Part - I

Environmental Management Plan - EMP

(Revised_03)

ပဲခူးတိုင်းဒေသကြီး၊ ပဲခူးမြို့၊ ညောင်အင်းကျေးရွာ၊ ပဲခူးစက်မှုနယ်မြေ၊ မြေကွက်အမှတ် (၁၈၊ ၁၉၊ ၂၀) ရှိKarisma Apparel (Myanmar) Company Limited ၏ အထည်ချုပ်လုပ်ငန်းအတွက်တင်ပြလာသော ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (2nd Revised EMP) အစီရင်ခံစာအပေါ် စိစစ်တွေ့ရှိချက်နှင့် သုံးသပ်အကြံပြုချက်များ

စဉ်	ထပ်မံတင်ပြလာမှုအပေါ် လိုအပ်သည်များအတွက် သုံးသပ်အကြံပြုချက်များ	ပြင်ဆင်ဖြည့်စွက်ဆောင်ရွက်မှုများ
၁။	**ကတိကဝတ်**	
	စာမျက်နှာ xv နှင့် xvi တို့တွင်ဖော်ပြထားသည့် ကတိကဝတ်အစား ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း ၇၇ အရ စီမံကိန်းအဆိုပြုသူနှင့် အစီရင်ခံစာပြုစုသူတို့မှ အောက်ပါအချက်အလက်များ မှန်ကန်ကြောင်း အတည်ပြုဝန်ခံချက်အား လက်မှတ်ရေးထိုးဖော်ပြရန်- ▪ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်သည် တိကျခိုင်မာကြောင်းနှင့် ပြည့်စုံကြောင်း၊ ▪ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်းအပါအဝင် သက်ဆိုင်ရာဥပဒေများကို တိကျစွာလိုက်နာ၍ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်ကို ရေးဆွဲထားကြောင်း၊ ▪ စီမံကိန်းသည် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်ပါ ကတိကဝတ်၊ ပတ်ဝန်းကျင်ထိခိုက်မှုလျော့ချရေးလုပ်ငန်းများနှင့် အစီအစဉ်များကို အပြည့်အဝအစဉ်အမြဲလိုက်နာမည်ဖြစ်ကြောင်း။	ညွှန်ကြားချက်အတိုင်း ▪ ခိုင်မာကြောင်းနှင့် ပြည့်စုံကြောင်း၊ ▪ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်းအပါအဝင် သက်ဆိုင်ရာဥပဒေများကို တိကျစွာလိုက်နာ၍ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်ကို ရေးဆွဲထားကြောင်းကို အစီရင်ခံစာပြုစုသူမှ လက်မှတ်ရေးထိုးမည့် Commitment and Acknowledgement (စာမျက်နှာ xvi) တွင်လည်းကောင်း၊ ▪ စီမံကိန်းသည် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်ပါ ကတိကဝတ်၊ ပတ်ဝန်းကျင်ထိခိုက်မှုလျော့ချရေးလုပ်ငန်းများနှင့် အစီအစဉ်များကို အပြည့်အဝ အစဉ်အမြဲ လိုက်နာမည်ဖြစ်ကြောင်းကို စီမံကိန်းအဆိုပြုသူမှ လက်မှတ်ရေးထိုးမည့် Document Certification and Declaration (စာမျက်နှာ xv) တွင်လည်းကောင်း ဖြည့်စွက်တင်ပြထားပါသည်။
၂။	**စီမံကိန်းအကြောင်းအရာဖော်ပြချက်**	
	Wastewater Treatment Plant of Printing နှင့် ပတ်သက်၍ စာမျက်နှာ ၇၅၊ Wastewater Treatment Plant (Printing Section) ခေါင်းစဉ်အောက်တွင် WTP မှ တစ်ရက်သန့်စင်နိုင်သည့် ပမာဏ၊ Printing လုပ်ငန်းစဉ်မှ တစ်ရက်ထွက်ရှိသည့် စွန့်ပစ်ရေကို သန့်စင်နိုင်မှုရှိ/မရှိ၊ WTP ရဲ့ လုပ်ငန်းဆောင်ရွက်မှု ဖော်ပြချက် (Flow Diagram	ညွှန်ကြားချက်အတိုင်း Wastewater Treatment Plant (Printing Section) မှ တစ်ရက်သန့်စင်နိုင်သည့် ပမာဏ၊ Printing လုပ်ငန်းစဉ်မှ တစ်ရက်ထွက်ရှိသည့် စွန့်ပစ်ရေကို သန့်စင်နိုင်မှု ရှိ/မရှိ၊ WTP ရဲ့ လုပ်ငန်းဆောင်ရွက်မှု ဖော်ပြချက် (Flow Diagram) နှင့် WTP မှ သန့်စင်ပြီး စွန့်ပစ်ရေ နှင့် Slug တို့အား နောက်ဆုံးစွန့်ပစ်မည့် အခြေအနေတို့ကို 2.10.1 Wastewater Treatment Systems မှ (2) Industrial Wastewater ရှိ (ii) Wastewater

စဉ်	ထပ်မံတင်ပြလာမှုအပေါ် လိုအပ်သည်များအတွက် သုံးသပ်အကြံပြုချက်များ	ပြင်ဆင်ဖြည့်စွက်ဆောင်ရွက်မှုများ
	ဖြင့် ဖော်ပြရန်)၊ WTP မှ သန့်စင်ပြီး စွန့်ပစ်ရေနှင့် Slug တို့အား နောက်ဆုံးစွန့်ပစ်မည့် အခြေအနေတို့ကို ဖော်ပြရန်၊	Treatment Plant (Printing Section) (စာမျက်နှာ ၇၅) တွင် ဖြည့်စွက်ဖော်ပြထားပါသည်။ Printing လုပ်ငန်းစဉ်မှထွက်ရှိသော စွန့်ပစ်ရေရလဒ်အား ကောက်ယူတိုင်းတာရာတွင် NEQG သတ်မှတ်ချက်အတွင်းရှိ၍ စွန့်ပစ်ရေသန့်စင်စနစ်သည် ကောင်းမွန်ကြောင်းကို ဇယား ၄-၂၇၊ Results of Wastewater Quality (GMES Lab) ၏အောက် (စာမျက်နှာ ၁၃၅) တွင် ဖော်ပြထားပါသည်။ ထို့ပြင် ၂၀၂၁ ခုနှစ် အောက်တိုဘာလတွင် ထပ်မံတိုင်းတာထားသောရလဒ်များကို စာမျက်နှာ ၁၃၅ တွင် ဆက်လက်တင်ပြထားပါသည်။
	Wastewater Treatment Plant of Washing နှင့် ပတ်သက်၍ စာမျက်နှာ ၇၂၊ Wastewater Treatment Plant (Washing Section) ခေါင်းစဉ်အောက်တွင် WTP မှ တစ်ရက်သန့်စင်နိုင်သည့် ပမာဏ၊ Washing လုပ်ငန်းစဉ်မှ တစ်ရက်ထွက်ရှိသည့် စွန့်ပစ်ရေကို သန့်စင်နိုင်မှု ရှိ/မရှိ၊ WTP ရဲ့ လုပ်ငန်းဆောင်ရွက်မှုဖော်ပြချက် (Flow Diagram ဖြင့် ဖော်ပြရန်)၊ WTP မှ သန့်စင်ပြီး စွန့်ပစ်ရေနှင့် Slug တို့အား နောက်ဆုံးစွန့်ပစ်မည့် အခြေအနေတို့ကို ဖော်ပြရန်၊	Wastewater Treatment Plant (Washing Section) မှ တစ်ရက်သန့်စင်နိုင်သည့်ပမာဏ၊ Washing လုပ်ငန်းစဉ်မှ တစ်ရက်ထွက်ရှိသည့် စွန့်ပစ်ရေကို သန့်စင်နိုင်မှု ရှိ/မရှိ၊ WTP ရဲ့ လုပ်ငန်းဆောင်ရွက်မှု ဖော်ပြချက် (Flow Diagram) နှင့် WTP မှသန့်စင်ပြီးစွန့်ပစ်ရေ နှင့် Slug တို့အား နောက်ဆုံးစွန့်ပစ်မည့်အခြေအနေတို့ကို 2.10.1 Wastewater Treatment Systems မှ (2) Industrial Wastewater ရှိ (ii) Wastewater Treatment Plant (Washing Section) (စာမျက်နှာ ၇၁)တွင် ဖြည့်စွက်ဖော်ပြထားပါသည်။ Washing လုပ်ငန်းစဉ်မှထွက်ရှိသော စွန့်ပစ်ရေရလဒ်အားကောက်ယူတိုင်းတာရာတွင် NEQG သတ်မှတ်ချက်အတွင်းရှိ၍ စွန့်ပစ်ရေသန့်စင်စနစ်သည် ကောင်းမွန်ကြောင်းကို ဇယား ၄-၇၂၊ Results of Wastewater Quality (GMES Lab) ၏အောက် (စာမျက်နှာ ၁၂၇) တွင် ဖော်ပြထားပါသည်။ ထို့ပြင် ၂၀၂၁ ခုနှစ် အောက်တိုဘာလတွင် ထပ်မံတိုင်းတာထားသော ရလဒ်များကို စာမျက်နှာ ၁၃၅ တွင် ဆက်လက်တင်ပြထားပါသည်။
	ယခင်သဘောထားမှတ်ချက်တွင် မပါဝင်သော်လည်း ECC ထုတ်ပေးရာတွင် အခက်အခဲဖြစ်နိုင်သည့် လိုအပ်သည့်အချက်များဖြစ်သဖြင့် အောက်	ယခင်သဘောထားမှတ်ချက်တွင် မပါဝင်သော်လည်း ECC ထုတ်ပေးရာတွင် ထပ်မံလိုအပ်သော အောက်ပါ

စဉ်	ထပ်မံတင်ပြလာမှုအပေါ် လိုအပ်သည်များအတွက် သုံးသပ်အကြံပြုချက်များ	ပြင်ဆင်ဖြည့်စွက်ဆောင်ရွက်မှုများ
	ဖော်ပြပါအချက်များကို အစီရင်ခံစာတွင် ဖြည့်စွက်ဖော်ပြရန်- ▪ စီမံကိန်းတည်ဆောက်ခြင်း၊လည်ပတ်ခြင်း နှင့်ပိတ်သိမ်းခြင်းကာလတို့အတွက် အကောင်အထည်ဖော်ဆောင်ရွက်မည့်ခန့်မှန်းအချိန်ဇယားကို ဖော်ပြရန်၊ ▪ အစီရင်ခံစာအပိုဒ် ၂.၉ တွင် ဖော်ပြထားသည့် ထုတ်လုပ်မှုလုပ်ငန်းစဉ်အဆင့်ဆင့်ကို Flow Chart ဖြင့် ရှင်းလင်းဖော်ပြရန်၊ ▪ အစီရင်ခံစာအပိုဒ်၂.၉၊ Project Activities တွင် Ironing လုပ်ငန်းစဉ်ပါဝင်သော်လည်း အစီရင်ခံစာ၌ Ironing လုပ်ငန်းစဉ်နှင့် ပတ်သက်၍ ဖော်ပြထားမှုမရှိသဖြင့် ဖော်ပြရန်၊	အချက်များကို ညွှန်ကြားချက်အတိုင်း အစီရင်ခံစာတွင် ဖြည့်စွက်ဖော်ပြထားပါသည်။ ▪ 2.1.5 Project Implementation Schedule (စာမျက်နှာ ၁၇) တွင် ဖော်ပြထားပါသည်။ ▪ ထုတ်လုပ်မှုလုပ်ငန်းစဉ်အဆင့်ဆင့်ကို အစီရင်ခံစာအပိုဒ် ၂.၉ အောက်တွင် Flow Chart ဖြင့် Figure 2-27 Process Flow Chart of Manufacturing Activities (စာမျက်နှာ ၄၆) တွင် ရှင်းလင်းဖော်ပြထားပါသည်။ ▪ Ironing လုပ်ငန်းစဉ်နှင့်ပတ်သက်၍ 2.9.11 Ironing (စာမျက်နှာ ၆၄) တွင် ဖြည့်စွက်ဖော်ပြထားပါသည်။
၃။	**မူဝါဒ၊ ဥပဒေနှင့် အဖွဲ့အစည်းဆိုင်ရာ မူဘောင်**	
	ပြင်ဆင်ဖြည့်စွက်ရန် လိုအပ်သည့်အချက်များကို ပြန်လည်ပြင်ဆင်ဖြည့်စွက် ဖော်ပြလာပါသည်။	-
၄။	**လက်ရှိပတ်ဝန်းကျင်အခြေအနေ**	
	ဇယား ၄-၉၊ Air Quality Workplace တွင် နမူနာကောက်ယူသည့်နေရာတို့၏ ကိုဩဒိနိတ်အမှတ် နှင့် ကောက်ယူသည့်နေရာအား ဓာတ်ပုံမှတ်တမ်းတို့ဖြင့် ဖော်ပြရန်၊	ညွှန်ကြားချက်အတိုင်း နမူနာကောက်ယူသည့်နေရာတို့၏ ကိုဩဒိနိတ်အမှတ်များကို ဇယား ၄-၈၊ Air Quality Workplace (စာမျက်နှာ ၁၁၈) တွင်လည်းကောင်း၊ ကောက်ယူသည့်ဓာတ်ပုံမှတ်တမ်းတို့ကို Figure 4-5 Some Photos of Indoor Air Quality Measurement (စာမျက် နှာ ၁၁၂ နှင့် ၁၁၃) တွင် ဖြည့်စွက်တင်ပြထားပါသည်။ ထို့ပြင် ၂၀၂၁ ခုနှစ် အောက်တိုဘာလတွင် ထပ်မံတိုင်းတာထားသောရလဒ်များကို ယင်းအောက်တွင် ဆက်လက်ဖော်ပြထားပါသည်။
၅။	**ပတ်ဝန်းကျင်အပေါ် ထိခိုက်နိုင်မှုများနှင့် လျော့ပါးစေရေး ဆောင်ရွက်မည့် အစီအစဉ်များ**	
	လုပ်ငန်း လည်ပတ်စဉ်ကာလ Boiler ၊ ဂျင်နရေတာနှင့် ထုတ်လုပ်မှုလုပ်ငန်းစဉ်အဆင့်ဆင့်တို့ကြောင့် Air Emission PM သည် သတ်မှတ်တန်ဖိုး	သုံးသပ်အကြံပြုချက်အတိုင်း Air Impact ဖြစ်စေသည့် အကြောင်းအရင်းများနှင့် ယင်းအပေါ်အခြေခံ၍ လျော့ချမည့်နည်းလမ်းများကို ဇယား ၅-၅၊ Evaluation of

စဉ်	ထပ်မံတင်ပြလာမှုအပေါ် လိုအပ်သည်များအတွက် သုံးသပ်အကြံပြုချက်များ	ပြင်ဆင်ဖြည့်စွက်ဆောင်ရွက်မှုများ
	ထက် ကျော်လွန်ခြင်းအပြင် Significance Score တွက်ချက်မှုအရ (High) ဖြစ်နေသည့်အတွက် Air Impact ဖြစ်စေသည့် အကြောင်းအရင်းများအပေါ် အခြေခံ၍ လျှော့ချမည့်နည်းလမ်းတို့အား ဖော်ပြရန် နှင့် Boiler Stack High တွင် အမှုန်ပုံ့လွှင့်မှု မဖြစ်စေရန် တပ်ဆင်ထားခြင်း ရှိ/မရှိ ဖော်ပြရန်၊ လုပ်ငန်းလည်ပတ်စဉ်ကာလ Washing၊ Printing၊ Boiler Blowdown Water နှင့် ထုတ်လုပ်မှုလုပ်ငန်းစဉ်အဆင့်ဆင့်တို့ကြောင့် Water Impact ဖြစ်စေသည့်အပြင် Significance Score တွက်ချက်မှုအရ (High) ဖြစ်နေသောကြောင့် Water Impact ဖြစ်စေသည့် အကြောင်းအရာများအပေါ် အခြေခံ၍ လျှော့ချမည့်နည်းလမ်းတို့အား ဖော်ပြရန်၊	Impacts during the Operation Phase (စာမျက်နှာ ၁၆၄) နှင့် ဇယား ၆-၁၊ Mitigation Measures for Operation Phase and Decommissioning Phase (စာမျက်နှာ ၁၆၆) တွင် ဖြည့်စွက်ဖော်ပြထားပါသည်။ Boiler Stack High တွင် အမှုန်ပုံ့လွှင့်မှု မဖြစ်စေရန် တပ်ဆင်ထားခြင်းရှိ/မရှိကို Figure 2-12 Boiler Design (စာမျက်နှာ ၂၇) တွင် ဖြည့်စွက်ထားပါသည်။ သုံးသပ်အကြံပြုချက်အတိုင်း Water Impact ဖြစ်စေသည့် အကြောင်းအရင်းများနှင့် ယင်းအပေါ်အခြေခံ၍ လျှော့ချ မည့်နည်းလမ်းများကို ဇယား ၅-၅၊ Evaluation of Impacts during the Operation Phase (စာမျက်နှာ ၁၆၄) နှင့် ဇယား ၆-၁၊ Mitigation Measures for Operation Phase and Decommissioning Phase (စာမျက်နှာ ၁၆၆) တွင် ဖြည့်စွက်ဖော်ပြထားပါသည်။
၆။	**စီမံကိန်းကြောင့် ထိခိုက်ခံစားရသည့် ဒေသခံပြည်သူများအတွက် ဆောင်ရွက်ပေးမည့် ဖွံ့ဖြိုးရေး**	
	ပြင်ဆင်ဖြည့်စွက်ရန် လိုအပ်သည့်အချက်များကို ပြန်လည်ပြင်ဆင်ဖြည့်စွက် ဖော်ပြလာပါသည်။	-
၇။	**အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးခြင်း နှင့် သတင်းအချက်အလက် ထုတ်ဖော်ခြင်း**	
	ပြင်ဆင်ဖြည့်စွက်ရန် လိုအပ်သည့်အချက်များကို ပြန်လည်ပြင်ဆင်ဖြည့်စွက် ဖော်ပြလာပါသည်။	-
၈။	**ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုနှင့် စောင့်ကြပ်ကြည့်ရှုခြင်း အစီအစဉ်**	
	ဇယား ၇-၃၊ Environmental Monitoring Plan တွင် Ambient Air Quality စောင့်ကြည့်မည့်နေရာအား Within the factory premises ဟု ဖော်ပြထားသဖြင့် တိကျသည့် ကိုဩဒိနိတ်အမှတ်များဖြင့် ဖော်ပြရန်၊ ဇယား ၇-၃၊ Environmental Monitoring Plan တွင် Ambient Noise Level စောင့်ကြည့်မည့်နေရာအား Within the factory premises ဟု ဖော်ပြထားသဖြင့် တိကျသည့် ကိုဩဒိနိတ်အမှတ်များဖြင့် ဖော်ပြရန်၊	Ambient Air Quality စောင့်ကြည့်မည့်နေရာအား Within the factory premises ဟု ဖော်ပြထားသည့်အပြင် တိကျသည့် ကိုဩဒိနိတ်အမှတ်ကို ဇယား ၇-၃၊ Environmental Monitoring Plan (စာမျက်နှာ ၁၈၄) တွင် ဖြည့်စွက်တင်ပြထားပါသည်။ Ambient Noise Level စောင့်ကြည့်မည့်နေရာအား Within the factory premises ဟု ဖော်ပြထားသည့်အပြင် တိကျသည့် ကိုဩဒိနိတ်အမှတ်ကို ဇယား ၇-၃၊ Environmental Monitoring Plan (စာမျက်နှာ ၁၈၅) တွင် ဖြည့်စွက်တင်ပြထားပါသည်။

စဉ်	ထပ်မံတင်ပြလာမှုအပေါ် လိုအပ်သည်များအတွက် သုံးသပ်အကြံပြုချက်များ	ပြင်ဆင်ဖြည့်စွက်ဆောင်ရွက်မှုများ
	အစီရင်ခံစာအပိုဒ် ၇-၂၊ Environmental Management Committee တွင်ပါဝင်သည့် အဖွဲ့ဝင်တို့၏တာဝန်ဝတရားတို့ကို ဖော်ပြရန်၊	Environmental Management Committee တွင်ပါဝင်သည့် အဖွဲ့ဝင်တို့၏တာဝန်ဝတရားတို့ကို ဇယား ၇-၁ Environmental Management Committee (စာမျက်နှာ ၁၇၉) တွင် ဖော်ပြထားပါသည်။
	အစီရင်ခံစာအပိုဒ် ၇-၃ တွင် EIA Procedure အပိုဒ် ၁၀၈ အရ စီမံကိန်းအဆိုပြုသူသည် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်၏ ဇယားပါအတိုင်း စောင့်ကြပ်ကြည့်ရှုမှု အစီရင်ခံစာကို ဝန်ကြီးဌာနသို့ ၆ လ တစ်ကြိမ် သို့မဟုတ် ဝန်ကြီးဌာနက သတ်မှတ်သည့်အတိုင်း တင်ပြမည်ဖြစ်ကြောင်း ထည့်သွင်းဖော်ပြထားချက်အရ ဇယား ၇-၃၊ Environmental Monitoring Plan တွင် Ambient Air Quality, Surface Water Quality, Ambient Noise Level တို့ စောင့်ကြည့်မည့် အကြိမ်အရေအတွက်အား ၁ နှစ်လျှင် ၁ ကြိမ်ဟု ဖော်ပြထားခြင်းမှာ သင့်လျော်မှု ရှိ/မရှိ ရှင်းလင်းဖော်ပြရန်၊	ဇယား ၇-၃၊ Environmental Monitoring Plan တွင် Ambient Air Quality, Surface Water Quality, Ambient Noise Level တို့ စောင့်ကြည့်မည့် အကြိမ်အရေအတွက်အား ၁ နှစ်လျှင် ၁ ကြိမ်ဟု ဖော်ပြထားခြင်းမှာ သင့်လျော်မှုရှိ/မရှိဟူသော အကြောင်းပြချက်နှင့် ECD မှလုံလောက်မှုမရှိသည်ဟုယူဆပါက ဝန်ကြီးဌာန၏ ညွှန်ကြားချက်အတိုင်း တင်ပြသွားမည်ဖြစ်ကြောင်းကို 7.5 Environmental Monitoring Plan (EMoP) (စာမျက်နှာ ၁၈၄) တွင် ရှင်းလင်းတင်ပြထားပါသည်။
	ဇယား ၇-၄၊ ပတ်ဝန်းကျင်ဆိုင်ရာစောင့်ကြပ် ကြည့်ရှုခြင်းအတွက် လျာထားရန်ပုံငွေသည် ပြည့်စုံ လုံလောက်မှုမရှိပါက ထပ်မံဖြည့်စွက်သွားမည် ဖြစ်ကြောင်း ဖော်ပြရန်၊	ဇယား ၇-၄၊ ပတ်ဝန်းကျင်ဆိုင်ရာ စောင့်ကြပ်ကြည့်ရှုခြင်းအတွက် လျာထားရန်ပုံငွေသည် ပြည့်စုံလုံလောက်မှု မရှိပါက စီမံကိန်းအဆိုပြုသူမှ ဝန်ကြီးဌာန၏ ညွှန်ကြားချက်အတိုင်း ထပ်မံဖြည့်စွက်သွားမည်ဖြစ်ကြောင်းကို ယင်းဇယား၏ အောက် (စာမျက်နှာ ၁၈၈) တွင် ဖော်ပြထားပါသည်။
	လုပ်ငန်းလည်ပတ်ခြင်းနှင့် ပိတ်သိမ်းခြင်းအဆင့်အလိုက် လုပ်ငန်းဆောင်ရွက်မှုကြောင့် ဖြစ်ပေါ်လာမည့် ပတ်ဝန်းကျင်ဆိုင်ရာကိစရပ်များအပေါ် စီမံခန့်ခွဲမည့်အစီအစဉ်များနှင့်စပ်လျဉ်း၍ စီမံခန့်ခွဲဆောင်ရွက်ရသည့် ရည်ရွယ်ချက်၊ အစီအစဉ်များ၊ ဆောင်ရွက်ရမည့် ပုဂ္ဂိုလ် (သို့) အဖွဲ့အစည်း၊ ရန်ပုံငွေလျာထားချက်တို့ကို ဖော်ပြရန်၊	လုပ်ငန်းလည်ပတ်ခြင်းနှင့် ပိတ်သိမ်းခြင်းအဆင့်အလိုက် လုပ်ငန်းဆောင်ရွက်မှုကြောင့် ဖြစ်ပေါ်လာမည့် ပတ်ဝန်းကျင်ဆိုင်ရာကိစရပ်များအပေါ် စီမံခန့်ခွဲမည့် အစီအစဉ်များနှင့်စပ်လျဉ်း၍ စီမံခန့်ခွဲဆောင်ရွက်ရသည့် ရည်ရွယ်ချက်၊ အစီအစဉ်များ၊ ဆောင်ရွက်ရမည့်ပုဂ္ဂိုလ် (သို့) အဖွဲ့အစည်း၊ ရန်ပုံငွေလျာထားချက်တို့ကို အခန်း (၇) Monitoring Program ၏အောက် (စာမျက်နှာ ၁၇၇ မှစ၍) တွင် ဖော်ပြထားပါသည်။

စဉ်	ထပ်မံတင်ပြလာမှုအပေါ် လိုအပ်သည်များအတွက် သုံးသပ်အကြံပြုချက်များ	ပြင်ဆင်ဖြည့်စွက်ဆောင်ရွက်မှုများ
၉။	**List of Commitment**	
	ယခင်သဘောထားမှတ်ချက်တွင် တောင်းခံခဲ့ခြင်း မရှိသော်လည်း အစီရင်ခံစာအား အတည်ပြုရာ တွင် လိုအပ်သောအချက်ဖြစ်ပါသဖြင့် စီမံကိန်း အဆိုပြုသူမှ အစီရင်ခံစာပါ အခန်းတစ်ခန်းချင်းမှ ဆောင်ရွက်မည့်အချက်များနှင့်စပ်လျဉ်း၍ ကတိ ကဝတ်ပြုချက်များကို ဇယားဖြင့် ဖော်ပြရန်၊	စီမံကိန်းအဆိုပြုသူမှ အစီရင်ခံစာပါ အခန်းတစ်ခန်းချင်း မှဆောင်ရွက်မည့်အချက်များနှင့်စပ်လျဉ်း၍ ကတိကဝတ် ပြုချက်များကို 3.10 Key Commitment of Proponent for Environmentak Management (စာမျက်နှာ ၁၀၇) အောက်တွင် ဇယားဖြင့် ဖော်ပြထားပါသည်။
၁၀။	**အထွေထွေ**	
	▪ စီမံကိန်းအဆိုပြုသူမှ ပတ်ဝန်းကျင်ထိန်းသိမ်း ရေးဦးစီးဌာန၏ သုံးသပ်အကြံပြုချက်များအား ပြန်လည်ရေးဆွဲတင်ပြရာတွင် ပြင်ဆင်ဖြည့် စွက်ရန် လိုအပ်သည့်အချက်များကို အစီရင်ခံ စာ၏ သက်ဆိုင်ရာအခန်းခေါင်းစဉ်အောက် တွင် ကျိုးကြောင်းရှင်းလင်းချက်ဖြင့် ဖော်ပြ၍ အဆိုပါရှင်းလင်းချက်များအား အစီရင်ခံစာ၏ မည်သည့်အခန်းတွင် ပြင်ဆင်ဖြည့်စွက် ဖော်ပြ ထားကြောင်းကို Comment Response Table ဖြင့် ဖော်ပြရန်နှင့် အစီရင်ခံစာ၏ Soft Copy ပူးတွဲတင်ပြရန်၊	▪ ညွှန်ကြားချက်အတိုင်း ပြင်ဆင်ဖြည့်စွက် ဖော်ပြထား ပါသည်။
	▪ စာမျက်နှာ ၁၁၀ တွင် Ambient and Indoor Air Baseline Data အား ၁၅-၁၁-၂၀၁၈ ဟု ဖော်ပြထားသော်လည်း စာမျက်နှာ ၁၁၅ တွင် Indoor Air Baseline Data အား ၈-၁၁-၂၀၁၈ တွင် ကောက်ယူခဲ့ကြောင်း ဖော်ပြထားခြင်းကို ပြန်လည်ဆန်းစစ်ရန်၊	▪ Ambient air quality ကို ၁၅-၁၁-၂၀၁၈ တွင်လည်း ကောင်း၊ Indoor air quality အား ၈-၁၁-၂၀၁၈ တွင် လည်းကောင်း ကောက်ယူခဲ့ကြောင်းကို 4.4 Primary Data for the Surrounding Environment အောက်ရှိ စာပိုဒ် (စာမျက်နှာ ၁၁၆) တွင် ပြန်လည် ပြင်ဆင်ဖော်ပြထားပါသည်။
	▪ လုပ်ငန်းမှအသုံးပြုသည့် အရန်မီးစက် ၅ လုံး (340 kVA 1 set and 1063 kVA 4 set) နှင့် ဇယား ၂-၉၊ List of Machinery and Equipment အမှတ်စဉ် ၇၂၊ Generator 400 kVA 1 set၊ အမှတ်စဉ် ၇၃၊ Generator 1250	▪ ညွှန်ကြားချက်အတိုင်း အရန်မီးစက်များ အရေ အတွက်ကို ပြန်လည်ဆန်းစစ်၍ ဇယား ၂-၁၀၊ List of Machinery and Equipment အမှတ်စဉ် ၇၁ နှင့် ၇၂ (စာမျက်နှာ ၄၀) နှင့် လုပ်ငန်းမှ အသုံးပြုသည့်

စဉ်	ထပ်မံတင်ပြလာမှုအပေါ် လိုအပ်သည်များအတွက် သုံးသပ်အကြံပြုချက်များ	ပြင်ဆင်ဖြည့်စွက်ဆောင်ရွက်မှုများ
	kVA 1 set၊ အမှတ်စဉ် ၇၄၊ Generator 1675 kVA 2 set၊ အမှတ်စဉ် ၇၅၊ Generator 2250 kVA 1 set ဟု ဖော်ပြထားသဖြင့် ကွဲလွဲနေခြင်းကို ပြန်လည်ဆန်းစစ်ရန်၊	အရန်မီးစက် ၅ လုံး (စာမျက်နှာ ၂၆) တို့တွင် ကိုက်ညီမှုရှိအောင် ပြင်ဆင်ဖော်ပြထားပါသည်။
	▪ လုပ်ငန်းစဉ်မှ Biomass Boiler (6T/Hr 2 set) အသုံးပြုကြောင်း ဖော်ပြထားသော်လည်း ဇယား ၂-၉၊ List of Machinery and Equipment အမှတ်စဉ် ၇၆၊ Biomass Boiler (8T/Hr 1 set)၊ အမှတ်စဉ် ၇၈၊ Biomass Boiler (2T/Hr 1 set)၊ အမှတ်စဉ် ၇၉၊ Diesel Boiler (4T/Hr 2 set) ဟု ဖော်ပြထားသောကြောင့် ကွဲလွဲနေခြင်းကို ပြန်လည်ဆန်းစစ်ရန်၊	▪ ညွှန်ကြားချက်အတိုင်း Boiler အရေအတွက်နှင့် အမျိုးအစားကို ပြန်လည်ဆန်းစစ်၍ ဇယား ၂-၁၀၊ List of Machinery and Equipment အမှတ်စဉ် ၇၃ (စာမျက်နှာ ၄၀) နှင့် လုပ်ငန်းမှအသုံးပြုသည့် Biomass Boiler (စာမျက်နှာ ၂၇) တို့တွင် ကိုက်ညီမှုရှိအောင် ပြင်ဆင်ဖော်ပြထားပါသည်။

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DOCUMENT CERTIFICATION AND DECLARATION

Green Myanmar Environmental Services Company Limited has prepared this Environmental Management Plan (EMP) report for Manufacturing of Garments (on CMP Basis) project.

I, the undersigned, (---------- of KARISMA Apparel (Myanmar) Company Limited) as proponent of this project, certify that the particulars in this report are correct, true to the best of my knowledge and do hereby solemnly affirm to:

- Ensure the legal and other obligations are incorporated in designs, procedures and project controls,
- Communicate legal and other requirements to personnel and contractors accountable for compliance,
- Ensure all relevant legal and other requirements and associated documentation (e.g., licenses, permits, approval applications) are readily available on site to company personnel and consultants,
- Comply with all Myanmar laws, rules and regulations, including Clauses 14 and 15 of the Environmental Conservation Law (2012),
- Conduct a compliance audit at least annually and ensure there is a process in place to monitor on-going compliance with all legal and other requirements,
- Follow according to the Environmental Mangement Plan (EMP) and Environmental Monitoring Plan (EMoP),
- Submit the monitoring report prescribed in the schedule of the Environmental Management Plan to the Ministry every (6) month,
- Follow company's OHS policies,
- Implement CSR,
- Commit to minimize the impact of its activities on the environment during operation phase and decommissioning phase,
- Commit that the project will always comply fully with the commitments, mitigation measures, and plans in the EMP.

Signature : ----------

Name : ----------

Designation : ----------

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Date: ----------

COMMITMENT AND ACKNOWLEDGEMENT

An Environmental Management Plan (EMP) describes the environmental condition of a project, including potential impact, formulation of mitigation measures, and preparation of institutional requirements and environmental monitoring. This EMP report was prepared using information from the following sources:

- Review of selected literature, reports, and advisors;
- Meetings with several interested parties;
- The experience of the Environmental Team: and
- Other information solicited from baseline data and stakeholders.

We strongly commit

- the accuracy and completeness of the EMP; and
- that the EMP has been prepared in strict compliance with the applicable laws including this Procedure.

The EMP team is grateful to the project proponent -***KARISMA Apparel (Myanmar) Co., Ltd.***- for commissioning us to conduct this Environmental Management Plan (EMP) Report in respect of the proposed project. We would like to further acknowledge with great appreciation all those neighbors who participated in the public disclosure process for their cooperation throughout the exercise.

We further acknowledge the support, either direct or indirect, from the various parties who assisted the EMP team towards the successful completion of this report.

Signature : ----------

Name : U Kyaw Soe Win ----------

Designation : Managing Director ----------

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ABBREVIATION

ASP	Air Sampling Point
BATs	Best Available Technologies
BOD_5	5-day Biochemical Oxygen Demand
CAD/CAM	Computer-Aided Design/ Computer-Aided Manufacturing
CCTV	Closed-circuit Television
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMP	Cutting, Making and Packing
CMP	Current Market Price
CMP	Central Myanmar Belt
CNC	Computer Numerical Control
COD	Chemical Oxygen Demand
CO_2e	Carbon Dioxide Equivalent
DO	Dissolved Oxygen
Dozs	Dozens (A grouping of twelve)
ECC	Environment Compliance Certificate
ECD	Environmental Conservation Department
EHP	Eastern Highlands Province
EMC	Environmental Management Committee
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
EPAS	Environmental Perimeter Air Station
ESP	Electric Submersible Ppump
GMES	Green Myanmar Environmental Services Co., Ltd.
GRM	Grievance Redress Mechanism
In	inch/inches
IS	Indian Specification
KARISMA	KARISMA Apparel (Myanmar) Company Limited
Kgs	Kilograms
LCMP	Low Carbon Manufacturing Programme
LED	Light-emitting Diode
LEV	Local Exhaust Ventilation
m	meter
MIC	Myanmar Investment Commission
MMK	Myanmar Kyats
MONREC	Ministry of Natural Resource and Environmental Conservation
MPN	Most Probable Number

ND	Not Detected
NEQGs	National Environmental Quality (Emission) Guidelines
NG	No Guidelines
OHS	Occupational Health and Safety
OT	Overtime
OTB	Open-to-Buy
PM_{10}	Particulate Matter 10 micrometer or less in diameter
$PM_{2.5}$	Particulate Matter 2.5 micrometer or less in diameter
PE	Polyethylene or Polythene
PP	Polypropylene
PPE	Personal Protective Equipment
PRP	Prime Running Power
PVC	Polyvinyl chloride
RFID	Radio Frequency Identification
QC	Quality Check
RMG	Ready Made Garment
RO	Reverse Osmosis
SSP	Soil Sampling Point
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
UNFCC	United Nations Framework Convention on Climate Change
USA	United States of America
USD	United States Dollar
UV	Ultraviolet
VOCs	Volatile Organic Compounds
WHO	World Health Organization
WR	Western Ranges
WSP	Water Sampling Point
WWTP	Wastewater Treatment Plant

အကျဉ်းချုပ်အစီရင်ခံစာ

ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (Environmental Management Plan - EMP) သည် စီမံကိန်း၏ ဒီဇိုင်း၊လုပ်ငန်းအပ်နှံခြင်းမှစပြီး စီမံကိန်း၏ဆောက်လုပ်ရေးအဆင့်၊ လုပ်ငန်းလည်ပတ်ခြင်းအဆင့်နှင့် လုပ်ငန်း ဖျက်သိမ်းခြင်းအဆင့် သုံးဆင့်အတွင်း အလုံးစုံသောလုပ်ငန်းစဉ်များကို ခြုံငုံသုံးသပ်ထားပါသည်။ စီမံကိန်း၏ အဆင့်တစ်ဆင့်ချင်းအလိုက် ဖြစ်ပေါ်လာနိုင်သည့် အဓိကပတ်ဝန်းကျင်ဆိုင်ရာကိစရပ်များကို စီမံဆောင်ရွက် ရန်ထိရောက်သောနည်းစဉ်များကို လမ်းညွှန်ချက်များနှင့်အညီ အစီအစဉ်ထားရှိပါသည်။ ပတ်ဝန်းကျင်စီမံခန့် ခွဲမှုအစီအစဉ်အစီရင်ခံစာတွင် စီမံကိန်း၏သိသာထင်ရှားသော ဆိုးကျိုးသက်ရောက်မှုများကို လျှော့ချရန်၊ ဖယ် ရှားရန် သတ်မှတ်ထားသော လျှော့ချရေးနည်းလမ်းများကို ဖော်ပြထားပါသည်။ ၄င်းသည် စီမံကိန်းတိုင်း၏ လုပ်ငန်းစဉ်များအတွက် လိုအပ်သည့် တရားဝင်လိုအပ်ချက်များ၊ ခွင့်ပြုမိန့်များနှင့် လိုင်စင်များကိုပါ သတ်မှတ် ဖော်ပြထားပါသည်။

ကာရစ် (စ်) မအ့ဲပရဲ (လ်) (မြန်မာ) ကုမ္ပဏီလီမိတက်၏စက်ရုံသည် လက်ခစားစနစ်ကိုအခြေခံ၍ ချည်သား၊ ဆွဲသား၊ ဆွယ်တာများချုပ်လုပ်သည့် စီမံကိန်းဖြစ်ပြီး မြန်မာနိုင်ငံ၊ ပဲခူးတိုင်းဒေသကြီး၊ ပဲခူးမြို့နယ်၊ ညောင်အင်းကျေးရွာ၊ ပြည်ပစက်မှုဇုန်နယ်မြေ၊ မြေကွက်အမှတ် (၁၈၊၁၉၊၂၀) တွင် တည်ရှိပါသည်။

ကာရစ် (စ်) မအ့ဲပရဲ (လ်) (မြန်မာ) ကုမ္ပဏီလီမိတက်သည် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်ကို ရေး သားရန် စိမ်းလန်းမြန်မာပတ်ဝန်းကျင်ဆိုင်ရာ ဝန်ဆောင်မှုလုပ်ငန်းကုမဏီလီမိတက် (GMES) ကို ငှားရမ်းခဲ့ပါ သည်။ ယခုစီမံကိန်းသည် နိုင်ငံခြားသို့တင်ပို့မည့် ဆေးဆိုး၊ပန်းထိုးထားသော သိုးမွေး၊ ရက်ထည်နှင့် ဆွယ်တာ ကဲ့သို့ အထည်အမျိုးမျိုးကိုထုတ်လုပ်ခြင်းအတွက် ပြင်ဆင်ထားခြင်းဖြစ်ပါသည်။

ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (EMP) ၏ အခြေခံရည်ရွယ်ချက်များမှာ

- ဆိုးကျိုးသက်ရောက်နိုင်သောသက်ရောက်မှုများ၏ လျှော့ချရေးနည်းလမ်းများကို ရရှိစေသည့် လုပ်ငန်းစဉ်များကိုဖော်ပြရန်၊
- စီမံကိန်း၏လုပ်ငန်းဆောင်တာများနှင့်ရည်ရွယ်ချက်များကို ပြီးမြောက်စေရန်၊
- ထိုရည်ရွယ်ချက်များနှင့်ချိန်ရွယ်မှုများသည် လိုအပ်သော အရေးယူဆောင်ရွက်မှု အစီအစဉ်၏စီမံ ခန့်ခွဲမှုနှင့် အကောင်အထည်ဖော်ခြင်းတို့ကို စောင့်ကြပ်ကြည့်ရှုနိုင်ကြောင်း သေချာစေရန်၊
- စီမံကိန်းကာလတစ်လျှောက်လုံးတွင် အလုပ်သမားများနှင့်အနီးအနားရှိအဖွဲ့အစည်းများ၏ ကျန်း မာရေးနှင့်ဘေးကင်းလုံခြုံမှုများအတွက် အရေးယူဆောင်ရွက်မှုအစီအစဉ်တွင် မတော်တဆမှုများ ကြိုတင်ကာကွယ်ရေးနှင့် စီမံခန့်ခွဲခြင်းတို့ ပါဝင်မှုရှိကြောင်း သေချာစေရန် တို့ဖြစ်ပါသည်။

စီမံကိန်း၏ထင်ရှားသောအချက်အလက်များ

ဝိသေသလက္ခဏာများ	ဖော်ပြချက်
စီမံကိန်းအမည်	လက်ခစားစနစ်ဖြင့် အထည်ထုတ်လုပ်ခြင်း
စီမံကိန်းအဆိုပြုသူ	ကာရစ် (စ်)မ အ့ဲပရဲ(လ်) (မြန်မာ) ကုမ္ပဏီလီမိတက်
ကုမ္ပဏီမှတ်ပုံတင်အမှတ်	၁၁၄၅၁၅၃၃၀
စီမံကိန်းတည်နေရာ	မြေကွက်အမှတ် (၁၈၊၁၉၊၂၀)၊ ပြည်ပစက်မှုဇုန်နယ်မြေ၊ ညောင်အင်းကျေးရွာ၊ ပဲခူးမြို့နယ်၊ ပဲခူးတိုင်းဒေသကြီး။

ဝိသေသလက္ခဏာများ	ဖော်ပြချက်	
ပထဝီသတင်းအချက်အလက်	အရှေ့လောင်ဂျီတွဒ်: ၉ဖ ဒီဂရီ ၂၇ မိနစ် ၃၀.၃၇ စက္ကန့် မြောက်လတ္တီတွဒ်: ၁၇ ဒီဂရီ ၁၅ မိနစ် ၁၉.၃၆ စက္ကန့်	
မြေအမျိုးအစား	စက်မှုဇုန်မြေယာ	
စီမံကိန်းမြေဧရိယာ	၁၅ ဧက (၆၀,၇၀၃ စတုရန်းမီတာ)	
မြေရရှိမှု	အငှားမြေ	
မြေပိုင်ရှင်	ပဲခူးတိုင်းဒေသကြီးအစိုးရ	
ကနဦးမြေအသုံးပြုမှုကာလ **(မြေသက်တမ်း တရားဝင်မှု)**	နှစ် ၅၀ နှင့် ထပ်တိုးနှစ် ၁၀ နှစ် (၂ ကြိမ်)	
ရင်းနှီးမြှုပ်နှံမှုအမျိုးအစား	၁၀၀ ရာခိုင်နှုန်းနိုင်ငံခြားရင်းနှီးမြှုပ်နှံမှု	
စုစုပေါင်းရင်းနှီးမြှုပ်နှံမှုပမာဏ	အေမရိကန်ဒေါ်လာ သန်း (၂၀)	
စီးပွားရေးလုပ်ငန်းအမျိုးအစား	လက်ခစားစနစ်ဖြင့် အထည်ထုတ်လုပ်ခြင်း	
ဆက်သွယ်ရန်ပုဂ္ဂိုလ် **ရာထူး** **ဖုန်း** **အီးမေးလ်**	Mr. Kinson Lau အထွေထွေမန်နေဂျာ ၀၉ ၉၆၅၈၇၇၆၀၈ kinson.lau@karisma-myanmar.com	
စတင်တည်ထောင်သည့်အချိန်	ဧပြီလ ၂ ရက်၊ ၂၀၁၄	
စမ်းသပ်လည်ပတ်သည့်နေ့စွဲ	ဧပြီလ ၂၄ ရက်၊ ၂၀၁၇	
စီးပွားဖြစ်လည်ပတ်သည့်နေ့စွဲ	ဧပြီလ ၃ ရက်၊ ၂၀၁၈	
ဘေးပတ်ဝန်းကျင်အနေအထား	အရှေ့ဘက် စက်မှုမြေကွက် အနောက်ဘက် စက်မှုမြေကွက် လက်ဝဲဘက် ဂရိတ်မန်း အထည်စက်ရုံ လက်ယာဘက် စက်ရုံအသစ် (ဆောက်လုပ်ဆဲ)	
အနီးဆုံးလူနေဧရိယာ	ညောင်အင်းကျေးရွာ	
အနီးဆုံးလူရေအရင်းအမြစ်	ပဲခူးမြစ် (၃.၁ ကီလိုမီတာခန့်)	
မြေမျက်နှာပြင်သွင်ပြင်	အနိမ့်အမြင့်များသည့် ဧရိယာ	
ကုန်ကြမ်းပစ္စည်းများ	• Knitted Shell အထည်စ • သိုးမွေးအထည်စ • ယက်ထည်စ (Woven) • Spun Polyester ချည် • ဝါချည် • နိုင်လွန်ချည် • အဓိကလေဘယ် • Care လေဘယ် • အမျိုးအစားလေဘယ် • စတိုင်လေဘယ် • Shoulder Tape • Interlining • တံဆိပ်ကတ်၊ စျေးနှုန်းကတ်	• ကပ်ခွာများ • ဇစ် • Metal Snaps • သားရေကြိုး • Woven Tape • Drawstring • PE Polybags • PP Polybags • ကတ်ထူပုံး • ကတ်ထူပုံးကပ်ခွာ • ချိတ် • အဝတ်လျှော်အေးဂျင့် • အဝတ်လျှော်ဆပ်ပြာ

ဝိသေသလက္ခဏာများ	ဖော်ပြချက်
	• ကြယ်သီး
ထုတ်ကုန်များ	(၁) သိုးမွေးလည်ဝိုင်းတီရှပ် (၂) သိုးမွေးအနွေးထည် (၃) သိုးမွေးဘောင်းဘီ (၄) သိုးမွေးဝတ်စုံ
ရေအရင်းအမြစ်များ	စုစုပေါင်း အဝီစိတွင်း (၃) တွင်း အချင်း ၆ လက်မ အဝီစိတွင်း (၂) တွင်း နှင့် အချင်း ၈ လက်မ အဝီစိတွင်း (၁) တွင်း
စုစုပေါင်းရေသုံးစွဲမှု	တစ်နှစ်လျှင် ၉၆,၆၉၃.၁၅ ကုဗမီတာ (၂၅,၅၄၃,၆၂၇.၈၈ ဂါလန်)
လျှပ်စစ်ဓာတ်အားအရင်းအမြစ်	သဘာဝဓာတ်အားလိုင်းမှ ထရန်စဖော်မာ (၆) ခု (၃၀၀၀ kVA (၁) လုံး၊ ၁၀၀၀ kVA (၄) လုံး ၊ ၁၀၀ kVA (၁) လုံး)
မီးစက်	ဂျင်နရေတာ (၅) ခု (၃၄၀ kVA ဂျင်နရေတာ (၁) လုံး နှင့် ၁,၀၆၃ kVA ဂျင်နရေတာ (၄) လုံး)
နှစ်စဉ်ဒီဇယ်ဆွဲသုံးစွဲမှု	၁၅,၀၀၀ လီတာခန့်
အလုပ်သမားဦးရေ	၅,၁၅၀ ဦး ပြည်တွင်း ၅,၀၀၀ ဦး (၉၇.၀၉ ရာခိုင်နှုန်း) ပြည်ပ ပညာရှင် ၁၅၀ ဦး (၂.၉၁ ရာခိုင်နှုန်း)
လုပ်ငန်းလည်ပတ်ချိန်	**တနလၤာမှသောကြာ** မနက် ၇ နာရီခွဲ မှ ညနေ ၄:၄၅ နာရီ **စနေ** မနက် ၇ နာရီခွဲ မှ နေ့လည် ၁၁ နာရီခွဲ
တစ်နှစ်စက်လည်ပတ်ရက်	ရက် (၃၀၀)ခန့် (အများပြည်သူရုံးပိတ်ရက်နှင့် အစိုးရရုံးပိတ်ရက်များတွင် စက်ရုံ ပိတ်ပါသည်။)

စီမံကိန်းလည်ပတ်စဉ်တွေ့ရှိရသော ညစ်ညမ်းမှုအမျိုးအစားများ

အရည် လုပ်ငန်းခွင်တွင် အရည်၏အဓိကအရင်းအမြစ်သည် အဝတ်လျှော်ခြင်း၊ ဆေးဆိုးပန်းရိုက်ခြင်း၊ ပန်းထိုးခြင်းလုပ်ငန်းမှထွက်ရှိသောရေဆိုးများနှင့် ဆေးကြောခြင်းမှ ရေဆိုး တို့ဖြစ်သည်။

လေ ဆေးဆိုးပန်း ရိုက်ခြင်းနှင့် မြောင်းမှအနံ့များ၊ အစများနှင့် အထည်များ၊ ဘွိုင်လာနှင့် လုပ်ငန်းခွင်အတွင်း ယာဉ်များသွားလာခြင်းတို့မှထွက်လာသော ဖုန်များနှင့်အမှုန်များသည် လုပ်ငန်းခွင်ဧရိယာတွင် ကြီးမားသော သက်ရောက်မှုဖြစ်စေသည်။

အစိုင်အခဲ လုပ်ငန်းလည်ပတ်ခြင်းမှ ဘေးထွက်အဖြစ်ထွက်လာသော အထည်စများ၊ အလုပ်သမားများ၊ ရုံးနှင့်လုံခြုံရေးခန်းမှစွန့်ပစ်သော အစိုင်အခဲစွန့်ပစ်ပစ္စည်းများ ဖြစ်သည်။

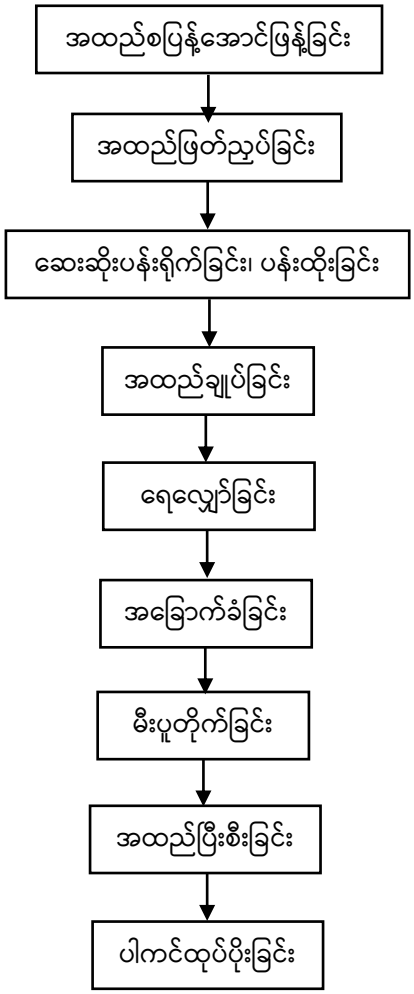
ဆူညံသံ ဆူညံသံ၏အဓိကအရင်းအမြစ်များမှာ

- ဘွိုင်လာနှင့်မီးစက်လည်ပတ်ခြင်း
- ယာဉ်များ၊ စက်များနှင့် ယန္တရားများ

- ကုန်ကြမ်းနှင့်ကုန်ချောများ သယ်ယူခြင်း တို့မှ ထွက်ပါသည်။

စီမံကိန်း၏ ထုတ်လုပ်မှုနည်းစဉ်

စက်ရုံ၏ထုတ်လုပ်မှုနည်းစဉ်သည် ရိုးရှင်းပါသည်။ နည်းစဉ်မှာ အထည်အလိပ်အဖြစ်မှ ကုန်ချောဖြစ်ပေါ်သည်အထိ ဖြစ်ပါသည်။



စီမံကိန်းလုပ်ငန်းလည်ပတ်နေစဉ်အတွင်း ဖြစ်ပေါ်သည့် အဓိကပတ်ဝန်းကျင်ဆိုင်ရာထိခိုက်မှုများမှာ အောက်ပါအတိုင်းဖြစ်ပါသည်။

- လေထုထိခိုက်မှု
- ရေဆိုးထွက်ရှိခြင်း
- ဆူညံသံထွက်ရှိခြင်း
- အစိုင်အခဲစွန့်ပစ်ပစ္စည်းများထွက်ပေါ်ခြင်း
- စွမ်းအင်အသုံးပြုခြင်း
- ရေအသုံးပြုခြင်း
- အန္တရာယ်ရှိသော ဓာတုပစ္စည်းများအသုံးပြုခြင်း

ပဲခူးမြို့နယ်၏ဒေသဆိုင်ရာအချက်အလက်များ

အထည်ချုပ်စက်ရုံသည် ပဲခူးတိုင်းဒေသကြီး၊ပဲခူးမြို့နယ်၊ပြည်ပစက်မှုဇုန်နယ်မြေတွင်တည်ရှိပါသည်။ ပဲခူးမြို့နယ်သည် ပဲခူးတိုင်းဒေသကြီး၏မြို့တော်ဖြစ်ပြီး ပင်လယ်ရေမျက်နှာပြင်အထက်အမြင့်ပေ (၃၁) ပေ တွင်တည်ရှိ၍တောတောင်ထူထပ်သောမြေမျက်နှာသွင်ပြင်ရှိပါသည်။ ပူအိုက်စိုစွတ်သောရာသီဥတုရှိပြီးအမြင့်ဆုံး အပူချိန်မှာ (၃၉.၈) ဒီဂရီစင်တီဂရိတ်နှင့် အနိမ့်ဆုံးအပူချိန်မှာ (၁၆.၄) ဒီဂရီစင်တီဂရိတ်ဖြစ်ပါသည်။

ပဲခူးမြို့နယ်၏အုပ်ချုပ်ရေးနယ်မြေဖွဲ့စည်းမှုကို ပဲခူး၊ဘုရားကြီးနှင့်အင်းတကော်ဟူ၍ အပိုင်း (၃) ပိုင်း ပိုင်းခြားထားပြီး မြို့ (၃) မြို့၊ ရပ်ကွက် (၄၀) ခု၊ ကျေးရွာအုပ်စု (၆၅) စုနှင့် ကျေးရွာပေါင်း (၂၁၁) ရွာဖြင့် ဖွဲ့စည်းထားပါသည်။ မြို့နယ်တွင်းအိမ်ထောင်စုပေါင်း (၁၁၅,၄၄၀) နေထိုင်ကြပြီး စုစုပေါင်းလူဦးရေမှာ ၄၃၄,၈၂၂ ဦး ဖြစ်ပါသည်။

ပဲခူးမြို့နယ်သည် မြောက်လတ္တီတွဒ် ၁၇ ဒီဂရီ ၁၄ မိနစ်မှ ၅၀ မိနစ်အကြား၊ အရှေ့လောင်ဂျီတွဒ် ၉၆ ဒီဂရီ ၂၄ မိနစ်မှ ၄၁ မိနစ်အကြား တည်ရှိပြီး ဧရိယာအကျယ်အဝန်းမှာ ၇၁၇,၈၆၁ ဧက (၁,၁၂၁.၆၆ စတုရန်းမိုင်) ကျယ်ဝန်းပါသည်။ ဧရိယာအကျယ်အဝန်းအားဖြင့် အရှေ့မှအနောက်သို့ (၂၁) မိုင်၊ တောင်မှမြောက်သို့ (၄၃) မိုင်ကျယ်ဝန်းပါသည်။ ပဲခူးမြို့နယ်သည်

- အရှေ့ဘက်တွင် ပဲခူးတိုင်းဒေသကြီး၊ ဝေါမြို့နယ်နှင့် သနပ်ပင်မြို့နယ်၊
- အနောက်ဘက်တွင် ရန်ကုန်တိုင်းဒေသကြီး၊ လှည်းကူးမြို့နယ်နှင့်တိုက်ကြီးမြို့နယ်၊ ပဲခူးတိုင်းဒေသကြီး၊ သာယာဝတီမြို့နယ်၊
- တောင်ဘက်တွင် ပဲခူးတိုင်းဒေသကြီး၊ ကဝမြို့နယ်နှင့်
- မြောက်ဘက်တွင် ပဲခူးတိုင်းဒေသကြီး၊ ဒိုက်ဦးမြို့နယ်နှင့် လက်ပံတန်းမြို့နယ်တို့အကြားတွင် တည်ရှိပါသည်။

ပဲခူးမြစ်သည် ပဲခူးမြို့နယ်အတွင်းအဓိကစီးဆင်းလျက်ရှိသောမြစ်ဖြစ်ပြီး ၎င်းသည် ပဲခူးရိုးမပေါ်ရှိ ဆင်နှာမောင်းတောင်တွင်မြစ်ဖျားခံ၍ တောင်ဘက်ရှိရန်ကုန်မြစ်အတွင်းသို့ စီးဆင်းပါသည်။ ထို့ပြင် မြောက်ဘက် ပဲခူးရိုးမတွင်မြစ်ဖျားခံသော ကိုလူကွဲချောင်း၊ အောင်မြချောင်း၊ ရွှေလောင်းချောင်း၊ စလူချောင်း၊ လက်ပံချောင်းတို့သည် ပဲခူးမြစ်သို့ စီးဆင်းပေါင်းဆုံကြပါသည်။

အခြေခံပညာသင်ကျောင်းမှာ (၃၂) ကျောင်း၊ အလယ်တန်းကျောင်း (၇၂) ကျောင်း၊ မူလတန်းကျောင်း (၅) ကျောင်း၊ မူလွန်ကျောင်း (၁၂၁) ကျောင်း၊ မူလတန်းကြိုကျောင်း (၁၆) ကျောင်း နှင့် ဘုန်းတော်ကြီးသင်ပညာရေးကျောင်း (၂၇) ကျောင်း ရှိပါသည်။ ထို့အပြင် ပဲခူးမြို့နယ် ဥဿာရပ်ကွက် (၈) တွင် တက္ကသိုလ်တစ်ခုရှိပါသည်။

ပတ်ဝန်းကျင်အရည်အသွေးတိုင်းတာမှု (အသေးစိတ်ကို အခန်း ၄ တွင် ဖတ်ရှုနိုင်သည်)

လေအရည်အသွေး

၂၀၁၈ ခုနှစ် နိုဝင်ဘာလ (၁၅) ရက်နေ့တွင် စီမံကိန်းဧရိယာအတွင်း လေအရည်အသွေးကို (၂၄) နာရီ ပတ်လုံးတိုင်းတာခဲ့ပါသည်။ တိုင်းတာရရှိထားသောရလဒ်တန်ဖိုးများကို စစ်ဆေးပြီး **ဇယား (၄-၉)** နှင့် **ဇယား (၄-၁၁)** တို့တွင်ဖော်ပြထားပါသည်။

ပတ်ဝန်းကျင်လေအရည်အသွေးနှင့် စက်ရုံအတွင်းလုပ်ငန်းခွင်လေအရည်အသွေးတိုင်းတာသည့်နေရာများအဖြစ် စုစုပေါင်း (၁၆) နေရာ ရွေးချယ်ပါသည်။ ဘွိုင်လာခန်းနှင့် ဂျန်နရေတာနှစ်ခုတို့၏မီးခိုးခေါင်းတိုင်များမှ တိုင်းတာရရှိသော ဓာတ်ငွေ့ထုတ်လုပ်မှုရလဒ်တန်ဖိုးများကို **ဇယား (၄-၁၃)၊ ဇယား (၄-၁၅)** နှင့် **ဇယား (၄-၁၆)** တို့တွင် ဖော်ပြထားပါသည်။

ရလဒ်များအရ ပတ်ဝန်းကျင်လေအရည်အသွေးရလဒ်မှာ အမှုန် ($PM_{2.5}$ and PM_{10}) ပျမ်းမျှရလဒ်များသည် သတ်မှတ်ထားသောလမ်းညွှန်ချက်များထက်များနေပြီး အခြားရလဒ်များမှာ သတ်မှတ်ချက်အတွင်း ရှိပါသည်။

လုပ်ငန်းခွင်လေအရည်အသွေးရလဒ်များအရ အချို့သောတိုင်းတာသည့်နေရာများ (ပိတ်စဖြတ်သည့်အခန်း-၁၊ ဆေးဆိုးပန်းရိုက်အခန်း၊ ရောသည့်အခန်း၊ ထုပ်ပိုးသည့်အခန်းနှင့် ဘွိုင်လာအခန်း) တွင် အမှုန် ($PM_{2.5}$ and PM_{10}) တန်ဖိုးများသည် သတ်မှတ်ထားသောလမ်းညွှန်ချက်များထက် များနေသည်ကို တွေ့ရပါ သည်။

ဘွိုင်လာခန်းနှင့်ဂျန်နရေတာ ၂ ခုတို့၏မီးခိုးခေါင်းတိုင်မှ တိုင်းတာရရှိသော ဓာတ်ငွေ့ထုတ်လုပ်မှုရလဒ်တန်ဖိုးများသည် သတ်မှတ်ထားသော လမ်းညွှန်ချက်များအတွင်း ရှိနေပါသည်။

ဆူညံသံအဆင့်

ဆူညံသံအဆင့်ကိုလည်း လေထုအရည်အသွေးကိုစောင့်ကြည့်သည့် တည်နေရာများအတိုင်း (၂၄) နာရီပတ်လုံး တိုင်းတာခဲ့ပါသည်။ ရလဒ်များအရ မနက်ပိုင်းနှင့်ညပိုင်း ဆူညံသံရလဒ်များသည် သတ်မှတ်ထားသောလမ်းညွှန်ချက်များအတိုင်း ရှိနေသည်။ ထို့ကြောင့် ဆူညံသံသည် အလုပ်သမားနှင့် ပတ်ဝန်းကျင်ကို မထိခိုက်နိုင်ပါ။ သို့သော် အလုပ်လုပ်သည့်နေရာမှရလဒ်များသည် သတ်မှတ်ချက်ထက် ကျော်လွန်နေသည်။ ၎င်းမှာ စက်များလည်ပတ်ခြင်းနှင့် လုပ်ငန်းလည်ပတ်ခြင်းမှ ထွက်လာသော ဆူညံသံများကြောင့်ဖြစ်သည်။

ရေအရည်အသွေး

ရေအရည်သွေးကို မြေအောက်ရေ၊ ပတ်ဝန်းကျင်ရေတို့ကို ရေအရည်အသွေးသတ်မှတ်ချက်ဘောင်အရ ပတ်ဝန်းကျင်အကဲဖြတ်မှုနှင့် စီမံကိန်းအတွက်သက်ရောက်မှု အကဲဖြတ်ရန် တိုင်းတာခဲ့ပါသည်။ ပတ်ဝန်းကျင်ရေ၊ အဝီစိတွင်းရေ၊ ရေဆိုးတို့ကို တိုင်းတာခဲ့ပြီး စိမ်းလန်းမြန်မာပတ်ဝန်းကျင်ဆိုင်ရာဝန်ဆောင်မှုကုမ္ပဏီရှိဓာတ်ခွဲခန်းနှင့် စိမ်းလန်းအမိမြေဖွံ့ဖြိုးတိုးတက်ရေးအသင်း၏ပတ်ဝန်းကျင်ရေးရာဓာတ်ခွဲခန်းတို့တွင် စစ်ဆေးခဲ့ပါသည်။ စီမံကိန်းအတွင်းနှင့်ဝင်း၏ပတ်ဝန်းကျင်ရှိ ရေအရည်အသွေးကို စုစုပေါင်း (၈) နေရာ တိုင်းတာခဲ့ပြီး အသေးစိတ်တည်နေရာများနှင့် ရလဒ်များကို **အခန်း (၄)** တွင် ဖော်ပြထားသည်။

ရလဒ်များအနေဖြင့် အချို့သောသောက်ရေစံချိန်စံနှုန်း၏ရလဒ်များသည် သတ်မှတ်ချက်တန်ဖိုးထက်များနေသည်ကိုတွေ့ရှိရပါသည်။ ဘွိုင်လာမှထွက်ရှိသောရေအရည်အသွေးတွင် အချို့သောရလဒ်များမှာ သတ်မှတ်နှိုးများထက် များနေသည်ကိုတွေ့ရှိရပါသည်။ ပတ်ဝန်းကျင်ရှိရေအရည်အသွေးသည် သတ်မှတ်ချက်အတွင်းရှိသော်လည်း ဘွိုင်လာထွက်ပေါက်မှ pH တန်ဖိုးနှင့် ဆေးဆိုးပန်းရိုက်ရေဆိုးသန့်စင်စက်အဝင်ပေါက်မှ COD, TDS ရလဒ်များမှာ သတ်မှတ်ချက်ထက်များနေသည်ကိုတွေ့ရပါသည်။ ထိုကဲ့သို့ သက်ရောက်မှုများကို လျှော့ချရေးနည်းလမ်းများဖြင့် လျော့ပါးစေနိုင်ပါသည်။

မြေအရည်အသွေး

စီမံကိန်းရှိမြေဆီလွှာကိုစစ်ဆေးရာတွင် စက်ရုံဝန်းအရှေ့မှရယူပြီး စိမ်းလန်းမြန်မာပတ်ဝန်းကျင်ဆိုင်ရာဝန်ဆောင်မှုကုမ္ပဏီရှိ ဓာတ်ခွဲခန်းတွင် စမ်းသပ်စစ်ဆေးခဲ့သည်။ ထိုမြေနမူနာကို ခွဲခြမ်းစိတ်ဖြာသည့် ရလဒ်များ ကိုလည်း **ဇယား (၄-၃၂)** တွင်ဖော်ပြထားပါသည်။

စီမံကိန်း၏ လုပ်ငန်းလည်ပတ်သည့်အဆင့်တွင် ပတ်ဝန်းကျင်ဆိုင်ရာအဓိကထိခိုက်မှုများ

လေအရည်အသွေးယုတ်လျော့ခြင်း၏အဓိကအကြောင်းမှာ စွမ်းအင်သုံးဂျန်နရေတာများ၊ ဘွိုင်လာများ၊ စက်အမျိုးမျိုးမှထွက်လာသောဓာတ်ငွေ့များ၊ စက်နှင့်လျှပ်စစ်ပစ္စည်းများ၊ လုပ်ငန်းလည်ပတ်သည့် လုပ်ဆောင်ချက်များမှ ထွက်လာသောအငွေ့များ ဖြစ်သည်။

- လုပ်ငန်းလည်ပတ်နေစဉ် စက်ရုံရှိစက်အများစုသည် လူသားများလက်ခံနိုင်သည့် လမ်းညွှန်ချက်အတွင်း ရှိနေပါသည်။ ဒီဇယ်ဂျန်နရေတာများ၊ ဘွိုင်လာများနှင့် လေဖိအားစက်များ လုပ်ငန်းလုပ်ဆောင်နေစဉ်အချိန်များတွင် ဆူညံသံပမာဏများနေသည်ကို တွေ့ရပါသည်။
- လုပ်ငန်းလည်ပတ်စဉ်အဆင့်တွင် စက်ရုံအတွင်းအစိုင်အခဲစွန့်ပစ်ပစ္စည်းထွက်ရှိမှု မြင့်မားပါသည်။
- အထည်ချုပ်စက်ရုံများသည် ရေသုံးစွဲမှုနည်းသော်လည်း ယခုစီမံကိန်းတွင် အဝတ်လျှော်ခြင်းနှင့် ဆေးဆိုးပန်းရိုက်လုပ်ငန်းစဉ်များကြောင့် ရေသုံးစွဲမှုမြင့်မားပါသည်။ ရေဆိုးအများစုမှာ ၎င်းလုပ်ငန်းစဉ်များမှ အများဆုံးထွက်ရှိပါသည်။ ထို့အပြင် နေ့စဉ်အထွေထွေရေသုံးစွဲမှုနှင့် ဆေးကြောမှုများမှာလည်း ရေဆိုးများထွက်ရှိပါသည်။

ဇယား (၁) အထည်ချုပ်လုပ်ငန်း၏ လုပ်ငန်းလည်ပတ်နေစဉ် ပတ်ဝန်းကျင်ဆိုင်ရာ ထိခိုက်မှုများ

လုပ်ဆောင်မှုများ	လုပ်ငန်းလည်ပတ်မှု	အကျိုးရလဒ်
အဓိကလုပ်ငန်းစဉ်		
ပိတ်စများ၊ အခြားပစ္စည်းများ စသည်တို့ကိုအသုံးပြုခြင်း	• **ကုန်ကြမ်းလက်ခံခြင်းနှင့် သိုလှောင်ခြင်း**	ပလတ်စတစ်အပြားများနှင့် ကြိုးများ
ပိတ်စ	• အမျိုးမျိုးသော ပိတ်စအလွှာများအား ပုံစံများဖြင့် စနစ်တကျ စီစဉ်ထားရှိမှု • အမျိုးမျိုးသော ပိတ်စအလွှာအား ပုံစံဖြတ်ခြင်း	ပိတ်စများမှ ထွက်ရှိလာသော ဖုန်၊ အမှုန်များနှင့် ကတ်ထူလိပ်လုံးများ
အမျိုးမျိုးသော ပိတ်စအလွှာများအား ပုံစံဖြတ်ခြင်း	• **ညှပ်/ဖြတ်ခြင်း** ပိတ်စများအား သက်ဆိုင်ရာပုံစံအတိုင်း ဖြတ်ခြင်း	ပိတ်စဖြတ်ခြင်းမှ ထွက်လာသော ဖြတ်စများ၊ သုံးပြီးသောအပိုင်းအစများ၊ ပိတ်စမှ VOCs များနှင့် ဆူညံသံ

လုပ်ဆောင်မှုများ	လုပ်ငန်းလည်ပတ်မှု	အကျိုးရလဒ်
အထည်အပိုင်းအစများ၊ ချည်မျှင်နှင့် ကျောဘက်အသားများ	• **ပန်းထိုးခြင်း** အစုံလိုက်အလှဆင်ဖန်တီးထားသော အပ်ချုပ်စက်များဖြင့် ပန်းထိုးခြင်း၊အထူးပြုလုပ်ထားသော ကွန်ပျူတာစက်များ အသုံးပြုခြင်း၊ အထူးဆော့ဖ်ဝဲများ သုံး၍ ကွန်ပျူတာထဲတွင် ဒီဇိုင်းဖန်တီးခြင်း	ပန်းထိုးအစအနများ အပ်ကျိုးများ၊ ချည်အိမ်များနှင့် အဆင့်မမီသည်အထည်များ
အထည်စများ၊ ဘောင်များ၊ ဖယောင်းစက္ကူ၊ ဓာတုပစ္စည်းများနှင့် အရောင်များ	• **ဆေးဆိုးပန်းရိုက်ခြင်း** သစ်သားဘောင်ပေါ်တွင် ဇကာကွက်ကို ဆွဲဆန့်ထား၍ ဆိုးဆေးကို ယင်းပေါ်တွင် စက်ဒီးဂီးနှင့်လှိမ့်ပြီး ပိတ်စပေါ်တွင် ပုံဖော်ခြင်း	ဆေးဆိုးပန်းရိုက်အစအနများ ဆေးဖျော်ရည်၊ လေထုကဲ့သို့ VOCs ထုတ်လွှတ်မှု၊ ဘောင်များဆေးကြောရာတွင်ထွက်လာသောရေဆိုး၊ အသုံးပြုပြီးဘောင်များ၊ ဆေးဘူးခွံများ
စွမ်းအင်၊ ဆပ်ပြာ၊ ရေနှင့် ချွတ်ဆေး	• **ရေလျှော်ခြင်း** အထည်များ အရည်အသွေး ပိုမိုကောင်းမွန်စေရန် အရောင်ဆိုးထား/ စွန်းနေသော အထည်များကို ရေလျှော်ဇရိယာတွင် လျှော်ခြင်း	ပလတ်စတစ်မျှင်စများနှင့် ရေဆိုး
အထည်အပိုင်းအစများ၊ အတွင်းခံသားအစများ၊ အပ်ချည်များ၊ ကြယ်သီးများ၊ ဇစ်များ စသည်ဖြင့်	• **အထည်ချုပ်ခြင်း** အထည်တစ်ခုချင်းစီအလိုက် လိုအပ်သော အပိုင်းအစများ တွဲဆက်ချုပ်ခြင်း	တွဲဆက်ချုပ်ပြီးအထည်များ အမှုန်များ၊ ပိတ်စမှ VOCs များ၊ ချည်ဖြတ်စများနှင့် ဆူညံသံ
ချုပ်ပြီးအထည်	• **မီးပူတိုက်ခြင်း** မီးပူတိုက်၍ အချောသတ်ခြင်း	ချုပ်၍မီးပူတိုက်ပြီးအထည် အငွေ့၊ ဆူညံသံ၊ ပတ်ဝန်းကျင်လေထု၊ အပူချိန်မြင့်၊ စိုထိုင်းဆမြင့်မား
အချောသတ်ပြီးအထည်	• **ပါကင်ထုပ်ပိုးခြင်း** အထည်များအားထုပ်ပိုးခြင်း	ကတ်ထူသေတ္တာ အရွယ်အစားအမျိုးမျိုး ကတ်ထူအစအနများနှင့် ပလတ်စတစ်အိတ်များ
အခြားအထောက်အကူပြုပစ္စည်းများ လည်ပတ်ခြင်း		
စွမ်းအင်နှင့် ဒီဇယ်	**ဂျန်နရေတာများ**	လေညစ်ညမ်းခြင်းနှင့် ဆူညံသံ
ရေနှင့် လောင်စာ	**ဘွိုင်လာများ**	Blowdown (ရေဆိုး)

လုပ်ဆောင်မှုများ	လုပ်ငန်းလည်ပတ်မှု	အကျိုးရလဒ်
စွမ်းအင်	**အလင်းနှင့် လေဝင်လေထွက်**	ရာသီဥတုပြောင်းလဲမှု
အခြားဆက်စပ်ပစ္စည်းများ၊ စွမ်းအင်	**ရုံးလုပ်ငန်းလည်ပတ်ခြင်းဆိုင်ရာ အုပ်ချုပ်မှု**	စွန့်ပစ်ကြူများနှင့် အခြားရုံးသုံးအစိုင်အခဲစွန့်ပစ်ပစ္စည်းများ

သက်ရောက်မှုများကို လျှော့ချရေးနည်းလမ်းများ

လျှော့ချရေးနည်းလမ်းတွင် လုပ်ငန်းလည်ပတ်ခြင်းကာလနှင့် လုပ်ငန်းပိတ်သိမ်းခြင်းကာလများတွင် ရုပ်ဂုဏ်သတ္တိ၊ ဇီဝဖြစ်စဉ်နှင့် လူမှုပတ်ဝန်းကျင်တို့အပေါ် သိသာထင်ရှားသောသက်ရောက်မှုများကို အောက်ပါ **ဇယား (၂)** တွင် ဖော်ပြထားသည်။

ဇယား (၂) လုပ်ငန်းလည်ပတ်ခြင်းကာလနှင့်ပိတ်သိမ်းခြင်းကာလတို့အတွက် ထိခိုက်မှုလျှော့ချရေး နည်းလမ်းများ

ထိခိုက်မှု အမျိုးအစား	ထိခိုက်မှု အပိုင်းအခြား (မလျှော့ချမီ)	လျှော့ချရေးနည်းလမ်းများ	ထိခိုက်မှု အပိုင်းအခြား (လျှော့ချ)	မှတ်ချက်
လုပ်ငန်းလည်ပတ်ခြင်းကာလ				
လေအရည်အသွေး	မြင့်မား	▪ ပိတ်စအလိပ်များ၊ အစိုင်အခဲစွန့်ပစ်ပစ္စည်းများ၊ အစွန်းသန့်ရှင်းရေးဘူးများ၊ ပြီးစီးသည့်အထည်များကို သင့်တော်သည့်နေရာတွင် သိုလှောင်ထားရမည်။ ▪ မှတ်တမ်းများထိန်းသိမ်းထားရမည်။ ▪ သင့်တော်သည့် လေဝင်/လေထွက်စနစ်ရှိရမည်။ ▪ လေဝင်/လေထွက်ကောင်းပြီး သယ်ယူသွားလာမှု လွယ်ကူရမည်။ ▪ ဘွိုင်လာ၊ ဂျန်နရေတာ၊ ယာဉ်များနှင့် စက်များကို ပုံမှန်စစ်ဆေးရမည်။ ▪ ဘွိုင်လာအခန်းတွင် Exhaust ပန်ကာများ တပ်ဆင်ထားရမည်။	နည်းပါး	➢ သင့်တော်စွာကိုင်တွယ်သိုလှောင်ခြင်းဖြင့် ထိခိုက်မှုလျှော့နည်းစေသည်။
ရေအရည်အသွေး	မြင့်မား	▪ အစိုင်အခဲပစ္စည်းများသိုလှောင်စဉ်တွင် မိုးရေနှင့်မုန်တိုင်းဒီရေဇော်မှ ကာကွယ်ရန် သင့်တော်သော အထောက်အပံ့ပစ္စည်းများ တပ်ဆင်ရမည်။ ▪ သန့်စင်ထားသောရေများကို အပင်စိုက်ခြင်း၊ ရေလောင်းခြင်းနှင့် မီးသတ်ခြင်း လုပ်ငန်းများတွင် ပြန်လည်အသုံးပြုနိုင်သည်။ ▪ အထွေထွေသုံးရေဆိုးများကို ရေဆိုးကန်ထဲသို့ စနစ်တကျစွန့်ပစ်ရမည်။	နည်းပါး	➢ ရေဆိုးပမာဏကို လေ့လာစောင့်ကြည့်ခြင်းနှင့် ပြန်လည်ပြုပြင်ခြင်းကဲ့သို့သော အလွန်အမင်းဂရုစိုက်ခြင်းကို လျှော့နည်းစေသည်။ ➢ ကြိုတင်ကာကွယ်ခြင်း၊ ထိန်းသိမ်းခြင်း

ထိခိုက်မှု အမျိုးအစား	ထိခိုက်မှု အဝိုင်းအခြား (မလျော့ချမီ)	လျော့ချရေးနည်းလမ်းများ	ထိခိုက်မှု အဝိုင်းအခြား (လျော့ချ)	မှတ်ချက်
		▪ မသန့်စင်ရသေးသော ရေဆိုးများကို မြေအောက်ရေမြောင်းနှင့် အခြားမည့်သည့် ရေထဲသို့မှ မစွန့်ထုတ်ရ။ ▪ အသုံးပြုပြီးဆီများကို သေချာစွာထိန်းသိမ်းခြင်း၊ အသုံးပြုပြီးပုံးများကို သက်ဆိုင်ရာဝယ်သူများထံ ရောင်းချခြင်း (သို့) စည်းမျဉ်းများ၊ ဥပဒေများနှင့်အညီ စွန့်ပစ်ရမည်။ ▪ အသုံးပြုပြီးဆီများစွန့်ပစ်မှုကိုစက်ရုံမှ suppliers များနှင့် ချိတ်ဆက်စွန့်ပစ်ရမည်။ ▪ စိမ့်ဝင်ခြင်းမှကာကွယ်နိုင်ရန် အဝတ်လျှော်သည့်နေရာကို ရေမစိမ့်နိုင်သော မျက်နှာပြင်ဖြစ်အောင် ပြုလုပ်ရမည်။ ▪ မကြာခဏသန့်ရှင်းရေးလုပ်ပြီး ပုံမှန်မိလ္လာစုပ်ထုတ်ခြင်း ပြုလုပ်ရ မည်။		ကြောင့် ထိခိုကမှု လျော့နည်းစေသည်။
မြေဆီလွှာ အရည်အသွေး	အသင့်အတင့်	▪ အသုံးပြုပြီးဆီများကို သေချာစွာထိန်းသိမ်းခြင်း၊ အသုံးပြုပြီးပုံးများကို သက်ဆိုင်ရာဝယ်သူများထံ ရောင်းချခြင်း (သို့) စည်းမျဉ်းများ၊ ဥပဒေများနှင့်အညီ စွန့်ပစ်ရမည်။ ▪ အသုံးပြုပြီးဆီများစွန့်ပစ်မှုကိုစက်ရုံမှ suppliers များနှင့် ချိတ်ဆက်စွန့်ပစ်ရမည်။ ▪ စိမ့်ဝင်ခြင်းမှကာကွယ်နိုင်ရန် အဝတ်လျှော်သည့်နေရာကို ရေမစိမ့်နိုင်သော မျက်နှာပြင်ဖြစ်အောင် ပြုလုပ်ရမည်။ ▪ တစ်ကိုယ်ရည်အကာကွယ်ပစ္စည်းများ (ခါးစည်းရှေ့ဖုံးနှင့်လက်အိတ်)၊ကြမ်းခင်းများထောက်ပံ့ပေးခြင်းနှင့် ယင်းတို့ကို မြို့နယ်စည်ပင်နှင့်ချိတ်ဆက်၍ စွန့်ပစ်ရမည်။	နည်းပါး	➢ ကြိုတင်ကာကွယ်ခြင်း၊ ထိန်းသိမ်းခြင်းကြောင့် ထိခိုက်မှု လျော့နည်းစေသည်။
ဆူညံသံ	မြင့်မား	▪ စက်ပစ္စည်းများကို ဆူညံသံထွက်ရှိမှု လျော့နည်းအောင် သေချာစွာ ထိန်းသိမ်းရမည်။	နည်းပါး	➢ အကာအကွယ်ပစ္စည်းများကို အသုံးပြုခြင်းနှင့် ထိန်းသိမ်းခြင်းများ

ထိခိုက်မှု အမျိုးအစား	ထိခိုက်မှု အဝိုင်းအခြား (မလျှော့ချမီ)	လျှော့ချရေးနည်းလမ်းများ	ထိခိုက်မှု အဝိုင်းအခြား (လျှော့ချ)	မှတ်ချက်
		▪ ဆူညံသည့်နေရာများတွင် နားကြပ်၊ နားအဆို့ကဲ့သို့သော တစ်ကိုယ်ရည်သုံးကိရိယာများ ပေးရမည်။ ▪ စက်ရုံဝန်းပတ်လည်တွင် အပင်များစိုက်ပျိုးခြင်းဖြင့်ဆူညံသံကိုလျှော့ချနိုင်သည်။		ကြောင့် ဆူညံသံကို လျော့နည်းစေသည်။
အစိုင်အခဲစွန့်ပစ်ပစ္စည်းထွက်ရှိမှု	မြင့်မား	▪ စိုက်ပျိုးရေးအတွက် ပြာများကို ရောင်းချနိုင်သည်။ ▪ ပြာအိတ်မှအမှုန်များ ပတ်ဝန်းကျင်သို့ မလွင့်စေရန် ဂရုစိုက်ရမည်။ ▪ စွန့်ပစ်ရေထွက်ရှိမှုပမာဏကို မှတ်တမ်းထားရှိရမည်။ ▪ ဆေးပုံးအလွတ်များကို ဝယ်သူများထံ ရောင်းချရမည်။ ▪ ရောင်းမရနိုင်သည့် စွန့်ပစ်ပစ္စည်းများကို မြို့နယ်စည်ပင်သာယာရေးကော်မတီ (ပဲခူး) သို့အပတ်စဉ် စွန့်ပစ်ရမည်။ ▪ အသုံးပြုပြီးဆီများကို သေချာစွာထိန်းသိမ်းခြင်း၊ အသုံးပြုပြီးပုံးများကို သက်ဆိုင်ရာဝယ်သူများထံ ရောင်းချခြင်း (သို့) စည်းမျဉ်းများ၊ ဥပဒေများနှင့်အညီ စွန့်ပစ်ရမည်။ ▪ အသုံးပြုပြီးဆီများစွန့်ပစ်မှုကိုစက်ရုံမှ suppliers များနှင့် ချိတ်ဆက်စွန့်ပစ်ရမည်။	နည်းပါး	➢ လူမှုရေးအဖွဲ့အစည်းအပေါ် အကျိုးရရှိနိုင်သည်။ ➢ အစိုင်အခဲစွန့်ပစ်ပစ္စည်းများစုပုံခြင်းကို လျော့နည်းစေသည်။
မီဘေး အန္တရာယ်	အလွန်မြင့်မား	▪ မီးသတ်ပစ္စည်းများကို နေ့စဉ်စစ်ဆေးရမည်။ ▪ မီးသတ်ခြင်းနှင့် အရေးပေါ်တုံ့ပြန်မှု လေ့ကျင့်ရေးသင်တန်းများကို ဝန်ထမ်းများအား သင်ကြားပေးရမည်။। ▪ မီးဘေးအန္တရာယ်မူဝါဒကို အကောင်အထည်ဖော်ဆောင်ရွက်ရမည်။ ▪ သင့်တော်သောမီးသတ်ပစ္စည်းများကို တပ်ဆင်အသုံးပြုရမည်။	နည်းပါး	
လုပ်ငန်းပိတ်သိမ်းခြင်းကာလ				
လေအရည်အသွေး	အသင့်အတင့်	▪ ဖုန်မှုန့်များလွင့်စင်ခြင်းကို အနည်းဆုံးဖြစ်စေရန် အကာအကွယ်များ အသုံးပြုရမည်။	နည်းပါး	

ထိခိုက်မှု အမျိုးအစား	ထိခိုက်မှု အဝိုင်းအခြား (မလျော့ချမီ)	လျော့ချရေးနည်းလမ်းများ	ထိခိုက်မှု အဝိုင်းအခြား (လျော့ချ)	မှတ်ချက်
		▪ ယာဉ်များနှင့်ဖျက်သိမ်းခြင်းလုပ်ငန်းစဉ်များမှ ဖုန်ထခြင်းအနည်းဆုံးဖြစ်စေရန် စက်ရုံအတွင်း လမ်းတစ်လျှောက်ရေဖြန်းခြင်း ပြုလုပ်ရမည်။ ▪ ယာဉ်များနှင့် စက်ပစ္စည်းကိရိယာများကို ပုံမှန်စစ်ဆေးရမည်။		
ရေအရည်အသွေး	အသင့်အတင့်	▪ ယာဉ်များနှင့်မီးစက်များမှ ဆီယိုစိမ့်မှု ရှိ/မရှိ ပုံမှန်စစ်ဆေးရမည်။ ▪ လိုအပ်သည့်အခါတိုင်း အနည်အနှစ်များကို စစ်ထုတ်ရမည်။ ▪ ရေကြီးရေလျှံမှုများမဖြစ်ပေါ်စေရန် ရေမြောင်းစနစ် ထိန်းသိမ်းရမည်။ ▪ ဝန်ထမ်းသုံးရေများ အညစ်အကြေး စွန့်ပစ်ပစ္စည်းများအတွက် သင့်တော်သော မြောင်းစနစ် ထားရှိပေးရမည်။ ▪ ဖျက်သိမ်းရေးသုံးပစ္စည်းများနှင့် စွန့်ပစ်ပစ္စည်းများကို ရေအရင်းအမြစ်များ မထိခိုက်စေရန် ကြိုတင်ကာကွယ်ရမည်။	နည်းပါး	➢ ရေဆိုးပမာဏကို လေ့လာစောင့်ကြည့်ခြင်းနှင့် ပြန်လည်ပြုပြင်ခြင်းကဲ့သို့သော အလွန်အမင်းဂရုစိုက်ရခြင်းကို လျော့နည်းစေသည်။
မြေဆီလွှာအရည်အသွေး	အသင့်အတင့်	▪ ယာဉ်များနှင့်မီးစက်များမှ ဆီယိုစိမ့်မှု ရှိ/မရှိ ပုံမှန်စစ်ဆေးရမည်။	နည်းပါး	
ဆူညံသံ	မြင့်မား	▪ စက်ပစ္စည်းများကို ဆူညံသံထွက်ရှိမှုလျော့နည်းအောင် သေချာစွာ ထိန်းသိမ်းရမည်။ ▪ ဆူညံသည့်နေရာများတွင် နားကြပ်၊ နားအဆို့ကဲ့သို့ သောတစ်ကိုယ်ရည်သုံး ကိရိယာများပေးရမည်။ ▪ ဖျက်သိမ်းခြင်းလုပ်ဆောင်မှုများကို ညအချိန်တွင် မပြုလုပ်ရပါ။	နည်းပါး	➢ အကာအကွယ်ပစ္စည်းများကို အသုံးပြုခြင်းနှင့် ထိန်းသိမ်းခြင်းများကြောင့် ဆူညံမှုကို လျော့နည်းစေသည်။
အစိုင်အခဲစွန့်ပစ်ပစ္စည်းထွက်ရှိမှု	မြင့်မား	▪ ဖျက်သိမ်းရေးသုံးပစ္စည်းများကို ဝယ်သူများထံ ရောင်းချရမည်။ ▪ ပြန်လည်မရောင်းချနိုင်သည့် စွန့်ပစ်ပစ္စည်းများကို မြို့နယ်စည်ပင်သာယာ (ပဲခူး) သို့ အပတ်စဉ် စွန့်ပစ်ရမည်။	နည်းပါး	➢ အစိုင်အခဲစွန့်ပစ်ပစ္စည်းများစုပုံခြင်းကို လျော့နည်းစေသည်။
မီဘေးအန္တရာယ်	အသင့်အတင့်	▪ မီးသတ်ပစ္စည်းများကိုမြင်သာသောနေရာများတွင် ထားရှိပြီး နေ့စဉ် စစ်ဆေးရမည်။	နည်းပါး	

ထိခိုက်မှုအမျိုးအစား	ထိခိုက်မှုအပိုင်းအခြား (မလျှော့ချမီ)	လျှော့ချရေးနည်းလမ်းများ	ထိခိုက်မှုအပိုင်းအခြား (လျှော့ချ)	မှတ်ချက်
		▪ အရေးပေါ်ဆက်သွယ်နိုင်မည့် ဖုန်းနံပါတ်များနှင့် မီးသတ်ဌာနများကိုမြင်သာသောနေရာတွင် ကပ်ထားရမည်။		
အလုပ်အကိုင်အခွင့်အလမ်းဆုံးရှုံးခြင်း	မြင့်မား	-	-	-

ပတ်ဝန်းကျင်ဆိုင်ရာစီမံခန့်ခွဲမှုအစီအစဉ်

စီမံကိန်းအကောင်အထည်ဖော်မှုမှဖြစ်ပေါ်လာမည့် သိသာထင်ရှားသောထိခိုက်မှုများနှင့် လျှော့ချရေးနည်းလမ်းများကို ဆုံးဖြတ်ရန်အတွက် စီမံကိန်းသည် ပတ်ဝန်ကျင်ဆိုင်ရာစီမံခန့်ခွဲမှုအစီအစဉ်ကို လိုအပ်ပါသည်။ ပတ်ဝန်းကျင်ဆိုင်ရာစီမံခန့်ခွဲမှုအစီအစဉ်သည် မြန်မာနိုင်ငံတော်အစိုးရ၏ပြဌာန်းထားသော ပတ်ဝန်းကျင်ကာကွယ်စောင့်ရှောက်ရေးအက်ဥပဒေနှင့်စည်းမျဉ်းများကို လိုက်နာရန် လိုအပ်ပါသည်။

- လေထုညစ်ညမ်းမှုနှင့်ဖုန်အမှုန်အမွှားစီမံခန့်ခွဲမှုအစီအစဉ်
- ဆူညံသံနှင့်တုန်ခါမှုစီမံခန့်ခွဲမှုအစီအစဉ်
- အစိုင်အခဲစွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှုအစီအစဉ်
- အန္တရာယ်ရှိသောဓာတုပစ္စည်းနှင့် အခြားသောပစ္စည်းများ ကိုင်တွယ်ခြင်း၊ သိုလှောင်ခြင်းနှင့် စွန့်ပစ်ခြင်း စီမံခန့်ခွဲမှုအစီအစဉ်
- စွမ်းအင်စီမံခန့်ခွဲမှုအစီအစဉ်
- ရေမြောင်းစီမံခန့်ခွဲမှုအစီအစဉ်
- အရေးပေါ်တုံ့ပြန်မှုနှင့် စီမံခန့်ခွဲမှုအစီအစဉ်

စီမံကိန်းသည် လုပ်ငန်းလည်ပတ်နေပြီဖြစ်သောကြောင့် ဆောက်လုပ်ရေးအဆင့်ရှိ ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအစီအစဉ်နှင့် ပတ်ဝန်းကျင်ဆိုင်ရာ စောင့်ကြပ်ကြည့်ရှုရေးအစီအစဉ်ကို ယခု အစီရင်ခံစာတွင် ထည့်သွင်းစဉ်းစားခြင်းမပြုပါ။

ပတ်ဝန်းကျင်ဆိုင်ရာစောင့်ကြပ်ကြည့်ရှုရေးအစီအစဉ်

ပတ်ဝန်းကျင်ဆိုင်ရာစောင့်ကြပ်ကြည့်ရှုရေးအစီအစဉ်သည် ပတ်ဝန်းကျင်ဆိုင်ရာအရည်အသွေး တိုးတက်စေမည့် ထိရောက်သောလုပ်ဆောင်ချက်များကိုချမှတ်ရန် ရည်ရွယ်ပါသည်။

ဇယား (၃) ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအစီအစဉ်

ပတ်ဝန်းကျင်ဆိုင်ရာ သက်ရောက်မှု အချက်များ	တိုင်းတာမည့် ပါရာမီတာများ/ အကောင်အထည်ဖော်မှု	စောင့်ကြပ်ကြည့်ရှုမှုပြုလုပ်ရန် အကြိမ်	တာဝန်ရှိသူ	နေရာ
လုပ်ငန်းလည်ပတ်ခြင်းကာလ				
လေအရည်အသွေး	ပတ်ဝန်းကျင်လေအရည်အသွေး (NO_2, PM_{10}, $PM_{2.5}$, SO_2, NH_3, CO_2, CO, Temperature, VOC, O_3, O_2, wind speed and wind direction)	တစ်နှစ်လျှင် ၁ ကြိမ်	ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးကော်မတီ	စက်ရုံအတွင်း (မြောက်လတ္တီတွဒ် ၁၇ ဒီဂရီ ၁၅ မိနစ် ၂၀.၉၂၆၈ စက္ကန့်၊ အရှေ့လောင်ဂျီတွဒ် ၉၆ ဒီဂရီ ၂၇ မိနစ် ၃၀.၉၅၆၄ စက္ကန့်)
	ဖုန်၊ အမှုန် (PM_{10}, $PM_{2.5}$) နှင့် VOC	တစ်နှစ်လျှင် ၂ ကြိမ်	ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးကော်မတီ	လုပ်ငန်းခွင် (ဂိုဒေါင်၊ ပိတ်ဖြတ်ခန်း၊ ဆေးဆိုး ပန်းရိုက်ခန်း၊ ပန်းထိုးခန်း၊ပိတ်ချုပ်ခန်း၊ မီးပူတိုက်ခန်း၊ ရေလျှော်ခန်း၊ ထုပ်ပိုးခန်း နှင့် အချောသတ်ခန်း)
	ခေါင်းတိုင်မှထုတ်လွှတ်မှု (PM_{10}, $PM_{2.5}$, CO_2, CO, SO_4, NO_x, O_2, NO)	တစ်နှစ်လျှင် ၂ ကြိမ်	ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးကော်မတီ	ဘွိုင်လာနှင့် မီးစက်ခေါင်းတိုင်များ
ရေအရည်အသွေး	စက်ရုံလုပ်ငန်းသုံးရေ (Aluminum, arsenic, chloride, cyanide, manganese, pH, sulfate, total alkalinity as $CaCO_3$, TDS, Total hardness as $CaCO_3$ total iron, turbidity)	တစ်နှစ်လျှင် ၂ ကြိမ်	ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးကော်မတီ	အဝီစိတွင်းရေ
	မြေပေါ်ရေ အရည်အသွေး (BOD_5, ammonia, arsenic, COD, cyanide, iron, oil & grease, pH, sulfide, TSS, zinc)	တစ်နှစ်လျှင် ၁ ကြိမ်	ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးကော်မတီ	စက်ရုံမှထွက်လာသော စုပေါင်းရေမြောင်း
	စွန့်ပစ်ရေ အရည်အသွေး (BOD_5, ammonia, arsenic, COD, cyanide, iron, oil & grease, pH, sulfide, TSS, zinc)	တစ်နှစ်လျှင် ၂ ကြိမ်	ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးကော်မတီ	ဘွိုင်လာရေထွက်ပေါက်၊ အဝတ်လျှော်ရေဆိုးသန့်စင်ကန်၏ဝင်ပေါက်နှင့် ထွက်ပေါက်၊ ဆေးဆိုးပန်း

ပတ်ဝန်းကျင်ဆိုင်ရာ သက်ရောက်မှု အချက်များ	တိုင်းတာမည့် ပါရာမီတာများ/ အကောင်အထည်ဖော်မှု	စောင့်ကြပ်ကြည့်ရှုမှုပြုလုပ်ရန် အကြိမ်	တာဝန်ရှိသူ	နေရာ
				ရိုက်ရေဆိုးသန့်စင်ကန်၏ ဝင်ပေါက်နှင့် ထွက်ပေါက်
ဆူညံသံအဆင့်	ပတ်ဝန်းကျင်ဆူညံသံ အဆင့် (decibel)	တစ်နှစ်လျှင် ၁ ကြိမ်	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး ကော်မတီ	စက်ရုံဝင်းအတွင်း (မြောက်လတ္တီတွဒ် ၁၇ ဒီဂရီ ၁၅ မိနစ် ၂၀.၉၂ဖြစ စက္ကန့်၊ အရှေ့လောင်ဂျီတွဒ် ၉၆ ဒီဂရီ ၂၇ မိနစ် ၃၀.၉၅ဖြင့် စက္ကန့်)
	လုပ်ငန်းခွင်ဆူညံသံ အဆင့် (decibel)	တစ်နှစ်လျှင် ၂ ကြိမ်	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး ကော်မတီ	လုပ်ငန်းခွင် (ဂိုဒေါင်၊ ပိတ်ဖြတ်ခန်း၊ ဆေးဆိုးပန်း ရိုက်ခန်း၊ ပန်းထိုးခန်း၊ပိတ် ချုပ်ခန်း၊ မီးပူတိုက်ခန်း၊ ရေလျှော်ခန်း၊ ထုပ်ပိုးခန်း နှင့် အချောသတ်ခန်း)၊ မီး စက်အခန်းနှင့် ဘွိုင်လာ အခန်း
စွန့်ပစ်ပစ္စည်း စီမံခန့်ခွဲ မှု	အမျိုးအစားမတူသော စွန့် ပစ်ပစ္စည်းများအတွက် အမှိုက်ပုံးများ ခွဲခြားထား ရှိခြင်း	နေ့စဉ်	စစ်ဆေးရေးကြီး ကြပ်ရေးမှူး၊ ဂို ဒေါင်ထိန်းသိမ်းသူ၊ အလုပ်သမားများ	လုပ်ငန်းခွင်နှင့် စက်ရုံဝင်း အတွင်း
	စွန့်ပစ်ပစ္စည်းပမာဏ လျှော့ချခြင်းနှင့် သတ်မှတ် ခြင်းအတွက် လုပ်ဆောင် ခြင်း	လိုအပ်သလို	ပတ်ဝန်းကျင်ထိန်း သိမ်းရေးကော် မတီ၊ စစ်ဆေးကြီး ကြပ်ရေးမှူး၊ ဂို ဒေါင်ထိန်းသိမ်းသူ၊ အလုပ်သမားများ	လုပ်ငန်းခွင်နှင့် စက်ရုံဝင်း အတွင်း
အန္တရာယ်ဖြစ်စေနိုင် သော ပစ္စည်းစီမံခန့်ခွဲ မှု	အန္တရာယ်ဖြစ်စေနိုင်သော ပစ္စည်းများကို မည်ကဲ့သို့ စွန့်ပစ်ရန် အလုပ်သမား များအား သင်တန်းပေး ခြင်း	လိုအပ်သလို	ပတ်ဝန်းကျင်ထိန်း သိမ်းရေးအရာရှိ၊ လုပ်ငန်းခွင်ကျန်း မာရေးနှင့် ဘေး ကင်းလုံခြုံရေး မန်နေဂျာနှင့် ပတ်ဝန်းကျင်ဆိုင် ရာ စီမံခန့်ခွဲမှု အဖွဲ့ဝင်များ	လုပ်ငန်းခွင်နှင့် စက်ရုံဝင်း အတွင်း

ပတ်ဝန်းကျင်ဆိုင်ရာ သက်ရောက်မှု အချက်များ	တိုင်းတာမည့် ပါရာမီတာများ/ အကောင်အထည်ဖော်မှု	စောင့်ကြပ်ကြည့်ရှုမှုပြုလုပ်ရန် အကြိမ်	တာဝန်ရှိသူ	နေရာ
	အန္တရာယ်ဖြစ်စေနိုင်သော ပစ္စည်းအတွက် ပစ္စည်းများ ဘေးကင်းလုံခြုံမှုစာရွက်များသည် အချိန်နှင့် တစ်ပြေးညီ ရရှိနိုင်အောင် လုပ်ခြင်း	လစဉ်	ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးအရာရှိ၊ လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးကင်းလုံခြုံရေး မန်နေဂျာနှင့် ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအဖွဲ့ဝင်များ	ဓာတုပစ္စည်းသိုလှောင်သည့်နေရာနှင့် လုပ်ငန်းခွင်နေရာ
စွမ်းအင်သုံးစွဲမှု	ဒီဇယ်နှင့်ထင်းများ၏ မှတ်တမ်းထားရှိခြင်း	လစဉ်	ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးအရာရှိ၊ လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးကင်းလုံခြုံရေး မန်နေဂျာနှင့် ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအဖွဲ့ဝင်များ	ဂျင်နရေတာ၊ ဘွိုင်လာနှင့် လေဖိအားစက်များ
	လျှပ်စစ်သုံးစွဲမှုမှတ်တမ်းထားရှိခြင်း	လစဉ်	ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးအရာရှိ၊ လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးကင်းလုံခြုံရေး မန်နေဂျာနှင့် ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအဖွဲ့ဝင်များ	လျှပ်စစ်မီတာ
အရေးပေါ်တုံ့ပြန်မှုကိရိယာများ	မီးသတ်ဆေးဘူးများ၊ မီးသတ်ပိုက်ခေါင်းများနှင့် မီးသတ်ပိုက်များစသည့် မီးသတ်ပစ္စည်းများ	နေ့စဉ်	မီးသတ်အဖွဲ့	စက်ရုံဝင်းအတွင်း၊ အဆောင်၊ လုပ်ငန်းခွင်နေရာ၊ ဂျင်နရေတာနှင့် ဘွိုင်လာအခန်း၊ လောင်စာနှင့် ဓာတုပစ္စည်းသိမ်းဆည်းသည့်နေရာ
	မီးသတ်လေ့ကျင့်ခန်းစစ်ဆေးခြင်း	လစဉ်	မီးသတ်အဖွဲ့	စက်ရုံဝင်းအတွင်းနှင့် အဆောင်

ပတ်ဝန်းကျင်ဆိုင်ရာ သက်ရောက်မှု အချက်များ	တိုင်းတာမည့် ပါရာမီတာများ/ အကောင်အထည်ဖော်မှု	စောင့်ကြပ်ကြည့်ရှုမှုပြုလုပ်ရန် အကြိမ်	တာဝန်ရှိသူ	နေရာ
	မီးသတ်ပစ္စည်းများ ထောက်ပံ့ခြင်း	သုံးလ တစ်ကြိမ်	မီးသတ်အဖွဲ့	ကိရိယာများ အားလုံး
	စက်ရုံတစ်ခုလုံးအတွင်း မတော်တဆမှု ဖြစ်ပျက်သမျှကို မှတ်တမ်းတင်ပြီး ပြန်လည်စစ်ဆေးခြင်း	သုံးလ တစ်ကြိမ်	မီးသတ်အဖွဲ့	-
	လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးကင်းလုံခြုံရေး သင်တန်း	တစ်နှစ်လျှင် ၂ ကြိမ်	လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးကင်းလုံခြုံရေး မန်နေဂျာ	စက်ရုံဝင်းအတွင်း
အရင်းအမြစ်များ အသုံးပြုမှု	အသုံးမပြုသောစက်ကိရိယာများကို ပိတ်ထားခြင်း	နေ့စဉ်	လုပ်ငန်းခွင်အပိုင်းတစ်ခုစီမှ တာဝန်ရှိ သူများ	စွမ်းအင်သုံးပြုသည့် နေရာများ
	အသုံးမပြုချိန်တွင် ရေပိုက်ခေါင်းများအား ပိတ်ခြင်း	နေ့စဉ်	အလုပ်သမားများ အားလုံး	ရေပိုက်ခေါင်းများ
လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးကင်း လုံခြုံရေး	သန့်ရှင်းရေးစက်ပစ္စည်းများအားလုံး သန့်ရှင်းစင်ကြယ်ပြီး လွယ်ကူစွာသုံးနိုင်အောင်အထူးဂရုပြုခြင်း	အပတ်စဉ်	လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးကင်းလုံခြုံရေး အဖွဲ့	စက်ရုံဝင်းအတွင်း
	အစိုင်အခဲစွန့်ပစ်ပစ္စည်းများအား သင့်တော်စွာ စွန့်ပစ်ခြင်းနှင့် သိုလှောင်ခြင်း	နေ့စဉ်	အထွေထွေမန်နေဂျာ၊ လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးကင်းလုံခြုံရေးအဖွဲ့	စက်ရုံဝင်းအတွင်း
	လုပ်ငန်းခွင်အတွင်း ဆေးသေတ္တာများ ထားရှိခြင်း၊ ဆေးခန်းတွင် သူနာပြုများ အမြဲအဆင်သင့်ရှိခြင်း၊ ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအပေါ် အလုပ်သမား များအား သင်တန်းပေးခြင်း	နေ့စဉ်	အထွေထွေ မန်နေဂျာ၊ သူနာပြု၊ လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးကင်းလုံခြုံရေးအဖွဲ့	စက်ရုံဝင်းအတွင်း
	တစ်ကိုယ်ရည်သုံးကာကွယ်ရေးပစ္စည်းများ ထောက်ပံ့ခြင်း	လိုအပ်သလို	လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးကင်းလုံခြုံရေး အဖွဲ့	စက်ရုံဝင်းအတွင်း

ပတ်ဝန်းကျင်ဆိုင်ရာ သက်ရောက်မှု အချက်များ	တိုင်းတာမည့် ပါရာမီတာများ/ အကောင်အထည်ဖော်မှု	စောင့်ကြပ်ကြည့်ရှုမှုပြုလုပ်ရန် အကြိမ်	တာဝန်ရှိသူ	နေရာ
	စက်ရုံအတွက်အန္တရာယ်နှင့် ကျန်းမာရေးဘေးကင်းလုံခြုံမှု အကဲဖြတ်စစ်ဆေးမှု လုပ်ဆောင်ခြင်း	နှစ်စဉ်	အထွေထွေ မန်နေဂျာ၊ လုပ်ငန်းခွင် ကျန်းမာရေးနှင့် ဘေးကင်းလုံခြုံရေးအဖွဲ့	စက်ရုံဝင်းအတွင်း
	လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးကင်းလုံခြုံရေး၊ အရေးပေါ်သူနာပြု အစီအစဉ်များကို အလုပ်သမားများအား သင်တန်းပေးခြင်း	လိုအပ်သလို	အထွေထွေ မန်နေဂျာ၊ လုပ်ငန်းခွင် ကျန်းမာရေးနှင့် ဘေးကင်းလုံခြုံရေးအဖွဲ့	စက်ရုံဝင်းအတွင်း
လုံခြုံရေး	အနှောင့်အယှက်များနှင့် အလားတူဖြစ်ရပ်များ ဖြစ်ပွားမှုကာကွယ်ရန် လုံခြုံရေးများ အဆင့်သင့်ရှိခြင်း	နှစ်စဉ်	လုံခြုံရေး ခေါင်းဆောင်	စက်ရုံဝင်းအတွင်း
	လုံခြုံရေးအချက်ပြမီးများ တပ်ဆင်ခြင်း (အထူးသဖြင့် လုပ်ငန်းခွင်အတွင်း)	နှစ်စဉ်	တာဝန်ကျလုံခြုံရေး	စက်ရုံဝင်းအတွင်း
လုပ်ငန်းပိတ်သိမ်းခြင်းကာလ				
လေအရည်အသွေး	ပတ်ဝန်းကျင်လေ အရည်အသွေး (NO_2, PM_{10}, $PM_{2.5}$, SO_2, NH_3, CO_2, CO, Temperature, VOC, O_3, O_2, wind speed and wind direction)	၁ ကြိမ်	ဖျက်သိမ်းခြင်း ကန်ထရိုက်တာ	စက်ရုံဝင်းအတွင်း
ရေအရည်အသွေး	မြေအောက်ရေ အရည်အသွေး (Aluminum, arsenic, chloride, cyanide, manganese, pH, sulfate, total alkalinity as $CaCO_3$, TDS, total hardness as $CaCO_3$, total iron, turbidity)	၁ ကြိမ်	ဖျက်သိမ်းခြင်း ကန်ထရိုက်တာ	ဖျက်သိမ်းခြင်းလုပ်ငန်းခွင်အတွင်း အသုံးပြုသော ရေကန်

ပတ်ဝန်းကျင်ဆိုင်ရာ သက်ရောက်မှု အချက်များ	တိုင်းတာမည့် ပါရာမီတာများ/ အကောင်အထည်ဖော်မှု	စောင့်ကြပ်ကြည့်ရှုမှုပြုလုပ်ရန် အကြိမ်	တာဝန်ရှိသူ	နေရာ
	မြေပေါ်ရေ အရည်အသွေး (BOD_5, ammonia, arsenic, COD, cyanide, iron, oil & grease, pH, sulfate, TSS, zinc)	၁ ကြိမ်	ဖျက်သိမ်းခြင်း ကန်ထရိုက်တာ	စက်ရုံအရှေ့ ရေမြောင်း
ဆူညံသံအဆင့်	ဆူညံသံအဆင့် (decibel)	၁ ကြိမ်	ဖျက်သိမ်းခြင်း ကန်ထရိုက်တာ	စက်ရုံဝင်းအတွင်း

မီးသတ်ခြင်းနှင့် ကာကွယ်ရေးအစီစဉ်များ

မီးသတ်ခြင်းနှင့် ကာကွယ်ရေးအတွက် အောက်ပါအစီအစဉ်များကို ပြုလုပ်ရမည်။

- ပေါက်ပြဲနေသော မီးကြိုးများကို အစားထိုးခြင်း၊
- မီးလောင်နိုင်သည့် အန္တရာယ်ရှိသောနေရာများတွင် မီးကြိုးများကို သေချာစွာစစ်ဆေးခြင်း၊
- သိုလှောင်သည့်နေရာတွင် အမှိုက်များမရှိအောင် ပြုလုပ်ခြင်း၊
- စက်ရုံ၏မည်သည့်နေရာတွင်မဆို မီးသတ်ခြင်းနှင့် ကာကွယ်ရေးအတွက် လုံလောက်သော ပစ္စည်းများကို မျဉ်းနိမ့်များထားကာ ထားရှိခြင်း၊
- ၎င်းပစ္စည်းများကို အချိန်အပိုင်းအခြားအလိုက် ကျွမ်းကျင်သူနှင့်စစ်ဆေးခြင်း၊ ထို့အတွက် နောက်ဆုံးစစ်ဆေးခြင်းများကို မှတ်တမ်းစာအုပ်တွင်မှတ်ခြင်း၊
- စက်တပ်ဆင်ခြင်းဆိုင်ရာ အလုပ်သမားများအား မီးသတ်ပစ္စည်းများအသုံးပြုခြင်းကို လမ်းညွှန်ပေးခြင်း၊
- မီးးအရေးပေါ်လမ်းညွှန်ချက်များအား လုပ်ငန်းခွင်ရှိ မြင်သာသောနေရာများတွင် ရှင်းလင်းစွာ ရေးသားပြီး ဖော်ပြထားခြင်း၊
- “ဆေးလိပ်မသောက်ရ” ဆိုင်းဘုတ်များအား စက်ရုံအတွင်းရှိ ထင်ရှားသောနေရာများတွင် ဖော်ပြပြီး မှောင်သောနေရာများတွင် မီးမောင်းထိုးပြခြင်း၊
- တပ်ဆင်ခြင်းများတွင် မတော်တဆမီးလောင်မှုဖြစ်ပါက အနီးဆုံးမီးသတ်ဌာနသို့ သတင်းပို့ခြင်း။

လူမှုရေးဆိုင်ရာတာဝန်ယူမှုအစီအစဉ် (CSR)

ကာရစ်(စ်)မအဲ့ပရဲ(လဲ)(မြန်မာ)ကုမ္ပဏီလီမိတက်သည် လုပ်ငန်းမှရရှိသော အကျိုးအမြတ်များမှ (၂) ရာခိုင်နှုန်းကို မြန်မာနိုင်ငံ၏လူမှုရေးဆိုင်ရာတာဝန်ယူမှုအစီအစဉ်အရ တာဝန်ယူ လုပ်ဆောင်ထားပါသည်။

အလုပ်သမားများ၏ လူမှုဖူလုံရေးအစီအစဉ်

စီမံကိန်းဆောင်ရွက်သူသည် အလုပ်သမားလူမှုဖူလုံရေးအစီအစဉ်ထားရှိပြီး အောက်ဖော်ပြပါ အကျိုးကျေးဇူးများမှာ ကုမ္ပဏီ၏ပုံမှန်လုပ်ဆောင်ပေးမှုများ ဖြစ်ပါသည်။

- ဝန်ထမ်းကြို/ပို့အစီအစဉ်
- နေထိုင်မှု
- ဝတ်စုံ
- အစားအသောက်စနစ်
- ကျန်းမာရေးစောင့်ရှောက်မှု
- ပါကင်
- ဆေးခန်း
- လူမှုဖူလုံရေးရန်ပုံငွေ
- ဝန်ထမ်းများနှင့် သက်ဆိုင်သောလူပ်ရှားမှုများ

အရေးပေါ်အစီအစဉ်

စီမံကိန်းဆောင်ရွက်သူသည် အရေးပေါ်အခြေအနေအတွက် အောက်ဖော်ပြပါအစီအစဉ်များ ထားရှိပါသည်။

- မီးဘေးကာကွယ်ရေးနှင့်ကြိုတင်ကာကွယ်မှု
- ကယ်ဆယ်ရေးလမ်းကြောင်းများ
- လုပ်ငန်းခွင်ဆိုင်ရာကျန်းမာရေးနှင့်ဘေးကင်းမှု
- အရေးပေါ်ထိခိုက်မှုနှင့် အလုပ်ပြန်လည်ဖွဲ့စည်းရေးအဖွဲ့

လူထုတွေ့ဆုံပွဲ

ကာရစ်(စ်)မအဲ့ပရဲ)(မြန်မာ)ကုမ္ပဏီလီမိတက်သည် စက်ရုံဝန်ထမ်းများနှင့် တွေ့ဆုံဆွေးနွေးပွဲကို ၂၀၁၈ ခုနှစ်၊ နိုဝင်ဘာလ၊ (၈၊ ၉၊ ၁၀) ရက်နေ့များတွင် စက်ရုံဝန်းအတွင်းရှိ စားသောက်ဆောင်တွင် ကျင်းပပြုလုပ်ခဲ့ပါသည်။ ထိုဆွေးနွေးပွဲတွင် အလုပ်သမားပေါင်း (၁၁၂၅)ဦး တက်ရောက်ခဲ့ပြီး အကြံပြုစာ (၉၅၃) စောင် ရရှိခဲ့ပါသည်။ ထိုမှတ်ချက်များ၊ အကြံပြုချက်များ၊ အမေးအဖြေများနှင့် တက်ရောက်သူစာရင်းများကို **အခန်း (၁၁)** နှင့် စာအုပ်၏ **နောက်ဆက်တွဲ (၅၆)၊ နောက်ဆက်တွဲ (၅၇)** နှင့် **နောက်ဆက်တွဲ (၅၈)** တို့တွင် ပြည့်စုံ စွာ ဖော်ပြထားပါသည်။

စီမံကိန်းအဆိုပြုသူသည် လူထုတွေ့ဆုံဆွေးနွေးပွဲအခမ်းအနားအစီအစဉ်ကို ၂၀၁၉ ခုနှစ်၊ ဖေဖော်ဝါရီလ (၆) ရက်နေ့တွင် မြို့ဦးဇီနမာန်အောင်ဘုန်းကြီးကျောင်း၊ ဥသာ (၉) ရပ်ကွက်၊ ပဲခူးမြို့နယ်တွင် ကျင်းပပြုလုပ်ခဲ့ပါသည်။ ထိုလူထုတွေ့ဆုံဆွေးနွေးပွဲတွင် ရပ်မိရပ်ဖများစုစုပေါင်း (၃၂) ဦးခန့် တက်ရောက်ဆွေးနွေးခဲ့ကြပါသည်။ ၎င်းတွေ့ဆုံဆွေးနွေးပွဲသည် စီမံကိန်းနှင့်ပတ်သက်သည့်အကြောင်းအရာများကို တောင်းခံသွားရန် ရည်ရွယ်ခြင်းဖြစ်သည်။ ပွင့်လင်းစွာဆွေးနွေးခဲ့သောလူထုတွေ့ဆုံပွဲသို့ တက်ရောက်လာသောဒေသခံပြည်သူများထံမှ အကြံပြုစာရွက် (၁၆) စောင် ရရှိခဲ့ပါသည်။ ထိုမှတ်ချက်များ၊ အကြံပြုချက်များ၊ အမေးအဖြေများနှင့်

တက်ရောက်သူများစာရင်းများကို **အခန်း (၁၁)** နှင့် **နောက်ဆက်တွဲ (၅၉)၊ နောက်ဆက်တွဲ (၆၀)** တို့တွင် ပြည့်စုံစွာဖော်ပြထားပါသည်။

နိဂုံး

ကာရစ်(စ်)မအဲ့ပရဲ(လ်)(မြန်မာ)ကုမ္ပဏီလီမိတက်၏ ပတ်ဝန်းကျင်ဆိုင်ရာစီမံခန့်ခွဲမှု အစီအစဉ်တွင် အဓိကထိခိုက်နိုင်သောသက်ရောက်မှုများကို လွယ်ကူစွာလျှော့ချနိုင်ကြောင်း သတ်မှတ်ထားပါသည်။ အဓိက ပတ်ဝန်းကျင်ဆိုင်ရာပြဿနာရပ်များမှာ စက်ရုံလည်ပတ်ခြင်းဆိုင်ရာသက်ရောက်မှုများ ဖြစ်ပါသည်။ အခြားထိခိုက်မှုများမှာ လျစ်လျူရှုနိုင်ပြီး ဖော်ပြထားသောထိန်းချုပ်ရေးနည်းလမ်းများနှင့် လေ့လာစောင့်ကြည့်နိုင်ပြီး ထိရောက်စွာ အကောင်ထည်ဖော်နိုင်ပါသည်။

ပတ်ဝန်းကျင်အပေါ်သက်ရောက်သောဆိုးကျိုးအများစုမှာ ရေတိုသက်ရောက်မှုဖြစ်သည်ကို တွေ့ရှိရပါသည်။ လုပ်ငန်းရှင်သည် ပတ်ဝန်းကျင်ဆိုင်ရာစီမံခန့်ခွဲမှုအစီအစဉ်ကို ပြီးမြောက်အောင်ဆောင်ရွက်ခြင်းကို လိုက်နာရန် ခံဝန်ကတိထားပါသည်။ ကုမ္ပဏီမှ မြန်မာနိုင်ငံ၏အလုပ်သမားဥပဒေဖြင့် အာမခံထားမှုများအား မပျက်စေဘဲ အကျိုးကျေးဇူးများရရှိအောင် အထူးဂရုပြုသွားမည်ဖြစ်သည်။ လုံလောက်သော ကျန်းမာရေးနှင့် ဘေးကင်းလုံခြုံရေးဆိုင်ရာ လျော့ချရေးအချက်များကို ပြဋ္ဌာန်းထားသောဥပဒေအရ သက်ဆိုင်သော လိုအပ်ချက်များအဖြစ် လုပ်ဆောင်သွားမည်။ လုပ်ငန်းရှင်သည် EMP အစီရင်ခံစာရှိ လမ်းညွှန်ချက်များကို လိုက်နာပြီး စီမံကိန်းကို အကောင်အထည်ဖော်ရန် ခွင့်ပြုချက်ရရှိထားပြီဖြစ်ပါသည်။

EXECUTIVE SUMMARY

The Environmental Management Plan (EMP) covers the whole activities of the project from design and commissioning to maintenance phases of the project in three stages; construction stage, operation stage and decommissioning stage. To manage the key environmental issues that occur during each stage of the project, EMP provides the effective strategies and plans with relevant guidelines. EMP report provides the mitigation measures which are designed to minimize or eliminate the significant adverse impacts of the project. It also defines the legal requirements, regulatory permits and licenses which are needed in activities of every project.

KARISMA Apparel (Myanmar) Company Limited is Manufacturing of Cotton Jersey Knitwear on CMP basis at Plot No. 18, 19 & 20, Bago Foreign Industrial Zone, Nyaung Inn Village, Bago Region, Myanmar. The proposed project is planning to produce all kinds of wearing apparels in knits, woven and sweater with printing and embroidery.

KARISMA Apparel (Myanmar) Company Limited has retained Green Myanmar Environmental Services Company Limited (GMES) to conduct Environmental Management Plan (EMP) for the project. This EMP report is prepared for Manufacturing of Knitwear on CMP basis exported to foreign.

The primary objectives of EMP are to-

- describe actions taken for achieving the mitigation measures of the adverse impacts
- accomplish the functions and objectives of the project
- linkage directly to the organization's environmental objectives and targets
- ensure that objectives and targets are achieved regarding the implementation or management of needed action plan.
- make sure the prevention and management of foreseeable accidents include in action plan for the health and safety of the workers and neighboring communities during the project's life cycle.

Salient Features of the Project

Characteristics	Description/Quantities
Project Name	Manufacturing of Garment on CMP basis
Project Proponent	KARISMA Apparel (Myanmar) Company Limited
Company Registration No.	114515396
Project Address	Plot No. 18,19 & 20, Bago Foreign Industrial Zone, Nyaung Inn Village, Bago Region, Myanmar.
Geographical Information	Latitude: 96º 27' 30.37"E Longitude: 17º 15' 19.36"N
Type of Land	Industrial Land
Area of Land	15 Acres (60,703 square meters)
Land Acquisition	Lease Land
Lessor	Bago Regional Government
Initial Period permitted to use the land (Validity of land grant)	50 years and extendable to 10 years two times
Type of Investment	100% Foreign Investment
Total Amount of Investment	USD 20 Million

Characteristics	Description/Quantities	
Type of Business	Garment Manufacturing (CMP basis)	
Contact Person **Designation** **Contact Details** **Mobile Phone:** **Email:**	Mr. Kinson Lau General Manager 09965877608 kinson.lau@karisma-myanmar.com	
Established Date	2nd April 2014	
Date of Test Run	24th April 2017	
Date of Commercial Run	3rd April 2018	
Surrounding Environment	East Side Industrial Field West Side Industrial Field Left Side Great Man Garment Factory Right Side New Factory (just construction phase)	
Nearest Residential Places	Nyaung Inn Village	
Nearest Water Bodies	Bago River (about 3.1 km)	
Topography	Flat and mainly Alluvium Area	
Raw Materials	(1) Knitted Shell Fabric (2) Knitted Trim Fabric (3) Woven Trim Fabric (4) Spun Polyester Thread (5) Cotton Thread (6) Nylon Thread (7) Main Labels (8) Care Labels (9) Brand Labels (10) Style Labels (11) Shoulder Tape (12) Interlining (13) Hangtags & Price Tickets (14) Buttons	(15) Stickers (16) Zippers (17) Metal Snaps (18) Elastic band (19) Woven Tape (20) Drawstring (21) PE Polybags (22) PP Polybags (23) Carton Box (24) Carton Sticker (25) Hanger (26) Laundry Agent (27) Laundry Detergent
Products	(1) Knitted Crew Neck Tee Shirt (2) Knitted Outerwear (3) Knitted Pant (4) Knitted Dress	
Water Resources	3 tube wells 6" diameter tube wells 2 nos. 8" diameter tube well 1 no.	
Total Water Demand	96,693.15 m^3/year (25,543,627.88 US Fluid gallons)	
Source of Electrical Power	From national grid line Six transformers (1 x 3000 kVA, 4 x 1000 kVA, 1 x 100 kVA)	
Generator	Five Generators (1 x 340 kVA, 4 x 1063 kVA)	
Annual Diesel Consumption	Around 15000 lit/year	
Employees	5,150 Heads Local employees 5000 (97.09%) Foreign experts and technicians 150 (2.91%)	
Operation Time	Monday- Friday 07:30 AM - 04:15 PM Saturday 07:30 AM - 11:30 AM	

Characteristics	Description/Quantities
Factory Running Days per Year	About 300 days *(Factory closes on public holidays/ gazette holidays)*

Types of Pollution found in the Project Operation

Liquid Storm water runoff and wastewater from washing and cleaning process is expected to be the greatest source of liquid waste on site.

Air Odors from printing process, drainages and dust emissions from knits, products, boilers, and vehicles moving around the site will greatly impact on the workplace's atmosphere.

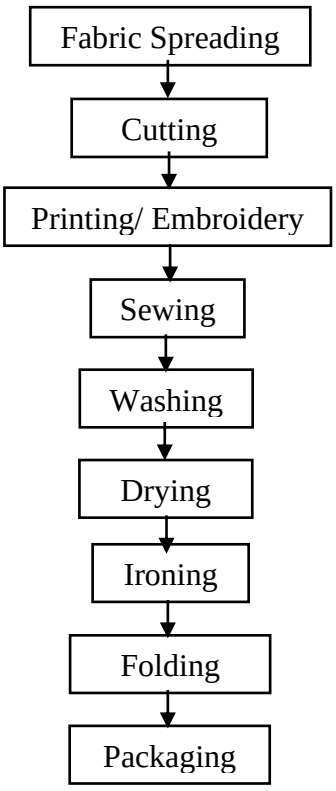
Solid Fabric scraps, as by-products from the operation process, general municipal waste from workers, office and security house will generate on site.

Noise The main source of Noise generation is from

- Operation of boiler and generator
- From vehicles, machines, and equipment
- Delivery of raw materials and products.

Project Activities and Production Process

The processes of the operation of the factory are simple. The process chain from the textile surface to the finished product comprises:



Main environmental aspects of the project during operation phases are:

- Air emissions
- Wastewater generation

- Noise generation
- Solid waste generation
- Energy use
- Water use
- Hazardous chemical use.

Baseline Data of Bago Township

The factory is situated in Bago Foreign Industrial Zone of Bago Township, Bago Region. Bago is the city of Bago Region, and is 31 ft above sea level. Its topographic condition is mountainous. The climate of the Bago Township is a tropical monsoon climate. The highest temperature is 39.8ºC and lowest temperature is 16.4ºC.

Bago Township is composed of three towns; namely Bago, Phayargyi and Inndagaw consisting of 40 wards, 65 village tracts and 211 villages. There are 115,440 households having a total population 434,822 in the township.

Bago Township is situated between north-latitude 17º 14' and 17º 50' and east-longitude 96º 24' and 96º 41'. The area of Bago Township is 717,861 acres (1,121.66 square miles). The length of Bago Township is 21 miles from east to west and 43 miles from south to north. Bago Township shares borders with

- Waw Township and Thanatpin Township of Bago Region in the east
- Hlegyu Township, Thaikkyi Twnship of Yangon Region, Tharyarwady Township of Bago Region in the west,
- Kawa Township of Bago Region in the south, and
- Daek-U Township and Letpadan Township of Bago Region in the north.

Bago River is the main river of the Bago Township and this river is originated from the Sin Narmaung Mountain, on the Bago Yoma Mountain Range and is flowing into the Yangon River. And then, there are many creeks in the Bago Township flowing into the Bago River. Kolukyel, Aungmya, Shwelaung, Salu and Latpan creeks are originated from Bago Yoma.

Bago region has many historical and cultural components such as Kanbawza Thardi Place, Shwe Thar Laoung Image and Phyargi Pagoda. However, there are no cultural resources at project implementation area due to the project site is situated in industrial zone.

There are 32 basic education high schools, 72 middle schools, 5 primary schools, 121 over primary school, 16 pre-primary schools and 27 monastery education schools. And then, Bago Township has University at Oakthar Ward (8).

Measuring of Environmental Quality (see Detail in Chapter 4)

Air Quality

In November 15, 2018, **air quality** was monitored with 24 hours monitoring within the project area. The collected air quality monitoring data were checked with the target values and the results are tabulated in **Table 4-9** and **Table 4-11**. Total numbers of 16 points are chosen to monitor the Ambient Air Quality and Workplace air quality. Measuring results of boiler and two generators stack emission in KARISMA Apparel (Myanmar) Co., Ltd. are tabulated in **Table 4-13, Table 4-15,** and **Table 4-16**.

According to ambient air results, particulates levels are much higher than the recommended air quality guidelines, but other parameters are within the standard.

According to the workplace air quality results, particulate levels in some sampling points (cutting-1, printing room, mixing room, packaging, and boiler) were much higher than the recommended air quality guidelines.

According to the monitoring results, stack emission gases from boiler and two generators are also within the desirable limits.

Noise Levels

Noise level is monitored for 24 hours continuously as the same sampling points of air quality monitoring. The observed values of the noise level for daytime and night time are within the limit of Guideline. Therefore, the noise values cannot affect the workers and the environment. However, the results for workplace are higher than guideline value. This is because of noise generated from the operation machines and activities.

Water Quality

For water quality, selected water quality parameters of ground water and ambient water have been studied for assessing the water environment and evaluating the anticipated impact of the proposed project. The ambient water samples, tube well water and wastewater samples were collected and analyzed at the laboratory of Green Myanmar Environmental Services Co., Ltd. and Ecological laboratory. Water qualities at the project site and its surroundings were monitored at the total of 8 sampling points and detail locations of sampling points are shown in **Chapter 4**.

Some results of the parameters are higher than the acceptable limit and other parameters are within the desirable limits as per Drinking Water Standards. All of the parameters from ambient water results are within the guideline values. Most of the parameters from wastewater quality results are within the guideline except pH value for Boiler Blowdown water that is a little higher than guideline and COD and TSS value of inlet stream to Wastewater Treatment Plant for printing section that is very higher than guideline. These impacts can be reduced by mitigation measures.

Soil Quality

In order to monitor the soil quality, soil sample in front of the factory premise was taken and tested at GMES laboratory and these results are described in **Table 4-32**.

Major Impacts for Operation Phase

- The major sources for air quality deterioration are power generators, boilers, gases from different machines, and emissions from different mechanical and electric appliances, and operation activities.
- Despite the level of noise in working with most of the machinery in the factory are within the human accepted level (max. 60 dB, Decibel), some noise levels may arise during some phases of work, for example: running of diesel generators, boilers and compressors.
- During the operation phase of the factory, the solid wastes will increase both quantitatively and qualitatively.
- Garment industry is well-known not to consume much water. However, due to the processes of washing and printing, water consumption is moderate. Most of

wastewaters are produced from these activities. Moreover, additional sources are from the personal daily uses, rinsed water from the washing machines, flushing and cleaning.

Table-1 Environmental Aspects of Apparel Manufacturing Processes

Inputs	Operations	Outputs
Main Process Line		
Fabrics, accessories, cut panels, etc.	• Raw materials receipts and storage	Plastic wraps, ropes
Garment fabric	• Arrangement of multilayer fabric, with patterns positioned and fixed on • Forming multilayer of fabric and fixing patterns on fabric	Particulates, Dust, Cardboard core from fabric rolls
Multilayer fabric with patterns on fabric	• **Cutting** Cutting fabric according to patterns	Fabric scrap, used forms Particulates, VOCs from fabrics, noise
Garment pieces, threads, and backings	• **Embroidery** Done on the sewing machine using the set decorative stitches. Use a special computerized machine; designs can be built into the memory or designed using special software.	Embroidered pieces Broken needles, cores and spools, rejects
Energy, detergents, water, softener	• **Washing** To get good quality clothing, the stained products are washed out in the washing area.	Microscopic plastic fibers, wastewater
Garment pieces, Lining pieces, Sewing threads, Buttons , Zippers etc.	• **Sewing** Assembling each of garment with necessary components	Complete assembled garment Particulates, VOCs from fabrics, Yarn scrap, Noise
Complete garment	• **Ironing** Finishing the appearance	Finished garment Steam, Noise, high ambient air temperature, high humidity

Inputs	Operations	Outputs
Finished garment 	• **Packaging** Packaging garment	Different sizes of carton boxes  Carton scrap, Plastic bags
Support Facilities Operation		
Energy and diesel	**Generators**	Air pollution; noise
Water and fuel	**Boilers**	Blowdown (wastewater)
Energy	**Lighting and air conditioning**	Climate change,
Office accessories; energy	**Administrative office operation**	Waste papers and other office solid wastes

Mitigation Measures on Adverse Impacts

Mitigation describes the measure proposed in order to avoid, reduce and where practicable remedy significant adverse effects. The mitigation measures for the identified effects for the various disciplines of the physical, biological, and human environment during the operation phase and decommissioning phase are summarized in **Table 2**.

Table-2 Mitigation Measures during Operation Phase and Decommissioning Phase

Impact Type	Impact Range (Before Mitigation)	Mitigation Measures	Impact Range (After Mitigation)	Remarks
Operation Phase				
Air Quality	High	▪ Proper storage area for fabrics, solid wastes, spot cleaning cans and finished products. ▪ Proper records will be maintained. ▪ Good ventilation and clear assess will be provided. ▪ Trained/Approved transports will be given work for the transportation of the raw materials / products. ▪ Periodic maintenance of boilers, generators, vehicles, and machineries is conducted. ▪ Exhaust fans will be installed in the boiler room.	Low	➢ Proper handling of material will be followed
Water Quality	High	▪ Install proper facilities to prevent rain/storm water contamination during the storage of solid materials. ▪ Treated effluent from wastewater treatment plants will be utilized for greenbelt, gardening & fire- fighting requirement.	Low	➢ Extreme care will be taken in treatment & monitoring of the quality of the effluent ➢ Low impacts due to preventive maintenance to

Impact Type	Impact Range (Before Mitigation)	Mitigation Measures	Impact Range (After Mitigation)	Remarks
		▪ Domestic wastewater will be disposed into septic tanks systematically. ▪ Untreated wastewater should not be drained out on the ground or to any body of water. ▪ Used oil is stored in a certain place within a container and the container need to handover to all supplier of waste buyer for recycling or proper disposal according to local laws and regulation. ▪ Verification of oil disposal by supplier might be done by the factory which would be a good practice. ▪ Washing area will be made of impervious surface to prevent leachability. ▪ Frequent cleaning and pumping out of septic tank should be done.		the underground water
Soil Quality	Medium	▪ Used oil is stored in a certain place within a container and the container need to handover to all supplier of waste buyer for recycling or proper disposal according to local laws and regulation. ▪ Verification of oil disposal by supplier might be done by the factory which would be a good practice. ▪ Washing area will be made of impervious surface to prevent leachability. ▪ Provides PPE (protective aprons, gloves), paved ground and disposing them by linking with City Development Committee (Bago).	Low	➢ Low impacts due to preventive maintenance
Noise	High	▪ Preventive Maintenance to ensure low noise generation. ▪ Personal Protective Equipment (Ear Plug & Muff) will be utilized in the affected area. ▪ Around the factory premise, lots of trees should be planted for reducing noise.	Low	➢ Low impacts due to preventive maintenance & usage of PPE's

Impact Type	Impact Range (Before Mitigation)	Mitigation Measures	Impact Range (After Mitigation)	Remarks
Solid Waste Generation	High	▪ Ash should be sold for agriculture. ▪ Use bag filter for fly ash not to disperse into the environment ▪ Records of quantity of waste generated will be maintained. ▪ Empty cans will be sold to the vendors. ▪ Some solid wastes which cannot be sold are disposed to the instruction of the City Development Committee (Bago). ▪ All hazardous wastes must be disposed with City Development Committee (Bago) facilities. ▪ Used oil is stored in a certain place within a container and the container need to handover to all supplier of waste buyer for recycling or proper disposal according to local laws and regulation. ▪ Verification of oil disposal by supplier might be done by the factory which would be a good practice.	Low	➢ Beneficial impacts on social community ➢ Low impact as prevention in accumulation of solid waste
Fire Hazards	Very High	▪ Firefighting Equipment should be checked daily. ▪ Employees should be provided regular trainings and exercises for firefighting and other emergency response. ▪ Fire safety policy should be designed and implemented. ▪ Fixed and portable fire equipment should be designed and installed.	Low	
Decommissioning Phase				
Air Quality	Medium	▪ Covers or control equipment must be used to minimize the dust from the sources. ▪ Spray water along the road inside the factory to minimize dust from decommissioning activities and vehicles. ▪ Regular maintenance of machines and vehicles must be done.	Low	

Impact Type	Impact Range (Before Mitigation)	Mitigation Measures	Impact Range (After Mitigation)	Remarks
Water Quality	Medium	▪ Regular inspection of vehicles and generators must be done to prevent leakage of fuel and engine oil. ▪ Use sediment traps wherever necessary. ▪ Maintenance of drainage system must be done to prevent flooding and overflow. ▪ Proper drainage system for wastewater from daily use of workers and sewage discharge should be prepared on-site. ▪ Demolished materials and wastes must be precautious not to reach any water sources.	Low	➢ Low impacts due to preventive from polluting the surrounding environment
Soil Quality	Medium	▪ Regular inspection of vehicles and generators must be done to prevent leakage of fuel and engine oil.	Low	
Noise	High	▪ Preventive Maintenance must be done to ensure low noise generation. ▪ Personal Protective Equipment (Ear Plug & Muff) will be utilized in the affected area. ▪ Demolition activities should not be done at night.	Low	➢ Low impacts due to preventive maintenance & usage of PPE's
Solid Waste Generation	High	▪ The demolished materials will be sold to suitable buyer. ▪ Some solid wastes which cannot be sold are disposed to City Development Committee (Bago) weekly.	Low	➢ Low impact as prevention in accumulation of solid waste
Fire Hazards	Medium	▪ Firefighting Equipment should be placed in the visible area and checked daily. ▪ Emergency contact numbers of township and District Fire Services Department incidences are hanged.	Low	
Loss of Job Opportunities	High	-	-	-

Environmental Management Plan (EMP)

The Project requires an Environmental Management Plan (EMP) to determine the significant impacts from implementation of the project and a range of mitigation measures. An EMP is also required as per the provision of the Environment Protection Act and Regulations of Government of Myanmar. implementing the EMP, which is composed of five

parts as follows:

- Air Pollution & Dust Management Plan
- Noise & Vibration Management Plan
- Solid Waste Management Plan
- Hazardous Chemicals or Other Substances Handling, Storage and Disposal Management Plan
- Energy Management Plan
- Drainage Management Plan

Emergency Response & Disaster Management Plan

The Environmental Management Plan and Environmental Monitoring Plan for construction phase are excluded in this report because this project is already in the operating phase.

Environmental Monitoring

Environmental monitoring involves measurement of relevant parameters to distinguish the anticipated changes. Monitoring aims at determining the effectiveness of actions to improve environmental quality.

Table-3 Environmental Monitoring Plan

Environmental Issues	Parameters/ Implementation	Monitoring Frequency	Responsibilities	Location
Operation Phase				
Air Quality	Ambient Air Quality (NO_2, PM_{10}, $PM_{2.5}$, SO_2, NH_3, CO_2, CO, Temperature, VOC, O_3, O_2, wind speed and wind direction)	Once a year	EMC	Within the factory premises (17° 15' 20.9268" N 96° 27' 30.9564" E)
	Dust deposition (PM_{10}, $PM_{2.5}$) and VOC	Twice a year	EMC	Workplace (Warehouse, cutting, printing, embroidery, sewing, ironing, washing, packaging and finishing)
	Stack Emission (PM_{10}, $PM_{2.5,}$ CO_2, CO, SO_4, NO_x, O_2, NO)	Twice a year	EMC	Stack chimney of boilers and generators
Water Quality	Process water quality (Aluminum, arsenic, chloride, cyanide, manganese, pH, sulfate, total alkalinity as $CaCO_3$, TDS, total hardness as $CaCO_3$, total iron, turbidity)	Twice a year	EMC	Tube well water
	Surface water quality (BOD_5, ammonia, arsenic, COD, cyanide, iron, oil &	Once a year	EMC	Municipal drain from the factory

Environmental Issues	Parameters/ Implementation	Monitoring Frequency	Responsibilities	Location
	grease, pH, sulfide, TSS, zinc)			
	Wastewater quality (BOD_5, ammonia, arsenic, COD, cyanide, iron, oil & grease, pH, sulfide, TSS, zinc)	Twice a year	EMC	Boiler Blowdown, washing wastewater (inlet & outlet), printing wastewater (inlet & outlet)
Noise Level	Ambient noise level (Noise level in decibel)	Once a year	EMC	Within the factory premises (17° 15' 20.9268" N 96° 27' 30.9564" E)
	Indoor noise level (Noise level in decibel)	Twice a year	EMC	Workplace (Warehouse, cutting, printing, embroidery, sewing, ironing, washing, packaging, and finishing), generators, boilers
Waste Management	Separate bins for different kinds of waste	Daily	Operation Supervisor, Storekeeper, workers	Workplace, factory premise
	Set quantified waste reduction and disposal targets (in volume, weight, or costs)	As necessary	EMC, operation supervisor, storekeeper, workers	Workplace, factory premise
Hazardous Substances Management	Provide training to employees on how to dispose of hazardous material	As necessary	Environmental officer, OHS manager and EMC members	Workplace, factory premise
	Ensure MSDS for hazardous products are up-to-date and accessible at any time.	Monthly	Environmental officer, OHS manager and EMC members	Chemical storage area and workplace
Energy Consumption	Record diesels and firewood	Monthly	Environmental officer, OHS manager and EMC members	Generator, boilers and compressors
	Record Electricity usage	Monthly	Environmental officer, OHS manager and EMC members	Electric meter
Emergency Response Equipment	Firefighting equipment such as extinguisher, fire hydrants, fire hose,	Daily	Fire brigade team	Factory Premise, Dormitory, workplace, generator room, boiler room, fuel and chemical storage areas

Environmental Issues	Parameters/ Implementation	Monitoring Frequency	Responsibilities	Location
	Fire-drill testing	Monthly	Fire brigade team	Factory Premise and Dormitory
	Servicing firefighting equipment	Quarterly	Fire brigade team	All equipment
	Reviewing records of accidents which is recorded on & around the entire facility	Quarterly	Fire brigade team	-
	OHS training	Biannual	OHS manager	Factory Premise
Resources Usage	Power off the unused equipment	Daily	In-charge in each section	Power Distribution panel
	All water taps shut when not in used	Daily	For all employees	All water taps
Public Health and Occupational Safety	Special attention should be paid to the sanitary facilities that should be kept clean and well lit.	Weekly	OHS team	Factory Premise
	Ensure proper solid waste disposal and collection facilities.	Daily	General manager and OHS team	Factory Premise
	Provide First Aid kits on the site. Ensure nurse(s) is stand-by in clinic. Educate stakeholders/workers on environmental management.	Daily	General manager, nurses and OHS team	Factory Premise
	Provision of all necessary PPEs.	As necessary	OHS team	Factory Premise
	A comprehensive risk assessment and health and safety audits should be conducted for the factory	Daily	General manager and OHS Team	Factory Premise
	Workers should be trained on occupational health & safety and first-aid administration.	As necessary	General manager and OHS team	Factory Premise
Security	Security men should always be available to alleviate cases of harassments and other related incidences on site.	Daily	Security (In-charge)	Factory Premise

Environmental Issues	Parameters/ Implementation	Monitoring Frequency	Responsibilities	Location
	Installation of security lighting especially at the site.	Daily	Security (On-duty)	Factory Premise
Decommissioning Phase				
Air Quality	Ambient Air Quality (NO_2, PM_{10}, $PM_{2.5}$, SO_2, NH_3, CO_2, CO, Temperature, VOC, O_3, O_2, wind speed and wind direction	Once	Contractor for Demolition	A suitable point on site
Water Quality	Ground water quality (Aluminum, arsenic, chloride, cyanide, manganese, pH, sulfate, total alkalinity as $CaCO_3$, TDS, total hardness as $CaCO_3$, total iron, turbidity)	Once	Contractor for Demolition	Water tank for site use
	Surface water quality (BOD_5, ammonia, arsenic, COD, cyanide, iron, oil & grease, pH, sulfide, TSS, zinc)	Once	Contractor for Demolition	Drain in front of the side
Noise Level	Noise level in decibel	Once	Contractor for Demolition	A suitable point on site

Fire Fighting and Protection Measures

- Make sure that worn wires are replaced.
- Check wiring in hazardous location where the risk of fire is especially high.
- Keep storage areas clear of rubbish.
- Each item of firefighting equipment shall be inspected and tested at appropriate intervals by a competent person. The date of the last inspection shall be entered in a logbook kept for that purpose.
- All the personnel employed in the installation shall be instructed on the use of firefighting equipment.
- Instruction to personnel in case of fire shall be clearly and concisely expressed in writing and prominently displayed on the site.
- "NO SMOKING" signs shall be displayed at conspicuous locations in the factory and highlighted in the case of identification in dull bright.
- Whenever a fire or any accident occurs in the installation, notify the nearest fire station.

Corporate Social Responsibility (CSR) Program

KARISMA Apparel (Myanmar) Company will undertake that 2 % of net profit earned from our business will be contributed towards CSR in the Republic of the Union of Myanmar.

Employees' Welfare Plan

The project proponent has employee's welfare plan and the following mentioned benefits are the usual company practices.

- Staff transportation
- Accommodation
- Uniform
- Meal system
- Health Care
- Parking
- Clinic
- Social Security Fund
- Staff Activities

Emergency Plan

The project proponent also has their emergency plan for project with the followings.

- Fire Protection and prevention
- Evacuation routes
- Occupational health and safety issue
- Emergency incident and work Restoring Team

Public Consultation Meeting

On 2018 November 8, the consultation meeting for staff was held in canteen of KARISMA Apparel (Myanmar) Co., Ltd. In first day, there are total of 1125 numbers of attended list and 953 numbers of suggestion and opinions were collected. Their comments, suggestions, question and answers, attendance lists were clearly described in **Chapter 11** and also attached in **Appendix 56, 57 and 58.**

On 2019 February 6, public consultation meeting was held in Myo Oo Zinamanaung Monastery of Oakthar (9) Ward, Bago Township. In that public meeting, 32 people attended and discussed. That public meeting is aimed for disseminating information of the project to public including stakeholder and requesting their comments. 16 suggestion letters are collected from local community participant who attended the meeting and participated in open discussion. Their comments, suggestions, question and answers, attendance lists were clearly described in **Chapter 11** and attached in **Appendix 59 and 60**.

Conclusion

This Environmental Management Plan (EMP) of KARISMA Apparel (Myanmar) Co., Ltd. has identified major negative impacts that can be successfully mitigated. The critical environmental issues identified by the EMP were related to operation impacts. Residual negative impacts are anticipated to be negligible, provided that the control measures recommended are properly implemented and monitored.

It is observed that most of the negative impacts on the environment are rated low and short-term effect. The project proponent has committed to adhere to prudent implementation of the environmental management plan. They will take extra care to oversee that the benefits fall short provided by the Company do not of those granted under the Labor Laws of the Republic of the Union of Myanmar. They have proposed adequate safety and health mitigation measures as part of the relevant statutory requirements. They have licensed to implement this project subject to adhere to the environmental management plan proposed in this report and the guidelines.

1.0 INTRODUCTION

1.1 Background

KARISMA is a large Hong Kong-based garment manufacturing company that produces cut & sewn cotton jersey knitwear, which is mainly exported to the USA and European markets. KARISMA is owned by the Hong Kong Laws group. With over 45 years of experience in garment production, Laws group has already established a wide network of production bases in China, Vietnam, and Bangladesh. KARISMA is the latest expansion of Laws group, located in Bago Foreign Industrial Park, covering an area of 15 acres. With strong financial background, rich production experience, advanced machines, seasoned technicians, and sophisticated production systems, KARISMA has now over 3,000 workforces with a capacity of advancing to full capacity of 5,000 employees.

In October 2018, Green Myanmar Environmental Services Company Limited (GMES) was requested by KARISMA Apparel (Myanmar) Company Limited to provide professional consultation service to KARISMA Apparel and assist the submission of the Environmental Management Plan (EMP) to the Myanmar Investment Commission (MIC).

This report is prepared for assessing the environmental impact due to the manufacturing of garment which is to be exported. The purpose of the project is to fulfill the increasing demand for ready-made garments in a rapidly growing society and to offer the employment for Myanmar. Proper design/selection, construction, and management of the manufacturing operations would mitigate negative impacts. The main sections of this environmental management plan (EMP) report include definition of the legal and institutional frameworks, description of the project and the environment, impacts assessment, identification of mitigation measures, and presentation of Environmental management system.

This document, the Environmental Management Plan for the KARISMA Apparel (Myanmar) Co., Ltd., is prepared in accordance with the existing policy, laws, rules and instructions and submitted as requirement to receive the Environmental Compliance Certificate (ECC) from MONREC.

1.2 Rationale of the EMP

The Project requires an Environmental Management Plan (EMP) to determine the significant impacts from implementation of the project and a range of mitigation measures. An EMP is also required as per the provision of the Environment Protection Act and Regulations of Government of Myanmar. In this regard, an EMP report for implementing “Manufacturing of Garment on CMP Basis” project was prepared.

1.3 Need of the Project

Ready Made Garments (RMG) industry has occupied a unique place in the industrial scenario of Myanmar by generating substantial export earnings and creating lot of employment. Its contribution to industrial production, employment and export earnings is very significant. This industry provides one of the necessities of life and provides the employment for a lot of people. It also provides maximum employment with minimum capital investment. This industry is highly labor-intensive; hence, it is ideally suited to developing countries like Myanmar. This kind of business can create the employments and benefit for people.

1.4 Scope and Objectives of the EMP

1.4.1 Scope

The scope of the EMP is summarized as follows:

- Collate and review background data and information on the project and the existing environment;
- Conduct field surveys of the study area;
- Identify sensitive receivers (SRs) within the vicinity of the study area;
- Assess the potential environment impacts likely to arise from the construction and operation phases of the project;
- Identify and recommend practical mitigation measures to reduce the potential impacts identified in the assessment; and
- Provide technical advice and support to any Public Consultation Program associated with the project.

There are several technical requirements for assessing specific environmental impacts. These are clearly defined in air and water quality impact, noise impacts, and land contamination impact. Other areas including occupational health and safety, risk, and fire hazards, reporting requirements, capacity building and training and finally work plan and implementation schedule make a more comprehensive EMP report.

1.4.2 Objectives

The objectives of the EMP are to:

- Identify a range of mitigation measures which could reduce and mitigate the potential impacts to minimal or insignificant levels;
- Identify measures that could optimize beneficial impacts;
- Create management structures that address the concerns and complaints of stakeholders with regards to the development;
- Establish a method of monitoring and auditing environmental management practices during all phases of development;
- Ensure that the construction and operational phases of the project continues within the principles of Integrated Environmental Management;
- Detail specific actions deemed necessary to assist in mitigating the environmental impact of the project;
- Ensure that the safety recommendations are complied with;
- Propose mechanisms for monitoring compliance with the EMP and reporting thereon; and
- Specify time periods within which the measures contemplated in the final environmental management plan must be implemented, where appropriate.

The purpose of this report is to provide an environmental impact assessment to demonstrate that there is no insurmountable environmental problem associated with the KARISMA Apparel (Myanmar) Co., Ltd.

This document is consistent with the requirements for Environmental Management Plan report as detailed in the Environmental Impact Assessment Procedures (2015).

To identify potential negative environmental impacts, relevant key environmental factors and to outline an environmental management plan/mitigation plan, the following environmental aspects will be considered.

- Air quality impact;
- Noise impact;
- Water quality impact;
- Sewerage and sewage treatment implications; and
- Waste management implications.

1.5 Salient Features of the Project

KARISMA Apparel (Myanmar) Company Limited is planning to produce all kinds of wearing apparels in knits, and woven sweater with printing and embroidery. The salient features of the project are presented in **Table 1-1.**

Table 1-1 Salient Features of the Project

Characteristics	Description/Quantities
Project Name	Manufacturing of Garment on CMP basis
Project Proponent	KARISMA Apparel (Myanmar) Company Limited
Company Registration No.	114515396
Project Address	Plot No. 18,19 & 20, Bago Foreign Industrial Zone, Nyaung Inn Village, Bago Region, Myanmar.
Geographical Information	Latitude: 96º 27' 30.37"E Longitude: 17º 15' 19.36"N
Type of Land	Industrial Land
Area of Land	15 Acres (60,703 square meters)
Land Acquisition	Lease Land
Lessor	Bago Regional Government
Initial Period permitted to use the land (Validity of land grant)	50 years and extendable to 10 years two times
Type of Investment	100% Foreign Investment
Total Amount of Investment	USD 20 Million
Type of Business	Garment Manufacturing (CMP basis)
Contact Person **Designation** **Contact Details** **Mobile Phone:** **Email:**	Mr. Kinson Lau General Manager 09965877608 kinson.lau@karisma-myanmar.com
Established Date	2nd April 2014
Date of Test Run	24th April 2017

Characteristics	Description/Quantities	
Date of Commercial Run	3rd April 2018	
Surrounding Environment	East Side Industrial Field West Side Industrial Field Left Side Great Man Garment Factory Right Side New Factory (just construction phase)	
Nearest Residential Places	Nyaung Inn Village	
Nearest Water Bodies	Bago River (about 3.1 km)	
Topography	Flat and mainly Alluvium Area	
Raw Materials	(1) Knitted Shell Fabric (2) Knitted Trim Fabric (3) Woven Trim Fabric (4) Spun Polyester Thread (5) Cotton Thread (6) Nylon Thread (7) Main Labels (8) Care Labels (9) Brand Labels (10) Style Labels (11) Shoulder Tape (12) Interlining (13) Hangtags & Price Tickets (14) Buttons	(15) Stickers (16) Zippers (17) Metal Snaps (18) Elastic band (19) Woven Tape (20) Drawstring (21) PE Polybags (22) PP Polybags (23) Carton Box (24) Carton Sticker (25) Hanger (26) Laundry Agent (27) Laundry Detergent
Products	(1) Knitted Crew Neck Tee Shirt (2) Knitted Outerwear (3) Knitted Pant (4) Knitted Dress	
Water Resources	3 tube wells 6" diameter tube wells 2 nos. 8" diameter tube well 1 nos.	
Total Water Demand	96,693.15 m^3/year (25,543,627.88 US Fluid gallons)	
Source of Electrical Power	From national grid line Six transformers (1 x 3000 kVA, 4 x 1000 kVA, 1 x 100 kVA)	
Generator	Five Generators (1 x 340 kVA, 4 x 1063 kVA)	
Annual Diesel Consumption	Around 15000 lit/year	
Employees	5,150 Heads Local employees 5000 (97.09%) Foreign experts and technicians 150 (2.91%)	
Operation Time	Monday- Friday 07:30 AM - 04:15 PM Saturday 07:30 AM - 11:30 AM	
Factory Running Days per Year	About 300 days *(Factory closes on public holidays/ gazette holidays)*	

1.6 Methodology Adopted

The report has been prepared based on information on the factory's activities supplied by the project proponent.

The methodologies adopted for conducting this EMP are as follows:

- **Desktop Research**

  Desktop research was used to establish an environmental information for the EMP. Consulted materials include articles, maps, internet, and photographs.

- **Consultation with Stakeholders**

  Experts in relevant fields, leaders of thought in environmental matters, Non-Governmental Organizations, local communities have been consulted for their opinions on issues relating to the potential ecological and socio-economic impacts of the proposed project.

- **Field Research**

  The fieldwork covered all relevant components of ecological, socio-economic and health components of the environments.

- **Laboratory Analysis**

Samples collected during the one-season field sampling were analyzed in GMES Co., Ltd. laboratory and Ecological Laboratory.

1.7 Identification of the Project Proponent

Concept 2001 (Sportswear) Company Limited and Laws Garments Limited are private companies registered in Hong Kong, they wish to apply permission to establish and operate a garment manufacturing company under the Union of Myanmar Foreign Investment Law to be named as "KARISMA Apparel (Myanmar) Company Limited".

KARISMA Apparel (Myanmar) Co., Ltd. leased land from the Bago Regional Government, the Republic of the Union of Myanmar for the purpose of constructing and operating a garment manufacturing factory. The construction period for this project is 18 months. The validity of investment permit is 50 years.

The objective of this company is to produce knitted and woven sweater products as per MIC Permit.

1.7.1 Information of Project Proponent

Name of Investor/Promoter:	Mr. Cheung Kwok Wing David
Citizenship:	British
Address (Aboard):	38D Block-6, Lynwood Court, Kingswood Villas, Tin Shui Wai, Yuen Long, Hong Kong.
Name and Address of Principal Organization:	Concept 2001 (Sportswear) Co., Ltd., 36/F, Laws Commercial Plaza. 788 Cheung Sha Wan Road, Lai Chi Kok,
Place of Incorporation:	Hong Kong
Type of Investment Business:	Manufacturing of Knitwear on CMP Basis

Table 1-2 List and Particulars of Stakeholders

Sr. No.	Stakeholders		Number of Shares
1.	**Name:**	Concept 2001 (Sportswear) Company Limited	149,999

Sr. No.	Stakeholders		Number of Shares
	Address:	36th Floor, Laws Commercial Plaza, 788 Cheung Sha Wan Road, Lai Chi Kok Kowloon, Hong Kong.	
	Place of Incorporation:	Hong Kong	
2.	**Name:**	Laws Garments Limited	1 (nominee)
	Address:	36th Floor, Laws Commercial Plaza, 788 Cheung Sha Wan Road, Lai Chi Kok Kowloon, Hong Kong.	
	Place of Incorporation:	Hong Kong	

Table 1-3 List of Directors for KARISMA Apparel (Myanmar) Co., Ltd.

Sr. No.	Name of Directors	Citizenship	Passport No.	Address
1.	Mr. Cheung Kwok Wing David	British	706346332	38D Block-6, Lynwood Court, Kingswood Villas, Tin Shui Wai, Yuen Long, Hong Kong.
2.	Mr. Pau Chung Keung	Chinese	KJ0104804	Flat 4, 21st Floor, Block H, Yuet Lai Court, Lai King, Kowloon, Hong Kong.
3.	Mr. Leung Chun Fai	Chinese	KJ0060927	Flat B, 27th Floor, Tower 2, Hill Paramount, 18 Hin Tai Street, Shatin, New Territories, Hong Kong.

1.7.2 Organization Chart of KARISMA

Reflecting the overall nature of the organization envisaged, there is very little hierarchy in the organizational plan of KARISMA Apparel (Myanmar) Company Limited. The organization is structured to provide flexibility, a high level of personal accountability and responsibility while also motivating cross training and sharing of responsibilities, as the need arises, and circumstances permit. The following figure describes the Organization Design of the project.

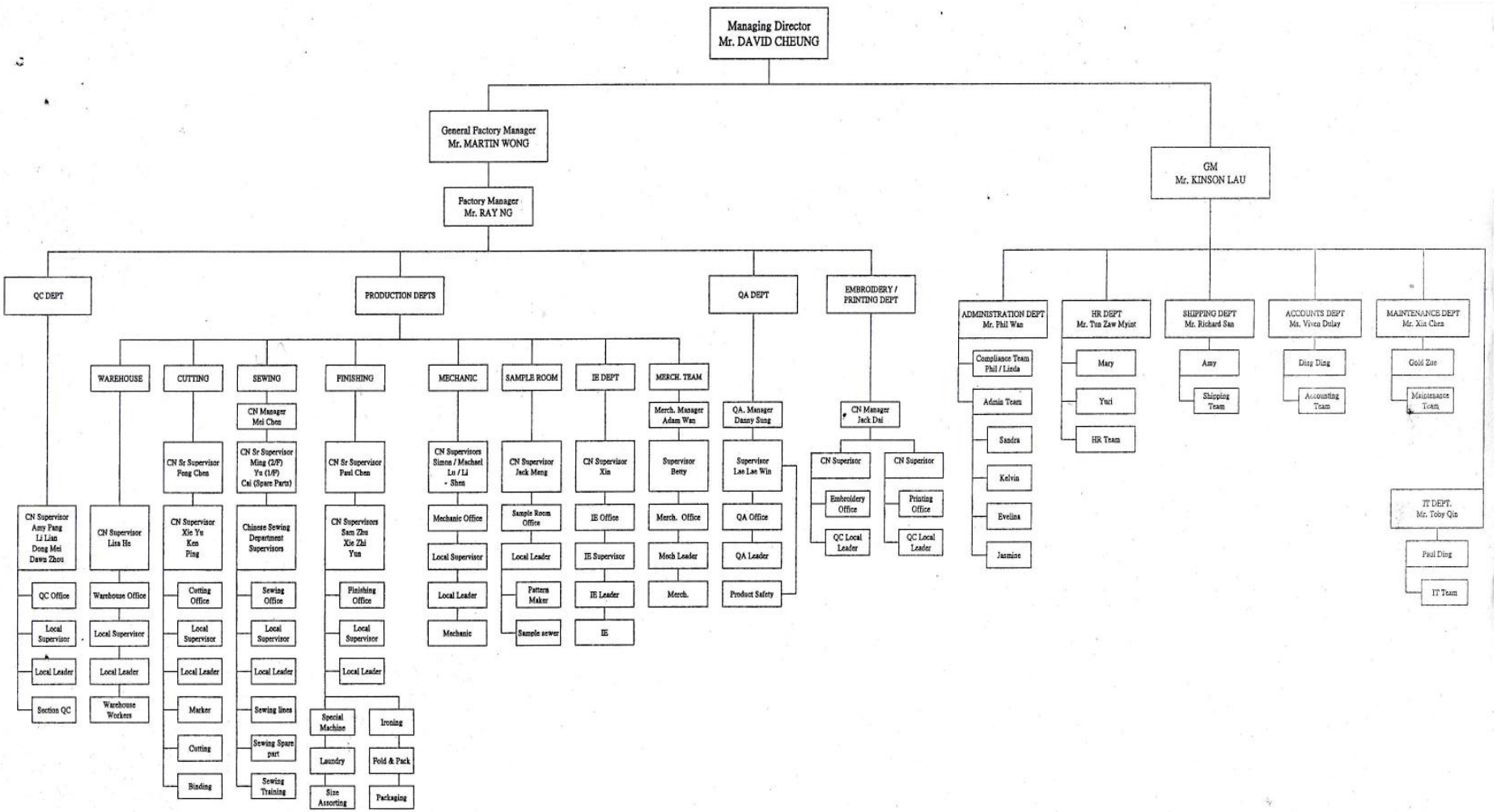


Figure 1-1 Organization Chart of the Project

1.8 EMP Consultants and Team

The planning and conduct of the EMP report of Manufacturing of Garment (CMP) Project was carried out by a team of Green Myanmar Environmental Services Co., Ltd (GMES) together with the support of Mr. Kinson Lau, General Manager from KARISMA Apparel (Myanmar) Co., Ltd.

The details of Information of the study team are described in **Table 1-4**.

Table 1-4 Organization of the GMES's EMP TEAM

Company's Consultant Registration Number - No. 0006			
No.	**Title of Post**	**Terms of Reference**	**Nominee, Organization & Transitional Consultant Registration Number**
1.	Team Leader	• Overall management of EMP operation • Work plan • Technical meeting and workshop • Document reviewing and process flow studying • Lead and facilitation of public consultation • Data compilation and analysis • Coordination with stakeholders	Engr. U Kyaw Soe Win Managing Director Green Myanmar Environmental Services Co., Ltd. Experience in EMP processing No.0019
2.	Consultant (Air Quality Management)	• Give advice on collecting field data for air quality • Assist on air quality control system • Give advice on air pollution evaluate and mitigation • Give advice for data processing, computing, projection, modeling, and analysis • Give advice in report preparation	Engr. U Sein Thaung Oo Chairman Green Myanmar Environmental Services Co., Ltd. Professional Engineer No.0023
3.	Environmental Consultant	• Advise on the design of EIA • Develop term of reference for duty and responsibility among EMP team • Advise on the environmental baseline • Advise on the field survey • Facilitate technical analysis • Streamline the Environmental Management Plan (EMP)	Engr. Daw Khin Swe Aye Former Lecturer, Chemical Engineering Dept., YTU No.0021
4.	Consultant (Environmental Quality Management)	• Assist in preparation of guideline for environmental sampling of air and water quality • Monitor the sample collection	Daw Khin Shwe Htay Former Lecturer, Chemical Engineering Dept., YTU Environmental Engineer

Company's Consultant Registration Number - No. 0006			
No.	**Title of Post**	**Terms of Reference**	**Nominee, Organization & Transitional Consultant Registration Number**
		• Register and inspect the sample collected • Assist in report preparation for environmental baseline	No.0022
5.	Consultant (Laboratory Analysis)	• Advise on data processing and laboratory testing • Prepare instruction for laboratory testing • Check the result of environmental laboratory testing • Compare the laboratory result and verification	U Myo Myint Retired Factory Manager Ministry of Industry (1) No.0026
6.	Specialist (Waste Management)	• Collecting field data for industrial and municipal waste • Assist in laboratory testing • Data processing, computing, projection, modeling and analysis • Assist in report preparation	Engr. Daw Tin May Soe Retired Professor & Head, Chemical Engineering Dept., MTU Experience in environmental toxicology and pollution control No.0028
7.	Quality Engineer	• Develop operational checklist for Environmental Study • In charge for preliminary field visit • Establish field operational office for field survey • Supervise field survey • Finalize checking for report and report formatting	U Kyi Han Bo B.E - Aerospace Fuel and Propellant Engineer Myanmar Aerospace Engineering University
8.	Junior Environmental Experts	• Environmental and social survey • Data collection • Document reviewing • Process studying • Preparation of impact evaluation and assessment, and management plan • Report preparing and formatting	Daw Hnin Htet Htet Hlaing B.E - Port and Harbor Myanmar Maritime University Daw Chaw Htet Htet Soe BE - Civil Engineering Technological University, Taunggyi
9.	Environmental Monitoring Experts	• Environmental baseline measuring • Data analysis • Coordinate for public consultation meeting • Report preparing and formatting	U Myo Thet Naung B.E - Aerospace Fuel and Propellant Engineer Myanmar Aerospace Engineering University U Aung Kyaw Than

Company's Consultant Registration Number - No. 0006			
No.	**Title of Post**	**Terms of Reference**	**Nominee, Organization & Transitional Consultant Registration Number**
			B.E (Chemical Engineering) U Myo Min Htun B. Sc (Physics) U Pyae Phyo Kyaw B. Sc (Forestry)
10.	Manager (Laboratory and Research)	• Water sampling and laboratory testing • Preparation for water and wastewater sampling • Preparation for laboratory testing • Laboratory testing and research work • Reporting for laboratory result	Daw Cherry Thwin B.E (Chemical Engineering)
11.	In-charge (Laboratory and Research)		Daw Wint Phyu Htway B.E (Chemical Engineering)
12.	Supervisor (Laboratory and Research)		Daw Aye Thuzar Hein B.E (Chemical Engineering)

Full address of the company:

Green Myanmar Environmental Services Co., Ltd.
No. 115, Kanaung Min Thar Gyi Road,
Hlaing Thar Yar Industrial City, Industrial Zone (1),
Hlaing Thar Yar Township, Yangon Region, Myanmar.
Tel: +959-897 978 296
Email: gmescompany@gmail.com , info@gmes-mm.com
Company Registration No: 110299931

1.9 Structure of the Report

This report is framed with twelve sections including this introduction chapter:

(1) Introduction
(2) Description of the Project
(3) Policy, Legal and Institutional Framework
(4) Governing Parameters
(5) Summary of Impacts
(6) Description of Proposed Mitigation Measures
(7) Monitoring Program
(8) Reporting Requirements
(9) Emergency Plan
(10) Capacity Development and Training
(11) Public Consultation and Information Disclosure
(12) Work Plan and Implementation Schedule

A number of appendices contain additional information and details referred to in the main text. A bilingual executive summary is also provided.

2.0 DESCRIPTION OF THE PROJECT

2.1 Project Information

The factory is situated in Bago Foreign Industrial Zone of Bago Township, Bago Region. This town shares borders with

- Waw Township and Thanatpin Township of Bago Region in the east,
- Hlegu Township, Taikkyi Twnship of Yangon Region, Thayarwady Township of Bago Region in the west,
- Kawa Township of Bago Region in the south, and
- Daek-U Township and Letpadan Township of Bago Region in the north.

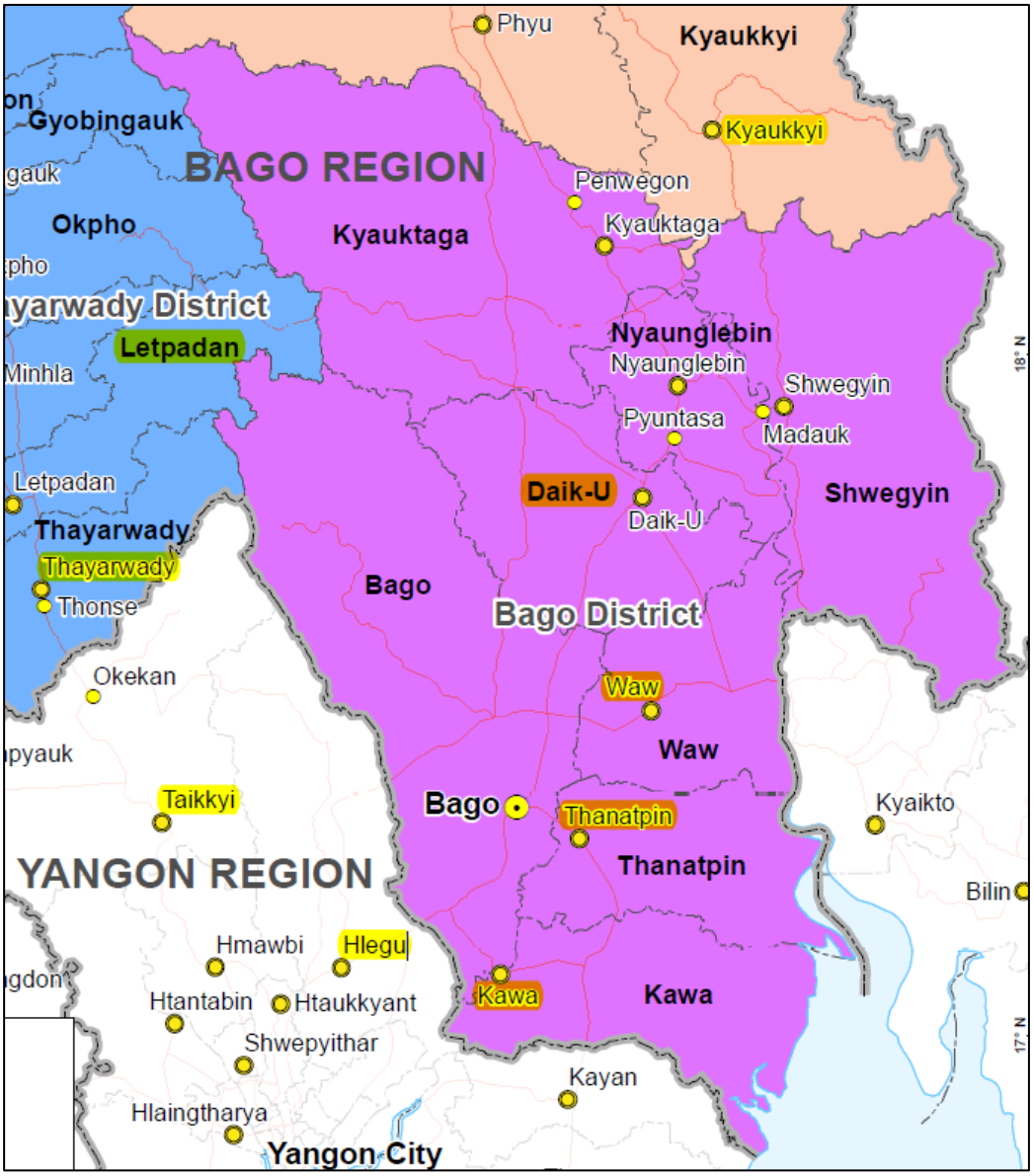


Figure 2-1 Map of Bago Region by Districts and Townships

2.1.1 Project Location

The proposed project, “Manufacturing of Knitwear on CMP Basis” Project, is located at Plot No. 18, 19 & 20, Bago Foreign Industrial Zone, Nyaung Inn Village, Bago Region, Myanmar. (See **Figure 2-2Figure 2-2**)

The factory building is surrounded on the four sides as follows:

- East Side Industrial Field
- West Side Industrial Field
- Left Side Great Man Garment Factory
- Right Side New Factory (just construction phase)

The geographical coordinates of project sites are as follows:

- Latitude: 17º 15' 19.36"N
- Longitude: 96º 27' 30.37"E

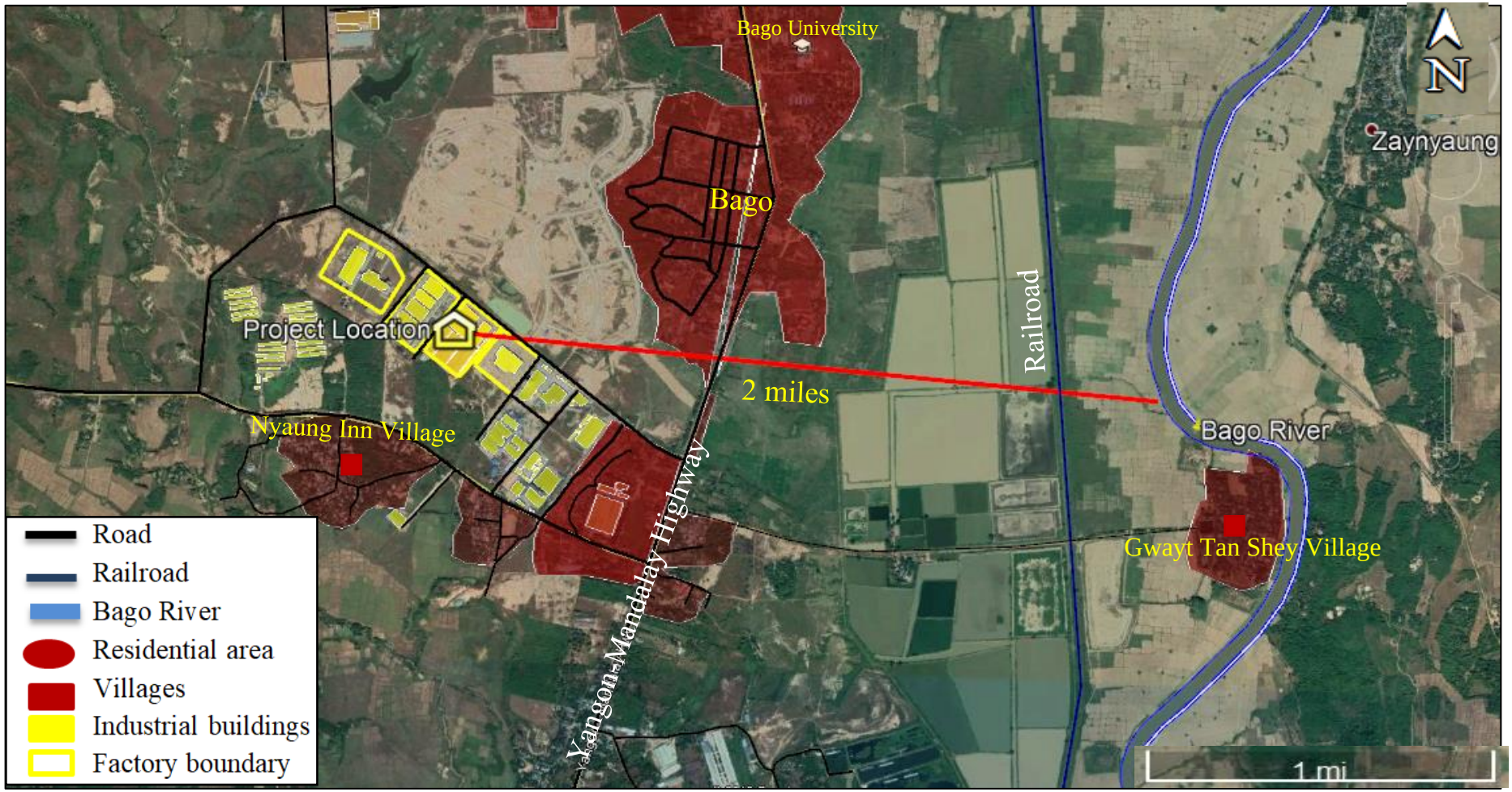


Figure 2-2 Layout Map of Proposed Project

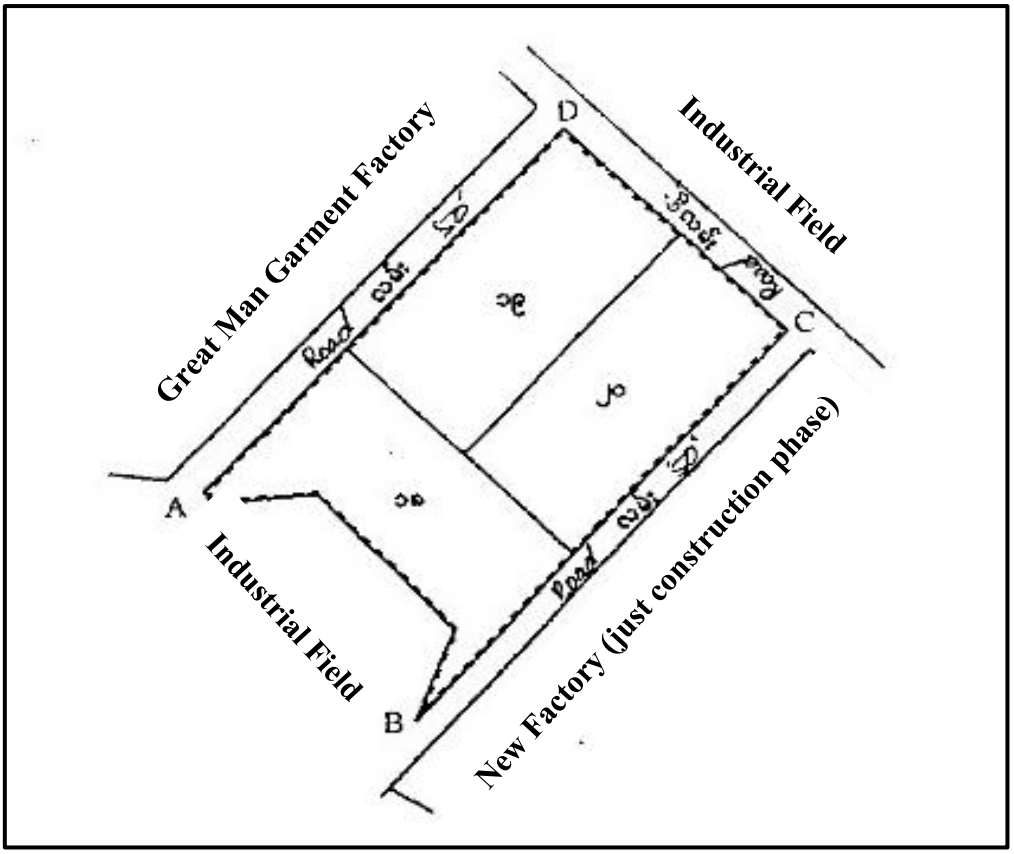


Figure 2-3 Surrounding Environment of the Factory

2.1.2 Area

The area of the proposed project site is 15 Acres (60,703 square meters).

2.1.3 Land Ownership

The owner of the land is the Bago Regional Government, the Republic of the Union of Myanmar.

2.1.4 Site Access

KARISMA Apparel (Myanmar) Co., Ltd. selected Bago Foreign Industrial Park in Bago Township to construct the apparel factory. The access roads of the specific site are as follows.

The project site is accessible by mini-roads and highway. There is Yangon-Mandalay Highway in the west direction of the proposed site. The site can be accessed by driving about 1.1 km from Yangon-Mandalay Highway road into industrial area's main road which is in front of the project site. Another approach road which is west side of the project site, is 1.91 km far from Yangon-Mandalay Highway road. (**See Figure 2-4** and **Figure 2-5**).

Figure 2-4 First Approach Road to the Project Site

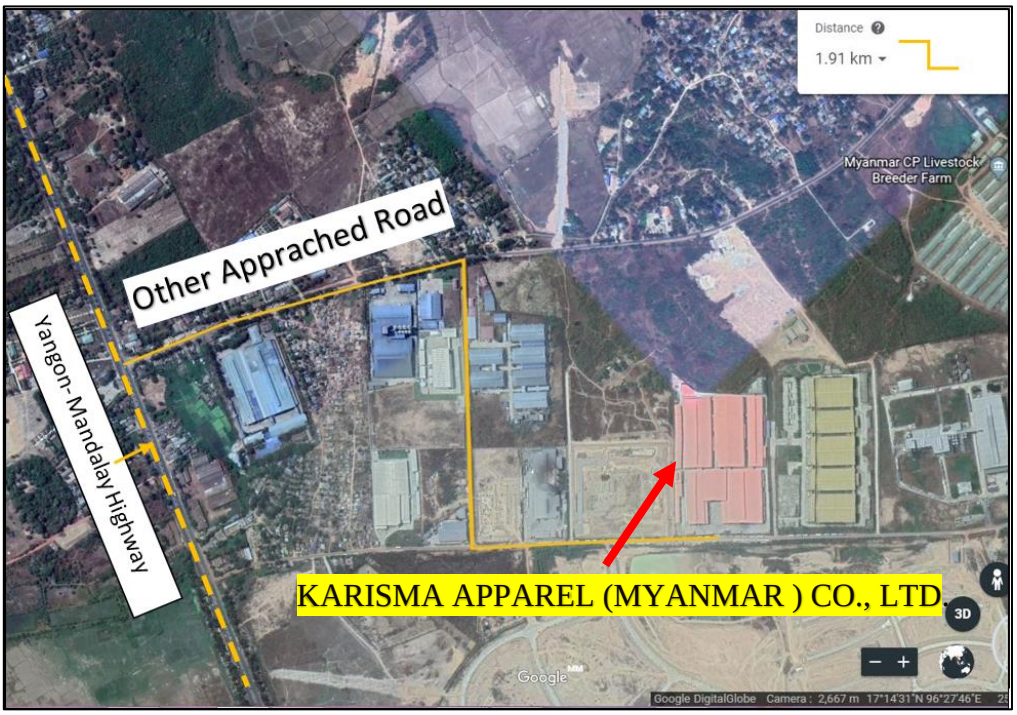


Figure 2-5 Second Approach Road to the Project Site

2.1.5 Project Implementation Schedule

The implementation schedule for this project is described in **Table 2-1**.

Table 2-1 Project Implementation Schedule

Sr. No.	Description	Period
1.	Receiving of License and Permission ▪ Land Grant ▪ MIC Permit	 25 Feb 2014 31 Oct 2014
2.	Design Preparation Stage	1 Nov 2014 ~ 5 Feb 2015
3.	Construction Phase	7 May 2015 ~ 31 Aug 2017
4.	Test Run/Trial Run	1 Sept 2017
5.	Operation Phase	3 April 2018
6.	Demolition Phase	31 Oct 2064

2.2 Financial Information and Investment Plan

KARISMA Apparel (Myanmar) Co., Ltd. is 100% foreign investment. The proposed capital is USD 15 million for the first year and additional USD 5 million for the second year. The financial information and investment plan are shown as follow.

Type of business organization to be formed:	
One Hundred Percent (Foreign Investment)	
Particulars relating to capital of the investment business:	
Amount of foreign capital to be contributed (Equity)	USD 6 Million
Amount of foreign capital to be contributed (Loan)	USD 14 Million
Detail list of foreign capital to be brought in:	
Foreign Currency (Type and Amount)	USD 3.21 Million
Machinery and equipment	USD 16.79 Million
Total Amount of Investment	
USD 20 Million	
Particulars of the Investment Project	
Initial 50 years (extendable and renewable for another period 10 years, 2 times)	

Investment of KARISMA Apparel (Myanmar) Co., Ltd. will help support the objective of the State for allowing foreign investment in Myanmar in the means of economic development, creation of job opportunities, making substantial amount of investment brining in high technology, receiving foreign exchange from Current Market Price (CMP charges) and other.

2.3 Working Hour and Man Power Requirements

2.3.1 Working Hour

The normal working hour is 8 hours per day from Monday to Friday and 4 hours in Saturday. Hence, there is 5 ½ working days per week.

The following table shows the detailed working hours.

Table 2-2 Working Hours of the Factory

Monday ~ Friday	
Morning Section	07:30 a.m. ~ 12:30 p.m.

Lunch Break	12:30 p.m. ~ 01:15 p.m.
Afternoon Section	01:15 p.m. ~ 04:15 p.m.
Overtime (if required)	04:15 p.m. ~ 06:15 p.m.
Saturday	
Working Hours	07:30 a.m. ~ 11:30 a.m.
Lunch Break (if OT arranged)	12:30 a.m. ~ 01:15 p.m.
Overtime (if required)	1st Section - 11:30 a.m. ~ 12:30 p.m. 2nd Section - 01:15 p.m. ~ 04:15 p.m.

*OT charges – 1200 MMK per hour

2.3.2 Manpower Requirement

The manpower requirement of the project is as follows.

Table 2-3 Manpower Requirement

Categories	No.	Position	Year				
			1	2	3	4	5
Foreigners							
Production	1	Skillful worker	0	0	0	0	0
	2	General worker	0	0	0	0	0
	3	Trainee	0	0	0	0	0
	4	Production Assistants	0	0	0	0	0
	5	Production Leaders & Technicians	0	0	0	0	0
	6	Senior Sewing Operators	0	0	0	0	0
	7	Sewing Technician	0	98	98	98	98
	8	Cutting Technician	0	2	2	2	2
	9	Embroidery Technician	0	2	2	2	2
	10	Printing Technician	0	2	2	2	2
	11	Laundry Technician	0	2	2	2	2
	12	Carton Box Technician	0	1	2	2	2
	13	Sewing Mechanic	0	3	3	3	3
	14	Senior Sewing Mechanic	0	2	2	2	2
Factory	15	Factory Manager	0	1	1	1	1
	16	Assistant Factory Manager	0	1	1	1	1
	17	Production Manager	0	1	1	1	1
	18	Assistant Production Manager	0	0	0	0	0
	19	Production Supervisors	0	1	1	1	1
	20	Sewing Section Manager	0	1	1	1	1
	21	Assistant Sewing Section Manager	0	0	0	1	2
	22	Cutting Section Manager	0	1	1	1	1
	23	Assistant Cutting Section Manager	0	0	0	2	2
	24	Finishing Section Manager	0	1	1	1	1
	25	Assistant Finishing Section Manager	0	0	0	2	2
	26	Maintenance Manager	0	1	1	1	1
	27	Assistant Maintenance Manager	0	0	0	1	1
	28	Merchandising Manager	0	1	1	2	2
	29	Assistant Merchandising Manager	0	0	0	1	1
	30	Senior Merchandising Supervisor	0	0	1	2	2

Categories	No.	Position	Year				
			1	2	3	4	5
	31	QC/QA Manager	0	1	1	2	2
	32	Assistant QC/QA Manager	0	0	0	1	1
	33	Quality Assurance Supervisor	0	0	1	1	1
	34	Quality Control Supervisor	0	0	1	1	1
	35	Merchandising Supervisor	0	0	0	0	0
	36	Maintenance Supervisor	0	0	0	0	0
	37	Production Clerical Staffs	0	0	0	0	0
Administration	38	General Manager	0	1	1	1	1
	39	General Manager Assistant	0	0	0	0	0
	40	Administration Manager	0	1	1	1	1
	41	Human Resource Manager	0	0	0	0	0
	42	Finance Manager	0	0	0	0	0
	43	Logistics Manager	0	0	0	0	0
	44	ITC Manager	0	0	0	1	1
	45	Administration Supervisor	0	0	0	0	0
	46	Human Resource Supervisor	0	0	0	0	0
	47	Finance Supervisor	0	0	0	0	0
	48	Clerical & other Staffs	0	0	0	0	0
	Total		**0**	**123**	**128**	**140**	**141**
Local Personnel Required							
Production	1	Skillful worker	0	500	1,410	1,650	1,850
	2	General worker	0	250	705	825	1,000
	3	Trainee	0	630	650	600	600
	4	Production Assistants	0	28	28	28	30
	5	Production Leaders & Technicians	0	43	56	56	58
	6	Senior Sewing Operators	0	0	0	0	0
	7	Sewing Technician	0	0	0	0	0
	8	Cutting Technician	0	0	0	0	0
	9	Embroidery Technician	0	0	0	0	0
	10	Printing Technician	0	0	0	0	0
	11	Laundry Technician	0	0	0	0	0
	12	Carton Box Technician	0	0	0	0	0
	13	Sewing Mechanic	0	0	0	0	0
	14	Senior Sewing Mechanic	0	0	0	0	0
Factory	15	Factory Manager	0	0	0	0	0
	16	Assistant Factory Manager	0	0	0	0	0
	17	Production Manager	0	1	1	1	1
	18	Assistant Production Manager	0	1	1	1	1
	19	Production Supervisors	0	1	4	4	4
	20	Sewing Section Manager	0	0	0	0	0
	21	Assistant Sewing Section Manager	0	0	0	0	0
	22	Cutting Section Manager	0	0	0	0	0
	23	Assistant Cutting Section Manager	0	0	0	0	0
	24	Finishing Section Manager	0	0	0	0	0
	25	Assistant Finishing Section Manager	0	0	0	0	0

Categories	No.	Position	Year				
			1	2	3	4	5
	26	Maintenance Manager	0	0	0	0	0
	27	Assistant Maintenance Manager	0	0	0	0	0
	28	Merchandising Manager	0	0	0	0	0
	29	Assistant Merchandising Manager	0	0	0	0	0
	30	Senior Merchandising Supervisor	0	0	0	0	0
	31	QC/QA Manager	0	0	0	0	0
	32	Assistant QC/QA Manager	0	0	0	0	0
	33	Quality Assurance Supervisor	0	0	0	0	0
	34	Quality Control Supervisor	0	0	0	0	0
	35	Merchandising Supervisor	0	1	1	1	1
	36	Maintenance Supervisor	0	1	2	1	1
	37	Production Clerical Staffs	0	19	22	22	22
Administration	38	General Manager	0	0	0	0	0
	39	General Manager Assistant	0	0	0	0	0
	40	Administration Manager	0	1	1	1	1
	41	Human Resource Manager	0	1	1	1	1
	42	Finance Manager	0	1	1	1	1
	43	Logistics Manager	0	1	1	1	1
	44	ITC Manager	0	1	1	1	1
	45	Administration Supervisor	0	0	0	1	1
	46	Human Resource Supervisor	0	0	0	1	1
	47	Finance Supervisor	0	0	0	1	1
	48	Clerical & other Staffs	2	12	22	30	33
	Total		**2**	**1,492**	**2,907**	**3,227**	**3,609**

2.4 Raw Materials

The raw materials are listed as follows:

Table 2-4 Annual Raw Material Requirements for 5 years

Sr. No.	Items	Units	Quantity				
			Year-1 (Pre-operation)	Year-2 (238,000 Dozs)	Year-3 (840,000 Dozs)	Year-4 (919,800 Dozs)	Year-5 (1,007,181 Dozs)
1.	Knitted Shell Fabric	Kgs	0	851,489	3,005,687	3,341,487	3,694,869
2.	Knitted Trim Fabric	Kgs	0	42,849	151,222	164,516	179,379
3.	Woven Trim Fabric	Yards	0	24,629	86,925	94,914	103,740
4.	Spun Polyester Thread	Cones	0	77,387	273,155	301,784	332,370
5.	Cotton Thread	Cones	0	47,600	168,000	183,960	201,436
6.	Nylon Thread	Cones	0	11,900	42,000	45,990	50,359
7.	Main Labels	Dozs	0	238,000	840,000	919,800	1,007,181
8.	Care Labels	Dozs	0	238,000	840,000	919,800	1,007,181
9.	Brand Labels	Dozs	0	238,000	840,000	919,800	1,007,181
10.	Style Label	Dozs	0	238,000	840,000	919,800	1,007,181
11.	Shoulder Tape	Yards	0	3,427,200	12,096,000	13,245,120	14,503,406

Sr. No.	Items	Units	Quantity				
			Year-1 (Pre-operation)	Year-2 (238,000 Dozs)	Year-3 (840,000 Dozs)	Year-4 (919,800 Dozs)	Year-5 (1,007,181 Dozs)
12.	Interlining	Yards	0	42,587	150,298	163,505	178,271
13.	Hangtags & Price Tickets	Dozs	0	476,000	1,680,000	1,839,600	2,014,362
14.	Buttons	Gross	0	8,330	29,400	32,193	35,251
15.	Stickers	Dozs	0	398,463	1,406,225	1,526,419	1,661,849
16.	Zippers	Dozs	0	29,937	105,775	129,221	151,077
17.	Metal Snaps	Gross	0	5,355	18,900	20,696	22,662
18.	Elastic band	Yards	0	924,154	3,261,720	3,571,583	3,910.884
19.	Woven Tape	Yards	0	1,900,243	6,706,625	7,330,357	8,017,161
20.	Drawstring	Yards	0	1,601,723	5,655,325	6,447,131	7,241,631
21.	PE Polybags	Dozs	0	238,000	840,000	919,800	1,007,181
22.	PP Polybags	Dozs	0	19,833	70,000	76,650	83,932
23.	Carton Box	Dozs	0	19,833	70,00	76,650	83,932
24.	Carton Sticker	Dozs	0	238,000	840,000	919,800	1,007,181
25.	Hanger	Dozs	0	21,420	75,600	82,782	90,646
26.	Laundry Agent	Kgs	0	47,600	168,000	183,960	201,436
27.	Laundry Detergent	Kgs	0	11,900	42,000	45,990	50,359

2.5 Product Profile, Production Capacity and Sale Plan

Variety of garments to be produced from KARISMA Apparel factory are knitted crew neck tee shirt, knitted outerwear, knitted pant and dress.

The production capacity will be increased gradually and will be exported to Europe, USA, Canada, France and Belgian.

The annual production capacity is listed in the following **Table 2-5.**

Table 2-5 Annual Production Capacity

Sr. No.	Products Name	AU	Qty				
			Year-1	Year-2	Year-3	Year-4	Year-5
1.	Knitted Crew Neck Tee Shirt	Dozs	0	160,463	566,225	606,619	654,668
2.	Knitted Outerwear	Dozs	0	29,937	105,775	129,221	151,077
3.	Knitted Pants	Dozs	0	26,180	92,400	101,178	110,790
4.	Knitted Dress	Dozs	0	21,420	75,600	82,782	90,646
Total Amount		**Dozs**	**0**	**238,000**	**840,000**	**919,800**	**1,007,181**

Figure 2-6 Photos of Products

There is no by-product (secondary product derived from a production process, manufacturing process or chemical reaction) in KARISMA's apparel manufacturing.

All the things generated from process such as the scraps, threads except the product are assumed as solid wastes.

2.6 Facilities and Infrastructure

2.6.1 Layout Plan of Factory Buildings

There are six main buildings and eight auxiliary buildings in the factory. The following table describes the details dimensions of buildings of the proposed project.

Table 2-6 Detail Dimensions of Each Room of the Proposed Project

Sr. No.	Type of Building	Structure	Storey	Building Measurements	Built Area (m^2)
				Length (M) x Width (M)	
6 Main Buildings					
1.	Warehouse Plant #1	Steel	1	(84 M x 48 M) + (108 M x 18 M)	5,976

Sr. No.	Type of Building	Structure	Storey	Building Measurements	Built Area (m^2)
				Length (M) x Width (M)	
2.	Production Plant #2 & Office	Steel	2	G/F (116 M x 48 M) + 1st /F (66 M x 24 M)	7,152
3.	Production Plant #3 & Canteen	Steel	1	(78 M x 30 M) + (72 M x 30 M)	4,500
4.	Production Plant #4	Steel	2 (G/F&1/F)	150 M x 60 M	18,000
5.	Production Plant #5	Steel	1	114 M x 60 M	6,840
6.	Production Plant #6	Steel	1	114 M x 54 M	6,156
8 Auxiliary Buildings					
1.	Transformer Yard	R.C.C	1	12 M x 10 M	120
2.	Switch Board House	Steel	1	18 M x 9 M	162
3.	Generator House	Steel		30 M x 10 M	300
4.	Maintenance House	Steel	1	32 M x 10 M	320
5.	Wood Storage Room	Steel	1	12 M x 11M	132
6.	Boiler Room	Steel	1	25 M x 11 M	275
7.	Storage Room	Steel	1	30 M x 5 M	150
8.	Gate House	Steel	1 (2 No.)	a. (6.2 M x 1.5 M) b. (1.5 M x 1.2 M)	27.48

1 Meter = 3.28 feet , 1 sq. Meter = 10.764 sq. Feet

Figure 2-7 Factory Layout 3D Design

2.6.2 Power Supply and Energy Requirement

Electricity is transmitted from existing national grid line to the Company's electrical system by connecting with 6 units of transformers at the factory. The necessary guidelines and precautionary measures relating to the use of electricity shall be adhered to. The internal infrastructure has to be designed. The necessary layouts and cable sizes needed are to be determined for the projected electrical demand.

Annual electricity requirement is 4,469,000 kWh.

For lighting, air-conditioning, air ventilation system and the production sectors, electricity is consumed continuously for the whole working time of the factory.

As the one unit of 4,000 kVA transformer was broken down, 3,000 kVA is used instead of it.

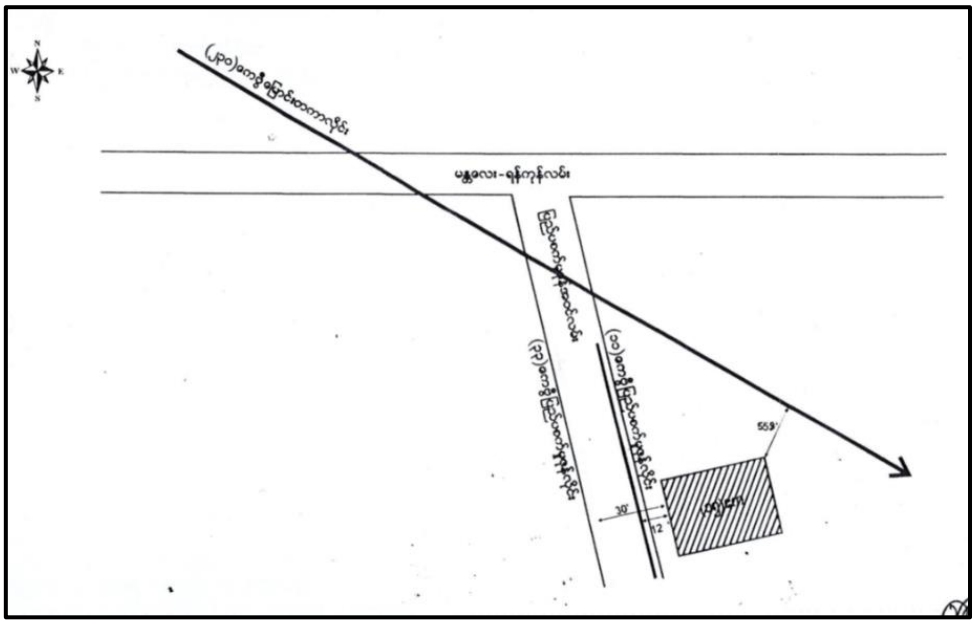


Figure 2-8 Route Layout for Electricity

Figure 2-9 Transformers

Transformer 3,000 kVA	1	Set
Transformer 1,000 kVA	4	Set
Transformer 100 kVA	1	Set

Table 2-7 Electricity Consumption

Sr. No.	Month	Electricity Consumption (kWh)			
		2017	2018	2019	2020
1.	January	204,000	282,000	457,000	462,000
2.	February	177,000	260,000	421,000	529,000
3.	March	269,000	385,000	492,000	422,000
4.	April	170,000	237,000	392,000	295,000
5.	May	271,000	431,000	515,000	512,000
6.	June	295,000	429,000	569,000	507,000
7.	July	261,00	401,000	491,000	401,000
8.	August	307,00	412,000	454,000	634,000
9.	September	376,000	416,000	511,000	433,000
10.	October	340,000	393,000	496,000	277,000
11.	November	392,000	399,000	472,000	555,000
12.	December	361,000	424,000	477,000	544,000
Total		**3,423,000**	**4,469,000**	**5,747,000**	**5,571,000**

2.6.3 Solar Energy Panel

There are 43 numbers of solar energy panels in this project and use as extra electricity. These solar energy panels convert the sun's rays into electricity for the purpose of lighting system and hot water system. These solar panels are used for street lights within the factory premise and at dormitory for the purpose of hot water system.



2.6.4 Generator, Boiler and Compressor Specification

Generator

Four 1063 kVA generators and one 340 kVA emergency generator are used in KARISMA Apparel (Myanmar) Co., Ltd. Power from the generator is used as an addition to the Power supply line and for Emergency backup in case of power failure.

Generator (340 kVA)	1 Set
Generator (1063 kVA)	4 Sets

The specifications of the generators are listed below:

	1063 kVA Generator (Four units)	**340 kVA Generator (One unit)**
Maximum Capacity: kVA	1063	340
Rated Voltage: V	400	400
Power (PRP): kW	800	240
Power (ESP): kW	880	880
Model:	MAGNA MAX 850-4	Cummins 340 DFCE
Engine Type:	Cummins KTA 38-65	Cummins NTA 855-G6
Fuel:	Diesel	Diesel
Frequency: Hz	50	50
Rated Rotating Speed: r/min	1500	1500
Rated Current: A	1443	613
Power factor:	0.8	0.8
Water Temperature: (˚C)	85,84, 85	84
Lube Oil Temperature: (˚C)	82, 81, 80, 80	40
Lube Oil Pressure: (bar)	4, 3.8, 4.1, 3.8	4.1
Charging Indication:	25.6, 25.5, 25.3, 25.4	25.3
Performance Grade:	G2	G2

Figure 2-11 Generators

Boiler

Pressure:	1.25 MPa
Fuel:	Firewood
Biomass Boiler (4T/Hr.)	2 sets
Boiler Stack Height:	25 m

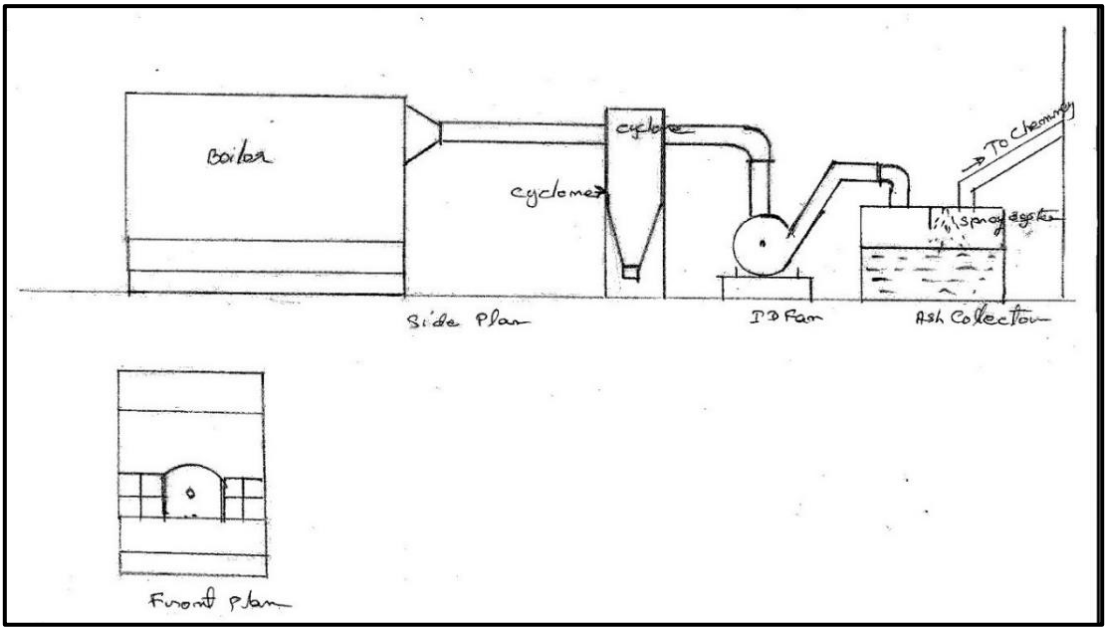


Figure 2-12 Boiler Design

Figure 2-13 Photos of Boilers

Compressor

The compressors are used for increasing the pressure of air and providing high pressure air to drive machines' movement in workplace.

Figure 2-14 Compressor Room

2.6.5 Fuel Requirements

Types of fuel used	***Consumption***
Diesel	Generator, Diesel cars and Trucks (Highway)
Gasoline	Office Vehicles (Gasoline cars)
Firewood	Boiler

The follow table shows the fuel consumption for the factory. Firewood is stored in separate room which is beside boiler room. Diesel is stored in separated room with two (800 gallons' capacity) iron tanks. **(See Figure 2-14 and Figure 2-15**)

Table 2-8 Yearly Records of Fuel Consumption

Year	Month	Consumption				
		Firewood (Boiler)	Diesel			Gasoline (Vehicles)
			Generator	Cars	Highway (Trucks)	
		(kg)	(Liter)			
2016	Jan	-	-	669.60	0.00	-
	Feb	-	-	1021.03	0.00	-
	Mar	-	-	1498.88	0.00	-

Year	Month	Consumption				
		Firewood (Boiler)	Diesel			Gasoline (Vehicles)
			Generator	Cars	Highway (Trucks)	
		(kg)	(Liter)			
(Trial Production Period)	Apr	-	1992.2	976.77	0.00	-
	May	-	1957.5	1566.33	0.00	-
	Jun	-	788.25	1531.48	319.87	-
	Jul	-	453.47	1845.18	233.78	-
	Aug	-	606.3	1631.29	428.15	-
	Sep	-	1989.35	1457.43	429.85	-
	Oct	-	1914.45	1656.60	626.90	-
	Nov	-	2190.85	1583.02	653.91	-
	Dec	-	3008.1	1004.95	680.08	-
Total (2016)		**-**	**14900.47**	**16442.55**	**3372.54**	**-**
2017	Jan	-	556	1748.46	748.50	-
	Feb	-	501	1409.29	752.92	-
	Mar	253020	513	2184.21	745.08	-
	Apr	115740	184	1720.18	428.35	-
	May	226980	12638	833.05	508.34	-
	Jun	218880	1325	676.82	568.96	-
	Jul	182160	430	446.93	408.04	-
	Aug	185160	1435	824.87	155.72	-
	Sep	241280	765	703.11	154.90	-
	Oct	240300	1696	740.58	295.42	-
	Nov	167900	2122	866.35	647.65	-
	Dec	220020	1129	993.849	514.07	96.381
Total (2017)		**2292820**	**23293**	**13147.70**	**5927.95**	**96.381**
2018	Jan	212880	763.7	796.61	392.49	395.90
	Feb	228740	1462.5	647.56	333.44	499.00
	Mar	246500	1592.5	868.5	236.1	350.34
	Apr	202360	910.0	916.6	419.0	459.11
	May	219940	688.8	909.9	786.1	711.35
	Jun	251880	1518.6	714.8	714.8	740.62
	Jul	210120	145.8	508.6	894.9	675.39
	Aug	236440	3460.2	321.1	1101.0	1624.81
	Sep	222400	620.9	300.4	986.1	1823.51
	Oct	162460	2230.6	1209.4	914.1	663.154
	Nov	216340	1244.2	363.0	807.1	1258.17
	Dec	231180	577.6	524.3	1058.1	907.653
Total (2018)		**2641240**	**15215.4**	**8080.66**	**18643.40**	**10109.01**
2019	Jan	166900	345.83	1281.427	867.441	1478.185
	Feb	255320	341.25	1284.681	522.578	1244.895
	Mar	347880	124.83	446.53	262.070	1062.71
	Apr	132040	3903.25	497.61	473.9	669.74

Year	Month	Consumption				
		Firewood (Boiler)	Diesel			Gasoline (Vehicles)
			Generator	Cars	Highway (Trucks)	
		(kg)	(Liter)			
	May	307100	4479.08	582.67	451.787	1014.918
	Jun	270680	3796.42	521.61	462.37	1297.82
	Jul	218480	926.25	737.67	332.16	1375.52
	Aug	286740	1921.15	727.32	243.24	1303.56
	Sep	234040	2853.50	438	460.34	1026.28
	Oct	182660	1649.75	412.25	642.36	835.86
	Nov	233420	1490.33	465.68	450.02	1235.600
	Dec	224560	4499.50	580.24	515.6	1008.110
Total (2019)		**2859820**	**26331.15**	**7975.688**	**5683.866**	**13553.198**
2020	Jan	238900	513.5	898.12	653.77	1106.02
	Feb	219840	630.5	1017.24	572.9	897.6
	Mar	235860	1010.75	1065.38	489.28	835.12
	Apr	16880	695.5	169.64	317.72	390.12
	May	257780	1026.05	440.09	254.891	723.637
	Jun	173320	2096.25	357.44	344.6	643.2
	Jul	140920	3360.5	201.7	242.4	869.53
	Aug	173240	0	279.83	203.415	709.733
	Sep	172700	2031.13	696.67	0	682.22
	Oct	33520	275.67	119.82	51.72	599.53
	Nov	206300	1694.68	360.72	62.5	578.04
	Dec	192580	2723.5	409.74	0	670.7
Total (2020)		**2061840**	**16058.03**	**6016.38**	**3193.196**	**8706.15**

Figure 2-15 Diesel Storage Room and Two Diesel Tanks

Figure 2-16 Firewood (Fuel for Boiler) Storage Room

2.6.6 Water Supply, Drinking Water Treatment, Water Consumption and Wastewater Generation

Water Supply

6-in tube well	two numbers
8-in tube well	one number

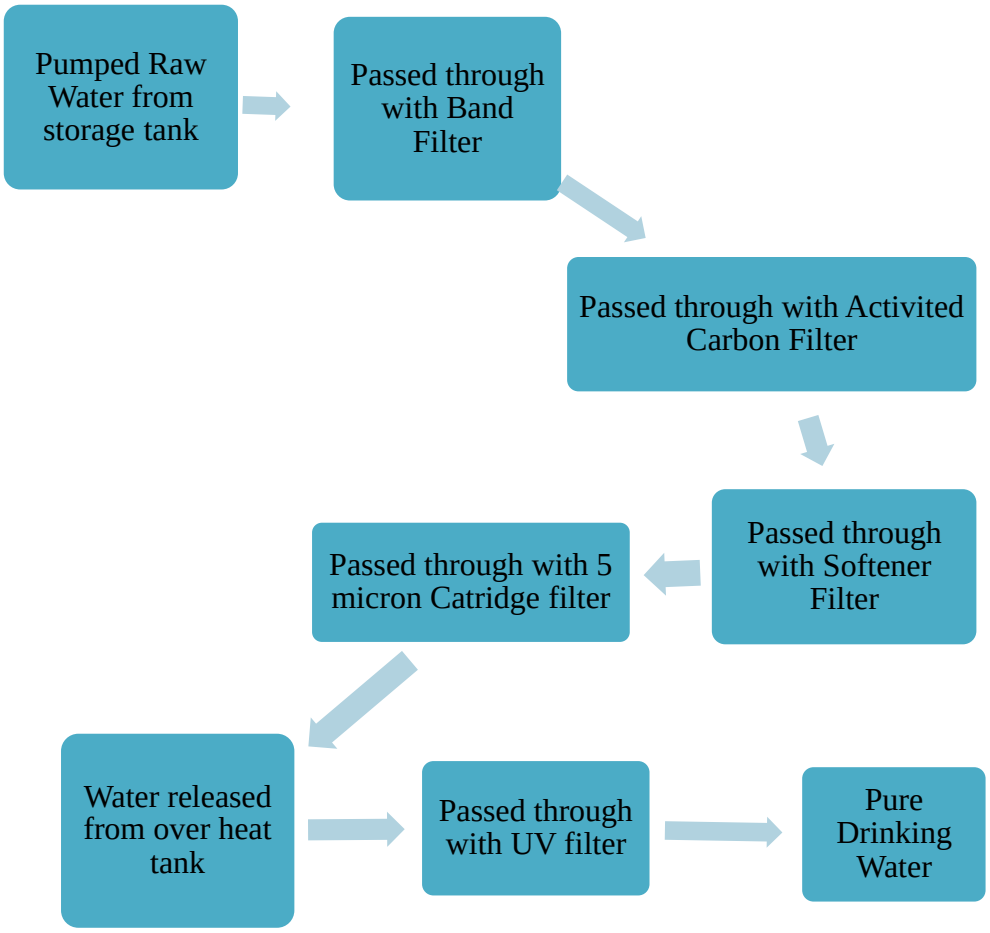
The water is pumped from tube wells and stored in tanks and stainless-steel water tanks.

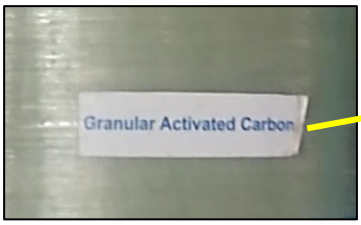
Drinking Water Treatment System

The project proponent provided water purified by Reverse Osmosis (RO) system in drinking water steel tanks and regularly checks the water quality. And drinking water quality results from ISO TECH laboratory are displayed in walls. The process of drinking water treatment system is mentioned in below. This Regeneration System is used to put Resin Chemical which is used to reduce the lime.

Figure 2-17 Lab Results and Treatment for Drinking Water in KARISMA

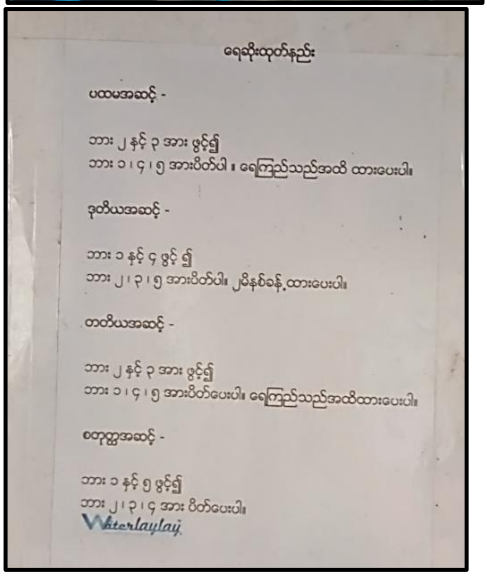
Water Treatment Process with Regeneration System for Drinking Water





Iron removal

Multi Media Filter



ရေဆိုးထုတ်နည်း

ပထမအဆင့် -

ဘား ၂ နှင့် ၃ အား ဖွင့်၍
ဘား ၁၊၄၊၅ အားပိတ်ပါ။ ရေကြည်သည်အထိ ထားပေးပါ။

ဒုတိယအဆင့် -

ဘား ၁ နှင့် ၄ ဖွင့် ၍
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တတိယအဆင့် -

ဘား ၂ နှင့် ၃ အား ဖွင့်၍
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Waterlaylay

Figure 2-18 Water Treatment Room

Water Consumption (in 2018)

Total water requirement	96,693.15 m^3 (34,146.86 tons, 25,543,627.88 US Fluid gallons)
Daily water used for boiler	550 m^3 (194.23 tons, 145,294.6 US Fluid gallons)

Water Storage* (*three tanks)

Overhead tank	45 tons (127.425 m^3) capacity
Water storage tank	225 tons (637.12 m^3) capacity
Water storage tank for firefighting.	95.349 tons (270m^3) capacity

There are 25 stainless steel water tanks (400-liter capacity) are provided in the factory. There are also 3000 L stainless steel tanks outside the dormitory and 400 L stainless steel tank in the kitchen. By comparing daily water requirement with storage capacity tanks, KARISMA apparel factory has sufficient water for daily use.

The water is purified and distributed through pipes for drinking purpose. The project proponent provides three drinking water stations in the factory.

Boiler water is used after treatment. The following table shows the monthly amount of water consumption in three consecutive years.

Table 2-9 Annual Water Consumption

Year	Month	Water Consumption (m^3)				
		Boiler	Printing	Washing	Domestic	Total (Monthly)
2017	January	211.4	60.45	60	2,800.15	3,132
	February	209.8	53.04	93	2,554.16	2,910
	March	286.8	76.98	70	3,636.22	4,070
	April	166.4	51.12	116	2,318.48	2,652
	May	290	77.58	367	4,961.42	5,696
	June	199.8	84.36	77	4,932.84	5,294

Year	Month	Water Consumption (m^3)				
		Boiler	Printing	Washing	Domestic	Total (Monthly)
	July	378.2	73.47	16	3,888.33	4,356
	August	556.35	94.14	210	6,196.51	7,057
	September	601.05	140.64	72	7,953.31	8,767
	October	599.4	96	64	5,501.6	6,261
	November	683	90.57	72	5,660.43	6,506
	December	586.65	75.14	49	7,006.21	7,717
	Total (2017)	**4,768.85**	**973.49**	**1,266**	**57,409.66**	**64,418**
2018	January	748	104.79	42	6,433.81	7,328.6
	February	456	92.46	37	4,885.54	5,471
	March	421.8	107.25	293	5,154.95	5,977
	April	297	63.45	180	3,239.55	3,780
	May	581.8	95.2	382	6,992	8,051
	June	693.8	179.28	106	11,559.92	12,539
	July	772	137.07	146	7,711.13	8,766.2
	August	686.55	202.38	380	10,434.07	11,703
	September	603	155.25	121	8,751.25	9,630.5
	October	758.4	105.27	111	6,437.33	7,412
	November	1,075.6	105.36	569	7,709.04	9,459
	December	456	65.92	69	5,984.93	6,575.85
	Total (2018)	**7,549.95**	**1,413.68**	**2,436**	**85,293.52**	**96,693.15**
2019	January	1,167	138	172	9,124	10,601
	February	820	140	92	7,802	8,5854
	March	856	136	53	7,829	8,874
	April	976	163	48	9,168	10,355
	May	1,154	109	203	9,942	11,408
	June	1,137	113	70	10,099	11,419
	July	828	170	19	8,797	9,814
	August	528	94	30	6,020	6,674
	September	553	131	35	7,354	8,073
	October	642	101	46	5,840	6,629
	November	643	101	109	5,845	6,698
	December	540	78	173	6,892	7,683
	Total (2019)	**9,844**	**1,474**	**1,050**	**94,712**	
2019	January	777	102	117	6,392	7,388
	February	800	112	53	6,808	7,773
	March	841	111	34	6,943	7,929
	April	517	70	21	4,346	4,954
	May	631	58	0	5,387	6,076
	June	769	77	0	6,829	7,675
	July	771	115	0	6,815	7,701
	August	589	105	0	6,745	7,439
	September	503	93	0	5,845	6,441
	October	130	31	0	1,525	1,686

Year	Month	Water Consumption (m^3)				
		Boiler	Printing	Washing	Domestic	Total (Monthly)
	November	672	96	0	5,788	6,556
	December	722	80	20	8,008	8,830
Total (2020)		**7,722**	**1,050**	**245**	**71,431**	

Data Source: M & E, Evidence: Monthly Meter Reading Record

Figure 2-19 Water Storage Tanks for Domestic Usage and Firefighting

Figure 2-20 Overhead Water Tank and Stainless-Steel Water Tanks in Canteens

Figure 2-21 Water Tanks and Water Taps for Drinking and Domestic Usage

Figure 2-22 Water Tanks in Dormitory

Figure 2-23 Water Taps and Tanks inside the Office and Operation Area

2.6.7 Machinery and Equipment

The machinery and equipment are listed as follows:

Table 2-10 List of Machinery and Equipment (Import)

Sr. No.	Equipment	Qty	A/U
1	Light Box	3	Set
2	Fabric Inspection Machine	6	Set
3	Fabric Relaxation Machine	6	Set
4	Shrinkage and forming fabric Machine	3	Set
5	Binding Cutting Machine	3	Set
6	Fabric Rolling Machine	3	Set
7	Sticker Printer	3	Set
8	Manual Hydromantic Forklift	25	Set
9	Fabric End Cutter	36	Set
10	Die Cut Machine	6	Set
11	Straight Knife Cutting Machine with auto-sharpening	50	Set
12	Air-operated Heal transfer Machine	20	Set
13	Air Float Cutting Table with electric tracking Set	24	Set
14	Assembly Wood & Steel Cutting Table Set	24	Set
15	Automatic Fabric Spreading Machine	24	Set
16	Standard Attachment for Automatic Fabric Spreading Machine	24	Set
17	Manual Fabric Spreading Machines and accessories & rails	24	Set
18	Computerized Cutting Machine	2	Set
19	Fabric Lifter	24	Set
20	Electric weighing Scale	15	Set
21	Pattern Writer	3	Set
22	Patterns Cutting Plotter	3	Set
23	Marker Plotter	3	Set
24	Stainless Steel Glove	80	Set
25	Fusing Machine	6	Set
26	Band-knife Cutting Machine	1	Set
27	Bias Cut Binding Cutting Machine (for Circular fabric)	3	Set
28	Stainless Steel Fabric Scissors	100	Set

Sr. No.	Equipment	Qty	A/U
29	Handhold Numbering Machine	30	Set
30	Intelligent Automation Hanging Production System & Facilities	1,476	Station
	(a) 380-Volt AC Motor	82	Piece
	(b) 220-Volt AC Motor	1,478	Piece
	(c) Frequency Inverter	41	Piece
	(d) Electric Relay	41	Piece
	(e) Air Cylinder	4,430	Piece
	(f) Trip Gear	2,952	Set
	(g) Into Station and Out Station Components	1,476	Set
	(h) Limit Switch	1,476	Piece
	(i) Main Rail Chain	1,476	Piece
	(j) White Chain	1,476	Piece
	(k) Solenoid Vent Valve	740	Piece
	(l) Capacitance Box	740	Piece
	(m) Main Board	370	Piece
	(n) Card Reader	2,951	Piece
	(o) Photoelectric Switch	1,476	Piece
	(p) Handheld Terminal	1,476	Piece
	(q) Push Button	1,476	Piece
	(r) PLC/Programmable Logic Controller	41	Piece
	(s) Electronic Hangers	30,000	Piece
	(t) Desktop Card Reader	41	Piece
	(u) CAN Bus Device	41	Piece
	(v) Grand dog	41	Piece
	(w) Attached accessories	41	Set
31	Single Needle Lockstitch Sewing Machine	905	Set
32	Flatlock Sewing Machine	423	Set
33	4-thread Overlock Sewing Machine	581	Set
34	Computer-controlled Cycle Machine	20	Set
35	Buttonhole Sewing Machine	17	Set
36	Button Mounting Machine	17	Set
37	Bar tack Sewing Machine	55	Set
38	Double Needle Chainstitch/Lockstitch Sewing Machine	65	Set
39	Multi-needle Sewing Machine	15	Set
40	Single Needle Cut-edge Sewing Machine	6	Set
41	5-thread Over edge Sewing Machine	20	Set
42	Automatic Placket Sewing Machine	5	Set
43	Multi-purpose Sewing Machine	150	Set
44	Attachments and Accessories for Sewing Machine	200	Set
45	Electric Snap Attaching Machine	20	Set
46	Thread End Trimming Machine	160	Set
47	Steam Iron	180	Set
48	Vacuum Suck Ironing Table	180	Set
49	Automatic Conveyor for Ironing Table	10	Set
50	Electric Heating Steam Boiler	4	Set
51	Industrial Washing Machine	10	Set
52	Industrial Extracting Machine	10	Set
53	Industrial Drying Machine	50	Set

Sr. No.	Equipment	Qty	A/U
54	Washing & Extracting Combined Machine	12	Set
55	Cleaning Spray	15	Set
56	Metal Detector	8	Set
57	Handy Metal Detector	50	Set
58	Thread Sucking Machine	6	Set
59	Strapping Machine	12	Set
60	Cloth Edge Abrader	6	Set
61	Computerized Embroidery Machines	34	Set
62	Octopus Printing Machines	4	Set
63	Oval Screen-Printing Machines	3	Set
64	Intelligent Production Management System & Facilities		
	(a) Wireless Handheld Terminal	2,000	Set
	(b) Wireless Receiving Antenna	15	Set
	(c) Card Dispenser	6	Set
	(d) Wireless Terminal Power Cord	2,000	Piece
	(e) RFID Circular Card	300,000	Piece
65	Big Electric Exhaust Cone Fan	150	Set
66	180" Super Spider Fan	10	Set
67	160"Super Spider Fan	10	Set
68	Celling Fan	600	Set
69	Thread Divider	10	Set
70	Explosion Proof Lamp Set	250	Set
71	Generator (340 kVA)	1	Set
72	Generator (1063 kVA)	4	Set
73	Biomass Boiler (4 T/Hr.) and attached equipment	2	Set
74	Paper Corrugation & Rolling Machine	1	Set
75	Paper Die Cut & Press Machine	6	Set
76	Paper Printing Machine	6	Set
77	Carton Box Staplers	4	Set
78	Air Compressor	6	Set
79	Air Dryer for Air Compressor	4	Set
80	Filter for Air Compressor	4	Set
81	Segregator for Air Compressor	4	Set
82	Pressure Vessel (6 Cubic meters)	3	Set
83	Cargo Lift	2	Set
84	Water Cooling & Negative Pressure Ventilation System & Facilities		
	(a) Boltless Cone Fan	216	Set
	(b) Electronic Automatic Control Unit	9	Set
	(c) Cooling Pads	1,080	Set
	(d) Upper & Lower Aluminum Trough	108	Set
	(e) PVC Nipple	216	Set
	(f) Water Pump	23	Set
85	Flat Plate Cleaning Machine	8	Set
86	Eye Bath Tub	5	Set
87	Warehouse Storage Rack Set	3	Set
88	Stylus Printer	5	Set
89	T5 Light Tube/LCD Light Tube Set	5,000	Set

Sr. No.	Equipment	Qty	A/U
90	LED Light Tube Set	5,000	Set
91	Automatic Voltage Stabilizer	5	Set
92	Solar Energy Panel	200	Set
93	Water Filter System with attached Facilities	4	Set
94	Flatbed Pattern Cutting Plotter	2	Set
95	PVC Sheet	1,000	Piece
96	Conveyer Belt Transportation System with attached equipment	4	Set
97	Sludge Press Machine with attached Piping System	2	Set
98	Hot Air Discharge Exhausting & Piping System for Dryers	3	Set

Table 2-11 List of Vehicle and Automatic Forklift (Import)

Sr. No.	Equipment	Quantity	A/U
1	Truck (8-10 Tons)	3	Set
2	Gasoline Forklift	3	Set
3	Electric Forklift	4	Set

Table 2-12 List of Machine & Equipment (Local Purchase)

Sr. No.	Equipment	Quantity	A/U
1	Computer Sets	150	Set
2	UBS Power Bank	150	Set
3	Digital Photocopier & Printer	15	Set
4	Air-conditioner	80	Set
5	Safety Box	2	Set
6	Fax Machine	3	Set
7	High Projector	3	Set
8	Server (CCTV/Email/PLS)	5	Set
9	PDBX, Communication Server	1	Set
10	Printing Server	1	Set
11	Server Power Bank (USB)	4	Set
12	Color Photocopier & Printer	3	Set
13	Office Table/ Chair/ File Cabinet/ Partition	150	Set
14	Paper Shredder	5	Set
15	Office Stationery	1	Lot
16	Warehouse Storage Rack Set	1	Set
17	Pulley Ladder	8	Set
18	Plastic Pallet	1,000	Piece
19	Electric Floor Scale (Max 2 tons)	1	Set
20	Flat Trolley	50	Set
21	Fabric Spreading Rack/Trolley	1,000	Set
22	4 Wheels Metal Transport Cart	510	Set
23	Cut Pieces Storage Rack	1,000	Set
24	Spare Parts for Sewing Machine (Folder, Feeder, Presser foot, Gauge Set, Needle Bar & etc.)	1	Lot
25	Wooden Cut Panel Table	600	Set
26	Wooden Stools/ Chairs	2,000	Set

Sr. No.	Equipment	Quantity	A/U
27	Wooden Working Table	50	Set
28	Wooden Shelves	50	Set
29	Wooden Inspection Table (Small)	108	Set
30	Wooden Inspection Table (Big)	108	Set
31	Steel Hanger Rack (L 2.5 m × H 1.7 m)	800	Set
32	Semi-finished Goods Storage Wooden Box	200	Set
33	4 Wheels Stainless Steel Trolley	50	Set
34	Lightning Protection System	1	Set
35	Electricity Switch Box	40	Set
36	CCTV System and Facilities	1	Set
37	Access Control System and Facilities	1	Set
38	Human Resource System and Facilities	1	Set
39	Fire Alarm System and Facilities	1	Set
40	Lighting Fixture and System with Facilities	1	Set
41	Broadcasting System and Facilities	1	Set
42	Working Table for Quality Control	250	Set
43	Underground Water Pumping & Piping System	2	Set
44	Water Purification & Treatment System	2	Set
45	Worker Storage Locker	5,000	Set
46	Canteen Tables & Chairs	5,000	Set
47	Small Scissors	4,000	Set
48	Grass Mower	3	Set
49	Medical First Aid Box	100	Set
50	Air Gun/ Air Duster with air pipe	100	Set
51	Tag Gun	100	Set
52	Plastic Container & Plastic Basket	400	Piece
53	Carton Sealer	150	Set
54	Sign Board	1,000	Set
55	Fire Exit Indication Light	300	Set
56	Emergency Light	300	Set
57	Transformer 3,000 kVA	1	Set
58	Transformer 1,000 kVA	3	Set
59	Transformer 100 kVA	1	Set
60	Steam Supply Piping System and Facilities	1	Set
61	Energy Saver Light Bulb 85W Set	600	Set
62	LED Street Lamp with Stand Set	80	Set
63	Fire Extinguisher (Dry Powder) 4 Kgs	350	Piece
64	Fire Extinguisher (Dry Powder) 35 Kgs	50	Piece
65	Fire Extinguisher (Foam)	25	Piece
66	Fire Extinguishing Sand Bin	100	Piece
67	High Pressure Air Container with Piping for Air Compressors	4	Set
68	Compressed Air Supply Piping, Meters and Valves	1	Set
69	Solar Hot Water System	1	Set
70	Fire Hydrant, Fire Hose & Fire Hose Box Set	100	Set
71	Vehicle	3	Set
72	Coach	2	Set

2.7 Chemical Usage

The name and amount of chemicals currently used in the factory are listed in **Table 2-13**.

Table 2-13 Quantities of Chemicals Used in the Factory

Sr. No.	Chemical Product	Chemical Usage Type	Average Annual Purchased Amount	Average Annual Consumption Amount	Unit
1	655 Embroidery Spray Adhesive	Embroidery	35.00	30.00	Box
2	White Paste	Printing	17000.00	15000.00	kg
3	PAM	Water treatment	150.00	100.00	kg
4	PAC	Water treatment	800.00	700.00	kg
5	Clothes Vehicle Lubricating Oil	Mechanic	1100.00	1000.00	kg
6	Compressor Oil	Compressor	266.00	209.00	L (19L/Pcs)
7	Black 9101	Printing	30.00	25.00	kg
8	Green 801H	Printing	30.00	25.00	kg
9	Navy Blue 7101	Printing	30.00	25.00	kg
10	Red 3301	Printing	30.00	25.00	kg
11	Yellow 1302	Printing	30.00	25.00	kg
12	Detergent (Oki)	For Cleaning (Toilets, etc.)	750.00	700.00	Bot (1kg/Bot)
13	Silicon Oil	Washing	1000.00	500.00	kg

They are stored in the separated room and carefully take care with precautions. (MSDS are attached in **Appendix 39**)

Figure 2-24 Chemical Warehouse

Figure 2-25 Precaution and PPEs for Chemical Handling in Chemical Storage Room

Figure 2-26 Painting Can in the Operation Area

2.8 Transportation System

Transportation by ship is considered for the imported raw materials from China, Hong Kong and Thailand, and local raw materials are transported by trucks. The finished products are delivered to the customer (Europe, USA, Canada, France, and Belgium) by using ship via trucks. Thu Kha San Container agent is assigned for loading/unloading products/raw materials and transporting between Yangon Terminal and the factory. In the production area, transportation is carried out by various types of conveyor.

2.9 Project Activities

The factory uses Cutting, Making and Packaging (CMP) system. The CMP system is a form of production on consignment in which the raw materials are imported from foreign countries, then shirts are linked, sewn, mended, and packed in cartoon boxes, after which all the finished products are exported to foreign countries.

The flow chart of production activities are as follows:

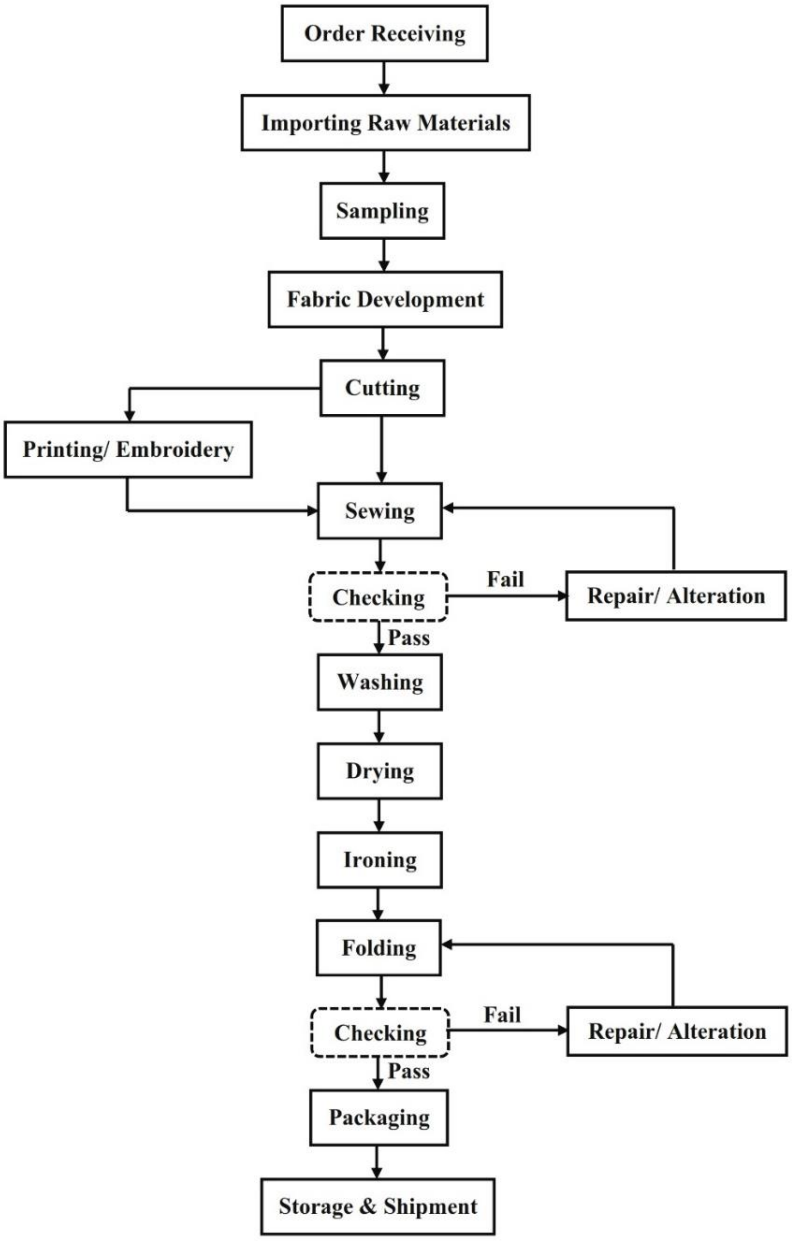


Figure 2-27 Process Flow Chart of Manufacturing Activities

2.9.1 Order Receiving

Garment factory receives order from oversea company according to processing contract.

2.9.2 Importing Raw Materials

Raw materials receipts and storage

Raw Materials used for operation process are imported from China, Hong Kong, and Thailand. The ordered raw materials are transported from Yangon Terminals to the factory by container trucks and stored in warehouse. There are 8 lines of storage shelves. The fabric and accessories are stored in correct locations.

Figure 2-28 Raw Materials and Storage Warehouse

Warehouse's Quality Checking

- QC conducts fabric inspection
- QC checking color shading under light box
- QC conduct accessories inspection

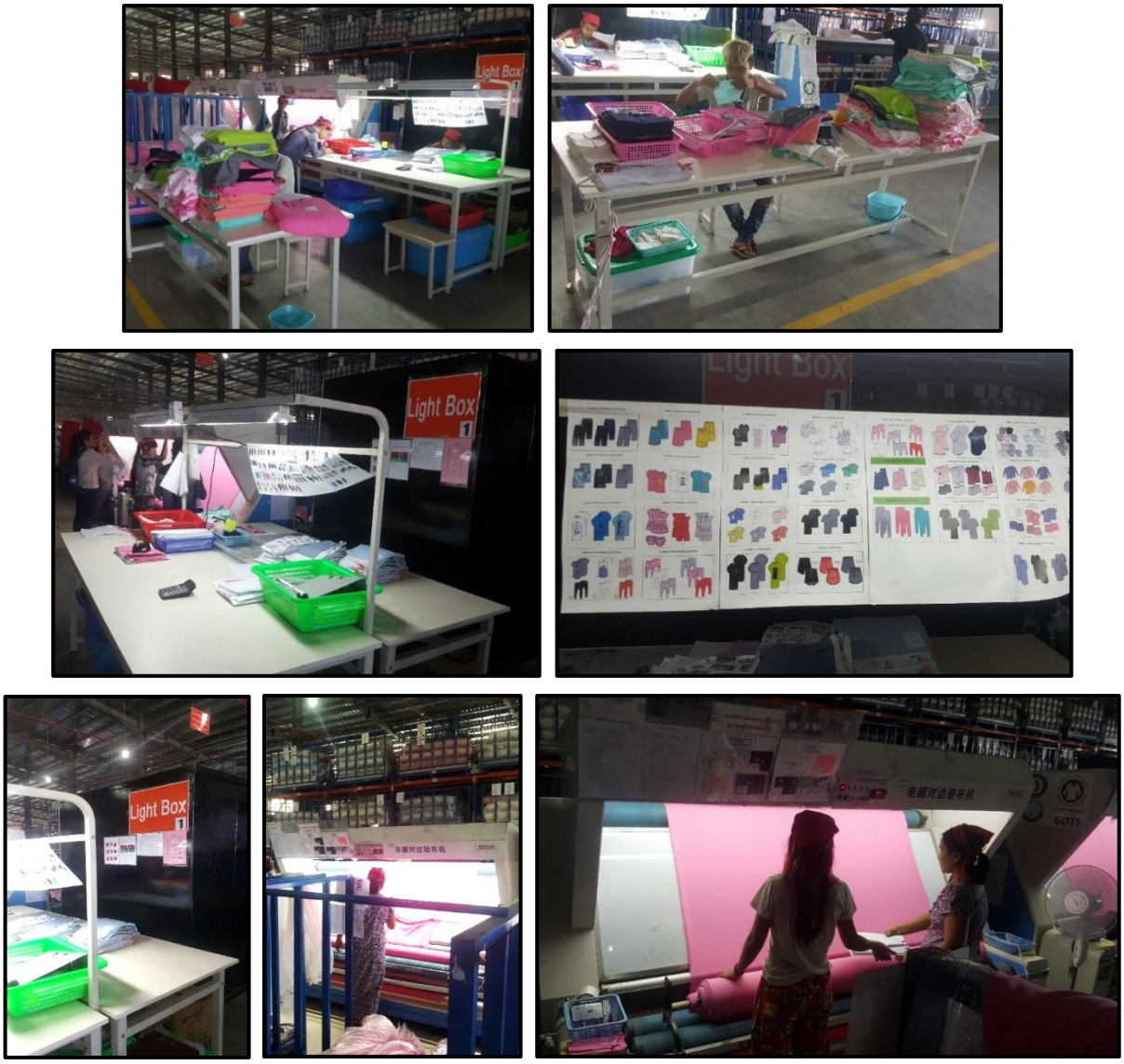


Figure 2-29 Warehouse's Quality Checking

2.9.3 Sampling

Design is provided by the buyer. After placing an order buyer send the technical sheet and art-work of an order to the merchandiser. By following technical sheet and art-work, pattern of each garment style is made. This process is done by using computerized method.

The main target of making a fit sample is to follow the details instruction about the garment style. After making, it is sent to the buyer to rectify. It is done manually. The activities done in sample room are:

- Testing shrinkage
- Adjust pattern
- Sample making
- Testing neck sketch

2.9.4 Fabric Development

Fabric Relaxation and Spreading Procedure Guideline

- Check anything remains before opening the machine
- Reduce the speed after placing the fabric rolls on the machine
- Keep hands away from roller while the fabric spreading machine is operating
- Swift off the light and clean the place after working time is over

2.9.5 Cutting

- Cutting plan
- Inform warehouse for fabric relaxing
- Process marker
- Consumption approved by section head
- Spreading fabric based on pre-cut sheet
- Checking marker by QC
- Heat seal label testing (pre-production & daily)- For heat seal labels, a fabric is coated on the back side with a heat activated adhesive. The fabric side is printed and cut to size and sent to you to be ironed on or applied with a heat seal machine to the final textile product.
- OTB testing (pre-production & daily) -Open-to-Buy (OTB) is merchandise budgeted for purchase by a retail store during a certain time period that has not yet been ordered.
- Issue RFID-radio frequency identification RFID tag is a small wireless chip with radio circuit wherein digital data is encoded to create an information structure that will help improve supply chain efficiency. Since RFID tags will eventually be placed on or in corrugated packaging, there are major implications for corrugated container manufacturers and their customers.

Figure 2-30 Cut Pieces and Cut Panels Checking and Bundling

2.9.6 Embroidery

Embroidery is the craft of decorating fabric or other materials using a needle to apply thread or yarn. This thread craft is best done on natural fabrics with a tight weave like silk or cotton. Other materials such as pearls, beads, quills, and sequins are also incorporated in embroidery. Nowadays, embroidery is widely used with various kinds of colorful thread or yarn. It is usually seen on caps, hats, scarfs, sweaters, coats, blankets, dress shirts, denim, dresses, stockings, and golf shirts. Embroidery is a diverse yet distinct evidence of our rich cultural heritage.

Some of the basic techniques or stitches of the earliest embroidery are chain stitch, buttonhole, or blanket stitch, running stitch, satin stitch, cross stitch. Those stitches remain the fundamental techniques of hand embroidery today. In ancient time, embroidery is done by hand. It changes from women embroidering the textiles by hand into embroidering with machines.

Contemporary embroidery is stitched with a computerized embroidery machine using patterns digitized with embroidery software. In machine embroidery, different types of "fills" add texture and design to the finished work. Machine embroidery is used to add logos and monograms on business shirts or jackets, gifts, and team apparel as well as to decorate household linens, draperies, and decorator fabrics that mimic the elaborate hand embroidery of the past.

The project proponent used computerized embroidery machine. There are total 19 machines in embroidery section. Most modern embroidery machines are computer controlled and specifically engineered for embroidery. Industrial and commercial embroidery machines and combination sewing-embroidery machines have a hooping or framing system that holds the framed area of fabric taut under the sewing needle and moves it automatically to create a design from a pre-programmed digital embroidery

pattern. A multi-needle machine may consist of multiple sewing heads, each of which can sew the same design onto a separate garment concurrently. Such a machine might have 20 or more heads, each consisting of 15 or more needles. A head is usually capable of producing many special fabric effects, including satin stitch embroidery, chain stitch embroidery, sequins, appliqué, and cutwork.

Ref; https://www.merchology.com/pages/guide-to-custom-embroidery https://en.wikipedia.org/wiki/Machine_embroidery

Computerized machine embroidery process: Machine embroidery is a multi-step process and it is important to be perfect according to their needed design. The steps for creating embroidery with a computerized embroidery machine are as follows:

Create the embroidery design: Create an embroidery design what customer asked to mock up the custom logo or design before transferring the design file to the embroidery machine. And cut the fabric into designated pattern in the embellished room.

Figure 2-31 Embellished Room

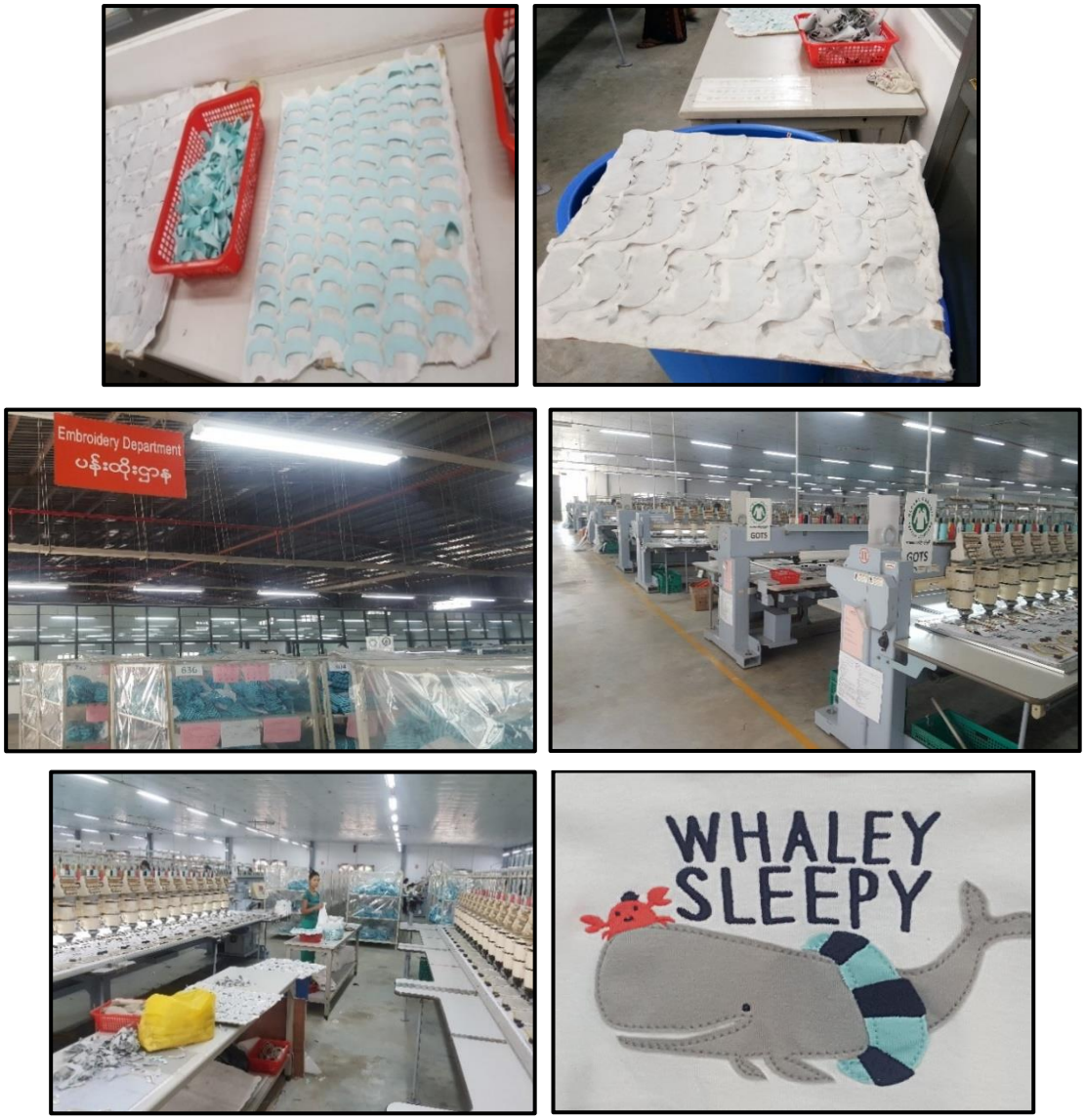


Figure 2-32 Embroidery Department

Transfer the file to the embroidery machine: Load the embroidery file into the embroidery machine, making sure it is the correct format for the machine. This can be done easily using a USB cable, flash card or directly from the computer running the software.

Stretch the fabric with hoops or frames and positioning it on the embroidery machine: Determine and mark the location of embroidery placement on the fabric to be embellished. The

cut designated patterns are attached into fabric pattern to be embroidered. Moreover, the stitched design will fit in the appropriate hoop. Secure the fabric in a hoop with the appropriate stabilizer and place it on the machine. The attached patterns are placed in machine embroidery.


***Inform the embroidery machine about the design elements*:** Typically, each of the needles is numbered and threaded with a different color thread. Only one needle with one color will embroider at a time, so an embroidery sequence must be scheduled. Center the needle over the start point of the design.


Line up the fabric: Before embroidery the fabric is stretched across frames or loops and slotted into the arms of the embroidery machine. The fabric should be tightly stretched over these frames and secured to the machine and let the stitching begin.

Remove the completed design from machine. Separate the fabric from the hoop and trim the stabilizer, loose threads, etc.

Figure 2-33 Finished Embroidery and Sample Embroidery Products

Quality checking and reject design for embroidery: When the embroidery is done, it needs to be checked by embroidery checker with the following guidelines. If the design does not pass the designated quality, they are rejected and stored.

2.9.7 Printing

Printing is the process of applying color to fabric in definite patterns or designs. In properly printed fabrics the color is bonded with the fiber, so as to resist washing and friction.

Printing is related to dyeing but, whereas in dyeing proper the whole fabric is uniformly covered with one color, in printing one or more colors are applied to it in certain parts only, and in sharply defined patterns.

There are two main types of screen printing; flat bed and rotary. Flatbed screen printing can be fully automated, semi-automated or manual. This method uses a squeegee to transfer the ink paste through an engraved screen. With rotary or cylinder printing, pressure forces the paste through engraved roller screens. For both types, each screen can only apply one color at a time.

Figure 2-34 Printing Department

In Printing Department, printing process is operated with oval screen-printing machines.

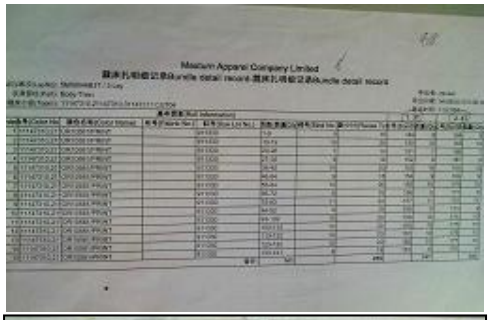
Oval Screen-printing Machines: It is a versatile and affordable oval screen printing press available. M&R's Stryker™ is a 10-station based module and can be expanded to create 16,

22, 28, up to 52 station configurations. In other words, there are no restrictions on print head placement. All other stations can support print-heads and any station can be left open. In addition, It can be tailored to any production requirement. A digital touchscreen control panel with icon-based graphics can display information and commands in multiple languages. Precise a three-point pallet levelling system with multiple (1-4) print stroke capability. Additionally, it comes with a two-year or 2,000,000-cycle limited warranty.

Figure 2-35 Oval Screen-Printing Machines

In this section, the operation steps in KARISMA are as follows:

Step 1: Cutting department will transfer the panels which need to print together with bundle information list for Printing Department



Step 2: Separate panels with style, color, size.

Step 3: Check the panels before print

Step 4: Put panels on the printing table

Step 5: After printing, panels must send to heating

Step 6: QC use the sample to check the printing measurement

Step 7: Return the printing panels to sewing department

There are different methods of screen printing, but they all involve the same basic technique. The form of printing in KARISMA uses a special light-reactive emulsion to create a custom stencil; this tends to be the most popular type of commercial printing, as it can be used to make intricate stencils.

Design Creation: Firstly, the printer takes the design they want to create on the product, and prints it out onto a transparent acetate film. This will be used to create the stencil.

***Screen Preparation*:** A screen is a piece of silk stretched tightly over a wooden frame. A screen must be stretched to a specified degree of tension. When a screen is too loose, the silk can shift slightly, causing a blurry image. If the screen is too tight, it may easily tear during the printing process, or peel away from the wood or metal frame.

Figure 2-36 Printing Screen Frame

Once a screen is stretched, the screen is coated with an emulsion (like emulsion used in a photographic process). This emulsion is light sensitive.

Exposing of Emulsion*:* The acetate sheet featuring the design is then laid onto the emulsion-coated screen, and the whole thing is exposed to a very bright light. The light hardens the emulsion, so the parts of the screen which are covered by the design remain in liquid form.

If the final design is going to include more than one color, then a separate screen must be used to apply each layer of ink. To create multi-colored products, the printer must use his skill to design each stencil, and line them up perfectly to ensure the final design is seamless.

Washing the Emulsion and Creating the Stencil: After the screen has been exposed for a set time, the areas of the screen not covered by the design will have turned hard. Any unhardened emulsion is then carefully rinsed away. This leaves a clear imprint of the design on the screen for the ink to pass through.

The screen is then dried, and the printer will make any necessary touch-ups or corrections to make the imprint as accurate as possible to the original design. The stencil is now ready to be used.

Item Preparation for Print: The screen is then placed on the printing press. The item or garment being printed is laid down flat onto the printing board, underneath the screen.

There are several different presses, including manual and automatic styles, but most modern commercial printers will use an automatic rotary carousel printer, as this allows several different screens to work at once. For multicolored prints, this sort of printer can also be used to apply the separate color layers in quick succession.

Pressing the Ink through the Screen onto the Item: The screen is lowered down onto the printing board. Ink is added to the top end of the screen, and a squeegee is used to pull the ink along the full length of the screen. This presses the ink through the open areas of the stencil, imprinting the design on the product underneath.

If the printer is creating multiple items, then the screen is raised and a new garment is placed onto the printing board. The process is then repeated.

Once all the items have been printed and the stencil has served its purpose, the emulsion is removed using a special washing fluid so the mesh can be reused to create new stencils**.**

Drying, Checking and Finishing: The printed product then passes through a dryer, which 'cures' the ink and creates a smooth, color fast finish. The final product will be checked and washed thoroughly to remove any residue, before being passed on to the sewing department.

2.9.8 Sewing

In this section, the operation steps are summarized as follows:

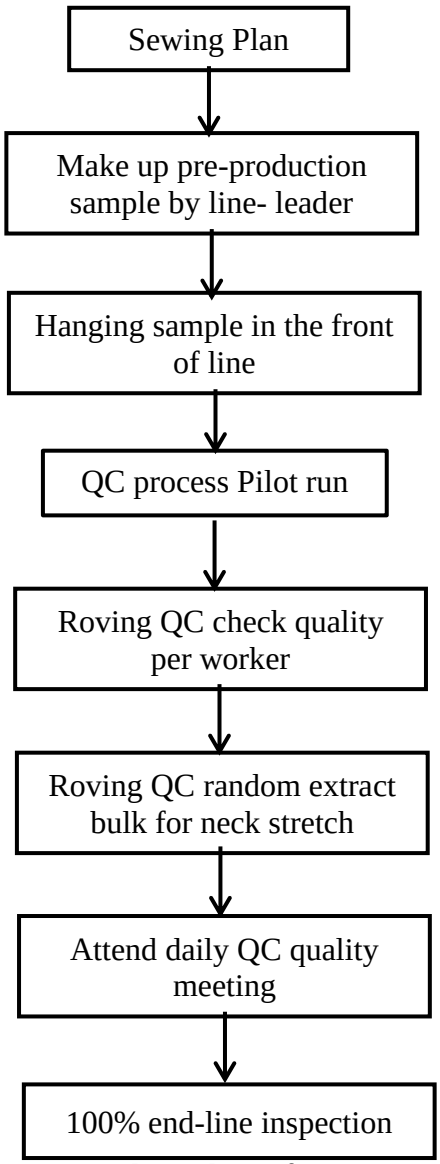


Figure 2-37 Flow Chart of Sewing Section

Sewing manager collected production order, accessories sheet and trim card, garment measurement request sheet, sewing production plan, garment delivery plan from merchandiser. Base on it to arrange production with the workshop.

Sewing supervisors received production order from her manager. Arrange an in-house PP sample with correction contraction and measurement for QC head approval before start production.

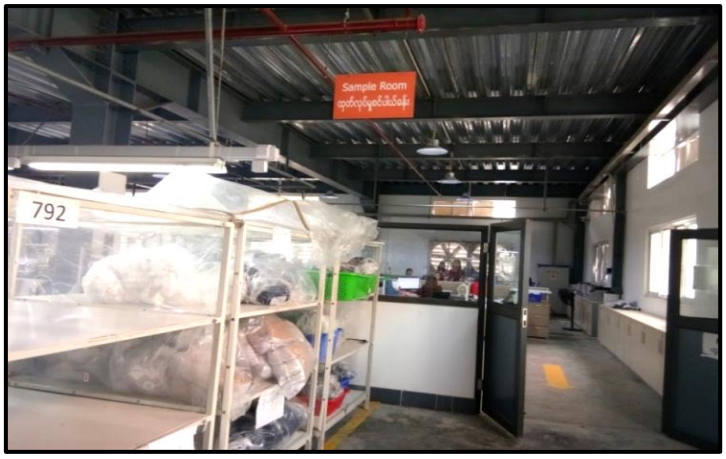


Figure 2-38 Sample Room

In-house PP samples should proceed bulk washing (if applicable) and approval by Factory QC manager. If this samples failed, related supervisor need remark for approval again until success.

There are 40 sewing lines in this section by using auto-handling system. The sewing procedures are showing in detail on TV screens.

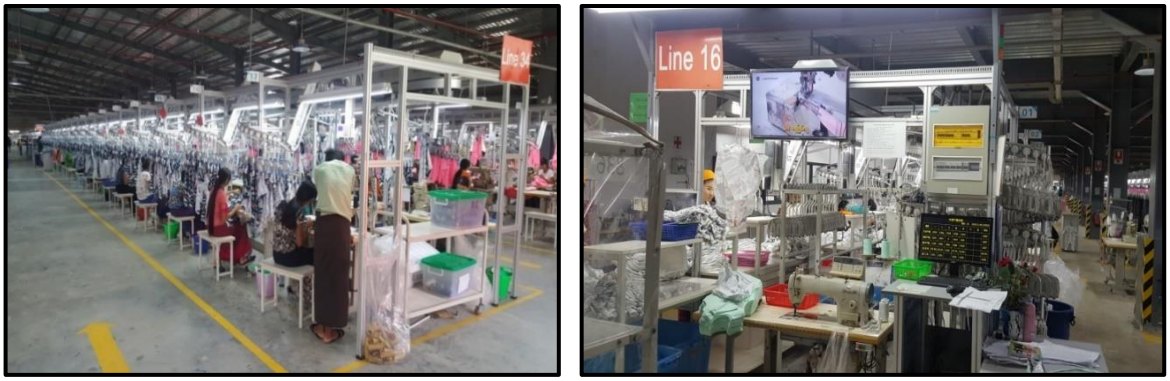


Figure 2-39 Sewing Lines and Sewing Procedures showing in TV Screen per Line

Garments are sewn in an assembly line, with the garment becoming more complete as it progresses down the sewing line. Sewing machine operators receive a bundle of cut fabric and repeatedly sew the same portion of the garment, passing that completed portion to the next operator. For example, the first operator may sew the collar to the body of the garment and the next operator may sew a sleeve to the body.

Complete parts making individually: By joining all the parts, a complete garment has to make here individually.

Quality Check: Quality assurance is performed at the end of the sewing line to ensure that the garment has been properly assembled and that no manufacturing defects exist. When needed, the garment will be reworked or mended at designated sewing stations. This labor-intensive process progressively transforms pieces of fabric into designer garments.

Figure 2-40 Storage Tank for Garment after Assembling

Reject: The rejected garments are put in carton packaging boxes and stored in the separate storage place. When the amount of rejected garment is larger, the project proponent informs the responsible buyers to make sure whether they want to destroy or sending them back.

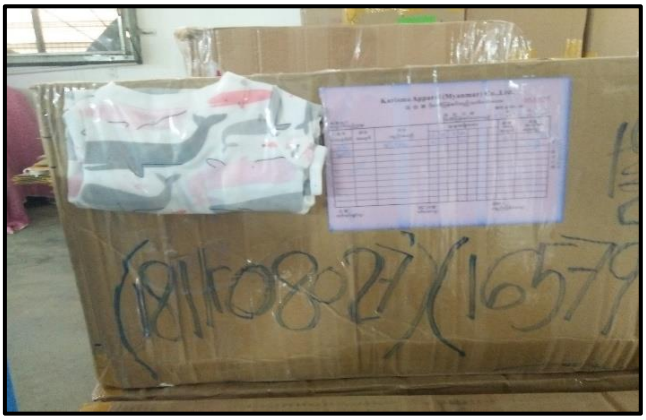


Figure 2-41 Rejected Garment Box

2.9.9 Washing

There are four washing machines, three extracting machines and twelve drying machines. The project proponent uses water flow meter (it measures water flow in cubic meters (m^3) or liters) to record the water usage.

In washing, the followings facts need to perform the wringing machines carefully. These notices and are also print out and put on the machine.

Needs*:* It is important to get good quality clothing; the employee need to know the method to be safety.

Responsibilities*:* Washing staff use the laundry equipment correctly in accordance with these guidelines. The head of the washing department and the team leader supervise the normal operation of the staff.

Procedures:

1. Clean the wastes and dust on the machines before using.
2. While putting the clothing into machine, make sure all four sides are equal.
3. After that, cover with one fabric sheet and put inside carefully. Close the machine cover and put the lock. After swift on, decide the washing time not less than 5 minutes.
4. After washing, switch off the button in designated time. Take out the clothing only when the machine stops spinning.
5. If strange sound occurs from machine during operation, power off the machine and inform the mechanic. It can use only after the machines is repaired.

Figure 2-42 Washing Machines

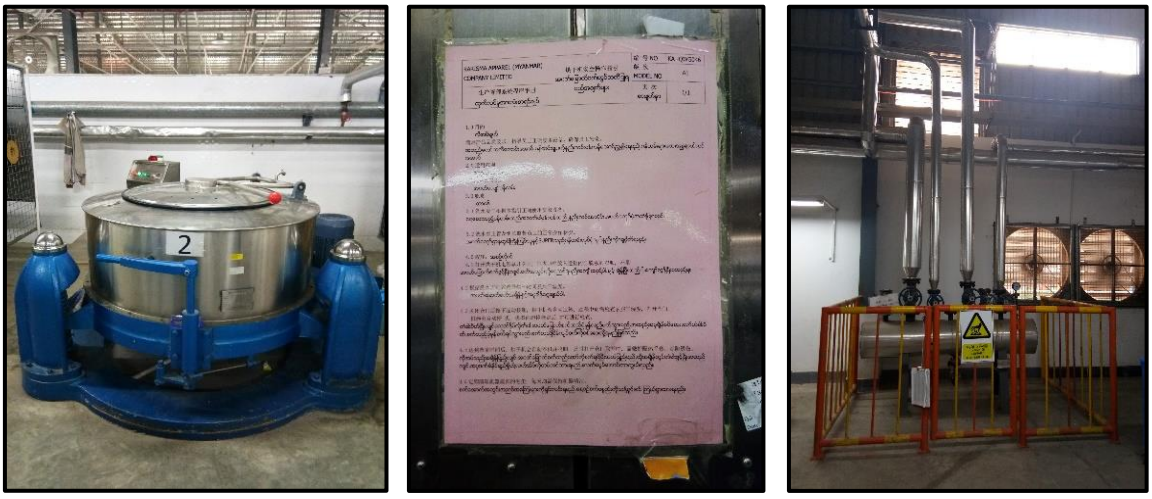
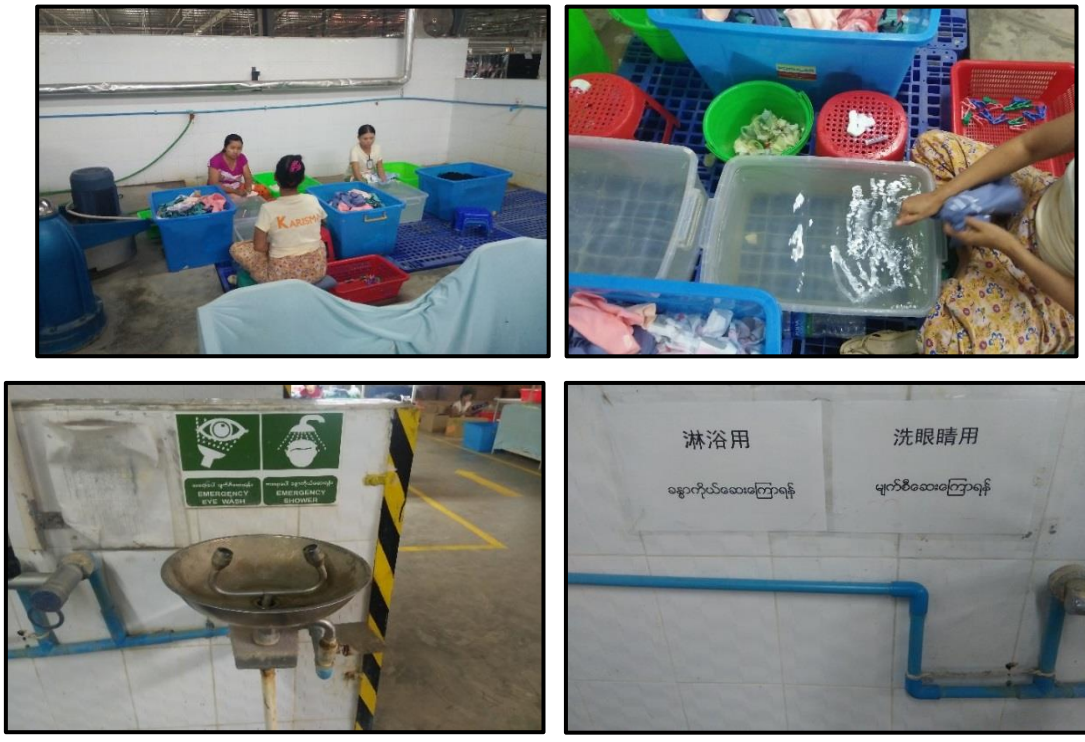
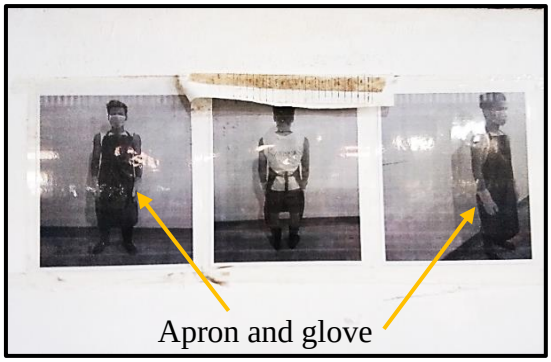


Figure 2-43 Extracting Machines and its Procedure, Steam Pipe for Drying Machine

Figure 2-44 Drying Machines

For the stained products, they used detergent to wash out the stain in the washing area. They provide the emergency eye wash and shower beside the staining cleaning place.





After washing, the products are water-squeezed and dried. And then, remove moisture in drying machines.

2.9.10 Drying

The completed clothes are dried in the dry room by using Dehumidifier to reduce moisture. The process needs to maintain the maximum temperature of 34 °C and moisture rate is 58%. The project proponent uses the two modernized PARKOO Industrial Dehumidifiers.

In drying, the followings facts need to perform the drying machine carefully. These notices and are also print out and put on the machine.

Needs: It is important to get good quality clothing; the employee need to know the method to be safety.

Responsibilities*:* Washing staff use the laundry equipment correctly in accordance with these guidelines. The head of the washing department and the team leader supervise the normal operation of the staff.

Procedures:

1. After turning on the main switch of the dryer's power button, put a proper amount of dehydrated clothes into the inner tank, make sure not to put over amount.
2. Choose the drying time and temperature.
3. Press the start button after closing the door. The drying machine operates automatically. After checking the dryness of clothes, close the door, the machine will automatically stop. The machine can be checked when it is completely stop.
4. After the specified time has elapsed, the drying machine will automatically stop and sound. Wear the gloves when taking out the clothes. Beware of the heat to hands.
5. Clean the dust below the machines regularly and keep the machine clean every day.

Figure 2-45 Drying Room and Dehumidifier

Figure 2-46 Garment are Dehumidifying in the Drying Room

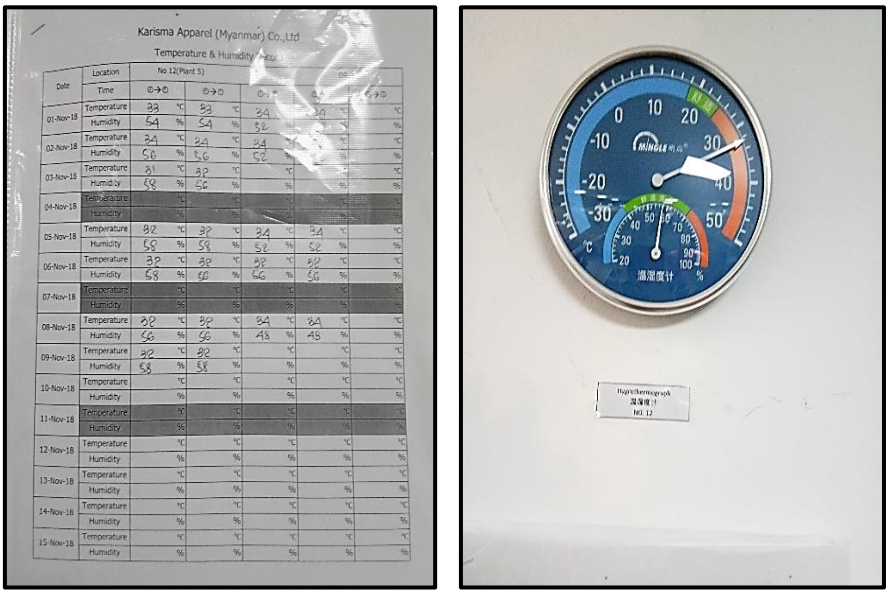


Figure 2-47 Temperature & Moisture Record Sheet and Hydro-thermograph

2.9.11 Ironing

After receiving the finished shirt checked, start ironing the shirt according to the requirements of the manufacturing order. During the ironing process, pay attention

to gestures and strength. After ironing the shirt, arrange it according to size and color and hand over to the next process.

According to the order requirements, distinguish whether it is light ironing, bucket ironing or steam spraying. Distinguish the fabrics, and pay attention to the shearing and sanding fabrics so as not to burn the hair to death. Ironing boots should be added to the dark colored cloth to prevent the mirror from being ironed. The tube, lapel and button must be ironed straight. There should be no leakage and wrinkles. Pay attention to the strips between the strips, and the strips should be straight. It must be ironed separately. According to the needs of the shape, consider whether to use the ironing board. For the shape without the ironing board, it is necessary to perform the painting position ironing on the ironing table according to the size requirements.

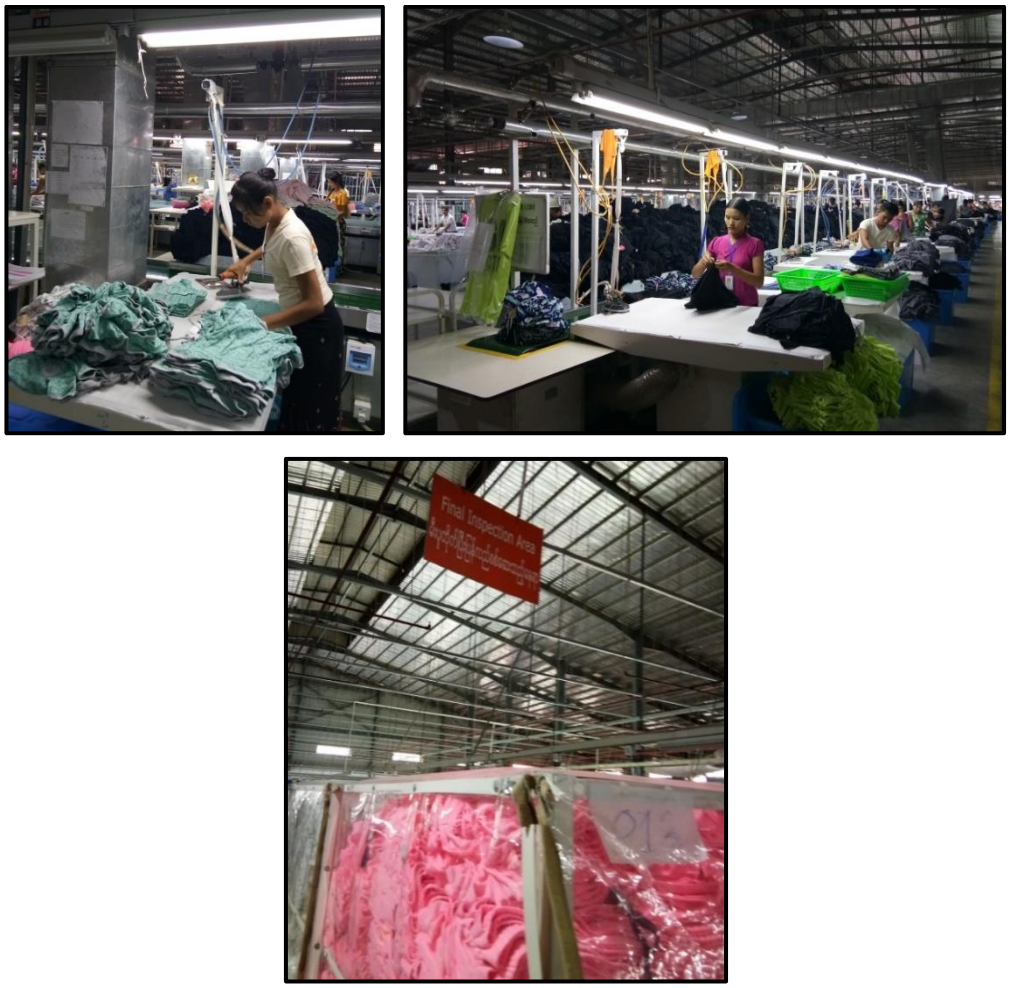


Figure 2-48 Ironing

2.9.12 Folding

The finished garments are then folded in a specific dimension. Folding can be done by using a template, plastic clips, and stainless-steel clips too. The price tags, hang hags and any other kind of tags are attached to garment after folding. The garment folding types varied depending on the article and buyer's requirement. The folded garment is packed into a poly bag or template as necessary.

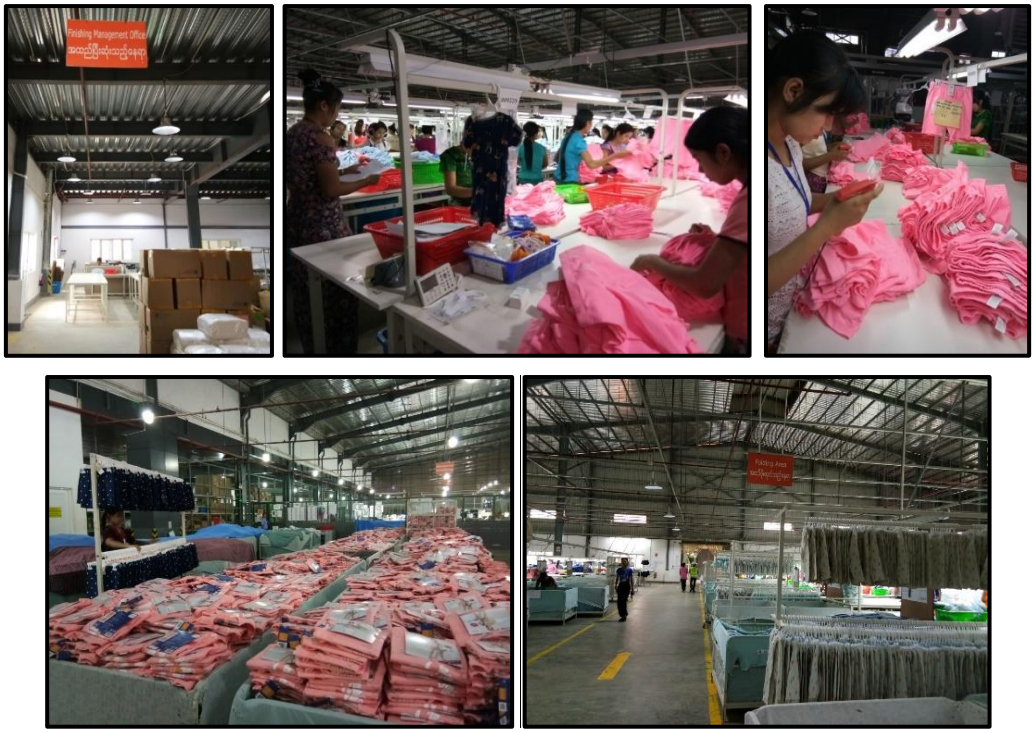


Figure 2-49 Folding

Needle Inspection: Finally, the complete garments are inspected according to the buyer's specification. All complete garments are made needle checking by machines.

Figure 2-50 Needle Inspection

2.9.13 Packaging

The folded garment is packed into a poly bag or template necessary. To minimize the damages of garments, all the garments have to carton by maintaining buyer's instruction.

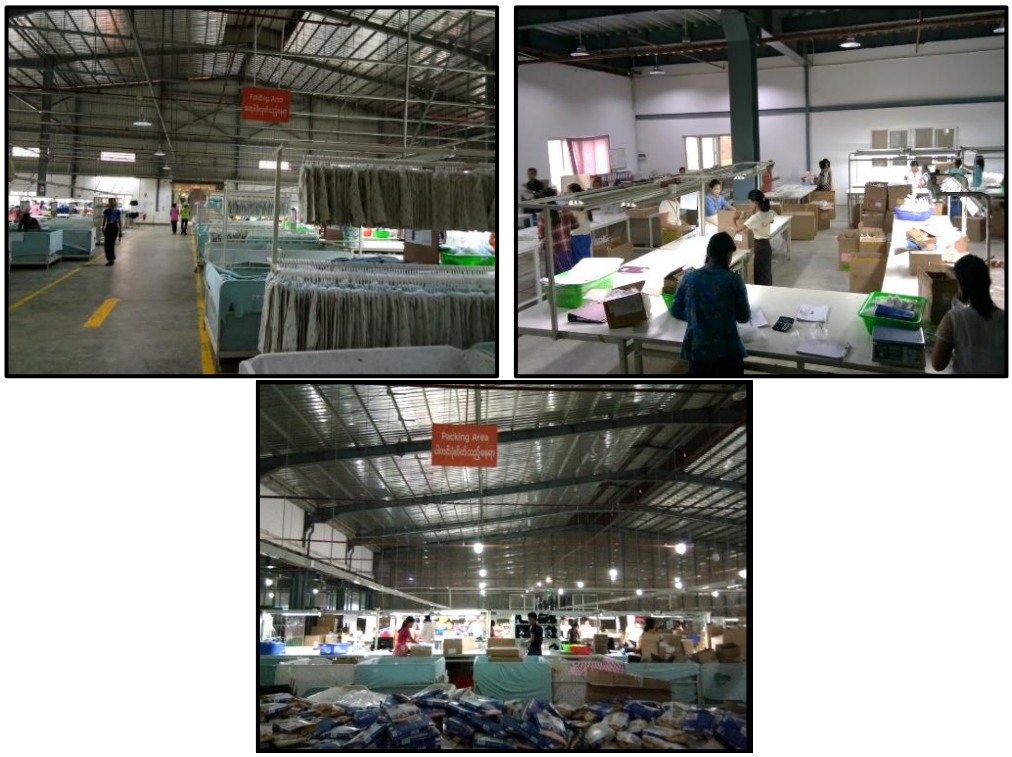


Figure 2-51 Packaging

2.9.14 Storage and Shipment

After completing all the required processes it's finally sends to the buyer. Lastly, garments are placed in cardboard boxes, stored in warehouse, and shipped to client distribution centers to eventually be sold in retail stores.

Figure 2-52 Storage and Shipment

2.10 Waste Management System in Project

2.10.1 Wastewater Treatment Systems

The company will have operative facilities to ensure the discharge of treated wastewater is in full compliance with local legislation.

(1) Domestic Wastewater and Storm water (Rainwater)

The domestic wastewater from canteen, sinks and toilets is discharged to septic tank before discharge to the municipal sewage.

The septic tank serves three purposes:

(1) sedimentation of solids in the wastewater,
(2) storage of solids, and
(3) anaerobic breakdown of organic materials.

The project proponent provided 170 numbers of toilets and 6 numbers of septic tanks (7000 x 2500 x 2134 m^3). Total number of employees is 5,150 and therefore there will be huge amount of sewage.

Table 2-14 Workshop Toilet Summary

Sr. No.	Location	Male Toilet	Female Toilet	Total	Remarks (big urinal in male toilet)
1	Plant 1	2	3	5	1
2	Plant 2	2	8	10	1
3	Plant 3	2	16	18	1
4	Plant 4 (G/F)	3	35	38	1
5	Plant 4 (2/F)	3	35	38	1
6	Plant 5	4	24	28	1
7	Plant 6	2	3	5	1
8	Dorm Canteen	2	6	8	4
9	Clinic Guard	1	1	2	1
10	Office	6	12	18	6
	Total	**27**	**143**	**170**	

The storm water on surface is directly discharged to the municipal sewage.

(2) Industrial Wastewater

Effluents from the textile industry commonly contain high concentrations of organic and inorganic chemicals. These are characterized by high chemical oxygen demand (COD). Biological Oxygen Demand (BOD), Total Dissolved solids (TDS), Total suspended solids (TSS) values and low dissolved Oxygen (DO) value as well as strong color.

After every effort that may be made to reduce waste strength and volume, there remains the problem of deposing the final remains of polluted waste into any water stream, thus the waste may be treated in various methods either singly or in combination and the best combination of methods differs from plant to plant.

To prevent and reduce the pollution of water and environment, wastewater treatment is specifically formulated. The procedure applies to the management of wastewater generated by the project activities, production, and domestic usage. The administration department is responsible for entrusting the environmental protection department to measure the company's wastewater pollutant emission.

In order to effectively control the wastewater generated from the project activities, the project proponent has two wastewater treatment Plants.

(i) One for washing section and
(ii) One for printing section.

Management of the generated sewage will be done by the engineering department together with the production department.

Laundering operations dedicated to washing new garments are not required to make special effects on garment appearance, but rather address garment shrinkage and hand feel issues. Therefore, washing the finished garments with mild detergent and cold water will typically suffice and no harsh chemicals or laundry additives are used.

The facility will process wastewater discharge from the in-house laundry department to the on-site wastewater treatment plant (WWTP) prior to the municipal sewage.

The following table shows the amount of wastewater discharge from the factory in two consecutive years.

Table 2-15 Annual Wastewater Generation

Year	Month	Wastewater Generation (m^3)		
		Boiler	Printing	Washing
2017	January	0.106	36	59
	February	0.105	31.8	89
	March	0.143	46.2	66
	April	0.083	30.6	97
	May	0.145	46.8	339
	June	0.100	50.4	69
	July	0.189	43.8	15
	August	0.278	56.4	208
	September	0.301	18	65

Year	Month	Wastewater Generation (m^3)		
		Boiler	Printing	Washing
	October	0.300	57.6	62
	November	0.342	54.6	68
	December	0.293	45	48
Total (2017)		**2.384**	**517.2**	**1,185**
2018	January	0.374	19.2	31
	February	0.228	15.9	21
	March	0.211	21.2	50
	April	0.149	12.1	17
	May	0.291	26.4	19
	June	0.347	27.1	83
	July	0.386	19.5	134
	August	0.343	25.19	182
	September	0.302	22.8	109
	October	0.379	20.65	99
	November	0.538	22.6	63
	December	0.228	13.7	58
Total (2018)		**3.775**	**246.34**	**866**
2019	January	0.428	27.1	168
	February	0.386	25.9	49
	March	0.422	24.1	56
	April	0.212	16.2	73
	May	0.616	29	97
	June	0.31	22.7	80
	July	0.582	25.6	120
	August	0.312	26.7	131
	September	0.218	25.5	132
	October	0.224	24.7	100
	November	0.364	27.8	88
	December	0.436	25.3	150
Total (2019)		**4.51**	**300.6**	**1,244**
2020	January	0.506	29.5	120
	February	0.304	25.3	86
	March	0.442	26.3	84
	April	0.012	10.5	53
	May	0.27	13.8	0
	June	0.432	29.1	0
	July	0.416	26.7	0
	August	0.316	25.9	0
	September	0.402	24.6	0
	October	0.01	7.8	0
	November	0.472	25.2	0
	December	0.614	52	21
Total (2020)		**4.196**	**296.7**	**364**

Data Source: M & E, Evidence: Monthly Meter Reading Record (For Printing and Washing)

Industrial Wastewater Treatment Procedure

- ***Overall requirements***
  a) The discharge of wastewater pollutants within the company shall be managed in accordance with national and local wastewater pollutant discharge standards.
  b) Based on compliance, minimize the discharge of sewage and the concentration of emissions.
  c) The residue after sewage treatment are put into bags and disposed to City Development Committee (Bago).
- ***Wastewater control (Mitigation Measure)***
  a) Production wastewater control
  Wastewater, including wastewater discharged after printing and garment washing, should be conserved to reduce water discharge
  b) Other wastewater controls
    - Do not clean oil and utensils at the domestic faucet. The oil leaked from the cleaned equipment shall not be poured into the ditch.
    - The toilet shall be disposed of by a special cleaning worker to keep the toilet clean and reduce the environmental pollution, and the septic tanks are regularly cleaned by specialized personnel to ensure that the septic tanks and sewers are unblocked, non-blocking and overflowing.
    - the dormitory is cleaned as required and the bathroom is kept clean to reduce environmental pollution
    - rice water and the residual rice soup in the canteen should be poured into the designated water bucket to supply the livestock households to reuse
  c) the wastewater is sent to wastewater treatment plant and treated.

(i) Wastewater Treatment Plant (Washing Section)

All the wastewater discharged from washing section is collected in this WWTP. According to the records, the annual amount of wastewater generated from washing section in the four years is listed in **Table 2-16**. The capacity of washing section's WWTP is 1 m^3/day. Details operation procedure of wastewater treatment plant is attached in **Appendix 43** for washing section.

The treated wastewater goes to Industrial Zone's drain and sludge is collected by the authorized 3rd organization.

Table 2-16 Influent and Effluent Standards of Washing Section's WWTP

Sr. No.	Parameter	Influent (mg/l)	Effluent (mg/l)	NEQE Guidelines
1.	CODCr	500-700	≤90	250 mg/l
2.	SS	150-300	≤60	50 mg/l
3.	BOD	100-200	≤20	50 mg/l
4.	pH	6-9	6-9	6-9
5.	Color	-	≤40	-

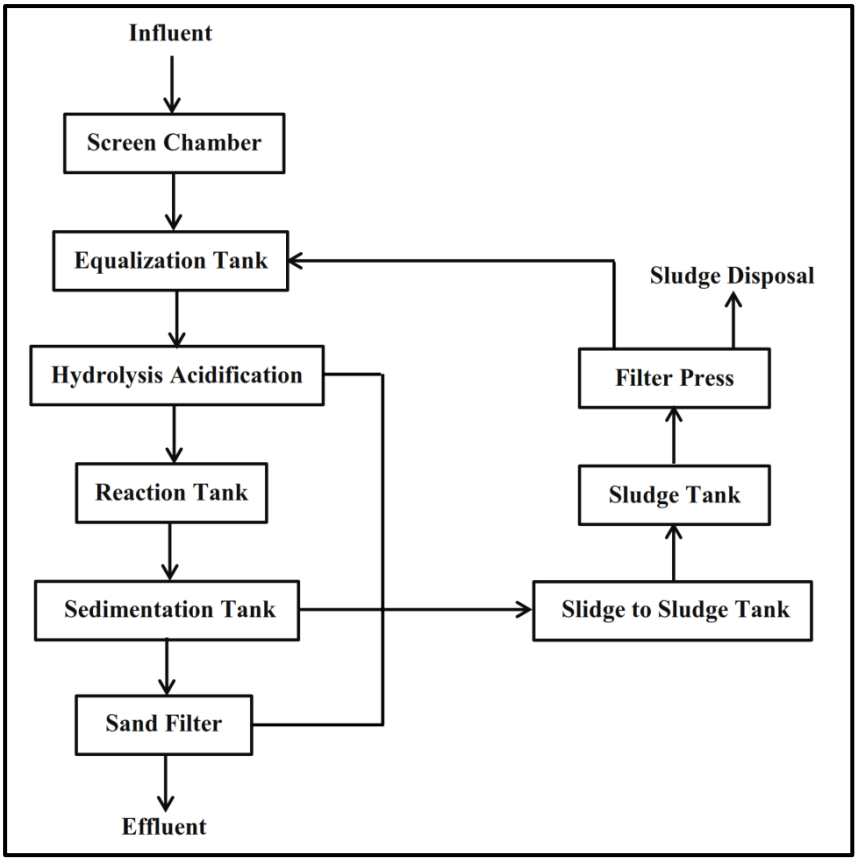


Figure 2-53 Process Flow Diagram of Washing Section's WWTP

Figure 2-54 Wastewater Treatment Plant (Washing Section)


Figure 2-55 Treated Wastewater and its Outlet

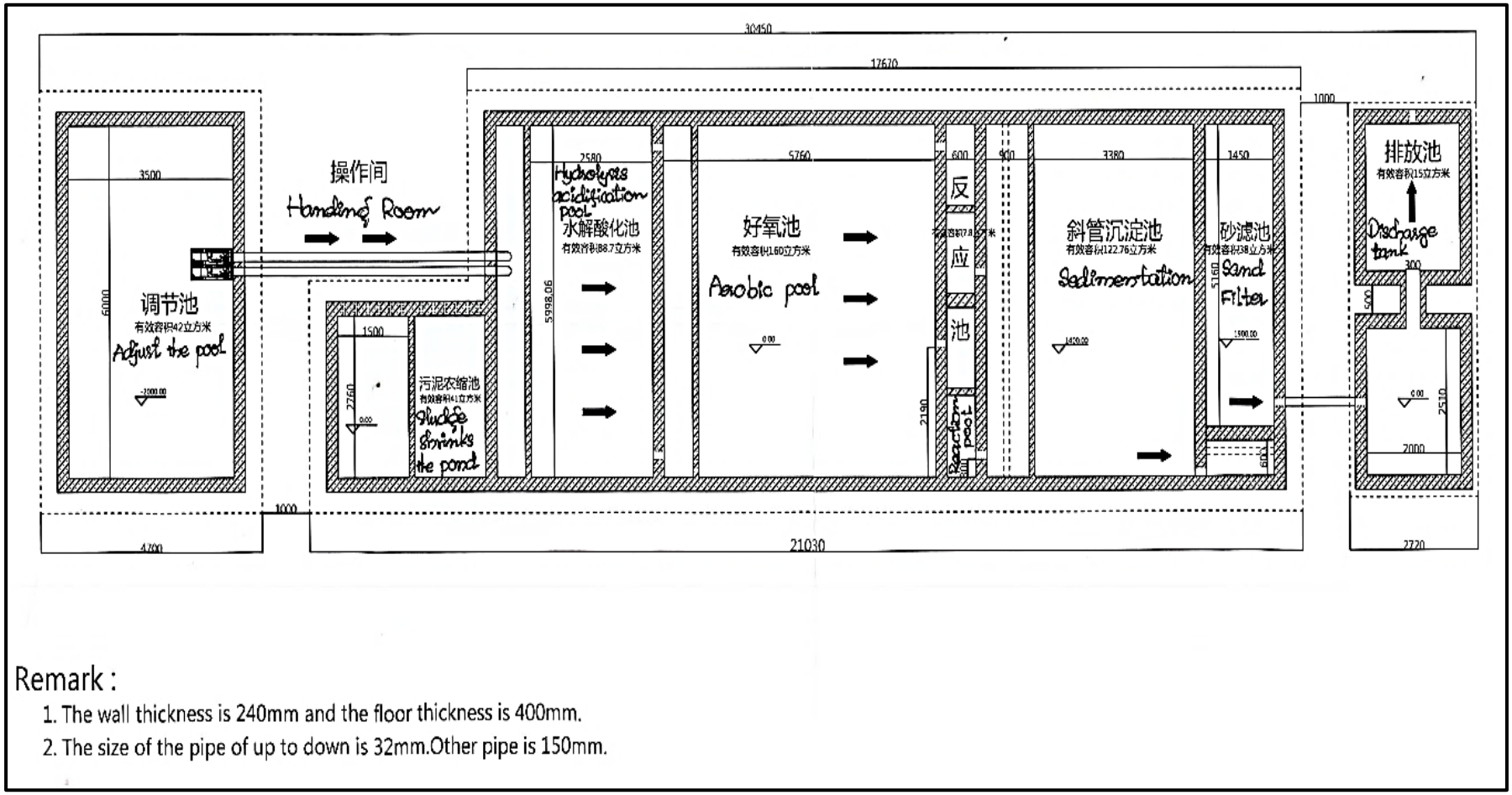


Figure 2-56 Washing Section's Wastewater Treatment Plant Process

(ii) Wastewater Treatment Plant (Printing Section)

All the wastewater discharged from printing section is collected in this WWTP. According to the records, the annual amount of wastewater generated from printing section in the four years is listed in **Table 2-17**Table **2-15.** The capacity of washing section's WWTP is 1.5 m^3/day. Details operation procedure of wastewater treatment plant is attached in **Appendix 42** for washing section.

The treated wastewater goes to Industrial Zone's drain and sludge is collected by the authorized 3rd organization.

Table 2-17 Influent and Effluent Standards of Printing Section's WWTP

Sr. No.	Parameter	Influent (mg/l)	Effluent (mg/l)	NEQE Guidelines
1.	CODCr	1000-1350	<100	250 mg/l
2.	SS	100-500	<30	50 mg/l
3.	BOD	200-400	<30	50 mg/l
4.	pH	6-9	6-9	6-9

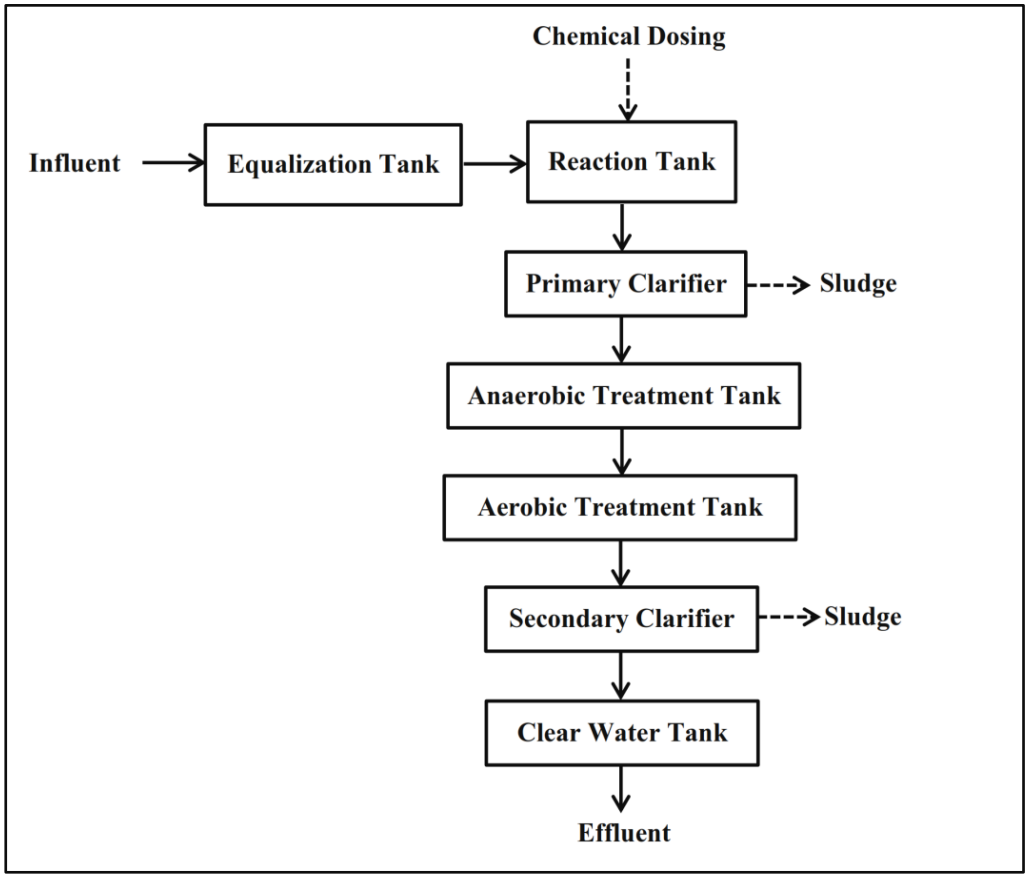
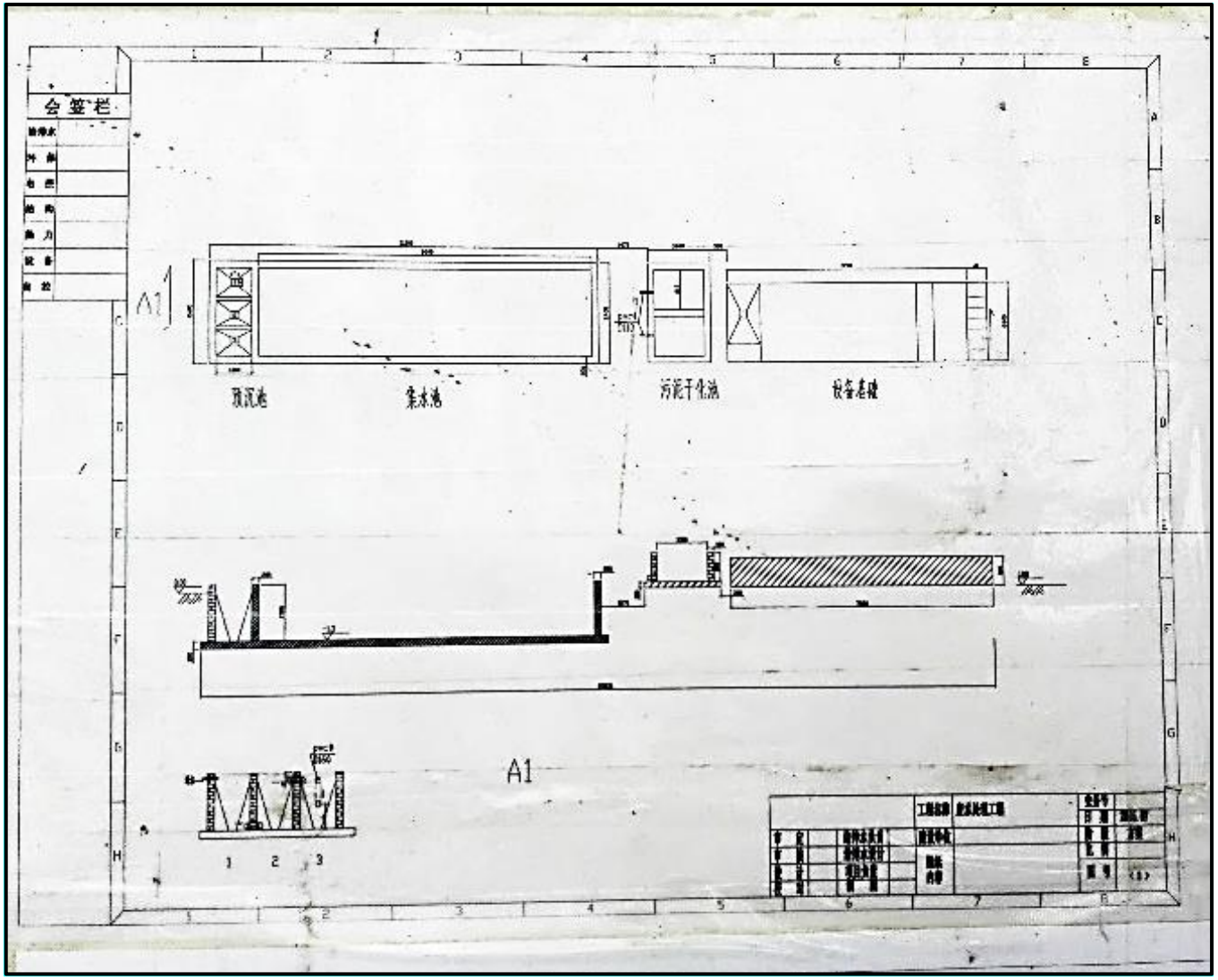
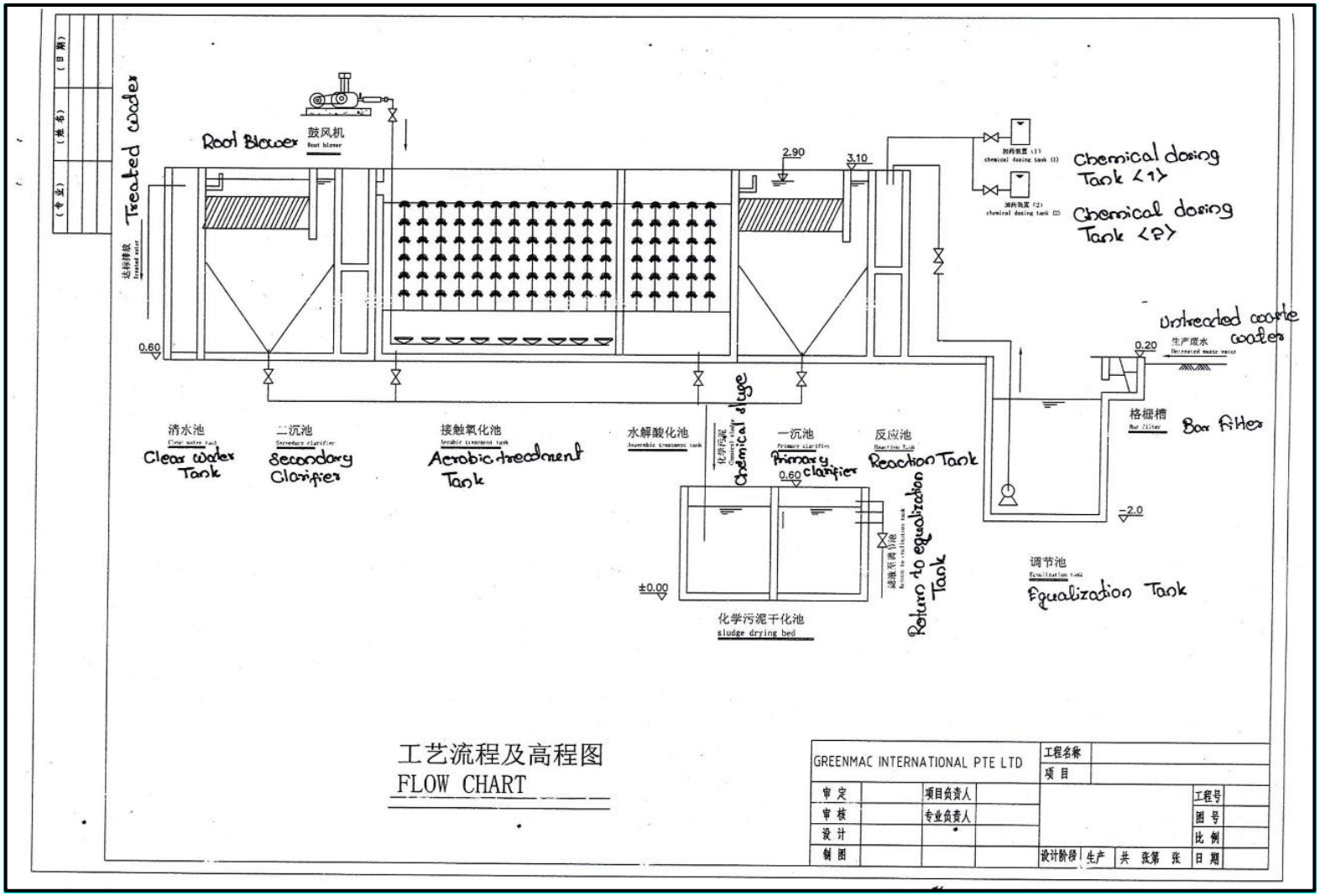


Figure 2-57 Process Flow Diagram of Printing Section's WWTP

Figure 2-58 Wastewater Treatment Plant (Printing Section)



(a)



(b)

Figure 2-59 Printing Section's Wastewater Treatment Process

2.10.2 Solid Waste Management System

Waste is an unwanted or undesired material or substance. To reduce the negative impacts on environment and society due to waste, the waste management is important.

The largest component of solid waste generated from the garment factory is scrap fabric. Other solid wastes and recyclables generated in much smaller amounts from garment factory include cardboard and plastic packaging material, organic and household wastes from the living areas, canteen, and restrooms.

The company will establish proper management guidelines and ensure that all local requirements for on-site waste management are met, and; train all employees on the waste management procedures.

The project proponent stores solid wastes in temporary places separately and manages them by cooperation with City Development Committee (Bago).

The ash generated from the fuel burning of the boiler are kept in bags and usually disposed to the City Development Committee (Bago).

Figure 2-60 Bins for Solid Wastes

Figure 2-61 Boiler Ash

In KARISMA Factory, waste was mainly divided into two categories: hazardous and non-hazardous. Non-hazardous wastes include cutting scrap, carton box, assorted wastes, domestic wastes, and boiler wastes and hazardous wastes include chemical waste and sludge. The quantities of solid wastes generated in KARISMA is tabulated in **Table 2-18**.

Table 2-18 Quantities and Types of Solid Wastes Generated in KARISMA Factory

Year	Month	Non-hazardous Waste (Solid Waste)						Hazardous Waste		
		Cutting Scrap (Tons)	Carton Box (Tons)	Assorted Waste (Tons)	Domestic Waste (Tons)	Boiler Waste (Ash & Sawdust) (Tons)	Total Monthly (Tons)	Chemical Waste (Tons)	Sludge Disposal (Tons)	Total Monthly (Tons)
2017	Jan	8.88	2.54	3.59	4.02	1.69	**20.72**	0.04	0.024	**0.064**
	Feb	5.06	1.45	2.05	2.29	0.96	**11.81**	0.02	0.029	**0.049**
	Mar	9.25	2.64	3.74	4.18	1.76	**21.57**	0.04	0.029	**0.069**
	Apr	9.89	2.83	4.00	4.47	1.88	**23.07**	0.05	0.030	**0.08**
	May	1.83	0.52	0.74	0.83	0.35	**4.27**	0.01	0.084	**0.094**
	Jun	26.59	7.60	10.76	12.03	5.06	**62.04**	0.13	0.031	**0.161**
	Jul	19.54	5.58	7.91	8.84	3.72	**45.59**	0.09	0.018	**0.108**
	Aug	14.17	4.05	5.74	6.41	2.70	**33.07**	0.07	0.061	**0.131**
	Sep	9.11	2.60	3.69	4.12	1.73	**21.25**	0.04	0.019	**0.059**
	Oct	27.98	8.00	11.33	12.66	5.33	**65.3**	0.13	0.033	**0.163**
	Nov	42.59	12.17	17.24	19.27	8.11	**99.38**	0.20	0.033	**0.233**
	Dec	13.25	3.79	5.36	6.00	2.52	**30.92**	0.06	0.025	**0.085**
Total (2017)		**188.15**	**53.76**	**76.16**	**85.12**	**35.84**		**0.90**	**0.418**	
2018	Jan	40.27	10.80	15.71	16.70	6.87	**90.35**	0.09	0.013	**0.103**
	Feb	21.87	5.87	8.53	9.07	3.73	**49.07**	0.05	0.010	**0.06**
	Mar	23.88	6.41	9.32	9.90	4.08	**53.59**	0.05	0.017	**0.067**
	Apr	18.14	4.87	7.08	7.52	3.10	**40.71**	0.04	0.008	**0.048**
	May	33.45	8.97	13.05	13.87	5.71	**75.05**	0.07	0.013	**0.083**
	Jun	45.07	12.09	17.59	18.69	7.69	**101.13**	0.10	0.026	**0.126**
	Jul	32.91	8.83	12.84	13.64	5.62	**73.84**	0.07	0.034	**0.104**
	Aug	30.92	8.30	12.07	12.82	5.28	**69.39**	0.07	0.045	**0.115**
	Sep	26.71	7.17	10.42	11.08	4.56	**59.94**	0.06	0.030	**0.09**

Year	Month	Non-hazardous Waste (Solid Waste)						Hazardous Waste		
		Cutting Scrap (Tons)	Carton Box (Tons)	Assorted Waste (Tons)	Domestic Waste (Tons)	Boiler Waste (Ash & Sawdust) (Tons)	Total Monthly (Tons)	Chemical Waste (Tons)	Sludge Disposal (Tons)	Total Monthly (Tons)
	Oct	44.47	11.93	17.35	18.44	7.59	**99.78**	0.10	0.027	**0.127**
	Nov	17.44	4.68	6.81	7.23	2.98	**39.14**	0.04	0.021	**0.061**
	Dec	30.31	8.13	11.83	12.57	5.18	**68.02**	0.07	0.016	**0.086**
Total (2018)		**365.44**	**98.05**	**142.61**	**151.52**	**62.39**		**0.8**	**0.259**	
2019	Jan	30.20	7.55	11.32	11.78	4.53	**65.38**	0.03	43.09	**43.12**
	Feb	38.89	9.72	14.58	15.17	5.83	**84.19**	0.04	18.87	**18.91**
	Mar	36.98	9.25	13.87	14.42	5.55	**80.07**	0.04	19.85	**19.89**
	Apr	30.86	7.72	11.57	12.04	4.63	**66.82**	0.03	20.27	**20.3**
	May	32.55	8.14	12.21	12.70	4.88	**70.48**	0.03	29.55	**29.58**
	Jun	39.64	9.91	14.87	15.46	5.95	**85.83**	0.04	23.95	**23.99**
	Jul	45.36	11.34	17.01	17.69	6.80	**98.2**	0.05	32.96	**33.01**
	Aug	40.00	10.00	15.00	15.60	6.00	**86.6**	0.04	35.55	**35.59**
	Sep	19.19	4.80	7.20	7.49	2.88	**41.56**	0.02	35.33	**35.35**
	Oct	23.30	5.83	8.74	9.09	3.50	**50.46**	0.02	28.65	**28.67**
	Nov	42.22	10.56	15.83	16.47	6.33	**91.41**	0.04	27.33	**27.37**
	Dec	35.25	8.81	13.22	13.75	5.29	**76.32**	0.04	38.86	
Total (2019)		**414.44**	**103.63**	**155.42**	**161.66**	**62.17**		**0.42**	**354.26**	
2020	Jan	22.69	5.37	7.33	8.66	3.04	**47.09**	0.02	34.33	**34.35**
	Feb	37.19	8.81	12.01	14.19	4.99	**77.19**	0.03	26.06	**26.09**
	Mar	33.78	7.30	10.40	12.78	4.57	**68.83**	0.03	26.01	**26.04**
	Apr	29.58	5.42	6.75	8.88	1.97	**52.6**	0.01	14.28	**14.29**
	May	9.75	1.79	2.00	2.93	0.65	**17.12**	0	4.83	**4.83**
	Jun	18.23	3.34	4.02	5.47	1.22	**153.06**	0.01	10.19	**10.2**

Year	Month	Non-hazardous Waste (Solid Waste)						Hazardous Waste		
		Cutting Scrap (Tons)	Carton Box (Tons)	Assorted Waste (Tons)	Domestic Waste (Tons)	Boiler Waste (Ash & Sawdust) (Tons)	Total Monthly (Tons)	Chemical Waste (Tons)	Sludge Disposal (Tons)	Total Monthly (Tons)
	Jul	29.33	5.38	6.81	8.80	1.96	**52.28**	0.01	9.35	**9.36**
	Aug	13.35	2.45	2.69	4.00	0.89	**23.38**	0.11	9.07	**9.18**
	Sep	32.7	6.33	8.40	10.55	3.16	**61.14**	0.02	8.61	**8.63**
	Oct	7.87	1.31	1.77	2.36	0.52	**13.83**	0.004	2.73	**2.734**
	Nov	26	4.35	5.35	7.82	1.74	**45.26**	0.009	8.82	**8.829**
	Dec	57	30.68	36.42	48.21	30.68	**202.99**	0.175	15.12	**15.295**
Total (2020)		**317.47**	**82.53**	**103.95**	**134.65**	**55.39**		**0.428**	**169.4**	

Figure 2-62 Hazardous and Non-hazardous Solid Wastes Storage Rooms

Figure 2-63 Temporary Separated Rooms for Solid Wastes

Figure 2-64 Disposal of wastes to the City Development Committee (Bago)

All the solid wastes are disposed weekly with City Development Committee (Bago) facilities.

2.11 Stormwater Management Plan in KARISMA

Industrial sites need effective management of stormwater run-off from roofs, pavements, exterior materials storage, and process areas to avoid flooding or contamination of sensitive water resources.

Existing Site Conditions and Topography

The Project is in Bago river sub-basin area. The Bago River Sub-basin refers to the catchment of the Bago River, running south from the Pegu Yoma mountain range at an elevation of 800 m.a.s.l. (metres above sea level) to the Yangon River. It is connected to the Sittaung River Basin by a 61-km long canal. Administratively and politically, the sub-basin primarily falls under the Bago District in the Bago Region.

Main pollution sources in the Bago River Sub-basin are run-off from farmland and sewage from scattered dwellings and urban areas. A major run-off typically follows the monsoon as heavy precipitation acts as surface wash-off for various pollutants. Identified industries in the catchment are mainly saw mills, and brick production industries in the Bago Township, but diffuse rather than point source pollution is associated.

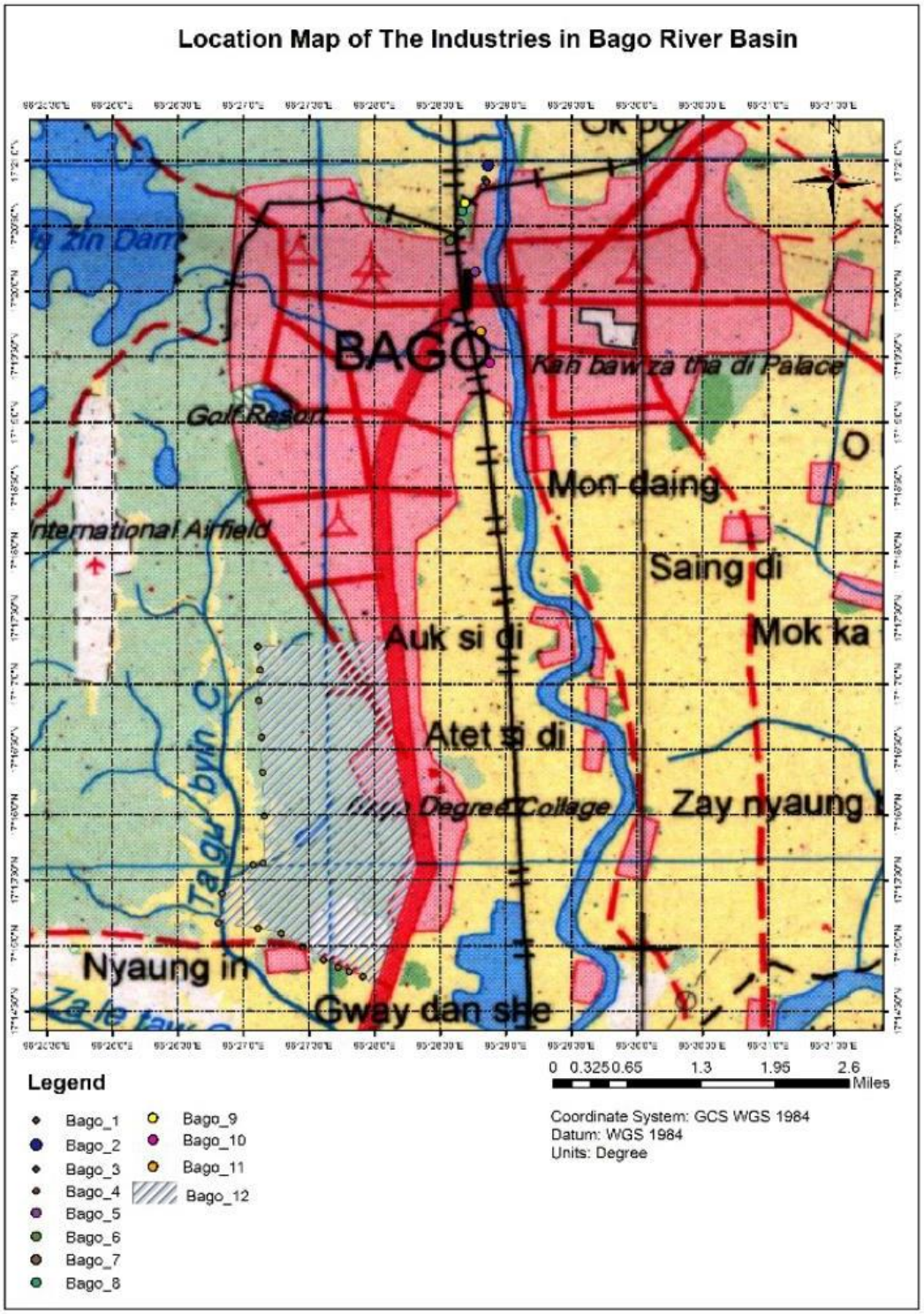


Figure 2-65 Location of Industries in Bago District (12 Industrial Zones)

Stormwater Management

- The storm water drainage and flood control options evaluated include Detention (storage measures) or hydraulic system improvements which mitigate storm water drainage and flooding problems. The selected storm water drainage and flood control plan will provide a balance between protection against structural flooding in the 100-year storm event and public expenditure of funds.

- Uncontaminated stormwater runoff from roofs, paths and the landscape should not be allowed to mix with process effluent, stored chemicals or stormwater runoff from areas susceptible to chemical spills. Where practical, processing areas involving the use of chemicals should be weatherproof or covered.
- Areas where stormwater may become contaminated should drain to treatment facilities for removal of solids and chemical residues to disposal.
- Chemical storage and handling areas should be located within sealed secondary containment areas that allow maximum recovery of any spilt chemicals.
- Paved areas exposed to rainfall where dust, litter or spilt substances accumulate should be regularly cleaned using methods that prevent drainage or leaching of fluid into the surrounding environment. Gross pollutant (litter), oil and sand traps (appropriate to the site) are recommended at drain entry points. These traps require regular inspection and residue removal. First-flush water diversion for dusty outdoor areas should be considered to capture initial stormwater runoff after any extended dry period. These may incorporate flow-diversion valves and stormwater storage for later treatment.
- Chemical solvents and non-degradable detergents used to clean equipment or pavements should not be released into stormwater systems. These chemicals are likely to cause environmental harm if they enter groundwater, wetlands, waterways

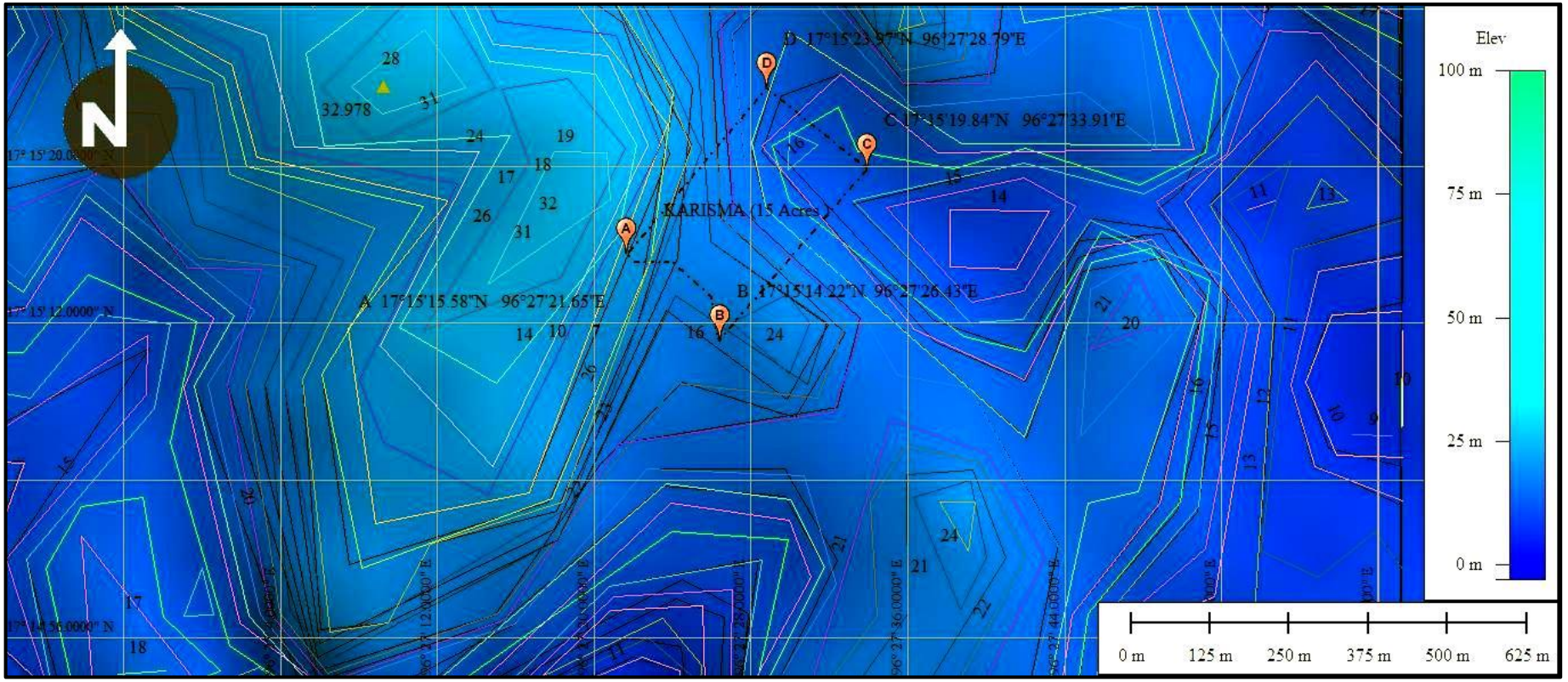


Figure 2-66 Elevation of the Study Factory Area

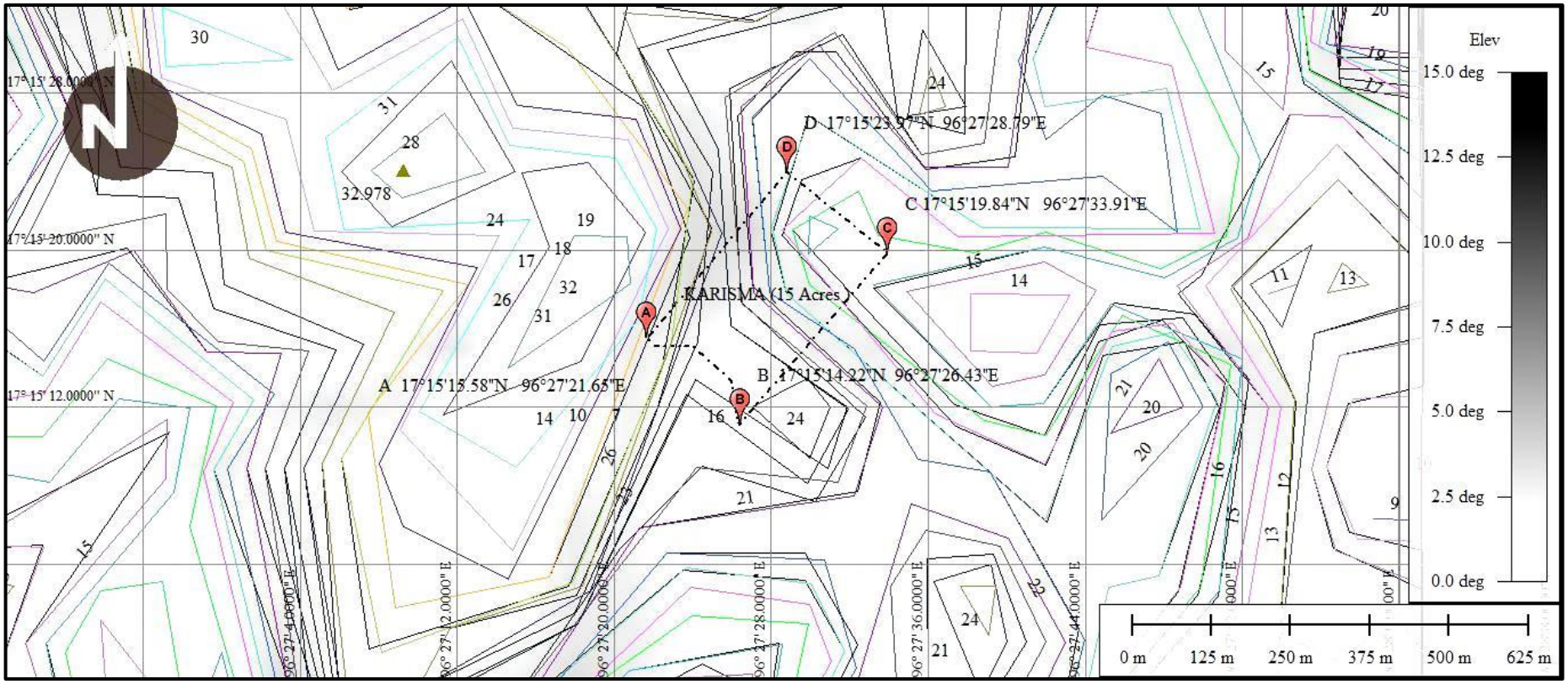


Figure 2-67 Slope Direction of Study Area

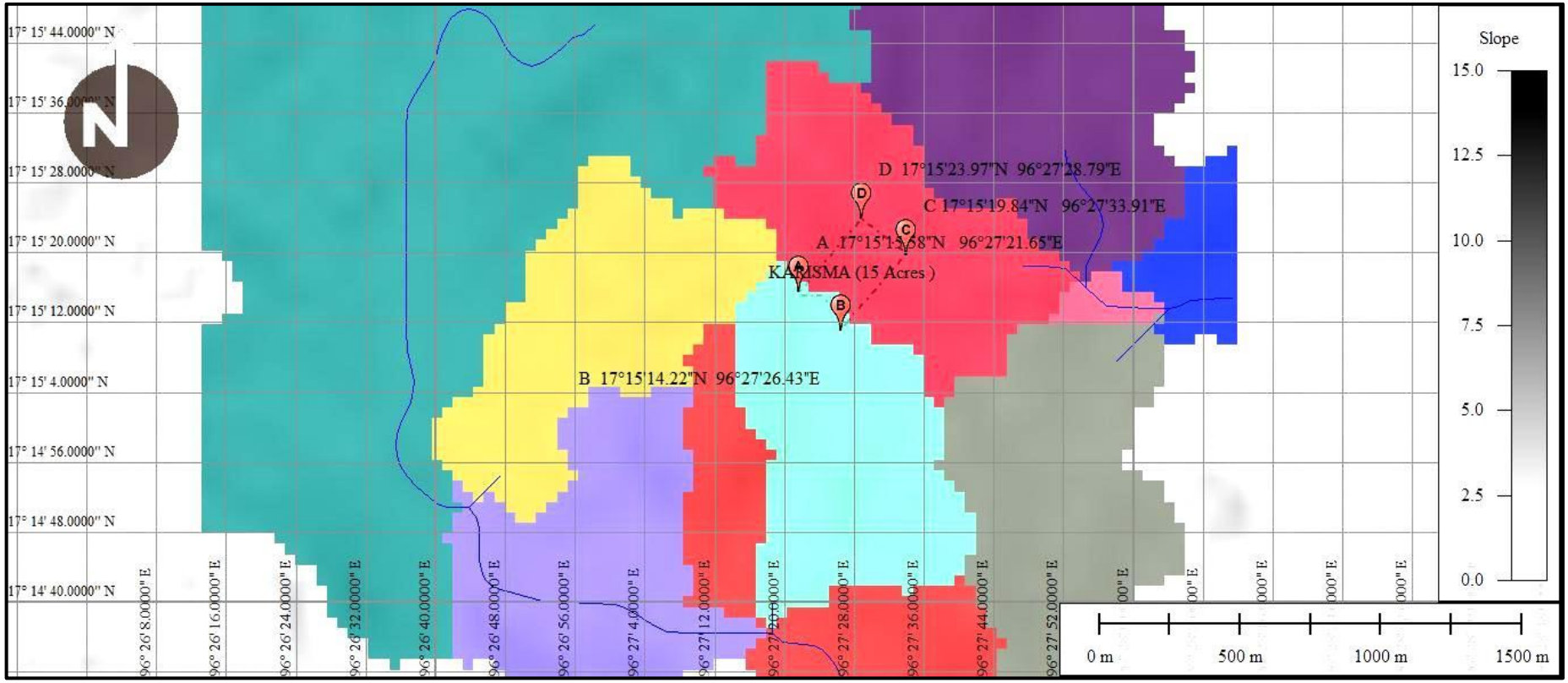


Figure 2-68 Watershed Map of Study Area

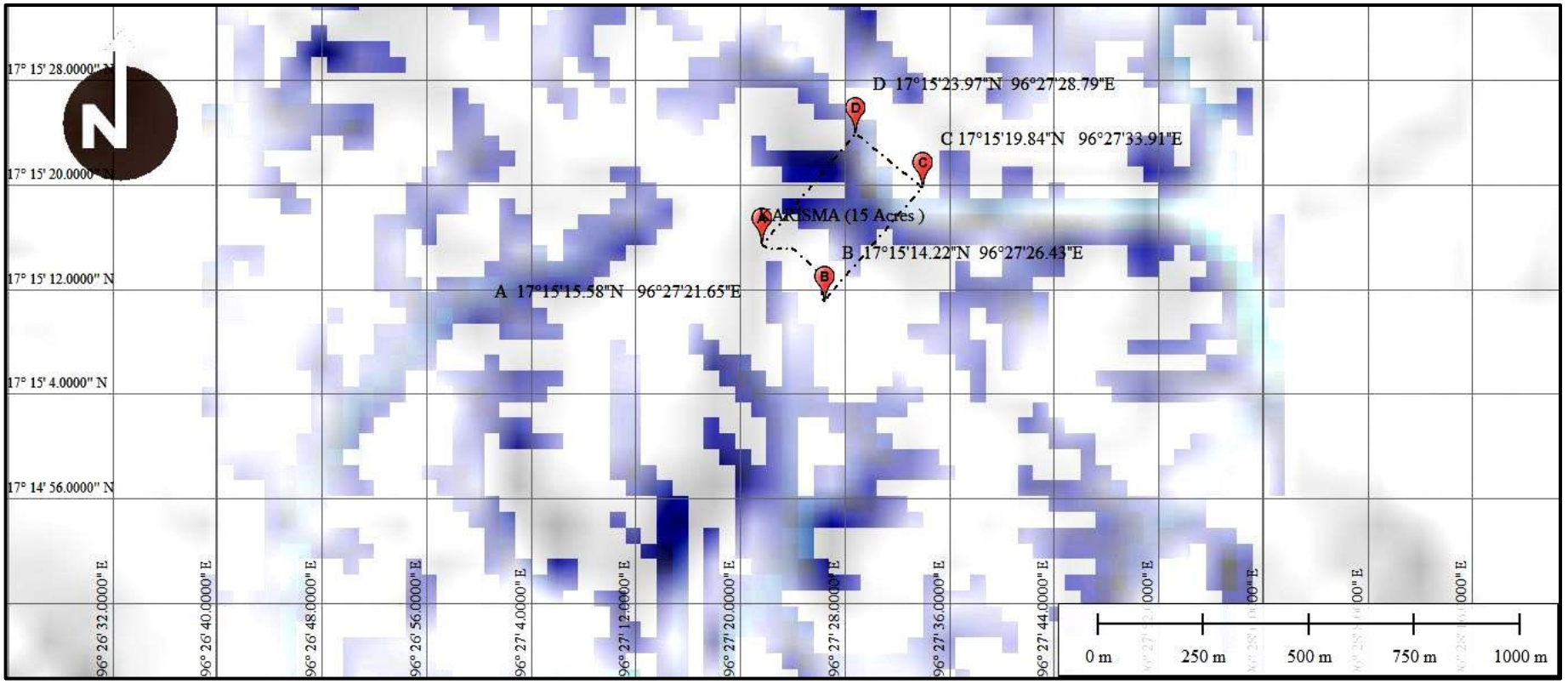


Figure 2-69 Surface Drainage Flow Grid Pattern of Study Area

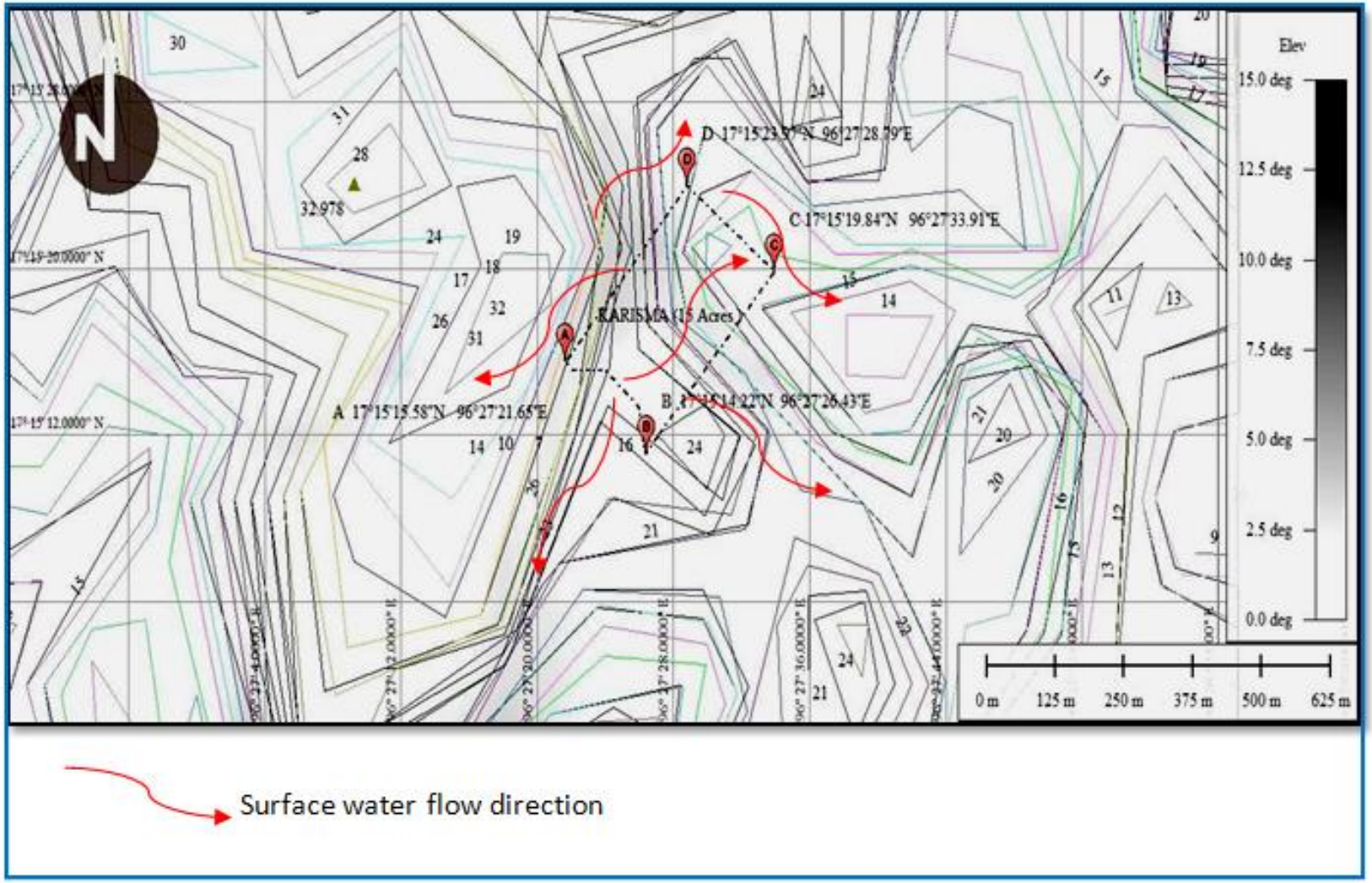


Figure 2-70 Surface Water Flow Direction of Study Area

Figure 2-71 Drainage System in KARISMA Apparel Factory

2.12 Chemicals Storage System

The company is fully aware of proper chemical storage as important to safety as proper chemical handling.

Follow these measures for safe chemical storage:

A. Read chemical labels and Materials Safety Data Sheets (MSDSs)in local language for specific storage instructions. MSDSs must be obtained from chemical suppliers and retained updated copies for all chemical substances used in the facility.
B. Store chemicals in a designed and well-ventilated area with secondary containers or leak-proof containers.
C. Maintain an inventory of all chemicals in storage.
D. Chemicals containers are checked at receiving to ensure that they meet purchasing specifications and that match MSDS.
E. Reports are kept of all incidents or accidents involving chemicals.

F. The volume of stored chemicals should be less than the volume of secondary leaking containers.

Requirements of Storage Room

A. Storage rooms should have containment systems to prevent release of liquid chemicals outside the room, and leaks should never drain into the local sewerage system.
B. Rooms should be cool, dry, and separated from production departments and canteen.
C. Storage Rooms should be designated "No Smoking",
D. Storage Rooms should have appropriate fire extinguishers located near entries.
E. Appropriate cleaning and absorbing material and personal protective equipment should be available in case of spills.
F. Containers should be regularly inspected for leaks, corrosion, bulging, etc.
G. Chemicals in metal containers should be protected against friction and must never be dragged across a floor or banged against other objects.
H. Obsolete and expired chemicals must be disposed of on a regular basis.
I. All tanks and containers must be labeled correctly and legibly.
J. All local laws governing storage and mixing of chemicals must be observed.

Separating Hazardous Chemicals

In addition to the guidelines above, there are storage requirements for separating hazardous chemicals. Because an alphabetical storage system may place incompatible chemicals next to each other, group chemicals according to their hazard category (i.e., acids, bases, flammables, etc.}. Ensure that hazardous chemicals are stored safely.

3.0 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

3.1 Background

The emerging environmental scenario calls for attention on conservation and judicious use of natural resources. There is a need to integrate the environmental consequences of the development activities and for planning suitable measures in order to ensure sustainable development. The environmental considerations in any developmental process have become necessary for achieving sustainable development. To achieve such goals the basic principles to be adopted are:

- To enhance the quality of environment in and around the project area by adopting proper measures for conservation of natural resources;
- Prevention of adverse environmental and social impact to the maximum possible extent;
- To mitigate the possible adverse environmental and socio-economic impact on the project-affected areas.

Policy, legal and institutional framework of the proposed project relating to the environmental, social, health and economic conditions are discussed in this section.

3.2 Policies

Myanmar Government issued:

- National Environmental Policy in 2019,
- Myanmar Agenda 21 in 1997,
- National Sustainable Development Strategy in 2009,
- The Environmental Conservation Law in 2012,
- Environmental Conservation Rules in 2014, and
- Environmental Impact Assessment Procedure and National Environmental Quality (Emission) Guidelines in 2015.

3.2.1 Myanmar Environmental Policy

Myanmar National Environmental Policy, which already included for social policy, subsequently gazette on 10th June 2019 is as follows:

To establish sound environment policies in the utilization of water, land, forests, marine resources, and other natural resources in order to conserve the environment and prevent its degradation, the Government of the Union of Myanmar hereby adopts the following policy:

"The wealth of a nation is its people, its cultural heritage, its environment and its natural resources."

The objective of Myanmar's environment policy is aimed at achieving harmony and balance between these through the integration of environmental considerations into the development process to enhance the quality of the life of all citizens.

Every nation has the sovereign right to utilize its natural resources in accordance with its environmental policies, but great care must be taken not to exceed its jurisdiction or infringe upon the interests of other nations. It is the responsibility of the state and citizen to preserve its natural resources in the interest of present and future generations. Environmental protection should always be the primary objective in seeking development."

3.3 Legal and Institutional Frameworks

3.3.1 Existing Environment-Related Laws and Rules

Legal and approval requirements applicable to the Project related to the environmental and social will be identified by KARISMA Apparel (Myanmar) Co., Ltd (KARISMA).

KARISMA must comply with the following Myanmar Acts and Rules related to the project.

Table 3-1 Environment-Related Laws and Rules

Administrative Sector
The Penal Code (1861) Provisions related to prohibitions against contaminating public springs or reservoirs and "making atmosphere noxious to health".
The Police Act (1945) Provisions on offences which affect the human environment.
The Ward or Village Tracts Administration Law (2012) [Amendment 2012,2016] Provisions on offences which affect the human environment.
The Myanmar Fire Brigade Law (2015) Provisions to protect and to prevent from fire disaster and natural disaster, which insures losses, and endanger.
City Development Sector
The Water Power Act (1927) Prohibitions on the pollution of public water.
The Underground Water Act (1930) This Act provides the requirement for systematic use of ground water toward sustainable purpose.
Environmental Conservation Sector
Environment Conservation Law (2012) To implement National Environmental Policy; to set up basic principles and guidelines for sustainable development and systematic integration of environmental conservation; to conserve the clean environment, natural and cultural heritage for present and future generation, to prevent degradation of natural resources and for sustainable use, to build up public understanding on environmental awareness.
Environmental Conservation Rules (2014) The Rules reinforce the obligation for project developers to submit an EIA or an IEE. It aims to establish and adopt the necessary programs for the conservation and enhancement of environment, protection, control, and reduction of pollution in environment, and conservation.
Environmental Impact Assessment Procedures (2015)

To establish types of project that needed to submit an EIA or an IEE or an EMP. Also, to establish the environmental assessment process and to issue the environmental compliance certificate.
National Environmental Quality (Emission) Guidelines (2015)
To provide the basis for regulation and control of noise and vibration, air emissions, and liquid discharges from various sources in order to prevent pollution for purposes of protection of human and ecosystem health.
Finance and Revenue Sector
The Myanmar Insurance Law (1993)
For any business which may pollute the environment to effect compulsory general liability insurance.
The Income Tax Law (1974) [Amendment 2011]
Income gained from the economic business shall be levied under the heading of economic business. [section 11 (a)]
An entrepreneur shall send income annual list annually within three months after the end of the income year. [section 18]
The Commercial Tax Law (1990) [Amendment 2014]
Whoever carries out the production in the country commercial business shall be levied tax stated in the schedule of this law. [section 4]
Whoever carries out the production business or service business shall register to the township income tax officer as prescribed in the regulations. [section 11]
Biodiversity and Ecosystem Sector
The Forest Law (2018)
Provision to conserve water, soil, biological diversity, and the environment; sustain forest produce yields; protect forest cover; establish forest and village firewood plantations; sustainably extract and transport forest products.
Protection of Biodiversity and Protected Area Law (2018)
To protect wildlife, wild plants, and conserve natural areas, to contribute towards works of natural scientific research, and to establish zoological gardens and botanical gardens. The Law highlights habits maintenance and restoration, protection of endangered and rare species of both fauna and flora, establishment of new parks and protected areas, and buffer zone management.
Health Sector
The Public Health Law (1972)
For promoting and safeguarding public health and to take necessary measures in respect of environmental health.
Prevention and Control of Communicable Diseases Law (1995) [Amendment 2011]
The Law highlights the functions and responsibilities of health personnel and citizens in relation to prevention and control of communicable diseases. It also describes measures to be taken in relation to environmental sanitation, reporting and control of outbreaks of epidemics and penalties for those failing to comply. The law also authorizes the Ministry of Health to issue rules and procedures when necessary with approval of the government.
The Control of Smoking and Consumption of Tobacco Product Law (2006)
To protect from the danger which affects public health adversely by creating tobacco smoke-free environment; To uplift the health, economy, and social standard of the public through control of smoking and consumption of tobacco product
Industrial Sector
The Export and Import Law (2012)
No one shall import or export the prohibited goods. [section 5]

No one shall import or export the goods without permit which are prescribed to obtain permit. [section 6]

The Electricity Law1 (2014)

No electrical business shall be operated other than the business contained in the permit by any permit holder. [section 45]

No one shall produce, transmit, connect, contact and use the electrical power without electric safety certificate. [section 47]

No one shall connect, waste, and utilize the electrical power without the permission of the permit holder. [section 52]

No one shall cut off the electric power line, transfer electricity, destroy electrical equipment and used in any electrical business. [section 53]

The Boiler Law (2015)

The salient objectives are: [section 3]

a. Not to occur loss to the public by protecting the danger from accident.
b. To use the boilers in line with Myanmar Standards or International Standards within the union.
c. To enable to use the boilers for long term and to decrease natural health environmental impact due to the boilers.

The owner shall not use the boilers not having utility certificate or temporary utility certificate; boilers which have void certificates, boilers which have void certificates, boilers which have withdrawn certificates. [section 20]

The Petroleum Act (1934), The Petroleum Rules (1937)

Provisions to regulate production, storage, and transport of oil so as not to cause pollution or the outbreak of fires.

The Factories Act (1951) [Amendment 2016]

Provisions for the proper disposal of waste and effluents in factories; treatment of waste water; regulations for health and cleanliness in factories, and the prevention of hazards.

The Private Industrial Enterprise Law (1990)

Provision to avoid environmental pollution.

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

To protect from being damaged the natural environment resources and being hazardous any living beings by chemical and related substances.

To perform the sustainable development for the occupational safety, health, and environmental conservation.

National Planning and Economic Development Sector

Myanmar Investment Law (2016)

The objectives are to protect the invertors and their businesses in accordance with law, to create job opportunities for the people, to develop high functioning production, service, and trading sectors. [sections 3 (b), (c) and (e)]

An investor who obtains permit or endorsement under this Law has the right to obtain a long-term lease of land or building from the owner if it is private land or building, or from the relevant government departments or government organization if it is land managed by the government, or land or building owned by the Union in accordance with the stipulations in order to do investment. Citizen investors may invest in their own land or building in accordance with relevant laws. [section 50 (a)]

The Government guarantees not to nationalize any investment carrying out in accordance with the law. Except under the following conditions, the Government guarantees not to take any measures

which expropriate or indirectly expropriate or is likely to affect a result in the termination of an investment:

(a), necessary for the interest of the Union or its citizen;

(b) non-discriminatory manner;

(c) measures in accordance with the applicable Laws;

(d) prompt, fair, and adequate payment of compensation. [section 52]

The investor shall abide by 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. [section 65 (g)]

The Myanmar Investment Rules (2017)

After obtaining the permit, the investor who requires environmental and social impact assessment shall submit the required performances on environmental and social impact assessments to the Commission along the course of operating business. [section 189]

Transportation Sector

The Motor Vehicle Law (2015)

Provisions to control vehicle engine emissions and the leakage of fuel or oil.

The Motor Vehicle Rules (1989)

No vehicles shall carry more than the number or weight of goods which is permitted according to registration. [section 138]

Workforce Sector

The Workmen's Compensation Act (1923), (Amendment) (2011)

To make payments out-of-pocket 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.

The Leave and Public Holidays Act (1951), (Amendment) (2014)

To allow worker for leave and holiday allowances, religious or social activities with earn allowance, and benefits for Health allowances.

Concerned workers: Daily wage workers/temporary workers/permanent workers.

Constitution of the Union of Myanmar (2008)

Section 24 – The Union shall enact necessary laws to protect the rights of workers.

Section 349 (b) – Citizens shall enjoy equal opportunity in carrying out occupation.

Section 359 -The Union prohibits forced labor except hard labor as a punishment for crime duly convicted and duties assigned by the Union in accord with the law in the interest of the public.

The Labor Organization Law (2011)

The objectives of this law are:

- To protect the rights of the workers in accordance with section 24 of the Constitution
- To promote good relations between the employer and the worker
- To enable to workers to form and carry out the labor organizations systematically and independently

The Development of Employment and Skill Law (2013)

The main objectives of this law are:

- To facilitate employment that is appropriate to the age and ability of the job seeker
- To help workers obtain employment and to provide stability of employment and skills development for employees
- To help employers obtain appropriate employees

The Minimum Wage Law (2013), The Minimum Wage Rules (2013)

▪ To fulfill the basic needs of the workers and their families who are working in commercial establishments, production and servicing establishments, agriculture, and livestock. ▪ To develop the work performance and competitiveness of workers
The Payment of Wage Law (2016) Receipt of wages is made regularly. Unlawful deductions are not to be made.
The Settlement of Labor Dispute Law (2012), (Amendment) (2014) The objectives of this law are: ▪ For safeguarding the rights of workers. ▪ Promoting a good relationship between employer and workers and creating a peaceful workplace. ▪ Obtaining the rights fairly, rightfully, and quickly by settling disputes between employer and worker justly.
The Social Security Law (2012), The Social Security Rules (2014) The objective of this law is to get benefit for sickness, maternity, death, employment injury, invalidity benefit, superannuation benefit by: giving medical treatment, providing cash benefit, or granting a right to residency.
Occupational Health and Safety Law (2019) The objectives of this law are: ▪ To effectively implement measures related to safety and health in every industry; ▪ To establish the duties and responsibilities of those who are responsible under this law, including workers and employers, to reduce workplace accidents and occupational diseases; ▪ To work with employees, 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; ▪ To set occupational safety and health standards which reflect the context of Myanmar while conforming with the regional and internal ones to create safe and health workplaces.
Disaster Sector
Natural Disaster Management Law (2013) The objectives are to implement natural disaster management programs systematically and expeditiously in order to reduce disaster risks, to conserve and restore the environmental affected by natural disasters and to provide health, education, social and livelihood programs in order to bring about living conditions for victims. [section 3 (a), (d) & (e)]

3.4 Laws related to Occupational Health and Safety (including Communicable Diseases)

There are several pieces of relevant legislation in Myanmar related to Occupational Health and Safety. These include:

- ***the Public Health Law 1972*** which is concerned with protection of people's health by controlling the quality and cleanliness of food, drugs, environmental sanitation, epidemic diseases, and regulation of private clinics.
- The ***Nation Drug Law 1992*** was enacted to ensure access by the people safe and efficacious drugs. The Nation Drug Law 1992 describes requirement for licensing in relation to manufacturing, storage, distribution and sale of drugs. It also includes

provisions on formation and authorization of Myanmar Food and Drug Board of Authority.

- ***The Prevention and Control of Communicable Diseases Law 1995*** (amended in 2011) describes the functions and responsibilities of health personnel and citizens in relation to prevention and control of communicable diseases. The Prevention and Control of Communicable Diseases Law 1995 also describes measures to be taken in relation to environmental sanitation, reporting and control of outbreaks of epidemics and penalties for those failing to comply. The law authorizes the Ministry of Health to issue rules and procedures when necessary with approval of the government.
- ***The Narcotic Drugs and Psychotropic Substances Law 1993*** provide legislation to control of drug abuse and describes measures to be taken against those breaking the law. Enacted to prevent danger of narcotic and psychotropic substances and to implement the provisions of United Nations Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances. Other objectives of the Narcotic Drugs and Psychotropic Substances Law 1993 are to cooperate with state parties to the United Nations Convention, international and regional organizations in respect to the prevention of the danger of narcotic drugs and psychotropic substances. According to the Narcotic Drugs and Psychotropic Substances Law 1993, the Central Committee for Drug Abuse Control (CCADC), Working Committees, Sectors and Regional Committees were formed to carry out the designated tasks in accordance with provisions of the law. The law also describes procedures relating to registration, medication, and deregistration of drug users.
- ***The Occupational Safety and Health Law 2019*** will implement workplace safety and health regulations for all industries, stipulate obligations of the relevant stakeholders to reduce and eliminate workplace accidents and occupational diseases, ensure the early prevention of workplace hazards arising from Myanmar's economic development, raise productivity and establish safe and healthy workplaces in accordance with regional and international standards. The law is applicable construction and engineering projects. The Occupational Safety and Health Law 2019 sets out duties and responsibilities of employers and employee, the National Workplace Safety and Health Council and administrative penalties and appeals.

3.5 International Conventions, Treaties and Agreements

Myanmar has signed several international treaties related to the environment, which may have implications for the Factory. These include:

- Convention Concerning the Protection of the World Cultural and Natural Heritage
- Montreal Protocol on Substances that Deplete the Ozone Layer & all amendments
- Stockholm Convention on Persistent Organic Pollutants
- Convention on Biological Diversity
- Cartagena Protocol on Biosafety
- Ramsar Convention on Wetlands

- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- ASEAN Agreement on the Conservation of Nature and Natural Resources
- United Nations Convention to Combat Desertification
- United Nations Framework Convention on Climate Change (UNFCCC) and Kyoto Protocol
- ASEAN Agreement on Trans-boundary Haze
- Global Tiger Forum, India in August 1994

3.6 Corporate Environmental Policy of the Project Proponent

3.6.1 Environmental Policy

KARISMA Apparel (Myanmar) Co., Ltd. commits to be socially accountable by improving environmental performance. The company will drive the awareness of the environment protection in the management and in employees and perform the plans which are believed to contribute Bago and Myanmar.

3.6.2 Social and Welfare Plan

The company operates in full compliance with all local laws, rules and regulations governing its operations.

A. The company respects the right of personnel to a living wage and ensure that wages paid for a normal work week shall always meet at least legal or industry minimum standards and shall be sufficient to meet the basic needs of personnel.
B. The company respects the differences of personal characteristics, religions and identities between employees.
C. The company ensures that employees' wages and benefits composition are detailed clearly and regularly in writing for them for each pay period.
D. The company ensures that wages and benefits are rendered in full compliance with all applicable laws and that remuneration is rendered in a manner of convenient to workers.
E. All overtime is reimbursed at a premium rate as required by Government law.

3.7 Environmental Commitment

To meet environmental, legal, and other requirements, the proponent shall

- Comply with all Myanmar laws, rules and regulations, and Clauses 14 and 15 of the Environmental Conservation Law (2012);
- Ensure that legal and other obligations are incorporated in the designs, procedures, and project controls.
- Communicate legal and other requirements to personnel and contractors accountable for compliance.

- Ensure all relevant legal and other requirements and associated documentation (e.g. licenses, permits, approval applications) are readily available on site to the project personnel, contractors, subcontractors, and consultants.
- Conduct a compliance audit at least annually and ensure there is a process in place to monitor on-going compliance with all legal and other requirements.
- Improve EMP systematically on a regular basis for realistic, efficient, and cost effective.
- Implement the best available technologies (BATs) and best environmental management practices.
- Confirm that EMP is sufficient for the proposed work.
- Implement the project EMP strictly by complying with these standards and any additional requirements set out in the project Environmental Compliance Certificate (ECC) adopted by the Department.
- Monitor air emissions, noise, odor, and liquid/effluent discharges at the points as specified in the project EMP and ECC.

3.8 Occupational Health and Safety Standards

At present, there are five Legal Instruments in Industrial Sector in Myanmar as follows:

1. The Private Industrial Enterprise Law, 1990
2. The Factories Act, 1951
3. The Oilfield (Workers and Welfare) Act, 1951
4. The Petroleum Act, 1934
5. The Oilfields Act, 1918

The OHS legislative framework in Myanmar is embodied in the Factories Act of 1951 and the Oilfield (Labor and Welfare) Act of 1951.The primary OHS regulator is the Factories and General Labor Laws Inspection Department (FGLLID). Other agencies involved in regulating OHS standards include:

- the Boiler and Electric Inspection Division (Ministry of Industries);
- Planning and Inspection Department (Ministry of Mines);
- Occupational Health Division (Ministry of Health);
- the Ministry of Construction;
- the Ministry of Agriculture and Irrigation; and
- the Yangon City Development Committee

Myanmar has a policy framework such as National Strategic Policy Document on workers' health. The framework includes elements such as:

- enactment of legislation,
- establishment of mechanisms for inter-sectorial coordination of activities,
- funding and resource mobilization for workers' health,
- strengthening the role and capacities of Ministries of Health and
- integration of objectives and actions for workers' health into national strategies

Aspects of Workers' Health covered by this policy framework are:

- Occupational Health
- Occupational Safety
- Workplace Health Promotion
- Provision of Occupational Health Services
- Chemical Safety
- Environmental Health
- Prevention of Communicable Diseases at the work-place (HIV/AIDS, TB, malaria, avian influenza)
- Prevention of Non-communicable Diseases at the work-place (cancer, cardiovascular diseases)

3.9 Preparation OHS Framework in Myanmar

3.9.1 Strategy to raise Occupational Health and Safety Standard

1. Set up National OHS Committee
2. Assist SME to Improve Work Conditions
3. Develop Capabilities of Inspectors
4. Upgrade Occupation Hygiene Laboratory
5. Upgrade Internal OHS Capabilities
6. Establish OHS Training Centre
7. International Collaboration to learn experiences

3.9.2 Roles of Stakeholders in Myanmar OHS Framework

Developer / Client

Developer Profile

- A 'Developer / Client is anyone having construction or building work carried out as part of their business.
- This could be an individual, partnership or company and includes property developers or management companies for domestic properties.
- The developer or client, being the pay master at the top of the value chain, is in the best position to influence the Occupational Health and Safety (OHS) performance of the project.
- Depending on the objectives and requirements developers set the suppliers and contractors they decide to engage, and the resources they provide,

The eventual outcome can vary greatly.

Role of the Developer / Client

Developer / Client's Duties

On all projects, developer / client will need to:

- Check competence and resources of all potential contractors and suppliers.

- Ensure there are suitable management arrangements for the project including welfare facilities.
- Allow sufficient time and resources for all stages.
- Provide pre-construction information to designers and contractors.
- Must lead in Design for Safety (DfS). DfS refers to active identification and addressing of WSH risks right from the conceptual and design phase of construction projects.
- Appoint a principal contractor.
- Make sure that construction work does not start unless a construction phase plan is in place and there are adequate welfare facilities on site.

Designer

Designer Profile

- The term 'Designer has a broad meaning and relates to the function performed, rather than the profession or job title.
- Designers are those who, as part of their work, prepare design drawings, specifications, bills of quantities and the specification of articles and substances.
- This could include architects, engineers, and quantity surveyors.

Role of the Designer

Designer's Duties

On all projects, Designer will need to:

- Eliminate hazards and risks during design stage.
- Provide information about remaining risks.

Where projects are notifiable under the Regulations, designers must also:

- Check that the client is aware of their duties and that a site representative has been appointed.
- Provide information needed for the health and safety of the all personnel involved in the project.

Contractors

Contractors Profile

- A 'Contractors' are those who are involved in construction, alteration, maintenance or demolition work. This could involve building, civil engineering, mechanical, electrical, demolition and maintenance companies, partnerships and the self-employed.
- All those who work in the construction industry have their part to play looking after their own health and safety and in improving the industry's health and safety record.

Role of the Contractor

Contractor's Duties

On all project's contractors will need to:

- Plan, manage and monitor their own work and that of their workers.
- Check the competence of all their appointees and workers.
- Train their own employees.
- Provide work related information to their workers.
- Ensure that there are adequate welfare facilities for their workers.

In addition, where projects are notifiable under the Regulations, Contractors must also:

- Co-operate with the principal contractor in planning and managing work, including reasonable directions and site rules.
- Provide details to the principal contractor of any contractor engaged in connection with carrying out work.
- Inform the principal contractor of reportable accidents, diseases, and dangerous occurrences.

3.9.3 Short Term / Long Term Plan for Effective Implementation

Occupational Health and Safety Management System (OHSMS) requires a 'Plan - Do - Check - Act' approach, based on the principle of continual improvement. OHSMS is structured into 14 distinct sections as follows:

(1) Occupational Health and Safety Policy
(2) Identification of Hazards
(3) Assessment of Risks
(4) Establishments of Occupational Health and Safety Objectives
(5) Development of OHS Plan
(6) Implementation of OHS Plan
(7) Routine Monitoring and Improvement
(8) Investigation of Work-Related Accidents, Incidents and Diseases
(9) Emergency Prevention, Preparedness and Response
(10) Performance Monitoring and Measurement
(11) Audit
(12) Preventive and Corrective Action
(13) Management Review
(14) Continual Improvement.

3.10 Key Commitment of Proponent for Environmental Management

The Project Proponent shall have several obligations related to environmental, social, health concerns and a consolidated summary list of environmental, social and health commitments that will be implemented in the Project in order to manage and mitigate the potential impacts associated with the project is provided in **Table 3-2**.

Table 3-2 List of Key Commitments

Sr. No.	Field	No.	Commitment	EMP Reference	Responsible Organization	
					KARISMA	Contractor
I	**General**	1	The relevant Myanmar laws, rules and regulations as follows will be complied with: ➢National Environmental Policy (2019) ➢Environmental Conservation Law (2012) ➢Environmental Conservation Rules (2014) ➢EIA Procedures (2015) ➢National Environmental Quality (Emission) Guidelines (2015)	Chapter-3	√	√
		2	The KARISMA will comply with all the target values of National Environmental Quality (Emission) Guidelines.	Chapter-4	√	√
		3	The KARISMA will comply and implement the environmental management plan (EMP), mitigation measures and monitoring plan formulated from this EMP for operation and decommissioning phases.	Chapter-6 and Chapter-7	√	√
		4	The KARISMA will comply and implement the Emergency Plan.	Chapter-9	√	
		5	The company will implement all the items in the list of commitments.	Chapter-3	√	√
II	**Air Quality**	1	The project set the target values of ambient air quality in accordance with the NEQG and US - EPA Guidelines.	Chapter-4	√	√
		2	To prevent air contaminants such as dust, particulate matters and exhaust gases during operation and decommissioning phases, the adequate mitigation measures will be implemented at both operation and decommissioning phases of the project.	Chapter-6	√	√
		3	Monitoring of air quality will be conducted in accordance with the EMP during both operation and decommissioning phases and respective monitoring reports will be submitted accordingly to ECD.	Chapter-7	√	

Sr. No.	Field	No.	Commitment	EMP Reference	Responsible Organization	
					KARISMA	Contractor
III	**Water and Wastewater Quality**	1	During operation phase, the domestic wastewater will be discharged into the drainage only after doing test to comply with NEQG target values for effluent.	Chapter-4 and Chapter-5	√	
		2	During operation phase, the wastewater generated from washing and printing will be collected into the wastwater treatment plants and only treated effluent from these plants will be discharged into the drainage.	Chapter-2 and Chapter-5	√	
		3	During decommissioning phase, wastewater generated from the domestic activities will be discharged into septic tank and collected by outsourced contractor. The wastewater from demolition activities will be discharged into the drainage only after passing through the settling ponds and inspection pit.	Chapter-5		√
		4	Direct discharges of all kinds of wastewater into the drainages will be strictly prohibited at both operation and decommissioning phases of the project.	Chapter-5	√	√
		5	Monitoring of water quality will be conducted in accordance with the EMP during operation and decommissioning phases to comply with target values set and respective monitoring reports will be submitted accordingly to ECD, Bago Region.	Chapter-4 and Chapter-7	√	√
IV	**Noise and Vibration**	1	Adequate mitigation measures would be adopted and implemented at both operation and decommissioning phases of the project to comply with target noise and vibration levels set for the project.	Chapter-4 and Chapter-5	√	√
		2	During operation phase, KARISMA set the target value of Noise level in accordance with the NEQG Guidelines for ambient noise level.	Chapter-2 and Chapter-4	√	

Sr. No.	Field	No.	Commitment	EMP Reference	Responsible Organization	
					KARISMA	Contractor
		3	For noise and vibration control, setting the speed limit for vehicles, proper repair and maintenance of demolition-related vehicles during decommissioning phase.	Chapter-5		√
V	**Soil Contamination**	1	Soil contamination due to accidental leakage and spillage of diesel and oil can be mitigated by paving with concrete floor.	Chapter-5	√	√
VI	**Wastes**	1	Comprehensive non-hazardous and hazardous waste management systems will be undertaken for waste assortment, segregation, proper storage, and disposal/ recycling will be implemented during both operation and decommissioning phases.	Chapter-2, Chapter-5 and Chapter-7	√	√
		2	The non-hazardous wastes generated from the all stages will be collected, segregated, and stored systematically and disposed properly by entrusting City Development Committee (Bago), while hazardous wastes will be disposed properly by licensed contractor.	Chapter-2, Chapter-5 and Chapter-7	√	√
		3	Types and amount of hazardous and non-hazardous wastes generated from factory operation and demolition works will be recorded monthly and included in the monitoring report to be submitted to ECD, Bago Region during both operation and decommissioning phases.	Chapter-5 and Chapter-7	√	√
VII	**Hazardous Chemicals and Materials**	1	Amount of fuel usage, and hazardous wastes to be consigned to waste management organization(s) will be recorded monthly, and will be included in the monitoring report to be submitted to ECD, Bago Region during both operation and decommissioning phases.	Chapter-5 and Chapter-7	√	√
		2	Self-Inspection for the chemical and hazardous materials management, including the measures to secure occupational health and safety will be carried out during regular operation period.	Chapter-5 and Chapter-7	√	

Sr. No.	Field	No.	Commitment	EMP Reference	Responsible Organization	
					KARISMA	Contractor
VIII	**Local Economy and Social Consideration**	1	Number of local staff and workers in KARISMA will be recorded as necessary to know the job employment for local people.	Chapter-5	√	
		2	The project proponent must give employees compensation for suffering during decommissioning phase.	Chapter-5	√	
IX	**CSR Activities**	1	Donations at wards and villages nearby and Social Welfare Programs, etc. will be recorded yearly.	Chapter-10	√	
X	**Occupational Health and Safety**	1	The relevant regulations/ rules of labor's rights, health and safety as follows will be complied with: ▪ The Workmen's Compensation Act (1923, Amendment in 2011) ▪ The Leave and Holiday Act (1951, Partially Amendment in 2014) ▪ The Labor Organization Law (2011) ▪ The Development of Employment and Skill Law (2013) ▪ The Minimum Wage Law (2013) ▪ The Minimum Wage Rules (2013) ▪ The Payment of Wage Law (2016) ▪ The Settlement of Labor Dispute Law (2012), (Amendment in 2014) ▪ The Social Security Law (2012) ▪ The Social Security Rules (2014) ▪ The Occupational Health and Safety Law (2019)	Chapter-3	√	√
		2	The adequate measures and plans for occupational health and safety of staff and workers will be implemented in accordance with EMP to comply with Myanmar laws and regulations and other international practices for OHS during operation and decommissioning phases of the project.	Chapter-3 and Chapter-5	√	√

Sr. No.	Field	No.	Commitment	EMP Reference	Responsible Organization	
					KARISMA	Contractor
		3	Accidents and incidents, OHS trainings and drills, Health Check-up and other OHS concerned issues will be recorded and prepared the report yearly. Reports for claims from workers will be prepared monthly during operation stage.	Chapter-7, Chapter-8, Chapter-9, and Chapter-10	√	
XI	**Emergency Risks**	1	Occurrences of the emergency risks especially fire hazards will be recorded at the time of occurrence and included in the monitoring report to be submitted to ECD, Bago Region.	Chapter-5	√	√
		2	The KARISMA has installed suitable firefighting system and established the emergency response team for the fire and natural disaster emergency.	Chapter-9	√	
		3	Firefighting Drills, Emergency Trainings and Preparedness for workers will be conducted during both operation and decommissioning phases.	Chapter-10	√	√
XIII	Training and Education	1	KARISMA will implement ▪ the training program for new workers ▪ Other capacity building program for skill workers and ▪ Emergency response training for all workers for fire and natural emergency.	Chapter-10	√	
XIV	Reporting	1	KARISMA and demolition contractor will submit monitoring reports during operation and decommissioning phases regularly to the ECD, Bago Region according to the EIA procedure or as necessary.	Chapter-7	√	√

4.0 GOVERNING PARAMETERS

4.1 Regulatory Requirement

In this section, all environmental aspects, governing parameters, and monitoring results are identified.

Project Proponent is responsible to prepare the standalone EMP in accordance with Article 8 or Article 24 of the EIA Procedure. The EMP report must be adequate with the format stated in Article 63 (h) of the EIA Procedure.

Ministry of Natural Resources and Environmental Conservation – MONREC (former Ministry of Environmental and Forestry – MOECAF) issued National Environmental Quality (Emission) Guidelines, NEQGs, in December 2015 according to the provision of Paragraph (42), Sub-paragraph (b) of the Environmental Conservational Law (2012).

The objective of the guidelines is to control noise and vibration, emissions, and effluents in order to prevent the pollutions for the protection of human health and ecosystem.

4.2 Emissions

4.2.1 Emissions to Air

Emissions of air pollutants can occur from a wide variety of activities during the construction, operation, and decommissioning phases of a project. These activities can be categorized based on the spatial characteristics of the source including point sources, fugitive sources, and mobile sources and, further, by process, such as cutting, material storage, or other industry sector- specific processes.

Where possible, facilities and projects should avoid, minimize, and control adverse impacts to human health, safety, and the environment from emissions to air. Where this is not possible, the generation and release of emissions of any type should be managed through a combination of:

- Energy use efficiency
- Process modification
- Selection of fuels or other materials, the processing of which may result in less polluting emissions
- Application of emissions control techniques.

4.2.2 Emissions to Water

Emission to water contains the discharges of process wastewater, sanitary wastewater, wastewater from utility operation or storm-water to the surface water or into public or private wastewater treatment systems.

Effluent Standards for site runoff and wastewater discharges during construction phase are listed in **Table 4-1**.

Table 4-1 Site Runoff and Wastewater Discharges (Construction Phase)

Sr. No.	Parameter	Unit	Maximum Concentration
1.	Biochemical oxygen demand	mg/l	30
2.	Chemical oxygen demand	mg/l	125
3.	Oil and grease	mg/l	10
4.	pH	-	6-9
5.	Total coliform bacteria	MPN/100l	400
6.	Total nitrogen	mg/l	10
7.	Total phosphorus	mg/l	2
8.	Total suspended solids	mg/l	50

MPN = Most Probable Number

The KARISMA Apparel Factory includes mainly four sections such as sewing bulk fabrics, washing, printing and embroidery section. The environmental impacts associated with sewing and embroidery are less substantial than those resulting from washing and printing processes.

Thus, the effluent standards for storm-water (site runoff) and domestic wastewater are referred to General Applications Standards of NEQGs and tabulated in **Table 4-2.**

Table 4-2 Effluent Standards for Operation Phase

Sr. No.	Parameter	Unit	Guideline Value
1.	5-day Biochemical Oxygen Demand	mg/l	50
2.	Ammonia	mg/l	10
3.	Arsenic	mg/l	0.1
4.	Cadmium	mg/l	0.1
5.	Chemical Oxygen Demand, (COD)	mg/l	250
6.	Chlorine (total residual)	mg/l	0.2
7.	Chromium (Hexavalent)	mg/l	0.1
8.	Chromium (total)	mg/l	0.5
9.	Copper, (Cu)	mg/l	0.5
10.	Cyanide (free)	mg/l	0.1
11.	Cyanide (total)	mg/l	1
12.	Fluoride	mg/l	20
13.	Heavy metals (total)	mg/l	10
14.	Iron	mg/l	3.5
15.	Lead	mg/l	0.1
16.	Mercury	mg/l	0.01
17.	Nickel	mg/l	0.5
18.	Oil and grease	mg/l	10
19.	pH	-	6-9
20.	Phenols	mg/l	0.5
21.	Selenium	mg/l	0.1

Sr. No.	Parameter	Unit	Guideline Value
22.	Silver	mg/l	0.5
23.	Sulfide	mg/l	1
24.	Temperature increase	ºC	<3
25.	Total coliform bacteria	100 ml	400
26.	Total phosphorus	mg/l	2
27.	Total suspended solids	mg/l	50
28.	Zinc	mg/l	2

4.3 Ambient Environmental Quality Standards

4.3.1 Ambient Air Quality

NEQs Guidelines for ambient air quality are tabulated in **Table 4-3.**

Table 4-3 NEQs Ambient Air Quality Guidelines

Sr. No.	Parameters	Average Period	Guideline Value (µg/m^3)
1.	Nitrogen dioxide (NO_2)	1-year 1-hour	40 200
2.	Ozone (O_3)	8-hour daily maximum	100
3.	Particulate matter (PM_{10})	1-year 24-hour	20 50
4.	Particulate matter ($PM_{2.5}$)	1-year 24-hour	10 25
5.	Sulfur dioxide (SO_2)	24-hour 10-minutes	20 500

Table 4-4 Small Combustion Facilities Emission Guidelines

Sr. No.	Combustion Technology/ Fuel	Particulate Matter PM10[a]	Sulfur Dioxide	Nitrogen Oxides
1.	Gas	-	-	200[b] mg/Nm^3[c] 400[d] mg/Nm^3 1,600[e] mg/Nm^3
2.	Liquid	10	3	1,600-1,850[f] mg/Nm^3
3.	Natural gas (3-<15 MW[g])	-	-	200[h] mg/Nm^3 310[i] mg/Nm^3
4.	Natural gas (3-<15 MW)	-	-	50 mg/Nm^3
5.	Fuels other than natural gas (3-<15 MW)	-	0.5 % sulfur	200[h] mg/Nm^3 310[j] mg/Nm^3
6.	Fuels other than natural gas (15-<50 MW)	-	0.5 % sulfur	150 mg/Nm^3
7.	Gas	-	-	320 mg/Nm^3
8.	Liquid	150 mg/Nm^3	2,000 mg/Nm^3	460 mg/Nm^3

[a] Particulate matter 10 micrometers or less in diameter,
[b] Spark ignition,
[c] Milligrams per normal cubic meter at specified temperature and pressure,
[d] dual fuel,
[e] compression ignition'
[f] higher value applies if bore size > 400 m,
[g] Megawatt,
[h] Electric generation,
[i] mechanical drive,
[j] Includes biomass

4.3.2 Water Quality

According to International Water Quality Guidelines Study report published by United Nation Environment Program, there are various water quality standards and they are:

(1) Water Quality Standards
- Water Quality Standards for Conservation of the living Environment (Rivers)
- Water Quality Standards for Conservation of the living Environment (Lakes)
- Water Quality Standards for Protecting Human Health (Rivers and Lakes)

(2) Ground Water Quality Standards
(3) Coastal Water Quality Standards
- Coastal Water Quality Standards for Conservation of the Living Environment
- Coastal Water Quality Standards for the Protection of Human Health

(4) Drinking Water Quality Standards

Although the water quality standards are widespread, for this EMP, Study GMES EMP Team selected WHO Drinking Water Standards – 2011, EPA Spring - 2012 and Indian Specification (IS: 10500, 2012) as ground water quality standards and also selected National Environmental Quality (Emission) Guidelines (2015) as wastewater quality standards.

4.3.3 Ambient Noise Levels

Ambient noise level is to address the impacts of noise beyond the property boundary of the facilities. Noise level standards presented in NEQGs are described in **Table 4-5.** Noise impacts should not exceed the levels presented in **Table 4-6** or result in a maximum increase in background levels of 3 dB (A) at the nearest receptor location off-site.

Table 4-5 Ambient Noise Level

Receptor	**One Hour L_{Aeq}, dB (A)**	
	Day time 07:00-22:00 (10:00-22:00 for Public holidays)	**Night time 22:00-07:00 (22:00-10:00 for Public holidays)**
Industrial Commercial	70	70
Resident, Institutional, Educational	55	45

Table 4-6 OHS Noise Exposure Limits for the Work Environment (Noise Exposures in dBA)

Noise (dBA)	Permissible exposure Noise (hours and minutes)
85	16 hrs
87	12 hrs 6 min
90	8 hrs
93	5 hrs 18 min
96	3 hrs 30 min
99	2 hrs 18 min
102	1 hrs 30 min
105	1 hr
108	40 min
111	26 min
114	17 min
115	15 min
118	10 min
121	6.6 min
124	4 min
127	3 min
130	1 min

Note: *Exposures above or below the 90 dB limit have been "time weighted" to give what OHSA believes are equivalent risks to a 90 dB eight-hour exposure. [Source: Marsh (9)]*

4.4 Primary Data for the Surrounding Environment

Green Myanmar Environmental Services Company Limited had done measuring primary data or baseline environmental parameters such as ambient air quality on 15th November 2018 and indoor air quality, water quality and noise level on 8th November 2018 respectively. The results are mentioned in the following section.

The project proponent, KARISMA, has done the monitoring of environmental quality twice a year. The latest monitoring results in October 2021 are also described in the respective section.

4.4.1 Air Environment

Dispersion of different air pollutants released into the atmosphere has significant impacts on the neighborhood air environment of an industrial project and forms an important part of impact assessment studies.

The air quality status with respect to the plant site will form the base line information over which the predicted impacts due to the proposed plant can be superimposed to find out the net (Final) impacts on air environment. Based on the final impacts of the air environment, a viable Environmental Management Plan (EMP) can be prepared.

The baseline status of the air quality can be assessed through scientifically designed air quality monitoring network.

Materials and Methods

The objective of the air quality monitoring exercise is to determine the normal concentration of respirable particulates and gaseous emissions in the project area prior to the start of the proposed project. The air quality parameters are Oxygen (O_2), Carbon monoxide (CO), Carbon Dioxide (CO_2), Sulfur Dioxide (SO_2), Nitrogen Dioxide (NO_2), Particulate Matter (PM) and Total Volatile Organic Compound (TVOC).

KANE900 PLUS combustion Analyzer was used to measure stack emission gas, PHOTOVAC 2020 ComboProTM Photoionization Detector and DUST TRAKTM 8532 AEROSOL MONITOR were used to measure workplace air quality and Sound Level Meter (SL-4033SD) was used to measure the noise level. And then Haz-Scanner also was used to ambient air quality. (See **Figure 4-1**)

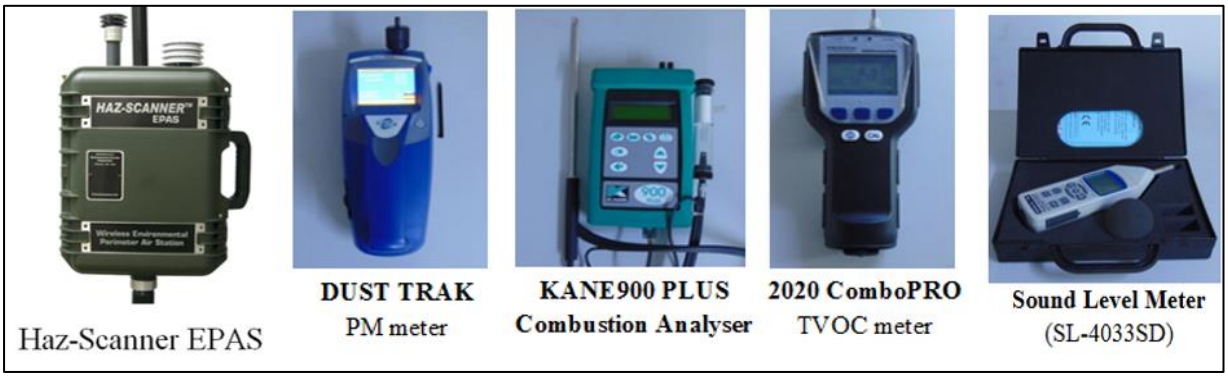


Figure 4-1 Equipment used for surveying the Environmental Baseline Data

Methods of Sampling and Analysis

Sampling rate of air quality was recorded automatically every one minute for important gases (Sulfur dioxide, Nitrogen dioxide, Carbon dioxide, Carbon monoxide, Hydrogen sulfide, Particulate matter, Hydrogen sulfide and Ozone) to describe ambient air quality.

Sampling pump was adjusted to 2 liter/min. Different analysis methods are integrated in the instrument, such as particulates, 90° Infrared Light Scattering for particulate matters (PM_{10}, $PM_{2.5}$), electrochemical sensors for toxic gases (SO_2, NO_2, CO, H_2S), NDIR (optional sensor) for (CO_2) and Gas Sensing Semiconductor- GSS technology (optional sensor) for O_3.

Table 4-7 Important Gases for Ambient Air Quality

No.	Parameters	Analysis Methods
1.	Sulfur dioxide (SO_2)	Electrochemical sensors
2.	Nitrogen dioxide (NO_2)	Electrochemical sensors
3.	Carbon Dioxide (CO_2)	NDIR (optional sensor)
4.	Carbon monoxide (CO)	Electrochemical sensors
5.	Hydrogen Sulfide (H_2S)	Electrochemical sensors
6.	Particulate matter 2.5 ($PM_{2.5}$)	Infrared Light Scattering
7.	Particulate matter 10 (PM_{10})	Infrared Light Scattering

No.	Parameters	Analysis Methods
8.	Ozone (O_3)	Gas Sensing Semiconductor- GSS technology (optional sensor)

Selection of Sampling Location and Results

Air quality measurements were taken at the project site. The sampling points were selected based on their locations relative to key community receptors, as well as their current or potential for impairments. Ambient air quality at the project site was monitored at only one sampling point and indoor air quality was monitored at 15 points.

Measurements to determine the environmental conditions of working environment of the factory were carried out for short-time interval samples (one hour for each sample measurement). Ambient air quality monitored continuously for 24 hours. Detail descriptions of the locations of air sampling points are listed in **Table 4-7** and Measuring results are shown in **Table 4-9** and **Table 4-11.**

Table 4-8 Locations of Air Quality and Noise Level Measuring Points

Sr. No.	Measuring Points	Geographical Information	Description
1.	ASP	17° 15' 20.9268" N 96° 27' 30.9564" E	Ambient Air Quality
2.	ASP-1	17°15'20.00"N 96°27'27.67"E	Cutting -1
3.	ASP-2	17°15'19.76"N 96°27'28.00"E	Cutting -2
4.	ASP-3	17°15'18.20"N 96°27'25.00"E	Printing Department
5.	ASP-4	17°15'19.32"N 96°27'25.36"E	Mixing Room
6.	ASP-5	17°15'17.61"N 96°27'24.38"E	Embroidery Department
7.	ASP-6	17°15'17.80"N 96°27'26.73"E	Sewing -1
8.	Asp-7	17°15'15.91"N 96°27'25.06"E	Sewing - 2
9.	ASP-8	17°15'15.91"N 96°27'25.06"E	Sewing -3
10.	ASP-9	17°15'17.80"N 96°27'26.73"E	Sewing-4
11.	ASP-10	17°15'14.18"N 96°27'27.06"E	Sewing -5
12.	ASP-11	17°15'15.47"N 96°27'28.35"E	Ironing Department
13.	ASP-12	17°15'16.35"N 96°27'28.83"E	Washing Department
14.	ASP-13	17°15'14.04"N	Press-Stud (Folding)

Sr. No.	Measuring Points	Geographical Information	Description
		96°27'26.66"E	
15.	ASP-14	17°15'18.57"N 96°27'30.73"E	Packaging
16.	ASP-15	17°15'16.73"N 96°27'30.98"E	Boiler

Air Quality Monitoring Results

(a) Ambient Air Quality

The ambient air quality was measured at the coordinates of:

Latitude 17° 15' 20.9268" N
Longitude 96° 27' 30.9564" E

At the initial stage of the project, baseline air quality should be measured on the vicinity of the site to assess background levels of key pollutants and to differentiate between existing ambient conditions and project-related impacts in future. Air quality is composed of dust and gas emissions of the ambient air.

Figure 4-2 Location of Ambient Air Quality and Noise Level Measurement

Figure 4-3 Photos of Ambient Air Quality and Noise Level Measurement

The ambient air monitoring was conducted on 15th November, 2018. The air quality monitoring result for ambient air is described in **Table 4-9**.

Table 4-9 Measuring Results of Ambient Air Quality Baseline Data (ASP) (15.11.2018)

Sr. No.	Parameters	Unit	Analysis Values		National Environmental (Emission) Quality Guidelines	
			Result Value	Average Period	Guideline Value	Average Period
1.	Nitrogen Dioxide	µg/m^3	16.22	24 hours	200	1 hour
2.	Particulate Matter PM_{10}	µg/m^3	65.06	24 hours	50	24 hours
3.	Particulate Matter $PM_{2.5}$	µg/m^3	28.82	24 hours	25	24 hours
4.	Sulphur Dioxide	µg/m^3	0	24 hours	20	24 hours
5.	Ammonia	ppm	11.23	24 hours	NG	-
6.	Carbon Dioxide	ppm	429.04	24 hours	NG	-
7.	Carbon Monoxide	ppm	0.17	24 hours	NG	-
8.	Temperature	ºC	24	24 hours	NG	-
9.	Volatile Organic Compound	ppb	0	24 hours	NG	-
10.	Wind Speed	mph	1.8	24 hours	NG	-
11.	Wind Direction	Deg	50	24 hours	NG	-
12.	Ozone	µg/m^3	24.91	24 hours	100	8 hours daily Maximum
13.	Oxygen	%	21.19	24 hours	NG	-

Note: NG-No Guideline

According to **Table 4-9,** particulates levels were much higher than the recommended air quality guidelines established by National Environmental Quality (Emission) but levels of other parameters were lower than this standard.

The ambient $PM_{2.5}$ and PM_{10} levels were high due to the location of sampling point which is near to the main gate of the factory. The mitigation measures should be implemented to manage this Impact.

The latest ambient air quality monitoring was conducted at the same point on 1st October, 2021. The air quality monitoring result for ambient air is described in **Table 4-10** .

Table 4-10 Monitoring Results of Ambient Air Quality Baseline Data (ASP) (1.10.2021)

No.	Parameters	Unit	Analysis Values		National Environmental (Emission) Quality Guidelines	
			Result Value	Average Period	Guideline Value	Average Period
1.	Nitrogen Dioxide	µg/m^3	53.5	24 hours	200	1 hour peak data from 24 hours measurement
2.	Particulate Matter PM_{10}	µg/m^3	35.54	24 hours	50	24 hours
3.	Particulate Matter $PM_{2.5}$	µg/m^3	21.02	24 hours	25	24 hours
4.	Sulphur Dioxide	µg/m^3	0	24 hours	20	24 hours
5.	Ammonia	ppm	0.98	24 hours	NG	-
6.	Carbon Dioxide	ppm	378.59	24 hours	NG	-
7.	Carbon Monoxide	ppm	0	24 hours	NG	-
8.	Volatile Organic Compound	ppb	0	24 hours	NG	-
9.	Wind Speed	mph	0.85	24 hours	NG	-
10.	Wind Direction	Deg	210.6	24 hours	NG	-
11.	Ozone	ppb	66.67	24 hours	100	8 hours daily Maximum
12.	Oxygen	%	20.09	24 hours	NG	-

Note: NG-No Guideline

According to the above results, all parameters were under the acceptable limits of NEQG.

(a) Indoor (Workplace) Air Quality at Work Place

Indoor air quality was measured at 15 locations. The following Table summarizes the air quality monitoring results collected on 8th November 2018 at inside of the building.

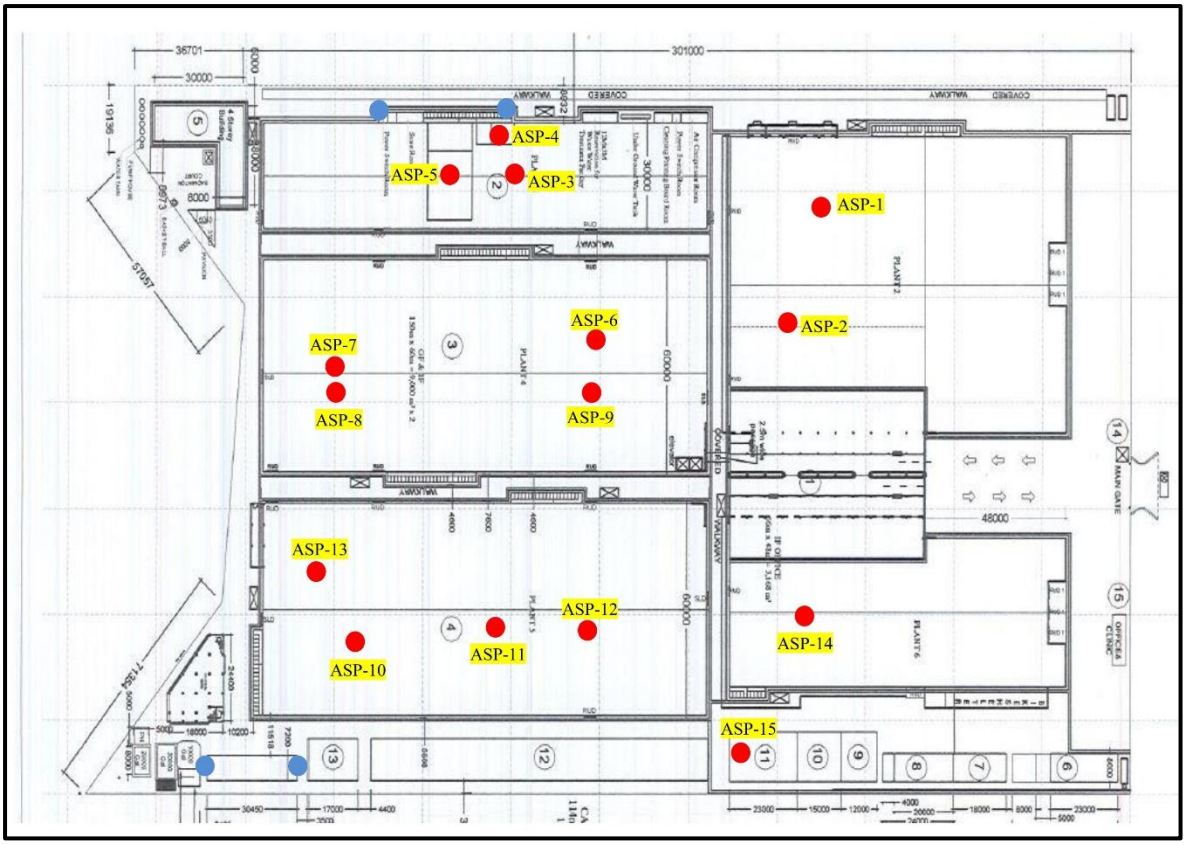
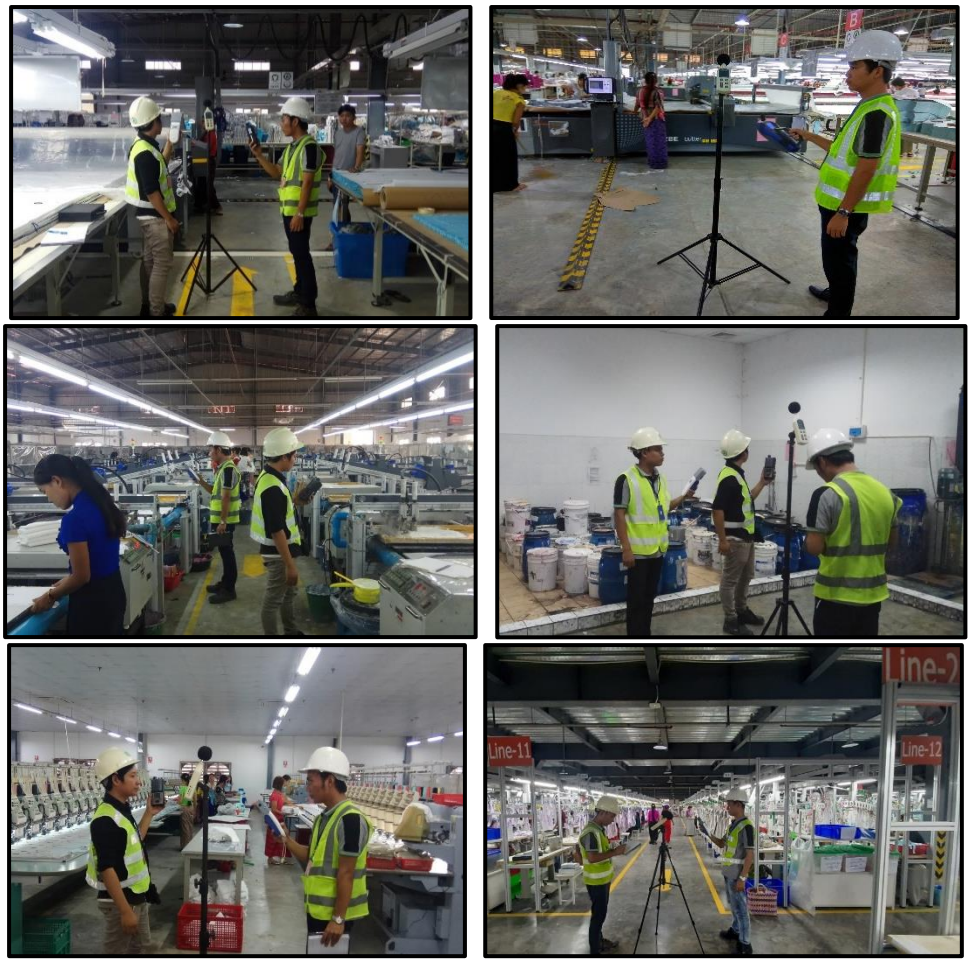


Figure 4-4 Location of Indoor Air Quality and Noise Level Measurement



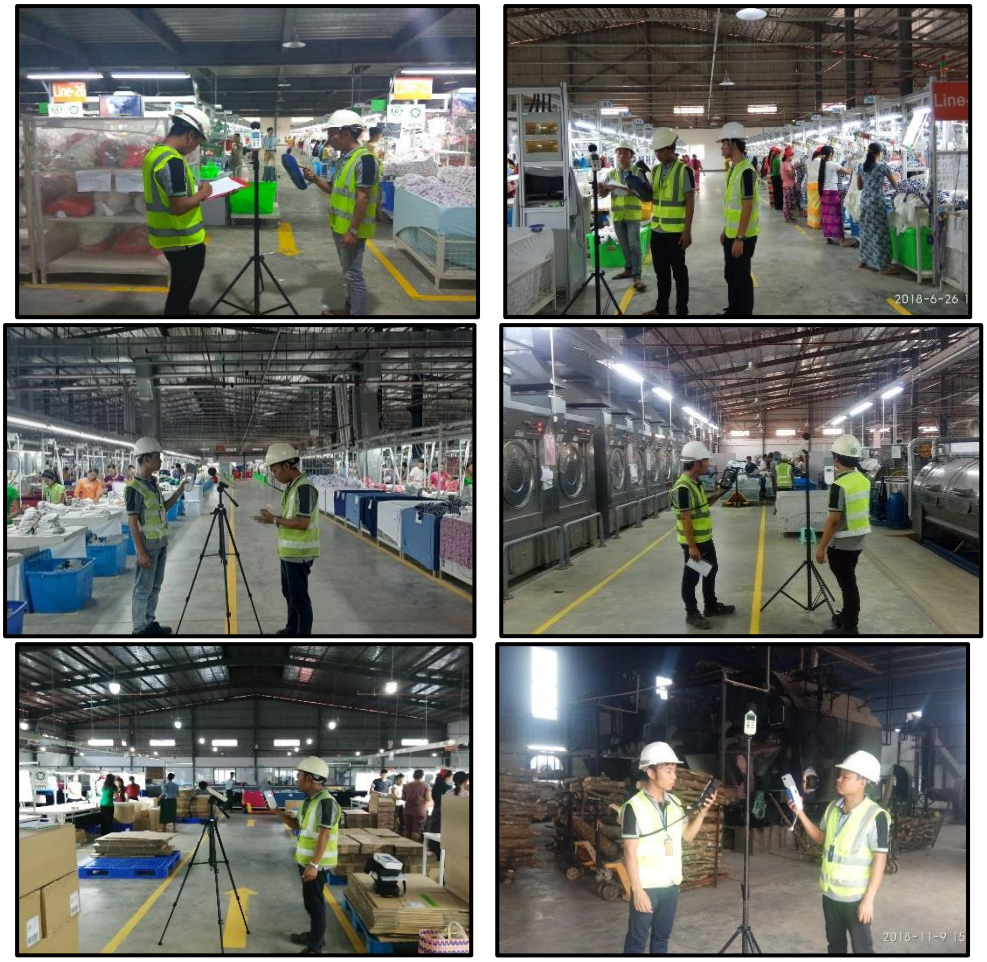


Figure 4-5 Some Photos of Indoor Air Quality and Noise Levels Measurement

Table 4-11 Indoor Air Quality Measuring Results (15.11.2018)

Sr. No.	Indoor Air Quality Measuring Points	Measuring Results		
		VOC (ppm)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)
1.	ASP-1	0	53	20
2.	ASP-2	0	49	20
3.	ASP-3	0.5	42	26
4.	ASP-4	1.5	60	48
5.	ASP-5	0	59	22
6.	ASP-6	0	37	21
7.	ASP-7	0	45	23
8.	ASP-8	0	44	23
9.	ASP-9	0	38	21
10.	ASP-10	0	38	22
11.	ASP-11	0	35	21
12.	ASP-12	0	41	21
13.	ASP-13	0	41	23
14.	ASP-14	0	69	30
15.	ASP-15	0.12	73	52
National Environmental Quality (Emission) Guideline		***NG***	***50***	***25***

Note: NG-No Guideline

According to the **Table 4-11**, particulate levels in some sampling points (cutting-1, printing room, mixing room, packaging, and boiler) were much higher than the recommended ambient air quality guidelines established by National Environmental Quality (Emission). The sampling stations are subject to a significant amount of fugitive dust from production activities such as cutting, printing, mixing, packaging and boiler operation. Ash can be produced from boiler because of using wood as fuel. So particulate levels increase and mitigation measures should be implemented to manage this impact.

The latest indoor air quality monitoring was conducted at six locations on 1st October, 2021. The locations of indoor air quality monitoring are seen in **Figure 4-6** and the results were described in **Table 4-12**Table **4-10** .

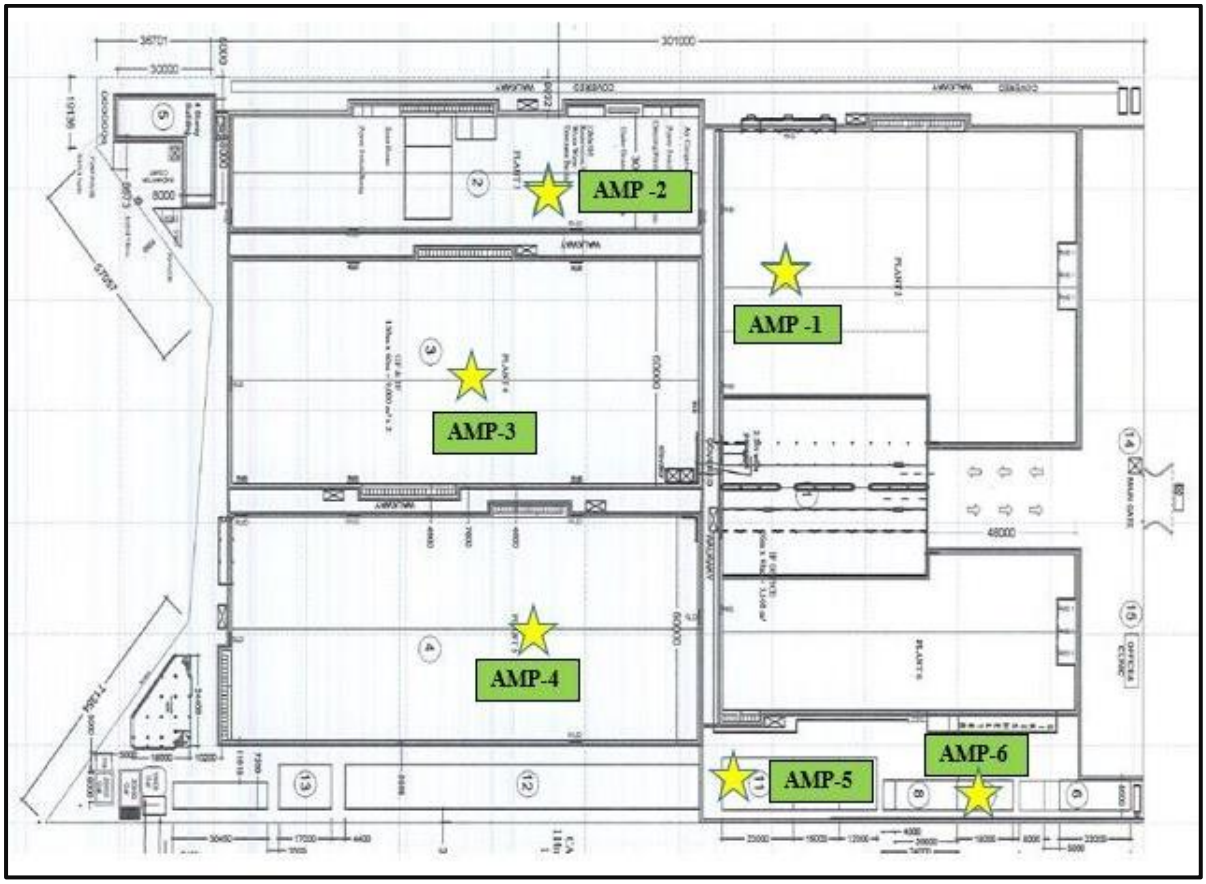


Figure 4-6 Location of Indoor Air Quality and Noise Levels Monitoring (1.10.2021)

Figure 4-7 Photos of Indoor Air Quality and Noise Levels Monitoring

Table 4-12 Indoor Air Quality Monitoring Results (1.10.2021)

Sr. No.	Indoor Air Quality Monitoring Points	Description	Measuring Results		
			VOC (ppm)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)
1.	AMP-1	Cutting (17°15'20.00"N, 96°27'27.67"E)	0	43	22
2.	AMP-2	Printing (17°15'18.20"N, 96°27'25.00"E	0	0	25
3.	AMP-3	Sewing (17°15'17.80"N, 96°27'28.35"E)	0	42	21
4.	AMP-4	Folding (17°15'14.04"N, 96°27'26.66"E)	0	54	21
5.	AMP-5	Boiler Room (17°15'16.73"N, 96°27'30.98"E)	0	40	23
6.	AMP-6	Generator Room (17°15'19.11"N, 96°27'31.30"E)	0	53	23
National Environmental Quality (Emission) Guideline			**NG**	***50***	***25***

Note: NG-No Guideline

According to the above table, workplace (indoor) air quality does not have specific guidelines. Therefore, the results are compared with NEQG general application.

(b) Boiler and Generators Stack Emission Monitoring

Boiler Stack Emission

Measuring results of boiler stack emission in KARISMA Apparel (Myanmar) Co., Ltd. are tabulated in **Table 4-13**.

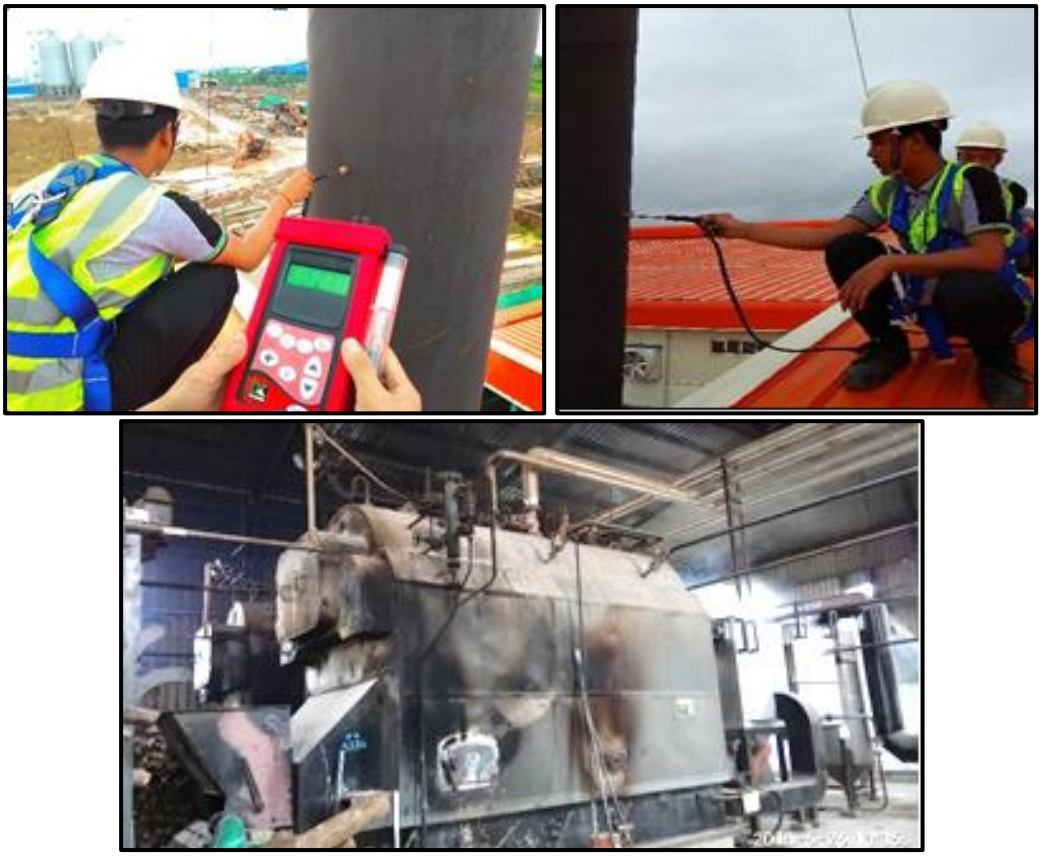


Figure 4-8 Boiler Stack Emission Measuring

Table 4-13 Boiler Stack Emisssion Measuring Results (15.11.2018)

Sr. No.	Parameter	Unit	Values				Small Combustion Facilities Emission Guidelines
			After 15 mins	After 30 mins	After 45 mins	After 60 mins	
1.	O_2	mol%	11.4	12	11.2	13	-
2.	CO	mg/m^3	5,700	5,490	3,200	4,220	-
3.	CO_2	mol%	8.7	2.4	2	4	-
4.	NO_2	mg/m^3	2	30	25	33	650
5.	SO_2	mg/m^3	560	597	630	650	2,000

The latest boiler stack emission monitoring was conducted on 1st October, 2021. The monitoring results were described in **Table 4-14**.

Table 4-14 Boiler Stack Emisssion Monitoring Results (1.10.2021)

Sr. No.	Parameter	Unit	Monitoring Results	Small Combustion Facilities Emission Guidelines
1.	O_2	mol%	19.2	-
2.	CO	mg/m^3	1,861	-
3.	CO_2	mol%	1.24	-
4.	NO	mg/m^3	24	650
5.	SO_2	mg/m^3	0	2,000

Generator Stack Emission

Measuring results of two generators' stack emission in KARISMA Apparel (Myanmar) Co., Ltd. are tabulated in **Table 4-15** and **Table 4-16**.

Figure 4-9 Generators Stack Emission Monitoring

Table 4-15 Stack Emission Measuring Results for Generator-1 (15.11.2018)

Sr. No.	Parameter	Unit	Values				Small Combustion Facilities Emission Guidelines
			After 15 mins	After 30 mins	After 45 mins	After 60 mins	
1.	O_2	mol%	18	17	17.5	18	-
2.	CO	mg/m^3	258	248	239	222	-
3.	CO_2	mol%	2.78	2.4	2	2.6	-
4.	NO_2	mg/m^3	3	5	5	10	460
5.	SO_2	mg/m^3	0	2	7	12	2000

Table 4-16 Stack Emission Measuring Results for Generator-2 (15.11.2018)

Sr. No.	Parameter	Unit	Values				Small Combustion Facilities Emission Guidelines
			After 15 mins	After 30 mins	After 45 mins	After 60 mins	
1.	O_2	mol%	18	18	17	18	-
2.	CO	mg/m^3	240	235	245	244	-
3.	CO_2	mol%	2.14	2.3	2.4	2	-
4.	NO_2	mg/m^3	1	4	6	4	460
5.	SO_2	mg/m^3	6	8	7	3	2000

The latest generator stack emission monitoring was conducted on 1st October, 2021. The monitoring results were described in **Table 4-17Table 4-14**.

Table 4-17 Generator Stack Emisssion Monitoring Results (1.10.2021)

Sr. No.	Parameter	Unit	Monitoring Results	Small Combustion Facilities Emission Guidelines
1.	O_2	mol%	18.9	-
2.	CO	mg/m^3	224	-
3.	CO_2	mol%	1.45	-
4.	NO	mg/m^3	12	460
5.	SO_2	mg/m^3	174	2,000

According to the measuring results (2018) and monitoring results (2021), stack emission gases from boiler and two generators are also within the desirable limits.

4.4.2 Noise Levels

Noise is one of the most undesirable and unwanted by-products of our modern life style. It may not seem as harmful as air and water pollutants but it affects human health and well-being and can contribute to deterioration of human well-being in general and can cause neurological disturbances and physiological damage to the hearing mechanism. It is therefore, necessary to measure both the quality as well as the quantity of noise in and around the site.

Parameter for noise level survey was determined according to Myanmar National Environmental Quality (Emission) Guidelines.

Noise surveys have been conducted at the project site in order to establish an acoustic baseline onto which potential impacts from the proposed project may be superimposed. Noise level monitoring was also done at the same sampling points used for air quality monitoring.

Measurements to determine the environmental conditions of working environment of the factory were carried out for short-time interval samples (one hour for each sample measurement). Ambient noise level monitored continuously for 24 hours.

The ambient noise level measuring results are presented in **Table 4-18** and results at workplace are described in **Table 4-19**.

Table 4-18 Ambient Noise Level Measuring Result (15.11.2018)

Receptor	One Hour L_{Aeq}, dB (A)[a]	
	Day time	Night time
Residential, Institutional, Educational	55	45
Industrial, Commercial	70	70
Ambient Noise Level (Result)	**57.27**	**59.24**
Day time 07:00 ~ 22:00 (10:00 ~ 22:00 for Public holidays)		
Night time 22:00 ~ 07:00 (22:00 ~ 10:00 for Public holidays)		

The project is located in the industrial land. The observed values of the noise level for daytime and night time are within the limit of Guideline. Therefore, the noise values cannot affect the workers and the environment.

Table 4-19 Measuring Results of Noise Level at Workplace (15.11.2018)

Sr. No.	Measuring Points	Noise Measuring Results (Duration = 1hr) (dB[A])	OHS Guideline (8 hr) (dB[A])
1.	ASP-1	82.77	90
2.	ASP-2.	80.8	90
3.	ASP-3	77.3	90
4.	ASP-4	73.75	90
5.	ASP-5	83.69	90
6.	ASP-6	80.3	90
7.	ASP-7	80.45	90
8.	ASP-8	80.83	90
9.	ASP-9	78.89	90
10.	ASP-10	78.71	90
11.	ASP-11	79.21	90
12.	ASP-12	80.56	90
13.	ASP-13	78.82	90
14.	ASP-14	73.37	90
15.	ASP-15	86.36	90

In general noise level inside the factory was within the acceptable conditions. The major noise pollution source inside the factory was operation of machinery.

In order to prevent adverse noise exposure to the people and the sensitive receptors within the study area, optimal mix of mitigation measures such as low noise generation units, and noise barriers will be essential.

The latest ambient noise levels and indoor (workplace) noise levels monitoring were conducted at the same locations of the air quality on 1st October, 2021. The ambient noise levels monitoring results were described in **Table 4-20** and the indoor (workplace) noise levels monitoring results were described in **Table 4-21**.

Table 4-20 Ambient Noise Level Monitoring Result (1.10.2021)

Monitoring Point	Monitoring Results (dBA)	NEQG (dBA)	Remarks
AMP	55.86	70	Day Time
	55.67	70	Night Time

According to the measuring results of ambient noise levels were lower than the NEQG guidelines.

Table 4-21 Monitoring Results of Indoor (Workplace) Noise Levels (1.10.2021)

Sr. No.	Monitoring Points	Description	Noise Level (L_{eq})			OHS Exposure Guideline (8 hr)
			Avg	Max	Min	
1.	AMP-1	Cutting	77.26	89.90	68.70	90
2.	AMP-2	Printing	79.12	82.00	76.50	90
3.	AMP-3	Sewing	79.37	86.90	74.00	90
4.	AMP-4	Folding	77.36	90.40	75.50	90
5.	AMP-5	Boiler Room	81.37	89.00	79.50	90
6.	AMP-6	Generator Room	97.77	102.50	60.10	90

According to the monitoring results of average noise levels at workplace, most of them are not exceeded the OHS exposure guideline. However, AMP-6, generator room, result is higher than the OHS exposure guideline.

4.4.3 Water Environment

Selected water quality parameters of tube water and surface water have been studied for assessing the water environment and evaluating the anticipated impact of the proposed project.

The purpose of this study is to:

- Assess the water quality characteristics for critical parameters,
- Predict impact on water quality by this project and related activities and
- Suggest appropriate mitigation measures.

Water qualities at the project site and its surroundings were monitored at the total of eight sampling points and detail locations of sampling points are shown in **Table 4-22.**

Table 4-22 Locations of Water Sampling Points (9.11.2018)

Sr. No.	Sampling Points	Coordinate	Description	Remarks
1.	WSP-1	17° 15' 12.905" N 96° 27' 27.364" E	Washing Wastewater Inlet	Wastewater
2.	WSP-2	17° 15' 12.384" N 96° 27' 26.570" E	Washing Wastewater Treatment Outlet	Treated Wastewater
3.	WSP-3	17° 15' 12.231" N 96° 27' 26.713" E	Total Tube Well Water	Water
4.	WSP-4	17° 15' 12.222" N 96° 27' 26.796" E	Domestic Water	Water
5.	WSP-5	17° 15' 16.76" N 96° 27' 30.85" E	Boiler Blowdown Water	Wastewater
6.	WSP-6	17° 15' 19.796" N 96° 27' 25.367" E	Printing Wastewater Treatment Inlet	Wastewater
7.	WSP-7	17° 15' 19.528" N 96° 27' 24.598" E	Printing Wastewater Treatment Outlet	Treated Wastewater
8.	WSP-8	17° 15' 21.671" N 96° 27' 32.124" E	Water from Drainage Channel (in front of the factory)	Ambient Water

The ambient water samples, tube well water and wastewater samples of the factory were collected on November 9, 2018 and analyzed at the laboratory of Green Myanmar Environmental Services Co., Ltd., and the Ecological Laboratory.

(a) Water Quality

The analysis results of the physico-chemical parameters are presented in and **Table 4-24**. The analysis results were compared with Drinking Water Standards.

Figure 4-10 Location of Water Sampling Points (Water Quality)

Table 4-23 Results of Water Quality (GMES Lab)

Sr. No.	Parameters	Unit	Analysis Value		Drinking Water Standards		
			WSP -3	WSP-4	WHO (2011)	EPA (Spring 2012)	Indian Specification (IS:10500, 2012)
1.	Aluminum	mg/l	ND	0.02	**0.2**	**0.2**	**0.03**
2.	Arsenic	µg/l	ND	ND	**10**	**10**	**10**
3.	Chloride	mg/l	20	20	**250**	**250**	**250**
4.	Cyanide	mg/l	ND	ND	**0.07**	**0.2**	**0.05**
5.	Manganese	mg/l	0.22	ND	**0.4**	**0.05**	**0.1**
6.	pH	-	6.85	7.47	**6.5~8.5**	**6.5~8.5**	**6.5~8.5**
7.	Sulfate	mg/l	2.2	2.7	**250**	**250**	**200**
8.	Total Alkalinity as $CaCO_3$	mg/l	120	110	-	-	**200**
9.	Total Dissolved Solids	mg/l	310	260	**600**	**500**	**500**

Sr. No.	Parameters	Unit	Analysis Value		Drinking Water Standards		
			WSP -3	WSP-4	WHO (2011)	EPA (Spring 2012)	Indian Specification (IS:10500, 2012)
10.	Total Hardness as $CaCO_3$	mg/l	36	33	**500**	**-**	**200**
11.	Total Iron	mg/l	0.5	0.1	**0.3**	**0.3**	**0.3**
12.	Turbidity	NTU	6.32	2.53	**5**	**-**	**1**

Note: ND-Not Detected

The value of manganese (Mn) from WSP-3 (total tube well water) exceeds the Indian Specification Standard and EPA Standard. And the total iron value exceeded the drinking water standards and the turbidity exceeded the WHO standard and the Indian Specification Standard. All other parameters are within the desirable limits as per Drinking Water Standards.

Table 4-24 Results of Water Quality (Ecological Lab)

Sr. No.	Parameters	Unit	Analysis Value		WHO Drinking Water Standard
			WSP-3	WSP-4	
1.	pH	-	6.5	7	**6.5~8.5**
2.	Chloride	mg/l	24.1	1	**≤ 250**
3.	Hardness	mg/l	20	27	**500**
4.	Iron	mg/l	<0.1	<0.1	**0.3**
5.	Arsenic	mg/l	0.01	0	**0.01**
6.	Total Dissolved Solids	mg/l	103	105	**NG**

Note: NG- No Guideline

According to the Ecological Lab result, all parameters of all sampling waters are within the desirable limits as per drinking water standard and effluent standard.

(b) Ambient Water Quality

The analysis results of the physico-chemical parameters are presented in **Table 4-25** and **Table 4-26**. The analysis results were compared with National Emission Quality (Emission) Guidelines (2015).

Figure 4-11 Location of Water Sampling Points (Ambient Water Quality)

Table 4-25 Results of Ambient Water Quality (GMES Lab)

Sr. No.	Parameters	Unit	Analysis Value	National Environmental Quality (Emission) Guidelines (2015) General Application
			WSP-8	
1.	BOD_5	mg/l	-	**50**
2.	Ammonia	mg/l	0.2	**10**
3.	Arsenic	mg/l	ND	**0.1**
4.	Chemical Oxygen Demand	mg/l	86	**250**
5.	Cyanide (Total)	mg/l	ND	**0.1**
6.	Iron	mg/l	0.3	**3.5**
7.	Oil and Grease	mg/l	ND	**10**
8.	pH	-	7.89	**6~9**
9.	Sulfide	mg/l	ND	**1**
10.	Total Suspended Solids	mg/l	15	**50**
11.	Zinc	mg/l	0.04	**2**

According to the GMES lab result, all the parameters from ambient water results are within the guideline values.

Table 4-26 Results of Ambient Water Quality (Ecological Lab)

No.	Parameters	Unit	Analysis Value	Effluent Standard (NEQGs)
			WSP-8	
1.	pH	-	6.7	**6.0~9.0**
2.	Total Suspended Solids (TSS)	mg/l	2	**50**
3.	COD	mg/l	40	**250**

No.	Parameters	Unit	Analysis Value	Effluent Standard (NEQGs)
			WSP-8	
4.	Zinc	mg/l	0.03	**250**
5.	Ammonia	mg/l	8	**10**

According to the Ecological Lab result, all the parameters from ambient water results are within the guideline values.

(c) Wastewater Quality

The analysis results of the physico-chemical parameters are presented in **Table 4-27** and **Table 4-28**. The analysis results were compared with National Emission Quality (Emission) Guidelines (2015).

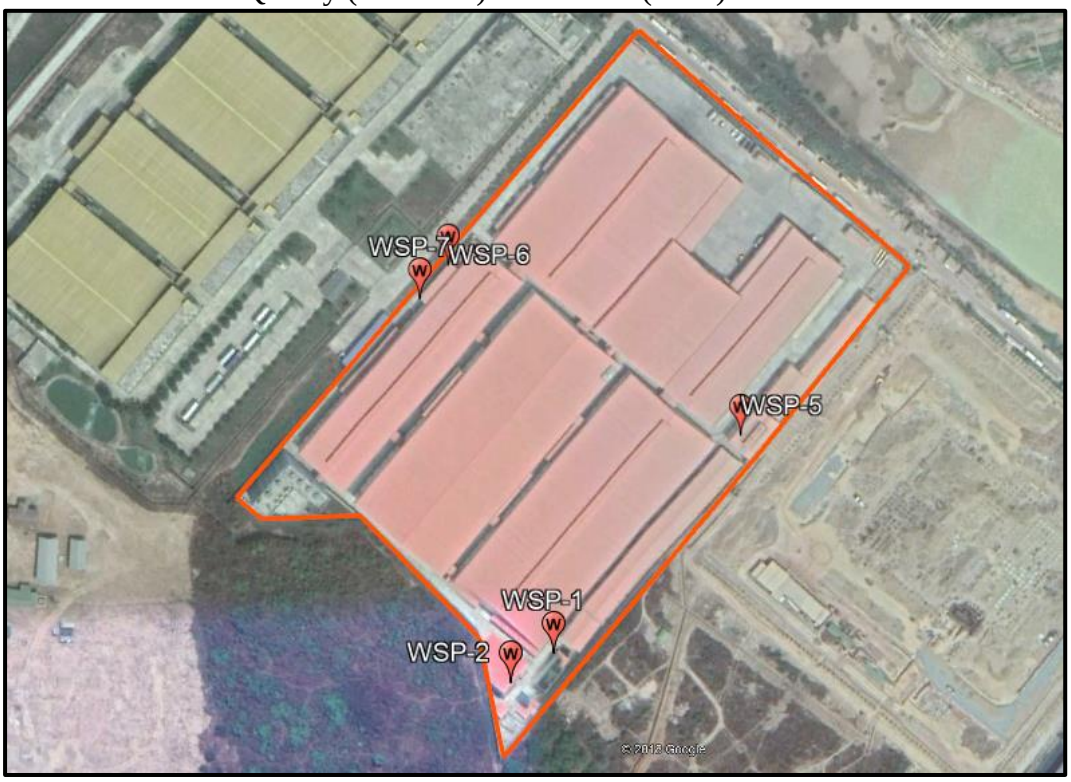


Figure 4-12 Location of Water Sampling Points (Wastewater Quality)

Table 4-27 Results of Wastewater Quality (GMES Lab)

Sr. No.	Parameters	Unit	Analysis Value					National Environmental Quality (Emission) Guidelines (2015) General Application
			WSP-1	WSP-2	WSP-5	WSP-6	WSP-7	
1.	BOD_5	mg/l	ND	ND	ND	-	-	**50**
2.	Ammonia	mg/l	ND	ND	ND	0.04	ND	**10**
3.	Arsenic	mg/l	ND	ND	ND	ND	ND	**0.1**
4.	Chemical Oxygen Demand	mg/l	ND	ND	ND	2400	43	**250**
5.	Cyanide (Total)	mg/l	ND	ND	ND	ND	ND	**0.1**
6.	Iron	mg/l	0.3	<0.1	<0.1	0.1	0.3	**3.5**
7.	Oil and Grease	mg/l	ND	2	10	10	6	**10**

Sr. No.	Parameters	Unit	Analysis Value					National Environmental Quality (Emission) Guidelines (2015) General Application
			WSP-1	WSP-2	WSP-5	WSP-6	WSP-7	
8.	pH	-	8.30	8.55	9.51	6.54	7.88	**6~9**
9.	Sulfide	mg/l	ND	ND	ND	ND	ND	**2**
10.	Total Suspended Solids	mg/l	50	30	30	450	10	**50**
11.	Zinc	mg/l	0.02	0.03	0.04	0.09	0.04	**2**

Most of the parameters from wastewater quality results are within the guideline except pH value from WSP-5 (Boiler Blowdown water) and COD and TSS value from WSP-6 (inlet stream to Wastewater Treatment Plant for printing section).

COD and TSS values in WSP-6 are higher than the NEQG guidelines because WSP-6 is the washed wastewater from the printing section. It is to be treated so that these values decrease to comply with NEQG guidelines. Thus, COD decreases from 2400 mg/l to 43 mg/l and TSS decreases from 450 mg/l to 10 mg/l after treatment.

According to the measured results of the wastewater samples, the results of the treated wastewater (WSP-2 and WSP-7) were not exceeded the NEQG guidelines. Therefore, these wastewater treatment systems are effective.

The pH value in WSP-5 is a little higher than the guidelines. This impact can be reduced by mitigation measures. According to American Society of Mechanical Engineers (ASME) guideline, the boiler water's pH level must be maintained above 9.5 to ensure that the proper chemical reaction occurs between the calcium and magnesium ions and the phosphate molecules.

Table 4-28 Results of Wastewater Quality (Ecological Lab)

No.	Parameters	Unit	Analysis Value					Effluent Standard (NEQGs)
			WSP-1	WSP-2	WSP-5	WSP-6	WSP-7	
1.	pH	-	7.3	7.7	8.8	5.5	7.1	**6.0~9.0**
2.	Total Suspended Solids	mg/l	7	1	1	680	2	**50**
3.	BOD_5	mg/l	5	<3	<3	147	21	**50**
4.	COD	mg/l	30	<30	<30	2340	149	**250**

Most of the parameters from wastewater quality results are within the guideline except pH value for Boiler Blowdown water that is a little higher than guideline and COD and TSS value of inlet stream to Wastewater Treatment Plant for printing section that is very higher than guideline. These impacts can be reduced by mitigation measures.

Monitoring of Wastewater Quality

Wastewater quality was sampled at the main discharge point of the factory premise on 2nd October 2021. Wastewater samples were carried out laboratory analysis by GMES laboratory. The locations of water sampling points are as shown in the **Table 4-29** and **Figure 4-13.**

Table 4-29 Locations of Wastewater Sampling Points (2.10.2021)

Sr. No.	Sampling Points	Coordinate	Description
1.	WSP-1	17° 15' 12.78" N 96° 27' 27.76" E	Inlet of Wastewater Treatment System for Washing (Before Treatment)
2.	WSP-2	17° 15' 12.14" N 96° 27' 27.06" E	Outlet of Wastewater Treatment System for Washing (After Treatment)
3.	WSP-3	17° 15' 19.69" N 96° 27' 25.38" E	Inlet of Wastewater Treatment System for Printing (Before Treatment)
4.	WSP-4	17° 15' 19.22" N 96° 27' 24.92" E	Outlet of Wastewater Treatment System for Printing (After Treatment)

Note: WSP – Wastewater Sampling Point

Figure 4-13 Locations of Wastewater Sampling Points

Figure 4-14 Photos of Wastewater Sampling from Wastewater Treatment of Washing Section

Table 4-30 Results of Wastewater Quality of Washing Process Discharge Water (2.10.2021)

Sr. No.	Parameters	Unit	Analysis Value		Minimum Measurement Range of Method	NEQG (2015) General Application
			Before Treatment (WSP-1)	After Treatment (WSP-2)		
1.	5-day Biochemical Oxygen Demand	mg/l	<30	<30	30	50
2.	Chemical Oxygen Demand	mg/l	56	40	30	250
3.	Chromium (Hexavalent)	mg/l	<0.2	<0.2	0.2	0.1
4.	Chromium (Total)	mg/l	0.04	0.02	0.02	0.5
5.	Copper	mg/l	<0.5	<0.5	0.5	0.5
6.	Cyanide (Total)	mg/l	<0.5	<0.01	0.01	1
7.	Iron	mg/l	0.1	0.1	0.1	3.5
8.	Nickel	mg/l	<0.2	<0.2	0.2	0.5
9.	Oil and Grease	mg/l	<50	<5	5	10
10.	pH	-	7.29	6.99	0.1	6~9
11.	Phenol	mg/l	0.2	<0.1	0.1	0.5
12.	Sulfide	mg/l	<0.04	<0.04	0.04	1
13.	Temperature	˚C	266.5	26.5	1	<35
14.	Total Suspended Solids	mg/l	23	22	1	50

Note: ND - Not Detectable

According to the monitoring results, the results of all parameters are accepted to the NEQG-General Application Guideline.

Figure 4-15 Photos of Wastewater Sampling from Wastewater Treatment of Printing Section

Table 4-31 Results of Wastewater Quality of Printing Process Discharge Water (2.10.2021)

Sr. No.	Parameters	Unit	Analysis Value		Minimum Measurement Range of Method	NEQG (2015) General Application
			Before Treatment (WSP-3)	After Treatment (WSP-4)		
1.	5-day Biochemical Oxygen Demand	mg/l	**890**	<30	30	50
2.	Chemical Oxygen Demand	mg/l	**1886**	40	30	250
3.	Chromium (Hexavalent)	mg/l	0.9	0.01	0.2	0.1
4.	Chromium (Total)	mg/l	**1.5**	0.06	0.02	0.5

Sr. No.	Parameters	Unit	Analysis Value		Minimum Measurement Range of Method	NEQG (2015) General Application
			Before Treatment (WSP-3)	After Treatment (WSP-4)		
5.	Copper	mg/l	<0.5	<0.5	0.5	0.5
6.	Cyanide (Total)	mg/l	<0.01	<0.01	0.01	1
7.	Iron	mg/l	0.1	0.5	0.1	3.5
8.	Nickel	mg/l	**1.7**	<0.2	0.2	0.5
9.	Oil and Grease	mg/l	**13**	<5	5	10
10.	pH	-	7	7.2	0.1	6~9
11.	Phenol	mg/l	<0.1	<0.1	0.1	0.5
12.	Sulfide	mg/l	<0.04	<0.04	0.04	1
13.	Temperature	˚C	26.5	26.5	1	<35
14.	Total Suspended Solids	mg/l	**329**	24	1	50

Note: ND - Not Detectable

According to the above table, before treatment the results of BOD, COD, chromium, nickel, oil & grease, TSS values were higher than the NEQG. Because there is influent water. Factory has installed effective wastewater treatment plant. Therefore, after treatment process, all parameters are accepted to the NEQG-General Application Guideline.

4.4.4 Soil Environment

In order to monitor the soil quality, soil sample in front of the factory premise was taken and tested at GMES laboratory. The soil sampling point (SSP) was selected at the coordinates of:

Latitude 17º 15' 22.559" N and

Longitude 96º 27' 31.634" E.

The analysis results of the physico-chemical parameters are presented in the following **Table 4-32**.

Table 4-32 Results of Soil Quality

Sr. No.	Parameters	Unit	Analysis Value
			Soil Sample in front of the Factory Premise
1.	Aluminum	mg/kg soil	0.35
2.	Arsenic	mg/kg soil	ND
3.	Chloride	g/kg soil	0.32
4.	Cyanide	mg/kg soil	ND
5.	Extractable Acidity	cmol/kg soil	3.75
6.	Manganese (Mn)	g/kg soil	ND
7.	P - Alkalinity	mmol/l extract	0
8.	pH	-	6.9
9.	Total Alkalinity	mmol/l extract	0.03
10.	Total Iron	mg/kg soil	0.02

Figure 4-16 Location of Soil Sampling Point

Figure 4-17 Photos of Taking Soil Sample in front of Factory Premise

4.5 Secondary Data of the Bago Township

Secondary Data such as socio-economic condition, physical/biological environment and weather data are collected from official township data (2018) from General Administrative Department and analyzed by the study team.

4.5.1 Physical Components

Physical environment essentially illustrates baseline conditions of topography, geology/ soils, climate, surface water and groundwater of the project area, where necessary, of proposed project regardless of an assessment study.

(a) Climate

The climate of the Bago Township is a tropical monsoon climate. The highest temperature is 39.8ºC and lowest temperature is 16.4ºC. The rainfall and temperatures of year 2017 are as follow:

Table 4-33 Climate of Bago Township (2018)

No.	Month	Precipitation		Temperature	
		Rainy day	Total rainfall (inches)	Summer (ºC)	Winter (ºC)
1.	April	3	4.46	39.3	20.0
2.	May	12	18.15	38.5	20.0
3.	June	25	22.36	33.8	21.3
4.	July	29	44.21	31.5	22.4
5.	August	26	15.39	33.4	13.6
6.	September	21	17.80	35.0	23.6
7.	October	8	9.17	-	-
Total		124	141.57	211.5	130.3

(b) Topography

Bago Township is situated at between north-latitude 17º 14' and 17º 50' and between east-longitude 96º 24' and 96º 41'. The area of Bago Township is 717,861 acres (1,121.66 square miles). The length of Bago Township is 21 miles from east to west and 43 miles from south to north.

Bago is the city of Bago Division, is situated average 31 ft above sea level. Bago city is the east part of the drainage of the Bago Yoma Mountain Range. The west portion of the whole township is forest cover mountainous area and part of the north is highest portion and has forest reserve with previous trees. And then, at north Dyte Oo and Lat Pa Tan Townships, at east Waw and Thanat Pin Townships, at south Kawa Township and at west Helgu, Tiekgyi and Tharyawadi Townships of Yangon Division are located. The proposed project is located at Bago Industrial Zone. But Industrial zone land is not flat plain. This area is range of hills area.

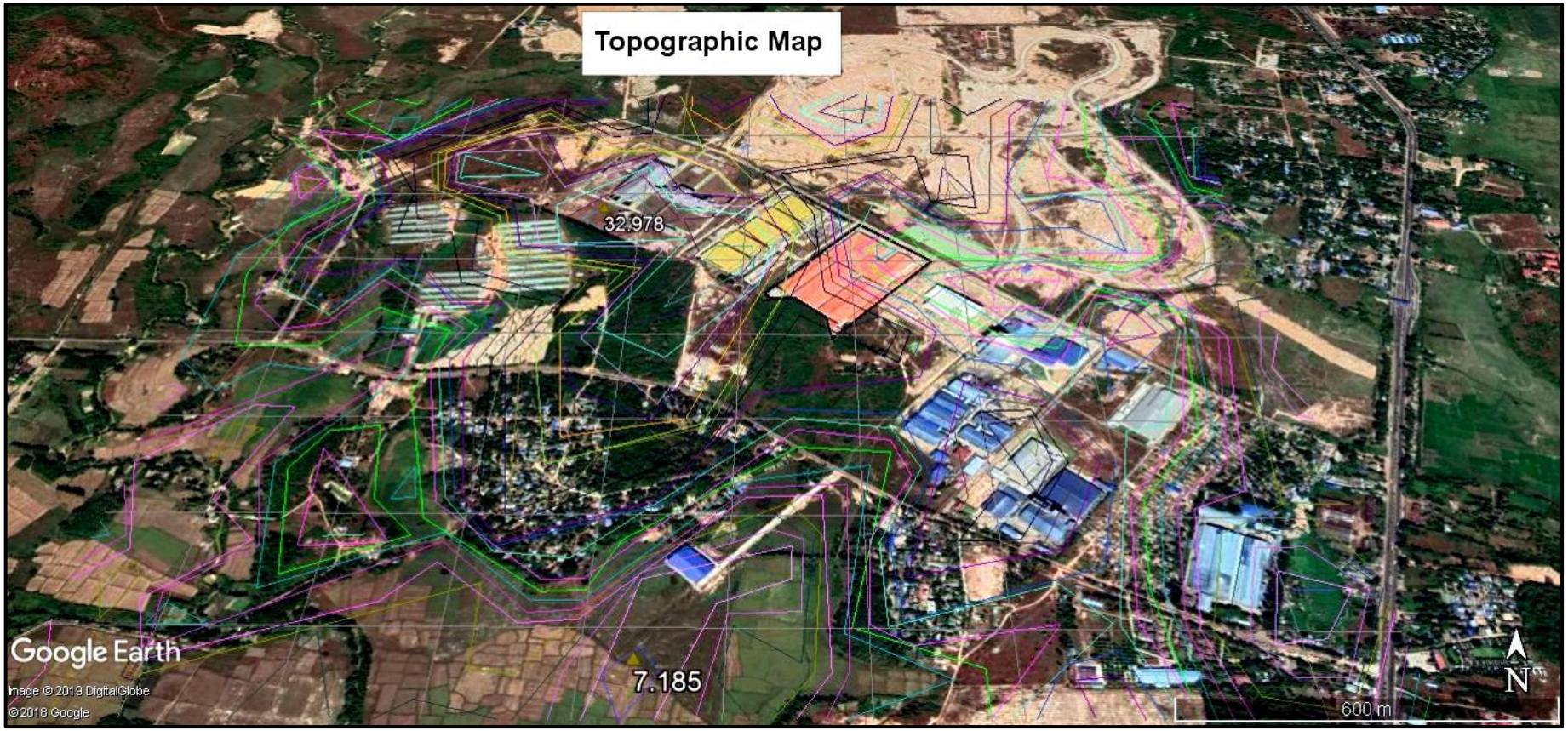


Figure 4-18 Topographic Map of Proposed Factory Area

(c) Geology

Bago Township is situated in the Bago region. So, most of Bago Township the geology is similar to Bago region. Bago region occupies the southernmost on land segment of the Central Myanmar Belt. It is bordered

- on the north by Magway and Mandalay Regions,
- on the east by Kayin and Mon States,
- on the south by Yangon and Ayeyarwady Regions, and
- on the west by Rakhine State.

Except for the low hills of the Bago Yoma, running north-south across the center of the Region, the foot-hills of the Eastern Highlands Province in the eastern part and those of the WR in the west, Bago Region is composed mostly of flat alluvial plains.

Except for the small northwestern part, the Bago region has not received enough geological investigations as much as it deserves. It is probably because Bago Yoma, known to be underlain almost entirely by Miocene clastic sedimentary rocks, is considered less attractive for the economic mineral potential. Generally, people are more interested in the reported economic mineral occurrences or in areas where there have been some local mining activities. Moreover, the Bago Yoma is very thinly populated and thickly wooded, hence it was largely reserved forest area. It is hardly accessible for the rigorous geological field work although it is surrounded by fairly thickly populated agricultural flat lands. The northwestern part of Bago region, however, was intensively investigated because of its oil potential.

The geology of Bago region is in fact interesting and is unique because the region embraces the southern segment of the Western Ranges (WR), the southern segment of the Central Myanmar Belt (CMB) and a narrow western part of the Eastern Highlands Province (EHP). Therefore, the geological succession of the Bago region is composed of a mixture of some rock units of the WR, the CMB and a few of the EHP, as shown in **Table 4-34** and **Figure 4-19**.

Table 4-34 Geological Succession of the Bago Region

Age	Unit
Quaternary	Laterite, landslide material and Alluvium Unconformity
Upper Miocene-Pliocene	Irrawaddy Formation Unconformity
Miocene Oligocene	Bago Group Unconformity
Eocene	Eocene Strata (molasse facies): Several Rock Units Faulted Contact
Cretaceous-Eocene	Indoburman Flysch of WR
Premian	Moulmein Limestone Unconformity
Precambrian	Gneisses and Schists
Igneous Rocks	
Quaternary/ Tertiary	Dolerites of Bago Yoma
Eocene Cretaceous	Granitoid Rocks
Mesozonic	Dislocated Ultramafic Rocks

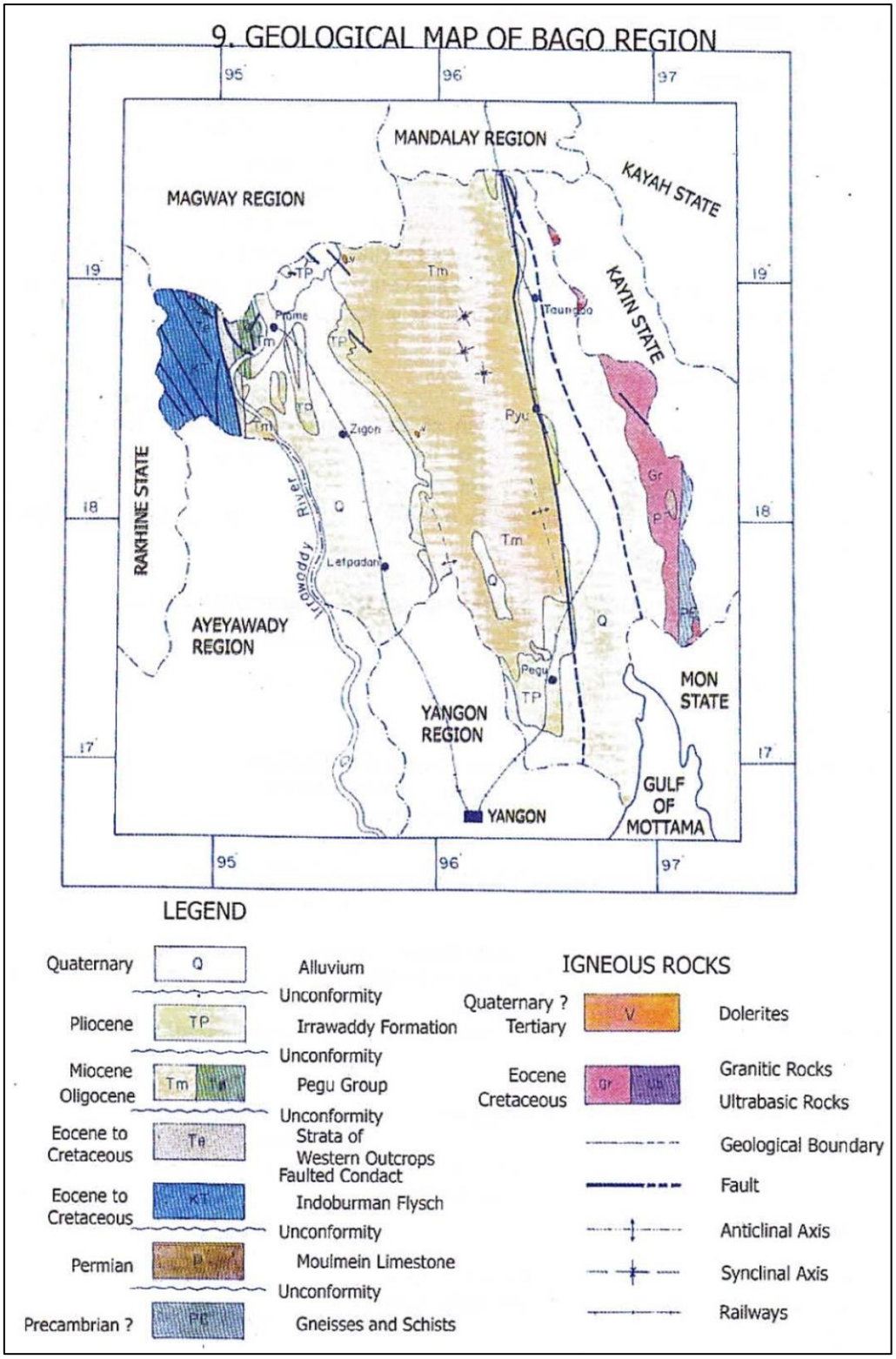


Figure 4-19 Geological Map of Bago Region

(d) Soil

The soil type of Bago Township is alluvial soil and is as shown in **Figure 4-20.**

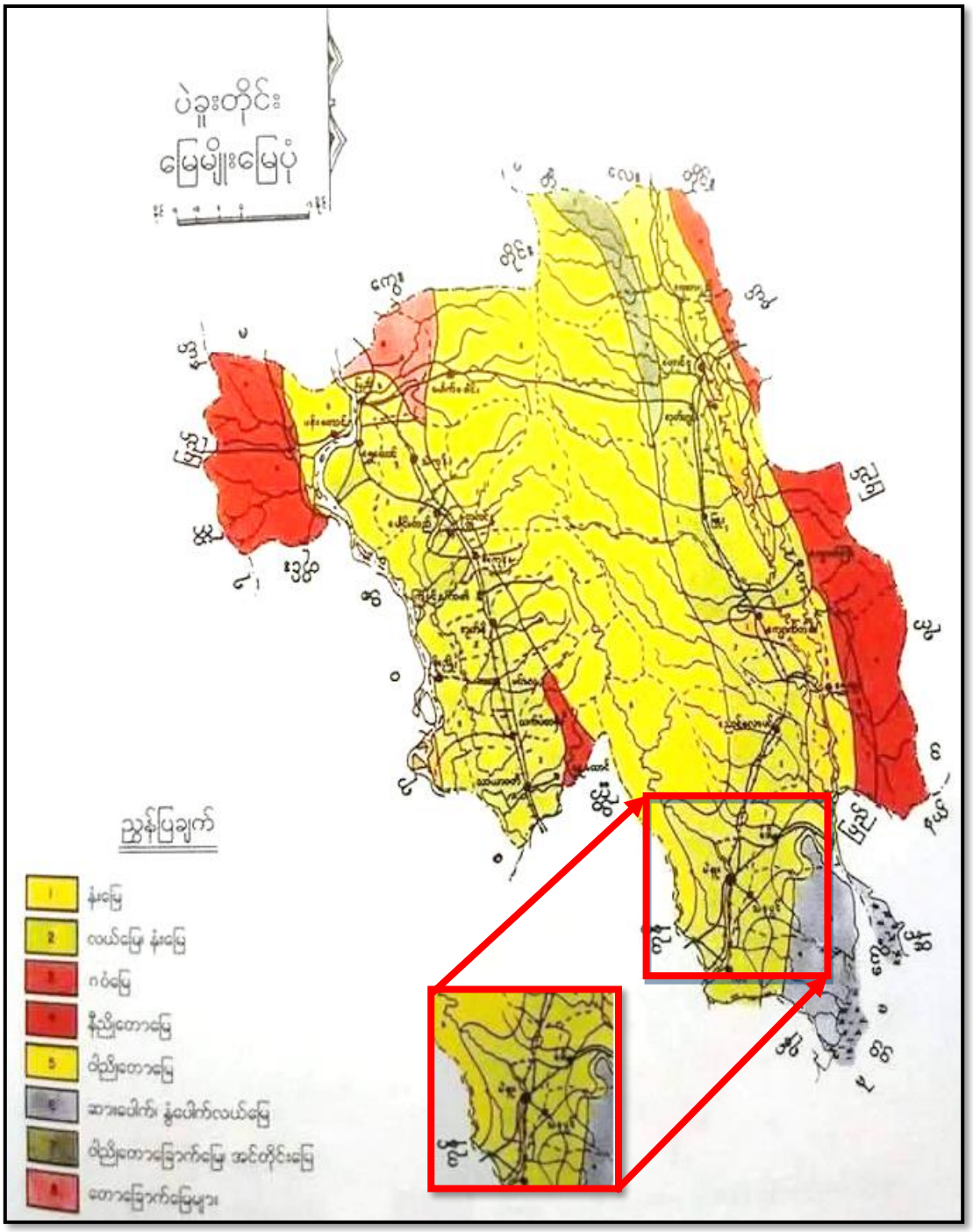


Figure 4-20 Description of Soil Type Map

(e) Surface Water Hydrology

Bago River is the main river of the Bago Township and this river is originated from the Sin Narmaung Mountain, on the Bago Yoma Mountain Range and is flowing the Yangon River, situated at the south part. And then, there are many creeks in the Bago Township which are flowing the Bago River. Kolukyel, Aungmya, Shwelaung, Salu and Latpan creeks are originated from Bago Yoma.

4.5.2 Flora and Fauna

As the project site is in the Bago Industrial Zone, Bago Township, the ecological information was received from the general administrative department of the Bago Township.

There are much natural vegetation in Bago Township such as teak, pyingadou, padauk, thityar, inngin, thingan, tamalan, kanyin, kayaway, thitkhar, koatco, kyana, sagaryar, sit, taungtamar, thadi, thinwin, thitkatoe, thitsay, mangyi, thitsho, anan, in, kanyaung, kantkaw, kaungmu, kyaylan, sandawar, nyan, talinekhaung, tawthatyet, taungpelal, and many kind of bamboos, etc. And then, there have medicinal properties plants at the Bago Township such as seephyu, phankhar, taungmayo, sintonemanwe, saymyinkhar, taungthangyi, kayayay, wonau, wild lemon, gonemin, sanwin, payanawar,.

Many animals are grazed in Bago Township. There is elephant, leopard, wild boar, wild buffalo, bear, sambur, guar, hilly goat, gi, pangolin, hilly tortoise, turtle, tortoise, otter, wild cat, bull, many kinds of monkey, snake, king of cat, wild dog, hog-badger, and many kinds of lizard.

4.5.3 Socio-Economic Components of Bago Township

(a) Regional Setting

The project area is located in Bago Township. The area of Bago Township is 1,121.61 square-miles. Bago Township is composed of three towns. There are Bago, Phyargyi and Inndagaw. And then, Bago Township is composed of 40 wards and 65 village tracts that is composed of 211 villages. There are 115,440 households having a total population 434,822 in the township.

(b) Population Characteristics

The female population is slightly higher than male with the ratio of 1:10 according to the general administration department in April, 2017. In the township, most of the people are 88.61% Burmese. There are 385,316 populations in the township. And then, population by national ethnic group that are lived in Bago Township describes in **Table 4-35.**

Table 4-35 Population by National Ethnic Group

Sr. No.	Ethnicity	No. of Persons	Percentage (%)
1.	Kachin	115	0.03
2.	Kayah	104	0.024
3.	Kayin	14,409	3.31
4.	Chin	463	0.11
5.	Mon	5,517	1.27
6.	Burmese	385,316	88.61
7.	Rakhine	793	0.18
8.	Shan	822	0.19
9.	Palaung	7,440	1.7
10.	Danu	3,780	0.86

Sr. No.	Ethnicity	No. of Persons	Percentage (%)
11.	Taungyo	2,680	0.61
12.	Kayan	2,369	0.54
Total		**423,808**	**97.434**

Table 4-36 Population by Foreigner

Sr. No.	Ethnic Race	No. of Persons	Percentage (%)
1.	Chinese	2,228	0.51
2.	Indian	6,389	1.47
3.	Pakistanis	848	0.20
4.	Bangladeshis	196	0.05
5.	Others	1,353	0.31
Total		**11,014**	**2.54**

Table 4-37 Population by Sex

Sr. No.	Living Area	Male	Female	Total
1.	Living on town	101,771	116,316	218,087
2.	Living in country	105,258	111,477	216,735
Total		**207,029**	**227,793**	**434,822**

(c) Religion

In the township, most of the people are 93.5% Buddhist and the other religious groups are shown in following table.

Table 4-38 Religious Groups of Ethnic in Bago Township

Sr. No.	Religious Group	No. of Persons
1.	Buddhist	406,580
2.	Christian	17,135
3.	Hindu	6,137
4.	Islam	2,925
5.	Others	2,045
Total		**434,822**

(d) Education Attainment

According to the secondary data from General Administration Department, there are 32 basic education high schools, 72 middle schools, 5 primary schools, 121 over primary school, 16 pre-primary schools and 27 monastery education schools. And then, Bago Township has University at Oakthar Ward (8).

(e) Connectivity

The selected project location has well connectivity and accessibility through road and air.

Air : Nearest airport is Yangon airport which is located around 30 km.

Road : The project is easily approachable from Yangon-Bago road.

(f) Health Facility

Bago Township has 6 hospitals. There are Bago general hospital with 500 beds, Zaungtu administrative unit hospital, Phyargyi administrative unit hospital, Thantawgyi administrative unit hospital, Phyarkalay administrative unit hospital and Chothein hospital. Rural healthcare department has 54 centers in the Bago Township.

(g) Industries

In the Project is situated in the Bago Industrial Zone, Bago Township, Thabyar village tract, near Thabyar village, beside the Dawei-Myit Tar Road. In Dawei Township, there are many types of industries such as six garment factories, two animal feed mills, one textile factory, two plywood factories, glove manufacturing factory, two shoe factories and Health care accessories production factories. And then, there are 982 food production businesses in Bago Township.

(h) Economy

Bago Township is the central economic township in Bago Division. The main livelihood of the township is agriculture and services work. Bago Township is situated at the junction of land route and junction of riverine route so road and communication is best. And then, the main products of the township is rice produced that is dispatched to Yangon Division.

(i) Land Use

The following table describes the land use classification of Bago Township.

Table 4-39 Land Use of Bago Township

No.	Types of Land	Area (acres)
1.	**Net Cultivation Area**	**205,514**
	(i) Paddy land	104,772
	(ii) Farmland for crop	-
	(iii) Cultivated Island	5,906
	(iv) Garden Land	94,799
	(v) nipa palm land	37
2.	**Vacant Land Area**	**-**
	➢ Paddy land	-
	➢ Farmland for crop	-
	➢ Cultivated land	-
	➢ Orchard	-
	➢ Hillside	-
3.	**Grazing Ground**	5,189
4.	**Industrial Land**	1,775
5.	**Urban/ Rural Land**	30,100
6.	**Reserved Forest and Protected Forest Area**	395,851
7.	**Wild forest**	-
8.	**Virgin Soil area**	945
9.	**Non-cultivated area**	78,487
	Total	**717,861**

(j) Workforce

There are 274,500 persons, who can be worked. Among them, 263,333 persons are employees and 11,167 persons are jobless. So, the percentage of jobless in Bago Township is 4.02 %.

Table 4-40 Workforce of Bago Township

Sr. No.	Types of Job	No. of Persons
1.	Government Employee	7,504
2.	Services	18,094
3.	Agriculture	37,940
4.	Breed	2,600
5.	Trading	20,700
6.	Factory / Workshop Employee	36,029
7.	Random Worker	19,760
8.	Others	120,706
Total		**263,333**

Table 4-41 Status of Managerial Organization Office

Sr. No.	Description	Quantity
1.	Township Administration Office	1
2.	Ward Administrator Office	5
3.	Township management level office	10
4.	Political party office	8

Table 4-42 Status of Economic Infrastructure

Sr. No.	Description	Quantity
1.	State owned factory	1
2.	Private factory	15
3.	Major market	6
4.	Hotel / Motel / Inn / Guest house	6
5.	Private Petroleum Station	4
6.	Media / Studio / Publication	4
7.	Transport service line	3
8.	Merchandising Co-operative society	108
9.	Government Bank	1
10.	Private bank	4
11.	Township-wise inter-link road	5
12.	Bridge above 180 feet	6
13.	Electrical Supply Center	1

Table 4-43 Status of Social Infrastructure and Organization

Sr. No.	Description	Quantity
1.	Monastery	360
2.	Nun dwelling	88

Sr. No.	Description	Quantity
3.	Pagoda	347
4.	Monastic education school	19
5.	State high school	9
6.	State Middle school	18
7.	State primary school	1
8.	Private pre-primary school	4
9.	University/ College	3
10.	Government hospital	5
11.	Private hospital	2
12.	Private clinic	25
13.	Library	99
14.	Social organization	10
15.	NGO	5
16.	INGO	1

4.6 Cultural Components

Bago region has many historical and cultural components such as Kanbawza Thardi Place, Shwe Thar Laoung Image and Phyargi Pagoda that is situated at the Bago City. However, there are no cultural resources in the surrounding of project implementation area because the project site is situated in industrial zone.

5.0 SUMMARY OF IMPACTS

Apparel manufacturing has a huge potential to contribute to economic growth as a substantial employment giver and attract foreign investment. Apparel manufacturing is labor-intensive, which is characterized by low-fixed capital investment; a wide range of product designs and, hence, input materials; variable production volumes; high competitiveness; and often high demand on product quality. Nevertheless, to achieve its full potential the garment industry needs to overcome some major challenges.

This Apparel manufacturing project of KARISMA Apparel (Myanmar) Co., Ltd. also has the major impacts and minor impacts, which are described in the followings.

5.1 Processes and Operations Involved in the Manufacture

The processes of the operation of the factory are very simple. The process chain from the fabric to the finished product comprises the following steps shown below.

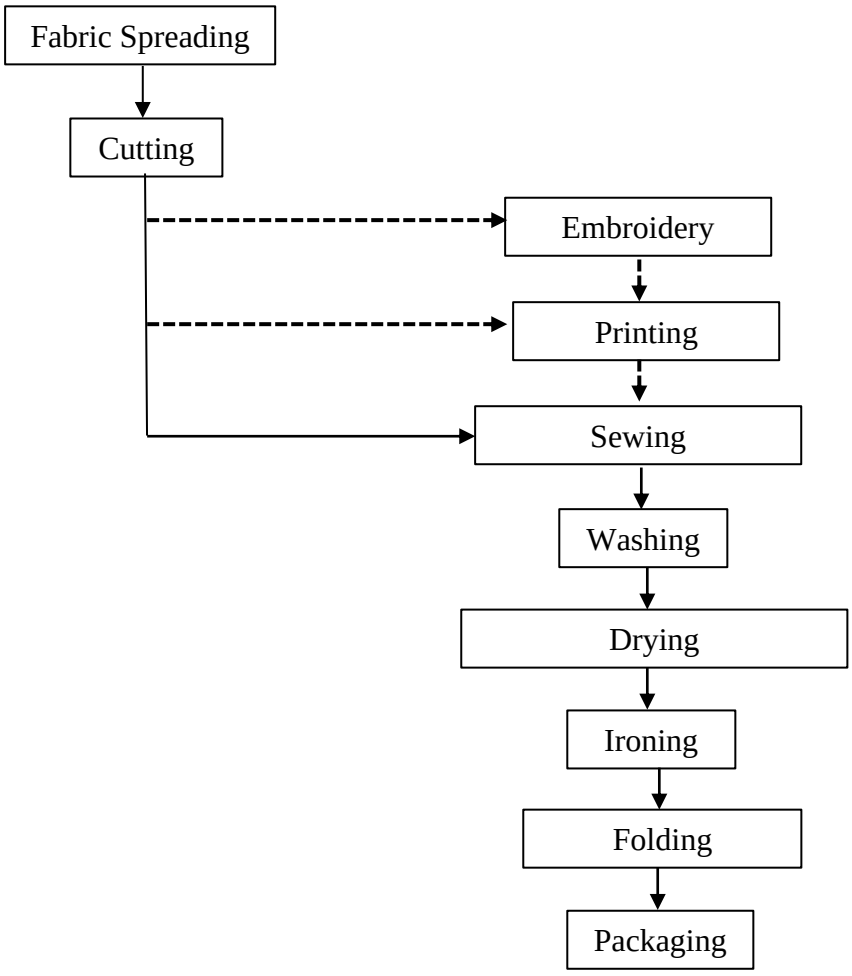


Figure 5-1 Process Sequence of Garment Manufacturing

5.2 Major Impacts for Operation Phase

The KARISMA Apparel Factory has been already constructed factory buildings so that there is no need to consider the construction phase impacts. Each garment manufacturing process has its own unique environmental impacts.

It is important to be aware of all environmental effects under normal and abnormal operating conditions, Furthermore, it must be clear which environmental legislation is valid for the site (draw up a list of all environmental regulations with their actual requirements).

Environmental Effects

Regular Conditions

Energy consumption	e.g. electrical supply for machinery electrical supply for lighting
Consumption of raw material	e.g. use of fabrics
Water consumption	e.g. process water for spot cleaning domestic water washing print screen
Chemicals	e.g. purchase storage use disposal
Emissions to atmosphere	e.g. dust, fumes, VOC, NO_x, SO_x, CO, CO_2 from heating installation
Discharges to water	e.g. effluents from washing effluents from cooling effluents from screen washing
Solid waste	e.g. process waste (off-cuts, fibers, etc.) hazardous waste (e.g. machine oil, paints, etc.) packaging waste (plastics, cardboard, paper, etc.)
Noise, visual impact, Odor, vibration	e.g. noise from machinery vibrations from machinery

Abnormal Conditions

Fire	e.g. air emissions Fuel handling

Soil contamination	e.g. leakage of vessels or tanks spillage at filling devices
Water contamination	e.g. accidental damage

All environmental effects are checked during an environmental audit to see that they comply with the established legal requirements. Deficits are noted during an inspection of the site. This Best Practice Guide and the HSE Guidelines are useful tools to identify critical issues. Following the audit, a written report is produced which includes further areas for improvement.

Legal Requirements

Regulation	**Specific Requirement (examples)**
Air Quality Standard	VOC limit, NO_x limit, SO_x limit CO limit, dust limit
Control of noise	maximum 90 dB (A) value for 8 hour at workplace
Waste regulations	control of disposal of solid waste requirements to recycling
Wastewater regulations	limits for specific parameters in waste water

5.2.1 Air Emissions and Ambient Air Quality

Process-related emissions, such as the pollutants given off by burning fuel, the use of organic solvents or noise from mechanical equipment, can affect a factory in two ways:

- when they occur in the workplace, they present occupational health and safety concerns;
- when they are released outside, they become an environmental issue.

Air pollution is the most difficult type of pollution to sample, test, and quantify in an audit. Air emissions can be classified according to the nature of their sources:

l. Point sources:

Specific discharge points, such as stacks or vents that are intended to be the point of atmospheric release for emissions.

2. Fugitive sources:

Sources for more general atmospheric emissions occurred by evaporation, leaks, and spills.

The major sources for air quality deterioration are boiler and power generators, gases from different machines, and emissions from different

mechanical and electric appliances; and operation activities such as ironing. Fugitive or area sources of air pollutants include warehouses and spills. .

Warehouses

Fabric stored in warehouses can emit volatile emissions from process residues, especially printing or dyeing or finishing chemicals that remain in the fabric. Formaldehyde residues have caused the most problems for the industry, but the other residues, notably hydrocarbons from softeners and wax water-repellent finishes, also can be present in fabric and result in volatile emissions.

Spill

Spills can emit volatile pollutants for years and, therefore, should be cleaned up promptly. Spill residues should be disposed of according to proper protocol, which in some cases requires handling residues as hazardous waste.

Common air pollutant emissions include VOCs from knitting oils, fiber-finishes, softeners, hydrocarbons, etc.

The ***mitigation measures*** to be carried out are:

- Installation of efficient ventilation system,
- Wearing suitable masks when needed,
- Sustainable maintenance for all machinery, and
- Continuous surveillance.

5.2.2 Noise

Despite the level of noise in working with most of the machinery in the factory are within the human accepted level (max. 60 dB, Decibel), some mitigation measures will be carried out in case of exceptional noise levels arise during any phase of work; for example: for example: running of diesel generators, boilers and compressors.

- Take steps to reduce noise directly at source
- Encase or encapsulate noisy machines and equipment
- Screen noisy areas with walls or ramparts
- Use sound-proofing materials for the coating of ceilings or walls
- Try to influence noise by modifying physical data (e.g. speed)
- Locate noise-intensive machines together if possible
- “Flag” noisy areas with signs and ensure that the workers wear ear plugs in these areas
- Wearing ears' anti-noise devices,
- Keeping continuous checking, and
- Sustainable maintenance for all machinery

5.2.3 Solid Wastes

During the operation phase of the factory, the solid wastes will increase quantitatively.

Common types of solid waste and pollution prevention strategies for the wastes are described below. Usually, the sources of each waste type are obvious upon inspection. A solid waste audit can identify waste sources that might be overlooked in everyday operations. After identifying the sources, factory can reduce or eliminate the associated wastes if they remain committed to achieving their pollution prevention goals.

Ash: Ash, pollution from boilers, is difficult to eliminate. Amount of ash produced depends on energy conservation programs, type of fuel used and recycling.

Packaging Materials: Another major source of solid waste is packaging materials. These materials include cardboard boxes, bale wrapping film or fabric, baling wire, wooden crates, paper sacks, and drums made of paperboard, plastic, or metal.

Reducing these wastes is largely a matter of establishing and enforcing improved purchasing specifications.

All raw materials should be received in bulk or returnable intermediate bulk containers (IBCs) if possible. Returnable IBCs or bulk purchases of raw materials eliminate waste and provide other benefits, such as:

- Reduced spillage
- Reduced handling costs
- Reduced packaging waste
- Reduced worker exposure to chemicals
- Simplified inventory
- Reduced cost of chemicals that are bought in bulk
- Savings in storage space (IBCs are stackable)

Drums: When purchasing fuel in drums, returnable containers should be specified, and the vendor should be required to accept unwashed drums for return. Eliminating the need to wash each drum before pickup can prevent a significant amount of wastewater.

Bags: Bags often break, resulting in spillage of contents, and disposing of them is a nuisance. They cannot be stored near high traffic areas or wet locations. They also must be moved on skids, which frequently break, and handling bags requires a considerable amount of labor.

Paper Cones and Tubes: Yarns can be supplied on reusable plastic cones, and cardboard yarn cases can be replaced with plastic yarn pallets, which can be reused for many cycles. Polyvinyl chloride (PVC) pipe is used as a durable replacement for paper tubes in many operations. In addition to waste savings, rigid PVC tubes reduce fabric distortion in knits.

Processing Wastes: Waste fabric, yarn, selvage trimming, seam cutout waste and fiber from processing accounts for the solid waste generated.

Proper training, even for such apparently simple tasks as sewing seams straight, can significantly reduce seam waste and could easily recover fabric waste.

Miscellaneous: Other solid wastes include scrap metal, broken needles, trash, paper, and semisolid waste oils.

It is inevitable that, during the working of the factory, the solid wastes will increase quantitatively. The company shall apply a strict policy within its all sections aims to minimize the solid wastes to the minimum by introducing the following measures:

- Solid waste separation and implying recycling when possible,
- Introducing suitable, clean and sufficient containers and keep them always closed and emptying them daily on regular bases,
- Cleaning around and spraying insecticides when necessary, and
- Arranging awareness training programs for all personnel on how to handle solid wastes.

5.2.4 Wastewater

Many garment industries are well-known not to consume much water. However, in this factory, due to the processes of washing and printing, water consumption is moderate. Most of wastewaters are produced from washing and printing section. Other wastewaters will be produced by the personal daily uses, rinsed water from the washing machines, flushing and cleaning. All wastewaters from the factory will be disposed according to the acting municipality regulations or Myanmar National Environmental Quality (Emission) Guidelines (Draft, Dec-2015). Such methodology of handling wastewater will prevent any seepage of bad water to the ground water aquifers.

5.3 Support Operations for Garment Manufacturing

5.3.1 Administrative Offices

- Order processing and preparing invoices
- Conducting marketing and sales
- Managing human resources

The administrative offices associated with a garment manufacturing facility are typically proportional to the size of the manufacturing operation (i.e. Larger factories require more administrative support). Administrative staff manages corporate functions such as human resources, finance and accounting, billing, health and safety, and environmental compliance. Offices are equipped with basic technologies and amenities, such as computers, printers, filing equipment, desk space, and meeting rooms.

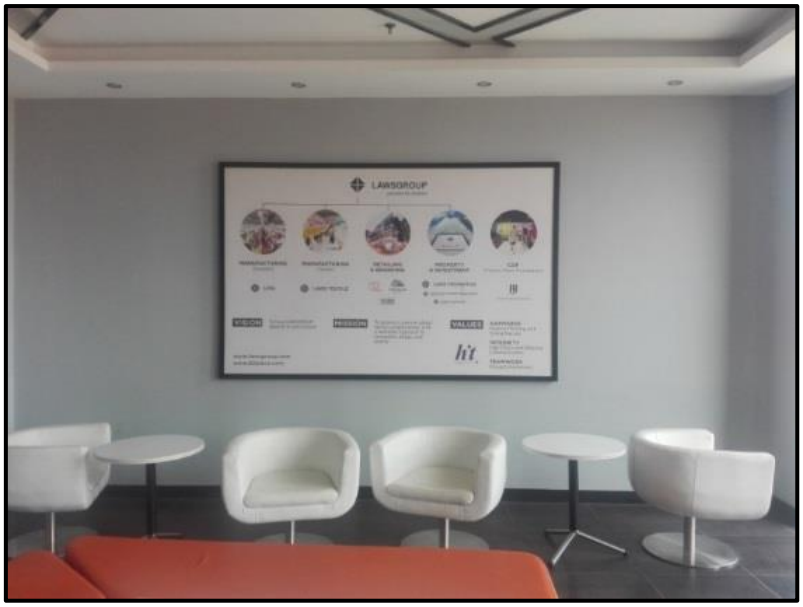


Figure 5-2 Living Room

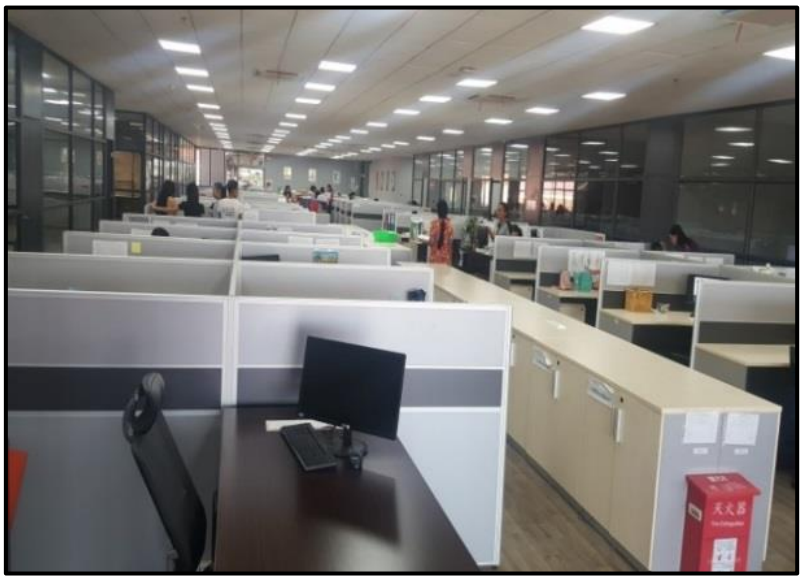


Figure 5-3 Office

Figure 5-4 Presentation Room

5.3.2 Steam Generation

On-site boilers centrally generate steam to support ironing operations. All garment factories had an on-site boiler to centrally generate steam for garment ironing. In most facilities, the ironing boards are attached to a ventilation system that captures the heat emitted from the iron and exhausts it to the outside environment. The quantity and size of boilers located on-site are proportional to the manufacturing operation.

In the Apparel industry, air compressor is used for clamping, conveying, tool powering, actuators and controls, and automated equipment.

Figure 5-5 Boilers

Figure 5-6 Air Compressors

5.3.3 Power Generation

On-site diesel generators provide backup power, as needed. The KARISMA Apparel (Myanmar) Factory also maintains and operates on-site diesel generators as a source of backup power.

Figure 5-7 Power Supply System

5.3.4 Storage Facilities

The specifications for the storage facilities depend on the nature and properties of the stored material.

- Raw materials are fibrous, which are flammable and should be stored under fire precautions.
- The storage of the finished products should also be equipped with fire precautions, because garments are flammable fibrous materials. When storing garments with resin-coated fabrics, they should be packaged to avoid the release of formaldehyde and the storage should be ventilated.
- Fuel used for boilers, generators, cars and trucks are stored in separated rooms where away from the material and product stores, and they should be equipped with fire precaution system.

5.3.5 Ventilation

Apparel manufacturing requires good light as well good ventilation to have optimum level of worker effectiveness. Good ventilation improves the air circulation. Inadequate ventilation can lead to lower productivity due to discomfort.

Many factories have air extraction fans which are placed at the work level. On the other hand, air is also blown-in to achieve balance of pressure. Evaporative cooling, which is also used helps reducing temperature and increases humidity. Often RMG units are in multi-storied buildings which require ventilation through windows and with the help of air extraction fans.

Appropriate ventilation can help effective circulation of air. It is recommended to install adequate number of air extraction fans and blowers to improve ventilation.

The following table summarizes the environmental aspects of KARISMA Apparel (Myanmar) Factory.

Table 5-1 Environmental Aspects of Apparel Manufacturing Processes

Inputs	Operations	Outputs
Main Process Line		
Fabrics, accessories, cut panels, etc. →	• Raw materials receipts and storage	→ Plastic wraps, ropes
Garment fabric →	• Arrangement of multilayer fabric, with patterns positioned and fixed on • Forming multilayer of fabric and fixing patterns on fabric	→ Particulates, Dust, Cardboard core from fabric rolls
Multilayer fabric with patterns on fabric →	• **Cutting** Cutting fabric according to patterns	→ Fabric scrap, used forms Particulates, VOCs from fabrics, noise
Garment pieces, threads, and backings →	• **Embroidery** Done on the sewing machine using the set decorative stitches. Use a special computerized machine; designs can be built into the memory or designed using special software.	Embroidered pieces → Broken needles, cores, and spools, rejects
Energy, detergents, water, softener →	• **Washing** To get good quality clothing, the stained products are washed out in the washing area.	Microscopic plastic fibers, wastewater →

Inputs	Operations	Outputs
Garment pieces, Lining pieces, Sewing threads, Buttons , Zippers etc.	• **Sewing** Assembling each of garment with necessary components	Complete assembled garment Particulates, VOCs from fabrics, Yarn scrap, Noise
Complete garment	• **Ironing** Finishing the appearance	Finished garment Steam, Noise, high ambient air temperature, high humidity
Finished garment	• **Packaging** Packaging garment	Different sizes of carton boxes Carton scrap, Plastic bags
Support Facilities Operation		
Energy and diesel	**Generators**	Air pollution; noise
Water and fuel	**Boilers**	Blowdown (wastewater)
Energy	**Lighting and air conditioning**	Climate change,
Office accessories; energy	**Administrative office operation**	Waste papers and other office solid wastes

Of particular environmental relevance, energy consumption, chemicals use, the associated air emissions, solid waste generation as well as water use, and wastewater generation are main issues of environmental impacts. There are also noise disturbances, fire risk and accidents during operation phase.

5.3.6 Energy Use

New energy-saving machines for ironing or pressing can significantly lower your energy consumption. The high-frequency fixing technology of modern presses only affects the adhesive, much in the manner of a microwave. As a consequence, a working temperature of just around 120 °C is required, which is not only gentle on the fabric but also lowers the energy costs.

5.3.7 Water Use

Due to the processes of washing and printing, water consumption is moderate and wastewater is generated.

5.3.8 Hazardous Chemicals Use

In the tailoring process formaldehyde is often used in the sewing and ironing stages, with halogenated and non-halogenated solvents used in stain removal.

Table 5-2 Operational Phase Activities and Environmental Impacts

Potential impact	Activity					
	Storage of materials	Storage of fuel/oil	Disposal of waste	Drainage works	Transportation of fuel, raw materials	Transportation of products
Solid waste			√	√	√	
Air emissions	√	√		√	√	
Noise disturbances					√	√
Fire risk	√	√	√			
Accidents	√	√			√	√

5.4 Impact Assessment Methodology

This section provides the generic scope for assessing the significance of impacts related to the key issues raised in the Scoping process.

In order to establish a coherent framework within which all impacts could be objectively assessed, it is necessary to establish a rating system, to be applied consistently to all the criteria. For such purposes each aspect is to be assigned a value ranging from one (1) to four (4) depending on its definition. The tables below provide a summary of the criteria and the rating scales, which will be used in the assessment of potential impacts.

5.4.1 Description of Nature and Scale Impacts

The table below provides a brief description of the terms used to assess the impact of the proposed activity on the environment.

Table 5-3 Nature, Extent, Duration, Probability and Significance of Impact

Nature: classification of whether the impact is positive or negative, direct, or indirect.	
Extent: spatial scale of impact and classified as:	
Site	The impacted area is the whole or significant portion of the site.
Local	Within a radius of 1.5 km of the construction site.
Regional	the impacted area extends to the immediate, surrounding, and neighboring properties
National	The impact can be of national significance.
Duration: Indicates what the lifetime of the impact will be and is classified as:	
Short term	The impact will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase
Medium term	The impact will last for the period of the construction phase, where after it will be entirely negated.

Long term	The impact will continue or last for the entire operational life of the development but will be mitigated by direct human action or by natural processes thereafter. The only class of impact which will be non-transitory
Permanent	Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient
Intensity: Describes whether an impact is destructive or benign;	
Low	Impact affects the environment in such a way that natural, cultural, and social functions and processes are not affected
Moderate	Affected environment is altered, but natural, cultural, and social functions and processes continue albeit in a modified way.
High	Natural, cultural, and social functions and processes are altered to extent that they temporarily cease.
Very High	Natural, cultural, and social functions and processes are altered to extent that they permanently cease.
Probability: Describes the likelihood of an impact occurring:	
Improbable	Likelihood of the impact materializing is very low
Possible:	The impact may occur
Highly Probable	Most likely that the impact will occur
Definite	Impact will certainly occur.

- **Significance:** Based on the above criteria the significance of issues was determined. The total number of points scored for each impact indicates the level of significance of the impact, and is rated as:
  - Low: the impacts are less important.
  - Medium: the impacts are important and require attention; mitigation is required to reduce the negative impacts.
  - High: the impacts are of great importance. Mitigation is therefore crucial.
- **Cumulative**: In relation to an activity, means the impact of an activity that may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.
- **Mitigation**: Where negative impacts are identified, mitigation measures (ways of reducing impacts) have been identified.

5.4.2 Criteria for Rating of Impacts

This describes the criteria to be used and the significance rating of the impacts.

Table 5-4 Criteria for Rating of Impacts

Criteria for the rating of impacts				
Criteria	**Description**			
Extent	Site	Local	Regional	National
Duration	Short-term	Medium-term	Long-term	Permanent
Intensity	Low	Medium	High	Very high
Probability	Improbable	Possible	Highly probable	Definite
Points allocation	1	2	3	4
Significance= Extent+ Duration+ Intensity +Probability				
Significance Rating of Classified Impacts				
Impact	**Points**	**Description**	**Action required**	

Low	4-6	A low impact has no permanent impact of significance.	Mitigation measures are feasible and are readily instituted as part of a standing design, construction or operating procedure.
Medium	7-9	Impact is real, and potentially substantial in relation to other impacts.	Mitigation is possible with additional design and construction inputs.
High	10-12	The design of the site may be affected.	Mitigation and possible remediation are needed during the construction and/or operational phases. The effects of the impact may affect the broader environment.
Very high	13-16	The design of the site may be affected.	Mitigation and possible remediation are needed during the construction and/or operational phases. The effects of the impact may affect the broader environment.
Status		Perceived effect of the impact	
Positive (+)		Beneficial impact	
Negative (-)		Adverse impact	
Negative impacts are shown with a (-) while positive ones are indicated as (+)			

The significance of the impact, rated from Low to High, is indicated in the table below with an explanation of the impact magnitude and a guide that reflects the extent of the proposed mitigation measures deemed necessary.

Table 5-5 Evaluation of Impacts during the Operation Phase

Environmental Component	Potential Impact	Environmental Significance Score					
		E	D	I	P	Total	Rating
Air quality	• Dust & other exhaust atmospheric emission of SO_2, NO_x, CO, PM etc. occur at the stack gas of generators, boilers, vehicles, etc. • Ash from boiler • Storage of fabric rolls, all the raw materials & products • Odor nuisance from toilets, screen printing section, glue room, canteen's drainage	1	3	3	3	10	High (Negative)
Water quality	• General usage of water • Wastewater from operation activities • Washing water from washing machines and printing section • Disposal of oil used for maintenance of machines • Sewage discharge	2	3	3	4	12	High (Negative)
Soil quality	• Leakage of oil from vehicle can cause soil contamination	1	3	1	2	7	Medium (Negative)
Noise	• Noise generation due to plant operation • Generation from vehicle movement & especially from the operation of generators, boilers, compressors or any other vibrating machines	1	3	3	3	10	High (Negative)
Solid Waste Generation	• Recyclables such as paper waste, plastics • Non-recyclable wastes such as tapes, cardboard core, boxes of accessories, yarn and fabric scraps from cutting garments • Bio-degradable – Kitchen waste • Ash from boiler fuel	2	3	3	3	11	High (Negative)
Fire hazards	• Ignorance fire hazardous, electric shock due to wire destroy and over voltage usage • Fuel Leakage from storage tank • Smoking	3	3	3	4	13	Very high (Negative)

Environmental Component	Potential Impact	Environmental Significance Score					
		E	D	I	P	Total	Rating
	• Incorrect Combustion of Firewood from boilers						
Job opportunity	• Job opportunities for local people will be provided and regional will be boosted.	3	3	3	3	12	High (Positive)

Table 5-6 Evaluation of Impacts during the Decommissioning Phase

Environmental Component	Potential Impact	Environmental Significance Score					
		E	D	I	P	Total	Rating
Air quality	• Dust & other exhaust atmospheric emission of SO_2, NOx, CO, PM etc. occur at the stack gas of generators, boilers, vehicles, etc. • Dust emissions from demolished activities and transportation of vehicles	2	1	3	3	9	Medium (Negative)
Water quality	• Disposal of oil from vehicles and DG sets • Sewage discharge from construction workers' tents • Wastewater from daily use of workers	2	1	2	2	7	Medium (Negative)
Soil quality	• Leakage of oil from vehicle can cause soil contamination	2	1	2	2	7	Medium (Negative)
Noise	• Noise generation duet to demolition operation • Generation from vehicle movement & especially from demolished activities, the operation of generators, or any other vibrating machines	2	1	4	4	11	High (Negative)
Solid Waste Generation	• Materials from the demolition of buildings	2	1	4	4	11	High (Negative)
Fire hazards	• Ignorance fire hazardous, electric shock • Fuel Leakage from storage tank • Smoking	2	1	2	2	7	Medium (Negative)
Job opportunity	• Job opportunities for construction workers	2	1	3	4	10	High (Positive)
	• If closure the factory, local economy will be back to the original condition.	2	3	3	3	11	High (Negative)

6.0 DESCRIPTION OF PROPOSED MITIGATION MEASURE

6.1 Mitigation Measures on Adverse Impacts

Mitigation describes the measure proposed in order to avoid, reduce and where practicable remedy significant adverse effects. The mitigation measures for the identified effects for the various disciplines of the physical, biological, and human environment during the operation phase and decommissioning phase are summarized in **Table 6-1**.

Table 6-1 Mitigation Measures for Operation Phase and Decommissioning Phase

Impact Type	Impact Range (Before Mitigation)	Mitigation Measures	Impact Range (After Mitigation)	Remarks
Operation Phase				
Air Quality	High	▪ Proper storage area for fabrics, solid wastes, spot cleaning cans and finished products. ▪ Proper records will be maintained. ▪ Good ventilation and clear assess will be provided. ▪ Trained/Approved transports will be given work for the transportation of the raw materials / products. ▪ Periodic maintenance of boilers, generators, vehicles, and machineries is conducted. ▪ Exhaust fans will be installed in the boiler room.	Low	➢ Proper handling of material will be followed
Water Quality	High	▪ Install proper facilities to prevent rain/storm water contamination during the storage of solid materials. ▪ Treated effluent from wastewater treatment plants will be utilized for greenbelt, gardening & fire- fighting requirement. ▪ Domestic wastewater will be disposed into septic tanks systematically. ▪ Untreated wastewater should not be drained out on the ground or to any body of water. ▪ Used oil is stored in a certain place within a container and the container need to handover to all supplier of waste buyer for recycling or proper disposal	Low	➢ Extreme care will be taken in treatment & monitoring of the quality of the effluent ➢ Low impacts due to preventive maintenance to the underground water

Impact Type	Impact Range (Before Mitigation)	Mitigation Measures	Impact Range (After Mitigation)	Remarks
		according to local laws and regulation. ▪ Verification of oil disposal by supplier might be done by the factory which would be a good practice. ▪ Washing area will be made of impervious surface to prevent leachability. ▪ Frequent cleaning and pumping out of septic tank should be done.		
Soil Quality	Medium	▪ Used oil is stored in a certain place within a container and the container need to handover to all supplier of waste buyer for recycling or proper disposal according to local laws and regulation. ▪ Verification of oil disposal by supplier might be done by the factory which would be a good practice. ▪ Washing area will be made of impervious surface to prevent leachability. ▪ Provides PPE (protective aprons, gloves), paved ground and disposing them by linking with City Development Committee (Bago).	Low	➢ Low impacts due to preventive maintenance
Noise	High	▪ Preventive Maintenance to ensure low noise generation. ▪ Personal Protective Equipment (Ear Plug & Muff) will be utilized in the affected area. ▪ Around the factory premise, lots of trees should be planted for reducing noise.	Low	➢ Low impacts due to preventive maintenance & usage of PPE's
Solid Waste Generation	High	▪ Ash should be sold for agriculture. ▪ Use bag filter for fly ash not to disperse into the environment ▪ Records of quantity of waste generated will be maintained. ▪ Empty cans will be sold to the vendors. ▪ Some solid wastes which cannot be sold are disposed to the instruction of the City	Low	➢ Beneficial impacts on social community ➢ Low impact as prevention in accumulation of solid waste

Impact Type	Impact Range (Before Mitigation)	Mitigation Measures	Impact Range (After Mitigation)	Remarks
		Development Committee (Bago). ▪ All hazardous wastes must be disposed with City Development Committee (Bago) facilities. ▪ Used oil is stored in a certain place within a container and the container need to handover to all supplier of waste buyer for recycling or proper disposal according to local laws and regulation. ▪ Verification of oil disposal by supplier might be done by the factory which would be a good practice.		
Fire Hazards	Very High	▪ Firefighting Equipment should be checked daily. ▪ Employees should be provided regular trainings and exercises for firefighting and other emergency response. ▪ Fire safety policy should be designed and implemented. ▪ Fixed and portable fire equipment should be designed and installed.	Low	
Decommissioning Phase				
Air Quality	Medium	▪ Covers or control equipment must be used to minimize the dust from the sources. ▪ Spray water along the road inside the factory to minimize dust from decommissioning activities and vehicles. ▪ Regular maintenance of machines and vehicles must be done.	Low	
Water Quality	Medium	▪ Regular inspection of vehicles and generators must be done to prevent leakage of fuel and engine oil. ▪ Use sediment traps wherever necessary. ▪ Maintenance of drainage system must be done to prevent flooding and overflow. ▪ Proper drainage system for wastewater from daily use of	Low	➢ Low impacts due to preventive from polluting the surrounding environment

Impact Type	Impact Range (Before Mitigation)	Mitigation Measures	Impact Range (After Mitigation)	Remarks
		workers and sewage discharge should be prepared on-site. ▪ Demolished materials and wastes must be precautious not to reach any water sources.		
Soil Quality	Medium	▪ Regular inspection of vehicles and generators must be done to prevent leakage of fuel and engine oil.	Low	
Noise	High	▪ Preventive Maintenance must be done to ensure low noise generation. ▪ Personal Protective Equipment (Ear Plug & Muff) will be utilized in the affected area. ▪ Demolition activities should not be done at night.	Low	➢ Low impacts due to preventive maintenance & usage of PPE's
Solid Waste Generation	High	▪ The demolished materials will be sold to suitable buyer. ▪ Some solid wastes which cannot be sold are disposed to City Development Committee (Bago) weekly.	Low	➢ Low impact as prevention in accumulation of solid waste
Fire Hazards	Medium	▪ Firefighting Equipment should be placed in the visible area and checked daily. ▪ Emergency contact numbers of township and District Fire Services Department incidences are hanged.	Low	
Loss of Job Opportunities	High	-	-	-

6.2 Best Management Practices for the Production Line

In order to ensure the proper operation of the factory, a management system must be implemented for the production line as well as for the supporting facilities. This management scheme shall assure regular monitoring and compliance, and process performance. Proper staff training and organized record keeping will also take place.

For most garment factories, energy use, water use, and hazardous chemical use emerged as the areas with the overall greatest impact on the environment, employees, and local community. Best Management Practices (BMPs) for these three areas are readily available and can offer the most potential savings and environmental impact.

However, these do not represent all the environmental impacts associated with garment manufacturing, especially if screening-printing, embroidery and washing operations are included, because impacts on ambient air, solid waste and water become significant. Thus, the best management practices for all these sectors are considered in the following section.

6.2.1 Energy Use Best Management Practices

The impacts associated with energy use are the most significant environmental impacts resulting from garment factories operations. Garment manufacturers typically have an onsite diesel generator for back-up power. Diesel emissions contain a mixture of compounds, including carbon monoxide (CO), nitrogen oxides (NOx) and diesel particulate matter that are harmful to human health and to the environment.

To reduce these emissions, garment manufacturers should:

- Reduce overall energy consumption through conservation and efficiency improvements, reducing both diesel emissions and monthly facility energy costs.
- Minimize use of on-site diesel generators, which generally emit more pollutants per kilowatt-hour of energy produced than centrally provided hydroelectric power by the government.

Best Management Practice

- Collect baseline energy use data and conduct an energy audit.
- Optimize equipment use based on changes in production.
- Determine appropriate task-based lighting levels for each area of the facility.
- Optimize existing lighting systems by adjusting lighting proximity and using task lighting.
- Develop written procedures and implement a scheduled, facility-wide lighting system maintenance program.
- Implement a strategic relamping program.
- Use automated controlled lighting systems.
- Upgrade from magnetic to electronic or hybrid ballasts.
- Upgrade fluorescent lighting to lamps.
- Use compact fluorescent lights in place of incandescent bulbs.
- Upgrade exit signs to use light-emitting diode (LED) lights in places of incandescent bulbs.
- Develop a written policy to consider energy efficiency when purchasing new equipment.
- Install an evaporative cooling system.
- Develop a steam leak inspection schedule for boiler operations.

Garment manufacturers operate boilers to generate steam for ironing operations. In most facilities, the ironing boards are attached to a ventilation system that captures the heat emitted from the iron and exhausts it to the outside environment. The quantity and size of boilers located on site is proportional to the manufacturing operation.

Simple maintenance and more significant retrofitting projects can improve the efficiency of the boiler, saving both energy and water. The resources invested into improving the efficiency of the boiler should be dependent on its size; specifically, larger boiler operations deserve greater attention and offer greater potential energy

savings. Regardless of boiler size, all garment factories should have written operation and maintenance procedures in place to check for steam and water leaks.

6.2.2 Water Use

The processes that use the most water at the garment factories are related to ancillary activities; specifically, laundering garments during garment manufacturing and personal hygiene.

Water Use in Apparel Factories

Water Use for Manufacturing Processes

Laundry and Spot Cleaning	Washing machines and some steam cleaning for spot removal.
Embroidery and Printing	Cleaning used screens and other screen printing equipment.

Water Use for Support Processes

Employee Housing	Bathrooms—including toilets, faucets, and showers—and other personal uses.
Food Preparation	Cooking, food preparation, dishwashing, and cleaning
Steam Generation	Boiler supply for steam generation to support ironing operations

Therefore, many of the water efficiency techniques and equipment from residential and business settings can be applied to the garment factories.

In garment factory, three of the most water-intensive processes are:

- laundry,
- boiler operation, and
- Restrooms in dormitories and the factory.

Because these support operations exist in many other industry sectors, there are several proven BMPs to minimize the water use associated with each.

Best Management Practice

- Develop and implement a preventive maintenance schedule for water leak identification and repair.
- Maximize use of the most water efficient washers in laundry operations.
- Install continuous batch washers in laundry operations.
- Retrofit washer-extractors to reuse final rinse water in laundry operations.
- Recycle boiler condensate.
- Install water-efficient shower heads in dormitories.

- Retrofit old toilets in dormitories and factory bathrooms to improve water efficiency.
- Install low-flush toilets in dormitories and factory bathrooms to improve water efficiency.
- Develop a water conservation outreach program for dormitories.

6.2.3 Hazardous Chemical Use Best Management Practices

Best Management Practice

- Identify and correct the cause of garment spotting.
- Minimize chlorinated solvent use through efficient application.
- Use alternative spot-removal techniques.
- Use alternative spot-removal agents

6.2.4 Specific-controls of VOC

To-reduce exposure to VOCs, selection of materials, or processes, with no, or low demand-for VOC-containing-products, is proposed as follows.

(1) Reduction in the-use of solvents, containing benzene, toluene, and other-aromatic-hydrocarbons, as-well-as acetic-acid;

(2) Use of water-based-inks, and vegetable-oil based-inks (e.g., soy, linseed, canola), and ultraviolet (UV)-curable-inks;

(3) Use of cleaning-solutions, with low-volatility-components (e.g., with benzene-content less than 0.1%, toluene, and xylene less than 1%) or vegetable-oil-based cleaning-agents, as-substitutes for organic-solvents, reducing, or replacing, isopropyl-alcohol;

(4) Use of cleaning-agents, based on soap, or detergent-solutions, and vegetable oils, esterified with-alcohol, for solvent-free-cleaning-operations, wherever possible;

(5) Use of press-cleaning solvents, with minimum-flash-points of 55°C (e.g., low-volatility hydrocarbon-mixtures, non-VOC-citrus, vegetable-oils, and their-esters);

(6) Replacement of dichloromethane (methylene-chloride) for the-removal of dried-ink;

(7) Use of water-based and UV-curing-lacquers;

(8) Substitution of solvent-based-adhesives, with adhesives, with a-lower-solvent content, UV-drying-systems, or water-based-adhesives, or thermo-foiling;

In-addition, recommended measures for avoiding, or minimizing, VOC-losses, through process-modifications, and solvent-vapor-recovery, are:

(1) Adoption of automatic-wash-up-systems and automatic-blanket wash systems;

(2) Implementation of solvent-recovery and recycling-systems, including distillation-units, for solvents; and

(3) Quality-control of storage-containers and drums, containing volatile-materials (e.g., inks, paints, and solvent-laden-cleaning-rags), ensuring that they are kept-closed, and segregated in a-ventilated-room/area.

Additional-steps, to-reduce the-emissions, to-air, include:

- Decreasing emissions of organic-solvents, by changing to water-based-products;
- Using scrubbers, to-collect particulate-matter;
- Pre-screening chemicals, using the-Material-Safety-Data-Sheets, to-ensure that chemicals are not toxic.

6.2.5 Solid Wastes

Following steps can help for extensive management of Garments waste and reduce the enduring of the city dwellers from physical, social, and environmental point of view

- Owner of garments factories should conscious about environmental Act and try to follow the rules and regulations strictly.
- Effluent treatment plant (ETP) installation can be mandatory for all garments industry for decreasing the toxicity of the produce waste.
- Where the amount of waste is more, the number of bins should be increased and placed at proper place.
- Use the containers to store buttons, bobbins, needles and more. Film canisters and other small containers are great for storing used needles and allows for safe disposal when the container is full.
- For quick transport of waste, the vehicles such as Container carrier, Compactor, Arm roller, Van etc. should be on proper operation and if necessary, more vehicles need to be included.
- Can be organized effective training program about health & hygiene as well as overall environment among the employees of the factory.
- Properly follow the systematic procedure of waste disposal and ensure while handling the wastes, workers must use their safety equipment like mask, hand gloves, boot etc.
- The garment factory including screen-printing or washing should be located away from residential area and proper drainage system should be ensured by the government.

6.2.6 Water Pollution

Printing businesses generate wastewater during daily operations. Sources of wastewater include imaging and pre-press operations, press cleaning, washing of frame which was already soaked with ink and paint in printing process and shop cleanup. This

wastewater may contain metals (e.g. silver), solvents or other contaminants that are regulated pollutants. Many communities restrict the quantity of silver that may be discharged to a drain connected to a publicly owned wastewater utility.

The possible cause of water pollution during the operation phase of the factory depends on the factory design and is assessed by site visit to KARISMA Apparel (Myanmar) factory. The wastewater treatment plant, with the selected technology would adequately treat all wastewater generated from washing of frame which has solvents, inks for screen printing

Only treated water can discharge into municipal drain. Regular monitoring of discharged treated water quality should be done for compliance with standards.

Screen printers use either solvent or water-based cleaners for cleaning parts and tools. Depending on the cleaner used and the items being cleaned, the waste water may be hazardous.

Solvent Cleaning

Many people use solvents for cleaning parts. Some solvents evaporate readily and can cause air pollution problems. For this reason, the use of certain solvents is restricted in some areas. Some solvents used in cleaning are hazardous waste when disposed. The material safety data sheet (MSDS) may have the information whether used solvent is a hazardous waste. It needs to make sure the solvent is handled properly and the paperwork is filled out correctly.

Even if the solvent is not hazardous waste, the used solvent can be hazardous due to contamination from cleaning the parts. Solvent-distillation units can remove contaminants to recycle the solvent. The residues from these solvent distillation units may be hazardous waste.

Water-based Cleaning

Many water-based cleanings is typically done in closed units that use very hot water and detergents with rust inhibitors. They work very much like home dishwashers. The units are often designed to filter oil and impurities from the water during operation.

As with solvent units, the contamination from the parts cleaning could cause the waste to be hazardous. It needs to have the wastewater, or sludge tested to find out if they are hazardous.

Hence, untreated wastewater should not be drained out on the ground or to any body of water.

Pollution Prevention Options

Preventing pollution instead of treating or disposing of it can save money, protect the environment, and reduce risk to people. Here are some suggestions:

- Close the parts washer and turn off the spray nozzle when not in use. This will decrease evaporation of solvent.

- Consider a solvent distillation unit (still). These units can extend the life of the solvent, saving raw material expense and hazardous waste disposal costs.
- Use slightly dirty solvent for initial rinsing of parts and clean solvent for final cleaning.
- Maintain parts washers regularly. Check to make sure seals are tight and there are no leaks.
- Consider adding a filter to the parts washer to reduce solvent usage. Used filters may be hazardous waste and must be managed properly.

6.3 Best Management Practices for the Supporting Facilities

The following table gives the management practices for the supporting activities considered to be causing significant environmental impacts during production phase.

In general, the best housekeeping practices are incorporated in the design as well as in the production phase to reduce the short term impacts due to the proposed activities.

Fabrics, fuels, and oils are flammable and present a risk of fire and explosions, therefore measures have to be taken to ensure the safe handling of these flammable materials on-site, as well as in the transportation.

Table 6-2 Best Management Practices for the Supporting Facilities

Activity	Environmental Impacts	Management Practice
Operation of Utility Facilities		
Operation of Boiler	• Air • Noise • Water	• Ensure proper preventive maintenance of fuel firing system and optimization of air fuel ratio. • Ensure proper maintenance of machinery to reduce noise level. • Ensure proper disposal of contamination due to spillage clean up. • Boiler blow down will be treated for further disposal. • Ensure usage of Personal Protective Equipment.
Operation Power Plant (Generator)	• Air • Noise • Water • Soil	• Ensure proper preventive maintenance of fuel firing system and optimization of air fuel ratio. • Ensure proper maintenance of machinery to reduce noise level. • Ensure proper disposal of contamination due to spillage clean up. • Provision of adequate ventilation • Used Oil will be disposed properly. • Ensure usage of Personal Protective Equipment.
Temporary solid waste storage and handling within the premises.	• Water • Land	• Install proper storage facilities for storage of solid waste. • Empty cans/card boxes to be sold for welfare fund.

Activity	Environmental Impacts	Management Practice
Other Facilities		
Toilets	• Water	• Ensure proper sewage disposal.
Development & maintenance of green belt	• Air. • Land	• Ensure development and maintenance of the proper green belt as proposed.
Direct / Indirect Employment	• Socioeconomic issue	• Continue policy of local employment according to the skill and availability of the manpower.

7.0 MONITORING PROGRAM

7.1 Objectives

Environmental Management Plan (EMP) makes to ensure that the quality of the environmental aspects does not deteriorate due to the operation of the proposed project. The EMP also ensures that the proposed project is to be implemented in compliance with relevant laws and regulations stipulated by national authorities.

In the previous chapter, the activities of the proposed project and their respective potential impacts are determined. Then the mitigation measures for alleviating of the adverse impacts and the evaluation for significance of residual impacts are presented. According to the outcome of the evaluation of residual impact significance, it can be considered that the mitigation measures can reduce the adverse impacts of the project activities to acceptable level. Hence in this chapter, a comprehensive Environmental Management Plan is stipulated based on the formerly proposed mitigation measures. Thus, this EMP covers the mitigation measures as well as additional considerations such as monitoring, management plan and others.

7.2 Structure

Environmental Management Plan (EMP) is a quality system that provides the framework to:

- Mitigate the probable or potential adverse impacts on various environmental components which have been identified during impact assessment.
- Protect the environmental resources where possible.
- Enhance the environmental components where possible.
- Monitor and verify the effectiveness of the mitigation measures implemented.

Therefore, the structure of EMP is prepared based on the following four principles.

1) Plan (P): Plan a framework to implement for alleviation of the project related impacts. **(Management Plan)**
2) Do (D): Carry out the implementation of the plan by the Environmental Management Team (EMT). **(Responsible Team and Responsibilities)**
3) Check (C): Monitor and check the effectiveness of the implemented EMP. **(Environmental Monitoring Plan)**
4) Act (A): Take corrective actions to improve the results, if found the implemented EMP is inadequate. **(EMP review and Corrective Action)**

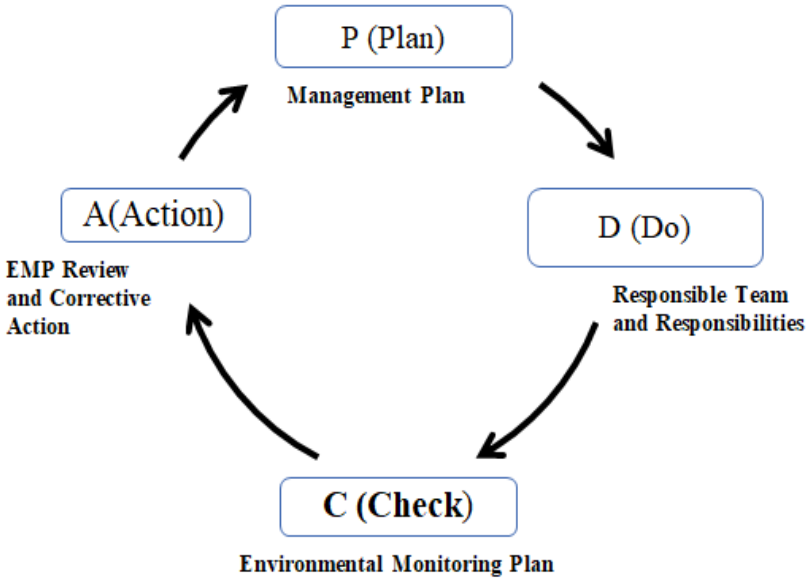


Figure 7-1 Basic Principle of Environmental Management Plan

7.3 Environmental Management Committee (EMC)

The project proponent pleased to offer all membership in KARISMA Apparel (Myanmar) Company Limited as Environmental Management Committee and appointment was commenced on 2018-06-30.

This team undertakes the activities of monitoring the stack emissions, ambient air quality, indoor air quality, noise levels, water quality, etc. either departmentally or by appointing external agencies wherever necessary. Regular monitoring of environmental parameters are being carried out to find any deterioration in environmental quality and also to take corrective steps, if required, through respective internal departments. The Environmental Management Committee also collects data about health of workers, Green Belt Development etc.

The EMC shall also be responsible for monitoring of the plant safety and safety related systems which include:

- Checking of safety related operating conditions.
- Visual inspection of safety equipment.
- Preparation of a maintenance plan and documentation of maintenance work specifying different maintenance intervals and the type of work to be performed.

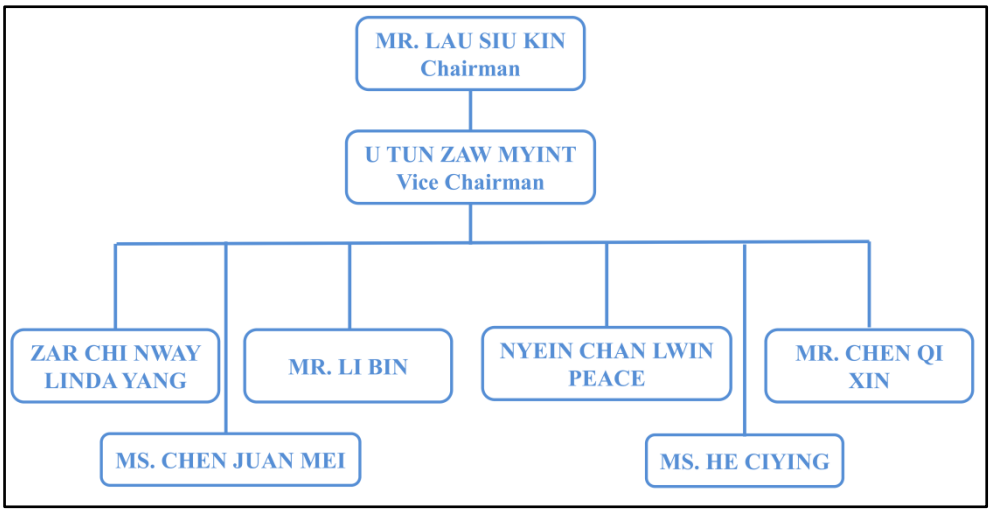


Figure 7-2 Organization Chart of Environmental Management Committee

Table 7-1 Environmental Management Committee

Sr. No.	Member Name	Position / Duty in EMC	Name of Affiliated Department / Title	Responsibilities in EMC
1.	Mr. Kinson Lau Siu Kin	Chairman	General Manager	▪ To support the implementation of the environmental management plan (EMP) and environmental monitoring plan (EMoP)
2.	U Tun Zaw Myint	Vice Chairman	HR & Admin Manager	▪ To monitor and assess the implementation of EMP and EMoP ▪ To discuss the results of EMP with the other EMC members
3.	Zar Chi Nway, Linda Yang	Member	Office Manager	▪ Assess training needs to apply and monitor training programs ▪ To give suggestions for improving EMP
4.	Mr. Li Bin	Member	Administration Assistant	▪ To monitor the parameters described in EMP ▪ To prepare the monitoring report ▪ To participate in any environmental and emergency activities ▪ To give suggestions for improving EMP ▪ To communicate with residents ▪ To response the accident, incident, injuries and complaints from local residents
5.	Nyein Chan Lwin, Peace	Member	Administration Supervisor	▪ To inform the environmental team at one when find out some problems to occur

Sr. No.	Member Name	Position / Duty in EMC	Name of Affiliated Department / Title	Responsibilities in EMC
				▪ To follow the EMP and aware of environmental impacts ▪ To participate in any health-care activities for both employees and communities ▪ To participate in any environmental and emergency activities
6.	Mr. Chen Qi Xin	Member	M & E In-charge	▪ To notify about the location of fire/ gas leakage immediately proceed to the help ▪ To give suggestions for improving EMP
7.	Ms. Chen Juan Mei	Member	Production Manager	▪ Monitoring environmental aspects in workplace ▪ Report to Karisma Factory Manager
8.	Ms. Lisa He Ciying	Member	Factory Manager	▪ Monitoring environmental aspects in workplaces ▪ Report to General Admin Manager & General Production Manager

Frequency of Meeting – 2 times per year

7.4 Environmental Management Plan (EMP)

The Project requires an Environmental Management Plan (EMP) to determine the significant impacts from implementation of the project and a range of mitigation measures. An EMP is also required as per the provision of the Environment Protection Act and Regulations of Government of Myanmar. The environmental management plan for operation phase and decommissioning phase is as follows:

Table 7-2 Environmental Management Plan

Review of EMP ***Management Activities*** ▪ Review EMP to uncover unidentified impacts ***Frequency/ Timing*** Monthly ***Responsible Person / Unit*** EMC
Operation Phase
Air Pollution and Dust Management ***Management Activities*** ▪ The factory should be planted a lot of trees in its premises which reduced the carbon emission by the factory & minimize the air pollution. ▪ Maintenance of boilers and generator is periodically conducted. ▪ There is no open burning of solid wastes at the project site. ▪ Workers are provided mask during working in any dusty area. ***Frequency/ Timing*** Monthly ***Responsible Person / Unit*** EMC
Noise & Vibration Management

Management Activities

- Build noise-insulated generator room, boiler room, and ensures satisfactory maintenance of relevant equipment.
- Impose speed limit for truck/ other vehicles & machineries at the factory area. Restrictions are imposed to factory vehicles about using horn outside the locality.
- Provide enough personal protective equipment (PPE) at the work place.
- All the related personnel will be provided proper training about the relevant issues.

Frequency/ Timing Monthly
Responsible Person / Unit EMC

Solid Waste Management

Management Activities

- The factory does not dispose any kind of solid waste on the factory premises or not dump in the surface water like local pond, canal, or river etc.
- The solid waste is stored properly. Solid waste is stored separately in a certain location in proper manner, metal/ hazardous material waste such as electric bulbs, empty chemicals containers are stored in separate place of the waste storage.
- Solid wastes are sent to local buyer for reuse or recycling and waste tracking record shall be kept. The metal or glass waste of electric bulbs is taken by the suppliers to recycle them.
- Daily wastes are stored in clearly labeled container's and in such a manner that they are not released to open land.
- All the related personal are provided proper training about the relevant issues.

Frequency/ Timing Monthly
Responsible Person / Unit EMC

Hazardous Chemicals or Other Substances Handling, Storage and Disposal Management

Management Activities

- Temporarily storage on site of all hazardous or toxic substances is done in safe containers, labeled with details of composition, properties, and handling information. The hazardous substances are placed in leak-proof containers to prevent spillage and leaching.
- Chemical are stored properly and expired date are tagged with chemical container. Material safety data sheet (MSDS) are provided at chemical storage area and workplace.
- Dispose of hazardous chemicals and containers in accordance with occupational health and safety (OHS) and environmental requirements. The empty chemical containers will be sent to supplies for recycle or appropriate disposal.
- Hazardous chemical is used properly in printing, washing & Effluent Treatment Plants (ETPs) by following user instruction.
- All the related personnel are provided proper training about the relevant issue.

Frequency/ Timing Weekly
Responsible Person / Unit EMC

Energy Management

Management Activities

- A dedicated energy management team comprising personnel from relevant department is working to overview the overall energy management system.
- Energy saving lights should be installed in different area of the factory for saving energy.
- Take energy rating into account when purchasing new equipment.
- All the related personnel are provided proper training about turn off the machine and light switch after work.

Frequency/ Timing Monthly
Responsible Person / Unit EMC

Drainage Management

Management Activities

- Make Sure that all drainage systems are covered & liquid wastes are disposed to drain after treatment to avoid soil pollution.

Frequency/ Timing Monthly
Responsible Person / Unit EMC

Emergency Response & Disaster Management

Management Activities

- The factory management has taken proper measures to handle any emergency like fire, earthquake, and accidental chemical exposure.
- Provision and inspection of firefighting equipment and fire hydrant system in all the sections.
- A detail evacuation plan (fire exit, emergency exit door etc.) is established and communicated with workers.
- Periodic inspection of boilers, generators, and equipment; preventive maintenance; aware the workers about electric shock by necessary training.
- Fire drill operation is conducted regularly.
- Workers are informed about what to do in earthquake like stay in a safe palace such as under table, desk, not to try move outside during earthquake, workers who will be outside during earthquake shall remain stay out of the building, trees, lamp post etc. Other relevant safety instruction of emergency is informed to workers by training.
- A medical team has been prepared for primary treatment.
- Prepare and emergency contact directory consisting contact numbers of nearest fire service, local police station, hospitals etc., & display it in a place that everybody can see it.
- Declaring the factory as a "no smoking area"
- When plant runs at abnormal situation e.g., if emission level increases than its normal level then immediately inform to health & safety Officer as well as general manager.
- If any emergency arises then assigned person will turn on the emergency alarm to make the workers alert.
- Build a safety committee which from fire brigade team, rescue team. The committee arrangement 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.

Decommissioning Phase

Air Pollution

Management Activities

- Enclose the site with dust-proof net
- Water should be sprayed during the construction phase of excavated areas during dry conditions
- Control speed and operation of construction vehicles
- Prohibit idling of vehicles
- Ensure sound condition of demolition machinery and equipment
- Engage sensitive demolition workers
- Measure air quality

Frequency/ Timing	**Air quality measurement** - once a year **Field observation** - once a month
Responsible Person / Unit	Contractor

Noise Pollution

Management Activities

- Erect suitable barriers to control noise
- Sensitize drivers of construction machinery on effects of noise
- Maintain plant equipment (if present)
- Construction activities to be restricted to daytime
- Workers in the vicinity of or involved in high-level noise to wear safety & protective gear
- Listening to local communities on their perception and complaints
- Measure noise level

Frequency/ Timing	**Noise level measurement** - twice a year **Field observation** - once a month
Responsible Person / Unit	Contractor

Waste Disposal due to Dismantling Activities

Management Activities

▪ Ensure the use of an integrated solid waste management system i.e. through a hierarchy of options ▪ Make sure all buildings, machinery, equipment, structures, and tools that will not be used for other purposes should be removed and recycled/ reused in other projects. ▪ Where recycling/reuse of the machinery, equipment, implements, structures, tools, and other waste is not possible, the materials should be disposed to approved dumpsites. ▪ Make sure wastes are collected regularly and collection, segregation, storage, and disposal of wastes are in accordance with procedure and guidelines ***Frequency/ Timing*** Daily check and control ***Responsible Person / Unit*** Contractor
Water Pollution due to Dismantling Activities ***Management Activities*** ▪ Test the water quality of daily consumed water ▪ Field observation and counter measures to ensure minimal use of water ▪ Special care and cautions in transport, storage and handling of oil and lubricants ▪ Listen to employee and local communities‟ perception and complaints on water quality and respond/ react properly ▪ Covering and damping of excavated materials ▪ Appropriate storage of contaminated material if found ▪ Ground contamination and storm water contamination will be limited on site by proper handling and storage of materials and equipment ***Frequency/ Timing*** **Water quality test** – once during demolishing **Field observation** – once a month ***Responsible Person / Unit*** Contractor
Health and Safety Impacts ***Management Activities*** ▪ The safety of the workers should surpass as a priority of all other objectives in the decommissioning project ▪ Strict control to avoid use of toxic and hazardous substance in demolishing ▪ Make sure that appropriate Personal Protective Equipment (PPE) are provided as necessary ▪ Make sure that emergency health care and sanitation is provided to employees ▪ Ensure that safety measures have been effectively integrated and positioned in respective areas of the project to control and manage fire outbreaks ▪ Staircases and other hazardous areas shall be suitably protected by using strong rails to avoid occurrence of incidences ***Frequency/ Timing*** **Field observation**- once a month ***Responsible Person / Unit*** Contractor
Socio-economic Impacts ***Management Activities*** ▪ Ensure assistance with re-employment and job seeking of the involved workforce ▪ Make sure to compensate and suitably recommend the workers to help in seeking opportunities elsewhere ▪ Offer advice and counseling on issues such as financial matters ***Frequency/ Timing*** Field observation ***Responsible Person / Unit*** KARISMA

7.5 Environmental Monitoring Plan (EMoP)

Monitoring is an essential and an integral part of the implementation of the proposed environmental mitigation measures. Environmental monitoring generates useful information and improves the quality of implementation of mitigation measures.

Monitoring involves the observation, review, and assessment of onsite activities to ensure adherence to regulatory standards and the recommendations made to reduce negative

impacts. The plan must be comprehensive and address relevant issues, with a reporting component that will be made available to the regulatory agencies based on a mutually agreed frequency. It is recommended that a minimum yearly monitoring report be submitted to the authorities. The monitoring report will include at a minimum:

- Raw data collected
- Tables/graphs (where appropriate)
- Discussion of results with respect to the development in progress, highlighting parameters which exceed standards
- Recommendations

According to the section 108 of EIA Procedure, the project proponent will submit the Monitoring Report prescribed in the schedule of the Environmental Management Plan to the Ministry every (6) month or as may be prescribed by the Ministry. But the ambient environmental quality such as ambient air quality, surface water quality and ambient noise level are monitored one time per year because the factory is one of the garment factories and it is in the industrial zone. If the ECD supposes that once a year is insufficient for this factory, the KARISMA will implement to follow up the ECD's instruction.

Table 7-3 Environmental Monitoring Plan

Environmental Issues	Parameters/ Implementation	Monitoring Frequency	Responsibilities	Location
Operation Phase				
Air Quality	Ambient Air Quality (NO_2, PM_{10}, $PM_{2.5}$, SO_2, NH_3, CO_2, CO, Temperature, VOC, O_3, O_2, wind speed and wind direction)	Once a year	EMC	Within the factory premises (17° 15' 20.9268" N 96° 27' 30.9564" E)
	Dust deposition (PM_{10}, $PM_{2.5}$) and VOC	Twice a year	EMC	Workplace (Warehouse, cutting, printing, embroidery, sewing, ironing, washing, packaging and finishing)
	Stack Emission (PM_{10}, $PM_{2.5}$, CO_2, CO, SO_4, NO_x, O_2, NO)	Twice a year	EMC	Stack chimney of boilers and generators
Water Quality	Process water quality (Aluminum, arsenic, chloride, cyanide, manganese, pH, sulfate, total alkalinity as $CaCO_3$, TDS, total hardness as $CaCO_3$, total iron, turbidity)	Twice a year	EMC	Tube well water
	Surface water quality (BOD_5, ammonia, arsenic, COD,	Once a year	EMC	Municipal drain from the factory

Environmental Issues	Parameters/ Implementation	Monitoring Frequency	Responsibilities	Location
	cyanide, iron, oil & grease, pH, sulfide, TSS, zinc)			
	Wastewater quality (BOD_5, ammonia, arsenic, COD, cyanide, iron, oil & grease, pH, sulfide, TSS, zinc)	Twice a year	EMC	Boiler Blowdown, washing wastewater (inlet & outlet), printing wastewater (inlet & outlet)
Noise Level	Ambient noise level (Noise level in decibel)	Once a year	EMC	Within the factory premises (17° 15' 20.9268" N 96° 27' 30.9564" E)
	Indoor noise level (Noise level in decibel)	Twice a year	EMC	Workplace (Warehouse, cutting, printing, embroidery, sewing, ironing, washing, packaging, and finishing), generators, boilers
Waste Management	Separate bins for different kinds of waste	Daily	Operation Supervisor, Storekeeper, workers	Workplace, factory premise
	Set quantified waste reduction and disposal targets (in volume, weight, or costs)	As necessary	EMC, operation supervisor, storekeeper, workers	Workplace, factory premise
Hazardous Substances Management	Provide training to employees on how to dispose of hazardous material	As necessary	Environmental officer, OHS manager and EMC members	Workplace, factory premise
	Ensure MSDS for hazardous products are up-to-date and accessible at any time.	Monthly	Environmental officer, OHS manager and EMC members	Chemical storage area and workplace
Energy Consumption	Record diesels and firewood	Monthly	Environmental officer, OHS manager and EMC members	Generator, boilers and compressors
	Record Electricity usage	Monthly	Environmental officer, OHS manager and EMC members	Electric meter
Emergency Response Equipment	Firefighting equipment such as extinguisher, fire hydrants, fire hose,	Daily	Fire brigade team	Factory Premise, Dormitory, workplace, generator room, boiler room, fuel and chemical storage areas

Environmental Issues	Parameters/ Implementation	Monitoring Frequency	Responsibilities	Location
	Fire-drill testing	Monthly	Fire brigade team	Factory Premise and Dormitory
	Servicing firefighting equipment	Quarterly	Fire brigade team	All equipment
	Reviewing records of accidents which is recorded on & around the entire facility	Quarterly	Fire brigade team	-
	OHS training	Biannual	OHS manager	Factory Premise
Resources Usage	Power off the unused equipment	Daily	In-charge in each section	Power Distribution panel
	All water taps shut when not in used	Daily	For all employees	All water taps
Public Health and Occupational Safety	Special attention should be paid to the sanitary facilities that should be kept clean and well lit.	Weekly	OHS team	Factory Premise
	Ensure proper solid waste disposal and collection facilities.	Daily	General manager and OHS team	Factory Premise
	Provide First Aid kits on the site. Ensure nurse(s) is stand-by in clinic. Educate stakeholders/workers on environmental management.	Daily	General manager, nurses and OHS team	Factory Premise
	Provision of all necessary PPEs.	As necessary	OHS team	Factory Premise
	A comprehensive risk assessment and health and safety audits should be conducted for the factory	Daily	General manager and OHS Team	Factory Premise
	Workers should be trained on occupational health & safety and first-aid administration.	As necessary	General manager and OHS team	Factory Premise
Security	Security men should always be available to alleviate cases of harassments and other related incidences on site.	Daily	Security (In-charge)	Factory Premise

Environmental Issues	Parameters/ Implementation	Monitoring Frequency	Responsibilities	Location
	Installation of security lighting especially at the site.	Daily	Security (On-duty)	Factory Premise
Decommissioning Phase				
Air Quality	Ambient Air Quality (NO_2, PM_{10}, $PM_{2.5}$, SO_2, NH_3, CO_2, CO, Temperature, VOC, O_3, O_2, wind speed and wind direction	Once	Contractor for Demolition	A suitable point on site
Water Quality	Ground water quality (Aluminum, arsenic, chloride, cyanide, manganese, pH, sulfate, total alkalinity as $CaCO_3$, TDS, total hardness as $CaCO_3$, total iron, turbidity)	Once	Contractor for Demolition	Water tank for site use
	Surface water quality (BOD_5, ammonia, arsenic, COD, cyanide, iron, oil & grease, pH, sulfide, TSS, zinc)	Once	Contractor for Demolition	Drain in front of the side
Noise Level	Noise level in decibel	Once	Contractor for Demolition	A suitable point on site

7.6 Budgetary Provisions for EMoP

Adequate budgetary provisions have been made by proponent. The management for execution of environmental management plans should be framed. The detailed capital and recurring (per annum) budget should be earmarked for pollution control/monitoring equipment; operation and maintenance of pollution control facilities.

The project is going in operation phase when this EMP report was prepared. Thus, estimated EMP budget was more emphasized for operation phase. The Project will carry out impact monitoring during operation phase and decommissioning phase. The following table shows the estimated expenditures for the implementation of Environmental Management Plan for operation phase ***twice a year*** and for decommissioning phase ***one time***. It can change according to the situation. The project proponent will carry out impact monitoring during operation and decommissioning stages. The following table shows the costs estimated for Environmental Monitoring for KARISMA Apparel (Myanmar) Company Limited.

Table 7-4 Estimated Costs for Environmental Monitoring

No.	Monitoring	Parameter	(a) Number of locations	(b) Recommended monitoring frequency (Times per year)	(c) Rate (Kyats/ measurement)	(a x b x c) Total Annual Amount (Kyats)
Operation Phase						
1	**Air Quality**	Ambient air quality	1	1	500,000	500,000
		Indoor air quality	9	2	150,000	2,700,000
		Stack emission of boilers and generators	2	2	200,000	800,000
2	**Water Quality**	Process water quality	1	2	120,000	240,000
		Surface water quality	1	1	120,000	120,000
		Wastewater quality	5	2	120,000	1,200,000
3	**Noise Level**	Noise in the factory premise	1	1	50,000	50,000
		Work Place	9	2	50,000	900,000
4	**Waste Management**				Lump sum	500,000
5.	**Hazardous Substances Management**				Lump sum	500,000
6.	**Energy Consumption (Diesel, firewood and electricity)**				Lump sum	2,000,000
7.	**Emergency Response Equipment (Signboard on safety, emergency safety measures, fire safety measures and so on)**				Lump sum	2,000,000
8.	**Resources Usage**				-	-
9.	**Public Health and Occupational Safety**				Lump sum	1,000,000
10.	**Security**				Lumpsum	500,000
Total Estimated Monitoring Cost for Operation Phase						**13,010,000**
Decommissioning Phase						
1.	**Ambient Air Quality**		1	1	500,000	500,000
2.	**Water Quality**	Ground water quality	1	1	120,000	120,000
		Surface water quality	1	1	120,000	120,000
3.	**Noise Level**		1	1	50,000	50,000
Total Estimated Monitoring Cost for Decommissioning Phase						**790,000**

Note: If this EMoP budget is insufficient, the KARISMA will be supplementary as the ECD's instruction or as necessary.

7.7 Occupational Health and Safety Management System

KARISMA Apparel (Myanmar) Company Limited currently maintains an occupational health and safety program actively managed by on-site staff. To implement the safety and health management for employees, the Occupational Health and Safety Management Committee was formed with the following members. The project proponent pleased to offer all

membership in KARISMA Apparel (Myanmar) Company Limited as Occupational Health Management Committee and appointment was commenced on 2017-11-30.

Table 7-5 Member List of Occupational Health and Safety Management Committee

Sr. No.	Member Name	Gender	Committee Position	Name of Affiliated Department
1	Chen Qi Xin	M	Chairman	M & E
2	Nyein Chan Lwin, Peace	M	Vice Chairman	Administration
3	Tian Ming	M	Member	Mechanic
4	Zawe Mg Mg	M	Member	M & E
5	San San Lwin	F	Member	Warehousing Office
6	Myo Ei Ei Hlaing	F	Member	Spare Part Finishing
7	Thu Zar Aung	F	Member	Cutting Office
8	Wai Wai Hlaing	F	Member	Carton packing
9	Myo Thandar Kyaw	F	Member	QC Office
10	Chaw Su Win	F	Member	Sewing Office
11	Thiri Kyaw	F	Member	Sample Room
12	Ei Ei Mon	F	Member	Nurse

Frequency of Meeting – 2 times per year

The duties and responsibilities of Occupational Health and Safety Management Committee are as follows.

1. To inspect the operation regularly with checklists for Safety and prevention of accidents.
2. To respond quickly when accident, illness or other emergency cases happen.
3. To convene the monthly committee meeting for discussing the situation of the Occupational Health and Safety status, accidents, emergency, other production problems and mitigation measures.
4. To report the findings and remarks from the monthly meeting to the administration for implementation.
5. To provide training for safety and health risk and prevention.
6. To keep the records of inspections, accidents, and meeting minute.

8.0 REPORTING REQUIREMENTS

8.1 Record Keeping and Reporting

An environmental management plan (EMP) will usually require reporting arrangements. Reporting arrangements assist with effective implementation and external reporting. External reports may include reports on environmental incidences to the regulator, reports to stakeholders, reports to inform reviews of the plan and reports to meet the reporting requirements of the conditions of approval.

Record keeping and reporting is one of the requirements of any production system and essentially of a good management tool. Properly maintained records of construction, installation, training, equipment maintenance, operation, fault detection and remedy can help in reducing risks of accidents, legal costs, and thereby overall cost of operation of a plant.

A description of the reporting requirements for the project should be provided and include:

- A description of a typical report content
- Personnel responsible for preparing the reports and when they are to be prepared
- Communications protocols establishing who is responsible for distributing information, what is to be distributed and to whom, and frequency of communication, and
- Document control procedures

Records also help in identifying causes of any accident and elimination of the same accident in future. Records may be maintained for the proposed plant as follows.

8.1.1 Water Use

To estimate water usage in various production processes such as washing and printing sections, the wastewater from unit operations should be monitored for each product stream at a minimum regularly. Records of monitoring results should be kept in an acceptable format.

8.1.2 Noise

Audiometric test records of employees should be kept during the employee's period of employment and longer as necessary, as they may provide a useful reference for workers' compensation. The records should be kept in a safe, secure place and held as confidential documents.

8.1.3 Hazardous Substances

Assessment reports which indicate a need for monitoring and/or health surveillance together with the results of monitoring and/or health surveillance shall be kept as records in a suitable form for at least 30 years from the date of the last entry made. Retention for a period of at least 30 years is necessary because some health effects, such as cancers, may take a long time to become evident.

The information kept will be valuable in epidemiological studies and for developing effective control strategies.

All other records, including assessment reports not indicating a need for monitoring and/or health surveillance and records of induction and training, shall be maintained for at least five years in a suitable form.

8.2 Internal Monitoring and Inspections

1. A list of all work sheets, equipment, vehicles, and work practices requiring inspection should be developed.
2. Checklists and schedules should be developed as part of the inspection program.
3. A system for correcting deficiencies noted during the inspection process must be developed.
4. The system should prioritize deficiencies noted so that serious hazards are dealt with immediately.

8.3 Incident, Accident and Emergency Reporting

8.3.1 Purpose

An accident reporting and investigation plan prescribes methods and practices for reporting and investigating accidents that can be read and understood by all managers, supervisors, and employees. No matter how conscientious the safety efforts are, accidents are going to happen sometimes due to human or system error.

8.3.2 Accident Reporting Procedures

Employees injured on the job are to report the injury to their supervisor as soon as possible after the incident/accident. Near miss accidents or incidents (when an employee nearly has an accident but can avoid it) should be reported as well. All accidents and incidents should be reported for prevention purposes.

The supervisor must immediately notify Human Resources Department and the Public Safety Department when an incident/accident occurs.

If they are not available a report should be forwarded for their review and the supervisor shall investigate and interview. All accident reports and police reports involving accidents with or without injuries are reviewed by the Safety office.

Any employee witnessing an accident at work is to call for emergency help or whatever assistance appears to be necessary. In addition, the employee is immediately to report the accident to his or her supervisor and take part in answering questions related to the Accident Report and Accident Investigation.

8.3.3 Accident Investigation Procedures

Thorough investigation of all accidents will lead to identification of accident causes and help:

- reduce economic losses from injuries and lost productive time;

- determine why accidents occur, where they happen, and any trends that might be developing;
- employees develop an awareness of workplace problems and hazards;
- identify areas for process improvement to increase safety and productivity; and
- suggest a focus for safety program development.

For all accident investigations, the Safety Department will perform the following duties:

- Conduct the accident investigation at the scene of the injury as soon after the injury as safely possible.
- Ask the employee involved in the accident and any witnesses, in separate interviews, to tell in their own words exactly what happened.
- Repeat the employee's version of the event back to him/her and allow the employee to make any corrections or additions.
- After the employee has given his/her description of the event, ask appropriate questions that focus on causes.
- When finished, remind the employee the investigation was to determine the cause and possible corrective action that can eliminate the cause (s) of the accident.
- Complete an accident investigation report with the employee and review data with employee for accuracy. This will provide information to put into database format.

The accident investigation report is used to:

- track and report injuries on a monthly basis;
- group injuries by type, cause, body part affected, time of day, and process involved;
- determine if any trends in injury occurrence exist and graph those trends if possible;
- identify any equipment, materials, or environmental factors that seem to be commonly involved in injury incidents;
- discuss the possible solutions to the problems identified with the safety team and superiors; and
- proceed with improvements to reduce the likelihood of future injuries.

Incident investigation report in KARISMA is attached in **Appendix 52.**

9.0 EMERGENCY PLAN

A clearly defined emergency response and preparedness policy will be developed and brought to the proposed project. An effective response is seen as the direct outcome of quality environmental management and comprehensive training and awareness of safety procedures. The principal objective of emergency preparedness is to localize accidents, and if possible, contain and minimize them.

The proposed development will have an Emergency Response Plan, which will provide guidelines to allow for flexible response to a range of potential circumstances. The plan would include:

- Chain of command and coordination procedures
- Lines of communication
- Means of obtaining needed information and assistance

Copies of the plan or relevant portions will be strategically located at vantage points across the property to allow for immediate access. All employees will receive safety and emergency response training as a part of the initiation process.

9.1 Fire Protection and Prevention Plan

The company is committed to minimizing the threat of fire to employees, visitors, and property by fire, and complies with all applicable laws, regulations, codes, and good practices pertaining to fire prevention.

9.1.1 Fire Fighting Equipment

The following requirements for firefighting equipment shall be taken into consideration:

- ***Location*** – smoke detectors, sprinklers, fire extinguishers and hoses are to be placed in readily accessible locations and in all areas where risk of fire is likely.
- ***Access*** - clear access is always to be maintained around fire extinguishers and hoses.
- ***Signage*** - signage is to be provided at each location, indicating the type of fire extinguisher and fire types that they are suited for.
- ***Mounting*** - fire extinguishers are to be mounted on purpose made hooks or brackets and suspended above the floor.
- ***Inspection*** - fire extinguishers are to be inspected and serviced every six months.

9.1.2 Fire/Explosion Response

All attempts to respond to an emergency should always ensure personal safety and only be attempted if within the capabilities of the individual.

Upon discovering a fire, the first responder should:

- Alert and evacuate nearby personnel located near the affected area.

- Immediately notify (address of incident and nearest cross street, state and any other relevant information).
- Fire sprinkler system automatically operates and immediately sprinkles fire with water.
- Shutdown plant as per shutdown procedure, if safe.
- Isolate the power source and ignition sources, if safe.
- Attempt to control and extinguish the fire (if safe and you are trained to do so).
- Raise the alarm and proceed with evacuation if necessary.
- Ensure the safety and well-being of personnel and attend to the injured.
- Secure the scene and assist external emergency services.

9.1.3 Fire Fighting and Protection Measures

- In every section of the factory, there shall be provided and kept in readiness adequate equipment for firefighting and protection.
- Each item of firefighting equipment shall be inspected and tested at appropriate intervals by a competent person. The date of the last inspection shall be entered in a logbook kept for that purpose.
- All the personnel employed in the installation shall be instructed on the use of firefighting equipment.
- Instruction to personnel in case of fire shall be clearly and concisely expressed in writing and prominently displayed on the site.
- "NO SMOKING" signs shall be conspicuously displayed at strategic locations in the factory and was highlighted in the case of identification in dull bright.
- Whenever a fire or any accident occurs in the installation, notify the nearest fire station.

The diagram below illustrates the color coding of fire extinguishers (so it should be printed in color) and can be used as a guideline for Fire Extinguisher selection.

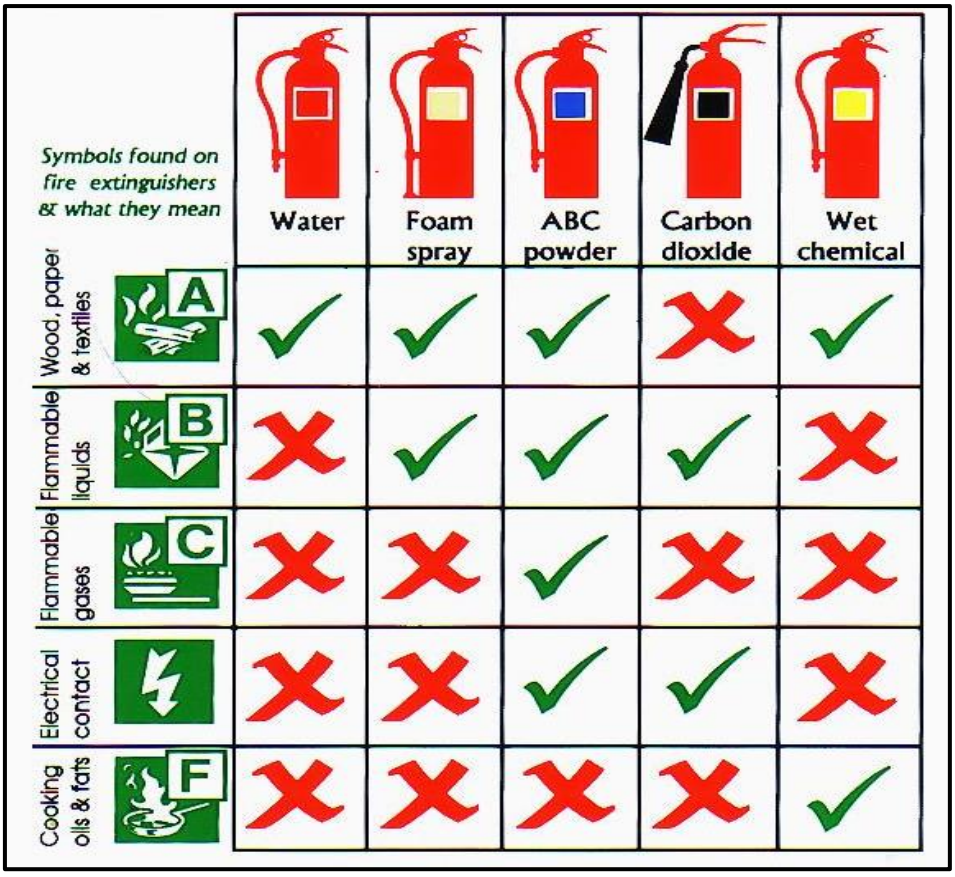


Figure 9-1 Selection Guidelines for Fire Extinguishers

9.1.4 Fire Protection Plan by KARISMA Apparel (Myanmar) Co., Ltd.

A small spark of fire may result into loss of properties and the damage by fire may produce high economic losses. This type of losses can be avoided by preventing and controlling the fire instantly for which fire–fighting group will be established.

This Fire Protection Plan serves to reduce the risk of fires at the factory in the following ways:

A. Identifies materials that are potential fire hazards and their proper handling and storage procedures;

B. distinguishes potential ignition sources and the proper control procedures of those materials;

C. describes fire protection equipment and/or systems used to control fire hazards;

D. identifies persons responsible for maintaining the equipment and systems installed to prevent or. control ignition of fires;

E. identifies persons responsible for the control and accumulation of flammable or combustible material;

F. provides regular trainings to new and old employees about fire hazards to which they may be exposed and four times per year.

KARISMA Apparel (Myanmar) Co., Ltd. has well-organized plan to prevent and protect from fire/emergency break out. There are altogether five sections in this plan.

(1) Assignment of Responsibility,
(2) Plan Implementation,
(3) Types of Hazards,
(4) Training,
(5) Plan Review.

(1) Assignment of Responsibility

Fire safety is everyone's responsibility. All employees should know how to prevent and respond to fires, and are responsible for adhering to company policy regarding fire emergencies.

(a) Management

Management determines the factory's fire prevention and protection policies. Management will provide adequate control to provide a safe workplace, and will provide adequate resources and training to its employees to encourage fire prevention and the safest possible response in the event of a fire emergency.

(b) Plan Administrator

Administration manager manages the Fire Prevention and Protection Plan for the factory, and maintain all records pertaining to the plan. The Plan Administrator shall also:

1) Develop and administer the fire prevention training program.
2) Ensure that fire control equipment and systems are properly maintained.
3) Control fuel source hazards.
4) Conduct fire risk surveys and mike recommendations.

(c) Supervisors

Supervisors are responsible for ensuring that employees receive appropriate fire safety training, and for notifying Administration Manager when changes in operation Increase the risk of fire Supervisors are also responsible for enforcing the fire prevention and protection policies.

(d) Employees

All employees are to:

1) Complete all required training before working without supervision.
2) Conduct operations safely to limit the risk of fire.
3) Report potential fire hazards to their supervisors.
4) Follow fire emergency procedures.

(2) Plan Implementation

(a) Good Housekeeping

To limit the risk of fires, employees shall take the following precautions:

1) Minimize the storage of combustible materials.
2) Make sure that doors, hallways, stairs, and other exit routes -are kept free of obstructions.
3) Dispose of combustible waste in covered, airtight, metal containers and separated stored.
4) Use and store flammable materials in well-ventilated areas away from ignition sources.
5) Use only nonflammable cleaning products.
6) Keep incompatible (i.e., chemically reactive) substances away from each other.
7) Keep equipment in good working order (i.e., inspect electrical wiring and appliances regularly and keep motors and machine tools free of dust and grease.
8) Ensure that heating units are safeguarded.
9) Repair and clean up flammable liquid leaks immediately.
10) Keep work areas free of dust, tint, scraps, and similar material.
11) Do not rely on extension cords if wiring, improvements are needed, and take care not to overload circuits with multiple pieces of equipment.
12) Ensure that required hot work permits are obtained.
13) Turnoff electrical equipment when not in use.

(b) Maintenance

The machinery and equipment are to be maintained according to manufacturers' specifications. Only properly trained individuals shall perform maintenance work.

(3) Types of Hazards

The following sections address the major workplace fire hazards at the facilities and the procedures for controlling the hazards.

(a) Electrical Fire Hazards

Electrical system failures and the misuse of electrical equipment are leading causes of workplace fires. Fires can result from lose ground connections, wiring with frayed insulation, or overloaded fuses, circuits, motors, or outlets.

To prevent electrical fires, employees are to:

1) Make sure that worn wires are replaced.
2) Use only appropriately rated fuses.
3) Never use extension cords as substitutes for wiring improvements.
4) Use only approved extension cords.
5) Check wiring in hazardous location where the risk of fire is especially high.
6) Check electrical equipment to ensure that it is either properly grounded or double insulated.

7) Ensure adequate spacing while performing maintenance.

(b) Office Fire Hazards

Fire risks are not limited to the production facilities. Fires in offices have become more likely because of the increased use of electrical equipment, such as computers and fax machines. To prevent office fires, employees are to:

1) Avoid overloading circuits with office equipment.
2) Turn off non-essential electrical equipment at the end of each workday.
3) Keep storage areas clear of rubbish.
4) Ensure that extension cords are not placed under inflammable materials.
5) Ensure that trash and paper set aside for recycling is not allowed to accumulate.

(c) Smoking

Smoking is prohibited in all buildings of the entire facility. Certain outdoor areas may also be designated as no smoking areas. The areas in which smoking is prohibited outdoors are identified by NO SMOKING signs.

(4) Training

Human Resource Manager presents basic fire prevention protection training to all employees upon employment, and shall maintain documentation of the training, which includes:

A. regular fire drill practice;
B. this Fire Prevention & Protection Plan, including how it can be accessed;
C. good housekeeping practices;
D. proper response and notification in the event of a fire;
E. instruction on the use of portable fire extinguishers; and
F. recognition of potential fire hazards.

Supervisors shall train employees about the fire hazards associated with the specific materials and processes to which they are exposed, and will maintain documentation of the training. (*Training records are seen in **Chapter-10** and Appendix)*

(5) Plan Review

The General Manager reviews this Fire Prevention & Protection Plan regularly for necessary changes.

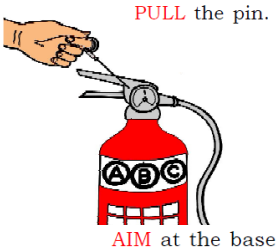
9.1.5 Operating a Fire Extinguishers

Fire extinguishers should be only used if safe and if trained to do so.

Even though extinguishers come in several shapes and sizes, they all operate in a similar manner. Here's an easy acronym for fire extinguisher use:

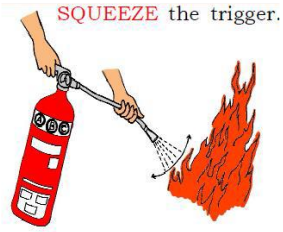
- **P A S S** -- Pull, Aim, Squeeze, and Sweep

Uses of a fire extinguisher properly
Remember the acronym **PASS.**



P – Pull the pin at the top of the extinguisher that keeps the handle from being accidentally pressed.

A - Aim at the base-not the flames. This is important- in order to put out the fire, you must extinguish the fuel.



S – Stand approximately 8 feet away from the fire and squeeze the handle to discharge the extinguisher. If you release the handle, the discharge will stop.

S – Sweep the nozzle back and forth at the base of the fire and then move towards the fire once it starts to diminish.
After the fire appears to be out, watch it carefully since it may re-ignite! Be sure to read the instructions on your fire extinguisher different fire extinguishers recommend operating them from different distances.

Using Fire Extinguishers

1. Ensure that you use the correct extinguisher
2. Always keep an emergency exit behind you. (Away from the fire)
3. Stay low to avoid the effects of smoke/heat.

4. Direct extinguisher stream at base of flames.
5. Move stream in a side to side, sweeping motion.
6. If the fire gets to the point where you can no longer able to control it, retreat and close the doors. (Do not lock)

Using Fire Hose Reels

1. Turn on the stop valve
2. Run out the length of hose
3. Turn on the water nozzle and direct stream at the base of the fire.
4. Ensure you leave a direct egress path between you and the exit door/egress route

NOTE: Fire Hose Reels should NOT be used within range of electrical equipment.

Fires have been classified into six categories involving different substances:

- **Class A,** combustible carbon-based solids e.g. paper, wood or textiles
- **Class B,** flammable liquids e.g. paraffin, petrol, diesel or oil (but not cooking oil)
- **Class C,** flammable gases, e.g. butane, propane or methane
- **Class D,** burning metals, e.g. aluminum, lithium or magnesium
- **Fires caused by electrical equipment** (indicated by an electric spark symbol and not the letter E)
- **Class F,** fats and cooking oils.

Types of extinguisher to use

- Class A fires – water, water mist, foam, dry powder, wet chemical
- Class B – water mist, foam, dry powder, CO_2, some wet chemical
- Class C – water mist, dry powder
- Class D – specialist dry powder
- Electrical – water mist, foam, CO_2
- Class F – water mist, wet chemical.

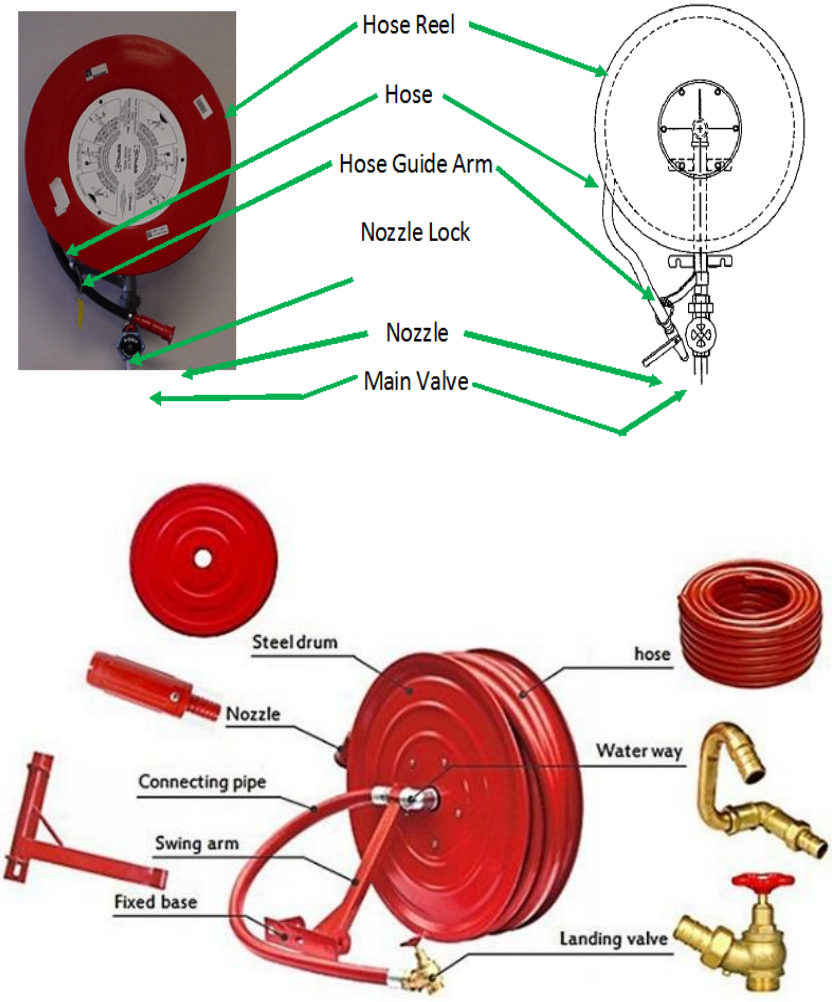


Figure 9-2 Explanation of Fire Hose Reel

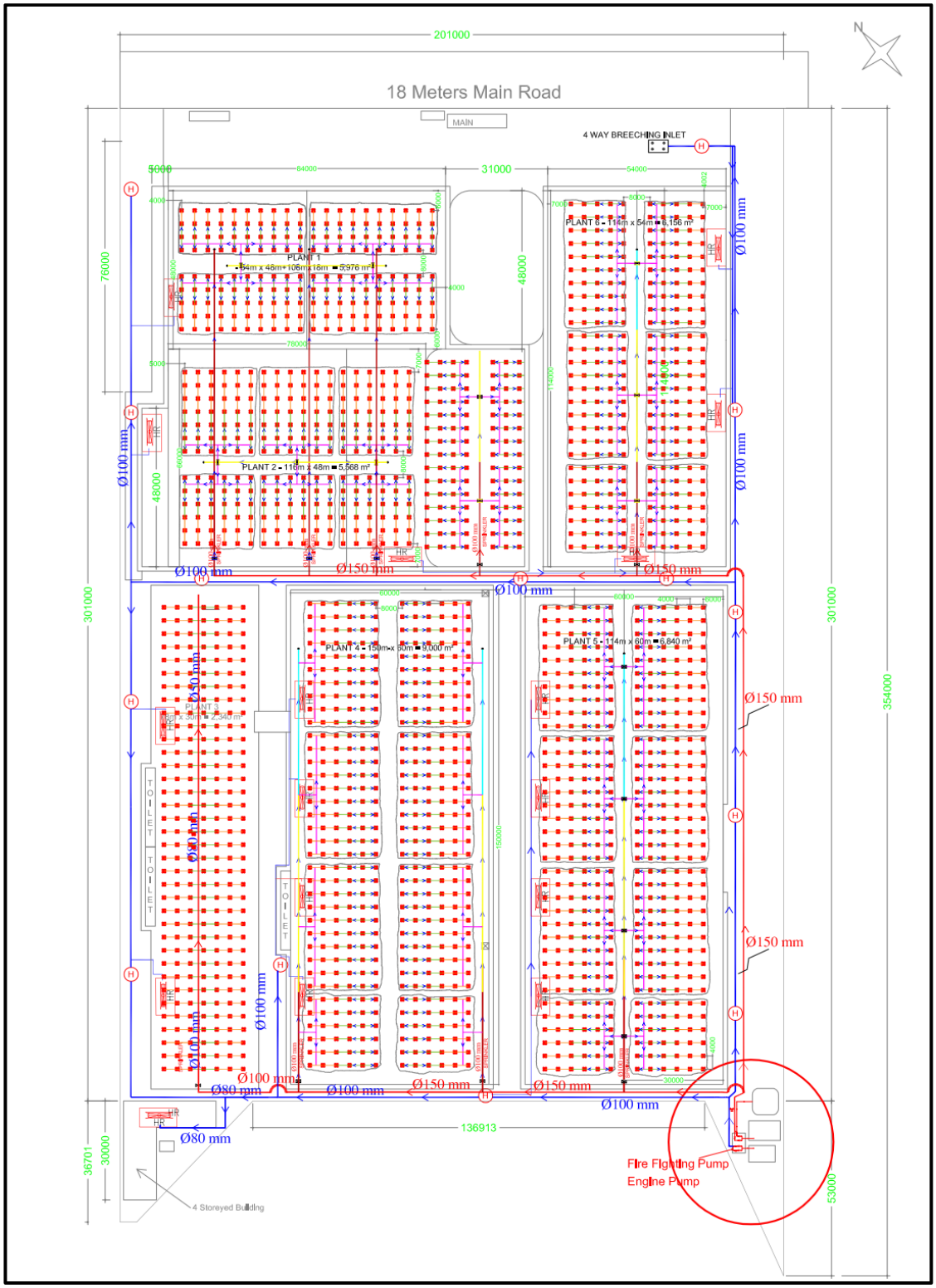


Figure 9-3 Fire Sprinkler System in KARISMA

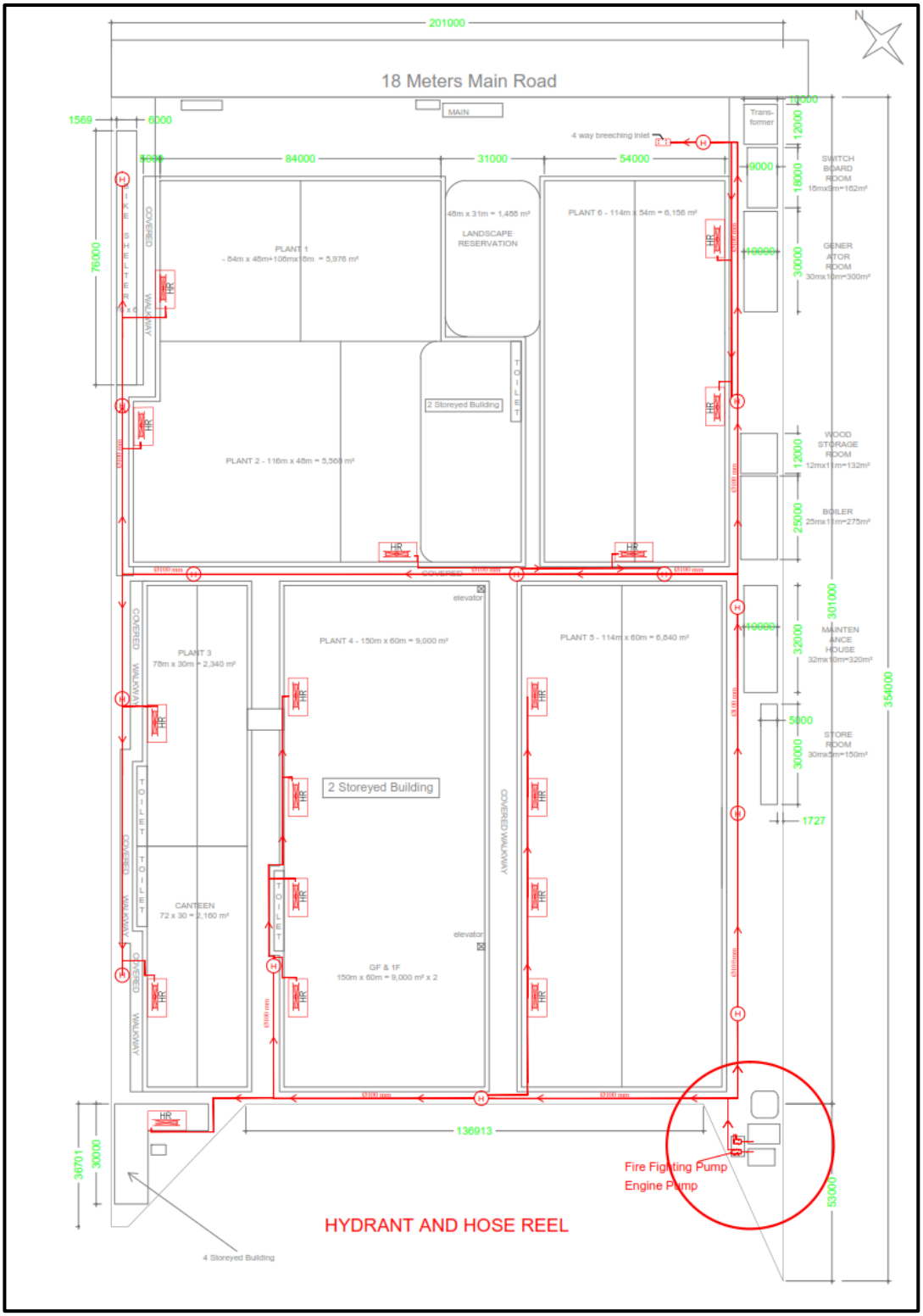


Figure 9-4 Fire Prevention System in KARISMA

9.2 Evacuation Routes

Evacuation routes maps have been posted in each work area. The following information is marked on evacuation maps;

- Emergency exists
- Primary and secondary evacuation routes
- Locations of fire extinguishers
- Fire alarm pull stations' location (e.g. Assembly points)

All the employees in the factory should know at least two evacuation routes. Each individual factory owner needs to take responsibility for ensuring the safety of his /her employees by taking adequate steps to rectify these problems. All buildings, including extensions to the factory, must meet legal standards and electrical equipment should be properly maintained. At the same time, they must ensure that managers, supervisors and workers are properly trained in fire and safety procedures; and that exit routes are sufficient for the number of workers employed in the factory. Factory gates should be kept unlocked at all times whenever workers are in the building.

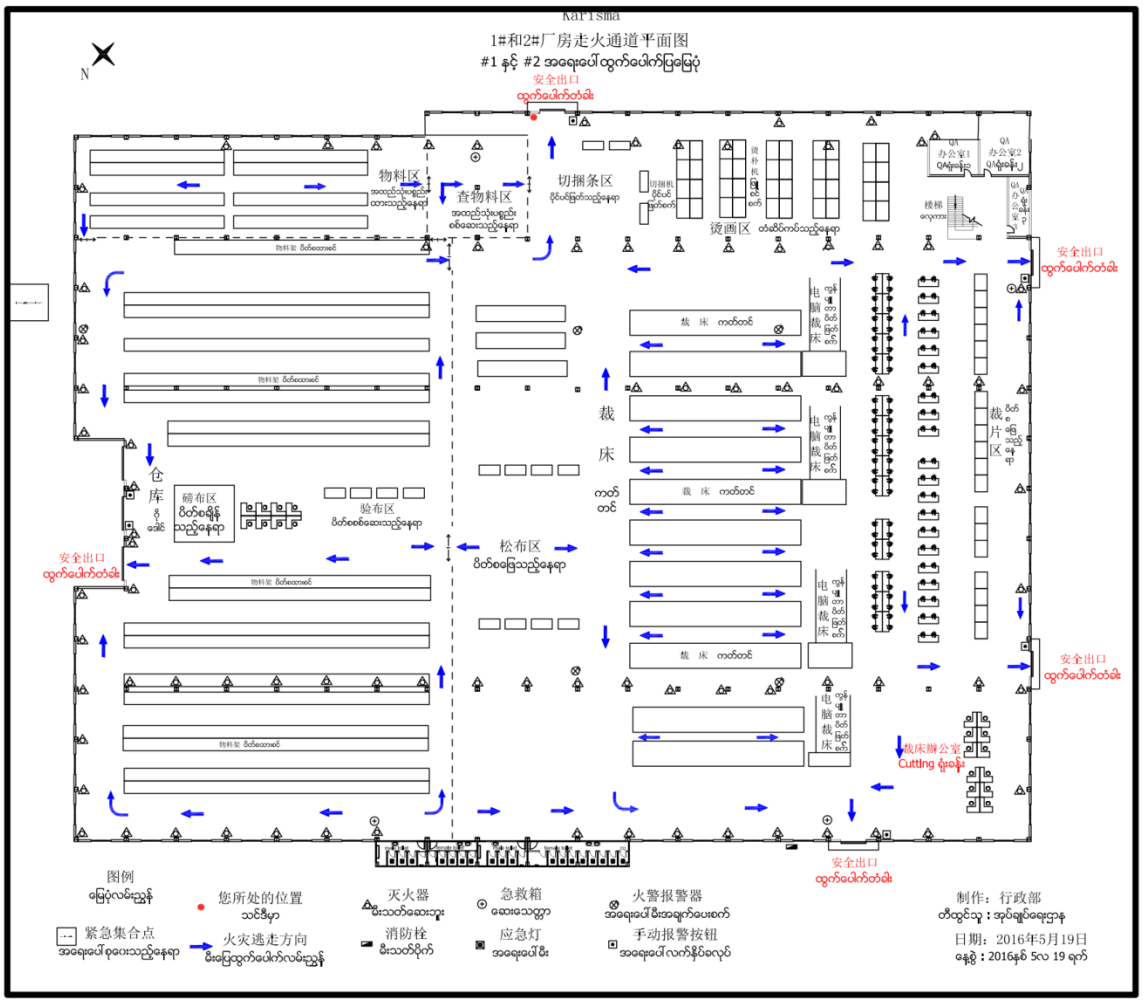


Figure 9-5 Emergency Route Map for Plant #1 and #2

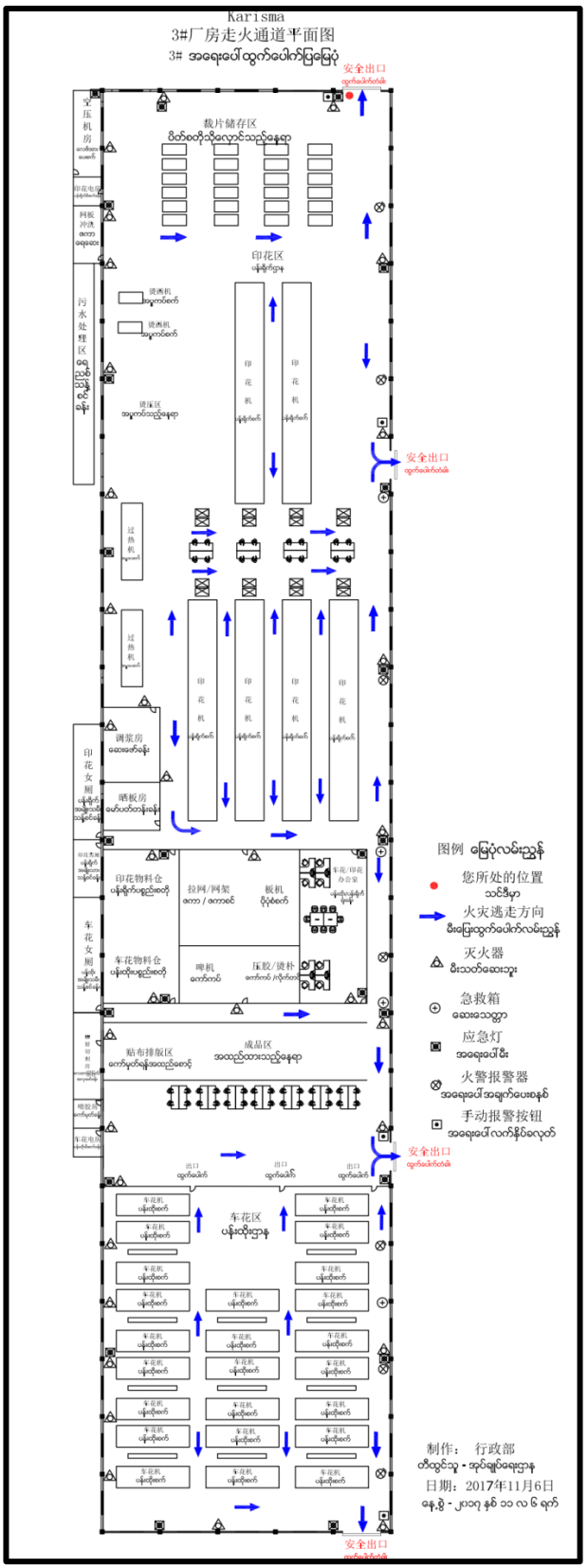


Figure 9-6 Emergency Route Map for Plant #3

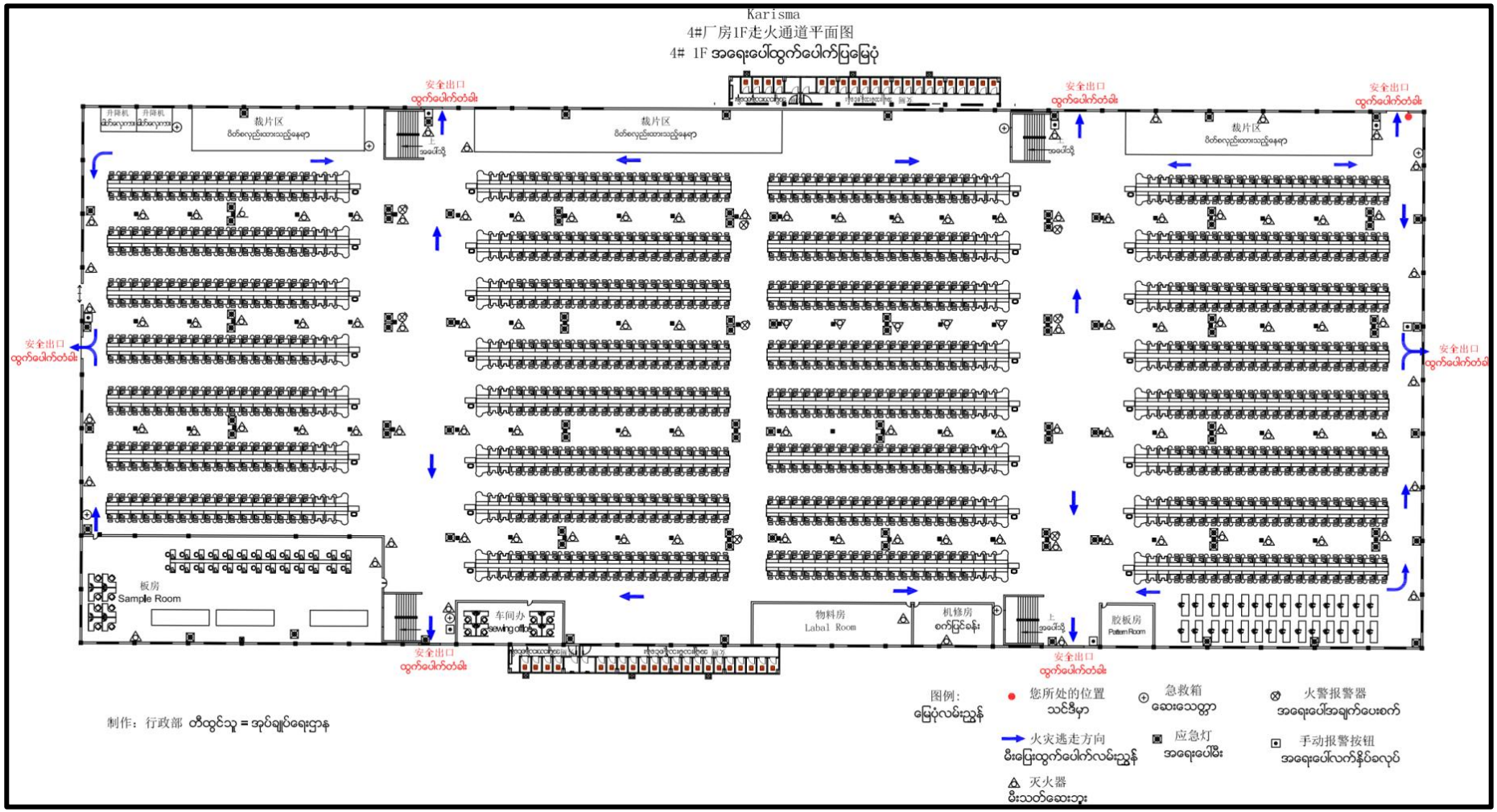


Figure 9-7 Emergency Route Map for Plant #4 (First Floor)

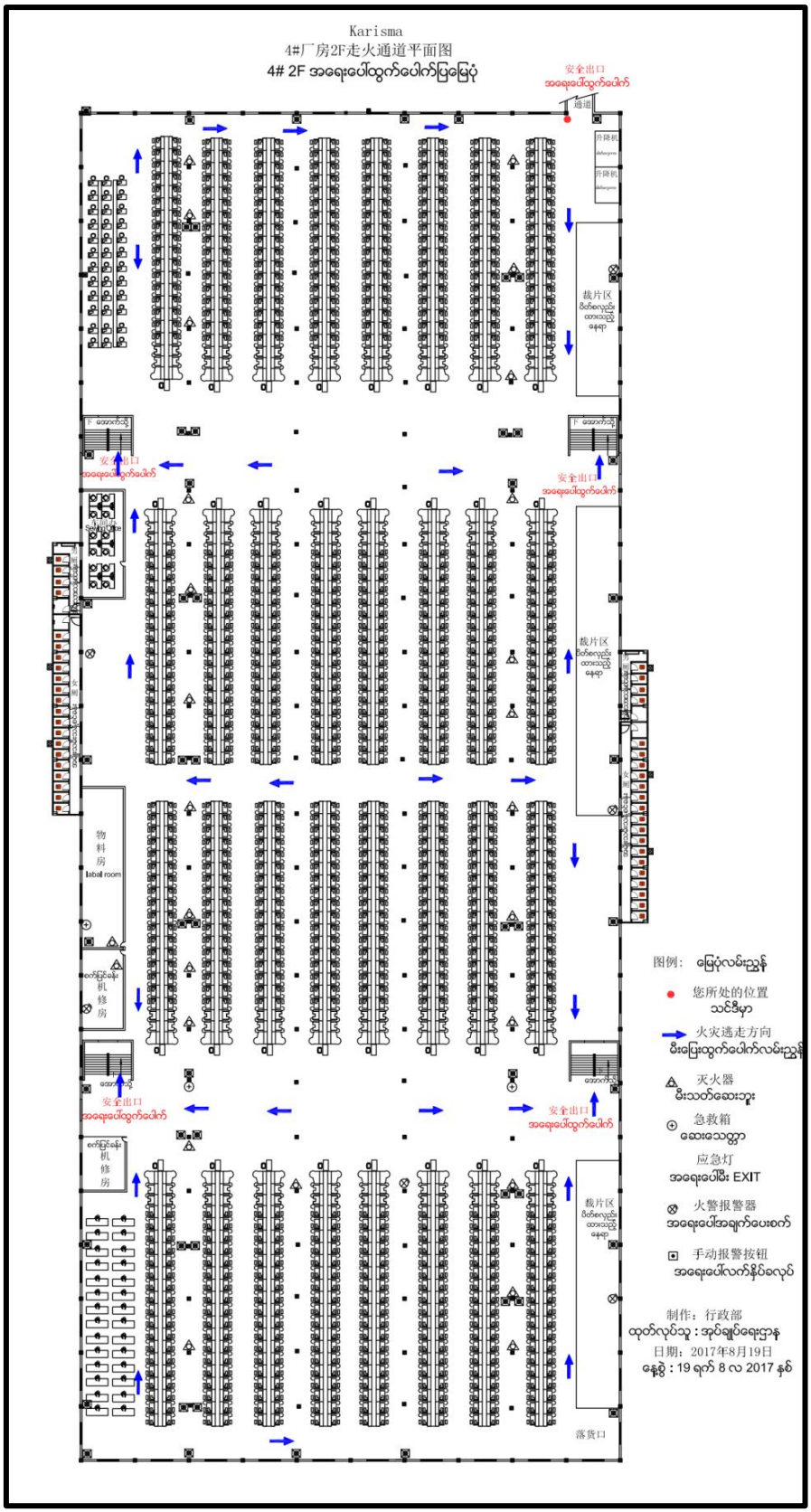


Figure 9-8 Emergency Route Map for Plant #4 (Second Floor)

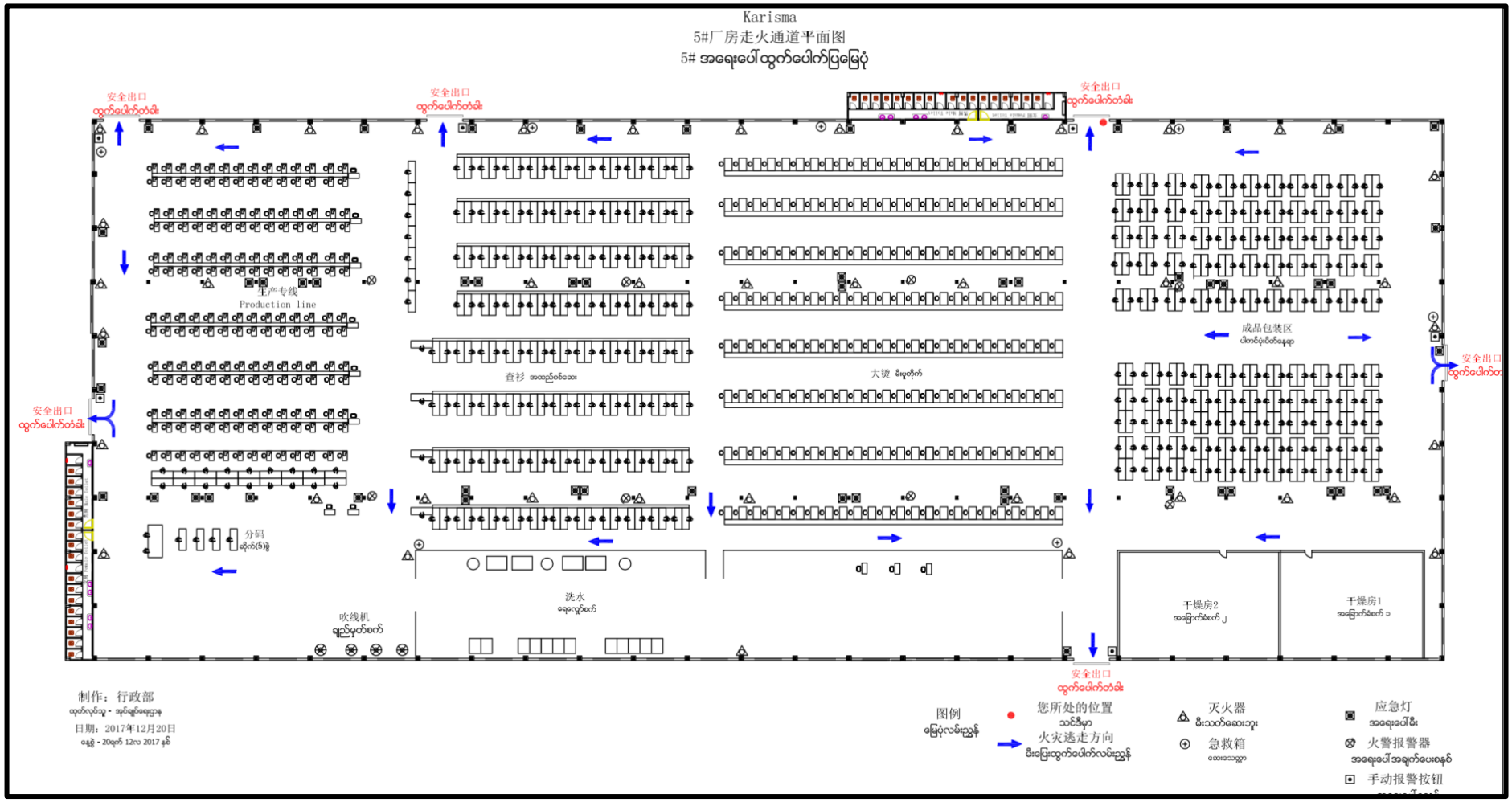


Figure 9-9 Emergency Route Map for Plant #5

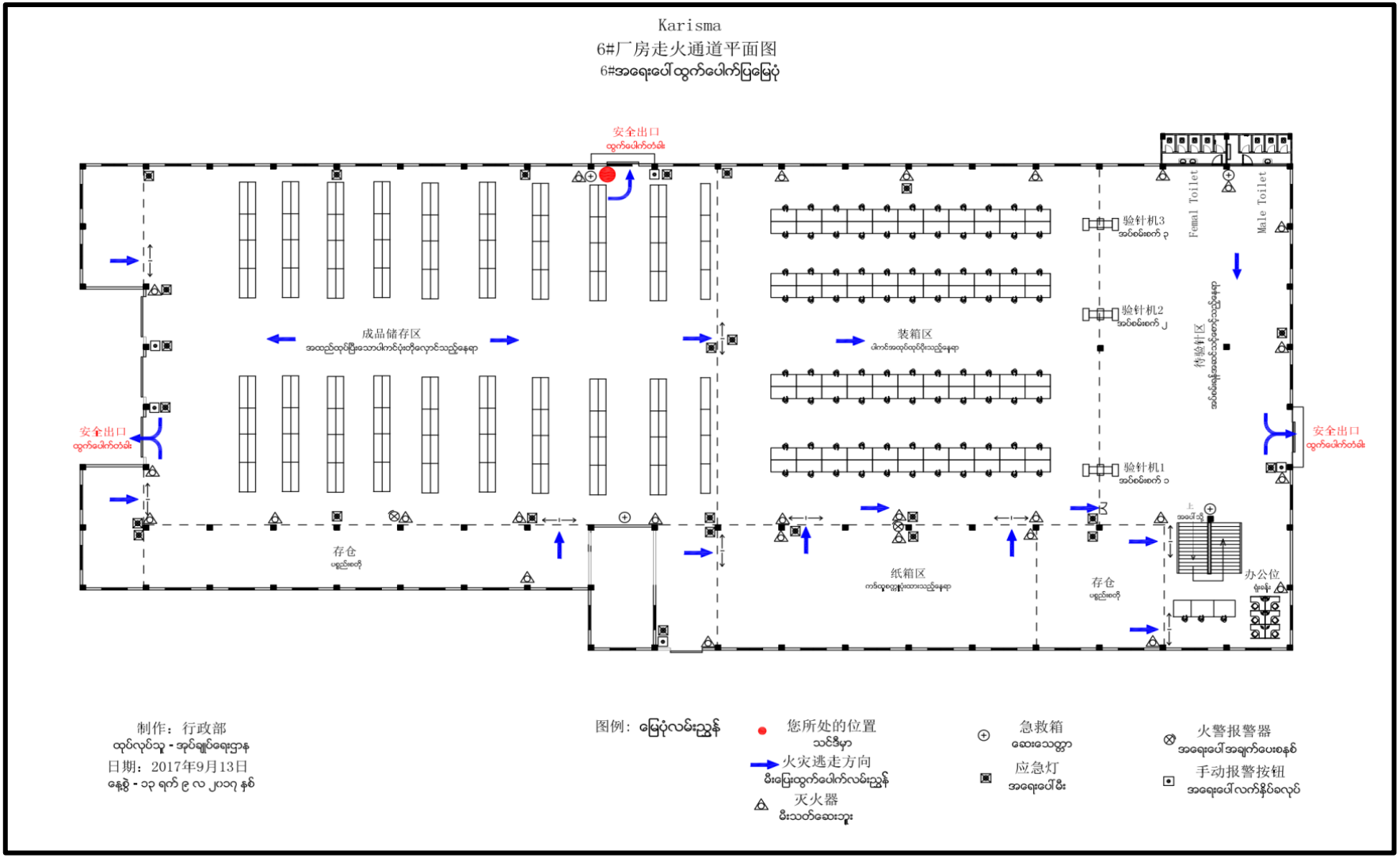


Figure 9-10 Emergency Route Map for Plant #6

9.3 Occupational Health and Safety Issues

9.3.1 Health and Safety Improvements

- Develop a formal Health and Safety policy,
- Conduct regular training for workers and managers on safety procedures,
- Develop Health and Safety measures with monitoring, reporting and target setting,
- Ensure safe machine use by:
  - Providing personal protective equipment (PPE) to staff,
  - Ensuring that all machinery is guarded according to the manufacturer's instructions with guards inspected regularly and maintained,
  - Ensuring that sufficient space at machines is provided for staff to work safely,
  - Ensuring that all staff are trained in the use of machinery by competent trainers,
  - Ensuring that all machines are braked and fitted with the necessary safety features,
  - Displaying information sheets on the safe use of the machines used in the workshop.
- Provide Local Exhaust Ventilation (LEV), suitable vacuum cleaners and respiratory protective equipment.
- Reduce injuries sustained through manual handling by:
  - Training staff in manual handling,
  - Setting workbenches and machine tables at a comfortable height,
  - Storing tooling next to the machine to reduce the carrying distance where possible.
- Reduce the impacts of noise pollution by:
  - Using noise enclosures where practicable, and maintaining them in good condition,
  - Using low-noise tooling where possible,
  - Planning maintenance programs for machinery and LEV systems,
  - Providing suitable hearing protectors for staff and training on proper use,
  - Training staff in risks of noise exposure and systems of work to reduce noise exposure.
- Control the risk of injury or property damage caused by electrical by:
  - Regular inspection, maintenance, and upgrade of electrical systems,
  - Training staff to spot and report any defective plugs, discolored sockets or damaged cable/equipment,
  - Ensuring that no personal electrical appliances, e.g. toasters or fans, are allowed.
- Consider implementing a Health and Safety management system.

9.3.2 Risk Assessment

A **risk assessment** considers all the risks that are present and identifies steps to reduce the risk.

Safety with people

- Follow safety rules
- Use chemicals in well-ventilated areas and use a mask when needed
- Keep flammables in a locked cupboard, away from children and heat
- Tie back long hair
- Only one person at a machine at a time
- Don't crowd people using machines or hot wax

Safety with chemicals

- Wear protective gloves if using toxic substances
- Take care with diesel oil and lubricating oil for sewing machines
- Keep workshop clean and tidy

Safety with machines

- Keep hands away from sharp blades on CADCAM cards, cutters and scissors
- Turn off sewing machines and irons after use
- Wear safety goggles where needed
- Wear goggles when using a CNC laser cutter and do not look directly at the laser beam
- Put tools away after use

It is agreed that drive wheels and belts beneath the tables should be fully enclosed, but enclosure of the belt and hand wheels above the tables is unnecessary and would interfere with sewing operations. Since the operator usually uses both hands to feed and guide the material while the belt and hand wheel are in motion, a safe distance is maintained from the nip point. The operator's hands should be near the wheel nip point to raise or lower the needle, only when the motor is disengaged. Reports indicate that accidents and injuries resulting from exposure to belts and hand wheels are very low.

Sewing machines

- Make sure that robust needle guards fitted and used
- Carry out a risk assessment on the provision of eye guards
- Check that lighting is adequate and stays on when the motor is switched off, e.g. for safe threading.
- Vee belt and pulley drives are guarded
- Seating allows for good posture and ease of movement

- Electrical wiring is supplied from overhead or otherwise to avoid cables on floors
- Where automated making-up machines are in use, give special consideration to additional guarding requirements
- Put a system in place to inspect guards, needles, and work areas on a weekly basis
- Guards should be adjusted for each individual operator's finger size
- A safe system of work includes removing feet from treadle when threading and changing needles
- Power should be switched off when carrying out adjustments and needle changing

When sewing machines with unguarded hand wheels and belts located above the table tops are encountered, the following guide is provided to determine if a hazard exists:

(1) When the belt and wheel are in motion, hands are not placed in the wheel, nip point or belt area.
(2) The distance between the points where the operator is holding material with both hands and the belt area is sufficient to prevent any part of the operator's body from being exposed to danger.
(3) The table top is arranged or of such size to prevent any other employee, passing by or working adjacent to the wheel or belt, from being exposed.

9.3.3 Health and Safety Plan by KARISMA

The company provides its employees with a safe, healthy and clean workplace in order to avoid preventable work related accidents and injuries.

A. The company provides a safe and healthy workplace environment and shall take effective steps to prevent potential accidents and injury to workers' health arising out of, associated with or occurring in the course of work, by minimizing, so far as is reasonably practicable, the causes of hazards inherent the workplace environment, and bearing in mind the prevailing knowledge of the industry and of any specific hazards.
B. A senior management representative to be responsible for ensuring a safe and healthy workplace environment for all employees, and for implementing the Health & Safety elements of the standard.
C. The company provides to personnel on a regular basis effective health and safety instructions, including on-site instruction and, where needed, job-specific instructions. Such instructions shall be repeated for new and reassigned employees and in cases where accidents have occurred.
D. The company establishes systems to detect. avoid, and correct work-risk to employees. The company shall maintain written records of all accidents that occur in the workplace.

E. The company arranges all machinery to be equipped with operational safety device which will be well-maintained, inspected, and serviced on a regular basis.

F. The company will provide appropriate personal protective equipment to employees. In the event of a work related injury the company shall provide first aid and assist the worker in obtaining suitable follow-up medical treatment.

9.4 Emergency Incident and Work Restoring Team

9.4.1 Aim

Effectively prevent, control & handle any emergency incidents, minimize the harms & loss caused by that incident, ensure every department can recover their work properly in a short period of time, maintain customer's delivery and keep factory's stability.

9.4.2 Effected Section

All sections in factory are included.

9.4.3 Organization

Sr. No.	Member Name	Gender	Position / Duty
1	Mr. Tun Zaw Myint	M	Leader
2	Mr. Nyein Chan Lwin	M	Member
3	Mr. Simon Tian	M	Member
4	Mr. Xin Chen	M	Member
5	Mr. Richard Sun	M	Member
6	Ms. Linda Yang	F	Communication Team
7	Ms. Linda Yang	F	Medical Team

M = Male, F= Female

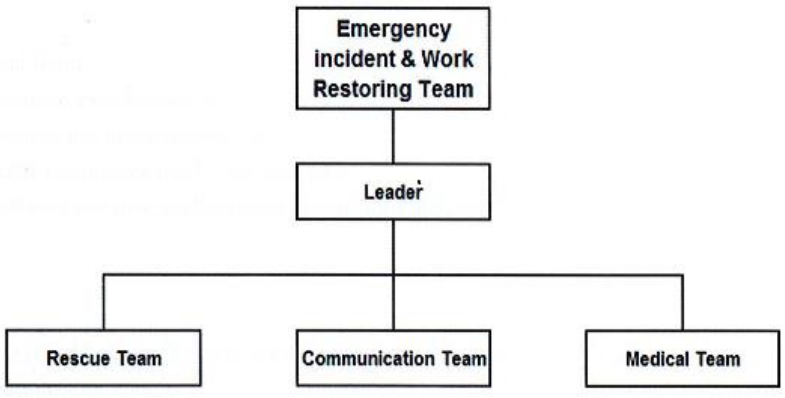


Figure 9-11 Organization Chart of Emergency Incident and Work Restoring Team

(A) Emergency incident & Work Restoring Leader

If emergency incident, the team leader is responsible to announce & remove the emergency rescue command, organize his team for rescue, represent factory to report to public, report to the management & nearby neighbor about the incident, call the related government office for help or assist, in-charge of the incident investigation, recap, and formulate system, policy to prevent in future.

(B) Emergency Incident & Work Recovery Team

Responsible for the planning, constitute policy, work out the emergency package.

- Assist reforming and set up the rescue team
- Practice & Process
- Responsible to assist investigation & tracing the responsibility parties.
- In-charge to rescue injurer in the scene
- Responsible to communicating with medical team
- Move the injurer to the safety location
- Shut down the machines and devices (if need)
- Arrange the ambulance parking and assist ambulance man
- Inform cut off electric power if necessary
- Arrange evacuation far away from the facility.

(C) Communication Team

- Received call/information of emergency incident, responsible to inform security guard or operator in charge
- Call police, make emergency announce, indicated spot, keep contact with “Emergency Incident and Work Restoring” members.

(D) Medical Team

- Member including nurses
- Prepare the first aid material
- Assist ambulance man to treat & cure
- Disinfect the spot & eliminate to pernicious influence

9.4.4 Policy

(a) Factory should set up "Emergency incident & Work Recovery Team", aims for accident prevention

(b) Emergency incident happened, "Emergency incident & Work Recovery Team" need to take care of rescue, in-charge, spot arrangement before ambulance arrival

(c) Factory should inform customer side about the fact of incident and keep updated

(d) After incident, factory management should discuss with the related section about the re-build schemes, including physical & psychical

(e) After incident, factory management should be checking all machine/ devices inventory and decided if any devices need to be repair, replace, or re-order.
(f) All related & factory management must be restoring all working in a short period of time.

10.0 CAPACITY DEVELOPMENT AND TRAINING

Capacity building of the factory officers will enhance the awareness of the manufacturing case of cleaner production and possibly also of the need for ensuring compliance with local legislation. The training programme begins with a detailed needs assessment phase, involving engagement with factory owners, management, supervisors, trade union representatives and workers to understand each factory's priorities and needs. The HR training modules focus on several key topics, including establishing clear roles and responsibilities, as well as introducing support networks (such as buddying schemes) and formal and accessible communications and feedback systems.

10.1 Environmental Training and Technical Assistance

Training and education at the start of operations is necessary for ensuring smooth operation. An environmental and social training and Technical Assistance (TA) program should be carried out to build the company's capacity to effectively implement this EMP, as well as to facilitate the improvement in the environmental management by increasing the environmental and social awareness of the staff in general.

The training program shall include:

- Awareness to laws, regulations, documentary requirements on environmental protection, water, and soil conservation, pertaining to environmental management of project.
- Environmental protection measures of the project suggested in the design and requirements and compliances to environmental protection during the construction period;
- Training regarding the operation & management, occupational health & safety and security relating to environmental standards of the project and built-in systems.
- The environmental management and monitoring program.

10.2 Economic Benefits in KARISMA

10.2.1 Gain in Foreign Exchange

As the status of normal production capacity, the proposed investment will generate average CMP income of over 30 million U.S. Dollars per year. This figure is expected to increase as the proposed company began to run production in full gear and utilize more local supplies.

10.2.2 Growth in National Income

The creation of more than five thousand employment opportunities will have a significant contribution to the growth in National Income and the relief of unemployment. Average more than 16.8 million U.S. Dollars per year in wages and

benefits will be paid to staffs. The ability of these staff to spend for necessities and others goods will further contribute sales of other industries.

Besides fabric as the main raw materials, the factory will also require many kinds of service and supplies. These include polybags, paper, prints, construction and installation works, transportation, auxiliary service & etc. Over time, the company will encourage domestic supplies and local entrepreneurs to start new production and service to supply to the company.

The company will start to pay corporate tax on sixth year and the total accumulated contribution on corporate tax for total 30 years is not less than 50 million U.S. Dollars as estimated.

10.2.3 Employment Opportunities

The proposed factory, when running at capacity, will be employing more than five thousand workers and staffs. The proposed garment factory shall give priority and preference to the citizens of Myanmar in the recruitment of labour, staffs, technicians and professional who are able to contribute to the well-being of the company in accordance with the rules, regulations, and laws of the Republic of the Union of Myanmar.

Besides providing employment to the masses, the proposed company will also continuously train and upgrade the skill of its employees. This ensures the proposed company is always at the forefront of technology and better equip in facing the competition by foreign economies.

10.2.4 Technology Transfer

The proposed plant will use the latest industrial machines with high technology to achieve the highest productivity and the most modern production system to promote the highest efficiency and reduce production loss possible. Comprehensive training will be provided to ensure employees will be well verse in handling the latest technology and equipment available.

Local management will also be implanted with the latest production management techniques and quality control system which is the cornerstone of the group's reputation.

Industrial discipline for a successful enterprise will be installed in all the employees of the proposed company. As these employees move from one company to the others for a variety of reason, such discipline and skill will generate the whole society.

10.3 Minimizing Environmental Footprint in KARISMA

10.3.1 Water Conservation and Recycling

(a) Production Wastewater Treatment and Recycling System

Recycled and treated water collected from washing machines and domestic sewage for toilet flushing, saving **1,705 m^3** of water every year.

(b) Washing and Dehydrating Machines with Inverter

All washing and dehydrating machines were installed with inverter. Every washer and dehydrator helped save **25% (or 1,500 kWh)** and **63% (6,000 kWh)** of electricity use respectively.

(c) Upgraded Sewage Treatment Plant

An additional 600 m^3 sewage collecting tank and a 400 m^3 sedimentation tank were installed as part of the overall upgrade of the existing sewage plant.

10.3.2 Energy Conservation and Recycling

(a) Steam Recycling System

Recycled heat and stream produced during the manufacturing process to maximize energy efficiency. The system also helped condense water back to the boiler and reduced overall coal and water consumption.

(b) Steam Pipe Heat Insulation

Helped minimize heat loss by **73 MJ per hour** and reducing fuel consumption by **2% (or 2 kg)** per hour. Over the year it saved **9 metric tons** of fuel and indirectly reduced CO_2 emissions from the boiler.

(c) Steam Washers Connected to Individual Valves

Minimized steam loss and energy consumption. The washing and drying processes also combined to reduce overall energy use and operating time.

10.3.3 Resources Conservation and Recycling

(a) Steam Recycling and hot Water Return System

Fully utilized heat and steam produced during the manufacturing process to maximize energy efficiency. At the same time, the hot water return system collected condensed water from the steam pipes back to the boiler and recycled for steam production, reducing overall energy and water consumption.

(b) Production Wastewater Treatment and Recycling System

Treated wastewater collected during the manufacturing process and reused in the production line, saving more than 50% of overall water use.

(c) Natural Gas Boiler

Operated by burning natural gas instead of heavy fuel, which greatly reduced air pollutants and CO_2e emissions.

10.3.4 Energy Conservation and Efficiency

(a) Upgraded Sewing Machines

All new sewing machines utilized servo motors instead of traditional clutch motors. Every machine saved **60-75%** (or **640 kWh**) of electricity annually. The machines are also integrated with a compressed air suction system to extract unnecessary threads, saving **35%** of energy use and **70 metric tons** of CO_2e emissions, as compared to traditional process using motors.

(b) Upgraded Led Lighting System

2,811 sets of traditional fluorescent tubes were replaced by 15W LED lights in 2016. In 2017, the LED lightning system was further upgraded by replacing 1,660 sets of 28W LED lights and 410 sets of 85W 4U lights with 16W and 24W LED lights respectively, saving **111,400 kWh** of electricity use annually.

(c) Upgraded Solar Hot Water System

Upgraded the existing system with new solar panels, 2 additional air source heat pumps, and pipe insulation, completely phase out traditional diesel water boilers.

(d) Upgraded Air Compressors

Upgraded the existing system with oil-injected rotary screw air compressors to enhance efficiency, while reducing **30%** electricity use, operating noise, and maintenance cost.

10.3.5 Productivity and Efficiency

(a) Fully Automated Cutting Machines

Utilized fully automated cutting machines which enhanced efficiency by **400%** and improved cutting accuracy, while reducing manpower by **67%** and overall yield loss.

(b) Automatic Hanger System

Enhanced productivity by 15% and improved production logistics and space utility, while reducing overall manpower at the same time.

(c) New Knitting Machines

Adopted new knitting machines which relatively conserved more than **40%** of energy use, while reducing **50%** of CO_2e emissions at the same time.

10.4 Quality Management Program /Unqualified Control Program in KARISMA

A. Purpose

Ensure that non-conforming products can be quickly regulated by the authority, prevent misuse, and misuse of non-conforming products, and expand the quality problems, and ensure that the quality of the products shipped meets the requirements of customers.

B. Scope of Application

Applicable to the control of raw materials, semi-finished products, finished products and non-conforming products found after delivery.

C. Duties

- QC Department is responsible for the inspection and recording of incoming materials, processes, and finished products, as well as the identification of defective products.
- The cutting machine is responsible for the control and handling of the defective products.
- Printing and Embroidery is responsible for the control and handling of non-conforming products.
- The sewing part is responsible for the control and handling of the defective products.
- the whole part is responsible for the control and handling of the defective products.
- The department and the related responsible department are responsible for the return of the non-conforming product.

D. Working Procedures

- Feed Control
  - If the feed inspection reveals that the specifications and quality of the fabric and accessories are inconsistent, it shall be marked and isolated, and reported to the superior in time for the return processing.
  - If it is found that the raw materials for processing materials do not meet the requirements of customers, they should be notified to the customer in time, and must be notified by the written approval of the customer before production. QC must record the actual situation of unqualified.
- Unqualified semi-finished products control:

In the process of inspection, unqualified semi-finished products shall be reviewed and disposed of, and shall be executed according to the unqualified semi-finished product control after 100% inspection (see 4.2.1) or the unqualified semi-finished product control after spot inspection (see 4.2.2), and fill out the workshop. Record form such as spot check report form.

- Control of unqualified semi-finished products after 100% inspection:

- The unqualified semi-finished products found in the whole inspection shall be reviewed by the supervisor and QC, and shall be classified into two types: reworkable and non-reworkable.
- Reworkable semi-finished product disposal a. The non-conforming product found by self-inspection shall be marked, returned to the relevant operator for rework, and returned to QC for inspection after rework; b. If it is a problem with the fabric/accessory, the workshop manager should be notified to re-patent; c. After the whole spot checker found the defects, should be marked with stickers, sorted and handed over to different departments for rework; the sewing seams are handed over to the workshop to repair the workers; the fabrics are smashed, the oil is dirty, the whole part is cut or the bed is repaired; Factory or workshop repair; large hot spots return to the hot position to be hot. d. If unqualified semi-finished products are found in QC, they should be repaired in accordance with the Semi-finished Product Rework Guide.
- For semi-finished products that cannot be reworked, the department head shall review the non-conforming product with the production supervisor, QC supervisor or customer. If the review is accepted by the customer, the process shall be transferred to the next process, and if it is not acceptable, it will be downgraded to a defective shirt or Scrap processing.
- If the pieces have lighter points, they shall be put together in the same color and batch, and the pieces shall be marked and stacked separately, and the quantity shall be recorded. After the production of genuine products in the workshop, the defective shirts can be produced, and the finished products are not distinguished by the owner, and the substitute shirts can be used for substitute materials.
- Obviously cut pieces are discarded.

➢ Control of unqualified semi-finished products

- When the quality of semi-finished products in each stage of QC sampling is unqualified, the workshop will find out the unqualified semi-finished products and rework. After rework, 100% of the inspectors will be inspected, and QC will conduct random sampling. The records indicate that it is the first few reviews. Release after passing the test.
- If the problem is found to be unworkable, follow the steps in the next step.
- If the number of unqualified parts is more than 10% of the number of samplings, a full inspection is performed on this problem.

▪ Unqualified finished product control

➢ If the final inspection fails or the customer fails to pass the inspection, it must be re-examined until the inspection is qualified.

- If the non-conforming product is not reworkable, it needs to be treated as follows:
  a. Downgrade to a defective shirt;
  b. Disposal.

- Control of non-conforming product after delivery of finished product
  - After the finished product is delivered, the non-conforming product returned by the sales department or the customer shall be reworkable and non-reworkable.
  - Reworkable finished products are reworked by the production department.
  - The non-reworkable finished product shall be downgraded to a defective shirt by the company or scrapped, and returned to the customer or the company's business department after redoing. If it is impossible to manufacture due to material reasons, you should inform the customer of the reasons and discuss the treatment measures.
- The specific inspection of incoming materials, work-in-progress and finished products shall be carried out according to the “Incoming Inspection Procedure” and “Production Process Control Procedure”.

E. Related Documents

- "Feeding Inspection Procedure"
- "Production Process Control Procedures"
- "Semi-finished product rework guide"

F. Relevant Records

- "Workshop Spot Check Report Form"
- "Dimensional Inspection Record Form"

10.5 Employee Development

10.5.1 Employee Education

In addition to the maintenance and management of a safe and reliable operating system, there is a need to continuously strive to improve technical skills and deepen the skill base. To this end, the operational staff needs to refine their trained operating and technical maintenance skills. Regularly scheduled on-the-job training is vital to maintaining and improving technical skills.

- Ensure employees are trained whenever new equipment is installed or new procedures are implemented. They should be familiar with the hazards associated with the material they are using and be aware of potential sources of contamination.
- Make sure employees are aware of the spill response plan and properly trained to carry it out.

- Maintain awareness of best available technology, as many companies now consider environmental issues when designing and manufacturing their products.
- Keep training records of all employee.

The project proponent also has a plan to give employment opportunities for employee.

10.5.2 Employment Opportunities

The project proponent has a plan to give priority and preference to the citizens of Myanmar in the recruitment of labour, staffs, technicians and professional who can contribute to the well-being of the company in accordance with the rules, regulations, and laws of the republic of the union of Myanmar.

Besides providing employment to the masses, the proposed company will also continuously train and upgrade the skill of its employees. This ensures the project proponent is always at the forefront of technology and better equip in facing the competition by foreign economies. The creation of more than five thousand employment opportunities will have a significant contribution to the growth in national income and the relief of unemployment. Average more than 16.8 million U.S Dollars per year in wages and benefits will be paid to staffs. The ability of these staff to spend for necessities and other goods will further contribute sales of other industries.

In this chapter, essential training which is based on the existing and available capacity of the project to undertake the required management actions and monitoring activities, implement Corporate Social Responsibility (CSR) Plan, employee's welfare plan, Training, Company working task force and Grievance Redress Mechanism (GRM) are described.

10.6 Corporate Social Responsibility (CSR) Plan

KARISMA Apparel (Myanmar) Company Limited is a garment manufacturer with well-established facilities in Bago Division. The company respects the relationships with the people in the local community where people live, work and does business. The company cannot easily succeed without the support of local community. Therefore, they deem important that their success can be shared with the local community. The project proponent implements a corporate social responsibility (CSR) to the local community.

KARISMA Apparel (Myanmar) Company Limited will implement Corporate Social Responsibility (CSR) Plan together with Environmental Management Plan (EMP) through the project lifespan. The objective of this plan is to create social welfare of factory workers and local community, and to prove that the establishment of the proposed factory is beneficial for not only the project owner but also for the local community. The project proponent has a plan to contribute **2% of net profit** for the corporate social responsibility fund.

(a) Mission

Our CSR program is voluntary. It goes beyond compliance and engages in actions that can further social good beyond the interests of our company. We are in strong conviction that corporate success and social welfare are interdependent.

(b) Create shared value

The company shares success with the community. The company will reserve fund to establish program that can "Create Shared Value". A business needs a healthy, educated workforce, sustainable resources, and adept government to compete effectively. For society to thrive, profitable and competitive businesses must be developed and supported to create income, wealth, tax revenues, and opportunities for local population.

(c) Scope of community participation

It includes donations and aid given to local and non-local nonprofit organizations and communities, including donations in areas such as the arts, traditional culture, faith, education, health, social welfare, and the environment, among others. Also, it will avoid purely philanthropy-based approach as it might not help build on the skills of local populations.

KARISMA Apparel (Myanmar) Co., Ltd.'s CSR budget is based on the profitability or financial performance of the company and is allocated as 2% of the annual profit.

Major focus will be on:

- Local community-based development 20%
- Education development 25%
- Natural disaster prevention and relief 10%
- Local culture promotion 10%
- Vulnerable group assistance 10%
- Health care promotion 10%
- Minimizing environmental footprint 15%

Getting through these can lead to more sustainable developments and promotions.

(d) Direction

1. Environmental Sustainability
2. Community Involvement and
3. Respects for religion and traditional culture.

(e) Criteria and Decision-making

Commit to coming up with and improving on company's goals, CSR Committee Members will determine the nature and direction of the firm's social and environmental activities and help others understand how the organization is likely to behave in a particular situation.

Criteria for CSR programs:

1. Program in compliance with Company CSR mission
2. Consultation with and approval from all affected stakeholders
3. Program feasibility and practicability

4. Budget as percentage to the entire CSR fund
5. Program priority at any moment

10.7 Employee's Welfare Plan

KARISMA Apparel (Myanmar) Company Limited will be a responsible employer and deem important that our success can be shared with the employees and their families. We plan to provide a series of welfare benefits to all employees.

Employee welfare raises the company's expenses but if it is done correctly, it has huge benefits for both the employee and the employer. In fact, employee welfare is in the interest of the employee, the employer, and the society as a whole. The objectives of employee welfare are:

(1) It helps to improve the loyalty and morale of the employees.
(2) It reduces labour turnover and absenteeism.
(3) It helps to improve employee productivity.
(4) Welfare measures help to improve the goodwill and public image of the company.

Statutory Welfare Scheme

The company commits to provide the statutory welfare benefits to all employees and these include the following provisions:

1. Legal wage (no training wage to be implemented)
2. Overtime pay at double salary rate
3. Statutory national holidays
4. Social security contributions
5. Maternity and paternity benefits
6. Clean drinking water
7. Hygienic toilets
8. First aid facility &
9. Canteen

Non-statutory Welfare Scheme

The company provides non-statutory welfare benefits to all employees and these include the following provisions:

1. Free transportation
2. Uniforms
3. Attendance Bonus for hardworking employees
4. Skill incentive Bonus
5. Productivity Bonus
6. Seniority Bonus
7. Funeral and accidental injury & death grants from Mutual Aid fund
8. Gifts for Water Festival
9. Annual celebration parties for Water Festival

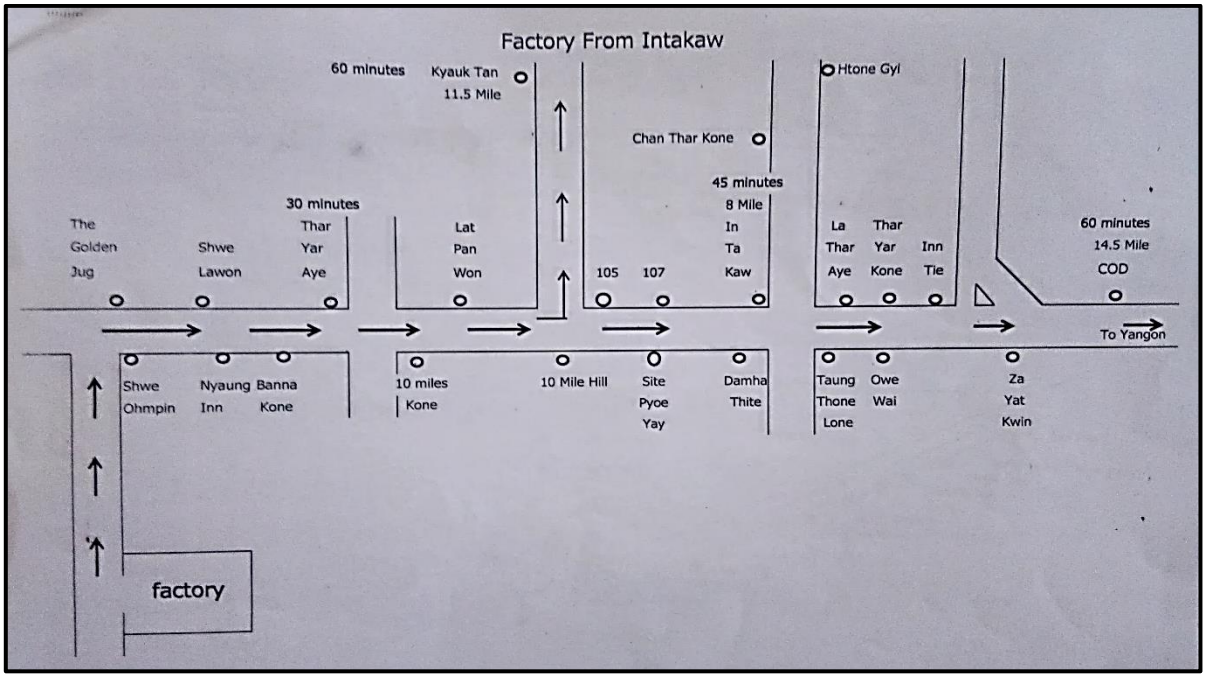
10. Occupational trainings &
11. Free medicine

10.7.1 Staff Transportation

The project proponent arranges the transportation for all employees. There are 69 ferries and the routes are arranged as:

(5) 12 ferries for factory - Intakaw and
(6) 57 ferries for factory - Bago respectively.

Figure 10-1 Provided Ferries Parked inside and outside the Factory Compound



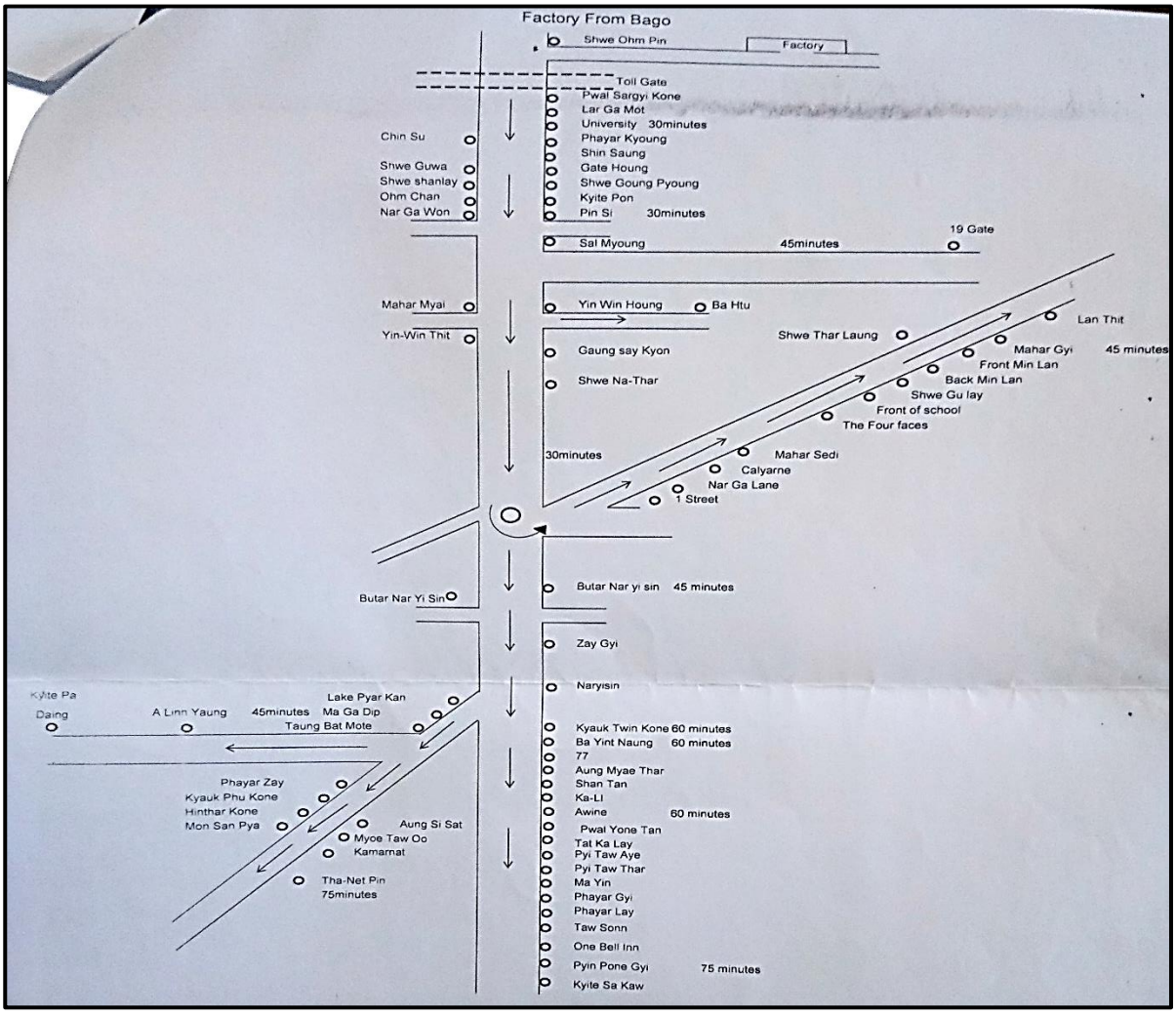


Figure 10-2 Provided Ferry Routes in KARISMA

10.7.2 Accommodation

The project proponent arranges dormitory which is four storeyed RC building, with full facilities for foreign technicians at project site. A small park exists within the dormitory compound. **(***See* ***Figure 10-3)***

(a) Dormitory








Figure 10-3 Plantation, Clean Sanitary and Drainage within the Dormitory Compound

Figure 10-4 Dining Room, Kitchen, Bath and WC, Sanitation inside the Dormitory

(b) Guest room

There is one guest room beside clinic and security gate. The External drivers can get rest in nighttime. There is one ATM provided in front of the room.

Figure 10-5 Guest Room

10.7.3 Other Benefits

(a) Uniform

Only few employees are supplied with uniform and the project proponent has a plan to provide uniform for all employees in the future.

Figure 10-6 Employee who wears Uniform

(b) Meal System

Meal system is provided only for the foreign technicians. The project proponent provided two Canteens for all employee, 3-storeyed steel- concrete composite building and one steel structure assembly. The employees can eat their lunch in these two areas. The cleaners are also provided for those canteens. For office staffs, there is also canteen beside the office workplace room.

Figure 10-7 Staff Canteen and Canteen for Workers

(c) Health Care

The company provides medical check-ups (free of charge) for all employees (certificates are attached in Appendix).

In addition, purified water are provided for staff drinking water. Appropriate sanitation facilities are installed and regular disinfection work carried out. The project proponent provides the following health programs.

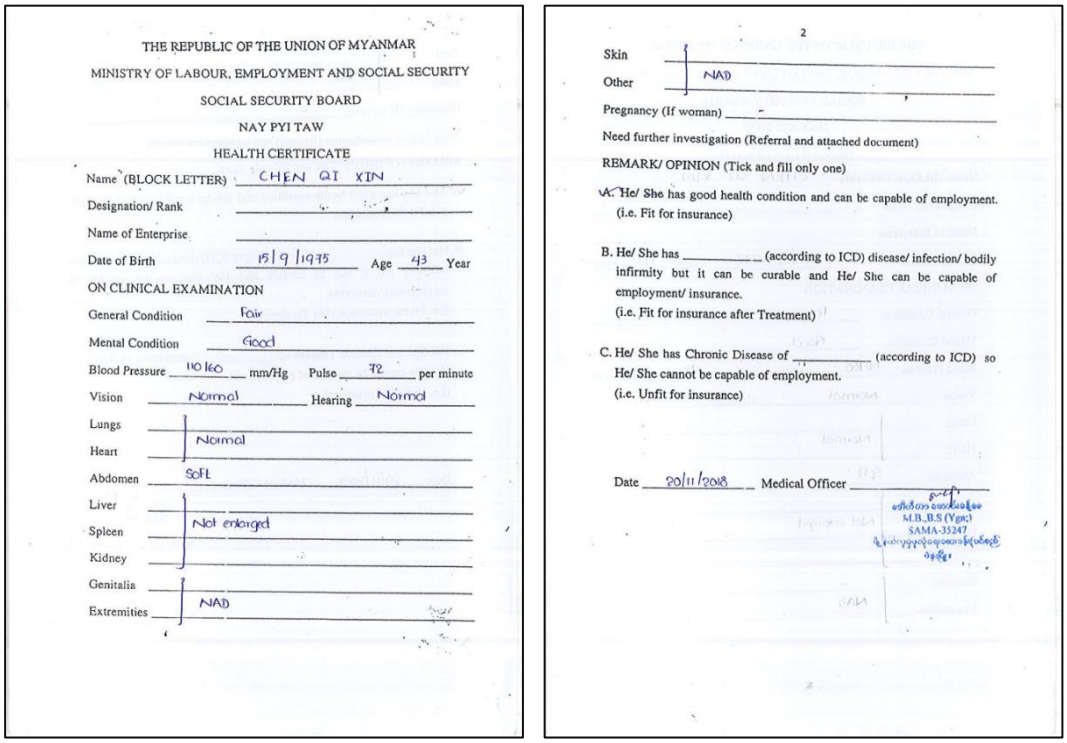
i. Medicine and 56 first aid kits are available in every section of the factory to address emergency cases.

ii. The factory has a clinic for staff who feel sick.

iii. Those who are sick will be sent to social welfare hospital for care.

iv. The project proponent trains employees on basic health care every three months. It aims to teach staff how to provide first aids for injured person during emergency cases.

All the employees also have life insurance.



THE REPUBLIC OF THE UNION OF MYANMAR
MINISTRY OF LABOUR, EMPLOYMENT AND SOCIAL SECURITY
SOCIAL SECURITY BOARD
NAY PYI TAW
HEALTH CERTIFICATE

Name (BLOCK LETTER) CHEN QI XIN
Designation/ Rank
Name of Enterprise
Date of Birth 15/9/1975 Age 43 Year

ON CLINICAL EXAMINATION

General Condition Fair
Mental Condition Good
Blood Pressure 110/60 mm/Hg Pulse 72 per minute
Vision Normal Hearing Normal
Lungs
Heart Normal
Abdomen Soft
Liver
Spleen Not enlarged
Kidney
Genitalia
Extremities NAD

2

Skin
Other NAD
Pregnancy (If woman) -
Need further investigation (Referral and attached document)

REMARK/ OPINION (Tick and fill only one)

A. He/ She has good health condition and can be capable of employment. (i.e. Fit for insurance)

B. He/ She has _____ (according to ICD) disease/ infection/ bodily infirmity but it can be curable and He/ She can be capable of employment/ insurance. (i.e. Fit for insurance after Treatment)

C. He/ She has Chronic Disease of _____ (according to ICD) so He/ She cannot be capable of employment. (i.e. Unfit for insurance)

Date 20/11/2018 Medical Officer
M.B.,B.S (Ygn)
SAMA-35247

Figure 10-8 Worker's Health Certificate and Life Insurance Form

(d) Parking

The project proponent provided parking area for trucks, cars, and motorbikes with safety lines and broad space.

Figure 10-9 Parking Area for Workers


Figure 10-10 Parking Area for Office Staffs and Visitors

Figure 10-11 Clear Way with Marking for Vehicles

(e) Clinic

There are 2 nurses in clinic for emergency health care purpose. One is always stand by in dormitory and other has duty time from 7.30 am to 6.30 pm. There are 3 clean beds; one for male and two for female. Required medical facilities are also provided. Nursery room is beside the clinic intended for children.

Figure 10-12 Clinic and Nursery Room

(f) Social Security Fund

All employees are given an additional 2% of their salary for SSP (Statutory sick pay) contributed by the company toward health care, social security and injury fund. In addition, workers are provided aid-money for both good events and funerary ceremony. For giving birth of female workers, they can get 90 days' leaves, 2 days leave for wedding and other leave (sick leave, annual leave etc.) will be drawn up.

(g) Staff Activities

The project proponent organizes and pays for additional out of work activities for the employees to participate in. There is annual party for all employee in KARISMA Apparel (Myanmar) Co., Ltd.

Figure 10-13 Annual Party Pictures of KARISMA Apparel (Myanmar) Co., Ltd.

10.8 Training

Trainings (including mini language training) are essential for ensuring that the provisions of the EMP are implemented efficiently and effectively. The project proponent provides first-aid trainings, Fire Drill trainings, PPE training, chemical training, washing trainings, fire-fighting trainings and other essential machinery handling trainings for the workers and staffs.

Human resource manager presents basic fire prevention and protection training to all employees about the fire hazards associated with the specific materials and processes to which they are exposed, and will maintain documentation of the training.

(The project proponents provide trainings for workers and these records are attached in Appendix)

Figure 10-14 PPE Training and Work Training

10.8.1 Special Task Team Training

The project proponent also performs the special task team training material for employee. In this training, purpose, methods, and activities section are contained. (*Detail training activities are attached in Appendix)*

Purpose

- In order to effectively prevent the other watching closely together during the emergency period.
- In order not to cause instability of other staff in the workshops.
- To make the normal production enterprise
- To carry the person out of the workshop as soon as possible while emergency case occurs.

10.8.2 Training on Safety Production for KARISMA Apparel (Myanmar) Garment Manufacturing Factory

(1) Workshop director shall train new employees about safety production and skills.

- First, let workers understand the fire alarm, firefighting equipment, emergency lights, emergency exits, evacuation maps, safe escape, fire and evacuation drills, personal protective equipment, electrical equipment, drinking water equipment, etc.;
- Second, let new employees understand the factory environment system, including workshop health, the control of dangerous tools, the use of drugs, the light source to meet production needs;
- Third, let workers know Environment Protection System, particularly:

a. Sewing workers must operate safely, sewing machine belt cover is complete, the needle guard device installed, cutting equipment operator must wear gloves when operating. The wire ring knife/ cutter shall be installed protective devices. When not on use, turn off power. Violation operator must be treated according to the internal evaluation standard. If there are updates about the above, directors shall train employees about the updates.
b. Equipment controller shall be trained about the maintenance of the machine, periodic inspection including checking shields, needle guard, etc., the cleaning of machine repair place.

(2) Emergencies training shall be responsible by workshop directors.

For example, worker injuries occur in production, such as a figure puncture, etc., it is necessary for workers to learn how to use medicine in medicine cabinet or call emergency personnel. Director shall check the medicine cabinet periodically. Directors shall be called to send the wounded to hospital if serious.

If the unexpected disasters, such as earthquake, floods, fires etc., employees shall be trained about how to escape.

Fire safety evacuation shall be held by directors four times per year, meetings about safety production shall be initiated by deputy factory director. Middle managements and workshop directors shall be invited.

(3) Let employees know:

a. There are 11 days' federal holidays per year.
b. Wages in sick leave will be paid in accordance with the minimum wage if hospital record are available.
c. marriage leave,
d. bereavement leave,
e. maternity leave,
f. annual leave and
g. Leave program.

Let employees understand:

a. The recruitment processes.
b. The prohibition of child labor,
c. youth worker's policy,
d. no forced labor,
e. no discrimination,
f. the payroll system,
g. payroll calculation and
h. Process of forgetting punching in / out.
i. Wages can be increased if employees work more efficiently and let employees agree to pay social security and knowing the benefits.

The following table summarized the training programs conducted KARISMA Apparel (Myanmar) Garment Manufacturing Factory.

Date	Place	Time	Training course	Description
			Occupational safety	Safe handling of automatic machines, electric cutting machine, button holing machine, lining machine
			PPE, Chemicals and MSDS	Effects of Hazardous Chemicals on health, labeling of chemicals, emergence response plan, methods of extinguishing fire and explosion, systematic storing and handling of chemicals, spills, leakage; PPE and MSDS
30.11.2018	Factory		Fire Drill	Demonstration of handling fire extinguishers and evacuation when fire breakout.
30.11.2018	Dormitory	12:15AM	Emergency Plan	Training Plan for Prevention in case of Emergency
30.11.2018	Factory Area	12:15PM - 12:30PM		
			Code of Labor Practices	Explanation of EC contract, working hours, wages, holidays, overtime, leave and Company's rules and regulations
			Training for warehouse manager	Systematic inventory of hazardous chemicals, labeling of chemicals, limitation on issue amount of chemicals, medical check-up
	HR Department		Discrimination, corruption, sexual assault	Policies on discrimination, corruption, and sexual assault
	HR Department		Reconciliation & suggestion	Responsibilities for employer and employees, objectives of reconciliation committee, Submission of suggestions, etc.

All the above courses are conducted by the factory Administration and HR Manager.

10.9 Training for Fire Prevention and Protection Plan

Fire Hazard: **Fire** is the important hazard in the garment manufacturing project. This is very serious risk to be considered in this project. Therefore, the project proponent also has the good prevention system for fire and is mentioned below.

The company is committed to minimizing the threat of fire to employees, visitors, and property by fire, and complies with all applicable laws, regulations, codes, and good practices pertaining to fire prevention.

10.9.1 Fire Drill Exercise (The Whole Factory)

KARISMA Apparel (Myanmar) Co., Ltd. exercised an announced Fire Drill on 2018-11-30, Friday at 12:15 a.m. for entire factory employee (4,937 employees

reported on duty). This was an internal exercise and no invitation sent to Fire Department. The purpose was to allow all employees having an in-depth understanding in evacuation procedures, escape routes, self-protection awareness, assemble point location and roll call process at any time during working hours.

Exercise summary:

Item	Duration	Program	Time used	Particular	In-charge
1	November 28, 2018 13:00-13:30	Briefings on Preparation Meeting	30 mins	Briefing given to the "All Super" level staff for the exercise arrangement details with PPT display, such as evacuation routes, assembly point location, roll call arrangement and first aid arrangement etc. All Super level staffs need to direct the right ways to the employees to escape from the plants and gather and then queue up at assembly point to be accounted for during the exercise process if necessary.	Tun
2	November 30, 2018 12:15-12:24	Fire Drill in progress	9 mins	1) Exercise in-charge instructed to start Fire Drill exercise. All alarms were ringing at 12:15. 2) M & E Manager turned on the Fire Alarm at main control panel. 3) All Super level staffs took care of the all employees leaving workshops, going to assemble point & gathering there department by department. 4) Security guards were guiding employees how to proceed to assemble point and queue up properly and not to go to the dining hall before the end of the fire drill. 5) HR staffs brought the daily manual attendance records to the assemble point & passed to All Supers of various departments for head counting.	Tun/Xin/ Peace/ Mary
3	12:18-12:21	Roll Call	3 mins	Roll call was performed by All Supers of various departments. Tun was responsible for gathering the roll call results, then report to Mr. Kinson that all employees presented at assembly point and no injury reported. Evacuation was finished within 9 minutes and faster than the last practice and shorter than scheduled 15 minutes	Tun/ Mr. Kinson
4	12:17-12:22	Workshop Check	5 mins	Peace & Bruno respectively led security guards swept all workshops, toilets and office areas, ensured no people stayed or injured person inside workshops and office. Then reported to Tun.	Peace/ Bruno/ Security guards
5	12:22-12:24	Debriefing	2 mins	Immediate revision was performed by Tun in assemble point. Conclusions: - Fast walking instead of running;	Tun

Item	Duration	Program	Time used	Particular	In-charge
				- Don't hand by hand with each other - Don't take personal belongings. - Follow super/leader instructions - All employees must be participated this exercise seriously with proper manner because this is a contingency plan with training for emergency.	
6	12:24	Dismissal	---	No fire and no injury were found. The commander declared the Fire drill exercise smoothly finished. Dismissed.	Tun

Figure 10-15 Fire Drill Training

10.9.2 Fire Drill Exercise (At Dormitory)

KARISMA Apparel (Myanmar) Co., Ltd exercised an ANNOUNCED Night Fire Drill at Dormitory on 30.11.2018 (Friday) at 18:00 p.m. This was an internal exercise and no invitation sent to Fire Department. The purpose was to allow dormitory occupants having an in-depth understanding in evacuation procedures, escape routes, self-protection awareness at night time in dormitory room.

Exercise summary:

Item	Duration	Program	Time used	Particular	In-charge
1	16:30-16:45 November 29, 2018	Briefings	15 mins	During Production and Administrative meeting on November 29, the management delivered the brief to all occupants for the program details, such as	Paul

Item	Duration	Program	Time used	Particular	In-charge
				evacuation routes, assembly point location, roll call arrangement and first aid arrangement etc. and informed all occupants that Fire Drill Exercise would be conducted on November 30 2018 at 18:00PM.	
2	18:00-18:04 November 30, 2018	Fire Drill in progress	4 mins	1) Exercise in-charge instructed to start Fire Drill exercise. 2) Accident finder pressed on the fire alarm button. 3) Occupants loudly shouted to alert others while running out from room and down to G/F. <u>Floor 1, 2 & 3</u> - Occupants in rooms 01 to 06, left from front staircase. - Occupants in rooms 07 to 12, left from rear staircase. <u>Ground floor</u> - People staying in G/F, left from any exit as long as which was in safe.	Paul
3	18:04-18:07	Roll Call	3 mins	Roll call was performed by Kelvin at dormitory assembly point situated at passage between dormitory and Plant #3. Report was made to Mr. Paul that all occupants presented at assembly point and no injury reported. Evacuation was finished within 4 minutes.	Kelvin
4	18:04-18:11	Building Check Finished	7 mins	Security guards searched whole dormitory building, no fire incident found and no occupants stayed at dormitory. Declared it was a false alarm.	Security guard
5	18:11-18:16	Debriefing	5 mins	The in-charge declared that this was an unannounced fire drill exercise and no fire happened. Gentle reminder was delivered during debriefing. - People must be aware of the items they should keep in their rooms, such as a flashlight, that can help them evacuate in the event of a fire. - Some peoples charge their phones next to their pillow all the night long. This manner may be overheated and can cause fire easily. Unplug the phone charging before you sleep is good. - Turn off air-cons and all electric appliances when leaving the rooms. - All the dormitory occupants should be closed back the room door while escaping since the door can prevent fire burning into the room.	Paul/ Kelvin
6	18:16	Dismissal	---	Fire drill exercise finished, no injury found and no mishap appeared.	Paul

10.10 Training Plan for Prevention in Case of Emergency

10.10.1 Training Plan at Factory

All staffs have to participate in a semi-announced fire evacuation exercise on November 30, 2018 for quickly response and movement, to protect all staff live and factory property in case of emergency.

Training Date/ Time/ Place	Organization and Duties
Date: November 30, 2018	*Organization* To inform contact person who listed on the attached table immediately when emergency case occurs in factory. HR & Administration Manager: U Tun Zaw Myint General Manager: Mr. Kinson Duty - Gives instruction, command, and control to entirely organization in emergency status.
Time: 12:15 PM -12:30 PM	*Communication Team* U Zayar Myint Duty - To communicate all related departments and to do suitable adjustment among inside and outside departments.
Place: Factory Area. Assembly Points: (1) Square between Plant 1 & Plant 6, (2) front yard of Plant 1 & (3) front yard of Plant 6	*Electric Power Control Team* U Min Thiha Duty - To control Electricity, Power cut off, arrange necessary lights on passages and fulfill other requirements on emergency status.
Dormitory Building.	*Fire Fighting Team* U Kyaw Swar Lwin Duty - To take immediate action on to stop the fire spreading
	Treatment (Rescue) Team U Myat Min Pyine Duty - To rescue injured person in emergency status.
	Emergency Safety Settlement Team U Thein Than Duty - To control and arrange all staff and surrounding area where people to move away from dangerous area.
	Security and Defense Team U Myint Oo Duty - To secure factory and check the number of people in emergency status.
Population participation	*All employees of the entire Factory*

Rehearsal Timeframe

After rescue team checked and explained the detail program, HR & Administration Manager announces to conduct with a semi-announced fire drill exercise at 12:15 a.m., August 31, 2018.

1. At 12:15 a.m., Fire Drill will be started.
2. All super and leaders with the security guards direct all employees to escape away from fire break out area to a safe place. The Communication Team inform to all emergency line such as Fire Brigade No.191, Police Station No.199, and Ambulance No.500005.
3. Within 15 minutes, all employees in all departments approach to assembly point and queue up at the assembly point for head counting.
4. Report the real situation by 12:30am.
5. Finish the fire drill exercise by 12:30am, and then dismiss.

How to contact in case of emergency

First Finder of accident
- Pressing the Fire Alarm Button
- Inform Communication Team

- HR & Administration Manager
- Brigade
- Police Department & Ambulance station

Position	Name
General Manager	Mr. Kinson
HR & Admin Manager	U Tun Zaw Myint
Communication In-charge	U Zayar Myint
Power Control In-charge	U Min Thiha
Fire Fighting Team Leader	U Kyaw Swar Lwin
Treatment/Rescue Team	U Myat Min Pyine
Safety Settlement Team	U Thein Than
Security & Defense Team	U Myint Oo

Organization & Duty

Responsible Person (High command) U Tun Zaw Myint (Overall Commander) Mr. Kinson (Field Commander) Mr. Paul (Coordinator)	*Communication Team* Daw Aye Aye Myat Daw Thandar Naung Ma Thazin Htwe
Electricity & Power Control Team U Thaung Htike Soe U Chit San Maung U Wai Lin Myo Treatment / Rescue Team Daw Aung Aung Kyi Daw Kay Thwe Moe Daw Khin Po	*Security & Defense Team's deployment* Plant 1 In-charge: Mar Lar Sein Plant 2 In-charge: Hla Zar Khyi Plant 3 In-charge: Khin Mg Lwin Plant 4 In-charge: Myo Min Oo Plant 5 In-charge: Mat Lin Aung Plant 6 In-charge: Kyaw Zay Ya

Safety Settlement Team U Nyunt Naing U Saw Bay Thon U Sai Aung Myo Min U Saw Zaw Htet	Office Building & Dormitory In-charge: Myint Shwe Staff canteen In-charge: Mg Kyaw North Road In-charge: Tin Win South Road In-charge: Myint Shwe Security Main Gate In-charge: Myint Oo Security Rear Gate In-charge: Than Win
Fire Fighting Team U Tin Maung Win U Thet Ko Ko U Min Thet Naing U Arkar Pyae Phyoe Hein U Wai Lin Oo	

10.10.2 Training Plan in Dormitory at Night

All dormitory occupants have to participate in an **unannounced** fire evacuation exercise on any night of 21 Nov 2018 till 31 Nov 2018 for quickly response and movement, to protect all staff live and factory property in case of fire/emergency.

Training Date/ Time/ Place	Organization and Duties (In-charge)
Date: 31 Nov 2018	*Overall management* Monitor and supervise the drill. ▪ Administrative Manager: Mr. Paul ▪ Administrative Assistant: Kelvin
Time: Any time at night	*Communication Team* Communicate with Security and Bago Fire Brigade. ▪ Shipping Manager: Richard San ▪ General Manager: Mr. Kinson Lau ▪ Production Manager: Mr. Ray Ng
	Electric Power Controller Monitor the electricity system ▪ M & E Technician: Ah Cheong
Place: Dormitory Building.	*First Aids* First Aider ▪ Factory Nurse: Ei Ei Mon
Population participation	All dormitory occupants

Rehearsal Time Details

1. After checked and explained the program details by Administrative Manager, Mr. Paul Weng and he announced to start the unannounced fire drill exercise at any time at night.
2. Fire Drill will be started at any unannounced moment. (The scenario: Fire Alarm rang, occupants heard, then immediately escape from room to go to the assemble point at ground floor)
3. Communication team members of each floor directed occupants to escape away from dormitory room to assemble point.
4. Should be finished within 5 minutes, all occupants escaped from dormitory and approached the assembly point.

5. After all occupants moved to a dormitory assembly point, the Security Guards searched the fire place.
6. Kelvin performed a Roll Call that all occupants moved to assembly point already and injury check.
7. Mr. Paul announced to the occupants that the exercise finished and there was no injured.

How to contact in case of emergency

Accident located person/ Heard fire alarm sound	- Pressing the Fire Alarm Button - Inform Communication Team members.	- Administration Manager - Security guard - Police Department & Ambulance station

10.11 Documentation and Reporting

10.11.1Documentation

The following documentation must be kept at Project Manager Office in order to maintain the record of compliance to the EMP for future references:

- Record of Complaints
- Monitoring Results
- Notification of Emergencies and Incidents.

Environmental Register which is maintained and kept in custody of the manager responsible for operations at the factory. It may contain the following information, observations, and records:

- The manager will report incidents involving employees and / or the public that could potentially cause negative sentiments and perception towards the project.
- Report environmental complaints and correspondence received from the public to the Project HR Manager or the Environmental Manager.
- Record and report incidents that cause harm or may cause harm to the environment to the Environmental Manager.
- Record all hazardous materials used on site.
- Maintain a record of all hazardous waste disposal manifests detailing the nature of the hazardous waste disposed of, the hazardous waste classification and the location of the site to which such waste was sent.

These records will be kept with the EMP, and will be made available for scrutiny if so, requested by the Project Manager or his delegate or the Environmental Manager.

The Environmental Manager will ensure that the following information is recorded for all complaints / incidents:

- Nature of complaint /incident.
- Causes of complaint /incident.

- Party/parties responsible for causing complaint/incident.
- Immediate actions undertaken and/or to be taken to address and to prevent reoccurrence of the complaint/incident.
- Timeframes and the parties responsible for the implementation of the corrective or remedial actions.
- Copies of all correspondence received regarding complaints /incidents.

10.11.2 Reporting

The project proponent will establish and maintain a procedure to monitor and report key characteristics of its operations and activities that have potential to have a significant impact on the environment.

Reports are to be forwarded to the Project Manager. This will comprise the incident reporting protocol and will allow the Project Manager to determine the effectiveness of environmental measures implemented in reducing impacts on the environment and/or to determine the extent of potential environmental harm. The measures ensure the management of the activity will achieve ongoing minimization of the activity's environmental harm through cost effective measures.

Environmental harm is defined as any adverse effect on the environment (of whatever degree or duration) and includes an environmental nuisance. The responsibilities for reporting environmental incidents are as follows:

- The person discovering a reportable environmental incident, as described below, on the proponent's site must report it to the proponent;
- The proponent may report the incident to external organizations that are needed to provide response support,
- The proponent gathers details about the incident and supplies them to the Environmental Committee; and
- Project Manager is responsible for reporting environmental incidents to relevant external organizations who are not involved in immediate response.

Incidents must be reported to the Department of Environmental Management as soon as reasonably practicable, but no later than 24 hours, after becoming aware of the release of a pollutant occurring as the result of an emergency, accident or malfunction in relation to any harmful activity.

Table 10-1 PPE Training Attendance List

No.	Department	Number of person
1	M & E	23
2	Printing	38
3	Embroidery	37
4	Sewing	2395
5	Special Machine	3
6	Washing	8
7	Warehouse	26
8	Cutting	242
9	Cleaner	33
10	Finishing	1129
11	Chemical Warehouse	6

10.12 Company Working Task Force

The task force has been established by the Department for **Business**, Energy & Industrial Strategy to promote flexible **work** and **working** practices, bringing together policy-makers, employer groups, Unions and employee representative groups, research groups and professional bodies.

Worker Representative, WCC and Committees Election

Annual election for below listed WR/WCC/Committees is scheduled to conduct on 2018 May 19 Saturday.

1) Social Compliance Committee
   (Responsibility: Steering the implementation of Social Compliance awareness in factory)
2) Occupational Safety & Health and Hygiene Committee
   (Responsibility: Steering the implementation of OHS & Hygiene awareness in factory)
3) Fire Brigade
   (Responsibility: Steering the implementation of fire prevention awareness and execution of emergency in factory)
4) Environmental Management Committee
   (Responsibility: Steering the implementation of environmentally friendly workplace in factory)
5) Workplace Coordinating Committee and Worker Representative
   (Responsibility: Coordinating with management for reviewing employee benefits in factory)

Nomination and Election will open to all factory workers except senior management. You all are welcome to nominate candidate for election by informing the HR & Administrative Manager on or before 2018 May 08 Tuesday.

10.12.1Social Compliance Committee

Purpose

The **Compliance Committee** (the "**Committee**") is a standing subcommittee of the Audit **Committee** (the "Audit **Committee**") of the Board of Directors (the "Board") of Aon plc (the "Company") that has general responsibility to oversee the Company's **compliance** and ethics programs, policies, and procedures.

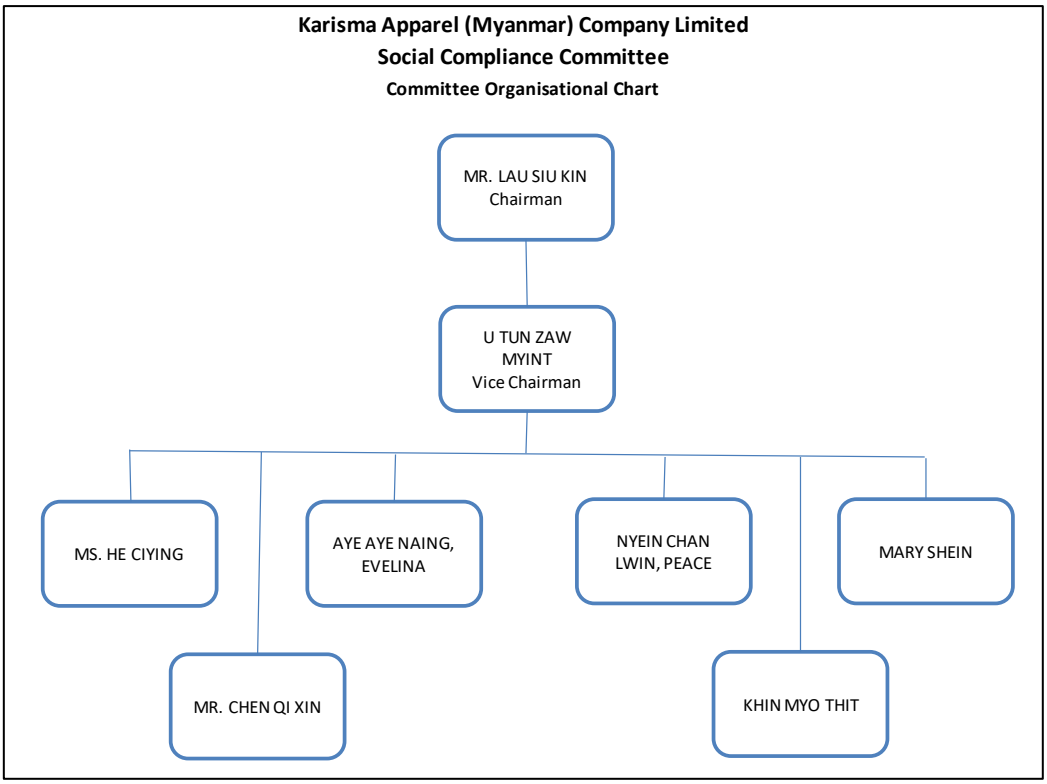


Figure 10-16 Organizational Chart of Social Compliance Committee

Table 10-2 Member List of Social Compliance Committee

Sr. No.	Member Name	Position / Duty	Name of Affiliated Department / Title	Gender
1.	Mr. Lau Siu Kin	Chairman	General Manager	M
2.	U Tun Zaw Myint	Vice Chairman	HR & Admin. Manager	M
3.	Ms. He Ciying	Member	Production Manager	F
4.	Aye Aye Naing, Evelina	Member	Administration Clerk	F
5.	Nyein Chan Lwin, Peace	Member	Administration Assistant	M
6.	Mary Shein	Member	HR Supervisor	F

Sr. No.	Member Name	Position / Duty	Name of Affiliated Department / Title	Gender
7.	Mr. Chen Qi Xin	Member	M & E In-charge	M
8.	Khin Myo Thit	Member	Accounting Assistant	F

M = Male, F = Female

10.12.2 Occupational Safety & Health and Hygiene Committee

Occupational Health and Safety (OHS), also commonly referred to as occupational health and safety (OHS), occupational health, or workplace health and safety (WHS), is a multidisciplinary field concerned with the safety, health, and welfare of people at work.

The goals of Occupational Health and Safety programs include to foster a safe and healthy work environment. OHS may also protect co-workers, family members, employers, customers, and many others who might be affected by the workplace environment. In the United States, the term occupational health and safety is referred to as occupational health and occupational and non-occupational safety and includes safety for activities outside of work.

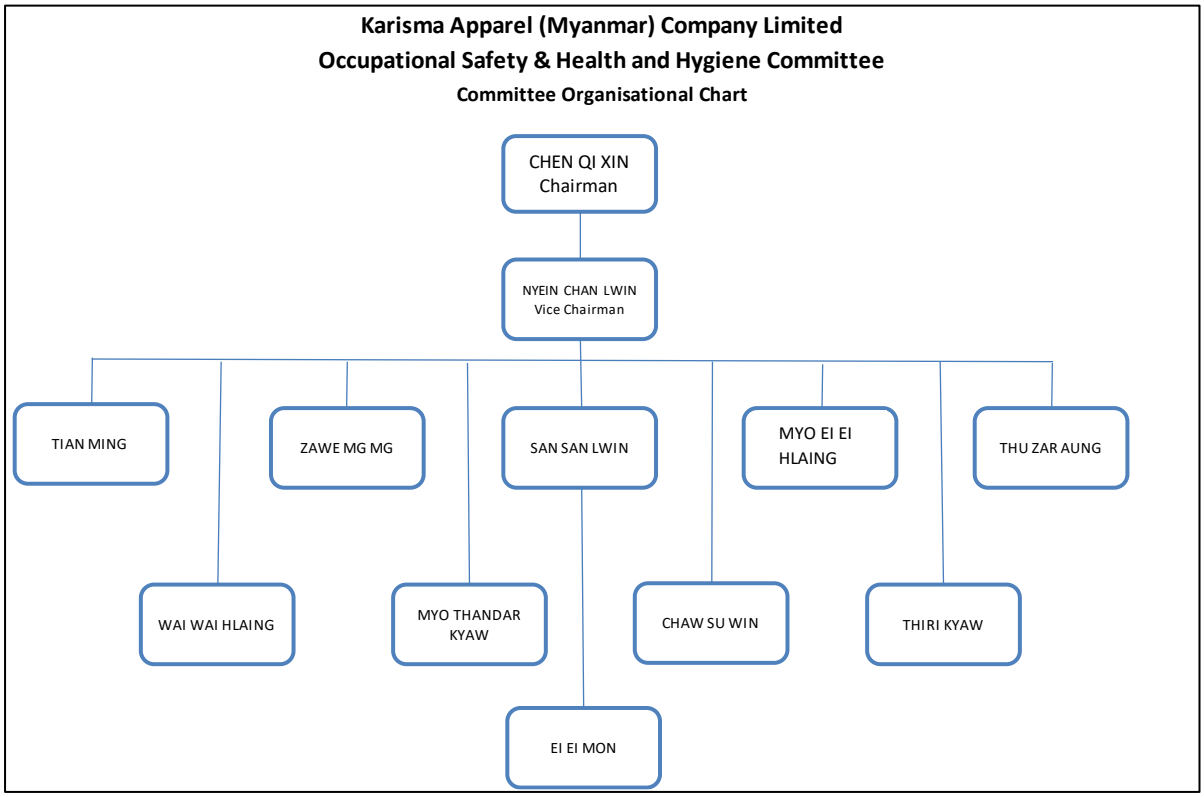


Figure 10-17 Organizational Chart of Occupational Safety & Health and Hygiene Committee

Table 10-3 Member List of Occupational Safety & Health and Hygiene Committee

Sr. No.	Member Name	Gender	Committee Position	Name of Affiliated Department
1.	Chen Qi Xin	M	Chairman	M & E
2.	Nyein Chan Lwin, Peace	M	Vice Chairman	Administration

Sr. No.	Member Name	Gender	Committee Position	Name of Affiliated Department
3.	Tian Ming	M	Member	Mechanic
4.	Zawe Mg Mg	M	Member	M & E
5.	San San Lwin	F	Member	Warehousing Office
6.	Myo Ei Ei Hlaing	F	Member	Spare Part Finishing
7.	Thu Zar Aung	F	Member	Cutting Office
8.	Wai Wai Hlaing	F	Member	Carton packing
9.	Myo Thandar Kyaw	F	Member	QC Office
10.	Chaw Su Win	F	Member	Sewing Office
11.	Thiri Kyaw	F	Member	Sample Room
12.	Ei Ei Mon	F	Member	Nurse

M = Male, F = Female

10.12.3 Fire Brigade

The project proponent is committed to minimizing the threat office to employees, visitors, and property by fire, and complies with all applicable laws, regulations, codes, and good practices pertaining to fire prevention. The project proponent also has fire brigade team in order to manage the firefighting system. The firefighting tank, hydrants, alarms, fire extinguishers, emergency fire routes and maps are provided in the factory.

A fire department (American English) or fire brigade (British English), also known as a fire protection district, fire authority or fire and rescue service is an organization that primarily provides firefighting services for a specific geographic area. A fire department may also provide fire protection or fire prevention services, give fire safety advice and fit smoke alarms. In many countries, fire protection or prevention is an important role for fire occurring in the first place, prevention can save lives and property. Fire departments are organized in a system of administration, services, training, and operations.

- **Administration** is responsible for supervision, budgets, policy, and human resources.
- **Service** offers protection, safety, and education to the public.
- **Training** prepares skilled people with the knowledge to perform their duties.
- **Operations** perform the tasks to successfully save the public from harm.

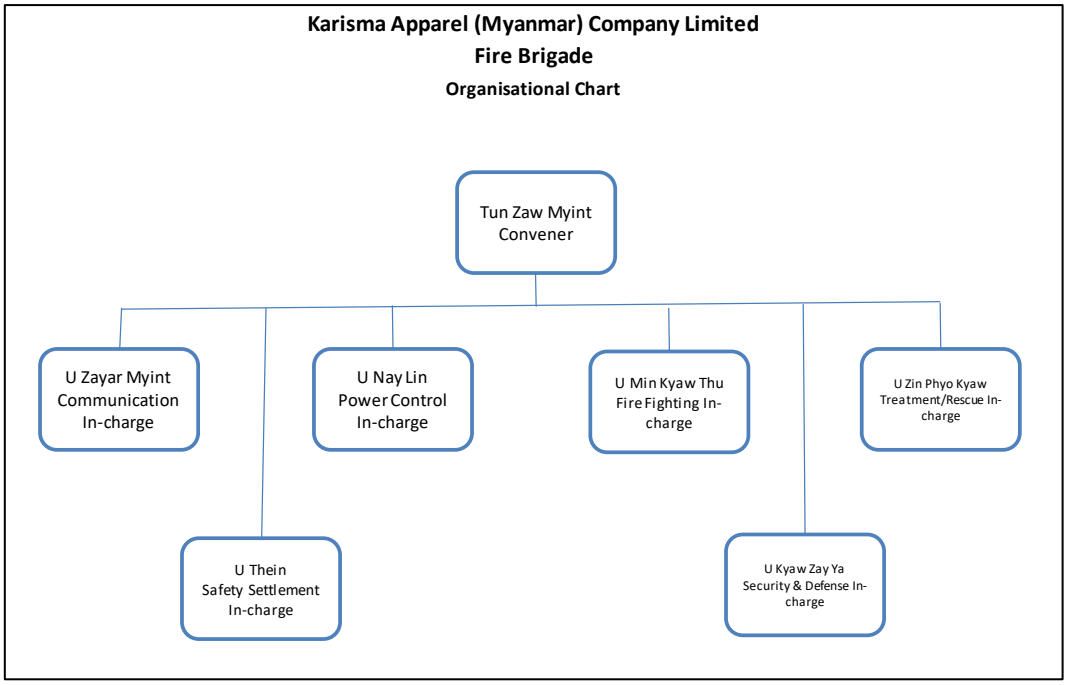


Figure 10-18 Organizational Chart of Fire Brigade

Table 10-4 Member List of Fire Brigade

Sr. No.	Member Name	Position / Duty	Name of Affiliated Department / Title	Gender
1.	U Tun Zaw Myint	Convener	HR & Admin. Manager	M
2.	U Zayar Myint	Communication In-charge	Cutting	M
3.	U Nay Lin	Power Control In-charge	Electrician	M
4.	U Min Kyaw Thu	Fire Fighting In-charge	M & E	M
5.	U Zin Phyo Kyaw	Treatment/Rescue In-charge	Cutting	M
6.	U Thein Than	Safety Settlement In-charge	Warehouse	M
7.	U Kyaw Zay Ya	Security & Defense In-charge	Security In-Charge	M

M = Male, F = Female

10.12.4 Environmental Management Committee

A **committee** comprising representatives from different functional or regional divisions of an organization. It takes the responsibility for managing the **environmental** issues of the organization under the chairmanship of the Green Manager.

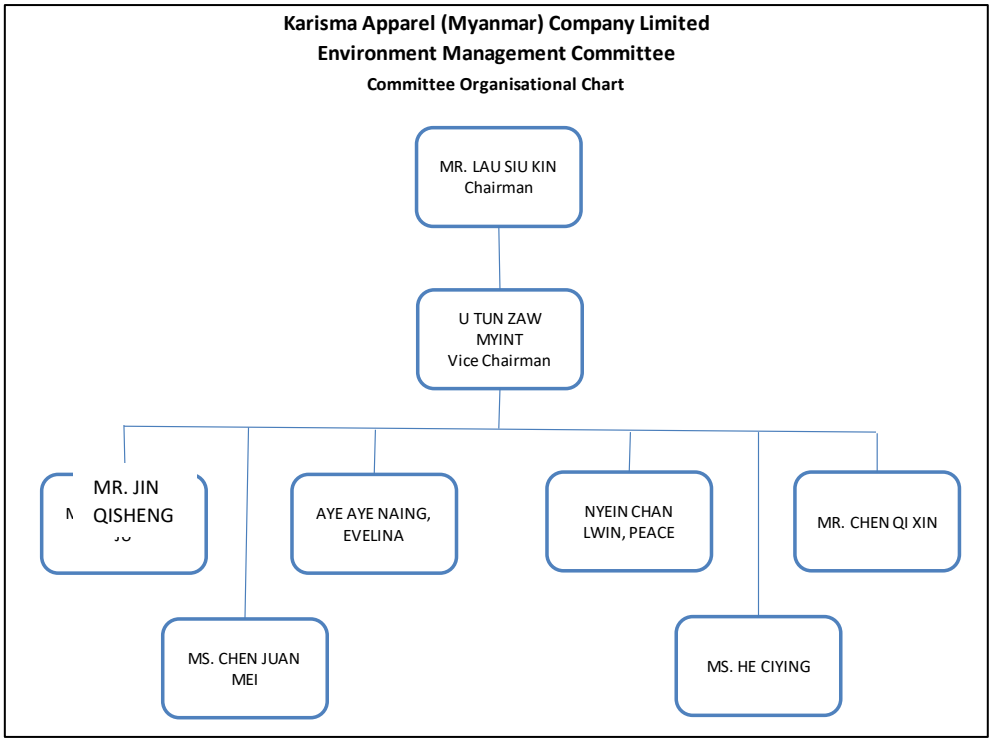


Figure 10-19 Organizational Chart of Environmental Management Committee

Table 10-5 Member List of Environmental Management Committee

Sr. No.	Member Name	Position / Duty	Name of Affiliated Department / Title	Gender
1.	Mr. Lau Siu Kin	Chairman	General Manager	M
2.	U Tun Zaw Myint	Vice Chairman	HR & Admin. Manager	M
3.	Mr.Jin Qisheng	Member	Administration Assistant	M
4.	Aye Aye Naing, Evelina	Member	Administration Clerk	F
5.	Nyein Chan Lwin, Peace	Member	Administration Assistant	M
6.	Mr. Chen Qi Xin	Member	M & E In-charge	M
7.	Ms. Chen Juan Mei	Member	Production Manager	F
8.	Ms. He Ciying	Member	Production Manager	F

M = Male, F = Female

10.12.5 Workplace Coordinating Committee and Worker Representative

Figure 10-20 Organization Chart of Workplace Coordinating Committee

Table 10-6 Member List of the Workplace Coordinating Committee

Sr. No.	Name	N.R.C No	Occupation Designation
1.	Mr.Tun Zaw Myint	7/DON(N)009934	HR Manager
2.	Mr. Lau Siu Kin	E 5773615 N	General Manager
3.	Ma Zar Chi Nway	1/BMN(N)059335	Admin Assistant
4.	Ma Aye Aye Naing	7/PKN(N)302932	Admin Clerk
5.	Ma Thandar	7/PKN(N)331222	HR Clerk
6.	Ma Tin Mar Khaing	7/PKN(N)386709	Iron Super
7.	Ma Tin Moe Khine	7/PKN(N)191784	QC Supervisor
8.	Ma Myint Myat Mon	7/PKN(N)308179	Finishing Supervisor
9.	Mg Zin Aung	12/ LTY(N)079078	Finishing Supervisor
10.	Mg Shine Linn Aung	7/PKN(N)348836	Warehousing Leader
11.	Ma Khin Moe Khaing	7/PKN(N)234393	Finishing Worker
12.	Ma San San Lwin	12/ASN(N)045359	Warehouse Worker
13.	Mg Aye Min Htay	7/NLP(N)151561	Finishing Supervisor
14.	Mg Zay Yar Myint	8/KMN(N)133196	Cutting Supervisor
15.	Ma Tha Ya Phuu	12/LKN(N)213900	Embroidery Clerk
16.	Mg Pyae Phyo Lwin	7/KWN(N)143994	Mechanic All Super
17.	Ma Aye Aye Khine	7/PKN(N)4504268	Sewing Line Super
18.	Ma Aye Thandar Htun	7/PKN(N)403538	Sewing All Super
19.	Ma Aye Hlaing Myo	7/PKN(N)266671	Cutting Worker
20.	Ma Aye Mi San	7/PKN(N)104692	Sewing Worker

10.12.6Grievance Redress Mechanism (GRM)

A grievance mechanism is a formal, legal or non-legal (or judicial/ non-judicial) complaint process that can be used by individuals, workers, communities dn/or civil society organizations that are being negatively affected by certain business activities and operations.

Grievance mechanisms are also called 'dispute', 'complaints' and 'accountability' mechanisms.

- **Grievance mechanisms for human rights violations**

Grievance mechanisms exist at the project, company, sector, national, regional, and international levels. They may directly address a company's behavior and respoinsibilities, a governmetn's obligation to protect citizens or an institution's duty to comply with its policies and procedures. Grievance mechanisms also vary in objective, approach, target groups, composition, government backing, procedure and costs.

- **Guide for filling a Complaint or Suggestion**

Refer to the rule 57 of Rules and regulations

This guidance aims to familiarize the types of issues which need to consider, decisions to make, activities need to make, activities need to carry out, and information need to document in order to file a complaint with a grievance mechanism.

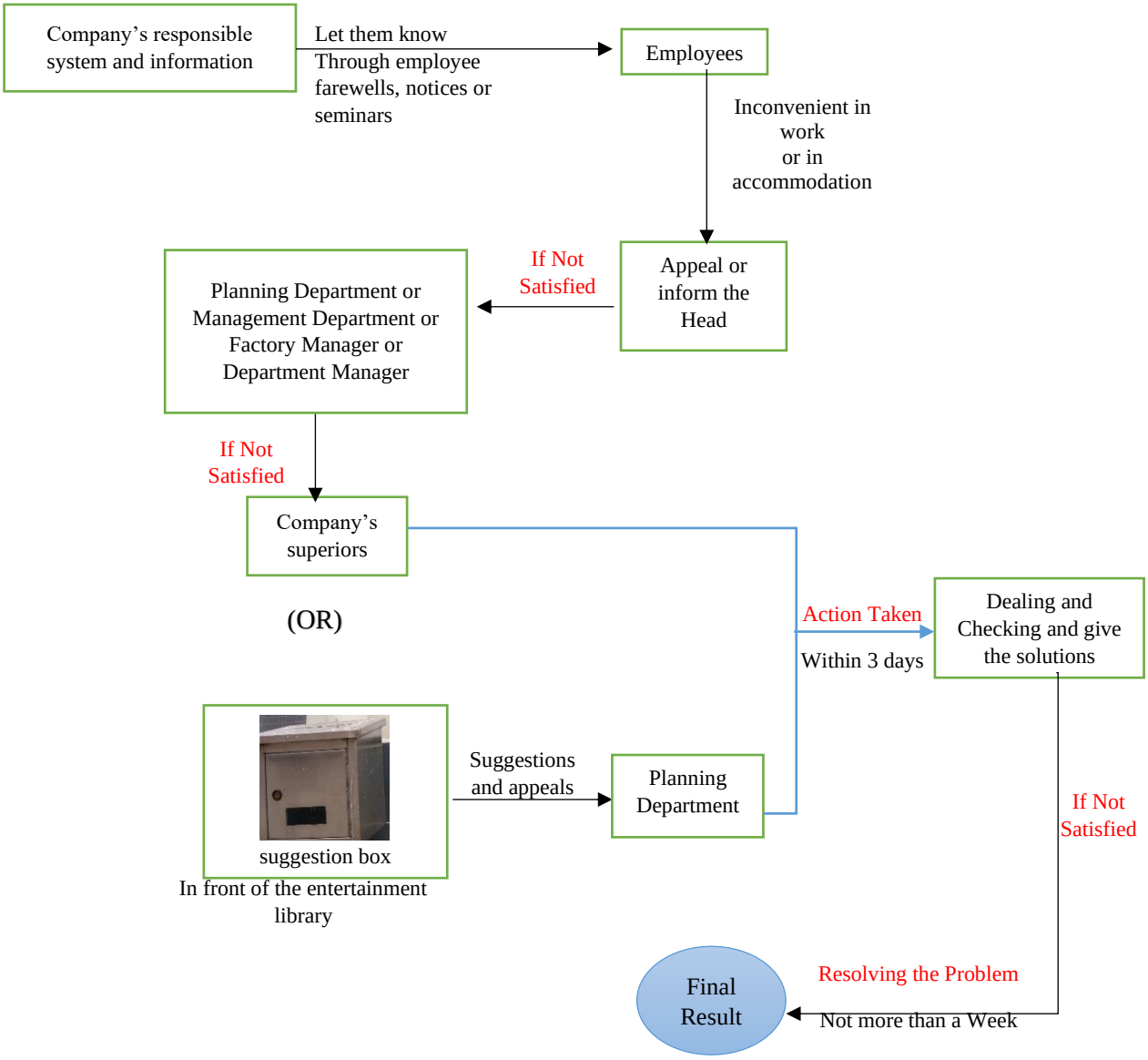


Figure 10-21 Filling a Complaint /Suggestion and Solution Guide Used in the Company

- **Suggestion box for complaints from employees**

In order to appeal about the employee's problem or any misunderstanding between employees, the project proponent has a system to put the complaints in suggestion box.

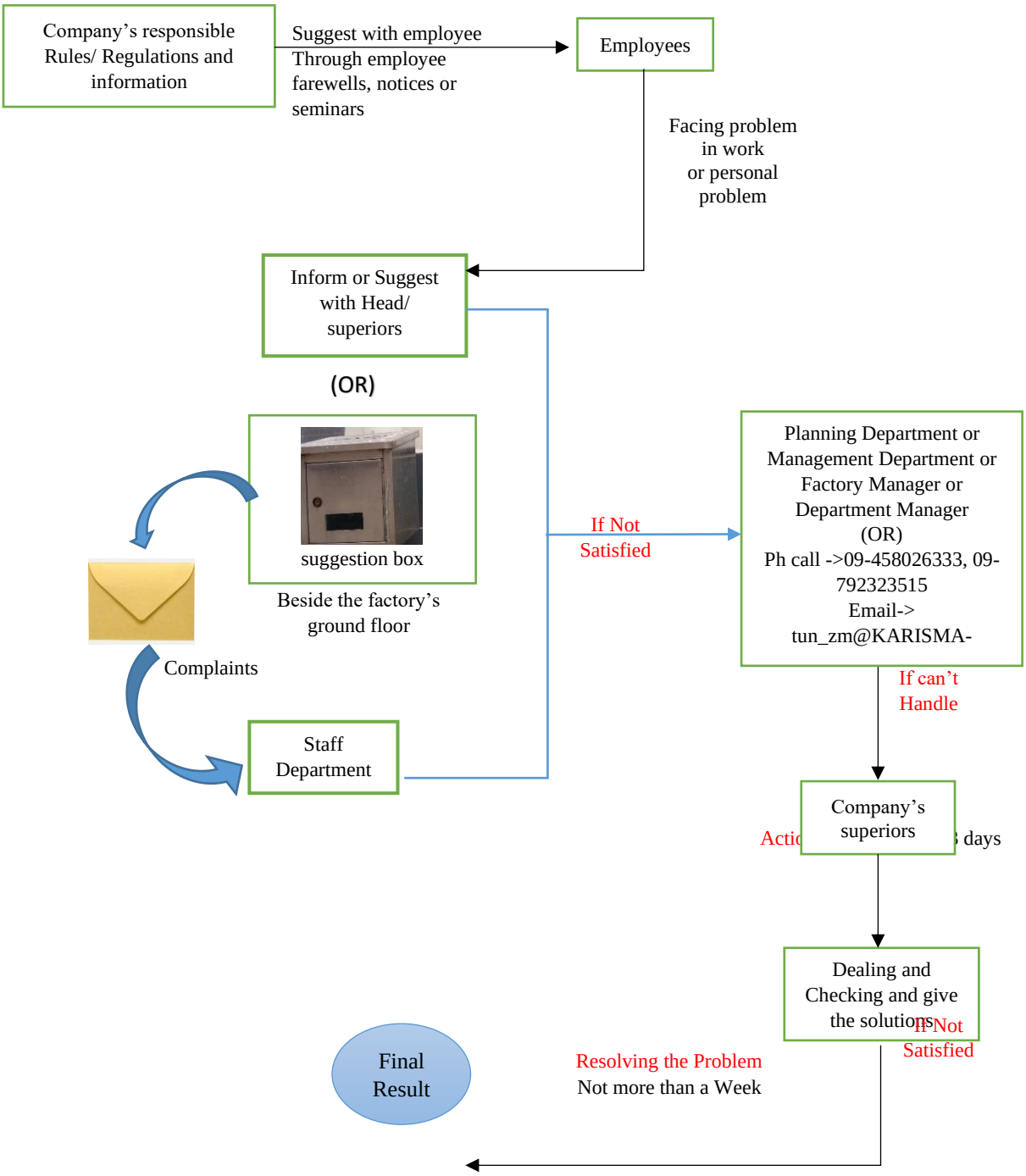


Figure 10-22 Solving the Complaints from Employee of the Factory

11.0 PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

Public involvement is a vital component in any development project and is an essential part of EMP process for the familiarization of the proposed plan by people or stakeholders. As part of this EMP, public participation involved not only meetings with nearest local residents but also discussion with factory employees.

The purpose of the consultation is

• Educating and informing the public,

• Incorporating public values into decision-making,

• Improving the substantive quality of decisions,

• Increasing trust in institutions,

• Reducing conflict, and

• Achieving cost-effectiveness.

The public consultation process should take full account of the following key planning tasks:

• Identify all stakeholder groups

• Identify the key issues around which consultation will be needed

• Understand the decision-making process

• Determine the necessary level of consultation

• Identify key consultation points

• Select consultation techniques

• Define a communication methodology

• Develop a budget.

11.1 Consultation with Factory Staff and Employees

Green Myanmar Environmental Services Co., Ltd. met the employees of the factory at the canteen; in 8^{th,} 9th, 10th November 2018 and they were urged to inform their suggestions and opinions about the occupational health such as personal protection equipment usage, availability of drinking water, condition of water-closet and sanitation, conditions of workplace such as noise, odor and vapor, light intensity, fire facilities, and ventilation, conditions of social relation between them, horizontal and lower level and other statements not include above. The 1125 numbers of attendance and 953 numbers of suggestion and opinions were collected and these documents and recorded photos are attached as **Appendix 56, 57 and 58.** The suggestions and opinions were briefly stated as follow:

- As regard the personal protection equipment, some persons mentioned that they are supported but 6 persons asked to provide personal protective equipment
- As regard the drinking water, most persons mentioned that they are supplied with good drinking water but (56) persons mentioned that sometimes there was the shortage of drinking water and there wasn’t enough cup

- As regard the sanitation system, most persons mentioned the sanitation system is good but (44) persons mentioned that there is no enough restrooms and some rooms are damaged
- As regard the water closet, most persons mentioned the water closets are enough and clean but (17) persons mentioned to soap is not enough for cleaning
- As regard the noise in workplace, most persons mentioned that it was not noisy but (77) persons mentioned that it was noisy.
- As regard the bad odor and vapor, most persons mentioned that it was no bad odor and vapor but (65) persons mentioned the ambient air is odorous.
- As regard the light intensity of workplace, all persons recommend gave no comments
- As regard the particulates dispersion in workplace, most persons mentioned that it was no dispersion of dust but (19) persons mentioned that it was particulates dispersion
- As regard the ventilation of workplace, most persons gave no complaints but (100) persons mentioned it was not good.
- As regard the social relation, all persons mentioned the relation between the different levels is smooth.

About the extra statements are:

- In summer, should set up a fan or air-con to prevent heat stroke
- Please open the door because there are many times when the entrance, nearest the work place, lunch time, to ventilation system, emergency condition at the factory
- To provide overtime
- Don’t change work section if do not agree by the workers
- To reduce target amount for production
- To open music at the working period
- To increase lunch time from 45 minutes to 60 minutes

Facts above mentioned were collected and sent to the responsible person of factory and got their reply to carry out their suggestion, and mentioned at attached. Attendee lists, their comments and suggestions were shown to **Appendix 56, 57 and 58**.

Figure 11-1 Photos Record of Employees Discussion Program

11.2 Consultation with Public and Neighbors of Factory

There are two ways of discussion, one way is participants can involve themselves in public consultation meeting and another way is by writing suggestions on distributed suggestion form.

Meeting attendees were encouraged to ask questions and give comments during and after the presentation. Comment forms were available at each meeting for attendees to write comments at the time of the meeting.

On February 6th 2019 at Myo Oo Zinamanaung Monastery of Oakthar (9) Ward, Bago Township, public meeting for disseminating project information to general public including

stakeholder and requesting their comments and (16) suggestions letter well collect from the (32) participants from local community attended the public meeting and participated in open discussion. Attendee lists were shown to **Appendix 59**. Their comments and suggestions were attached as **Appendix 60**.

The main points of discussion, questions and answers were mentioned in the following table.

Table 11-1 Excerpts of Suggestion at the Public Consultation Meeting

No.	Discussions	Explanation
1.	**U Maung Cho – Hundred household Administrator (Oakthar (9) Ward)** • I would like to suggest a local development necessity such as regional school, to develop road at the Oakthar (9) Ward by the factory collaborate with local residents	**U Tun Zaw Myint – Admin and HR Manager (KARISMA APPAREL (MYANMAR) CO., LTD** • The support group is established at the factory, we take donation necessity places such as monastery, natural disaster places, teaching fees for Orphans • Moreover, we will donate and provide to develop regional area collaborate with local residents

Table 11-2 Excerpts of Suggestion Letters from Public Consultation Meeting

No.	Participants	Suggestions and Discussions
1.	U Zaw Min Tun	• The road is damaged due to the freight vehicles and ferry of the factory. Please fix Shwe Ohn Pin road, it is easy for local residents and employees to commute
2.	U Aye Win	• Please make sure to make it not to be noisy • After treatment the wastewater, please dispose it • Please make sure to pay the labor cost of the employees
3.	Ko Aung Gyi (Ten Household Administrator of Oakthar (9) Ward)	• To provide CSR (2 %) such as local developing, road and bridge, educational developing from the benefit of the factory
4.	U Than Zaw	• To know about of the labor difficulty as a manager, help them with the trouble at the work place
5.	U Tun Myint	• Thank you very much for the company that makes good profits for the political tax
6.	U Win Win Tun (Office staff at General Administrative Department)	• Is was a factory that was able to get a regional employment opportunity because of follow to the National Rule and Law, Procedure • Please take care not to cause a fire hazard
7.	U Hla Myint	• Please set up the monitoring team and take care of the necessary places such as school and road in the Oakthar (9) ward

No.	Participants	Suggestions and Discussions
8.	U Khin Zaw	• Are you performing social activity, road and to develop for educational
9.	Mg Cho (Hundred Household Administrator of Oakthar (9) Ward)	• Please try not to cause Air quality, Water quality, odor, Noise, vibration, and any environmental damage • Not to harmful to the public
10.	U Tin Soe	• To increase the country's tax • To reduces air pollution • To reduces dispose of wastewater • To be good for transportation • To follow the National Policy and guideline
11.	U Aung Myint	• I would like to have a local development necessity such as regional school, to develop road at the Oakthar (9) Ward by the factory with collaborate with local residents
12.	Daw San San Aye	• I want you to make an arrangement for the ward. Thank you for your explanation
13.	U Aung Myint Naing (Ten Household Administrator)	• Our son and daughter can get a job at a factory. Thank you so much.
14.	Daw Than Than Maw	• I am satisfied with the performance and discussion. Thank you
15.	Daw Thidar	
16.	Maung Ye Myint Aung	• Thank you

Figure 11-2 Recorded Photos taken from Public Disclosure Meeting

11.3 Response for Comments and Suggestions

The proponent's commitment is attached as **Appendix 61**.

Table 11-3 Commitments to Suggestion of Factory's Workers and Local Residents

No.	Suggestions and Discussions	Commitments
Suggestion of Factory's Employees		
(1)	To provide a mask	• We are providing department that requires nasal masks
(2)	Sometimes, the shortage of drinking water is not enough and cup is not enough	• Normally, drinking water is enough. In lunch time, all the employees were at the same time and the shortage of them occurred at the same time, will were for these facts • The public water container is prohibited by the factory because it is the first priority of the employee's health and sanitation, we recommend employees to bring their own water container. Also, there is a place to keep a cup of water
(3)	There is not enough restroom and some rooms are damaged	• We will arrange excess male restrooms instead to female restrooms because the number of girls are more than the boys at the factory

No.	Suggestions and Discussions	Commitments
		• We will arrange the repair department to repair it and encourage the employees to use them properly
(4)	Soap is not enough for cleaning	• We will arrange the soap to be sufficient
(5)	There is a noise	• We will provide ear mask if the noise level are over than the National Standard Guideline
(6)	It has a strong smell	• We will perform priority to cleaning and to good ventilation system
(7)	It has a little particulates dispersion	• We will arrange good planning for dust collect system
(8)	Ventilation system are not good	• We will perform good ventilation system
(9)	In summer, should set up a fan or air-con to prevent heat stroke	• We will arrange to open the door and all the installed fans are open at the time of the work
(10)	To open the door such as when the entrance nearest the workplace, lunch time, to good ventilation system and emergency condition	• We will arrange it according to the Garments of the factory, inventory of the factory and security situation
(11)	To provide overtime	• We will perform it according to the production of the factory
(12)	Don't change work section if do not agree by the workers	• We make sure not to be reduced of the benefit of employees it according to the labor law
(13)	To reduce target amount for production	• We will perform it according to the production of the factory, depending on the percentage of production, the bonus payment is carried out
(14)	To open music at the working period	• We take open the music at the lunch time and overtime, we will perform for normal work time it depends on the numbers of request of the employees
(15)	To increase lunch time from 45 minutes to 60 minutes	• We will perform it depends on the numbers of request of the employees
Suggestion of Local Residents		
(1)	The road is damaged due to the freight vehicles and ferry of the factory. It is easy for local residents and employees to commute, please fix Shwe Ohn Pin road	• We will submit it to the relevant Industrial Zone Administrative Committee and collaborate with them
(2)	Please make to make it not to be noisy	• We are taking measures not to cause any environmental damage
(3)	After treatment the wastewater, please dispose it	• There are two wastewater treatment plants in the factory
(4)	Not to affect to the Air quality, water quality, odor, noise, and vibration of the environment of the residents	• We will perform not to pollute to the environment and not to harm the public it according to the Environmental Management Plan (EMP)

No.	Suggestions and Discussions	Commitments
(5)	To dispose solid waste systematically	• We will solid waste dispose systematically it according to the City Development Committee (Bago)
(6)	Take care of the fire hazard	• We must sure Fire Fighting, Emergency Generators, Fire Department, checking the fire extinguisher, the Government Fire Department check to the factory, Fire Fighting performance at the factory by quarterly
(7)	Please make sure to pay the labor cost of the employees	• We are paying basic salary (4,800) per day to the employees according to the labor law
(8)	To know about of the labor difficulty as a manager, help them with the trouble at the work place	• We made suggestion box to report any difficulty of the employees, phone number and email address are put it on the notice board to direct connect to the factory manager • We have support plan and providing to the factory's employees such as their family affair
(9)	To provide CSR (2 %) such as local developing, road and bridge, educational developing from the benefit of the factory	• The support group is established at the factory, we take donation necessity places such as monastery, natural disaster places, teaching fees for Orphans • Moreover, we will donate more than now and provide to develop local area
(10)	I would like to have a local development necessity such as regional school, to develop road at the Oakthar (9) Ward by the factory collaborate with local residents	• The support group is established at the factory, we take donation necessity places such as monastery, natural disaster places, teaching fees for Orphans • Moreover, we will donate and provide to develop regional area collaborate with local residents
(11)	Please set up the monitoring team and take care of the necessary places such as school and road in the Oakthar (9) ward	• There were organized the support group in 2017 at the factory, we will provide necessity places such as monastery, natural disaster places, teaching fees for Orphans
(12)	Are you performing social activity, road and to develop for educational	• We will perform to develop at the Oakthar (9) Ward by the factory collaborate with local residents through the support group of the factory

11.4 Information Disclosure

To inform to the employees and local residents about the project proponent's commitment on suggestion and discussion of employees' discussion program and public consultation meeting, the project proponent made such report publicly available on the notice board at the factory premise and the administrative office of Oakthar (9) Ward, Bago Township.

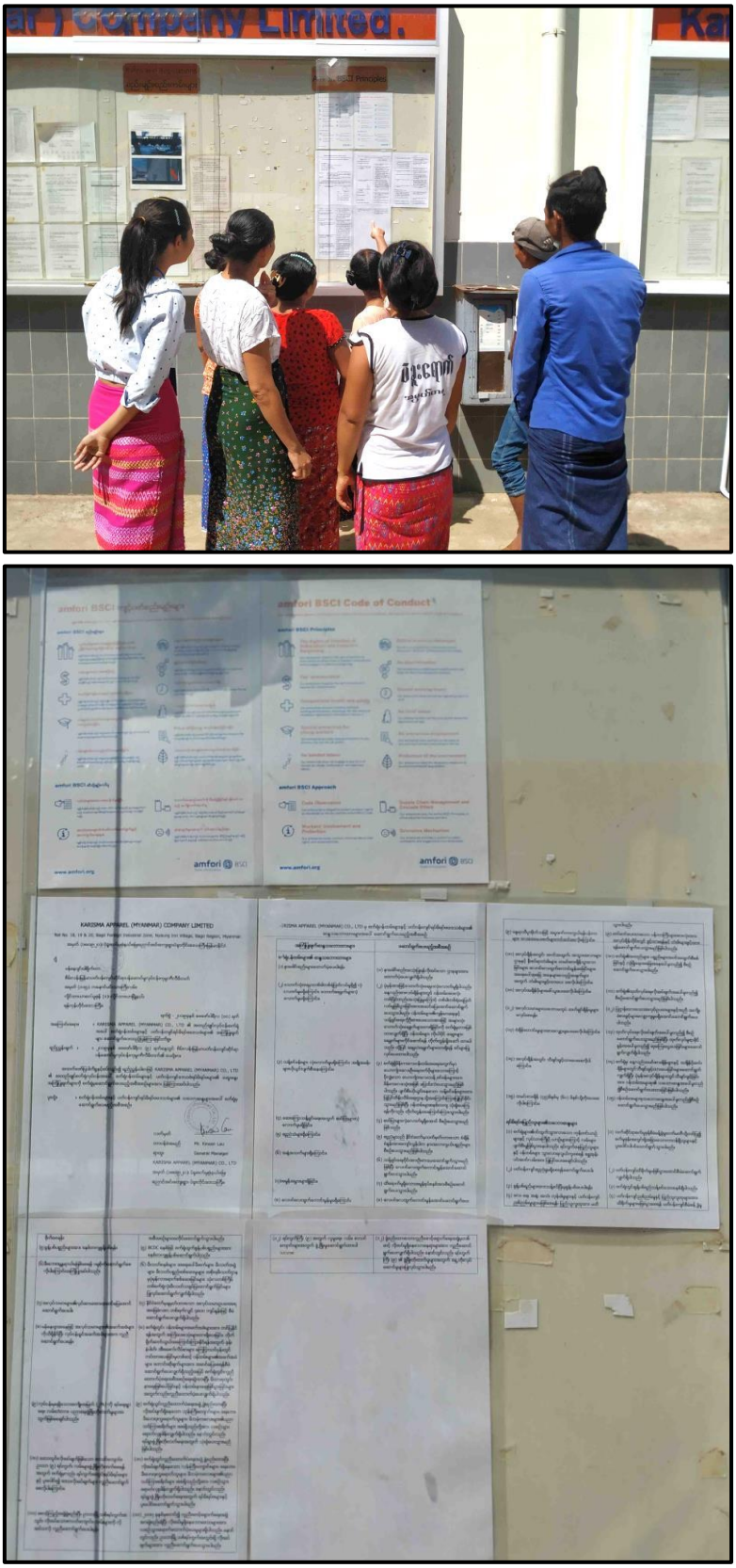


Figure 11-3 KARISMA's Commitment on Suggestion and Discussion of Employees' Discussion Program and PCM at the Factory's Notice Board

Figure 11-4 KARISMA's Commitment on Suggestion and Discussion of Employees' Discussion Program and PCM at the Notice Board of administrative office of Oakthar (9) Ward

12.0 WORK PLAN AND IMPLEMENTATION SCHEDULE

12.1 Social Environmental Aspects

- There is No rehabilitation/resettlement issues are involved
- The project on implementation will generate direct employment opportunities
- The project is a garment factory on CMP basis, which is owned by KARISMA Apparel (Myanmar) Company Limited, hence the tax revenue for proposed project will be directly paid to the Government.
- Activities such as donation and charity had been implemented.
- Project proponent is already engaged with many activities under various sector such as public educational, health, cultural as well as welfare activities, and will continue the activities with updated mechanisms.

Figure 12-1 Social Donation, Charity Records and Low Carbon Manufacturing Programme (LCMP)

12.2 Time Schedule for Implementation of the EMP

Actions	Responsible party/person	Monitoring/ Measurement
Develop action plans against mitigation measures	KARISMA Apparel (Myanmar) Company Limited	Will do in future
Implement mitigation action plans, re-layout, install new equipment.		No need yet
Install fire protection system at storage area		**Done**
Provide training and on EMP implementation		Training records