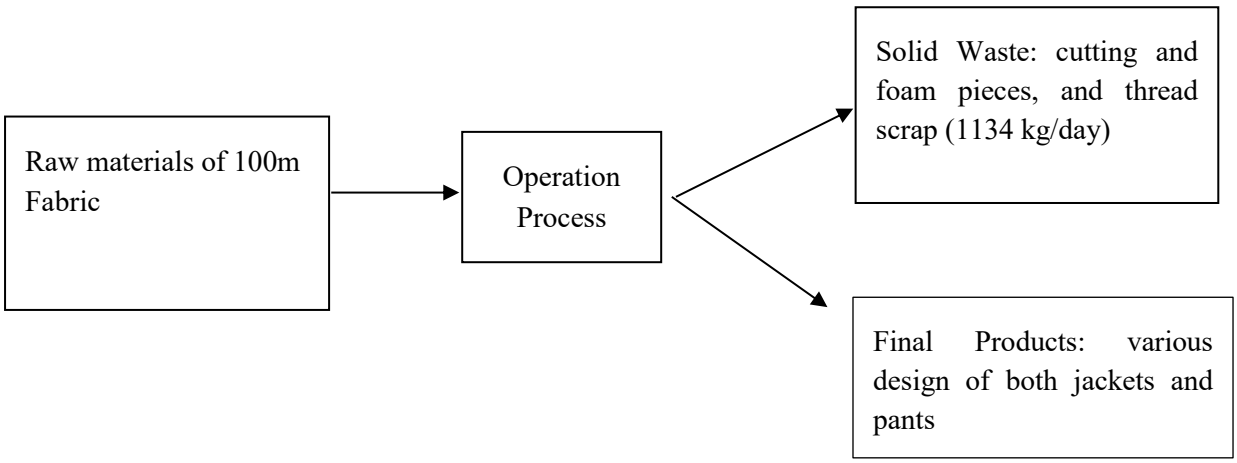


Figure 2-28 Solid Waste Generating from Operation Process

2.10.2. Air emissions

During the production process, air emission may generate dust and gas. The gas emission generated from boiler funnel which include CO, SO_2, NO_x and CO_2. There is two boiler that consumes diesel as a fuel about 30 to 35 gallons per day shown in Figure 2-29. The boiler funnel was built at the northwest of the factory, shown in Figure 2-30 and gas emission balance shown in Figure 2-31.

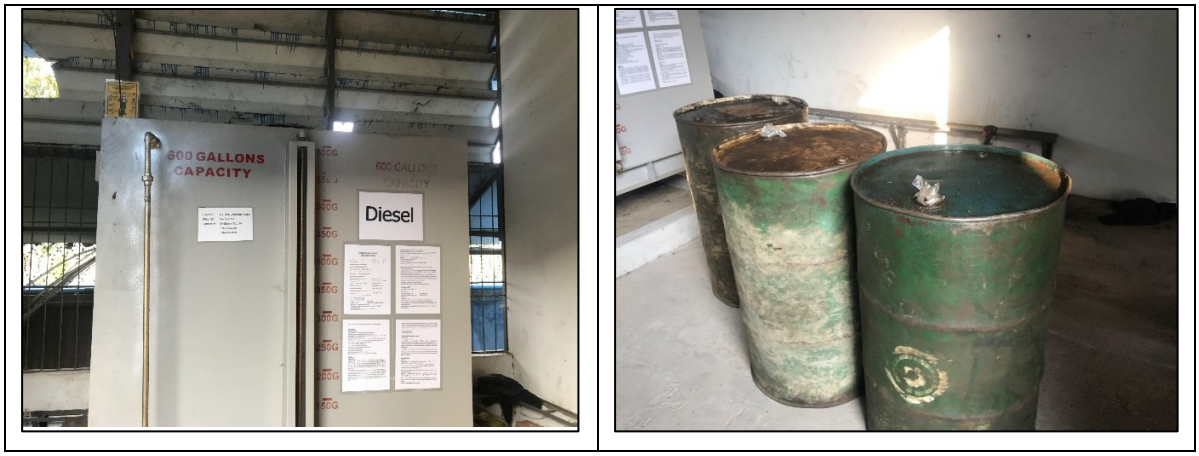


Figure 2-29 Diesel Fuel Storage at Hakers Enterprise Factory

Figure 2-30 Boiler Funnel of Hakers Enterprise Factory

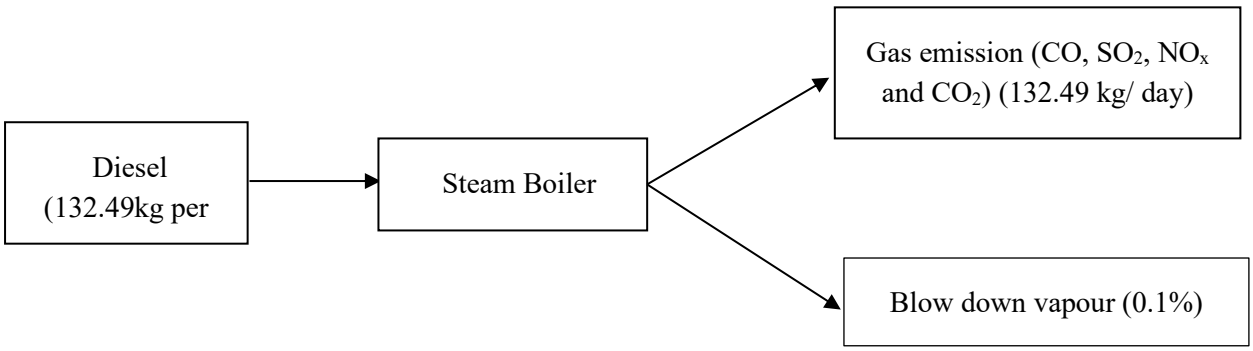


Figure 2-31 Gas Emissions Balance from the Steam Boiler

2.11. WASTE WATER

There is no waste water produced from the production process, however, waste water produced are from the washrooms and 2 septic tanks. Effluent water from the tank is discharged when need. And domestic wastewater, storm water and drainage water discharges from the factory, drainage channel to the industrial zone channel. The quality of water result is mentioned in **Chapter 4**.

CHAPTER 3
LEGAL REQUIREMENT

3.1. INTRODUCTION

Hakers Enterprise (Myanmar) Co., Ltd. has environmental policy of doing environmentally and socially responsible with minimal impact on the environment. The company is working with the local communities and government agencies integrating the environment into its planning, operations and policy decisions.

In the factory, the operation process is running with the local committees and government agencies, such as MONREC integrating the environment into its planning, operations and policy decisions. The first and foremost policy is to comply with laws, rules and regulations relating to the physical and social environment. Most of all, it will follow the rules and regulations set up by the ECD, the main agency responsible for environmental management of regional level. The company pledges to do the business that will be environmentally as practical as possible.

Environmental management of the Project/Factory needs to comply with legal requirements of the Environmental Management Plan prescribed in the Environmental Conservation Rules, Notification No. 50/2014 and the EIA Procedure, Notification No. 616/2015.

An EMP (Environmental Management Plan) is a project document to be prepared according to the requirements and guidance of the Ministry of Natural Resources and Environmental Conservation (MONREC), in order to refrain from, protect against, mitigate and monitor adverse impacts caused by the design, construction, implementation, operation, maintenance, termination, or closure of a project or business or activity; or after its closure, or by any other related cause [Environmental Conservation Rules, 50/ 2014, Chapter I, Article(s 2g)]. An EMP should include programs to manage, implement activities, and monitor changes to the environmental context.

3.2. ENVIRONMENTAL POLICY AND LEGAL FRAMEWORK IN MYANMAR

The National Commissions of Environmental Affairs (NCEA) formed in 1990. Myanmar Agenda-21 was outlined which contains social, economic, institutional and infrastructural improvement programs and most of all, environmental conservations programs.

Respective ministries devised 56 environmental policies and regulations directly related with environmental conservation and protection.

The National Environmental Conservational Committee (NECC) was formed 2011 with the aim to achieve sound environmental management in the country. With a view of effectively implementing the protection and conservation of the environment, the government in 2016 has created the new ministry, the MONREC. The ECD is the focal and coordinating agency for the overall and detail environmental management throughout the country.

3.3. MYANMAR LAWS AND REGULATIONS RELATING TO THE ENVIRONMENT

The existing Myanmar laws and regulations are relevant to environmental, health and safety issues of this project. The conducting works of Amity Company shall comply with the following Laws and Acts:

3.3.1. Environmental Conservation Law (Notification No.9/2012 on March 20th, 2012)

On 30th March 2012, Myanmar Environmental Law was approved and effectively enforced to public. The Environmental Conservation Law relevant to this Project is "Any person causing a point source of pollution shall treat any pollution which caused environmental pollution, in accord with stipulated environmental quality standard".

ECD and MONREC are the responsible organizations to ensure that any new project developments comply with the Environmental Conservation Law and other environmental guidelines. Articles 7 (o), section 14, 15, 24, 29 in the environmental conservation law are described below.

Article 7 (o), The duties and powers relating to the environmental conservation of the Ministry are managing to cause the polluter to compensate for environmental impact, cause to contribute fund by the organizations which obtain benefit from the natural environmental service system, cause to contribute a part of the benefit from the businesses which explore, trade and use the natural resources in environmental conservation works;

Section 14, A person causing a point source of pollution shall treat, emit, discharge and deposit the substances which cause pollution in the environment in accord with stipulated environmental quality standards.

Section 15, The owner or occupier of any business, material or place which causes a point source of pollution shall install or use an on-site facility or controlling equipment 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.

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

3.3.2. Environmental Conservation Rules (Notification No.50/2014 on June 5th, 2014)

Chapter IX, Articles 41 to 46 prescribe, the tasks regarding waste management under the control of MONREC and ECD. Waste management covers hazardous wastes, solid wastes, wastewater and emissions. Moreover, rule 69 are (a) Any person shall not emit, cause to emit, dispose, and cause to dispose, pile and cause to pile, by any means, the pollutants to environment and the hazardous waste or hazardous material stipulated by

notification under the Law and any of these rules at any place which may affect the public directly or indirectly and (b) Any person shall not carry out the actions which can be damaged to natural environment which is changing due to ecosystem and such system, except the permission of the relevant Ministry in order to the interest of the public.

3.3.3. Environmental Impact Assessment Procedure (Notification No.616/2015 on December 29th, 2015)

Articles 76, Chapter (7) EMP in the EIA Procedure should be prepared the relevant to the preparation and implementation of the EMP report. Preparation and implementation of the EMPs will need to comply with relevant rules of 55(A). Section 102, 110, 113, 115 and 117 are as follow:

Section 102. The monitoring reports shall include:

a) Documentation of compliance with all Conditions;

b) Progress made to date on implementation of the EMP against the submitted implementation schedule;

c) difficulties encountered in implementing the EMP and recommendations for remedying those difficulties and steps proposed to prevent or avoid similar future difficulties;

d) Number and type of non-compliance with the EMP and proposed remedial measures and timelines for completion of remediation;

e) Accidents or incidents relating to the occupational and community health and safety, and the environment; and f) monitoring data of environmental parameters and conditions as committed in the EMP or otherwise required.

Section 110. 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.

Section 113. The Ministry shall indicate the manner in which environmental obligations are not being complied with by the Project Proponent, and shall give the Project a specified time period (determined by the Ministry to be reasonable under the circumstances) within which to bring the Project into compliance.

Section 115. All costs of the Ministry to conduct inspection and monitoring of the Project shall be borne by the Project Proponent. Such costs shall not exceed that which is necessary to ensure the Project's compliance with the Project commitments as set out in the EMP and in the ECC.

Section 117. The Ministry may require that Projects and other economic activities that derive from such policy, strategy, development plan, framework or program and which have been required to undertake a study to identify and assess the potential environmental and social impacts (as stipulated above) shall be developed and implemented (sited, designed, constructed and operated) in accordance with the environmental and social management and monitoring framework of such policy, strategy, development plan, framework or program.

3.3.4. National Environmental Quality (Emission) Guidelines (Notification No. 615/2015 on December 29th, 2015)

Objectives of the National Environmental Quality (Emission) Guidelines (NEQG) are to provide the basis for regulation and control of noise and vibration, air emissions, solid wastes and effluent discharges from various sources to prevent pollution and protection of human health and ecosystem.

The type of project is complied with guidelines applied to the garments, textile and leather product manufacturing. Textile and garment manufacturing using natural fibers, synthetic fibers, and regenerated fibers must follow the guidelines provided for those types of product.

Table 3-1 Effluent Levels

Parameter	Unit	Guideline Value
5-day Biochemical oxygen demand	mg/l	30
Adsorbable organic halogens	mg/l	1
Ammonia	mg/l	10
Cadmium	mg/l	0.02
Chemical oxygen demand	mg/l	160
Chromium (hexavalent)	mg/l	0.1
Chromium (total)	mg/l	0.5
Cobalt	mg/l	0.5
Color	m^{-1}	7 (436 nm[a], yellow) 5 (525 nm, red) 3 (620 nm, blue)
Copper	mg/l	0.5
Nickel	mg/l	0.5
Oil and grease	mg/l	10
Pesticides	mg/l	0.05-0.10[b]
pH	S.U.[C]	6-9
Phenol	mg/l	0.5
Sulfide	mg/l	1
Temperature increase	°C	<3[d]
Total coliform bacteria	100ml	400
Total nitrogen	mg/l	10
Total phosphorus	mg/l	2
Total suspended solids	mg/l	50
Zinc	mg/l	2

*Environmental, health, and safety guidelines for foundries. 2007. International Finance Corporation, World Bank Group.

a Aluminum smelting and casting

b Standard unit

c At the edge of a scientifically established mixing zone which takes into account ambient water quality, receiving water use, potential receptors and assimilative

Table 3-2 Air Emission Levels

Parameter	Unit	Guideline Value
Ammonia	mg/Nm^3[a]	30
Carbon disulfide	mg/Nm^3	150
Chlorine	mg/Nm^3	5
Formaldehyde	mg/Nm^3	20
Hydrogen sulfide	mg/Nm^3	5
Particulates	mg/Nm^3	50[b]
Volatile organic compounds	mg/Nm^3	2/20/50/75/100/1 150[c, d]

Milligrams per normal cubic meter at specified temperature and pressure

b As the 30-minute mean for stack emissions

c Calculated as Total carbon

d As the 30-miute mean for stack emissions: 2mg/Nm^3 for volatile organic compounds classified as carcinogenic or mutagenic with mass flow greater than or equal to 10g/hour; 20 mg/Nm^3 for discharges of halogenated volatile organic compounds with a mass flow equal or greater than 100g/hour; 50 mg/Nm^3 for waste gases from drying of large installations (solvent consumption > 15tons/year); 75 mg/Nm^3 for coating application processes for large installations (solvent consumption > 15tons/year); 100 mg/Nm^3 for small installations (solvent consumption < 15 tons/year); if solvent is recovered from emissions and reused, the guideline value is 150 mg/Nm^3

3.3.5. The Ethnic Rights Protection Law (2015)

Article 5 states the matters of projects shall completely be informed, coordinated and performed with the relevant local ethnic groups in the case of development works, major projects, businesses and extraction of natural resources will be implemented within the area of ethnic groups.

3.3.6. Myanmar Investment Law (2016)

Article 50 (d) states the matters of projects shall completely be informed, coordinated and performed with the relevant local ethnic groups in the case of development works, major projects, businesses and extraction of natural resources will be implemented within the area of ethnic groups.

Article 51 states the investor (a) 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; (b) 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; (c) shall appoint only citizens for works which does not require skill; 18 Official Translation; (d) 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; (e) 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; (f) 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.

Article 65 (f) states the investor 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;

Article 65 (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;

Article 65 (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;

Article 65 (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;

Article 65 (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; 23 Official Translation

Article 65 (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;

Article 65 (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.

Article 65 (p) shall allow the Commission to inspect in any places, when the Commission informs the prior notice to inspect the investment;

Article 65 (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.

Article 73 states 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.

3.3.7. **Myanmar Investment Rules (2017)**

Rules 202 states the Investor must comply with the conditions of the Permit and other applicable laws when making an Investment.

Rules 203 states the Investor shall fully assist while negotiating with the Authority for settling the grievances of the local community that have been affected due to Investments.

Rules 206 states if the Investor is desirous to appoint a foreigner as senior management, technician expert or consultant according to section 51 (a) of the Law, it shall submit such foreigner's passport, expertise evidence or degree and profile to the Commission Office for approval.

Rules 212 states 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.

3.3.8. **Myanmar Insurance Law (1993)**

Article 15 states owners of motor vehicles shall affect compulsory Third Party Liability Insurance with the Myanmar Insurance.

Article 16 states 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.

3.3.9. **Private Industrial Enterprise Law (1990)**

Article 4 states

(a) Any person desirous of conducting any private industrial enterprise;

(b) Any person conducting any private industrial enterprise on the day this Law is enacted; by using any type of power which is three horsepower and above or manpower of ten wage-earning workers and above shall register under this Law.

Article 13 states the duties of the entrepreneur are as follows: -

(b) Shall abide by the terms and conditions of the registration certificate;

(f) Shall shift the place of enterprise, change the nature of enterprise, amalgamate enterprises and split up enterprises only with the approval of the Directorate;

(g) Shall abide by the orders and directives issued from time to time by the Ministry and the Directorate;

Article 15 states the entrepreneur has the right to carry out the followings: -

(a) Appointing foreign exports and technicians with the approval of the Ministry;

(b) Carrying out change of the name of enterprise, transfer of ownership, temporary suspension or permanent closing down of the enterprise in the manner prescribed and with the approval of the Directorate.

3.3.10. Prevention from Danger of Chemical and Associated Materials Law (The Pyidaungsu Hluttaw Law No. 28/2013 on August 26th, 2013)

There are 14 Chapters in Prevention from danger of chemical and Associated Materials Law (2013). The sections associated with the Project are:

Article 13 of Chapter-7 (work permit relating to Chemical and Associated Materials) states that any people, who want to do the business of chemical and associated materials, shall apply the central body of the acquisition of the license, attached with the management plan for the environmental conservation in accord with the stipulations.

Article 2 of Chapter 9 (Controlling, Preventing the danger and alleviating the danger) states that the license holders shall follow the stipulations of the following items to control, preventing alleviate the danger relating to the chemical and associated materials:

a) To classify the danger level according to the properties of the chemical and associated materials to prevent the danger in advance;

b) To reveal the danger warning sign and safety level certificate;

c) To attend the training for keeping the personal protective equipment and using them systematically to prevent and alleviate accident;

d) To carry out in accord with the stipulations about transporting, keeping, storing, using and disposing the chemical and associated materials;

e) Importing or exporting the chemical and associated materials, which are prohibited by the central supervising team, the equipment which are used inside the said materials.

Article 15 states a person who has obtained a license, before starting the respective chemical and related substances business: -

(a) Shall be inspected for the safety and the power of resistance of the machinery and equipment's by the respective Supervisory Board and Board of Inspection;

(b) Shall be attended 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.

Article 16 states a person who has obtained a license: -

(a) Shall abide the license regulations;

(b) Shall perform to abide strictly the instructions for being safety in using the chemical and related substances by himself and the persons who serve the work;

(c) Shall keep the required safety equipment's enough in the chemical and related substances businesses, furthermore shall grant the personal protection equipment's and dresses free of charge to the working persons;

(d) Shall make the course of training and study and instruction if necessary, to the working persons for using the occupational safety equipment, the personal protection equipment and the dresses systematically in the chemical and related substances business;

(e) Shall be inspected by the respective Supervisory Board and Boards of Inspection in respect of if the hazard may impact on the Human Being and Animals' health and the environment;

(f) Shall make medical checkup the working persons who will work in the chemical and related substances business and shall permit to serve in that work after obtaining the recommendation that his health is suitable for that work. This medical checkup records shall be kept systematically;

(g) shall send the copy of informative letter of the permission to the respective Department of Township Administration, if the hazardous chemical or related substances are permitted to store; (h) shall acquire in advance the guidance and agreement of the respective Department of Fire Brigade, if the business that is worried to fire hazard is operated by using the fire hazard substances or the explosive substances;

(i) Shall transport only the permitted amount of the chemical and related substances in accordance with the prescriptive stipulations, if they are transported in local;

(j) shall take the permission from the Central Supervisory Board if the chemical and related substance is altered and transferred from one place to any other place which contained in the license;

(k) Shall abide and perform in accordance with the related environmental laws not to impact and damage to the environment in operating the chemical and related substances business.

Article 17 states 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.

Article 22 states 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.

Article 27 state a person who has obtained the license to be complied the following matters with control and decrease the hazard of the chemical and related substances: -

(a) Classifying the hazard level to protect in advance the hazard according to the properties of the chemical and related substances;

(b) Expressing the Material Safety Data Sheet and Pictogram;

(c) Providing the safety equipment's, the personal protection equipment's to protect and decrease the accident and attending to the training to be used systematically;

(d) Performing in accordance with the stipulations in respect of transporting, possessing, storing, using, discharging the chemical and related substances;

(e) Not being imported or exported the chemical and related substances banned by the Central Supervisory Board and the machinery and equipment's which have used them.

3.3.11. The Myanmar Fire Brigade Law (The Pyidaungsu Hluttaw Law No. 11, 2015 on March 17th, 2015)

In Chapter 8 of the law, Article 17, states-C, factory, workshop, warehouse and store should take inspection from the Department of Fire Service for safety and permissions to grant.

Article 25 states the owner or manager of the factory, workshop, bus terminal, airport, port, hotel, motel, lodgings, condominium, market, department, organization or business exposed to fire hazard shall, in accord with the directive of the Department of Fire Services:

(a) Not fail to form the Reserve Fire Brigade;

(b) Not fail to provide fire safety equipment.

3.3.12. The Petroleum and Petroleum Products Law (The Pyidaungsu Hluttaw Law No.20/2017 on August 1st, 2017)

Its aim is to provide a framework for the safe handling of petroleum and petroleum products. It is basically a combination of the 1934 act with Ministry of Energy Notification 100/2013 on the import, transport, storage and distribution of petroleum products. It is stated to regulate production, storage, and transport of oil so as not to cause pollution or the outbreak of fires.

Article 9 states the Ministry of Transport and Communications shall carry out the following functions relating to any petroleum and petroleum product;

a. issuing license to vehicles, vessels and barges that carry any petroleum and petroleum product;

e. determining procedures and conditions to be abided by in carrying out transport business except transport by pipeline.

Article 10 states the Ministry of Natural Resources and Environmental Conservation shall carry out the following functions relating to any petroleum and petroleum product;

b. issuing transport permit for the vehicles, vessels and barges that shall carry any petroleum and petroleum product;

Articles 11 states all receptacles containing any dangerous petroleum and petroleum product, the warning sign of danger by stamping, embossing, painting, printing or any other means shall be expressed. If it is impossible to express as such, similar warning signs of the nature of danger of gasoline, spirit or petroleum shall be expressed in writing at the ostensible place in salient words or signs near the receptacle.

Articles 10 states 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;

c. determining the period, form and terms and conditions, manners of applying license, permitting authority and fees to be assessed, for license under subsection (a) and permit under subsection (b);

d. if it occurs environmental impacts in carrying out petroleum and petroleum product business activities, acting, as necessary, in accordance with the existing laws of on-site inspection;

3.3.13. Motor Vehicle Law (2015)

The main objectives of this law are as follows:

(a) For the safe driving of motor vehicles in public areas through registration according to official rules and regulations.

(b) To provide driving licenses for driving particular types of motorized vehicles after qualification checks.

(c) For the easy flow of road users and for the protection against road risks and vehicle perils.

(d) To avoid traffic congestion and to use high technology transportation systems efficiently in order to implement protection against road risks and vehicle perils.

(e) To reduce environmental pollution caused by motor vehicles.

3.3.14. Law on Standardization (The Pyidaungsu Hluttaw Law No.28/2014 on July 3rd, 2014)

The objectives of this Law are as follows:

a) To enable to determine Myanmar Standards

b) To enable to support export promotion by enhancing quality of production organizations and their products, production processes and services

c) To enable to protect the consumers and users by guaranteeing imports and products are not lower than prescribed standard, and safe from health hazards

d) To enable to support protection of environment related to products, production processes and services from impact, and conservation of natural resources

e) To enable to protect manufacturing, distributing and importing the disqualified goods which do not meet the prescribed standard and those which are not safe and endangered to the environment

f) To support on establishing the ASEAN Free Trade Area and to enable to reduce technical barriers to trade

g) To facilitate technological transfer and innovation by using the standards for the development of national economic and social activities in accordance with the national development program.

Article 17 states a person desirous of obtaining certificate of certification shall apply to the department and organization which has obtained the accreditation.

Article 19 states the Committee may, if it is found out that holder of certificate of certification violates any term or condition contained in the relevant recommendation, pass any of the following administrative orders:

(a) Warning;

(b) Suspending the certificate of certification for limited period;

(c) Cancelling the certificate of certification

Article 26 states if any person who obtained certificate of certification uses standardization mark on the product which is not in conformity with the relevant standard or relating to service shall be punished with imprisonment for a term not exceeding one year or with fine not more than one million Kyats or with both.

3.3.15. Protection and Preservation of Cultural Heritage Regions Law (1998)

Article 13 states a person desirous of carrying out one of the following shall abide by the provisions of other existing laws and also apply to the Department in accordance with stipulations to obtain prior permission under this Law: -

(a) Within the ancient monumental zone or the ancient site zone:

(1) Constructing or extending a building;

(2) Renovating the ancient monument or extending the boundary of its enclosure;

(b) Within the protected and preserved zone, constructing, extending, renovating a hotel, motel, guest house, lodging house or industrial building or extending the boundary of its enclosure;

(c) Within the cultural heritage region:

(1) Carrying out the renovation and maintenance work of the ancient monument without altering the original ancient form and structure or original ancient workmanship;

(2) Carrying out archaeological excavations;

(3) Building road, constructing bridge, irrigation canal and embankment or extending the same.

Article 15 states the person desirous of carrying out one of the following shall abide by the provisions of other existing laws and apply in accordance with the stipulations to the Department to obtain prior permission under this Law: -

a) Renovation of a building other than an ancient monument or extension of the boundary of its enclosure in the ancient monumental zone or the ancient site zone;

b) Within the protected and preserved zone, constructing, extending, renovating a building other than a hotel, motel, guest house, lodging house or industrial building or extending the boundary of its enclosure;

c) Digging well, pond and fish-breeding pond or extending the same within the cultural

d) Heritage region.

3.3.16. The Protection and Preservation of Antique Objects Law (The Pyidaungsu Hluttaw Law No.43/2015 on July 22nd, 2015)

The objectives of this law are as follows:

a) To implement the policy of protection and preservation for the perpetuation of antique objects
b) To protect and preserve antique objects so as not to deteriorate due to natural disaster or man-made destruction;
c) To uplift hereditary pride and to cause dynamism of patriotic spirit by protection and preservation of antique objects
d) To have public awareness of the high value of antique objects
e) To carry out in respect of protection and preservation of antique objects in conformity with the International Convention and Regional Agreement ratified by the State.

Article 12 states the person who finds any object which has no owner or custodian, he 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.

3.3.17. The Protection and Preservation of Ancient Monuments Law (Union Parliament Law No. 51/2015 on August 26th, 2015)

The objectives of this Law are as follows:

a) To implement the policy of protection and preservation for the perpetuation of ancient monuments
b) To protect and preserve ancient monuments so as not to deteriorate due to natural disaster or man-made destruction
c) To uplift hereditary pride and to cause dynamism of patriotic spirit by protecting and preserving ancient monuments
d) To have public awareness of the high value of ancient monuments

e) To protect and preserve ancient monuments from destruction
f) To search and maintain ancient monuments;
g) To carry out in respect of protection and preservation of ancient monuments in conformity with the International Convention and Regional Agreement ratified by the State.

Article 12 states if a person who finds an ancient monument of over one hundred years old and above or under the ground or above or under the water which has no owner or custodian knows or it seems reasonable to assume that the said monument is an ancient monument, he shall promptly inform the relevant Ward or Village-Tract Administrative Office.

Article 15 states a person desirous of any of the followings within the specified area of an ancient monument shall apply to get prior permission to the Department:

(a) Extending towns, wards and villages;

(b) Constructing or extending or repairing new buildings including hotels, factories and residential buildings or fencing or extending a fence;

(c) digging to search petroleum, natural gas, gem or mineral, piping petroleum and natural gas, constructing factories, connecting national grid, constructing communication tower, constructing or extending infrastructures such as road, bridge, airfield, irrigation and embankment;

(d) Connecting underground electric cable, communication cable and other underground works;

(e) Digging or extending wells, lakes, cannels and ponds;

(f) gold sieving, digging, burning bricks, digging well, lake, creek, ditch, gully, pit digging, refilling, levelling, mining, quarry, gravel digging and unearth sand, removing the mounds and hills which can damage the physical feature of the land;

(g) Placing and fencing ancient monuments in a private compound and area;

(h) Constructing a building which is not consistent with the terms and conditions stipulated according to the region by the Ministry near and at the surrounding of an ancient monument.

Article 20 states no one shall carry out any of the following acts which is assumed to cause damage to an ancient monument within the specified area of an ancient

(b) Using machines which causes vibration within the specified place of an ancient monument and running various types of vehicles;

3.3.18. Myanmar Engineering Council Law (2013)

Article 34 states if, whoever has received a registration certificate, is found to have breached any rules contained in the registration certificate or violated any prohibition contained in a rule, order or directive enacted under this law or in any stipulation of this law, the executive committee may take the following administrative actions-

(a) Giving a warning;

(b) Assessing a suitable fine;

(c) Suspending the registration certificate;

(d) Cancelling the registration certificate.

Articles 37, No one shall perform any engineering work and technological work which are specified as being dangerous to the public by a rule enacted under this law without having received a registration certificate issued by the council, except for engineers appointed in a government department or an organization in the performance of their duties.

3.3.19. The Export and Import Law (2012)

In 2012, the Export and Import Law was enacted and the Control of Imports and Exports Act (1947) was abolished. It aims to implement the economic principles of the State successfully, to lay down the policies to export and import that support the development of the State; and that are to be in conformity with the international trade standards.

Article 7 states a person who obtained any license shall not violate the conditions contained in the license.

3.3.20. Labor Organization Law (The Pyidaungsu Hluttaw Law No. 7/2011 on October 11th, 2011)

The law created to protect the rights of the workers, to have good relations among the workers or between the employer and the worker, and to enable to form and carry out the labor organizations systematically and independently.

3.3.21. The Settlement of Labor Dispute Law (The Pyidaungsu Hluttaw Law No. 5/2012 on 28th March 2012)

The Trade Disputes Act (1929) repealed the Settlement of Labor Dispute Law (2012). The purpose of this act is for safeguarding the right of workers or having good relation between employer and workers and making peaceful workplace or obtaining the rights fairly, rightfully and quickly by settling the dispute of employer and worker justly. This law contains 10 main chapters.

3.3.22. The Employment and Skills Development Law (The Pyidaungsu Hluttaw Law No. 29/2013 on August 30th, 2013)

The Authority shall lay down policies relating to the following duties and functions: -

(a) Creation of employment opportunities

(b) Implementing measures to reduce unemployment

(c) Carrying out to enhance discipline and capacity of the workers

(d) Carrying out for the skills development of the workers

(e) Forming and guiding the Employment and Skills Development Agencies.

3.3.23. Minimum Wage Law (The Pyidaungsu Hluttaw Law No. 7/2013 on March 22nd, 2013)

In Chapter 2 of the law, the president will create a National committee comprised of relevant persons in government departments, representatives of employers and employees, to conduct research on the prevalent minimum wages across various industries for employees.

The national committee will be calculated the basis for which minimum wage. The committee will take into consideration the needs of the employees and their families, the current living standards, the cost of living, the state of the country's economy, the well-being of the employee vis-a-vis his profession, and other considerations presented by the relevant ministry.

Relating to fixing of the minimum wage rate, reviewing, and amending that rate, regular meeting of the national committee shall hold twice in a year. If necessary, special meeting may hold.

In Chapter 6 of the law, the committee will use its findings to set forth a minimum wage for employees across the various industries for the entire country, including for employees employed in special economic zones.

3.3.24. The Payment of Wages Act (The Pyidaungsu Hluttaw Law No. 17/2016 on 25th January 2016)

The Payment of Wage Act was firstly unacted on 1963, the act was repealed in 25th January 2016. The purpose of this act the employer must pay wage or salary to employee (working part time, weekly or monthly) within designated time frame. In this Act contains 9 main Chapters.

In Chapter 2 (Method of Payment and period) of the law, Article 3 and 4 describe the following:

Article 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 the Employee.
b) Moreover, pay can be in the mean of;
    1. Totally in cash or half the cash and half in things set as local price according to the local price to those employees working in trade, manufacturing and service sector.
    2. Totally in cash or half the cash and half in things set as local price according to local traditions or common agreement to those working in agriculture and livestock sectors. However, this must be for the sake of the employees and their families. Moreover, it must be reasonable and fair.
    3. An employee shall receive the payment for 60 days when he/she is in Alternative Civil Service.

Article 4. 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 basic as below.

    1. Must pay at the end of the payment period when there are not more than 100 workers.

2. If there are 100 workers and above, pay must not be administered later than 5 days after the end of the payment period.

d) Upon termination, wages must pay within 2 days from the date of termination.
e) If a resignation letter submitted, wages must pay at the ending day of the payment period.
f) If an employee dies, wages must pay to legally recognized person within 2 working days after the day he/she died.
g) All wages must pay during the working day.

3.3.25. Minimum Wage (Notification No.2/2015 on August 28th, 2015)

The National Committee for Minimum Wage issued on 28 August 2015 which set the minimum wage at 450 kyat per hour for each standard 8 hour working day (or 3600 kyat a day) with effect from 1 September 2015. This stipulated rate of minimum wage applies uniformly to all workers nationwide and across all industries except those in small, family-run business with a workforce of less than 15 workers.

3.3.26. Social Security Law (Notification No.15/2012 on August 31th, 2012)

The objectives of the Law are:

a) To fulfill health and social needs of the workers
b) Workers to enjoy more security in social life and health care
c) To raise public reliance upon the social security system
d) To have the right to draw back some of the contributions paid by the employers
e) To obtain the right to continued medical treatment and benefits after retirement.

3.3.27. The Workmen's Compensation Act (1923)

It stipulates that employer is required to make payments to employees who become injured or who die in any accidents arising during and in consequence of their employment. Such compensation also must be made for diseases which arise as a direct consequence of employment, such as carpal tunnel syndrome.

3.3.28. Factories Act (Act No. 65/1951)

This act deals with the provisions for the proper disposal of wastes and effluents in factories, treatment of wastewater, regulations for health and cleanliness in factories and prevention of hazards. First aid appliances related to factory presented in Article 47 and described below.

a) In every factory, the manager shall provide and maintain a first-aid box or a cupboard equipped with the prescribed contents in suitable place as may be directed by the Inspector to be readily accessible during all working hours, and where more than one maintained for every additional one hundred workers or part thereof.
b) Nothing but the prescribed contents shall be kept in the first-aid boxes or cupboards referred to in sub-section (1), and all such first-aid boxes and cupboard shall be kept in the charge of a responsible who has been trained in first-aid treatment and who shall always be available during working hours.
c) In every factory wherein more than two hundred and fifty workers employed there shall be provided and maintained a first-aid room or dispensary of the prescribed dimension, containing the prescribed equipment, and shall be kept under the supervision of such medical officer and nursing staff as may be prescribed.

3.3.29. The Leave and Holiday Act, 1951 (Law Amended July 2014)

The International Labor Organization, Myanmar, firstly adopted the Leave and Holidays Act on 1 January 1952. Recently, the Act amended in July 2014. 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 followings describe the right of workers to leave and have a holiday:

a) Causal Leave (6 days)
b) Earned Leave (10 days)
c) Medical Leave (30 days)
d) Maternity leave
e) Public Holiday (21 days)
f) Penalty for Violation

3.3.30. Public Health Law (12th June 1972)

The law deals with the provisions to promote and safeguard public health including preventive measures to promote environmental health. The laws related to the public health are provided in Sections 2 to 5.

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

Article 3 states the order to prevent the outbreak of Communicable Diseases, the Department of Health shall implement the following project activities:

(a) Immunization of children by injection or orally;

4. When a Principal Epidemic Disease or a Notifiable Disease occurs: -

(a) Immunization and other necessary measures shall be undertaken by the Department of Health, in order to control the spread thereof:

(b) The public shall abide by the measures undertaken by the Department of Health under subsection (a).

11. To prevent and control the spread of a Principal Epidemic Disease, the Health Officer may undertake the following measures: -

(a) Investigation of a patient or any other person required:

(b) Medical examination;

(c) Causing laboratory investigation of stool, urine, sputum and blood samples to him carried out:

(d) Causing investigation by injection to him carried out;

(e) Carrying out other necessary investigations.

3.3.32. Ayeyarwady City Development Committee Law (2018)

The objectives of this law are as follows:

a) Capital with the leadership of the City Development Committee stages of sustainable development and improve the living standards of urban communities.

b) Municipal broad tax within the borders of the capital to ensure full and existing laws on municipal development, to be used properly in accordance with rules.

c) Clean as a large international capital, and upgrade to become beautiful, quiet, and lovely city, in order to contribute the urban community.

d) About municipal activities and accountability, Accountability, Open and transparent, and to become the revelation of the people-centered management system with open, transparent and full accountability on municipal activities.

e) To constitute organized work groups and departments to be more dynamic and efficient in charge of operation

3.3.33. The Conservation of Water Resources and Rivers Law (2016)

Article 8 states no person shall:

(a) Carry out any act or channel shifting with the aim to ruin the water resources and rivers and creeks.

Article 11. 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.

Article 19. 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.

Article 21. No one shall:

(b) Drill well or pond or dig earth without the permission of the Directorate.

Article 22. 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.

Article 24. No one shall:

(b) Violate the conditions prescribed by the Directorate so as not to cause water pollution and change of watercourse in rivers and creeks.

3.3.34. The Draft Occupational Health and Safety Law (The Pyidaungsu Hluttaw Law No.8/2019 on March 15th, 2019)

The objectives of this Law are as follows:

a) To effectively implement measures related to safety and health in every industry;
b) To establish the duties and responsibilities of those who are responsible under this Law, including Workers and Employers, so as to reduce Workplace accidents and Occupational Diseases;
c) To work with Employers, Workers and others who are responsible under this Law to prevent accidents and occupational diseases in the increasing number of Workplaces as a result of economic growth;
d) To set occupational safety and health standards which reflect the context of Myanmar while conforming to the regional and internal ones so as to create safe and healthy workplaces.

3.4. INTERNATIONAL AND NATIONAL GUIDELINES AND STANDARDS

International policies, guidelines and standards relevant to environmental and social impacts of projects that referred to by most countries are those issued by the NEQG, World Health Organization (WHO), the U.S Environmental Protection Agency (EPA), the World Bank, and the International Finance Corporation (IFC). The policies, guidelines and standards of the World Bank and IFC are cross-referenced and complementary as the IFC is an organization of the World Bank 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 World Bank and IFC, especially those related to environmental pollution, also provide due consideration to the guidelines and standards of U.S. EPA and WHO.

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

3.4.1. IFC's Standards and Guidelines

IFC's standards and guidelines relevant to this project described in two documents:

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

The first document describes eight performance standards on environmental and social sustainability, which IFC requires its clients to apply throughout the project life cycle.

The second document provides general guidelines for environmental, health and safety (EHS) for development projects.

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

Toward Clear Production

The World Bank'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 apply 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.

3.4.3. **National Environmental Quality (Emission) Guidelines (No. 615/2015) (2015 Dec, 29)**

Objective of the guidelines are to provide the basis for regulation and control of noise and vibration, air emissions and effluent discharges from various sources in order to prevent pollution for the purpose of protection of human health and ecosystem.

3.5. GUIDELINES APPLICATION TO THE PROJECT

The project environmental management plan during construction and operation needs to comply with Myanmar National Environmental Quality (Emission) Guidelines (2015) and the others as appropriate. Guidelines for parameters relevant to the Project as shown in Table 3-3 to Table 3-5.

Table 3-3 National Guidelines of Air Quality

Parameter	Averaging Period	Guideline Value µg/ m³
Nitrogen dioxide	1-year 1-hour	40 200
Ozone	8-hour daily maximum	100
Particulate matter PM_{10}[a]	1-year 24-hour	20 50
Particulate matter $PM_{2.5}$[b]	1-year 24-hour	10 25
Sulphur dioxide	24-hour 10 -minute	40 500

a Particulate matter 10 micrometers or less in diameter

b Particulate matter 2.5 micrometers or less in diameter

a Equivalent continuous sound level in decibels

Table 3-4 National Guidelines on Noise Level

Receptor	One Hour LAeq (dBA)a	
	Daytime 07:00-22:00 (10:00-22:00 for Public holidays)	Night time 22:00-07:00 (22:00-10:00 for Public holidays)
Residential, institutional, educational	55	45
Industrial, commercial	70	70

Table 3-5 National Guidelines for (Wastewater, Storm Water Runoff, Effluent and Sanity Discharges (General Application))[2] Operation phase

Parameter	Unit	Guideline Value [a]
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
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

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

3.5.1. **Commitment Table**

Commitment List	No	Explanation of Commitment	Chapter
Legal requirement	1	Environmental policy and legal framework The project proponent will follow all the legal requirements mentioned in Chapter 3.	Chapter 3
Environmental quality monitoring	2	Measured based on National Environmental Quality (Emission) Guidelines (2015) and international environmental guidelines and Environmental management guidelines	Chapter 4
Outdoor Air quality	2.1	The results of outdoor air quality measurements are presented by comparing with NEQEG (2015) and WHO guidelines	Paragraph Section 4.3.1.1
Indoor Air quality	2.2	The results of indoor air quality measurements are presented by comparing with US. EPA and WHO guidelines	Paragraph Section 4.3.1.2
Water quality	2.3	Wastewater was collected from factory's drainage channel and the results are indicated by comparing NEQEG (2015) and WHO Guidelines.	Paragraph Section 4.3.2
Noise quality	2.4	Noise Quality Results are described by comparing NEQEG (2015).	Paragraph Section 4.3.3
Light	2.5	Light Quality Results are depicted by comparing IFC Guidelines.	Paragraph Section 4.3.4.1
Temperature	2.6	Temperature results are presented by comparing IFC Guidelines.	Paragraph Section 4.3.4.2
Environmental management plan	3	Responsible organization, responsibilities, estimated budget and emergency response plan for implementing mitigation measures and monitoring to mitigate environmental impacts are completely described.	Chapter 7
Operation phase			

Commitment List	No	Explanation of Commitment	Chapter
Outdoor Air pollution	3.1	• Diesel consumption of generator • Turn off equipment and machines when not in use. • Proper ventilation for generator room. • Ozone depletion substances will not be used in Air conditioning system. • Plant and grass plantation programs must be provided at project site • Grow efficient air-purifying plants • Install sufficient ventilation must be used in places where exposures can be excessive. • Water spraying just need inside and outside of the project site before the loading/ unloading process. • Plant and grass plantation programs must be provided at project site • Grow efficient air-purifying plants e.g. areca Palm, aloe Vera and climbing ivy etc. • Enforce to wear PPE to employees	Table 7.1
Indoor Air pollution	3.2	• Install sufficient ventilation must be used in places where exposures can be excessive. • Well ventilation for the source of pollutant areas • Grow efficient air-purifying plants e.g. areca Palm, aloe Vera and fern etc. • Install the fine particles (PM) and CO_2 detectors • Enforce to wear PPE to employees	Table 7.1
Water pollution	3.3	• Minimize the amount of water used • Avoid generating unnecessary wastewater • Separate the drainage and pipeline system for sewer line and surface runoff • Regularly check the septic tank to avoid leakage of sewage. • Control oil generating from the domestic activities and generator room. • All drainage systems are covered and liquid wastes are disposed to the septic to avoid soil population	Table 7.1
Noise pollution	3.4	• Use equipment and machines which generate low noise levels. • Regular maintenance for noise generation machines such as sewing machine, cutter, and equipment from the operation process. • Provide adequate ear protection (ear plugs or muffs) to workers working in the excessive noise areas.	Table 7.1

Commitment List	No	Explanation of Commitment	Chapter
		• No employee should be exposed to a noise level greater than 85 dB(A) for a duration of more than 8 hour per day without hearing protection. In addition, no unprotected ear should be exposed to a peak sound pressure level (instantaneous) of more than 140 dB (C). • Grow noise-absorbing plants (e.g. Areca Palm, etc.,) • Install sound (esp. echo) proof curtain	
Odor	3.5	• Store the stain removers in a well-ventilated area. • Keep the stain remover containers tightly closed using PPEs. • During the stain removing activities, the employee must wear mask, chemical splash goggles and handling with chemical resistant gloves, like Nitrile glove. • Provide sufficient ventilation system for working area. • Task-shifting and task-sharing. • Provide specific storage area within the factory to collect waste that emit VOCs. • Daily cleaning the toilets, floors and basins. • Regularly check the septic tank to avoid leakage of sewage. • Regularly disposal of sewage from septic tanks by township municipalities.	
Industrial Solid waste	3.6	• Chemical wastes like thinner and wastes from clinic should be collected in separate bins and disposed properly • Provide masks and gloves for those staffs • Provide training to workers on how to handle the chemical waste. • Soaking the spilled chemicals with sawdust and sand will be done as spill response plan. • Regular disposal to final disposal sites by Pakokku City Development Committee on weekly basis • Record waste transfer by notes	Table 7.1
Domestic Solid waste	3.7	• Use marked bins to segregate dry and wet waste. • Waste must be separated by type of waste and systematically disposed into containers. • Recyclable waste bins must be supplied and a good practice of waste sorting habit must introduce for wastes that can recycle. • Regular disposal to final disposal sites by Pakokku City Development Committee on weekly basis • Record waste transfer by notes	Table 7.1

Commitment List	No	Explanation of Commitment	Chapter
Occupational Health and Safety			
Physical injuries	3.8	• Use a device (forklift) to lift and reposition heavy objects • Store heavy objects at waist height • Use personal protective equipment (PPE) like shoulder pads to cushion loads carried on the shoulder • Workplace exercises include stretching exercises focusing on neck, shoulders, low back, and hand and wrist	Table 7.1
Weak of enforcement in good safety practices	3.9	• Officially set the restricted laws and regulations • Personal protective equipment (PPE) must be worn • Educate and train them for health education and workers in First Aid Kit training • Sharing the knowledge concerned with first aid	Table 7.1
Emergency and Firefighting program	3.10	• Train almost all of the workers and staffs for firefighting and mock drills for firefighting. • Educate workers for safety awareness in work place. • Sharing program to workers	Table 7.1
Environmental Monitoring Program	4	The objectives of environmental monitoring program are outlined in five points.	Paragraph Section 7.4.
Outdoor Air Quality	4.1	• Parameter - PM2.5 and PM10, TSP, SO2, NO2, CO, O3 • Guidelines - NEQEG (2015) • For operation phase • Area to be Monitored - Near Boiler Stack • Frequency - Once a year • For decommission phase • Area to be Monitored - Within the project site • Frequency - Once a year	Table 7.3
Indoor Air Quality	4.2	Parameter - CO_2, $PM_{2.5}$ and PM_{10}, TVOC, Formaldehyde • Guidelines - NEQEG (2015) • **For operation phase** • Area to be Monitored - Both sewing lines and production area	Table 7.3

Commitment List	No	Explanation of Commitment	Chapter
		• Frequency - Twice a year	
Water Quality	4.3	• Parameter - pH, BOD, COD, Ammonia, TSS, Iron, Oil and Grease, temperature, Total Chlorine • Guidelines - NEQEG (2015) and WHO • **For operation phase** • Area to be Monitored - Domestic waste water • Frequency - Twice a year • **For decommission phase** • Area to be Monitored - wastewater discharged from point • Frequency - Twice a year	Table 7.3
Noise	4.4	• Parameter - Noise Level (DBA) • Guidelines - NEQEG (2015) and international limit • **For operation phase** • Area to be Monitored - Generator room and Operation area (Sewing line) • Frequency - Twice a year during operation period • **For decommission phase** • Area to be Monitored - Within the project site • Frequency - Twice a year	Table 7.3
Solid Waste	4.5	• Parameter - Industrial and domestic solid waste • Guidelines - Standards of Myanmar National Master Plan • **For operation phase** • Area to be Monitored - Production Area, Dining area, Accommodation, Toilet, Factory compound • Frequency - Weekly • **For decommission phase** • Area to be Monitored - Within the project site • Frequency - Weekly	Table 7.3
Occupational Health and Safety	4.6	• Parameter - Record of incident/accident report, first aid training report, health checkup and seasonal diseases	Table 7.3

Commitment List	No	Explanation of Commitment	Chapter
		• **For operation phase** • Area to be Monitored - The whole factory and production sector • Frequency - Daily • **For decommission phase** • Area to be Monitored - Within the project site • Frequency - Daily	
Emergency Risk	4.7	• Parameter - Records of mock drill, self-inspection to firefighting facilities and emergency and its response • **For operation phase** • Area to be Monitored - The whole factory and production sector • Frequency - Twice a year • **For decommission phase** • Area to be Monitored - Within the project site • Frequency - Twice a year	Table 7.3
Environmental monitoring team	4.8	The names and positions of people who are responsible for environmental monitoring program are described in table.	Table 7.2
Estimated budget for environmental monitoring team	4.9	The estimated budget for environmental monitoring program is described in table.	Table 7.5
Corporate Social Responsibilities	4.10	CSR program of project proponent are mentioned.	Paragraph Section 7.6

CHAPTER 4
SURROUNDING ENVIRONMENT

4.1. INTRODUCTION

The purpose of this section is to predict how environmental and socio-economic conditions will be impacted because of the implementation of the proposed project. This requires a sound understanding of the baseline conditions at the project site, which established through desktop study research, site surveys, primary data collection and projections for future developments. Findings provide the current and future characteristics of the Project Site and the value and vulnerability of the key environmental and socio-economic resources and receptors. The following sections provide a description of the environmental and socio-economic aspects of the Project.

The project area is defined as an area surrounding the project site from which the baseline information collection should collect. The project site has a coverage of about 4.54 acres in area extent, located in Pathein Industrial Zone, Pathein Township, Ayeyarwady Region. In the EMP report, the area of about 500-meter radius around the project site has been studied to check the impacts for the surrounding environment.

Three groups of components are consisted in studying surrounding environment. They are (i) Physical Components, (ii) Biological Components and (iii) Socio-economic Components.

4.2. PHYSICAL ENVIRONMENT

The relevant physical environment consists of climate and meteorology, topography, geology, water quality, baseline environmental quality, which are described as follows.

4.2.1. Overview of The Project Area

The Project Site will occupy 18368.84 m2 in Block No. (P-3), Plot No.52, Industrial Zone, Ward No. 13, Pathein Township, Pathein District, Ayeyarwady Region. Pathein Township is located in the southern part of Myanmar, lies between North latitudes 16˚ 17′ 10” along with 17˚ 10′ and 46” between East longitudes 94˚ 45′ 56” and 94˚ 22′ 14”. Overview map of the project area as shown in Figure 4-1.

Since the project factory is located at the Pathein Industrial Zone, Yangon-Pathein main road, its neighborhood is bordered by other factories such as undeveloped areas and garment factories within 500 m radius of study area. The area on the other side of the road is occupied by the mixed residential and commercial area identified by dwelling areas and small commercial shops such as tailoring shops, and tea shops etc. Adjacent factories in the surrounding the project site and information of those factories are shown in Table 4-1 and Figure 4-1.

Table 4-1 Adjacent factories in the project site

No	Name	Type of Factory
1	Amava Garment	Garment
2	Dong Long (Pathein) Garment Co.,Ltd	Garment
3	Myanmar Knitting Factory	Garment
4	He Shan (Myanmar) Garments Co.,Ltd	Garment
5	Hwapotai Fabric Store	Garment
6	Chia Moon Garment	Garment
7	EMB Computer Embroidery	Garment
8	North Shore Group	Garment

Figure 4-1 Overview map of the project area

4.2.2. Climate and Meteorology

The project area is located in Pathein Township, Ayeyarwady Region. It lies on 27ft above the sea level and has a tropical climate. The tropical monsoon climate of Pathein has three seasons – summer (March to mid-May), rainy (Mid-May to Mid-October) and winter (Mid-October to February). April is the hottest month (highest recorded temperature 37.7°C and December the coldest (lowest recorded temperature 17.8°C). During the monsoon, rainfall is short and intense – often more than 100 mm of water falls in an hour resulting in localized flooding. mm). The temperature and rainfall data (2015-2018), Pathein Township is shown in Table 4-2.

Table 4-2 2017-2018 temperature and rainfall data in Pathein Township

No.	Year	Rainfall		Temperature	
		Raining day	Total rainfall (Inches)	Summer season (Mix °C)	Winter season (Min °C)
1	2017 - 2018	118	88.78	40.0	12.0
2	2018 - 2019	128	13.12	41.8	14.0
3	2019 - 2020	125	13.24	40.03	13.2

(Source: Regional Data, Administrative Department, Pathein Township, Ayeyarwady Region, February 2020)

4.2.3. **Topography**

Pathein Township is located in the south-west area of Myanmar, the Latitude 16˚ 17′ 10” along with 17˚ 10′ and 46” N between longitudes 94˚ 45′ 56” and 94˚ 22′ 14” E of 27ft above mean sea level which is about 150 km west of Yangon and 40 km east from coast line. Pathein Township is about 1,450 km^2, which stretches 50 km east and west, and 68 km north and south. The township belongs to Pathein District and Ayeyawady Region, which region shares border with Rakhine State, Bago Region, and Yangon Region.

The township is surrounded by Thabaung and Kangyidaunt townships in the east, in the west The Bay of Bengal is located then Ngaputaw in the south and Gwa Township in the north receptively. Pathein can be divided by Ayeyarwady delta region, the joint of Rakhine Yoma Mountainous area and beach area. Rest of the area about 75 percent are low land areas.

4.2.4. **Geology**

Younger alluvium formation is mainly dominant in Pathein township and other exposures can be observed on Ayeyarwaddy delta region. Alluvium (8-10 meters thick) is loose, ranging from very fine to medium grained, unconsolidated soil or sediment that has been eroded, reshaped by water in some form and redeposited in a non-marine setting. Alluvial-fan and wash gravel, with interbedded and intermixed sand; poorly to moderately. The geological map of the project area is as shown in Figure 4-2.

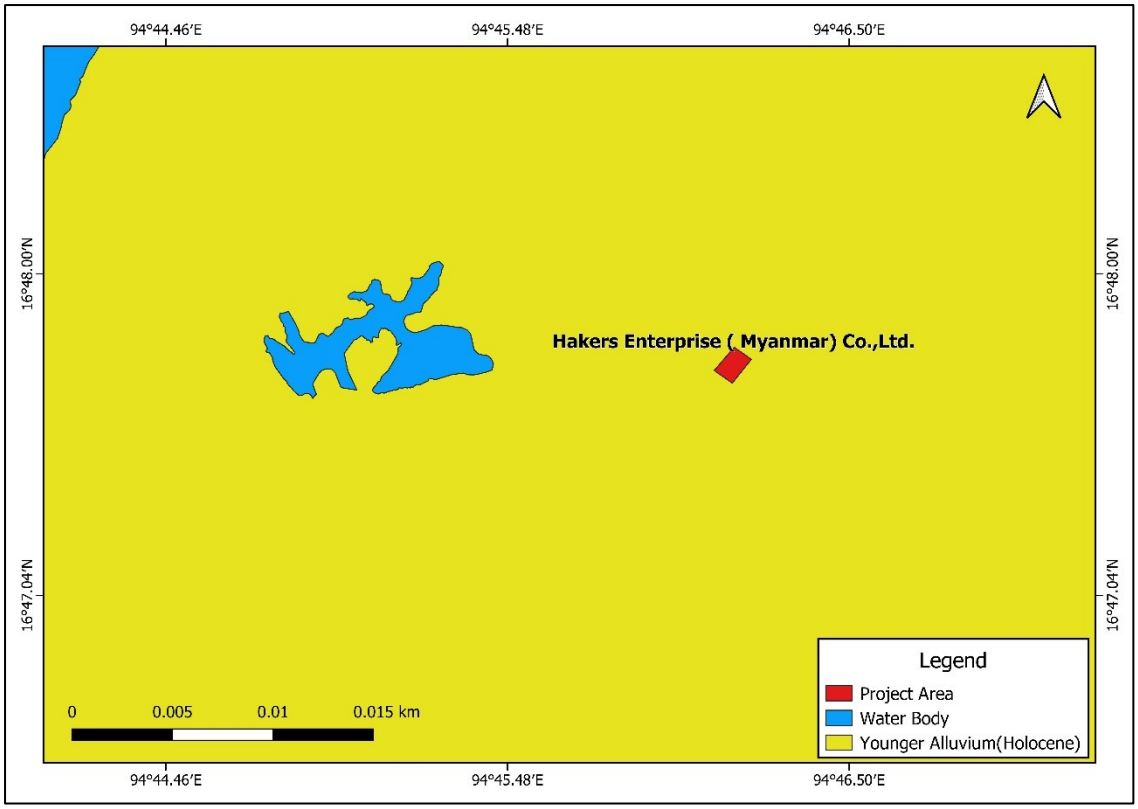
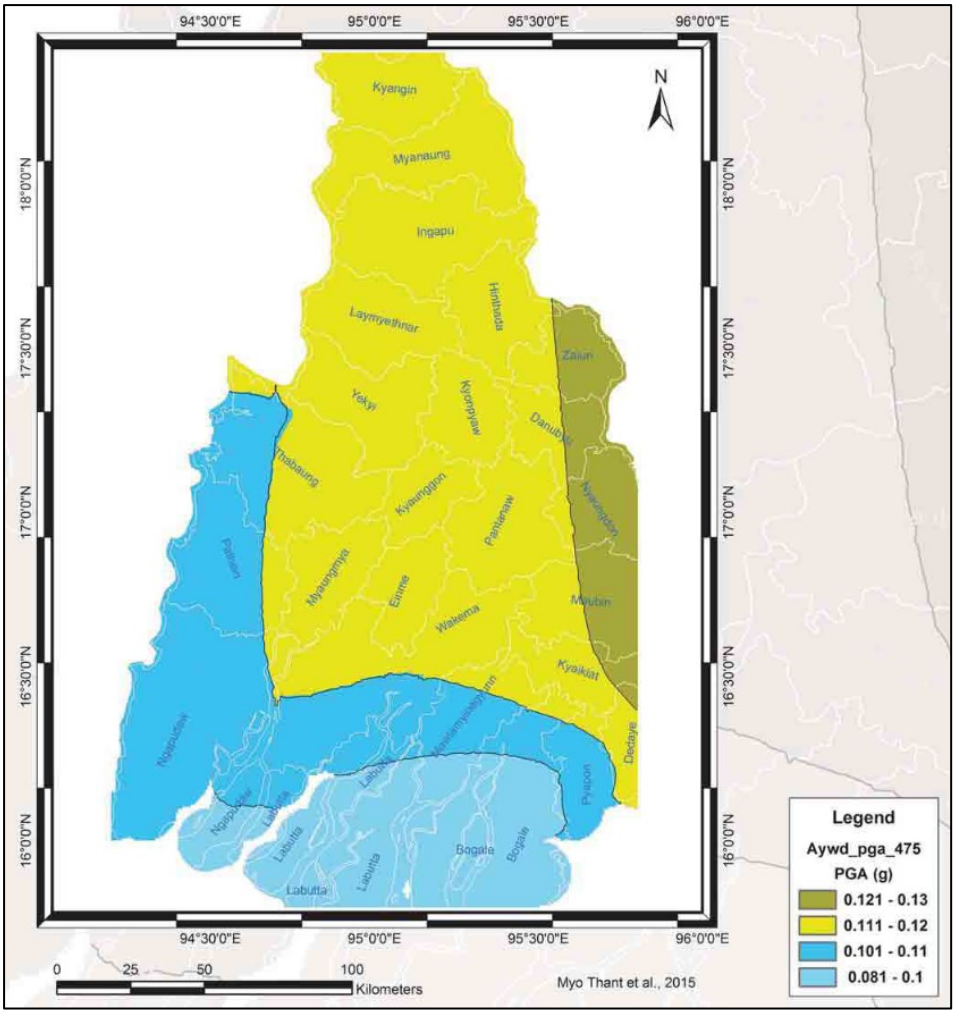


Figure 4-2 Geological map of the project area

4.2.5. **Seismic Background**

In and around Ayeyarwady Region, most of the earthquakes happened are shallow focus earthquakes, especially within about 250km in radius. Most are related with Sagaing fault and the seismic intensity map of Ayeyarwady area is shown in Figure 4-3.

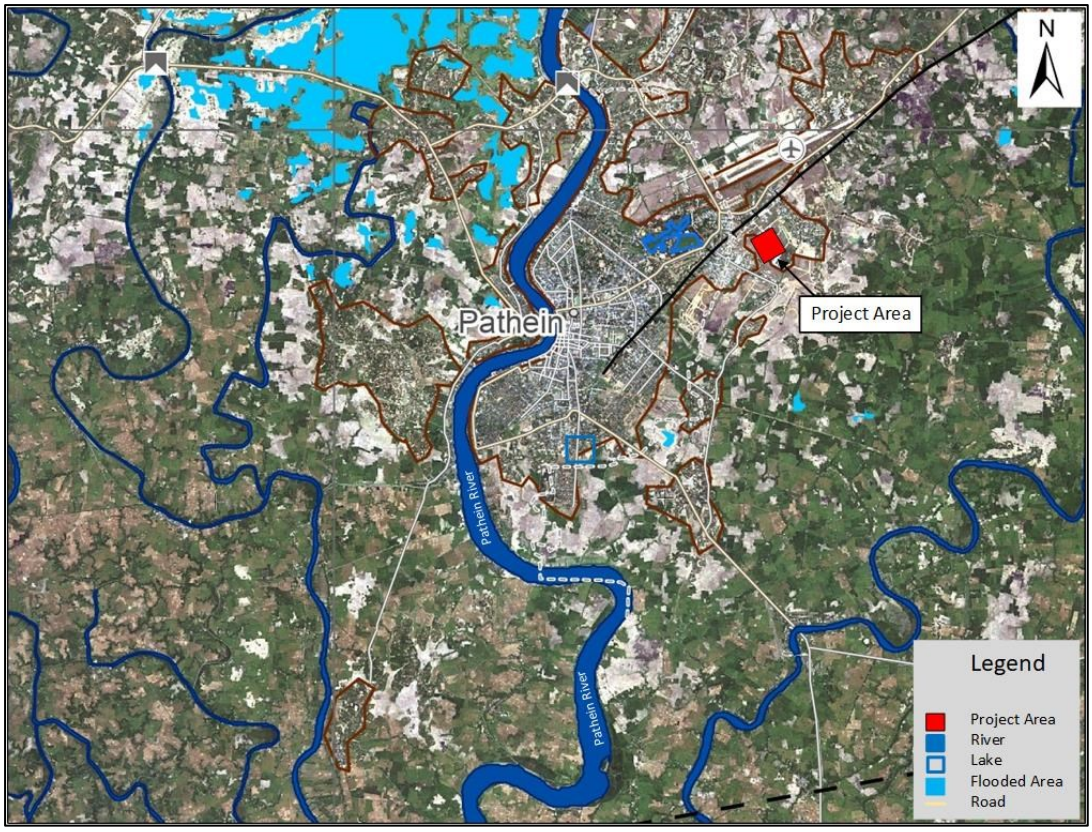


(Source: Myanmar Earthquake Committee)

Figure 4-3 Seismicity Map of Ayeyarwady area

4.2.6. **Hydrogeology**

There are three distinct rivers in Pathein Township namely Ngawun river (or) Pathein river, Thandwe river and Phaye river. Ngawun river discharge from the Northern Daka river which flows into the southern Gwe Kone Ywar then connects with Thadwe and Phaye rivers. Finally, these flow through the Ngaputaw Township. The length has 22miles. Hydrogeological map of Pathein Township is shown in Figure 4-4.



(Source & Reference from Copernicus Europe's eyes on Earth)

Figure 4-4 Hydrogeological Map of Pathein Township

4.3. BASELINE ENVIRONMENTAL QUALITY

4.3.1. Air Quality

4.3.1.1. Outdoor Air Quality

Air quality measurement was conducted at the project area during 23rd -24th April 2021. The OCEANUS-AQM09 was used for air monitoring survey. The measurement station for air quality is as displayed in Figure 4-5.

The measurement station is located at the project area and monitoring point is located near boiler. The sampling point is surrounded by the garment factories in the east, garment factories, undeveloped and residential areas are mixed in the north and south then residence areas in the west. The continuous flow of passing by cars and motorcycles, and other small-scale commercial workshop activities.

Project Name	Air Quality Measurement GPS Location	Date
Hakers Enterprise (Myanmar) Co., Ltd.	16°47'44.63"N 94°46'7.84"E	23rd and 24th April 2021

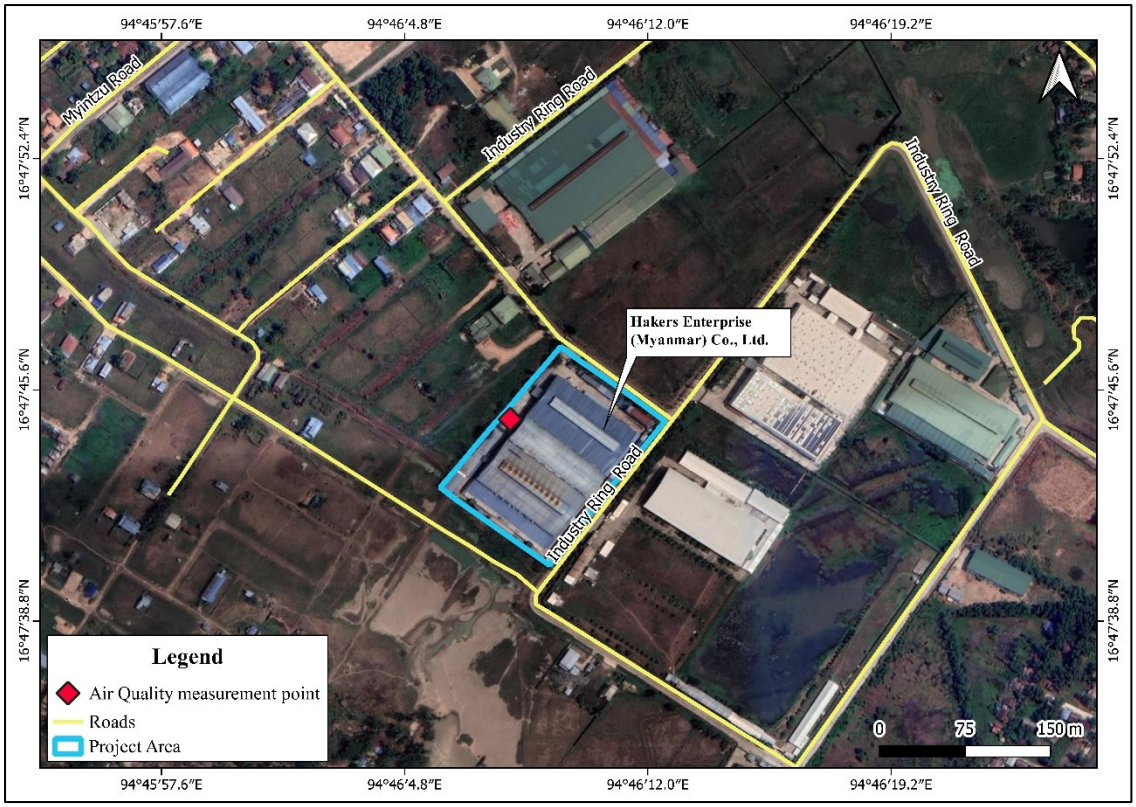
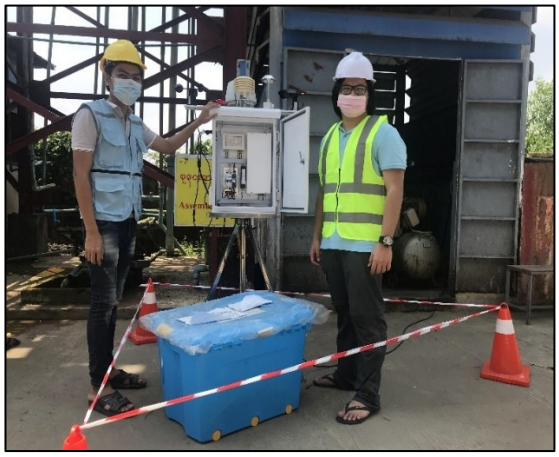


Figure 4-5 Air quality measurement location

The OCEANUS-AQM09



Air quality measurement

Figure 4-6 Air quality monitoring during field trip (23rd-24th April 2021)

The emission of harmful gaseous pollutants in the atmosphere is a major health issue. The garment operations generate different kinds of air pollution, depending upon the kinds of fuels use in boilers. Therefore, the 24-hour measurements of air quality are performed by the consultants during the field trip from 23rd - 24th April 2021 as displayed in Figure 4-6. These measurements were made in accordance with the guidelines of National Environmental Quality (Emission) Guidelines in the project site area. The measured parameters are dust (PM_{10} and $PM_{2.5}$), gas (NO_2, CO_2, CO, SO_2, O_3), total suspended particulate (TSP), relative humidity, air pressure, and temperature etc., for outdoor air quality.

Based on the findings, both 24-hour and 1-year average of Nitrogen Dioxide (NO2) concentration does not exceed the guideline values of WHO and NEQG. At the 2:00 pm and 3:00 pm, the result of particulate matter (PM10 and PM2.5) was a peak about 55µg/m3 and about 48 µg/m3 respectively owing to moving transportation vehicles near the detection zone. The rest concentrations were also within the guideline values at the average period but the average values of PM2.5 is slightly higher than the guideline values of 24-hours and 1-year. Carbon Monoxide (CO) lied below the standard values of air quality. The rest parameters are agreed with the standard limitations as shown in Figure 4-8 and Table 4-3.

Winds are an integral part of the thermodynamic mechanism of the atmosphere by which heat, moisture, particles, and other properties are transferred from one place to another. The exchange of pollutants and other environmentally important trace gases are also affected by wind speed and wind direction. Wind speed and wind direction's average values of project area is 0.2 m/s and 212.09° respectively.

Consequently, prevention of air and mitigation measures should make in the project site area. The laboratory result has been attached to the **Appendix B**.

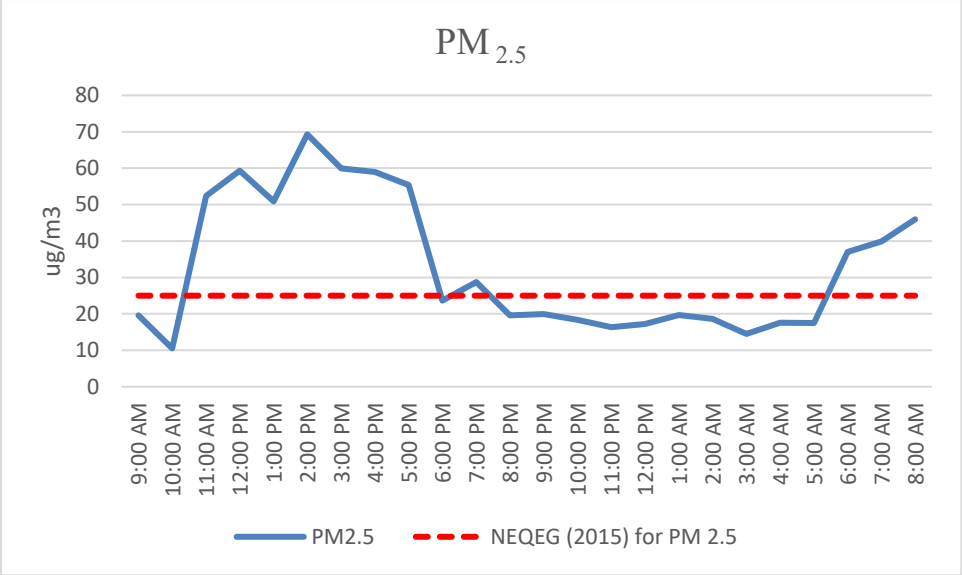


Figure 4-7 Demostration graphs of Particulate Matters ($PM_{2.5}$ and PM_{10})

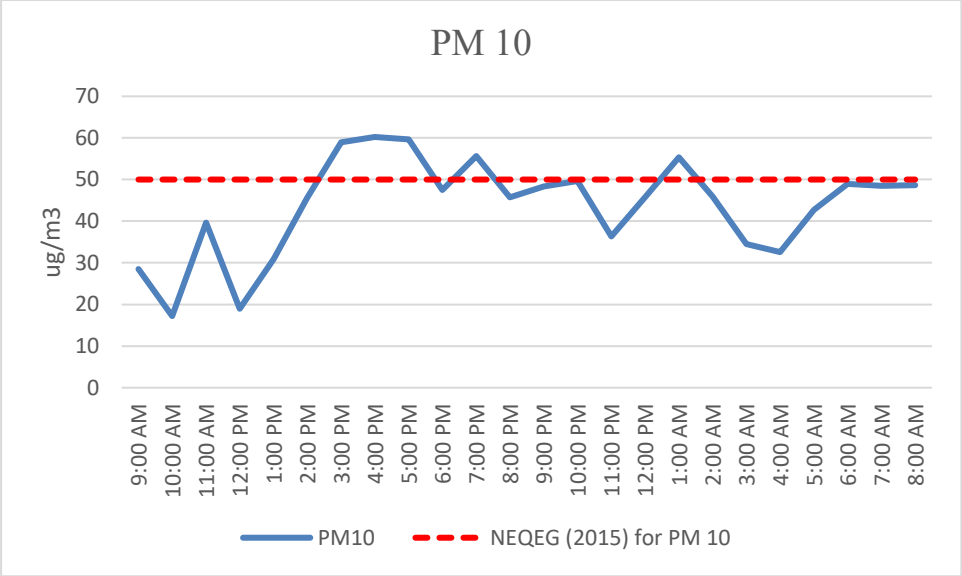


Figure 4-8 Demonstration Graphs of Air Quality Measurement (1hour)

Table 4-3 Results of the Ambient Air Monitoring Measurement

No.	Parameter	Result	Unit	Average Period		WHO Guideline Value	NEQG* Guideline Value
1	Particulate Matter PM_{10}	43	$\mu g/m^3$ $\mu g/m^3$	1 24	Year Hour	-	*20 $\mu g/m^3$ *50 $\mu g/m^3$
2	Particulate Matter $PM_{2.5}$	37	$\mu g/m^3$ $\mu g/m^3$	1 24	Year Hour	25$\mu g/m^3$	*10 $\mu g/m^3$ *25 $\mu g/m^3$

No.	Parameter	Result	Unit	Average Period		WHO Guideline Value	NEQG* Guideline Value
3	Total Suspended Particulate (TSP)	60.78	µg/m^3	24 Hours		NG	NG
4	Sulphur Dioxide (SO_2)	3	µg/m^3 µg/m^3	10 24	Mins Hours	8 ppb	* 500 µg/m^3 * 20 µg/m^3
5	Nitrogen Dioxide (NO_2)	55	µg/m^3 µg/m^3	1 1	Year Hour	21 ppb	*40 µg/m^3 *200 µg/m^3
6	Carbon Monoxide (CO)	0.3	ppm	8 Hours		9 ppm	NG
8	Ozone (O_3)	60.51	µg/m^3	8 Hours		NG	100
9	Relative Humidity	79.54	%	24 Hours		NG	NG
10	Temperature	29.29	°C	24 Hours		NG	NG
11	Air Pressure	1008.1	hPa	24 Hours		NG	NG
12	Wind Speed	0.2	m/s	24 Hours		NG	NG
13	Wind Direction	212.09		24 Hours		NG	NG

*National Environmental Quality (Emission) Guidelines (2015) NG=No Guideline

4.3.1.2. Indoor Air Quality

The measurement was made by smart sensor and air quality monitor devices during one hour for indoor air quality during the field trip from 23rd - 24th April 2021 as displayed in Figure 4-9. Design drawing room, laser cutting room, foam fabric cutting room, fabric cutting lines, branding room, sewing lines, ironing lines and finishing lines were carried out the measurements. Air quality Index (AQI) can be classified as the grades likes danger to very good with standard parameter for formaldehyde (HCHO) and total volatile organic compound (TVOC) and detailed air results are shown in Table 4-8.

The parameters include dust ($PM_{2.5}$ and PM_{10}), formaldehyde (HCHO) along with volatile organic compound (VOC) were detected as an indoor air quality. Measuring the $PM_{2.5}$ and PM_{10}, then VOCs have a variety of chemicals, some of which may have short-

and long-term adverse health effects, long-term HCHO exposure may experience cancer with the purpose of protecting respiratory tract diseases to the staffs near the main operation areas. According to the results, PM 2.5 and 10 are unhealthy level in laser cutting room and fabric cutting room because fabric cutting activities generates air borne particles. The air quality test result is attached in **Appendix B**.

Table 4-4 Standard Parameter for Carbon Dioxide

Ranges	Unit	Potential Health Problems	Impact
250 - 350	ppm	Normal	Normal
350 – 1000		Typical level found in occupied spaces with good air exchange	Good
1000 – 2000		Level associated with complaints of drowsiness and poor air.	Fair
2000 – 5000		Level associated with headaches, sleepiness, and stagnant, stale, stuffy air; poor concentration, loss of attention, increased heart rate and slight nausea may also be present.	Low
> 5000		Unusual air conditions where high levels of other gases also could be present. Toxicity or oxygen deprivation could occur. This is the permissible exposure limit for daily workplace exposures	Medium
> 40000		Immediately harmful due to oxygen deprivation	High

Source: Carbon Dioxide Detection and Indoor Air Quality Control by OHS/ Modified by HA Team

Table 4-5 Indoor Air Quality Index (AQI)

Index Value	Descriptor	Revised Breakpoints (µg/m^3, 24-hour average)		Cautionary Statements
		$PM_{2.5}$	PM_{10}	
0 - 50	Good	0.0 - 12.0	0.0 - 54.9	None
51 - 100	Moderate	12.1 - 35.4	55 – 154.9	Unusually sensitive people should consider limiting prolong exposure
101 - 150	Unhealthy for sensitive groups	35.5 - 55.4	155 – 254.9	Children and adults with respiratory disease should limit the exposure
151 - 200	Unhealthy	55.5 - 150.4	255 – 354.9	Both children and adults should limit the exposure
201 - 300	Very unhealthy	150.5 - 250.4	355 – 424.9	All ages of people with respiratory disease should avoid all the exposure
301 - 500	Hazardous	250.5 - 500	425 – 604.9	Everyone should avoid all exertion/ may experience more serious health effects

* A Guide to Air Quality Index by U.S Environmental Protection Agency (EPA)

Table 4-6 Standard Parameter for Formaldehyde (HCHO)

Standard Guideline	Unit	Range
0.101-0.200	mg/m^3	Low
0.201-0.300		Medium
0.301 or more		high

Source: A Guide to Air Quality Index by U.S Environmental Protection Agency (EPA)

Table 4-7 Standard Parameter for Total Volatile Organic Compound (TVOC)

Standard Guideline	Unit	Range
0.600	mg/m^3	Safe
0.601 or more		Danger

Source: A Guide to Air Quality Index by U.S Environmental Protection Agency (EPA)

<table>
<tr><td> 
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<tr><td>Carbon dioxide Detector</td><td>Dust Detector</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Branding Room</td><td>Sewing Lines</td></tr>
</table>

Figure 4-9 Indoor Air quality measurement

Table 4-8 Indoor Air Result

No.	Location	Parameter	Activities	Result	*EPA (Air Quality Index, AQI)
1	Design drawing room	Carbon Dioxide (CO_2)	Drawing the design	1921ppm	Fair
		Particulate Matter (PM_{10})		23 µg/m^3	Good
		Particulate Matter ($PM_{2.5}$)	Drawing the design	20 µg/m^3	Moderate
		Total Volatile Organic Compound (TVOC)		0.098 mg/m^3	Safe
		Formaldehyde (HCHO)		0.016 mg/m^3	Low
2	Laser cutting room	Carbon Dioxide (CO_2)	Cardboard and design are cutting	662 ppm	Good
		Particulate Matter (PM_{10})		182 µg/m^3	Unhealthy for sensitive groups
		Particulate Matter ($PM_{2.5}$)		143 µg/m^3	Unhealthy
		Total Volatile Organic Compound (TVOC)		0.091 mg/m^3	Safe
		Formaldehyde (HCHO)		0.015 mg/m^3	Low
3	Foam fabric cutting room	Carbon Dioxide (CO_2)	Not operating	600 ppm	Good
		Particulate Matter (PM_{10})		43 µg/m^3	Good
		Particulate Matter ($PM_{2.5}$)		33 µg/m^3	Moderate
		Total Volatile Organic Compound (TVOC)		0.033 µg/m^3	Safe

No.	Location	Parameter	Activities	Result	*EPA (Air Quality Index, AQI)
		Formaldehyde (HCHO)		0.005 µg/m^3	Low
4	Fabric cutting lines	Carbon Dioxide (CO_2)	Cutting process is present.	605 ppm	Good
		Particulate Matter (PM_{10})		46 µg/m^3	Moderate
		Particulate Matter ($PM_{2.5}$)		37 µg/m^3	Unhealthy for sensitive groups
		Total Volatile Organic Compound (TVOC)		0.065 mg/m^3	Safe
		Formaldehyde (HCHO)		0.009 mg/m^3	Low
5	Branding room	Carbon Dioxide (CO_2)	Branding process is present.	578 ppm	Good
		Particulate Matter (PM_{10})		45 µg/m^3	Good
		Particulate Matter ($PM_{2.5}$)		34 µg/m^3	Moderate
		Total Volatile Organic Compound (TVOC)		0.009 mg/m^3	Safe
		Formaldehyde (HCHO)		0.001 mg/m^3	Low
6	Sewing Lines	Carbon Dioxide (CO_2)	Sewing process is present.	636 ppm	Good
		Particulate Matter ($PM_{2.5}$)		36 µg/m^3	Moderate
		Particulate Matter (PM_{10})		44 µg/m^3	Good
		Total Volatile Organic Compound (TVOC)		0.269 mg/m^3	Safe
		Formaldehyde (HCHO)		0.044 mg/m^3	Low
7	Ironing Lines	Carbon Dioxide (CO_2)	Ironing process is present.	585 ppm	Good
		Particulate Matter ($PM_{2.5}$)		33 µg/m^3	Moderate
		Particulate Matter (PM_{10})		42 µg/m^3	Good

No.	Location	Parameter	Activities	Result	*EPA (Air Quality Index, AQI)
		Total Volatile Organic Compound (TVOC)		0.052 mg/m^3	Safe
		Formaldehyde (HCHO)		0.008 mg/m^3	Low
8	Finishing Lines	Carbon Dioxide (CO_2)	Finishing process is present.	697 ppm	Good
		Particulate Matter ($PM_{2.5}$)		34 µg/m^3	Moderate
		Particulate Matter (PM_{10})		44 µg/m^3	Good
		Total Volatile Organic Compound (TVOC)		0.124 mg/m^3	Safe
		Formaldehyde (HCHO)		0.018 mg/m^3	Low
8	Office (Production Room)	Carbon Dioxide (CO_2)	Office operation is present.	811 ppm	Good
		Particulate Matter ($PM_{2.5}$)		25 µg/m^3	Moderate
		Particulate Matter (PM_{10})		32 µg/m^3	Good
		Total Volatile Organic Compound (TVOC)		0.189 mg/m^3	Safe
		Formaldehyde (HCHO)		0.028 mg/m^3	Low

* A Guide to Air Quality Index by U.S Environmental Protection Agency

4.3.2. **Water Quality**

The production process does not produce waste-water, therefore water sample was collected from domestic effluent from workers, shown in Figure 4-10. The process was conducted on 24th April 2021 then sent to the laboratory. As the result, pH level of water is nearly neutral stage and the other parameters such as BOD, COD, Total suspended solid (TSS) and so on. Water sample collection map of Hakers Enterprise factory is shown in Figure 4-11. The laboratory test result is attached in **Appendix C**.

Figure 4-10 Water Sample Collected from the Drain within the Factory's Compound

Project Name	Air Quality Measurement GPS Location	Date
Hakers Enterprise (Myanmar) Co., Ltd.	16°47'45.23"N 94°46'8.56"E	23rd and 24th April 2021

Figure 4-11 Location of Water Sample

Table 4-9 Domestic Water Quality Result

No.	Parameter	Result	Unit	Method	WHO Guideline Value	NEQG* Guideline Value	Remark
1	pH	7.34	-	Hanna (HI 2211)-pH and Temperature Meter	6.5-8.5	6-9	Under the guideline
2	Iron	3.45	mg/l	Phenanthroline	0.3	3.5 mg/l	Under the guideline
3	Total suspended solid	20	mg/l	Drying Method	NG	50 mg/l	Under the guideline
4	Total Chlorine	0.05	mg/l	Portable Photometer	NG	0.2 mg/l	Under the guideline
5	Ammonia	1.6	mg/l	Spectrometer	NG	10 mg/l	Under the guideline
6	Biological Oxygen Demand (BOD)	14.79	mg/l	DO and BOD Meter	NG	≤50 mg/l	Under the guideline
7	Chemical Oxygen Demand (COD)	32	mg/l	Spectrometer	NG	≤250 mg/l	Under the guideline
8	Oil and grease	13	mg/l	Soxhlet Extraction Method	NG	10	Little above the guideline

*National Environmental Quality (Emission) Guidelines (2015) NG=No Guideline

4.3.3. **Noise**

WHO has described noise pollution as an underestimated threat that can cause hearing loss, cardiovascular problems, cognitive impairment, stress and suffering from depression. Noise pollution can affect people in several ways, some of which are hearing loss, cardiovascular diseases, and sleep disturbances. MONREC (Ministry of Natural Resources and Environmental Conservation) has issued National Environmental Quality (Emission) Guidelines to provide the basis for regulations and control of noise level. Noise impacts should not exceed the levels presented in Figure 4-11.

Table 4-10 Noise Level Standard

Receptor	One Hour LAeq (dBA)[a]	
	Daytime 07:00-22:00 (10:00-22:00 for Public holidays)	**Nighttime 22:00 – 07:00 (22:00 – 10:00 for Public Holidays)**
Residential, Institutional, educational	55	45
Industrial, commercial	70	70

[a] Equivalent continuous sound level in decibels

A reconnaissance survey of noise level measurements was made in the garment factory in order to ensure and protect from the hazardous work environment. The data were collected on 23rd April 2021. Noise measurements are needed to make in the garment factory as it helps in identifying work locations where there are noise problems, employees who may be affected, and in checking the compliance with noise regulations, noise control and community annoyance. It is also important to determine if noise is a potential problem in the workplace. Equipment that is used to measure ambient noise measurement is as shown below in Figure 4-12. The stations which were made noise measurements are shown in Figure 4-13.

GM-1356 Digital Sound Level Meter It is used for measuring noise and other sounds in the project factory.	

Figure 4-12 Equipment used to measure noise levels

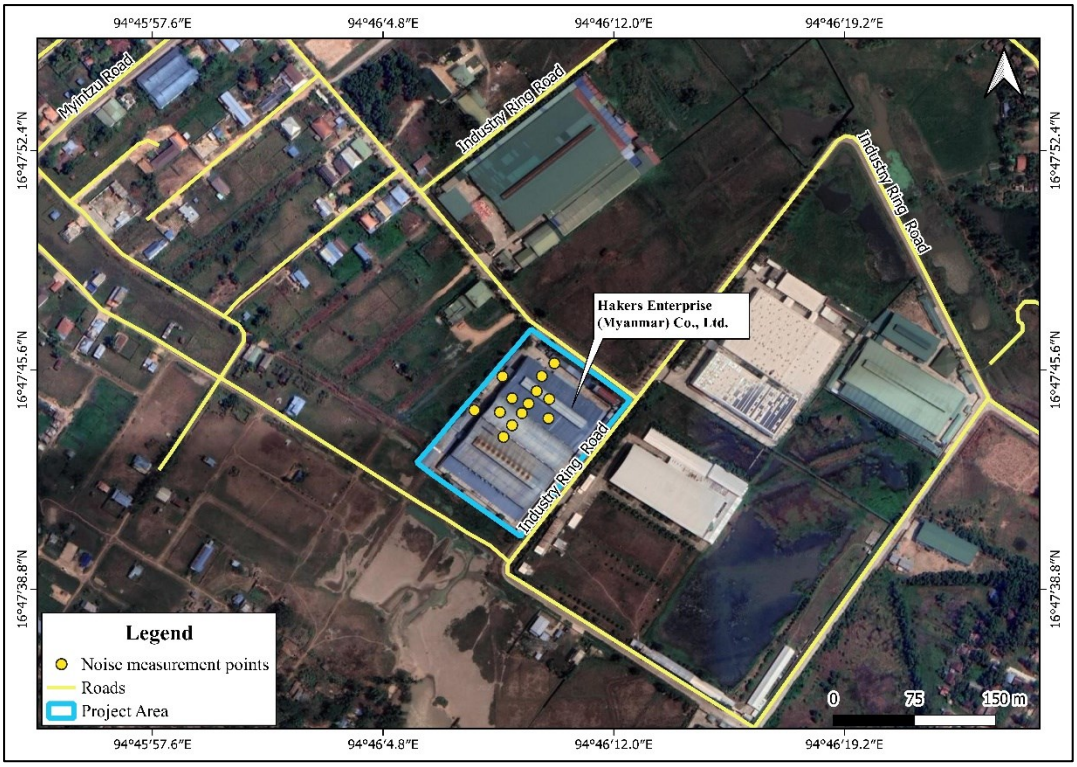


Figure 4-13 Noise quality measurement stations

The measurements of noise quality were made in office, warehouse, fabric cutting room, foam fabric cutting room, mold pattern room, working lines and sewing lines of the production area. The measurements were made in the office which is the center point of organization and performs a clerical function such as information collection, recording analyzing, distribution of information. All of the working lines were measured because they are the main operation processes in the garment factory such as sewing, cutting, ironing and inspection, and to identify hazards and associated risks relating to noise.

The description of noise results will be divided into those which are relevant to the guidelines and some are irrelevant to the guidelines. The workplaces which are applicable to the standard noise guidelines were office, warehouse, foam fabric cutting room, finishing line, ironing line and compound area. The rest places were disagreed with the standard guidelines.

The office is measured because it is not only a key operation for the office procedures but also a workplace for office staffs. It is noted that average noise level is ranging from 51.58 to 58.16 dBA at the maximum because there is no activity in the office, except the staff were talking. Thus, the measurements were relevant to the standard noise level.

In the compound of the factory, the result marks below the standard noise level which is around 63.53 dBA due to the generator and boiler were not operating that time. The maximum measured values of warehouse and foam fabric cutting room were 63.6 dBA and 67.91 dBA respectively. Although there were some minor activities like employees were talking and walking through the rooms, there is no operating process that time we measured. So, the measured values were below the standard noise level.

The highest noise level results of operation areas such as ironing and finishing lines were 67.78 dBA and 66.08 dBA below the standard noise level although there was operation is present. The values of cutting lines are around 69.49 and 70.16 dBA where only cutting process are present and it is a little higher than the standard guidelines because of playing the music when we measure.

When monitoring all of the sewing lines and mold pattern room, the values were ranging from 71.83 to 75.5 dBA and 75.56 to 77.23 dBA. Those were moderately higher than the guideline. While making the noise survey, there was only sewing activity in sewing lines but there were sewing and foam fabric molding activities in mold pattern room. The results and graph of noise measurement are shown in Table 4-11 and Figure 4-14, and the measurements made in the field visit are shown in Figure 4-15 respectively.

Table 4-11 Monitoring measurement of noise (dBA)

No.	Measurement Place	Current activity during monitoring	Noise Level (dBA)		NEQG[1] standard	
			Day Time		Residential, Institutional, educational	Industrial, commercial
			Minimum dBA	Maximum dBA		
1	Office	Employees talking	51.58	58.16	55	70
2	Warehouse	No activity	59.4	63.6		
3	Compound	Generator was not operating	60.43	63.53		
4	Foam fabric cutting room	Not operating but some employees were talking.	66.84	67.91		
5	Fabric Cutting room	Cutting is present.	69.49	70.16		
6	Finishing line	Operation is present.	62.06	66.08		
7	Mold pattern room	Foam fabrics were put in clothes and some employees were attaching accessories at clothes.	75.56	77.23		
8	Sewing line	Sewing is present.	71.83	75.5		
9	Ironing line	Ironing is present.	59.84	67.78		

[1]National Environmental Quality (Emission) Guidelines, 29 Dec 2016

*Average equivalent for one hour

**Average maximum for one hour

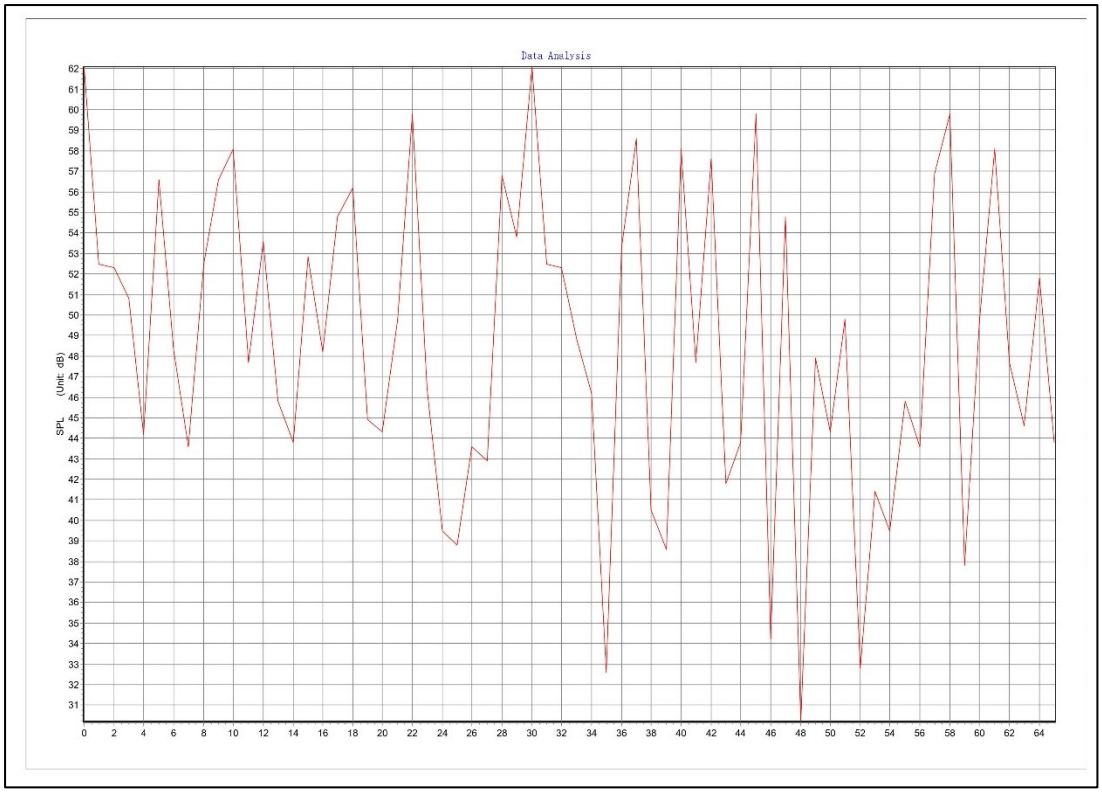
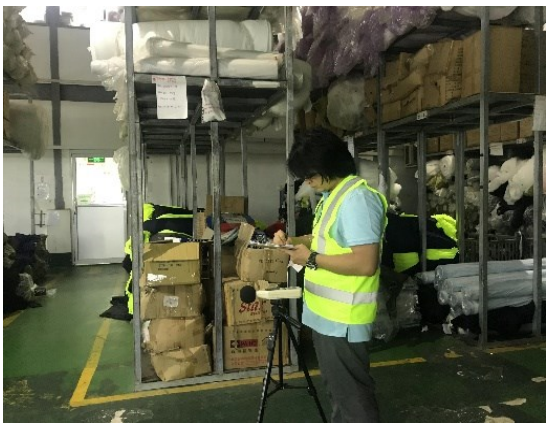


Figure 4-14 Noise Level Graph in the Garment Factory

	
Office area	Finishing line
	
Warehouse Area	Foam fabric cutting room

	
Sewing line	Cutting line

Figure 4-15 Noise Level Measurement in the Garment Factory

4.3.4. Lighting and Temperature

The workplace environment comprises an important aspect of an individual's overall wellbeing. Good lighting in the workplace can promote a reduced risk of occupational accidents, health problems, better concentration and accuracy in work. Activities of the workers in the garment factory are highly dependent on the quality of light and temperature for better visibility and work performance. Improper light and temperature levels can affect productivity and health negatively.

Therefore, the study team performed light and temperature measurement in the garment factory during April 23, 2021 site visit. Equipment used to measure light and temperature measurement are as shown below in Figure 4-16.

UT383-Mini Light Meter It is used to read ambient light in a scene, or the direct light from the light source.	
ROHS-Infrared Thermometer It is used to read the average room temperature and it shows current temperature of an object.	

Figure 4-16 Equipment used to measure light and temperature measurement

4.3.4.1. Light

According to the "Good Practices for Garment Factories" established by IFC (International Finance Corporation) and ILO (International Labor Office), proper lighting conditions are critical for good productivity. Many employers have found that lighting improvements have improved productivity by 10 percent, and reduced errors by 30 percent. Conversely, poor lighting can cause eye strain, fatigue and headache. Moreover, work area light intensity should be adequate for the general purpose of the location and type of activity, and should be supplemented with dedicated work station illumination, as needed.

As stated in General EHS Guidelines by International Finance Corporation (World Bank Group) on 30th April 2007, the minimum limits of illumination intensity for precision work such as office, moderately difficult assembly, sorting and checking are required to have 500 Lux at least.

Every working lines in the production areas were measured for the quality of light with a total of 12 stations including office. Every working lines were examined whether the light level meets the standard light level because those are the main operation features of in the factory. It is necessary for all the employees to see in a clear vision and to have better concentration in work.

The stations include office, meeting room, fabric warehouse, cutting line, sewing lines, ironing lines and finishing line, etc. Those areas were carried out for light measurement.

At first, office which is an important place for all kinds of office procedures, the measured values were below the minimum light intensity for a workplace. The results are applicable to the general purpose of the location and type of activity because the recommended level for office is within the range of 300-500 Lux.

The measurements were carried out in every working section. All of the sewing lines, the measure values around 536 to 831Lux were reached the standard value 500Lux except finishing line which don't meet the standard value. The average value of ironing lines, fabric cutting line section and laundry & spot cleaning room were 418Lux, 479Lux and 485Lux that was a little decreased comparison with the standard value of 500 Lux. Likewise, the measured values of light in meeting room and pattern drawing room, 667Lux and 580 Lux were overshot the standard value, however, foam fabric cutting room was significantly low which had 173Lux.

The general guideline table of light is shown in Table 4-12. And the results of light measurements are shown in Table 4-13.

Table 4-12 General EHS guidelines: Occupational Health and Safety[3]

Location/Activity	Light Intensity (Lux)
Emergency Light	10

[3] World Bank Group and IFC. (April 30, 2007)

Location/Activity	Light Intensity (Lux)
Out Door Non-Working Area	20
Simple orientation and temporary visits (machine storage, garage, warehouse)	50
Workspace with occasional visual tasks only (Corridors, stairways, lobby, elevator, auditorium, etc.)	100
Medium precision work (simple assembly, rough machine works, welding, packing, etc.)	200
Precision work (reading, moderately difficult assembly, sorting, checking, medium bench and machine works, etc.), offices.	500
High precision work (difficult assembly, sewing, color inspection, fine sorting etc.)	1,000-3,000

Table 4-13 Light measurement in garment factory (Lux)

No	Location/Activity	Measure Value (Lux)	*Standard Value (Lux)
1	Office	356	500
2	Meeting room	667	500
3	Fabric warehouse	471	200
4	Sewing line 2	544	500
5	Sewing line 3	760	500
6	Sewing line 4	536	500
7	Sewing line 9	573	500
8	Sewing line 11	831	500
9	Sewing line 14	571	500
10	Finishing line	404	500
11	Ironing line 1 and 2	418	500
12	Laundry & Spot cleaning room	485	500
13	Fabric cutting line	479	500
14	Cutting Room (Foam fabric)	173	500
15	Mold pattern room	380	500
16	Pattern drawing room	580	500
17	Packing room	225	200

*General EHS Guidelines: Introduction, April 30, 2007. International Finance Corporation, World Bank Group.

Explanation

The results highlighted by yellow color describe the light quality of workplaces which nearly meet the standard light level guidelines.

The results highlighted by red color describe the light quality of workplaces which is still required to meet the minimum light intensity a workplace should have.

The results in black color describe about the workplaces which are applicable to the guidelines.

Office

Sewing line

Figure 4-17 Light measurement in Production Areas

4.3.4.2. Temperature

There is a total of 9 stations for measurements of temperature in office and production areas which included sewing line, cutting line (both fabric and foam fabric), ironing line and boiler room.

The places measured above are fundamental operations in garment factory, because temperature plays a big role in whether employees are comfortable, focused and productive. According to the collected data from measuring, the temperatures of production areas were slightly higher than the standard guidelines except the temperature of office (28.8°C). The monitored data of temperature measurements as shown in Table 4-14 and temperature measurement in workplaces shown in Figure 4-18.

Table 4-14 Temperature measurement in iron melting factory (°C)

No	Location	Measure Value (°C)	(IFC) Standard Value* (°C)
1	Office	28.8	32
2	Sewing line	33.9	
3	Cutting line (Fabric)	34.4	
4	Cutting line (Foam fabric)	33.2	
5	Numbering Room	34.3	
6	Ironing line	33.4	
7	Packing room	34.3	
8	Boiler room	35.5	
9	Warehouse	32.9	

*International Finance Corporation (Environmental Health and Safety Guideline)

	
Ironing Line	Sewing line near QC

Figure 4-18 Temperature measurement in the workplaces of the garment factory

4.3.5. **Odor**

MONREC has provided National Environmental Quality (Emission) Guidelines for the rules and control of odors in industrial sectors. During operation phase, offensive odor generated from stain removal process, use chemical namely thinner and DJW super dryer lifter. While operating the boiler, the hot air (burning fuels) can create unpleasant smell. When using the hot wire cloth cutting machine, it emits burning smell. Hence, it is judged that the offensive odor generated from the project would not cause any significant environmental impact on the surrounding area. On the other hand, strong odors may cause some workers to feel a burning sensation that leads to coughing, wheezing or other breathing problems. The odor in this project factory is not an issue since there's no textiles dyeing and printing which can produce various types of smell.

4.3.6. **Soil**

The project area is mostly covered by younger alluvium formation. The nutrient-dense soil in found in the alluvium deposits of these areas is perfect for cultivating crops such as rice, wheat, sugarcane, and legumes.

4.4. BIOLOGICAL ENVIRONMENT

From the environmental impact point of view, biological resources are not relevant in the factory, as it is in the industrial zone of Pathein.

4.5. SOCIO ECONOMIC ENVIRONMENT

This section describes the baseline data to define socio-economic profile and cultural resources of the study area. The project area is situated in Pathein Township, southern part of Myanmar.

4.5.1. **Population**

The updated number of populations and religions comprised in June 2018 data of Pathein Administrative Department. The following tables show the regional data of

Pathein Township. The number of household and religions is shown in Table 4-15 and Table 4-16.

Table 4-15 List of the number of households in Pathein Township

	Number of House	Household	Quarter	Village tract	Village
Town	37616	40795	25	-	-
Village	38463	40165	-	53	285

(Source: Regional Data, Administrative Department, Pathein Township, Ayeyarwady Region, February 2019)

Table 4-16 List of the religions in Pathein Township

Township	Buddhist	Christian	Hindu	Islam	Other	Total
Pathein	2938,825	36891	1617	5857	-	338,589

(Source: Regional Data, Administrative Department, Pathein Township, Ayeyarwady Region, February 2019)

4.5.2. **Economy**

The economy of Pathein Township has a high concentration of industrial production facilities in Ayeyarwady Region. Pathein industrial zone is situated in Kinmalin Kyun Ward. Moreover, the locals are mainly relay on the business likes agricultural and marine products. It also has a great transportation facility.

4.5.3. **Education level**

The majority of people in the project area have completed primary, middle, high school and university level. There's 2 universities and an education college. there are 21high schools, 21 middle schools, 20 primary schools and 4 monastic schools. Some of them are listed in Table 4-17, Table 4-18 and Table 4-19.

Table 4-17 List of Universities in Pathein Township

No	Universities	Location
1	Pathein University	Kan Thone Sint Nae' Myay
2	Computer University	Kam Ni Ywar
3	College	Pathein-Monywa

Table 4-18 List of High Schools and Middle Schools

No	School	Address
1	No. (1) Basic Education High School	Ya Ka A (3)
2	No. (2) Basic Education High School	Ya Ka A (3)
3	No. (3) Basic Education High School	Ya Ka A (3)
4	No. (4) Basic Education High School	Ya Ka A (8)

No	School	Address
5	No. (5) Basic Education High School	Ya Ka A (2)
6	No. (6) Basic Education High School	Ya Ka A (4)
7	No. (7) Basic Education High School	Ya Ka A (11)
8	No. (12) Basic Education High School	Ya Ka A (9)
9	No. (9) Basic Education High School	Ya Ka A (6)
10	No. (1) Middle School	Ya Ka A (4)
11	No. (5) Middle School	Ya Ka A (2)
12	No. (2) Middle School	Ya Ka A (2)
13	No. (1) Middle School	Ya Ka A (13)
14	No. (3) Middle School	Ya Ka A (1)
15	No. (4) Middle School	Taung Tan Kone

Table 4-19 Lists of Monastic Schools

No	School	Address
1	Aung Bawdi	Pathein Township
2	Aung Thapyay	
3	Nidaryone	
4	Pyin Nyar Parami	

(Source: Regional Data, Administrative Department, Pathein Township, Ayeyarwady Region, February 2019)

4.5.4. **Public Health**

The diseases of high prevalence reported in 2018 are Malaria, Tuberculosis (TB), Diarrhea, Dysentery and Liver disease. With reference to the Township Health Profile 2018 of Pathein Township, no accidental work injuries reported to the township hospital in 2017. The common diseases and hospital lists are shown in Table 4-20 and Table 4-21.

Table 4-20 Common Diseases in Pathein Township

Diseases	Morbidity	Mortality
Malaria	1668	2
Diarrhoea	857	2
Tuberculosis (TB)	774	-
Dysentery	140	-
Hepatitis B virus (HBV)	782	-

(Source: Regional Data, Administrative Department, Pathein Township, Ayeyarwady Region, February 2019)

Table 4-21 List of hospitals in Pathein Township

Hospital Name	Beds	Responsible
Pathein	250	Government
Ngwe Saung	16	Government
Thalat Kwar	16	Government
Shwe Thaung Yan	16	Government
Mathe'	10	Private
Lamin	10	Private

(Source: Regional Data, Administrative Department, Pathein Township, Ayeyarwady Region, February 2019)

4.6. CULTURE COMPONENT

There is no cultural heritage site designated by the United Nations Educational, Scientific and Cultural Organization (UNESCO) in this area. The list of major historical monuments of Pathein Township are shown in Table 4-22.

Table 4-22 List of historical monuments in Pathein Township

Historical Monuments	Address
Dhamma Temple	(3) Ward, Mahar Bandoola Road
City Hall	(4) Ward, Kan Nar Road
Ayeyarwady Library	(4) Ward, Kan Nar Road
Clock Tower	(4) Ward, Mahar Bandoola Road

(Source: Regional Data, Administrative Department, Pathein Township, Ayeyarwady Region, February 2019)

4.7. INFRASTRUCTURE AND SERVICE

4.7.1. Major access road

The project factory is easily accessible by car since it is located at Yangon-Pathein Main Road. As the project factory is located within the Pathein Industrial Zone, transportation is not an issue for this factory.

4.7.2. Land use

4.7.2.1. Methodology

Information about land use collected from secondary sources in combination with ground truth surveys. The survey helps to verify and fill gaps of the secondary information.

4.7.2.2. Secondary Data Collection

Secondary data on land use compiled from the following sources:

- Satellite image of GOOGLE EARTH PRO
- Geographic Information System Map of Ayeyarwady Region

- Factory Layout Plan by using AutoCAD Drawing Software

Based on the secondary data, initial land use map was prepared and used as a basis for subsequent ground truth surveys.

4.7.3. **Field Survey**

Field survey was performed by the study team at the project factory on 23rd April 2021 and the study of surrounding environment within 500m radius marginal area around the factory, was performed by the study team on that day. It is used to verify the land use information in identifying land use types. QGIS mapping software was used to produce the results for rechecking, revising, and modifying the accuracy of each type of land use. Eventually, the land use map generated accordingly is as shown in Figure 4-19.

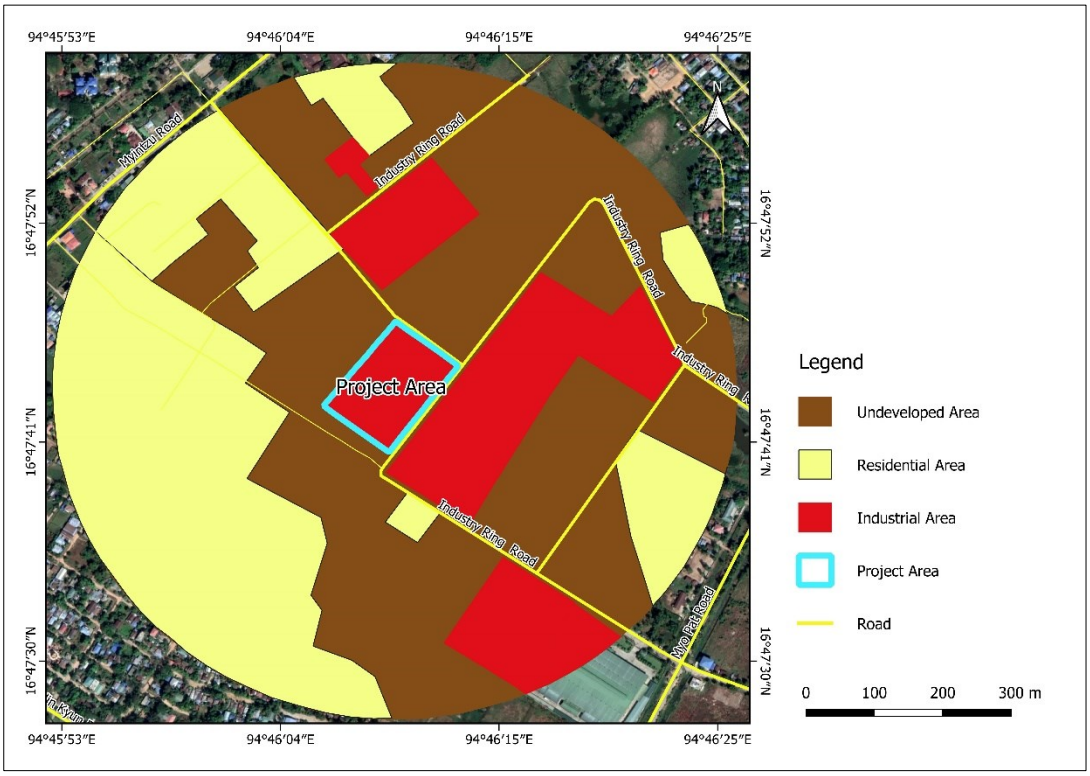


Figure 4-19 Land use map of project area

4.7.3.1. Result of the study

Result of land use type investigation on project site by the study area of 500m radius are described in this section. As the project factory is located in the Pathein Industrial Zone of Pathein Township, it is bordered by the undeveloped areas and industrial areas in the east, south and north, then residential area in the west, etc. The study area consists of the proposed project factory for about 4.54 acres and four types of land use are recognized in the study area having 500-meter radius.

First of all, undeveloped area occupies as the largest portion with a total of 45.35%. The residential area follows as second with occupancy of 35.41% of study area and it is noted that the residential area situated at a distance from the project factory within the 500-meter radius.

Lastly, the industrial area is the smallest portion of the study area as 19.24%. This type of land use deals with garments. The other business establishments located in this area are fashion shops, hotels, tea shops and groceries, etc.

According to the field survey, the project area is examined to comprise of land uses where manufacturing, assembly or processing of products takes place. These areas generally have a high percentage of impervious surface coverage. Characteristic features of this study area include the nature of buildings, the presence of outdoor storage facilities, trailer trucks, power sources and smokestacks. On the other side, residential and commercial urban/suburban neighborhoods can also be seen.

Table 4-23 Type of Land use in the Project Area

Name	Area (Acre)	Percentage (100 %)
Undeveloped area	87.71	45.35
Residential area	68.48	35.41
Industrial Area	37.21	19.24
Total	193.4	**100%**

4.7.4. **Existing land use within project area**

The field observation photos taken during the field visit on June 23rd, 2021 for specific land use types are displayed in Figure 4-20.

Commercial Area

Residential Area

Industrial Area

Undeveloped area

Road

Figure 4-20 Existing land use in project area

CHAPTER 5
POTENTIAL ENVIRONMENTAL IMPACT ASSESSMENT

5.1. INTRODUCTION

Hakers Enterprise (Myanmar) Co., Ltd. is a garment industry under cutting, making, packing (CMP basis) manufacturing various design of jackets and different type of pants. Its products have been exported to Germany, Italy and Netherlands, and the raw materials are imported from China. That kind of operation works may cause the potential environmental impacts. This chapter provides an assessment of potential impact arising from the operation and decommissions phases of the project.

In this chapter, the potential impact and mitigation measures of the operation phase and decommission phase of the project are described. However, the preconstruction phase and construction phase were not taken into account as the project was already underway at the time of preparing this EMP report.

5.2. OBJECTIVES OF ENVIRONMENTAL IMPACT ASSESSMENT

The objectives of Environmental Impact Assessment and describing the potential environmental impacts is that

- To make assessment of the environmental impacts including socio-economic impacts from the project factory.
- To make systematic assessment and to describe mitigation plan for the project
- Both Positive and Negative impacts will be considered in the impact assessment aiming to cover the aspects of natural resource, ecosystem, society and types of solid-waste.

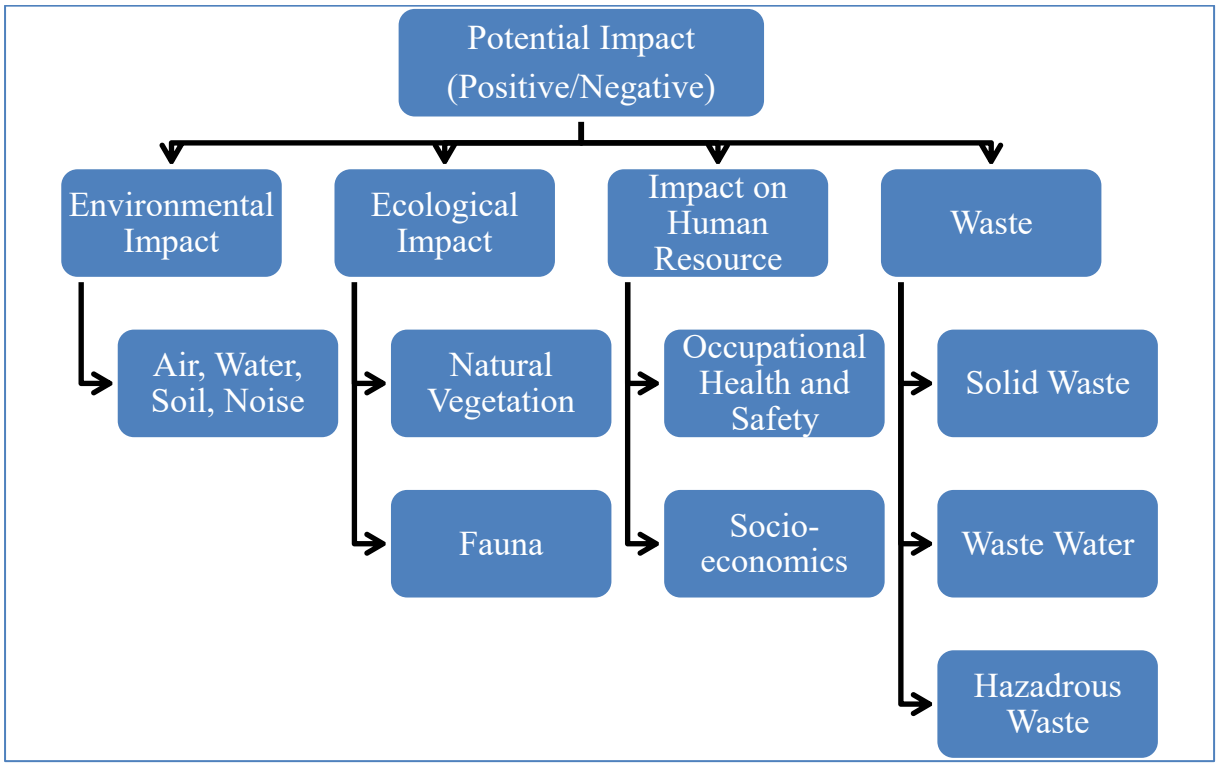


Figure 5-1 Potential Impacts of the Proposed Project

5.3. IMPACT ASSESSMENT METHODOLOGY

An impact can be defined as any change in the physical, chemical, biological, cultural and/or socio-economic environment that can be attributed to human activities related to alternatives under study for meeting a project need.

The assessment of the magnitude of the impact is referred from the research paper articled in **African Journal of Environmental Assessment and Management**[4]. The criteria for assessment of environmental impacts is as shown in the following table.

5.3.1. Status of the Impact

The status of the impact means that the project's activities create benefits/advantages or disadvantages to the potential/possible impact.

Table 5-1 Criteria for Rating the Status of Impacts

Rating	Criteria
Positive	In case of causing benefits/advantages
Negative	In case of causing costs/disadvantages
Neutral	No impact

5.3.2. Magnitude of the Impact

In this assessment methodology, the magnitude of the impact is considered the sum of the scores of typical characteristics which can simply reflect all characteristics of the impact.

Magnitude = Type + Extent + Duration + Intensity + Reversibility

Table 5-2 Criteria for Rating the Magnitude of the Impacts

Rating	Range of Score	Criteria
Large	15-11	In case of the impact possesses more than three of the adverse characteristics (e.g., irreversible, permanent, global impacts to the environment)
Medium	10-8	In case of the impact possesses more than three of the medium level impact characteristics
Small	7-5	In case of the impact possesses at least all low-level impact characteristics

*Note: the range of the score is selected by considering the condition higher than three high impacts as the rating of "High" for the magnitude of impacts.

The typical criteria used for prediction of magnitude of the impacts are explained as follow Table 5-3 that includes the type, extent, duration, intensity, reversibility of the impact to the project.

[4] Rossouw, N., January, 2003. A review of methods and generic criteria for determining impact significance. *African Journal of Environmental Assessment and Management*.

Table 5-3 Typical Criteria Used for Prediction of Magnitude of the Impacts

Criteria for Assessment	Rating	Explanation	Range of Score
Type of the Impact (T)	Direct	Potential Impacts causing from a direct interaction of the Project	3
	Indirect	Potential Impacts causing from an indirect interaction resulted from the subsequent interaction of the Project and its environment	2
	Induced	Potential Impacts resulting from other activities which are not part of the Project that happen as a consequence of the Project	1
Extent of the Impact (E)	High	Widespread, Far Beyond site boundary, Regional/National/International Scale	3
	Medium	Beyond site boundary, Local Area	2
	Low	Within site boundary	1
Duration of the Impact (D)	High (Long term)	Permanent/Beyond decommissioning Long term (More than 15 years)	3
	Medium (Medium Term)	Reversible over time/During lifespan of the project Medium term (5-15 years)	2
	Low (Short Term)	Quickly reversible Less than the project lifespan Shot term (0-5 years)	1
Intensity of the Impact(I)	High	Disturbance of pristine areas that have important conservation value/ Destruction of rare or endangered species	3
	Medium	Disturbance of areas that have potential conservation value or are of use a resource/ Complete change in species occurrence or variety	2
	Low	Disturbance of degraded areas, which have little conservation value/ Minor change in species occurrence or variety	1
Reversibility of the Impact (R)	High	Irreversible/Permanent	3
	Medium	Uncertain either irreversible or reversible	2
	Low	Reversible	1

5.3.3. Importance of the Impact

In this assessment methodology, the importance of the impact is considered in the form of level of acceptability on the potential/possible (environmental) impact in terms of legal requirements as well as the potential/possible (social) impact in terms of acceptability of affected community.

Table 5-4 Criteria for Rating the Importance of Impacts

Rating	Criteria
Hight (Normally Unacceptable)	In case of possibility to exceed legal or regulatory standard/In case of conflict with policies or land-use plans/ In case of increase level of risk to public health/ In case of loss of population of commercial biological species or extinction of biological species, loss of genetic diversity, rare or endangered species, critical habitat.

Medium (Acceptable with mitigations)	In case of some loss of threatened habitat/avoidance of spread of biological disease, pests, feral animals or weeds/in case of mitigable impacts of the environment/social.
Low (Normally Acceptable)	In case of some loss of populations and habitats of non-threatened species/In case of emissions demonstrably less than carrying capacity of the receiving environmental/In case of generally acceptable impact.

*Note: The judgement of importance will be also based on the experiences and knowledge of study team.

5.3.4. Significance of the Impact

Once the impacts have been predicted and described in terms of both magnitudes of the impact and importance of the impact, the significance of the impact will be evaluated.

The magnitude of the impact is usually magnified with the importance of the impact. Hence, the significance of the impact is evaluated as follow:

Significance of the Impact = Magnitude ×Importance

Table 5-5 Criteria for Rating the Significance of Impacts

		Importance		
		Low	Medium	High
Magnitude	Small	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Major

5.4. POTENTIAL ENVIRONMENTAL IMPACTS DUTING OPERATION PHASE

The project has not construction phase activity this is on-going project of EMP preparing. Only the operation phase on impact analysis of negative and positive impacts will generate in the project. There will be positive or negative impacts on the environment due to the project.

5.4.1. Negative Impacts

The negative impacts can be generated from the project operation process such as air pollution, water pollution, solid waste and employee's health and safety. There can be affected on the environment if the proponent will not systematically mitigate this impact from the operation phase. The level of potential impact assessment of project is described in following.

5.4.1.1. Air Quality

5.4.1.1.1 Outdoor Air Quality

The gas emission as outdoor air was mainly generated from the generator, boiler, vehicles using, transportation and loading process within the factory compound. Although the boiler is installed in the factory, there is no generated heavy gas emission from boiler stack because of using electric only. Therefore, it cannot impact on the environment strongly. In addition, the source of air emission equipment and vehicles will use for operation process at short-term and these will not apply continuously during operation time at the factory. As a result, the air pollution cannot be harmful to the employee and surrounding due to the project factory.

According to the air quality monitoring results, $PM_{2.5}$ is higher than the NEQEG (2015) whereas other parameters are within the standard. The results of $PM_{2.5}$ is 37 µg/m3.

Owing to the higher $PM_{2.5}$, it may lead to asthma, cough, skin irritation, damage respiratory system and general health problems to people while the dust is reaching to the lung. People can suffer from mucous membranes of the eyes, nose, throat and lungs as well as inflammation and irritation of the respiratory system. Consequently, the gas can react with other chemicals in the air and change to a small particle that can get into the lungs and cause similar health effects to people. Therefore, it requires to mitigate the air pollution impact and the project proponent need to follow the mentioned in mitigation measure.

5.4.1.1.2 Indoor Air Quality

Indoor air was generated from operation process such as mechanical room, warehouse and operation department etc. The survey team was monitored the parameters of indoor air quality as CO_2, PM_1, $PM_{2.5}$, PM_{10}, TVOC, HCHO within the factory. According to the results, PM 2.5 and 10 are unhealthy level in laser cutting room and fabric cutting room because fabric cutting activities generates air borne particles.

When carbon dioxide (CO_2) concentration is high, the worker can suffer drowsiness, increased heart rate and blood pressure, sweating, headache. Long periods of exposure can also be linked with increased risk of heart disease and coma. Particulate matter ($PM_{2.5}$ and PM_{10}) range are able to travel deeply into the respiratory tract, reaching the lungs. Exposure to fine particles can cause short-term health effects such as eye, nose, throat and lung irritation, coughing, sneezing, runny nose and shortness of breath.

Total volatile organic compound (TVOC) signs or symptoms associated with exposure to include conjunctival irritation nose and throat discomfort, headache, allergic skin reaction Concentrations of many TVOCs are consistently higher indoors (up to ten times higher) than outdoors. Health effects may include: eye, nose and throat irritation, loss of coordination and nausea, damage to liver, kidney and central nervous system. The most common health problems in people exposed to formaldehyde

(HCHO) include irritation of the eyes, nose, and throat. HCHO may cause occupational asthma, but this seems to be rare. The impact level of air is shown in Table 5-6.

Table 5-6 Impact level of Air

No.	Impacts	Source of Impact/Activities	Magnitude of Impact (M = T + E + D + I + R)						Importance of Impact (Imp)	Significance of Impact Calculation (SI = M x Imp)	Significance of Impact	Status of Impact
			T	E	D	I	R	M				
		Operation Phase										
1.	Air Pollution	• Emission from vehicles • Generator, • Boiler • Load/Unloading in the warehouse	3	2	3	1	1	10 (Medium)	Medium	(Medium × Medium)	Moderate	Negative

Mitigation Measure

There are described in the following factors how to mitigate the emission of dust and gas.

- Install sufficient ventilation system especially air cooler, fan and window in the factory operation room.
- Regular maintenance of boiler, generator and machines especially sewing machines and cutting machines as well as turn off equipment when not in use.
- Proper ventilation for generator room.
- Regular monitoring for air quality parameters ($PM_{2.5}$ and PM_{10}, TSP, SO_2, NO_2, CO, O_3) mentioned in the monitoring program.
- Grow efficient air-purifying plants, e.g., areca palm, aloe vera and so on.
- Enforce to wear PPE to employees who are working in cutting section that it must wear the 95 mask or surgical mask in their working time.
- Water should be sprayed as suppressants to increase the moisture content at least one time per day (it can be applied at morning or evening).

5.4.1.2. Cumulative Impact on Air Quality

Hakers Enterprise (Myanmar) Co., Ltd. is located in Pathein Industrial Zone. There is Myanmar Crochet Factory near the proposed factory. In addition, transportation car and vehicles are moving for operation process in this study area. Therefore, several greenhouse gases (CO_2, SO_2 etc.) may be produced.

Sulfur dioxide (SO_2) contains one of the air pollutants can affect vegetation indirectly, via chemical reactions in the atmosphere, or combines with water and air, it forms sulfuric acid, which is the main component of acid rain. CO_2 gas that spark off

environmental disasters like global warming and climate change, etc. $PM_{2.5}$ can also be formed from the chemical reactions of gases such as sulfur dioxide (SO_2) and nitrogen oxides (NO_x: nitric oxide, NO plus nitrogen dioxide, NO_2); these are called secondary particles which increase the age-specific mortality risk, particularly from cardiovascular causes.

5.4.1.3. Negative Impact of Noise

The total number of 9 areas which can be subdivided into office, compound, warehouse, cutting rooms, ironing lines and sewing lines of the whole production areas were measured with the purpose of realizing the overall level of noise pressure and analyzing by decibel(dBA)a with detailed values have already described in Chapter 4. Noise impact from building may occur from production process of various sources such as sewing, playing music (only in the evening), cutting machine and employees' conversation. When carried out the survey, running the water pump might be a key impact on the result.

According to the results, noise level is exceeding 70 dBA of NEQG (National Environmental Quality (Emission) guidelines) standard at the mold pattern room and sewing lines.

Therefore, it can be concluded that the negative results can impact on the employees and workers for occupational health and safety at operation sector such as hearing loss, psychological disorders, increasing the risk of cardiovascular diseases, interrupted sleep and interfering the speech etc. Hence, it is judged that the noise generated from operation process in limited area would not cause any significant environmental impact on the surrounding area but this impact will directly affect on the employees and workers. The impact level of nose is shown in Table 5-7.

Table 5-7 Impact level of noise

No.	Impacts	Source of Impact/Activities	Magnitude of Impact (M = T + E + D + I + R)						Importance of Impact (Imp)	Significance of Impact Calculation (SI = M x Imp)	Significance of Impact	Status of Impact
			T	E	D	I	R	M				
		Operation Phase										
1.	Noise	• Sewing lines, Cutting lines • Generator • Boiler Room	3	1	3	1	1	9 (Medium)	Medium	(Medium ×Medium)	Moderate	Negative

Mitigation Measure

- Use equipment and machines which generate low noise levels.
- Regular maintenance for noise generation machines such as sewing machine, cutter, and equipment from the operation process.

- Record and inspection maintenance for each machine and change the good quality product (if necessary).
- Provide adequate ear protection (ear plugs or muffs) to workers working in the excessive noise areas. To make sure workers wear ear plug two times a day with 1hour period each time.
- No employee should be exposed to a noise level greater than 85 dB(A) for a duration of more than 8 hour per day without hearing protection. In addition, no unprotected ear should be exposed to a peak sound pressure level (instantaneous) of more than 140 dB (C).
- Effective noise controls include regular inspection and maintenance of all vehicles and construction equipment working onsite, installation of sound suppressive devices (Figure 5-2) on all mechanical plants as necessary, where practicable, vehicles and machinery that are used intermittently should not be left idling for long periods of time.
- Follow noise control hierarchy (Figure 5-3).
- Grow noise-absorbing plants (e.g. Areca Palm, etc.,)
- Install sound (esp. echo) proof curtain

Figure 5-2 Noise control Equipment

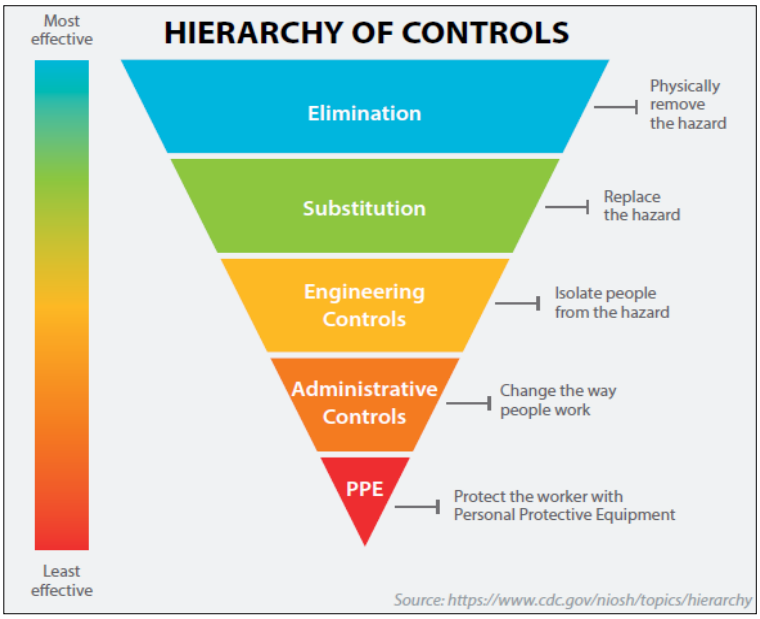


Figure 5-3 Noise control Hierarchy

5.4.1.4. Negative Impact of Odor

The impacts of odor released in operation stage can cause different types of impacts on the environment. During operation phase, offensive odor generated from stain removal process, use chemical namely thinner. When using cutting machine, it emits burning smell. Hence, it is judged that the offensive odor generated from the project would not cause any significant environmental impact on the surrounding area. Therefore, the impact does not cause any significant environmental impact on surrounding area. As in the operation phase, if not properly dispose the food wastes from workers, the odor will be emitted. Strong odors may cause some workers to feel a burning sensation that leads to coughing, wheezing or other breathing problems. The impact level of odor is shown in Table 5-8.

Table 5-8 Impact level of odor

No.	Impacts	Source of Impact/Activities	Magnitude of Impact (M = T + E + D + I + R)						Importance of Impact (Imp)	Significance of Impact Calculation (SI = M x Imp)	Significance of Impact	Status of Impact
			T	E	D	I	R	M				
		Operation Phase										
1.	Odor	• Chemical storage room and using process • Waste dumping site • Accommodation	3	1	3	1	1	9 (Medium)	Low	(Medium × Low)	Minor	Negative

Mitigation Measures

- Install sufficient ventilation.
- Food wastes should be collected in enclosed bins.
- Provide specific storage area within the factory to collect waste that emit VOCs.
- Regular disposal to final disposal sites by Pathein City Development Committee on weekly basis.
- Record waste transfer by notes.
- Make sure to get sufficient ventilation.
- Enforce to wear PPE to employees.
- Have chemical fume hoods (stain removal area).
- Task-shifting and task-sharing.
- Install proper septic tank systems
- Regular disposal of sewage from septic tanks by township municipalities
- Daily cleansing of Toilets

5.4.1.5. Negative Impact on Water Quality

There is no water usage for the operation process. In addition, others are domestic wastewater, storm water and sewage water. The storm water can be polluted by roofs contaminated with dust, open space and work areas etc. The surface water is flow into the drainage channels of the project area. Diseases caused by bacteria, typhoid and cholera, etc., are introduced by the waste water.

In order to know the domestic waste water quality, water sample was analysis, then the detail values were described in **Chapter4**. According to the result, many parameters were within the standard guideline of WHO and NEQEG expect Oil and Grease.

Due to the leakage of fuel and engine oil, vegetable oil, kitchen activities, instant food and other oils from domestic use are flow to the factory drain during cleaning process, the oil and grease parameter can pollute in the water quality. Moreover, the surface water runoff, sedimentation in the water, hand washing, domestic wastewater from accommodation and factory can be higher the total suspended solid parameter. Impact level of wastewater is shown in Table 5-9.

Table 5-9 Impact level of wastewater

No.	Impacts	Source of Impact/Activities	Magnitude of Impact (M = T + E + D + I + R)						Importance of Impact (Imp)	Significance of Impact Calculation (SI = M x Imp)	Significance of Impact	Status of Impact
			T	E	D	I	R	M				
		Operation Phase										
1.	Wastewater	• Domestic waste water from hand wash basin, kitchen, accommodation and toilets • Sewage water	3	2	3	1	1	10 (Medium)	Medium	(Medium ×Medium)	Moderate	Negative

Mitigation Measure

- Minimize the amount of water used in accommodation, hand washing and domestic activities
- Avoid generating unnecessary wastewater
- Separate the drainage and pipeline system for sewer line and surface runoff.
- Regularly check the septic tank to avoid leakage of sewage
- Control oil generating from the domestic activities and generator room
- All drainage systems are covered and liquid wastes are disposed to the septic to avoid soil population.

5.4.1.6. Negative Impact of Solid Waste

Non-Hazardous Waste

In the operation phases, cutting area mainly produce solid wastes particularly pieces of fabrics. In the sewing lines, generated thread fragments and error fabric are dumped to waste collecting room. The raw materials also produce the waste like paper tubes for holding the fabric roll, patterns, makers and corrugated papers. Sometime the corrugated papers are sold for recycling use and the rests are threw into the Pathein City Development Committee.

The domestic wastes such as plastic, tissues, glass, sanitary pads and leftovers are generated from workers. The sanitary pads are the wastes that are generated from female toilet which is biomedical or plastic waste. The sanitary waste management disposing is lacked in our country. Although, all the wastes are disposed to the Pathein City Development Committee on daily basis from damping site during a period, leaches infiltrates into the ground which build toxification into soil. By the time runoff water flows onto the wastes, the project site and environment can have the adverse effect

(blocking the drainage channels) as a result flooding and groundwater pollution can be faced.

Hazardous Waste

The chemical (used in stain removal) containers and filters used in generator and operation process have to store systematically and separately. In addition, the hazardous wastes such as pieces of nail, metal scarps, wood pieces, broken glass rods and abandoned electrical container, lubricant and engine oil can generate from the operation process. They can float along the water-courses, in case the rest will spill into water bodies that can be groundwater contamination. On the other hand, liquid diesel fuel is widely regarded as safe to handle and store. In its vapor stage, diesel is very dangerous and can catch fire (or explode) easily in the presence of an accelerant such as fan air or oxygen. Diesel vapors can ignite and explode when mixed with air. In the same way, thinner is also as a recognized source of fire that may prove fatal. The soil can be degraded by the used diesel containers and filters because of the remnant spills onto the ground. Consequently, subsurface water contaminates through the surface water bodies (rivers & channels, etc.). Impact level of solid waste is shown in Table 5-10.

Table 5-10 Impact level of solid waste

No.	Impacts	Source of Impact/Activities	Magnitude of Impact (M = T + E + D + I + R)						Importance of Impact (Imp)	Significance of Impact Calculation (SI = M x Imp)	Significance of Impact	Status of Impact
			T	E	D	I	R	M				
1.	Solid Waste	Operation Phase										
		• Operation Waste (cutting, sewing, QC, ironing and packing sections) • Domestic Waste • Hazardous Waste (chemical container and engine oil)	3	2	3	2	1	11 (Large)	Medium	(Large ×Medium)	Major	Negative

Mitigation Measure

- Provide specific storage area to collect waste and dispose within the factory.
- Construct proper tent or protected dumping site to control the liquid leaches from it.
- Use marked bins to segregate hazardous and non-hazardous wastes.
- Waste must be separated by type of waste and systematically disposed into containers.

- The sanitary pad from female worker should be packed with paper and it needs generate to the waste bins systematically.
- Recyclable waste bins must be supplied and a good practice of waste sorting habit must introduce for wastes that can recycle.
- Soaking the spilled chemicals with sawdust and sand will be done as spill response plan.
- 3R (reuse, reduce, recycle) should be promoted for employees by awareness-raising campaigns and environmental education program.
- Chemical wastes like thinner and wastes from clinic should be collected in separate bins and disposed properly.
- Collect systematically and dispose to the Pathein City Development Committee waste dumping site

5.4.1.7. Lack of good safety practice and health education

a) Lighting

Appropriate lighting, without glare or shadows, can reduce eye fatigue and headaches; it can prevent workplace incidents by increasing the visibility of moving machinery and other safety hazards. Good quality lighting also reduces the chance of incidents and injuries from "momentary blindness" (momentary low field vision due to eyes adjusting from brighter to darker, or vice-versa, surroundings). It is essential to have a uniform illumination over the entire workplace by combining both, natural and artificial lighting. Especially, the garment workers are highly dependent on the quality of light; thus, it is crucially important to provide sufficient lighting to those areas. With this purpose, light measurements were carried out especially in the production area and the results are mentioned in **Chapter 4**.

According to the results, all of the measure points meet the guideline except from finishing line, ironing line, laundry, fabric cutting, mold pattern room. However, above mentioned room need more lighting for the workers at the factory. Consequently, poor lighting in the workplace can lead to eyestrain burning, irritation, and itchy or red eyes, as well as fatigue and increased stress. The employees become sensitive to contrast, have a hard time focusing and may lead to health problems relating with nervous system.

b) Temperature

In the project area, according to the collected data from measuring, the temperatures of production areas were slightly higher than the standard guidelines except the temperature of office (28.8°C). Therefore, it can impact on workers at the factory. Although those were not significantly affected on the employee, they can have the experience of metabolic heat, produced by the body through chemical processes, exercise, hormone activity, digestion if the level of temperature over the standard. People can feel increased irritability, loss of concentration and ability to do mental tasks and lack of ability to do skilled tasks or heavy work. In the severe conditions, workers can suffer heat edema, heat rashes, heat cramps, heat syncope, heat stroke and so on.

Chronic heat exhaustion, sleep disturbances and susceptibility to minor injuries and sicknesses can be attributed to the possible effects of prolonged exposure to heat.

c) Physical injuries

Workplace injuries are common in every segment of the process. Improper use of machines and lack of inspecting those before operating, unless effectively protected as well as improper product loading and unloading in warehouse. The cutting operators can be faced ergonomic hazards. Similarly, many fabric cutters can tend to work with the machine at ear level, often exposing to excessive noise with the attendant risk of noise-induced hearing loss. When using the hot wire cloth cutting machine, hot wire may cause the heat burn sometimes may get injuries to the body parts. Additionally, they may have musculoskeletal disorders of the neck, shoulder, elbow, forearm/wrist and low back pain.

While fabric stretching across the cutting table, can present a risk of neck, upper-extremity and back disorders. Handling rolls of fabric which may be weigh up to 32kg and must be lifted above the head onto a rack for spreading, also can suffer an ergonomic risk. The sewing machine work stations are performed the same operation during the entire progress of the workday combine with time-pressured work, can resulted in high rates of the risk of developing musculoskeletal disorders can be high.

The minor accidence like needle stabbing can suffer while using sewing machine. Fingers and eyes injury by snap button machine, dust particles enter into eyes while quilting. Garment workers also involve various manual operations and abnormal joint postures which carry a risk of physical injury.

d) Weak in enforcement

Enforcement is another factor to save the dangerous conditions in workplace. Lack of the practice, the countless risky situations can be encountered. Officially set the laws and regulations especially in the production process in which the most careful attention and PPE are needed.

e) Job Strain

The job strain is the result from continuous working since tailoring need continuous attention and concentration. It involves highly repetitive tasks which are performed in a sitting working posture and need continuous attention resulting in stress and strain on muscles and bones of the workers. The stressful work can be harmful to both physical and mental health of the workers and in order to reduce this impact, exercise and training should be taught to workers. Impact level of occupational health and safety is shown in Table 5-11.

Table 5-11 Impact level of occupational health and safety

No.	Impacts	Source of Impact/Activities	Magnitude of Impact (M = T + E + D + I + R)						Importance of Impact (Imp)	Significance of Impact Calculation (SI = M x Imp)	Significance of Impact	Status of Impact
			T	E	D	I	R	M				
1.	Occupational Health and Safety	Operation Phase										
		• Operation area • Cutting, sewing sections • Within the project site	3	1	3	2	1	10 (Medium)	Medium	(Medium ×Medium)	Moderate	Negative

Mitigation Measures

Recommendations on health and safety management include:

- To install proper lighting in factory especially in production area.
- Install sufficient air conditioner (or) fan must be used where temperature can be excessive (most of the factory working area is higher than the guideline)
- Store heavy objects at waist height.
- Use personal protective equipment (PPE) like shoulder pads to cushion loads carried on the shoulder.
- Provide proper PPEs and qualified first-aider at all times and enforce to wear PPEs.
- Risk assessment in construction site.
- Place health and safety signboards and risk warning signboards in construction area.
- Make regular maintenance to vehicles and machines that used for construction.
- Officially set the restricted laws and regulations.
- Educate and train them for health education and workers in First Aid Kit training.
- Train almost all of the workers and staffs for firefighting and mock drills for firefighting.
- Sharing the knowledge concerned with first aid and firefighting.

5.4.2. Positive Impacts of Operation and Decommission Phases

The livelihood and socio-economic impacts considered positive, as more jobs will create during operation and decommission phases of the project. In the factory, workers comprising both skilled and unskilled will recruit from the local population. Impact level of livelihood and socio economic is shown in Table 5-12. The project

proponent will implement the following practices during operation and decommission phase:

- Promote the fair treatment, non-discrimination (gender, religion & skin colour, etc.) and equal opportunity for workers;
- The Project plans to increase the production capacity in this years, nearby communities will get benefit by being the source of work force for the factory,
- Ensure total compliance with national labor and employment laws;
- To avoid exploitation of child labor by contractor, sub-contractor and supply chain; and,
- Promote safe and healthy working conditions.
- Commitments upon the safety of workers by the management level and providing appropriate the amount of budget.
- The company will continue to implement CSR programs.
- Hakers Enterprise (Myanmar) Co., Ltd. should try to eliminate or at least mitigate negative impacts it should, on the other hand, enhance and maximize the positive impacts to their optimum.

Table 5-12 Impact level of livelihood and socio economic

No.	Impacts	Source of Impact/Activities	Magnitude of Impact (M = T + E + D + I + R)						Importance of Impact (Imp)	Significance of Impact Calculation (SI = M x Imp)	Significance of Impact	Status of Impact
			T	E	D	I	R	M				
1.	Livelihood and socio - economic	Operation Phase										
		• Job Opportunities • Local development due to the project implementation	3	3	3	2	2	13 (Large)	Medium	(Large ×Medium)	Major	Positive
		Decommission Phase										
		• Job Opportunities during demolition process	3	2	2	1	1	9 (Medium)	Medium	(Medium ×Medium)	Moderate	Positive

5.5. POTENTIAL ENVIRONMENTAL IMPACTS DUTING DECOMMISSION PHASE

5.5.1. Negative Impact of Air Quality

During decommission phase exhaust gases and particulate matter can be emitted from uninstallation of the machines, generator, boiler, equipment and devices which were used in the production process of the project and from the vehicles used for the transportation of wastes and scraps. Fugitive dust is generated when a vehicle travels down the road. Although generally not toxic, dust can cause health problems, alone or in combination with other air pollutants.

The significance impact is **minor** because these demolition activities will be operated for a short time (with a year or two). The mitigation measures for the decommission phase are described in the following. Impact level of air pollution is shown in Table 5-13.

Table 5-13 Impact level of air pollution

No.	Impacts	Source of Impact/Activities	Magnitude of Impact (M = T + E + D + I + R)						Importance of Impact (Imp)	Significance of Impact Calculation (SI = M x Imp)	Significance of Impact	Status of Impact
			T	E	D	I	R	M				
1.	Air Pollution	Decommission Phase										
		• Dust and PM emission from demolition activities • Gas and PM emission from motor vehicles and machines	3	1	1	1	1	7 (Small)	Medium	(Small × Medium)	Minor	Negative

Mitigation Measures

The following dust suppression measures and good site practices are recommended for the decommission phase.

- Dust will be efficiently countered by sprinkling of water during the phase. Water spraying just need outside of the project site (along the main accessible road to the project site) after the transportation of heavy construction materials.
- Tarpaulin covering of all dusty vehicle loads transported to, from and between site locations.
- Use of vehicle wheel and body washing facilities at the exit points of the site.
- Dusty activities should be re-scheduled where possible if high-wind conditions are encountered.

- Restore, resurface and rehabilitate the disturbed area as soon as practicable after completion of construction or renovation.
- Significant emission reduction will be achieved through regular equipment maintenance.
- Cover dump trucks before traveling on public roads.
- Establish and enforce speed limits of vehicles to reduce airborne fugitive dust. (Reducing speed from 40 miles per hour (mph) to 20 mph reduces dust emissions by 65%) (Top Ten Dust Control Techniques List).

5.5.2. **Negative impacts of Noise**

Noise pollution can be generated from the demolition and uninstallation processes of the buildings and machinery used in the operation processes. Moreover, the vehicle used for the transportation of metals and scraps will be generated noise pollution. However, the significance impact is **minor** because these demolition activities will be operated for a short time (with a year or two) and temporary event at the project site. Impact level of noise is shown in Table 5-14.

Table 5-14 Impact level of noise

No.	Impacts	Source of Impact/Activities	Magnitude of Impact (M = T + E + D + I + R)						Importance of Impact (Imp)	Significance of Impact Calculation (SI = M x Imp)	Significance of Impact	Status of Impact
			T	E	D	I	R	M				
		Decommission Phase										
1.	Noise	• Demolition of buildings and vehicles	3	2	1	1	1	8 (Medium)	Low	(Medium × Low)	Minor	Negative

<u>Mitigation Measures</u>

- Provide adequate ear protection (ear plugs or muffs) to workers working in the excessive noise areas. To make sure workers wear ear plug two times a day with 1hour period each time.
- Provide adequate ear protection (ear plugs or muffs) to workers working in the excessive noise areas and force them to wear.
- No employee should be exposed to a noise level greater than 85 dB(A) for a duration of more than 8 hour per day without hearing protection. In addition, no unprotected ear should be exposed to a peak sound pressure level (instantaneous) of more than 140 dB (C).
- Ensure that all contractors on site have effectively controlled noise levels from equipment.

- Effective noise controls include regular inspection and maintenance of all vehicles and construction equipment working onsite,
- vehicles and machinery that are used intermittently should not be left idling for long periods of time.
- Avoid running construction machineries at night. (22:00-07:00)

5.5.3. Negative Impact of Odor

There is no significant impact on environment and worker during decommission phase. Impact of odor is shown in Table 5-15.

Table 5-15 Impact of odor

No.	Impacts	Source of Impact/Activities	Magnitude of Impact (M = T + E + D + I + R)						Importance of Impact (Imp)	Significance of Impact Calculation (SI = M x Imp)	Significance of Impact	Status of Impact
			T	E	D	I	R	M				
1.	Odor	Decommission Phase										
		• Waste dumping site • Demolition activities	3	1	1	1	1	7 (Small)	Low	(Small × Low)	Negligible	Neutral

5.5.4. Negative Impact of Water

During decommission phase, the wastewater will be generated from worker such as toilets and washing process and demolition activities. If the wastewater is directly discharged to the public directly, water bodies will be polluted and health issues will be arisen in the society nearby. Impact of wastewater is shown Table 5-16.

Table 5-16 Impact of wastewater

No.	Impacts	Source of Impact/Activities	Magnitude of Impact (M = T + E + D + I + R)						Importance of Impact (Imp)	Significance of Impact Calculation (SI = M x Imp)	Significance of Impact	Status of Impact
			T	E	D	I	R	M				
1.	Wastewater	Decommission Phase										
		• Leakage of oil from vehicles and machinery • Domestic waste water from worker	3	1	1	1	1	7 (Small)	Low	(Small × Low)	Negligible	Neutral

<u>Mitigation Measures</u>

- Minimize the amount of water used.
- Avoid generating unnecessary wastewater.
- Discharging wastewater directly to the natural water bodies will be avoided as much as possible.
- Need to arrange proper drainage system to prevent leakage of chemical and oil in surface water runoff.
- The sewage and grey water will be collected into the septic tanks systematically and should be generated with Pathein City Development.

5.5.5. Negative Impact of Solid Waste

The solid wastes generated from both domestic usage and demolition works that can cause the soil and water contamination. The domestic wastes such as plastic, tissues, glass, paper, and leftovers are generated from workers.

In addition, the hazardous wastes such as pieces of nail, metal scarps, wood pieces, broken glass rods, abandoned electrical container, adhesives, ceramics. lubricant and engine oil can generate from the demolition process. Impact level of solid waste is Table 5-17.

Table 5-17 Impact of solid waste

No.	Impacts	Source of Impact/Activities	Magnitude of Impact (M = T + E + D + I + R)						Importance of Impact (Imp)	Significance of Impact Calculation (SI = M x Imp)	Significance of Impact	Status of Impact
			T	E	D	I	R	M				
		Decommission Phase										
1.	Solid Waste	• Wastes from demolition activities (concrete, plaster, metal, and wood scrap, and its related) • Domestic Waste from worker	3	1	1	2	1	8 (Medium)	Low	(Medium × Low)	Minor	Negative

Mitigation Measures

- Food wastes, plastics and tissues will be collected in a temporary waste dumping site within the factory area and need to connected with Pathein City Development.
- Hazardous chemicals like oil, chemicals and emulsions will be managed to use in order not to spill.
- Soaking the spilled chemicals with sawdust and sand will be done as spill response plan.

- The soaked sawdust, sand and containers of oil, chemicals and emulsions will be collected in separate dust bin and finally disposed to Pathein City Development dumping site.
- Waste disposal will be recorded regularly.

5.5.6. **Lack of Good Safety Practice and Health Education**

During decommission phase, the worker can cause accident from demolition activities such as construction materials dropping from height building, falls and slip at the project site, air pollution from the demolition works, temporary hazards from vehicle moving and machine. Moreover, the infectious diseases can occur on the worker especially COVID-19, HIV/AIDS and so on, if the workers do not wear PPE in their working time. Impact level of occupational health and safety is shown in Table 5-18.

Table 5-18 Impact level of occupational health and safety

No.	Impacts	Source of Impact/Activities	Magnitude of Impact (M = T + E + D + I + R)						Importance of Impact (Imp)	Significance of Impact Calculation (SI = M x Imp)	Significance of Impact	Status of Impact
			T	E	D	I	R	M				
		Decommission Phase										
1.	Occupational Health and Safety	• Demolition area • Within the project site	3	1	1	2	1	8 (Medium)	Medium	(Medium ×Medium)	Moderate	Negative

Mitigation Measure

- To develop emergency team and emergency plan at the construction site.
- Use personal protective equipment (PPE) like shoulder pads to cushion loads carried on the shoulder.
- Provide proper PPEs and qualified first-aider at all times and enforce to wear it.
- Risk assessment in construction site.
- Place health and safety signboards and risk warning signboards in construction area.
- Make regular maintenance to vehicles and machines that used for construction.
- Officially set the restricted laws and regulations.
- Educate and train them for health education and workers in First Aid Kit training.

CHAPTER 6
PUBLIC CONSULTATION

The main objective of public consultation is to provide project information, production procedures, waste management and potential environmental impacts to the regulators, authorities and stakeholders. This chapter presents results of public consultation and information disclosure conducted for the Hakers Enterprise (Myanmar) Co., Ltd. Public participation can be considered as the required element of the EMP process. In this study various stakeholder's participation was made. Environment management plan (EMP) is carried out under the instruction of Environmental Conservation Department (ECD).

6.1. The Role of Public Consultation Meeting

At the beginning of each consultative meeting, an overall brief of the project was provided to various groups. Impacts, both negative and positive, that are common with any infrastructure development program acquiring land were discussed with the stakeholders. People interacted with interest to learn about the project and shared their views as well.

The main objective of the meeting was to share project's planned activities and their associated potential impacts on the environment and society. The consultation program, participants feedback was also received which reflected the necessity and demand of the proposed project. Information dissemination and information sharing techniques will be used to inform the stakeholders regarding the action being taken in a program area through personal communication to make them aware about the project. Focused Group Discussions (FGDs) will be conducted in public consultation to cover different components of the project aims to increase local awareness about the forthcoming project as well as to incorporate their views, needs, priorities considering different positive and negative impact of the project.

6.2. Public Consultation Meeting

Public consultation was conducted on 8th September 2022at the meeting room No (3) of Hakers Enterprise (Myanmar) Co., Ltd. The event was planned to be held starting from 10:00 am to 12:00 pm. The summary of public consultation meeting can be seen in Table 6-1.

The public consultation was celebrated with 17 persons who are staff officer and deputy staff officer (ECD), deputy staff officer (Pathein City Development Committee), staff officer of fire department, chief of health, area commander, staff officers of district factories and general labor laws inspection department, HR manager and employees of Hakers and Marketing Associate and Project coordinator and senior environmentalist of HA Company. The ceremony was started by the introduction speech for the consultant company was given by Daw Khant Zin Thant (Marketing Associate of HA Company). Then, the findings and results were presented by Daw Thandar Kyaw (Senior Environmentalist of HA Company) and it is shown in Figure 6-1The presentation slides in Appendix A and attendance list are described in Appendix E

Table 6-1 Summary of public consultation meeting

Time and Date	Friday, 20th May 2022 Introduction Speech Session : 10:00 – 10:30 AM Presentation Session : 10:30 – 11:30 AM Q&A Session : 11:30 – 12:00 AM	
Venue	Zoom Meeting	
Agenda	Brief explanation on the EMP process Presentation on the Background Information of Project, Project Description, Environmental Issues and Environmental Management Plan Receiving questions, feedback and suggestions from participants	
Attendees	Environmental Conservation Department	2
	Pathein City Development Committee	2
	Fire Department	1
	Factories and General Labour Law Inspection	2
	Area Commandar	1
	Hakers Enterprise Myanmar Co., Ltd.	6
	HA Co., Ltd	3
	Total	17 persons

6.3. RECOMMENDED SUGGESTION AND COMMENTS

After the presentation, suggestion section was followed by. Most of the topics were talking for corporate socially responsible (CSR) and key point of following factors for project proponent.

Suggestion

Daw Ye May Oo Zaw (Staff Officer), ECD

- Detail information of environmental monitoring should be included in the EMP report.
- PM 2.5 and PM 10 should be measured twice a year and reasons why PM 2.5 must be mentioned in EMP report.
- Indoor air quality should be measured twice a year.

U Win Tun Zaw (Staff Officer), Fire Department

- The factory use boiler for production and it has fire risk. Therefore, proper management of firefighting equipment must be done.
- All the fire equipment such as fire extinguisher and fire hose reel must be usable in anytime.

Q & A Section

Question

Daw Ye May Oo Zaw (Staff Officer), ECD

- Why is PM $_{2.5}$ high in the factory and are reasons of the highness included in the report?

Answer

U Win Naing Oo (Project Coordinator, HA Co., Ltd.)

- PM $_{2.5}$ is high around 2 pm and 3 pm according to the air quality result because of moving transportation vehicles of the factory and these reasons are mentioned in the EMP report.

Question

U Win Tun Zaw (Staff Officer), Fire Department

- Is there any specific area for temporary dumping site? Dumping site should be marked as specific area because unproper management of dumping site could lead to fire hazard.

Answer

U Win Naing Oo (Project Coordinator, HA Co., Ltd.)

- The proponent has already implemented the temporary dumping site in the factory.

Question

Daw Mar Lar Swe (Health Officer), Public Health Department

- Which kind of facilities are provided for the employees to protect Covid-19.

Answer

Daw Thandar Kyaw (Senior Environmentalist, HA Co., Ltd.)

- The project proponent provides masks, hand gel, hand washed basins, vaccination to the factory workers.

Question

U Kyaw Khaung Htet (Staff Officer), Factories and General Labor laws Inspection Department

- Which kind of PPE are provided for the employees who are in charge of cutting line.

Answer

Daw Thandar Kyaw (Senior Environmentalist, HA Co., Ltd.)

- The project proponent provides suitable PPE for relevant tasks in the factory. For example, gloves are provided for cutting line workers.

Question

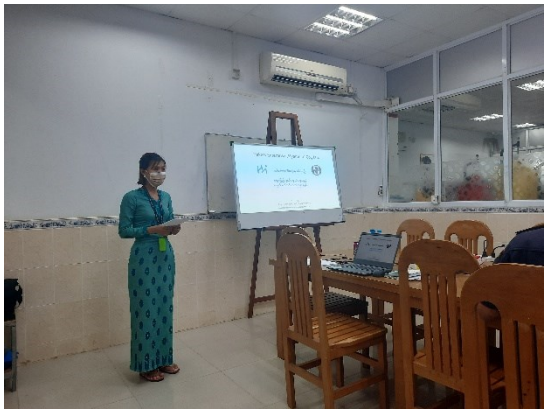
Daw Nyein Nyein Htay (Deputy Staff Officer), Pathein City Development Committee (PCDC)

- How wastes such as chemical products and nonhazardous waste are disposed?

Answer

Daw Thandar Kyaw (Senior Environmentalist, HA Co., Ltd.)

- The project proponent disposed hazardous and nonhazardous waste separately on daily basic by Hijet to the PCDC dumping site.

	
Indroduction speech by Daw Khant Zin Thant (Marketing Associate, HA)	Presentation by Daw Thandar Kyaw (Senior Environmentalist, HA)
	
Suggestion and questions by U Win Tun Zaw (Staff Officer of Fire Department)	Suggestion and questions by Daw Ye May Oo Zaw (Staff Officer of Environmental Conservation Department)
	
Question by U Kyaw Khaung Htet (Staff Officer of Factories and General Labor laws Inspection Department)	Question by Daw Mar Lar Swe (Health Officer of Public Health Department)

	
Question by Daw Nyein Nyein Htay (Deputy Staff Officer of PCDC)	Answer by U Win Naing Oo (Project Coordinator) and Daw Thandar Kyaw (Senior Environmentalist) from HA

Figure 6-1 Photos of Public Consultation Meeting

CHAPTER 7
ENVIRONMENTAL MANGEMENT ACTION

7.1. INTRODUCTION

This chapter presents the Environmental Management Plan (EMP) of garment. 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 which Hakers Enterprise (Myanmar) Co., Ltd. has committed. In addition, this EMP used to ensure compliance with statutory requirement and corporate safety and environmental policies.

7.2. SCOPE OF THE ENVIRONMENTAL MANAGEMENT

The objective of the environmental management is to ensure potential environmental issues managed by proper mitigation measures in compliance with the relevant laws and regulations stipulated by national authorities. Environmental management based on the basic principles of management known as the PDCA cycle (see Figure 7-1). Environmental management consists of four related tasks as described below:

- Plan (P) - What need to be done

  Mitigation measures for the potential environmental impacts of the factory, such as air emission, noise, solid waste, wastewater and health and safety at work described in this chapter. The Project Proponent will follow the plan for the mitigation measures according to the scheduled time.

- Do (D) - Implement the plan

  The Project Proponent as described in this chapter will implement the mitigation measures 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 noted with reference to the environmental monitoring benchmarks, corrective actions need to plan to mitigate the existing environmental impacts.

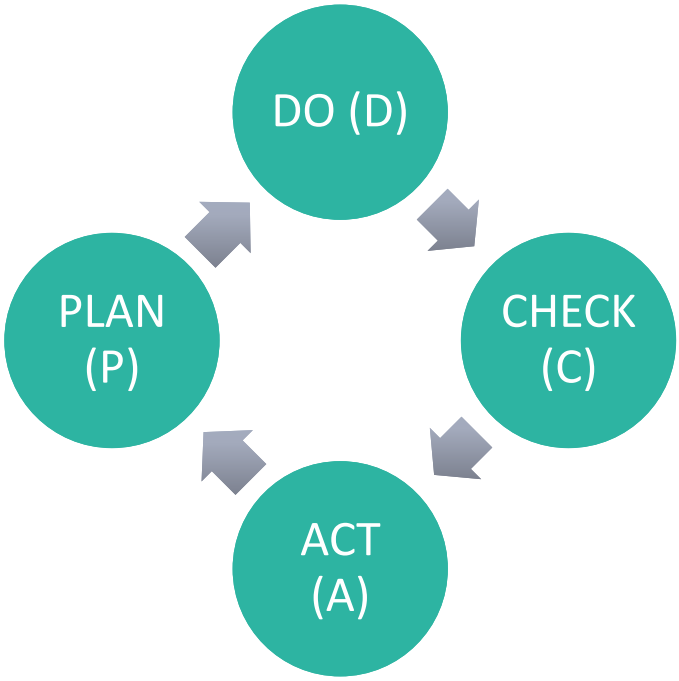


Figure 7-1 P.D.C.A Cycle

7.3. ENVIRONMENTAL MITIGATION MEASURE PLAN

The environmental impact assessment described in **Chapter 5**, and the proposed Environmental Mitigation Plans including mitigation measures to reduce and minimize the negative impacts for each item as shown in Table 7-1.

Table 7-1 Environmental Mitigation Measures Plan

Categories	Expected Environmental and Social Impact	Mitigation Measure	Implementation	Responsible Party
Operation				
Outdoor Air Quality (Point Source Emission)	• Impact of air pollution at the boiler room and generator room. • Exhaust gas emission from vehicles movements • Shortness of breath which leads decrease visibility	• Diesel consumption of generator • Turn off equipment and machines when not in use. • Proper ventilation for generator room. • Ozone depletion substances will not be used in Air conditioning system. • Plant and grass plantation programs must be provided at project site • Grow efficient air-purifying plants	Throughout Operation Phase	Project Proponent
Outdoor Air Quality (Fugitive Emission)	• Particulate Matters ($PM_{2.5}$, PM_{10}) and Total suspended particles from moving of vehicles. • Eyes irritation • Shortness of breath which leads decrease visibility	• Install sufficient ventilation must be used in places where exposures can be excessive. • Water spraying just need inside and outside of the project site before the loading/ unloading process. • Plant and grass plantation programs must be provided at project site • Grow efficient air-purifying plants e.g. areca Palm, aloe Vera and climbing ivy etc. • Enforce to wear PPE to employees	Throughout Operation Phase	Project Proponent
Indoor Air Quality	• Dust ($PM_{2.5}$ and PM_{10}) sparks off eye/ nose/ throat irritation, respiratory tract problems and lung diseases • CO2 may drive to headache, bounding pulse, warm	• Install sufficient ventilation must be used in places where exposures can be excessive. • Well ventilation for the source of pollutant areas • Grow efficient air-purifying plants e.g. areca Palm, aloe Vera and fern etc.	Throughout Operation Phase	Project Proponent

Categories	Expected Environmental and Social Impact	Mitigation Measure	Implementation	Responsible Party
	extremities and finally, unconsciousness	• Install the fine particles (PM) and CO_2 detectors • Enforce to wear PPE to employees		
Decommission				
Indoor Air Quality	• Particulate Matters (PM2.5, PM 10) and Total suspended particles from moving of vehicles. • Eyes irritation • Shortness of breath which leads decrease visibility	• Dust will be efficiently countered by sprinkling of water during the phase. • Water spraying just need outside of the project site • Tarpaulin covering of all dusty vehicle loads transported to, from and between site locations. • Dusty activities should be re-scheduled where possible if high-wind conditions are encountered. • Restore, resurface and rehabilitate the disturbed area as soon as practicable after completion of construction or renovation. • Significant emission reduction will be achieved through regular equipment maintenance. • Cover dump trucks before traveling on public roads. • Establish and enforce speed limits to reduce airborne fugitive dust.	Throughout Decommission Phase	Project Proponent/ Contractor
Operation				
Noise	• Irritation, increased stress or nervousness • Interference in concentration • Increase the rate of accidents • High blood pressure • Long term cardiovascular diseases	• Use equipment and machines which generate low noise levels. • Regular maintenance for noise generation machines such as sewing machine, cutter, and equipment from the operation process. • Provide adequate ear protection (ear plugs or muffs) to workers working in the excessive noise areas. • No employee should be exposed to a noise level greater than 85 dB(A) for a duration of more than 8 hour per day without hearing protection. In addition, no unprotected ear should be exposed to a	Throughout Operation Phase	Project Proponent

Categories	Expected Environmental and Social Impact	Mitigation Measure	Implementation	Responsible Party
		peak sound pressure level (instantaneous) of more than 140 dB (C). • Grow noise-absorbing plants (e.g. Areca Palm, etc.,) • Install sound (esp. echo) proof curtain		
Decommission				
	• Interference in concentration • Increase the rate of accidents • High blood pressure • Long term cardiovascular diseases	• Provide adequate ear protection (ear plugs or muffs) to workers working in the excessive noise areas. To make sure workers wear ear plug two times a day with 1hour period each time. • Provide adequate ear protection (ear plugs or muffs) to workers working in the excessive noise areas and force them to wear. • Ensure that all contractors on site have effectively controlled noise levels from equipment. • Effective noise controls include regular inspection and maintenance of all vehicles and construction equipment working onsite, • vehicles and machinery that are used intermittently should not be left idling for long periods of time. • Avoid running construction machineries at night. (22:00-07:00)	Throughout Decommission Phase	Project Proponent/ Contractor
Operation				
Odor	• Exposure to odors could result in health effects, discomfort, to more serious symptoms. • eye, nose, throat or lung irritation. • coughing, wheezing or other breathing problems. • headaches or feel dizzy or nauseous.	• Store the stain removers in a well-ventilated area. • Keep the stain remover containers tightly closed using PPEs. • During the stain removing activities, the employee must wear mask, chemical splash goggles and handling with chemical resistant gloves, like Nitrile glove. • Provide sufficient ventilation system for working area. • Task-shifting and task-sharing.	Throughout Operation Phase	Project Proponent

Categories	Expected Environmental and Social Impact	Mitigation Measure	Implementation	Responsible Party
	• anxiety and stress level.	• Provide specific storage area within the factory to collect waste that emit VOCs. • Daily cleaning the toilets, floors and basins. • Regularly check the septic tank to avoid leakage of sewage. • Regularly disposal of sewage from septic tanks by township municipalities.		
Operation				
Wastewater	• There is no wastewater from operation process. • Domestic waste water from toilets and hand wash basin • Sewage water can cause diarrhea-related diseases. • Storm water runoff from roofs, roads, paths into drains after raining.	• Minimize the amount of water used • Avoid generating unnecessary wastewater • Separate the drainage and pipeline system for sewer line and surface runoff • Regularly check the septic tank to avoid leakage of sewage. • Control oil generating from the domestic activities and generator room. • All drainage systems are covered and liquid wastes are disposed to the septic to avoid soil population	Throughout Operation Phase	Project Proponent
Decommission				
	• Domestic waste water from toilets and hand wash basin • Storm water runoff from roofs, roads, paths into drains after raining.	• Minimize the amount of water used. • Avoid generating unnecessary wastewater. • Discharging wastewater directly to the natural water bodies must be avoided as much as possible. • arrange proper drainage system	Throughout Decommission Phase	Project Proponent/ Contractor
Operation				

Categories	Expected Environmental and Social Impact	Mitigation Measure	Implementation	Responsible Party
Solid Waste	• Domestic Waste (Non-Hazardous Waste) • Impact of waste generated on related health risk and for community • Serious negative environmental impacts	• Use marked bins to segregate dry and wet waste. • Waste must be separated by type of waste and systematically disposed into containers. • Recyclable waste bins must be supplied and a good practice of waste sorting habit must introduce for wastes that can recycle. • Regular disposal to final disposal sites by Pathein City Development Committee on weekly basis • Record waste transfer by notes	Throughout Operation Phase	Project Proponent
	• Chemical Wastes (Hazardous-Waste) • Impact of waste generated on related health risk and for community • Serious negative impacts on environmental and biodiversity	• Chemical wastes like thinner and wastes from clinic should be collected in separate bins and disposed properly • Provide masks and gloves for those staffs • Provide training to workers on how to handle the chemical waste. • Soaking the spilled chemicals with sawdust and sand will be done as spill response plan. • Regular disposal to final disposal sites by Pathein City Development Committee on weekly basis • Record waste transfer by notes	Throughout Operation Phase	Project Proponent
Decommission				
	• soil and water contamination. • Serious negative environmental impacts	• Food wastes, plastics and tissues will be collected in a temporary waste dumping site within the factory area and finally disposed to Pathein City Development dumping sites on weekly basis. • Hazardous chemicals like oil, chemicals and emulsions will be managed to use with care in order not to spill. • Soaking the spilled chemicals with sawdust and sand will be done as spill response plan. • The soaked sawdust, sand and containers of oil, chemicals and emulsions will be collected in separate	Throughout Decommission Phase	Project Proponent/ Contractor

Categories	Expected Environmental and Social Impact	Mitigation Measure	Implementation	Responsible Party
		dust bin and finally disposed to Pathein City Development dumping site. • Waste disposal will be recorded regularly.		
Operation				
Physical Injuries	• Loading and unloading in warehouse, repetitive tasks such cutting, sewing and ironing can drive ergonomic hazards, musculoskeletal disorders of the neck, shoulder, elbow, forearm/wrist and low back pain	• Use a device (forklift) to lift and reposition heavy objects • Store heavy objects at waist height • Use personal protective equipment (PPE) like shoulder pads to cushion loads carried on the shoulder • Workplace exercises include stretching exercises focusing on neck, shoulders, low back, and hand and wrist	Throughout Operation Phase	Project Proponent
Operation/Decommission				
Weak of enforcement in good safety practices	• Increase the health risks for workers	• Officially set the restricted laws and regulations	Throughout both Operation and Decommission Phase	Project Proponent/ Contractor
	• Accidents and incidents can occur physical injuries within the operation area.	• Personal protective equipment (PPE) must be worn • Educate and train them for health education and workers in First Aid Kit training • Sharing the knowledge concerned with first aid		
Operation/Decommission				
Emergency and fire-fighting training program	• Increasing of fire risk in and around the project site • Delay and fire in an emergency.	• Train almost all of the workers and staffs for firefighting and mock drills for firefighting. • Educate workers for safety awareness in work place. • Sharing program to workers	Throughout both Operation and Decommission Phase	Project Proponent/ Contractor

7.4. MONITORING PROGRAM

Environmental monitoring plan is the important for the effective execution and successful implementation of EMP. Environmental monitoring focuses on the work environment which includes, waste management, health and safety of workers, safety of the facilities and the socio-economic component of the environment. The objective of monitoring is;

- To measure impacts that occurs during the operation phase of the project
- To ensure compliance with statutory requirements
- To determine the effectiveness of mitigation measures and other measures
- To assist in the implementation of EMP

7.4.1. Environmental Monitoring Team

The environmental monitoring team should be comprised to accomplish regular monitoring and check-up. The leader or coordinator of the team should be fully responsible for the environmental affairs of the factory. The following Table 7-2 shows proposed organization plan for the monitoring team.

Table 7-2 Environmental Monitoring Team

No	Position	Environmental management team position	Responsibility	Address
1	Wint Wint Thu Naing	Team leader	Environmental quality monitoring, Management of implementing mitigation measures in Environmental Management Plan	Block No. (P-3), Plot No.52, Industrial Zone, Ward No. 13, Pathein Township, Pathein District, Ayeyarwady Region
2	Naw Al Ni Htoo	member	Occupational Health and Safety Management	
3	Hnin Wittye Lwin	member	Implementing solid waste management plan	
4	Zaw Myo Htet	Member	Implementing fire hazard mitigation measures	
5	Zin Lin Aung	Member	Monitoring of equipment and vehicles	
6	San San Maw	Member	Informing group leader in case of accident	

Apart from having an Environmental Management Plan, it is necessary to have a permanent staff who is in charge of ensuring its effective implementation of mitigation measures and to conduct environmental monitoring. According to the above table, it is necessary to assign staffs who have the background knowledge for the regular check-up. Training program for safety issues should be completed if necessary. Environmental monitoring can also be done by registered third party monitoring agency. The major duties and responsibilities of the person who is responsible for environmental monitoring of Hakers Enterprise Myanmar Co., Ltd. should be as given below:

(a) To ensure regular operation and maintenance of pollution control devices.

(b) To minimize environmental impacts of operations by true dedication to the EMP.

(c) To initiate environmental monitoring as per approved schedule.

(d) Review and interpretation of monitored results and corrective measures in case monitored results are above the specified limit.

(e) Maintain environmental related records.

(f) Coordination with regulatory agencies, external consultants, monitoring laboratories.

(g) Ready to solve any complaints from guest, local people, neighborhood or government authorities about environmental and social issues especially in wastewater and solid waste.

7.4.2. **Summary of Environmental Monitoring Program**

The following **Error! Reference source not found.** described the detailed m onitoring plan for project factory. The project proponent must obey it to mitigate impact on the environment and meet with standard and guideline.

Table 7-3 Environmental, Health and Safety Monitoring Program

Phases	Monitoring Parameter	Target Level	Area to be Monitored	Frequency	Responsible Organization
Outdoor air quality					
Operation	For 24 hours $PM_{2.5}$ and PM_{10}, TSP, SO_2, NO_2, CO, O_3	Within ambient standards level of NEQEG and International Standards	Near Boiler's stack 16°47'44.63"N 94°46'7.84"E	Once a year	Hakers Enterprise Myanmar Co., Ltd.
Decommission			Within the project site	Once a year	
Indoor air quality					
Operation	CO_2, $PM_{2.5}$ and PM_{10}, TVOC Formaldehyde	Within standards international limit	Both sewing lines and production area	Twice a year	Hakers Enterprise Myanmar Co., Ltd.
Water quality					
Operation	pH, BOD, COD, Ammonia, TSS, Iron, Oil and Grease, temperature, Total Chlorine	Within WHO and NEQEG	Domestic wastewater from factory	Twice a year	Hakers Enterprise Myanmar Co., Ltd.
Decommission			Wastewater discharged point	Twice a year	
Noise					
Operation	For 24 hours Noise level (dB(A) scale)	Within standards international limit/ NEQEG	Generator room	Twice a year	Hakers Enterprise Myanmar Co., Ltd.
			Operation area • Sewing Line		
Decommission			Within the project site	Twice a year	
Solid waste					
	• Solid wastes from operational process such as cutting, sewing and packing. Then, paper rod and corrugated paper from raw material, thread cone.	Within standards of Myanmar National Master Plan	Production area • Sewing Line • Cutting Line • Design Room • Packing Line	Weekly	Hakers Enterprise Myanmar Co., Ltd.

Phases	Monitoring Parameter	Target Level	Area to be Monitored	Frequency	Responsible Organization
	• Domestic refuse, Paper and food scrape.		• Dining area • Accommodation • Toilet • Factory Compound		
Decommission	• Domestic waste • Demolition materials		Within the project site	Weekly	
Occupational Health and Safety					
Operation	Record of incident/accident report, first aid training report, health checkup and seasonal diseases	-	The whole factory and production sector	Daily	Hakers Enterprise Myanmar Co., Ltd.
Decommission		-	Within the project site		
Emergency Risks					
Operation	Records of mock drill, self-inspection to firefighting facilities and emergency and its response	-	The whole factory and production sector	Twice a year	Hakers Enterprise Myanmar Co., Ltd.
Decommission		-	Within the project site	Twice a year	

In addition to monitoring plan, there should be auditing plan in the form of internal and external environmental audit. The audits will assess the environmental performance of the operation in complying with environmental laws, rules and regulations.

7.5. ENVIRONMENTAL MANAGEMENT PLAN

This sector is environmental management plan for impact generated from the project factory. Besides monitoring program, there should be a budget for mitigating plan for environmental impact. Thus, the budget is compliance with environmental laws, regulations, methods and procedures.

7.5.1. Outdoor Air quality management

Before operation stage, the conveying of raw material by trucks and people creates dust and particulates matters ($PM_{2.5}$ and PM_{10}). Then, the vehicles as cars, box trucks and cycles may come and go into the factory. In addition, the project site is located on Industrial Road, for this reason there are a lot of traffic that introduce smog forming emissions, such as nitrogen dioxide, carbon monoxide, carbon dioxide, particulate matter, and formaldehyde. The best way to mitigate those, In the factory, must grow air purification plants, mentioned in Figure 7-2. Areca Palm, Aloe Vera and Fern, these leafy green creatures absorb as much as 87% of indoor and outdoor pollutants within 24 hours then emit oxygen.

Temporary pollution of fine particles (PM_{10} and $PM_{2.5}$) can be beaten by artificial precipitation can create an effective outcome. The main production processes such as cutting, sewing and ironing operations emits a few pollutions. Due to welding and cutting the iron rods at that time, the workers must wear the dust face mask is the key to keeping safe from nose and throat, skin irritations and neurotoxic or general health problems.

Hakers Enterprise (Myanmar) Co., Ltd. already has a stack or chimney which is about 18 feet from ground is installed for boiler. But all the air quality parameters were valid to the standard values. Thus, the boiler's stack height does not need to elevate than the previous height.

	
Areca Palm	Climbing Ivy
	
Aloe Vera	Fern

Figure 7-2 Plants that can reduce dusts and other pollutants from the air and converts CO_2 to O_2

7.5.2. **Indoor Air quality management**

Allocation the responsibility, source control, ventilation, air cleaning can eliminate or at least mitigate the pollution. Then, indoor carbon dioxide (CO_2) levels ideally should not rise above 1500 ppm, take the necessary steps to ventilate with fresh air. There are many factors that affect CO_2 levels including good ventilation and regularly replace air filters in indoor fan systems and install a CO_2 monitor to remind the level of CO_2. Particulate filters are the most commonly used air cleaning devices. Personal protective equipment as face shield and gloves are the effective method to protect the air pollutants. Indoor plants which are mentioned in Figure 7-2. can reduce not only CO_2 levels but also dust in the enclosed areas.

7.5.3. **Solid Waste Management**

There are two types of solid wastes, production process and domestic wastes. While operation materials, the wastes such as cloth and thread scrap pieces, thread cones and filtered are created. Raw materials also produce - paper tubes for holding the fabric roll. Recyclable waste bins must be supplied and a good practice of waste sorting habit must introduce and officially legislate the practice within the factory, in Figure 7-3.

Wastes from employees are plastic bags, leftovers, tissues and pieces of paper. Although, all the wastes are disposed to the Pathein City Development Committee twice a month, damping those are spilling out as leaches. While keeping the chemical like thinner, it must be stored with a stabilizer in a weakly acidic solution in a dark colored bottle.

After that, wastes must be discharged every two days at Pathein City Development Committee waste dumping site by following the guidance of Ayeyarwady City Development Committee.

Figure 7-3 Waste collecting system by colored bins

7.5.4. **Wastewater Management**

There is no waste water produced from the production process, however, waste water produced are from the hand wash basins and septic tank. For the domestic wastewater and surface runoff, drainage channels are already constructed, thus regularly inspected to collect the garbage from canals so as to improve water flow. Moreover, domestic waste water quality laboratory result was acceptable with the WHO and NEQEG guidelines. Therefore, the impact does not cause any significant environmental impact on surrounding area.

7.5.5. **Occupational Health and Safety management**

The main focus of occupational health includes promotion and maintenance of working capacity and employee health; improvement of working environment; development of work cultures and organizations to support health and safety; promotion of positive social climate; smooth operation in the whole production process; enhanced productivity of the organization and getting high the job satisfaction rates.

7.5.5.1. Lighting

Insufficient light area such as foam fabric cutting room, fabric cutting lines, ironing lines, finishing lines, Laundry & Spot cleaning room, fabric warehouse, mold pattern room and packing room which areas were needed to supply proper light. Those 8 places required to install more lighting. Light installation techniques are shown in Figure 7-4 and Figure 7-5. As the provided demonstration, Reflectors which are highly reflective sheets silver coated or polished aluminum improves the light focus onto the workplace. The reflectors are designed to reflect the wasted light downward.

The reflectors surfaces should be cleaned and free from dust to get full reflection. With a reflector the space become 30-50% brighter than the original situation, which means the energy consumed is effectively used and can save more energy by shutting down the excessive lights. However, over illumination is incurred in the inspection line, so fluorescent light of such area must be switched off the unnecessary light, in the alternative ways can be attaching a filter over the fluorescent light, using desk lamps for everyone in the area, or moving the desks position, in Figure 7-6.

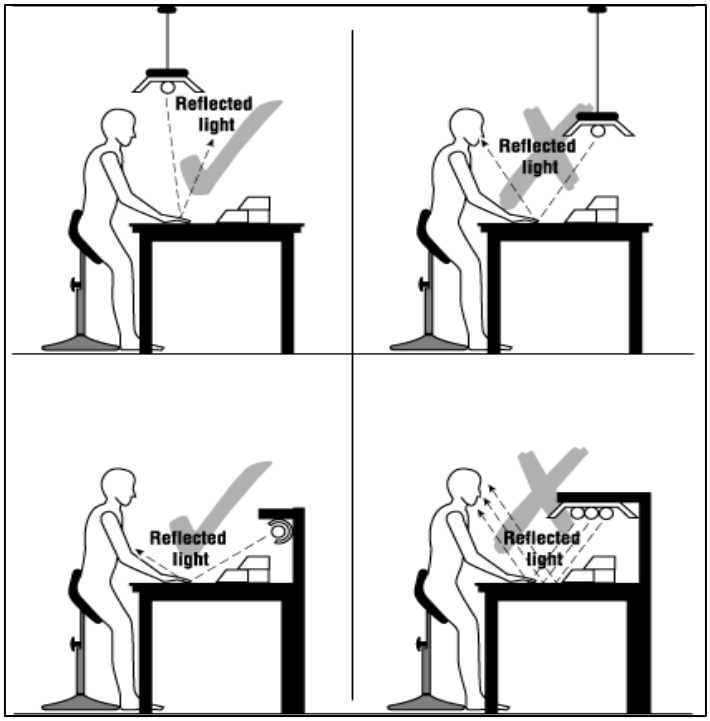


Figure 7-4 Right Position to Install Lighting

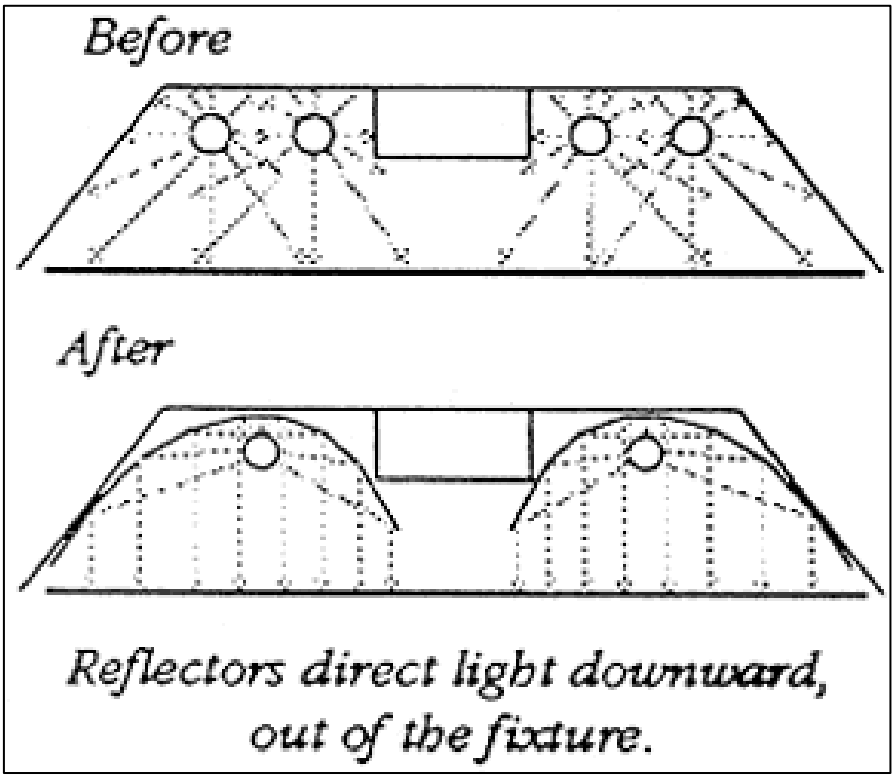


Figure 7-5 Difference between Normal Lamps and Reflectors Installed Lamps

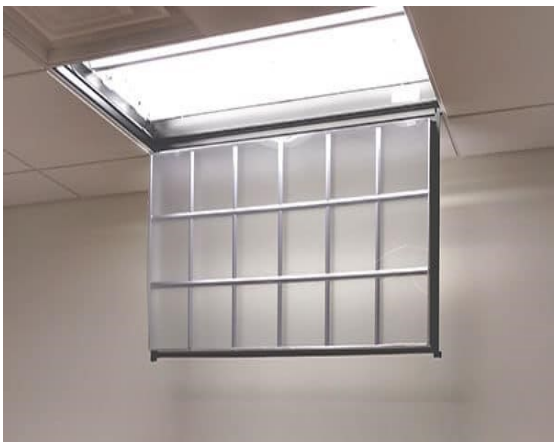
	
Light Filter by Fabric Panel	Fluorescent Light Tube Cover

Figure 7-6 Mitigation for Over Illumination

7.5.5.2. Noise

In the project area noise pollution is significant issue, therefore the workers in the production area must wear the personal protective equipment (PPE) and plantation the noise-reducing plants to get effective result mentioned in Figure 7-7. Weeping Fig, Madagascan Dragon, Areca Palm and Baby's Tears are excellent noise blockers. Plants can also help to reduce background noise levels inside buildings by up to 5 decibels (dBA). The effect appears to be dependent on the plant type, density, location and sound frequency.

	
Ficus Benjamina (weeping fig)	Dracaena Marginata (Madagascan dragon)
	
Areca Palm	Baby's Tears

Figure 7-7 Noise-reducing plants

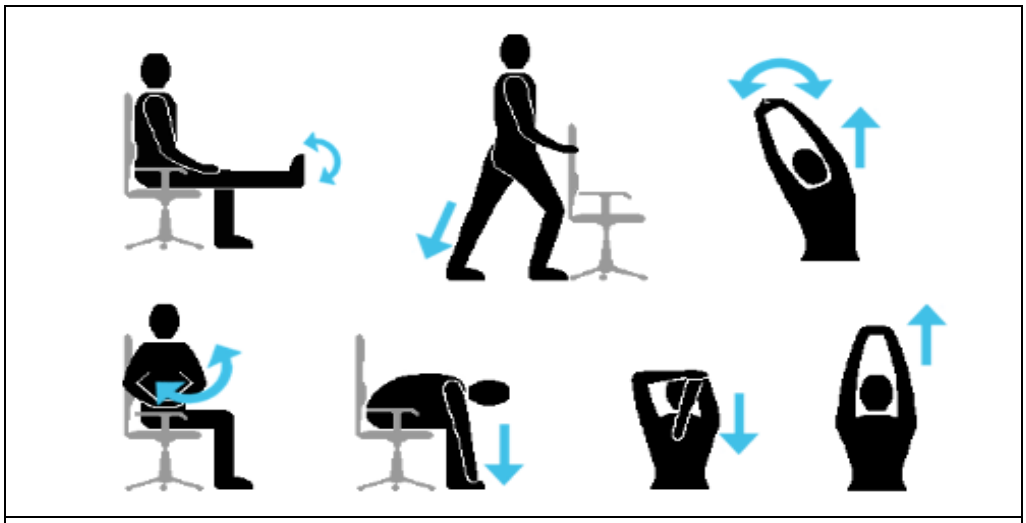
7.5.5.3. Mitigation the impacts of Offensive odor

Although the drawback of offensive odor cannot be effect on the environment, it may have impacts on the workers who are on duty. With this purpose, planting a stand of indoor plants have the ability to disperse odor. Task-shifting and task-sharing may be another option for minimizing or reducing the impacts between the receptor and the source. The garment authorities must support the PPE (masks and face shield) to the workers.

7.5.5.4. Physical Injuries

The workers in the garment factory always encounter poor body posture while doing their repetitive jobs as cutting, sewing and ironing stages. Among them, a backless stools chairs (without backrest and armrest) in the sewing department are uncomfortable that lead to musculoskeletal disorders, for this reason the seated must be replaced with the comfortable ones. Then, the whole production processes the worker must take some workplace exercises. Doing the exercises about 20 minutes per day show that reduce stress, combat fatigue, improve performance and high rate of satisfaction during workday.

In some duty like product loading and unloading in warehouse, work-related musculoskeletal and ergonomic disorders can be faced. To reduce those drawbacks, the warehouse small forklift trucks must be provided. Possible of prevention the physical injuries are shown in Figure 7-8.



Workplace Exercises

Figure 7-8 Prevention the Physical Injuries

7.5.5.5. Reduction the Symptoms of Electromagnetic (EMF) Radiation

Using the radiation resistant clothing is the effective way to protect the EMF radiation, another way may be increasing the distance from the sources. For the seamstress, both two options are not suitable for the them. Thus, providing the multivitamin supplements is the best alternative choice for those. Having sufficient iodine can help maintain the body against various types of radiations. Many physicians recommend when taking iodine to take also magnesium, vitamin C and selenium. Before taking those, should follow the doctor's prescriptions. Another option may be a noni juice which has ability to approach the radioprotective affects. In the same way, spirulina can cure the EMF exposure symptoms shown in Figure 7-9.

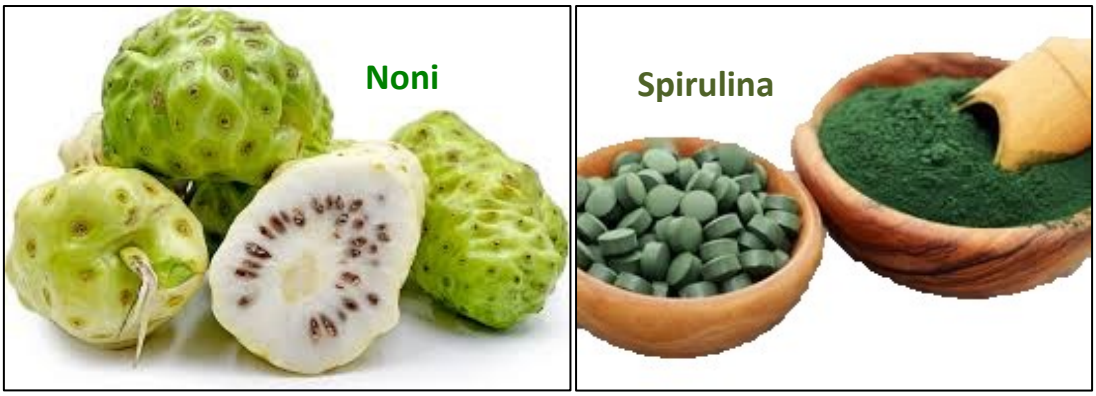


Figure 7-9 Supplement for Electromagnetic (EMF) Radiation Protection

7.5.5.6. Fire Management and Emergency Plan

The factory management has taken proper measures to handle any emergency situation like fire, earthquake, flood and storm etc. Provision and inspection of firefighting equipment and fire hydrant system in all the sections of the factory. A detail

evacuation plan (fire exit, emergency exit door etc.) is established and communicated with workers. The seniors who accomplished the course must share their knowledge and experience through the juniors. Safety manager must establish internal educational campaign with the purpose of being overwhelming the information.

Periodic inspection of safety relief valve provided with pressure vessels and equipment, preventive maintenance, aware the workers about electric shock by necessary training. Prepare an emergency contact directory consisting contact numbers of nearest fire service, local police station, hospitals etc. and displace that everybody can see it. Declaring the factory as a "No Smoking Zone". When plant runs at abnormal situation e.g. if emission level increases than its normal level then immediately inform to HSE officer as well as project manager. Build a safety committee which from firefighting team, rescue team. The committee arranges a meeting every month to discuss about five safety management. Ensure proper training of the employees about the disaster management, fire safety as well as occupational health and safety. Emergency response facilities and Emergency Layout Plan at Hakers Garment factory are provided in Figure 7-10 and Figure 7-11 respectively.

	
Fire Extinguisher	First Aid Box
	
Fire Hydrant	Fire Extinguisher

Assembly Point

Emergency Bell

Figure 7-10 Fire Fighting and Emergency Response Facilities at Hakers Garment

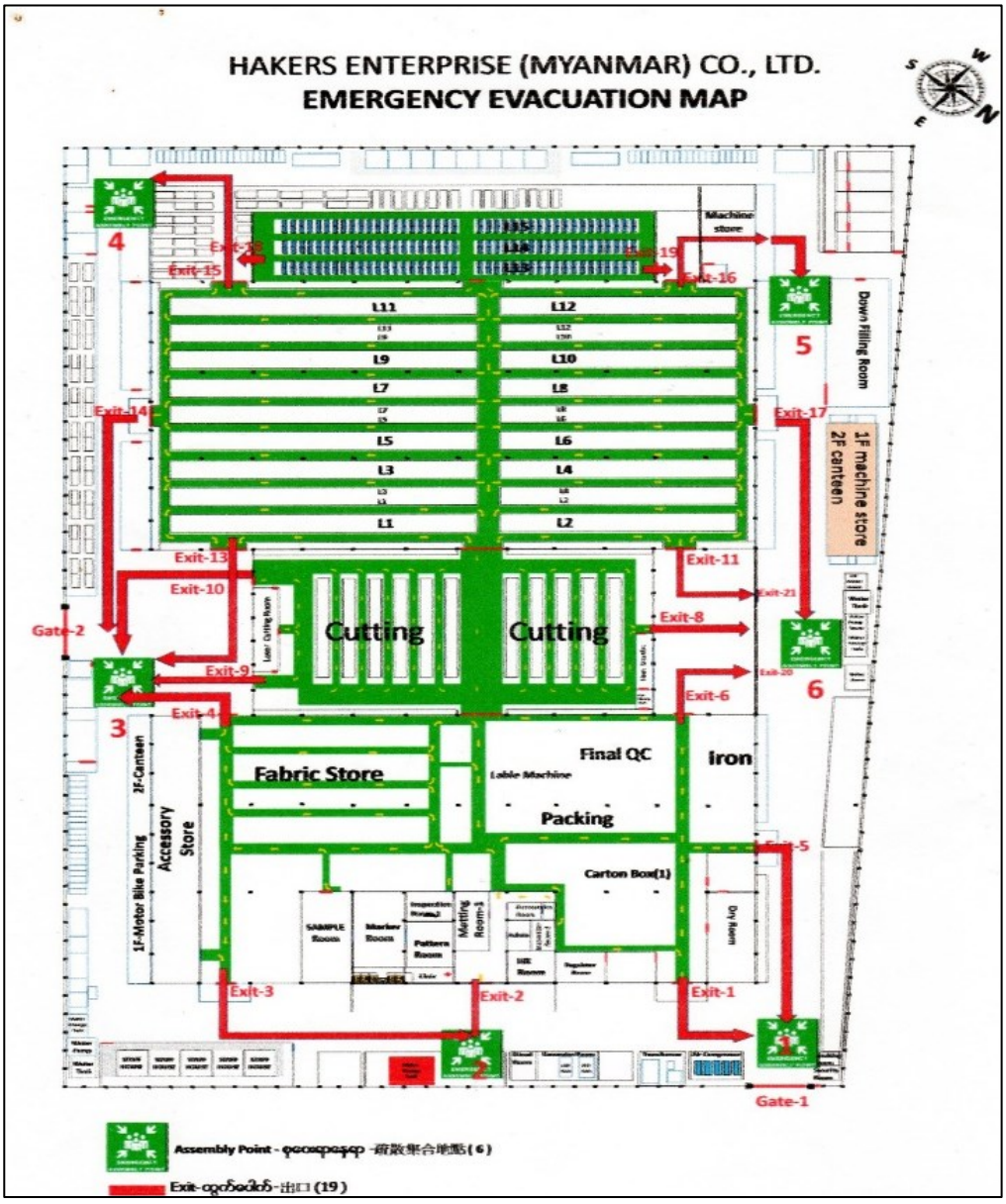


Figure 7-11 Emergency Plan of the Hakers Enterprise (Myanmar) Co., Ltd.

7.5.6. **Safety Regulation and Enforcement**

The enforcement involves inspection of workplace to detect flaws and make recommendations for designing healthy environment. The act of ensuring that workers obey the laws. If not, warning or punishment must be set to workers who do not wear PPE. In workplace, the manager attempts to motivate staffs, promote them in the workplace by promising rewards.

7.5.7. **EMP for good working practices and good safety practices**

The project proponent must follow, as practical as possible environmental health and safety guidelines and international standard for the garment factory. There is the own program for capacity building and training covering good working practices and good safety practices.

7.6. CORPORATE SOCIAL RESPONSIBILITY (CSR)

For workers to be prepared, the employee's health care plans and procedures are kept in the factory. Regularly inspecting worker. In addition, employees are paid an annual bonus, endorsement for employees' special occasions (joy and grief). In addition, the project proponent is also donating orphanage shelter, etc.

7.7. ORGANIZATION AND FUND FOR EMP

A small EMP cell consisting of 2-5 members has formed; In the factory, manager should be the 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 implement EMP. The team for implementation environmental management plan of project factory is described in Table 7-4.

The budget for EMP fund will cover the initial cost and recurring expenses for implementation EMP. The total budget for EMP in Hakers Enterprise (Myanmar) Co., Ltd. estimated and shows budget allocation for proposed environmental safety mitigation measures in Table 7-5. The project proponent already has the portion about 2% from the annual profit in order to support all the staffs and workers of social occasional events (Table 7-6).

Table 7-4 Environmental Management Team

No.	Group Member	Rank in EMP Teatam	Responsibilities
1.	Wint Wint Thu Naing	Leader	✓ Supervise and implement the environmental management programs, fire suppression systems and CSR Programs. ✓ Follow the instructions of the relevant government departments.
2.	San San Maw	Member	✓ Implementation of environmental monitoring programs contain in the Environmental Management Plan. ✓ Follow the instructions of the relevant government departments.

No.	Group Member	Rank in EMP Teatam	Responsibilities
			✓ Inspect, record, plan, and train for fire safety and emergency case ✓ Follow and implement the instructions, monitoring program and mitigation measures contained in the EMP
3.	Hnin Wittye Lwin	Member	✓ Supervise and implement the risk controls for potential risk during the operation. ✓ Brief and train the risk controls to workers ✓ Inspection and implementation measures of occupational health and safety. ✓ Follow and implement the instructions, monitoring program and mitigation measures contained in the EMP ✓ Regular inspection and implementation of the waste disposal system
4.	Zaw Myo Htet	Member	✓ Inspect, record, plan, and participate in arranging for fire safety and emergency case ✓ Follow and implement the instructions, monitoring program and mitigation measures contained in the EMP

Table 7-5 Estimated Budget for Environmental Safety Mitigation Measurement

No	Proposed Environmental Mitigation Measures	Estimated Budget (MMK)
Environmental Work		
1	Monitoring program	1,500,000
2	Capacity building and training	1,500,000
3	Emergency case	1,500,000
Health and Safety Work		
4	Medical for Clinic (per year)	3,000,000
5	Fire Extinguisher	2,500,000
6	Personal protective equipment	1,000,000

Table 7-6 Social Responsibility Fund of Hakers Enterprise (Myanmar) Co., Ltd.

No.	Social Responsibility Fund	Responsible Organization	Quantity	Estimated Budget (MMK)
1	Social			
	Road construction and improve water flow surrounding village	Hakers Enterprise (Myanmar) Co., Ltd.	Yearly	3,000,000
2	Education			
	Participating in school construction and other related building at the local	Hakers Enterprise (Myanmar) Co., Ltd.	Yearly	1,500,000
3	Health			
	Participating in drinking water lake construction and supporting the fund to rural health department near villages	Hakers Enterprise (Myanmar) Co., Ltd.	Yearly	2,000,000
4	Religious			
	Donating to the monastery and religious organization	Hakers Enterprise (Myanmar) Co., Ltd.	Yearly	1,000,000
Total				**7,500,000**

CHAPTER 8
CONCLUSION AND RECOMMENDATION

The main objective of the study is to identify the major environmental impacts due to the implementation of the project activities in operation phase. Therefore, assessment of potential environmental impacts and preparing of environmental management plan with recommended impact mitigation measures were prepared according to the compliance with environmental impact assessment procedure (2015) and National Environmental (Emission) Guidelines. The environmental monitoring team organized by in the factory, should take the responsibility of regular monitoring.

Baseline environmental data collection and site visit activities was conducted and monitoring results were compared with Air Quality Index (AQI), National and Environmental Quality (emission) guideline and international guideline standards. Operation process does not emit waste water therefore, domestic waste water was tested.

Looking through the impacts the most considerable impacts caused are due to air emissions, solid waste formed by the process and health impacts of the workers. Solid wastes like cloth scrap pieces, threads fragments and cones when cutting the fabric; foam fabric and sewing, the raw materials also produce the waste like paper tubes for holding the fabric roll. Others are pattern and marker papers, corrugated paper, carton box, domestic wastes (leftovers, plastic bottles, tissues and sanitary pad, etc.) and chemical containers. The waste from the production process, cloths are sold to the pillow production factories and others etc. Both domestic wastes and chemical containers are disposed to Pathein City Development Committee in every two days.

The gases like NO_2, CO_2 and other gases are emitted from the production process which have lots of health impacts on the workers and the surroundings nearby. For gas emissions plants like Areca Palm, Climbing Ivy, Aloe Vera and Fern should be planted along the side of the industry, not only reduce the toxic gases from air but also spread the purified air. In addition, for health impact of the workers must be legislate the disciplines to wear Personal Protective Equipment (PPE) for workers within the working place.

In conclusion, it has been figured out that, the proposed factory is going to generate local employment opportunities and enhance capabilities and working skills of employees. Consequently, their socio-economic standard is expected to be improved and undertaking corporate social responsibilities (CSR) as recommended. The study further concluded that positive impacts would be of immense benefit to the local community and national development as well.

8.1. RECOMMENDATIONS

The following recommendations have been made for efficient and effective implementation of environmental conservation, health and safety and social responsibilities through the lifespan of the proposed project.

- Follow the comments and suggestions made by ECD after reviewing this EMP report.

- Once EMP is approved by concerned authorities, strict implementation is essential.
- For full and proper implementation of EMP, well understanding and supports by proponent and authority is deem necessity.
- Top level management commitment upon the safety and health of workers and providing adequate amount of budget.
- Well experienced and knowledgeable HSE Manager and HSE Assistants shall be appointed.
- Daily, monthly and annual action plan shall be formulated based on this EMP and practiced at operation level.
- Keep full records of environmental management activities and present to annual independent third-party environment audit.
- Follow the audit report and comments.
- Abide environmental policy, laws, rules and instructions of the Republic of the Union of Myanmar.

Finally, the proponent should follow the comments and suggestions made by ECD after reviewing this EMP report. Once EMP is approved by concerned authorities, effective implementation of EMP by the project proponent is essential. The proponent should abide environmental policy, laws, rules and instructions of the Republic of the Union of Myanmar.

REFERENCES

A Guide to Air Quality and Your Health by U.S Environmental Protection Agency.

Environmental Impact Assessment Procedure, 2015. The government of the Republic of the Union of Myanmar, Ministry of Natural Resource and Environmental Conservation. Notification No. 616/2015, Nay Pyi Taw, the 3rd Waning Day of Nadaw, 1377 M.E.

Environmental, Health and Safety (EHS) Guideline (Complete Version), www.ifc.org/ehsguidelines.

General Guidelines in the selection of emission control equipment for Boiler Flue cases, Headquarters Department of the Army and the Air force Washington D.C May 1988.

International Finance Corporation (IFC), 2012. Performance Standard on Environmental and Social Sustainability. IFC's Guidance Notes.

International Commission on Non-Ionizing Radiation Protection, Guidelines for limiting exposure in time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz). Health Phys. 74, 494-522; 1998.

National Environmental Quality (Emission) Guideline, 2015. The Government of the Republic of the Union of Myanmar, Ministry of Natural Resource and Environmental Conservation. Notification No. 615/2015, Nay Pyi Taw, the 3rd Waning Day of Nadaw, 1377 M.E.

Regional Data, Administrative Department, Pathein Township, Ayeyarwaddy, 2018.

Soe Thura Tun, Maung Thein, Nyunt Htay and Kyaing Sein, 2014. Geological Map of Myanmar, Myanmar Geosciences Society (MGS)

APPENDIX A
Presentation Slide of Public Consultation

Hakers Enterprise (Myanmar) Co., Ltd.

ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်

အများပြည်သူနှင့်တွေ့ဆုံဆွေးနွေးပွဲ
၈ ရက်၊ စက်တင်ဘာလ၊ ၂၀၂၂ ခုနှစ်။

တင်ဆက်သူ
Daw Thandar Kyaw (Senior Environmentalist)
Hexagonal Angle International Consultants Co.,Ltd

ဆွေးနွေးတင်ပြမည့်အကြောင်းအရာများ

1.ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် ပြုလုပ်ရခြင်းရည်ရွယ်ချက်။

2.Hakers ကုမ္ပဏီ၏ နောက်ခံအကြောင်းအရာများကို တင်ပြခြင်း။

3. Hexagonal Angle ကုမ္ပဏီ၏ အကြောင်းအရာ နှင့် ဝန်ဆောင်မှုများကို တင်ပြခြင်း။

4. Hakers Co., Ltd. ၏ အထည်ချုပ်လုပ်ငန်းအကြောင်းအရာများ တင်ပြခြင်း။

5.ကွင်းဆင်းလေ့လာခြင်းနှင့် တွေ့ရှိချက်များတင်ပြခြင်း။

6. သက်ရောက်မှုဆန်းစစ်ခြင်းရလဒ်များနှင့် ထိခိုက်မှုအဆင့်သတ်မှတ်ခြင်း။

7.စောင့်ကြပ်ကြည့်ရှုရေးအစီအစဉ်

8.အကြံပြုချက် သဘောထားများတောင်းခံခြင်း

ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် ရေးဆွဲရခြင်း၏ ရည်ရွယ်ချက်

- အဝတ်အထည်ချုပ်လုပ်ခြင်း လုပ်ငန်းကြောင့် ဖြစ်ပေါ်လာနိုင်သော ပတ်ဝန်းကျင်အပေါ်အကျိုးသက်ရောက်မှုများကို လေ့လာခြင်း။
- ကောင်းကျိုး၊ ဆိုးကျိုး ခွဲခြားခြင်း။
- ကောင်းကျိုးများကို ပိုမိုကောင်းမွန်အောင် နှင့် ဆိုးကျိုးများကို လျှော့ချအောင် အစီအစဉ်များ ရေးဆွဲခြင်း။
- စီမံကိန်းမှ ထွက်ရှိလာသည့် လေ၊ ရေ၊ စွန့်ပစ်အမှိုက်၊ အသံဆူညံမှုနှင့်တုန်ခါမှု တို့ကိုလည်း ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း လုပ်ထုံးလုပ်နည်း နှင့် ကိုက်ညီစွာ ဆောင်ရွက်ပြီး သဘာဝပတ်ဝန်းကျင် ထိခိုက်မှုလျော့ပါးအောင် ပြုလုပ်ခြင်း။
- အများပြည်သူနှင့် တွေ့ဆုံဆွေးနွေးပွဲ ပြုလုပ်ခြင်း နှင့် သဘောထားများကိုရယူခြင်း။

Hakers ကုမ္ပဏီ၏ နောက်ခံအကြောင်းအရာများကို တင်ပြခြင်း

- Hakers ကုမ္ပဏီသည် တစ်ရာ ရာခိုင်နှုန်း နိုင်ငံခြားသားပိုင် ရင်းနှီးမြှုပ်နှံမှုဖြစ်ပြီး ဘောင်းဘီ၊ ဂျာကင်အင်္ကျီ အမျိုးမျိုးကို ဝယ်ယူသူများ၏ စိတ်တိုင်းကျအတိုင်း ထုတ်လုပ်ဖြန့်ချီနေသော လုပ်ငန်းတစ်ခုဖြစ်ပါသည်။
- Hakers ကုမ္ပဏီသည် ဧရာဝတီတိုင်းဒေသကြီး၊ ပုသိမ်ခရိုင်၊ ပုသိမ်မြို့နယ်၊ ဦးပိုင်အမှတ် (၅၂/စီးပွားဇုန်)၊ အမှတ် (၁၃) ရပ်ကွက်၊ အကွက်အမှတ် (P-3) တွင် တည်ရှိပါသည်။
- Hakers အထည်ချုပ်စက်ရုံသည် မြန်မာနိုင်ငံအက်ဥပဒေ (၁၉၁၄) အရ ၂၀၁၃ခုနှစ်၊ ဇန်နဝါရီလတွင် နိုင်ငံခြားကုမ္ပဏီအဖြစ် မှတ်ပုံတင်ထားပြီး ၂၀၁၇ခုနှစ် ကုမ္ပဏီများ ဥပဒေသစ်အရလည်း မှတ်ပုံတင်ထားပြီးဖြစ်ပါသည်။

Hexagonal Angle ကုမ္ပဏီ၏အကြောင်းအရာ

ကုမ္ပဏီနောက်ခံအကြောင်း

- Hexagonal Angle (HA) ကုမ္ပဏီသည် ၂၀၁၇ ခုနှစ်တွင် စတင်တည်ထောင်ခဲ့သည်။ ကုမ္ပဏီသည် သဘာဝပတ်ဝန်း ကျင်ဆိုင်ရာ အကြံပေး လုပ်ငန်းများ၊ ပို့ဆောင်ဆက်သွယ်ရေးဆိုင်ရာ စီမံကိန်းများ၊ သုတေသနနှင့် စစ်တမ်းကောက်ယူခြင်း လုပ်ငန်းများ လုပ်ကိုင်လျက် ရှိပါသည်။
- HA ကုမ္ပဏီတွင် စီးပွားရေးဆိုင်ရာ အကြံပေးပညာရှင်များ၊ သဘာဝပတ် ဝန်းကျင်ဆိုင်ရာ ကျွမ်းကျင်ပညာရှင်များ၊ ဘူမိဗေဒပညာရှင်များ၊ Research and Survey ကျွမ်းကျင်ပညာရှင်များ၊ အင်ဂျင်နီယာများ၊ Project Coordinator များဖြင့် ဖွဲ့စည်းထားပါသည်။
- HA ကုမ္ပဏီတွင် သဘာဝပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲသည့် ဘာသာ ရပ်များအား အထူးပြုသင်ကြားပေးသည့် HA INSTITUTE ကိုလည်း ဖွင့် လှစ်ထားပါသည်။



ဝန်ဆောင်မှုလုပ်ငန်းများ

- သဘာဝပတ်ဝန်းကျင်ဆိုင်ရာ ဝန်ဆောင်မှုများ
  - ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း (EIA)
  - ပတ်ဝန်းကျင်နှင့်လူမှုဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်း (ESIA)
  - ကနဦးပတ်ဝန်းကျင်လေ့လာဆန်းစစ်ခြင်း (IEE)
  - ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (EMP)
  - ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုမှုအစီရင်ခံစာ (EMR)
- လမ်းပန်းပို့ဆောင်ဆက်သွယ်ရေးဆိုင်ရာဝန်ဆောင်မှုများ
  - အကြံပေးလုပ်ငန်းများ
  - ယာဉ်အသုံးပြုမှုဆိုင်ရာစစ်တမ်းများ
  - ခရီးသည်စိတ်ကျေနပ်မှုစစ်တမ်းများ
  - လူမှုစီးပွားဆိုင်ရာစစ်တမ်းများ
  - အင်တာဗျူးကောက်ယူသောစစ်တမ်းများ
- အခြားဝန်ဆောင်မှုများ
  - စီးပွားရေးလုပ်ငန်းဆိုင်ရာအကြံပေးလုပ်ငန်းများ
  - သဘာဝပတ်ဝန်းကျင်ဆိုင်ရာ သင်တန်း
  - သယ်ယူပို့ဆောင်ရေးဆိုင်ရာ သင်တန်း
  - သစ်တောစီမံခန့်ခွဲမှုအစီအစဉ် (FMP Report)
  - Branding Certificate Services (Food and Safety, Garment)

၅

စီမံကိန်း အကြောင်းအရာ ဖော်ပြချက်

Hakers အထည်ချုပ်စက်ရုံ လုပ်ငန်း၏တည်နေရာ

စီမံကိန်းတည်နေရာ

- ဧရာဝတီတိုင်းဒေသကြီး၊ ပုသိမ်ခရိုင်၊ ပုသိမ်မြို့နယ်၊ ၁၃ ရပ်ကွက်၊ စက်မှုဇုန်
- စီမံကိန်းနှင့် ပုသိမ်မြို့ အကွာအဝေး (၂.၆ ကီလိုမီတာခန့်)
- စီမံကိန်းနှင့် ပုသိမ်လေဆိပ် အကွာအဝေး (၂.၃ ကီလိုမီတာခန့်)
- စီမံကိန်းနှင့် မြန်မာချည်ထိုးကုမ္ပဏီလီမိတက် အကွာအဝေး (၇၀၀ မီတာခန့်)
- စီမံကိန်းနှင့် ပုသိမ်လမ်း အကွာအဝေး (မီတာ ၈၃၆ ခန့်)
- စီမံကိန်းဧရိယာအကျယ်အဝန်း ၄.၅၄ ဧက

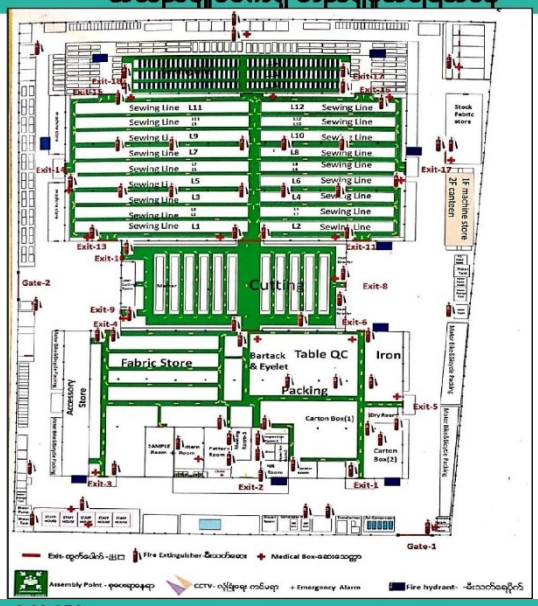
၇

Hakers Enterprise (Myanmar) အထည်ချုပ်စက်ရုံ အကြောင်းအရာ

- လုပ်ငန်းအမည် – Hakers Enterprise (Myanmar) Co.Ltd
- အမျိုးအစား – အထည်ချုပ် လုပ်ငန်း။
- လုပ်ငန်းစတင်လည်ပတ်သည့်နှစ် – ၂၀၁၃ ခုနှစ်။
- ကုန်ကြမ်း – ပိတ်စများ၊ အခြား အလှဆင်ပစ္စည်းများ
- ဝန်ထမ်းအင်အား – ဝန်ထမ်းစုစုပေါင်း ၁၉၄၆ ဦး၊ လုပ်သား ၁၈၄၁ ဦး။
  မြန်မာပညာရှင် ၃၃ ယောက်၊ နိုင်ငံခြားသား ၁၃ ယောက်၊ ရုံးဝန်ထမ်း ၃၃ ယောက်၊ လုံခြုံရေးနှင့် သန့်ရှင်းရေး ၂၆ ယောက်။
- အလုပ်ချိန် – မနက် ၇:၃၀နာရီမှ ညနေ ၄:၀၀ နာရီအထိ၊
  (တနင်္ဂနွေနေ့နှင့် အစိုးရရုံးပိတ်ရက် တို့တွင်ပိတ်ပါသည်။)
- စီမံကိန်း ဧရိယာ –၄.၅၄ ဧက။

၈

Hakers Enterprise (Myanmar)
အထည်ချုပ်စက်ရုံ တည်ရှိမှုအခြေအနေ



၉

ထုတ်လုပ်ပုံအဆင့်ဆင့်

ချော်ကျခြင်း CO₂ထွက်ရှိခြင်း လက်ထိခိုက်ခြင်း
အသံဆူညံမှု အပူရှိန် အမှုန်၊ဖုန်မှုန့်နှင့် ဓာတ်ငွေ့များ
မျက်စိထိခိုက်နိုင်ခြင်း ပေါက်ကွဲနိုင်ခြင်း

ပိတ်လိပ်ကုန်ကြမ်းများ

Pattern ပြုလုပ်ခြင်း

ပိတ်ဖြတ်ခြင်း

စက်ချုပ်ခြင်း

Accessories တပ်ခြင်း

မီးပူတိုက်ခြင်း

အရည်အသွေး စစ်ဆေးခြင်း

ထုတ်ပိုးခြင်းနှင့် ပို့ဆောင်ခြင်း

၁၀

ဝန်ထမ်းများအတွက် စီစဉ်ထားရှိမှုများ

ဝန်ထမ်းအိမ်ယာ

ဝန်ထမ်းများအတွက်
ထမင်းစားဆောင်

သောက်သုံးရေ

သန့်စင်ခန်း

လုပ်ငန်းလည်ပတ်သည့်
အခန်းတွင်းနှင့်
အခန်းပြင်တွင် ပန်ကာများ
တပ်ဆင် ပေးထားမှု

သန့်စင်ခန်းအရှေ့ နှင့် စက်ရုံခြံဝန်းတို့တွင်
တစ်ကိုယ်ရေ သန့်ရှင်းမှုအတွက်
စီစဉ်ထားရှိမှု

လုပ်ငန်းခွင်ဘေးအန္တရာယ်ကင်းရှင်းရေး လုပ်ဆောင်ချက်များ

အရေးပေါ်စုရပ်

စက်ရုံ အတွင်းရှိ
ဆေးခန်း

လုပ်ငန်းခွင်အတွင်း၊ အပြင် တွင်မီးဘေးအန္တရာယ်ကို ကာကွယ်ရန်
ထားရှိမှု

လုပ်ငန်းလည်ပတ်သည့်
အလုပ်ခန်းတွင်
ရှေးဦးသူနာပြု
သေတ္တာထားရှိပုံ

မီးဘေးအန္တရာယ်ကင်းရှင်းရေးအတွ
က် လေ့ကျင့်ထားရှိမှု

ကွင်းဆင်းလေ့လာခြင်း နှင့် တွေ့ရှိချက်များတင်ပြခြင်း

၁၃

ပတ်ဝန်းကျင်အခြေအနေ လေ့လာခြင်း

- စီမံကိန်းကြောင့် ပတ်ဝန်းကျင်နှင့်လူမှုအပေါ်သက်ရောက်မှုများအား သိရှိနိုင်ရန် တိုင်းတာမှုများအား HA Team မှ သွားရောက်တိုင်းတာခဲ့ပါသည်။ တိုင်းတာမှုရလဒ်များအား ဆိုးကျိုးသက်ရောက်မှု အဆင့်များအား ကာလအပိုင်းအခြား အလိုက် သတ်မှတ်ဖော်ပြ သွားမည်ဖြစ်ပါသည်။

- **ကွင်းဆင်းလေ့လာမှု**
  - ကွင်းဆင်းလေ့လာမှုကို ၂၃ ရက် နှင့် ၂၄ ရက် ဧပြီလ ၂၀၂၁ တွင် ပြုလုပ်ခဲ့ ပါသည်။
  - စီမံကိန်း ဧရိယာ၏ အနီးပတ်ဝန်းကျင် ၅၀၀ မီတာ ပတ်လည် လေ့လာခြင်းများ ပြုလုပ်ခဲ့ ပါသည်။

- **စက်ရုံဝန်းအတွင်း လေ့လာမှု**
  - လုပ်ငန်းဖြစ်စဉ်များကို လေ့လာခြင်း၊ မေးမြန်းခြင်း၊ မှတ်တမ်းယူခြင်း။
  - လေထုအရည်အသွေး တိုင်းတာခြင်း။
  - အသံဆူညံမှု တိုင်းတာခြင်း။
  - အလင်း တိုင်းတာခြင်း။
  - အပူချိန် တိုင်းတာခြင်း။

၁၄

ပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေးများတိုင်းတာခြင်း

လေအရည်သွေးတိုင်းတာခြင်း

ရေနမူနာများကောက်ယူစစ်ဆေးခြင်း

အသံဆူညံမှုတိုင်းတာခြင်း

အလင်းရောင်နှင့် အပူချိန် တိုင်းတာခြင်း

လေအရည်သွေးတိုင်းတာခြင်း

- ၂၄ နာရီဆက်တိုက် တိုင်းတာခြင်း
- $PM_{2.5}$၊ PM_{10}၊ TSP၊ NO_2၊ CO၊ SO_2၊ O_3 စိုထိုင်းဆ

ရေအရည်သွေးတိုင်းတာစစ်ဆေးခြင်း

- ရေနမူနာများကောက်ယူပြီး၊ ဓာတ်ခွဲခန်းများတွင်စစ်ဆေးခြင်း
- pH၊ Total Suspended Solid (TSS)၊ Ammonia၊ Biological Oxygen Demand (BOD)၊ Chemical Oxygen Demand (COD)၊ စုစုပေါင်း ကလိုရင်း၊ သံ၊ ဆီနှင့် ဆီခဲ

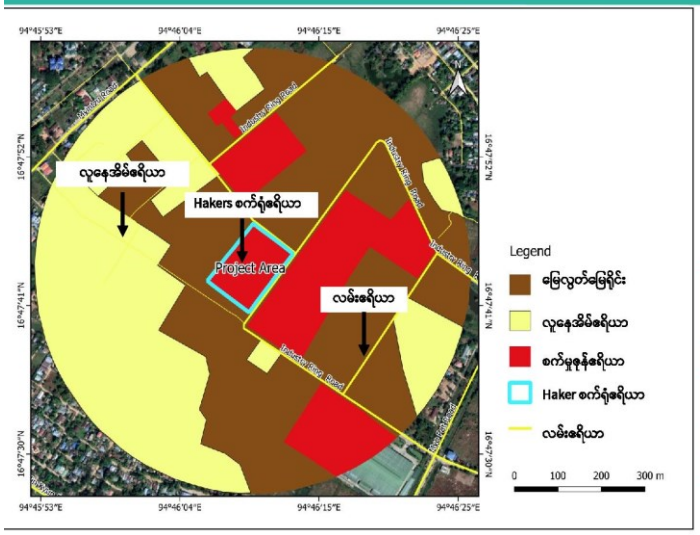
အသံဆူညံမှုတိုင်းတာခြင်း

- ၂၄ နာရီဆက်တိုက် တိုင်းတာခြင်း
- စစ်ဆေးမှုရလဒ်ကို သဘာဝပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များနှင့် နှိုင်းယှဉ် လေ့လာခြင်း

အလင်းရောင်နှင့် အပူချိန် တိုင်းတာခြင်း

- စီမံကိန်းစက်ရုံတွင် ကွင်းဆင်းတိုင်းတာခြင်း
- စစ်ဆေးမှုရလဒ်ကို သဘာဝပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များနှင့် နှိုင်းယှဉ် လေ့လာခြင်း

စီမံကိန်းပတ်ဝန်းကျင်ရှိမြေအသုံးချမှုလေ့လာခြင်း



မြေပုံအညွှန်း

- လေ့လာသည့်နယ်ပယ် = ၅၀၀ မီတာပတ်လည်
- အနီးဆုံးအဆောက်အဦး = မြန်မာချည်ထိုးလုပ်ငန်း
- ကားလမ်း = ပုသိမ်လမ်း
- အနီးဆုံးရေအရင်းအမြစ် = ပုသိမ်မြစ်

အမျိုးအစား	ဧရိယာ (ဟက်တာ)	ရာခိုင်နှုန်း (100 %)
မြေလွတ်ဧရိယာ	၈၇.၇၁	၄၅.၃၅
လူနေဧရိယာ	၆၈.၄၈	၃၅.၄၁
စက်မှုဇုန်ဧရိယာ	၃၇.၂၁	၁၉.၂၄
စုစုပေါင်း	၁၉၃.၄	၁၀၀ %

စီမံကိန်းပတ်ဝန်းကျင်ရှိမြေအသုံးချမှုလေ့လာခြင်း

လူနေဇရိယာ

လမ်းဇရိယာ

စီးပွားရေးဇရိယာ

စက်မှုဇုန်ဇရိယာ

မြေလွတ် ဇရိယာ

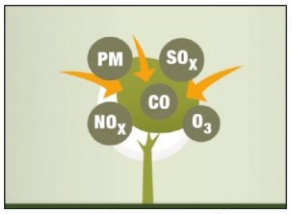
၁၇

ပတ်ဝန်းကျင်အပေါ်သက်ရောက်မှုနှင့်လျော့ချရေးအစီအစဉ်များ

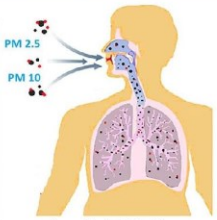
၁၈

ပတ်ဝန်းကျင်အပေါ်သက်ရောက်မှုနှင့်လျော့ချရေးအစီအစဉ်များ

- ဖုန်၊ အမှုန် နှင့် ဓာတ်ငွေ့ ထွက်ရှိမှုကြောင့် လေထုအရည်အသွေး အပေါ် သက်ရောက်ခြင်း။
- စွန့်ပစ်အမှိုက် ထွက်ရှိမှုကြောင့် ပတ်ဝန်းကျင် ညစ်ညမ်းခြင်း။
- ဝန်ထမ်းများ၏ သုံးစွဲရေမှ ထွက်ရှိသော စွန့်ပစ်ရေကြောင့် ပတ်ဝန်းကျင် ညစ်ညမ်းခြင်း။
- လျှပ်စစ်စွမ်းအင်၊ အပူစွမ်းအင် နှင့် အလင်းစွမ်းအင် သုံးစွဲမှုကြောင့် မိတာခကုန်ကျခြင်း၊ CO_2 ဓာတ်ငွေ့ ထွက်ရှိခြင်း နှင့် လုပ်သားများ၏ ကျန်းမာရေး အပေါ် သက်ရောက်မှုရှိခြင်း။
- ဆူညံသံ ထွက်ရှိမှုကြောင့် လုပ်သားများ၏ ကျန်းမာရေး နှင့် ပတ်ဝန်းကျင် အပေါ် သက်ရောက်ခြင်း။
- လုပ်ငန်းခွင် အတွင်းရှိ ဘေးအန္တရာယ်များကြောင့် လုပ်သားများ၏ ကျန်းမာရေး နှင့် ဘေးအန္တရာယ် အပေါ် သက်ရောက်ခြင်း။
- လူမှုစီးပွားရေး အပေါ် သက်ရောက်မှုရှိခြင်း။



လေထုအရည်အသွေး လျော့ကျခြင်း



အသက်ရှူလမ်းကြောင်းဆိုင်ရာ ရောဂါများရရှိနိုင်ခြင်း


စွန့်ပစ်အမှိုက်

ရေထုအရည်အသွေး ညစ်ညမ်းခြင်း


ခြင်များပေါက်ပွားနိုင်ခြင်း

ပြင်ပလေထုအရည်အသွေးတိုင်းတာသည့်ရလဒ်

စဉ်	လေအရည်အသွေး အမျိုးအစား	ရလဒ်	ယူနစ်	တိုင်းတာသည့် ကာလ		WHO စံချိန်စံညွှန်း	NEQG* စံချိန်စံညွှန်း
၁	အမှုန်အမွှား (PM၁၀)	၄၃	µg/m³ µg/m³	၁ Year ၂၄ Hour		-	*၂၀ µg/m³ *၅၀ µg/m³
၂	အမှုန်အမွှား (PM၂.၅)	၃၇	µg/m³ µg/m³	၁ Year ၂၄ Hour		၂၅µg/m³	*၁၀ µg/m³ *၂၅ µg/m³
၃	Total Suspended Particulate (TSP)	၆၀.၇၈	µg/m³	၂၄ Hours		NG	NG
၄	ဆာလဖာဒိုင်အောက်ဆိုဒ်	၃	µg/m³ µg/m³	၁၀ Mins ၂၄ Hours		၈ ppb	* ၅၀၀ µg/m³ * ၂၀ µg/m³
၅	နိုက်ထရိုဂျင် ဒိုင်အောက်ဆိုဒ်	၅၅	µg/m³ µg/m³	၁ Year ၁ Hour		၂၁ ppb	*၄၀ µg/m³ *၂၀၀ µg/m³
၆	ကာဗွန်မိုနောက်ဆိုဒ်	၀.၃	ppm	၈ Hours		၉ ppm	NG
၇	အိုဇုန်း	၆၀.၅၁	µg/m³	၈ Hours		NG	၁၀၀
၈	ပျမ်းမျှ စိုထိုင်းဆ	၇၉.၅၄	%	၂၄ Hours		NG	NG
၉	အပူချိန်	၂၉.၂၉	°C	၂၄ Hours		NG	NG
၁၀	လေဖိအား	၁၀၀၈.၁	hPa	၂၄ Hours		NG	NG
၁၁	လေတိုက်နှုန်း	၀.၂	m/s	၂၄ Hours		NG	NG
၁၂	လေတိုက်ရာအရပ်	၂၁၂.၀၉		၂၄ Hours		NG	NG

- စီမံကိန်းဧရိယာအတွင်း ပြင်ပလေထု အရည်အသွေး တိုင်းတာခြင်းများအား ဧပြီလ ၂၃ ရက်နေ့မှ ၂၄ ရက် နေ့အထိ ၂၄ နာရီကြာတိုင်းတာခဲ့ပါသည်။
- တိုင်းတာခဲ့သည့် Parameter များမှာ အမှုန်အမွှားများ (PM10, PM2.5, Total Suspended Particulate TSP)၊ ဆာလဖာဒိုင် အောက်ဆိုဒ်၊ နိုက်ထရိုဂျင် ဒိုင်အောက်ဆိုဒ်၊ ကာဗွန်မိုနောက် ဆိုဒ်၊ အိုဇုန်း၊ ပျမ်းမျှ စိုထိုင်းဆ၊ အပူချိန်၊ လေဖိအား၊ လေတိုက်နှုန်းနှင့် လေတိုက်ရာအရပ်တို့ ဖြစ်ပါသည်။
- တိုင်းတာမှုရလဒ်များအား အမျိုးသားအရည်အသွေး ထုတ်လွှတ်မှုဆိုင်ရာ စံချိန်စံညွှန်းများဖြင့် နှိုင်းယှဉ် ဖော်ပြထားပါသည်။
- တိုင်းတာမှုရလဒ်များအရ အမှုန်အမွှား (PM 2.5) သည် စံချိန်စံညွှန်းထက် အနည်းငယ် ကျော်လွန်ကြောင်းတွေ့ရှိရပါသည်။
- ထိုသို့ အမှုန်အမွှား (PM 2.5) များနေရခြင်းမှာ စီမံကိန်းလုပ်ငန်းသည် အထည်ချုပ်လုပ်ငန်းဖြစ်၍ ထိုလုပ်ငန်းအဆင့်ဆင့်မှ ထွက်လာသော အမှုန်အမွှားများကြောင့် ဖြစ်နိုင်ချေရှိသည်။

အခန်းတွင်းလေထုအရည်အသွေးများအားအတွက် စံချိန်စံညွှန်းများ

အခန်းတွင်းလေထုအရည်အသွေးတိုင်းတာခြင်း (PM1.0, PM10, PM2.5, TVOC) အတွက် AQI စံချိန်စံညွှန်း

သတ်မှတ်ချက်အညွှန်း	အဆင့်သတ်မှတ်ချက်	ရလဒ်တန်ဖိုး (µg/m³, 24-hour average)	သတိပေး ဖော်ပြချက်
၀ - ၅၀	ကောင်း	၀.၀ - ၁၂	-
၅၁ - ၁၀၀	အသင့်အတင့်	၁၂.၁ - ၃၅.၄	ထိခိုက်လွယ်သူများအတွက် အန္တရာယ်ရှိ
၁၀၁ - ၁၅၀	ကျန်းမာရေးဆိုင်ရာ ထိခိုက်လွယ်သော အခြေအနေ	၃၅.၅ - ၅၅.၄	အသက်ရှူလမ်းကြောင်းဆိုင်ရာ ရောဂါရှိသော ကလေးများနှင့် လူကြီးများအတွက် မသင့်သောအခြေအနေ
၁၅၁ - ၂၀၀	ကျန်းမာရေးနှင့် မညီညွတ်	၅၅.၅ - ၁၅၀.၄	ကလေးနှင့် လူကြီးများအတွက် ထိတွေ့ရန်မသင့်သော အခြေအနေ
၂၀၁ - ၂၅၀	လုံးဝကျန်းမာရေးနှင့် မညီညွတ်	၁၅၀.၅ - ၂၅၀.၄	အသက်ရှူလမ်းကြောင်းဆိုင်ရာ ရောဂါရှိသူများအားလုံး ရှောင်ကြဉ်သင့်
၂၀၁ - ၄၀၀	အန္တရာယ်ရှိ	၂၅၀.၅ - ၃၅၀.၄	လူတိုင်းရှောင်ကြဉ်သင့်။ ကျန်းမာရေးဆိုင်ရာဆိုးရွားသော အခြေအနေဖြစ်နိုင်
၄၀၁ - ၅၀၀		၃၅၀.၅ - ၅၀၀	

Indoor Air Quality Index (AQI)

အခန်းတွင်းလေထုအရည်အသွေး (CO2) တိုင်းတာခြင်းအတွက် OHS စံချိန်စံညွှန်း

နှုန်း	ယူနစ်	ကျန်းမာရေးဆိုင်ရာသက်ရောက်မှု	အဆင့်သတ်မှတ်ချက်
၂၅၀ - ၃၅၀	ppm	ပုံမှန်	ပုံမှန်
၃၅၀ - ၁၀၀၀		လေဝင်လေထွက်ကောင်းသော နေရာများတွင် ရှိတတ်သော ပုံမှန်အဆင့်	ကောင်း
၁၀၀၀ - ၂၀၀၀		ငိုက်မျဉ်းခြင်း	သင့်တင့်
၂၀၀၀ - ၅၀၀၀		ခေါင်းကိုက်ခြင်း၊ အိပ်ငိုက်ခြင်း၊ ထိုင်းမှိုင်းခြင်း၊ အာရုံစိုက်ရခက်ခဲခြင်း၊ နှလုံးခုန်နှုန်းတိုးခြင်းနှင့် ပျို့အန်ခြင်း	မကောင်း
၅၀၀၀နှင့် အထက်		ပုံမှန်မဟုတ်သော၊ အဆိပ်သင့်နိုင်သော ဓာတ်ငွေ့များရှိနေသော အခြေအနေ။ အောက်ဆီဂျင်ပြတ်တောက်နိုင်သော အခြေအနေ။ နေ့စဉ်အလုပ်ခွင်အတွက် မသင့်တင့်သော အခြေအနေ။	အလယ်အလတ်အဆင့်မကောင်း
၄၀၀၀၀နှင့် အထက်		အောက်ဆီဂျင်လုံလုံပြတ်တောက်နိုင်သည်။ အန္တရာယ်ရှိသောအခြေအနေ	ပို၍မကောင်းသော အခြေအနေ

Carbon Dioxide Detection and Indoor Air Quality Control by OHS

အခန်းတွင်းလေထုအရည်အသွေးတိုင်းတာခြင်း

- အခန်းတွင်းလေထုအရည်အသွေးအဖြစ် ငွေ့ရည်ပြန်လွယ်သောဓါတုဒြပ်ပေါင်း (TVOC)၊ ဖော်မယ်ဒီဟိုက် (HCHO)၊ ကာဗွန်ခိုင်အောက်ဆိုက်ဒ် (CO_2)၊ လေထုထဲတွင်ရှိသောအမှုန်အမွှား (PM1) (PM10) (PM 2.5) တို့ကို ဧပြီလ ၂၃ ရက် ၊ ၂၀၂၁ ခုနှစ်တွင် စက်ရုံတွင် တိုင်းတာခဲ့ပါသည်။
- တိုင်းတာမှုရလဒ်များအရ နေရာအားလုံးရှိ CO_2 နှင့် Laser ပိတ်ဖြတ်ခန်း ရှိ (PM10) (PM 2.5) မှလွဲ၍ ကျန်နေရာများအားလုံးတို့သည် အန္တရာယ်မဖြစ်စေသော အခြေအနေတွင်ရှိပါသည်။
- ရလဒ်များကို အစီရင်ခံစာတွင် ထည့်သွင်းဖော်ပြထားပါသည်။

Air Quality Index by U.S Environmental Protection Agency (EPA)

စဉ်	အခန်းတွင်းလေ အရည်အသွေးတိုင်းတာခဲ့ သည့်နေရာ
၁	ဒီဇိုင်းဆွဲခန်း
၂	Laser ပိတ်ဖြတ်ခန်း
၃	ရေမြှုပ်ပိတ် ဖြတ်ခန်း
၄	ပိတ်စဖြတ်ခန်း
၅	Branding room
၆	စက်ချုပ်လိုင်း
၇	မီးပုတ်ကိုက်လိုင်း
၈	ကုန်ချောထုတ်သည့် လိုင်း
၉	ရုံးခန်း (ကုန်ထုတ်ခန်း)

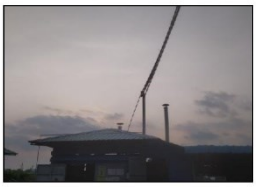
အခန်းတွင်းလေထုအရည်အသွေး တိုင်းတာခဲ့သည့် ကိရိယာ

အခန်းတွင်းလေထုအရည်အသွေး တိုင်းတာခြင်း

လေထုညစ်ညမ်းမှုကြောင့် ပတ်ဝန်းကျင်အပေါ် သက်ရောက်မှုများ

❑ ဖုန်၊ အမှုန်နှင့် ဓာတ်ငွေ့ထွက်ရှိနိုင်သော နေရာများ

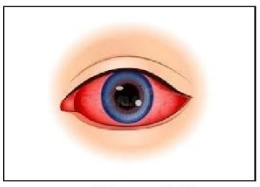
- ကုန်ကြမ်းသိုလှောင်ရုံအတွင်း ပစ္စည်းအသွင်းအထုတ်မှ အမှုန်ထွက်ရှိခြင်း
- ကျောက်ဂွမ်း၊ ပိတ်ဖြတ်ခြင်းမှ အမှုန်ထွက်ရှိခြင်း
- စက်ရုံမှကုန်ချော/ကုန်ကြမ်း သယ်ယူပို့ဆောင်ရာတွင် အသုံးပြုသော ကားများမှ ဓာတ်ငွေ့ထွက်ရှိခြင်း
- အစွန်းရွှတ်သည့်အခါတွင် အသုံးပြုသည့် တင်ဒါမှ ဓာတ်ငွေ့ထွက်ရှိခြင်း
- ပေ ၁၈ အမြင့်ရှိသော ဒီဇယ်သွိုင်လာ၏ မီးခိုးခေါင်တိုင်မှ ဓာတ်ငွေ့ထွက်ရှိခြင်း



မီးခိုးခေါင်းတိုင်

ကုန်ကြမ်းသိုလှောင်သည့်နေရာ

အဆုတ်ရောဂါ



မျက်စိယားယံခြင်း

J၃

လေထုညစ်ညမ်းမှု သက်ရောက်မှုနှင့် လျှော့ချရမည့် အစီအစဉ်များ

ဖြစ်ပေါ်လာနိုင်သောသက်ရောက်မှု

လုပ်ငန်းလည်ပတ်ကာလ

- မီးစက်နေရာနှင့် ပါကင်ထုတ်ပိုးသည့် နေရာတို့မှ ထွက်ရှိသောအမှုန်ကြောင့် လုပ်သားများ တွင် အသက်ရှူ လမ်းကြောင်း ဆိုင်ရာရောဂါများ ဖြစ်ပေါ်ခြင်း။
- ကား၊ ဆိုင်ကယ် နှင့် စက်ပစ္စည်းများ မောင်းနှင်ခြင်း တို့၏ အိပ်ဓောမှ ဓာတ်ငွေ့များ ထွက်ရှိခြင်းကြောင့် နှာခေါင်း နှင့် မျက်လုံးများအား ယားယံနိုင်ခြင်း၊ အဆုတ်၏ လုပ်ဆောင်မှု အပြောင်းအလဲ ဖြစ်နိုင်ခြင်း၊ အသက်ရှူလမ်းကြောင်း ဆိုင်ရာ ရောဂါများ ဖြစ်နိုင်ခြင်း။
- ရောဂါအခံရှိသူ၊ နှလုံးရောဂါရှိသူများနှင့် သက်ကြီး ရွယ်အိုများ၏ ကျန်းမာရေးကို ထိခိုက်စေနိုင်ခြင်း။
- လုပ်ငန်းခွင်အတွင်းရှိဝန်ထမ်းများတွင် နာတာရှည် လေပြွန်ရောဂါ၊အဆုတ်ကင်ဆာ၊ နှလုံးသွေးကြော ရောဂါနှင့် အရွယ်မတိုင်မီ သေဆုံးခြင်း။

ပိတ်သိမ်းကာလ

- အဆောက်အဦများဆောက်လုပ်ခြင်း/ဖျက်သိမ်းခြင်း၊ ဆောက်လုပ်ရေးနှင့်ဖျက်သိမ်းရေးယာဉ်များမှ အမှုန်အမွှားနှင့် ဓာတ်ငွေ့များထွက်ရှိနိုင်ပြီး လေထုညစ်ညမ်းခြင်း။

လျှော့ချရမည့်အစီအစဉ်

လုပ်ငန်းလည်ပတ်ကာလ/ပိတ်သိမ်းကာလ

- ✓ လုပ်ငန်းလည်ပတ်ရာတွင် အသုံးပြုသော မီးစက်များ၊ စက်ပစ္စည်းများ၊ နှင့် ကားများ အား ပုံမှန်စစ်ဆေးပေးခြင်း။ (လိုအပ်ပါက အသစ်လဲခြင်း)
- ✓ ဖုန်မှုန့်နှင့် ဓာတ်ငွေ့ထွက်ရှိမှုသက်သာစေရန် အလုပ်ရုပ်နှားချိန်တွင် စက်များကို ရပ်နားထားခြင်း
- ✓ လုပ်ငန်းသုံးမော်တော်ကားများနှင့် စက်ယန္တရား များအသုံးပြုခြင်းကို ကန့်သတ်ချက် များဖြင့်ထားရှိခြင်း (စက်ယန္တရားများအသုံးပြုရန်မလိုအပ်သည့်နေရာတို့တွင် တားမြစ်ထားခြင်း။
- ✓ အမှုန်အမွှားနှင့် ဓာတ်ငွေ့များဒဏ်မှ ကာကွယ်ရန် ဒေသမျိုးရင်းသစ်ပင်များကို စီမံကိန်းဧရိယာ တစ်လျှောက် စိုက်ပေးခြင်း။
- ✓ ဖုန်မှုန့်ထွက်ရှိမှုလျော့နည်းစေရန်အတွက် လုပ်ငန်းသုံးကားများ အဝင်အထွက်များသော နေရာများအား တစ်နေ့ လျှင် (၂) ကြိမ် ပုံမှန်ရေဖြန်းပေးခြင်း။
- ✓ အခန်းတွင်းလေဝင်လေထွက်ကောင်းမွန်စေရန် ပန်ကာများတပ်ဆင်ခြင်း။ (အနှံ့စုပ်ယူမှုကောင်းသည့် ပန်ကာများ)
- ✓ သယ်ယူပို့ဆောင်ရေးယာဉ်များသွားလာသည့် လမ်းများကို နေ့စဉ်ရေဖျန်းခြင်း၊ သယ်ဆောင်သည့်ယာဉ်များကို မိုးကာစများဖြင့်အလုံဖုံးအုပ်ပြီးမှ မောင်းနှင်စေခြင်း၊ စီမံကိန်းဧရိယာမှ အန္တရာယ်ဖြစ်စေသည့် ဓာတ်ငွေ့များမထွက်ပေါ်စေရန် အမှိုက်များမီးရှို့ခြင်းကို တားမြစ်ခြင်း။
- ✓ တည်ဆောက်ရေးကာလတွင်အမှုန်အမွှားများလွင့်စင်မှုမရှိစေရန် မိုးကာစီမံများဖြင့်ကာရံထားရှိခြင်း

J၄

ရေအရည်အသွေး

- HA Team မှရေနုမူနာကောက်ယူခြင်းကို ၂၄ ရက် ဧပြီလ ၂၀၂၁ ခုနှစ်တွင်ပြုလုပ်ခဲ့ပြီး သက်ဆိုင်ရာ ဓာတ်ခွဲခန်းသို့ ပို့ဆောင်စစ်ဆေးခဲ့ပါသည်။
- တိုင်းတာစစ်ဆေးချက်များအရ Oil and Grease ဂုဏ်သတ္တိသည် သတ်မှတ်စံချိန်စံညွှန်းထက်ကျော်လွန်နေပြီး ကျန်အရည်အသွေးများမှာ စံသတ်မှတ်ချက်အတွက်းငး ရှိကြောင်းကို တွေ့ရသည်။

စီမံကိန်းဧရိယာရှိ ဝန်ထမ်းသုံးစွန့်ပစ်ရေ ရေအရည်အသွေးတိုင်းတာမှု ဓါတ်ခွဲခန်းမှရလဒ်

စဉ်	အရည်အသွေး	ရလဒ်	ယူနစ်	Method	WHO စံချိန်စံညွှန်း	NEQG* စံချိန်စံညွှန်း	မှတ်ချက်
1	pH (ချဉ်ဖန်ကိန်း)	၇.၃၄	-	Hanna (HI 2211)-pH and Temperature Meter	၆.၅-၈.၅	၆-၉	စံနှုန်းအတွင်း
2	Iron (Fe) သံသတ္တုဓါတ်	၃.၄၅	mg/l	Phenanthroline	၀.၃	၃.၅	စံနှုန်းအတွင်း
3	Total Suspended Solids (ဆိုင်းကြွအနုည်)	၂၀	mg/l	Drying Method	NG	၅၀	စံနှုန်းအတွင်း
4	Total Chlorine (ကလိုရင်း (စုစုပေါင်း)	၀.၀၅	mg/l	Portable Photometer	NG	၀.၂	စံနှုန်းအတွင်း
5	Ammonia (အမိုးနီးယား)	၁.၆	mg/l	Spectrometer	NG	၁၀	စံနှုန်းအတွင်း
6	Biochemical Oxygen Demand (ဇီဝဆိုင်ရာအောက်ဆီဂျင် လိုအပ်ချက်)	၁၄.၇၉	mg/l	DO and BOD Meter	NG	≤ ၅၀	စံနှုန်းအတွင်း
7	Chemical Oxygen Demand (ဓာတုဆိုင်ရာအောက်ဆီဂျင် လိုအပ်ချက်)	၃၂	mg/l	Spectrometer	NG	≤ ၂၅၀	စံနှုန်းအတွင်း
8	Oil and Grease (ဆီနှင့် ချောဆီ)	၁၃	mg/l	Soxhlet Extraction Method	NG	၁၀	စံနှုန်းအထက်

NA- Not Applicable
**NEQG Guidelines for Ports, Habors and Terminals

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စွန့်ပစ်ရေထွက်ရှိမှုကြောင့် ပတ်ဝန်းကျင်အပေါ်သက်ရောက်မှုနှင့် လျှော့ချရမည့် အစီအစဉ်များ

အသုံးပြုမှု

- ဝန်ထမ်းများ သုံးရေ နှင့် မီးသတ်ရန်အတွက် စက်ရုံ အတွင်း ၃,၀၀၀ ဂါလံ ဆန့် မြေအောက်ရေကန် ၃ နှင့် ၅၀၀ ဂါလံ့ ဆန့် ရေစင်ဂုလုံး တွင် သိုလှောင်ထားခြင်း။
- လုပ်ငန်းလည်ပတ်မှုမှ ရေဆိုးမထွက်ရှိပါ။
- သန့်စင်ခန်းမှ ထွက်ရှိသည့် ရေဆိုးများ၊ ဆေးကြောရေများ၊ မိုးရေ တို့သာ ထွက်ရှိခြင်း။
- ထိုရေဆိုးများကို စက်ရုံ၏ ပတ်ပတ်လည်တွင်ရှိသော ရေမြောင်းများမှ စွန့်ထုတ်ခြင်း။

ထွက်ရှိမှု

- ရေကို ဘွိုင်လာအတွက်သာ အသုံးပြုသောကြောင့် ထိုလုပ်ငန်းစဉ်တွင် ရေသည် အပူရှိန်ကြောင့် ရေငွေ့အဖြစ်သို့ ပြောင်းသွား သည့် အတွက် စွန့်ပစ်ရေ မထွက်ရှိပါ။
- ဝန်ထမ်းများအသုံးပြုသောသန့်စင်ခန်းမှ ထွက်ရှိသည့်ရေဆိုးများ၊ ဆေးကြောရေများ၊ မိုးရေ တို့ဖြစ်ပါသည်။

ခြင်များပေါက်ပွားနိုင်ခြင်း

သက်ရောက်မှု

လုပ်ငန်းလည်ပတ်သည့်ကာလ/ပိတ်သိမ်းကာလ

- ❑ စက်ရုံအတွင်းရှိ ရေမြောင်းများ အချို့တွင် မြောင်းဖုံးများ မရှိသည့်အတွက်
  - ➢ မိုးသည်းထန်စွာရွာသွန်းချိန်တွင် ရေကြီး ရေလျှံဖြစ် နိုင်ခြင်း။
  - ➢ ထိခိုက် ဒဏ်ရာရနိုင်ခြင်း။
  - ➢ ရေဝပ်/ရေဆိုင်ခြင်း။
  - ➢ အနံ့ဆိုးထွက်နိုင်ခြင်း
- ❑ ဝန်ထမ်းများ၏ ချိုးရေသုံးရေများတွင် အသုံးပြုသောဆပ်ပြာတွင် ပါဝင်သည့် detergentသည် မြေအောက်ရေကို ညစ်ညမ်းစေနိုင်ခြင်း။
- မြေအောက်ရေခမ်းခြောက်ခြင်း
- ရေအရင်းအမြစ်ခမ်းခြောက်ခြင်း
- ပတ်ဝန်းကျင်ရှိကျေးရွာများအတွက် စိုက်ပျိုးရေ၊ သောက်သုံးရေ ရှားပါးခြင်း

လျှော့ချမည့်အစီအစဉ်

လုပ်ငန်းလည်ပတ်သည့်ကာလ/ပိတ်သိမ်းကာလ

- ရေမြောင်းဖုံးမရှိသေးသည့် နေရာများတွင် စနစ် တကျ ဖုံးများ ကာထားပေးခြင်း။
- ရေစီးရေလာကောင်းအောင် ပုံမှန်စစ်ဆေးခြင်း။
- ရေဝပ်သည့်နေရာများကိုစစ်ဆေး/မြေဖို့ခြင်း၊
- ခြင်များမပေါက်ပွားအောင် ဆေးဖျန်းခြင်း။
- ခြင်မလာစေရန် စက်ရုံတွင်းအပင်များ စိုက်ပျိုး စေခြင်း။
- ရေချွေတာသုံးစွဲနိုင်ရေးအတွက် ရေမီတာတပ်ဆင်၍ ရေသုံးစွဲမှုအား စောင့်ကြပ်ကြည့်ရှုခြင်း
- ပြန်လည်သန့်စင်ပြီးရေများအား သန့်စင်ခန်းနှင့် ဥယျာဉ်စိုက်ပျိုးခြင်းလုပ်ငန်းများတွင် ပြန်လည်အသုံးပြုခြင်း

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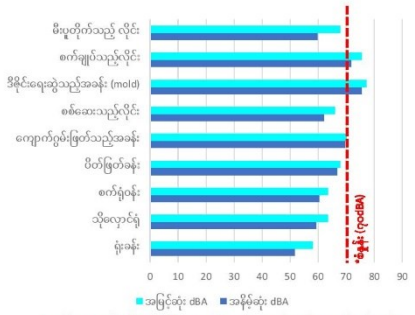
ဆူညံသံသက်ရောက်မှုနှင့် လျှော့ချရမည့် အစီအစဉ်များ

❖ **ဆူညံသံထွက်ရှိမှု**

လုပ်ငန်းခွင်အတွင်း



* အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာအရည်အသွေး(ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်

❖ စက်ချုပ်သည့်လိုင်းနေရာနှင့် ဒီဇိုင်းရေးဆွဲသည့်အခန်း (mold) တို့၏ အသံအရည်အသွေးသည် စံချိန်စံညွှန်းထက် အနည်းငယ် ကျော်လွန်နေသော်လည်း အခြားအခန်းများတွင် စံညွှန်းအောက်သာရှိသည်ကို တွေ့ရပါသည်။

သက်ရောက်မှု

လုပ်ငန်းလည်ပတ်သည့်ကာလ/ပိတ်သိမ်းကာလ

❖ လွန်ကဲသော ဆူညံသံထိတွေ့မှု
- အကြားအာရုံထိခိုက်ခြင်း၊
- အိပ်မပျော်ခြင်း၊
- သွေးတိုးရောဂါ ဖြစ်ပွားခြင်း။
- တုန်ခါမှုဖြစ်ပေါ်ခြင်း။
  - ✓ သွေးပေါင်ချိန်တိုးလာခြင်းနှင့် နှလုံးနှင့် ဆက်စပ်သောရောဂါများ ဖြစ်ပွားခြင်း၊
  - ✓ အာရုံကြော်စနစ် ကစဉ့်ကလျား ဖြစ်ခြင်း၊
  - ✓ အစာအိမ်၊ ကျောရိုးနှင့် အဆစ်များ ပျက်စီးခြင်း၊

လျှော့ချမည့် အစီအစဉ်

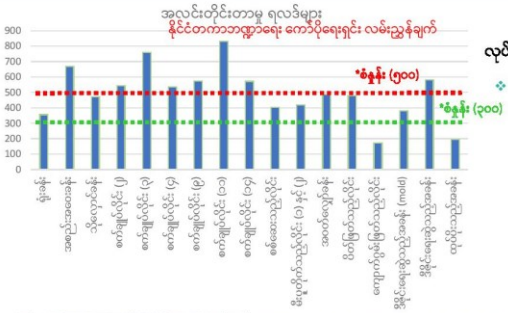
လုပ်ငန်းလည်ပတ်သည့်ကာလ/ပိတ်သိမ်းကာလ

- ✓ မလိုလားအပ်သော ဆူညံသံများ မဖြစ်ပေါ်စေရန် စက်ပစ္စည်းကိရိယာများအား ကောင်းစွာထိန်းသိမ်းခြင်း။
- ✓ လုပ်ငန်းလည်ပတ်သည့် နေရာများနှင့် ဘို့ရိုလာအနီးရှိ ဝန်ထမ်းများ တွင် နားအကာအကွယ်ပစ္စည်းများ တပ်ဆင်စေခိုင်းခြင်း။
- ✓ တုန်ခါမှုနည်းသော စက်ပစ္စည်းများ အသုံးပြုခြင်း။
- ✓ ဝန်ထမ်းများကို အလှည့်ကျ လုပ်ကိုင်စေခြင်း။
- ✓ ဝန်ထမ်းများအတွက် နားစစ်ဆေးမှုနှင့် လိုအပ်သည့် ကျန်းမာရေးစောင့်ရှောက်မှုများပေးခြင်း။
- ✓ အသံစုပ်ယူနိုင်သည့် အခန်းတွင်းစိုက်ပျိုးနိုင်သော တောသဖန်းပင်ကဲ့သို့ အပင်များ စိုက်ပျိုးပေးခြင်း။
  - ➢ ၎င်းအပင်သည် ၅ dbA နှင့် အထက် ဆူညံသံများကို စုပ်ယူနိုင်ပါသည်။

ပိတ်သိမ်းကာလ

မလိုလားအပ်သော ဆူညံသံများ မဖြစ်ပေါ်စေရန် စက်ပစ္စည်းကိရိယာများအား ကောင်းစွာထိန်းသိမ်းခြင်း။

အလင်းရောင် သက်ရောက်မှုနှင့် လျှော့ချရမည့် အစီအစဉ်များ



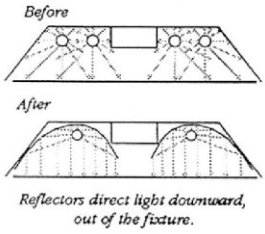
❖ အလင်း

ရုံးခန်းနှင့် စက်ချုပ်လိုင်း

သက်ရောက်မှု

လုပ်ငန်းလည်ပတ်သည့်ကာလ/ပိတ်သိမ်းကာလ

❖ အလင်း
- အာရုံစူးစိုက်ရခြင်း၊
- ကုန်ပစ္စည်း အရည်သွေးကျဆင်းနိုင်ခြင်း၊
- မတော်တဆထိခိုက်မှုများဖြစ်ပေါ်နိုင်ခြင်း။
- အာရုံကြောများထိခိုက်နိုင်ခြင်း၊
- မျက်စိတွင် ဒဏ်ဖြစ်ခြင်း၊
- မူးမေ့၊ ခေါင်းကိုက်နိုင်ခြင်း



လျှော့ချမည့် အစီအစဉ်

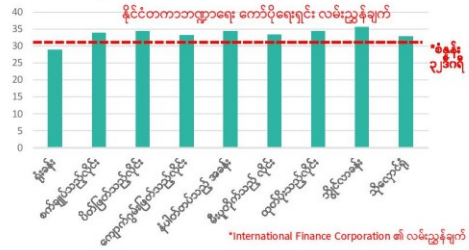
လုပ်ငန်းလည်ပတ်သည့်ကာလ/ပိတ်သိမ်းကာလ

1. အဓိကလုပ်ငန်း လည်ပတ်သော နေရာများဖြစ်သည့် စက်ချုပ်လိုင်း၊ ပိတ်စဖြတ်သည့် နေရာနှင့် မီးပူတိုက်သည့် နေရာတို့တွင် မီးလုံး၊ မီးချောင်းများ လုံလောက်စွာ တပ်ဆင်ခြင်း။
2. မီးအလင်းအား ပိုမိုရရှိစေရန် မီးချောင်း/မီးလုံးများ အပေါ်တွင် ရောင်ပြန်(Reflectors) များတပ်ဆင်ပေးခြင်း။
3. အလင်းရောင်လုံလောက်မှုရှိ/မရှိ ပုံမှန်စစ်ဆေးခြင်း။
4. အလင်း မစူးစေရန် ပုံမှန်စစ်ဆေးခြင်း နှင့် အလင်းစူးသည့် နေရာများတွင် အလင်းပြင်းအားကို လျော့ကျစေရန် အကာများတပ်ဆင်ပေးခြင်း။

အပူချိန်သက်ရောက်မှုနှင့် လျော့ချရမည့် အစီအစဉ်များ

❖ **အပူချိန်တိုင်းတာခြင်း**

လုပ်ငန်းခွင်အတွင်း



မီးပူတိုက်သည့်လိုင်း နှင့် စက်ချုပ်သည့်လိုင်း

သက်ရောက်မှု

လုပ်ငန်းလည်ပတ်သည့်ကာလ/ပိတ်သိမ်းကာလ

❖ အပူ

- ချွေးထွက်လွန်ခြင်း၊
- အရေပြားဆိုင်ရာ ရောဂါများဖြစ်ခြင်း၊
- ကိုယ်ခန္ဓာပင်ပန်းနွမ်းနယ်ခြင်း
- ခေါင်းကိုက်ခြင်း
- ကြွက်တက် ခြင်း၊
- မျက်စိတိမ်ဖြစ်ခြင်း၊
- ဖျားနာခြင်း၊

ဖန်းပင်

လျော့ချမည့် အစီအစဉ်

လုပ်ငန်းလည်ပတ်သည့်ကာလ/ပိတ်သိမ်းကာလ

1. လုပ်ငန်း လည်ပတ်သည့်နေရာများတွင် လုံလောက်သော ပန်ကာများ၊ လေအေးပေးစက်များနှင့် လေဝင်လေထွက် ကောင်းစွာ ထားရှိပေးခြင်း။
2. အပူဒဏ်လျော့ချပေးနိုင်သော အခန်းတွင်းစိုက်ပျိုးနိုင်သည့် အပင်များဖြစ်သည့် တောသဖန်းပင်(Areca Palm), ဖန်းပင်(Fern Plant) နှင့် ရှားစောင်းလက်ပတ်ပင်(Aloe Vera) တို့စိုက်ပျိုးစေခြင်း။
   - ၎င်းအပင်တို့သည် အခန်းတွင်းအပူချိန်ကို ၁၀° ခန့်စီလျော့ကျစေပါသည်။
3. ဝန်ထမ်းများကို အလှည့်ကျ တာဝန်များခွဲပေးခြင်းနှင့် ရေတစ်ပြန်လည်ဖြည့်ပေးနိုင်သည့် ဓာတ်ဆားများ ထောက်ပံ့ပေးခြင်း၊ ရေလုံလောက်စွာ သောက်ပေးခြင်း

တောသဖန်းပင်

ရှားစောင်းလက်ပတ်ပင်

၂၉

စွန့်ပစ်အမှိုက်ထွက်ရှိနိုင်သောနေရာများ

❑ **လုပ်ငန်းလည်ပတ်ရာမှ**

- ပိတ်ညှပ်စ/ဖြတ်စများ၊ ပိတ်လိပ်များ အတွင်းတွင်ခံ ထားသော စက္ကူချောင်းများ ထွက်ရှိခြင်း။
- ကုန်ချောထုတ်ပိုးရာမှ ပလပ်စတစ်အိတ်များ၊ စက္ကူပုံးများ၊ အပ်ချည်မျှင် အပိုင်းအစများ၊ အပ်ချည်လုံးမှ အခွံများ ထွက်ရှိခြင်း။
- မီးစက်နှင့် ဘွိုင်လာတွင် အသုံးပြုသော engine oil စစ်များ/ ပုံးများ ထွက်ရှိခြင်း၊
- အထည်များကို အစွန်းရွှတ်ရာတွင် အသုံးပြုသော တင်ဒါ(Thinner) ဘူးခွံများ ထွက်ရှိခြင်း၊

❑ **ဝန်ထမ်းများစွန့်ပစ်လိုက်သောအမှိုက်များ**

- ပလတ်စတစ်အိတ်များ၊ တစ်ရှူးများ။
- စာကြွင်းစားကျန်များ၊
- ရေသန့်ဘူးခွံများ၊
- အအေးဘူးခွံများ၊
- အိမ်သာမှထွက်ရှိသော အမျိုးသမီးသုံးပစ္စည်းများ

ပိတ်စစွန့်ပစ်အမှိုက်များထွက်ရှိခြင်း

၃၀

စွန့်ပစ်အစိုင်အခဲဆိုင်ရာ သက်ရောက်မှုနှင့် လျှော့ချရေး အစီအစဉ်

သက်ရောက်မှု

လုပ်ငန်းလည်ပတ်သည့်ကာလ/ပိတ်သိမ်းကာလ

- Engine oil စစ်များနှင့် ဆီပုံးခွံများကို စနစ်တကျ မသိမ်းဆည်း/ မစွန့်ပစ်ပါက မီးဘေး အန္တရာယ် များ ဖြစ်ပေါ်နိုင်ခြင်း။
- အမှိုက်များမှ စိမ့်ထွက်လာသော အရည်များသည် မြေဆီလွှာအတွင်းသို့ စိမ့်ဝင်ရာမှတဆင့် မြစ်၊ ချောင်း၊ အင်းအိုင်များ နှင့် မြေအောက်ရေ ညစ်ညမ်းမှု ဖြစ်ပေါ်စေနိုင်ခြင်း။
- ဘွိုင်လာလောင်စာများမှ မီးဘေးအန္တရာယ် ဖြစ်ပေါ် စေနိုင်ခြင်း။
- စာကြွင်း စာကျန်များ စွန့်ပစ်ခြင်းနှင့် အမှိုက်များကို ကြာလရှည်ကြာစွာ မစွန့်ပစ်ပဲ ထားသောကြောင့် အနံ့ဆိုးများ ထွက်ပေါ်စေနိုင်သောကြောင့် ပတ်ဝန်းကျင် ကို သာမကလူတို့၏ ကျန်းမာရေး ကိုပါထိခိုက် စေနိုင်ခြင်း
- ဘေးဥပဒါ ဖြစ်စေနိုင်သည့် ပစ္စည်းများ (လျှပ်စစ်ပစ္စည်း အပေါင်းများ) ၌ ပါဝင်သော ဓာတ်များနှင့် ထိတွေ့မိ သော လူ၊ မြေဆီလွှာ၊ ရေထု တို့သည် ထိုဓာတ်များ၏ ပြင်းထန်မှု အပေါ် မူတည် ၍ ထိခိုက်မှုများ ဖြစ်ပေါ် စေနိုင်ခြင်း။

လျှော့ချရမည့်အစီအစဉ်

လုပ်ငန်းလည်ပတ်သည့်ကာလ/ပိတ်သိမ်းကာလ

- ✓ အမှိုက်စွန့်ပစ်ရန် လုံလောက်သောနေရာ အကျယ် အဝန်းရှိသည့် အမှိုက်ကန်များ တည်ဆောက် ထားရှိခြင်း။
- ✓ အမှိုက်စိုး၊ အမှိုက်ခြောက်နှင့် ပြန်လည် အသုံး ပြုနိုင်သော အမှိုက်များဟူ၍ အမျိုးအစားများ ခွဲခြား၍ စွန့်ပစ်ခြင်း။
- ✓ အန္တရာယ်ရှိသောဓာတုပစ္စည်းနှင့် စွန့်ပစ်အမှိုက် များ ကို ကိုင်တွယ်ရာနှင့် ပတ်သက်ပြီး အလုပ်သမားများ အား ကျန်းမာရေး အသိပညာ ပေးခြင်း။
- ✓ အိမ်သာမှ ထွက်ရှိသော အမျိုးသမီးသုံး ပစ္စည်းများကို စနစ်တကျ စွန့်ပစ်ပေးခြင်း။
- ✓ စီမံကိန်းဧရိယာ အတွင်း အမှိုက်မီးရှို့ခြင်းကို တားမြစ် ခြင်း။
- ✓ အမှိုက်များကို ပုသိမ်စည်ပင်သာယာ ရေး ကော်မတီနှင့်ချိတ်ဆက်ပြီး တစ်ပတ်တစ်ကြိမ် စနစ်တကျ စွန့်ပစ်ပေးခြင်း။

အမှိုက်ပုံးများ

စွမ်းအင်အသုံးပြုမှုကြောင့် ပတ်ဝန်းကျင်အပေါ်သက်ရောက်မှုနှင့် လျှော့ချရမည့် အစီအစဉ်များ

လုပ်ငန်းခွင်အတွင်း

- လျှပ်စစ်စွမ်းအင်အသုံးပြုမှု။
- ဘွိုင်လာကို အသုံးပြု၍ အပူစွမ်းအင် အသုံးပြုမှု။

<u>လျှပ်စစ်အသုံးပြုမှု</u>

- စီမံကိန်းစက်ရုံသည် လျှပ်စစ်အတွက် ပုသိမ်စက်မှုဇုန် လျှပ်စစ်ဓါတ်အားလိုင်းမှ ရယူပြီး ၅၀၀ ကေဗွီအေ အားရှိသော ထရန်စဖော်မာဖြင့် သုံးစွဲပါသည်။

<u>ဘွိုင်လာအသုံးပြုမှု</u>

- ဒီဇယ်လောင်စာသုံးဘွိုင်လာ ၂ လုံး နှင့် လျှပ်စစ် ဘွိုင်လာ ၁ လုံး ရှိပါသည်။
- လောင်စာဆီ အသုံးပြုမှုမှာ တစ်ရက်လျှင် ၃၅ ဂါလံခန့် ဖြစ်ပါသည်။

<u>မီးစက်အသုံးပြုမှု</u>

- လျှပ်စစ်ဓါတ်အားပြတ်တောက်ချိန်တွင် အရေးပေါ်သုံးစွဲရန် ဒီဇယ်လောင်စာသုံး ၆၃၀ ကေဗွီအေ ၁ လုံး၊ ၂၅၀ ကေဗွီအေ ၁ လုံး နှင့် ၃၅၀ ကေဗွီအေ ၁ လုံး စုစုပေါင်း မီးစက် ၃ လုံး ရှိပါသည်။
- လောင်စာဆီ အသုံးပြုမှုမှာ တစ်ရက်လျှင် ၀၊လံ ၈၀ ခန့် ဖြစ်ပါသည်။

စွမ်းအင်သုံးစွဲမှုသက်ရောက်မှုနှင့် လျော့ချရေး အစီအစဉ်များ

လုပ်ငန်းခွင်အတွင်း

- လျှပ်စစ်မီးအသုံးပြုမှု။
- ဘွိုင်လာမှ စွမ်းအင် သုံးစွဲမှု။
- အထည်ချုပ်လုပ်ငန်းလည်ပတ်မှုမှ လျှပ်စစ်စွမ်းအင်သုံးစွဲမှု။
- မီးစက် အသုံးပြုမှု။

သက်ရောက်မှု

လုပ်ငန်းလည်ပတ်ကာလ

- SO_2, NO_2, CO , Particulate Matter (PM) များထွက်ရှိခြင်း။
- လျှပ်စစ်မီတာခများ ကုန်ကျခြင်း။
- ဘွိုင်လာအသုံးပြုခြင်းကြောင့် လောင်စာများကုန်ဆုံးခြင်း။
- လောင်စာဆီအတွက် ငွေကြေးမြောက်များစွာ သုံးစွဲရခြင်း။

ပိတ်သိမ်းကာလ

- SO_2, NO_2, CO , Particulate Matter (PM) များထွက်ရှိခြင်း။
- လောင်စာဆီအတွက် ငွေကြေးမြောက်များစွာ သုံးစွဲရခြင်း။

လျော့ချရမည့်အစီအစဉ်

လုပ်ငန်းလည်ပတ်ကာလ

- ✓ ဘွိုင်လာအသုံးပြုမှုကို အချိန်ကန့်သတ်ပေးထားခြင်း။
- ✓ နေ့အချိန်နှင့်ညအချိန်တို့တွင် မလိုအပ်သည့် မီးများကို ပိတ်ထားခြင်း၊
- ✓ မီးစက်များကို အသုံးမပြုချိန်တွင် ရပ်နားထားခြင်း
- ✓ စက်ရုံအတွင်း သဘာဝအလင်းရောင် ရရှိစေရန် ဆောင်ရွက်ခြင်း
- ✓ မီတာစားသက်သာသည့် LED မီးလုံး/မီးချောင်းများ တပ်ဆင်အသုံးပြုခြင်း။

ပိတ်သိမ်းကာလ

- ✓ ကုန်ပစ္စည်းကားများအတင်အချုပြုလုပ်ချိန်တွင် စက်ရပ်နားထားခြင်း။

၃၃

ကိုယ်ခန္ဓာကျန်းမာရေးနှင့် လုပ်ငန်းခွင် ဘေးအန္တရာယ်ကင်းရှင်းမှု

ဖြစ်ပေါ်နိုင်သည့်နေရာများ

- လုပ်ငန်းလည်ပတ်သည့်နေရာများဖြစ်သော-
  - ပိတ်ဖြန့်ခင်းသည့်နေရာ၊
  - ပိတ်စဖြတ်သည့်နေရာ၊
  - ဂွမ်းအနွေးထည်များ ပြုလုပ်ရန် ကျောက်ဂွမ်းဖြတ်သည့်နေရာ၊
  - စက်ချုပ်သည့်နေရာ၊
  - Accessoriesတပ်သည့်နေရာ၊
  - မီးပူတိုက်သည့်နေရာ၊
  - လုပ်ငန်းလည်ပတ်သည့်ဧရိယာ အတွင်းတွင် ကုန်ကြမ်းများထားသည့် နေရာ၊
  - ကုန်ကြမ်း/ကုန်ချောများ သယ်ယူခြင်း၊





၃၄

လုပ်ငန်းခွင်ဘေးအန္တရာယ်ကင်းရှင်းရေးဆိုင်ရာ စီမံခန့်ခွဲမှု

ထိခိုက်ဒါဏ်ရာရှိမှု

လုပ်ငန်းခွင်အတွင်း

- ❑ ကုန်တင်ကုန်ချပြုလုပ်ရာသည့် နေရာ။
- ❑ လုပ်ငန်းလည်ပတ်သည့် နေရာ။
- ❑ စက်ချပ်ခြင်း၊ ဝိတ်ဖြတ်ခြင်း၊ မီးပူတိုက်ခြင်း။
- ❑ စက်ယန္တရားများ ပြုပြင်ထိန်းသိမ်းသည့်နေရာ။
- ❑ သဘာဝဘေးအန္တရာယ်

သက်ရောက်မှု

လုပ်ငန်းလည်ပတ်သည့်ကာလ/ပိတ်သိမ်းကာလ

- ❖ ကုန်တင်ကုန်ချပြုလုပ်ရာတွင် မတော်တဆ ထိခိုက်နိုင်ခြင်း။
- ❖ ကုန်ကြမ်းများစုပုံခြင်းမှ ချော်လဲနိုင်ခြင်း။ ခြေလက်များကျိုးပဲ့နိုင်ခြင်း၊ ပွန်းပဲ့နိုင်ခြင်း။
- ❖ လုပ်ငန်းလည်ပတ်သည့် စက်ကိရိယာများ အတွင်းသို့ မတော်တဆ လက်ညှပ်နိုင်ခြင်း။ ထိခိုက်ရှုနာဒါဏ်ရာ နှင့်ကျိုးပဲ့နိုင်ခြင်း။
- ❖ လျှပ်စစ်ဝါယာရှော့များ ဖြစ်ပေါ်ပြီး ထိခိုက်နိုင်ခြင်း
- ❖ ငလျင်၊ မုန်တိုင်း၊ ရေကြီးခြင်း၊ မီးဘေးအန္တရာယ် များဖြစ်ပေါ်နိုင်ပြီး လုပ်သားများအပေါ်ထိခိုက်နိုင်ခြင်း။

လျော့ချရမည့်အစီအစဉ်

လုပ်ငန်းလည်ပတ်သည့်ကာလ/ပိတ်သိမ်းကာလ

- ✓ ကုန်တင်ကုန်ချပြုလုပ်ရာတွင် စနစ်တကျကြပ်မတ်လုပ်ဆောင်ခြင်း။
- ✓ လုပ်သားအရေအတွက်နှင့်ကိုက်ညီသော ဆေးသေတ္တာများထောက်ပံ့ပေးခြင်း။
- ✓ စက်ပစ္စည်းများကို အသုံးပြုရာတွင် လုပ်သားများ ကို လေ့ကျင့်သင်ကြားပေးပြီးမှ အသုံးပြုစေခြင်း။
- ✓ စက်ယန္တရားများနှင့်ငင်းတို့အနီးတွင်ထိခိုက်နိုင်ကြောင်း အန္တရာယ်ရှိကြောင်း ဖော်ပြထားသော သတိပေး သင်္ကေတများနှင့် စာများကပ်ထားခြင်း။
- ✓ မတော်တဆ ထိခိုက်မှုများရှိခဲ့ပါက သက်ဆိုင်ရာ အရေးပေါ်ဌာနများသို့ ဆက်သွယ်နိုင်မည့် ဖုန်းနံ ပါတ် များကို မြင်သာသော နေရာများတွင် ချိတ်ဆွဲစေခြင်း၊ အရေးပေါ်သတိပေးခေါင်းလောင်းထားရှိခြင်း။
- ✓ သဘာဝဘေးအန္တရာယ်သတင်းများကို နားဆင်၍ ကြိုတင်ပြင်ဆင်မှုများပြုလုပ်ခြင်း။
- ✓ သဘာဝဘေးများကျရောက်နိုင်သည်ဟု ကြားသိရပါက စက်ရုံအလုပ်များရပ်နား၍၊ ဘေးအန္တရာယ်ကင်းရာနေရာသို့ ရွှေ့ပြောင်းနေခြင်း။

ထိခိုက်နိုင်ကြောင်း အသိပေး ဆိုင်းဘုတ်များတပ်ဆင်ထားခြင်း

၃၅

အရေးပေါ်နှင့် မီးဘေးအန္တရာယ်လုံခြုံရေးအစီအစဉ်များ

ဖြစ်ပေါ်နိုင်သည့်နေရာများ

- ❑ သဘာဝဘေးအန္တရာယ်ကျရောက်ခြင်း
- ❑ မီးဘေးအန္တရာယ်
  - မီးစက်အသုံးပြုခြင်း၊
  - စက်ပစ္စည်းများအသုံးပြုခြင်း၊
  - လုပ်ငန်းသုံးမော်တော်ကားများ၊ မီးပို့ချောင်သုံးပစ္စည်းများ၊ လျှပ်စစ်ပစ္စည်းများ။
  - မီးလောင်လွယ်သော စွန့်ပစ်ပစ္စည်းများနှင့် သိုလှောင်ထားသော ကုန်ကြမ်းနှင့် ကုန်ချောပစ္စည်းများ

သက်ရောက်မှု

လုပ်ငန်းလည်ပတ်သည့်ကာလ/ပိတ်သိမ်းကာလ

- ❖ သဘာဝဘေး
  - မုန်တိုင်းတိုက်ခတ်ခြင်း၊ ငလျင်လှုပ်ခတ်ခြင်း၊
  - ရေဘေး၊ ရေကြီးရေလျှံမှု
- ❖ မီးဘေးအန္တရာယ်
- စက်ပစ္စည်းများ အပူလွန်ကဲခြင်းနှင့် မတော်တဆ မီးဘေးအန္တရာယ်ဖြစ်စေနိုင်ခြင်း။
- လျှပ်စစ်ဝါယာကြိုးများရှော့ဖြစ်၍ မီးဘေးအန္တရာယ်ဖြစ်ပေါ်စေနိုင်ခြင်း။

လျော့ချရမည့် အစီအစဉ်

လုပ်ငန်းလည်ပတ်သည့်ကာလ/ပိတ်သိမ်းကာလ

- ✓ အဆောက်အအုံများကို ငလျင်ဒဏ်ခံနိုင်သည့် ဒီဇိုင်းဖြင့် ဆောက်လုပ်ခြင်း။
- ✓ ရေမြောင်းများ ရေစီးရေလာကောင်းစေရန် စီမံထားရှိခြင်း။
- ✓ လောင်စာများအနီးတွင် မီးအသုံးပြုမှုကို တားမြစ်ထားခြင်း။
- ✓ မော်တော်ယာဉ်၊ မီးစက်၊ စက်ယန္တရားများအား ပုံမှန်စစ်ဆေးခြင်း၊ ထိန်းသိမ်းခြင်း၊ ပြုပြင်ခြင်း။
- ✓ သွယ်တန်းထားသော လျှပ်စစ်မီးကြိုးများကို ကျွမ်းကျင်သူများနှင့် ပုံမှန်စစ်ဆေးခြင်း။
- ✓ ဝန်ထမ်းများအား မီးဘေးအန္တရာယ်ကာကွယ်ရေး၊ ရှုးဦးသူနာ ပြုစုခြင်းနှင့် အရေးပေါ် တုံ့ပြန်ခြင်း ဆိုင်ရာ အသိပညာပေးခြင်း များ ဆောင်ရွက်ခြင်း။
- ✓ လုပ်ငန်းလည်ပတ်သည့်နေရာများ၊ မီးစက် ထားရှိသည့်နေရာ၊ လျှပ်စစ်ထိန်းချုပ်ခန်း နေရာများ နှင့် ရုံးခန်းနေရာများတွင် အရေးပေါ်မီးဘေးအန္တရာယ်အား ကာကွယ်နိုင်ရန် မီးသတ်ပစ္စည်းများနှင့် မီးသတ်ဆေးဘူးများကို ထားရှိခြင်း။
- ✓ မီးသတ်ဆေးပူးများအား ပုံမှန်စစ်ဆေးပေးခြင်း။
- ✓ မတော်တဆ မီးဘေးအန္တရာယ်ဖြစ်ပေါ်ပါက အရေးပေါ် ဆက်သွယ်ရမည့် မီးသတ်ဌာနများ၊ ဆေးရုံများနှင့် သက်ဆိုင်ရာ ဌာနများ၏ ဖုန်းနံပါတ်များကို ဝန်ထမ်းအားလုံးမြင်နိုင်သော နေရာများတွင် ချိတ်ဆွဲထားရန် လိုအပ်သည်။

မီးဘေးအန္တရာယ်သတိပေးဆိုင်းဘုတ်များတပ်ဆင်စေခြင်း

၃၆

လူမှုစီးပွားအပေါ်ကောင်းကျိုးသက်ရောက်မှု

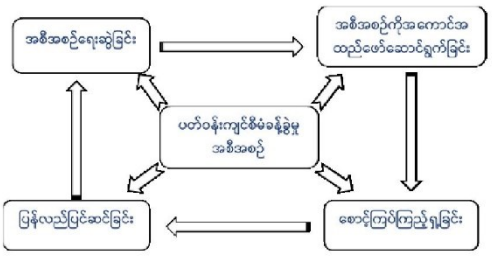
- စီမံကိန်းတည်ရှိရာဒေသအနီးအဝိုက်ရှိ ပြည်သူများအတွက် အလုပ်အကိုင်အခွင့်အလမ်းရရှိစေခြင်း။
- အလုပ်သမားများအတွက် လူမှုရေးခွဲခြားမှုမရှိဘဲ တန်းတူညီမျှ သင့်တင့်သော အခွင့်အရေးများနှင့် ပေါင်းသင်းဆက်ဆံခြင်း၊
- စီမံကိန်းလုပ်ငန်းကြောင့် အနီးနားဆက်စပ်လျက်ရှိသော အဖွဲ့အစည်းများအတွက် အကျိုးမြတ် ရရှိစေခြင်း။
- အလုပ်သမားရေးဆိုင်ရာ ဥပဒေများနှင့်အညီ သေချာစွာ ဆောင်ရွက်ခြင်း။
- ကလေးလုပ်သားများ ခေါ်ယူခြင်းအား ရှောင်ရှားခြင်း။
- ကျန်းမာရေးနှင့် ဘေးကင်းလုံခြုံသည့် လုပ်ငန်းခွင်အား တိုးမြှင့်တည်ထောင်ခြင်း။
- အလုပ်သမားများ၏ ဘေးကင်းလုံခြုံရေးအတွက် စီမံခန့်ခွဲမှုများနှင့် လုံလောက်သော အသုံးစရိတ် ထောက်ပံ့မှုများပေးခြင်း။
- စီမံကိန်းပိုင်ရှင်မှ ဒေသဆိုင်ရာ ဖွံ့ဖြိုးတိုးတက်ရေး အစီစဉ်များအား အကောင်အထည် ဖော်ဆောင်ခြင်း။
- အရည်အချင်းရှိသောဝန်ထမ်းများဖြစ်အောင် လေ့ကျင့်သင်ကြားပေးခြင်း။
- ဒေသဆိုင်ရာ ရိုးရာယဉ်ကျေးမှုများအား နားလည်သဘောပေါက်ခြင်းနှင့် ထိန်းသိမ်းစောင့်ရှောက်ခြင်း။
- ဤသို့သော စီမံကိန်းလုပ်ငန်းများကြောင့် နိုင်ငံတော်ဝင်ငွေ နှင့် အခွန်ဘဏ္ဍာရရှိစေခြင်း။

ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်

ပတ်ဝန်းကျင်ဆိုင်ရာလေ့လာစောင့်ကြည့်မှုအစီအစဉ်

တည်ဆောက်ဆဲကာလနှင့် လုပ်ငန်းလည်ပတ် ဆောင်ရွက်သည့်ကာလအတွက် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်ကို စနစ်တကျရေးဆွဲရမည်

စီမံကိန်း အကောင် အထည်ဖော်သူမှ ဆောင်ရွက်ရပါမည်။



စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးပြီး ရလဒ်များကို ပိုမိုကောင်းမွန်ရန် ပြန်လည်ပြင်ဆင် ရေးဆွဲ ရမည်။

ဌာနဆိုင်ရာ၊ စီမံကိန်းအကောင်အထည် ဖော်သူ၊ အနီးအနား၌ ဒေသခံများမှ စောင့်ကြပ် စစ်ဆေးပေးရမည်။

၃၉

စောင့်ကြပ်ကြည့်ရှုရမည့် အချက်အလက်များ

ကြည့်ရှုရမည့် ကဏ္ဍများ	ကာလအပိုင်းအခြား	အကြောင်းအရာ	တည်နေရာ	ကြိမ်နှုန်း	တာဝန်ရှိသော အဖွဲ့အစည်း
လေထုအရည်အသွေး	လုပ်ငန်းလည်ပတ်ခြင်းကာလ	အမှုန်အမွှားများ (PM_{10}, $PM_{2.5}$), နိုက်ထရိုဂျင်ဒိုင်အောက်ဆိုဒ် (NO_2), ဆာလဖာဒိုင်အောက်ဆိုဒ် (SO_2), ကာဗွန်မိုနောက်ဆိုဒ် (CO), ကာဗွန်ဒိုင်အောက်ဆိုဒ် (CO2) အခန်းတွင်းလေထုအရည်အသွေး ငွေ့ရည်ပြန်လွယ်သောဓာတုပြဒ်ပေါင်း (TVOC)၊ ဖော်မယ်ဒီဟိုက် (HCHO)၊ ကာဗွန်ဒိုင်အောက်ဆိုက်ဒ် (CO_2)၊ လေထုထဲတွင်ရှိသောအမှုန်အမွှား (PM1) (PM10) (PM 2.5)	စက်ရုံတွင်း လုပ်ငန်းလည်ပတ်သည့် နေရာ	တစ်နှစ်လျှင် တစ်ကြိမ်	Hakers Enterprise (Myanmar) Co., Ltd / တာဝန့်ရိုးပို့လ်
	ပိတ်သိမ်းကာလ	အမှုန်အမွှားများ (PM_{10}, $PM_{2.5}$), နိုက်ထရိုဂျင်ဒိုင်အောက်ဆိုဒ် (NO_2), ဆာလဖာဒိုင်အောက်ဆိုဒ် (SO_2), ကာဗွန်မိုနောက်ဆိုဒ် (CO), ကာဗွန်ဒိုင်အောက်ဆိုဒ် (CO2)	စီမံကိန်းတည်နေရာ	တစ်နှစ်လျှင် တစ်ကြိမ်	
ဆူညံသံ	လုပ်ငန်းလည်ပတ်ခြင်းကာလ	အသံဆူညံမှု ပမာဏ	လုပ်ငန်းလည်ပတ်သည့် နေရာ စက်ရုံဝင်း အတွင်း	တစ်နှစ်လျှင် နှစ်ကြိမ်	Hakers Enterprise (Myanmar) Co., Ltd / တာဝန့်ရိုးပို့လ်
	ပိတ်သိမ်းကာလ		စီမံကိန်းတည်နေရာ	တစ်နှစ်လျှင် တစ်ကြိမ်	

၄၀

စောင့်ကြပ်ကြည့်ရှုရမည့် အချက်အလက်များ

ကြည့်ရှုရမည့် ကဏ္ဍများ	ကာလအပိုင်းအခြား	အကြောင်းအရာ	တည်နေရာ	ကြိမ်နှုန်း	တာဝန်ရှိသော အဖွဲ့အစည်း
စွန့်ပစ်ပစ္စည်း	လုပ်ငန်းလည်ပတ်ခြင်းကာလ	✓ ထွက်ရှိလာသော စွန့်ပစ်ပစ္စည်းများကို ပမာဏ၊ အမျိုးအစားခွဲခြင်း။ ✓ အမှိုက်စွန့်ပစ်သည့် အရေအတွက်ကို မှတ်တမ်းပြုလုပ် ခြင်း။ ✓ အမှိုက်စနစ်တကျစွန့်ပစ်မှုရှိမရှိ စစ်ဆေးခြင်း။	စီမံကိန်းတည်နေရာ	လစဉ်	Hakers Enterprise (Myanmar) Co., Ltd / တာဝန်ရှိပုဂ္ဂိုလ်
	ပိတ်သိမ်းကာလ		စီမံကိန်းတည်နေရာ	အပတ်စဉ်	
ရေအရည်အသွေး	လုပ်ငန်းလည်ပတ်ခြင်းကာလ	pH, Ammonia, Iron, Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total Chlorine, Total Suspended Solids, Oil and Grease	စွန့်ပစ်ရေထွက်ရှိသည့် နေရာ	တစ်နှစ်လျှင် နှစ်ကြိမ်	Hakers Enterprise (Myanmar) Co., Ltd / တာဝန်ရှိပုဂ္ဂိုလ်
	ပိတ်သိမ်းကာလ		စွန့်ပစ်ရေထွက်ရှိသည့် နေရာ	တစ်နှစ်လျှင် တစ်ကြိမ်	
လုပ်ငန်းခွင် ဘေးအန္တရာယ် ကင်းရှင်းရေး နှင့် ကျန်းမာရေး	လုပ်ငန်းလည်ပတ်ခြင်းကာလ	❖ လုပ်ငန်းခွင်အတွင်းတစ်ကိုယ်ရေသုံးကာကွယ်ရေးပစ္စည်းများ ထောက်ပံ့ပေးခြင်း။ ❖ အကာအကွယ် ပစ္စည်းများ ဝတ်ဆင်ခြင်း ရှိမရှိ စစ်ဆေးခြင်း။ ❖ အလုပ်တက်ရောက်သူ မှတ်တမ်းများ ထားရှိခြင်း။ ❖ ဘေးအန္တရာယ်အသိပေးဆိုင်းဘုတ်များ ထားရှိခြင်း။ ❖ အန္တရာယ်ကင်းရှင်းရေး စောင့်ကြည့်သုံးဖြင့် လုပ်ငန်းခွင် စစ်ဆေးခြင်း။	စီမံကိန်းအတွင်း	နေ့စဉ်	Hakers Enterprise (Myanmar) Co., Ltd / တာဝန်ရှိပုဂ္ဂိုလ်
	ပိတ်သိမ်းကာလ		စီမံကိန်းအတွင်း	နေ့စဉ်	

၄၁

စောင့်ကြပ်ကြည့်ရှုရမည့် အချက်အလက်များ

ကြည့်ရှုရမည့် ကဏ္ဍများ	ကာလအပိုင်းအခြား	အကြောင်းအရာ	တည်နေရာ	ကြိမ်နှုန်း	တာဝန်ရှိသော အဖွဲ့ အစည်း
အရေးပေါ်အခြေအနေ (မီးဘေးအန္တရာယ်၊ ငလျင်၊ ရေကြီးရေလျှံမှု)	စီမံကိန်းကာလ တစ်လျှောက်	❖ အရေးပေါ်အစီအစဉ်များကိုလေ့ကျင့်ခြင်း (Emergency Drill) ❖ အသိပညာပေးခြင်း၊ သင်တန်းပေးခြင်း။ ❖ အရေးပေါ်ဆက်သွယ်ရမည့် ဌာနများ၊ အဖွဲ့အစည်းများ၏လိပ်စာ/ ဖုန်းနံပါတ်များ အလွယ်တကူထားရှိခြင်း။	စီမံကိန်းအတွင်း	လေးလ တစ်ကြိမ်	Hakers Enterprise (Myanmar) Co., Ltd / တာဝန်ရှိပုဂ္ဂိုလ်

- ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် အစီရင်ခံစာတွင် ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုရေးအစီအစဉ်များနှင့် စီမံခန့်ခွဲမှုအစီအစဉ်များကို ထည့်သွင်းရေးသားထားပါသည်။
- အစီရင်ခံစာကို အတည်ပြုချိန်မှစ၍ ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုမှုအစီရင်ခံစာကို ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန (ECD) သို့ ၆လ တစ်ကြိမ် တင်ပြရမည် ဖြစ်ပါသည်။

၄၂

မကျေလည်မှုများ ဖြေရှင်းပေးသည့် အစီအစဉ်

- လုပ်ငန်းလည်ပတ် ဆောင်ရွက်နေစဉ်အတွင်း လုပ်သားများနှင့် ဒေသခံများ ကျေနပ်မှုမရှိခဲ့လျှင် သက်ဆိုင်ရာပုဂ္ဂိုလ်ထံသို့ တိုင်ကြားနိုင်ခြင်း
- တိုင်ကြားမှုပြုလုပ်ရာတွင် စာဖြင့်ဖြစ်စေ၊ ဖုန်းဖြင့်ဖြစ်စေ၊ လူကိုယ်တိုင်ဖြစ်စေ တိုင်ကြားနိုင်ခြင်း
- တိုင်ကြားချက်များကို မြန်မာနိုင်ငံရှိ တည်ဆဲဥပဒေများနှင့်အညီ ဖြေရှင်းပေးရမည်။

Hakers Enterprise (Myanmar) အထည်ချုပ်လုပ်ငန်း၏ ဘဏ္ဍာငွေလျာထားမှု

စဉ်	ပတ်ဝန်းကျင်လျော့ချရေးအတွက်ပြုလုပ်မည့်အစီအစဉ်များ	နှစ်စဉ် ခန့်မှန်းအသုံးစရိတ် (ကျပ်ငွေ)
	ပတ်ဝန်းကျင်ဆိုင်ရာလုပ်ငန်းများ	
၁။	ပတ်ဝန်းကျင် အရည်အသွေး တိုင်းတာခြင်း၊ စောင့်ကြပ်ကြည့်ရှုခြင်း	၁၅ သိန်း
၂။	သက်ဆိုင်ရာသင်တန်းများပို့ချခြင်း	၁၅ သိန်း
၃။	အရေးပေါ်အခြေအနေ	၁၅ သိန်း
	ကျန်းမာရေးနှင့်ဘေးအန္တရာယ်ကင်းရှင်းရေးဆိုင်ရာလုပ်ငန်းများ	
၄။	ကျန်းမာရေးနှင့်ဘေးအန္တရာယ်ကင်းရှင်းရေးဆိုင်ရာလုပ်ငန်းများ	သိန်း ၃၀
၅။	မီးသတ်ဆေးဘူး	၂၅ သိန်း
၆။	တစ်ကိုယ်ရည် ကာကွယ်ရေး ပစ္စည်းများ	သိန်း ၃၀

လူမှုအကျိုးတူပူးပေါင်းပါဝင်မှု (CSR) အစီအစဉ်

- မြန်မာ့ရင်းနှီးမြှုပ်နှံမှုကော်မတီ၏ ချမှတ်ထားသော နည်းလမ်းများအတိုင်း အမြတ်ငွေမှ ၂% ကို (CSR) အတွက် အသုံးပြုခြင်း ။
- စက်ရုံတွင်လည်း CSR အစီအစဉ်များချမှတ်ဆောင်ရွက်ခြင်း။

စီမံကိန်းအတွက်လျာထားရန်ပုံငွေ

စဉ်	လုပ်ဆောင်ချက်	တာဝန်ရှိအဖွဲ့အစည်း	ကြိမ်နှုန်း	ခန့်မှန်းပမာဏ (အသားတင်အမြတ်%)
၁.	လူမှုရေး			
	စီမံကိန်းပတ်ဝန်းကျင်ရှိ ရွာများတွင် လမ်းဖောက်လုပ်ပေးခြင်း၊ ရေစီးရေလာကောင်းမွန်စေရေး ဆောင်ရွက်ခြင်း	Hakers Enterprise (Myanmar) Co., Ltd	နှစ်စဉ်	၀.၈
၂.	ပညာရေး			
	စီမံကိန်းပတ်ဝန်းကျင်ရှိ ရွာများရှိ စာသင်ကျောင်းများတွင် အဆောက်အဦများ ဆောက်လုပ်ပေးခြင်း	Hakers Enterprise (Myanmar) Co., Ltd	နှစ်စဉ်	၀.၄
၃.	ကျန်းမာရေး			
	စီမံကိန်းအနီးပတ်ဝန်းကျင်ရှိ ကျေးရွာများတွင် သောက်ရေသန့်ကန့်များ ထောက်ပံ့ခြင်း စီမံကိန်းရှိရာဒေသရှိ ကျေးလက်ကျန်းမာရေးဆေးခန်းများသို့ ပံ့ပိုးကူညီခြင်း	Hakers Enterprise (Myanmar) Co., Ltd	နှစ်စဉ်	၀.၆
၄.	ဘာသာရေး			
	စီမံကိန်းအနီးပတ်ဝန်းကျင် ကျေးရွာများရှိ ဘုန်းကြီးကျောင်း၊ ဘာသာရေးအဖွဲ့အစည်းများသို့ လှူဒါန်းခြင်း	Hakers Enterprise (Myanmar) Co., Ltd	နှစ်စဉ်	၀.၂

၄၅

ကျေးဇူးတင်ပါသည်

Hexagonal Angle International Consultants Co., Ltd.

ဝေဖန်အကြံပြုချက်များ နှင့်

ဆွေးနွေးလိုသည့် အကြောင်းအရာများ

လွတ်လပ်စွာ မေးမြန်းနိုင်ပါသည်။

Hexagonal Angle International Consultants Co., Ltd.

Get In Touch With Us

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APPENDIX B
Air Quality Results

HEXAGONAL ANGLE
INTERNATIONAL CONSULTANTS CO.,LTD.

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Tel: +959 898333711
Email: info@hexagonalangle.com
Website: www.hexagonalangle.com

Project Name - Hakers Enterprise Myanmar
Project Location - Block No. (P-3), Plot No.52, Industrial Zone, Ward No. 13, Pathein Township, Pathein District, Ayeyarwady Region

Air Monitoring Result

No.	Parameter	Duration	Result	Unit	Average Period		*Guideline Value
1	Particulate Matter PM_{10}	24 hour	43	$\mu g/m^3$ $\mu g/m^3$	1 24	Year Hour	*20 $\mu g/m^3$ *50 $\mu g/m^3$
2	Particulate Matter $PM_{2.5}$	24 hour	37	$\mu g/m^3$ $\mu g/m^3$	1 24	Year Hour	*10 $\mu g/m^3$ *25 $\mu g/m^3$
3	Total Suspended Particulate (TSP)	24 hour	60.78	$\mu g/m^3$	24 hour		NG
4	Sulphur Dioxide (SO_2)	2 4 hour	3	$\mu g/m^3$ $\mu g/m^3$	10 24	Min Hour	*500 $\mu g/m^3$ * 20$\mu g/m^3$
5	Nitrogen Dioxide (NO_2)	1 hour	55	$\mu g/m^3$ $\mu g/m^3$	1 1	Year Hour	*40 $\mu g/m^3$ *200 $\mu g/m^3$
6	Carbon Monoxide (CO)	24 hour	0.3	ppm	24 hour		NG
7	Air Pressure	24 hour	1008.1	hPa	24 hour		NG
8	Ozone (O_3)	8 hour	60.51	$\mu g/m^3$	8 hour		100
9	Relative Humidity	24 hour	79.54	%	24 hour		NG
10	Temperature	24 hour	29.29	Degree Celsius	24 hour		NG

*National Environmental Quality (Emission) Guideline 2015 NG=No Guideline

Analyzed by

Su Myat Mon
Environmentalist
Hexagonal Angle International Consultants Co., Ltd.

Checked by

Ei Ei Zaw
General Manager (Environmental & Social Specialist)
Hexagonal Angle International Consultants Co., Ltd.

APPENDIX C
Water Quality Results

PRO LAB
ANALYTICAL LABORATORY

Myanmar Innovation Group of Co.,Ltd.
Address : No.(9), Sabae Housing, Pyi Htaung Su Road,
26 Ward, South Dagon Tsp, Yangon, Myanmar.
Tel : 09-958 285 413, 09-893 767 424
Email : info@prolabmyanmar.com

LABORATORY ANALYSIS REPORT

1 Client Name : Hakers Enterprise (Myanmar) Company Limited Garment Factory
2 Location : အမှတ် (P3/52 - စက်မှုဇုန်) ၊ ဘဉ ရပ်ကွက် ၊ မဘူးလမ်း ပုသိမ်မြို့နယ် ၊ ကင်းမလင်းကျွန်း ၊ ရောဝတီတိုင်းဒေသကြီး
3 Type of Sample : Domestic Waste Water
4 Sample No. : 00141/2021
5 Contact Person : Ko Win Naing Oo
6 Phone No. : 09-255896108
7 Date Received : 24.04.2021
8 Date of Test Performed : 24.04.2021
9 Date of Issued : 03.05.2021
10 Result :

No.	Parameter	Result	Unit	WHO STD 2018	Method
1	Ammonia	1.6	mg/L	-	Salicylate Method
2	BOD	14.79	mg/L	-	Hanna (HI 98193) - DO and BOD meter
3	COD	32	mg/L	-	USEPA Reactor Digestion Method
4	Iron	3.45	mg/L	-	Phenanthroline Method
5	Oils & Greases	13	mg/L	-	Soxhlet Extraction Method
6	pH	7.34	-	-	Hanna (HI 2211)-pH and Temperature Meter
7	Total Chlorine	0.05	mg/L	-	Hanna (HI 97104)- Free & Total Chlorine Portable Photometer
8	Total Suspended Solids	20	mg/L	-	Drying method

Remark:
This certificate is issued only for the receipt of the test sample.

Tested By
Name : EI THU THU MYINT
Position : Laboratory Technician
Signature :.....

Approved By
Name : MAY THU ZAW MYINT
Position : Chief Technical Officer
Signature :.....

Myanmar Innovation Group of Co., Ltd. PRO LAB ANALYTICAL LABORATORY

APPENDIX D
Public Consultation Attendance list

HEXAGONAL ANGLE
INTERNATIONAL CONSULTANTS CO.,LTD.

Office: No. 233/2, 1st Floor, Daung Min Street, 14/3 Quarter, South Okkalapa Township, Yangon, Myanmar
Tel: 1959 898333711
Email: info@hexagonalangle.com
Website: www.hexagonalangle.com

Hakers Enterprise Myanmar Co., Ltd. ၏ CMP စနစ်ဖြင့် အထည်ချုပ်လုပ်ငန်းနှင့်ပတ်သက်၍

ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်အစီရင်ခံစာ (EMP) အတွက်

အများပြည်သူတွေ့ဆုံဆွေးနွေးပွဲသို့ တက်ရောက်သူများစာရင်း

နေ့စွဲ : ၈ ရက်၊ စက်တင်ဘာလ၊ ၂၀၂၂ ခုနှစ်။

အချိန် : နံနက် ၁၀ နာရီမှ ၁၂ နာရီ အထိ။

စဉ်	အမည်	ရာထူး	ဌာန/အဖွဲ့အစည်း	နေရပ်လိပ်စာ	ဖုန်းနံပါတ်	လက်မှတ်
၁	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
၂	[illegible]	[illegible]	[illegible]	[illegible]	09-7542427	
၃	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
၄	[illegible]	[illegible]	[illegible]	[illegible]	09 [illegible]	
၅	[illegible]	[illegible]	[illegible]	[illegible]	09-25[illegible]	
၆	[illegible]	[illegible]	[illegible]	[illegible]	09-977100334	

HEXAGONAL ANGLE
INTERNATIONAL CONSULTANTS CO.,LTD.

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Website: www.hexagonalangle.com

๑	[illegible]	[illegible]	[illegible]	[illegible]	๐๙-๙๔๑๗๕๐๑๕	[illegible]
๒	[illegible]	[illegible]	[illegible]	[illegible]	09-422491874	[illegible]
๓	Wint Wint Tho Naing	Manager	Hakess	ပုဂ္ဂိုလ်	09-400298699	[illegible]
๑๐	Htar Ceket Yee Lwin	Admin	Hakers	"	09-456627142	[illegible]
๑๑	San San Maw	HR	Hakers	"	09.253155782	[illegible]
๑๒	May Thet Aung	Finance	Hakers	"	09.45122[illegible]21	[illegible]
๑๒	May Myat Mon	Finance	Hakers	"	09.676298167	[illegible]
๑๙	Htay Htay Win	Finishing (WCC members)	Hakers	"	09250936515	[illegible]
๑๗						
๑๘						

APPENDIX E
Company Registration

ကုမ္ပဏီမှတ်ပုံတင်လက်မှတ်

Certificate of Incorporation

ဟာကာစ် အင်တာပရိုက်(မြန်မာ) ကုမ္ပဏီ လီမိတက်

HAKERS ENTERPRISE (MYANMAR)COMPANY LIMITED

Company Registration No. 110161867

မြန်မာနိုင်ငံကုမ္ပဏီများအက်ဥပဒေ ၁၉၁၄ ခုနှစ် အရ

ဟာကာစ် အင်တာပရိုက်(မြန်မာ) ကုမ္ပဏီ လီမိတက်

အား ၂၀၁၃ ခုနှစ် မတ်လ ၁၁ ရက်နေ့တွင်

အစုရှယ်ယာအားဖြင့် ကာဝန်ကန့်သတ်ထား သည့် အမျှားနှင့်မသက်ဆိုင်သောကုမ္ပဏီ

အဖြစ် ဖွဲ့စည်းမှတ်ပုံတင်ခွင့် ပြုလိုက်သည်။

This is to certify that

HAKERS ENTERPRISE (MYANMAR)COMPANY LIMITED

was incorporated under the Myanmar Companies Act 1914 on 11 March 2013 as a Private Company Limited by Shares.

ကုမ္ပဏီမှတ်ပုံတင်အရာရှိ

Registrar of Companies

ရင်းနှီးမြှုပ်နှံမှုနှင့်ကုမ္ပဏီများညှိနှိုင်းကြားဆင်ရေးဦးစီးဌာန

Directorate of Investment and Company Administration

Former Registration No. 461FC/2012-2013