

**Environmental Impact Assessment for
the Hmawbi Agricultural Inputs Complex
(HAIC)
Final ESIA Report**

6 June 2019

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Hmawbi Agricultural Inputs Complex (HAIC) Project

Environmental Impact Assessment for the Hmawbi Agricultural Inputs Complex (HAIC)

Final ESIA Report

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<p>This document presents the ESIA Report as part of the Environmental Impact Assessment for the Hmawbi Agricultural Inputs Complex (HAIC)</p>		6 June 2019			
		Approved by:			
		 <p>Craig Reid Partner</p>			
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မြန်မာ့သြာလာလုပ်ငန်းစုကုမ္ပဏီလီမိတက်မှ စိုက်ပျိုးရေးသုံးဆေးဝါးများ ထုတ်လုပ်သည့် စက်ရုံစီမံကိန်းအတွက် တင်ပြထားသည့် ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာအပေါ်စိစစ်တွေ့ရှိချက်နှင့် သုံးသပ်အကြံပြုချက်များ

အမှတ်စဉ်	အခန်း	ပထမအကြိမ် သဘောထားမှတ်ချက်	ကုမ္ပဏီမှ ပြန်လည်ဖြေကြားချက်	ထပ်မံအကြံပြုချက်	ကုမ္ပဏီမှ ထပ်မံ ပြန်လည် အကြံပြုချက်
(က)	အကျဉ်းချုပ်အစီရင်ခံစာ				
၁။	၁.၂ (၁-၂)	အကျဉ်းချုပ်အစီရင်ခံစာ၏ စီမံကိန်း အကြောင်းအရာ ဖော်ပြချက်တွင် ထုတ်လုပ်မှုပမာဏကိုသာ ဖော်ပြထားပြီး ယူနစ်အား ဖော်ပြထားခြင်း မရှိသည့်အတွက် ထည့်သွင်းဖော်ပြရန်၊	အခန်း ၁.၂ တွင် ကီလိုဂရမ်အစား ကီလိုဖြင့် ထည့်သွင်းဖော်ပြထား ပါသည်။	သဘောထားပေးရန်မရှိပါ။	
၂။	၁.၂ (၁-၂)	(2007) EHS guidelines for Pesticide Manufacturing, formulation and Packing's အခန်း ၁၁ တွင် ဖော်ပြထား သော Environmental Issues များတွင် Air	အခန်း ၁.၃ တွင် Environmental Baseline Conditions တွင် ဖော်ပြထားကြောင်း ရေးသားထားသော်လည်း စိစစ်တွေ့ရှိခြင်းမရှိပါ။	လက်ရှိ လေထု အရည်အသွေးကို တိုင်းတာပြီး ထည့်သွင်းဖော်ပြရန်၊	• အခန်း ၁.၃၊ ဇယား ၅.၈၊ ၅.၉၊ ၅.၁၀၊ ၅.၁၁ တို့တွင် လက်ရှိ လေထု အရည်အသွေးကို ဖော်ပြထားပါသည်။

		Emission ဟု ပါရှိသည့်အားလျော်စွာ Impact Severity and Receptor နှင့် ချိတ်ဆက်နေသော စီမံကိန်း ဝန်းကျင်၏ လက်ရှိ လေထု အရည် အသွေးအားထည့်သွင်း ဖော်ပြရန်၊			• EIA Procedure အရ ပတ်ဝန်းကျင် ရေနှင့် လေ အရည်အသွေး တိုင်းတာမှု များအား Operation phase အတွင်း နှစ်စဉ် တိုင်းတာ ၍ ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးဦးစီး ဌာန သို့တင်ပြ သွားပါမည်။
၃။	အကျဉ်း ချုပ်အစီရင် ခံစာ (၅)	ပြည်သူလူထုအခြေခံ အဆောက် အအုံနှင့် ပတ်သက်၍ ထိခိုက်နိုင်မှု အပေါ် အဆိုပါ အကြံပြုချက်အား အနံ့ဆိုင်ရာ ကိစ္စရပ်ကို ရောနှော ဖော်ပြထားသည်ကို စိစစ်တွေ့ရှိရ ပါသည်။	ဇယား ၁.၂ တွင် ကုမ္ပဏီအနေဖြင့် Existing Road ကိုသာ အသုံးပြု မည်ဖြစ်ပြီး ဒေသခံအဖွဲ့အစည်းများ အနေဖြင့် မကျေနပ်မှုများရှိလာပါက Community Grievance Mechanism ထားရှိပြီး မကျေနပ် ချက်များကို ဖြေရှင်းဆောင်ရွက် သွား မည်ဖြစ်ကြောင်း ဖော်ပြထားပါသည်။	ဇယား ၁.၂ ပါ အချက် အလက်များ ပါဝင်သည့် အကြောင်း အရာများကို ပြန်လည်ပြင်ဆင်ပေးပါ ရန်၊	ဇယား ၁.၂ တွင် အဆိုပါအချက်များကို ပြန်လည် ပြင်ဆင် ထားရှိပြီး ဖြစ်ပါ သည်။
(ခ)	နိဒါန်း				

၄။	၂.၂ (၂-၁)	စီမံကိန်းအဆိုပြုသူအနေနှင့်စပ်လျဉ်း ၍ လိပ်စာ၊ ဖုန်းနံပါတ်၊ အီးမေးလ် စသည့်အချက်အလက်များ ထည့်သွင်း ဖော်ပြရန်၊	အခန်း ၂.၂ တွင် စီမံကိန်းအဆိုပြုသူ ဖော်ပြချက်တွင် ထည့်သွင်းဖော်ပြ ထားပါသည်။	သဘောထားပေးရန်မရှိ ပါ။	
(ဂ)	မူဝါဒ၊ ဥပဒေနှင့် အဖွဲ့အစည်းဆိုင်ရာမူဘောင်				
၅။	(၃-၁)	အောက်ပါနိုင်ငံတကာ Guidelines များကို ထည့်သွင်းဖော်ပြရန်- ❖ World Bank Group Specific Guidelines ❖ EHS Guidelines for Nitrogenous Fertilizer Production ❖ EHS Guidelines for Phosphate Fertilizer Manufacturing	ယခုစီမံကိန်းအနေဖြင့် pesticide, herbicide and fungicide ကဲ့သို့သော စိုက်ပျိုးရေးသုံး ဓာတု ပစ္စည်းများကိုသာ ထုတ်လုပ်မည် ဖြစ်ကြောင်း ဖော်ပြထားပါသည်။	အဆိုပါ အကြောင်းအရာ အား အစီရင်ခံစာတွင် ထည့်သွင်းဖော်ပြ ရန်၊	အခန်း ၃.၁ တွင် ထည့်သွင်းဖော်ပြ ပြီး ဖြစ်ပါ သည်။
၆။	ဇယား ၃.၂.၁(၃-၃)	အခန်း ၃.၂.၁ ၏ ဖော်ပြချက်အရ ကုမ္ပဏီ ရင်းနှီးမြှုပ်နှံမှု အမျိုးအစား သည် PS5, PS 6, P 7 and PS 8 များနှင့် ဆက်နွှယ်မှုရှိကြောင်း ဖော်ပြ	အခန်း ၃.၂.၁ တွင် ရှင်းလင်းဖော်ပြ ထားပါသည်။	သဘောထားပေးရန် မရှိပါ။	

		ထားသည်ကို စိစစ် တွေ့ရှိရပါသည်။ သို့သော် စီမံကိန်းအမျိုး အစားအရ Hazardous chemicals များ အသုံး ပြု၍ ထုတ်လုပ်မည့်လုပ်ငန်း ဖြစ် သဖြင့် လုပ်ငန်းခွင် ဘေးအန္တရာယ် ကင်းရှင်း ရေးနှင့် Community Health and Safety စသည့် သက်ဆိုင်ရာ Performance Standardsများအား ထည့်သွင်း စဉ်းစား ထား ခြင်း ရှိ မရှိ ဖော်ပြရန်၊			
၇။	ဇယား ၃.၃ (၃-၄)	အစီရင်ခံစာတွင် World Bank Guidelines For Pesticide Manufacturing, Formulation and Packaging (2007) အား ကိုးကား ဖော်ပြထားရာ ဇယား ၃.၃ တွင် Chromium ဟုသာ ဖော်ပြထားပြီး ရည်ညွှန်းပါ Guidelines တွင် Chromium (Hexavalent) ဟု ဖော်ပြ	ဇယား ၃.၃ တွင် ထည့်သွင်းဖော်ပြ ထားပါသည်။	သဘောထားပေးရန်မရှိ ပါ။	

		ထားသည့်အတွက် ရှင်းလင်း ဖော်ပြရန်၊			
၈။	၃.၂.၂ (၃-၃မှ၃-၅)	သက်ဆိုင်ရာ Guidelines ဖော်ပြချက်များတွင် Pesticide Manufacturing အတွက်သာ ရည်ညွှန်းဖော်ပြထားပါသည်။ သို့သော် အခန်း ၄.၄.၃ တွင် The HAIC will have the capabilities to formulate a variety of pesticides, herbicides, fungicides, and foliar fertilizers”, ဟု ဖော်ပြချက်အရ ယခုစီမံကိန်း အမျိုး အစားသည် Pesticides သာမက Fertilizer စသည့် အခြား Agrochemical Products များ ထုတ်လုပ်မည်ဟု ယူဆရသည့် အတွက် အဆိုပါအချက်များကို ကွဲပြား စွာ ရှင်းလင်းဖော်ပြရန်၊	ယခုစီမံကိန်းအနေဖြင့် Pesticide, Herbicide and Fungicide ကဲ့သို့သော စိုက်ပျိုးရေးသုံး ဓာတုပစ္စည်းများကိုသာ ထုတ်လုပ်မည် ဖြစ်ကြောင်း ဖော်ပြထားပါသည်။	အဆိုပါ အကြောင်းအရာ အား အစီရင်ခံစာတွင် ထည့်သွင်း ဖော်ပြရန်၊	အခန်း ၃၊ စာမျက်နှာ ၃-၃ တွင် ထည့်သွင်းဖော်ပြပြီး ဖြစ်ပါ သည်။
၉။	၃.၂.၃ (၃-၅)	Myanmar Legislation အခန်းတွင် စီမံကိန်းနှင့်ဆက်နွှယ်သည့် Laws and	The Welfare of Labors of Oilfield Act, 1951 အား ဇယား ၃.၆ တွင်	သဘောထားပေးရန် မရှိပါ။	

		<p>Regulations များ ဖော်ပြထားခြင်းမရှိကြောင်း၊ သို့ရာတွင် The Welfare of Labors of Oilfield Act 1951 အစရှိသည့် Oil and Gas Sector နှင့် ဆက်နွယ်သည့် Myanmar Laws and Regulations များ ဖော်ပြထားရာ ယခုဖော်ပြပါ စီမံကိန်း နှင့် မည်ကဲ့သို့ သက်ဆိုင်မှုရှိသည်ကို ရှင်းလင်း ဖော်ပြရန်နှင့် Agrochemical Formulation နှင့် သက်ဆိုင်သည့် Laws and Regulations များကို ထည့်သွင်းဖော်ပြရန်၊</p>	<p>ဖော်ပြခြင်း မပြုတော့ဘဲ အခြားသက်ဆိုင်သည့် Laws and Regulations များကို ဇယား ၃.၆ တွင် ထည့်သွင်းဖော်ပြထားပါသည်။</p>		
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၁၀။	3.2.3 (3-7)	အခန်း ၂.၁ နှင့် အခန်း ၄.၄.၃ ဖော်ပြချက် များအရ ယခုဖော်ပြပါ စီမံကိန်းအမျိုးအစား သည် Agrochemical Formulation များ ဆောင်ရွက်ရမည့် စီမံကိန်း ဖြစ်ကြောင်း သိရှိရသည့်အတွက် NEQG တွင် သက်ဆိုင်ရာ စီမံကိန်း အမျိုးအစားနှင့် ဆက်စပ်မှု မရှိသည့် NEQG For Oil and Gas Sector ကို ထည့်သွင်းဖော်ပြထားသည့်အတွက် ယခု စီမံကိန်းနှင့် မည်ကဲ့သို့ ဆက်စပ်မှု ရှိကြောင်း ဖော်ပြရန်၊	ဇယား ၃.၆ တွင် ပြင်ဆင်ဖော်ပြ ထားပါသည်။	သဘောထားပေးရန်မရှိပါ။	
၁၁။	3.4.1 (3-21)	မြန်မာ့ဩဘာကုမ္ပဏီလီမိတက်၏ တာဝန် နှင့် ဝတ္တရားများကို ဇယား ၃.၆ တွင် ဖော်ပြထားမှုများသည် ကိုက်ညီမှု မရှိသည့်အတွက် ပြင်ဆင်ဖော်ပြရန်၊	ဇယား ၃.၁၀ တွင် ပြောင်းလဲပြင်ဆင် ဖော်ပြထားပါသည်။	သဘောထားပေးရန်မရှိပါ။	
၁၂။	3.4.2 (3-22)	လုပ်ငန်းလည်ပတ်ခြင်းအဆင့်တွင် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်ကို အကောင်အထည်ဖော်ခြင်း၊	အခန်း ၃.၄.၂ တွင် လုပ်ငန်းလည်ပတ်ခြင်းအဆင့်တွင် plant operation အတွက် ကန်ထရိုက်တာဖြင့် ဆက်	လုပ်ငန်းလည်ပတ်ခြင်း အဆင့်တွင် ဆောင်ရွက်မည့်အစီအစဉ်များနှင့်	<ul style="list-style-type: none"> Incinerator and Wastewater Treatment Facilities အကြောင်း များ

		စောင့်ကြပ်ကြည့်ရှုခြင်း လုပ်ငန်းများ၊ Incinerator and Wastewater Treatment Facilities များ ဆောင်ရွက်မှုဆိုင်ရာ အဖွဲ့အစည်း ဆိုင်ရာ မူဘောင်နှင့်သက်ဆိုင်သည့် တာဝန်နှင့် ဝတ္တရားများ ရှင်းလင်း ဖော်ပြ ထားခြင်းမရှိသည့်အတွက် ထည့်သွင်း ဖော်ပြရန်၊	သွယ် ဆောင်ရွက်သွားမည်ဖြစ်ပြီး လျှော့ချမည့်နည်းလမ်းများ အပေါ် အကောင်အထည်ဖော် ဆောင်ရွက် သွားမည်အဖွဲ့က Contractors Operation မှ တာဝန်ယူဆောင်ရွက် သွားမည်ဖြစ်ကြောင်း၊ လုပ်ငန်း လည်ပတ်ခြင်းအဆင့်တွင်ဆောင်ရွက် ရမည့် Role and Responsibility ကို ထည့်သွင်းဖော်ပြထားပါသည်။	စပ်လျဉ်း၍ Wastewater Treatment and Incinerator, Monitoring Activities for Incinerator and Wastewater Treatment Facilities Implementation Related Institution Framework etc) တို့ကို ပြည့်စုံစွာထည့်သွင်းဖော် ပြရန်၊	ကို အခန်း (၄.၄.၃) စာမျက်နှာ ၄-၁၄ မှ ၄-၁၆ အတွင်း ထည့် သွင်း ဖော်ပြထားပါသည်။ • လုပ်ထုံးလုပ်နည်း များနှင့် အသေးစိတ် လုပ်ငန်း အဆင့်များကို ESMP တွင် ဖော်ပြထားပါသည်။ • ၂၀၁၉ ခုနှစ်၊ ဇွန်လ တွင် ESMP ကို တင်ပြမည် ဖြစ်ပါသည်။
၁၃။	3.5 (3-22 to 3-25)	အဆိုပြုအစီရင်ခံစာတွင် World Bank Guidelines ၏ ကိုသာ အဓိက ဖော်ပြထား ပြီး World Bank Group ESHS Guidelines and National Environmental Quality (Emission) Guidelines for Agrochemical	❖ အခန်း ၃.၅ တွင် air emission and effluentနှင့်ပတ်သက်သည့် အချက်အလက်များကို ဖော်ပြ ထားပါသည်။ ❖ ဇယား ၈.၂ တွင် Measures and standards for chemical waste	❖ စာမျက်နှာ ၈-၁၄၊ ဇယား ၈.၂ တွင်ဖော်ပြထားသော Management Plan များအား လေ့လာရာ တွင် ရည်ရွယ်ချက် သာ ဖော်ပြထားပြီး	Awba မှ management plan အချက်အလက်များ အား ESMP တွင် ဖော်ပြ ထားပါသည်။

		production activities နှင့်ပတ်သက် ၍ ထည့်သွင်း ဖော်ပြရန်၊ Effluent Water and Chemical wastes နှင့်စပ်လျဉ်း၍ ဖော်ပြရန်၊	management အား ဖော်ပြထား ပါသည်။ ❖ ဇယား ၃.၆ တွင် National Environmental Quality Guidelines အား ဖော်ပြထား ပါသည်။ ❖ World Bank Group ESHS Guidelines အား ထည့်သွင်း ဖော်ပြထားပါသည်။	management plan တစ်ခုလုံးအား ဖော်ပြ ထားခြင်းမရှိသည့် အတွက် ထည့်သွင်း ဖော်ပြရန်၊ ❖ စာမျက်နှာ ၈-၁၃ တွင် These plans are currently being drafted by Awba ဟု ဖော်ပြထားသဖြင့် အဆိုပါ Management Plan များ ပြီးစီးမည့် အချိန်အား (ခန့်မှန်း) တင်ပြရန် နှင့် အဆိုပါ Management Plan များအား တင်ပြရန်၊	
(ဃ)	စီမံကိန်းအကြောင်းအရာဖော်ပြချက်				

၁၄။	4.4.3 (4-6)	ဓာတုပစ္စည်းများ၏ ပတ်ဝန်းကျင်နှင့် ကျန်းမာရေးအပေါ် သက်ရောက်မှုမှာ တစ်ခုနှင့်တစ်ခု မတူညီနိုင်သည့် အတွက် ယခုစီမံကိန်းတွင် အသုံးပြုမည့် ဓာတုပစ္စည်း (ပိုးသတ်ဆေး၊ မြေဩဇာ) စာရင်း ဖော်ပြထားခြင်း မရှိကြောင်း၊ သို့ရာတွင် ယခု အစီရင်ခံစာသည် မည်သည့် ဓာတုပစ္စည်းများအတွက် လွှမ်းခြုံမှုရှိကြောင်း သိရှိနိုင်ခြင်း မရှိသည့်အတွက် ဓာတုပစ္စည်း စာရင်းအား ထည့်သွင်း ဖော်ပြရန်၊	ကုမ္ပဏီအနေဖြင့် Trade Class II (Moderately Hazardous) Agrochemical Product ကိုသာ ထုတ်လုပ်မည် ဖြစ်ကြောင်း၊ ကုမ္ပဏီအနေဖြင့် ဓာတုပစ္စည်းစာရင်းအား အစီရင်ခံစာတွင် ထည့်သွင်းဖော်ပြ မှုမှာ အခက်အခဲရှိပါကြောင်း ဖော်ပြထားပါသည်။	WHO Class IA (Extremely Hazardous) Chemical များအား အသုံးပြုမည် မဟုတ်ပဲ Class II (Moderately Hazardous) Chemical များသာ ထုတ်လုပ်မည် (သို့)ရောင်းဝယ် ဖောက်ကားမည်ဆိုသည့်အချက် အား စီမံကိန်းအကြောင်းအရာဖော်ပြချက်တွင် ရှင်းလင်း ပြတ်သားစွာ ဖော်ပြရန်၊	အခန်း ၁.၂၊ စာမျက်နှာ ၁-၃ တွင် ထည့်သွင်းဖော်ပြပြီး ဖြစ်ပါ သည်။
၁၅။	4.4.4. (4-14)	Disposable PPE and Contaminated Containers and Packing အပြင် စာမျက်နှာ ၄-၁၈ တွင် (Sludge from the wastewater treatment is expected to be	စာမျက်နှာ ၄-၁၈ တွင် ကုမ္ပဏီအနေဖြင့် စွန့်ပစ်ရေဆိုးများကို သန့်စင်ရာမှ ထွက်ရှိလာသော Sludge များကို Licensed Hazardous Waste Management	ဘေးအန္တရာယ်မရှိသော စွန့်ပစ်ပစ္စည်း များအား မည်သို့ ဆောင်ရွက်သွားမည်ဆိုသည့် အချက်	• ဘေးအန္တရာယ်မရှိသော စွန့်ပစ်ပစ္စည်း များအား အောက်ပါစည်းမျဉ်းစည်းကမ်းအတိုင်းပြုလုပ် ဆောင်ရွက်မည်ဖြစ်ပါ

		<p>cleared regularly for incineration by the on-site incinerator) ဖော်ပြထားချက် အရ Sludge များအား ထည့်သွင်း မီးရှို့မည်ဖြစ်ကြောင်း ဖော်ပြထားသည့်အတွက် အဆိုပြုလုပ်ငန်းစဉ်မှ ထွက်ရှိလာသော စွန့်ပစ်ပစ္စည်းအမျိုးအစားများကို ထည့်သွင်း ဖော်ပြရန်၊</p>	<p>Facility in Thilawa တွင် ချိတ်ဆက် ဆောင်ရွက်သွားမည်ဖြစ်ပါသည်။ အဆိုပါ အချက်အလက်များအား လိုအပ်ပါက ECD ထံသို့ တင်ပြသွား မည်ဖြစ်ပါသည်။</p>	<p>အလက်များကို ထည့်သွင်း ဖော်ပြရန်၊ Ash(from incinerator) ဖော်ပြထားမှု မရှင်းလင်းပါ။ onsite incinerator အသုံးပြု မည့်နှင့် စပ်လျဉ်း၍ ရှင်းလင်းစွာ ထည့်သွင်း ဖော်ပြရန်၊</p>	<p>သည်။ ပထမဦးဆုံးအနေဖြင့် ဘေးအန္တရာယ်ရှိသော စွန့်ပစ်ပစ္စည်း များကို သတ်မှတ်ထားသောနေရာ တွင် ယာယီအနေဖြင့် သိုလှောင်ပါမည်။ ဒုတိယဆင့်အနေဖြင့် ထိုပစ္စည်းများအား စက်ရုံအတွင်းရှိ သတ်မှတ်ထားသောနေရာ တွင် တစ်စုတစ်စည်း တည်း စုစည်းသိမ်းဆည်း ပါမည်။ တတိယအနေဖြင့် ထိုစွန့်ပစ်ပစ္စည်းများအား လိုင်စင်ရ တတိယ အဖွဲ့အစည်းအား ငှားရမ်းကာ စနစ်တကျ ဖျက်ဆီး သွားပါမည်။</p>
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					<ul style="list-style-type: none"> • မီးရှို့စက်မှထွက်ရှိသော ပြာများကို လိုင်စင်ရ တတိယ အဖွဲ့အစည်းအား ငှားရမ်းကာ စနစ်တကျ ဖျက်ဆီး သွားပါမည်။ မီးရှို့စက်ကိုလည်း Hazardous waste management plan တွင် ဖော်ပြထားသည့်အတိုင်း အရန် အနေဖြင့်သာ ထားရှိမည်ဖြစ်ပါသည်။ အထက်ဖော်ပြပါအချက် အလက်များကို အခန်း ၄.၄.၄ တွင် ပြန်လည်ပြင်ဆင် ဖော်ပြထားပြီးဖြစ်ပါသည်။ ။ • အခန်း ၁.၆ (ဇယား ၁.၆ အပေါ်)၊ အခန်း ၄.၄.၄၊ ၅.၅.၁၊ ၆.၂.၁၊ ၆.၅.၁ နှင့် ၈.၂ တို့တွင်
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					ပြန်လည်ပြင်ဆင် ဖော်ပြပြီး ဖြစ်ပါ သည်။ • ဘေးအန္တရာယ်မရှိသော စွန့်ပစ်ပစ္စည်း များအား မည်သို့ ဆောင်ရွက်သွား မည်ဆိုသည့် အချက် အလက်များကို ESMP တွင် အသေးစိတ် ဖော်ပြ ထား မည် ဖြစ်ပါသည်။
၁၆။	4.4.4 (4-16)	ထွက်ရှိမည့် စွန့်ပစ်ပစ္စည်း အမျိုးအစား များ အား ထည့်သွင်းဖော်ပြရန်၊ Solid waste management အတွက် Incinerator တွင် Air Emission Reduction Measures များဖြစ်သည့် Cyclone Dust Removal and Activated Carbon filters တို့ ပါရှိ သည့်အတွက် Incinerator Operation Process တွင် Water Tank, Pump, Cooling Tower and	❖ ဇယား ၄.၂ တွင် စွန့်ပစ်ပစ္စည်း အမျိုးအစားများအား Hazardous and non- hazardous waste material ဖြင့် ခွဲခြားဖော်ပြထား ပါသည်။ ❖ There is no release of black water from Water Tank, Pump, Cooling Tower and Air Pollution Control Device from incinerator because those are	Hazardous Waste Management Plan ပြင်ဆင်တင်ပြပေးပါရန် ။	ဘေးအန္တရာယ်မရှိသော စွန့်ပစ်ပစ္စည်း များအား စီမံဆောင်ရွက်မည့် အစီအစဉ် အသေးစိတ် ကို ESMP ၏ ဇယား ၆.၁ တွင် ဖော်ပြသွားမည် ဖြစ်ပါသည်။

		<p>Air Pollution Control Device အသုံးပြုမှုများ ဖော်ပြထားရာ အဆိုပါ လုပ်ငန်းစဉ် များမှ ရေဆိုးထွက်ရှိနိုင်မှု ရှိမရှိ စိစစ် ဖော်ပြရန်၊ Solid Waste and Wastewater (sludge) များအား မီးရှို့ဖျက်ဆီးရာမှ နောက်ဆုံး အဆင့် စွန့်ပစ် ပစ္စည်းဖြစ်သည့်အတွက် ပတ်ဝန်းကျင်နှင့် လူထုကျန်းမာရေး အပေါ် သက်ရောက်မှု မရှိစေရန် အရေးကြီးသည့် အတွက် Hazardous Waste Management Plan ကို ပြည့်စုံစွာ ထည့်သွင်းရေးဆွဲရန်၊</p>	<p>closed system. There will be a regular schedule.</p> <p>❖ Dust Collector ထားရှိသည့် အတွက်မီးရှို့စက်မှ ပြာများ ထွက်ရှိမှုမရှိကြောင်း ရေးသား ဖော်ပြ ထား ပါသည်။</p>		
၁၇။	4.4.4 (4-16)	<p>Wastewater Treatment မှာ နောက်ဆုံး သန့်စင်ပြီးရေအား စီမံကိန်း ၏ အနီးဆုံးချောင်းသို့ စွန့်ပစ် မည် ဖြစ်ရာ အဆိုပါ စမ်းချောင်း၏ Downstream Water User များ အပေါ် သက်ရောက်မှု မရှိစေရန် စွန့်ပစ်ရေတွင် ထိခိုက်လွယ်သော ပစ္စည်းများ (ဥပမာ- ပိုးသတ်ဆေးနှင့်</p>	<p>ထုတ်လုပ်မှု နည်းစဉ်မှာ Batch operation စနစ်ဖြစ်ကြောင်း၊ Wastewater Treatment စနစ်ချို့ ယွင်းပျက်စီးခြင်းသော်လည်းကောင်း ဖြစ်ခဲ့ပါက ထုတ်လုပ်မှုလုပ်ငန်းများ ကို ခေတ္တခဏ ရပ်နားထားမည် ဖြစ်ပြီး စွန့်ပစ်ရေ ထွက်ရှိမှုများကို</p>	<p>Batch operation ဖြင့် ဆောင်ရွက်မည့် အချက် အား စီမံကိန်း အကြောင်းအရာ ဖော်ပြ ချက်၌ ဖော်ပြရန်၊</p>	<p>အခန်း ၄.၄.၃ တွင် Batch operation အကြောင်းကို ထည့်သွင်း ဖော်ပြထားပြီး ဖြစ်ပါ သည်။</p>

		မြေဩဇာ အကြွင်းအကျန်များ) မပါရှိစေရေး ဆောင်ရွက်မည့် အစီအစဉ်ကို ထည့်သွင်း ဖော်ပြရန်၊ အမျိုးမျိုး သော လုပ်ငန်းစဉ်များမှ စွန့်ပစ်ရေများသည် နေ့စဉ် 23 m ³ ထွက်ရှိကြောင်းနှင့် စာမျက်နှာ ၄-၁၆ ဇယား ၄.၃ တွင် စွန့်ပစ်ရေများအား သန့်စင်နိုင်မှု ပမာဏ သည် 1m ³ /hr သန့်စင်နိုင်ကြောင်း ဖော်ပြထားသည့် အတွက် စက်ပစ္စည်း များ ပြန်လည် ပြုပြင်ခြင်း ကာလနှင့် စက်ယန္တရားများ ရပ်နားခြင်း ကာလတို့တွင် ဆောင်ရွက်ထားမည့် အစီအစဉ် တို့ကို ထည့်သွင်း ဖော်ပြရန်၊	လည်း ရပ်နားထားမည်ဖြစ်ကြောင်း ဖော်ပြ ထားပါသည်။ Batch Operation မှ ထွက်ရှိလာသော စွန့်ပစ်ရေများကို wastewater treatment plant ဖြင့် ကိုင်တွယ် ဖြေရှင်း ဆောင်ရွက်သွားမည်ဖြစ်ကြောင်း ဖော်ပြထားပါသည်။		
၁၈။	4.4.4 (4-18)	အစီရင်ခံစာတွင် သန့်စင်ပြီးမှ ထွက်ရှိလာ သော စွန့်ပစ်ရေများကို စီမံကိန်းအနီးဝန်း ကျင်ရှိ ချောင်းထဲသို့ စွန့်ပစ်ကြောင်း ဖော်ပြ ထားသည်ကို စိစစ်တွေ့ရှိရပါသည်။	စာမျက်နှာ ၄-၁၈ တွင် စွန့်ထုတ် လိုက်သောရေများသည် Downstream Water Quality အား ထိခိုက်မှုမရှိ ကြောင်းနှင့် အဆိုပါရေထဲတွင် ဘေးအန္တရာယ်ဖြစ်စေသော ပစ္စည်းများ မပါဝင်ကြောင်း၊ အဆိုပါရေအရည်	နောက်ဆုံးစွန့်ထုတ် လိုက်သည့် နေရာအား မြေပုံပေါ်တွင် ကိုဩဒီနိတ် အမှတ်များဖြင့် ထည့်သွင်း ဖော်ပြရန်၊ တိုင်းတာ ရရှိထားသည့်	ဇွန်၊ဇူလိုင် ၂၀၁၇ အတွင်း တိုင်းတာထားသော Baseline Surface Water Quality Data အား Update လုပ်၍ ESIA ဇယား၅.၁၇ တွင်

			အသွေး အား Site Runoff Drainage Management Plan ၏ အစိတ်အပိုင်း တစ်ခုအနေဖြင့် စောင့်ကြပ်ကြည့်ရှု ဆောင်ရွက်သွားမည် ဖြစ်ကြောင်း ရေးသားဖော်ပြထားပါသည်။	ရလဒ်များကို အမျိုးသား ပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက် တန်ဖိုး များဖြင့် နှိုင်းယှဉ် ဖော်ပြ ရန်၊	နှိုင်းယှဉ် ဖော်ပြ ပေးထားပါသည်။ EIA Procedure (2015) အရ Environmental Quality Monitoring Report (လေ၊ စွန့်ပစ်ရေ နှင့် ဆူညံသံ အပါအဝင်) အား ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနသို့ နှစ်စဉ်တင်ပြသွားပါမည်။
(c)	စီမံကိန်းအနီးဝန်းကျင်အကြောင်းအရာဖော်ပြချက်				
၁၉။	5.5.1 (5-16)	ဇယား ၅.၉ အရ Monitoring stations ၅ နေရာ တိုင်းတာရာတွင် နေရာ ၄ နေရာ၏ PM2.5 သည် WHO standard ထက် ကျော်လွန် နေသည်ကို တွေ့ရှိရပြီး Status of Airshed in study မှ Degraded အဆင့်ဟု ဖော်ပြထားပါသည်။ သို့သော် PM2.5 ပမာဏများပြား ရသည့် နောက်ခံ အကြောင်းအရာများ	The status of the airshed is classified as degraded and is based on the average baseline concentration (11.3μg/m3) across all monitoring locations (AQM1 to AQM5). PM2.5 particles in ambient air result from burning of fossil fuels and organic matter, thus the reason	အဆိုပါ ဖြေရှင်းချက်များ အား သက်ဆိုင်ရာ အခန်း ကဏ္ဍတွင် ပြောင်းရွှေ့ ဖော်ပြပေးရန်၊	အခန်း ၅.၅.၁ ဇယား(၅-၁၁) အောက် တွင် ထည့်သွင်းဖော်ပြပြီး ဖြစ်ပါ သည်။

		<p>ထည်သွင်းဆွေးနွေးမှု ဖော်ပြ ထားခြင်း မရှိသည့်အတွက် ဖော်ပြရန်၊</p>	<p>for an elevated ambient PM2.5 concentration at the monitoring locations is most likely associated to a variety of reasons including, but not limited to, fuel combustion in vehicles, domestic burning of waste and biomass, and regional influences and variations due to changes in meteorological conditions.</p>		
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၂၀။	5.5.4 5-26	<p>Total Ssuspended Solid ပါဝင်မှုများ တိုင်းတာသည့် နေရာ အားလုံးတွင် များပြား နေကြောင်း၊ အဆိုပါ များပြားနေရသည့် အကြောင်းကို ဖော်ပြ ထားပါကြောင်း၊ ဇယား ၅.၅ အရ စီမံကိန်းအတွင်း ကောက်ယူသည့် Water Sampling နေရာ၏ TSS ပါဝင်မှုနှုန်းသည် အခြား နေရာများ၏ TSS ပါဝင်မှုနှုန်းထက် ၅ ဆခန့် ပိုမိုများပြား နေကြောင်း တွေ့ရှိ ရပါသည်။ Water Sampling အမှတ် ၄ ၏ နေရာတွင်လည်း TSS ပါဝင်မှု သိသာစွာ မြင့်တက်နေ ကြောင်း၊ ထို့ပြင် Guidelines အတွင်း ကျရောက် နေသော်လည်း SW1 ၏ တိုင်းတာ မှုရလဒ်များ သည် ကျန် SW များထက် ၂ ဆ ခန့် ပိုမိုမြင့်တက် နေသည်ကို တွေ့ရှိရပါကြောင်း၊ သို့သော်လည်း တိုင်တာသည့် ပါရာမီတာ များ၏ Spatial Changes</p>	<p>The TSS in locations around the project area is high due to poor watercourse management. The farm lands bordering the rivers have no protection so in the monsoon season, soil runs off from the land.</p> <p>In <i>Table 5.17</i> the value has been modified from "Available" to "20". Noted that, this value is for Discharges not for Baseline.</p>	<p>လက်ရှိ Surface Water Quality အား ဖော်ပြ ထားသော်လည်း ပြည့်စုံ လုံလောက်မှု မရှိ သည့် အတွက် ပြန်လည် ထည့်သွင်းဖော်ပြရန်၊</p>	<p>အခန်း ၅.၅.၄၊ (ဇယား ၅-၁၆) တွင် ပြန်လည် ထည့်သွင်းဖော်ပြပြီး ဖြစ်ပါ သည်။</p>
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		နှင့် နောက်ခံ အကြောင်းအရာများအား ဖော်ပြ ထားမှုမရှိကြောင်း၊ ဖော်ပြထားသည့် စံတန်ဖိုးနှုန်းများသည် WHO Guidelines Limits များ ဖြင့် အနည်းငယ် ကွဲလွဲမှုရှိနေကြောင်း စိစစ် တွေ့ရှိရသည့် အတွက် အဆိုပါ အကြောင်းအရာများကို ထည့်သွင်း ဖော်ပြရန်၊			
၂၁။	5.7.1 (5-49)	စီမံကိန်းအနီးဝန်းကျင်ရှိ ကျေးရွာများ၏ ရေအရင်းအမြစ်အား မြစ်/ချောင်းများမှ ရယူသုံးစွဲကြောင်း ဖော်ပြထားရာ ပုံ ၅.၂၉ အရ စီမံကိန်းအနီးဆုံးကျေးရွာများဖြစ်သည့် ရေတာရှည်နှင့်ညောင်ကုန်းကျေးရွာများ၏ အဓိက သောက်သုံးရေ အရင်းအမြစ်များ ဖြစ်ကြောင်း တွေ့ရှိရသဖြင့် အဆိုပါကျေးရွာ	<ul style="list-style-type: none"> ❖ The name of the creek flowing around the villages is Sa-Par-Kye Creek and it flows into Hmaw-bi river/Htan Ta Pin River. This information has been added in Section 5.7.1 ❖ Baseline water quality survey was conducted in five (5) locations nearby Awba HAIC compound (within 2 km of 	အဆိုပါ ဖြေရှင်းချက်များအား သက်ဆိုင်ရာ အခန်းကဏ္ဍတွင် ပြောင်းရွှေ့ဖော်ပြပေးရန် ၊	<ul style="list-style-type: none"> • ကျေးရွာများ၏ ရေ အရင်းအမြစ် ရယူသည့် မြစ်/ချောင်းများ အမည် ကို အခန်း ၅.၅.၄၊ ဇယား ၅-၁၆ တွင် ဖော်ပြထား ပါသည်။ • ကျေးရွာများ၏ အမည်များကိုလည်း အခန်း ၅.၅.၄ ၊ ဇယား ၅-၁၆

		<p>များမှ ရယူသည့် မြစ်/ချောင်းများ၏ အမည်၊ Baseline Surface Water</p> <p>တိုင်းတာရာတွင် Active</p> <p>Ingredients, Bioassays/Toxicity, Chromium (Hexavalent) တို့ကို တိုင်းတာ ရန်၊</p>	<p>the proposed project). The names of the villages have been included in Table 5.16</p> <ul style="list-style-type: none"> ❖ Most of the villagers in Yae Tar Shey and Nyaung Tone village use water from Hand dug well and some of them use water from the Sa-Par-Kye creek for agriculture purpose. ❖ Many households from War Net Chaung receive from hand pump well (37%), 23% from hand dug wells, 20% from river and creek, 17% from piped water supply and 3% from other sources (such as bottled). For Yae Tar Shey and Nyaung Kone village over 50% of household 		<p>တွင် ဖော်ပြထား ပါ သည်။</p> <ul style="list-style-type: none"> • စပါးကြီးချောင်းနှင့် ရေတွင်းမှ ရေ အသုံး ပြုမှုများအား အခန်း ၅.၇.၁ နှင့် အခန်း ၅.၅.၄၊ ဇယား (၅-၁၆) တို့တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ • ဖန်တွန်နည်းပညာ ကို အခန်း၄.၄.၄ ၊ ပုံ ၄-၁၉ တွင် ဖော်ပြထား ပါသည်။
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			<p>received drinking water from rivers and creeks only during the rainy season.</p> <p>HAIC wastewater treatment system uses, Fenton technique (also known as "Advance Oxidation Process") to treat the wastewater, in accordance WBG Guidelines and GIIP.</p>		
၂၂။	5.8.3 (5-64)	<p>❖ ရေတာရှည်ကျေးရွာမှ သောက်သုံးရေ အတွက် လက်ယက်တွင်းမှ အဓိက ရရှိသည်ဟု ဖော်ပြထားရာ အခန်း ၅.၇.၁ နှင့် ပုံ ၅.၂၉ ဖော်ပြချက်များ ကိုက်ညီမှု မရှိသည့်အတွက် ပြင်ဆင်ဖော်ပြရန်၊</p> <p>❖ Methodology and objectives တွင် တစ်ပါတည်း ထည့်သွင်း ဖော်ပြရန်၊</p>	<p>❖ Section 5.7.1 says that in Yae Tar Shey and Nyaung Kone villages over 50% of household received drinking water from Hmaw-bi river/ Htan Ta Pin river and Sa-Par-Kye creek rivers and creeks during rainy season.</p> <p>Focus Group Discussions methodology and objectives is included in Section 5.2.1</p>	<p>အစီရင်ခံစာ၏ Infrastructure and Utilities တွင် ရေတာရှည်ကျေးရွာ သည် သောက်သုံးရေ အား ရေတွင်းများ မှ ရယူကြောင်း ဖော်ပြ ထားရာ အခန်း ၅.၈.၃ ပါ အကြောင်းအရာများ ပြင်ဆင် ဖော်ပြပေး ပါရန်၊</p>	<p>ရေတာရှည်ကျေးရွာ၏ ၅၀ ရာခိုင်နှုန်း အထက် အိမ်ထောင်စုများသည် သောက်သုံးရေအတွက် မိုးရာသီအတွင်း မှော်ဘီမြစ်နှင့် ထန်းတပင်မြစ် တို့ မှရရှိ ကြပြီး၊ အများစုမှာ ရေတွင်းရေကိုသာ အသုံးပြုကြပါသည်။ စပါးကြီးချောင်းမှ ရေကို</p>

					စိုက်ပျိုးရေးလုပ်ငန်းများ အတွက်သာ အသုံးပြုကြောင်း အခန်း ၅.၈.၃ ၊ ပုံ ၅-၄၆ တွင် ပြန်လည် ဖော်ပြထား ရှိပြီး ဖြစ်ပါသည်။
၂၃။	5.10 (5-72)	အစီရင်ခံစာတွင် ဘုန်းကြီးကျောင်း သည် ရှေးဟောင်းယဉ်ကျေးမှုနှင့် ဆက်စပ်မှု ရှိ မရှိ ဖော်ပြရန်၊ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း ဆိုင်ရာ လုပ်ထုံးလုပ်နည်းပါ ယဉ်ကျေး မှု ဆိုင်ရာ ထည့်သွင်းလေ့လာရမည့် အချက်များကို ထည့်သွင်းဖော်ပြရန်၊ .	❖ As the Buddhist religion country, like other part of the country, many numbers of Pagodas and monasteries can be found in Hmawbi Town ship. Monasteries are the place where the monks live and celebrate the religious occasions and events. Many monasteries located in the Hmawbi Township are famous for its tranquility, respected discipline and religious	အဆိုပါ ဖြေရှင်းချက်များအား သက်ဆိုင်ရာ အခန်းကဏ္ဍတွင် ပြောင်းရွှေ့ဖော်ပြပေးရန် ၊	<ul style="list-style-type: none"> • အခန်း ၅.၁၀ တွင် ထည့်သွင်း ဖော်ပြပြီး ဖြစ်ပါသည်။ • ဆန်းစစ်လေ့လာချက်အ ရ စီမံကိန်းဧရိယာတွင် IFC PS 7(Cultural Hreitage) နှင့် ပတ်သက်သော အကြောင်းအရာများ မရှိပါ။ အခန်း ၃.၂.၁ တွင် ဖော်ပြထားပါသည်။

			<p>monuments. Moreover, it is the place where people usually collect and meet at the monasteries during religious day and taking Sabbath. Some monasteries gave monastic education to the children who are not able to go to the public schools. There are several monasteries around the project area. There is a monastery located within 500 m of the Project Site (Figure 5.53). This monastery was visited during the Site Visit in February 2017. There are about 7 monks living and sometimes people living near the monastery come and pay</p>		
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			<p>homage to the monks and the pagoda in the monastery. Given the proximity of this monastery to the Project, this was identified as one of the air and noise sensitive receptors (Figure 5.53) There is also a monastery in Wah Net Chaung where the public consultation was conducted (Figure 5.54) and there gave monastic education to the novice, nuns and orphans.</p> <p>No cultural heritage close to the project area has been identified and hence IFC PS 7 is not applicable.</p>		
၂၄။	5.11 (5-74)	ပုံ ၅.၅၁ ဖော်ပြချက်တွင် ချောင်းသို့မဟုတ် မြောင်းတစ်ခုခု ဖြတ်သန်းစီးဆင်းနေသည်ကို တွေ့ရှိရသည့်	အဆိုပါချောင်းသည် တည်ဆောက်ရေး ကာလအတွင်းယာယီ စီးဆင်းနေခြင်းဖြစ်ကြောင်း၊ လက်ရှိအနေ	အဆိုပါ အကြောင်းအရာ အပြည့်အစုံကို သက်ဆိုင်ရာ	အခန်း ၅.၁၁ တွင် ထည့်သွင်း ဖော်ပြပြီး ဖြစ်ပါသည်။

		အတွက် အဆိုပါ အကြောင်းအရာ (visual component) အား ထည့်သွင်း ဖော်ပြရန်၊	ဖြင့် ချောင်းမဟုတ်ကြောင်း ရေးသား ထားပါသည်။	အခန်းကဏ္ဍတွင် ထည့်သွင်း ဖော်ပြရန်၊	
(စ)	ပတ်ဝန်းကျင်အပေါ် သက်ရောက်မှုဆန်းစစ်ခြင်းနှင့် လျော့နည်းစေရေးနည်းလမ်းများ				
၂၅။	6-1 to 6-2	Baseline Monitoring Section တွင် Aquatic Biodiversity Species နှင့် ပတ်သက်၍ လေ့လာထားမှုမရှိခြင်း၊ North-west corner of the Project Site တွင် စမ်းချောင်းတစ်ခုရှိကြောင်း နှင့်အဆိုပါစမ်းချောင်းမှ စီမံကိန်းမှ wastewater runoff စွန့်ထုတ် မည်ဖြစ်ကြောင်း ဖော်ပြထားရာ အဆိုပါ စမ်းချောင်းအတွင်း Aquatic Biodiversity တည်ရှိမှု အခြေအနေ လေ့လာထားမှု မရှိကြောင်းဖြစ်သည့် အတွက် ထည့်သွင်း ဖော်ပြရန်၊	❖ Most of the villagers in Yae Tar Shey and Nyaung Tone village use water from Sa-Par-Kye creek for agriculture purpose during rainy season (seasonal creek). In the interviews, focus groups and public consultation, villagers mentions that they do not fish in Sa-Par-Kye creek where Awba will disposed the treated wastewater. No aquatic biodiversity has been found there. Hence no aquatic biodiversity survey was made,	အခန်း ၅.၇.၁ တွင် Sa-Par-Kye Creek မှ သောက်သုံးရေအား မိမိ အသုံးပြုနေခြင်းဖြစ်ကြောင်း၊ စွန့်ပစ် ရေဆိုးများအား အဆိုပါ ချောင်းအတွင်း စွန့်ပစ်မှုတွင် ရလဒ်များ အနေဖြင့် EQEG သတ်မှတ်ချက် အတွင်းရှိကြောင်း ဖော်ပြ ထားသဖြင့် ERM အနေ ဖြင့် aquatic biodiversity မရှိကြောင်း လေ့လာချက် အရ ERM အနေဖြင့်	<ul style="list-style-type: none"> • ဖော်ပြပြီး ဖြစ်သည့်အတိုင်း နွေရာသီတွင် ချောင်းငယ်မြောင်းငယ်များခန်းခြောက်သဖြင့် ရေနေသတ္တဝါများ တစ်နှစ်ပတ်လုံး အသက်ရှင်နေထိုင်ခြင်း မရှိပါ။ • ဒေသခံများ ပြောကြားချက် အရ စီမံကိန်း သက် ရောက်ရာဒေသအတွင်း ချောင်းမြောင်းများတွင် ငါးများသည့်အလေ့အထမ ရှိ၍ ရှားပါးငါးမျိုးစိတ်များ ထိခိုက်နိုင်မှု

			because HAIC will not disposed treated water to the river nor nearby premises.	အဆိုပါ အကြောင်းအရာ များအား ပြန်လည် ဆန်းစစ်ရန်၊	ဆန်းစစ်ခြင်းကို ဖယ်ထုတ် ထားပါသည်။ • EQEG standards အတိုင်း စွန့်ပစ်ရေများကို စွန့်ထုတ်မည်ဖြစ်သဖြင့် ၎င်းတို့အပေါ် တိုက်ရိုက်အကျိုး သက်ရောက်မှုလည်း မရှိနိုင်ပါ။ ထိုအကြောင်းအရာများကို ဇယား ၈.၃ တွင် ဖော်ပြထားပါသည်။
၂၆။		လုပ်ငန်းလည်ပတ်ခြင်းအတွင်းထွက်ရှိ မည့် ညစ်ညမ်းပစ္စည်းများ ဖော်ပြထား ပြီး Localized Impacts ဟု သတ်မှတ် ဖော်ပြ ရန်၊	❖ PME is the acronym of Powered Machinery and Equipment. ❖ As part of Awba environ - mental monitoring program, Awba will continue monitoring the parameters which have been measured	လုပ်ငန်းလည်ပတ်ခြင်း အတွင်း ထွက်ရှိမည့် ညစ်ညမ်း ပစ္စည်းများ ဖော်ပြထားပြီး Localized Impacts ဟု သတ်မှတ် ထားသည်ကို တွေ့ရှိရသည်။ သို့သော် International Finance	• လုပ်ငန်းလည်ပတ်ခြင်း မှ ထွက်ရှိမည့် Total Organic Carbon, VOC, Hydrogen Sulfide Ammonia, Gaseous Inorganic များကို ထုတ် ပြန်ကြေငြာမည် ဖြစ်ကြောင်းကို အခန်း

			<p>in June and July 2017 (construction first phase period).</p> <p>❖ In addition, Awba will start monitoring point source air emission parameters and ambient air quality parameter as defined in the WBG EHS Guidelines and WHO Guidelines on a regular basis.</p>	<p>Corporation (IFC) (2007)Environmental, Health, and Safety Guidelines for Pesticide Manufacturing, Formulation, and Packaging ဖော်ပြချက် အရ အလားတူ စီမံကိန်း အမျိုးအစားများမှ Total Organic Carbon, VOC, Hydrogen Sulfide Ammonia, Gaseous Inorganic စသည့် gaseous compound များ ထွက်ရှိနိုင်သည်ဟု ဖော်ပြထားသည်ကို တွေ့ရှိ ရပါသည်။ ထို့ကြောင့် အဆိုပြု</p>	<p>၆.၅.၁ တွင် ဖော်ပြထားပါသည်။</p> <ul style="list-style-type: none"> • ဤသတ်မှတ်ချက် ဘောင်များကို ပတ်ဝန်းကျင်ထိန်းသိမ်းမှု ဆိုင်ရာစောင့်ကြည့် အစီအစဉ်၏ လစဉ် လေ့လာဆန်းစစ်မှု အပေါ် အခြေခံ၍ ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။ ထို့ အကြောင်း အရာများကို ဇယား ၈.၃ တွင် ဖော်ပြ ထားပါသည်။
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				စီမံကိန်းမှ Guidelines တွင် ပါရှိသည့် gaseous compounds များ ထွက်ရှိခြင်း ရှိမရှိ၊ လေ့လာ ဆန်းစစ်မှု ရှိ မရှိ နှိုင်းယှဉ် ဖော်ပြရန်၊	
၂၇။	6.5.1 (6-39)	<ul style="list-style-type: none"> ❖ Air Quality Impact Assessment အား ဖော်ပြရန်၊ ❖ စီမံကိန်းမှ အနံ့ထွက်ရှိမှုနှင့် စပ်လျဉ်း၍ ဖော်ပြထားမှု မရှိသည့် အတွက် ဖော်ပြရန်၊ ❖ အခန်း ၉.၄ တွင် Consultation Meeting ၌ ညောင်ကုန်း ရွာသားများ၏ တင်ပြချက်အရ စီမံကိန်းဧရိယာ အနီး ဝန်းကျင်၌ အနံ့ဆိုးများ ထွက်ရှိကြောင်း ဖော်ပြထားသည့်အတွက် အဆိုပါ အကြောင်းအရာအား ထည့်သွင်း ဖော်ပြ ရန်၊ 	<ul style="list-style-type: none"> ❖ Ok ❖ For clarify Awba has developed an ambient air monitoring program and point source air emission monitoring program in accordance with WGB Guidelines. ❖ In order to minimized the odor Awba has implemented a series of mitigation measures such as: confined partition room for solid production to minimized the 	<p>စီမံကိန်း၏ မည်သည့် လုပ်ငန်းအဆင့်မှ ထွက်ရှိလာသောအနံ့ များနှင့် စပ်လျဉ်း၍ ဖော်ပြထားခြင်းမရှိ သည့်အတွက် ပြန်လည် ဖော်ပြရန်၊</p>	<ul style="list-style-type: none"> • လုပ်ငန်းလည်ပတ် သည့်အချိန်တွင်သာ အနံ့ထွက်နိုင်ခြေ ရှိပါသည်။အနံ့ဆိုးများ လျော့ချနိုင်ရန် အတွက် သြဇာအနေဖြင့် အနံ့ဆိုးများနှင့် ဖုန်မှုန့် များကို အနည်းဆုံး ဖြစ် စေရန် ထုတ်လုပ်မှု အခန်းများ ကို သီးခြား ကာရံထားခြင်း၊ အနံ့ဆိုးများနှင့် ဖုန်မှုန့်

			odor and dust, scrubber system source of emission to reduce odor and volatile escaping through the process. This information has been included in <i>Table 1.2</i>		များကိုလျော့ချစေနိုင်သည့် ကိရိယာများ တပ်ဆင် ထားခြင်း အစရှိသည့် စနစ်များကိုအဆင့်ဆင့် အကောင်အထည် ဖော်ဆောင်ရွက် လျှက်ရှိပါသည်။ ဇယား ၁-၂ တွင် လက်ရှိ ဆောင်ရွက်နေမှုများ နှင့် ယခင်က ဆောင်ရွက်နေမှုများ ကို ထည့်သွင်း ဖော်ပြ ထားပြီး ဖြစ်ပါသည်။
၂၈။	6.5.5 (6-66)	တည်ဆောက်ရေးအဆင့်တွင် သက်ရောက်နိုင်သော ထိခိုက်မှု များသည် လုပ်ငန်း လည်ပတ်ခြင်း အဆင့်အတွက် သက်ရောက် နိုင်သော ထိခိုက်မှုများနှင့် တူညီသည်ဟု	Information has been updated in Section 6.5.5	ဖြစ်နိုင်ချေရှိသောထိခိုက်မှုများ၌ Public health and safety in relation to air quality and wastewater was	Air quality and wastewater ကြောင့် သက်ရောက်နိုင်မှုအား Public health and safety ရှုထောင့်မှ လေ့

		<p>ဖော်ပြထားပြီး အခန်း ၆.၄.၅ ကို ပြန်လည် ညွှန်းဆိုထားရာ စက်ရုံ၏ လုပ်ငန်း လည်ပတ်ခြင်း အမျိုးအစား မှာလည်း Agrochemical Formulation အမျိုးအစား ဖြစ်၍ လုပ်ငန်းလည်ပတ်ခြင်းအဆင့်၌ ပတ်ဝန်းကျင်ဆိုင်ရာ ထိခိုက်မှုများမှာ တည်ဆောက်ရေးအဆင့်နှင့် တူညီမှု မရှိနိုင်သည့်အတွက် ပြန်လည် ဆန်းစစ်ရန်၊</p>		<p>a key concern of the villagers ဟု ဖော်ပြထား သော်လည်း Impact significance ၌ Traffic issue သာ ဖော်ပြထားရာ Air quality and wastewater ကြောင့် သက်ရောက်နိုင်မှုအား Public health and safety ရှုထောင့်မှ လေ့လာ ဆန်းစစ် ပေးရန်၊</p>	<p>လာ ဆန်းစစ်ချက်များကို အခန်း ၆.၅.၅ တွင် ထည့်သွင်း ဖော်ပြပြီး ဖြစ်ပါသည်။</p>
(ဆ)	ဆက်စပ်သက်ရောက်မှုဆန်းစစ်ခြင်း				
၂၉။		<p>အဆိုပြုစီမံကိန်း အနီးဝန်းကျင်တွင် လုပ်ငန်းသဘောသဘာဝ မတူသည့် စီမံကိန်းနှစ်ခုရှိရာ အဆိုပြုလုပ်ငန်း မစတင်မီ ရေထု နှင့်မြေထု၏ စီမံကိန်း အနီးဝန်းကျင်ရှိ ပိုးသတ်ဆေးနှင့် fertilizer ပါဝင်မှု အနေအထားအား</p>	<p>❖ The Ministry of Agriculture is responsible of undertaking such cumulative impact assessment as per the establishment of this Industrial Park. Awba</p>	<p>cumulative impact assessment နှင့် စပ်လျဉ်း၍ ထည့်သွင်း ဖော်ပြရန်၊</p>	<p>Myanmar National Environmental Guidelines အတိုင်း သြဘာမှ ပြည်စုံစွာ ဆောင်ရွက် သွားမည့် အစီအစဉ်ကို အခန်း</p>

		အခြေပြု အချက်အလက် ကောက်ယူရန်၊	<p>through its HAIC agrochemical formulation plant committee itself to good international industry practice GIIP in compliance with IFC Performance Standards, WBG EHS Guidelines and Myanmar National Environmental Guidelines. As it relate to MPI Awba is considering to undertake a comprehensive EHS audit to Myanmar National Environmental Guidelines (soil and water survey).</p> <p>❖ Awba is not informed about the E&S analysis of Marlarmyaing Company Limited.</p>		<p>၇.၀ တွင် ထည့်သွင်း ဖော်ပြပြီး ဖြစ်ပါသည်။</p>
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(ဇ)	ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်				
၃၀။	8.3 (8-4 to 8-12)	At Environmental and Social Commitment တွင် Production Formulation Process များမှ ထွက်ရှိလာနိုင်သော လေအရည်အသွေး ထိခိုက်မှုများအား ဖော်ပြထားခြင်း မရှိသည့် အတွက် ဖော်ပြရန်၊	<ul style="list-style-type: none"> ❖ <i>Table 8.1</i> (item 9.1) has been corrected. ❖ The onsite incinerator and wastewater treatment has been purchased accordingly with Myanmar National Environmental Guidelines and WBG EHS Guidelines for hazardous waste incineration. ❖ Technical Specifications of the process control equipment (such as Dust collectors and Scrubber systems) are according to the industrial best practice. Monitoring Plan will be in place to meet WBG EHS guidelines. 	ဇယား ၁.၆ Environmental and Social Monitoring Programme (Construction and Operation Phase) တွင် PCDD and PDCF နှင့် စပ်လျဉ်း၍ ဖော်ပြထားမှု မရှိသည့် အတွက် ဖော်ပြ ရန်၊	Solid and hazardous waste များကို လိုင်စင်ရ တတိယအဖွဲ့အစည်းများ နှင့် ငှားရမ်း၍ စနစ်တကျ ဖယ်ရှား ရှင်းလင်း မည်ဖြစ်ပါသည်။ မီးရှို့စက်ကိုလည်း Hazardous waste management plan တွင် ဖော်ပြထားသည့်အတိုင်း အရန် အနေဖြင့်သာ ထားရှိမည်ဖြစ်ပါသည်။ ထို့အတွက် PCDD and PDCF တို့အား Environmental Monitoring Programme တွင် ထည့်သွင်း စဉ်းစားရန် မလိုအပ်တော့ပါ။

			Periodically concentrations of PCDD and PCDF will be done as part of the environmental monitoring plan.		
၃၁။	Page 8-9	အစီရင်ခံစာတွင် Volatile Organic Carbon နှင့်စပ်လျဉ်း၍ ထည့်သွင်းစဉ်းစားထားခြင်း မရှိသည့်အတွက် ထည့်သွင်းဖော်ပြရန်၊	<ul style="list-style-type: none"> ❖ Table 8.1 (item 9.1) has been corrected. ❖ Monitoring Plan will be in place to meet WBG EHS guidelines and it includes VOC. <p>Technical Specifications of the process control equipment (such as Scrubber systems) are according to the industrial best practice.</p>	ဇယား ၁.၆ တွင် VOC PDCF နှင့် စပ်လျဉ်း၍ ဖော်ပြထားမှုမရှိသည့် အတွက် ဖော်ပြရန်၊	ဇယား ၁.၆ တွင် ထည့်သွင်း ဖော်ပြပြီး ဖြစ်ပါသည်။

၃၂။	Table 8.2 (8-13)	အစီရင်ခံစာတွင် ဆောင်ရွက်မည့် အစီ အစဉ်ခွဲများအား ပြည့်စုံစွာ ဖော်ပြ ထားမှု မရှိခြင်း၊ ဇယား ၈.၂ တွင် ဖော်ပြထားမှု များသည် ယေဘုယျ သဘောသာ ဖော်ပြထား ခြင်း၊ အဆိုပါ အချက်များနှင့် စပ်လျဉ်း၍ လေ့လာ ဆန်းစစ်ရန် အတွက် အသေးစိတ်အစီ အစဉ်များ ကို ထည့်သွင်းဖော်ပြရန်၊	ဇယား ၈.၂ တွင် ဖော်ပြထားပါသည်။	ဇယား ၈.၂ တွင် ဖော်ပြထားသည့် အစီ အစဉ်များသည် ယေဘုယျ သဘောသာ ဖြစ်နေသဖြင့် အသေး စိတ် အစီအမံများ ကို ထည့်သွင်း ဖော်ပြရန်၊	အသေးစိတ် အစီအမံ များကို ESMP တွင် ထည့်သွင်းဖော်ပြမည် ဖြစ်ပါသည်။
၃၃။	8.4.5 (8-15)	Environmental Monitoring and Audit Manual နှင့်ပတ်သက်၍ အသေးစိတ်ဖော်ပြ ရန်၊	Awba will establish Environmental Monitoring Audit team as part the Guidelines from ECD and roles and responsibilities of the team members will be defined. The roles and responsibilities of the Environmental Monitoring Team are described in the ESMP.	Comment နှင့် Response ကိုက်ညီမှု မရှိကြောင်းနှင့် Environmental Monitoring and Audit (EM&A) Manual နှင့် ပတ်သက်၍ အသေးစိတ် ဖော်ပြချက် မပါရှိသည့် အတွက် ပြင်ဆင် ဖော်ပြရန်၊	ESMP တွင် ထည့်သွင်း ဖော်ပြ ပေးပါမည်။

၃၄။	Table 8.3 (8-19)	Social monitoring program အား general component တွင် ထည့်သွင်း ဖော်ပြထားပါသည်။ Social monitoring KPIs များကို ထည့်သွင်း ဖော်ပြရန်၊	<ul style="list-style-type: none"> ❖ Awba is the process of formulating a Human Resources Management Plan and Occupational Health and Safety Management Plan). ❖ As it related to the OHS Management Plan, Awba is the process of defining OHS KPIs (leading OHS indicators, e.g. training, employee audits and observation, near misses, safety meetings, facility housekeeping, participation in safety committees, overall employee engagement in safety, equipment/machinery maintenance and lagging 	Human Resources Management Plan and Occupational Health and Safety Management Plan (OHS) အား ထည့်သွင်း ဖော်ပြရန်။	OHS Management Plan တွင် ထည့်သွင်း ဖော်ပြ ပေးပါ မည်။ OHS Management Plan ကို ဇွန်လ အတွင်းတွင် ပတ်ဝန်းကျင်ထိန်းသိမ်း ရေးဦးစီးဌာနသို့ ပေးပို့သွားမည် ဖြစ်ပါသည်။
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			<p>indicators, e.g. injury frequency and severity, OSHA recordable injuries, lost work days, worker's compensation cost).</p> <ul style="list-style-type: none"> ❖ KPIs for Human Resources are under definition by Awba. ❖ KPIs for Grievance Mechanism are as following: number of complaints received monthly of complaint close out monthly, average time to acknowledgement, average time to feedback, average duration to closure, % satisfied with process, % satisfied with the outcome). 		
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၃၅။	8.8 (8-23)	စီမံကိန်းဆိုင်ရာ ESMP ကို Environmental Monitoring Audit team အတူ စိစစ်လေ့လာမှု ပြုလုပ်မည်ဖြစ်ကြောင်း ဖော်ပြထားရာ အဆိုပါအဖွဲ့၏ လုပ်ငန်းတာဝန်များ၊ တာဝန်ယူမှု အပိုင်းများကို ထည့်သွင်း ဖော်ပြရန်၊	❖ Awba will establish Environmental Monitoring Audit team as part the Guidelines from ECD and roles and responsibilities of the team members will be defined. The roles and responsibilities of the Environmental Monitoring Team are described in the ESMP.	Environmental Monitoring Audit team ၏ လုပ်ငန်းတာဝန်များ၊ တာဝန် ယူမှု အပိုင်းများကို ထည့်သွင်း ဖော်ပြ ရန်၊	ESMP တွင်ထည့်သွင်း ဖော်ပြ ပေးပါမည်။
၃၆။	Table 8.4 (8-20)	<ul style="list-style-type: none"> Waste Water Treatment Plant Monitoring Plan ထည့်သွင်းဖော် ပြရန်၊ Waste Water Treatment Plant နှင့် Incinerator များကို သက်ဆိုင်ရာ Operators များဖြင့် ဆောင်ရွက်ရန် လိုအပ်ပါသည်။ 	<ul style="list-style-type: none"> Information included in <i>Table 8.2</i> The Wastewater Management Plan is included in the ESMP. 	<ul style="list-style-type: none"> အစီရင်ခံစာ စာမျက်နှာ ၈-၁၄၊ ဇယား ၈.၂ တွင် ဖော်ပြထားသော Management Plan များအား လေ့လာ ရာတွင် ရည်ရွယ်ချက် သာ ဖော်ပြထားပြီး management plan တစ်ခုလုံးအား 	<ul style="list-style-type: none"> ESMP တွင်ထည့်သွင်း ဖော်ပြ ပေးပါမည်။ Waste Water Treatment Plant နှင့် Incinerator များကို သက်ဆိုင်ရာ ကျွမ်းကျင်သူများနှင့်သည ဆောင်ရွက်သွားပါမည်။ ထိုအချက် အလက် အပြည့်အစုံ အား အခန်း ၄.၄.၄၊ ပုံ ၄-၁၈ နှင့် ၄-၁၉

				<p>ဖော်ပြထားခြင်း မရှိသည့် အတွက် ပြန်လည် ဖော်ပြရန်၊</p> <ul style="list-style-type: none"> Waste Water Treatment Plant နှင့် Incinerator တို့နှင့်ပတ်သက်သည့် အချက်အလက် အပြည့်အစုံ အား ထည့်သွင်းဖော်ပြရန်၊ 	<p>တို့တွင် ဖော်ပြထားပြီး ဖြစ်ပါသည်။</p>
၃၇။	1.2(7)	<p>အဆိုပြုစီမံကိန်းနှင့်သက်ဆိုင်သော Hazard identification study [HAZID], hazard and operability study [HAZOP] or a quantitative risk assessment [QRA] စသည်တို့တွင် လေ့လာဆန်းစစ် ဖော်ပြရန်၊</p>	<ul style="list-style-type: none"> The Air Pollution Management Plan (part of the ESMP) contains the Procedure for Monitoring and Measuring the working environment for heat, sound light, dust, and chemical vapors (section 8.8). 	<ul style="list-style-type: none"> Section 8.8 တွင် ဖော်ပြပါ Air Pollution Management Plan နှင့် ပတ်သက်၍ ဖော်ပြထားမှု မရှိသည့် အတွက် ပြန်လည် ဖော်ပြရန်၊ 	<ul style="list-style-type: none"> သဘာဝပတ်ဝန်းကျင် အရည်အသွေး စောင့်ကြည့်ရေး အစီရင်ခံစာကို သဘာဝပတ်ဝန်းကျင် ထိန်းသိမ်းရေးဝန်ကြီးဌာနသို့ နှစ်စဉ် တင်ပြသွားမည်ဖြစ်ပါသည်။

		<p>အဆိုပါ ရလဒ်များအပေါ် မူတည်၍ Occupational Health and Safety ၏ အစိတ်အပိုင်းများ ဖြစ်သော Process Safety, Chemical exposure, Pathogen exposure, Fires and explosion တို့ကို လွှမ်းခြုံနိုင်သော အစီအစဉ်များ အကောင်အထည်ဖော် ဆောင်ရွက် ရန်၊</p>	<ul style="list-style-type: none"> The Environmental Monitoring is presently in the drafting process, schedule for completion is January 2019. Once it is completed will be shared to ECD. Awba Environmental Policy indicates that Environment Audit will be perform on an annual basis. 	<ul style="list-style-type: none"> Air Pollution Management Plan အသေးစိတ်ထည့်သွင်းဖော်ပြရန်၊ Environmental Monitoring အား ရေးဆွဲ ပြီးပါက ပြန်လည် ထည့်သွင်း ဖော်ပြရန်၊ 	<p>ထိုအစီရင်ခံစာတွင် လေထုအတွင်း ထုတ်လွှတ်မှု၊ အသံနှင့် ရေဆိုး ထုတ်လုပ်မှု စောင့်ကြည့်စစ်ဆေးမှုများပါဝင်မည် ဖြစ်ပါ သည်။</p> <ul style="list-style-type: none"> ESMP တွင်ထည့်သွင်း ဖော်ပြ ပေးပါမည်။
၃၈။	9-2 (9-1)	<p>ဇယား ၉.၁ အများပြည်သူနှင့်တိုင်ပင် ဆွေးနွေးခြင်းအရ စီမံကိန်းနှင့် ပတ်သက်၍ ဆန့်ကျင်ဘက် သဘောထားအမြင်ရှိသည့် CSO များ နှင့် cumulative impacts များ သက်ရောက်ဖွယ်ရှိသည့် ပုဂ္ဂလိက လုပ်ငန်းရှင်များထံမှ စီမံကိန်းဆိုင်ရာ သဘောထား အမြင်များကိုပါ ထည့်သွင်း ဆွေးနွေး ဖော်ပြ ရန်၊</p>	<ul style="list-style-type: none"> Awba has started community grievance since July 2017 until now along with stakeholder engagement workshops stated in Appendix E, which includes Grievance Mechanism Campaign covers in eleven locations 407 participants 	<p>Table 9.2 ဖော်ပြချက် အရ Scoping Phase နှင့် ESIA Phase ဆိုင်ရာ Stakeholders consultations များ ဆောင်ရွက်ရာတွင် အဆိုပါ CSO များ နှင့် အနီးဝန်းကျင်ရှိ ပုဂ္ဂလိကလုပ်ငန်းရှင်</p>	<p>ESIA Phase ဆိုင်ရာ Stakeholders consultations များ ဆောင်ရွက်ခဲ့မှု အခြေအနေများကို ဇယား ၉.၂ တွင် ဖော်ပြထားပါသည်။</p>

		<p>ဇယား ၉.၂ ဖော်ပြချက်အရ နယ်ပယ် အတိုင်းအတာ သတ်မှတ်ခြင်း အဆင့် နှင့် ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ် ခြင်း အစီရင်ခံစာပြင်ဆင်ခြင်း အဆင့်ဆိုင်ရာ အများပြည်သူ တိုင်ပင် ဆွေးနွေးခြင်းများ ဆောင်ရွက်ရာတွင် အဆိုပါ CSO များနှင့် အနီးဝန်းကျင်ရှိ ကိုယ်စားပြု ပုဂ္ဂလိက လုပ်ငန်းရှင် များထံမှ သဘောထား အမြင်များ ကိုပါ ထည့်သွင်း ဆွေးနွေး ဖော်ပြရန်၊</p>	<p>from December 2017 to July 2018.</p> <p>❖ Stakeholder Engagement Workshops covers in 16 locations with 387 participants (including Government, officials, CSO and private sector) from June 2017 to April 2018.</p>	<p>များ ထံမှ သက်ဆိုင်သူ များ ပါဝင်မှု ဖော်ပြချက် မပါရှိသည့် အတွက် ပြန်လည် ထည့်သွင်း ဖော်ပြရန်၊</p>	
(ဈ)	အများပြည်သူနှင့်တိုင်ပင်ဆွေးနွေးခြင်းနှင့်သတင်းအချက်အလက်ထုတ်ပြန်ခြင်း				
၃၉။		<p>အစီရင်ခံစာတွင် ဖော်ပြထားသည့် Guidelines ရှိ ဖော်ပြထားသည့် Parameters များနှင့် အမှန်တကယ် တိုင်းတာခဲ့သော Parameters များ အား တိုက်ဆိုင်စစ်ဆေးရာတွင် အောက်ဖော်ပြပါ Parameters များ</p>	<p>❖ Information modified in Section 1.4.3.</p> <p>❖ Monitoring Plan will be in place to meet WBG EHS Guidelines for Pesticide</p>	<p>❖ စာမျက်နှာ ၈-၂၁၊ ဇယား ၈.၃ တွင် ဖော်ပြထားသော Surface water monitoring parameters များမှာ</p>	<p>• ဇယား ၈.၃ နှင့် ၈.၄ တို့တွင် ထည့်သွင်း ပြင်ဆင်ပြီး ဖြစ်ပါသည်။</p>

	<p>တိုင်းတာထားခြင်း မရှိသည်ကို စိစစ် တွေ့ရှိရသည့်အတွက် ထည့်သွင်း ဖော်ပြရန်၊</p> <ul style="list-style-type: none"> • AOX • Chromium (Hexavalent) (According to reference value in the report, surveyed chromium is just chromium total. It is not chromium (hexavalent)) • Chlorinated organics • Nitroorganics (Surveyed nitrate as N and Nitrate as N) • Zinc • Total Phosphorus (Surveyed Reactive Phosphate as P) • Active Ingredients (each) 	<p>Manufacturing, Formulation and Packaging (2007).</p>	<p>WBG EHS Guidelines for Pesticide Manufacturing, Formulation and Packaging (2007) နှင့်အညီ ဖြည့်စွက် ထားသော်လည်း စာမျက်နှာ ၈-၂၃၊ ဇယား ၈.၄ ၌ ဖော်ပြ ထားသော Surface water monitoring parameters များမှာ Update မဖြစ်သည့် အတွက် ပြင်ဆင် ပေးပါရန်။</p> <p>❖ WBG EHS Guidelines for Pesticide Manufacturing,</p>	
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		Bioassays/Toxicity		Formulation and Packaging (2007) နှင့်အညီဟု ဖော်ပြထားသော်လည်း Mercury အား Monitoring parameter ၌ ထည့်သွင်း ဖော်ပြထားခြင်း မရှိသည့်အတွက် ထည့်သွင်း ဖော်ပြ ပေးပါရန်။	
(ည)	အထွေထွေအကြံပြုချက်				
၄၀။		ဓာတုပစ္စည်းများနှင့် တိုက်ရိုက် ထိတွေ့ရမည့် စက်ရုံလုပ်သားများ အတွက် မည်သည့် စံသတ်မှတ်ထားသော အလုပ်ရုံသုံး/ ဓာတ်ခွဲခန်းသုံး ဝတ်စုံများ ဝတ်ဆင်စေမည်ဆိုသည့် အစီအစဉ်အား ထည့်သွင်းစဉ်းစား၍ Health and	Awba is implementing PPE program based on activities and location of the workers who are handling different types of chemicals.	အစီရင်ခံစာတွင် PPE Program နှင့် စပ်လျဉ်း၍ ထည့်သွင်းဖော်ပြ ရန်။	OHS Management Plan တွင် ထည့်သွင်း ဖော်ပြ ပေးပါမည်။

		Awareness Programmer တွင် ထည့်သွင်းဖော်ပြရန်၊			
၄၁။		Household solid waste များကို မီးရှို့စက်ဖြင့် မီးရှို့မည် ဖော်ပြထား သဖြင့် Hazard waste ကြောင့် မီးရှို့စက်မှ ထွက်လာမည့် ပြဿနာ များအတွက် Management Plan အား ထည့်သွင်း ရေးဆွဲဖော်ပြရန်၊	<ul style="list-style-type: none"> ❖ Yes, household products are burn at incinerator. However, company plans to send all the waste to licensed contractors and the incinerator only will be use as a backup as per Hazardous Waste Management Plan. ❖ No fly ash is generated by the incinerator because it has a dust collector. <p>Solid and hazardous waste will be disposed through licensed contractors.</p>	အဆိုပါ အချက် အလက် များအား သက်ဆိုင်ရာ အခန်းကဏ္ဍတွင် ပြန်လည်ထည့်သွင်းဖော် ပြရန်၊	Incinerator, Waste Management Plan နှင့်ပတ်သက်သောသတ င်းအချက်အလက်များကို အခန်း ၁.၆ (ဇယား ၁.၆)၊ အခန်း ၄.၄.၄ ပုံ ၄.၁၈၊ ၅.၅.၁၊ ၆.၂.၁၊ ၆.၅.၁ နှင့် ၈.၂ တို့ တွင် ထည့်သွင်း ဖော်ပြ ထားပြီး ဖြစ်ပါသည်။

၄၂။	Risk Management and Occupational Health Actions အား ထည့်သွင်းဖော်ပြရန်၊	ဇယား ၈.၂ တွင် Occupational Health and Safety Management Plan အား အနှစ်ချုပ်ဖော်ပြထားပြီး အသေးစိတ်အစီအစဉ်ကို ESMP တွင် ဖော်ပြသွားမည်ဖြစ်ပါသည်။	Risk Assessment Program အား အသေးစိတ်ကို ESMP တွင် ထည့်သွင်း ဖော်ပြရန်၊	OHS Management Plan တွင် ထည့်သွင်း ဖော်ပြသွား ပါမည်။
၄၃။	အစီရင်ခံစာတွင် Risk analysis အား ဆန်းစစ်ရန်နှင့် Risk Management Plan အား ရေးဆွဲရန်၊	အစီရင်ခံစာတွင် OHS Management Plan ၏ အစိတ်အပိုင်း တစ်ခု အနေဖြင့် Risk assessment ကို ဆောင်ရွက်ပြီး Risk assessment program အား အသေးစိတ်ကို ESMP တွင် ထည့်သွင်း ဖော်ပြမည်ဖြစ်ပါ သည်။	Risk assessment program အား အသေးစိတ်ကို ESMP တွင် ထည့်သွင်း ဖော်ပြ ရန်၊	OHS Management Plan တွင် ထည့်သွင်း ဖော်ပြသွား ပါ မည်။
၄၄။		ပြင်ဆင်ချက်ဇယားဖြင့် Revised EIA အစီရင်ခံစာပြန်လည်တင်ပြရာတွင် နည်းပညာ ပိုင်းဆိုင်ရာ အသုံးအနှုန်းများမှလွဲ၍ သဘောထားမှတ်ချက်များအား မြန်မာဘာသာဖြင့် ပြင်ဆင်တင်ပြရန်၊		

In June 2016, the **International Finance Corporation** (IFC) extended a financing facility of US\$10 million to **Myanma Awba** (Awba) for the expansion of Awba's core business. This includes the construction and operation of a new agro-chemical formulation complex, Hmawbi Agriculture Input Complex (HAIC), in the Hmawbi Township of Yangon Region ("the Project").

An Environmental Impact Assessment (EIA) Report for this specific Project was prepared prior to the implementation of the Myanmar EIA Procedure and National Environmental Quality (Emission) Guidelines (NEQs), both enacted in December 2015. The locally prepared EIA Study, however, has been submitted to the Ministry of Natural Resources and Environmental Conservation (MONREC) for the application of an Environmental Compliance Certificate (ECC) for the Project. Awba participated in the EIA Review Team meeting with MONREC on the local EIA in August 2017, and provided an updated EIA Report in response to comments received by MONREC. At the time of writing this ESIA Report (February 2018), Awba are waiting the Ministry's final decision on whether another Review Team meeting is required or if the ECC will be issued.

Awba have been conducting technical feasibility studies since 2015 on the Project. The land was owned by the Ministry of Industry in 1982 and transferred to Ministry of Agriculture. The Ministry of Agriculture has provided Awba this land under a Built-Operate-Transfer (BOT) system. No record of the site selection for this Industrial Park is available and no environmental and social impacts assessment and/or strategic environmental assessment have been carried out by the government to date.

The IFC has reviewed the local EIA and considered that it does not fulfil the requirements of the IFC Performance Standards (PSs). As such, **Environmental Resources Management** (ERM) have been commissioned by Awba to undertake a supplemental Environmental and Social Impact Assessment (ESIA). The ESIA addresses gaps with respect to the IFC PSs and other relevant international requirements such as the World Bank Group (WBG) Environmental Health and Safety (EHS) Guidelines for Pesticide Manufacturing, Formulation, and Packaging (2007) and the WBG EHS General Guidelines (2007).

1.1

PURPOSE AND OBJECTIVES OF THE ESIA STUDY

The ESIA aims to produce a fit-for-purpose identification, assessment, and management of potential risks and impacts from the Project, and to gain material useful to inform other aspects of the Project planning.

Specifically, the objectives of the ESIA are:

- To review the proposed Project activities with respect to their potential to interact with environmental and social receptors and resources;
- To identify the potentially vulnerable environmental and social components of the baseline within the Study Area;
- To identify and evaluate potential environmental and social impacts from the Project; and
- To recommend mitigation or enhancement measures to avoid, reduce or compensate potential adverse impacts.

1.2

PROJECT DESCRIPTION

The Project involves the construction and operation of the HAIC, which is located in the Hmawbi Township of Yangon Region. The HAIC will formulate a variety of pesticides, herbicides, fungicides, and foliar fertilizers with Emulsifiable Concentrate (EC), Soluble Liquid (SL), Suspension Concentrate (SC), Wettabel Powder (WP), Soluble Powder (SP) formulation, which are discussed below:

- **Emulsifiable Concentrate (EC).** The main ingredients are active ingredients, solvent, emulsifier, and stabilizer. This is a liquid formulation, and is produced using 3,000 litres in 6,000 litres formulation vessel. All the raw materials are delivered in drums and finish products are also packed into drums;
- **Soluble Liquid (SL).** The main ingredients are active ingredients, wetter, and water. This is a liquid formulation and is produced using 2,000 litres in 5,000 litres formulation vessels. All the raw materials are delivered in drums and finish products are also packed into drums;
- **Suspension Concentrate (SC).** The main ingredients are active ingredients, wetting agent, dispersant, thickener, antifreeze agent, anti form agent, preservative, and water. This is a liquid and solid mixing formulation, using 2,000 litre formulation vessels and wet milling machines. All the raw materials are delivered in drums and finish products are also packed into drums;
- **Wettabel Powder (WP).** The main ingredients are active ingredients, absorbent/carrier, wetting agent, and dispersant. This is solid formulation, using 500kg mixing hopper and microniser to reduce the particle size of the product. Raw materials are delivered in bags and the finished product is packed in 25kg and 50kg bags; and
- **Soluble Powder (SP).** SP formulation is same as WP formulation process, but for SP formulation the active ingredients are dissolved in water.

The HAIC will not purchase, store, use, manufacture, or trade any agrochemical product that falls in WHO class IA (extremely hazardous). The HAIC will only manufacture or trade class II (moderately hazardous) and Class III (Slightly Hazardous) agrochemical products including pesticide.

The plant will be designed for both solid and liquid products, and is expected to have an initial capacity of 16 million litres/kilogram per annum of agrochemical products in the first phase (2017). This will eventually grow up to a capacity of 30 million litres/kilogram per annum in 2020 with growing demand from Myanmar's agriculture industry.

In addition to the production and formulation facilities, there will laboratory, utility, workshop, warehouse, office, and security facilities, carpark, staff accommodation, canteen, testing farm and greenhouse supporting the operations.

The HAIC will be constructed in three phases. It was observed during the site visit in May 2017 that construction had commenced for Phase 1. Construction of the Project is expected to be completed before 2020.

1.3

BASELINE ENVIRONMENTAL CONDITIONS

For the purposes of this non-technical summary, the description of the baseline environmental conditions is limited to those aspects that are directly relevant to the proposed Project and anticipated impacts, i.e. ambient air quality, noise, water quality, soil and biodiversity etc. Baseline surveys were undertaken in June to July 2017 for these aspects in order to provide baseline information to inform the ESIA of the Project.

Baseline river and well water quality data was collected in June and July. At all river sampling locations, the level of total suspended solids (sediment and soil in the water) exceeded the WBG *General EHS Guidelines* (2007) for treated sanitary sewage discharge and WHO Drinking Water Standards. These exceedances are due to the turbid nature of the surface waters. Villagers use sieve / filtering systems when using the water for drinking purposes. In addition, high levels of faecal matter were recorded. Other measurements were generally within the WHO and WBG EHS Guidelines with no specific concern / pollution identified. Well water quality parameters measured include in-situ measurement of pH and temperature as well as laboratory analysis of pH, Total Suspended Solid (TSS), Total Cyanide, Ammonia, Nitrite, Nitrate, Reactive Phosphorus, Oil & Grease, Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD), Phenols, Arsenic, Cadmium, Chromium, Copper, Mercury, and Faecal Coliforms. Only one exceedance of WHO Drinking Water quality standards – PH levels in water in Yae Tar Shey well. This is not an indication of pollution on its own, as heavy metal concentrations identified did not exceed the WHO standards.

Noise measurements showed exceedance of both the noise limits set out in NEQ and WBG General EHS guideline values during daytime (except at one location) and night-time periods, the baseline levels of other aspects generally

indicated compliance with relevant environmental standards with occasional isolated exceedances.

Ambient air quality monitoring was undertaken at five (5) locations in the Area of Influence (AOI) of the Project using diffusion tubes. The tubes were left in place for four weeks between 30 June and 17 July 2017 to record concentrations of PM₁₀, PM_{2.5}, NO_x, NO₂, and SO₂.

The results from the monitoring indicated that ambient concentrations of NO_x, NO₂ and SO₂ are below the relevant air quality standards. The receiving airshed can therefore be classified as 'non-degraded' for 24-hour period survey with regard to the aforementioned pollutants.

Ambient concentrations of PM_{2.5} and PM₁₀ were measured using a Haz-Scanner Environmental Perimeter Air Station (EPAS) over the 24-hour period. The data collected indicates that ambient concentration of PM_{2.5} exceeds the air quality standard at AQM1 (Wah Net Chaung) and AQM3 (near the Project Site) and is below at all other monitoring locations. On average across the AOI, the PM_{2.5} concentration is below the relevant air quality standard and the airshed can be classified as non-degraded for PM_{2.5} 24-hour period survey. The monitoring results for PM₁₀ indicated that ambient concentrations are below the relevant standard at all locations and the airshed can be classified as non-degraded.

For biodiversity, the survey results indicated presence of a modified habitat with generally low biodiversity value near the proposal HAIC.

1.4 STAKEHOLDER CONSULTATION

As a part of the ESIA process, consultation was carried out with the indirectly and directly affected population within the Project's Area of Influence (AOI). The consultation served the dual purpose of informing the public about the potential impacts of the Project and seeking community views on issues.

A summary of the stakeholder consultation activities for the ESIA Study is provide in *Table 1.1*.

Table 1.1 *Engagement Undertaken*

Date	Location	Venue	Attendees
Scoping Phase			
21/6/2017	Hmawbi	GAD office	Government (8)
21//2017	Wah Net Chaung	Village monastery	Government (19), Local Community (37)
22/6/2017	Tha Pyay Kone	Village monastery	Government (4), Local Community (35)
22/6/2017	Yae Tar Shey	Village monastery	Government (9), Local Community (41)

Date	Location	Venue	Attendees
Scoping Phase			
23/6/2017	Nyaung Kone	Village monastery	Government (4), Local Community (35)
ESIA Phase			
16/8/2017	War Net Chaung	Village monastery	Government (5), Local Community (43)
16/8/2017	Nyaung Kone	Village monastery	Local Community (33)
17/8/2017	Yae Tar Shey	Village monastery	Government (1), Local Community (55)
17/8/2017	Tha Pyay Kone	Village monastery	Local Community (33)

Key findings of consultation are presented below and summarised in *Table 1.2*.

Table 1.2 *Summary of Comments Received during Engagement*

Key Comments Received and Response	Consideration for Supplementary ESIA
<p>Consultation & Information Disclosure</p> <p>One of the key comments received related to the availability of information and transparency in the process. Stakeholders wanted to emphasise that it is important to ensure the community can understand the information provided.</p> <p>Some stakeholder in War Net Chaung noted that Pa Ywet Sate Kone, Kyi Ni San, Poe Dana Kone, and Shan Kone villages are located within 5 km of the Project (upstream) and should be included in the assessment.</p>	<p>The Regulatory EIA Report will have a Myanmar language executive summary to ensure information is easily available to local communities.</p> <p>Awba will undertake further disclosure and consultation in Pa Ywet Sate Kone, Kyi Ni San, Poe Dana Kone, and Shan Kone villages.</p>
<p>Public Health & Safety</p> <p>The key concern related to public health and safety impacts specifically from air and wastewater emissions. These also included concerns related to unplanned events.</p> <p>During rainy season, some villagers from the AOI use the Hmawbi River and Htan Ta Pin River for domestic and drinking purposes. Villagers does not use the water resource of the Sabagyi creek.</p>	<p>This Supplementary ESIA will assess the impact on Public Health and Safety from air and noise emissions.</p> <p>The baseline survey results from air, noise, soil, and water will be disclosed to the community.</p>
<p>Monitoring and Auditing</p> <p>Transparency of the monitoring and auditing process during operation was of key importance to the stakeholders.</p>	<p>The grievance mechanism and future disclosure will be provided to all PAPs in the area.</p>
<p>Use of Existing Infrastructure</p> <p>The quality of the access road was commented on during the public</p>	<p>The access road to Hmawbi site is a public road under the responsibility of the government. Awba has acknowledged</p>

Key Comments Received and Response	Consideration for Supplementary ESIA
consultation. Some community members mentioned that Awba vehicle use had damaged the road into the Project Site.	receipt of this complaint through its Community Grievance Mechanism. Follow-up corrective action is under the responsibility of the local authorities.
Current Activities / Historic Activities	
Some people in Nyaung Kone reported a smell coming from the current operations or store at the Project Site.	Awba has investigated the odour complaint from the Operation of the existing facility through their community grievance mechanism.
In addition, one main concern was historic contamination from the existing industrial park and factories.	Although the actual source of the odour is difficult to identify, Awba has implemented a series of mitigation measures for minimise odour such as; a confined partition room for solid production, and a scrubber system on the source of emission to reduce odour escaping through the process.
	Awba have undertaken a baseline assessment and will disclose the results of the baseline to the local communities. Awba will also undertake regular monitoring as outlined in this supplementary ESIA and will disclose monitoring results to the local community.
Land Permitting	
This village raised concerns with the permitting of the land from the ministry / government and the site selection process.	Awba were given permission from the Ministry of Agriculture, Livestock and Irrigation to construct the Project within this existing Industrial Zone.
Corporate Social Responsibility and Social Benefits	
All villages mentioned potential social investment opportunities in the village. The two key concerns on inadequacies of services related to road condition and electricity. These were mentioned as potential opportunities for social investment. In Nyaung Kone, it was noted that villagers spend a lot of money on pesticides and Awba could provide a subsidized store for the local community for their products.	Awba will undertake a CSR program once operational and will consider these suggestions in the planning of any social investment.

In addition to questions raised during the ESIA engagement, a number of grievances were collected as part of the Community Grievance Procedure, this are provided in *Table 1.3* with considerations for this Supplementary ESIA.

Table 1.3 **Community Grievance Log**

Category	Summary of Query	Action for ESIA
Corporate Social Responsibility (CSR)	To conduct the Community Development activities transparently and affectively. Awba should contribute to the local hospital and provide discount pesticide shop for local.	All engagement activities will be conducted transparently. CSR is not part of the ESIA. Awba will consider CSR separately.
ESIA	Who will take responsibility to inspect and monitor following the impact assessment. ERM to involve respective community members for the ESIA survey. Provide communities the result of the ESIA as well as provide guarantee on their result and collect from tube wells.	Monitoring, including roles and responsibilities, will be included in the ESIA Report. Community members will be invited to the baseline surveys. Water will be collected from tube wells and the results will be provided to the community during future engagement.
Accidental events	Information needed on the emergency plan and the potential impact to villagers.	Accidental events (including impact to communities) will be assessed in the ESIA.
Job opportunities	Provide job opportunities to youth and local community members.	The provision of jobs and potential beneficial impact will be assessed in the ESIA.
Land Issue	The road connecting Phoe Dana Kone village to Nyaung Kone village has been reduced from 13 ft. to 6.5 ft. by the Project fencing.	This is based on the Land Lease Agreement between Awba and the Ministry of Agriculture.
Pollution	Will gas emissions damage crops or agricultural land? There have been historic examples of sickness in the community when the MPI factory produced gas (and/or) smoke.	Emissions and their impact on local communities and the surrounding environment will be assessed in the ESIA. A cumulative assessment of impacts from the Industrial Park will also be undertaken.
Relocation	The Project is located near villagers, why was this land selected? Is it possible to relocate?	This is based on the Land Lease Agreement between Awba and the Ministry of Agriculture.
Road damage	The factory trucks are damaging the roads of the villages. Awba should repair the road.	The access road to Hmawbi site is a public road under the responsibility of government. Awba has acknowledged receipt of this complaint through its Community Grievance Mechanism. Follow-up corrective action is under the responsibility of the local authorities.

Category	Summary of Query	Action for ESIA
Village Information	The village list shared is not correct. Public consultation should be conducted in all the villages surrounding project area and involved in the ESIA survey.	Consultation locations were selected to include all the village tracts within 3.5 km. The second round of engagement will invite villagers from villages in which the meetings are not held during the scoping engagement.
Waste Management	Concerned that waste produced by the factory would impact local water courses, local crops and local communities. Provide an explanation of the waste management system to the villagers.	The potential impact of waste on environmental and social receptors will be considered in the ESIA.

In parallel to the stakeholder consultation, a total of 72 useable household surveys, and 8 group discussions for socio-economic systems were completed with the Project's AOI with particular focus on the livelihoods of community. The information obtained is used to inform the impact assessment and mitigation measures derivation.

1.5

KEY POTENTIAL IMPACTS AND PRELIMINARY MITIGATION MEASURES

During the impact assessment, potential impacts have firstly been identified through a systematic scoping process whereby the activities (both planned and unplanned) associated with the Project have been considered with respect to their potential to interact with environmental resources or receivers. Interactions which may generate potentially significant environmental impacts ranging from those associated with the construction phase, operation phase as well as accidental events (e.g. spillage) of the Project.

The potentially significant environmental impacts are further assessed in the ESIA Study, with appropriate mitigation and enhancement measures recommended for alleviating potential negative impacts or enhancing potential positive impacts from the Project. It is concluded in the ESIA Study that with proper implementation of the recommended mitigation measures, the residual environmental and social impacts causing by the construction and operation of the Project would be of no larger than **moderate** significance. A summary of the residual impacts (after mitigation) are provided in *Table 1.4*.

Table 1.4 *Summary of Impact Assessment Results*

Impact	Summary of Mitigation	Residual Impact Significance
Impacts to Air Quality	<ul style="list-style-type: none"> Implement monitoring system. Apply intensive dust suppression methods. 	Minor

Impact	Summary of Mitigation	Residual Impact Significance
	<ul style="list-style-type: none"> Emissions in line with Myanmar Standards (NEQ Guidelines) and international guidelines. 	
Impacts from Noise	<ul style="list-style-type: none"> Only well-maintained equipment should be operated on-site. Emissions in line with Myanmar Standards (NEQ Guidelines) and international guidelines. 	Negligible
Impact to Water Quality	<ul style="list-style-type: none"> Implement monitoring system to continuously monitor / disclose wastewater discharge quality. Discharges in line with Myanmar Standards (NEQ Guidelines) and international guidelines. 	Minor
Impacts to Soil Quality	<ul style="list-style-type: none"> As per water quality impacts above. 	Negligible
Community Health and Safety	<ul style="list-style-type: none"> A Contractor EHS Management Plan. During consultation, it was mentioned that an access road was damaged by Project vehicles and it is recommended that Awba restore the road to its original condition. Community Grievance Mechanism 	Minor
Economy and Livelihoods	<ul style="list-style-type: none"> None recommended. 	Positive
Occupational health and safety	Ventilation systems, and life and fire safety systems in the buildings	Minor
Impacts to Biodiversity	<ul style="list-style-type: none"> Limit clearance of land and re-establish vegetation where possible. Potential re-instatement of vegetation on site. 	Minor
Infrastructure services	<ul style="list-style-type: none"> Road Transport Management Plan. Community Grievance Mechanism. 	Minor

Impact	Summary of Mitigation	Residual Impact Significance
Accidental Events	<ul style="list-style-type: none"> - Solid Waste Management Plan and Emergency Preparedness and Response Plan. - Project will adopt good practices for chemical storage. - Drainage design to limit spread of spills. 	Moderate

1.6

ENVIRONMENTAL MANAGEMENT PLAN

The detailed Environmental Management Plan is provided in Section 8. The scope of this EMP covers both construction and operation phases of the Project, which have the potential to affect, positively or negatively, the environment and communities in which the Project will operate.

A range of detailed management plans will be developed and implemented for each specific phase of the Project. The responsibility for the implementation of these plans will lay variously with the Awba, contractors and sub-contractors. It is noted that this is only a framework EMP into which the full range of management and monitoring activities will eventually fit.

As identified with the summary of impacts and mitigation and management measures, the following detailed management plans are considered necessary to effectively implement the outcomes of the ESIA throughout the life of the Project (*Table 1.5*). These plans are currently being drafted by Awba.

Table 1.5 **Management Plans Required by the Project**

Management Plans	Key Objectives and Content
Air Pollution Management Plan	The Air Pollution Management Plan should demonstrate how appropriate management techniques will reduce the potential for any dust-related adverse effect to public health or the environment, and describe the measures that will be undertaken to control dust and air emissions generated by operation process. This could include dust produced by bulk materials handling, storage activities, earth-moving, construction, or vehicular movements.
Emergency Preparedness and Response Plan	The EPRP will describe the general emergency response procedures to be undertaken for each of the follow potential emergency events that may occur at the HAIC Project: fire emergency, chemical release, worker injuries, thunderstorm, and vehicle accident. In addition, set up the responsibilities of the EHS Department, medical team, first aider team, security team, area wardens and contractors and other service providers.
Solid Waste Management Plan	Solid waste management plan is a guide for reducing, handling, and disposing of solid waste. Detailing all types of waste and their origins, the steps taken to lower the level of waste, and plans for removing and eliminating waste.
Wastewater Management Plan	A Wastewater Management Plan outlines wastewater management (treatment and associated infrastructure and services), and identifies plans for the future development, expansion or upgrade of wastewater systems to accommodate changing needs.
Road Transport Management Plan	A Road Transport Management Plan is the management of occupational safety and site performance risks associated with work activities undertaken in a traffic environment including managing traffic to and from the Site.
Stakeholders Engagement Management Plan	<p>A SEMP facilitates effective and efficient communications with the various stakeholders. It describes how project communications will occur. A good communication plan generally includes the following elements:</p> <ul style="list-style-type: none"> • Communication objectives; • Target audiences; • Key content for the communications; and • Communication method and frequency.
Contractors EHS Management Plan	A Contractors EHS Management Plan links to the Projects EMP and ensures that all contractors are aware of the requirements to mitigate and manage the environmental, health and safety risks and impacts associated with the Project.
Occupational Health and Safety Management Plan	An Occupational Health and Safety Plan demonstrates an organisation's commitment to health and safety in the workplace by providing a clearly written statement of intent and plan of action for the prevention of accidents and occupational illness and injury.

Management Plans	Key Objectives and Content
Environmental Monitoring Plan	The Environmental Monitoring Plan describes the comprehensive program to conduct environmental quality monitoring accordingly with the World Bank Group EHS Guidelines and Myanmar National Environmental Quality (Emission) Guidelines.
Hazardous Material Management Plan	The overall objective of hazardous materials management is to protect the workers who are handling hazardous materials and to allow safe uses and storage practices to avoid or, when avoidance is not feasible, minimize uncontrolled releases of hazardous materials or accidents (including explosion and fire) during their handling, storage and use so as to protect both the workforce and the environment.
Site Run-off Drainage Management Plan	The Site Runoff Drainage Management Plan (RDMP) seeks to minimize uncontrolled runoff, improper wastewater, solid waste and hazardous material management at the site, that may affect the surface water quality of watercourse at HAIC's Project.
Construction Management Plan	The Construction Management Plan will compile all the necessary measures to mitigate the impacts during the second and third phases of construction stage.

It is intended that these documents will be prepared to cover the construction phase of the Project. Prior to operation commencing further documents should be developed to cover the operation phase.

Specific plans will be disclosed to stakeholders at the appropriate time, which should be determined within the individual plans.

Physical, biological, and social environmental management components of particular significance have been identified as performance indicators. A comprehensive monitoring plan for each performance indicator has been prepared for all phases of the Project and is presented in *Table 1.6*.

The ash generated from the incinerator with other household solid waste will be sent to a licensed contractor in Thilawa and the incinerator will only be used as a backup, as per Hazardous Waste Management Plan. The incinerator will not generate fly ash as it includes a dust collector.

Table 1.6 Environmental and Social Monitoring Programme (Construction and Operation Phase)

Project Stage/ Affected Component	Potential Impact	Parameters to be Monitored	Location	Measurements	Frequency
Noise	Increase in ambient noise levels	Noise levels in Leq, Leq day, Leq night and hourly Leq	Identified NSRs within 500 m from the Project boundary as shown in Figure 5.14	24-hour	Monthly during construction
			Production line (point source measurement)	24-hour	Monthly until completion of operation
Surface Water	Contamination of surface water	pH, DO, COD, BOD5, oil and grease, TN, TP, TSS and total coliform.	Water sampling points as shown in Figure 5.20 and one upstream station located 100 m upstream of the Project Site.	Standard analytical methods.	Monthly during construction
		pH, BOD5, COD, TSS, Oil and Grease, AOX, Phenol, Arsenic, Chromium Total, Chromium (hexavalent), Copper, Chlorinated organics, Nitroorganics, Mercury, Zinc, Active Ingredient (each), Bioassays Toxicity: Fish, Daphnia, Algae, Bacteria, Ammonia, Total Phosphorus, Total Coliform, Total Nitrogen.	Wastewater monitoring will be conducted at the discharge point 17°16'65.98"N 96°07'70.56"E.	Standard analytical methods	Monthly until completion of operation
Air	Increase in emissions of dust and particulates.	PM ₁₀ , PM _{2.5} , NO ₂ and SO ₂	ASRs as shown in Figure 5.3.	Diffusion tube.	Monthly during construction

Project Stage/ Affected Component	Potential Impact	Parameters to be Monitored	Location	Measurements	Frequency
				HAZ-SCANNER (EPAS) Environmental Perimeter Air Monitoring System	
	Production formulation process	Particular Matter, TOC, VOC, Chloride, Bromines (as HBr), Cyanides (as HCN), Fluorine (as HF), Hydrogen Sulphide, Chlorine, Ammonia, Gaseous Inorganic Chlorine Compounds (as HCl).	Emission locations	Diffusion tube. HAZ-SCANNER (EPAS) Environmental Perimeter Air Monitoring System	Monthly until completion of operation

The Project covers the construction and operation of a new agro-chemical formulation complex, HAIC, in the Hmawbi Township of Yangon Region by Awba. The Project is funded by IFC through extending a financing facility of US\$10 million to Awba with specific use of proceeds for the expansion of Awba's core business.

An ESIA Study has been conducted for Project in accordance with the local Myanmar requirements and in conformance with relevant environmental and social guidelines of the international benchmark (i.e. IFC PS and WBG EHS Guidelines) with an overall objective to ensure acceptable environmental and social performance of the Project. During the ESIA Study, potential impacts have firstly been identified through a systematic scoping process whereby the activities (both planned and unplanned) associated with the Project have been considered with respect to their potential to interact with environmental and social resources or receptors. Interactions, which may generate potentially significant environmental and social impacts, have been further assessed in the ESIA Study, with appropriate mitigation and enhancement measures recommended for alleviating potential negative impacts or enhancing potential positive impacts from the Project.

A local ESIA has been prepared for MONREC requirements and is currently being reviewed by MONREC. It is recommended that Awba wait for the approval of this report prior to commencing operations.

Consultation outcomes have been incorporated into the design of mitigation measures for Project and are contained in this ESIA Report. These include:

- Routine air and water monitoring at the Project Site and in communities closest to the Project Site.
- The access road to the Project Site has been damaged by Project vehicles and it is recommended that Awba restore the road to its original condition.
- Development of a formal grievance procedure for use by local residents.
- Undertake consultation and information disclosure in Pa Ywet Sate Kone, Kyi Ni San, Poe Dana Kone, and Shan Kone villages.

It is concluded in the ESIA Study that with proper implementation of the recommended mitigation measures, the residual environmental and social impacts causing by the construction and operation of the Project would be of no larger than **moderate** significance.

To ensure proper delivery of the committed mitigation measures identified in the ESIA Study, an Environmental and Social Management Plan has been prepared for the Project, which provides the procedures and processes to be applied to the Project activities in order to check and monitor compliance and effectiveness of the mitigation measures during the construction and

operation of the Project. In addition, this ESMP will be used to ensure compliance with statutory requirements and corporate safety and environmental policies. Overall, it is expected that the Project will be constructed and operated with acceptable environmental and social performance under proper implementation of the ESMP.

The Project will also have a Construction Phase and Operational Phase Monitoring Plan will be required for the Project, which will include air quality, noise, and water quality impacts. It is important to undertake monitoring to track the effectiveness of these mitigation measures and manage any necessary changes accordingly.

၂၀၁၆ ခုနှစ် ဇွန်လ တွင် အပြည်ပြည်ဆိုင်ရာ ဘဏ္ဍာရေး ကော်ပိုရေးရှင်း (IFC) သည် သြဘာ၏ အဓိကစီးပွားရေးလုပ်ငန်းတိုးချဲ့ရန်အတွက် မြန်မာ့သြဘာ (သြဘာ) သို့ အမေရိကန်ဒေါ်လာ ၁၀ သန်းကို တိုးပေးခဲ့ပါသည်။ ၎င်းတွင် ရန်ကုန်တိုင်းဒေသကြီး မှော်ဘီမြို့နယ်ရှိ မှော်ဘီ စိုက်ပျိုးရေး ဆိုင်ရာ ဆေးဝါးများဖျော်စပ်ထုတ်လုပ်သည့်စက်ရုံ (HAIC) ("စီမံကိန်း") တည်ဆောက်ရေး နှင့် လုပ်ငန်းလည်ပတ်ရေး တို့ ပါဝင်ပါသည်။

၂၀၁၅ ဒီဇင်ဘာလတွင် ထုတ်ပြန်ခဲ့ကြသော မြန်မာ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း နှင့် အမျိုးသား ပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များ (NEQS) အကောင်အထည်ဖော် အတည်မပြုမီထဲကပင် ဤစီမံကိန်းအသေး စိတ်အတွက် ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်း (EIA) ကို ပြင်ဆင်ခဲ့ပါသည်။ သို့ရာတွင် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လိုက်နာဆောင်ရွက်မှု သက်သေခံလက်မှတ် (ECC) သို့မဟုတ် စီမံကိန်း လျှောက်ထားခြင်းအတွက် ဒေသတွင်းပြင်ဆင်ခဲ့သော ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းလေ့လာချက်တစ်ခုကို သယံဇာတ နှင့် သဘာပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း ဝန်ကြီးဌာန (MONREC) သို့ တင်သွင်းခဲ့ပါသည်။ သြဘာသည် ၂၀၁၇ ဩဂုတ်လတွင် MONREC နှင့် EIA ပြည်လည်သုံးသပ်ရေးအဖွဲ့ အစည်းအဝေးတို့တွင် တက်ရောက်ခဲ့ပြီး MONREC မှ လက်ခံရရှိမှုချက်များနှင့် လျော်ညီစွာပြင်ဆင်ထားသော EIA ကို တင်သွင်းခဲ့ပါသည်။ ယခု ESIA အစီရင်ခံစာရေးသားနေချိန်ကာလ (၂၀၁၈ ဖေဖော်ဝါရီလ) တွင် ပြန်လည်သုံးသပ်ရေးအဖွဲ့အစည်းအဝေး နောက်တစ်ကြိမ်တက်ရောက်လိုအပ်မည် သို့မဟုတ် ECC ကို ထုတ်ပေးမည် စသည်နှင့်သက်ဆိုင်သည့် ဝန်ကြီးဌာန၏ အပြီးသတ်ဆုံးဖြတ်ချက်ကို စောင့်ဆိုင်းလျက်ရှိပါသည်။

သြဘာသည် ၂၀၁၅ ခုနှစ်ကတည်းက စီမံကိန်းနှင့်သက်ဆိုင်သော ပညာရပ်ဆိုင်ရာဖြစ်နိုင်ခြေရှိမှု လေ့လာမှုတို့ကို ဆောင်ရွက်လျက်ရှိပါသည်။ ၁၉၈၂ ခုနှစ်တွင် မြေကို စက်မှုဝန်ကြီးဌာနက ပိုင်ဆိုင်ခဲ့ပြီး စိုက်ပျိုးရေးဝန်ကြီးဌာနသို့ လွှဲပြောင်းပေးအပ်ခဲ့ပါသည်။ ၎င်းမြေကို စိုက်ပျိုးရေး ဝန်ကြီးဌာနက သြဘာသို့ တည်ဆောက်လည်ပတ်လွှဲပြောင်း (BOT) ရေး စနစ်အရ ပေးအပ်ခဲ့ပါသည်။ ၎င်းစက်မှုလုပ်ငန်းနေရာအတွက် လုပ်ငန်းနေရာရွေးချယ်မှုနှင့်ပတ်သက် ၍ မှတ်တမ်းများမရရှိပါ။ ထို့ပြင်၊ အစိုးရက ယခုအချိန်ထိ ပတ်ဝန်းကျင်ဆိုင်ရာ နှင့် လူမှုဆိုင်ရာ ထိခိုက်မှုဆန်းစစ်ခြင်းများ နှင့်/သို့မဟုတ် မဟာဗျူဟာမြောက် ပတ်ဝန်းကျင်ဆိုင်ရာ ဆန်းစစ်ခြင်းကို ဆောင်ရွက်ခဲ့ခြင်း မရှိခဲ့ပါ။

IFC သည် ဒေသတွင်းဆောင်ရွက်ခဲ့သော EIA ကိုပြန်လည်သုံးသပ်ခဲ့ပြီး IFC လုပ်ဆောင်မှု စံသတ်မှတ်ချက်များ (PSs) နှင့် ပြည့်မီမှုမရှိကြောင်း စဉ်းစားပါသည်။ ထို့ကြောင့် နောက်ဆက်တွဲ ပတ်ဝန်းကျင် နှင့် လူမှုဘဝထိခိုက်မှုဆိုင်ရာဆန်းစစ်ခြင်း (ESIA) ကို ဆောင်ရွက်ရန် သြဘာက **Environmental Resources Management (ERM)** ကို တာဝန်ပေးအပ်ခဲ့ပါသည်။ ESIA တွင် IFC PSs နှင့်စပ်လျဉ်း၍ ကွာဟချက်များ နှင့် ပိုးသတ်ဆေးထုတ်လုပ်ခြင်း၊ ဖော်စပ်ခြင်း၊ နှင့် ထုတ်ပိုးခြင်းတို့အတွက် ကမ္ဘာ့ဘဏ်အုပ်စု (WBG) ပတ်ဝန်းကျင်ဆိုင်ရာ ကျန်းမာရေး နှင့် ဘေး ကင်းရေး (EHS) လမ်းညွှန်ချက်များ (၂၀၀၇) နှင့် WBG EHS အထွေထွေလမ်းညွှန်ချက်များ (၂၀၀၇) တို့ကဲ့သို့သော အခြားသက်ဆိုင်ရာနိုင်ငံတကာသတ်မှတ်ချက်များကို ထည့်သွင်းပုံဖော် ထားပါသည်။

၁.၁ ပတ်ဝန်းကျင် နှင့် လူမှုဘဝ ထိခိုက်မှုဆန်းစစ်ခြင်း (ESIA) လေ့လာချက် ၏ ရည်ရွယ်ချက်များ

စီမံကိန်းမှ ဖြစ်ပေါ်လာနိုင်သည့် အန္တရာယ်များ နှင့် သက်ရောက်မှုများအတွက် ရည်ရွယ်ချက်နှင့် ကိုက်ညီသည့် သတ်မှတ်ဖော်ထုတ်ခြင်း၊ ဆန်းစစ်ခြင်း နှင့် စီမံခန့်ခွဲခြင်း တို့ကို ရရှိရန် နှင့် စီမံကိန်းဆိုင်ရာ အစီအစဉ်များအတွက် အခြားကဏ္ဍများကို ထည့်သွင်းဆောင်ရွက်ရန် အသုံးဝင်မည့် အကြောင်းအရာများကို ရရှိရန် ESIA က ရည်ရွယ်ပါသည်။

အထူးသဖြင့်၊ ESIA ၏ ရည်ရွယ်ချက်တို့မှာ အောက်ပါတို့ဖြစ်ကြပါသည် -

- စီမံကိန်း၏ဖြစ်ပေါ်လာနိုင်သည့် သဘာဝပတ်ဝန်းကျင်၊ လူမှုပတ်ဝန်းကျင် နှင့် အရင်းအမြစ်များ နှင့် ဆက်သွယ်နိုင်သည့် အဆိုပြု စီမံကိန်းလုပ်ငန်းများကို ပြန်လည်သုံးသပ်ရန်၊
- လေ့လာမှုဧရိယာအတွင်း ထိခိုက်လွယ်နိုင်သော ပတ်ဝန်းကျင် နှင့် လူမှုဘဝအစိတ်အပိုင်းဆိုင်ရာ အခြေခံအချက်အလက်များကို သတ်မှတ်ဖော်ထုတ်ရန်၊
- စီမံကိန်းမှ ဖြစ်ပေါ်လာနိုင်သည့် ပတ်ဝန်းကျင် နှင့် လူမှုဘဝ သက်ရောက်မှုများကို သတ်မှတ်ဖော်ထုတ်အကဲဖြတ်ရန်၊ နှင့်
- ဖြစ်ပေါ်လာနိုင်သည့် ဆိုးကျိုးသက်ရောက်မှုများကို ရှောင်ရန်၊ လျော့ချရန် သို့မဟုတ် အလျော် ပေးရန် သက်ရောက်မှုလျော့ချရေး သို့မဟုတ် မြှင့်တင်ရေးအစီအမံများကို အကြံပြုရန်။

၁.၂ စီမံကိန်းအကြောင်းအရာ ဖော်ပြချက်

စီမံကိန်းတွင် ရန်ကုန်တိုင်းဒေသကြီး၊ မှော်ဘီမြို့နယ်တွင် တည်ရှိသည့် HAIC တည်ဆောက်မှု နှင့် လည်ပတ်မှု တို့ပါဝင်ပါသည်။ HAIC သည် ပိုးသတ်ဆေးအမျိုးမျိုး၊ ပေါင်းသတ်ဆေးများ၊ မှိုသတ်ဆေးများ နှင့် အရွက်မြေဩဇာများအား ပျက်ခြစွာပျော်ဝင်ခြင်း (EC)၊ ပျော်ဝင်ပျော်ရည် (SL)၊ အနည်ကျပျော်ရည် (SC)၊ အရည်ဖျော်အမှုန့် (WP)၊ ပျော်ဝင်အမှုန့် (SP) ဖျော်စပ်ခြင်းနည်းများဖြင့် ဖော်စပ်မည် ဖြစ်ပါသည်။

- **ပျက်ခြစွာပျော်ဝင်ခြင်း (EC)** - အဓိကပါဝင်စွည်းများတွင် အခြေခံပါဝင်ပစ္စည်းများ၊ ပျော်ရည်များ၊ ပျက်ခြစေသောပစ္စည်းများ နှင့် တည်ငြိမ်ပစ္စည်းများ ပါဝင်ပါသည်။ ၎င်းသည် အရည်ပုံစံ ဖျော်စပ်ခြင်း ဖြစ်ပြီး ၆၀၀၀ လီတာဆန့် ဖျော်စပ်ကန်များတွင် ၃၀၀၀ လီတာဖျော်စပ်သွားမည်ဖြစ်သည်။ ကုန်ကြမ်းပစ္စည်းအားလုံးကို စည်များဖြင့်အသုံးပြုသွားမည်ဖြစ်ပြီး နောက်ဆုံးထွက်ကုန်များကိုလည်း စည်များဖြင့် ထုပ်ပိုးသွားမည်ဖြစ်သည်။
- **ပျော်ဝင်ပျော်ရည် (SL)** - အဓိကပါဝင်စွည်းများတွင် အခြေခံပါဝင်ပစ္စည်းများ၊ ပျော်ရည်နှင့် ရေတို့ဖြစ်သည်။ ၎င်းသည် အရည်ပုံစံ ဖျော်စပ်ခြင်း ဖြစ်ပြီး ၅၀၀၀ လီတာဆန့် ဖျော်စပ်ကန်များတွင် ၂၀၀၀ လီတာဖျော်စပ် သွားမည်ဖြစ်သည်။ ကုန်ကြမ်းပစ္စည်းအားလုံးကို စည်များဖြင့်အသုံးပြုသွားမည်ဖြစ်ပြီး နောက်ဆုံးထွက်ကုန်များကိုလည်း စည်များဖြင့် ထုပ်ပိုးသွားမည်ဖြစ်သည်။
- **အနည်ကျပျော်ရည် (SC)** - အဓိကပါဝင်စွည်းများတွင် အခြေခံပါဝင်ပစ္စည်းများ၊ စိုစွတ်စေသောပစ္စည်းများ၊ ဓာတ်ပြိုကွဲပစ္စည်းများ၊ ပျက်ခြစေသောပစ္စည်းများ၊ မအေးခဲစေသော ဓာတုပစ္စည်းများ၊ အမြှုပ်မထစေသော ဓာတုပစ္စည်းများ၊ တာရှည်ခံ ဓာတုပစ္စည်းများ နှင့် ရေတို့ပါဝင်ပါသည်။ ၎င်းသည် အစိုင်အခဲ နှင့် အရည် ပုံစံ ဖျော်စပ်ခြင်း ၂၀၀၀ လီတာဆန့် ဖျော်စပ်ကန်များနှင့် လှည့်ပတ်အခြောက်ခံစက်များ အသုံးပြုသွားမည်ဖြစ်သည်။

ကုန်ကြမ်းပစ္စည်းများအားလုံးကို

စည်များဖြင့်အသုံးပြုသွားမည်ဖြစ်ပြီး နောက်ဆုံးထွက်ကုန်များကိုလည်း စည်များဖြင့် ထုပ်ပိုးသွားမည်ဖြစ်သည်။

- **အရည်ပျော်အမှုန့် (WP)** - အဓိကပါဝင်ပစ္စည်းများတွင် အခြေခံပါဝင်ပစ္စည်းများ၊ စုပ်ယူ/ထိမ်းသိမ်းပစ္စည်း၊ အရည်ပျော်နိုင်သောပစ္စည်း နှင့် အမျိုးအစားခွဲပစ္စည်းတို့ပါဝင်ပါသည်။ ၎င်းသည် အစိုင်အခဲ ပုံစံ ဖျော်စပ်ခြင်း ဖြစ်ပြီး ၅၀၀ကီလိုဂရမ် ရောမွှေစက် နှင့် အမှုန့်ကျိတ်စက်တို့ကို အသုံးပြုကာ အစိုင်အခဲအသေးများဖြစ်စေရန် အသုံးပြုသွားမည်ဖြစ်သည်။ ကုန်ကြမ်းပစ္စည်းများအားလုံးကို အိတ်များဖြင့်အသုံးပြုသွားမည်ဖြစ်ပြီး နောက်ဆုံးထွက်ကုန်များကို ၂၅ကီလိုဂရမ် နှင့် ၅၀ကီလိုဂရမ် ဆန့်အိတ်များဖြင့် ထုပ်ပိုးသွားမည်ဖြစ်သည်။
- **ပျော်ဝင်အမှုန့် (SP)** - SP ဖျော်စပ်ခြင်းနည်းသည် WP နည်းစနစ်နှင့် ဆင်တူသော်လည်း SP ဖျော်စပ်ခြင်းတွင် အခြေခံပါဝင်ပစ္စည်းများအား ရေတွင် ပျော်ဝင်စေပါသည်။

HAIC သည် WHO အဆင့် IA (အလွန်အန္တရာယ်ရှိခြင်း) တွင်ကျရောက်သော စိုက်ပျိုးရေးဓာတုဆေးဝါး ထွက်ကုန်များကို ဝယ်ယူခြင်း၊ သိုလှောင်ခြင်း၊ အသုံးပြုခြင်း၊ ထုတ်လုပ်ခြင်း သို့ ကုန်သွယ်ခြင်းများ ပြုလုပ်မည်မဟုတ်ပါ။ HAIC သည် WHO အဆင့် II (အတန်အသင့်သာ အန္တရာယ်ရှိခြင်း) တွင်ကျရောက်သော ပိုးသတ်ဆေး နှင့် စိုက်ပျိုးရေးဓာတုဆေးဝါး ထွက်ကုန်များကိုသာ ထုတ်လုပ်၊ ကုန်သွယ်မည် ဖြစ်ပါသည်။

စက်ရုံကို အခဲ နှင့် အရည် ထုတ်ကုန် နှစ်ခုလုံးအတွက် ဒီဇိုင်းပြုသွားမည်ဖြစ်ပြီး၊ ကနဦးထုတ်လုပ်နိုင်စွမ်းမှာ ပထမအဆင့် (၂၀၁၇) တွင် သီးနှံစိုက်ပျိုးရေးဓာတုထုတ်ကုန် တစ်နှစ်လျှင် လီတာ/ကီလို ၁၆ သန်း ထွက်ရှိရန် တွက်ချက်ထားပါသည်။ ၎င်းသည် နောက်ပိုင်းတွင် မြန်မာ့စိုက်ပျိုးရေးလုပ်ငန်းဝယ်လိုအားအရ ၂၀၂၀ ပြည့်နှစ် တွင် တစ်နှစ်လျှင် လီတာ/ကီလို သန်း ၃၀ ထိ တဖြည်းဖြည်းတိုးမြှင့်သွားမည် ဖြစ်ပါသည်။

ထုတ်လုပ်မှုနှင့် ဖော်စပ်မှုနေရာအဆောက်အအုံများအပြင်၊ လုပ်ငန်းလည်ပတ်မှုကို အထောက်အကူပြုနိုင်သော ဓာတ်ခွဲခန်း၊ အသုံးပြုခန်း၊ အလုပ်ရုံ၊ ကုန်လှောင်ရုံ၊ ရုံးခန်း၊ နှင့် လုံခြုံရေး နေရာများ၊ ကားရပ်နားရန်နေရာ၊ ဝန်ထမ်းနေထိုင်ဆောင်၊ စက်ရုံစားသောက်ဆိုင်၊ စမ်းသပ်စိုက်ပျိုးခြံ နှင့် ဖန်လုံအိမ်တို့ပါဝင်မည် ဖြစ်ပါသည်။ HAIC မှ ထွက်ရှိလာသော အမှိုက်များကို ရှင်းလင်းရန် လုပ်ငန်းခွင်၌ အမှိုက်မီးရှို့စက်ရုံ နှင့် ရေဆိုးဖျက်ဆီးသည့် အဆောက်အအုံများ ကို တည်ဆောက်သွားမည် ဖြစ်ပါသည်။

HAIC ကို အဆင့်သုံးဆင့်ဖြင့်တည်ဆောက်သွားမည် ဖြစ်ပါသည်။ ၂၀၁၇ မေလတွင် ကွင်းဆင်း လေ့လာသည့် ကာလအတွင်း အဆင့် ၁ အတွက် တည်ဆောက်ရေးကိုစတင်ခဲ့ပြီး ဖြစ်ကြောင်း လေ့လာခဲ့ရပါသည်။ စီမံကိန်းတည်ဆောက်ရေးကို ၂၀၂၀ မတိုင်မီ ပြီးမြောက်ရန် တွက်ချက်ထား ပါသည်။

၁.၃ အခြေခံပတ်ဝန်းကျင်ဆိုင်ရာ အချက်အလက်များ

ယခုအကျဉ်းချုပ်အစီရင်ခံစာအတွက်၊ အခြေခံ ပတ်ဝန်းကျင်ဆိုင်ရာအခြေအနေဖော်ပြချက်ကို အဆို ပြု စီမံကိန်း နှင့် ဥပမာ၊ အနီးဝန်းကျင်လေထုအရည်အသွေး၊ ဆူညံသံ၊ ရေအရည်အသွေး၊ မြေဆီ လွှာ နှင့် ဇီဝမျိုးစုံမျိုးကွဲ စသည့် မျှော်လင့်ထားသောသက်ရောက်မှုများနှင့် တိုက်ရိုက်သက်ဆိုင်သည့် ကဏ္ဍများကို ကန့်သတ်ခဲ့ပါသည်။ စီမံကိန်းအတွက် သရုပ်ဖော်ထားသော ESIA ကို ဆောင်ရွက်ရန် အတွက် အခြေခံအချက်အလက်များကိုရရှိနိုင်ရန်၊ ၎င်းကဏ္ဍများအတွက်

အခြေခံအချက်အလက် နှင့်စပ်လျဉ်းသည့်စစ်တမ်းများကို ၂၀၁၇ ဇွန်လ နှင့် ဇူလိုင်လတွင် ဆောင်ရွက်ခဲ့ပါသည်။

မြစ်ချောင်း နှင့် တွင်းရေအရည်အသွေးဆိုင်ရာ အခြေခံအချက်အလက်များကို ဇွန်လ နှင့် ဇူလိုင်လ တို့တွင် ကောက်ယူခဲ့ပါသည်။ မြစ်ချောင်းနမူနာကောက်ယူမှုနေရာများအားလုံးတွင် အစဉ်အခဲ ပါဝင်မှု (ရေတွင် အနည်အနှစ် နှင့် မြေကြီးပါဝင်မှု) သည် သန့်စင်ထားသောမိလ္လာအညစ်အကြေး စွန့်ထုတ်မှုအတွက် WBG အထွေထွေ EHS လမ်းညွှန်ချက်များ (၂၀၀၇) နှင့် WHO သောက်သုံးရေ စံနှုန်းများကို ကျော်လွန်သွားပါသည်။ ၎င်းကျော်လွန်သွားမှုများမှာ မျက်နှာပြင်ရေများ၏ နောက်ကျိုတတ်သော သဘောသဘာဝကြောင့် ဖြစ်ပါသည်။ ကျေးရွာသူ/သားများသည် သောက်သုံးရန် ရေအတွက် ရေစစ်အသုံးပြုကြပါသည်။ ထို့ပြင်၊ မစင်များပါဝင်မှုသည်လည်း မြင့်မားကြောင်း မှတ်တမ်းရရှိပါသည်။ အခြားတိုင်းတာချက်များသည် စိုးရိမ်စရာမလို ညစ်ညမ်းမှုမရှိဘဲ များသောအားဖြင့် WHO နှင့် WBG EHS လမ်းညွှန်ချက်များအတွင်း ကျရောက်ပါသည်။ ရေတွင်းရေအရည်အသွေး သတ်မှတ်ချက်ဘောင်များဖြင့်တိုင်းတာမှုတွင် တိုင်းတာနေကျအတိုင်း pH နှင့် အပူချိန် တို့ပါဝင်ကြပါသည်။ ထို့ပြင် pH ဓာတ်ခွဲစမ်းသပ်ခြင်း၊ အစဉ်အခဲပါဝင်မှု (TSS)၊ Cyanide အက်စစ်ပါဝင်မှု၊ အမိုးနီးယား၊ နိုက်ထရိုဂျင်၊ ဓာတ်ပြုဖော့စဖရတ်၊ ဆီ နှင့် ချောဆီ၊ ဓာတုအောက်ဆီဂျင်လိုအပ်မှု (COD)၊ ဇီဝအောက်ဆီဂျင်လိုအပ်မှု (BOD)၊ ဖီနော (Phenols)၊ အာဆင်နစ်၊ ကက်အမီယံ၊ ခရိုမီယမ်ဒြပ်၊ ကြေးနီ၊ ပြဒါး၊ နှင့် မစင်ကောလီဖောင်း(ဘက်တီးရီးယား) တို့ ပါဝင်ခဲ့ ပါသည်။ WHO သောက်သုံးရေအရည်အသွေးစံနှုန်းများကို ကျော်လွန်သွားသည်မှာ ရေတာရှည် ရေတွင်းရေရှိ pH အဆင့်များဖြစ်ပါသည်။ ၎င်းညွှန်းကိန်းသက်သက်ဖြင့် ညစ်ညမ်းမှုရှိသည်ဟု သတ်မှတ်၍မရပါ။ အကြောင်းမှာ ဖော်ထုတ်ခဲ့သော သတ္တုပါဝင်မှုများသည် WHO စံနှုန်းများကို ကျော်လွန်သွားခြင်းမရှိသောကြောင့်ဖြစ်ပါသည်။

ဆူညံသံတိုင်းတာမှုများသည် နေ့ခင်းဘက် (တစ်နေရာမှလွဲ၍) နှင့် ညဘက်ကာလ တို့တွင် NEQ နှင့် WBG အထွေထွေလမ်းညွှန်ချက်ပါတန်ဖိုးများ၌ ဆူညံသံကန့်သတ်ထားချက်တို့ကို ကျော်လွန်သွားကြောင်းတွေ့ရပါသည်။ အခြားကဏ္ဍအခြေခံအချက်အလက်များမှာ များသောအားဖြင့် ရံဖန်ရံခါ ကျော်လွန်သွားသည်မှလွဲ၍ သက်ဆိုင်ရာပတ်ဝန်းကျင်စံနှုန်းများနှင့် ကိုက်ညီနေကြောင်းတွေ့ပါသည်။

လေထုအရည်အသွေးစောင့်ကြည့်တိုင်းတာခြင်းကို စီမံကိန်း၏ Area of Influence (AOI) အတွင်းရှိ နေရာ ၅နေရာတွင် Diffusion Tube များကို အသုံးပြု၍ ဆောင်ရွက်ခဲ့ပါသည်။ Tube များကို တိုင်းတာရေးနေရာများတွင် ၂၀၁၇ ဇွန်လ ၁၇ မှ ဇူလိုင် ၁၇ ရက်နေ့အထိ ၄ပတ်ကြာ ထားရှိပြီး PM10၊ PM2.5၊ NOx၊ NO2 နှင့် SO2 ပါဝင်မှုနှုန်းများအား တိုင်းတာခဲ့ပါသည်။

တိုင်းတာရေးရလဒ်များကို လေ့လာခြင်းအားဖြင့် NOx၊ NO2 နှင့် SO2 ပါဝင်မှုနှုန်းများမှာ သက်ဆိုင်ရာလေထုအရည်အသွေးစံနှုန်းများအတွင်း ကျရောက်နေပါသည်။ ထို့ကြောင့် လက်ခံရာ လေထုဝန်းကျင်သည် ၂၄နာရီတိုင်းတာရေးကာလအတွင်း အထက်ဖော်ပြပါ ညစ်ညမ်းနိုင်မှုအခြေအနေများနှင့် ပတ်သတ်၍ 'အရည်အသွေးကျနေခြင်းမရှိ' ဟုအဆင့်အတန်းသတ်မှတ်နိုင်ပါသည်။

လေထုထဲတွင် PM_{2.5} နှင့် PM₁₀ ပါဝင်နေမှု ပမာဏအား Haz-Scanner Environmental Perimeter Air Station (EPAS) အသုံးပြု၍ ၂၄နာရီကြာတိုင်းတာခဲ့ပါသည်။ ရရှိလာသော အချက်အလက်များအရ AQM1 (ဝါးနက်ချောင်း) နှင့် AQM3 (စီမံကိန်းဆိုင်ခံ အနီး) တွင် PM_{2.5} ပါဝင်နေမှု ပမာဏသည် စံချိန်နှုန်းထားထက် မြင့်မားနေပြီး အခြားနေရာများတွင် စံချိန်နှုန်းအတွင်း ရှိပါသည်။ ပျမ်းမျှအားဖြင့် AOI ဧရိယာတလျှောက်တွင် PM_{2.5} ပါဝင်နေမှု ပမာဏသည် သက်ဆိုင်ရာ လေထုအရည်အသွေး

ရက်စွဲ	နေရာ	ကျင်းပရာနေရာ	တက်ရောက်သူများ
နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်းဆိုင်ရာ အဆင့်			
၁၇/၈/၂၀၁၇	သပြေကုန်း	ကျေးရွာရှိ ဘုန်းကြီးကျောင်း	ဒေသခံ (၃၃) ဦး

တိုင်ပင်ဆွေးနွေးမှု၏ အဓိကတွေ့ရှိချက်များကို အောက်ပါ ဇယား ၁.၂ တွင် အကျဉ်းချုပ် ဖော်ပြထားပါသည်။

ဇယား ၁.၂ လက်ခံရရှိခဲ့သော မှတ်ချက်များအကျဉ်းချုပ်

အဓိက လက်ခံရရှိခဲ့သော မှတ်ချက်များ နှင့် ဖြေကြားချက်များ	နောက်ဆက်တွဲ ESIA အတွက် ထည့်သွင်းစဉ်းစားမှု
<p>တိုင်ပင်ဆွေးနွေးခြင်း နှင့် သတင်းအချက်အလက်များ ထုတ်ဖော်တင်ပြခြင်း</p> <p>လုပ်ငန်းစဉ် သတင်းအချက်အလက်များရရှိနိုင်မှု နှင့် ပွင့်လင်းမြင်သာမှု တို့နှင့်ဆက်စပ်၍ အဓိကမှတ်ချက်တစ်ခု ကို ရရှိခဲ့ပါသည်။ သက်ဆိုင်သူမှ တင်ပြလိုသည်မှာ ပေးသည့်သတင်းအချက်အလက်များကို ရပ်ရွာမှ နားလည်စေရန် အရေးကြီးကြောင်း ဖြစ်ပါသည်။</p> <p>စီမံကိန်းမှ ရေဆန်ဘက် ၅ ကီလိုမီတာအတွင်းရှိ ပစ္စုက ဆိတ်ကုန်း၊ ကြည်နီဆန်း၊ ပိုးနေကုန်း နှင့် ရှမ်းကုန်းကျေးရွာ တို့ကိုပါ ဆန်းစစ်မှုတွင် ပါဝင်သင့်ကြောင်း ဝါးနက်ချောင်းရှိ သက်ဆိုင်သူအချို့မှ မှတ်ချက်ပေးကြပါသည်။</p>	<p>ဒေသခံရပ်ရွာများ အလွယ်တကူလက်လှမ်းမီပြီး သတင်းအချက်အလက်များ ကို အသေအချာ ရရှိစေရန် ကြီးကြပ်ရေးဆိုင်ရာ EIA အစီရင်ခံစာတွင် အစီရင်ခံစာ အကျဉ်းချုပ်ကို မြန်မာဘာသာဖြင့် တင်ပြသွားမည် ဖြစ်ပါသည်။</p> <p>ဩဘာသည် နောက်ထပ်ထုတ်ပြန်တင်ပြမှုများ နှင့် တိုင်ပင်ဆွေးနွေးမှုများကို ပစ္စုက ဆိတ်ကုန်း၊ ကြည်နီဆန်း၊ ပိုးနေကုန်း နှင့် ရှမ်းကုန်းကျေးရွာ တို့တွင် ဆောင်ရွက်သွား မည် ဖြစ်ပါသည်။</p>
<p>အများပြည်သူ ကျန်းမာရေး နှင့် ဘေးကင်းရေး</p> <p>အများပြည်သူကျန်းမာရေး နှင့် ဘေးကင်းရေးဆိုင်ရာ သက် ရောက်မှုများနှင့် ဆက်စပ်၍ အဓိက စိုးရိမ်မှုမှာ လေ နှင့် စွန့်ပစ်ရေ ထုတ်လွှတ်မှုများမှ ဖြစ်ပါသည်။ ၎င်းတွင် စီစဉ်ထားသည့်ဖြစ်ရပ်များနှင့်ဆက်စပ်၍ စိုးရိမ်မှုများလည်း ပါဝင်ပါသည်။</p> <p>တိုင်ပင်ဆွေးနွေးခဲ့သော ကျေးရွာလေးရွာသည် စီမံကိန်း လုပ်ငန်းခွင်နေရာမှ ရေစုန်ဘက်တွင်ရှိနေပြီး မြစ်ချောင်း များမှရေကို အိမ်တွင်းသုံးရန် နှင့် သောက်သုံးရန် အသုံးပြုပါသည်။</p>	<p>ယခု နောက်ဆက်တွဲ ESIA သည် လေထု နှင့် ဆူညံသံထုတ်လွှတ်မှုများနှင့် ပတ်သက်သည့် သက်ရောက်မှုများကို ဆန်းစစ်သွားမည် ဖြစ်ပါသည်။</p> <p>. လေထု၊ ဆူညံသံ၊ မြေဆီလွှာ၊ ရေ နှင့် ဇီဝမျိုးစုံ မျိုးကွဲများဆိုင်ရာမှ အခြေခံအချက်အလက်ရလဒ်များကို ရပ်ရွာသို့ ဖော်ထုတ်တင်ပြသွားမည် ဖြစ်ပါသည်။</p>
<p>စောင့်ကြပ်ကြည့်ရှုခြင်း နှင့် စစ်ဆေးခြင်း</p> <p>လည်ပတ်ရေးကာလအတွင်း စောင့်ကြည့်ရှုခြင်း နှင့် စစ်ဆေးခြင်းလုပ်ငန်းစဉ်၏ ပွင့်လင်းမြင်သာမှုအကြောင်း အရာသည်</p>	<p>တိုင်ကြားရေးဆိုင်ရာ ယန္တရား နှင့် အနာဂတ် ဖော်ထုတ် တင်ပြမှုတို့ကို ဧရိယာရှိ PAP များအားလုံးသို့ ဆောင်ရွက် သွားမည် ဖြစ်ပါသည်။</p>

သက်ဆိုင်သူများ အတွက် အဓိကအရေးပါ ပါသည်။

ရှိနေပြီးသော အခြေခံအဆောက်အအုံကို အသုံးပြုခြင်း

လမ်းအသုံးပြုမှုဆိုင်ရာအရည်အသွေး နှင့်ပတ်သက်၍ အများပြည်သူနှင့်တိုင်ပင်ဆွေးနွေးမှုတွင် မှတ်ချက်ပြုသွား ခဲ့ပါသည်။ အချို့ရပ်ရွာသူ / သားများက တင်ပြသည်မှာ ဩဘာမှ အသုံးပြုသည့် စီမံကိန်းလုပ်ငန်းနေရာသို့သွားသည့် ယာဉ်များသည် လမ်းများကိုပျက်စီးစေကြောင်း ဖြစ်ပါသည်။

မှော်ဘီလုပ်ကွက်အား ဆက်သွယ်ထားသောလမ်းသည် အစိုးရ၏စီမံခန့်ခွဲမှုအောင်တွင်ရှိသော အများပြည်သူပိုင်လမ်းဖြစ်သည်။ ဩဘာသည် ၎င်း၏ ရပ်ရွာမှ အကြံပြုတိုင်ကြားရေး ဆိုင်ရာ ယန္တရား မှ တစ်ဆင့် တိုင်းကြားလာသည့် အနံ့ဆိုင်ရာ ကိစ္စရပ်ကို မှတ်တမ်းတင်ထားပြီးဖြစ်ပြီး နောက်ဆက်တွဲ ဖြေရှင်းရေးလုပ်ငန်းသည် သက်ဆိုင်ရာ ဒေသတွင်းအစိုးရ၏ တာဝန်ဖြစ်ပါသည်။

လက်ရှိဆောင်ရွက်မှုများ / သမိုင်းဝင် ဆောင်ရွက်မှုများ

ညောင်ကုန်းရှိ အချို့လူများက စီမံကိန်းလုပ်ငန်းခွင်နေရာ၌ လက်ရှိလည်ပတ်မှုများ သို့မဟုတ် သိုလှောင်မှု မှ အနံ့များ ထွက်ကြောင်း တင်ပြကြပါသည်။

အဓိက စိုးရိမ်မှုတစ်ခုမှာလည်း ရှိနေပြီးသော စက်မှုနေရာ နှင့် စက်ရုံးများမှ ညစ်ညမ်းမှုဖြစ်ပေါ်ခဲ့ကြောင်း ဖြစ်ပါသည်။

ဩဘာသည် ၎င်း၏ ရပ်ရွာမှ တိုင်ကြားရေးဆိုင်ရာယန္တရား မှ တစ်ဆင့် တိုင်ကြားလာသည့် တည်ရှိပြီးသော စက်ရုံအဆောက်အအုံ၏ လုပ်ငန်းလည်ပတ်ခြင်းမှ ထွက်ရှိသော အနံ့ဆိုင်ရာကိစ္စရပ်ကို စုံစမ်းထားပါသည်။

အနံ့ထုတ်လွှတ်ရာ မူရင်းအရင်းအမြစ်ကို ရှာဖွေဖော်ထုတ်ရန်မှာ ခက်ခဲသော်လည်း၊ အနံ့ကြောင့်ခံစားရခြင်းများကို လျော့ချရန်အတွက် အစိုင်အခဲထုတ်လုပ်ရာ နေရာမှ လှောင်ပိတ်အကန့် ခွဲခန်းထားရှိကာ အနံ့နှင့် ဖုန်မှုန့်ထွက်ရှိခြင်းကို လျော့ချခြင်း၊ ဓာတ်ငွေ့စစ်စနစ်ကို ထုတ်လွှတ်ရာ အရင်းမြစ်တွင် တပ်ဆင်ခြင်း အစရှိသော လျော့ပါးရေးနည်းလမ်းများကို ဩဘာမှ ထည့်သွင်းပြီးဖြစ်ပါသည်။

ဩဘာသည် အခြေခံအချက်အလက်ဆန်းစစ်မှုကို ဆောင် ရွက်ခဲ့ပြီး အခြေခံအချက်အလက်ရလဒ်များကို ဒေသခံ ရပ်ရွာများထံ ထုတ်ဖော်တင်ပြသွားမည် ဖြစ်ပါသည်။ ဩဘာ သည် ယခု နောက်ဆက်တွဲ ESIA တွင် ပါရှိသည့်အတိုင်း ပုံမှန်စောင့်ကြည့်ရေးကိုလည်း ဆောင်ရွက်သွားမည်ဖြစ်ပြီး၊ စောင့် ကြည့်ရေးမှရရှိသည့် ရလဒ်များကိုလည်း ဒေသခံ ရပ်ရွာထံသို့ ထုတ်ဖော်တင်ပြသွားမည် ဖြစ်ပါသည်။

မြေယာခွင့်ပြုချက်

ကျေးရွာမှမေးမြန်းသည်မှာ ဝန်ကြီးဌာ / အစိုးရက ခွင့်ပြုသောမြေအကြောင်းအရာ နှင့် လုပ်ငန်းခွင်နေရာ ရွေးချယ်မှုလုပ်ငန်းစဉ် နှင့် ဆက်စပ်ပါသည်။

ရှိနေပြီးသော စက်မှုရန်နေရာအတွင်း စီမံကိန်း ဆောင်ရွက် ရန် လယ်ယာစိုက်ပျိုးရေး နှင့် ဆည်မြောင်းဝန်ကြီးဌာနမှ ဩဘာသို့ ခွင့်ပြုချက်ပေးခဲ့ပါသည်။

လူမှုရေးဆိုင်ရာ တာဝန်ယူဆောင်ရွက်မှု နှင့် လူမှုရေးဆိုင်ရာ အကျိုးအမြတ်များ

ကျေးရွာအားလုံးမှ တင်ပြသည်မှာ ဖြစ်လာနိုင်ခြေရှိသော လူမှုဖွံ့ဖြိုးရေးအခွင့်အလမ်းများဖြစ်ပါသည်။ အဓိကတင်ပြ သည့် နှစ်ရပ်မှာ လမ်းအခြေအနေ နှင့် လျှပ်စစ်မီးတို့နှင့် စပ်လျဉ်းသည့်

ဩဘာသည် CSR အစီအစဉ်ကို လုပ်ငန်းလည်ပတ်သည်နှင့် စတင်မည်ဖြစ်ပြီး၊ ၎င်းအကြံပြုချက်များကို လူမှုဖွံ့ဖြိုးရေး အတွက် စီစဉ်ရာတွင် ထည့်သွင်းစဉ်းစားသွားမည် ဖြစ်ပါ သည်။

အဓိက လက်ခံရရှိခဲ့သော မှတ်ချက်များ နှင့် ဖြေကြားချက်များ **နောက်ဆက်တွဲ ESIA အတွက် ထည့်သွင်းစဉ်းစားမှု**

လုံလောက်မှုမရှိသောဝန်ဆောင်မှုများနှင့် သက်ဆိုင်ပါသည်။ ၎င်းတို့ကို လူမှုဖွံ့ဖြိုးရေးအတွက် ဖြစ်ပေါ်လာနိုင်သည့် အခွင့်အလမ်းများအဖြစ် တင်ပြခဲ့ခြင်း ဖြစ်ပါသည်။ ညောင်ကုန်းတွင် ကျေးရွာသူ/ သားများသည် ပိုးသတ်ဆေးများ အတွက် ငွေအမြောက်အများကုန်ကျပြီး၊ ဩဘာမှ သူတို့၏ ထုတ်ကုန်များကို ဒေသခံရပ်ရွာအတွက် ဈေးလျှော့ရောင်း သင့်ကြောင်း ဖြစ်ပါသည်။

ESIA ထိတွေ့တိုင်ပင်ဆွေးနွေးမှုအတွင်း မေးခွန်းများကိုမေးမြန်းခဲ့ကြသည်သာမဟုတ်ဘဲ၊ ရပ်ရွာမှ အကြံပြုတိုင်ကြားရေးလုပ်ထုံးလုပ်နည်း၏ အစိတ်အပိုင်းတစ်ရပ်အနေဖြင့် မကျေနပ် ချက်များကို လည်း ကောက်ယူခဲ့ပြီး၊ ယခုနောက်ဆက်တွဲ ESIA အတွက် ထည့်သွင်းစဉ်းစားလျက် ၎င်းကို **ဇယား ၁.၃** တွင် တင်ပြထားပါသည်။

ဇယား ၁.၃ ရပ်ရွာမှ မှတ်ချက်များ မှတ်တမ်း

အမျိုးအစား	မှတ်ချက်အတိုချုပ်	ESIA အတွက် ဆောင်ရွက်မှု
လူမှုရေးဆိုင်ရာ တာဝန်ယူဆောင်ရွက်မှု (CSR)	ကျေးရွာဖွံ့ဖြိုးရေးလုပ်ငန်းများကို ပွင့်လင်းမြင်သာစွာ နှင့် ထိရောက်စွာဆောင်ရွက်ရန်။ ဩဘာသည် ဒေသရှိဆေးရုံအတွက် ထောက်ပံ့ပေးသင့်ပြီး ပိုးသတ်ဆေးများကို ဒေသခံများအတွက် လျှော့စျေးဖြင့်ရောင်းချသည်ဆိုင် ပြုလုပ်ပေး သင့်ပါသည်။	တိုင်ပင်ဆွေးနွေးမှုလုပ်ငန်းများ အားလုံးကို ပွင့်လင်းမြင်သာစွာဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။ CSR သည် ESIA ၏ အစိတ်အပိုင်းတစ်ရပ် အဖြစ်မဟုတ်ဘဲ၊ ဩဘာသည် CSR ကို သီးသန့် ထည့်သွင်းစဉ်းစား သွားမည် ဖြစ်ပါသည်။
ESIA	ထိခိုက်မှုဆန်းစစ်ခြင်းနောက်ပိုင်း စစ်ဆေးရေး နှင့် လေ့လာစောင့်ကြည့်ရေးအတွက် မည်သူက တာဝန်ယူသွားမည်နည်း။ ERM သည် ESIA အတွက် သက်ဆိုင်ရာ ရပ်ရွာက လူများပါဝင်စေရန်။ ESIA ရလဒ်များကို ရပ်ရွာသို့ ထုတ်ပြန်ပေးရန် နှင့် ၎င်းရလဒ်များအပေါ် အာမခံပေးရန် အပြင် မြွန်ရေတွင်းများမှလည်း ကောက်ယူဆောင် ရွက်ရန်။	ESIA အစီရင်ခံစာတွင် အခန်းကဏ္ဍများ နှင့် တာဝန်များအပါအဝင် စောင့်ကြည့်ရေးတို့ကို ထည့်သွင်းပါဝင်သွားမည် ဖြစ်ပါသည်။ အခြေခံအချက်အလက် စစ်တမ်းများအတွက် ရပ်ရွာရှိလူများကို ဖိတ်ခေါ်သွားမည် ဖြစ်ပါ သည်။ မြွတ်ရေတွင်းမှ ရေများကို ယူဆောင်ပြီး ရလဒ်များကို နောက်ဆောင်ရွက်မည် တိုင်ပင် ဆွေးနွေးမှုတွင် ရပ်ရွာထံသို့ တင်ပြသွားမည် ဖြစ်ပါသည်။
မတော်တဆ ဖြစ်ရပ်များ	အရေးပေါ်အစီအစဉ်တွင် လိုအပ်သည့် သတင်းအချက်အလက်များ နှင့် ကျေးရွာသူ/ သားများထံ ကျရောက်နိုင်သည့် ထိခိုက်မှုများ။	ESIA တွင် မတော်တဆဖြစ်ရပ်များ (ရပ်ရွာများ အပေါ်ကျရောက်နိုင်သော ထိခိုက်မှုများ အပါအဝင်) ကို ဆန်းစစ်သွားမည် ဖြစ်ပါသည်။

အမျိုးအစား	မှတ်ချက်အတိုချုပ်	ESIA အတွက် ဆောင်ရွက်မှု
အလုပ်အကိုင် အခွင့်အလမ်းများ	လူငယ်များ နှင့် ဒေသခံရပ်ရွာရှိလူများအတွက် အလုပ်အကိုင်အခွင့်အလမ်းများ ဆောင်ရွက် ပေးမှု။	ESIA တွင် အလုပ်အကိုင်များဆောင်ရွက်ပေးမှု နှင့် အကျိုးနိုင်ခြေတို့ကို ထည့်သွင်း ဆန်းစစ်သွားမည် ဖြစ်ပါသည်။
မြေယာကိစ္စ	ဗိုင်းနုကျွန်းကျေးရွာ နှင့် ညောင်ကုန်းကျေးရွာ ဆက်ထားသော လမ်းမှာ ၁၃ ပေ မှ ၆.၅ ပေထိ ကျဉ်းမြောင်းသွားခြင်း။	ဤသည်မှာ ဩဘာ နှင့် စိုက်ပျိုးရေး ဝန်ကြီးဌာန တို့အကြား မြေငှားရမ်းမှုတို့အပေါ် မူတည်ပါသည်။
ညစ်ညမ်းမှု	ဓာတ်ငွေ့ထုတ်လွှတ်မှုများ သည် သီးနှံများ သို့မဟုတ် စိုက်ပျိုးရေးမြေအပေါ် ပျက်စီးစေနိုင် ပါသလား။ MPI စက်ရုံမှ ဓာတ်ငွေ့ (နှင့်/သို့မဟုတ်) အစိုးအငွေ့ ထုတ်လွှတ်သောအခါ ရပ်ရွာတွင် အတိတ်ဖြစ်ရပ် ဖျားနာမှုဥပမာများရှိ နေပါသည်။	ESIA တွင် ထုတ်လွှတ်မှုများ နှင့် ဒေသခံ ရပ်ရွာများ နှင့် အနီးပတ်ဝန်းကျင်တို့အပေါ် ၎င်းတို့၏ သက်ရောက်မှုကို ဆန်းစစ်သွားမည် ဖြစ်ပါသည်။ စက်ရုံနေရာများမှ သက်ရောက်မှု၏ ပေါင်းစပ် ဆန်းစစ်မှုကို ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။
တည်နေရာ ပြောင်းရွှေ့ခြင်း	စီမံကိန်းမှာ ကျေးရွာများနှင့် အနီးတွင်ရှိနေပြီး၊ ဘာကြောင့် ၎င်းမြေနေရာကို ရွေးချယ်ခဲ့ပါ သလဲ။ တည်နေရာကိုရွှေ့ပြောင်းရန် ဖြစ်နိုင်ပါသလား။	ဤသည်မှာ ဩဘာ နှင့် စိုက်ပျိုးရေး ဝန်ကြီးဌာန တို့အကြား မြေငှားရမ်းမှုတို့အပေါ် မူတည်ပါသည်။
လမ်းပျက်စီးမှု	စက်ရုံ ကုန်တင်ကားများသည် ကျေးရွာ လမ်းများကို ပျက်စီးစေပါသည်။ ဩဘာက လမ်းများကို ပြုပြင်သင့်ပါသည်။	မှော်ဘီလုပ်ကွက်အား ဆက်သွယ်ထားသောလမ်းသည် အစိုးရ၏စီမံခန့်ခွဲမှုအောင်တွင်ရှိသော အများပြည်သူပိုင်လမ်းဖြစ်သည်။ ဩဘာသည် ၎င်း၏ ရပ်ရွာမှ အကြံပြုတိုင်ကြားရေး ဆိုင်ရာ ယန္တရား မှ တစ်ဆင့် တိုင်းကြားလာသည့် အနံ့ဆိုင်ရာ ကိစ္စရပ်ကို မှတ်တမ်းတင်ထားပြီးဖြစ်ပြီး နေ ဘက်ဆက်တွဲ ဖြေရှင်းရေးလုပ်ငန်းသည် သက်ဆိုင်ရာ ဒေသတွင်းအစိုးရ၏ တာဝန်ဖြစ်ပါသည်။

အမျိုးအစား	မှတ်ချက်အတိုချုပ်	ESIA အတွက် ဆောင်ရွက်မှု
ကျေးရွာဆိုင် သတင်းအချက် အလက်များ	ကျေးရွာစာရင်းမှာ မမှန်ကန်ပါ။ အများပြည်သူ နှင့် တိုင်ပင်ဆွေးနွေးမှုကို စီမံကိန်းအနီးရှိ ကျေးရွာအားလုံးတွင်ဆောင်ရွက် သင့်ပြီး ESIA စစ်တမ်းတွင် ပါဝင်သင့်ပါသည်။	၃.၅ ကိုလိုမီတာအတွင်း ကျရောက်သော ကျေးရွာအုပ်စုများ အားလုံးကို တိုင်ပင် ဆွေးနွေးမှု တည်နေရာများကို ရွေးချယ်ရာတွင် ပါဝင်စေခဲ့ပါသည်။ နယ်ပယ်အတိုင်းအတာ သတ်မှတ်ခြင်းဆိုင်ရာ တိုင်ပင်ဆွေးနွေးမှု ကာလအတွင်း အစည်းအဝေးများ မပြုလုပ် သည့် ကျေးရွာများမှ ကျေးရွာသူ/သား များကို ဒုတိယမြောက် ထိတွေ့တိုင်ပင်မှုတွင် ဖိတ်ခေါ်သွားမည် ဖြစ်ပါသည်။
စွန့်ပစ်ပစ္စည်း စီမံခန့်ခွဲမှု	စက်ရုံမှ ထုတ်လွှတ်သည့် စွန့်ပစ်ပစ္စည်းများ သည် ဒေသရှိ ရေလမ်းကြောင်းများ၊ ဒေသရှိ သီးနှံများ နှင့် ဒေသရှိရပ်ရွာများအပေါ် ထိခိုက်နိုင်ခြေကို စိုးရိမ်ကြောင်း။ စွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှုစနစ်ကို ကျေးရွာ သူ/သားများထံ ရှင်းပြပေးရန်။	ESIA တွင် သဘာဝပတ်ဝန်းကျင် နှင့် ဇီဝ ပတ်ဝန်းကျင်တို့အပေါ် ဖြစ်ပေါ်လာနိုင်သည့် စွန့်ပစ်ပစ္စည်းကြောင့် သက်ရောက်မှုများကို ဆန်းစစ်သွားမည် ဖြစ်ပါသည်။

သက်ဆိုင်သူများနှင့် တိုင်ပင်ဆွေးနွေးမှုများနှင့်အတူ၊ လူမှု-စီးပွားစနစ်များအတွက် အသုံးပြုနိုင်သည့် စုစုပေါင်း အိမ်ထောင်စု ၇၂ စု အိမ်ထောင်စုစစ်တမ်း နှင့် အဖွဲ့လိုက်ဆွေးနွေးမှု ၈ ခုကို ဆောင်ရွက် ခဲ့ပါသည်။ စစ်တမ်းကောက်ယူခဲ့ပြီး၊ ရရှိခဲ့သော သတင်းအချက်အလက်များကို ထိခိုက်မှုဆန်း စစ်ခြင်း နှင့် လျော့ချရေးအစီအမံများတွင် ထည့်သွင်းအသုံးပြုခဲ့ပါသည်။

၁.၅ အဓိက ဖြစ်ပေါ်လာနိုင်သည့် သက်ရောက်မှုများ နှင့် ပဏာမ လျော့ချရေး အစီအမံများ

ထိခိုက်မှုဆန်းစစ်ခြင်းအတွင်း၊ သဘာဝအရင်းအမြစ်များ သို့မဟုတ် လူများ ဆက်နွှယ်လာနိုင် ခြေရှိ သည့်တို့ကို စီမံကိန်းတွင်ထည့်သွင်းစဉ်းစားလျက် လုပ်ငန်းများ (စီစဉ်ထားခြင်း နှင့် စီစဉ်ထားမှု မရှိခြင်း) အပါအဝင် စနစ်ကျသော နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်း လုပ်ငန်းစဉ်ဖြင့် ဖြစ်ပေါ် လာနိုင်သည့် သက်ရောက်မှုများကို ပထမဦးစွာ သတ်မှတ်ဖော်ထုတ်ခဲ့ပါသည်။ ဖြစ်ပေါ်လာနိုင်သည့် ပတ်ဝန်းကျင်သက်ရောက်မှုဆိုင်ရာ ဆက်နွှယ်မှုများသည် စီမံကိန်း၏ တည်ဆောက်မှုကာလ၊ လည်ပတ်မှုကာလ နှင့် မတော်တဆဖြစ်ရပ် (ဥပမာ - ယိုဖိတ်ခြင်း) တို့ ပါဝင်ကြ ပါသည်။

ဖြစ်ပေါ်လာနိုင်သည့်အရေးပါသောပတ်ဝန်းကျင်ဆိုင်ရာသက်ရောက်မှုများ ကို ESIA လေ့လာမှုတွင် စီမံကိန်းမှ ဖြစ်ပေါ်လာနိုင်သော ဆိုးကျိုးသက်ရောက်မှုများကို လျော့ပါးစေရန် သို့မဟုတ် ဖြစ်ပေါ် လာနိုင်သော အပြုသဘောဆောင်သည့် သက်ရောက်မှုများကို မြှင့်တင်နိုင်ရန် သင်လျော်သော လျော့ချရေး နှင့် မြှင့်တင်ရေး အစီအမံများဖြင့် နောက်ထပ်ဆန်းစစ်ထားပါသည်။ အကြံပြုထားသည့် လျော့ချရေးအစီအမံများကို စနစ်ကျသော အကောင်အ ထည်ဖော်ဆောင်ရွက်ခြင်းဖြင့် စီမံကိန်း၏ တည်ဆောက်ရေး နှင့် လည်ပတ်ရေးကာလအတွင်း ဖြစ်ပေါ်လာနိုင်သည့် ကြွင်းကျန် ပတ်ဝန်းကျင် နှင့် လူမှုဘဝ သက်ရောက်မှုများ သည် အသင့်အတင့် အရေးပါသော အနေအထားထက် ကြီးမားမှု

မရှိနိုင်ကြောင်း ESIA လေ့လာမှုတွင် နိဂုံးချုပ်ထားပါသည်။ ကြွင်းကျန်သက်ရောက်မှု (လျှော့ချပြီး နောက်) အကျဉ်းချုပ်ကို ဇယား (၁.၄) တွင် တင်ပြထားပါသည်။

ဇယား (၁.၄) သက်ရောက်မှုဆန်းစစ်ခြင်းရလဒ်များ၏ အကျဉ်းချုပ်

သက်ရောက်မှု	လျှော့ချရေးဆိုင်ရာ အကျဉ်းချုပ်	ကြွင်းကျန် သက်ရောက်မှု၏ အရေးပါမှု
လေထုအရည်အသွေးအပေါ် သက်ရောက်မှုများ	<ul style="list-style-type: none"> - စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးရေးစနစ် ကို အကောင်အထည်ဖော်ဆောင်ရွက်ခြင်း။ - ဖုန်မှုန့်ထိန်းချုပ်ရေးနည်းလမ်း များကို အသုံးပြုခြင်း။ - ထုတ်လွှတ်မှုများအတွက် မြန်မာ စံနှုန်းများ (NEQ လမ်းညွှန်ချက်များ) နှင့် နိုင်ငံတကာ လမ်းညွှန်ချက်များနှင့် အညီ ဆောင်ရွက်ခြင်း။ 	သာမညဖြစ်သော
ဆူညံမှုကြောင့် သက်ရောက်မှုများ	<ul style="list-style-type: none"> - အသေအချာ ပြုပြင်ထိန်းသိမ်းထားသော ကရိယာများကိုသာ လုပ်ငန်းခွင်တွင် အသုံးပြုသင့်ပါသည်။ - ထုတ်လွှတ်မှုများအတွက် မြန်မာ စံနှုန်းများ (NEQ လမ်းညွှန်ချက်များ) နှင့် နိုင်ငံတကာ လမ်းညွှန်ချက်များနှင့် အညီ ဆောင်ရွက်ခြင်း။ 	မပြောပလောက်သော
ရေအရည်အသွေးအပေါ် သက်ရောက်မှုများ	<ul style="list-style-type: none"> - စဉ်ဆက်မပြတ် စောင့်ကြည့်လေ့လာ ရန် / စွန့်ပစ်ရေ စွန့်ထုတ်မှု အရည်အသွေးကို ထုတ်ဖော်တင်ပြရန် စောင့်ကြည့်လေ့လာရေးစနစ်ကို အကောင်အထည်ဖော် ဆောင်ရွက်ခြင်း။ - မြန်မာ စံနှုန်း (NEQ လမ်းညွှန်ချက်များ) နှင့် နိုင်ငံတကာ လမ်းညွှန်ချက်များနှင့်အညီ စွန့်ထုတ်ခြင်း။ 	သာမညဖြစ်သော
မြေဆီလွှာအရည်အသွေးအပေါ် သက်ရောက်မှုများ	<ul style="list-style-type: none"> - အထက်ပါ ရေအရည်အသွေး သက် ရောက်မှုအရ။ 	မပြောပလောက်သော
ရပ်ရွာ ကျန်းမာရေးနှင့် ဘေးကင်းရေး	<ul style="list-style-type: none"> - လုပ်သားများအတွက် လုပ်ငန်းဆိုင်ရာ စည်းကမ်းများ။ - EHS စီမံခန့်ခွဲမှုအစီအစဉ် ကန်ထရိုက်တာ ထားရှိခြင်း။ - တိုင်ပင်ဆွေးနွေးမှုကာလအတွင်း၊ စီမံကိန်းသုံး ယာဉ်များမှ 	သာမညဖြစ်သော

သက်ရောက်မှု	လျော့ချရေးဆိုင်ရာ အကျဉ်းချုပ်	ကြွေးကျန် သက်ရောက်မှု၏ အရေးပါမှု
	<p>လမ်းများပေါ် သွားလာမှု နှင့် လမ်းများပျက်စီးမှုတို့ကို တင်ပြခဲ့ကြပါပြီး၊ ၎င်းအတွက် ဩဘာမှ လမ်းများကို သူ၏မူအတိုင်းဖြစ်အောင် ပြုပြင်ရန် အကြံပြုခဲ့ပါသည်။</p> <p>- ရပ်ရွာမှအကြံပြုတိုင်ကြားရေးဆိုင်ရာ ယန္တရား အကောင်အထည်ဖော်ခြင်း။</p>	
စီးပွားရေး နှင့် အသက်မွေး ဝမ်းကျောင်း လုပ်ငန်းများ	-	အပြုသဘော ဆောင်သော
လုပ်ငန်းခွင် ကျန်းမာရေး နှင့် ဘေးကင်းရေး	အဆောက်အအုံများအတွင်းရှိ လေဝင်လေထွက်စနစ်များ နှင့် လူများ နှင့် မီးဘေးကင်းရေး စနစ်များ ရှိခြင်း။	သာမညဖြစ်သော
ဇီဝမျိုးစုံ မျိုးကွဲအပေါ် သက်ရောက်မှုများ	<p>- မြေရှင်းလင်းရေးကို ကန့်သတ်ခြင်း နှင့် ဖြစ်နိုင်သောလျင် သစ်တောသစ်ပင်များ ပြန်စိုက်ခြင်း။</p> <p>- လုပ်ငန်းခွင်၌ သစ်တောသစ်ပင်များ ပြန်လည် ပြုစုခြင်း။</p>	သာမညဖြစ်သော
အခြေခံအဆောက်အအုံဆိုင်ရာ ဝန်ဆောင်မှုများ	<p>- ယာဉ်အသွားအလာ စီမံခန့်ခွဲမှုအစီအစဉ်။</p> <p>- ရပ်ရွာမှအကြံပြုတိုင်ကြားရေးဆိုင်ရာ ယန္တရား အကောင်အထည်ဖော်ခြင်း။</p>	သာမညဖြစ်သော
မတော်တဆဖြစ်ရပ်များ	<p>- စွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှုအစီအစဉ်များ နှင့် အရေးပေါ်တုံ့ပြန်ရေးအစီအစဉ်များ ရှိခြင်း။</p> <p>- စီမံကိန်းသည် ဓာတုပစ္စည်းများ သိုလှောင်မှုအတွက် အလေ့အကျင့် ကောင်းများကို မွေးစားကျင့်သုံးခြင်း။</p> <p>- ယိုစိတ်မှုများပြန့်နှံ့မှုကိုထိန်းနိုင်ရန် မိလ္လာစနစ်များကို ဒီဇိုင်းပြုလုပ်ခြင်း။</p>	အတော်အသင့် ဖြစ်သော

၁.၆ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်

ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ် အသေးစိတ်ကို အခန်း ၈တွင် ထည့်သွင်းထားပါသည်။ ဤ EMP ၏နယ်ပယ်သည် စီမံကိန်းမှ ပတ်ဝန်းကျင် နှင့် ဒေသခံ ပြည်သူလူထု အတွက် အပေါင်းလက္ခဏာ နှင့် အနှုတ်လက္ခဏာဆောင်နိုင်သော ဆောက်လုပ်ရေးနှင့် လုပ်ငန်းလည်ပတ်ရေး အဆင့် ၂ ရလုံးကို လွှမ်းမိုးခြင်း ဖြစ်သည်။

စီမံကိန်း၏ သီးခြားအဆင့်တစ်ခုချင်းစီအတွက် အသေးစိတ်စီမံခန့်ခွဲမှုနည်းလမ်းများကို ဖော်ဆောင်သွားမည်ဖြစ်သည်။ ၎င်းနည်းလမ်းများကို ဖော်ဆောင်ရွက်အတွက် တာဝန်ရှိသူများမှာ ဩဘာ၊ ကန်ထရိုက် နှင့် ကန်ထရိုက်ခွဲများ ဖြစ်သည်။ မှတ်သားထားသင့်သည်မှာ ဤသည်မှာ EMP ၏မူဘောင်အဆင့်သာဖြစ်ပြီး စောင့်ကြည့်စီမံခန့်ခွဲရေး လုပ်ငန်းအပြည့်အစုံများ နောက်ဆက်တွဲ ထည့်ဝင်သွားမည်ဖြစ်သည်။

ဖော်ပြပြီးသော သက်ရောက်မှု နှင့် လျော့ကျရေးနည်းလမ်းများ အကျဉ်းချုပ်အရ အောက်ပါ အသေးစိတ် စီမံခန့်ခွဲရေးနည်းလမ်းများသည် စီမံကိန်းကာလတလျှောက် ESIA ထည့်သွင်းအသုံးပြုခြင်း (ဇယား ၁.၅) အတွက် လိုအပ်သည်ဟု သတ်မှတ်ပါသည်။ ၎င်းလမ်းစဉ်များကို ယခု ဩဘာမှ အကြမ်းဖျင်း ပြုစုနေပါသည်။

ဇယား (၁.၅) စီမံကိန်းအတွက် လိုအပ်သော စီမံခန့်ခွဲမှု အစီအစဉ်များ

စီမံခန့်ခွဲမှု အစီအစဉ်များ	အဓိကရည်မှန်းချက်နှင့် ပါဝင်မှု
လေထုညစ်ညမ်းမှု စီမံခန့်ခွဲမှု အစီအစဉ်	သင့်လျော်သောစီမံခန့်ခွဲမှုသည် လူထုကျန်းမာရေးနှင့် သဘာဝပတ်ဝန်းကျင်အတွက် ဖုန်မှုန့်နှင့်ဆိုင်သော မည်သည့် တန်ပြန်သက်ရောက်မှုကိုမဆိုလျော့ချပေးနိုင်ခြင်း နှင့် လုပ်ငန်းလည်ပတ်စဉ်ကာလ ဖုန်မှုန့် နှင့် လေထုထဲသို့ထုတ်လွှတ်မှု ကိုထိန်းချုပ်သော လမ်းစဉ်များဖော်ဆောင်ရန် လေထုညစ်ညမ်းမှု စီမံခန့်ခွဲမှု အစီအစဉ် ကသရုပ်ဖော်ပြသသင့်ပါသည်။ ၎င်း အစီအစဉ်သည် ကုန်ပစ္စည်းအမြောက်အများ အသုံးပြုခြင်း နှင့် ထားသိုခြင်း၊ မြေအစိုင်အခဲများ ရွေ့လျားရသော ဆောက်လုပ်ရေးလုပ်ငန်းများ သို့ ယာဉ်များသွားလာခြင်းမှ ထွက်သောဖုန်များလည်းပါဝင်ပါသည်။
အရေးပေါ်အခြေအနေ ပြင်ဆင်ရေးနှင့် တုံ့ပြန်ရေး အစီအစဉ်	ဤအစီအစဉ်သည် HAIC စီမံကိန်းတွင် ဖြစ်နိုင်ခြေရှိသော အရေးပေါ်အခြေအနေများအတွက် အရေးပေါ်တုံ့ပြန်ရေးလမ်းစဉ်များကို ဖော်ပြပါမည်။ ၎င်းတို့မှာ မီး၊ ဓာတုယိုစိမ့်မှု၊ အလုပ်သမားထိခိုက် ဒဏ်ရာရမှု၊ လျှပ်စီးမှုနိတိုင်း နှင့် ယာဉ်မတော်တဆ ထိခိုက်မှု တို့ ဖြစ်သည်။ ထို့ပြင် EHS ဌာန၊ ဆေးကုသမှုအဖွဲ့၊ အရေးပေါ်ကုသရေးအဖွဲ့၊ လုံခြုံရေးအဖွဲ့၊ ဓေသအာဏာပိုင်များ နှင့် ကန်ထရိုက်တာများ နှင့် ဝန်ဆောင်ရေးအဖွဲ့များ ၏ တာဝန်ဝတ်တရားများကိုလည်း ဖော်ဆောင်ပေးမည်။
စွန့်ပစ်ပစ္စည်း စီမံခန့်ခွဲမှု အစီအစဉ်	စွန့်ပစ်ပစ္စည်း လျော့ချရေး၊ ကိုင်တွယ်ရေးနှင့် စွန့်ပစ်ရေးတို့အတွက် စွန့်ပစ်ပစ္စည်း စီမံခန့်ခွဲမှု အစီအစဉ် သည်လမ်းညွှန်လမ်းပြဖြစ်သည်။ စွန့်ပစ်ပစ္စည်း အမျိုးအစားများအားလုံး ၏ ထွက်ရှိရာ၊ အမှိုက်အဆင့်သို့ နိမ့်သွားပုံ၊ ဖယ်ရှားခြင်း နှင့် ဖျက်ဆီးခြင်း တို့အတွက် အသေးစိတ်အချက်အလက်ပြင်ဆင်ခြင်းတို့ပါဝင်သည်။
စွန့်ပစ်ရေ စီမံခန့်ခွဲမှု အစီအစဉ်	စွန့်ပစ်ရေ စီမံခန့်ခွဲမှု (သန့်စင်ရေး နှင့် ဆက်စပ်အဆောက်အဦများ နှင့် ဝန်ဆောင်မှုများ) အတွက် စွန့်ပစ်ရေ စီမံခန့်ခွဲမှု အစီအစဉ် ကလမ်းပြဖော်ဆောင်ပါသည်။ ထို့ပြင် အနာဂတ်အတွက် ဖွံ့ဖြိုးတိုးတက်မှု၊ ရေဆိုးစွန့်ပစ်မှုစနစ်အား တိုးချဲ့ခြင်းနှင့်

စီမံခန့်ခွဲမှု အစီအစဉ်များ	အဓိကရည်မှန်းချက်နှင့် ပါဝင်မှု
	အဆင့်မြှင့်တင်ခြင်းတို့တွင် ပြောင်းလဲမှုများလုပ်ဆောင်ရေးအတွက်လိုအပ်သော လမ်းစဉ်များကို ဖော်ဆောင်ပေးပါသည်။
ကုန်းလမ်းပို့ဆောင်ရေး စီမံခန့်ခွဲမှု အစီအစဉ်	ကုန်းလမ်းပို့ဆောင်ရေး စီမံခန့်ခွဲမှု အစီအစဉ်သည် လုပ်ငန်းခွင်မှ ယာဉ်အသွားအပြန် အပါအဝင် လုပ်ငန်းခွင်ဘေးကင်းရေးနှင့် လုပ်ငန်းခွင်စွမ်းဆောင်ရည်ကောင်းမွန်ရေးတို့အား စီမံခန့်ခွဲခြင်းဖြစ်ပြီး ယာဉ်သွားလာသော ပတ်ဝန်းကျင်တွင် လုပ်ကိုင်သော လုပ်ငန်းအားလုံးနှင့် ဆက်စပ်နေပါသည်။
ပတ်သက်ဆက် နွယ်သူများနှင့် တွေ့ဆုံခြင်း စီမံခန့်ခွဲမှု အစီအစဉ်	SEMPက အမျိုးမျိုးသော ပတ်သက်ဆက်နွယ်သူများကို ထိရောက်ကျွမ်းကျင်သော ဆက်သွယ်မှုများ ရရှိနိုင်ရန် စီစဉ်ပေးသည်။ ၎င်းမှာ စီမံကိန်းဆက်သွယ်မှုများ မည်ကဲ့သို့ ဖြစ်ပေါ်နေသည်ကို ဖော်ပြသည်။ ကောင်းမွန်သော ဆက်သွယ်မှု အစီအစဉ်များတွင် ယေဘုယျအားဖြင့် အောက်ပါ အချက်များ ပါဝင်ကြသည် ။ <ul style="list-style-type: none"> ဆက်သွယ်ရသည့် ရည်ရွယ်ချက် ရည်ရွယ်သည့် လူထုပရိတ်သတ် ဆက်သွယ်ရာတွင် လိုအပ်သည့် အချက်အလက်ပါဝင်မှုနှင့် ဆက်သွယ်ရေးနည်းလမ်းနှင့် အကြိမ်အရေအတွက်
Contractors EHS စီမံခန့်ခွဲမှု အစီအစဉ်	Contractors EHS စီမံခန့်ခွဲမှု အစီအစဉ်သည် ပရောဂျက် EMP နှင့် ဆက်နွယ်နေသည့်အပြင် အားလုံးသော Contractor များမှာ ပတ်ဝန်းကျင် ကျန်းမာရေး စီမံမှု၊ ဘေးကင်းလုံခြုံမှုအန္တရာယ်များ လျော့ချမှု နှင့် စီမံကိန်းနှင့် ပတ်သက်သော သက်ရောက်နိုင်ချေများ လျော့ချမှုများကို သေချာစွာ သိရှိနားလည်ထားရမည် ဖြစ်သည်။
အလုပ်အကိုင် ကျန်းမာရေးနှင့် ဘေးကင်းလုံခြုံရေး စီမံခန့်ခွဲမှု အစီအစဉ်	အလုပ်အကိုင် ကျန်းမာရေးနှင့် ဘေးကင်းလုံခြုံရေး အစီအစဉ်သည် အဖွဲ့အစည်းမှ ကတိကဝတ်ပြုထားသော လုပ်ငန်းခွင် ကျန်းမာရေးနှင့် ဘေးကင်းလုံခြုံရေး ရည်ရွယ်ချက်များနှင့် လုပ်ငန်းခွင်ဖျားနာမှုနှင့် ထိခိုက်မှုများအား ကာကွယ်ရန် လုပ်ဆောင်မှု အစီအစဉ်များကို ရှင်းလင်းစွာ ရေးသားဖော်ပြခြင်းအားဖြင့် ပြသဖော်ဆောင်သည်။
ပတ်ဝန်းကျင် ထိန်းသိမ်းစောင့်ကြည့်ရေး အစီအစဉ်	ပတ်ဝန်းကျင် ထိန်းသိမ်းစောင့်ကြည့်ရေး အစီအစဉ်သည် The Environmental World Bank Group EHS ညွှန်ကြားချက်နှင့် and Myanmar National Environmental Quality (Emission) ညွှန်ကြားချက်များနှင့်အညီ ပတ်ဝန်းကျင်အရည်အသွေး စောင့်ကြည့်ရေးကို ကျင့်ကြံပြုမူနိုင်ရန် ပြည်ပသော အစီအစဉ်တရပ်အဖြစ် ဖော်ပြသည်။
အန္တရာယ်ရှိ ပစ္စည်းများ စီမံခန့်ခွဲမှု အစီအစဉ်	အန္တရာယ်ရှိ ပစ္စည်းများ စီမံခန့်ခွဲမှု အစီအစဉ်၏ ခြုံငုံရည်ရွယ်ချက်မှာ အန္တရာယ်ရှိ ပစ္စည်းများအား ကိုင်တွယ်နေသူ အလုပ်သမားများအား ကာကွယ်ရန်၊ ဘေးကင်းစွာ အသုံးပြုခွင့်ပြုရန်နှင့် ရှောင်ရှားခြင်းမဖြစ်နိုင်သည့်အခါ

စီမံခန့်ခွဲမှု အစီအစဉ်များ	အဓိကရည်မှန်းချက်နှင့် ပါဝင်မှု
	၎င်းတို့ ကိုင်တွယ်နေစဉ် မီးလောင်ပေါက်ကွဲခြင်းအပါအဝင် ထိခိုက်မှုများ သို့မဟုတ် မထိန်းချုပ်နိုင်သော အန္တရာယ်ရှိပစ္စည်းများထုတ်လွှတ်မှု အနည်းဆုံးဖြစ်စေရန် သိုလှောင်သော အလေ့အကျင့်ကို ခွင့်ပြုရန်၊ ထိုသို့ သိုလှောင် အသုံးပြုခြင်းဖြင့် ပတ်ဝန်းကျင်နှင့် လုပ်သားအင်အားနှစ်ခုလုံးအား ကာကွယ်ရန် ဖြစ်သည်။
လုပ်ငန်းခွင်အတွင်း စီးဆင်းသော ရေအား စီမံခန့်ခွဲမှု အစီအစဉ်	(RDMP) သည် HAIC ပရောဂျက်တွင် ချောင်းရေ၏ ရေမျက်နှာပြင်အရည်အသွေးကို ထိခိုက်စေသော မထိန်းချုပ်နိုင်သည့် ရေစီးဆင်းမှု၊ မသင့်လျော်သော ရေဆိုးများ၊ စွန့်ပစ်အပိုင်အခဲများ၊ အလုပ်ခွင်အတွင်း အန္တရာယ်ရှိပစ္စည်းများအား စီမံခန့်ခွဲရာ လျော့ကျစေရန် ရှာဖွေသည်။
ဆောက်လုပ်ရေး စီမံခန့်ခွဲမှု အစီအစဉ်	ဆောက်လုပ်ရေး စီမံခန့်ခွဲမှု အစီအစဉ်သည် ဆောက်လုပ်ရေးစင်၏ ဒုတိယနှင့် တတိယအဆင့်များအတွင်း ထိခိုက်မှုကို လျော့ချရန် လိုအပ်သော တိုင်းတာချက်အားလုံးကို စုဆောင်းသည်။

ထိုစာရွက်စာတမ်းများသည် စီမံကိန်း၏ ဆောက်လုပ်ရေးအဆင့်ကို လွှမ်းမိုးရာတွင် ပြင်ဆင်ရန် ရည်ရွယ်သည်။ လုပ်ငန်းအဆင့်များအားလွှမ်းမိုးခြင်း လိုအပ်သော စာရွက်စာတမ်းများကို လုပ်ငန်းမစတင်မီ ကြိုတင် ပြင်ဆင်ထားသင့်သည်။

သီးခြား အစီအစဉ်တစ်ခုချင်းစီကို ပတ်သက်ဆက်နွယ်သူများထံသို့ သင့်တော်သော အချိန်တွင် အသိပေးချပြသွားမည်ဖြစ်သည်။

ရုပ်ပိုင်းဆိုင်ရာ၊ ဇီဝဗေဒနှင့် လူမှုရေးပတ်ဝန်းကျင်ဆိုင်ရာ အထူးအရေးပါသော အစိတ်အပိုင်းများ စီမံခန့်ခွဲမှုသည် စွမ်းဆောင်နိုင်မှုရည်ညွှန်းကိန်းကို ဖော်ထုတ်သည်။ စွမ်းဆောင်နိုင်မှုရည်ညွှန်းကိန်းတစ်ခုချင်းစီ၏ ပြည့်စုံသော စောင့်ကြည့်လေ့လာရေးအစီအစဉ်သည် စီမံကိန်းအဆင့်အားလုံးအတွက် ပြင်ဆင်ထားပြီးဖြစ်ပြီး ဇယား ၁.၆ တွင် ဖော်ပြထားသည်။

မီးရှို့စက်မှထွက်ရှိသောငြာများနှင့် အိမ်များထွက်ရှိသောစွန့်ပစ်ပစ္စည်းများကို သီလဝါရှိလိုင်စင်ရ ကန်ထရိုက်ထံ ပို့ဆောင်သွားမည်ဖြစ်ပြီး မီးရှို့စက်ကိုလည်း ဘေးအန္တရာယ်ရှိသော စွန့်ပစ်ပစ္စည်းများ စီမံခန့်ခွဲရေး အစီအစဉ်အတိုင်း အရံအနေဖြင့်သာ အသုံးပြုသွားမည်ဖြစ်ပါသည်။

ဇယား ၁.၆ ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးနှင့် လူမှုစောင့်ကြည့်လေ့လာရေး အစီအစဉ် (ဆောက်လုပ်ရေးနှင့် ပြုလုပ်ပုံ အဆင့်)

စီမံကိန်းအဆင့် /အကျိုးသက် ရောက်သော အစိတ်အပိုင်း	အလားအလာရှိသော သက်ရောက်မှု	စောင့်ကြည့်ခံရန်အတွက် သတ်မှတ်ချက်များ	နေရာ	အတိုင်းအတာ	ကြိမ်နှုန်း
ဆူညံသံ	ပတ်ဝန်းကျင်ဆူညံမှု အဆင့်များ မြင့်တက်ခြင်း	Leq, Leq day, Leq night နှင့် hourly Leq ရှိ ဆူညံမှုအဆင့်များ	ပုံ ၅.၁၄ တွင် ပြထားသည့်အတိုင်း စီမံကိန်းနယ်နိမိတ်မှ ၅၀၀ မီတာအတွင်း NSRsကို ခွဲခြားဖော်ထုတ်ခြင်း	၂၄ နာရီ	ဆောက်လုပ်ရေး ကာလ အတွင်း လစဉ်
			ထုတ်လုပ်ရေးလှိုင်း (point source measurement)	၂၄ နာရီ	လုပ်ငန်းစဉ်မပြီး မြောက်သေးသရွေ့ လစဉ်
ရေမျက်နှာပြင်	ရေမျက်နှာပြင် ညစ်ညမ်းခြင်း	pH၊ DO၊ COD၊ BOD၊ စက်ဆီ ချောဆီ၊ TN၊ TP၊ TSS (အနည်အဖတ် စုစုပေါင်း) နှင့် Total Coliform	ပုံ ၅.၂၀ တွင် ဖော်ပြထားသော ရေနမူနာ နေရာများ နှင့် စီမံကိန်းလုပ်ငန်းခွင်၏ အထက် မီတာ ၁၀၀ အကွာတွင် တည်ရှိသော အထက်စခန်း	သတ်မှတ်ထားသော ခွဲခြမ်းစိတ်ဖြာ ညှင်းလမ်းများ	ဆောက်လုပ်ရေး ကာလ အတွင်း လစဉ်
		pH၊ BOD ₅ ၊ COD၊ TSS (အနည်အဖတ် စုစုပေါင်း)၊ စက်ဆီ ချောဆီ၊ AOX၊ Phenol၊ Arsenic၊ Chromium Total၊ Chromium (hexavalent)၊ Copper၊ Chlorinated organics၊ Nitroorganics	စွန့်ပစ်ရော စောင့်ကြည့်ရေးအား ရေဆိုးစွန့် ပို့ငှင်တွင် စောင့်ကြည့် သွားမည်ဖြစ်သည်။	သတ်မှတ်ထားသော ခွဲခြမ်းစိတ်ဖြာ နည်းလမ်းများ	လုပ်ငန်းစဉ်မပြီး မြောက်သေးသရွေ့ လစဉ်

စီမံကိန်းအဆင့် /အကျိုးသက် ရောက်သော အစိတ်အပိုင်း	အလားအလာရှိသော သက်ရောက်မှု	စောင့်ကြည့်ခံရန်အတွက် သတ်မှတ်ချက်များ	နေရာ	အတိုင်းအတာ	ကြိမ်နှုန်း
		Mercury၊ Zinc၊ Active Ingredient (တစ်ခုချင်းစီ)၊ Bioassays Toxicity: Fish၊ Daphnia၊ Algae၊ Bacteria၊ Ammonia၊ Total Phosphorus၊ Total Coliform၊ Total Nitrogen	17°16'65.98"N 96°07'70.56"E.		
လေထု	ဖုန်မှုန့်နှင့် အမှုန်များ ထုတ်လွှတ်မှု တိုးမြှင့်ခြင်း	PM ₁₀ ၊ PM _{2.5} ၊ NO ₂ နှင့် SO ₂	ပုံ ၅.၃ တွင် ပြထားသည့် ASRs	Diffusion tube. HAZ-SCANNER (EPAS) Environmental Perimeter Air Monitoring System	ဆောက်လုပ်ရေး ကာလ အတွင်း လစဉ်
	ထုတ်ကုန်ဖော်စပ်ရေး နည်းလမ်းစဉ်	အမှုန်အမွှားအသေးများ၊ TOC၊ VOC၊ Chloride၊ Bromines (as HBr)၊ Cyanides (as HCN)၊ Fluorine (as HF)၊ Hydrogen Sulphide၊ Chlorine၊ Ammonia၊ Gaseous Inorganic Chlorine Compounds (as HCl) mg/Nm ³	ထုတ်လွှတ်ရာနေရာများ	Diffusion tube. HAZ-SCANNER (EPAS) Environmental Perimeter Air Monitoring System	လုပ်ငန်းစဉ်မပြီး မြောက်သေးသရွေ့ လစဉ်

၁.၇ အကျဉ်းချုပ်နှင့် နိဂုံးချုပ် အကြံပြုချက်များ

စီမံကိန်းတွင် ရန်ကုန်တိုင်းဒေသကြီး၊ မှော်ဘီမြို့နယ်တွင် တည်ရှိသည့် သြဘာမှ စိုက်ပျိုးရေးဆိုင်ရာ ဆေးဝါးများဖျော်စပ်ထုတ်လုပ်သည့်စက်ရုံ HAIC တည်ဆောက်မှု နှင့် လည်ပတ်မှု တို့ပါဝင်ပါသည်။ စီမံကိန်းကို အပြည်ပြည်ဆိုင်ရာ ဘဏ္ဍာရေး ကော်ပိုရေးရှင်း (IFC) မှ ရန်ပုံငွေဖြင့် သြဘာ၏ အဓိက စီးပွားရေးလုပ်ငန်းတိုးချဲ့ရန်အတွက် သြဘာသို့ အမေရိကန်ဒေါ်လာ ၁၀ သန်းကို တိုးပေးခဲ့ပါသည်။

စီမံကိန်းအတွက် ESIA လေ့လာမှုကို မြန်မာနိုင်ငံ၏သတ်မှတ်ချက်များ၊ နိုင်ငံတကာစံနှုန်းများ (ဥပမာ - IFC PS နှင့် WBG EHS လမ်းညွှန်ချက်များ) ၏ သက်ဆိုင်ရာ ပတ်ဝန်းကျင် နှင့် လူမှု လမ်းညွှန်များ နှင့်အညီ စီမံကိန်း၏ လက်ခံနိုင်ရည်ရှိသော ပတ်ဝန်းကျင် နှင့် လူမှုဘဝဆိုင်ရာ လုပ်ဆောင်မှု ကို သေချာစေရန် ခြုံငုံရည်ရွယ်ချက်များဖြင့် ဆောင်ရွက်ခဲ့ပါသည်။ ESIA လေ့လာမှုကာလအတွင်း၊ သဘာဝအရင်းအမြစ်များ သို့မဟုတ် လူများ ဆက်နွှယ်လာနိုင် ခြေရှိ သည့်တို့ကို စီမံကိန်းတွင် ထည့်သွင်းစဉ်းစားလျက် လုပ်ငန်းများ (စီစဉ်ထားခြင်း နှင့် စီစဉ်ထားမှု မရှိခြင်း) အပါအဝင် စနစ် ကျသော နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်း လုပ်ငန်းစဉ်ဖြင့် ဖြစ်ပေါ် လာနိုင်သည့် သက်ရောက် မှုများကို ပထမဦးစွာ သတ်မှတ်ဖော်ထုတ်ခဲ့ပါသည်။ ဖြစ်ပေါ်လာနိုင်သည့် အရေးပါသော ပတ်ဝန်းကျင်ဆိုင်ရာသက်ရောက်မှုများ ကို ESIA လေ့လာမှုတွင် စီမံကိန်းမှ ဖြစ်ပေါ်လာနိုင်သော ဆိုးကျိုးသက်ရောက်မှုများကို လျော့ပါးစေရန် သို့မဟုတ် ဖြစ်ပေါ် လာနိုင်သော အပြုသဘော ဆောင်သည့် သက်ရောက်မှုများကို မြှင့်တင်နိုင်ရန် သင်လျော်သော လျော့ချရေး နှင့် မြှင့်တင်ရေး အစီအမံများဖြင့် နောက်ထပ်ဆန်းစစ်ထားပါသည်။

ဒေသတွင်း ESIA ကို MONREC အတွက် ပြင်ဆင်ရေးသားခဲ့ပြီး လက်ရှိတွင် MONREC မှ ပြန်လည် သုံးသပ်လျက်ရှိပါသည်။ လည်ပတ်ရေးလုပ်ငန်းများမစတင်မီ သြဘာအနေဖြင့် ခွင့်ပြုချက်ကို စောင့်ဆိုင်းရန် အကြံပြုထားပါသည်။

တိုင်ပင်ဆွေးနွေးမှုရလဒ်များကို စီမံကိန်းအတွက် လျော့ချရေးအစီအမံများတွင် ထည့်သွင်းဆောင် ရွက်ခဲ့ပြီး ယခု ESIA အစီရင်ခံစာတွင် ပါဝင်ပါသည်။ ၎င်းတွင် အောက်ပါတို့ ပါဝင်ပါသည် -

- စီမံကိန်းလုပ်ငန်းခွင် နှင့် စီမံကိန်းလုပ်ငန်းခွင်နေရာအနီးဆုံးရှိ ရပ်ရွာများ ၌ ပုံမှန် လေထု နှင့် ရေ တို့ကို စောင့်ကြည့်လေ့လာခြင်း။
- စီမံကိန်းဘက်သို့သွားရာလမ်းသည် စီမံကိန်းသုံး ယာဉ်များကြောင့် ပျက်စီးခဲ့ပြီး၊ ၎င်းလမ်းကို သြဘာမှ နဂိုအနေအထားအတိုင်းပြန်လည် ပြုပြင်ရန် အကြံပြုထားခြင်း။
- ဒေသခံများမှ အသုံးပြုရန်အတွက် တရားဝင်အကြံပြုတိုင်ကြားရေးဆိုင်ရာ လုပ်ထုံးလုပ်နည်းကို ရေးဆွဲခြင်း။
- ပရွက်ဆိတ်ကုန်း၊ ကြည်နီဆန်း၊ ဖိုးနေကုန်း နှင့် ရှမ်းကုန်းကျေးရွာတို့တွင် တိုင်ပင်ဆွေးနွေးမှု ပြုလုပ်ခြင်း နှင့် သတင်းအချက်အလက်များကို ထုတ်ဖော်တင်ပြခြင်း။

အကြံပြုထားသည့် လျော့ချရေးအစီအမံများကို စနစ်ကျသော အကောင်အထည်ဖော်ဆောင် ရွက်ခြင်းဖြင့် စီမံကိန်း၏ တည်ဆောက်ရေး နှင့် လည်ပတ်ရေးကာလအတွင်း ဖြစ်ပေါ်လာနိုင်သည့်

ကြွင်းကျန် ပတ်ဝန်းကျင် နှင့် လူမှုဘဝ သက်ရောက်မှုများ သည် အသင့်အတင့် အရေးပါသော အနေအထားထက် ကြီးမားမှု မရှိနိုင်ကြောင်း ESIA လေ့လာမှုတွင် နိဂုံးချုပ်ထားပါသည်။

ESIA လေ့လာမှုတွင် သတ်မှတ်ဖော်ထုတ်ထားသော ကတိပြုထားသည့် လျော့ချရေးအစီအမံများ စနစ်တကျဆောင်ရွက်မှုကို သေချာစေရန်၊ ပတ်ဝန်းကျင် နှင့် လူမှုဘဝ စီမံခန့်ခွဲမှုအစီအစဉ် (ESMP) တစ်ရပ် ကို စီမံကိန်းအတွက် ပြင်ဆင်ခဲ့ပြီး ဖြစ်ပါသည်။ ၎င်းတွင် စီမံကိန်း၏ တည်ဆောက်ရေးကာလ နှင့် လည်ပတ်ရေးကာလတို့အတွင်း လျော့ချရေးလုပ်ငန်းများသည် နှင့် ထိရောက်မှု ကိုက်ညီမှု ရှိမရှိ ကို လေ့လာစောင့်ကြည့် စစ်ဆေးရန် အသုံးပြုရမည့် လုပ်ထုံးလုပ်နည်းများ နှင့် လုပ်ငန်းစဉ်များ ပါဝင်ပါသည်။ ထို့ပြင်၊ ယခု ESIA ကို ဥပဒေအရ သတ်မှတ်ချက်များ နှင့် အညီဖြစ်စေရန် နှင့် ဘေးကင်းရေး နှင့် ပတ်ဝန်းကျင်ဆိုင်ရာ မူဝါများနှင့်ပေါင်းစပ် သေချာစေရန် အသုံးပြုသွားမည် ဖြစ်ပါသည်။ ခြုံငုံဆိုရလျှင်၊ ESMP ကို စနစ်တကျအကောင်အထည်ဖော်ဆောင်ရွက်ခြင်းဖြင့် လက်ခံနိုင်ဖွယ်ရှိသော ပတ်ဝန်းကျင် နှင့် လူမှုရေး လုပ်ဆောင်မှုတို့နှင့် အညီ စီမံကိန်းကို တည်ဆောက်လည်ပတ်သွားမည်ဟု တွက်ချက်ထားပါသည်။

စီမံကိန်းတွင် တည်ဆောက်ရေးအဆင့် နှင့် လည်ပတ်ရေးအဆင့် ဆိုင်ရာ စောင့်ကြပ်ကြည့်ရှုစစ် ဆေးရေး အစီအစဉ်ကိုလည်း စီမံကိန်းအတွက် ထည့်သွင်းသွားရန် လိုအပ်ပါသည်။ ၎င်းတွင် လေထု အရည်အသွေး၊ ဆူညံသံ၊ နှင့် ရေထုအရည်အသွေးဆိုင်ရာ သက်ရောက်မှုများ ပါဝင်သွားမည် ဖြစ်ပါသည်။ ဤလျော့ချရေးအစီအမံများ၏ ထိရောက်မှုကို ခြေရာခံနိုင်ရန် စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးမှုကို ဆောင်ရွက်အရေးကြီးပြီး၊ လိုအပ်သောအပြောင်းအလဲများကိုလည်း သင့်တော်သလို စီမံခန့်ခွဲ သွားရမည် ဖြစ်ပါသည်။

2 INTRODUCTION

2.1 PROJECT OVERVIEW

Established in 1995, **Myanmar Awba Group's** (Awba) core business involves the importation, manufacturing, formulation, reformulation, blending and distribution of Crop Protection Products (CPP or agrochemicals, such as pesticides, fungicides and herbicides), fertilizers (urea and compound fertilizers – Nitrate, Phosphate, Potassium - NPK) and seeds.

In June 2016, the International Finance Corporation (IFC) extended a financing facility of US\$10 million to Awba with specific use of proceeds for the expansion of Awba's core business. This includes the construction and operation of a new agro-chemical formulation complex, the Hmawbi Agriculture Input Complex (HAIC), in the Hmawbi Township of Yangon Region ("the Project"). The location of the Project Site is shown in *Figure 2.1*.

2.2 PRESENTATION OF THE PROJECT PROPONENT

Awba is the leading group of companies in Myanmar focused on agriculture. The contact details for Awba are provided below:

- Address: Hmawbi Agriculture Input Complex (HAIC), Tharyar Gone East, Wah Net Chaung Village Group, Hmawbi Township, Yangon Division.
- Number: 0926042138
- Email: aung.swe@awba-group.com
- Contact Person: Dr. Aung Swe

2.3 PRESENTATION OF THE ENVIRONMENTAL, SOCIAL AND HEALTH EXPERTS

ERM-Hong Kong, Limited is registered on MONRECs Transitional Consultant Registration Scheme: Certificate No. 0016.

The key environmental and social consultants that conducted the EIA Study are presented in *Table 2.1*. The key consultants presented below are supported by a selection of professional and technical staff from ERM and REM based in Myanmar, and Hong Kong.

Table 2.1 *Environmental and Social Consultants for the Proposed Project*

Name	Organisation	Academic Experience	Years' Experience	Area of Expertise
Craig A. Reid	ERM	BSc (honours) Marine Biology	19	Ecology and Biodiversity, Risk Assessment and Hazard Management
Rebecca Summons	ERM	MSc Marine Environmental Protection	9	Ecology and Biodiversity, Risk Assessment and Hazard Management
Jovy Tam	ERM	MSc Environmental Science	10	Ecology and Biodiversity
Francesca Zino	ERM	MSc Environmental Technology (Ecological Management)	>10	Ecology and Biodiversity
Myat Mon Swe	ERM	M.Eng Engineering- Energy and Environmental Management	>10	Socio-economic, Facilitation of Meeting, Risk Assessment and Hazard Management
Ohnmar Tin Hlaing (and support staff)	EQM	PhD Environmental Toxicology, Technology and Management	14	Pesticide and chemical expert
Tom Glenwright	ERM	PhD Pollution	16	Water Pollution Control, Modeling for Water Quality, Ground water and Hydrology
Stuart Mackenzie	ERM	BSc Environmental Geography	10	Waste Management
Piers Touzel	ERM	MBA Business Administration	15	Facilitation of meeting, Socio-

Name	Organisation	Academic Experience	Years' Experience	Area of Expertise
				Economy, Land use
Edmund Taylor	ERM	MSc Environmental Dynamics and Climate Change	5	Air Pollution Control, Modelling for Air Quality
Man Ping To (Mandy To)	ERM	MSc Environmental Management	20	Noise and Vibration
Herve Bonnel	ERM	M.En Mechanical Engineering	19	Risk Assessment and Hazard Management
Laurence Geene	ERM	MSc Environmental Technology / Construction Management	20	Risk Assessment and Hazard Management, Legal Analysis
Fion Tai	ERM	M.A GIS	10	Other (GIS)
Chi Hung Wan (Frank Wan)	ERM	MSc Applied Science in Waste Management	30	Waste Management,, Geology and Soil, Archaeology
Ohnmar Tin Hlaing (and support staff)	EQM	PhD Environmental Toxicology, Technology and Management	14	Socio-economic baseline and impact assessment, Facilitation of Meeting
Dr Nyo Nyo Lwin (and support staff)	-	PhD (Zoology)	20	Ecology and Biodiversity

2.4

OBJECTIVES OF THE ESIA STUDY

The ESIA aims to produce a fit-for-purpose identification, assessment, and management of potential risks and impacts from the Project, and to gain material useful to inform other aspects of the Project planning.

Specifically, the objectives of the ESIA are:

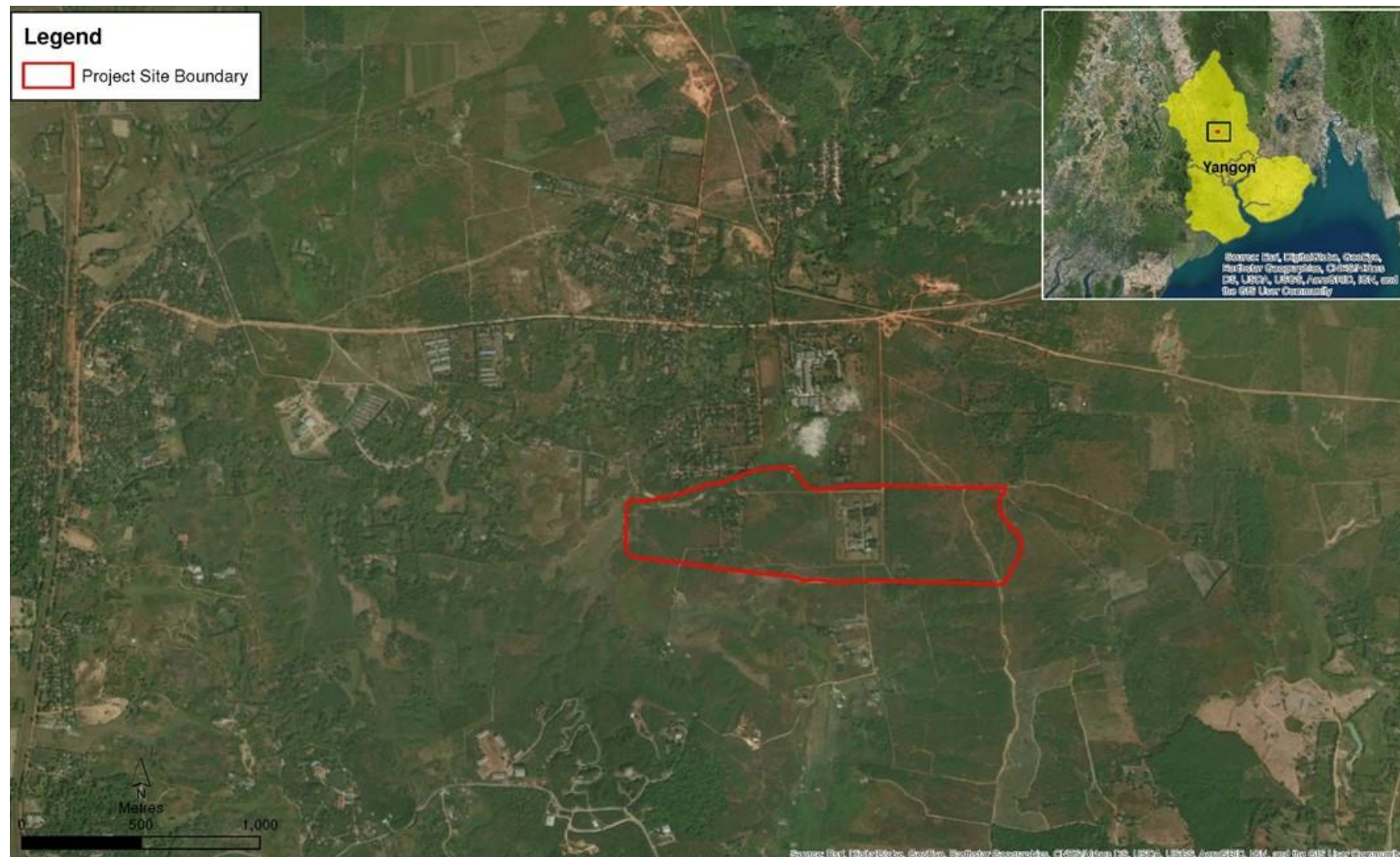
- To review the proposed Project activities with respect to their potential to interact with environmental and social receptors and resources;
- To identify the potentially vulnerable environmental and social components of the baseline within the Study Area;
- To identify and evaluate potential environmental and social impacts from the Project; and
- To recommend mitigation or enhancement measures to avoid, reduce or compensate potential adverse impacts.

2.5

STUDY LIMITATIONS

This EIA is based on data and information obtained from Myanmar Awba Group at the time of the study. Any future changes to the Project Description, as presented in *Chapter 4*, upon which this report is based or additional relevant information revealed as Project design, equipment, and service procurement proceed may affect the analysis, assessment, and conclusions contained in this report. Should such changes occur, they should be the subject of further study to verify that the conclusions of this EIA do not change and to determine whether any additional mitigation, management, or monitoring measures are warranted.

Figure 2.1 Project Site Location



This section sets out the relevant international and national standards that the Project will follow, including:

- Myanmar National Environmental Quality (emissions) (NEQ) Guidelines (2015);
- IFC Performance Standards (IFC PS) (2012);
- World Bank Group (WBG) Environmental Health and Safety (EHS) General Guidelines (2007); and
- WBG EHS Guidelines and National Environmental Quality (Emissions) Guidelines for Pesticide Manufacturing, Formulation and Packaging (2007).

The local Myanmar requirements on emissions from the Project (for pesticide manufacturing, formulation and packaging) are specified in the NEQ Guidelines which are noted to be the same as those recommended by the relevant WBG EHS Guidelines.

As the scope of the present ESIA only covers agrochemicals such as pesticide, herbicide and fungicide, the EHS Guidelines for Nitrogenous Fertilizer Production and EHS Guidelines for Phosphate Fertilizer Manufacturing do not apply to this Project. If Awba plans to produce Nitrogenous and Phosphate Fertilizers in the future, this will be subject to additional environmental assessments as per the EIA Procedure.

3.1

CORPORATE ENVIRONMENTAL AND SOCIAL POLICIES

AWBA have an Environmental Management System ISO 14001 (*Figure 3.1*) which is a structure designed to implement and establish a working environmental policy.

Figure 3.1 Awba Environmental Management System


	MYANMA AWBA GROUP CO., LTD		
	Environmental Management System Manual		
	Chapter 1-General		
	Doc. No- EMS-02	Rev. 0	Effective Date: 09/02/2016

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1.0	General
2.0	Ambient Air Quality Control
3.0	Waste water Quality Control
4.0	Solid Waste Management
5.0	Hazardous Material Management
6.0	Noise and Vibration Management
7.0	Transport Management

Appendices

Aspect Impact Register

Environmental KPI Monitoring Plan

3.2 POLICY AND LEGAL FRAMEWORK

3.2.1 International Finance Corporation Performance Standards

The IFC PS represent the 'policy and performance-based framework' and requirements for the ESIA and sustainable social and environmental management for the Project⁽¹⁾. Whereas the World Bank Group's EHS Guidelines provide guidance on general and industry best practice as well as recommended numerical limits for air emissions to the atmosphere, noise, liquid and solid wastes, hazardous wastes, occupational health and safety, and other aspects of industrial facilities and other types of development projects. The IFC PS includes:

- PS1 - Assessment and Management of Environmental and Social Risks and Impacts
- PS 2 - Labour and Working Conditions
- PS 3 - Resource Efficiency and Pollution Prevention

(1) IFC Performance Standards on Environmental and Social Sustainability, January 2012, International Finance Corporation, World Bank Group

- PS 4 - Community Health, Safety and Security
- PS 5 - Land Acquisition and Involuntary Resettlement
- PS 6 - Biodiversity Conservation and Sustainable Management of Natural Resources
- PS 7 - Indigenous Peoples
- PS 8 - Cultural Heritage

According to information presented on IFC Environmental and Social Review Summary (ESRS) ⁽¹⁾, for the investment in Awba issues related to PS5: Land Acquisition and Involuntary Resettlement, PS6: Biodiversity Conservation and Sustainable Natural Resources Management, PS7: Indigenous Peoples and PS8: Cultural Heritage are not expected for the following reasons

- All the land related transactions within the context of this investment are/will be based on a willing seller: willing buyer and/or willing lessor: willing lessee and are expected to be located within industrial areas.
- During IFC appraisal, IFC obtained copies of all land lease agreements in Myanmar, which were all valid.
- Awba is not directly involved in agricultural primary production and its operating facilities are or will be developed in urban industrial sites.
- There was no presence of Indigenous Peoples or known cultural heritage within the company's operational footprint. As no tangible or intangible cultural heritage has been identified in the Projects Area of Influence, IFC PS 7 is not applicable.

As such in the current ESIA Study, it is expected that there will be no potentially significant issues related to PS5, PS6, PS7, and PS8. However, if such issues arise for the proposed HAIC, these will be addressed as appropriate by Awba in the appropriate manner.

3.2.2

World Bank Group EHS Guidelines and Myanmar National Environmental Quality (Emission) Guidelines

The WBG EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). The EHS Guidelines contain the performance levels and measures that are considered achievable in new facilities by existing technology at reasonable costs.

The scope of the ESIA covers agrochemicals such as pesticide, herbicide and fungicide. There are no plans to produce Nitrogenous and Phosphate

⁽¹⁾ <https://disclosures.ifc.org/#/projectDetail/ESRS/35880>

Fertilizers. Should Awba decide to produce these products, additional environmental assessment will be required as per the EIA Procedure.

Levels of noise, air emissions, and effluent recommended by the relevant WBG Guidelines are summarised in *Tables 3.1-3.5*. The Project should achieve compliance with these recommended levels.

Table 3.1 *Noise Level Guidelines outside the Project Site Boundary*

Receptor	One Hour LAeq (dBA) ^a	
	Daytime 07:00 – 2:00 (10:00 – 22:00 for Public holidays)	Night-time 22:00 -07:00 (22:00 – 10:00 for Public holidays)
Residential, institutional, educational	55	45
Industrial, commercial	70	70

Source: WBG EHS General Guidelines (2007)

^a Equivalent continuous sound level in decibels

Table 3.2 *Air Emission Levels for Pesticides*

Pollutants	Units	Guideline Value
Particulate Matter	mg/Nm ³	20
Total Organic Carbon	mg/Nm ³	50
Volatile organic compounds	mg/Nm ³	20
Chloride	mg/Nm ³	5
Bromines (as HBr), Cyanides (as HCN), Fluorines (as HF), Hydrogen Sulfide	mg/Nm ³	3
Chlorine	mg/Nm ³	3
Ammonia, Gaseous Inorganic Chlorine Compounds (as HCl)	mg/Nm ³	30

Source: WBG EHS Guidelines for Pesticide Manufacturing, Formulation and Packaging (2007)

Table 3.3 *Effluent Levels for Pesticides*

Pollutants	Unit	IFC Guideline
pH	S.U.	6-9
BOD ₅	mg/L	30
COD	mg/L	150
TSS	mg/L	10-20
Oil and Grease	mg/L	10
AOX	mg/L	1
Phenol	mg/L	0.5
Arsenic	mg/L	0.1
Chromium total	mg/L	0.5
Chromium (Hexavalent)	mg/L	0.1
Copper	mg/L	0.5
Chlorinated organics	mg/L	0.05
Nitrorganics	mg/L	0.05
Mercury	mg/L	0.01
Zinc	mg/L	2

Pollutants	Unit	IFC Guideline
Active Ingredient (each)	mg/L	0.05
Bioassays Toxicity	Toxicity to:	TU
	Fish	2
	Daphnia	8
	Algae	16
	Bacteria	8
Ammonia	mg/L	10
Total Phosphorus	°C	2

Source: WBG EHS Guidelines for Pesticide Manufacturing, Formulation and Packaging (2007)

Table 3.4 *Guideline Values for Treated Sanitary Sewage Discharge and Site Runoff*

Parameter	Unit	Maximum Concentration
Biological oxygen demand	mg/L	30
Chemical oxygen demand	mg/L	125
Oil and grease	mg/L	10
pH	S.U.	6-9
Total coliform bacteria	MPN/100 ml	400
Total nitrogen	mg/L	10
Total phosphorus	mg/L	2
Total suspended solids	mg/L	50

Source: Environmental Health and Safety (EHS) General Guidelines (2007) and Myanmar National Environmental Quality (Emissions) Guidelines

Table 3.5 *Guideline Values for Air Emission Standards for MSW and Hazardous Waste Incinerators*

Parameter	Unit	Maximum Concentration
Total Suspended Particulars	mg/m ³	10
Sulphur Dioxide	mg/m ³	50
Oxides of Nitrogen	mg/m ³	200 – 400
Hydrochloric Acid	mg/m ³	10
Dioxins and Furans	ng TEQ/m ³	0.1
Cadmium	mg/m ³	0.05 – 0.1
Carbon Monoxide	mg/m ³	50 – 150
Lead	mg/m ³	0.5 – 1
Mercury	mg/m ³	0.05 – 0.1
Total Metals	mg/m ³	0.5 – 1
Hydrogen fluoride	mg/m ³	1

Source: Environmental Health and Safety (EHS) General Guidelines (2007)

3.2.3 Myanmar Legislation

Laws relating to environmental and social issues within the Agriculture Sector and hence their relevance to the Environmental Impact Assessment (EIA) Study for the proposed Project are included in *Table 3.6*.

Table 3.6 Myanmar Legislation Relating to the Agriculture Sector and Relevance to Project

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
The Constitution of the Republic of the Union of Myanmar, 2008	Article 37 (a)(b) , 42, 390	<p>The Constitution of the Union of Myanmar is the supreme law of the country and has provisions regarding the protection of the environment in Myanmar.</p> <p>The Project Proponent commits to comply as these three Articles in the Constitution provide a basis for legalizing and institutionalizing environmental health impact assessment and social impact assessment. There stipulates that</p> <ul style="list-style-type: none"> • The Union is the ultimate owner of all lands and all natural resources above and below the ground, above and beneath the water and in the atmosphere in the Union; The Union shall enact necessary law to supervise extraction and utilization of State owned natural resources by economics forces; • The Union shall protect and conserve natural environment. • Every citizen has the duty to assist the Union in carrying out the following matters: <ul style="list-style-type: none"> (a)preservation and safeguarding of cultural heritage; (b)environmental conservation; (c)striving for development of human resources; (d)protection and preservation of public property.
Environmental Conservation Law (Pyidaungsu Hluttaw Law No.9/2012)	Clause 7(o), 14,15, 29	<p>The Project Proponent commits to comply as there prescribes</p> <ul style="list-style-type: none"> • That the Ministry (MONREC) has the right to manage a proponent to provide compensation for environmental impact and contribute funds and need for prior permission from the Ministry for the business that have been categorized for causing impact on the environmental quality and right to issuing permit with terms and conditions relating to environmental conservation after scrutinizing. • To treat, emit, discharge and deposit the substances which cause pollution in the environment in accord with stipulated environmental quality standards for causing a point source of pollution. • That the owner or occupier of any business, material or place which causes a point source of pollution have to install or use an on-site facility or controlling equipment in order to monitor, control, manage, reduce or eliminate environmental pollution. If it is impracticable, it has to be arranged to dispose the wastes in accord with environmentally sound methods. • For not to violate any prohibition contained in the rules, notifications, orders, directives

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		and procedures under the Environmental Conservation Law.
Environmental Conservation Rules (notification no 50/2014)	Rule 69(a) (b)	<p>The Project Proponent (Project Proponent) commits:</p> <ul style="list-style-type: none"> Not to emit, cause to emit, dispose, cause to dispose, pile and cause to pile, by any means, the pollutants and the hazardous waste or hazardous material stipulated by notification under the Law and any of these rules at any place which may affect the public directly or indirectly. Not to carry out to damage the ecosystem and the natural environment which is changing due to such system, except for carrying out with the permission of the Ministry for the interest of the people.
Environmental Impact Assessment Procedure, 2015	Clause 102(a)(b), 103, 104, 105, 106, 107, 108, 110, 113, 115, 117	<p>The EIA Procedure sets out the procedures for completing an IEE, EIA and/or EMP in Myanmar. This includes information on project categorization, responsibilities of project developers and ministries, EIA review, monitoring and auditing, among other issues.</p> <p>The Project Proponent (Project Proponent) commits to bear full legal and financial responsibility:</p> <ul style="list-style-type: none"> For his actions and omissions and those of its contractors, subcontractors, officers, employees, agents, representatives, and consultants employed, hired, or authorized by the Project acting for or on behalf of the Project, in carrying out work on the Project; and To support programs for livelihood restoration and resettlement in consultation with the PAPs, related government agencies, and organizations and other concerned persons for all Adverse Impacts until PAPs have achieved socio-economic stability at a level not lower than that in effect prior to the commencement of the Project. <p><i>For EMP</i>, The Project Proponent commits to comply:</p> <ul style="list-style-type: none"> to implement the EMP, all Project commitments, and conditions, and for liability to ensure that all contractors and subcontractors of the Project comply fully with all applicable Laws, the Rules, this Procedure, the EMP, Project commitments and conditions when providing services to the Project. For his responsibility, and to fully and effectively implement the requirements set forth in ECC, applicable Laws, Rules, EIA Procedure and standards.

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		<ul style="list-style-type: none"> Project commitments and conditions when providing services to the Project and inform the Ministry with detailed information as to the proposed project's potential adverse impacts. <p><i>For monitoring and reporting,</i> The Project Proponent(the Project Proponent) commits to comply:</p> <ul style="list-style-type: none"> To notify and identify in writing to the Ministry, providing detailed information as to the proposed Project's potential Adverse Impacts. To engage in continuous, proactive and comprehensive self-monitoring of the Project and activities related thereto, all Adverse Impacts, and compliance with applicable laws, the Rules, this EIA Procedure, standards, the ECC, and the EMP during all phases of the Project (pre-construction, construction, operation, decommissioning, closure and post-closure). to notify and identify in writing to the Ministry for any breaches of his obligations or other performance failures or violations of the ECC and EMP as soon as reasonably possible and in any event, in respect of any breach which would have a serious impact or where the urgent attention of the Ministry is or may be required, to undertake within not later than twenty-four (24) hours, and in all other cases within seven (7) days of the Project Proponent becoming aware of such incident. to submit monitoring reports to the Ministry not less frequently than every six (6) months, as provided in a schedule in the EMP, or periodically as prescribed by the Ministry. to submit the monitoring report within ten (10) days of completing a monitoring report and the information to be included. To make a monitoring report as contemplated in Article 108 and Article 109 in accordance with the EMP schedule, (except as may relate to National Security concerns) publicly available on the Project's website, at public meeting places (e.g. libraries, community halls) and at the Project offices within ten (10) days of completing To submit a digital copy of a monitoring report within ten (10) days of receiving such request via email or as may otherwise be agreed upon with the requestor for the request of any organization or person. <p><i>For the purposes of monitoring and inspection, the event of emergency,</i> The Project Proponent commits to</p> <ul style="list-style-type: none"> grant the ministry and/or its representatives, at any time during normal working hours, access to the Project's offices

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		<p>and to the Project site and any other location at which the Project activities or activities related to the Project are performed;</p> <ul style="list-style-type: none"> • grant, from time to time as and when the Ministry may reasonably require, the Ministry access to the Project's offices and to the Project site and any other location at which the Project activities or activities related to the Project are performed. • grant full and immediate access to the Ministry at any time as may be required by the Ministry in the event of an emergency, or where, in the opinion of the Ministry, there is or may exist a violation or risk of violation of the compliance by the Project with all applicable environmental and social requirements. • Ensure that the Ministry's rights of access can extend to access by the Ministry to the Project's contractors and subcontractors.
National Environmental Quality (Emissions) Guidelines (2015)		The Project Proponent commits to comply the NEQ guidelines and its setting out for emission standards for air, noise and effluent discharges for oil and gas operations. The Project Proponent considers this emissions standards in its environment impact assessment and environmental management plan.
Myanmar Investment Law, 2016	Clause (50)(d), (51), (65), (73)	<p>The Project Proponent commits to comply</p> <ul style="list-style-type: none"> • The stipulation to register the land lease contract at the office of Registry of Deeds in accordance with the Registration Act. • The mentioning for appointment, replacement, providing for the employment of staff and workers, ensuring to comply the entitlements and rights in the labour laws and rules, settling dispute regarding HR issues. • Stipulation: <ul style="list-style-type: none"> (a). To respect and comply with the customs, traditions and traditional culture of the ethnic groups in the Union; (e). To inform to the Commission if it is found that natural mineral resources or antique objects and treasure trove are not related to the investment permitted; (f). Not to make any significant alteration of topography or elevation of the land on which is entitled to lease or to use, without the approval of the Commission; (g). To 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;

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		<p>(h). To list and keep proper records of books of account and financial statement and necessary financial matters relating to the investments performed by permit or endorsement in accordance with internationally and locally recognized accounting standards;</p> <p>(j). To pay wages and salaries to employees in accordance with applicable laws, rules, procedures, directive and so forth during the period of suspension of investment for a credible reason;</p> <p>(k). To pay compensation and indemnification in accordance with applicable laws to the relevant employee or his successor for injury, disability, disease or death due to the work;</p> <p>(l). To supervise foreign experts, supervisors and their families, who employ in their investment, to abide by the applicable laws, rules, orders and directives, and the culture and traditions of Myanmar;</p> <p>(m). To respect and comply with the labour laws;</p> <p>(n). To have the right to sue and to be sued in accordance with the laws;</p> <p>(o). To pay effective compensation for loss incurred to the victim, if there are damage to the natural environment and socioeconomic losses caused by logging or extraction of natural resources which are not related to the scope of the permissible investment, except from carrying out the activities required to conduct investment in a permit or an endorsement;</p> <p>(p). To allow the Commission to inspect in any places, when the Commission informs the prior notice to inspect the investment;</p> <p>(q). To take in advance permit or endorsement of the Commission for the investments which need to obtain prior approval under the Environmental Conservation Law and the procedures of environmental impact assessment, before undertaking the assessment, and shall submit the situation of environmental and social impact assessment to the Commission along the period of activities of the investments which obtained permit or endorsement of the Commission.</p> <ul style="list-style-type: none"> • To insure the types of insurance stipulated in the provision of the rules at any insurance enterprise which is entitled to carry out insurance business within the Union.

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
Myanmar Investment Rules, 2017	Clause 202, 203, 206, 212,	<p>The Project Proponent commits:</p> <ul style="list-style-type: none"> • To comply with all terms and conditions in the permit and other applicable laws when the investment is carried out. • To fully assist while negotiating with the Authority for settling the grievances of the local community that have been effected due to Investments. • To appoint expert foreigner as senior manager, technical and operational expert or advisor according to subsection (a) of the section 51 of the Law. • To obtain the permit or tax exemption or relief to insure the relevant insurance out of the following types of the insurance at any insurance business entitled to carry out insurance business within the Union based on the nature of the business: Property and Business Interruption Insurance; Engineering Insurance; Professional Liability Insurance; Bodily Injury Insurance; Marine Insurance; or Workmen Compensation Insurance; Life Insurance; Fire Insurance.
The Import and Export Law, 2012	Clause 7	The Project Proponent, as a license holder, commits to comply not to violate the conditions contained in the license.
The Forest Law (2018)	Clause12	<p>The Forest Law is enacted by Pyihtaungsu Hluttaw in September, 2018. It empowers, to declare for the reserved forest for the maintaining a sustained yield of the forest produce, to manage the forest land.</p> <p>The Project Proponent commits to comply the stipulation</p> <ul style="list-style-type: none"> (a). For requiring prior approval from the Ministry if desirous to implement the development work or economic project within a forest land and forest covered land. (c). Whoever desirous to undertake as in sub-section (a), has to comply the Environmental Conservation Law and the stipulations from respective Laws.
The Forest Rules (1995)	Clause 27, 32	<p>The Project Proponent commits to comply:</p> <ul style="list-style-type: none"> • Not to cut, mark, lop, perforate or damage by fire or any other means the teak and any reserved trees grown in the forest land and the land at the disposal of the government except for doing so with permission. • Not to fell, cut or dissect the trees which are not reserved trees for commercial purpose in the forest area and land at the disposal of the government, to make firewood or charcoal, without the permission of the State, division or district forest office.
Conservation of Water Resources and Rivers Law (2006)	Clause 6, 8(b), 21(b), 22	The Project Proponent commits to comply prohibitions for the following activities:

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		<ul style="list-style-type: none"> • “No person shall anchor the vessels where vessels are prohibited from anchoring in the rivers and creeks. • No person shall dispose of engine oil, chemical, poisonous material and other materials which may cause environmental damage, or dispose of explosives from the bank or from a vessel which is plying, vessel which has berthed, anchored, stranded or sunk. • No one shall dispose of any substance into the river creek that may cause damage to waterway or change of watercourse from the bank or vessel.” <p>The empowerment of this Law is provided to the Ministry of Transport for controlling navigation of vessels in the rivers and creeks as well as communicating with local and foreign government and organizations for conservation of water resources, rivers and creeks. Also, to carry out conservation works for water resources, rivers and creeks, in accordance with the relevant international conventions, regional agreements and bilateral agreements for environmental conservation.</p> <p>The Project Proponent commits</p> <ul style="list-style-type: none"> • not to cause the wastage of water resources wilfully • not to drill well or pond or dig earth without the permission of the Directorate. • not to pile sand, shingle and other heavy materials for business purposes in the bank area and waterfront area without the permission of the Directorate,
The Protection of Biodiversity and Conservation Areas Law 2018	Clause 39 (d) (e),	<p>The Project Proponent commits to comply the stipulation that there may be charge with fine or imprisonment or both if finds guilty of</p> <ul style="list-style-type: none"> • using dynamite or explosive chemicals, electrolyzing, destroying water flow or poisoning water, intentionally pollutes the soil, water, air in the conservation area; • Disposing or handling chemical waste and poisoning materials in the conservation area.
Law on Protecting New Species of Plants (2016)		<p>The Project Proponent commits to comply the stipulation for the right and protect the right of the new species growers for causing any impact to environment and biodiversity.</p>
The Protection and Preservation of Cultural Heritage Regions Law, 1998	Clause 13, 15, 18, 22	<p>The State Peace and Development Council Law enacted this law by Law No. 9/ 98 on the date of 10 September, 1998. The Ministry of Culture may, with the approval of the Government issue notification for the protection of cultural heritage areas are categorized as following kinds of zones / region:</p> <p>a) Ancient monumental zone; b) Ancient site zone.</p> <p>The Project Proponent commits:</p>

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		<ul style="list-style-type: none"> To apply for prior permission and must abide by provisions of existing laws for certain land-based construction works. To comply the stipulation for the person desirous of carrying out construction works to abide by the provisions of other existing laws and also apply in accordance with the stipulations to the Department to obtain prior permission under this law. To construct, extend, renovate a building or extend the boundary of its enclosure in the ancient monumental zone or ancient site zone, , without prior permission granted under this law To conform to conditions prescribed by the Ministry of Culture for Buildings in cultural heritage region.
The Protection and Preservation of Antique Objects Law (2015)	Clause 12, 13	<p>The Project Proponent commits to comply the stipulation:</p> <ul style="list-style-type: none"> For person who finds any object which has no owner or custodian, needs to inform the relevant Ward or village-tract administrator if he knows or it seems reasonable to assume that the said object is an antique object. For a procedure to inform and the responsibility to inspect whether it is a real ancient monument or not and keep or cause to protect as may be necessary in accordance with the stipulation
The Protection and Preservation of Ancient Monuments Law (Pyidaungsu Hluttaw Law No.51/2015)	Clause 12, 13, 15, 20	<p>The Project Proponent commits to comply the stipulations:</p> <ul style="list-style-type: none"> For a person who finds an ancient monument over one hundred years old under the water or above ground to promptly inform the relevant Ward or Village-Tract Administrative Office. For procedure to inform and the responsibility to inspect whether it is a real ancient monument or not and keep or cause to protect as may be necessary in accordance with the stipulation. To apply prior permission from the Department before searching for and extracting oil and gas or constructing pipelines For prohibitions not to damage ancient monuments including using machinery which causes vibration and discharging chemical substance.
The Fertilizer Law, 2002	Clause 8, 9, 14, 15	<p>The Project Proponent commits to comply:</p> <ul style="list-style-type: none"> The Right of The fertilizer Committee <ol style="list-style-type: none"> to cause the Fertilizer Technical Boday to examine the application for carrying out production, import or export of fertilizer for commercial purpose whether or not it is in accordance with the stipulations and submit to obtain registration certificate.

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		<ul style="list-style-type: none"> b) to grant or refuse to issue certificate after scrutinizing the submission made under sub- section (a). If granted, the registration certificate shall be issued to the applicant after prescribing conditions. • The stipulation mentioned for the registration certificate holder to: <ul style="list-style-type: none"> a) abide by this Law and the rules, procedures, notifications, orders and directives issued hereunder; b) abide by the conditions contained in the registration certificate; c) perform in accordance with the stipulations the quality assurance, label, and specifications d) submit to the inspection of the relevant manager and inspectors when they come for inspection • The stipulation: <ul style="list-style-type: none"> ❖ For A person desirous of distribution and sale of fertilizer in excess of the weight and volume of fertilizer prescribed by the Fertilizer Committee shall, in accordance with the stipulations, apply to the State and Divisional Manager to obtain the business license. ❖ For a license holder to: <ul style="list-style-type: none"> ▪ abide by this Law and the rules, procedures, notifications, orders and directives issued hereunder; ▪ abide by the conditions contained in the license;
Myanmar Fire Force Law, Pyidaungsu Hluttaw Law No. 11/2015)	Clause 25	<p>The Project Proponent commits:</p> <ul style="list-style-type: none"> • To comply the stipulations for the factory, workshop, highway bus, airport, jetty, hotel, motel, guest house, collective-owned building, market, work-site or business exposed to fire hazard of the owner or manager; <ul style="list-style-type: none"> (a). Not fail to form the reserve fire brigade (b). Not fail to provide materials and apparatuses for fire safety; in conformity with the directive of the Fire Services Department.
Pesticide Law, 2016	Clause 18, 23, 24	<p>The Project Proponent commits:</p> <ul style="list-style-type: none"> ▪ To comply for the stipulation for the right of the Director General <ul style="list-style-type: none"> a) to issue or refuse the license applying in accordance with section 17, subsection (a) (b) and (c) b) to order the administrative order if fail to comply the conditions mentioned in license regarding for issuing licence. c) Can occasionally order to the officers in relation to testing the pesticides to the crops and selling pesticides if necessary.

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		<ul style="list-style-type: none"> ▪ The stipulation for the person holding export license: <ul style="list-style-type: none"> a) to abide the conditions mentioned in licence; b) to comply the orders, directions issued by registration board in case of necessary c) to get the permission from the trade department after getting the recommendation from the registration board for importing and exporting ▪ To comply the statement for the duties and responsibilities of the license holder for selling the pesticide, repacking and selling <ul style="list-style-type: none"> a) to pay the license fees and charges for laboratory tests. b) to stick the label for trademark, reference logo, manufacturing date described in license application, expiry date on the bottle including pesticide or package. ▪ Not to employ the child aged 18 and under, pregnant, mother who are breeding in handling, using pesticide.
Prevention from Danger of Hazardous Chemical and Associated Material Law (Pyidaungsu Hluttaw Law No 28/2013)	Clause 8, 13, 20, 22, 15, 16, 17, 23, 27	<p>The Project Proponent commits to comply the stipulations:</p> <ul style="list-style-type: none"> • For Any person, who wants to do the business of chemical and associated materials, to apply to the central body for the acquisition of the license, attached with the management plan for the environmental conservation in accord with the stipulations”. • For License holder to apply to the central supervising body in accord with the stipulation for the relevant chemicals and associated materials using for his chemicals and associated materials business” for a certificate. • For the registered certificate holder to abide by the regulations contained in the registered certificate and follow the order and directives issued from time to time by the central supervising body”. • For the duties and powers of the central supervising board. • For the requirements: <ul style="list-style-type: none"> (a). before works, license holder to be inspected by the relevant supervising and inspection team for safety and machinery/equipment check and (b). The persons who are discharging the duty to be asked to attend foreign training or preventative trainings conducted by government departments and organizations. • For license holders to <ul style="list-style-type: none"> (a). follow the license regulations, (b). follow directives on safe handling and shall ask workers to strictly follow

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		<ul style="list-style-type: none"> (c). shall provide necessary safety equipment and issue free personal protective equipment to workers, (d). provide training in occupational safety (e). determine the hazard to the environment, people and animals (f). provide fit for work medical check-up and keep records (g). send permission letter to Department of Township Administration if the chemicals and associated material are permitted to store (h). acquire in advance guidance and agreement from fire service department if using inflammable materials or explosives (i). transport only the permitted amount of chemicals in accordance with prescriptive stipulations (j). obtain approval of central supervising body if transporting chemical and associated material from the permitted region to any other region (k). abide and operate in accordance with related environmental laws to avoid impacts and damage to the environment. • For the license holder to have insurance in accordance with stipulations in case of compensation is required for losses related to people, animals and environment. • For the registered certificate holder to apply for using chemical which are not in the registered list. • For the license holder: <ul style="list-style-type: none"> (a). To classify the hazard level of chemicals and related substances in advance (b). To show Material Safety Data Sheet and warning signage (c). To provide safety equipment, personal protective equipment and training on their use (d). To possess, transport, store, use and discharge chemicals and related materials in accordance with stipulations, (e). Not to import or export chemicals and related materials banned by the central supervising board.
Prevention from Danger of Hazardous Chemical and Associated Material Rule (notification No 85/2015-2016)	Clause 61 (a)	<p>The Project Proponent commits to comply the stipulations:</p> <ul style="list-style-type: none"> • For organizations and license holders who store the chemical and related substances to abide by the following facts for safety: <ul style="list-style-type: none"> (a). installing the fire protection system in building to be stored in accordance with prescribed provisions of the Department of Fire Brigade and being the building which is constructed to correspond for

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		<p>storing the chemical and related substances;</p> <p>(b). sticking the warning sign according to hazard class, and keeping the safety equipment at the stored places;</p> <p>(c). storing only after checking certainly to the chemical and related substances which are kept completely with the pictogram, and packing system by the importers and possessors;</p> <ul style="list-style-type: none"> To be safe, for the user of chemical and related substances: <ul style="list-style-type: none"> (a). To use only the registered restricted or conditional chemical and related substances; (b). Not to use the unregistered, without labelled, unknown, damaged or expired chemical and related substances;
Yangon City Development Committee (YCDC) Law (2018)		<p>The Project Proponent commits to comply the stipulations for the statement that the committee has the right to corporate for the inspection with the concerning authority and has the right to stipulate orders for the carriage, storage of chemical and related substances for not harming to public health and life and right to manage the waste regarding for the hazardous. There it has been prohibited for disposing chemical and its related substances in areas, which are not being allowed in the City Development area and mentioned offenses and penalties.</p>
Underground Water Act, 1930	Clause 3, 6	<p>The underground water act is enacted on the date of 21st June in 1930 whereas it is expedient to conserve and protect underground sources of water supply in the Union of Myanmar. The Project Proponent commits to comply the stipulations:</p> <ul style="list-style-type: none"> for prohibition from sinking of a tube for the purpose of obtaining underground water except under and in accordance with the terms of a license granted by the water officer. For the powers of Township Officer or sub-divisional officer to close a license tube after exercising jurisdiction over the local area concerned and the expense of such closure shall be recoverable from the owner of the tube as if it were an arrear of land-revenue.
Myanmar Insurance Law (1993)	Clause 15, 16	<p>Myanmar Insurance is established under this Law as a legal entity having perpetual succession, capable of suing and being sued in its own name. The Project Proponent commits to comply the stipulations:</p> <ul style="list-style-type: none"> For compulsory requirement for owners of motor vehicles to have Third Party Liability Insurance with Myanma Insurance For compulsory requirement for organizations operating as an enterprise which may cause damage to life and

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		property of the public or may pollute the environment to have General Liability Insurance with the Myanmar Insurance.
Third-Party Liability insurance Rules (notification no.64/2003)	Clause 3(a) (b)	<p>The Project Proponent commits to comply the stipulations for the motor vehicles using in project:</p> <ul style="list-style-type: none"> To compulsorily insured with the Myanmar Insurance against third-party liability for having his vehicle. To pay the premium charged by the Myanmar Insurance to it or the organization authorized thereby on registration of his motor vehicle or renewal of the registration.
The Law On Standardization (2014)	Clause 3, 5	<p>The Project Proponent commits to comply the stipulations:</p> <ul style="list-style-type: none"> For the smoothness of technology transfer and invention, utilizes the standardization to reduce the technological barriers for the trade and supportive for the development international free trade zone and for the development of Myanmar economy and social, For empowering Ministry to organize the council for setting up the policy, guideline and to implement to practice the national standard in respective production and service.
The Science and Technology Development Law (1994)		<p>The Project Proponent commits to comply the stipulations and its objectives:</p> <ul style="list-style-type: none"> To carry out development of Science and Technology for promotion of industrial production contributory towards the National Economic Development Plans; To carry out Research and Development for the increased extraction and utilization of domestic raw materials and the promotion of industrial production enterprises based on modern Science and Technology; To effect Technology Transfer for the promotion of production processes and the improvement of the quality of goods; <ul style="list-style-type: none"> To nurture luminaries required for the development of Science and Technology and for Research and Development and to improve their qualifications.
Motor Vehicle Law (2015)	Chapter 1, 2(v)	<p>The Project Proponent commits to comply the stipulations:</p> <ul style="list-style-type: none"> for reducing environmental pollution caused by motor vehicles for the right of the Department to issue directives, the standards, guidelines for the purposes of importing, manufacturing, assembling, maintaining to be safe in accident and environment conservation. For taking actions to conserve the green environment and the reduction in pollution of air, water, land and noises caused by motor vehicles.

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
The Farmland Act 2012	Clause 30 (a) (b)	<p>The Project Proponent commits to comply the stipulations for empowering</p> <ul style="list-style-type: none"> to utilize the farmland for other purposes in the interest of the public in respect of the application: <ol style="list-style-type: none"> The Central Farmland Management Body to give permission to utilize the paddy land for other purposes, with the recommendation of the Region or State Farmland Management Body; The respective Region or State Government shall give permission to utilize the farmland for other purposes except paddy land, with the recommendation of the Region or State Farmland Management Body;
The Law of Protection of the Farmer Rights and Enhancement of their Benefits, (Pyidaungsu Hluttaw Law No. 32, 2013)	Clause 20 (f)	<p>The Project Proponent commits to comply the stipulation for the Leading Body, in respect of agriculture and livestock breeding, to carry out the followings:</p> <ol style="list-style-type: none"> carrying out to guarantee in production, import, preparation, package and sales of fertilizer and pesticides that they meet with the standards and are safe for use and to aware farmers the defects of fertilizer and pesticides without guarantee in time.
Vacant, Fallow and Virgin Land Management Act 2012, (Pyidaungsu Hluttaw Law No.10 of 2012)	Clause 16, 19	<p>The Project Proponent commits to comply the stipulation</p> <ul style="list-style-type: none"> for Person who is granted the right to use the vacant, fallow and virgin lands to comply the following conditions: <ol style="list-style-type: none"> Land granted will use for the purpose granted and in relation to economic enterprise; To carry out to be completed within four years from the date of grant according to the purpose granted (can revise by the Central Committee for losing time due to natural disaster and unstable security conditions; Not to mortgaged, giving, sold, leasing or otherwise transferred or divided without the permission of the Cabinet of the Union Government; To fully pay the land revenue; To comply the conditions prescribed by the Central Committee Prohibit to explore other natural resources below and above ground except the purpose granted; To surrender the natural resources found in the authorized land and the Government being desirous of extracting the same on a commercial resumes the area required therefrom. For the Central Committee to resume the area required in the authorized land, if one of the following situation arises:

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		<ul style="list-style-type: none"> (a) If ancient culture heritage are found in the authorized land; (b) If infrastructure project or Special project are desired to be constructed on the authorized land, in the interest of the State; (c) Except the permitted minerals , if other natural resources are found in the authorized land which are permitted for production of mining; (d) If natural resources are found in the authorized land which are permitted for the purposes described in Section4, Sub-section (a),(b), and (d);
Freshwater Fisheries Law, 1991,	Clause36, 40, 41	<p>The Project Proponent commits:</p> <ul style="list-style-type: none"> • Not to erect, construct place, maintain or arrange any obstruction such as a dam, bank or weir in a freshwater fisheries waters without the permission of the Department. • Not to cause harassment of fish and other aquatic organisms or pollution of the water in a freshwater fisheries water. • Not to alter the quality of water, volume of water or the water -course in a leasable fishery, reserved fishery and creeks contiguous thereto or in water-courses.
Yangon Region Fresh Water Fisheries Law (Yangon Region Hluttaw Law No.3,2013)	Clause 53, 55	<p>This was enacted for the purposes of development in Fisheries, preserve Fish species and to get royalties.</p> <p>The Project Proponent commits to comply:</p> <ul style="list-style-type: none"> • Prohibition for not causing pollution to water or destroying, disturb to the fish, aquatic living organism and the living and non-living resources at the Freshwater Fishing water. • prohibition for production, exporting, importing, modification, carrying, storing, distribution and selling the undermentioned fisheries materials; <ul style="list-style-type: none"> a) Fisheries materials causing toxic, hazardous, harm to health and impact to environment.
The Law Relating to Aquaculture, 1989	Clause 29(b)	<p>The Project Proponent commits to comply the stipulation:</p> <ul style="list-style-type: none"> • For deterring transport by water and flow or pollution or mean to happen that at the territory of fishing area.
Public Health Law, 1972	Clause 3, 5	<p>The Project Proponent commits to cooperate with the authorized person or organization in line with the stipulations</p> <ul style="list-style-type: none"> • To abide by any instruction or stipulation for public health. • To accept any inspection, anytime, anywhere if it is needed.
The Protection and Prevention of	Clause 3(a), 9, 11	<p>The Project Proponent commits to comply the stipulations:</p>

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
Communicable Disease Law, 1995		<ul style="list-style-type: none"> For the Department of Health to carry out immunizations and health education activities related to communicable diseases For all responsible persons to prepare report for an outbreak of a communicable disease to the nearest Health Officer. For Health Officer to undertake investigations and medical examinations to prevent the control the spread of Principal Epidemic Disease.
The Control of Smoking and Consumption of Tobacco Product Law, 2006	Clause 9(a-d),	<p>The Project Proponent commits to comply the stipulation:</p> <ul style="list-style-type: none"> For the person-in-charge <ol style="list-style-type: none"> To keep the caption and mark referring that it is a non-smoking area, To arrange the specific place To supervise and carry out measures so that no one shall smoke at the non-smoking area To accept the inspection when the supervisory body comes to the place for which he is responsible.
Explosives Substances Act (1908)		<p>The Project Proponent commits to comply the stipulations</p> <ul style="list-style-type: none"> For any person who unlawfully and maliciously causes, by any explosive substance, an explosion of a nature likely to endanger life or to cause serious injury to property, whether any injury to person or property has been actually caused or not, to be punished with transportation for life or any shorter term, to which a fine may be added, or with imprisonment for a term which may extend ten years, to which a fine may be added.
Industrial Use Explosive Substance Law (Law no.17/2018)	Clause 19 (a)	<p>The Project Proponent commits to comply the prohibition</p> <ul style="list-style-type: none"> Not to import, transport, store, make, use, hold, transfer the industrial explosive substances without any approval in accordance with this law.
Employment and Skill Development Law, 2013	Clause 5, 14, 15, 30	<p>The Project Proponent commits to comply the stipulation</p> <p>(a). For the agreement, training and probation period as prescribed in:</p> <ol style="list-style-type: none"> If the employer has appointed the employee to work for an employment, the employment agreement shall be made within 30 days. But it shall not be related with government department and organization for a permanent employment. If pre training period and probation period are stipulated before the appointment, the said trainee shall not

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		<p>be related with the stipulation of sub-section (1).</p> <p>(b). For particulars to be included in the employment agreement:</p> <ol style="list-style-type: none"> 1. the type of employment; 2. the probation period; 3. wage, salary; 4. location of the employment; 5. the term of the agreement; 6. working hour; 7. day off, holiday and leave; 8. overtime; 9. meal arrangement during the work hour; 10. accommodation; 11. medical treatment; 12. ferry arrangement to worksite and travelling; 13. regulations to be followed by the employees; 14. if the employee is sent to attend the training, the limited time agreed by the employee to continue to work after attending the training; 15. resigning and termination of service; 16. termination of agreement; 17. the obligations in accord with the stipulation of the agreement; 18. the cancellation of employment agreement mutually made between employer and employee; 19. other matters; 20. specifying the regulation of the agreement, amending and supplementing; 21. Miscellaneous. <p>(c). For the worksite regulations contained in the employment agreement to be in compliance with any existing law and the benefits of the employee not to be less than those of the any existing law.</p> <p>(d). For the employment agreement, the Ministry can issue the notification for paying the stipulated compensation to the employee by the employer, if the work is completed earlier than the stipulated period or the whole work or any part of it have to be terminated due to unexpected condition or the work has to be terminated due to various conditions.</p> <p>(e). For the employment agreement made under sub-section (a) to be related with daily wage workers, piece rate workers who are appointed temporarily in the government department and organization.</p> <p>(f). For the worksite regulations and benefits contained in the employment agreement mutually made between the employer and employee or among the employees to be amended as necessary, in accord with the existing law.</p>

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		<p>(g). For the employer to send a copy of the employment agreement made between the employer and employee, to the relevant employment and labour exchange office within the stipulated period and to get the approval of it.</p> <p>(h). For the employment agreement made before the enforcement of this law has to be confirmed up to the end of the term of the original agreement.</p> <ul style="list-style-type: none"> To carry out the training program in accord with the work requirement in line with the policy of the skill development team to develop the skill relating to the employment for the workers who are proposed to appoint and working at present. to carry out the training for each work or compounding the work individually or group-wise by opening on-job training, training systematically at worksite, sending outside training and training by using information technology system, for arranging the training program to enhance the employment skill of the workers; For appointing the youths of 16 years as apprentice, to arrange the training for technology relating to the employment systematically in accord with the regulations prescribed by the skill development team. For the employer of the industry and service business to put in to the fund monthly as put in fees without fail for the total wages of the subordinates and the supervisors' salary for not less than 0.5%; (b) To put in money paid under sub-section (a) not to be deducted from the wage and salary of the employees.
The Factories Act , 1951 (Amended in 1953, 1954, 1962, 2016)		<p>The Project Proponent commits to comply the provisions for the requirement</p> <ul style="list-style-type: none"> For permits for some chemicals. For all factories to have proper pollution control measures such as air pollution, sewage and wastewater treatment system.
The Private Industrial Enterprise Law, 1990	Clause 4, 13, 15	<p>The Project Proponent commits</p> <ul style="list-style-type: none"> Not to causing health threats to the nearby residence; Not to causing fire threats or hazards; Not to causing source of nuisance or pollution originating from the enterprise; Not to causing occupational hazard to the workers. To comply for the requirement for registration of private industrial enterprises as: <ul style="list-style-type: none"> (a) Any person desirous of conducting any private enterprise, (b) Any person conducting any private industrial enterprise on the day this Law is enacted, by using any type of

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		<p>power which is three horsepower and above or manpower of ten wage-earning workers and above shall register under this Law.</p> <ul style="list-style-type: none"> To comply the statement for the duties of the entrepreneur are as in:- <ul style="list-style-type: none"> b) to abide by the terms and conditions of the registration certificate; e) to submit to the inspection of the person or inspection body assigned by the Directorate or Supervisory Body; f) to shift the place of enterprise, change the nature of enterprise, amalgamate enterprises and split up enterprises only with the approval of the Directorate; g) to abide by the orders and directives issued from time to time by the Ministry and the Directorate; For the right of the entrepreneur to carry out the followings:- <ul style="list-style-type: none"> a) appointing foreign experts and technicians with the approval of the Ministry; b) carrying out change of the name of enterprise, transfer of ownership, temporary suspension or permanent closing down of the enterprise in the manner prescribed and with the approval of the Directorate.
The Settlement of Labor Dispute Law, 2012	Clause 38, 39, 40, 51	<p>The Pyidaungsu Hluttaw hereby had enacted this Law for safeguarding the right of workers or having good relationship between employer and workers and making peaceful workplace or obtaining the rights fairly, rightfully and quickly by settling the dispute of employer and worker justly.</p> <p>The Project Proponent commits to comply:</p> <ul style="list-style-type: none"> Not to fail to negotiate and coordinate in respect of a complaint within the prescribed period without sufficient cause Not to alter the conditions of service of workers involved in disputes prior to investigation by tribunals For no party to strike or lock-out without negotiation, conciliation and arbitration by Arbitration Body. For the employer if commits acts without sufficient cause, to be liable to pay full compensation to workers as determined by Arbitration Body or Tribunal.
The Workmen Compensation Act, 1923 (amended 2005)		<p>The Workmen's compensation act had been promulgated in 1923, amended in 2005, The Project Proponent commits to comply the stipulations:</p> <ul style="list-style-type: none"> For the payment by certain classes of employers to their workmen of compensation for injury by accident. For the liability for compensation of employer's, amount of compensation,

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		<p>compensation to be paid when due and penalty for default, method of calculating wages, review, commutation of half-monthly payments, payment of a lump sum amount, distribution of compensation, compensation not to be assigned, attached or charged, notice and claim, power to require from employers statements regarding fatal accidents, reports of fatal accidents and serious bodily injuries, medical examination, contracting, remedies of employer against stranger, compensation to be first charge on assets transferred by employer, special provisions relating to masters and seamen.</p> <ul style="list-style-type: none"> For any updating for revising the monetary amount as per the amendment law.
Labour Organization Law (The Pyidaungsu Hluttaw Law No. 7/2011)	Clause 17, 18, 19, 20, 21, 22	<p>This Law was enacted, to protect the rights of the workers, to have good relations among the workers or between the employer and the worker, and to enable to form and carry out the labour organizations systematically and independently.</p> <p>The Project Proponent commits to comply the stipulations as there mentions:</p> <ul style="list-style-type: none"> That Labour Organizations are free to organise and negotiate workers rights if not meeting labour laws. That Labour Organisations may demand re-appointment of worker if cause of dismissal is related to labour organisation membership or activities or not conform with labour laws. That Labour Organisations have the right to send representatives to conciliation tribunals. That Labour Organisations have the right to participate and discuss workers rights and interests with government and employers That Labour Organisation have the right to participate in collective bargaining in accordance with labour laws. That Labour Organisation may take collective actions in accordance with the relevant procedures, regulations and law.
Minimum Wages Law, 2013	Clause 12 (a-e), 13 (a-g)	<p>This Law was enacted to meet with the essential needs of the workers, and their families, who are working at the commercial, production and service, agricultural and livestock breeding businesses and with the purpose of increasing the capacity of the workers and for the development of competitiveness.</p> <p>The Project Proponent commits to comply the stipulations:</p> <ul style="list-style-type: none"> For the employer not to pay wage less than the minimum wage stipulated, do not have the right to deduct any other wage; For the employer to inform rates of minimum wage relating to the business, allow the entry and inspection of the inspection officer, give the sick worker

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		<p>holiday for medical treatment in accord with stipulation and give holiday for the matter of funeral of the family of worker without deducting from the minimum wage.</p>
Payment of Wages Law, 2016	Clause 3, 4, 5, 7 (ii), 8, 9, 10, 14	<p>The Project Proponent commits to comply the stipulations:</p> <ul style="list-style-type: none"> • That salaries are to be paid at the end of the month or, depending on the size of the employing enterprise, between 5-10 days before the end of the month. The employer is permitted and required to withhold income tax and social security payments. Other deductions, e.g. for absence, may only be withheld in accordance with the law. • For the employer (a) to pay for salary either Myanmar Kyats or Foreign Cash permitted by National Bank of Myanmar. When delivery the salary (b) If the employer needs to pay the other opportunities or advantages, he can pay cash together with other materials according employee's attitude. • For finishing the contract, employer need to pay the salary (not more than one month) to employees. For the permanent worker, need to pay per monthly. If more than 100 employees, need to pay within the 5 days from the end of month. If fire the employees, need to pay salary within two days after fire. When employee dies due to the accident, need to pay money as an insurance to employee's family within two days. • For the employer to report to the Department with evidence of payment at later date agreed with the employee if the employer has difficulties to pay wages on time because of significant events (eg natural disaster), • For the employer to deduct expense which are allowance for accommodation and ferry service arranged by the employer, meal allowance, electricity charges, water service charges and income taxes liable to be paid by workers and cash paid in excess under mistake, which are not included in the expression of wages under this Law and not to deduct from the wages of the worker except the deduction as per clause 7. • For any deducting from the salary due to the employees' absence, the total cut salary not to be more than 50 % of his salary. • For overtime work, to allow the presiding overtime rate as set by the Law.
Social Security Law, 2012	Clause 11 (a)(b), 15(a), 16 (a), 18(b), 48(a), 49(a)(b),	<p>The Project Proponent commits to comply the stipulations:</p>

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
	51(a)(b), 53(a), 54(a)(b), 75	<ul style="list-style-type: none"> For compulsory registration for social security system and benefits, the following establishments can be applied if they employ minimum number of workers and above determined by the Ministry of Labour in co-ordination with the Social Security Board: <ul style="list-style-type: none"> i. production industries doing business whether or not they utilize mechanical power or a certain kind of power, works of production, repairing or services, or engineering works, mills, warehouses, establishments; ii. Government departments, Government organizations and regional administrative organizations doing business; iii. development organizations; iv. financial organizations, v. companies, associations, organizations and their subordinate departments and branch offices doing business; vi. shops, commercial establishments, public entertaining establishments; vii. Government departments and Government organizations doing business or transport businesses owned by regional administrative body, and transport businesses carried out with the permission of such department, body or in joint venture with such department or body; viii. construction works carried out for a period of one year and above under employment agreement; ix. works carried out with foreign investment or citizen investment or joint ventured businesses; x. works relating to mining and gemstone contained in any existing law; xi. works relating to petroleum and natural gas contained in any existing law; xii. ports and out-ports contained in any existing law; xiii. works and organizations carried out with freight handling workers; xiv. Ministry of Labour and its subordinate departments and organizations; xv. Establishments determined by the Ministry of Labour from time to time, in co-ordination with the Social Security Board and with the approval of the Union Government; that they shall be applied with the provisions of compulsory registration for Social Security System and benefits contained in this Law. For provisions of compulsory registration under sub-section (a) to continue to be applied by this Law even though any of the following situations occurs if it continues to carry out such work:

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		<ul style="list-style-type: none"> i. carrying out work by employing under stipulated minimum number of workers but more than one worker; ii. changing the employer or changing the type of business. <ul style="list-style-type: none"> • For the Social security fund, to include the funds for health and social care, family assistant, invalidity benefit, superannuation benefit and survivors' benefit, unemployment benefit, other social security fund for social security system of compulsory registration and contribution stipulated by the Ministry of labour, other social security fund and social security housing plan fund. • For arranging insurance for the workers to enable to enjoy social security benefits by contributing to the social security fund. • For the employer to deduct contributions to be paid by worker from his wages together with contribution to be paid by him and pay to the social security fund and in such case he can incur the expense. • For the employer to effect insurance by registering for employment injury benefit insurance system contained in section 45 at the relevant township social security office and pay contribution to employment injury benefit fund in accord with stipulations in order that workers applied to provisions of compulsory registration may obtain the employment injury benefits. • For the inapplicability to the Workmen's compensation act. • For the employer (a) to pay contribution monthly to Employment Injury Benefit Fund at the rates stipulated under section 50. Moreover he shall also bear the expenses for paying as such; (b) to pay defaulting fee stipulated under section 88, in addition to the contribution if fails to contribute after effecting insurance for employment injury benefit. • For the employers and workers (a) to co-ordinate with the Social Security Board or insurance agency in respect of keeping plans for safety and health in order to prevent employment injury, contracting disease and decease owing to occupation and in addition to safety and educational work of the workers and accident at the establishment; • For the employer (a) to report to the relevant township social security office immediately if a serious employment accident occurs to his insured worker. There shall not be any delay without sufficient cause to report as such. (b) A team of officers and other staff who inspect the establishments, if it is found out the employment injury, death, and contracting disease, shall report to the

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		<p>relevant township social security office in accord with the stipulations.</p> <ul style="list-style-type: none"> For keeping records of work and lists.
Law protecting Ethnic Right, 2015	Clause 5	<p>The Project Proponent commits to comply the stipulations</p> <p>For the Equal right between the Ethnic living in Myanmar. It enacted that if an ethnic loose the right, he can complain to the Regional or State Government to get the equal chance and find the equal right.</p> <p>That project matters shall be informed, coordinated and undertaken in consultation with ethnic groups if projects are in areas with ethnic groups.</p> <p>The Project Proponent also commits to comply the Succeeding laws to protect the right of Myanmar national:</p> <p>Monogamy Law (2015): Concerning all those who are living in Myanmar, Myanmar Citizens who live outside of Myanmar, and foreigners who marry Myanmar citizens while living in Myanmar for preventing misconducting marriages.</p> <p>Buddhist Women Special Marriage Law (2015): Concerning the marriage between Buddhist Woman and other religious man. There prescribed the legal procedure, the conditions to be complied by non-Buddhist husband, the customs for dividing property when divorcing.</p> <p>Religious Conversion Law (2015): This is enacted for the freedom to convert from one religion to another, or a person without a religion has the freedom to convert to a religion. There prohibited to apply for a religious conversion with an intent to insult, disrespect, destroy, or abuse a religion.</p> <p>Population Control Healthcare Law (2015); This is for alleviate poverty, provide adequate quality healthcare, and ensure that family planning improves maternal and child health in the country. This Empowers region or state government that concerned with the special zone for healthcare to form region or state population control healthcare group to implementing the task as per the directives of the Ministry and region or state government and the Union Territory Governing body.</p>
Leaves and Holidays Act, 1951	Clause 4.	<p>The Project Proponent commits to comply the stipulations:</p> <ul style="list-style-type: none"> For employee to be granted to pay public holidays as announced by the Government in the Myanmar Gazette. On average, Myanmar has 26 public holidays per year,

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		<p>depending on the date of the variable holidays.</p> <ul style="list-style-type: none"> For additional rules to apply in accordance with other laws, such as the Social Security Law (2012) for employees contributing to the Social Security Fund. To grant earned leave with average wages or average pay for a period of ten consecutive days by his employer during the subsequent period of twelve months to every employee who has completed a period of twelve months continuous service.

3.2.4 *Environmental and Social Standards*

With the release of the Myanmar EIA Procedure in December 2015, the National Environmental Quality (Emissions) Guidelines (NEQEG) was also enacted. The EQEG provide the basis for regulation and control of noise and air emissions and effluent discharges from projects in order to prevent pollution and protect the environment and public health. The NEQEG are noted to be the similar to that recommended by the International Finance Corporation (IFC) General Environmental Health and Safety (EHS) Guidelines for pesticides formulation, manufacturing and packaging, 2007, (World Bank Group, 2007).

This EQEG applies to the synthesis, optimisation of the active ingredients, processing development (manufacturing), and the formulation and packaging of pesticides from these active ingredients. Pesticide groups include insecticides, herbicides, fungicides, acaricides (or miticides), nematicides, and rodenticides.

Air Emissions / Noise and Vibration

The air and noise emission parameters are taken from Section 2.3.4.6 and Section 1.3 of the EQEG and shown in Table 3.7 and 3.8 respectively.

Table 3.7 *EQEG Air Emissions Parameters*

Parameter	Guideline Value ^a µg/m ³
Ammonia, gaseous inorganic chlorine compounds	30
Bromines, Cyanides, Fluorines, Hydrogen sulphide	3
Chloride	5
Chlorine	3
Particulate matter PM ₁₀ ^b	20, 5 ^c
Total organic carbon	50

Volatile organic compounds	20
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a Milligrams per normal cubic meter at specified temperature and pressure
b PM 10 = Particulate matter 10 micrometres or less in diameter
c Applicable where very toxic compounds are present

Table 3.8 *EQEG Noise Level Parameters*

Receptor	One hour LAeq (dBA) ^a	
	Daytime 07:00 – 22:00 (10:00 – 22:00 for Public holidays)	Night Time 22:00 – 07:00 (22:00 – 10:00 for Public holidays)
Residential, institutional, educational	55	45
Industrial, commercial	70	70

^a Equivalent continuous sound level in decibels

NEQEG Effluent Discharge

Effluent discharges are provided in a sector specific section in the NEQEG. These are detailed in *Table 3.9*.

Table 3.9 *NEQEG on Effluent Discharge Levels*

Parameter	Unit	Guideline Value
5-day Biochemical oxygen demand	mg/l	30
Active ingredients (each)	mg/l	0.05
Adsorbable organic halogens	mg/l	1
Ammonia	mg/l	10
Arsenic	mg/l	0.1
Chemical Oxygen demand	mg/l	150
Chlorinated organics	mg/l	0.05
Chromium (hexavalent)	mg/l	0.1
Chromium(total)	mg/l	0.5
Copper	mg/l	0.5
Mercury	mg/l	0.01
Nitroorganics	mg/l	0.05
Oil and grease	mg/l	10

Parameter	Unit	Guideline Value
pH	S.U. ^a	6-9
Phenol	mg/l	0.5
Total phosphorus	mg/l	2
Total suspended solids	mg/l	10-20 ^b
Zinc	mg/l	2

^a Standard unit

^b Lower value for pesticide manufacturing, higher value for pesticide formulation

3.3 CONTRACTUAL AND OTHER COMMITMENTS

The Ministry of Agriculture has provided Awba this land under a Built-Operate-Transfer (BOT) system. The Ministry of Agriculture rented 126.13 acres within 137.28 acres of Industrial Park that located near Wah Net Chaung village, Hmawbi Township, Yangon Region to Awba. According to the BOT, contract terms are from the contract signing date (23 September 2015) until initial 10 years. If the contract terms will be extended, that will be five years in one term and up to 2 terms can be extended (totally will be 20 years).

3.4 INSTITUTIONAL FRAMEWORK

3.4.1 Construction Phase

The EMP of this EIA Report will be included in the construction contract and the contractor will be responsible for implementation of the measures associated with design and construction. Awba's staff, specifically the EHS Officer and Site Engineer of the Project Management team, will monitor the implementation of these mitigation measures by the contractors at the site.

The roles and responsibilities of Awba and the Contractor for implementation and monitoring have been outlined in *Table 3.10*.

Table 3.10 Roles and Responsibilities of AWBA and Contractor

Awba – EHS Officer and Site Engineer	Contractor
Obtaining statutory clearances required during pre-construction stage of the Project	Obtaining permits required during the construction stage
Overall Project co-ordination and management through Contractor and supported by the third party environmental consultants	Joint verification with Awba and Third Party Environmental Consultant for review of ESMP implementation

Awba - EHS Officer and Site Engineer	Contractor
Interaction and reporting to IFC	Filling of reporting formats as per the reporting schedule and submission to IFC via Awba
Effective implementation of ESMP and monitoring of ESMP implementation	Environmental monitoring through Third Party Environmental Consultant
Carryout verification/supervision exercises during the construction phase of the Project for implementation of ESMP	Preparation of various plans for effective implementation of ESMP
Overall supervision of ESMP implementation	Management of labour camp and to provide drinking water, sanitation facility
Approval of plans prepared by the Contractor	
Addressing grievances of local community and information dissemination	
Environmental monitoring through Third Party Environmental Consultant	

While the contractor or a particular party is responsible for physical implementation of the mitigating measures, the whole implementation process requires supervision, checking, documentation and verification so that problems are identified and properly addressed before they get out of hand. In order to ensure proper execution of the ESMP, implementation reviews will be conducted by the EHS Officer / Site Engineer by various means including weekly construction meetings, review of construction log book, monthly and other construction reports etc. Records of these minutes of the weekly meeting, monthly reports and special reports on implementation of the mitigating measures will also be maintained and available for review by the Project management. It is suggested to identify documents and records that require templates and accordingly suitable templates should be developed, which should include but not limited to policies, procedures and work instructions, meeting minutes, monitoring results, training attendance records, emergency contract lists, action plans etc. Further, all these templates should be communicated to all potential users. All these records will be archived at the Project office and will be maintained by the EHS officer. All documents and records shall be archived with a unique identifier so that they can be distinguished from any other material and can be easily retrieved.

3.4.2 *Operation Phase*

The ESMP will be included in the operation contract if contractor is engaged for plant operation and the contractor's operations team will be responsible

for implementation of the associated mitigation measures. Awba's staff, specifically the EHS Officer and Site Engineer, will monitor the implementation of these mitigation measures by the operations team at the site.

The roles of the EHS Officer are:

- i. oversees the implementation of the ESMP and all other relevant policies, procedures and management plans;
- ii. leads, documents and is the secretariat for regular ESHS Department meetings where ESHS matters are discussed, solutions agreed, information and lessons shared;
- iii. conforms and leads the Emergency Response Team;
- iv. ensures lessons learned are converted into continuous improvement through revisions to the ESMP; and
- v. reports to the CEO.

The roles of the Site Engineer are:

- i. oversees the implementation of the agreed-upon parts of the ESMP and makes resources available to do so;
- ii. ensures the implementation of Corrective Actions;
- iii. manages the activities of the ESHS, Admin, Procurement and Maintenance Departments; and
- iv. ensures that the HAIC Project operates in accordance with applicable regulatory and best practice health, safety, and social requirements and plans.

3.5 PROJECTS ENVIRONMENTAL, SOCIAL AND HEALTH STANDARDS

For ambient air quality standards, the WBG EHS General Guidelines (2007) states that:

...Emissions do not result in pollutant concentrations that reach or exceed relevant ambient quality guidelines and standards by applying national legislated standards, or in their absence, the current WHO Air Quality Guidelines, or other internationally recognized sources

Myanmar has established air quality standards published in the NEQ Guidelines (2015), which are noted to be the same as those specified under the WBG EHS General Guidelines (2007). Therefore, for the air quality impact assessment, where air quality standards for specific substances assessed are not specified under the WBG EHS General Guidelines (2007), the World Health Organization (WHO) or other internationally recognised sources have been referred to.

In terms of potential impacts to ecology and agriculture, local assessment criteria do not exist and the WBG do not set standards or guidelines for

protection of vegetation, however, guidelines and standards from the WHO ⁽¹⁾ existed and are referred.

The WBG EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). The EHS Guidelines contain the performance levels and measures that are generally considered achievable in new facilities by existing technology at reasonable costs.

Levels of noise, air emissions, and effluent recommended by the relevant WBG Guidelines are summarised in Tables 3.1-3.5. The Project should achieve compliance with these recommended levels.

3.5.1 Human Health

A summary of the air quality standards that are relevant to the air quality impact assessment of the Project are shown in *Table 3.11*. These guidelines provide the basis for regulation and control of air emissions from the Project in order to prevent pollution and protect the environment and public health. These standards will be used for comparison of baseline data and predicted impacts in this air quality impact assessment unless otherwise stated.

Table 3.11 Air Quality Standards and Guidelines

Parameter	Averaging Period	Air Quality Standard ($\mu\text{g}/\text{m}^3$)	Source
Nitrogen dioxide (NO_2)	Annual	40	WBG ⁽¹⁾
	1-hour	200	WBG
Ozone (O_3)	8-hour daily maximum	100	WBG
Particulate matter (PM_{10}) ^(a)	Annual	20	WBG
	24-hour	50	WBG
Particulate matter ($\text{PM}_{2.5}$) ^(b)	Annual	10	WBG
	24-hour	25	WBG
Sulphur dioxide (SO_2)	24-hour	20	WBG
	10-minute	500	WBG
Hydrogen Chloride (HCl)	24-hour	600	WHO ⁽²⁾
Hydrogen Fluoride (HF)	1-hour	600	WHO
Cadmium (Cd)	Annual	0.005	WHO
Carbon monoxide (CO)	Annual	100,000	WHO
	8-hour	30000	WHO
	1-hour	10000	WHO
Lead (Pb)	Annual	0.5	WHO
Mercury (Hg)	Annual	1	WHO
Dioxins and Furans	24-hour	1.00×10^{-7}	Ontario ⁽³⁾

1. WBG EHS General Guidelines (2007)
2. World Health Organisation (WHO) Air Quality Guidelines for Europe, 2nd edition (2000)
3. Ontario's Ambient Air Quality Criteria (2012)

⁽¹⁾ World Health Organisation (WHO) (2000) Air Quality Guidelines for Europe, 2nd Edition [Online] Available at: http://www.euro.who.int/_data/assets/pdf_file/0005/74732/E71922.pdf [Accessed 3 August 2017]

3.5.2 Ecology and Agriculture

Air quality critical levels for the protection of sensitive ecological areas and agriculture adopted in this air quality impact assessment are presented below in *Table 3.12*. The critical level is the concentration in the atmosphere above which direct adverse effects on ecological receptors, such as plants or ecosystems may occur. These standards will be used for comparison of baseline data and predicted impacts in this air quality impact assessment unless otherwise stated.

Table 3.12 *Air Quality Critical Levels used for the Assessment of Impacts on Sensitive Ecological and Agricultural Receptors*

Pollutant	Averaging Period and Statistic	Assessment Criteria (µg/m ³) (1)
Nitrogen Oxides (NO _x)	Annual mean	30
Sulphur dioxide (SO ₂)	Annual Mean	20

1. World Health Organisation (WHO) Air Quality Guidelines for Europe, 2nd edition (2000)

3.5.3 Nuisance Effects

Dust emissions from the Project site may result in nuisance issues when depositing onto surfaces, for example, property, vehicles, and washing. In addition, dust deposition can affect vegetation and agriculture due to the soiling of leaves hindering photosynthesis and the blockage of leaf pores. There is very little information available on the sensitivity of specific plants to dust soiling, however, the information that is available suggests that the guidelines for identifying the deposition rate at which nuisance at human sensitive receptors may occur is also appropriate for use as a metric for assessing the point at which significant impacts on plants may arise ⁽¹⁾.

Dust *per se* does not pose a specific risk to human health and as such, the WBG and WHO guidelines do not include guidelines for nuisance dust. A number of organisations have set guidelines for dust deposition and these are set out in *Table 3.13*.

⁽¹⁾ Farmer, A. M. (1993). The Effects of Dust on Vegetation – A Review. *Environmental Pollution*. 79, 63-75.

Table 3.13 **Dust Deposition Nuisance Thresholds**

Potential for complaint	Measure of soiling	Data source
National Guidelines		
Nuisance: mass deposition measurements (mg/m²/day)		
Possible Nuisance	350 (monthly mean)	German Technical Instructions on Air Quality Control (TA-Luft)
Very Likely Nuisance	650	
First Loss of Amenity	133 (monthly mean)	West Australia Nuisance Standard
Unacceptable reduction in air quality	333	
Serious nuisance	200 (annual mean)	UK recommended nuisance dust deposition rate
Nuisance dust deposition	133	Malaysia air quality standard
Nuisance: soil rate measurements		
Upper limit of acceptability through soiling	20 - 25 soiling units/week	UK glass slide guideline

Where relevant these standards will be used for comparison of baseline data and predicted impacts in this air quality impact assessment unless otherwise stated.

4 PROJECT DESCRIPTION

4.1 PROJECT BACKGROUND

Established in 1995, **Myanmar Awba Group's** (Awba) core business involves the importation, manufacturing, formulation, reformulation, blending and distribution of Crop Protection Products (CPP or agrochemicals, such as pesticides, fungicides and herbicides), fertilizers (urea and compound fertilizers – Nitrate, Phosphate, Potassium - NPK) and seeds.

In June 2016, the International Finance Corporation (IFC) extended a financing facility of US\$10 million to Awba with specific use of proceeds for the expansion of Awba's core business. This includes the construction and operation of a new agro-chemical formulation complex, the Hmawbi Agriculture Input Complex (HAIC), in the Hmawbi Township of Yangon Region ("the Project").

4.2 PROJECT LOCATION

The Hmawbi Agriculture Input Complex is located in the Hmawbi Township of the Yangon Region. The size of the HAIC is 126.13 acres. Next to the HAIC is the existing Hmawbi pesticide factory, which was established in 1986 and is under a Joint Venture (JV) agreement between Awba and the Myanmar Government. The nearest community is Yae Tar Shey Village, 1 km from the Project Site. The location of the Project Site is shown in *Figure 4.1*.

Figure 4.1 Project Location



4.3 PROJECT SCHEDULE

The project will be built in three phases and the land utilisation for each phase is as stated in *Table 4.1*.

Table 4.1 *Project Phases and Land Use*

Phase	Year	Land Usage
Phase 1	2016	16 Acres
Phase 2	2017	16+4=20 Acres
Phase 3	2019	20+9=29 Acres

4.4 DESCRIPTION OF THE PROJECT

4.4.1 Land Use

The overall land size is approximately 130 acres and only some portions of it will be utilized for the construction of a new plant. The land is generally flat with small and gradual contours in the west while the eastern side is hilly and has rubber plantations on it. There is an existing pesticide formulation plant somewhere near the middle (slightly closer to the eastern side). Most of the plot is vacant save for the existing pesticide factory and the old worker housing. The new factory is to be constructed on an empty land, which is at the immediate west of the existing pesticide plant.

The land of HAIC was owned by the Ministry of Industry in 1982 and transferred to Ministry of Agriculture. The Ministry of Agriculture has provided Awba this land under a Built-Operate-Transfer (BOT) system. The Ministry of Agriculture rented 126.13 acres within 137.28 acres of Industrial Park that located near Wah Net Chaung village, Hmawbi Township, Yangon Region to Awba. According to the BOT, contract terms are from the contract signing date (23 September 2015) until initial 10 years. If the contract terms will be extended, that will be five years in one term and up to 2 terms can be extended (totally will be 20 years). No record of the site selection for this Industrial Park is available and no environmental and social impacts assessment and/or strategic environmental assessment have been carried out by the government to date.

The neighbouring MPI Site will not be decommissioned as it is leased under a similar BOT contract to the HAIC. Instead, Awba will investigate two options, the final decision of which will be made later:

- 1) Transfer of the Site back to the Ministry of Agriculture; or
- 2) Transfer of the Site to another Company.

It was observed during the site visit in May 2017 that construction of an office building and warehouses had already commenced from January 2017 and is due to be completed before 2020.

The Project Site is accessed by an unpaved road from the main road connecting to War Net Chaung Village. An estimated five vehicles access the Site daily. During consultation, it was mentioned that this access road was damaged by Project vehicles and it is recommended that Awba restore the road to its original condition. This was noted by the local community as a grievance during the consultation.

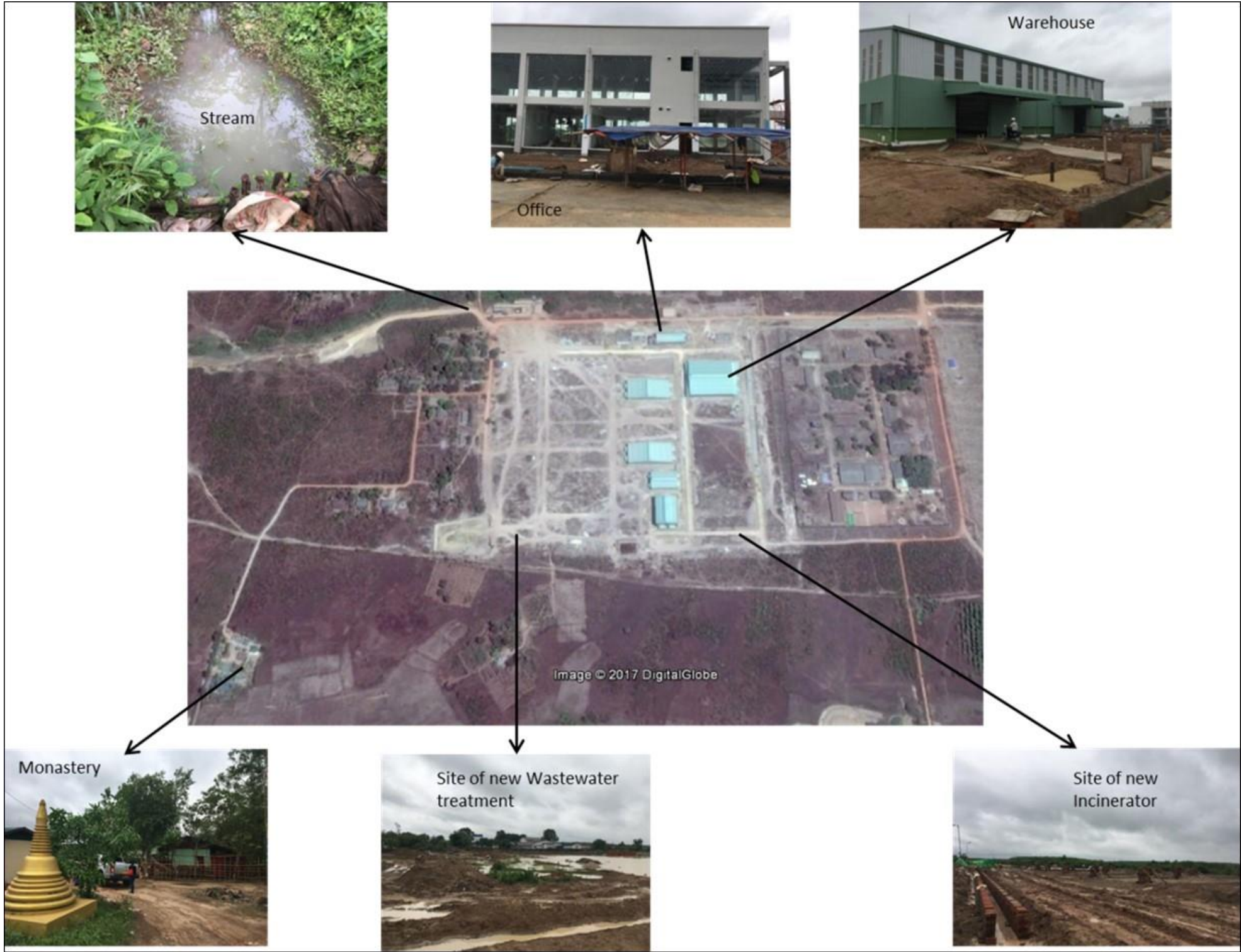
The construction of the HAIC involves three phases. The first phase took place between 2016 and 2017. This stage involved a building area of 12,618 m² composed of one warehouse, one liquid formulation buildings, two solid formulation buildings, one incinerator, one drum crusher and small storage, one workshop and utility room, a wastewater treatment system, a wastewater intermitted storage, firefighting water storages, security guard houses, one laboratory, a car parking, offices, one dining room, and locker rooms.

The second phase will take place in 2019. The second stage will involve a building area of 7,594 m² composed of two warehouses and one liquid formulation building. The third phase is planned for between 2020 and 2021, with a building area of 11,575 m² composed of four warehouses and two liquid formulation building.

During construction, there is currently around 50-100 workers on site. Water is supplied by potable bottled sources and power is provided by generators. Clearance and excavation works have already been conducted in the Phase 1 area.

Figure 4.2 shows some representative photos taken during the site visit at the Project Site and its vicinity.

Figure 4.2 Representative Photos taken at the Project Site and its vicinity during the Site Visit in May 2017



The layout of the Project facilities is shown in *Figure 4.3*. The HAIC will have the capabilities to formulate a variety of pesticides, herbicides, fungicides, and foliar fertilizers. The plant will be designed for both solid and liquid products formulation, and is expected to have an initial capacity of 16 million litres/kilogram per annum of agrochemical products in the first phase in 2017. This will eventually grow to a capacity of 30 million litres/kilogram per annum in 2020 to meet the growing demand from Myanmar's progressive agriculture industry. It is expected that the plant will have a capacity to manufacture 50% of Myanmar's domestic crop protection demand.

In addition to the production facilities, there will laboratory, utility, workshop, warehouse, office and security facilities, carpark, staff accommodation, canteen, testing farm and greenhouses supporting the operations. Incinerator and wastewater treatment facilities will be constructed to treat the solid/hazardous and liquid wastes generated from the HAIC.

The following sections provide an overview of the facilities within the HAIC.

Office Building

There will be a two-story office building able to hold up to 100 people (*Figure 4.4*). The building will be 40 m x 13 m x 7 m (11,800 square feet) and will feature a fire protection system, sprinkler and alarm system, CCTV system, and an indoor public address (PA) system.

Figure 4.3 Layout of Hmazwbi Agriculture Input Complex

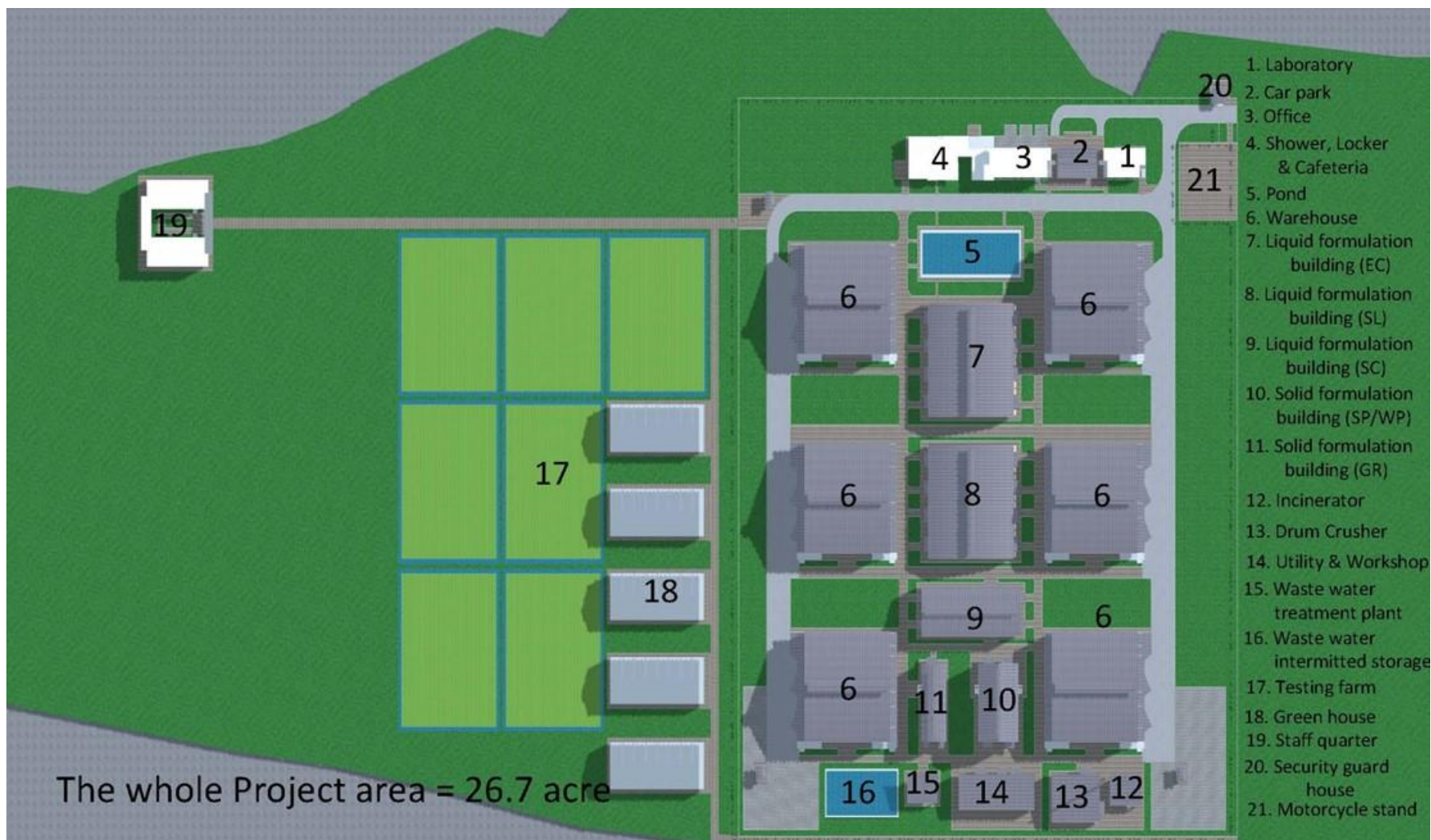


Figure 4.4 *Office Building*



Laboratory Building

The laboratory is a one-story building, and will be suitable for 7 to 10 people. The building will be 28 m x 13 m x 4 m (3,900 square feet) and will provide state-of-the art quality testing equipment such as UCFL, GCMS, and separate storage system for flammable and non-flammable chemicals. A mechanical ventilation system will be installed in every room, scrubber system, liquid waste drainage system and black water drainage and solid waste storage area. The lab has a fire protection system, sprinkler and alarm system, CCTV system and indoor PA. Information on the fire system is provided in **Appendix D**.

Worker Facilities

The worker facilities are a one-story building with security camera and PA system (*Figure 4.5*). The facilities include cafeteria, shower room, and locker room for up to 350 people. The facility is 50.5 m x 19.5 m x 3.5 m (85,000 square feet). The canteen can serve 100 people in a time. The facilities also include a clinic, convenient store, and food distribution area.

Figure 4.5 *Worker Facilities*



Warehouse

The warehouse (*Figure 4.6*) consists of the following: high-density warehouse system, flood prevention system, firefighting system, lightening protection

system, and good ventilation and is 54 m x 17.5 m x10.5 m (35,000 square feet). A good storage practice will apply for forklift operations, a 5 layer of racking system, and plastic pellets.

Figure 4.6 **Warehouse**



Pesticide Formulation Facilities

The following sections provided an overview of the facilities involved in formulation of the pesticide Project during operation.

Emulsifiable Concentrates (EC) Building

The Emulsifiable Concentrates (EC) building will be 14,424 square feet and will have a fire alarm system, ex-proof formulation line, processing equipment, packaging equipment, dust collector system, scrubber system, black water drainage system, and natural ventilation system. The building is shown in *Figure 4.7*. The EC process that will be conducted on site is shown in *Figure 4.8* and the packaging process in *Figure 4.9*.

Figure 4.7 EC Building



Figure 4.8 EC Process

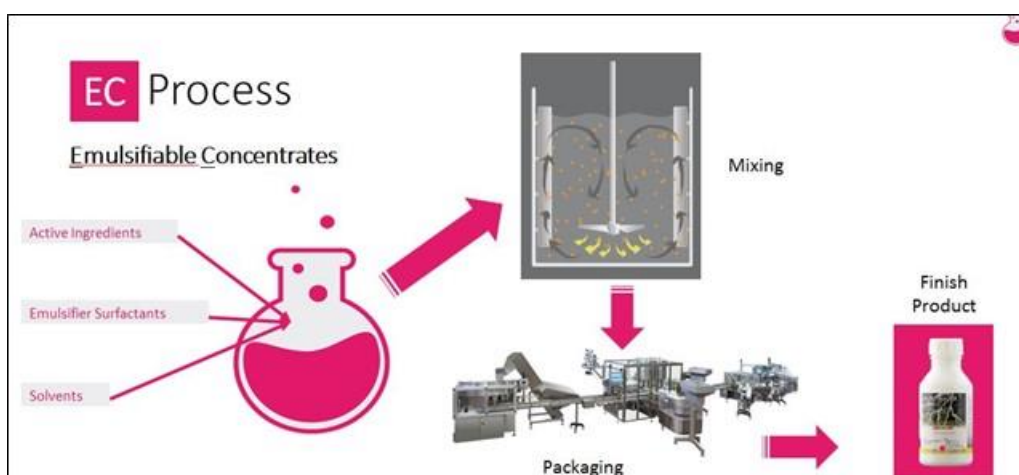
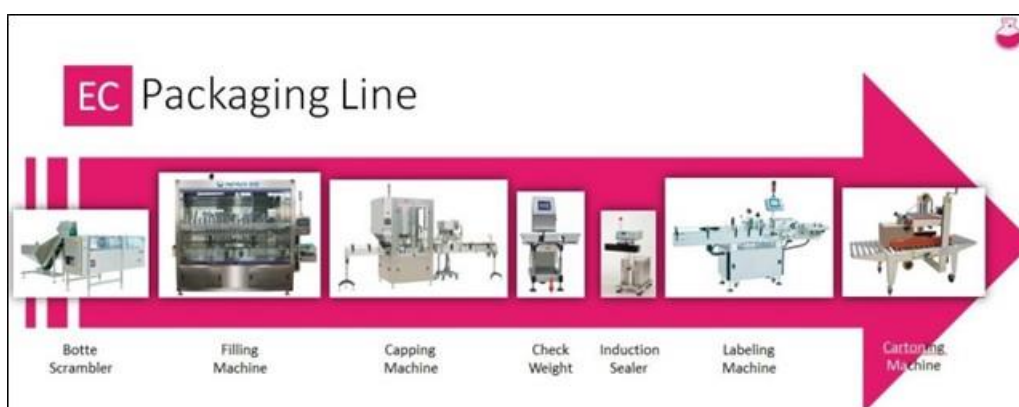


Figure 4.9 EC Packaging line



Soluble Liquid (SL) Building

The Soluble Liquid (SL) building will have an installed fire alarm system, processing equipment, packaging equipment, dust collector system, scrubber system, black water drainage system, and natural ventilation system. The building size is 14,424 square feet (Figure 4.10). The SL process that will be conducted on site is shown in Figure 4.11 and the packaging process in Figure 4.12.

Figure 4.10 SL Building



Figure 4.11 SL Formulation

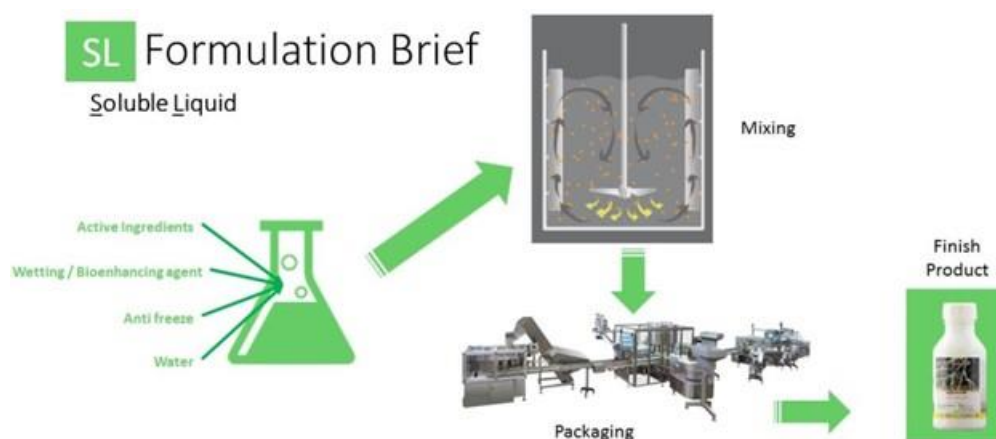
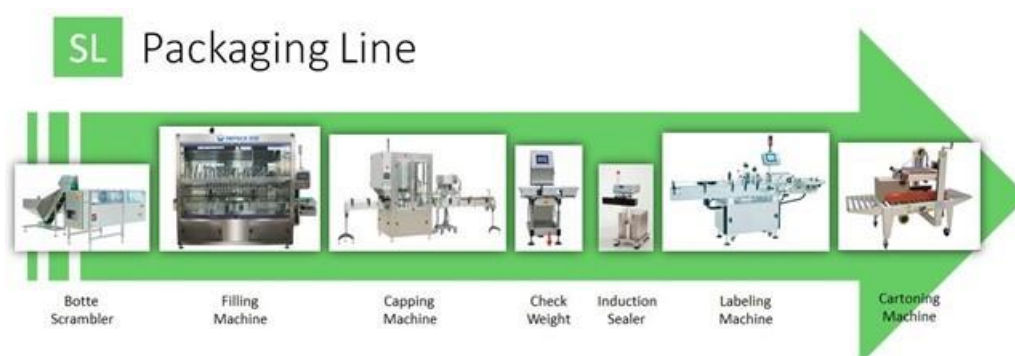


Figure 4.12 SL Packaging Line



Wettable Powder (WP) and Soluble Power (SP) Building

The wettable powder (WP) and soluble power (SP) building is 43.5 m x 24m x 14 m (10,120 square feet) and will have an installed fire alarm system, processing equipment, packaging equipment, dust collector system, scrubber system, black water drainage system, and natural ventilation system (Figure

4.13). The WP and SP process that will be conducted on site is shown in Figure 4.14 and the packaging process in Figure 4.15.

Figure 4.13 WP and SP Building



Figure 4.14 WP and SP Formulation

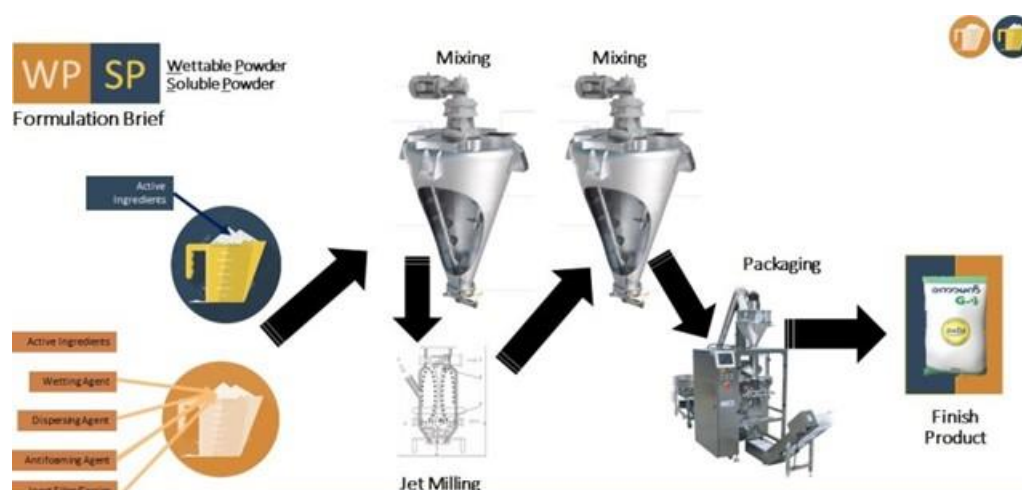


Figure 4.15 WP and SP Packaging



Suspension Concentrates (SC) Building

The SC building is 43 m x 21 m x 9 m (7,100 square feet) and has an installed fire alarm system, processing equipment, packaging equipment, dust collector system, scrubber system, black water drainage system, and natural ventilation system. The SC process that will be conducted on site is shown in Figure 4.16 and the packaging process in Figure 4.17.

Figure 4.16 SC Formation Line

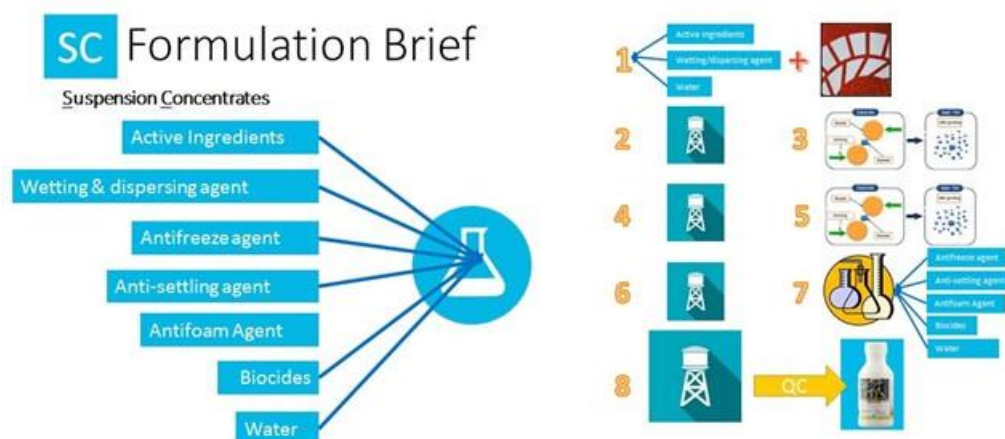
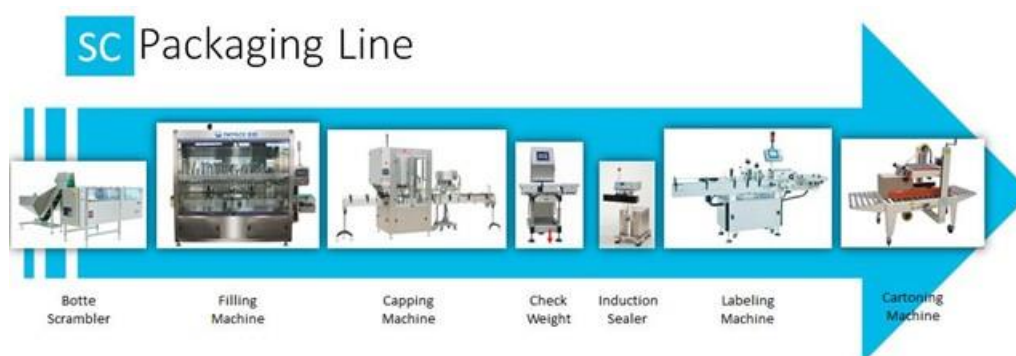


Figure 4.17 SC Packaging Process



Utility Building

Utility Building size is 448x22.5x 6 m (5537 square feet). It features the compressor systems, workshop, restrooms; spare parts store room, fire alarm system in place, security camera, PA, IP PBX system and natural ventilation system.

Drum Crusher Building

The drum crusher building is 30 m x 20 m x 8.8 m (7,108 square feet) and features the drum crushing machine, drum washing machine, temporary waste storage, fire alarm system, security camera, PA, IP PBX system, and natural ventilation system.

Waste Water Treatment System Building

Waste Water Treatment System Building size is 23x16x10m (8,024 square feet). It features the collecting basing, equalization tank, reaction tanks,

Flocculation, Sedimentation tanks, aeration tank, effluent tank, slug dehydrator, and control panel.

The batch process consist of three steps. Firstly, wastewater is filled up into Equalization tank (initial stage of the process) up to the level sensor. Secondly, the chemical treatment, the biological treatment, the sludge treatment and the filter process are run. Then, the treated water is stored in the Buffer tank and standing by for testing for five working days retention time. It is because BOD and Oil & Grease by lab testing process takes averagely five working days. Thirdly, the retained treated wastewater samples from buffer tank are regularly taken to test the pH, COD, TSS, BOD and Oil & Grease. After all the parameter has the results within standard guidelines as per requirements, the treated water from buffer tank are released into Lagoon-1 and then Lagoon 2. After finishing the above three steps, the filling up process of newly collected wastewater to Equalization tank will be performed again (step-1).

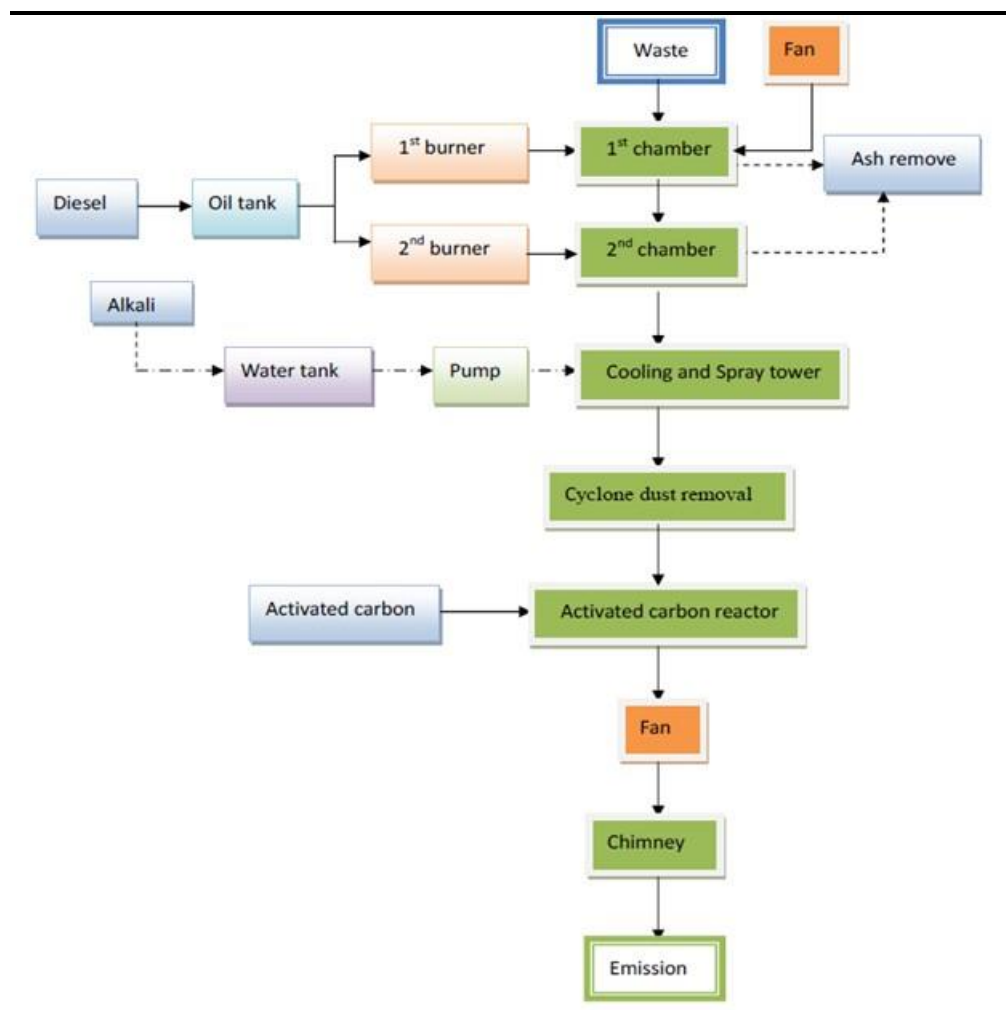
4.4.4 *Waste Management*

The Project will not purchase, store, use, manufacture or trade any agrochemical product that falls in WHO class IA (extremely hazardous). The HAIC will only manufacture or trade class II (moderately hazardous) agrochemical products, including pesticide.

Solid Waste Management

The ash together with other household solid waste will be sent to a licensed contractor and the incinerator will only be used as a backup as per Hazardous Waste Management Plan. The incinerator will not generate fly ash as it has a dust collector. The incinerator will be designed on a basis to treat a solid waste volume of 1,000 kg/day from HAIC. Only certified operators will handle the incinerator. Figure 4.18 illustrates the incineration process.

Figure 4.18 Flow Chart of the Incineration Process



The incinerator process is detailed in Figure 4.18 and described below:

- a. Stage (1): Burning in first chamber – Burnt at 500°C temperature to ensure that all the substances are completely burnt;
- b. Stage (2). Burning in second chamber – Burnt at between 1000 to 1200°C to ensure that all unwanted toxic chemical fumes are burnt which could potentially be produced from burning chamber 1;
- c. Stage (3): Cooling – hot gas passed through; the jacket tank will cool down from >1000°C to below 800°C and the spraying tower will cool down from >800°C to <300°C;
- d. Stage (4): Treatment – treated with charcoal (activated carbon powder) and lime (calcium hydroxide) to treat the odour and colour;
- e. Stage (5): Filtering – All the treated gas will be passed through a 20µm filter; and
- f. Stage (6): Releasing – after filtration, air will be released from a 80 ft. chimney.

The waste will be fed manually into the incinerator. The incinerator comprises a primary and secondary combustion chambers in which diesel will be used as fuel for the combustion process. Air blowers will be used to supply the oxygen required for combustion in the chambers and the combustion can be controlled by adjusting the volume of air flow rate inside the furnace. The flue gas from the second chamber is then passed into the cooling tower where the temperature of the gas is brought down with alkaline and at the same time acidic gas content is reduced. Afterwards, the flue gas will pass through the cyclone dust removal system where fly ash is forced to out of the system. Eventually, gas will enter the activated carbon filter where the metal content in the flue gas is reduced before being discharged through the chimney into the atmosphere.

The estimated types and quantities of waste material are provided in *Table 4.2*.

Table 4.2 *Hazardous and non-hazardous waste material*

Type	Quantity per month
<i>Non-hazardous</i>	
Plastic Packaging	4 tons m ³
Paper Packaging	6 tons m ³
Metal (drums)	2 tons
<i>Hazardous</i>	
Bottom ash from the incinerator	500 Kg
Sludge	4 tons
Activated Carbon	2 tons/year

There will be two kinds of solid waste storage at HAIC; temporary storage or waste collection sites and a central storage area.

In the temporary solid waste storage locations (Waste Classification Points), solid waste will be segregated accordingly with a colour code. Once the waste bins are filled, the solid waste will be transported to the central storage area, which will use the same colour code.

Solid waste will be stored in clearly labelled containers/skips. The colour coded labels will state the waste types in Myanmar language to be easily understandable by the workforce.

The central waste storage will comply with the following requirements:

- A concrete slab to avoid leaching into the ground;
- A roof to protect waste against rain;
- Not located close to places where food is handled, consumed and stored;
- Not located close to sources of heat;
- Easy access for the licensed contractor fleet;
- A water supply systems for cleaning, and

- For hazardous waste, it will be equipped with shelves that have a leak-proof sill or spill catcher trays to retain the capacity of the largest container or 20% of the total storage capacity in that shelf (whichever is the greater volume). There will also be ventilation holes of 30mm diameter located at the top and bottom (above the sill) of the side panels of the cabinet/cupboard.

A licensed contractor will transport the solid waste from the HAIC's central waste storage to its final disposal site (certified and managed in accordance with good international practices) in Thilawa.

The licensed contractor will deliver a copy of the Waste Discharge Record (manifest) to Awba. This record will indicate the type of waste to be transported, weight, number of packages, the name of the transporter, and the name of the responsible supervisor who performed the verification.

It is noted that the incinerator will be designed to comply with the Air Emission Standards for Municipal Solid Waste (MSW) and Hazardous Waste Incinerators of the European Union (EU) as specified in the World Bank Group Environmental, Health and Safety (EHS) Guidelines for Waste Management Facilities (2007) (*Table 3.5*). These air emission standards for MSW and Hazardous Waste Incinerators specified in the WBG EHS Guidelines for Waste Management Facilities (2007) are noted to be the same as those specified for the same types of incinerator in the Myanmar NEQ Guidelines (2015).

The emission inventory from the incinerator is presented in *Table 4.3*. During operation, air emissions from the incinerator should be monitored to track compliance with the applicable WBG and NEQ standards.

Table 4.3 *Project Emission Inventory*

Stack Parameter ⁽¹⁾	Unit	Value
Stack location	Lat / Long	17° 9'59.99"N 96° 4'41.98"E
<i>Actual Stack Conditions</i> ⁽²⁾		
Stack height	M	25
Stack diameter	M	0.4
Emission velocity	m/s	10
Exit temperature	C	120
Oxygen content (wet gas)	%	9
Moisture content (wet gas)	%	20
Actual volume flow rate	Am ³ /s	1.26
<i>Normalised Conditions</i> ⁽³⁾		
Exit temperature	C	0
Oxygen content (dry gas)	%	7
Moisture content (dry gas)	%	0
Normalised volume flow rate ⁽⁴⁾⁽⁵⁾	Nm ³ /s	0.598
<i>Normalised Emission Concentrations</i> ⁽³⁾⁽⁶⁾		
NO _x	mg/Nm ³	400
SO ₂	mg/Nm ³	50
PM ⁽⁷⁾	mg/Nm ³	10

Stack Parameter ⁽¹⁾	Unit	Value
HCl	mg/Nm ³	10
Dioxins and Furans	ng TEQ/m ³	0.1
Cd	mg/Nm ³	0.1
CO	mg/Nm ³	150
Pb	mg/Nm ³	1
Hg	mg/Nm ³	0.1
HF	mg/Nm ³	1

Normalised Emission Rates

NO _x	g/s	0.239
SO ₂	g/s	0.0299
PM _{2.5}	g/s	5.98 × 10 ⁻³
PM ₁₀	g/s	5.98 × 10 ⁻³
HCl	g/s	5.98 × 10 ⁻³
Dioxins and Furans	g/s	5.98 × 10 ⁻¹⁰
Cd	g/s	5.98 × 10 ⁻⁵
CO	g/s	0.0896
Pb	g/s	5.98 × 10 ⁻⁴
Hg	g/s	5.98 × 10 ⁻⁵
HF	g/s	5.98 × 10 ⁻⁴

(1) Incinerator stack

(2) Actual stack data provided and confirmed by Awba

(3) International Finance Corporation (IFC) (2008) Environmental, Health and Safety Guidelines for Waste Management facilities [Online] Available at: http://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/policies-standards/ehs-guidelines [Accessed 08 August 2017]

(4) Environment Agency (2013) Pollution Inventory Reporting – Combustion Activities Guidance Note [online] Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/296994/LIT_7825_e97f48.pdf [Accessed 08 August 2017]

(5) Normalised flow rate at 7% oxygen, dry gas, 273K and a pressure of 101.3 kPa.

(6) Myanmar National Environmental Quality (Emission) Guidelines (2015)

(7) The PM concentration is used to conservatively estimate emissions of both PM_{2.5} and PM₁₀.

The residual bottom ash from the incinerator will be managed under the Hazardous Waste Management Plan. Accordingly, the ash together with others hazardous waste will be sent to a licensed contractor in Thilawa and the onsite incinerator will be used only as a backup.

General refuse is expected to be generated at a rate of 25 kg / day, which will be taken off-site for disposal by Yangon City Development Committee (YCDC).

Wastewater Management

Wastewater generated from washing of formulation lines (~20 m³ / day), laundry (~1m³ / day) and cleaning of process area (~3 m³ / day) in the HAIC will be treated by an on-site wastewater treatment plant. Table 4.4 shows the design basis of the influent characteristics for the on-site wastewater treatment plant.

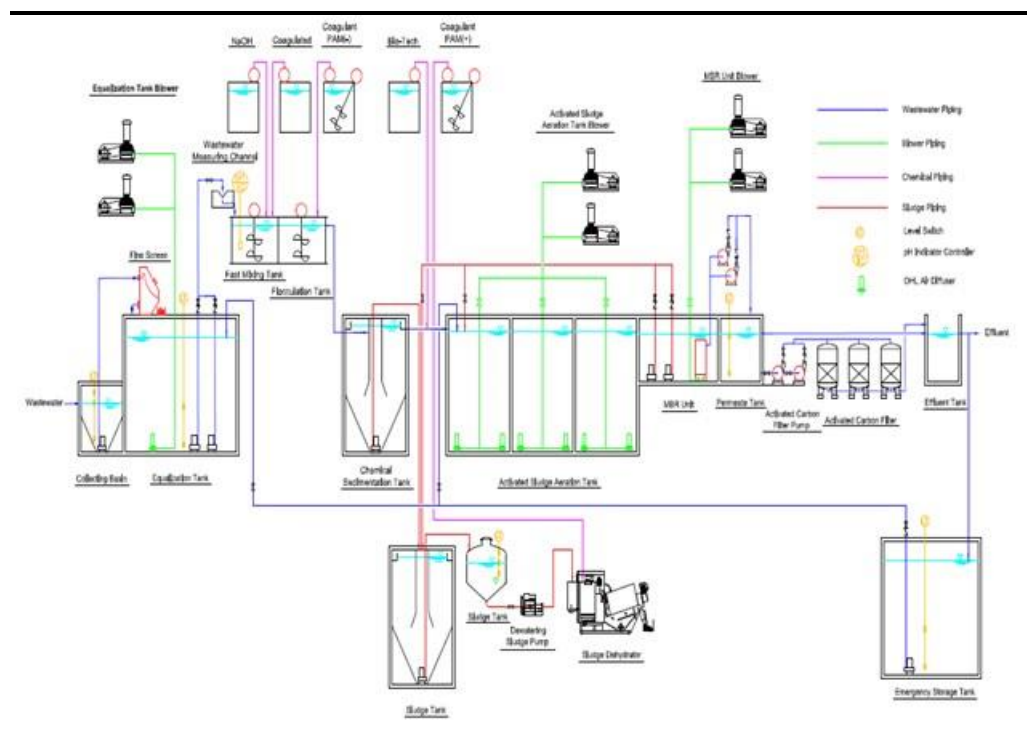
Table 4.4 **Design Basis of the Influent Characteristics for the On-site Wastewater Treatment Plant**

Parameters	Unit	Value
Flow Rate	m ³ /hr	1
Ph	S.U.	3-9
BOD ₅	mg/L	8,750
COD	mg/L	10,000
TSS	mg/L	3,000

Figure 4.19 indicates the flowchart of the proposed wastewater treatment plant. Wastewater will firstly be collected in the collection basin and then passed into the fine screen where large solids and trashes are screened out before entering the equalization tank. In the equalization tank, air diffusers are used for even mixing of the wastewater. The water is subsequently transferred via submersible pumps into the fast mixing tank where pH adjustment and chemical coagulation will be conducted. The sludge formed will be settled in the chemical sludge sedimentation tank while water will pass as overflow into the activated sludge aeration tank. In this tank, aerobic bacteria are used to digest organic matters to reduce the biological oxygen demand (BOD) with the aid of oxygen supplied through air diffusers. Next, the overflow will be passed into the second sedimentation tank where the sludge will be settled and transferred into the sludge tank while the water is forced through the membrane filter. Thereafter, the water will be passed through activated carbon filters to remove odour and colour and then temporarily stored in the effluent tank where water samples will be taken and analysed before being discharged into the pond next to the treatment facility.

The HAIC wastewater treatment system uses the Fenton technique (also known as “Advance Oxidation Process”) to treat the wastewater, in accordance the relevant standards (WBG and EQEG). Awba will dispose of the sludge from the wastewater through a licensed hazardous waste management facility in Thilawa. Only certified operators will work within the wastewater treatment plant.

Figure 4.19 Flow Chart of the Wastewater Treatment Process



There will be two types of pond in this area. The first pond or **Lagoon-1** will be able to hold seven (7) days of treated effluent from the wastewater treatment system and it will be water proof concrete pond. The second pond or **Lagoon- 2** will be more natural which will have enough capacity to hold over one and half years of effluent. This pond will be developed to include natural flora and fauna (e.g., fishes and lotus flowers). There will be over flow in each pond and the final discharge will be via the factory main drainage system, which will lead to the nearest stream.

Wastewater monitoring will be conducted at the discharge point:

17°16'65.98"N 96°07'70.56"E. Should the treated wastewater content be unsuitable for discharge into the pond (i.e., not in line with WBG EHS Standards for Pesticide Manufacturing, Formulation and Packaging (2007), water will be directed into an emergency storage tank and then recirculated back to the equalization pond for re-treatment. This will ensure that impacts on downstream water quality are reduced and there are no harmful substances in wastewater (e.g., pesticides and fertilizer wastes). In addition, water quality monitoring will be conducted as part of the Environmental Monitoring Plan.

Sewage from the operation workforce is expected to be generated at a rate of 10 m³ / day, which will be treated on-site by a septic tank and seepage field.

4.5

DESCRIPTION OF SELECTED ALTERNATIVES AND ALTERNATIVES ASSESSMENT

As part of the Project, alternatives were considered for the Project, these are discussed below:

- No Project alternative: If there were no project, additional pesticide manufacturing would not be available for Myanmar.
- Location: As the land was provided by the Ministry of Agriculture, there was no alternative for the location of the Project Site.
- Wastewater treatment: the project looked at collecting wastewater and taking to an offsite location for treatment. However, this would have entailed additional transportation costs. Therefore, the selected alternative is to have a wastewater treatment facility on site, which aims to achieve zero waste to the local environment. The first pond will be able to hold seven (7) days of treated effluent from the wastewater treatment system and it will be waterproof concrete pond. The second pond will be more natural which will have enough capacity to hold over one and half years of effluent. This pond will be developed to include natural flora and fauna (e.g., fishes and lotus flowers). There will be over flow in each pond and the final discharge will be via the factory main drainage system, which will lead to the nearest stream. In case the treated wastewater content is unsuitable to be discharged into the pond, water will be directed into the emergency storage tank and then recirculated back to the equalization pond for re-treatment.

This Section is structured to provide information on the environmental baseline characteristics and conditions in the Project Site and its Area of Influence (AOI). The discussion is limited to the factors and environmental components that could have a direct impact on the Project, or which may be impacted by the Project.

Baseline information has been collated from a range of sources including publicly available information, primary data collection and through consultation. Primary data collection was undertaken through a scoping site visit in May 2017 as well as the baseline surveys of air quality, airborne noise, surface water quality, and soil quality in June to July 2017 (2017 baseline surveys).

5.1 SETTING THE STUDY LIMITS

5.1.1 *Biological Area of Influence*

The Area of Influence (AOI) of the Project encompasses:

- Primary Project Site including the proposed HAIC; and
- Areas potentially affected by the cumulative impacts from other developments as well as induced activities of the Project.

It should be noted that the AOI for a particular resource/ receptor may vary depending on the nature of the change caused by the Project activities and the type of effect being considered, but in each case it is defined to include all the area within which it is likely that potentially significant impacts could result. For example, a 600 m AOI may be considered sufficient for noise given the localised nature of noise impacts while the AOI for water quality impacts due to uncontrolled runoff from the Project Site may be considered sufficient from the stream in the north-west corner of the Project Site to the War Net Chaung village 3 km downstream. As such, for a specific resource / receptor / impact, the AOI will be discussed and refined as appropriate.

5.1.2 *Social Area of Influence*

A preliminary Area of Influence (AOI) of the project for the purpose of social environment has been defined and this will be revisited and refined as an outcome of the scoping stage of the ESIA process. The criteria used to demarcate the AOI at this stage are:

- The Project Area;
- The major village tracts around the Project Area: the Township is Hmawbi and the closest village tract is War Net Chaung; and

- Location of decision making centres and location of the key government agencies (Yangon, and Naypyidaw).

The administrative area falling within Awba's AOI is shown in *Table 5.1*.

Table 5.1 *Local setting in the Project Area of Influence*

Administrative levels	Area	Features
Regional	Yangon	Business capital of Myanmar.
District / Township	Hmawbi	Home for Myaung Dagar Industrial Zone and well known for supplying vegetables and fruits for commercial market

The AOI is shown in *Figure 5.1*. This is defined by a radius of 3.5 km around the Project Area. The villages are located to the north, and west of the Project. To the south and east are industrial and army land and no residences.

Figure 5.1 Social Area of Influence



The villages in the AOI and the number of households in each are presented in *Table 5.2*.

Table 5.2 *Villages in the Project AOI*

No.	Community	Number of Household (HH)
1.	War Net Chaung	1,447 HH
2.	Nyaung Gone	58 HH
3.	Yae Tar Shey	449 HH
4.	Tha Pyay Kone	96 HH
5.	Zaw Ti Kone	82 HH
6.	War Phyu Taw	122 HH

Detailed information was collected from focus group discussions and household surveys with villagers, farmers, village tract leaders, village elders, and women in these villages and is presented in the following sections. There was no public consultation meeting in Zaw Ti Kone and War Phyu Taw villages. However, the villagers were invited to attend the meeting in War Net Chaung village and household socio economic survey was done in those villages.

5.2 **METHODOLOGY AND OBJECTIVES**

The information provided in this section is based on data collected from primary and secondary sources.

Primary data was collected during the scoping visit and site survey of the Project Area in February to March 2017. Secondary sources include a desktop review of published information, supplemented with information provided by Awba and through review of available ERM in-house literature. These data sources have been supplemented by data provided from a variety of stakeholders, including government, scientific organisations, non-governmental organisations (NGOs), Civil Society Organisations (CSOs), and local communities.

The objective of this section is to ensure there is a robust environmental and social baseline for the Study Area against which the potential Project impacts can be assessed.

5.2.1 **Baseline Surveys**

An overview of the environmental and social surveys conducted for the Project are presented in *Table 5.3. and Table 5.4*

Table 5.3 *Environmental Baseline Surveys Conducted*

Receptor	Parameters
Air	5 locations within 3 km of the Project identified as sensitive receptors. 24-hour SO ₂ and NO _x measurements. Diffusion tubes for 3 weeks measuring PM _{2.5} , PM ₁₀ , SO ₂ and NO _x .
Ground water	2 locations within 1.5 km downstream of the Project identified as sensitive receptors. Measurements for pH, metals, faecal coliforms, BOD
Surface water	5 locations within 3 km downstream of the Project identified as sensitive receptors. Measurements for pH, metals, faecal coliforms, BOD
Soil	5 locations in the Project Site. Measurements for pH, and metals.
Biodiversity	Walk over surveys and transects to identify local plant and animal species conducted by Dr Nyo Nyo Lwin

Table 5.4 *Socioeconomic Baseline Surveys Conducted (primary information)*

Type	Sample size	Name of the villages
Farmer questionnaires	4	War Net Chaung (4 people participated), Tha Pyay Kone (1 person participated), Yae Thar Shey (1 person participated) and Naung Kone (5 people participated).
Community Questionnaires	4	War Net Chaung (1), Tha Pyay Kone (1), Yae Thar Shey (1) and Naung Kone (1).
Household Survey	72	Nyaung Gone (6), Yae Thar Shey (15), War Net Chaung (30), Kyauk Taung Su Ward (5), Tha Pyay Kone (6), Wa Phyu Taw (5), Zaw Ti Kone (5).
Woman Group Discussion	1	Naung Kone

The methods of engagement for collecting social data are discussed below:

- **Farmer Questionnaires:** conducted with local farmers. Questions include type of crops, livestock, areas of farm land, location of farmland and income amongst others.
- **Community Questionnaire:** conducted with Village Tract Leaders as both semi-structured interviews and checklists. Topics covered include demographics and population, livelihoods, infrastructure and services and community health.
- **Households (HH) Surveys:** include a wide range of questions to gather detailed information of the village profile, livelihoods and economy of the community, basic infrastructure and utility around the Project Area, and the community views and the expectation from the projects. This allowed for the direct involvement of the community in the interpretation of the social setting; and
- **Focus Group Discussions (FGDs):** FGD refers to a discussion carried out amongst a group of people (4-10) from a similar background/profile on a

specific topic while being guided by a moderator. The primary purpose of such discussions is to gather an insight into the thought process of the group in regards to a particular issue. One FGD was undertaken with women.

5.3 *PUBLIC ADMINISTRATION AND PLANNING*

The land was owned by the Ministry of Industry in 1982 and transferred to Ministry of Agriculture. The Ministry of Agriculture has provided Awba this land under a Built-Operate-Transfer (BOT) system. This Project is located in the Hwambi Industrial Park area. No record of the site selection for this Industrial Park is available and no environmental and social impacts assessment and/or strategic environmental assessment have been carried out by the government to date.

5.4 *PROTECTED AREAS AND KEY BIODIVERSITY AREAS*

There are 39 Protected Areas in Myanmar covering an area of 38,906 km². Based on Myanmar's National Biodiversity Strategy and Action Plan (NBSAP) for 2015 to 2020, there are plans to establish nine more Protected Areas in three phases from 2020 to 2021. With the addition of these nine proposed areas, the total area under protection in Myanmar will be 52,932 km², representing a coverage of 7.82% of the country's total land area ⁽¹⁾.

National Protected Wildlife Park within a 20 km buffer of project sites is Hlawga National Park (*Figure 5.2*) and the locations in relation to project site are shown *Table 5.5*.

Hlawga National Park is a national park located in Mingaladon Township, Yangon Region, Myanmar, 22 miles (35 km) north of Yangon. The park was established in 1982 with joint-funding by the UNDP and the Burmese government. The 1,540-acre (623-hectare) park includes an 818-acre (313 hectare) wildlife park, a 62-acre (25-hectare) mini-zoo and a 660-acre (267-hectare) buffer zone. First established as an environmental education centre in 1982, the national park is a popular day-trip destination with Yangonites and Eco-tourists.

(1) Republic of the Union of Myanmar, National Biodiversity Strategy and Action Plan 2015-2020 (Oct, 2015) Retrieved from <https://www.cbd.int/doc/world/mm/mm-nbsap-v2-en.pdf>

Table 5.5 **Protected Areas within 20 km of Project Sites**

Protected Area	Properties	Details
Hlawga National Wildlife Park (25 km south)	<ul style="list-style-type: none"> Size KBA year Key Species 	<ul style="list-style-type: none"> 6 km² 2012 Pale-capped Pigeon (VU) (CO)
Key Biodiversity Area	Properties	Details
Hlawga Reservoir	<ul style="list-style-type: none"> Size KBA year Key Species 	<ul style="list-style-type: none"> 23 km² 2012 <i>Dalbergia cultrata</i> (EN)(CO), <i>Dipterocarpus alatus</i> (EN)(CO), <i>Hopea odorata</i> (VU)(CO), <i>Holarrhena pubescens</i> (EX)(CO)
U-do Terrestrial KBA (25 km south)	<ul style="list-style-type: none"> Size KBA year Key Species 	<ul style="list-style-type: none"> 5 km² 2012 Sarus Crane (VU) (CO), Congregatory waterbirds (CO)

Figure 5.2 Protected Areas and Key Biodiversity Areas Closest to the Project Site



5.5

PHYSICAL COMPONENTS

5.5.1

Air Quality

Overview

Taking into account the nature of activities during the construction and operation phases of the Project and the relative locations of sensitive receptors, an AOI of 500 m and 5 km around the Project Site has been established for the construction and operational phases, respectively, for the Air Quality Impact Assessment. The AOIs have been determined so that all potentially impacted sensitive receptors closest to the Project activities during both construction and operation phase have been identified.

Sensitive receptors are split into two categories, which are identified within the Project AOI as described below.

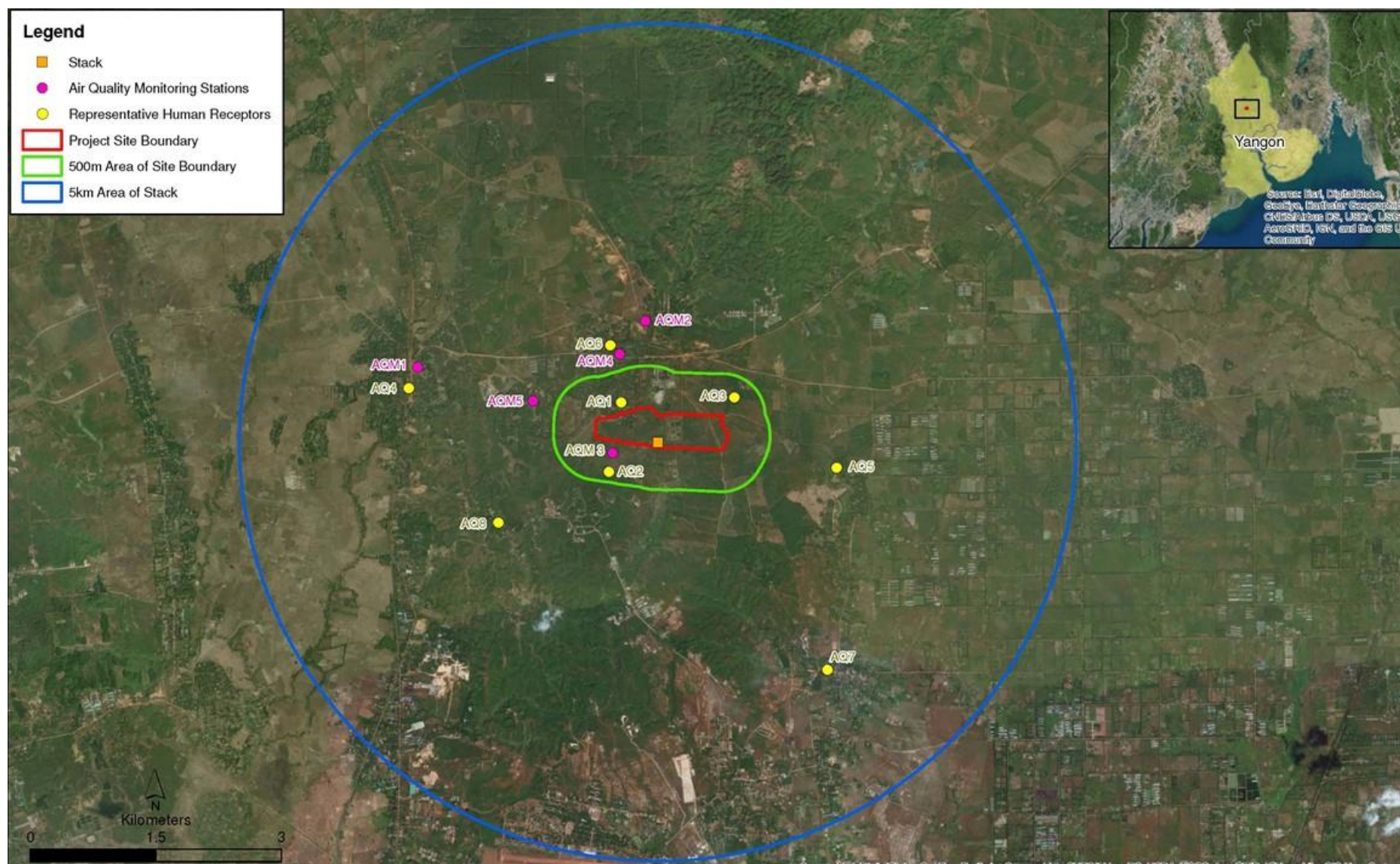
- Human – these are locations of human settlement, schools, hospitals, clinics and government offices. The relevant pollutants of interest for sensitive human receptors are particulate matter as dust, PM₁₀ and PM_{2.5}, NO₂, NO_x and SO₂.
- Agricultural - these are locations where there are crop growing activities, as crop growth may be detrimentally affected and crops soiled as a result of project activities. The relevant pollutants of interest for sensitive agricultural receptors are particulate matter as dust, SO₂ and NO_x.

A number of representative human sensitive receptors and agricultural areas were identified in the vicinity of the Project Site as presented in *Table 5.6* and *Figure 5.3*. For the operational air quality impact assessment, a select number of representative human receptors spatially distributed around the incinerator stack location have been identified. **Note that ash generated by the incinerator together with other household solid waste will be sent to a licensed contractor in Thilawa and the incinerator will only be used as a backup as per Hazardous Waste Management Plan. The incinerator will not generate fly ash as it has a dust collector.** Detailed information on these is presented in *Table 5.6*.

Table 5.6 *Representative Human Receptors*

Receptor ID	Type of Receptor	Location		Approximate Distance to Stack (km)
		Latitude	Longitude	
AQ1	Human	17°10'15.25"N	96° 4'26.86"E	<0.7
AQ2	Human	17° 9'48.27"N	96° 4'22.35"E	<0.7
AQ3	Human	17°10'17.89"N	96° 5'12.54"E	<1.1
AQ4	Human	17°10'19.59"N	96° 3'1.04"E	<3.1
AQ5	Human	17° 9'51.22"N	96° 5'54.35"E	<2.2
AQ6	Human	17°10'37.35"N	96° 4'22.09"E	<1.3
AQ7	Human	17° 8'32.74"N	96° 5'51.75"E	<3.4
AQ8	Human	17° 9'27.86"N	96° 3'37.90"E	<2.2

Figure 5.3 Representative Air Sensitive Receptors around the Project Site



In accordance with WBG guidelines ⁽¹⁾, measurement of existing air quality is required for emissions associated with the Project processes over time that have potential to impact the surrounding land use.

Ambient concentrations of NO₂ and SO₂ were measured by means of a diffusion tube survey undertaken by ERM in June to July 2017. Ambient concentrations of PM_{2.5} and PM₁₀ were measured using the Haz-Scanner Environmental Perimeter Air Station (EPAS) ⁽²⁾ operated by a specialist subcontractor under the supervision of ERM.

The findings from both surveys are presented in the following section.

Monitoring Methodology

Ambient air quality monitoring was undertaken between 30 June and 17 July 2017 to provide an indication of current concentrations of PM₁₀, PM_{2.5}, NO_x, NO₂, and SO₂ in ambient air and to inform the air quality impact assessment.

Air quality monitoring (AQM) locations (see *Figure 5.3*) were selected by identifying potentially affected communities, with consideration given to the prevailing wind conditions and Project activities. There is limited local monitoring of meteorology and therefore the Weather Research and Forecasting Model (WRF) data ⁽³⁾ was used to generate meteorological data for the purpose of reviewing climatic conditions, review regional air quality and identify representative sensitive receptors. The final decision on AQM locations was made while in the field to determine the most suitable and representative locations for monitoring equipment to be deployed.

A total of five (5) air quality monitoring sites were established at locations in the vicinity of the Project. Information regarding the monitoring locations and period of monitoring are presented in *Table 5.7*. In most cases, monasteries were identified as monitoring locations due to their accessibility and security. At each monitoring location, measurements of NO_x, NO₂ and SO₂ were undertaken using Palmes type diffusion tubes and measurements of PM₁₀ and PM_{2.5} were undertaken using the EPAS.

Representative photos taken at the AQM stations are shown in *Figures 5.4-5.8*.

(1) International Finance Corporation (IFC) (2007) Environmental, Health and Safety Guideline: Air Emissions and Ambient Air Quality

(2) Haz-Scanner Environmental Perimeter Air Station (EPAS). Specifications available online at: <http://www.skinc.com/catalog/pdf/instructions/1801.pdf> [Accessed 03 August 2017]

(3) Skamarock, W. C., J. B. Klemp, J. Dudhia, D. O. Gill, D. M. Barker, M. G Duda, X.-Y. Huang, W. Wang, and J. G. Powers, 2008: A Description of the Advanced Research WRF Version 3. NCAR Tech. Note NCAR/TN-475+STR, 113 pp.

Table 5.7 *Air Quality Monitoring Summary*

Site	Land-use	Location		Monitoring	Period	Duration (hours)
		Latitude	Longitude			
AQM1	Monastery	17°10'27.70"	96° 3'4.36"	NO ₂ , SO ₂	30/06/2017 – 17/07/2017	406
				PM _{2.5} , PM ₁₀	30/06/2017 – 01/07/2017	24
AQM2	Primary School	17°10'46.97"	96° 4'36.16"	NO ₂ , SO ₂	30/06/2017 – 17/07/2017	404
				PM _{2.5} , PM ₁₀	01/07/2017 – 02/07/2017	24
AQM3	Monastery	17° 9'55.55"	96° 4'23.67"	NO ₂ , SO ₂	30/06/2017 – 17/07/2017	405
				PM _{2.5} , PM ₁₀	02/07/2017 – 03/07/2017	24
AQM4	Monastery	17°10'34.00"	96° 4'25.95"	NO ₂ , SO ₂	30/06/2017 – 17/07/2017	404
				PM _{2.5} , PM ₁₀	03/07/2017 – 04/07/2017	24
AQM5	Monastery	17°10'15.30"	96° 3'51.27"	NO _x , NO ₂ , SO ₂	30/06/2017 – 17/07/2017	403
				PM _{2.5} , PM ₁₀	04/07/2017 – 05/07/2017	24

Figure 5.4 *Air Quality Monitoring Station at AQM1: War Net Chaung Village*



Figure 5.5 Air Quality Monitoring Station at AQM2: Tha Pyay Kone Village



Figure 5.6 Air Quality Monitoring Station at AQM3: Monastery near the Project Site



Figure 5.7 Air Quality Monitoring Station at AQM4: Yae Tar Shae Village



Figure 5.8 Air Quality Monitoring Station at AQM5: Nyaung Kone Village



Diffusion tubes are passive samplers that consist of small plastic tubes, which contain a chemical reagent to absorb the pollutant to be measured directly from the air. The preparation and analysis of the diffusion tubes is undertaken to British Standard (BS) EN 13528. The technique is widely recognised internationally, including by the IFC, US EPA, and UK Environment Agency. There is best practice guidance, adopted by this

assessment, available from the US EPA ⁽¹⁾ and from the UK Department for the Environment, Food and Rural Affairs (DEFRA) ⁽²⁾ on the siting and deployment of tubes. The analysis of the exposed tubes is completed through Ion Chromatography (United Kingdom Accreditation Service (UKAS) Accredited Method ISO/IEC 17025:2005).

The EPAS is a portable real time continuous air quality monitor capable of simultaneously monitoring both PM_{2.5} and PM₁₀ in ambient air using 90° infrared light scattering technology.

Baseline Results and Summary – NO_x, NO₂ and SO₂

The monitoring data from the air quality survey undertaken between 30 June and 17 July 2017 for NO_x, NO₂, and SO₂ are presented below in *Table 5.8*.

The diffusion tube data have conservatively been used to represent indicative annual background concentrations of NO_x, NO₂, and SO₂. A review of the baseline data collected concludes that the baseline concentrations are consistently below the relevant annual air quality standards. Baseline concentrations of SO₂ were found to be low and below the limit of detection at all monitoring sites.

Table 5.8 *Derived Long Term NO_x, NO₂ and SO₂ Background Concentrations*

Site	Land-use	Tube No.	NO _x	NO ₂	SO ₂ ⁽¹⁾
			µg/m ³		
AQM1	Residential	1	-	4.70	<1.63
		2	-	<0.93	<1.63
		3	-	4.18	<1.63
AQM2	Residential	1	-	4.08	<1.64
		2	-	3.43	<1.64
		3	-	4.66	<1.64
AQM3	Residential	1	-	3.53	<1.64
		2	-	4.34	<1.64
		3	-	4.49	<1.64
AQM4	Residential	1	-	5.28	<1.64
		2	-	4.69	<1.64
		3	-	4.31	<1.64
AQM5	Residential	1	12.2	4.61	<1.64
		2	-	4.92	<1.64
		3	-	4.66	<1.64
Average			12.2	4.42	1.64 ⁽²⁾
WHO Annual Mean Air Quality Standard (Human Health)			<i>n/a</i>	40	<i>n/a</i>
WHO Annual Mean Air Quality Standard (Agriculture)			30	<i>n/a</i>	20

⁽¹⁾ United States Environmental Protection Agency (USEPA) Ambient Monitoring Technology Information Centre [Online] Available at: <https://www3.epa.gov/ttn/amtic/> [Accessed 08 August 2017]

⁽²⁾ AEA Energy and Environment on behalf of the Department for Environment, Food and Rural Affairs (Defra) and the Devolved Administrations (2008) Diffusion Tubes for Ambient NO₂ Monitoring: Practical Guidance for Laboratories and Users [Online] Available at: https://laqm.defra.gov.uk/documents/0802141004_NO2_WG_PracticalGuidance_Issue1a.pdf [Accessed 08 August 2017]

Site	Land-use	Tube No.	NO _x	NO ₂	SO ₂ ⁽¹⁾
			µg/m ³		
Status of airshed in Study Area ⁽³⁾			Non-degraded	Non-degraded	Non-degraded
⁽¹⁾	Results reported as <0.03µgS on tube are below the detection limit.				
⁽²⁾	The detection limit will be used as indicative of the long term background as a conservative approach.				
⁽³⁾	Status of airshed based on the average concentration across all five monitoring sites.				

The baseline also needs to be interpreted for short term periods to compare against the short term air quality standards where relevant. DEFRA ⁽¹⁾ recommends that the short term baseline is derived by multiplying the long term by a factor of two. Furthermore, DEFRA sets out conversion factors for converting between the one hour and 24 hour periods. To compare against the SO₂ 10-minute averaging period, the power law ⁽²⁾ has been applied to the derived hourly SO₂ baseline data.

These conversions have been undertaken to provide baseline concentrations for comparison against the short term air quality standards. The results from applying this methodology are presented below in *Table 5.9*. The results at each monitoring site are based on the median value from the triplicate diffusion tube data set presented in *Table 5.9* to remove outlying values.

Table 5.9 *Derived Short Term NO₂ and SO₂ Background Concentrations*

Site	NO ₂	SO ₂	
	1-hour	10-minute	24-hour
AQM1	8.36	4.69	1.94
AQM2	8.16	4.69	1.94
AQM3	8.68	4.69	1.94
AQM4	9.38	4.69	1.94
AQM5	9.32	4.69	1.94
Average ⁽¹⁾	8.78	4.69	1.94
Air Quality Standard (Human Health)	200	500	20
Status of airshed in study area ⁽²⁾	Non-degraded	Non-degraded	Non-degraded
⁽¹⁾ Average across all five sites			
⁽²⁾ Based on the average concentration.			

The results from the monitoring conducted in the AOI indicated that ambient concentrations of NO₂ and SO₂ are likely to be below the relevant air quality standards. The receiving airshed in the area can therefore be classified as 'non-degraded' with regard to the aforementioned pollutants. The magnitude of the impact to air quality is defined based on this finding.

Baseline Results and Summary – PM_{2.5} and PM₁₀

The monitoring data from the air quality survey undertaken between 30 June and 5 July 2017 for PM_{2.5} and PM₁₀ are presented below in *Table 5.10*.

⁽¹⁾ Department for Environment, Food and Rural Affairs (DEFRA) (2016) Air emissions risk assessment for your environmental permit [Online] Available from: <https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit> [Accessed 03 August 2017]

⁽²⁾ Environmental Protection Agency (EPA) (1970) Workbook of Atmospheric Dispersion Estimates [Online] Available at: <http://www.dot.ca.gov/newtech/researchreports/1969-1970/70-07.pdf> [Accessed 03 August 2017]

The data was collected continuously over a 24-hour period at each location and are used as an indication of average daily background concentrations in the AOI. A review of the information collected indicates that the ambient concentration of PM_{2.5} exceeds the air quality standard at AQM1 and AQM3 and is below at all other monitoring locations. On average across the AOI, the PM_{2.5} concentration is below the relevant air quality standard and the airshed can therefore be classified as non-degraded on this basis. With regard to PM₁₀, the monitoring results indicated that ambient concentrations over the 24-hour period are below the relevant air quality standard at all monitoring locations and thus the airshed can be classified as non-degraded on this basis.

Table 5.10 *PM_{2.5} and PM₁₀ Background Concentrations (24-hour Average)*

Site	Land-use	PM _{2.5}	PM ₁₀
		µg/m ³	
AQM1	Residential	29	39
AQM2	Residential	17	30
AQM3	Residential	26	41
AQM4	Residential	21	24
AQM5	Residential	20	34
Average⁽¹⁾		23	34
WHO 24-hour Mean Air Quality Standard (Human Health)		25	50
Status of airshed in study area ⁽²⁾		Non-degraded	Non-degraded

⁽¹⁾ Average across all five sites
⁽²⁾ Based on the average concentration across all five monitoring sites.
Note; values exceeding the standard limits are shown in red

The baseline also needs to be interpreted for long term periods. By applying the DEFRA approach, the long term baseline is derived by dividing the short term by a factor of two.

These conversions have been undertaken to provide baseline concentrations for comparison against the long term air quality standards for PM_{2.5} and PM₁₀. The results from applying this methodology are presented below in Table 5.11.

Table 5.11 *Derived Long Term PM_{2.5} and PM₁₀ Background Concentrations*

Site	Land-use	PM _{2.5}	PM ₁₀
		µg/m ³	
AQM1	Residential	14.5	19.5
AQM2	Residential	8.5	15
AQM3	Residential	13	20.5
AQM4	Residential	10.5	12
AQM5	Residential	10	17
Average⁽¹⁾		11.3	16.8
WHO Annual Mean Air Quality Standard (Human Health)		10	20
Status of airshed in study area ⁽²⁾		Degraded	Non-Degraded

⁽¹⁾ Average across all five sites
⁽²⁾ Based on the average concentration.
Note; values exceeding the standard limits are shown in red

The results from the monitoring conducted in the AOI indicated that long term ambient concentrations of PM_{2.5} exceed the relevant air quality standard

at four (4) out of five (5) monitoring stations and the combined average is also in exceedance. The results from the monitoring conducted in the study area indicate that the long term ambient concentrations of PM_{2.5} exceed the WHO standard specified at four out of five monitoring stations. The combined average across all monitoring sites is also found to exceed the Myanmar National Environmental (Emissions) Quality Standards. Concentrations of PM₁₀ exceed the relevant standard at only one (1) of five (5) stations and the combined average is below the air quality standard.

The airshed in the AOI with regard to long-term air quality has been classified as degraded and non-degraded for PM_{2.5} and PM₁₀ 24-hour period survey, respectively. The airshed is classified as degraded for PM_{2.5} long term period based on the average baseline concentration (11.3ug/m³) at all monitoring locations (AQM1 to AQM5). PM_{2.5} particles can result from burning of fossil fuels and organic matter, therefore elevated ambient PM_{2.5} in the monitoring locations is potentially associated with the following; fuel combustion in vehicles, domestic burning of waste and biomass, and regional influences and variations due to changes in meteorological conditions.

5.5.2 *Climate and Meteorology*

In order to define the baseline meteorology and climate, hourly sequential meteorological data are required for:

- Wind speed;
- Wind direction;
- Precipitation;
- Relative humidity;
- Temperature; and
- Cloud cover.

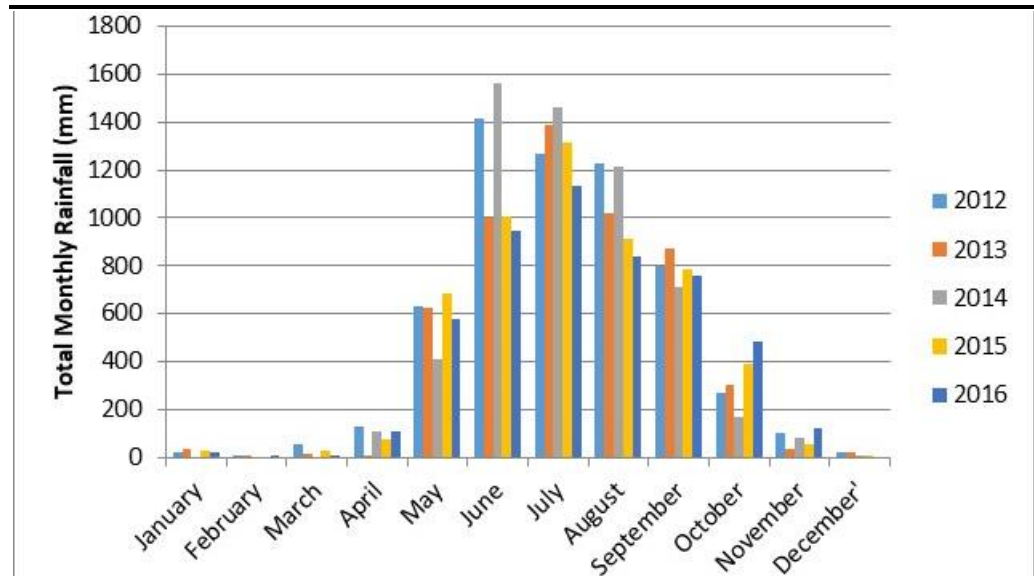
Following IFC recommendations, data is required for five (5) years in order to capture year on year variability. These data are also used in the air quality impact assessment.

There are no meteorological stations in the vicinity of the Project Site that capture all these parameters or have sufficient data availability. Therefore five years of meteorological data were modelled using a 12 km x 12 km grid resolution using the Weather Research and Forecasting Model (WRF) ⁽¹⁾. The WRF model is a next-generation mesoscale numerical weather prediction system designed for both atmospheric research and operational forecasting needs. The model is extensively validated using actual observations to ensure the best possible accuracy and precision.

(1) Skamarock, W. C., J. B. Klemp, J. Dudhia, D. O. Gill, D. M. Barker, M. G Duda, X.-Y. Huang, W. Wang, and J. G. Powers, 2008: A Description of the Advanced Research WRF Version 3. NCAR Tech. Note NCAR/TN-475+STR, 113 pp.

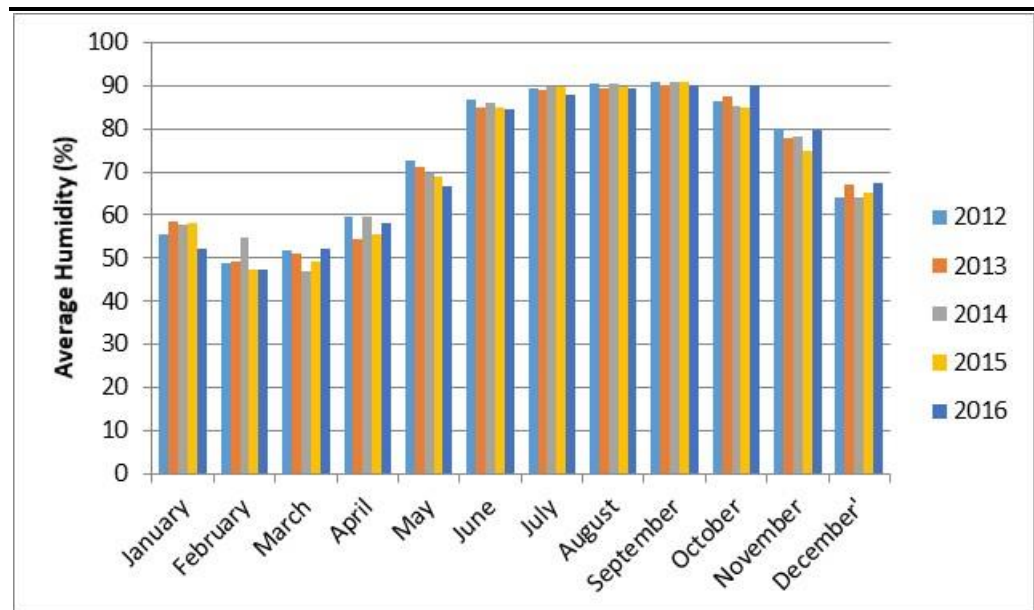
Figures 5.9-5.13 illustrate the monthly meteorological characteristics at the Project Site for a five year period from 2012 to 2016 inclusive. The figures have been created using the WRF data discussed previously. The data show that the climate of the AOI is characterised by a dry season that occurs between December and April and prevailing winds that blow from the south west.

Figure 5.9 *Total Monthly Rainfall*



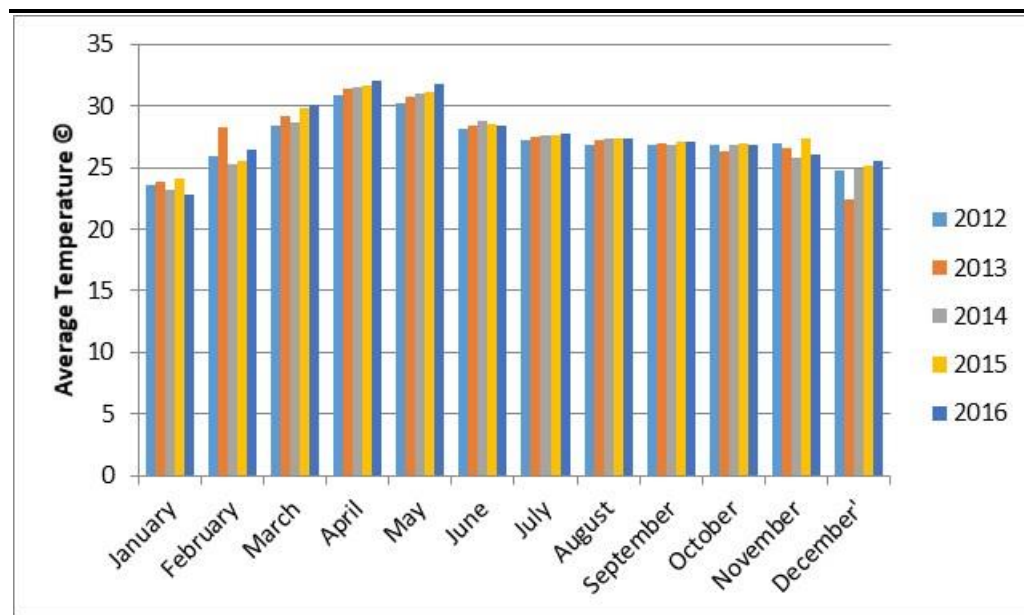
Modelled using the Weather Research and Forecasting Model (WRF)

Figure 5.10 *Relative Humidity*



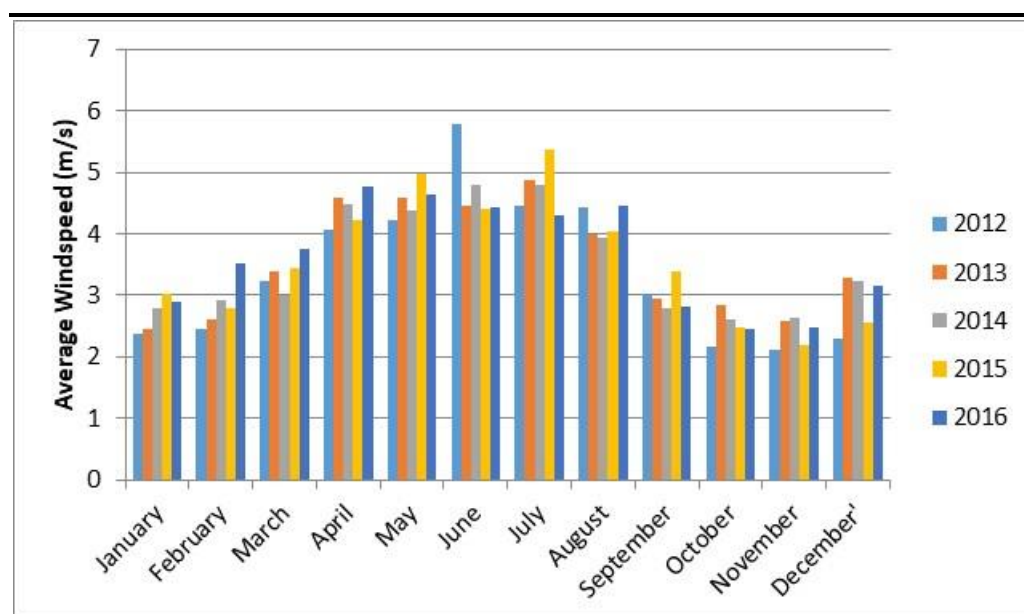
Modelled using the Weather Research and Forecasting Model (WRF)

Figure 5.11 Mean Monthly Temperature



Modelled using the Weather Research and Forecasting Model (WRF)

Figure 5.12 Mean Wind Speed



Modelled using the Weather Research and Forecasting Model (WRF)

Figure 5.13 Wind Rose 2012 - 2016

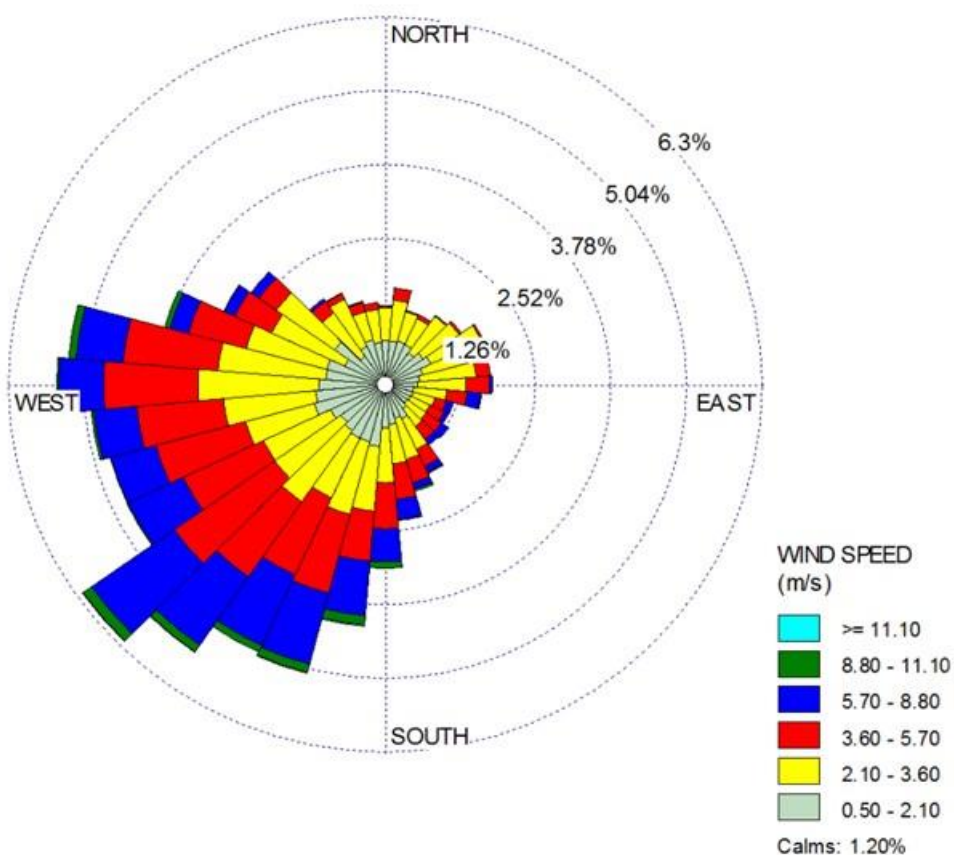


Figure 5.9 indicates that most rainfall is received at the Project Site from May to October, with June, July and August being the most consistently wet months in comparison to the rest of the year.

Relative humidity is presented in Figure 5.10. The modelled data show that humidity in the area is highest from July through to September with February and March recorded as the least humid. The average temperatures presented in Figure 5.11 correlate with average humidity with the highest average temperatures recorded during periods of low relative humidity.

Mean wind speeds are presented in Figure 5.12. Higher wind speeds are more pronounced from April through to August, with lowest mean wind speeds generally found in October and November.

A wind roses based on the WRF data is shown in Figure 5.13. The figure shows that south west winds dominate. Wind speeds average 3.54 m/s, with a maximum one hour average of 12.5 m/s. Wind direction and wind speed are both important factors when considering air pollution dispersion. Prevailing winds mean receptors downwind are more likely to be exposed to

increased concentrations with higher wind speeds leading to increased dispersion.

5.5.3 *Ambient Noise*

Existing noise sensitive receivers (NSR) located near the Project site have been identified that may be potentially affected by the Project during construction and operation phases. Baseline noise monitoring was conducted at representative NSRs to establish the background noise levels in these areas. The location of baseline monitoring station is summarised in *Table 5.12* and is presented in *Figure 5.14*. Representative photos of the NSRs are presented in *Figures 5.15-5.19*.

Table 5.12 *Location of Baseline Noise Monitoring Station*

Station ID	Description	GPS Coordinates	
NSR1	War Net Chaung Village	17°10'27.70"N	96°3'4.36"E
NSR2	Tha Pyay Kone Village	17°10'46.97"N	96°4'36.16"E
NSR3	Monastery near the factory	17°9'55.55"N	96°4'23.67"E
NSR4	Yae Tar Shay Village	17°10'34.00"N	96°4'25.95"E
NSR5	Nyaung Kone Village	17°10'15.30"N	96°3'51.27"E

Baseline noise monitoring was conducted in June and July 2017. Hourly A-weighted equivalent continuous sound pressure levels ($L_{Aeq, 1 \text{ hour}}$) were recorded continuously for 24 hours. Daytime and night-time noise levels in L_{Aeq} were calculated by averaging the hourly sound pressure levels measured during the 24-hour period between 0700 and 2200 hours and between 2200 to 0700 hours, respectively.

Noise levels (L_{Aeq}) were recorded using a Type II sound level meter at about 1.5 m above ground with no reflecting surface nearby in accordance with the Myanmar NEQ and IFC guidelines. Sampling frequency was at 0.2-second interval for 24 hours continuously. Sound level meter employed for the baseline noise monitoring and the measurement parameter are summarised in *Table 5.13* with the detailed monitoring schedule shown in *Table 5.14*.

Table 5.13 *Equipment Used for Baseline Noise Monitoring and Measurement Parameters*

Sound Level Meter	Measurement Parameters
Lutron SL-0423SD	Sound Pressure Level, $L_{Aeq, 0.2s}$ dB(A)

Table 5.14 *Monitoring Schedule*

Station ID	Description	Measurement Schedule
NSR1	War Net Chaung Village	30 June – 1 July 2017
NSR2	Tha Pyay Kone Village	1 – 2 July 2017
NSR3	Monastery near the factory	2 – 3 July 2017
NSR4	Yae Tar Shay Village	3 – 4 July 2017
NSR5	Nyaung Kone Village	4 – 5 July 2017

Legend

- Baseline Monitoring Location
- Project Site Boundary

NSR1, NSR2, NSR3, NSR4, NSR5

Yangon

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNR/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

0 0.5 1 2 Kilometres

Figure 5.15 *Noise Monitoring Station at NSR1*



Figure 5.16 *Noise Monitoring Station at NSR2*



Figure 5.17 Noise Monitoring Station at NSR3



Figure 5.18 Noise Monitoring Station at NSR4



Figure 5.19 Noise Monitoring Station at NSR5



The dominant sources of noise were from the traffic along access roads and community activities around the monitoring stations. Results of the baseline noise monitoring are summarised in *Table 5.15*.

Table 5.15 Summary of Baseline Noise Monitoring and Noise Criteria

NSR	Type of Uses	Averaged Background Noise Levels, dB(A)		NEQ and WBG Noise Level Guidelines, dB(A)	
		Daytime	Night-time	Daytime	Night-time
NSR1	Residential	66	64	55	45
NSR2	Residential	59	62	55	45
NSR3	Place of Worship	61	62	55	45
NSR4	Residential	50	53	55	45
NSR5	Residential	67	68	55	45
Notes:					
(a) Daytime refers to the hours from 0700 hrs to 2200 hrs while night-time refers to the hours from 2200 hrs to 0700 hrs.					
(b) Noise levels are averaged from the data obtained for daytime and night-time periods, respectively, and without inclusion of highly intrusive noises.					
Note; values exceeding the standard limits are shown in red					

The background noise levels at all NSRs exceeded both the noise limits set out in NEQ and WBG General EHS guideline values during daytime (except NSR4) and night-time periods. In accordance with the NEQ and IFC Guidelines, noise impacts from the Project should then not result in a maximum increase in background noise levels of 3 dB(A) at the nearest receptor which is taken as the basis for the impact assessment.

Baseline water quality survey was conducted in June and July 2017 at five (5) locations within (2) km of the proposed Project. One of the sampling locations was at a stream located within approximately 100 m of the Awba HAIC factory compound and other four sites were along this stream, which flows down across three (3) villages including War Net Chaung, Nyaung Kone, and Yae Tar Shay. The locations of monitoring sites are presented in Table 5.16. Figure 5.20 illustrates the locations of the sampling station with photos shown in Figures 5.21-5.25.

Table 5.16 Water Sampling Locations

ID	Date	Name of the village where the sample was taken	Coordinates	
			Northern	Eastern
SW-1	30.6.2017	Stream located 100 m from the Awba HAIC compound	1710' 12.01"	96° 04' 31.87"
SW-2	1.7.2017	War Net Chaung	1710' 06.98"	96° 02' 57.37"
SW-3	1.7.2017	War Net Chaung	1710' 10.44"	96° 03' 02.33"
SW-4	2.7.2017	Nyaung Kone	1710' 06.23"	96° 03' 58.59"
SW-5	3.7.2017	Yae Thar Shay	1710' 25.28"	96° 04' 25.51"

During the baseline survey in June and July 2017, three water samples were taken at each sampling location using sampling bottles provided by a laboratory certified under the Hong Kong Laboratory ALS Technichem (HK) Pty Ltd. These samples were stored at chilled condition and sent to the laboratory for analysis. Water quality parameters measured include *in-situ* measurement of pH and temperature as well as laboratory analysis of pH, Total Suspended Solid (TSS), Total Cyanide, Ammonia, Nitrite, Nitrate, Reactive Phosphorus, Oil & Grease, Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD), Phenols, Arsenic, Cadmium, Chromium, Copper, Mercury, Faecal Coliforms. These parameters have been selected to align with the relevant WBG EHS and Myanmar National Environmental Quality (Emission) Standards for monitoring.

For construction of the Project, it is noted that the Myanmar National Environmental Quality (Emissions) Guidelines specify the guidance levels for site runoff and wastewater discharges, which are the same as those specified for treated sanitary sewage discharge by WBG *General EHS Guidelines* (2007). As the water in the streams is also used for drinking purposes, the *WHO Drinking Water Standards* are used for comparison.

The baseline water quality data collected in June and July 2017 are presented in Table 5.17. At all stations, the level of TSS exceeded the WBG *General EHS Guidelines* (2007) for treated sanitary sewage discharge and WHO Drinking Water Standards. High TSS levels could be due to poor watercourse management. The farmlands bordering the rivers have no protection and in the monsoon season, soil runs off from the land.

Villagers use rudimentary sieve / filtering systems when using the water for drinking purposes. Within War Net Chaung, 37% of the households use hand pump wells for drinking water, 23% from hand dug wells, 20% from Hmawbi River/Htan Ta Pin River and Sa-Par-Kye Creek, 17% from piped water supply and 3% from other sources (such as bottled). For Yae Tar Shey and Nyaung Kone village, over 50% of households receive drinking water from the Hmawbi River/Htan Ta Pin River and Sa-Par-Kye Creek during rainy season.

During the dry season, most of the villagers in Yae Tar Shey and Nyaung Tone village get drinking water from hand dug wells and some use water from the Sa-Par-Kye creek for agriculture purposes. Tha Pyay Kone village use piped spring water as there is a storage tank in the village.

Figure 5.20 Surface Water Sampling Locations Stations

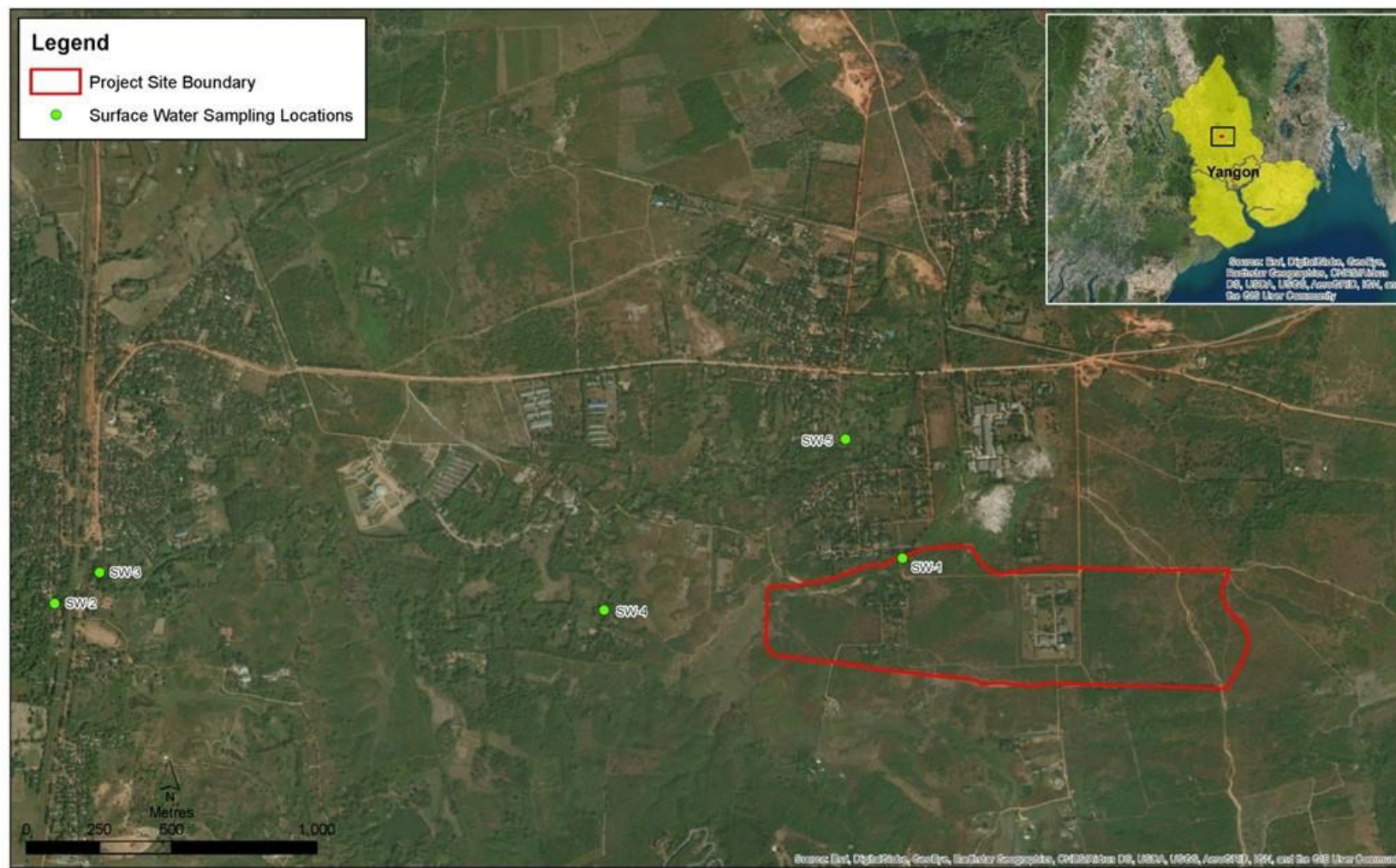


Figure 5.21 Surface Water Quality Sampling Station at SW1



Figure 5.22 Surface Water Quality Sampling Station at SW2



Figure 5.23 Surface Water Quality Sampling Station at SW3



Figure 5.24 Surface Water Quality Sampling Station at SW4



Figure 5.25 Surface Water Quality Sampling Station at SW5



Table 5.17 Baseline Surface Water Quality Data, June and July 2017

Parameter	Unit	SW1	SW2	SW3	SW4	SW5	WHO Drinking Water Standard	WBG EHS Treated Sanitary Water / NEQ Guidelines
pH	pH Unit	7.1	6.8	6.8	6.7	6.7	6.5-8.5	6-9
Total Suspended Solid	mg/L	271.3	54.33	59.67	122.67	48.67	Not available	20
Total Cyanide	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.07	N/A
Ammonia as N	mg/L	0.06	0.02	0.03	0.07	0.01	Not available	10
Nitrite as N	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.5	N/A
Nitrate as N	mg/L	0.34	0.13	0.12	0.17	0.12	<10	N/A
Reactive Phosphorus as P	mg/L	<0.01	<0.01	<0.01	<0.03	<0.01	Not available	2
Oil & Grease	mg/L	<5	<5	<5	<5	<5	10	10
Chemical Oxygen Demand	mg/L	23	11.33	12.33	14.67	9.33	250	150
Biochemical Oxygen Demand	mg/L	2.33	<2	<2	2	<2	<3	30
Phenols (Total)	mg/L	<0.2	<0.2	<0.2	<0.3	0.57	4	0.5
Arsenic	µg/L	<10	<10	<10	<10	<10	<10	100

Parameter	Unit	SW1	SW2	SW3	SW4	SW5	WHO Drinking Water Standard	WBG EHS Treated Sanitary Water / NEQ Guidelines
Cadmium	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<5	N/A
Chromium	µg/L	20.33	4	4	5.67	2.33	Not available	500
Copper	µg/L	7	2.67	2	4.33	2	Not available	500
Mercury	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	Not available	10
Faecal Coliforms	CFU/100mL	6,566.67	4,833.33	5,066.67	10,066.67	2,233.33	Not available	N/A

Notes:

(1) LOR = Limit of Reporting

(2) N.D. = not detected

To determine the average level at a station with one of the three samples reported to be below detection limit, value below detection limit is halved for the calculation.

5.5.5 *Ground Water Quality*

Baseline ground water sampling was conducted at two (2) locations (dug well and tube well) within (2) km of the proposed project site. In each location, three (3) replicates sampling were carried out at approximately the same time to identify the variability in all sampling and analysis system.

The locations of monitoring sites are presented in *Table 5.18*. *Figure 5.26* illustrates the locations of the sampling station with photos shown in *Figures 5.27* and *5.28*.

Table 5.18 *Ground Water Monitoring Locations*

ID	Date	Coordinates	
		Northern	Eastern
GW-1	1.8.2017	17°10' 52.10"	96°04' 43.97"
GW-2	1.8.2017	17°10' 46.93"	96°04' 22.86"

Figure 5.26 Ground Water Sampling Locations Stations

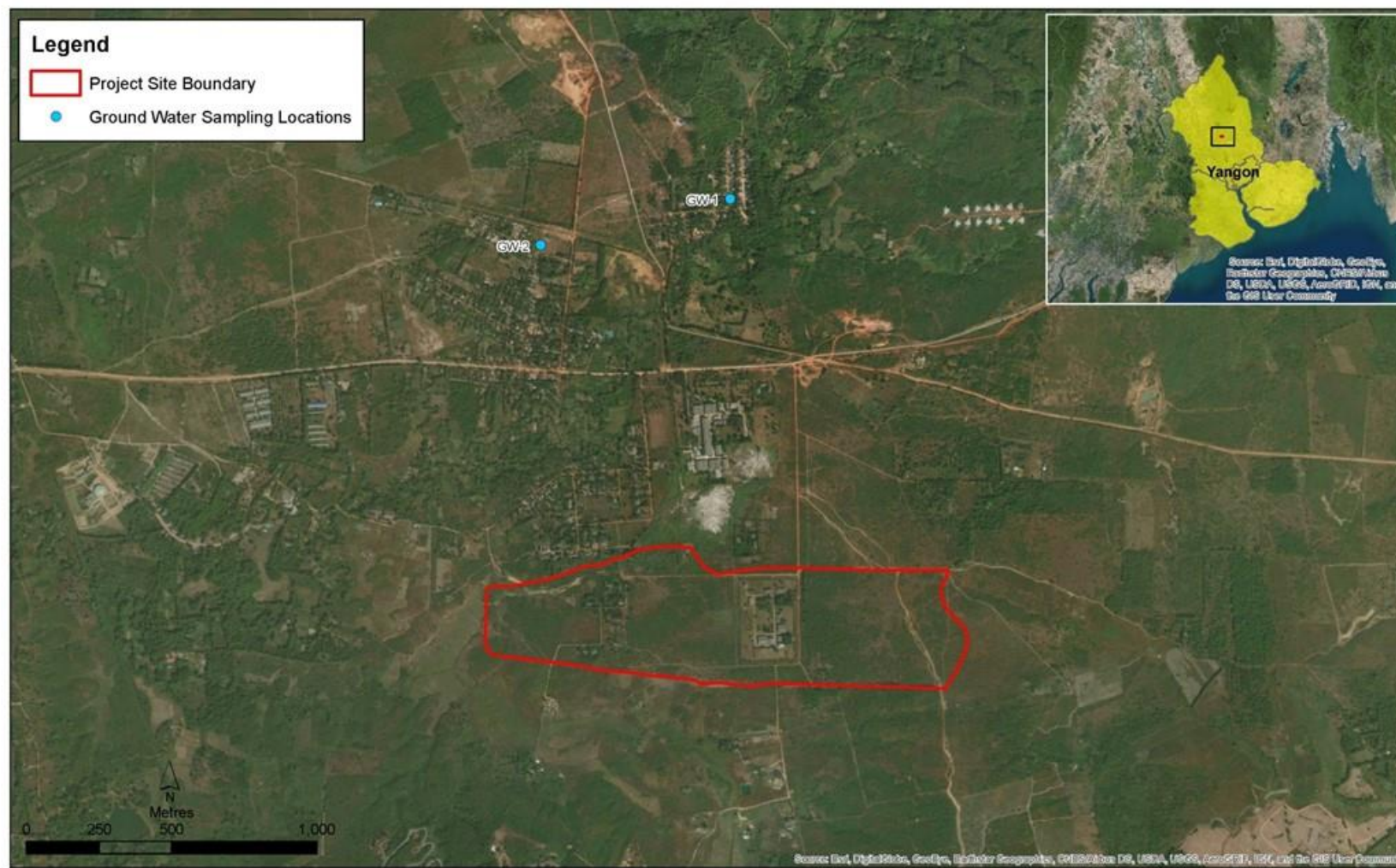


Figure 5.27 Ground Water Quality Sampling Station at GW1



Figure 5.28 Ground Water Quality Sampling Station at GW2



During the baseline survey in June and July 2017, three water samples were taken at each sampling location using sampling bottles provided by a laboratory certified under the Hong Kong Laboratory ALS Technichem (HK)

Pty Ltd. These samples were stored at chilled condition and sent to the laboratory for analysis. Water quality parameters measured include in-situ measurement of pH and temperature as well as laboratory analysis of pH, Total Suspended Solid (TSS), Total Cyanide, Ammonia, Nitrite, Nitrate, Reactive Phosphorus, Oil & Grease, Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD), Phenols, Arsenic, Cadmium, Chromium, Copper, Mercury, Faecal Coliforms. These parameters have been selected to align with the relevant WBG EHS and Myanmar National Environmental Quality (Emission) Standards for monitoring.

Only one exceedance of WHO Drinking Water quality standards – PH levels in water in Yae Tar Shey well. The baseline water quality data collected in June and July 2017 are presented in *Table 5.19*.

Table 5.19 *Baseline Ground Water Quality Data, June and July 2017*

Test Parameter	Unit	WHO Drinking Water Standard	GW1	GW2
pH	pH Unit	6.5-8.5	6.5	4.9
Total Suspended Solid	mg/L	NG	43	15
Total Cyanide	mg/L	<0.07	<0.01	<0.01
Ammonia as N	mg/L	NG	0.03	0.06
Nitrite as N	mg/L	<0.5	<0.01	<0.01
Nitrate as N	mg/L	<10	0.91	1.05
Reactive Phosphorus as P	mg/L	NG	<0.01	<0.01
Oil & Grease	mg/L	10	<5	<5
Chemical Oxygen Demand	mg/L	250	<1	<2
Biochemical Oxygen Demand	mg/L	<3	<2	<2
Phenols (Total)	mg/L	4	<0.2	<0.2
Arsenic	µg/L	<10	<10	<10
Cadmium	µg/L	<5	<0.2	<0.2
Chromium	µg/L	NG	<1	<1
Copper	µg/L	NG	<1	<1
Mercury	µg/L	NG	<0.5	<0.5
Faecal Coliforms	CFU/100mL	NG	10,977.67	3,861.67

To determine the average level at a station with one of the three samples reported to be below detection limit, value below detection limit is halved for the calculation.

5.5.6 Soil

Soil baseline sampling with the Project Site was undertaken. The locations for soil sampling are provided in *Figure 5.29*.

Soil quality monitoring results for laboratory analysed parameters are shown in *Table 5.20*.

During the baseline survey in June and July 2017, two soil samples were taken at each sampling location using sampling bottles provided by a laboratory certified under the Hong Kong Laboratory ALS Technichem (HK) Pty Ltd. These samples were stored at chilled condition and sent to the laboratory for

analysis. Soil quality parameters measured during laboratory analysis included pH level, Moisture Content, Cadmium, Copper, Lead, Zinc, and Iron. These parameters have been selected to align with the relevant WBG EHS and Myanmar National Environmental Quality (Emission) Standards for monitoring.

Table 5.20 Soil Quality Monitoring Results for Laboratory Analysed Parameters

Test Parameter	Unit	LOR	S1	S2	S3	S4	S5	FAO Soil Bulletin 65 & Dutch Standards
			Result	Result	Result	Result	Result	
pH Value	pH Unit	0.1	4.45	5	4.75	5.3	4.9	-
Moisture Content (dried @ 103°C)	%	0.1	14	20.35	15.35	15.35	19.35	-
Cadmium	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.8
Copper	mg/kg	1	3.5	10	6.5	4.5	7	20-300
Lead	mg/kg	1	7	10	11	10.5	10.5	85
Zinc	mg/kg	1	7.5	19	13	13.5	14	15-150
Iron	mg/kg	2	3480	12800	6040	7120	5280	-

5.6 BIOLOGICAL COMPONENTS

The biodiversity survey was undertaken in the wet season between 24 and 27 June, 2017. The survey was conducted in the Project Site and within habitats types within 500 m of the Project Site. The study covered terrestrial fauna, especially as major groups are vertebrate (birds, reptiles, lizards and amphibians especially visual observation for the birds) and invertebrate (butterflies, and dragonflies). A total of 73 fauna species were recorded; 25 avian species, 10 reptilian species, 22 species of butterfly, and 14 species of Dragonfly. The survey also covered the assessment of the species diversity of flora groups such as trees, small trees, shrubs, herbs and climbers. It was calculated for trees and small trees species by quantitative method. A total of 47 flora species were recorded.

5.6.1 Avifauna

25 species of avian fauna belonging to 7 order and 18 families were recorded including insectivores, omnivores, carnivorous and Fruit-eating species (Table 5.21). Among them, the Asian Palm Swift *Cypsiurus balasinensis* was most abundant at the Project Site. Two bird species were recorded that are completely protected under Myanmar Law (Protection of Wildlife, Wild Plants and Conservation of Natural Areas Act 15(A)); White Throated Babbler *Turdoides gularis*, and Watercock *Gallicrex cinerea*. No species recorded were listed as species of conservation concern on the IUCN Red List. Avian fauna species occurrences of various types of habitats in Study Area are presented in Table 5.21. Photos of some species observed are shown in Figure 5.30.

Table 5.21 *Bird species recorded during the survey period in Hmawbi Agriculture Input Complex*

No.	Order/Family	Scientific Name	Common Name	IUCN Red List Status
I	Passeriformes			
1	Muscicapidae	<i>Copsychus saularis</i>	Oriental Magpie Robin	LC
2	Muscicapidae	<i>Saxicola caprata</i>	Pied Bushchat	LC
3	Covidae	<i>Dicrurus macrocercus</i>	Black Drongo	LC
4	Covidae	<i>Aegithina tiphia</i>	Common Iora	LC
5	Leiothrichidae	<i>Heterophasia melanoleuca</i>	Dark-Backed Sibia	LC
6	Passeridae	<i>Passer domesticus</i>	House Sparrow	LC
7	Passeridae	<i>Passer montanus</i>	Eurasian Tree Sparrow	LC
8	Passeridae	<i>Anthus rufulus</i>	Paddy field Pipit	LC
9	Ploceidae	<i>Lonchua punctulata</i>	Scaly-Breasted Munia	LC
10	Sturnidae	<i>Acridotheres tristis</i>	Common Myna	LC
11	Columbidae	<i>Streptopelia chinensis</i>	Spotted Dove	LC
12	Columbidae	<i>Columba livia</i>	Rock Pigen	LC
13	Pycnonotidae	<i>Pycnonotus blanfordi</i>	Streak Eared Bulbul	LC
14	Pycnonotidae	<i>Pycnonotus cafer</i>	Red-vented Bulbul	LC
15	Cisticolidae	<i>Prinia inornata</i>	Plain Prinia	LC
16	Cisticolidae	<i>Prinia hodgsonii</i>	Grey-Breasted Prinia	LC
17	Laniidae	<i>Lanius cristatus</i>	Brown Shrike	LC
18	Sylviidae	<i>Turdoides gularis</i>	White Throated Babbler	LC
19	Sylviidae	<i>Chrysomma sinense</i>	Yellow-Eyed Babbler	LC
II	Apodiformes			
20	Apodidae	<i>Cypsiurus balasiensis</i>	Asian Palm Swift	LC
III	Coraciiformes			
21	Meropidae	<i>Merops orientalis</i>	Green Bee-Eater	LC
IV	Piciformes			

No.	Order/Family	Scientific Name	Common Name	IUCN Red List Status
22	Megalaimidae	<i>Megalaima haemacephala</i>	Coppersmith Barbet	LC
V	Charadriiformes			
23	Turnicidae	<i>Turnix suscitator</i>	Barred buttonquail	LC
VI	Gruiformes			
24	Rallidae	<i>Grallixrex cinerea</i>	Watercock	LC
VII	Cuculiformes			
25	Centropodidae	<i>Centropus sinensis</i>	Greater Coucal	LC

LC= Least Concern

Figure 5.30 *Photos of Bird Species in the Study Area*



Watercock *Grallixrex cinerea*



White-Throated Babbler *Turdoides gularis*

5.6.2

Herpetofauna

Interviews and transect walks were conducted across the Study Area and noted 10 reptile species belonging to one order and 6 families. This consisted of three lizard and six snake species. The water snake *Xenochrophis flavipunctatus* is occasionally seen in this area. Two species of amphibian fauna belonging to one order and one family were recorded with different population abundance and different categorize aquatic species. The list of species found within the Project Site and its surroundings is presented in Table 5.22. Photos of some of the species observed are provided in Figure 5.31.

No species recorded were listed as species of conservation concern on the IUCN Red List or as “completely protected” under Myanmar Law (Protection of Wildlife, Wild Plants and Conservation of Natural Areas Act 15(A)).

Table 5.22 *Reptile species recorded during the survey period in Awba Pesticide Plant Project Area*

No.	Order/Family	Species	Common Name	IUCN Red List Status	Type of evidence
I Squamata (Lizard)					
1	Agamidae	<i>Calotes versicolor</i>	Garden Fence Lizard	LC	Observed
2	Agamidae	<i>Calotes mystaceus</i>	Blue Crested Lizard	LC	Observed
3	Agamidae	<i>Calotes jerdoni</i>	Jerdon's Forest Lizard	NE	Observed
4	Scincidae	<i>Mabuya multifasciata</i>	East Indian Brown Mabuya	LC	Observed
II Squamata (Snake)					
5	Viperidae	<i>Trimeresurus gramineus</i>	Common Green Pit Viper	LC	Observed
6	Viperidae	<i>Daboia russelii</i>	Russell's viper	LC	Interviewed
7	Colubridae	<i>Dendrelaphis pictus</i>	Painted Bronzeback Tree Snake	LC	Observed
8	Colubridae	<i>Oligodon spp</i>	kukri snakes	LC	Interviewed
9	Colubridae	<i>Xenochrophis flavipunctatus</i>	Water snake	LC	Interviewed
10	Elapidae	<i>Bungarus fasciatus</i>	Banded Krait	LC	Interviewed
III Anura					

No.	Order/Family	Species	Common Name	IUCN Red List Status	Type of evidence
1	Dicroglossidae	<i>Fejervarya limnocharis</i>	Paddy frog	LC	Observed
2	Dicroglossidae	<i>Euphlyctis cyanophlyctis</i>	Skittering frog	LC	Observed

LC= Least Concern, Not Evaluated =NE

Figure 5.31 *Photos of Herpetofauna Observed in the Study Area*

	
<p>Paddy frog <i>Fejervarya limnocharis</i></p>	<p>Painted Bronzeback Tree Snake <i>Dendrelaphis pictus</i></p>
	
<p>Blue Crested Lizard <i>Calotes mystaceus</i></p>	<p>Garden Fence Lizard <i>Calotes versicolor</i></p>

	
Jerdon's Forest Lizard <i>Calotes jerdoni</i>	East Indian Brown Mabuya <i>Mabuya multifasciata</i>

5.6.3 *Butterflies and Dragonflies*

Biodiversity surveys observed 20 species of Butterfly belonging to 8 families and 14 species of Dragonfly species belonging to one family (Libellulidae) (Table 5.23).

Table 5.23 *Butterfly species recorded during the survey period in Awba Pesticide Plant Project Construction Area*

Sr.	Order/Family	Species	Common Name	IUCN Red List
Lepidoptera				
1	Papilionidae	<i>Papilio polytes</i>	Common Mormon	NE
2	Papilionidae	<i>Papilio demoleus</i>	Lime butterfly	NE
3	Pieridae	<i>Catopsilia pomona</i>	Common Emigrant	NE
4	Pieridae	<i>Catopsilia crocale</i>	Common Emigrant	NE
5	Pieridae	<i>Catopsilia pyranthe</i>	Mottled Emigrant	NE
6	Pieridae	<i>Eurema hecabe</i>	Common grass yellow	NE
7	Danaidae	<i>Euploea core</i>	Common Crow	LC
8	Danaidae	<i>Danaus genutia</i>	Striped- Tiger	NE
9	Danaidae	<i>Danaus limniace</i>	Blue Tiger	NE
10	Nymphalidae	<i>Hypolimnas bolina</i> (Male)	Great Eggfly	NE
11	Nymphalidae	<i>Athyma perius</i>	Common Sergeant	NE
12	Nymphalidae	<i>Acraea violae</i>	Tawny Coster	NE
13	Nymphalidae	<i>Junonia hierta</i> (Male)	Yellow Pansy	LC




Sr.	Order/Family	Species	Common Name	IUCN Red List
14	Nymphalidae	<i>Junonia atlites (Male)</i>	Gray Pansy	NE
15	Satyridae	<i>Ypthima baldus</i>	Common Five ring	NE
16	Lycaenidae	<i>Chilades pandava (Male)</i>	plains Cupid	NE
17	Lycaenidae	<i>Chilades pandava (Female)</i>	plains Cupid	NE
18	Lycaenidae	<i>Loxura atymnus</i>	Yamfly	NE
19	Riodinidae	<i>Abisara abnormis</i>	-	NE
20	Hesperiidae	<i>Calptoris sp.</i>	Swift	-
I	Odonata (Dragonfly)			
1	Libellulidae	<i>Orthetrum sabina</i>	Slender Skimmer/ Green Marsh Hawk	LC
2	Libellulidae	<i>Brachythemis contaminata</i>	Ditch Jewel (Male)	LC
3	Libellulidae	<i>Rhyothemis phyllis</i>	Yellow-striped Flutterer	VU
4	Libellulidae	<i>Potamarcha congener</i>	Yellow-Tailed Ashy Skimmer	LC
5	Libellulidae	<i>Neurothemis tullia (Female)</i>	Pied Paddy Skimmer	LC
6	Libellulidae	<i>Brachythemis fuscopalliata</i>	Dark-winged Groundling	LC
7	Libellulidae	<i>Crocothemis erythraea</i>	Carmine Darter	LC
8	Libellulidae	<i>Diplacodes trivialis (Male & Female)</i>	Ground Skimmer/Chalky Percher	LC
9	Libellulidae	<i>Diplacodes pumila (Male)</i>	Dwarf Percher	LC
10	Libellulidae	<i>Orthetrum pruinatum (Male)</i>	Crimson-tailed Marsh Hawk	LC
11	Libellulidae	<i>Lathrecista asiatica (Male & Female)</i>	Asiatic Blood Tail	LC
12	Libellulidae	<i>Pantala flavescens</i>	Wandering Glider	LC
13	Libellulidae	<i>Crocothemis servilia</i>	Scarlet Skimmer/Ruddy Marsh Skimmer	LC

Sr.	Order/Family	Species	Common Name	IUCN Red List
14	Libellulidae	<i>Trithemis pallidinervis</i>	Long-legged Marsh Glider	LC

LC= Least Concern, NE = Not Evaluated

Some examples of butterfly and dragonfly species observed are provided in *Figure 5.32*. No species recorded were listed as “completely protected” under Myanmar Law (Protection of Wildlife, Wild Plants and Conservation of Natural Areas Act 15(A)). However, one species, *Rhyothemis Phyllis*, Yellow-striped Flutterer is listed as Vulnerable on the species of conservation concern on the IUCN Red List.

Figure 5.32 Photos of Butterfly and Dragonfly Species in Study Area

	
Common Crow <i>Euploea core</i>	Yellow Pansy <i>Junonia hierta</i> (Male)
	
Yellow-striped Flutterer <i>Rhyothemis phyllis</i>	Ditch Jewel (Male) <i>Brachythemis contaminata</i>





5.6.4

Flora

The Project Site is classified as terrestrial swamp land with no forest areas nearby. A total of 47 species were recorded during the study period, of which 5 species were herbs, 15 shrubs, 10 climbers and 17 trees. Among them 17 species belonging to 17 genera of tree and small tree species representative of 11 sample plots were calculated for density index. Among the sample plots tree and small tree species density per plot was varied and the highest density was observed *Glochidion assamicum*, *Psidium acidum*, *Cratoxylum ligustrinum* and *Microcos paniculata*. The result shows that these four species are abundant in surrounding area.

Relative frequency is the frequency of one species compared to the total frequency of all the species. According to the results *Glochidion assamicum* and *Microcos paniculata* have high relative frequency value (11%) followed by, *Psidium acidum* (10%). Some examples of flora species observed are provided in Figure 5.33.

Figure 5.33 *Photos of Flora Species in Study Area*

	
<p><i>Ampelocissus Latifolia</i></p>	<p><i>Convolvulus arvensis</i></p>
	
<p><i>Lagerstroemia macrocarpa</i></p>	<p><i>Semecarpus subpanduriformis</i></p>

5.7

INFRASTRUCTURE AND SERVICES

5.7.1

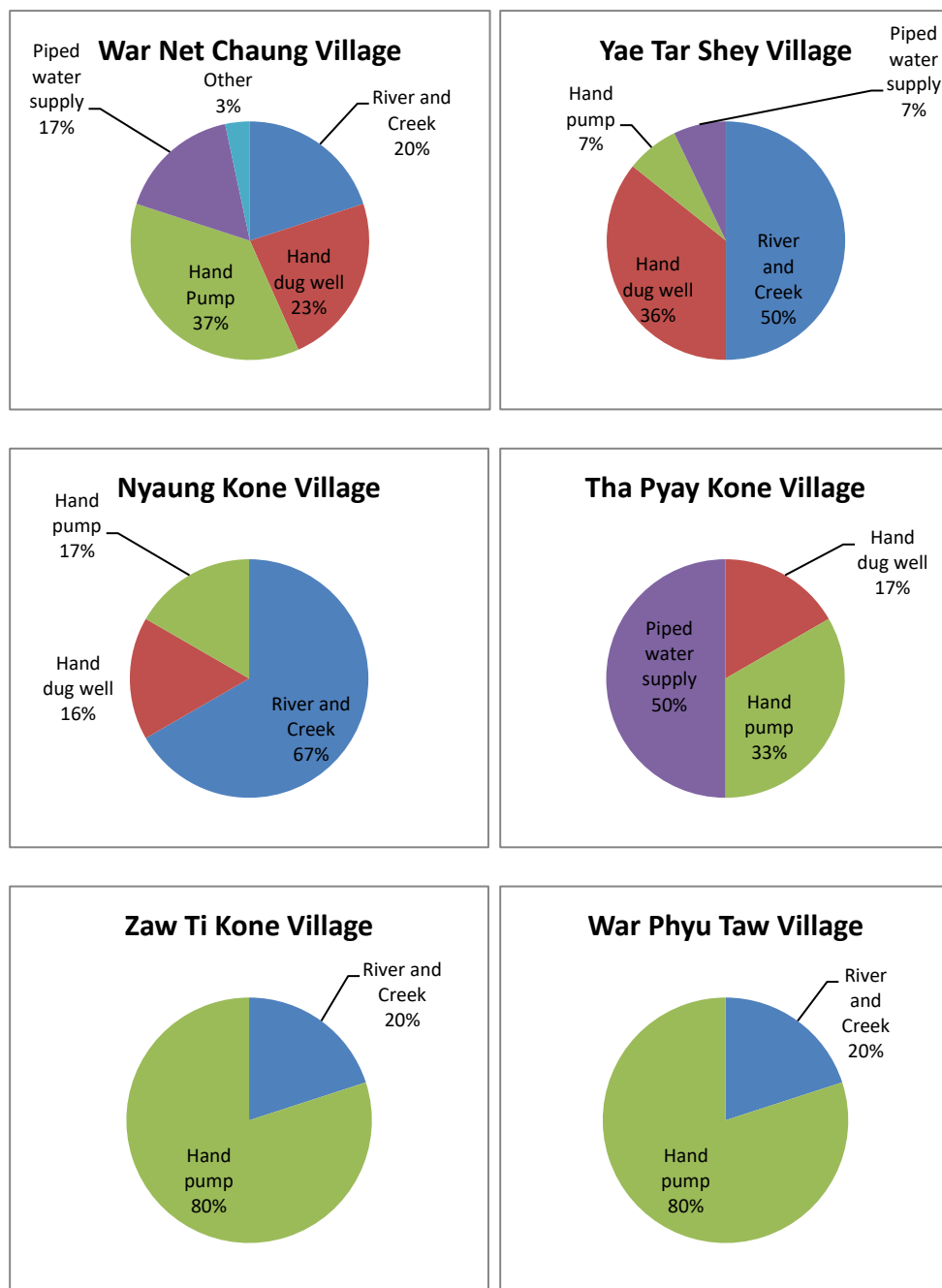
Utilities and Infrastructure

The villages consulted are well connected with average to good condition roads to Hmawbi Township. The main infrastructure and facilities are found in War Net Chaung village as it is the biggest populated area and village tract. War Net Chaung has a hospital, high school and train station. There are primary schools in Yae Tar Shey and Tha Pyay Kone villages but there are no schools in Nyaung Kone village. All villages except Nyaung Kone Village have access to government facility electricity schemes. In Nyaung Kone solar panels are used for electricity.

Villagers receive drinking water from different sources such as from river and creek, hand dug well, hand pump, piped water supply. Some village use purified water for drinking but not all villages. Most of the villagers in the area have access to drinking water on perennial basis, only few of them have problem during summer time. They received water from in the village level and see the quality as good.

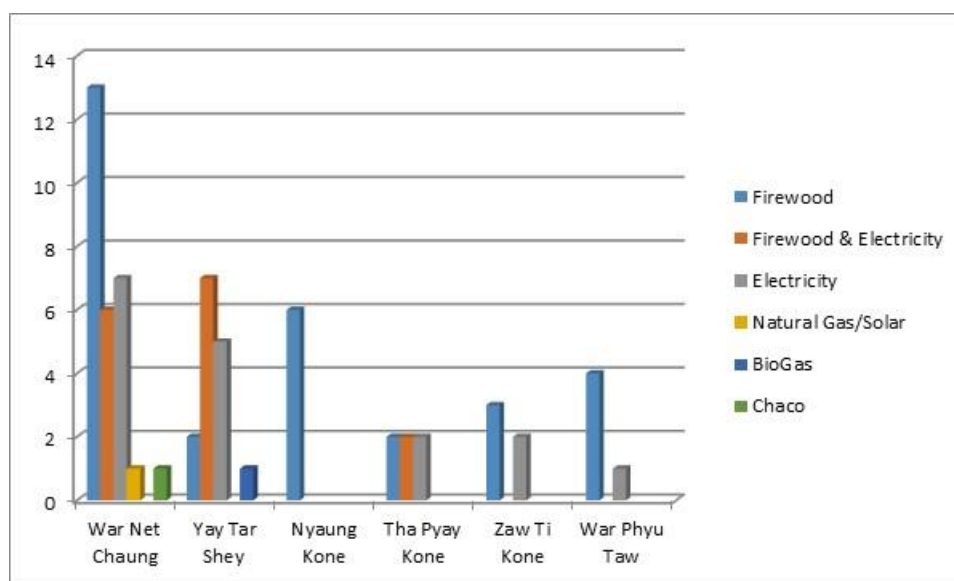
In War Net Chaung, 37% of households receive drinking water from hand pump well (37%), 23% from hand dug wells, 20% from Hmawbi River/Htan Ta Pin River and Sa-Par-Kye Creek, 17% from piped water supply and 3% from other sources (such as bottled). For Yae Tar Shey and Nyaung Kone villages over 50% of household get their drinking water from Hmawbi River and Htan Ta Pin River during rainy season. During the dry season, most of the villagers in Yae Tar Shey and Nyaung Kone use water from hand dug wells and some use water from the Sa-Par-Kye creek for agriculture purposes. Tha Pyay Kone village receive piped spring water as there is a storage tank in the village. The detailed sources of drinking water in each village are shown in Figure 5.34

Figure 5.34 Source of Drinking Water in Villages



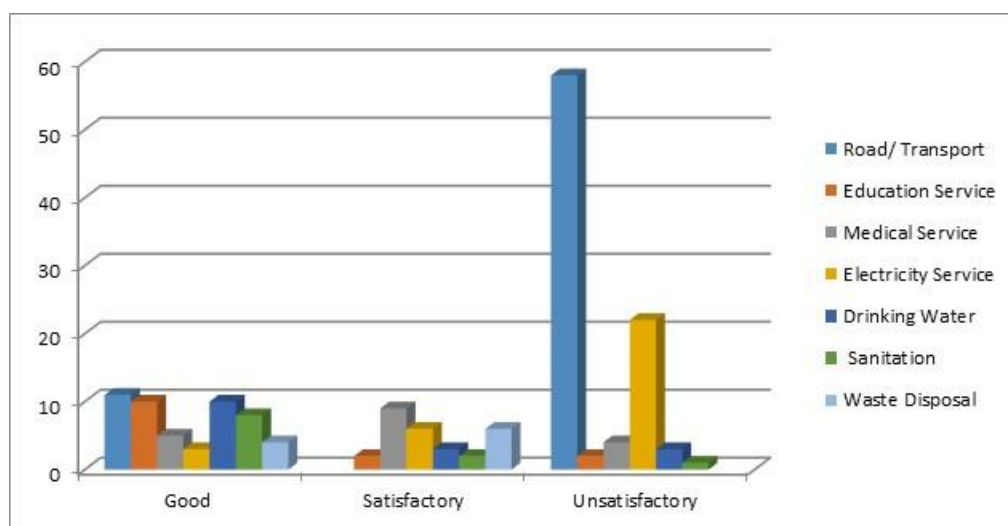
Most households in the area use firewood or charcoal for cooking as this is easily available from the local forest although villages also have access to use electric and gas stove. Villagers from most villages use both firewood and electricity as main source of cooking. Nyaung Kone is the only village which has no access to electricity of the villages consulted. As a result firewood is the only source of cooking. The detail sources of cooking fuel kinds are shown in Figure 5.35. More than 50% of firewood is collected from the forest, 20% is purchased from the market, and 20 % are collected from household land and within the village.

Figure 5.35 Sources of Cooking Fuel



The adequacy of services in the area was recorded by the villages in terms of good, satisfactory and unsatisfactory. The majority of people stated that roads are unsatisfactory with electricity connection as the second most common unsatisfactory issue. An overview of the adequacy of the services in the community is shown in Figure 5.36 (the number of households is recorded against the adequacy of the service).

Figure 5.36 Adequacy of Services in the Community



5.8 SOCIO-ECONOMIC COMPONENTS

5.8.1 Population and Demographic

Table 5.24 provides an understanding of the population and demographic profile of the village tracts consulted from during focus group discussions and household socio economic survey with villagers, village leaders and village tract leaders. The smallest village is Nyaung Kone with 58 households and

the largest is War Net Chaung village tract with 1,447 households. The villages consulted were:

- War Net Chaung village, War Net Chaung Village Tract, Hmawbi Township, Yangon Region
- Tha Pyay Kone village, Let Pa Dan Village Tract, Hmawbi Township, Yangon Region
- Nyaung Kone village, War Net Chaung Village Tract, Hmawbi Township, Yangon Region
- Yae Tar Shey village, War Net Chaung Village Tract, Hmawbi Township, Yangon Region
- Zaw Ti Kone village, War Net Chaung Village Tract, Hmawbi Township, Yangon Region
- War Phyu Taw village, War Net Chaung Village Tract, Hmawbi Township, Yangon Region.

Data on demography, population, and livelihoods from the Myanmar Census (2015) is presented in *Tables 5.24-5.26*.

Table 5.24 *Secondary data on Population Statistics from the Townships and Villages in the Study Area (Myanmar Population Census 2015)*

Township / Village	Male	Female	Total	No. of household (Census 2015)	Ethnicity	Distance from Project Area
Hmawbi	120,931	123,676	244,607	231,073		
War Net Chaung	3172	3412	6584	1651	90 % Burma, 5 % of Shan, 3 % of Kayin, 1 % of Mon, 1 % of other	2.6 km
Tha Pyay Kone	-	-	364	96	70 % of Shan, 20 % of Burma, 10 % of Kayin	1.3 km
Nyaung Kone	145	126	271	58	70 % of Shan, 30 % of Burma	1.4 km
Yae Tar Shey	868	910	1778	449	50 % of Shan, 50 % of Burma	0.9 km
War Phyu Taw	247	242	489	122	100% of Burma	3 km
Zaw Ti Kone	193	161	354	82	60% of Burma, 40% of Shan	3.6 km

Table 5.25 *Population in Yangon and Hmawbi Township (Myanmar Census, 2015)*

	Total population				Population in conventional households			Population in institutions		
	Both sexes	Male	Female	Sex ratio	Both sexes	Male	Female	Both sexes	Male	Female
Yangon	7,360,703	3,516,403	3,844,300	91.5	6,949,440	3,258,469	3,690,971	411,263	257,934	153,329
- Yangon Urban	5,160,512	2,441,229	2,719,283	89.8	4,855,682	2,252,076	2,603,606	304,830	189,153	115,677
- Yangon Rural	2,200,191	1,075,174	1,125,017	95.6	2,093,758	1,006,393	1,087,365	106,433	68,781	37,652
- North Yangon	2,606,670	1,253,082	1,353,588	92.6	2,456,529	1,159,498	1,297,031	150,141	93,584	56,557
Hmawbi	244,607	120,931	123,676	97.8	231,073	110,580	120,493	13,534	10,351	3,183

Table 5.26 *Livelihoods in Hmawbi Township (Myanmar Census, 2015)*

	Usual activity status												
	Total	Employee (government)	Employee (private)	Employer	Own account worker	Unpaid family worker	Sought work	Did not seek work	Full time student	Household worker	Pensioner, retired, elderly	Disabled	Other
Hmawbi													
Total	202,679	11,927	50,276	2,764	32,559	8,545	4,069	831	29,364	39,589	11,474	1,431	9,850
Male	99,729	8,518	32,777	2,021	20,586	3,484	2,630	573	14,814	1,141	5,469	782	6,934
Female	102,950	3,409	17,499	743	11,973	5,061	1,439	258	14,550	38,448	6,005	649	2,916

Livelihood Sources

The main livelihood source is cultivation of seasonal vegetables, flowers, rice and some fruits and others businesses related to agriculture. Some villagers are employed in the private sector or with the government particularly in War Net Chaung and Yae Tar Shey. People from smaller villages such as Nyaung Kone and Tha Phay Kone focus more on agriculture based business.

Agriculture is the major economic source for Tha Pyay Kone and Nyaung Kone villages with 70% and 90 % of households, respectively, engaged in agriculture related business. The 30% of villagers from War Net Chaung and Yae Tar Shey villages also engaged in agricultural based business. Growing flowers and vegetables to sell and working as labourers in gardens are the main source of agriculture related income. The main crops grown include:

- Seasonal vegetables such as eggplant, beans, gourd, cucumber, betel leave and Roselle;
- Flowers mainly jasmine and golden and silver ginger lily;
- Fruits such as bananas, guavas and other citrus fruit; and
- Rice and other cash crops like rubber.

Employment as part-time or full-time labourers in the industrial zone (in which the Project is situated) and around Hmawbi is another source of income particularly for War Net Chaung villages where this accounts for around 30% of households. In Tha Pyay Kone and Yae Tar Shey the employment in industrial zones is around 10%. Less than 15% of households work in government jobs. Yae Tar Shey village has significant numbers (50%) of the population engaged in private companies while the other villages have less than 15%. Households in the villages consulted have small numbers of livestock for domestic use and some small scale farm for commercial purposes. There is a private poultry commercial farm in Nyaung Kone. The animals they raise include chickens, ducks, goats, and pigs and a small number of buffalos and cattle in War Net Chaung village a reared to assist with cultivation. *Figure 5.37* shows examples of cultivation in the Study Area.

The main crops and cooking fuel sources per village are presented in *Table 5.27* and livelihood sources per village are provided in *Table 5.28*.

Figure 5.37 *Photos of Cultivation in Tha Pyay Kone*



Table 5.27 *Main Crops and Cooking Fuels in Village Tracts*

Village	Village Tract	Main Crops/ Vegetable	Cooking Fuel
War Net Chaung	War Net Chaung	1) Egg Plant 2) Gourd 3) Paddy 4) Rubber 5) Roselle 6) Cucumber 7) Green beans 8) Betel leave 9) Banana 10) Lime	45 % of households (HHs) use firewood and charcoal, and 50 % use electricity and 5 % use gas.
Tha Pyay Kone	Let Pa Dan	1) Flower 2) Jasmine 3) Monsoon Paddy 4) Sugar Cane	-

Village	Village Tract	Main Crops/ Vegetable	Cooking Fuel
		5) Bean 6) Vegetables	
Nyaung Kone	War Net Chaung	1) Egg Plant 2) Jasmine 3) Flower 4) Vegetables 5) Gourd 6) Cucumber 7) Green beans	Most of households (HHs) use firewood.
Yae Thar Shey	War Net Chaung	1) Egg Plant 2) Groundnut 3) Bean 4) Cucumber 5) Vegetables 6) Flower	All households (HHs) use firewood, charcoal and electricity.

Table 5.28 *Livelihood Sources per Village (% of households in each Village)*

Type of Livelihood	War Net Chaung	Tha Pyay Kone	Nyaung Kone	Yae Thar Shey
Cultivator				30 %
Agricultural labourer	30 %	70 %	90 %	-
Fishing	-	-	-	-
Business (Small/Medium Enterprise, shop, trading etc.)	5 %	5 %	1 %	5 %
Livestock rearing	5 %	-	-	-
Casual Labourer/ temporary work	30 %	10 %	-	10 %
Government service	15 %	5 %	3 %	5 %
Private companies	15 %	5 %	5 %	50 %
Other	-	5 %	1 %	-

Household Income and Credit

The monthly income of the villages consulted varies depending on the size of village. 70% of the average monthly income in Nyaung Kone village is between 100,000 – 200,000 Kyats while 40% of people from War Net Chaung village earn more than 300,000 Kyats. This may be due to the fact that there are more people employed in private companies or government than in other villages. The details of monthly income from different village can be seen in Table 5.29.

Table 5.29 *Average Monthly Income and Expenses Distribution per Village*

Monthly Income	War Net Chaung	Tha Pyay Kone	Nyaung Kone	Yae Tar Shey
100,000 - 200,000 Kyats	20 %	50 %	70 %	50 %
200,000 - 300,000 Kyats	40 %	30 %	20 %	40 %
More than 300,000 Kyats	40 %	20 %	10 %	

The average monthly income of the village ranges from approximately 195,000 to 385,000 Kyats. War Phyu Taw village has the highest monthly income and Nyaung Kone village has the lowest. Nyaung Kone and War Net Chaung villages have the same expenditure and Tha Pyay Kone village has the lowest expenditure. The details of average monthly income and expenditure can be seen in Table 5.30.

Table 5.30 *Income and Expenditure in the AOI*

Village Name	Average Monthly Income (Kyat)	Average Monthly Expenditure (Kyat)
War Net Chaung	231,103	176,666
Tha Pyay Kone	233,333	155,833
Nyaung Kone	195,000	176,067
Yae Tar Shey	382,667	178,384
War Phyu Taw	379,000	238,000
Zaw Ti Kone	243,000	178,385

There are different sources for loans in the villages consulted. Women in Yae Tar Shey mentioned PACT's microfinance system with the interest rate of 2.5% per month. However the facility does not go to other villages consulted. Villagers take loans from small loan services with the interest rate of 15% per year and can get a maximum 2 lakhs (1 lakh = 100,000) Kyats per year. In War Net Chaung, there is a licensed saving and loan group who take 2% interest rate per month and allow people to borrow up to 12 lakhs Kyats.

Average Land Holding

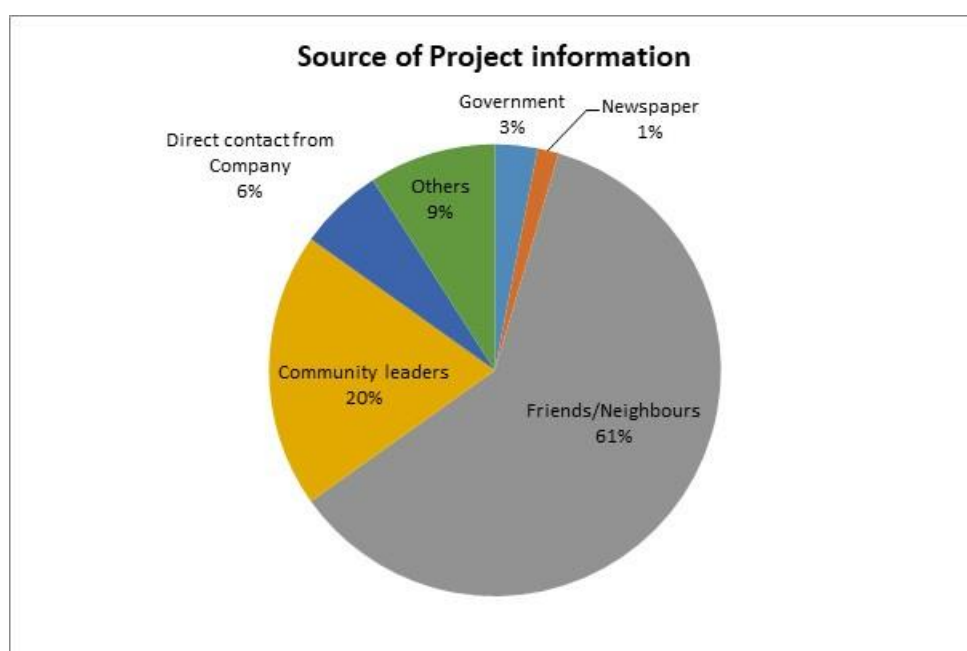
The average agricultural land holding size for consulted villages is approximately 0.5 acre to 2 acre. Villagers mentioned that selling and buying land among villagers is not common but some villagers sell the land to people from other areas for higher prices. Villagers mostly inherited the land from their ancestors and village leaders and land administration officers normally make the decisions on land purchase in the community.

In War Net Chuang village, only 5% of household own the land they cultivate while Tha Pyay Kone and Nyaung Kone all own the land they cultivate. 50% of households in Yae Tar Shey village own the land they cultivate. The reason for this pattern is not known.

Knowledge and Information about the Project

The household surveys considered knowledge of the Project and it was found that the community mainly received project information from friends and neighbours (61%). The 20% of information is shared by community leaders and 6% from directly from the company (Figure 5.38).

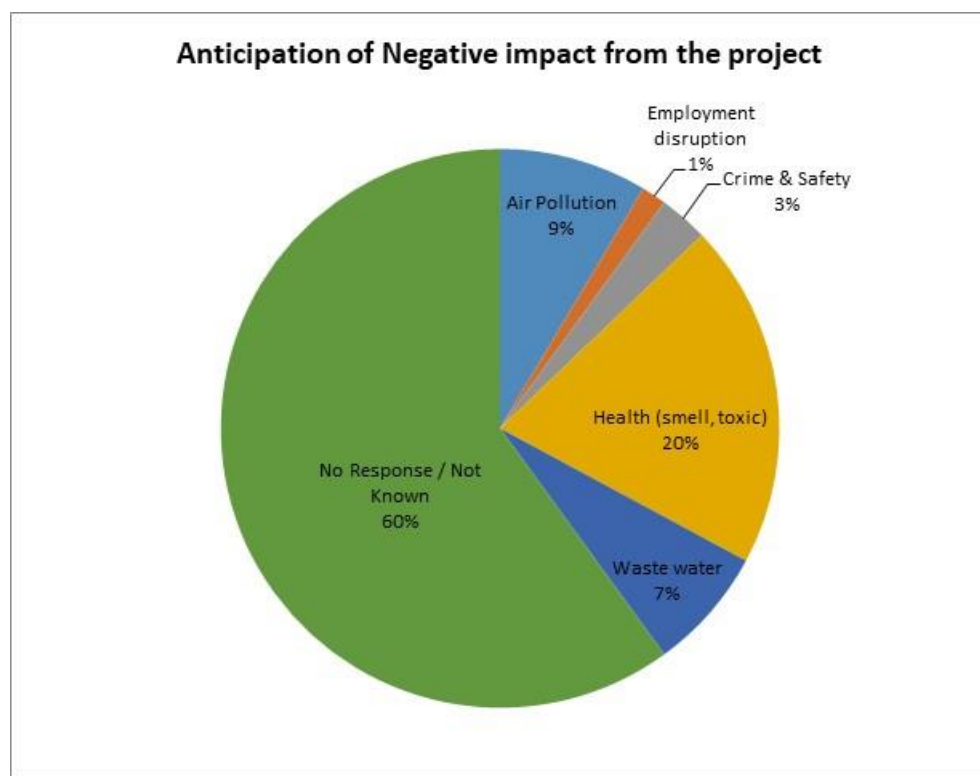
Figure 5.38 *Source of Project Information*



21% of households consulted mentioned that the project may bring positive impact for their livelihoods while 43% of villagers anticipated that the project will generate impacts. The 43% of respondent do not give any answer.

The most common issue raised was from potential health impact related to smell and toxins (20% of respondents) with 9% concerned for air pollution, and 7% for wastewater. The 60% of villages did not respond or did not know what the potential impacts / benefits may be (Figure 5.39).

Figure 5.39 Community Views and Anticipation of the Project



5.8.3 Village Profiles

A number of focus group discussions (FGDs) were held with attendees in order to gather data on the Potentially Affected Communities. These FGDs were targeted at village heads (for population and demographic data), farmers (for livelihood data) and where present, women's groups were also conducted. Information collected during these FGDs is summarised in the following sections.

Tha Pyay Kone Village

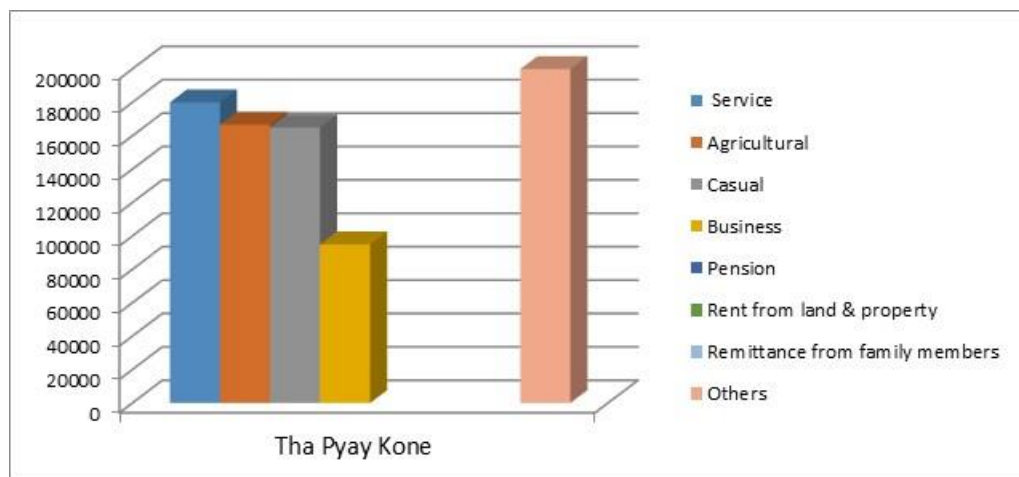
Background

Tha Pyay Kone village is located in Hmawbi Township, Northern District of Yangon Region. This village is located approximately 1.2 km north of Project site. The village was established over 100 years ago and is located near the Sa-Par-Kye Creek, which flows into Hmawbi River. There are 96 households in the village with a population of 364 people (3.8 members per household on average) and most are engaged in agriculture. Vegetable plantation such as, green beans, cucumbers, and aubergine, and fruit plantation, such as pomelo, mango, and guava are common in the village. The 70% of the population are Shan, 20% are Bamar and 10% are Karen.

Livelihood and Income

Half of the households in the village earn between 100,000 and 200,000 Kyats per month. The detailed source of income information is provided in Figure 5.40.

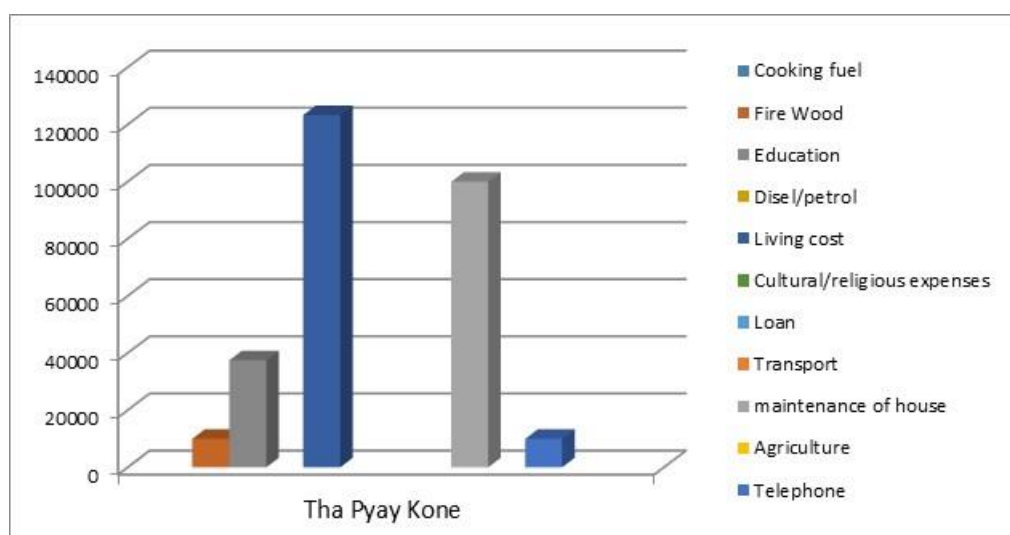
Figure 5.40 *Different Source of Income in Tha Pyay Kone Village*



Note: casual = casual labourer

Most of the house expenditure goes to living costs (food, domestic use, etc.); some of them go to education, firewood and telephone. Only one respondent recorded a high expense for house maintenance, therefore the graph for maintenance shows this as high when it is low for the majority of households (Figure 5.41). There is no expense allocated for healthcare, transportation, loan repayment and agriculture input investment.

Figure 5.41 *Household Expenditures in Tha Pyay Kone village*



Infrastructure and Utilities

The village has average road access to other villages but access is limited during the rainy season as it is made of laterite ⁽¹⁾. The village also has its own transformer for electricity and a collective storage water tank. Water supply is from a single manual pump well installed in the majority of households and streams. There is also a primary school in the village. Photos of the village are provided in *Figure 5.42*.

⁽¹⁾ A reddish clayey material, hard when dry, forming a topsoil in some tropical or subtropical regions and sometimes used for building

Figure 5.42 Photos Taken from Tha Pyay Kone Village



Houses



Monastery

Yae Tar Shey Village

Background

Yae Tar Shey village is located in Hmawbi Township, Northern District of Yangon Region. This village is located 1 km north-west of the Project and is made up of around 449 households. The village was established over 60 years ago as is located near Sa-Par-Kye Creek, which flows into Hmawbi River (around 10 miles from the village). Of the population, 50% are Shan and 50% are Bamar. Yae Tar Shey Village is home to population of 1,778 (4 members per household on average).

Livelihood and Income

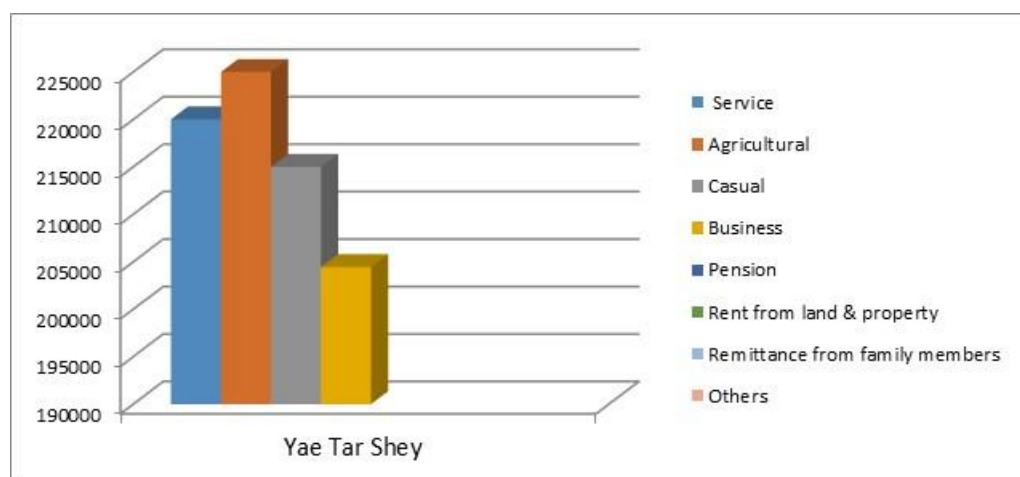
The main source of income in the past was making cook stoves. The majority of young people now work in garment and fertilizer factories located in Hmawbi Township. The senior generation are engaged in agriculture related business and grow golden and silver ginger lily and seasonal vegetable such as cucumber and eggplants. Only small numbers of households are engaged in other businesses such as trading, and government service. The 50% of the households in this village earn between 100,000 and 200,000 Kyats per month (Figure 5.43).

Figure 5.43 *Monthly Income of Household*



In Yae Tar Shey village, most of the income is from agricultural, casual labour, and business. There is no income from pension, rent, remittance from family members and others (Figure 5.44).

Figure 5.44 *Different Source of Income in Yae Tar Shey village*



Income in Kyats shown on the Y Axis

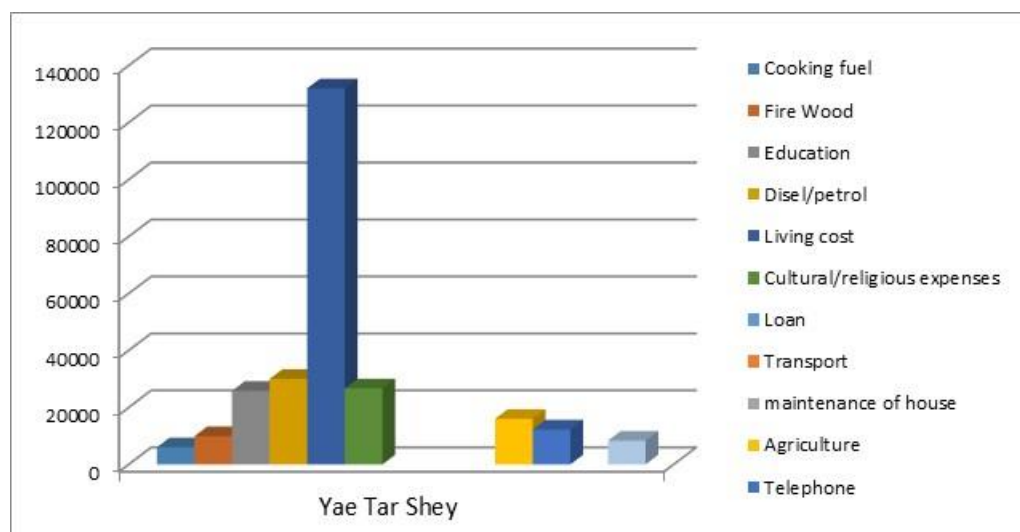
In this village, 90% of agricultural land is irrigated using water pumps. Generally all family members are involved in farming however sometimes additional labourers are hired from neighbouring villages. The wages paid per day are provided in *Table 5.31*. There are also poultry and pig farms for domestic and commercial purposes in this village.

Table 5.31 *Expenditure on Agriculture*

Expenditure on Agriculture	Amount
Wage paid per male labour per day	6,000 kyats
Wage per women labour per day	4,000 kyats

The main expense is for living costs. It is the only village in the AOI where some money was allocated to cultural and religious affairs. The detail of household expenditure Yae Tar Shey village is provided in *Figure 5.45*.

Figure 5.45 *Household Expenditure in Yae Tar Shey village*



Infrastructure and Utilities

The village is located along the main road to Hmawbi with good road access year round. There is a government owned Asbestos factory located between the village and the HAIC which is no longer functional. A secondary school is located in the village and 70% of the village has access to electricity from the national grid whilst the remainder use solar energy.

For Yae Tar Shey village, over 50% of household receive drinking water from Hmawbi River/Htan Ta Pin River and Sa-Par-Kye Creek during the rainy season. During the dry season, most of the villagers in Yae Tar Shey use water from hand dug wells and some use water from the Sa-Par-Kye creek for agriculture purposes. Photos of the village are provided in Figure 5.46.

Figure 5.46 *Photo Taken from Yae Tar Shey Village*





War Net Chaung Village

Background

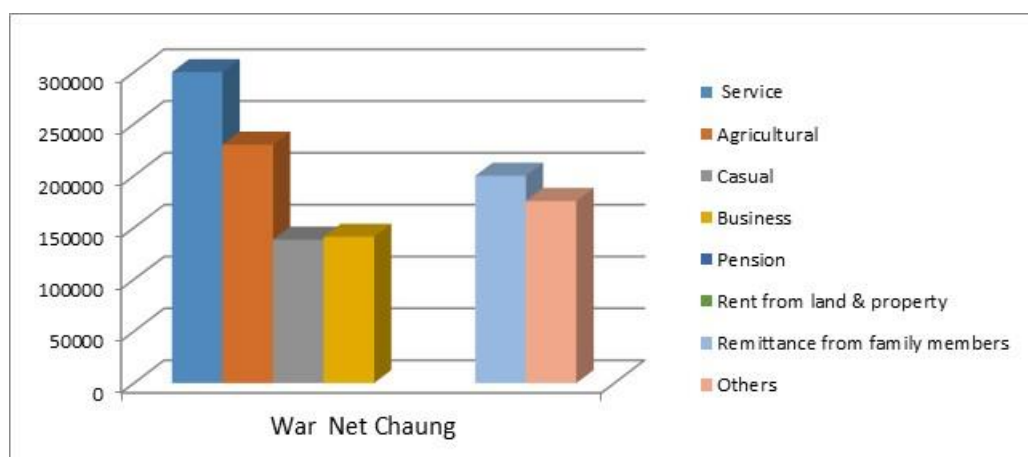
War Net Chaung village is located in Hmawbi Township, Northern District of Yangon Region. This village is located 2.6 km north-west of the Project and is made up of about 1,651 households. This is the main village tract in the area where HAIC has situated. The village was established over 100 years ago and is located near the Sa-Par-Kye Creek, which flows into the Htan Ta Pin River (9 miles from the village).

Livelihood and Income

The majority of livelihood sources are casual labourer and agriculture. There are higher numbers of government employees residing in this village compared to other three villages. Small scale businesses such as grocery and other shops can be found along the main road. Livestock rearing is also undertaken as a source of livelihood in War Net Chaung.

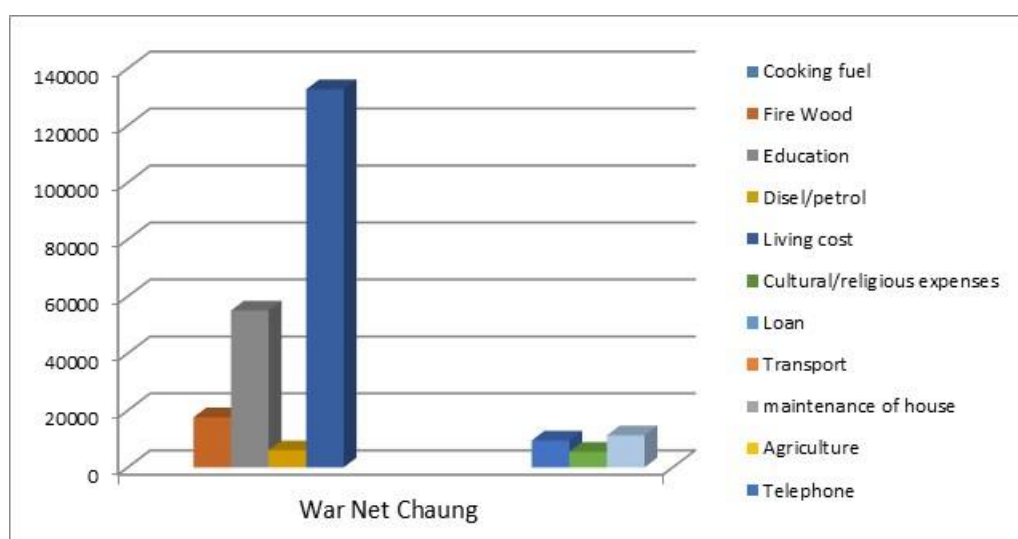
In War Net Chaung village, the higher amount of income comes from the source of general service and agriculture. Casual labourer work, remittance from family members and others also provided for family income. The detail sources of household income are provided in the *Figure 5.47*.

Figure 5.47 *Different Source of Income in War Net Chaung Village*



Average monthly income in War Net Chaung is slightly higher than in other villages with around 40% earning between 200,000 and 300,000 Kyat and 40% earning over 300,000 Kyat per month. Most expenses go to cost of living, as with other villages, the detailed household expenditure is provided in the Figure 5.48.

Figure 5.48 *Household Expenditure in War Net Chaung Village*



Infrastructure and Utilities

War Net Chaung village is located in the main road to Hmawbi Township and can be accessed year round. There is a train station, sub-township hospital, one Government High School, and one monastic education school. The area is well known for supplying fruits and vegetables to the markets around the country. The main transportation is by motorbike.

80% of houses in War Net Chaung village have electricity provided by the government and others use solar power. Streams and ground water wells are the sources of water. Firewood is predominately used for cooking though electric and gas stove are available. Photos from the village are provided in Figure 5.49.

Figure 5.49 Photo Taken from War Net Chaung Village



Nyaung Kone Village

Background

Nyaung Kone village is located in Hmawbi Township, the Northern District of Yangon Region. The village is located 1.4 km west of the HAIC and has 58 households. The village was established over 100 years ago and it located

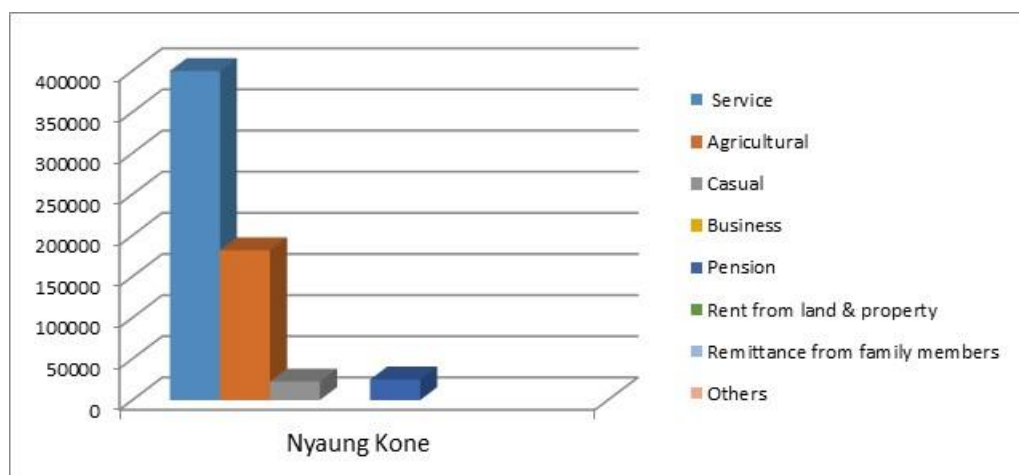
near Sa Par Kye Creek which flows into Hmawbi River. This village is the smallest of the villages consulted. Nyaung Kone village is home to some 58 households for a population of 271 (4.7 members per household on average).

Livelihood and Income

90% of households depend on agriculture and related business such as labouring. Growing seasonal vegetables, such as eggplant, beans, cucumbers, and jasmine flowers are the main source of income. Only small numbers of households are employed by the government and private sectors.

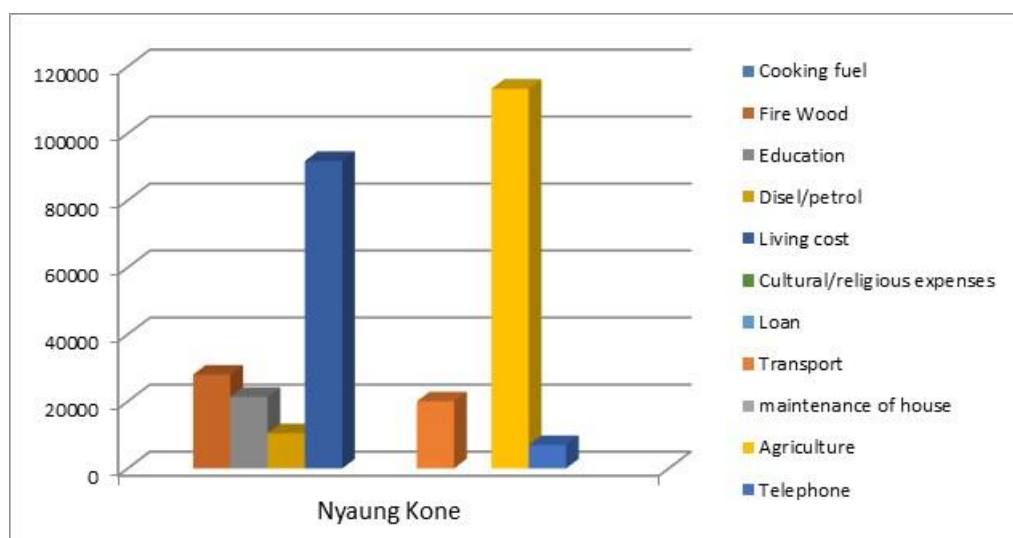
In Nyaung Kone village, most of the income comes from services and agriculture. It is the only village which has income from pension compared to other villages. Information on income sources is provided in the *Figure 5.50*.

Figure 5.50 *Different Source of Income in Nyaung Kone Village*



Villagers spend much more money in agriculture input than other villages and are the only village where living cost is lower than the agriculture expense. There is small amount of expenses on firewood, education, diesel and transport. Information on income sources is shown in *Figure 5.51*.

Figure 5.51 Household Expenditure in Nyaung Kone village



Agriculture and Livestock

Farmers mentioned that they use water pumps to irrigate their fields and each household owns about an acre of agriculture land. They stated that productivity has reduced compared to 20 years ago. In the past, farmers stated that they did not need to use fertilizer, as production was good. Nowadays farmers use different types of fertilizers and pesticides in order to meet the same productivity of the past. The younger generation are employed in factories with a small number working in agriculture related businesses.

Households in this village raise some animals such as chicken and pigs for domestic use. A private poultry farm owned by people from Yangon was seen around the entrance of the village. Photos of Kyaung Kone Village are provided in *Figure 5.52*.

Figure 5.52 Photo Taken from Nyaung Kone Village



5.9 PUBLIC HEALTH COMPONENTS

Villagers from War Net Chaung and Yae Tar Shey village rely on both public and private health care services. Tha Pyay Kone and War Phyu Taw villagers rely on Public than Private while Nyaung Kone villagers go to public facility. Zaw Ti Kone village rely equally on both public and private.

81% of people in the AOI spend 1,500 to 5,000 Kyats per month for health service and 19 % of them spend above 5,000 Kyats per month. The main illnesses are common fever, hypertension, kidney problems, and stomach-aches. The main hospital in the AOI is in War Net Chaung village.

5.10 CULTURAL COMPONENTS

There are a number of pagodas and monasteries in Hmawbi Township.

Some monasteries provide monastic education to children who are not able to go to the public schools. The nearest monastery is located 500 m from the HAIC (Figure 5.53). This monastery was visited during the Site Visit in February 2017. There are seven monks living at the monastery and people living near the monastery come to visit. Given the proximity of this monastery to the Project, this was identified as one of the air and noise sensitive receptors (Figure 5.53). There is also a monastery in Wah Net Chaung where public consultation was conducted (Figure 5.54) which provides monastic education to novice monks, nuns, and orphans.

Figure 5.53 Monastery within 500m of the Project Site



Figure 5.54 Monastery in Wah Net Chaung Village



5.11 VISUAL COMPONENTS

The Project is located in an existing Industrial Zone, which is surrounded by trees and fields. The Project Site is not visible from the main road. Figures 5.55 and 5.56 show the view of the surrounding area from the Project Site.

The Sabagyi creek flows through the fields shown in Figure 5.56 as a temporary seasonally drainage channel during the construction phase. There no currently (May 2019) no channel present.

Figure 5.55 Trees surrounding the Project Site



Figure 5.56 Fields surrounding the Project Site



6.1 INTRODUCTION

This section of the ESIA Report presents the methodology used to conduct the impact assessment. This methodology has been developed by ERM and is based on international good practice. The first section summarises the scoping results from the scoping study.

6.2 SCOPING RESULTS

Scoping has been undertaken to identify the potential Area of Influence (AOI) for the Project (and thus the appropriate Study Area), to identify interactions between the Project and resources/receptors in the AOI and the impacts that could result from these interactions, and to prioritize these impacts in terms of potential significance.

This phase is intended to ensure that the IA focuses on those issues that are most important for design, decision-making, and stakeholder interest.

Scoping also has the benefit of identifying those impacts, which are not likely to be significant and hence which warrant little or no further consideration or associated data gathering.

ESIA Scoping followed a systematic process that involved the following activities:

- Gathering of information on Project activities during each phase of the Project through desktop review of information provided by Awba;
- A site visit to the Project Site and its vicinity in April 2017 to obtain preliminary information on existing site conditions as well as environmental and socio-economic receptors and/or resources;
- Identifying environmental and socio-economic receptors and/or resources identified in the AOI;
- Identifying potential interactions between Project activities and resources/receptors based on information obtained above;
- Prioritising potential interactions in terms of their likelihood to lead to significant impacts; taking into consideration the extent and nature of Project activities, and the existing condition/ sensitivities of the resources;
- Developing the ESIA ToR, which detailed the methodology and requirements of the subsequent IA Phase to address potentially significant impacts that are most likely to affect Project planning, decision-making and which are of stakeholder interest.

Potential impacts, which were not likely to be significant, and hence will need little further consideration or associated data gathering during the IA Phase, were “scoped-out” of the ESIA at this stage.

For scoping, Project activities are divided into the following phases:

- Construction Phase (including accidental events); and
- Operational Phase (including accidental events).

A Scoping Matrix displays Project activities against resources/receptors, and supports a methodical identification of the potential interactions each Project activity may have on the range of resources/receptors within the Area of Influence for the Project. Entries in the matrix cells are coloured to indicate whether:

- An interaction is not reasonably expected (white);
- An interaction is reasonably possible but none of the resulting impacts are likely to lead to significant effects (grey); or
- The interaction is reasonably possible and at least one of the resulting impacts is likely to lead to an effect that is significant (black).

All potential interactions, regardless of probability of occurrence, were considered at this stage.

A scoping exercise was undertaken as part of ESIA Study of the Project. Scoping matrix of the Project is presented in *Table 6.1*. The scoping of impacts indicates that the majority of identified potential impacts are not expected to be significant (i.e. those scoped out above). For activities predicted to have no significant impact (i.e. those in white in the Matrix), no detailed quantification, or further assessment will be conducted in this ESIA Report. For activities where possible significant effects could occur, these interactions will be assessed in more detail in *Sections 6.4 and 6.5* of this ESIA Report.

Table 6.1 *Scoping Matrix for Construction and Operation of HAIC*

Project Activities	Physical Environmental							Biological Environment				Human Environment				
	Ambient Air Quality and Climate Change	Ambient Noise & Vibration	Groundwater and Surface Water Quality	Hydrology & Hydrogeology	Soil and Topography	Landscape and Visual Character	Use of Natural Resources	Terrestrial Flora	Terrestrial Fauna	Aquatic Habitat (freshwater)	Aquatic Flora & Fauna(freshwater)	Community Health and Safety	Demographic Pattern, Economy and Livelihoods	Occupational Health and Safety	Infrastructure Services	Cultural Heritage
<i>Construction Phase</i>																
Labour, equipment and services supply																
Transportation of equipment, materials, waste and workforce																
Site preparation, excavation and foundation works																
Use of PME for construction (e.g. generator)																
Solid waste management (non-hazardous and hazardous)																
Wastewater management																
Machinery maintenance / vehicle refueling																
Accidental Events																
<i>Operational Phase</i>																
Incineration																
Presence of the structures																
Labour, equipment and services supply																
Transportation of equipment, materials, waste and workforce																
Use of PME for plant operation (e.g. Drum Crusher)																
Solid waste management (non-hazardous and hazardous)																
Wastewater management																
Machinery maintenance / vehicle refueling																

Project Activities	Physical Environmental							Biological Environment				Human Environment				
	Ambient Air Quality and Climate Change	Ambient Noise & Vibration	Groundwater and Surface Water Quality	Hydrology & Hydrogeology	Soil and Topography	Landscape and Visual Character	Use of Natural Resources	Terrestrial Flora	Terrestrial Fauna	Aquatic Habitat (freshwater)	Aquatic Flora & Fauna (freshwater)	Community Health and Safety	Demographic Pattern, Economy and Livelihoods	Occupational Health and Safety	Infrastructure Services	Cultural Heritage
Accidental Events																

A summary of the impacts that were scoped out during the Scoping Phase and are not considered in this ESIA Report is provided in *Table 6.2*.

Table 6.2 *Scoped Out Impacts and Rationale*

Impact	Rationale for scoping out of assessment
Construction Phase	
Impacts on terrestrial and aquatic biodiversity due to construction activities	The Project will be developed within a brownfield industrial zone. As such, terrestrial and aquatic biodiversity are expected to be of negligible value with no potentially significant impacts from the development.
	During construction of the Project, potential short-term, localized impacts to air quality may arise from gaseous emissions from equipment and vehicles.
Impacts on air quality due to the use of PMEs	Pollutants emitted during the construction phase are likely to include NO _x and NO ₂ , SO ₂ and particulate matter (PM ₁₀ and PM _{2.5}) and remain mostly localised. Due to the nature of the construction process, emissions will not be constant and will fluctuate according to the operating periods for each activity and the equipment being used. In addition, it is expected that emissions could be managed and reduced by implementing good industry practices such as provision of site hoarding along the Project Site and proper maintenance of machinery, etc.
Operation Phase	
Impacts on terrestrial and aquatic biodiversity due to operation activities	The Project will be developed on an industrial zone and is surrounded by other industrial development. As such, terrestrial and aquatic biodiversity are expected to be of negligible value with no potentially significant impacts from the Project.

Impact	Rationale for scoping out of assessment
Impacts on hydrology, hydrogeology and landscape and visual character due to presence of the structure	<p>Potentially significant impact to hydrology and hydrogeology is not expected since drainage channel will be constructed around the Project Site to divert the run-off.</p> <p>Potentially significant impact to landscape and visual character is not expected due to the Project structure since the surrounding area is planned and already been used for industrial purposes.</p>
Impacts on air quality due to the use of PMEs	<p>During operation of the Project, potential localized impacts to air quality may arise from gaseous emissions from equipment and vehicles.</p> <p>Pollutants emitted during the operation phase are likely to include NO_x and NO₂, SO₂ and particulate matter (PM₁₀ and PM_{2.5}). It is expected that emissions could be managed and reduced by implementing good industry practices such as provision of site hoarding along the Project Site and proper maintenance of machinery etc.</p>

Findings of the Scoping Phase are presented in the Scoping Report of the Project under a separate cover ⁽¹⁾. The ESIA ToR is extracted from the Scoping Report and appended in *Annex A*.

As presented in the ESIA ToR, potential significant impacts to air quality, noise, surface water quality, waste management, biodiversity and ecosystems, traffic management and socio-economic conditions are expected from the construction and operation of the Project. Baseline data collection, stakeholder consultation, impact assessment and the preparation of management plans been undertaken, with findings presented in *Sections 4-10* of this ESIA Report.

Priority impacts of the Project identified during the Scoping Phase, for which particular attention was paid during the current IA Phase are discussed in detail below.

6.2.1 *Potential Impacts on Ambient Air Quality*

Based on the nearest settlements within proximity to the Project Site, representative ASRs were identified and shown in *Figure 5.3*. Potential impacts to these ASRs are further discussed below.

Construction Phase

During the scoping site visit, it was observed that the Project Site was muddy with exposed earth works and stockpile materials. These areas associated with site preparation, excavation and foundation works together with transportation were observed to be sources of fugitive dust. Impact to air

(1) Scoping Report - Supplementary ESIA for STC Cement Plant & Associated Facilities in Myanmar, ERM, 2016.

quality from these areas and activities is considered as potentially significant given the existing unmanaged road condition at the Project Site.

Operational Phase

Point source air emission from the incinerator is considered as a potentially significant impact to the nearby ASRs and has not been assessed during local EIA study. The ash generated from the incinerator together with other household solid waste will be sent to a licensed contractor in Thilawa and the incinerator will only be used as a backup as per Hazardous Waste Management Plan. The incinerator will not generate fly ash as it has a dust collector.

6.2.2 Potential Impact on Ambient Noise

Based on the nearest settlements within proximity to the Project Site, representative ASRs were identified and shown in Figure 5.3. Potential impacts to these NSRs are further discussed below.

Construction Phase

Noise will be generated by the plant and machinery used on site to construct the HAIC. This will include PME (Powered Machinery and Equipment) such as generator, cranes, backhoe etc. Noise will also be generated by vehicles transporting the materials and workforce to and from the Project Site. Noise generated during the construction phase is a nuisance to nearby NSRs (Figure 5.14) and is thus considered as potentially significant impact.

Operational Phase

During operation, noise will be generated from transportation related to the Project as well as use of PME for plant operation (e.g. drum crusher). Given that the plant is expected to manufacture 50% of domestic crop protection demand, the transportation volume to and from the Project Site as well as the operation may lead to potentially significant noise impacts on nearby NSRs (Figure 5.14).

6.2.3 Potential Impacts on Groundwater and Surface Water Quality as well as Use of Natural Resources

As presented in Section 4.3, there is a stream at the north-west corner of the Project Site. This stream is on the lowest point of the Project Site and is subjected to wastewater run-off from the Project. The stream flows to the northwest and into the villages of Nyaung Kone and Wah Net Chaung where stream water is then used for domestic purposes (washing, cleaning). Potential impacts to groundwater and surface water quality and use of these water resources by the communities are therefore important issues to be considered in the ESIA Report.

Construction Phase

Typical construction activities (such as site preparation, excavation and foundation work etc.) can cause impacts to surface water quality through run

off of unconsolidated sediments, for example, from stockpile areas. As observed during the site visits in May 2017, there appeared to be no run-off management at the Project Site and sediment-laden run-off was observed flowing to the stream at the north-west corner of the Project Site. The generation of sediment-laden run off could be transferred to the nearby Ayeyarwaddy River. In addition, poor sanitation facilities in the worker camps may lead to surface water contamination through improper sewage handling. Improper solid waste management, which was observed during the site visit, could also be a potentially significant issue to surface water quality.

No secondary containment was observed at the Project Site at the storage area of hazardous materials. Leakage from the storage area as well as from maintenance and refuelling area may result in surface water and groundwater contamination and this can have long-term deleterious effects on human and environmental health.

Operational Phase

During operation, it is expected that the same water quality issues as presented for the construction phase above may occur. In addition, treated wastewater discharge from the wastewater treatment facilities could be a potential issue if not designed properly. However, the distance between the wastewater treatment plant and the nearest stream is 1 km.

6.2.4 *Potential Impacts on Soil and Topography*

Improper solid waste management was observed during the site visit in May 2017, which is considered as a potentially significant issue to soil quality. In addition, there was no secondary containment at the Project Site at the storage area of hazardous materials. Leakage from the storage area as well as from maintenance and refuelling area may result in soil contamination and this can have long-term deleterious effects on human and environmental health. These impacts may occur during both the construction and operation phases and will require proper management measures.

6.2.5 *Potential Impacts on Community Health and Safety*

Potential impacts on community health and safety may be caused by environmental impacts to air quality, noise, surface and ground water quality as well as natural resources as discussed above.

Contractors will be engaged for supply of labour, equipment or services. Contractors' activities could be a nuisance to the local community if not properly managed, for example, occupancy of public area for storage of construction wastes, staging areas or nuisance from workers' camps if sited near the communities.

There is also the increased risk of vehicle collisions with local residents due to increased traffic traveling to and from the Project Site during both the construction and operation phases.

6.2.6 Potential Impacts on Economy and Livelihoods

Construction Phase

The Project is expected to create the following livelihood opportunities (positive impacts) during construction:

- Contractual employment in construction phase activities, including in the supply chain; and
- Increase in business of local shops and markets, establishment of small shops etc. due to the influx of construction personnel.

Operational Phase

During operation, the Project is expected to create the following livelihood opportunities:

- Increase in business of local shops and markets, establishment of small shops etc. due to the influx of operational personnel.
- Regular employment in the operations phase, based on the requirement and skill level of the community.

6.2.7 Potential Impacts on Occupational Health and Safety

Construction Phase

In terms of occupational health and safety, issues include exposure to dust, noise and hazardous materials / wastes and physical hazards associated with the use of heavy equipment. In addition, the construction camp was observed to be not up to international standards during the site visit in May 2017, which may be a potentially significant health and safety issue to the construction workers such as not meeting the IFC PS2 guidelines on minimum living areas, provision of potable drinking water (meeting WHO parameters), electricity, and latrine services.

Operational Phase

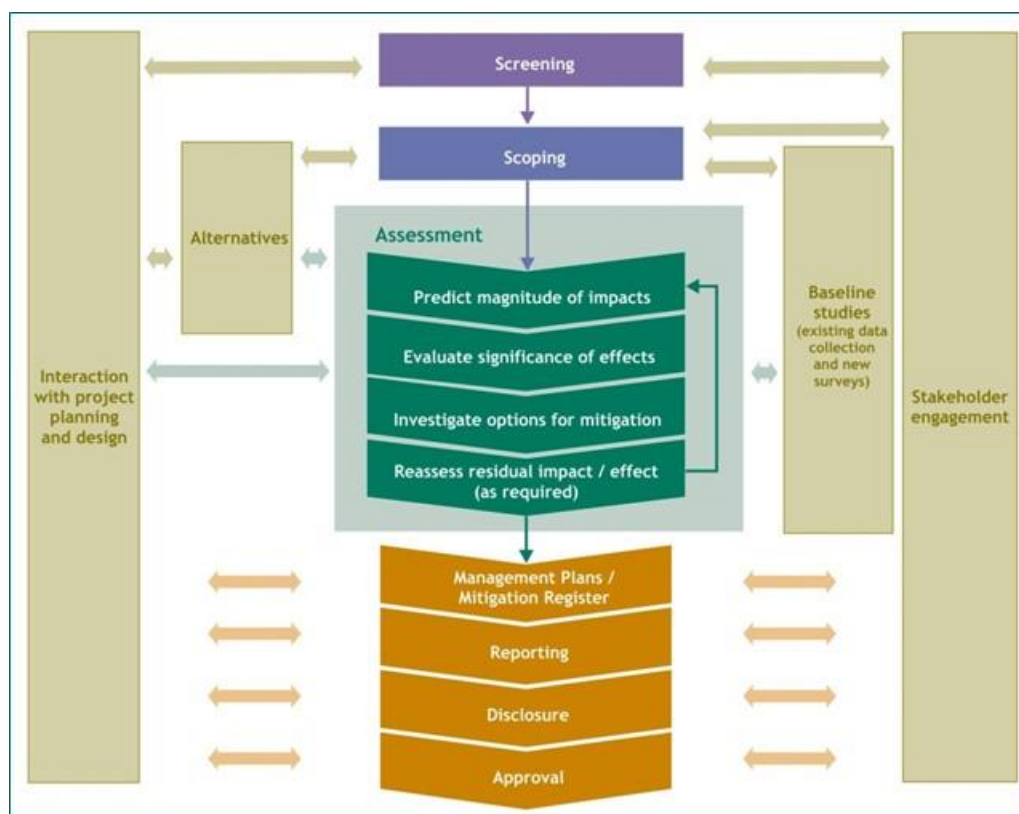
The impacts during the operational phase will be similar to those discussed during construction of the Project.

6.2.8 Potential Impacts on Infrastructure Services

The impacts on the road infrastructure from the Project are likely to result from the movement of equipment, material and workforce during construction. In addition, presence of workers and in-migration may place pressure on the already limited social infrastructure e.g. schools, health facilities, village roads and water supply. These impacts are expected to occur during the construction and operation phases.

The impact assessment (IA) methodology follows the overall approach illustrated in *Figure 6.1*. The IA has been undertaken following a systematic process that predicts and evaluates the impacts the Project could have on aspects of the physical, biological, and social/ socio-economic environment, and identifies measures that the Project will take to avoid, minimise/reduce, mitigate, offset, or compensate for adverse impacts; and to enhance positive impacts where practicable. The stages of the IA process are described below and further explained in the subsequent sections.

Figure 6.1 *Impact Assessment Process*

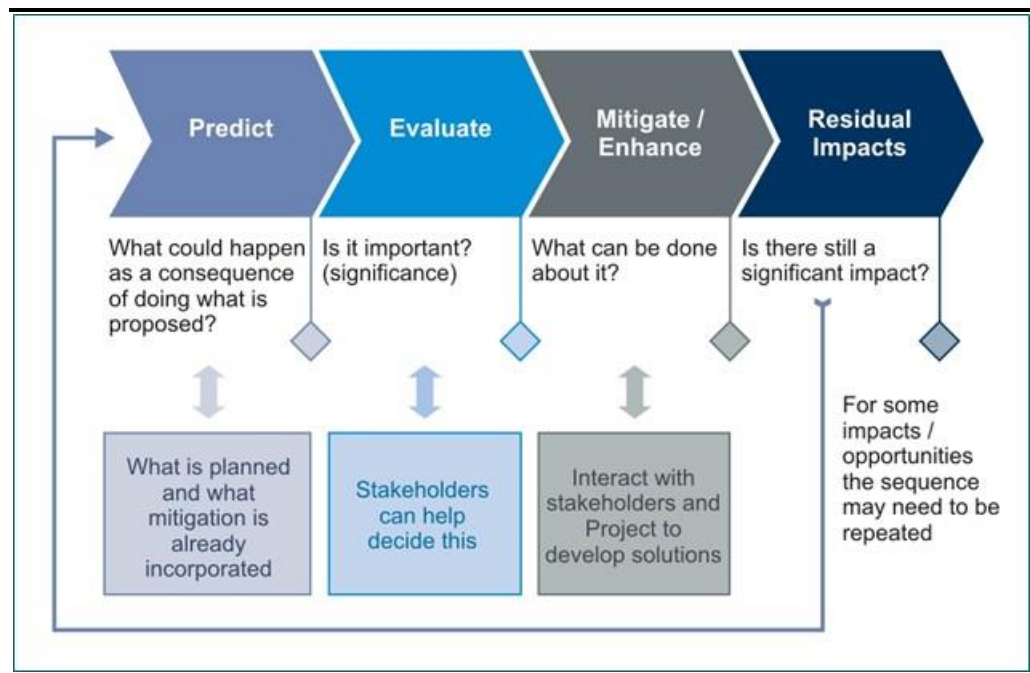


Impact identification and assessment starts with scoping and continues through the remainder of the IA Process. The principal IA steps are summarised in *Figure 6.2* and comprise:

- Impact prediction: to determine what could potentially happen to resources/receptors as a consequence of the Project and its associated activities.
- Impact evaluation: to evaluate the significance of the predicted impacts by considering their magnitude and likelihood of occurrence, and the sensitivity, value and/or importance of the affected resource/receptor.
- Mitigation and enhancement: to identify appropriate and justified measures to mitigate negative impacts and enhance positive impacts.

- Residual impact evaluation: to evaluate the significance of impacts assuming effective implementation of mitigation and enhancement measures.

Figure 6.2 *Impact Assessment Process*



6.3.1 *Prediction of Impacts*

Prediction of impacts is essentially an objective exercise to determine what could potentially happen to the environment as a consequence of the Project and its associated activities. This is essentially a repeat of the process undertaken in scoping, whereby the potential interactions between the Project and the baseline environment are identified. In the impact assessment stage, these potential interactions are updated based on additional Project and baseline information. From these potential interactions, the potential impacts to the various resources/receptors are identified, and are elaborated to the extent possible. The diverse range of potential impacts considered in the IA process typically results in a wide range of prediction methods being used including quantitative, semi-quantitative and qualitative techniques.

6.3.2 *Evaluation of Impacts*

Once the prediction of impacts is complete, each impact is described in terms of its various relevant characteristics (e.g., type, scale, duration, frequency, extent). The terminology used to describe impact characteristics is shown in Table 6.3.

Table 6.3 *Impact Characteristic Terminology*

Characteristic	Definition	Designations
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Type	A descriptor indicating the relationship of the impact to the Project (in terms of cause and effect).	Direct Indirect Induced
Extent	The “reach” of the impact (e.g., confined to a small area around the Project Footprint, projected for several kilometres, etc.).	Local Regional International
Duration	The time over which a resource / receptor is affected.	Temporary Short-term Long-term Permanent
Scale	The size of the impact (e.g., the size of the area damaged or impacted, the fraction of a resource that is lost or affected, etc.)	[no fixed designations; intended to be a numerical value]
Frequency	A measure of the constancy or periodicity of the impact.	[no fixed designations; intended to be a numerical value]

The definitions for the *type* designations are shown in Table 6.4. Definitions for the other designations are resource/receptor-specific, and are discussed in the resource/receptor-specific sections.

Table 6.4 *Impact Type Definitions*

Designations (Type)	Definition
Direct	Impacts that result from a direct interaction between the Project and a resource/receptor (e.g., between occupation of a plot of land and the habitats which are affected).
Indirect	Impacts that follow on from the direct interactions between the Project and its environment as a result of subsequent interactions within the environment (e.g., viability of a species population resulting from loss of part of a habitat as a result of the Project occupying a plot of land).
Induced	Impacts that result from other activities (which are not part of the Project) that happen as a consequence of the Project (e.g., influx of camp followers resulting from the importation of a large Project workforce).

The above characteristics and definitions apply to planned and unplanned events. An additional characteristic that pertains only to unplanned events is *likelihood*. The *likelihood* of an unplanned event occurring is designated using a qualitative scale, as described in Table 6.5.

Table 6.5 *Definitions for Likelihood Designations*

Likelihood	Definition
Unlikely	The event is unlikely but may occur at some time during normal operating conditions.
Possible	The event is likely to occur at some time during normal operating conditions.
Likely	The event will occur during normal operating conditions (i.e., it is essentially inevitable).

6.3.3 *Impact Magnitude, Receptor/Resource Sensitivity and Impact Significance*

Once an impact’s characteristics are defined, the next step in the impact assessment phase is to assign each impact a ‘magnitude’. Magnitude is a

function of some combination (depending on the resource/receptor in question) of the following impact characteristics:

- Extent;
- Duration;
- Scale; and
- Frequency.

Additionally, for unplanned events only, magnitude incorporates the 'likelihood' factor discussed above.

Magnitude essentially describes the intensity of the change that is predicted to occur in the resource/receptor as a result of the impact. As discussed above, the magnitude designations themselves are universally consistent, but the definitions for these designations vary on a resource/receptor-by-resource/receptor basis, as further discussed in each of the resource/receptor-specific sections. The universal magnitude designations are:

- Positive;
- Negligible;
- Small;
- Medium; and
- Large.

In the case of a *positive* impact, no magnitude designation (aside from 'positive') is assigned. It is considered sufficient for the purpose of the IA to indicate that the Project is expected to result in a *positive* impact, without characterising the exact degree of positive change likely to occur.

In the case of impacts resulting from unplanned events, the same resource/receptor-specific approach to concluding a magnitude designation is utilised, but the 'likelihood' factor is considered, together with the other impact characteristics, when assigning a magnitude designation.

The definitions for these designations vary on a resource/ receptor basis. The impact magnitude for the key receptors are provided in *Table 6.6-6.10*.

Table 6.6 *Impact Magnitude for Terrestrial Species*

	Extent / Duration / Scale / Frequency
Large	May affect an entire population or species in sufficient magnitude to cause a decline in abundance and/ or change in distribution beyond which natural recruitment (reproduction, immigration from unaffected areas) would not return that population or species, or any population or species dependent upon it, to its former level within several generations.

Extent / Duration / Scale / Frequency	
Medium	May affect a portion of a population and may bring about a change in abundance and/ or distribution over one or more generations, but does not threaten the integrity of that population or any population dependent on it.
Small	May affect specific group of localised individuals within a population over a short time period (one generation or less), but does not affect other trophic levels or the population itself.
Negligible	Immeasurable, undetectable or within the range of normal natural variation.

Table 6.7 *Impact Magnitude for Terrestrial Habitats*

Extent / Duration / Scale / Frequency	
Large	May affect the integrity of an area or region, by substantially changing, in the long term, its ecological features, structures and functions, across its whole area, that enable it to sustain the habitat, complex of habitats and/or population levels of species that makes it important.
Medium	May affect some, if not all, of the area's ecological features, structures and functions in the short or medium term. The area or region may be able to recover through natural regeneration and restoration.
Small	May cause some minor impacts of limited extent, or to some elements of the area, are evident but easy to recover through natural regeneration.
Negligible	Immeasurable, undetectable or within the range of normal natural variation.

Table 6.8 *Impact Magnitude for Water Quality*

Extent / Duration / Scale / Frequency	
Large	Change in water quality over a large area that lasts over the course of several months with quality likely to cause secondary impacts on marine ecology; and/or Routine exceedance of benchmark effluent discharge limits.
Medium	Temporary or localised change in water quality with water quality returning to background levels thereafter and/or occasional exceedance of benchmark effluent discharge limits.
Small	Slight change in water quality expected over a limited area with water quality returning to background levels within a few metres and/or discharges are well within benchmark effluent discharge limits.
Negligible	Immeasurable, undetectable or within the range of normal natural variation.

Table 6.9 *Impact Magnitude for Local Communities*

Extent / Duration / Scale / Frequency	
Large	Change dominates over baseline conditions. Affects the majority of the area or population in the area of influence and/or persists over many years. The impact may be experienced over a regional or national area.
Medium	Clearly evident difference from baseline conditions. Tendency is that impact affects a substantial area or number of people and/or is of medium duration. Frequency may be occasional and impact may potentially be regional in scale.
Small	Perceptible difference from baseline conditions. Tendency is that impact is local, rare and affects a small proportion of receptors and is of a short duration.
Negligible	Change remains within the range commonly experienced within the household or community.

Table 6.10 *Impact Magnitude for Air Pollutants*

Magnitude of impact	Non-degraded airshed (i.e. baseline < AQS)	Degraded airshed (i.e. baseline > AQS)
Negligible	PC <25% of AQS	PC <10% of AQS
Small	PC between 25% and 50% of AQS and PEC <100% of AQS	PC between 10% and 30% of AQS

Magnitude of impact	Non-degraded airshed (i.e. baseline < AQS)	Degraded airshed (i.e. baseline > AQS)
Medium	PC between 50% and 100% of AQS, and PEC <100% AQS; or PC between 25% and 50% of AQS, and PEC >100% of AQS	PC between 30% and 50% of AQS
Large	PC > 100% of AQS; or PC > 50% of AQS, and PEC >100% of AQS	PC > 50% of AQS
PC: Process Contribution PEC: Predicted Environmental Concentration AQS: Air Quality Standard		

The other principal impact evaluation step is definition of the sensitivity (including vulnerability and importance) of the impacted resource/receptor. Other factors may also be considered, such as legal protection, government policy, stakeholder views, and economic value.

As in the case of magnitude, the sensitivity designations themselves are universally consistent, however, the definitions for these designations vary on a resource/receptor basis. The universal sensitivity/ vulnerability/ importance designations are: Low; Medium; and High.

The receptor sensitivities for key receptors are provided in *Table 6.11-6.15*.

Table 6.11 ***Receptor Sensitivity for Terrestrial Habitat***

Category	Designation / Importance / Vulnerability
High	A habitat that has designated conservation status at an international scale (e.g. IUCN). Areas of particular biodiversity importance that may support populations of restricted range, endemic or endangered species, or is in itself unique or threatened.
Medium	A habitat that has designated conservation status at a national or regional scale. Areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition.
Low	A habitat not protected by law. Areas that may contain a large proportion of plant and/or animal species of non-native origin, and/or where human activity has substantially modified an area's primary ecological functions and species composition.

Table 6.12 ***Receptor Sensitivity for Terrestrial Species***

Category	Designation / Importance / Vulnerability
High	A species population that has designated conservation status at an international scale (e.g. IUCN). A species that is globally rare. A keystone species fundamental to the functioning of the ecosystem.
Medium	A species population that has designated conservation status at a national or regional scale. A species common globally but rare locally. Important to ecosystem functions or under threat or population in decline.
Low	A species not protected by law.

Category	Designation / Importance / Vulnerability
	Not critical to other ecosystem functions (e.g. as prey to other species or as predator to potential pest species) or common / abundant locally.

Table 6.13 *Receptor Sensitivity for Water Quality*

Category	Designation / Importance / Vulnerability
High	Existing water quality is already under stress and/ or the ecological resources it supports are very sensitive to change (secondary ecological or health impacts are likely).
Medium	Existing water quality already shows some signs of stress and/ or supports ecological resources that could be sensitive to change in water quality.
Low	Existing water quality is good and the ecological resources that it supports are not sensitive to a change in water quality.

Table 6.14 *Receptor Sensitivity for Local Communities*

Category	
High	Profound or multiple levels of vulnerability that undermine the ability to adapt to changes brought by the Project.
Medium	Some but few areas of vulnerability; but still retaining an ability to at least in part adapt to change brought by the Project.
Low	Minimal vulnerability; consequently with a high ability to adapt to changes brought by the Project and opportunities associated with it.

Table 6.15 *Receptor Sensitivity for Air Pollutants*

Receptor Sensitivity	Human Health	Ecology
High	Hospitals	Internationally Designated Sites
Medium	General Population	Nationally Designated Sites
Low	n/a	<ul style="list-style-type: none"> Locally Designated Sites (Areas of specific ecological interest not subject to statutory protection) Agriculture

Once magnitude of impact and sensitivity/vulnerability/importance of resource/receptor have been characterised, the significance can be assigned for each impact. Impact significance is designated using the matrix shown in Figure 6.3.

Figure 6.3 *Impact Significances*

		Sensitivity/Vulnerability/Importance of Resource/Receptor		
		Low	Medium	High
Magnitude of Impact	Negligible	Negligible	Negligible	Negligible
	Small	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Major

The matrix applies universally to all resources/receptors, and all impacts to these resources/receptors, as the resource/receptor-specific considerations are factored into the assignment of magnitude and sensitivity/vulnerability/importance designations that enter into the matrix.

Box 6.1 provides a context for what the various impact significance ratings signify.

It is important to note that impact prediction and evaluation take into account any embedded controls (i.e., physical or procedural controls that are already planned as part of the Project design, regardless of the results of the IA Process). An example of an embedded control is a standard acoustic enclosure that is designed to be installed around a piece of major equipment. This avoids the situation where an impact is assigned a magnitude based on a hypothetical version of the Project that considers none of the embedded controls.

6.3.4 *Identification of Mitigation and Enhancement Measures*

Once the significance of an impact has been characterised, the next step is to evaluate what mitigation and enhancement measures are warranted. For the purposes of this IA, ERM has adopted the following Mitigation Hierarchy:

- **Avoid at Source; Reduce at Source:** avoiding or reducing at source through the design of the Project (e.g., avoiding by siting or re-routing activity away from sensitive areas or reducing by restricting the working area or changing the time of the activity).
- **Abate on Site:** add something to the design to abate the impact (e.g., pollution control equipment, traffic controls, perimeter screening, and landscaping).
- **Abate at Receptor:** if an impact cannot be abated on-site then control measures can be implemented off-site (e.g., noise barriers to reduce noise impact at a nearby residence or fencing to prevent animals straying onto the site).
- **Repair or Remedy:** some impacts involve unavoidable damage to a resource (e.g. agricultural land and forestry due to creating access, work camps or materials storage areas) and these impacts can be addressed through repair, restoration or reinstatement measures.
- **Compensate in Kind; Compensate Through Other Means:** where other mitigation approaches are not possible or fully effective, then compensation for loss, damage and disturbance might be appropriate (e.g., planting to replace damaged vegetation, financial compensation for damaged crops or providing community facilities for loss of fisheries access, recreation and amenity space).

The priority in mitigation is to first apply mitigation measures to the source of the impact (i.e., to avoid or reduce the magnitude of the impact from the associated Project activity). Then to address the resultant effect to the resource/receptor via abatement or compensatory measures or offsets (i.e., to reduce the significance of the effect once all reasonably practicable mitigations have been applied to reduce the impact magnitude).

An impact of **negligible** significance is one where a resource/receptor (including people) will essentially not be affected in any way by a particular activity or the predicted effect is deemed to be 'imperceptible' or is indistinguishable from natural background variations.

An impact of **minor** significance is one where a resource/receptor will experience a noticeable effect, but the impact magnitude is sufficiently small (with or without mitigation) and/or the resource/receptor is of low sensitivity/ vulnerability/ importance. In either case, the magnitude should be well within applicable standards.

An impact of **moderate** significance has an impact magnitude that is within applicable standards, but falls somewhere in the range from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit. Clearly, to design an activity so that its effects only just avoid breaking a law and/or cause a major impact is not best practice. The emphasis for moderate impacts is therefore on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable (ALARP). This does not necessarily mean that impacts of moderate significance have to be reduced to minor, but that moderate impacts are being managed effectively and efficiently.

An impact of **major** significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. An aim of IA is to get to a position where the Project does not have any major residual impacts, certainly not ones that would endure into the long-term or extend over a large area. However, for some aspects there may be major residual impacts after all practicable mitigation options have been exhausted (i.e. ALARP has been applied). An example might be the visual impact of a facility. It is then the function of regulators and stakeholders to weigh such negative factors against the positive ones, such as employment, in coming to a decision on the Project.

6.3.5 *Residual Impact Evaluation*

Once mitigation and enhancement measures are declared, the next step in the IA Process is to assign residual impact significance. This is essentially a repeat of the impact assessment steps discussed above, considering the assumed implementation of the additional declared mitigation and enhancement measures.

6.3.6 *Management and Monitoring*

The final stage in the IA Process is definition of the management and monitoring measures that are needed to identify whether: a) impacts or their associated Project components remain in conformance with applicable standards; and b) mitigation measures are effectively addressing impacts and compensatory measures and offsets are reducing effects to the extent predicted.

An ESMP, which contains a summary of all actions which the Project Proponents have committed to executing with respect to environmental/social/health performance for the Project, is also included as part of the ESIA Report. The ESMP includes mitigation measures, compensatory measures and offsets, and management and monitoring activities.

As presented in the ESIA ToR (**Appendix A**), potential significant impacts to air quality, noise, surface water quality, soil quality, community health and safety, economy and livelihoods, occupational health and safety, and infrastructure are expected from the construction and operation of the Project. These priority impacts of the Project identified during the Scoping Phase are included in the impact assessment provided below.

The Project's Environmental and Social Action Plan (ESAP) is included in **Appendix C**.

6.4.1

Air Quality

Source of Impacts

The construction of the Project has the potential to generate dust as a result of ground excavation, material transfer, stockpiles of material and use of construction vehicles on unmade roads.

Fugitive dust has the potential to cause impacts on sensitive receptors near construction activities if not managed accordingly. Dust emissions can vary substantially from day to day and will depend on the level of activity, the specific operations being undertaken and the meteorological conditions.

The proposed Project activities identified as having a potential impact on air quality during the construction period include:

- Vehicle movements over unpaved access roads and within construction areas;
- Site clearance, site formation and levelling involving excavation and material transfer; and
- Construction of the main Project infrastructure.

The Institute of Air Quality Management (IAQM) ⁽¹⁾ provide guidance for defining the significance arising from construction sites based on the magnitude of the change and the sensitivity of the receptors identified. The risk of dust emissions is defined using a number of variables including, but not limited to the activities being undertaken, the duration of activities, the size of the site and the meteorological conditions. The guidance further provides screening criteria of 350 m and 50 m from the construction site and access road, respectively, beyond which impacts are not considered likely. The premise of the guidance is that with the implementation of effective site specific mitigation measures, the environmental effect will not be significant in most cases. However, as the guidance is primarily developed for use in the UK, consideration is given to its applicability in Myanmar due to the dissimilar climate and differing construction working practices. On this

⁽¹⁾ Institute of Air Quality Management (IAQM) (2014) Guidance on the Assessment of Dust from Demolition and Construction [Online] Available at: <http://iaqm.co.uk/guidance/> {Accessed 07 August 2017}

basis, further evidence has been explored such as that specified by the USEPA⁽¹⁾ (2) which states that:

“The potential drift distance of particles is governed by the initial injection height of the particle, the terminal settling velocity of the particle, and the degree of atmospheric turbulence. Theoretical drift distance, as a function of particle diameter and mean wind speed, has been computed for fugitive dust emissions. Results indicate that, for a typical mean wind speed of 16 km/hr (10 mph), particles larger than about 100 µm are likely to settle out within 6 to 9 meters (20 to 30 feet [ft]) from the edge of the road or other point of emission. Particles that are 30 to 100 µm in diameter are likely to undergo impeded settling. These particles, depending upon the extent of atmospheric turbulence, are likely to settle within a few hundred feet from the road. Smaller particles, particularly PM-15, PM-10, and PM-2.5, have much slower gravitational settling velocities and are much more likely to have their settling rate retarded by atmospheric turbulence.”

And:

“Entrainment of dust particles by the action of turbulent air currents, such as wind erosion, are likely to occur from open exposed surfaces (such as stripped ground and stock piles) at wind speeds greater than 19 kilometres per hour(5.3 m/s).”

And:

“However, all roads are subject to some natural mitigation because of rainfall and other precipitation and emission factors can be extrapolated to annual average uncontrolled conditions (but including natural mitigation) under the simplifying assumption that annual average emissions are inversely proportional to the number of days with measurable (more than 0.254 mm [0.01 inch]) precipitation.”

Existing / In-Place Controls

There are no in place controls for air quality.

Impact Significance

The evidence presented suggests that particulate matter generated by the Project can remain airborne and can travel several hundred feet from the source, and emissions and subsequent impacts to air quality associated with the construction activities will depend a lot upon the nature of the activities occurring at any one time or location and local meteorological conditions at the time of release. Given that during construction, emission source locations and volumes of materials being moved, for example, are constantly changing both spatially and temporally, impacts have not been separately quantified for separate Project related construction sites or activities. Instead, the impact from construction dust is said to have a major adverse impact if unmitigated and uncontrolled at receptors within a conservative distance of 500 m of

(1) United States Environmental Protection Agency (USEPA) (1995) AP-42 Section 13.2 Fugitive Dust Sources [Online] Available at: <https://www3.epa.gov/ttnchie1/ap42/ch13/> [Accessed 03 August 2017]

(2) United States Environmental Protection Agency (1995) AP-42 Section 13.2 Fugitive Dust Sources [Online] Available at: <https://www3.epa.gov/ttnchie1/ap42/ch13/> [Accessed 03 August 2017]

construction activities and access roads. The significance of impacts pre-mitigation is presented below in *Table 6.16*.

Table 6.16 *Assessment of Impact Related to Construction Dust during Construction*

Impact	Adverse impact to human health and agriculture, as well as nuisance issues from dust emitted from construction related activities including vehicles moving over un-paved road surfaces.				
Impact Nature	Negative	Positive	Neutral		
	Elevated ambient concentrations of dust from construction related activities will have a negative impact on human health and agriculture as well create nuisance issues.				
Impact Type	Direct	Indirect	Induced		
	Elevated ambient concentrations of dust from construction related activities will have a direct impact on human health and agriculture as well create nuisance issues.				
Impact Duration	Temporary	Short-term	Long-term	Permanent	
	Potential impacts to air quality will occur throughout the construction phase only and can therefore be described as short term in nature.				
Impact Extent	Local	Regional	International		
	Construction activities at the site have the potential to result in significant emissions of dust up to 500 m from the construction site boundary and can therefore be described as local .				
Impact Scale	The scale of the impact is likely to be up to 500m from the construction site boundary.				
Frequency	Impacts will be intermittent and spatially variable during the construction phase.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
	The impact magnitude before mitigation is expected to be large .				
Receptor Sensitivity	Low	Medium	High		
	All sensitive human and agricultural receptors in the study area are defined as 'medium' sensitivity with regard to impacts from dust emissions.				
Impact Significance	Negligible	Minor	Moderate	Major	
	The impact magnitude before mitigation is expected to be major .				

Additional Mitigation and / or Management Measures

Effective site management is critical to the successful implementation of dust suppression procedures and any air quality complaints during the construction phase of the Project should be investigated, the cause determined and actions taken to reduce those emissions in a timely manner.

For the construction activities, several best practice mitigation and management measures are advised:

- An Air Pollution Management Plan (APMP) should be produced and adhered to. The APMP will include measures to be adopted by Awba during the dry season to avoid dust impacts such as the use of localised dampening and activity specific dampening should be used to reduce localised emissions of dust;
- Water suppression or surface binding agents should be used on exposed open earthworks where rainfall is less than 0.25 mm in a 24 hour period and wind speeds are forecast to be more than 19 kph (5.3m/s) (i.e., during the dry season from December to March;
- Where unpaved roads are utilised by vehicles, water suppression at a rate of 2 litres/m²/hr should be used where rainfall of less than 2 mm in the last hour has occurred or surface binding agents should be used to more permanently reduce dust generation;
- On-site meteorological monitoring should be undertaken to inform the use of mitigation on site during construction period. This will be included in the Construction Phase Monitoring Plan;
- Wheel washing should be used prior to entry onto a sealed road section to avoid tracking dirt onto sealed roads and generating dust;
- Vehicles transporting dusty materials should be covered;
- Stockpiling of material, for example, rocks, sand and soils should be minimised;
- Stockpiles should be located as far away from receptors as possible;
- The design of stockpiles should be optimised to retain a low profile with no sharp changes in shape;
- Vegetation of stockpiles should be used where a stockpile is not to be used for a month to stabilize the surface and prevent dust generation;
- Drop heights of material should be minimised;
- Wind breaks should be erected around the key construction activities and in the vicinity of potentially dusty works;
- Qualitative monitoring surveys should be implemented to include site inspections for visible dust emissions in the vicinity of the site boundary (both internal and external); and
- Visual monitoring of dust deposition onto surfaces on and off-site should be undertaken regularly.

Management procedures, such as those outlined above, should be outlined within the air pollution management plan so that impacts to air quality are reduced.

It should be noted that dust during the construction phase, dust emissions will be naturally attenuated during periods of increased precipitation i.e. during the wet season. Mitigation measures should be carefully considered relative to meteorological conditions and amended accordingly. For example, the use of additional water suppression and localised dampening should be managed during periods of increased rainfall as additional suppression techniques may not be necessary.

A Construction Phase Monitoring Plan will be required for the Project which will include air quality. During construction, emissions of particulates PM10, PM2.5, NO₂, and SO₂ will be monitored monthly at the ASRs. NO₂ and SO₂ measured by means of a diffusion tube. Others will be monitored by HAZ-SCANNER (EPAS) Environmental Perimeter Air Monitoring System.

Significance of Residual Impact

When correctly applying and actively managing the mitigating controls outlined in Section 8.1.2, it is reasonable to conclude that receptors located within 500 m downwind of any construction activity are likely to experience minor impacts to air quality. It is important to undertake monitoring to track the effectiveness of these mitigation measures and manage any necessary changes accordingly.

Monitoring Plan

Air monitoring will be conducted monthly during construction and operation. Parameters to be measured during construction include PM₁₀, PM_{2.5}, NO₂, and SO₂. More information is provided in *Section 8.4.5*.

6.4.2

Noise

Source of Impacts

The construction noise impact assessment was conducted with reference to relevant international guidelines and local legislation, regulations, standards where available. Noise level guidelines given in Myanmar Environmental Quality Guideline (EQG) and IFC General EHS Guidelines are 55 dB(A) LAeq,1 hour for daytime and 45 dB(A) LAeq, 1 hour for night-time, or a maximum increase in background levels of not more than 3 dB(A) at the nearest receptor location off-site. Since baseline monitoring was conducted, noise criterion of a maximum increase in background levels of not more than 3 dB(A) was adopted as the assessment criterion.

Baseline noise monitoring was conducted on 30 June to 5 July 2017 at five selected noise sensitive receivers (NSRs) located near the Project Site to establish the background levels (*Figure 5.14*). Based on the findings, the average noise levels (both day and night time) at the Baseline Noise Monitoring locations are in general above the EQG and IFC EHS General Guidelines (2007). These baseline levels were mainly captured from vehicles (motorcycles, cars), people activities, rain and loud speakers.

The methodology adopted for the construction noise impact assessments is based on standard acoustics principles. The procedures of the assessment are summarised as follows:

- locate representative noise sensitive receiver (NSR) that may be affected by the works;
- assign Sound Power Level (SWL) to each plant item proposed and calculate the overall SWL associated with the proposed plant inventory;

- determine the distance between the approximate geographical centre of the Project work site and the NSR;
- apply correction factors on the distance and façade reflection, in accordance with BS5228: Part 1: 2009(1); and
- predict the construction noise levels at NSRs on the basis of the plant activity and an in built design controls, if any.
- Identification of Noise Sensitive Receivers
- The nearest representative NSRs that may potentially experience noise impacts from the construction works of the Project are identified with locations shown in *Figure 5.14*:

Noise will be generated by the plant and machinery used on site to construct the HAIC. This will include plant and machinery such as generator, cranes, backhoe etc. Noise generated during the construction phase is a nuisance to nearby NSRs and is thus considered as potentially significant impact.

The indicative construction plant inventory for the construction activities during daytime period of the Project is summarised in *Table 6.17*. It is assumed that the construction works will be carried out during daytime period only.

Table 6.17 *Indicative Construction Plant Inventory (Daytime)*

Plant Item	Quantity during peak hour	Unit SWL, dB(A)	Sub-Total SWL, dB(A)	Overall SWL, dB(A) ^{(b) (c)}
Excavator	5	100	107	123
Dozer	5	107	114	
Mobile crane	5	108	115	
Concrete pump (stationery)	3	103	108	
Concrete pump (Boom)	3	108	113	
Roller compactor	5	103	110	
Jack hammer	5	113	120	

Notes:

(a) SWL is calculated from the Sound pressure level at 10m provided by the Client.

(b) The figures are rounded up to a whole number.

(c) The overall SWL represents the maximum potential noise impact during construction phase.

The results of the predicted construction noise levels at the representative NSRs are presented in *Table 6.18*.

Table 6.18 *Predicted Construction Noise Levels at Representative NSRs*

NSR	Distance between the approximate Geometric Centre of the Works Area and NSR (D), m	Predicted Noise Level ^{(b) (c)} , dB(A)
NSR1	3,000	45
NSR2	1,307	47

(i) Noise and Vibration Control on Construction and Open Sites, Part 1. Code of Practice for Basic Information and Procedures for Noise and Vibration control. British Standard, BS5228: Part 1: 2009

NSR	Distance between the approximate Geometric Centre of the Works Area and NSR (D), m	Predicted Noise Level ^{(b) (c)} , dB(A)
NSR3	615	55
NSR4	1,026	50
NSR5	1,564	45

Notes:

- (a) The SWL from *Table 8.4* has been adopted in the calculation.
(b) Predicted noise level = overall SWL + distance correction + façade reflection
= 123 - (25 x log D + 1) + 3
(c) The figures are rounded-up to a whole number.

Potential Consequence

With the indicative plant inventory presented in *Table 6.19*, the predicted construction noise levels at the representative NSRs are in the range of 45 - 55 dB(A).

Table 6.19 Predicted Construction Noise Levels at Representative NSRs

NSR	Predicted Noise Level (A), dB(A)	Daytime Averaged Background Noise Level (B), dB(A)	Cumulative Noise Level, dB(A) ^(a)	Increase in Background Noise, dB(A) ^(b)	Compliance (Yes/No)
NSR1	45	66	66	0	Yes
NSR2	47	59	59	0	Yes
NSR3	55	61	62	1	Yes
NSR4	50	50	53	3	Yes
NSR5	45	67	67	0	Yes

Notes:

- (a) Cumulative Noise Level (C) = $10 \times \log (10^{(A/10)} + 10^{(B/10)})$
(b) With reference to assessment noise criterion of a maximum increase in background levels of not more than 3 dB(A).

The predicted noise levels at all NSRs during daytime period due to construction activities comply with the EQG and IFC General EHS Guidelines. Noise mitigation measures are considered unnecessary.

Existing in-place controls

There are currently no existing / in-place controls for noise.

Impact Significance

The nearby NSRs are residential in nature and their sensitivity is considered medium. Given in *Table 8.6* that the predicted noise levels due to construction of the Project comply with noise criteria, construction noise impact is not anticipated. As such, the magnitude of impact is considered high and the impact significance is considered **negligible** (see *Table 6.20*).

Table 6.20 Noise Impact Assessment - General Construction Phase

Impact	Noise impact from the construction works during construction phase.		
Impact Nature	Negative	Positive	Neutral
	Noise impact from the construction activities is negative .		

Impact Type	Direct		Indirect		Induced
	Noise impact from the construction activities is direct .				
Impact Duration	Temporary	Short-term	Long-term	Permanent	
	Noise impact from the construction activities is temporary .				
Impact Extent	Local		Regional		International
	Noise impact from the construction equipment and activities is local .				
Impact Scale	Project area.				
Frequency	Throughout the construction period.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
	Considering the predicted noise levels comply with both the noise criteria. The magnitude of the noise impact is Negligible .				
Receptor Sensitivity	Low		Medium		High
	The identified NSR are residential, the sensitivity of the receptor is considered as medium .				
Impact Significance	Negligible	Minor	Moderate	Major	
	As the impact magnitude is negligible and the receptor sensitivity is medium, the impact significance is considered as Negligible .				

Good Site Practices

The following good site practices are recommended during construction phase of the Project:

- Well-maintained equipment to be operated on-site;
- Regular maintenance of equipment such as lubricating moving parts, tightening loose parts and replacing worn out components;
- Shut down or throttled down between work periods for machines and construction plant items (e.g. trucks) that may be in intermittent use;
- Reduce the number of equipment operating simultaneously as far as practicable;
- Orientate equipment known to emit noise strongly in one direction so that the noise is directed away from receptors as far as practicable;
- Locate noisy plant as far away from receptors as practicable;
- Avoid transportation of materials on- and off-site through existing community areas; and
- Use material stockpiles and other structures, where practicable, to screen noise sensitive receptors from on-site construction activities.

Significance of Residual Impact

Residual noise impact due to the construction of the Project is expected to be of **negligible significance**. Noise monitoring during construction will take place on a monthly basis.

Monitoring plan

Noise monitoring will be conducted as part of the Environmental Monitoring Plan during construction and operation. Parameters to be measured include dB noise levels over a 24 hour period (day and night time). More information is provided in Section 8.4.5.

6.4.3

Water Quality

Source of Impacts

As presented in Section 5.5, the Sabagyi creek is located at the north-west corner of the Project Site. This creek is on the lowest point of the Project Site and is subjected to wastewater run-off from the Project. The Sabagyi creek flows to the northwest and into the villages of Nyaung Kone and Wah Net Chaung. The villagers does not use the water resource of the Sabagyi creek. However, if the surface water quality of the creek were impacted by the HAIC Project's activities, this creek would be also impacted.

Typical construction activities (such as site preparation, excavation and foundation work etc.) can cause impacts to surface water quality through run-off unconsolidated sediments, for example, from stockpile areas. As observed during the site visits in May 2017, there appeared to be no run-off management at the Project Site and sediment laden run-off was observed flowing to the creek at the north-west corner of the Project Site. The generation of sediment-laden run off could be transferred to the nearby Sabagyi creek. In addition, poor sanitation facilities in the worker camps may lead to surface water contamination through improper sewage handling. Improper solid waste management, which was observed during the site visit, could also be a potentially significant issue to surface water quality.

No secondary containment was observed at the Project Site at the storage area of hazardous materials. Spill from the storage area as well as from maintenance and refuelling area may result in surface water contamination and this can have long-term deleterious effects on human and environmental health.

Results of the baseline water quality surveys conducted in June to July 2017 indicated there where high levels of TSS in the surface water and total coliform bacteria at all stations.

Existing / In-place Controls

There are no existing / in-place controls.

Impact Significance

The receptor sensitivity to surface water quality impact is high given that the streams and rivers downstream of the Project Site are used as a drinking water supply. The potential impact magnitude is considered to be large given the existing in-place control is considered inadequate. The overall impact significance is therefore **major** (Table 6.21).

Table 6.21 **Water Quality Impact Assessment**

Impact	Deterioration of surface water quality in nearby watercourses from uncontrolled runoff, improper wastewater, solid waste and hazardous material management at the site.				
Impact Nature	Negative	Positive	Neutral		
	Pollutants entering surface water courses would create a negative impact.				
Impact Type	Direct	Indirect	Induced		
	The impact would be directly upon surface water resources and on the residents of nearby villages that depend on water supplied from the watercourses.				
Impact Duration	Temporary	Short-term	Long-term	Permanent	
	If not managed, the impact would occur during the construction phase of the Project.				
Impact Extent	Local	Regional	International		
	The extent of the impact would be limited to the watercourses adjacent to the site.				
Impact Scale	Moderate				
Frequency	Runoff from the construction site will occur frequently during the construction phase. Contamination due to improper wastewater, solid waste and hazardous material management are expected to be infrequent during the construction phase.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
	The impact magnitude is Large .				
Receptor Sensitivity	Low	Medium	High		
	The receptor sensitivity is High , given the year round dependence by residents on water from the watercourses for drinking, washing and cleaning.				
Impact Significance	Negligible	Minor	Moderate	Major	
	The impact magnitude before mitigation is expected to be major .				

Additional Mitigation/Management Measures

Construction Site Run-off and Drainage

Good site practices should be developed in order to minimise surface runoff, and also to retain and reduce any suspended solids prior to discharge. These practices include the follows:

- Exposed soil surfaces should be protected by paving or fill material as soon as possible to reduce the potential of soil erosion.

- Open stockpiles of construction materials or construction wastes on-site should be covered with tarpaulin or similar fabric during rainstorms.
- Design drainage pipes and culverts for the controlled release of storm flows.
- Regularly, and particularly following rainstorms, inspect and maintain drainage systems and erosion control and silt removal facilities to ensure proper and efficient operation at all times.
- Provide measures to reduce the ingress of site drainage into excavations. If trenches have to be excavated during the wet season, excavate and backfill them in short sections wherever practicable. Discharge any water pumped out from trenches or foundation excavations into storm drains via silt removal facilities.
- Mulch to stabilise exposed areas, where practicable and appropriate.
- Re-vegetate areas promptly, where practicable and appropriate.
- Provide measures to prevent the washing away of construction materials, soil, silt or debris into any drainage system of open stockpiles of construction materials.
- Construct wells/ sediment basins for the separation of oil in the wash water and storm water drains.
- Oil water separators and grease traps will be installed and maintained as appropriate at refuelling facilities, workshops, parking areas, fuel storage and containment areas.
- Discharges of runoff should be monitored monthly for compliance with Myanmar National Environmental Quality (Emissions) Guidelines for site runoff and wastewater discharges (construction phase).

Sewage Generated from On-site Workforce

- Where no public sewage treatment system is available (e.g. during construction), sanitary waste water will be treated by domestic waste water unit (ref. septic tank). The contractor will provide the domestic waste water unit which is designed and installed to treat all domestic wash and wastewater and sewage during construction. All effluents shall comply with legal guidelines for emissions into the environment, as appropriate.
- Sewage from toilets, kitchens and similar facilities should be discharged into a foul sewer or appropriate receiving facility. Wastewater collected from canteen kitchens, including that from basins, sinks and floor drains, should be discharged into foul sewers via grease traps. The foul sewer should then lead to the temporary sewage treatment plant prior to discharge or reuse as greywater.

- Discharges of treated sewage should be monitored monthly for compliance with Myanmar National Environmental Quality (Emissions) Guidelines for site runoff and wastewater discharges (construction phase).

Hazardous Material Management

- Oils, fuels and chemicals should only be used and stored in designated areas which have pollution prevention facilities and constructed on bund hardstand. The bund should be drained of rainwater after a rain event.
- Proper guidelines and procedures should be developed and included in a Spill Response Plan (SPR) for immediate clean-up actions following any spillages of oil, fuel or chemicals.
- Surface run-off from bunded areas should pass through oil water separators and grease traps prior to discharge to the storm water system.

Solid Waste Management

- A Solid Waste Management Plan (SWMP) for the Project should be developed that sets out plans and actions for construction waste as follows.
- Good housekeeping practices for waste storage and handling referencing GIIP;
- The SWMP should include a waste inventory developed in the planning stage, in discussion with the engineers, to establish the types of wastes expected from the construction and to identify appropriate disposal routes;
- Construction materials will be managed in a way to avoid over-ordering, poor storage and maintenance, mishandling as well as improper operation procedures;
- Construction wastes will be separated into reusable items and materials to be disposed of or recycled whenever possible;
- Waste suitable for reuse will be stored on site and reintroduced to the construction process as and when required;
- The SWMP will identify disposal routes (including transport options and disposal sites) for all wastes generated during the construction phase;
- A hazardous waste management system covering waste classification, separation, collection, storage, transfer and disposal should be set up and operated. The waste management system will comply with applicable regulation of the government, if any, or in its absence, GIIP;
- Hazardous waste will be stored in such a way as to prevent and control accidental release to the environment (e.g. secondary containment, sealed containers);
- Waste will be collected regularly by reputable waste collectors;

- Recyclables such as scrap steel, metals, plastics, and paper items will be collected for recycling wherever possible;
- Disposal of construction waste in or off the construction site should be prohibited;
- Chain of custody documents should be used for construction waste to monitor disposal; and
- Waste segregation should be practiced at the workers camps with an emphasis placed on reducing, reusing and recycling of waste streams as appropriate.

A Construction Phase Monitoring Plan will be required for the Project which will include surface water quality. During construction, surface water quality monitoring will include pH, DO, COD, BOD5, oil and grease, TN, TP, TSS and total coliform. This will be conducted monthly at the water sampling locations shown in *Figure 5.20* and one upstream station located 100m upstream of the Project Site.

Significance of Residual Impact

With proper implementation of the recommended mitigation measures, the residual impacts to surface water quality are expected to be of **minor significance**. It is important to undertake monitoring to track the effectiveness of these mitigation measures and manage any necessary changes accordingly.

Monitoring plan

Surface water quality monitoring will be conducted monthly during construction and operation. Parameters to be measured during construction include pH, DO, COD, BOD5, oil and grease, TN, TP, TSS and total coliform. More information is provided in *Section 8.4.5*.

6.4.4

Soil Quality

Source of Impacts

Improper solid waste management was observed during the site visit in May 2017 which is considered as a potentially significant issue to soil quality. In addition, there was no secondary containment at the Project Site at the storage area of hazardous materials. Spills from the storage area as well as from maintenance and refuelling area may result in soil contamination and this can have long-term deleterious effects on human and environmental health. These impacts may occur during both the construction and operation phases and will require proper management measures.

Existing / in-place controls

There are no existing / in place controls.

Impact Significance

Results of the baseline soil quality surveys conducted in June to July 2017 indicated the soil quality parameters generally complied with the FAO Soil Bulletin 65 & Dutch Standards and soils are of good quality with limited contamination.

For potential soil quality impact, the receptor sensitivity is considered low given that impacts caused by improper solid waste and hazardous material management are likely to be contained within the Project Site for industrial use only. The potential impact magnitude is considered to be large given the existing in-place control is considered inadequate. The overall impact significance is therefore **moderate** (Table 6.22).

Table 6.22 Soil Quality Impact Assessment

Impact	Deterioration of soil quality due to improper solid waste and hazardous material management at the site.				
Impact Nature	Negative	Positive	Neutral		
	Pollutants entering soil would create a negative impact.				
Impact Type	Direct	Indirect	Induced		
	The impact would be direct on soil quality.				
Impact Duration	Temporary	Short-term	Long-term	Permanent	
	If not managed, the impact would occur during the construction phase of the Project.				
Impact Extent	Local	Regional	International		
	The extent of the impact would be limited to mainly within the Project Site.				
Impact Scale	Small				
Frequency	Contamination due to improper solid waste and hazardous material management are expected to be infrequent during the construction phase.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
	The impact magnitude is Large .				
Receptor Sensitivity	Low	Medium		High	
	The receptor sensitivity is Low , given that the Project Site where potential impact is more likely to occur is for industrial use.				
Impact Significance	Negligible	Minor	Moderate	Major	
	The impact magnitude before mitigation is expected to be moderate .				

Additional Mitigation/Management Measures

To mitigate potential impacts on soil quality, mitigation measures developed for management of impacts to water quality as presented in *Section 8.3.4* above should be followed.

Significance of Residual Impact

With proper implementation of the recommended mitigation measures, the residual impacts to soil quality are expected to be of **negligible significance**.

Monitoring plan

Given the negligible significance of the impacts, no monitoring of soil is required.

6.4.5 Community Health and Safety

Potential Impacts

Potential impacts on community health and safety may be caused by environmental impacts to air quality, noise, surface water quality and soil quality as discussed in *Section 8.1-4* above. Public health and safety in relation to air quality and wastewater was a key concern of the villagers.

The Project is employing employ around 50-100 staff during the construction Phase. Some of these staff are sourced from local villages. Contractors will be engaged for supply of labour, equipment or services. Contractors' activities could be a nuisance to the local community if not properly managed, for example occupancy of public area for storage of construction wastes, staging areas or nuisance from workers' camps if sited near the communities.

There is also the increased risk of vehicle collisions with local residents due to increased traffic traveling to and from the Project Site during both the construction and operation phases. Currently up to 5 vehicles per day access the site using the one access road. This road is not paved for the majority of its length.

Existing / In-place Controls

There are currently no existing and/or in-place controls for the above impacts.

Impact Significance

Traffic accidents represent the greatest risk for local communities in the vicinity of the Project. The sensitivity is considered high given that both livestock and local residents will not be accustomed to increased traffic during the construction phase. The magnitude of the impact is likely to be medium. This impact is assessed as of **major** significance (*Table 6.23*).

Table 6.23 *Assessment of Impacts on Community Health and Safety*

Impact	Impact on community health and safety during construction				
Impact Nature	Negative	Positive		Neutral	
	Potential injury or death to humans or livestock would be a negative occurrence.				
Impact Type	Direct	Indirect		Induced	
	The impact could directly affect local residents and/or livestock.				
Impact Duration	Temporary	Short-term	Long-term	Permanent	
	Impact is expected to be most significant during the construction phase.				
Impact Extent	Local	Regional		Global	
	Impact is limited to communities near the construction site.				
Impact Scale	N/A				
Impact Frequency	Construction equipment and vehicles will be operational almost continuously over the construction period.				
Likelihood	Unlikely but certainly possible given that residents and livestock will be unaccustomed to construction equipment and vehicles in the area.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
	The impact magnitude is potentially Medium .				
Receptor Sensitivity	Low	Medium		High	
	The receptor sensitivity is considered High .				
Significance	Negligible	Minor	Moderate	Major	
	The significance is likely to be Major .				

Additional Mitigation and/or Management Measure

- Impacts on community health and safety can be mitigated through good practices and close cooperation between the Project managers, contractors and local authorities, as below:
- A Contractor EHS Management Plan will be developed to reduce potential impacts of contractors' activities to nearby communities.
- During consultation, it was mentioned that this access road was damaged by Project vehicles and it is recommended that Awba restore the road to its original condition. This was noted by the local community as a grievance during the consultation.
- Awba will prepare and implement a Community Grievance Mechanism (as per Myanmar/ Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 1).

- A Road Transport Management Plan should be developed to indicate the traffic routes to be followed and speed limit to be complied with in order to reduce risk to the local communities.
- Awba will develop a Safe Vehicle Policy and Training Safety Procedure for its own transport fleet, including provisions for safe agro-chemical and hazardous waste transport, and will include such requirements in transport contractual agreements, including barge third-party contractors (as per Myanmar/ Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 7).
- Enforcement of a speed limit for vehicles related to construction activities of the Project. During the construction phase, a speed limit of 40km/h shall be enforced.
- Establishment of a security team to monitor entrance to the construction site.

Significance of Residual Impacts

The enforcement of speed limits for Project vehicles and other measures as presented above should reduce the likelihood of vehicle strikes and of health and safety issues to local communities such that the residual impact is of **minor significance**.

Monitoring plan

Monitoring for community health and safety is included in the air, noise, and water sections above.

6.4.6 Economy and Livelihoods

Source of Impact

The Project is expected to create the following livelihood opportunities (positive impacts) during construction:

- Contractual employment in construction phase activities, including in the supply chain; and
- Increase in business of local shops and markets, establishment of small shops etc. due to the influx of construction personnel.

Significance of Impact

The local economy is expected to grow as a result of the project. This positive impact will be felt during the construction phase and will continue throughout the lifespan of the Project. Both technical and basic products procured for the project operations will likely be characterised by short-term, high value expenditures. It is likely that there might be some businesses in local area can satisfy the demand for basic goods and services required by the

project (such as provision of basic supplies, the supply of food, plastic footwear, clothing, soap, powder, *etc.*).

Enhancement Measures

For positive impacts, it will not be further discussed in the ESIA Study. Awba should explore further enhancement of these impacts as well as practicable during the Project's construction and operation.

Monitoring Plan

As no negative impacts are anticipated, no monitoring is required.

6.4.7 Occupational Health and Safety

Source of Impact

In terms of occupational health and safety, issues include exposure to dust, noise and hazardous materials / wastes and physical hazards associated with the use of heavy equipment. In addition, the construction camp was observed to be not up to international standards during the site visit in May 2017, such as not meeting the IFC PS2 guidelines on minimum living areas, provision of potable drinking water (meeting WHO parameters), electricity, and latrine services. This will be a potentially significant health and safety issue to the construction workers.

Existing / In-place Controls

There are ventilation systems, and life and fire safety systems in the buildings as outlined in the Project Description. Information on these systems are provided in **Appendix C**. There are also a number of existing controls under the air, noise, and water impact assessments (*Section 8.1 to 8.3*) that are also applicable to reduce impact on workers.

Impact Significance

Provided the impacts will be temporary and limited to workers of the Project, the magnitude of the impact is likely to be medium. The sensitivity of workforce is considered medium. This impact is assessed as of **moderate significance** (*Table 6.24*).

Table 6.24 Assessment of Impacts on Occupational Health and Safety

Impact	Impact on occupational health and safety during construction		
Impact Nature	Negative	Positive	Neutral
	Potential negative impacts to workers due to health and safety issues.		
Impact Type	Direct	Indirect	Induced
	The impact could directly affect the workers.		

Impact Duration	Temporary	Short-term	Long-term	Permanent	
	Impact is expected to be most significant during the construction phase.				
Impact Extent	Local	Regional	Global		
	Impact is limited to workers of the construction site.				
Impact Scale	N/A				
Impact Frequency	Construction workers are working and some staying in the construction camp during the construction period.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
	The impact magnitude is potentially Medium .				
Receptor Sensitivity	Low	Medium	High		
	The receptor sensitivity is considered High				
Significance	Negligible	Minor	Moderate	Major	
	The significance is likely to be Moderate .				

Additional Mitigation and/or Management Measure

Measures adopted for air, noise, and water are also applicable here (Section 8.1 to 8.3). The following mitigation measures will also be adopted for occupational health and safety impacts:

- The Project will design an occupational health and safety management plan, which will be a subset of the overall ESMP, tailored to the needs of the Project. This plan will set standards that will be met by all contractors and subcontractors.
- The Project will abide by Myanmar laws and regulations, and International Labour Organisation (ILO) conventions when gaps are identified between national legislation and international standards.
- Use equipment wash-down waters as makeup solutions for subsequent batches.
- Use dedicated dust collectors to recycle recovered materials.
- Workers will have contracts, which clearly state the terms and conditions of their employment and their legal rights. The Project and all contractors will be able to access a worker grievance mechanism managed by Awba.
- Workers accommodation will comply with the requirements of IFC PS2 guidelines regarding minimum living areas, provision of potable drinking water (meeting WHO parameters), electricity, and latrine services
- Awba will develop and implement a corporate Human Resource Policy and Manual of Procedures in compliance with applicable national labour laws and regulations and IFC's Performance Standard 2 requirements, including the following actions issues (as per Myanmar/Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 2).

- Corporate HR policies applicable to all operations;
 - HR Manual of Procedures and Staff HR Handbook;
 - Development of a multi-year HR awareness program;
 - Worker's grievance mechanism for its permanent and casual workers, as well as for construction workers, to enable anonymous complaints and tracking and analysis of systemic
- Awba will develop and implement OHS management system – consistent with OHSAS 18001 – commensurate with the level of risks and impacts, applying to all its new operations, including the following actions issues (as per Myanmar/ Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 3).
 - Corporate OHS policy applicable to all operations;
 - OHS Manual of Procedures (SOPs), including ambient air quality monitoring procedure;
 - Development of a multi-year OHS training plan for its staff, including centres of responsibilities, budgetary allocations, and schedule of delivery;
 - Definition of OHS KPIs for monitoring and reporting;
 - External and internal OHS audits and implementation of Corrective Action Plan (CAP), if required;
 - Training manuals for end-customers (e.g. farmers);
 - Consolidated annual OHS performance reports
 - Awba will develop a management procedure to ensure contractor labour and safe working conditions (inclusive of OHS) comply with PS2 requirements. This procedure will be developed based on standards of contract work in Myanmar and approved by the relevant Department / Ministry of Labour. This procedure will identify Awba's roles and responsibilities for monitoring contractor performance and will apply to all new/existing facilities included within this investment issues (as per Myanmar/ Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 4).
 - Submission of the procedure and supporting OHS documentation (e.g. safety plan, procedures, work instructions);
 - Inclusion of contractual provisions for casual workers and contractors to comply with Performance Standard 2 for all facilities identified within the scope of IFC's investment,

Significance of Residual Impacts

The residual impact is considered of **minor significance**.

Monitoring Plan

Monitoring for occupational health and safety during construction is not anticipated. However, monitoring will be conducted during operation.

6.4.8

Infrastructure Services

Source of Impact

The impacts on the road infrastructure from the Project are likely to result from the movement of equipment, material, and workforce during construction. In addition, presence of workers and in-migration may place pressure on the already limited social infrastructure e.g. schools, health facilities, village roads and water supply. These impacts are expected to occur during the construction and operation phases. There is a non-paved access road leading to the Project Site. During consultation, the damage experienced to this road was a key concern of the local communities. This road has already been damaged by traffic to and from the Project Site during the current activities.

Existing / In-place Controls

There are currently no existing and/or in-place controls for the above impacts and the existing social infrastructures are considered limited. The magnitude of the impact is likely to be medium given the impacts would be local in extent. The sensitivity of the community is considered medium. This impact is assessed as of **moderate significance** (Table 6.25).

Table 6.25 *Assessment of Impacts on Infrastructure Services*

Impact	Impact on occupational health and safety during construction				
Impact Nature	Negative	Positive		Neutral	
	Potential impacts are considered negative.				
Impact Type	Direct	Indirect		Induced	
	The impact could directly affect the community use of infrastructure.				
Impact Duration	Temporary	Short-term	Long-term	Permanent	
	Impact is expected to be most significant during the construction phase.				
Impact Extent	Local	Regional		Global	
	Impact is limited to the communities in the vicinity.				
Impact Scale	N/A				
Impact Frequency	Construction activities are continuous during the construction period.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
	The impact magnitude is potentially Medium .				
Receptor Sensitivity	Low	Medium		High	
	The receptor sensitivity is considered High .				
Significance	Negligible	Minor	Moderate	Major	
	The significance is likely to be Moderate .				

Additional Mitigation and/or Management Measure

A number of mitigation measures could be adopted to reduce impact on infrastructure services. These include:

- Camps for construction and operational workforces should be properly sited and designed to reduce demand on local infrastructure services.
- A Road Transport Management Plan should be developed to indicate the traffic routes to be followed, speed limit to be complied with as well as restriction of traffic hours (e.g. avoid rush hour) in order to reduce pressure on road infrastructure.
- Stakeholder engagement should be undertaken, including implementing its grievance mechanism to address stakeholder concerns and issues related to infrastructure services in a timely manner.
- Awba will prepare and implement a Community Grievance Mechanism (as per Myanmar/ Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 1).

Residual Impact

The residual impact is considered of **minor** significance.

Monitoring plan

No monitoring is anticipated but the community grievance mechanism will be in place.

6.4.9 Unplanned Spills

Source of Impacts

No secondary containment was observed at the Project Site at the storage area of hazardous materials during the site visit in May 2017. As presented in *Section 5.5*, there is a stream at the north-west corner of the Project Site. This stream is on the lowest point of the Project Site and is subjected to wastewater run-off from the Project. The stream flows to the northwest and into the villages of Nyaung Kone and Wah Net Chaung where stream water is then used for domestic purposes (washing, cleaning). As such, leakage from the storage area as well as from maintenance and refuelling area could easily run off into the nearby water courses. This may result in surface water and groundwater contamination, which can have long-term deleterious effects on human health and the environment.

Existing / In-place Controls

There are currently no existing and/or in-place controls for the above impacts.

Impact Significance

The receptor sensitivity to surface water quality impact is high given that the streams and rivers downstream of the Project Site are used as a drinking water supply. Although spill is unlikely to occur in general with good practice on site, the potential impact magnitude is considered to be large given there is no existing in-place control. The overall impact significance is therefore **major** (*Table 6.26*).

Table 6.26 Assessment of Impacts from Unplanned Spills

Impact	Deterioration of surface water quality in nearby watercourses from unplanned spills from the site.		
Impact Nature	Negative	Positive	Neutral
	Pollutants entering surface water courses would create a negative impact.		
Impact Type	Direct	Indirect	Induced
	The impact would be directly upon surface water resources and on the residents of nearby villages that depend on water supplied from the watercourses.		

Impact Duration	Temporary	Short-term	Long-term	Permanent	
	If not managed, the impact would occur during the construction phase of the Project and may lead to long-term impacts to the environment and human health.				
Impact Extent	Local		Regional		International
	The extent of the impact would be limited to the watercourses adjacent to the site or extend to further downstream, depending on scale of spill.				
Impact Scale	Large				
Frequency	Potentially occur during construction phase.				
Likelihood	Unlikely in general with good practice on site.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
	The impact magnitude is Large .				
Receptor Sensitivity	Low		Medium		High
	The receptor sensitivity is High , given the year round dependence by residents on water from the watercourses for drinking, washing and cleaning.				
Impact Significance	Negligible	Minor	Moderate	Major	
	The impact magnitude before mitigation is expected to be major .				

Additional Mitigation/Management Measures

- Development of an Emergency Preparedness and Response Plan, including for transport and sale depots (as per Myanmar/ Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 1).
- Fuel tanks and chemical storage areas should be provided with locks and be sited on sealed areas. Establishment of secondary containment for fuel storage and hazardous materials (as per Myanmar/ Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 5).
- Oils, fuels and chemicals should only be used and stored in designated areas, which have pollution prevention facilities. The bund should be drained of rainwater after a rain event.
- Surface run off from bunded areas should pass through oil/ gas traps prior to discharge to the storm water system.
- On site oil-water separators and holding facilities should be installed to accommodate unanticipated releases of oily water.
- The oil contaminated water will be collected and handled by local licensed waste water sub-contractors (if available, to be determined at the later stage).

- Guidelines and procedures should be established for immediate clean up actions following any spillages of oil, fuel or chemicals.

Significance of Residual Impact

With proper implementation of the recommended mitigation measures, the residual impacts to surface water quality are expected to be of **moderate significance**.

Monitoring Plan

No monitoring is anticipated, however, any large spills will be reported to MONREC as per the EIA Procedure.

6.5 OPERATIONAL PHASE IMPACT ASSESSMENT

As presented in the ESIA ToR (**Appendix A**), potential significant impacts to air quality, noise, surface water quality, soil quality, community health and safety, economy and livelihoods, occupational health and safety, and infrastructure are expected from the construction and operation of the Project. These priority impacts of the Project identified during the Scoping Phase are included in the impact assessment provided below.

6.5.1 Air Quality

Source of Impacts

The main source of atmospheric emission from the Project during the operation phase includes stack emissions from the onsite incineration of process waste. The Project emission inventory is presented in *Table 6.27*.

In addition, during the Operation Phase, the Project will release air emissions from production line activities such as TOC, VOC, Chloride, HBr, HCN, HF, Hydrogen Sulphide, Chlorine, Ammonia and Gaseous Inorganic Chlorine Compounds.

Potential impacts to air quality during this phase of the Project were quantified using detailed dispersion modelling, the USEPA AERMOD dispersion model version 9.4.0. AERMOD is a state of the art detailed dispersion model that can be used to represent complex multiple emission sources and predict air quality at receptor locations taking into account meteorology. The model is widely recognised for use in this type of application, including by the IFC, US EPA, UK Environment Agency and Australian EPA.

Table 6.27 Project Emission Inventory

Stack Parameter ⁽¹⁾	Unit	Value
Stack location	Lat / Long	17° 9'59.99"N 96° 4'41.98"E
Actual Stack Conditions ⁽²⁾		
Stack height	m	25

Stack Parameter ⁽¹⁾	Unit	Value
Stack diameter	m	0.400
Emission velocity	m/s	10
Exit temperature	C	120
Oxygen content (wet gas)	%	9
Moisture content (wet gas)	%	20
Actual volume flow rate	Am ³ /s	1.26
Normalised Conditions ⁽³⁾		
Exit temperature	C	0
Oxygen content (dry gas)	%	7
Moisture content (dry gas)	%	0
Normalised volume flow rate ⁽⁴⁾⁽⁵⁾	Nm ³ /s	0.598
Normalised Emission Concentrations ⁽³⁾⁽⁶⁾		
NO _x	mg/Nm ³	400
SO ₂	mg/Nm ³	50
PM ⁽⁷⁾	mg/Nm ³	10
HCl	mg/Nm ³	10
Dioxins and Furans	ng TEQ/m ³	0.1
Cd	mg/Nm ³	0.1
CO	mg/Nm ³	150
Pb	mg/Nm ³	1
Hg	mg/Nm ³	0.1
HF	mg/Nm ³	1
Normalised Emission Rates		
NO _x	g/s	0.239
SO ₂	g/s	0.0299
PM _{2.5}	g/s	5.98 × 10 ⁻³
PM ₁₀	g/s	5.98 × 10 ⁻³
HCl	g/s	5.98 × 10 ⁻³
Dioxins and Furans	g/s	5.98 × 10 ⁻¹⁰
Cd	g/s	5.98 × 10 ⁻⁵
CO	g/s	0.0896
Pb	g/s	5.98 × 10 ⁻⁴
Hg	g/s	5.98 × 10 ⁻⁵
HF	g/s	5.98 × 10 ⁻⁴
⁽⁸⁾ Incinerator stack		
⁽⁹⁾ Actual stack data provided and confirmed by Awba		
⁽¹⁰⁾ International Finance Corporation (IFC) (2008) Environmental, Health and Safety Guidelines for Waste Management facilities [Online] Available at: http://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/policies-standards/ehs-guidelines [Accessed 08 August 2017]		
⁽¹¹⁾ Environment Agency (2013) Pollution Inventory Reporting – Combustion Activities Guidance Note [online] Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/296994/LIT_7825_e97f48.pdf [Accessed 08 August 2017]		
⁽¹²⁾ Normalised flow rate at 7% oxygen, dry gas, 273K and a pressure of 101.3 kPa.		
⁽¹³⁾ Myanmar National Environmental Quality (Emission) Guidelines (NEQEG) (2015)		
⁽¹⁴⁾ The PM concentration is used to conservatively estimate emissions of both PM _{2.5} and PM ₁₀ .		

Existing / In-place Controls

The incinerator will be designed to comply with the Air Emission Standards for Municipal Solid Waste (MSW) and Hazardous Waste Incinerators of the European Union (EU) as specified in the World Bank Group Environmental, Health and Safety (EHS) Guidelines for Waste Management Facilities (2007)

(Table 3.5). The ash generated together with other household solid waste will be sent to a licensed contractor in Thilawa and the incinerator will only be used as a backup as per Hazardous Waste Management Plan. The incinerator will not generate fly ash as it has a dust collector.

Impact Significance

The modelling results based on the emissions inventory detailed in Table 6.28 and the methodology detailed in **Appendix B** are presented below in Tables 6.29-6.46. The results of the assessment comprise the maximum process contribution predicted over a period of five years from 2012 to 2016 on the receptor grid. At each of the representative human air sensitive receptor (see Figure 5.3) the maximum process contribution and the predicted environmental concentration for each substance of interest is presented and the significance of the impact defined using the approach outlined in the modelling methodology in Annex B. In addition, the maximum process contribution and predicted environmental concentration at any point on the receptor grid has been identified and the significance defined.

Overall, the assessment defines the potential impacts on air quality as **negligible**.

Table 6.28 Nitrogen Dioxide (NO₂) 1-hour Average

Site	Baseline(µg/m ³)	AQS ⁽¹⁾ (µg/m ³)	PC ⁽²⁾ (µg/m ³)	PC/AQS (%)	PEC ⁽³⁾	PEC/AQS (%)	Impact Significance
Maximum			41.1				
AQ1			4.72	21%	49.9	24.9%	Negligible
AQ2			6.62	2%	13.5	6.7%	Negligible
AQ3			5.45	3%	15.4	7.7%	Negligible
AQ4	8.78	200	2.33	1%	11.1	5.6%	Negligible
AQ5			2.27	1%	11.0	5.5%	Negligible
AQ6			3.67	2%	12.4	6.2%	Negligible
AQ7			1.66	1%	10.4	5.2%	Negligible
AQ8			2.47	1%	11.3	5.6%	Negligible

⁽¹⁾ Air Quality Standard
⁽²⁾ Process Contribution
⁽³⁾ Predicted Environmental Contribution

Table 6.29 Nitrogen Dioxide (NO₂) Annual Average

Site	Baseline(µg/m ³)	AQS ⁽¹⁾ (µg/m ³)	PC ⁽²⁾ (µg/m ³)	PC/AQS (%)	PEC ⁽³⁾	PEC/AQS (%)	Impact Significance
Maximum							
AQ1	4.19	40	0.428	1.1%	4.62	11.5%	Negligible
AQ2			0.0510	<1%	4.24	10.6%	Negligible
			0.0435	<1%	4.23	10.6%	Negligible

Site	Baseline($\mu\text{g}/\text{m}^3$)	AQS ⁽¹⁾ ($\mu\text{g}/\text{m}^3$)	PC ⁽²⁾ ($\mu\text{g}/\text{m}^3$)	PC/AQS (%)	PEC ⁽³⁾	PEC/AQS (%)	Impact Significance
AQ3			0.0662	<1%	4.25	10.6%	Negligible
AQ4			0.0116	<1%	4.20	10.5%	Negligible
AQ5			0.0311	<1%	4.22	10.5%	Negligible
AQ6			0.0234	<1%	4.21	10.5%	Negligible
AQ7			0.0122	<1%	4.20	10.5%	Negligible
AQ8			0.0123	<1%	4.20	10.5%	Negligible

(1) Air Quality Standard

(2) Process Contribution

(3) Predicted Environmental Contribution

Table 6.30 *Sulphur Dioxide (SO₂) 10-minute Average*

Site	Baseline($\mu\text{g}/\text{m}^3$)	AQS ⁽¹⁾ ($\mu\text{g}/\text{m}^3$)	PC ⁽²⁾ ($\mu\text{g}/\text{m}^3$)	PC/AQS (%)	PEC ⁽³⁾	PEC/AQS (%)	Impact Significance
Maximum			9.18	1.8%	13.9	2.8%	Negligible
AQ1			1.05	<1%	5.75	1.1%	Negligible
AQ2			1.48	<1%	6.17	1.2%	Negligible
AQ3	4.69	500	1.22	<1%	5.91	1.2%	Negligible
AQ4			0.521	<1%	5.21	1.0%	Negligible
AQ5			0.507	<1%	5.20	1.0%	Negligible
AQ6			0.820	<1%	5.51	1.1%	Negligible
AQ7			0.372	<1%	5.07	1.0%	Negligible

Site	Baseline(µg/m ³)	AQS ⁽¹⁾ (µg/m ³)	PC ⁽²⁾ (µg/m ³)	PC/AQS (%)	PEC ⁽³⁾	PEC/AQS (%)	Impact Significance
AQ8			0.553	<1%	5.25	1.0%	Negligible
⁽¹⁾ Air Quality Standard ⁽²⁾ Process Contribution ⁽³⁾ Predicted Environmental Contribution							

Table 6.31 Sulphur Dioxide (SO₂) 24-hour Average

Site	Baseline(µg/m ³)	AQS ⁽¹⁾ (µg/m ³)	PC ⁽²⁾ (µg/m ³)	PC/AQS (%)	PEC ⁽³⁾	PEC/AQS (%)	Impact Significance
Maximum							
			0.478	2.4%	2.41	12.1%	Negligible
AQ1			0.151	<1%	2.09	10.4%	Negligible
AQ2			0.0930	<1%	2.03	10.1%	Negligible
AQ3			0.111	<1%	2.05	10.2%	Negligible
AQ4	1.94	20	0.0417	<1%	1.98	9.9%	Negligible
AQ5			0.0473	<1%	1.98	9.9%	Negligible
AQ6			0.0827	<1%	2.02	10.1%	Negligible
AQ7			0.0484	<1%	1.98	9.9%	Negligible
AQ8			0.0468	<1%	1.98	9.9%	Negligible
⁽¹⁾ Air Quality Standard ⁽²⁾ Process Contribution ⁽³⁾ Predicted Environmental Contribution							

Table 6.32 *Particulate Matter (PM_{2.5}) 24-hour Average*

Site	Baseline(µg/m ³)	AQS ⁽¹⁾ (µg/m ³)	PC ⁽²⁾ (µg/m ³)	PC/AQS (%)	PEC ⁽³⁾	PEC/AQS (%)	Impact Significance
Maximum			0.0957	<1%	22.7	91%	Negligible
AQ1			0.0303	<1%	22.6	91%	Negligible
AQ2			0.0186	<1%	22.6	90%	Negligible
AQ3			0.0222	<1%	22.6	90%	Negligible
AQ4	22.6	25	8.34x10 ⁻³	<1%	22.6	90%	Negligible
AQ5			9.46 x10 ⁻³	<1%	22.6	90%	Negligible
AQ6			0.0165	<1%	22.6	90%	Negligible
AQ7			9.68 x10 ⁻³	<1%	22.6	90%	Negligible
AQ8			9.37 x10 ⁻³	<1%	22.6	90%	Negligible

(1) Air Quality Standard

(2) Process Contribution

(3) Predicted Environmental Contribution

Table 6.33 *Particulate Matter (PM_{2.5}) Annual Average*

Site	Baseline(µg/m ³)	AQS ⁽¹⁾ (µg/m ³)	PC ⁽²⁾ (µg/m ³)	PC/AQS (%)	PEC ⁽³⁾	PEC/AQS (%)	Impact Significance
Maximum			0.01426	<1%	11.3	113%	Negligible
AQ1			1.70 x10 ⁻³	<1%	11.3	113%	Negligible
AQ2	11.3	10	1.45 x10 ⁻³	<1%	11.3	113%	Negligible
AQ3			2.21 x10 ⁻³	<1%	11.3	113%	Negligible

Site	Baseline($\mu\text{g}/\text{m}^3$)	AQS ⁽¹⁾ ($\mu\text{g}/\text{m}^3$)	PC ⁽²⁾ ($\mu\text{g}/\text{m}^3$)	PC/AQS (%)	PEC ⁽³⁾	PEC/AQS (%)	Impact Significance
AQ4			3.90×10^{-4}	<1%	11.3	113%	Negligible
AQ5			1.04×10^{-3}	<1%	11.3	113%	Negligible
AQ6			7.80×10^{-4}	<1%	11.3	113%	Negligible
AQ7			4.10×10^{-4}	<1%	11.3	113%	Negligible
AQ8			4.10×10^{-4}	<1%	11.3	113%	Negligible

⁽¹⁾ Air Quality Standard

⁽²⁾ Process Contribution

⁽³⁾ Predicted Environmental Contribution

Table 6.34 *Particulate Matter (PM₁₀) 24-hour Average*

Site	Baseline(µg/m ³)	AQS ⁽¹⁾ (µg/m ³)	PC ⁽²⁾ (µg/m ³)	PC/AQS (%)	PEC ⁽³⁾	PEC/AQS (%)	Impact Significance
Maximum							
AQ1			0.0957	<1%	33.7	67.4%	Negligible
AQ2			0.0303	<1%	33.6	67.3%	Negligible
AQ3			0.0186	<1%	33.6	67.2%	Negligible
AQ4	33.6	50	0.0222	<1%	33.6	67.2%	Negligible
AQ5			8.34x10 ⁻³	<1%	33.6	67.2%	Negligible
AQ6			9.46 x10 ⁻³	<1%	33.6	67.2%	Negligible
AQ7			0.0165	<1%	33.6	67.2%	Negligible
AQ8			9.68 x10 ⁻³	<1%	33.6	67.2%	Negligible
AQ8			9.37 x10 ⁻³	<1%	33.6	67.2%	Negligible

(1) Air Quality Standard

(2) Process Contribution

(3) Predicted Environmental Contribution

Table 6.35 *Particulate Matter (PM₁₀) Annual Average*

Site	Baseline(µg/m ³)	AQS ⁽¹⁾ (µg/m ³)	PC ⁽²⁾ (µg/m ³)	PC/AQS (%)	PEC ⁽³⁾	PEC/AQS (%)	Impact Significance
Maximum							
AQ1			0.01426	<1%	16.8	84%	Negligible
AQ2	16.8	20	1.70 x10 ⁻³	<1%	16.8	84%	Negligible
AQ3			1.45 x10 ⁻³	<1%	16.8	84%	Negligible
AQ3			2.21 x10 ⁻³	<1%	16.8	84%	Negligible

Site	Baseline($\mu\text{g}/\text{m}^3$)	AQS ⁽¹⁾ ($\mu\text{g}/\text{m}^3$)	PC ⁽²⁾ ($\mu\text{g}/\text{m}^3$)	PC/AQS (%)	PEC ⁽³⁾	PEC/AQS (%)	Impact Significance
AQ4			3.90×10^{-4}	<1%	16.8	84%	Negligible
AQ5			1.04×10^{-3}	<1%	16.8	84%	Negligible
AQ6			7.80×10^{-4}	<1%	16.8	84%	Negligible
AQ7			4.10×10^{-4}	<1%	16.8	84%	Negligible
AQ8			4.10×10^{-4}	<1%	16.8	84%	Negligible

⁽¹⁾ Air Quality Standard

⁽²⁾ Process Contribution

⁽³⁾ Predicted Environmental Contribution

Table 6.36 Hydrogen Fluoride (HF) 1-hour Average

Site	Baseline($\mu\text{g}/\text{m}^3$)	AQS ⁽¹⁾ ($\mu\text{g}/\text{m}^3$)	PC ⁽²⁾ ($\mu\text{g}/\text{m}^3$)	PC/AQS (%)	PEC ⁽³⁾	PEC/AQS (%)	Impact Significance
Maximum			0.128	<1%	0.128	<1%	Negligible
AQ1			0.0147	<1%	0.0147	<1%	Negligible
AQ2			0.0207	<1%	0.0207	<1%	Negligible
AQ3			0.0170	<1%	0.0170	<1%	Negligible
AQ4	n/a	600	7.29×10^{-3}	<1%	7.29×10^{-3}	<1%	Negligible
AQ5			7.09×10^{-3}	<1%	7.09×10^{-3}	<1%	Negligible
AQ6			0.0115	<1%	0.0115	<1%	Negligible
AQ7			5.20×10^{-3}	<1%	5.20×10^{-3}	<1%	Negligible
AQ8			7.73×10^{-3}	<1%	7.73×10^{-3}	<1%	Negligible

⁽¹⁾ Air Quality Standard

⁽²⁾ Process Contribution

⁽³⁾ Predicted Environmental Contribution

Table 6.37 Mercury (Hg) Annual Average

Site	Baseline($\mu\text{g}/\text{m}^3$)	AQS ⁽¹⁾ ($\mu\text{g}/\text{m}^3$)	PC ⁽²⁾ ($\mu\text{g}/\text{m}^3$)	PC/AQS (%)	PEC ⁽³⁾	PEC/AQS (%)	Impact Significance
Maximum			1.40×10^{-4}	<1%	1.40×10^{-4}	<1%	Negligible
AQ1			1.00×10^{-5}	<1%	1.00×10^{-5}	<1%	Negligible
AQ2	n/a	1	1.00×10^{-5}	<1%	1.00×10^{-5}	<1%	Negligible
AQ3			2.00×10^{-5}	<1%	2.00×10^{-5}	<1%	Negligible

Site	Baseline($\mu\text{g}/\text{m}^3$)	AQS ⁽¹⁾ ($\mu\text{g}/\text{m}^3$)	PC ⁽²⁾ ($\mu\text{g}/\text{m}^3$)	PC/AQS (%)	PEC ⁽³⁾	PEC/AQS (%)	Impact Significance
AQ4			0.00	0%	0.00	0%	Negligible
AQ5			1.00×10^{-5}	<1%	1.00×10^{-5}	<1%	Negligible
AQ6			1.00×10^{-5}	<1%	1.00×10^{-5}	<1%	Negligible
AQ7			0.00	0%	0.00	0%	Negligible
AQ8			0.00	0%	0.00	0%	Negligible

⁽¹⁾ Air Quality Standard

⁽²⁾ Process Contribution

⁽³⁾ Predicted Environmental Contribution

Table 6.38 *Lead (Pb) Annual Average*

Site	Baseline($\mu\text{g}/\text{m}^3$)	AQS ⁽¹⁾ ($\mu\text{g}/\text{m}^3$)	PC ⁽²⁾ ($\mu\text{g}/\text{m}^3$)	PC/AQS (%)	PEC ⁽³⁾	PEC/AQS (%)	Impact Significance
Maximum			1.43x10 ⁻³	<1%	1.43x10 ⁻³	<1%	Negligible
AQ1			1.10 x10 ⁻⁴	<1%	1.10 x10 ⁻⁴	<1%	Negligible
AQ2			1.30 x10 ⁻⁴	<1%	1.30 x10 ⁻⁴	<1%	Negligible
AQ3			2.20 x10 ⁻⁴	<1%	2.20 x10 ⁻⁴	<1%	Negligible
AQ4	n/a	0.5	3.00 x10 ⁻⁵	<1%	3.00 x10 ⁻⁵	<1%	Negligible
AQ5			1.00 x10 ⁻⁴	<1%	1.00 x10 ⁻⁴	<1%	Negligible
AQ6			6.00 x10 ⁻⁵	<1%	6.00 x10 ⁻⁵	<1%	Negligible
AQ7			4.00 x10 ⁻⁵	<1%	4.00 x10 ⁻⁵	<1%	Negligible
AQ8			4.00 x10 ⁻⁵	<1%	4.00 x10 ⁻⁵	<1%	Negligible

⁽¹⁾ Air Quality Standard

⁽²⁾ Process Contribution

⁽³⁾ Predicted Environmental Contribution

Table 6.39 *Carbon monoxide (CO) 15-minute Average*

Site	Baseline($\mu\text{g}/\text{m}^3$)	AQS ⁽¹⁾ ($\mu\text{g}/\text{m}^3$)	PC ⁽²⁾ ($\mu\text{g}/\text{m}^3$)	PC/AQS (%)	PEC ⁽³⁾	PEC/AQS (%)	Impact Significance
Maximum			89.7	<1%	89.7	<1%	Negligible
AQ1			2.92	<1%	2.92	<1%	Negligible
AQ2	n/a	100,000	4.09	<1%	4.09	<1%	Negligible
AQ3			3.37	<1%	3.37	<1%	Negligible

Site	Baseline($\mu\text{g}/\text{m}^3$)	AQS ⁽¹⁾ ($\mu\text{g}/\text{m}^3$)	PC ⁽²⁾ ($\mu\text{g}/\text{m}^3$)	PC/AQS (%)	PEC ⁽³⁾	PEC/AQS (%)	Impact Significance
AQ4			1.44	<1%	1.44	<1%	Negligible
AQ5			1.40	<1%	1.40	<1%	Negligible
AQ6			2.27	<1%	2.27	<1%	Negligible
AQ7			1.03	<1%	1.03	<1%	Negligible
AQ8			1.53	<1%	1.53	<1%	Negligible

(1) Air Quality Standard

(2) Process Contribution

(3) Predicted Environmental Contribution

Table 6.40 *Carbon monoxide (CO) 1-hour Average*

Site	Baseline(µg/m ³)	AQS ⁽¹⁾ (µg/m ³)	PC ⁽²⁾ (µg/m ³)	PC/AQS (%)	PEC ⁽³⁾	PEC/AQS (%)	Impact Significance
Maximum			19.3	<1%	19.3	<1%	Negligible
AQ1			2.21	<1%	2.21	<1%	Negligible
AQ2			3.10	<1%	3.10	<1%	Negligible
AQ3			2.55	<1%	2.55	<1%	Negligible
AQ4	n/a	30,000	1.09	<1%	1.09	<1%	Negligible
AQ5			1.06	<1%	1.06	<1%	Negligible
AQ6			1.72	<1%	1.72	<1%	Negligible
AQ7			0.780	<1%	0.780	<1%	Negligible
AQ8			1.16	<1%	1.16	<1%	Negligible

(1) Air Quality Standard

(2) Process Contribution

(3) Predicted Environmental Contribution

Table 6.41 *Carbon monoxide (CO) 8-hour Average*

Site	Baseline(µg/m ³)	AQS ⁽¹⁾ (µg/m ³)	PC ⁽²⁾ (µg/m ³)	PC/AQS (%)	PEC ⁽³⁾	PEC/AQS (%)	Impact Significance
Maximum			4.30	<1%	4.30	<1%	Negligible
AQ1			0.888	<1%	0.888	<1%	Negligible
AQ2	n/a	10,000	0.799	<1%	0.799	<1%	Negligible
AQ3			0.842	<1%	0.842	<1%	Negligible

Site	Baseline($\mu\text{g}/\text{m}^3$)	AQS ⁽¹⁾ ($\mu\text{g}/\text{m}^3$)	PC ⁽²⁾ ($\mu\text{g}/\text{m}^3$)	PC/AQS (%)	PEC ⁽³⁾	PEC/AQS (%)	Impact Significance
AQ4			0.281	<1%	0.281	<1%	Negligible
AQ5			0.404	<1%	0.404	<1%	Negligible
AQ6			0.668	<1%	0.668	<1%	Negligible
AQ7			0.337	<1%	0.337	<1%	Negligible
AQ8			0.349	<1%	0.349	<1%	Negligible

(1) Air Quality Standard

(2) Process Contribution

(3) Predicted Environmental Contribution

Table 6.42 *Cadmium (Cd) Annual Average*

Site	Baseline($\mu\text{g}/\text{m}^3$)	AQS ⁽¹⁾ ($\mu\text{g}/\text{m}^3$)	PC ⁽²⁾ ($\mu\text{g}/\text{m}^3$)	PC/AQS (%)	PEC ⁽³⁾	PEC/AQS (%)	Impact Significance
Maximum			1.40 x10 ⁻⁴	<1%	1.40 x10 ⁻⁴	<1%	Negligible
AQ1			2.00 x10 ⁻⁵	<1%	2.00 x10 ⁻⁵	<1%	Negligible
AQ2			1.00 x10 ⁻⁵	<1%	1.00 x10 ⁻⁵	<1%	Negligible
AQ3			2.00 x10 ⁻⁵	<1%	2.00 x10 ⁻⁵	<1%	Negligible
AQ4	n/a	0.005	0.00	0%	0.00	0%	Negligible
AQ5			1.00 x10 ⁻⁵	<1%	1.00 x10 ⁻⁵	<1%	Negligible
AQ6			1.00x10 ⁻⁵	<1%	1.00x10 ⁻⁵	<1%	Negligible
AQ7			0.00	0%	0.00	0%	Negligible
AQ8			0.00	0%	0.00	0%	Negligible

⁽¹⁾ Air Quality Standard

⁽²⁾ Process Contribution

⁽³⁾ Predicted Environmental Contribution

Table 6.43 *Hydrochloric Acid (HCl) 24-hour Average*

Site	Baseline($\mu\text{g}/\text{m}^3$)	AQS ⁽¹⁾ ($\mu\text{g}/\text{m}^3$)	PC ⁽²⁾ ($\mu\text{g}/\text{m}^3$)	PC/AQS (%)	PEC ⁽³⁾	PEC/AQS (%)	Impact Significance
Maximum			0.0957	<1%	0.0957	<1%	Negligible
AQ1			0.0303	<1%	0.0303	<1%	Negligible
AQ2	n/a	600	0.0186	<1%	0.0186	<1%	Negligible
AQ3			0.0222	<1%	0.0222	<1%	Negligible

Site	Baseline($\mu\text{g}/\text{m}^3$)	AQS ⁽¹⁾ ($\mu\text{g}/\text{m}^3$)	PC ⁽²⁾ ($\mu\text{g}/\text{m}^3$)	PC/AQS (%)	PEC ⁽³⁾	PEC/AQS (%)	Impact Significance
AQ4			8.34×10^{-3}	<1%	8.34×10^{-3}	<1%	Negligible
AQ5			9.46×10^{-3}	<1%	9.46×10^{-3}	<1%	Negligible
AQ6			0.0165	<1%	0.0165	<1%	Negligible
AQ7			9.68×10^{-3}	<1%	9.68×10^{-3}	<1%	Negligible
AQ8			9.37×10^{-3}	<1%	9.37×10^{-3}	<1%	Negligible

⁽¹⁾ Air Quality Standard

⁽²⁾ Process Contribution

⁽³⁾ Predicted Environmental Contribution

Table 6.44 *Dioxins and Furans 24-hour Average*

Site	Baseline($\mu\text{g}/\text{m}^3$)	AQS ⁽¹⁾ ($\mu\text{g}/\text{m}^3$)	PC ⁽²⁾ ($\mu\text{g}/\text{m}^3$)	PC/AQS (%)	PEC ⁽³⁾	PEC/AQS (%)	Impact Significance
Maximum			0.00	0%	0.00	0%	Negligible
AQ1			0.00	0%	0.00	0%	Negligible
AQ2			0.00	0%	0.00	0%	Negligible
AQ3			0.00	0%	0.00	0%	Negligible
AQ4	n/a	1x10 ⁻⁷	0.00	0%	0.00	0%	Negligible
AQ5			0.00	0%	0.00	0%	Negligible
AQ6			0.00	0%	0.00	0%	Negligible
AQ7			0.00	0%	0.00	0%	Negligible
AQ8			0.00	0%	0.00	0%	Negligible
⁽¹⁾ Air Quality Standard ⁽²⁾ Process Contribution ⁽³⁾ Predicted Environmental Contribution							

Table 6.45 *NO_x – Maximum Annual Average (Agriculture)*

Receptor	Baseline(µg/m ³)	AQS ⁽¹⁾	PC ⁽²⁾	PC / AQS (%)	PEC ⁽³⁾	PEC/AQS (%)	Impact Significance
Maximum on grid	12.2	30	0.570	1.9%	12.7	42%	Negligible
⁽¹⁾ Air Quality Standard ⁽²⁾ Process Contribution ⁽³⁾ Predicted Environmental Contribution							

Table 6.46 *SO₂ – Maximum Annual Average (Agriculture)*

Receptor	Baseline(µg/m ³)	AQS ⁽¹⁾	PC ⁽²⁾	PC / AQS (%)	PEC ⁽³⁾	PEC/AQS (%)	Impact Significance
Maximum on grid	1.64	20	0.0713	<1 %	1.66	8.3%	Negligible
⁽¹⁾ Air Quality Standard ⁽²⁾ Process Contribution ⁽³⁾ Predicted Environmental Contribution							

Table 6.47 *Assessment of Impact Related to Incinerator Emissions during Operation*

Impact	Adverse impact to human health and agriculture from stack emissions.				
Impact Nature	Negative	Positive		Neutral	
	Elevated ambient concentrations of NO ₂ , SO ₂ , PM ₁₀ , PM _{2.5} , HF, Hg, Pb, CO, Cd, HCl and Dioxins and Furans will have a negative impact on human health and NO _x and SO ₂ will have a negative impact on agriculture.				
Impact Type	Direct	Indirect		Induced	
	Elevated ambient concentrations of NO ₂ , SO ₂ , PM ₁₀ , PM _{2.5} , HF, Hg, Pb, CO, Cd, HCl and Dioxins and Furans will have a direct impact on human health and NO _x and SO ₂ will have a direct impact on agriculture.				
Impact Duration	Temporary	Short-term	Long-term	Permanent	
	Potential impacts to air quality will occur throughout the operation phase and can therefore be described as long term in nature.				
Impact Extent	Local	Regional		International	
	Emissions from the Project may cause adverse impacts up to 5 km from the point of release and are therefore local in their extent.				
Impact Scale	The scale of the impacts is likely to be within 5 km from the point of release and is therefore considered medium scale.				
Frequency	Impacts will arise continuously throughout the operation period.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
	The impact magnitude before mitigation is expected to be negligible for all substances of interest.				
Receptor Sensitivity	Low	Medium		High	
	When considering impacts to human health due to inhalation of airborne pollutants, all sensitive human receptors are defined as ' medium ' sensitivity. This represents general populations and areas of habitation. Agricultural areas are defined as ' low ' sensitivity.				
Impact Significance	Negligible	Minor	Moderate	Major	
	The impact significance before mitigation is expected to be negligible for all substances of interest at both human and agricultural receptors.				

Additional Mitigation/Management Measures

The Project should ensure that emission concentrations from the incinerator do not exceed the concentrations outlined in the WBG EHS Guidelines for

Waste Management Facilities ⁽¹⁾. The WBG EHS Guidelines for Waste Management Facilities also provides following good practice measures to prevent, minimise and control air emissions from incineration facilities:

- Segregate waste to avoid the incineration of waste that contains metals and metalloids that may volatilize during combustion and be difficult to control through air emission technology;
- Adhere to applicable national requirements and internationally recognized standards for incinerator design and operating conditions;
- Introduce wastes only after the optimum temperature is reached in the final combustion chamber of the incinerator and avoid operating conditions in excess of those that are required for the efficient combustion of waste;
- Interlock the charging system with the temperature monitoring and control system to prevent further addition of waste if the operating temperature falls below the required limits;
- Minimise planned and unplanned shutdowns by implementing and managing a robust maintenance program;
- Optimise furnace and boiler geometry, combustion air injection, NO_x control devices (if used), combustion temperature and level of distribution, and the control of raw gas residence time;
- Use auxiliary burner(s) for start-up and shut-down and for maintaining the required operational combustion temperatures at all times when unburned waste is in the combustion chamber; and
- Use flue gas treatment system for control of acid gases, particulate matter, and other air pollutants such as NO_x control measures and/or selective catalytic reduction (SCR) or selective noncatalytic reduction (SNCR) systems.

An Operational Phase Monitoring Plan will be required for the Project which will include air quality. During construction, emissions of particulates PM₁₀, PM_{2.5}, NO₂, and SO₂ will be monitored monthly at the ASRs as shown in Figure 5.3. NO₂ and SO₂ measured by means of a diffusion tube. Others will be monitored by HAZ-SCANNER (EPAS) Environmental Perimeter Air Monitoring System. Stacked emissions from incinerator will be continuously monitored including waste feed rate, total hydrocarbons, temperature (measured at the end of the residence zone), and CO and oxygen (measured at the stack). **In addition, the Project will monitor air emissions generated from production formulation process as TOC, VOC, Chloride, HBr,**

⁽¹⁾ International Finance Corporation (IFC) (2007) Environmental, Health and Safety Guidelines for Waste Management Facilities [Online] Available at: http://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/policies-standards/ehs-guidelines [Accessed 01 August 2017]

HCN, HF, Hydrogen Sulphide, Chlorine, Ammonia, Gaseous Inorganic Chlorine Compounds, on a monthly basis until completion of operation.

Residual Impact

The residual impact on air quality from waste incineration during the normal operation of the Project is considered negligible. It is important to undertake monitoring to track the effectiveness of these mitigation measures and manage any necessary changes accordingly.

Monitoring Plan

Air monitoring will be conducted monthly during construction and operation. Parameters to be measured during operation phase include PM₁₀, PM_{2.5}, TOC, VOC, Chloride, Bromines (as HBr), Cyanides (as HCN), Fluorine (as HF), Hydrogen Sulphide, Chlorine, Ammonia, Gaseous Inorganic Chlorine Compounds (as HCl) mg/Nm³. More information is provided in Section 8.4.5.

For stack emissions, there will be continuous monitoring of incinerator parameters including waste feed rate, total hydrocarbons, temperature (measured at the end of the residence zone), and CO and oxygen (measured at the stack).

6.5.2

Ambient Noise

Source of Impacts

During operation, noise will be generated from transportation related to the Project as well as use of PME for plant operation (e.g. drum crusher). Given that the plant is expected to manufacture 50% of domestic crop protection demand, the transportation volume to and from the Project Site as well as the operation may lead to potentially significant noise impacts on nearby NSRs (Figure 5.14).

Baseline noise monitoring was conducted on 30 June to 5 July 2017 at five selected noise sensitive receivers (NSRs) located near the Project Site to establish the background levels (Figure 5.14). Based on the findings, the average noise levels (both day and night-time) at the Baseline Noise Monitoring locations did not meet the WBG EHS General Guidelines (2007). These baseline levels were mainly captured from vehicles (motorcycles, cars) and people activities, raining and loud-speaker.

Existing / In-place Controls

There are no existing / in place controls.

Impact Significance

A final plant inventory for operational activities is not available for quantitative assessment of noise. As such, the following is based on qualitative assessment.

The nearby NSRs are residential in nature and their sensitivity is considered medium. Given that the existing baseline noise level exceeded the WBG EHS General Guidelines (2007), any additional noise impact from the Project may lead to significant cumulative impact to the community. As such, the magnitude of impact is considered high and the impact significance is considered **major** (Table 6.48).

Table 6.48 Noise Impact Assessment – Operation Phase

Impact	Noise impact from the operation of fixed plant and machinery during operational phase.				
Impact Nature	Negative		Positive		Neutral
	Noise impact from the construction activities is negative .				
Impact Type	Direct		Indirect		Induced
	Noise impact from the construction activities is direct .				
Impact Duration	Temporary	Short-term	Long-term		Permanent
	Noise impact from the construction activities is long-term ..				
Impact Extent	Local		Regional		International
	Noise impact from the operation activities is local .				
Impact Scale	Project area				
Frequency	Throughout the operation period.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
	The magnitude of the noise impact is negligible .				
Receptor Sensitivity	Low		Medium		High
	The identified NSR are residential, the sensitivity of the receptor is considered as medium .				
Impact Significance	Negligible	Minor	Moderate		Major
	As the impact magnitude is large and the receptor sensitivity is medium, the impact significance is considered as Major .				

Mitigation/Management Measures

The following mitigation measures are recommended to mitigate the noise impact during operation phase of the Project:

- Select equipment with lower SWL from the BS5228: Part 1: 2009.
- Install silencers, mufflers or acoustic enclosures to reduce sound power level of noisy equipment at all times.
- Re-locate noise sources to less sensitive areas to take advantage of distance and shielding.
- Site permanent facilities away from community areas if possible.
- Take advantage of the natural topography as a noise buffer during facility design; Vehicles should be regularly maintained.

- Transportation of materials during night time should be avoided to minimize disturbance to communities.

An Operational Phase Monitoring Plan will be required for the Project which will include noise emissions. During operation, ambient noise levels in Leq, Leq day, Leq night and hourly Leq will be measured monthly at the NSRs within 500 m from the Project boundary. These will be measured for 24-hours.

Residual Impact

Through the implementation of the above mitigation measures, operational noise would be expected to be of **moderate significance**.

Monitoring Plan

Noise monitoring will be conducted monthly during construction and operation. Parameters to be measured include dB noise levels over a 24 hour period (day and night time). More information is provided in *Section 8.4.5*.

6.5.3

Surface Water Quality

Source of Impacts

During operation, it is expected that the same surface water quality issues as presented for the construction phase in the previous *Section 8.3.1* above may occur. In addition, wastewater generated from washing of formulation lines (~20 m³ / day), laundry (~1m³ / day) and cleaning of process area (~3 m³ / day) in the HAIC may be a potential issue if they are not being managed properly.

According to Project information provided by Awba as presented in *Section 4*, wastewater generated from washing of formulation lines, laundry and cleaning of process area will be treated by an on-site wastewater treatment plant. In addition, sewage from the operation workforce will be treated on-site by a septic tank and seepage field. Solid wastes generated during operation will be incinerated on site. No specific mitigation measures are currently proposed to manage potential surface water quality impacts from site runoff and hazardous material management.

Existing / In-place Controls

Awba will have a solid and liquid wastewater treatment facility as detailed in *Section 4*.

Impact Significance

Considering the above, the potential impact magnitude is considered to be small while receptor sensitivity is high given that the streams and rivers downstream of the Project Site are used as a drinking water supply. The overall impact significance is therefore **moderate** (*Table 6.49*).

Table 6.49 Surface Water Quality Impact Assessment

Impact	Deterioration of surface water quality in nearby watercourses from uncontrolled runoff, improper wastewater, solid waste and hazardous material management at the site.				
Impact Nature	Negative	Positive	Neutral		
	Pollutants entering surface water courses would create a negative impact.				
Impact Type	Direct	Indirect	Induced		
	The impact would be directly upon surface water resources and on the residents of nearby villages that depend on water supplied from the watercourses.				
Impact Duration	Temporary	Short-term	Long-term	Permanent	
	If not managed, the impact would occur during the operation phase of the Project.				
Impact Extent	Local	Regional	International		
	The extent of the impact would be limited to the watercourses adjacent to the site.				
Impact Scale	Moderate				
Frequency	Runoff from the Project site will occur frequently during the operation phase. Contamination due to improper wastewater, solid waste and hazardous material management are expected to be infrequent during the operation phase.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
	The impact magnitude is Small .				
Receptor Sensitivity	Low	Medium	High		
	The receptor sensitivity is High , given the year round dependence by residents on water from the watercourses for drinking, washing and cleaning.				
Impact Significance	Negligible	Minor	Moderate	Major	
	The impact magnitude before mitigation is expected to be Moderate .				

Additional Mitigation/Management Measures

To mitigate potential impacts on surface water quality during the operation phase, mitigation measures developed for the construction phase as presented in *Section 6.4.3* above should be followed given the similar issues expected. In addition to the above:

- Discharges from the production process should be treated and monitored monthly for compliance with effluent levels specified in WBG EHS Guidelines for Pesticide Manufacturing, Formulation and Packaging (2007).

- Sewage from the operation workforce should be treated on-site by a septic tank and seepage field properly designed and maintained according to WBG General EHS Standards (2007) as follows:
 - Installed in areas with sufficient soil percolation for the design wastewater loading rate;
 - Installed in areas of stable soils that are nearly level, well drained, and permeable, with enough separation between the drain field and the groundwater table or other receiving waters; and
 - Grease trap should be installed at sources where oily water is expected (e.g. kitchen).
- Should treated wastewater to be reused as spray water, they should be monitored monthly for compliance with Myanmar National Environmental Quality (Emissions) Guidelines for site runoff and wastewater discharges (for TSS, oil and grease, pH).
- For Class II (moderately hazardous) pesticides, Awba will provide the appropriate controls in relation to the manufacture, procurement, or distribution and/or use of these chemicals (as per Myanmar/Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 6).

An Operational Phase Monitoring Plan will be required for the Project which will include surface water quality. During construction, surface water quality monitoring will include pH, DO, COD, BOD5, oil and grease, TN, TP, TSS and total coliform. This will be conducted monthly at the water sampling locations shown in *Figure 5.20* and one upstream station located 100m upstream of the Project Site.

Significance of Residual Impact

With proper implementation of the recommended mitigation measures, the residual impacts to surface water quality are expected to be of minor significance. A Construction Phase Monitoring Plan will be required for the Project which will include surface water quality. During construction, surface water quality monitoring will include pH, DO, COD, BOD5, oil and grease, TN, TP, TSS and total coliform. This will be conducted monthly at the water sampling locations shown in *Figure 5.20* and one upstream station located 100 m upstream of the Project Site.

Monitoring plan

Surface water quality monitoring will be conducted monthly during construction and operation. Parameters to be measured during operation phase include pH, BOD5, COD, TSS (Total Suspended Solids), Oil and Grease, AOX (Absorbable Organic Halogens), Phenol, Arsenic, Chromium Total, Chromium (hexavalent), Copper, Chlorinated organics, Nitroorganics, Mercury, Zinc, Active Ingredient (each), Bioassays Toxicity: Fish, Daphnia, Algae, Bacteria, Ammonia, Total Phosphorus, Total Coliform, Total Nitrogen. More information is provided in *Section 8.4.5*.

Source of Impacts

Improper solid waste management was observed during the site visit in May 2017, which is considered as a potentially significant issue to soil quality. In addition, there was no secondary containment at the Project Site at the storage area of hazardous materials. Spills from the storage area as well as from maintenance and refuelling area may result in soil contamination and this can have long-term deleterious effects on human and environmental health.

Existing / in-place controls

There are no existing / in place controls.

Impact Significance

Results of the baseline soil quality surveys conducted in June to July 2017 indicated the soil quality parameters generally complied with the FAO Soil Bulletin 65 and Dutch Standards and soils are of good quality with limited contamination.

For potential soil quality impact, the receptor sensitivity is considered low given that impacts caused by improper solid waste and hazardous material management are likely to be contained within the Project Site for industrial use only. The potential impact magnitude is considered to be large given the existing in-place control is considered inadequate. The overall impact significance is therefore moderate (Table 6.50).

Table 6.50 *Soil Quality Impact Assessment*

Impact	Deterioration of soil quality due to improper solid waste and hazardous material management at the site.		
Impact Nature	Negative	Positive	Neutral
	Pollutants entering soil would create a negative impact.		
Impact Type	Direct	Indirect	Induced
	The impact would be direct on soil quality.		
Impact Duration	Temporary	Short-term	Long-term
	If not managed, the impact would occur during the operation phase of the Project.		
Impact Extent	Local	Regional	International
	The extent of the impact would be limited to mainly within the Project Site.		
Impact Scale	Small		
Frequency	Contamination due to improper solid waste and hazardous material management are expected to be infrequent during the operation phase.		

Impact Magnitude	Positive	Negligible	Small	Medium	Large
	The impact magnitude is Large .				
Receptor Sensitivity	Low		Medium	High	
	The receptor sensitivity is Low , given that the Project Site where potential impact is more likely to occur is for industrial use.				
Impact Significance	Negligible	Minor	Moderate	Major	
	The impact magnitude before mitigation is expected to be moderate .				

Additional Mitigation/Management Measures

To mitigate potential impacts on soil quality, mitigation measures developed for management of impacts to water quality as presented in *Section 8.3.4* above should be followed.

Significance of Residual Impact

With proper implementation of the recommended mitigation measures, the residual impacts to soil quality are expected to be of **negligible significance**.

Monitoring plan

Given the negligible significance of the impacts, no monitoring of soil is required.

6.5.5 Community Health and Safety

Potential Impacts

Potential impacts on community health and safety may occur indirectly from air emissions, noise generation, and impacts to water quality. Public health and safety in relation to air quality and wastewater was a key concern of the villagers.

The following potential risks on the HAIC Project's community health and safety have been identified:

- Increased risks of accidents along the HAIC access road (between the site and the Pyay Road);
- Increased noise levels from the equipment/machinery use, material transport and workforce transport;
- Surface water deterioration from wastewater discharge could be a potential issue if not handled properly;
- Air quality deterioration from stack emissions.

The risks related to noise emissions, surface water deterioration, and air emissions during Operation Phase are detailed in Sections 6.5.2, Section 6.5.3, and Section 6.5.1.

Existing / In-place Controls for traffic accidents' risks

There are currently no existing and/or in-place controls for the above impacts.

Impact Significance

The Project is employing employ around 200-300 staff during the operation Phase. Some of these staff are sourced from local villages. During the peak of the operation phase, an estimated number of six trucks (in total 24 trips per day) are expected to transport raw material and merchandise through the access road.

Traffic accidents represent the greatest risk for local communities near the Project. The sensitivity is considered high given that both livestock and local residents will not be accustomed to increased traffic during the operation phase. The magnitude of the impact is likely to be medium. This impact is assessed as of **major** significance (Table 6.51).

Table 6.51 *Assessment of Impacts on Community Health and Safety (increased of traffic accidents' risks)*

Impact	Impact on community health and safety during operation				
Impact Nature	Negative	Positive		Neutral	
	Potential injury or death to humans or livestock.				
Impact Type	Direct	Indirect		Induced	
	The impact could directly affect local residents and/or livestock.				
Impact Duration	Temporary	Short-term	Long-term		Permanent
	Impact is expected to be most significant during the operation phase.				
Impact Extent	Local	Regional		Global	
	Impact is limited to communities near the Project Area.				
Impact Scale	N/A				
Impact Frequency	During the operational period				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
	The impact magnitude is potentially Medium .				
	Low	Medium		High	

Receptor Sensitivity	The receptor sensitivity is considered High .			
Significance	Negligible	Minor	Moderate	Major
	The significance is likely to be Major .			

Additional Mitigation and/or Management Measure

Impacts on community health and safety can be mitigated through good practices and close cooperation between the Project managers, contractors and local authorities, as below:

- A Contractor EHS Management Plan will be developed to reduce potential impacts of contractors' activities to nearby communities;
- All complaints will be addressed through the Community Grievance Mechanism (as per Myanmar/ Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 1);
- A Road Transport Management Plan should be developed to indicate the traffic routes to be followed and speed limit to be complied with in order to reduce risk to the local communities;
- Awba will develop a Safe Vehicle Policy and Training Safety Procedure for its own transport fleet, including provisions for safe agro-chemical and hazardous waste transport, and will include such requirements in transport contractual agreements, including barge third-party contractors (as per Myanmar/ Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 7);
- During the operation phase, a speed limit of 40km/h shall be enforced and
- Establishment of a security team to monitor entrance to the site.

Significance of Residual Impacts

The enforcement of speed limits for Project vehicles and other measures as presented above should reduce the likelihood of vehicle strikes and of health and safety issues to local communities such that the residual impact is of **minor** significance.

Monitoring plan

Monitoring for community health and safety is included in the air, noise, and water sections (Section 6.5.1 to 6.5.3).

6.5.6 *Economy and Livelihoods*

Potential impacts on economy and livelihoods are expected to be similar to those during construction phase. Please refer to *Section 6.4.6* for the relevant assessment and mitigation measures recommended.

6.5.7 *Occupational Health and Safety*

Source of Impact

In terms of occupational health and safety, issues include exposure to dust, noise and hazardous materials / wastes, and physical hazards associated with the use of heavy equipment.

During operation, there is also the potential for fugitive emissions from the pesticide formulation.

Existing / In-place Controls

There are ventilation systems, and life and fire safety systems in the buildings as outlined in the project description. Information on these systems are provided in **Appendix C**. Adequate PPE and suction hoods will be used to collect vapours and other fugitive emissions. There are also a number of existing controls under the air, noise, and water management plans (*Section 8.1 to 8.3*) that are also applicable to reduce impact on workers.

Impact Significance

Provided the impacts will be localised to certain work areas, the magnitude of the impact is likely to be medium. The sensitivity of workforce is considered medium with the in-place controls. This impact is assessed as of **moderate significance** (*Table 6.52*).

Table 6.52 *Assessment of Impacts on Occupational Health and Safety*

Impact	Impact on occupational health and safety during operation			
Impact Nature	Negative	Positive	Neutral	
	Potential negative impacts to workers due to health and safety issues.			
Impact Type	Direct	Indirect	Induced	
	The impact could directly affect the workers.			
Impact Duration	Temporary	Short-term	Long-term	Permanent
	Impact is expected to be most significant during the operation phase.			
Impact Extent	Local	Regional	Global	
	Impact is limited to workers of the operation site.			
Impact Scale	N/A			

Impact Frequency	During operation activities				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
	The impact magnitude is potentially Medium .				
Receptor Sensitivity	Low		Medium		High
	The receptor sensitivity is considered High				
Significance	Negligible	Minor	Moderate	Major	
	The significance is likely to be Moderate .				

Additional Mitigation and/or Management Measure

Measures adopted for air, noise, and water are also applicable here (Section 8.1 to 8.3). The following mitigation measures will also be adopted for occupational health and safety impacts:

- The Project will design an occupational health and safety management plan, which will be a subset of the overall ESMP, tailored to the needs of the Project. This plan will set standards for all contractors and subcontractors;
- The Project will abide by Myanmar laws and regulations, and International Labour Organisation (ILO) conventions when gaps are identified between national legislation and international standards;
- Use equipment wash-down waters as makeup solutions for subsequent batches;
- Use dedicated dust collectors to recycle recovered materials;
- Workers will have contracts, which clearly state the terms and conditions of their employment and their legal rights. The Project and all contractors will be able to access a worker grievance mechanism managed by Awba;
- Workers accommodation will comply with the requirements of IFC PS2 guidelines regarding minimum living areas, provision of potable drinking water (meeting WHO parameters), electricity, and latrine services;
- Awba will develop and implement a corporate Human Resource Policy and Manual of Procedures in compliance with applicable national labour laws and regulations and IFC's Performance Standard 2 requirements, including the following actions issues (as per Myanmar/ Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 2);
 - Corporate HR policies applicable to all operations;
 - HR Manual of Procedures and Staff HR Handbook;
 - Development of a multi-year HR awareness program; and

- Worker's grievance mechanism for its permanent and casual workers, as well as for construction workers, to enable anonymous complaints and tracking and analysis of systemic.
- Awba will develop and implement OHS management system – consistent with OHSAS 18001 – commensurate with the level of risks and impacts, applying to all its new operations, including the following actions issues (as per Myanmar/ Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 3);
 - Corporate OHS policy applicable to all operations;
 - OHS Manual of Procedures (SOPs), including ambient air quality monitoring procedure;
 - Development of a multi-year OHS training plan for its staff, including centres of responsibilities, budgetary allocations, and schedule of delivery;
 - Definition of OHS KPIs for monitoring and reporting;
 - External and internal OHS audits and implementation of Corrective Action Plan (CAP), if required;
 - Training manuals for end-customers (e.g. farmers); and
 - Consolidated annual OHS performance reports.

Significance of Residual Impacts

With the additional management and mitigation measures, the residual impact is considered of **minor** significance.

Monitoring Plan

Air monitoring will be conducted monthly during operation inside warehouses for particulate (inert or nuisance dust), carbon monoxide, nitrogen dioxide, and sulphur dioxide. More information is provided in *Section 8.4.5*.

6.5.8 Infrastructure Services

Potential impacts on infrastructures are expected to be similar to those during construction phase. Please refer to *Section 6.4.8* for the relevant assessment and mitigation measures recommended.

6.5.9 Unplanned events

Source of Impact

During operation, there is the potential for hazardous materials (pesticide ingredients, oils, lubes, etc.) to spill or leak into the surrounding environment which can lead to pollution of water courses and potential impacts to human

health. Potential impacts from unplanned spills are expected to be similar to those during construction phase. Please refer to *Section 6.4.9* for the relevant assessment and mitigation measures recommended.

Unplanned fire during the pesticide formulation process is a potential unplanned event of the Project which may cause potential impacts to workers and local communities.

Existing / In-place Controls

As presented in *Section 4*, fire protection / fighting system will be installed at the office building, laboratory building, warehouse, EC Building, SL Building, WP Building, SP Building, SC Building, Utility Building, Drum Crusher Building to mitigate fire risk during operation of the Project.

Impact Significance

Fire event due to the Project is more likely to occur within the Project Site at which the pesticide formulation process occurs. As presented in *Section 6.4.9* above, existing / in-place controls are planned at the Project Site to reduce likelihood and potential impact of a fire event. Provided that these measures are implemented properly, fire outbreaks have been evaluated to result in impacts of up to **Moderate** significance (*Table 6.53*).

Table 6.53 *Assessment of Impacts on Community and Occupational Health and Safety from Unplanned Fire Event*

Impact	Impacts from fire to workers and local communities.				
Impact Nature	Negative	Positive		Neutral	
	Unplanned fire event is a health and safety risk to workers and local communities				
Impact Type	Direct	Indirect		Induced	
	Direct impacts to health and safety in case of fire.				
Impact Duration	Temporary	Short-term	Long-term	Permanent	
	If not managed, the impact would occur and may lead to long-term impacts to workers / communities.				
Impact Extent	Local	Regional		International	
	The extent of the impact likely to be limited to the Project Site.				
Impact Scale	Large				
Frequency	Potentially occur during operation phase.				
Likelihood	Unlikely in general with good practice on site.				
	Positive	Negligible	Small	Medium	Large

Impact Magnitude	The impact magnitude is Small .		
Receptor Sensitivity	Low	Medium	High
	The receptor sensitivity is High .		
Impact Significance	Negligible	Minor	Moderate
	The impact magnitude before mitigation is expected to be moderate .		

Additional Mitigation, Management and Monitoring

- As administered under the Emergency Preparedness Plan, a Fire Risk Management Plan will be developed including communications protocols and measures to control any fires that do arise.
- Induction training for personnel is recommended to include a mandatory segment on fire safety and actions in the event of a fire.
- Conduct fire training and response drills.

Significance of Residual Impacts

With measures to manage fire risk, it is considered the residual risk can be reduced to **Minor to Moderate**.

Within the Industrial Park area there are two other facilities that could be operational at the same time as the HAIC:

1. Marlarmyaing Company Limited; and
2. Myanmar Pesticide Industry (MPI).

Both of these facilities are pesticide formulation and packaging industries like the HAIC and therefore potential impacts are expected to be similar. **There is no publically available information on the operations of the Marlarmyaing facility.** It is also unconfirmed whether the MPI facility will continue its operation after the end of the BOT contract between the Awba and the Government of Myanmar. Based on this, a quantitative cumulative impact assessment of the HAIC with the two facilities is not possible; however, the following presents a qualitative approach.

Under the ESIA of the HAIC project, baseline surveys for air quality, noise, surface water quality, groundwater quality and soil quality were undertaken in June to July 2017. Except for noise which showed exceedance of both the noise limits set out in NEQ and WBG General EHS guideline values during daytime (except NSR4) and night-time periods, the baseline levels of other aspects generally indicated compliance with relevant environmental standards as presented in *Sections 5.1-7* with occasional isolated exceedances. These baseline levels are considered to reflected environmental conditions at the sensitive receiver under normal operation of the surrounding facilities (i.e. Marlarmyaing and MPI), and were taken into account during the operational impact assessment of the Project in *Section 9*.

It is concluded in the ESIA Study that with proper implementation of the recommended mitigation measures, the residual environmental and social impacts causing by the operation of the Project could be expected to be of no larger than **moderate** significance. If the operations of the surrounding facilities remain the same as when the baseline surveys were undertaken in June to July 2017, it is expected that the cumulative impact of the HAIC Project and the Marlarmyaing and MPI facilities will also be no larger than moderate significance.

Awba commit to good international industry practice (GIIP) in compliance with IFC Performance Standards, WBG EHS Guidelines, and Myanmar EQEGs. Awba will undertake a comprehensive EHS audit in accordance with the WBG EHS Guidelines in Myanmar National Environmental Guidelines for operation phase.

Through a systematic assessment, the ESIA has identified a number of significant environmental and social impacts, which may potentially result from the construction and operation of the Project. In order to manage and mitigate these impacts, a range of measures have been developed to reduce the overall residual impacts to acceptable levels and as low as reasonably practicable. Implementing and tracking the effect of these management and mitigation measures is an essential element to ensuring that the assessed residual impact levels are confirmed.

8.1 *OBJECTIVES AND SCOPE OF THIS ESMP*

8.1.1 *Objectives*

The key objectives of this Environmental and Social Management Plan (ESMP) are to:

- Collate the various mitigation and management measures developed throughout the ESIA into a single point;
- Identify all of the detailed management plans which will need to be developed for implementation throughout the construction and operation phases of the Project;
- Define monitoring requirements to determine the efficiency of all mitigation and management measures; and
- Provide clarity to all stakeholders as to what impacts have been identified, how they will be mitigated and managed, and through what means.

8.1.2 *Scope of this ESMP*

The scope of this ESMP covers both construction and operation phases of the Project, which have the potential to affect, positively or negatively, the environment and communities in which the Project will operate.

As required by this ESMP, a range of detailed management plans will be developed and implemented for each specific phase of the Project. The responsibility for the implementation of these plans will lay variously with the Awba, contractors and sub-contractors. It is noted that this is only a framework ESMP into which the full range of management and monitoring activities will eventually fit into.

In addition, the ESMP for the Project should align with the HSE Policy of the Project which will be developed by Awba.

8.2 *PROJECT DESCRIPTION*

The Project involves the construction and operation of the HAIC, which is located in the Hmawbi Township of Yangon Region. The HAIC will

formulate a variety of pesticides, herbicides, fungicides, and foliar fertilizers. The plant will be designed for both solid and liquid products, and is expected to have an initial capacity of 16 million litres/kilogram, per annum of agrochemical products in the first phase (2017). This will eventually grow up to a capacity of 30 million litres/kilogram per annum in 2020 with growing demand from Myanmar's agriculture industry.

In addition to the production and formulation facilities, there will laboratory, utility, workshop, warehouse, office, and security facilities, carpark, staff accommodation, canteen, testing farm and greenhouse supporting the operations. Onsite incinerator and wastewater treatment facilities will be constructed to treat the wastes generated from the HAIC. The ash generated by the incinerator together with other household solid waste will be sent to a licensed contractor in Thilawa and the incinerator will only be used as a backup as per Hazardous Waste Management Plan. The incinerator will not generate fly ash because it has a dust collector.

The HAIC will be constructed in three phases. It was observed during the site visit in May 2017 that construction had commenced for Phase 1. Construction of the Project is expected to be completed before 2020.

BASELINE ENVIRONMENTAL CONDITIONS

For the purposes of this non-technical summary, the description of the baseline environmental conditions is limited to those aspects that are directly relevant to the proposed Project and anticipated impacts, i.e. ambient air quality, noise, water quality, soil and biodiversity etc. Baseline surveys were undertaken in June to July 2017 for these aspects in order to provide baseline information for the purpose of conducting an informed ESIA of the Project.

Baseline river and well water quality data was collected in June and July. At all river sampling locations, the level of total suspended solids (sediment and soil in the water) exceeded the WBG *General EHS Guidelines* (2007) for treated sanitary sewage discharge and WHO Drinking Water Standards. These exceedances are due to the turbid nature of the surface waters. Villagers use sieve / filtering systems when using the water for drinking purposes. In addition, high levels of faecal matter were recorded. Other measurements were generally within the WHO and WBG EHS Guidelines with no specific concern / pollution identified. Well water quality parameters measured include in-situ measurement of pH and temperature as well as laboratory analysis of pH, Total Suspended Solid (TSS), Total Cyanide, Ammonia, Nitrite, Nitrate, Reactive Phosphorus, Oil & Grease, Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD), Phenols, Arsenic, Cadmium, Chromium, Copper, Mercury, and Faecal Coliforms. Only one exceedance of WHO Drinking Water quality standards – PH levels in water in Yae Tar Shey well. This is not an indication of pollution on its own, as heavy metal concentrations identified did not exceed the WHO standards.

Noise measurements showed exceedance of both the noise limits set out in NEQ and WBG General EHS guideline values during daytime (except at one location) and night-time periods, the baseline levels of other aspects generally indicated compliance with relevant environmental standards with occasional isolated exceedances.

For biodiversity, the survey results indicated presence of a modified habitat with generally low biodiversity value near the proposal HAIC.

8.3 *PROJECT ENVIRONMENTAL AND SOCIAL COMMITMENTS*

The commitments of the Project are provided in *Table 8.1*.

Table 8.1 *Environmental and Social Commitments of the Project*

Item No.	Project Stage/Affected Aspect	Project Activity and affected area	Potential Impacts	Mitigation Measures	Implementation Schedule	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Reporting Requirements
8.1	Air Quality	<p>Vehicle movements over unpaved access roads and within construction areas.</p> <p>Site clearance, site formation and levelling involving excavation and material transfer.</p> <p>Construction of the main Project infrastructure.</p>	Dust	<ul style="list-style-type: none"> • An Air Pollution Management Plan shall be produced and adhered to; • Water suppression or surface binding agents should be used on exposed open earthworks where rainfall is less than 0.25 mm in a 24 hour period and wind speeds are forecast to be more than 19 kph (5.3m/s); • Where unpaved roads are utilised by vehicles, water suppression at a rate of 2 litres/m²/hr should be used where rainfall of less than 2 mm in the last hour has occurred or surface binding agents should be used to more permanently reduce dust generation; • On-site meteorological monitoring should be undertaken to inform the use of mitigation on site during construction period; • Use of localised dampening and activity specific dampening should be used to reduce localised emissions of dust; • Wheel washing should be used prior to entry onto a sealed road section to avoid tracking dirt onto sealed roads and generating dust; • Vehicles transporting dusty materials should be covered; • Stockpiling of material, for example, rocks, sand and soils should be minimised; • Stockpiles should be located as far away from receptors as possible; • The design of stockpiles should be optimised to retain a low profile with no sharp changes in shape; • Vegetation of stockpiles should be used where a stockpile is not to be used for a month to stabilize the surface and prevent dust generation; • Drop heights of material should be minimised; • Wind breaks should be erected around the key construction activities and in the vicinity of potentially dusty works; • Qualitative monitoring surveys should be implemented to include site inspections for visible dust emissions in the vicinity of the site boundary (both internal and external); • Visual monitoring of dust deposition onto surfaces on and off-site should be undertaken regularly; • Mitigation measures should be carefully considered relative to meteorological conditions and amended accordingly. For example, the use of additional water suppression and localised dampening should be managed during periods of increased rainfall as additional suppression techniques may not be necessary; and • A Construction Phase Monitoring Plan will be required for the Project which will include air quality. During construction, emissions of particulates PM10, PM_{2.5}, NO₂, and SO₂ will be monitored monthly at the ASRs as shown in <i>Figure 5.3</i>. NO₂ and SO₂ measured by means of a diffusion tube. Others will be monitored by HAZ-SCANNER (EPAS) Environmental Perimeter Air Monitoring System. 	Construction Phase	Appointed Contractor	On site Project Management team and designated EHS team	Monthly report to the Awba
8.2	Noise	Overall construction activities including heavy machinery operations for construction works.	Increase in ambient noise levels	<ul style="list-style-type: none"> • Well-maintained equipment to be operated on-site; • Regular maintenance of equipment such as lubricating moving parts, tightening loose parts and replacing worn out components; • Shut down or throttled down between work periods for machines and construction plant items (e.g. trucks) that may be in intermittent use; • Reduce the number of equipment operating simultaneously as far as practicable; • Orientate equipment known to emit noise strongly in one direction so that the noise is directed away from receptors as far as practicable; • Locate noisy plant as far away from receptors as practicable; • Avoid transportation of materials on- and off-site through existing community areas; 	Construction Phase	Appointed Contractor	On site Project Management team and designated EHS team	Monthly report to the Awba

Item No.	Project Stage/Affected Aspect	Project Activity and affected area	Potential Impacts	Mitigation Measures	Implementation Schedule	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Reporting Requirements
				<ul style="list-style-type: none"> Use material stockpiles and other structures, where practicable, to screen noise sensitive receptors from on-site construction activities; and A Construction Phase Monitoring Plan will be required for the Project which will include noise emissions. During construction, ambient noise levels in Leq, Leq day, Leq night and hourly Leq will be measures monthly at the NSRs within 500 m from the Project boundary as shown in <i>Figure 5.14</i>. These will be measured for 24-hours. 				
8.3	Surface Water Quality	Uncontrolled runoff, improper wastewater, solid waste and hazardous material management at the site, affecting surface water quality of watercourse.	Impact to surface water quality	<p>Construction Site Run-off and Drainage</p> <ul style="list-style-type: none"> Exposed soil surfaces should be protected by paving or fill material as soon as possible to reduce the potential of soil erosion; Open stockpiles of construction materials or construction wastes on-site should be covered with tarpaulin or similar fabric during rainstorms; Design drainage pipes and culverts for the controlled release of storm flows; Regularly, and particularly following rainstorms, inspect and maintain drainage systems and erosion control and silt removal facilities to ensure proper and efficient operation at all times; Provide measures to reduce the ingress of site drainage into excavations. If trenches have to be excavated during the wet season, excavate and backfill them in short sections wherever practicable. Discharge any water pumped out from trenches or foundation excavations into storm drains via silt removal facilities; Mulch to stabilise exposed areas, where practicable and appropriate; Re-vegetate areas promptly, where practicable and appropriate; Provide measures to prevent the washing away of construction materials, soil, silt or debris into any drainage system of open stockpiles of construction materials; Construct wells/ sediment basins for the separation of oil in the wash water and stormwater drains; Oil water separators and grease traps will be installed and maintained as appropriate at refueling facilities, workshops, parking areas, fuel storage and containment areas; Discharges of runoff should be monitored monthly for compliance with Myanmar National Environmental Quality (Emissions) Guidelines for site runoff and wastewater discharges (construction phase); and A Construction Phase Monitoring Plan will be required for the Project which will include surface water quality. During construction, surface water quality monitoring will include pH, DO, COD, BOD5, oil and grease, TN, TP, TSS and total coliform. This will be conducted monthly at the water sampling locations shown in <i>Figure 5.20</i> and one upstream station located 100m upstream of the Project Site. 	Construction Phase	<p>Appointed Contractor for mitigation measures implementation</p> <p>3rd Party Environmental Consultant for monitoring & audit</p>	On site Project Management team and designated EHS team	Monthly report to the Awba
				<p>Sewage Generated from On-site Workforce</p> <ul style="list-style-type: none"> Where no public sewage treatment system is available (e.g. during construction), sanitary waste water will be treated by domestic waste water unit (ref. septic tank). The contractor will provide the domestic waste water unit which is designed and installed to treat all domestic wash and wastewater and sewage during construction. All effluents shall comply with legal guidelines for emissions into the environment, as appropriate. Sewage from toilets, kitchens and similar facilities should be discharged into a foul sewer or appropriate receiving facility. Wastewater collected from canteen kitchens, including that from basins, sinks and floor drains, should be discharged into foul sewers via grease traps. The foul sewer should then lead to the temporary sewage treatment plant prior to discharge or reuse as greywater. 				

Item No.	Project Stage/Affected Aspect	Project Activity and affected area	Potential Impacts	Mitigation Measures	Implementation Schedule	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Reporting Requirements
				<ul style="list-style-type: none"> Discharges of treated sewage should be monitored monthly for compliance with Myanmar National Environmental Quality (Emissions) Guidelines for site runoff and wastewater discharges (construction phase). 				
				<p>Hazardous Material Management</p> <ul style="list-style-type: none"> Oils, fuels and chemicals should only be used and stored in designated areas which have pollution prevention facilities and constructed on bund hardstand. The bund should be drained of rainwater after a rain event; Proper guidelines and procedures should be developed and included in a Spill Response Plan (SPR) for immediate clean-up actions following any spillages of oil, fuel or chemicals; and Surface run-off from bunded areas should pass through oil water separators and grease traps prior to discharge to the storm water system. The bottom ash from the incinerator will be managed under the Hazardous Waste Management Plan. The ash together with other hazardous waste will be sent to a licensed contractor in Thilawa and the onsite incinerator will be used only as backup. 				
				<p>Solid Waste Management</p> <ul style="list-style-type: none"> A solid waste management plan (SWMP) for the Project should be developed that sets out plans and actions for construction waste as follows; Good housekeeping practices for waste storage and handling referencing GIIP; The SWMP should include a waste inventory developed in the planning stage, in discussion with the engineers, to establish the types of wastes expected from the construction and to identify appropriate disposal routes; Construction materials will be managed in a way to avoid over-ordering, poor storage and maintenance, mishandling as well as improper operation procedures; Construction wastes will be separated into reusable items and materials to be disposed of or recycled whenever possible; Waste suitable for reuse will be stored on site and reintroduced to the construction process as and when required; The SWMP will identify disposal routes (including transport options and disposal sites) for all wastes generated during the construction phase; A hazardous waste management system covering waste classification, separation, collection, storage, transfer and disposal should be set up and operated. The waste management system will comply with applicable regulation of the government, if any, or in its absence, good international practise; Hazardous waste will be stored in such a way as to prevent and control accidental release to the environment (e.g. secondary containment, sealed containers); Waste will be collected regularly by reputable waste collectors; Recyclables such as scrap steel, metals, plastics, and paper items will be collected for recycling wherever possible; Disposal of construction waste in or off the construction site should be prohibited; Chain of custody documents should be used for construction waste to monitor disposal; and Waste segregation should be practiced at the workers camps with an emphasis placed on reducing, reusing and recycling of waste streams as appropriate. 				
8.4	Soil Quality	Improper solid waste and hazardous	Impacts to soil quality	To mitigate potential impacts on soil quality, mitigation measures developed for management of hazardous material and solid waste as presented in Item 8.3 above should be followed.	Construction Phase	Appointed Contractor	On site Project Management team and designated EHS team	Monthly report to the Awba

Item No.	Project Stage/Affected Aspect	Project Activity and affected area	Potential Impacts	Mitigation Measures	Implementation Schedule	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Reporting Requirements
		material management at the site						
8.5	Landscape and Visual	Improper solid waste management outside the Project Site	Impacts to landscape and visual characters	<p>Mitigation measures developed for management of solid waste as presented in Item 8.3 above should be followed. In addition:</p> <ul style="list-style-type: none"> The extent of the construction areas should be limited; and Construct site hoarding around the construction site. The colour of the hoarding should blend in with the surrounding environment. 	Construction Phase	Appointed Contractor	On site Project Management team and designated EHS team	Monthly report to the Awba
8.6	Community Health and Safety	Contractor's activities, increased traffic activity as well as environmental impacts to air quality, noise, surface water quality and soil quality from the Project.	Impacts to community health and safety.	<ul style="list-style-type: none"> A Contractor EHS Management Plan will be developed to reduce potential impacts of contractors' activities to nearby communities; During consultation, it was mentioned that this access road was damaged by Project vehicles and it is recommended that Awba restore the road to its original condition. This was noted by the local community as a grievance during the consultation; Awba will prepare and implement a Community Grievance Mechanism (as per Myanmar/Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 1); A Road Transport Management Plan should be developed to indicate the traffic routes to be followed and speed limit to be complied with in order to reduce risk to the local communities; Awba will develop a Safe Vehicle Policy and Training Safety Procedure for its own transport fleet, including provisions for safe agro-chemical and hazardous waste transport, and will include such requirements in transport contractual agreements, including barge third-party contractors (as per Myanmar/Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 7); Enforcement of a speed limit for vehicles related to construction activities of the Project. During the construction phase, a speed limit of 40km/h shall be enforced; and Establishment of a security team to monitor entrance to the construction site. 	Construction Phase	Appointed Contractor	On site Project Management team and designated CSR team	Monthly report to the Awba
8.8	Occupational Health and Safety	Construction activities as well as construction camp.	Impacts to occupational health and safety.	<ul style="list-style-type: none"> The Project will design an occupational health and safety management plan which will be a subset of the overall ESMP, tailored to the needs of the Project. This plan will set standards that will be met by all contractors and subcontractors; Use dedicated dust collectors to recycle recovered materials; Workers will have contracts which clearly state the terms and conditions of their employment and their legal rights. The Project and all contractors will be able to access a worker grievance mechanism managed by Awba; Workers accommodation will comply with the requirements of IFC PS2 guidelines regarding minimum living areas, provision of potable drinking water (meeting WHO parameters), electricity, and latrine services Awba will develop and implement a corporate Human Resource Policy and Manual of Procedures in compliance with applicable national labour laws and regulations and IFC's Performance Standard 2 requirements, including the following actions issues (as per Myanmar/Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 2). <ul style="list-style-type: none"> Corporate HR policies applicable to all operations; HR Manual of Procedures and Staff HR Handbook; Development of a multi-year HR awareness program; Worker's grievance mechanism for its permanent and casual workers, as well as for construction workers, to enable anonymous complaints and tracking and analysis of systemic Awba will develop and implement OHS management system – consistent with OHSAS 18001 – commensurate with the level of risks and impacts, applying to all its new 	Construction Phase	Appointed Contractor	On site Project Management team and designated EHS and CSR teams	Monthly report to the Awba

Item No.	Project Stage/Affected Aspect	Project Activity and affected area	Potential Impacts	Mitigation Measures	Implementation Schedule	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Reporting Requirements
				<p>operations, including the following actions issues (as per Myanmar/Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 3).</p> <ul style="list-style-type: none"> - Corporate OHS policy applicable to all operations; - OHS Manual of Procedures (SOPs), including ambient air quality monitoring procedure; - Development of a multi-year OHS training plan for its staff, including centres of responsibilities, budgetary allocations, and schedule of delivery; - Definition of OHS KPIs for monitoring and reporting; - External and internal OHS audits and implementation of Corrective Action Plan (CAP), if required; - Training manuals for end-customers (e.g. farmers); - Consolidated annual OHS performance reports. <ul style="list-style-type: none"> • Awba will develop a management procedure to ensure contractor labour and safe working conditions (inclusive of OHS) comply with PS2 requirements. This procedure will be developed based on standards of contract work in Myanmar and approved by the relevant Department / Ministry of Labour. This procedure will identify Awba’s roles and responsibilities for monitoring contractor performance and will apply to all new/existing facilities included within this investment issues (as per Myanmar/Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 4). - Submission of the procedure and supporting OHS documentation (e.g. safety plan, procedures, work instructions); - Inclusion of contractual provisions for casual workers and contractors to comply with Performance Standard 2 for all facilities identified within the scope of IFC’s investment. <ul style="list-style-type: none"> • The Project will abide by Myanmar laws and regulations and International Labour Organisation (ILO) conventions when gaps are identified between national legislation and international standards. • Workers will have contracts which clearly state the terms and conditions of their employment and their legal rights. The Project and all contractors will be able to access a worker grievance mechanism managed by Awba. 				
8.9	Infrastructure Services	Project traffic and in-migration of workers.	Completion of infrastructures with local communities..	<ul style="list-style-type: none"> • Camps for construction and operational workforces should be properly sited and designed to reduce demand on local infrastructure services. • A Road Transport Management Plan should be developed to indicate the traffic routes to be followed, speed limit to be complied with as well as restriction of traffic hours (e.g. avoid rush hour) in order to reduce pressure on road infrastructure. • Stakeholder engagement should be undertaken, including implementing its grievance mechanism to address stakeholder concerns and issues related to infrastructure services in a timely manner. 	Construction Phase	Appointed Contractor	On site Project Management team and designated EHS and CSR teams	Monthly report to the Awba
8.10	Accidental Events – Leaks and Spills	Unplanned Spills	Contamination to water course and impact to human health	<ul style="list-style-type: none"> • Development of an Emergency Preparedness and Response Plan, including for transport and sale depots (as per Myanmar/Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 1). • Fuel tanks and chemical storage areas should be provided with locks and be sited on sealed areas. Establishment of secondary containment for fuel storage and hazardous materials (as per Myanmar/Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 5). • Oils, fuels and chemicals should only be used and stored in designated areas which have pollution prevention facilities. The bund should be drained of rainwater after a rain event. • Surface run off from bunded areas should pass through oil/gas traps prior to discharge to the storm water system. 	Construction Phase	Appointed Contractor	On site Project Management team and designated EHS and CSR teams	Monthly report to the Awba

Item No.	Project Stage/Affected Aspect	Project Activity and affected area	Potential Impacts	Mitigation Measures	Implementation Schedule	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Reporting Requirements
				<ul style="list-style-type: none"> On site oil-water separators and holding facilities should be installed to accommodate unanticipated releases of oily water. The oil contaminated water will be collected and handled by local licensed waste water sub-contractors (if available, to be determined at the later stage). Guidelines and procedures should be established for immediate clean up actions following any spillages of oil, fuel or chemicals. 				
9.1	Air Quality	<p>Stack emissions from the onsite incineration of process waste.</p> <p>Air emissions from production formulation process</p>	Impact on ambient air quality	<ul style="list-style-type: none"> The Project should ensure that emission concentrations from the incinerator do not exceed the concentrations outlined in the WBG EHS Guidelines for Waste Management Facilities ⁽¹⁾. Segregate waste to avoid the incineration of waste that contains metals and metalloids that may volatilize during combustion and be difficult to control through air emission technology; Adhere to applicable national requirements and internationally recognized standards for incinerator design and operating conditions; Introduce wastes only after the optimum temperature is reached in the final combustion chamber of the incinerator and avoid operating conditions in excess of those that are required for the efficient combustion of waste; Interlock the charging system with the temperature monitoring and control system to prevent further addition of waste if the operating temperature falls below the required limits; Minimise planned and unplanned shutdowns by implementing and managing a robust maintenances program; Optimise furnace and boiler geometry, combustion air injection, NOX control devices (if used), combustion temperature and level of distribution, and the control of raw gas residence time; Use auxiliary burner(s) for start-up and shut-down and for maintaining the required operational combustion temperatures at all times when unburned waste is in the combustion chamber; and Use flue gas treatment system for control of acid gases, particulate matter, and other air pollutants such as NOX control measures and/or selective catalytic reduction (SCR) or selective noncatalytic reduction (SNCR) systems. An Operational Phase Monitoring Plan will be required for the Project which will include air quality. Air Monitoring Plan will be in place to meet WBG EHS guidelines, included parameters for Ambient Air Emissions Levels for Pesticides (Within production line), such as Volatile Organic Carbon (VOCs). During construction, emissions of particulates PM10, PM_{2.5}, NO₂, and SO₂ will be monitored monthly at the ASRs as shown in <i>Figure 5.3</i>. NO₂ and SO₂ measured by means of a diffusion tube. Others will be monitored by HAZ-SCANNER (EPAS) Environmental Perimeter Air Monitoring System. Stacked emissions from incinerator will be continuously monitored including waste feed rate, total hydrocarbons, temperature (measured at the end of the residence zone), and CO and oxygen (measured at the stack). 	Design and Operation Phase	<p>Appointed Operations team</p> <p>for mitigation measures implementation</p> <p>3rd Party Environmental Consultant for monitoring & audit</p>	On site Project Management team and designated EHS team	Monthly report to the Awba
9.2	Noise	Operation of fixed plant and machinery during operational phase	Increase in ambient noise levels	<ul style="list-style-type: none"> Select equipment with lower SWL from the BS5228: Part 1 : 2009; Install silencers, mufflers or acoustic enclosures to reduce sound power level of noisy equipment at all times; Re-locate noise sources to less sensitive areas to take advantage of distance and shielding; Site permanent facilities away from community areas if possible; 	Operation Phase	Appointed Operations team	On site Project Management team and designated EHS team	Monthly report to the Awba

⁽¹⁾ International Finance Corporation (IFC) (2007) Environmental, Health and Safety Guidelines for Waste Management Facilities [Online] Available at: http://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/policies-standards/ehs-guidelines [Accessed 01 August 2017]

Item No.	Project Stage/Affected Aspect	Project Activity and affected area	Potential Impacts	Mitigation Measures	Implementation Schedule	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Reporting Requirements
				<ul style="list-style-type: none"> Take advantage of the natural topography as a noise buffer during facility design; Vehicles should be regularly maintained. Transportation of materials during night time should be avoided to minimize disturbance to communities. An Operational Phase Monitoring Plan will be required for the Project which will include noise emissions. During construction, ambient noise levels in Leq, Leq day, Leq night and hourly Leq will be measures monthly at the NSRs within 500 m from the Project boundary as shown in <i>Figure 5.14</i>. These will be measured for 24-hours. 				
9.3	Surface and Ground Water Quality	Uncontrolled runoff, improper wastewater, solid waste and hazardous material management at the site, affecting surface water quality of watercourse.	Impact to surface water quality	<p>To mitigate potential impacts on surface water quality during the operation phase, mitigation measures developed for the construction phase as presented in Item 8.3 above should be followed given the similar issues expected. In addition to the above:</p> <ul style="list-style-type: none"> Discharges from the production process should be treated and monitored monthly for compliance with effluent levels specified in WBG EHS Guidelines for Pesticide Manufacturing, Formulation and Packaging (2007). Sewage from the operation workforce should be treated on-site by a septic tank and seepage field properly designed and maintained according to WBG Genera EHS Standards (2007) as follows: <ul style="list-style-type: none"> Installed in areas with sufficient soil percolation for the design wastewater loading rate; Installed in areas of stable soils that are nearly level, well drained, and permeable, with enough separation between the drain field and the groundwater table or other receiving waters; Grease trap should be installed at sources where oily water is expected (e.g. kitchen); and Should treated wastewater to be reused as spray water, they should be monitored monthly for compliance with Myanmar National Environmental Quality (Emissions) Guidelines for site runoff and wastewater discharges (for TSS, oil and grease, pH). An Operational Phase Monitoring Plan will be required for the Project which will include surface water quality. During construction, surface water quality monitoring will include pH, DO, COD, BOD5, oil and grease, TN, TP, TSS and total coliform. This will be conducted monthly at the water sampling locations shown in Figure 5.20 and one upstream station located 100m upstream of the Project Site. For Class II (moderately hazardous) pesticides, Awba will provide the appropriate controls taken in relation to the manufacture, procurement, or distribution and/or use of these chemicals (as per Myanmar/ Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 6). All wastewater from Project Site will be fully collected and treated to comply with applicable standards at the proposed wastewater treatment plant. Implement monitoring system to continuously monitor / disclose waste water discharge quality. 	Operation Phase	<p>Appointed Operations team for mitigation measures implementation</p> <p>3rd Party Environmental Consultant for monitoring & audit</p>	On site Project Management team and designated EHS team	Monthly report to the Awba
9.4	Soil Quality	Improper solid waste and hazardous material management at the site	Impacts to soil quality	<p>To mitigate potential impacts on soil quality, mitigation measures developed for management of hazardous material and solid waste as presented in Item 8.3 above should be followed.</p> <ul style="list-style-type: none"> Debris and refuse generated on-site should be collected, handled and disposed of properly. Oils, fuels and chemicals should only be used and stored in designated areas which have pollution prevention facilities. 	Operation Phase	Appointed Operations team	On site Project Management team and designated EHS team	Monthly report to the Awba

Item No.	Project Stage/Affected Aspect	Project Activity and affected area	Potential Impacts	Mitigation Measures	Implementation Schedule	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Reporting Requirements
9.5	Landscape and Visual	Improper solid waste management outside the Project Site	Impacts to landscape and visual characters	Mitigation measures developed for management of solid waste as presented in Item 8.3 above should be followed. In addition, it is recommended for the operation that that landscaped area should be developed along the Project Site boundary.	Operation Phase	Appointed Operations team	On site Project Management team and designated EHS team	Monthly report to the Awba
9.6	Community Health and Safety	Project activities, increased traffic activity as well as environmental impacts to air quality, noise, surface water quality and soil quality from the Project.	Impacts to community health and safety.	<p>Please refer to Item 8.6 above for mitigation measures recommended. A number of mitigation measures could be adopted to reduce impact on community health and safety, these measures may include the following:</p> <ul style="list-style-type: none"> Awba will prepare and implement a Community Grievance Mechanism (as per Myanmar/Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 1). Awba will develop a Safe Vehicle Policy and Training Safety Procedure for its own transport fleet, including provisions for safe agro-chemical and hazardous waste transport, and will include such requirements in transport contractual agreements, including barge third-party contractors (as per Myanmar/Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 7). 	Operation Phase	Appointed Operations team	On site Project Management team and designated CSR team	Monthly report to the Awba
9.8	Occupational Health and Safety	Operational activities as well as workers camp.	Impacts to occupational health and safety.	<p>Please refer to Item 8.6 above for mitigation measures recommended. A number of measures should be adopted to reduce impacts to occupational health and safety:</p> <ul style="list-style-type: none"> Ventilation systems and life and fire safety systems in all buildings. Adequate PPE and suction hoods will be used to collect vapours and other fugitive emissions. The Project will develop and implement a worker’s grievance mechanism for its permanent and casual workers, as well as for construction workers, to enable anonymous complaints and tracking and analysis of systemic issues (as per Myanmar/Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 2). 	Operation Phase	Appointed Operations team	On site Project Management team and designated EHS and CSR teams	Monthly report to the Awba
9.9	Infrastructure Services	Project traffic and in-migration of workers.	Completion of infrastructures with local communities.	Please refer to Item 8.6 above for mitigation measures recommended.	Operation Phase	Appointed Operations team	On site Project Management team and designated EHS and CSR teams	Monthly report to the Awba
9.10	Accidental Events – Leaks and Spills	Unplanned Spills	Contamination to water course and impact to human health	<ul style="list-style-type: none"> Development of an Emergency Preparedness and Response Plan, including for transport and sale depots (as per Myanmar/Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 1). Fuel tanks and chemical storage areas should be provided with locks and be sited on sealed areas. Establishment of secondary containment for fuel storage and hazardous materials (as per Myanmar/Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 5). Oils, fuels and chemicals should only be used and stored in designated areas which have pollution prevention facilities. The bund should be drained of rainwater after a rain event. Surface run off from bunded areas should pass through oil/gas traps prior to discharge to the storm water system. On site oil-water separators and holding facilities should be installed to accommodate unanticipated releases of oily water. The oil contaminated water will be collected and handled by local licensed waste water sub-contractors (if available, to be determined at the later stage). 	Operation Phase	Appointed Operations team	On site Project Management team and designated EHS team	Monthly report to the Awba

Item No.	Project Stage/Affected Aspect	Project Activity and affected area	Potential Impacts	Mitigation Measures	Implementation Schedule	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Reporting Requirements
				<ul style="list-style-type: none"> Guidelines and procedures should be established for immediate clean up actions following any spillages of oil, fuel or chemicals. 				
9.11	Accidental Events –Fire	Accidental Events – Fire	Health and safety risk to workers and local community.	<ul style="list-style-type: none"> Fire protection / fighting system will be installed at the office building, laboratory building, warehouse, EC Building, SL Building, WP Building, SP Building, SC Building, Utility Building, Drum Crusher Building to mitigate fire risk during operation of the Project. As administered under the Emergency Preparedness Plan, a Fire Risk Management Plan will be developed including communications protocols and measures to control any fires that do arise. Induction training for personnel is recommended to include a mandatory segment on fire safety and actions in the event of a fire. Conduct fire training and response drills. 	Operation Phase	Appointed Operations team	On site Project Management team and designated EHS team	Monthly report to the Awba

8.4 *MANAGEMENT AND MONITORING SUB-PLANS*

Based upon the outcomes of the ESIA, detailed management plans are required to guide Awba and its contractors in the implementation of all mitigation and management measures. This is essential to ensure that the key outcomes of the impact assessment process are put in place throughout the life of the Project, and their overall efficacy tracked. These detailed management plans will be leveraged by the contractors in developing their own management plans.

Each management plan will also outline the roles and responsibilities, reporting duties, frequency of the measures proposed, evidence, and record-keeping requirements that will be implemented to ensure that mitigation measures are effective.

8.4.1 *Objectives*

As identified with the summary of impacts and mitigation and management measures, the following detailed management plans are considered necessary to effectively implement the outcomes of the ESIA throughout the life of the Project (*Table 8.2*). These plans are currently being drafted by Awba.

Table 8.2 Management Plans Required by the Project

Management Plans	Key Objectives	Content
Air Pollution Management Plan (APMP)	The prime objective of the APMP is to reduce dust and fugitive emissions from the HAIC Project to the extent practicable, in an effort to prevent Project activities from contributing to ambient dust levels exceeding Myanmar standards.	Protection of peripheral receptors (population and natural vegetation) of the HAIC Project will be instigated as a dust abatement strategy. The plan will propose measures to reduce dust and fugitive emissions produced by production line, vehicle movements, constructions activities and material transfer.
Emergency Preparedness and Response Plan	The Emergency Preparedness and Response Plan (EPRP) is designed to provide a high-level overview of the procedures to mitigate and control the impacts on occupational health and safety, the environment and the HAIC Project premises in the event of emergency situations.	The EPRP will describe the general emergency response procedures to be undertaken for each of the follow potential emergency events that may occur at the HAIC Project: fire emergency, chemical release, worker injuries, thunderstorm, and vehicle accident. In addition, the EPRP will set up the responsibilities of the EHS Department, medical team, first aider team, security team, area wardens and contractors, and other service providers.
Solid Waste Management Plan	The overall objective of the Solid Waste Management Plan is to avoid or, when avoidance is not feasible, minimise, reuse and recycle waste when it is generated, handled, collected (i.e. sorted) for transfer to collection points. The waste should be treated, recycled or disposed of in a manner that protects HAIC Project's workforce (own and contractors), as well as surrounding villages and natural environment.	<p>The design and management of this Plan addresses the whole process of the waste management: handling, storage, disposal, transport, as well as design and emergency preparedness and specific non-hazardous and hazardous waste management operation guidance for:</p> <ul style="list-style-type: none"> ● Plastic and paper packaging ● Sludge ● Bottom ash ● Metal (drums) ● Medical Waste ● Active Carbon

Management Plans	Key Objectives	Content
Wastewater Management Plan	A Wastewater Management Plan outlines wastewater management (treatment and associated infrastructure and services), and identifies plans for the future development, expansion or upgrade of wastewater systems to accommodate changing needs.	<p>This plan addresses the most potential adverse impacts to watercourses: industrial line process, sanitation facilities (toilets); sinks and showers; spillages and wastage and/or potential runoff of spilt materials.</p> <p>Water quality monitoring of the water treated by the water treatment plant has been in-place (whenever the wastewater treatment system discharges treated water).</p>
Road Transport Management Plan	A Road Transport Management Plan (RTMP) is the management of occupational safety and site performance risks associated with work activities undertaken in a traffic environment including managing traffic to and from the Site.	<p>The RTMP seeks to minimise the following potential impacts associated with an increase of HAIC Project vehicles on the access road:</p> <ul style="list-style-type: none"> ● increased risk of road traffic accidents resulting in spillage of fuel, hazardous raw or agrochemical merchandise; ● increased risk of collisions with other vehicles or pedestrians resulting in injury or death; ● dust generation; ● increased risk of collision with fauna and domestic animals; ● deterioration of the access road resulting from heavy equipment usage and high levels of vehicular traffic; and ● air emissions from combustion engines.
Stakeholders Engagement Management Plan (SEMP)	The SEMP contains the guidelines established to regulate the recommended communication between the HAIC Project and the different social stakeholders in the area of social influence. The methods and strategies proposed in this Plan will help Awba manage its interactions with its main contractors and their subcontractors, the relevant governments and authorities, local villages and other social	<p>The SEMP proposes different communication mechanisms, which are grouped as follows: Villages Development Advisory Committee (VDAC) meetings, workshops with the main social stakeholders, notice boards, and a community grievance mechanism.</p> <p>Awba's ESHS Department will develop stakeholder mapping and perform continuous informative events to keep the population updated on progress</p>

Management Plans	Key Objectives	Content
	organizations that may be based in the area of influence of the HAIC Project.	regarding the implementation of the Project's social and environmental commitments.
Contractor EHS Management Plan	A Contractor EHS Management Plan links to the Projects EMP and ensures that all contractors are aware of the requirements to mitigate and manage the environmental, health and safety risks and impacts associated with the Project.	Awba will design an occupational health and safety management plan, which will be a subset of the overall ESMP, tailored to the needs of the Project. This plan will set specific standards for all contractors and subcontractors.
Occupational Health and Safety Management Plan	An Occupational Health and Safety (OHS) Management Plan demonstrates an organisation's commitment to health and safety in the workplace by providing a clearly written statement of intent and plan of action for the prevention of accidents and occupational illness and injury.	The OHS Management Plan include the following 10 elements: Policy, Leadership and Commitment of Management, Accident and Incident Investigation, Hazard Identification & Risk Assessment, Permit to Work, Engineering and Management Change, Operation Procedures, Training System, Emergency Response, Regulatory Documentation, and Compliance.
Environmental Monitoring Plan	The Environmental Monitoring Plan describes the comprehensive program to conduct environmental quality monitoring accordingly with the World Bank Group EHS Guidelines and Myanmar National Environmental Quality (Emission) Guidelines.	The plan defines the parameters, sampling points, frequency and responsible for the ambient air, fugitive emissions, ambient noise and wastewater quality monitoring.
Hazardous Material Management Plan	The overall objective of hazardous materials management is to protect the workers who are handling hazardous materials and to allow safe usage and storage practices to avoid or, when avoidance is not feasible, minimize uncontrolled releases of hazardous materials or accidents (including explosion and fire) during their handling, storage and use so as to protect both the workforce and the environment.	The plan establishes general guidelines on safe storage, characterization, handling, chain of custody, use and disposal of hazardous materials. The bottom ash from the incinerator will be managed under this plan. The ash together with other hazardous waste will be sent to a licensed contractor in Thilawa and the onsite incinerator will only be used as a backup.

Management Plans	Key Objectives	Content
Site Run-off Drainage Management Plan	The Site Runoff Drainage Management Plan (RDMP) seeks to minimise uncontrolled runoff, improper wastewater, solid waste and hazardous material management at the site, that may affect the surface water quality of watercourse at HAIC's Project.	<p>The plan recommends preventive and mitigation measures to ensure:</p> <ul style="list-style-type: none"> ● all runoff is adequately drained without causing any significant impacts on the surface water resources; ● Awba will develop a drainage system relevant to each of the construction and operation phases of the HAIC Project at the premises; and ● Awba will conduct monitoring activities relevant to site runoff drainage management, including the identification and reporting of non-compliances to this RDMP and the proposed related corrective actions.
Construction Management Plan	Compile all the necessary measures to mitigate the impacts during the second and third phases of construction stage.	The plan identifies all the potential impacts and risks related to the construction phase: dust emissions, noise, risk of accidents on the access road, and to ensure the local communities are safe during construction.

It is intended that these documents will be prepared to cover the construction phase of the Project. Prior to operation commencing further documents should be developed to cover the operation phase.

Only relevant professional operators should handle the wastewater treatment plant and incinerator operations.

Specific plans will be disclosed to stakeholders at the appropriate time, which should be determined within the individual plans.

8.4.2 *Legal Requirements*

The legislative requirements are presented in *Section 3.5* of this ESIA.

8.4.3 *Overview maps*

The maps are presented in *Sections 1-5* of this ESIA.

8.4.4 *Implementation Schedule*

General EHS inspections will be implemented weekly to ensure compliance with mitigation measures presented in this EMP.

8.4.5 *Monitoring Plans*

Monitoring is a means verifying overall effectiveness of the management and mitigation measures contained within the management plans listed above. Key objectives of the monitoring process are to:

- Confirm effectiveness of management and mitigation measures;
- Ensure compliance with Applicable Standards (i.e. IFC Performance Standards and WBG EHS Guidelines);
- Monitoring the status of, and impacts on, identified sensitive receptors;
- Provide an early warning that any of the control measures or practices are failing to achieve their desired performance and ensure changes can be implemented to remedy these practices;
- Determine whether environmental and social changes are attributable to Project activities, or as a result of other activities or natural variation; and
- Provide a basis for continual review and improvements to Project design and execution.

An Environmental Monitoring and Audit (EM&A) Manual will be required of the Project. The purpose of the Manual is to provide information, guidance and instruction to personnel charged with environmental duties and those responsible for undertaking EM&A work during the construction and operation of the HAIC. It will provide systematic procedures for monitoring

and auditing of potential environmental impacts that may arise from the works.

The objectives of the EM&A will be:

- To monitor and report on the environmental impacts of the construction and operational activities;
- To design and continually review the operation and monitoring programme;
- To make recommendations for changes to the operation that will rectify any unacceptable environmental impacts;
- To make recommendations for changes to the monitoring programme that will improve the ability to cost effectively detect environmental changes caused by the Project activities;
- To establish numerical decision criteria for defining impacts for each monitoring component; and
- To provide supervision on the field works and laboratory works to be carried out by contractors/laboratories.

Performance Indicators and Monitoring Schedule

Physical, biological and social environmental management components of particular significance have been identified as performance indicators. A comprehensive monitoring plan for each performance indicator has been prepared for all phases of the Project and is presented in *Table 8.3*.

This includes the tentative parameters to be measured, methods to be utilised, sampling locations, frequency of measurements, detection limits and responsibilities for implementation and supervision.

It is to be noted that the detailed and specific monitoring measures will be developed and included within the Environmental Monitoring Plan. The monitoring components will be refined and finalised during plan development.

Impact monitoring will be undertaken during the life of the Project to verify the predicted levels of residual impacts from the Project and the effectiveness of the various management plans and mitigation measures.

Reporting Mechanism for Environmental and Social Monitoring Programme

A robust reporting system will provide the Project with the necessary feedback mechanisms to ensure quality and timely implementation of the works. The reporting system will provide a mechanism to ensure that the measures proposed in the Project's ESMP are implemented.

Prior to the commencement of the construction and operation activities, Awba will finalise the format and frequency for reporting on the status and progress of environmental and social monitoring.

The format will be designed to meet all the compliance conditions associated with the local and international requirements. The contractor will be required to submit the duly filled up reporting form on the agreed frequency to Awba.

Table 8.3 *Environmental and Social Monitoring Programme (Construction and Operation Phase)*

Project Stage/ Affected Component	Potential Impact	Parameters to be Monitored	Location	Measurements	Frequency
Noise	Increase in ambient noise levels	Noise levels in Leq, Leq day, Leq night and hourly Leq	Identified NSRs within 500 m from the Project boundary as shown in Figure 5.14	24-hour	Monthly during construction
			Production line (point source measurement)	24-hour	Monthly until completion of operation
Surface Water	Contamination of surface water.	pH, DO, COD, BOD5, oil and grease, TN, TP, TSS and total coliform.	Water sampling points as shown in Figure 5.20 and one upstream station located 100 m upstream of the Project Site.	Standard analytical methods.	Monthly during construction
		pH, BOD5, COD, TSS, Oil and Grease, AOX, Phenol, Arsenic, Chromium Total, Chromium (hexavalent), Copper, Chlorinated organics, Nitroorganics, Mercury, Zinc, Active Ingredient (each), Bioassays Toxicity: Fish, Daphnia, Algae, Bacteria, Ammonia, Total Phosphorus, Total Coliform, Total Nitrogen.	Wastewater monitoring will be conducted at the discharge point 17°16'65.98"N 96°07'70.56"E.	Standard analytical methods	Monthly until completion of operation
Air	Increase in emissions of dust and particulates.	PM ₁₀ , PM _{2.5} , NO ₂ and SO ₂	ASRs as shown in Figure 5.3.	Diffusion tube.	Monthly during construction

Project Stage/ Affected Component	Potential Impact	Parameters to be Monitored	Location	Measurements	Frequency
				HAZ-SCANNER (EPAS) Environmental Perimeter Air Monitoring System	
	Production formulation process	Particular Matter, TOC, VOC, Chloride, Bromines (as HBr), Cyanides (as HCN), Fluorine (as HF), Hydrogen Sulphide, Chlorine, Ammonia, Gaseous Inorganic Chlorine Compounds (as HCl)	Emission locations	Diffusion tube. HAZ-SCANNER (EPAS) Environmental Perimeter Air Monitoring System	Monthly until completion of operation

8.4.6 *Projected Budgets and Responsibilities*

The estimated budgets and responsible parties are provided in *Table 8.4*.

Table 8.4 *Monitoring Budgets and Responsibilities*

Project Stage/ Affected Component	Potential Impact	Parameters to be Monitored	Responsibility	Estimated Budget (USD)
General	Inspection of mitigation compliance	General compliance with mitigation measures presented in the ESMP.	EHS Team of Appointed Contractor / Operations team and On site EHS team of Awba	Within EHS Advisor responsibilities
Construction				
Air	Increase in emissions of dust and particulates	PM ₁₀ , PM _{2.5} , NO ₂ and SO ₂	3 rd Party Environmental Consultant	Air monitoring will be 2,500- 5,000 USD monthly A monitoring machine costs 20,000-30,000 USD
Noise	Increase in ambient noise levels	Noise levels in Leq, Leq day, Leq night and hourly Leq	3 rd Party Environmental Consultant	Noise monitoring will be 2,500-5,000 USD monthly A monitoring machine costs 20,000-30,000 USD
Surface Water	Contamination of surface water	pH, DO, COD, BOD5, oil and grease, TN, TP, TSS and total coliform.	3 rd Party Environmental Consultant	Water monitoring will cost 3,000 USD monthly (including laboratory fees)
Operation				

Project Stage/ Affected Component	Potential Impact	Parameters to be Monitored	Responsibility	Estimated Budget (USD)
Air	Production formulation process	Particular Matter, TOC, VOC, Chloride, Bromines (as HBr), Cyanides (as HCN), Fluorine (as HF), Hydrogen Sulphide, Chlorine, Ammonia, Gaseous Inorganic Chlorine Compounds (as HCl).	On site EHS team of Awba	As above
Noise	Increase in ambient noise levels	Noise levels in Leq, Leq day, Leq night and hourly Leq	On site EHS team of Awba	As above
Surface Water	Contamination of surface water	pH, BOD5, COD, TSS, Oil and Grease, AOX, Phenol, Arsenic, Chromium Total, Chromium (hexavalent), Copper, Chlorinated organics, Nitroorganics, Mercury, Zinc, Active Ingredient (each), Bioassays Toxicity: Fish, Daphnia, Algae, Bacteria, Ammonia, Total Phosphorus, Total Coliform, Total Nitrogen	On site EHS team of Awba	As above
Occupational H&S	Emissions inside factory	Particulate (Inert or Nuisance Dust), Carbon	On site EHS team of Awba	Air monitoring will be 2,500 USD monthly

Project Stage/ Affected Component	Potential Impact	Parameters to be Monitored	Responsibility	Estimated Budget (USD)
		Monoxide, Nitrogen dioxide, Sulphur dioxide		

8.5 SUMMARY OF IMPACTS AND MITIGATION MANAGEMENT MEASURES

A summary of mitigation measures identified for the construction and operation phases of the Project is presented in *Table 8.1*. This also identifies lead responsibility for implementing the mitigation measures and sources of funds for such implementation. Awba will be responsible for ensuring that the mitigation measures in the ESMP are implemented throughout the life span of the Project.

In addition, Awba will implement the IFC Environmental and Social Action Plan (ESAP), which is provided in *Annex E*.

8.6 OVERALL BUDGET FOR IMPLEMENTING MITIGATION MEASURES

The Contractor and Awba will allocate separate budget for environmental and social management plan implementation, training, environmental monitoring, analysis and reporting, verification monitoring and capacity building. The budget is estimated to be **US\$ 1,000,000**. It should be noted that costs for many in-built mitigation measures, such as, acoustic enclosures for noise control, water and wastewater treatment, are already included in the contract cost estimate and/or operating cost estimates. In addition, separate budget will be allocated for CSR activities, which will be conducted by the Awba for community development.

8.7 TRAINING

8.7.1 Construction Phase

Prior to commencement of major civil works at site, a suitably qualified in-house/external expert will be appointed by the contractor in consultation with the Awba to develop and deliver a training program on implementation of the ESMP, monitoring and reporting will be conducted in line with the applicable reference framework for the Project. The training will include the following topics:

- Environment, Health and Safety Policy of the contractor;
- Environment and fundamentals of environmental pollution in relation to the Project;

- EHS management plans prepared by the Contractor;
- Do's and Don'ts for the construction workers;
- Safety procedures and guidelines; and
- Internal reporting and response system.

In addition, specific training will be provided to the team involved in environmental and social monitoring and reporting, which will include:

- Applicable environmental and social guidelines and standards;
- Sampling site selection guidelines in line with environmental monitoring plan;
- Sample collection, storage, transportation and analysis procedures;
- Quality assurance and quality control; and
- Environmental monitoring report preparation.

The training will help in capacity building and implementation of the ESMP during the construction phase of the Project. It will also help in ensuring internal and external monitoring and verification of the environmental and social performance of the Project. The timeframe for reporting and verification during the construction phase will be agreed between the Awba, the contractor and the IFC.

8.7.2 Operation Phase

Prior to the commencement of the Project operation, a suitably qualified in-house/external environmental expert will be engaged by the Awba to develop and deliver a training program on operation phase environmental and social monitoring and reporting. The topics will be mostly same as that during the construction phase.

The training will help in capacity building and implementation of the ESMP during the operation phase of the Project. It will also help in ensuring internal and external monitoring and verification of the environmental and social performance of the Project. The timeframe for reporting and verification during the operation phase will be agreed between the Awba, the contractor and the IFC.

8.8 UPDATE OF THE ESMP

This ESMP will be updated, revised and reviewed internally on a regular basis to ensure its effectiveness in monitoring the environmental and social performance of the Project. The ESMP of the Project will be reviewed on a half-yearly basis in conjunction with the EM&A.

Awba will conduct monitoring through inspection, meetings and audits, accordingly with the ESMP.

Furthermore, in the event of an unanticipated impact and design change with respect to the Project standards (including Myanmar Government and IFC requirements); the ESMP would be updated as necessary.

As a part of the ESIA process, consultation was carried out with the indirectly and directly affected population in four villages within the Project's Area of Influence (AOI). This included interviews with Village Leaders in each of the five villages in the AOI.

The consultation served the dual purpose of informing the public about the potential impacts of the Project and seeking community views on issues.

9.1 OBJECTIVES OF THE STAKEHOLDER ENGAGEMENT

The objectives of stakeholder engagement during the ESIA were to:

- Identify stakeholders and communities potentially affected by Project activities;
- Update stakeholders about the expansion Project; and
- Engage with potentially affected groups and individuals to understand their views, concerns and perceptions in order to inform the ESIA

9.2 METHODOLOGY AND APPROACH

9.2.1 Stakeholder Identification

For this Project, local communities within 3.5 km of the Project Area were identified from a site visit in May, 2017. In addition to local communities, other stakeholder groups were identified such as governmental departments, non-governmental organisations (NGOs), civil society organisations (CSOs) and local businesses. These stakeholder groups are shown in *Table 9.1*. Appendix E describes a summary of the Grievance Mechanism Campaign and Stakeholder Engagement Workshops.

Table 9.1 Stakeholder Mapping

Group	Key Stakeholders	Relevance
Potentially Affected Communities	<ul style="list-style-type: none"> - Wah Net Chaung Village - Tha Pyay Kone Village - Nyaung Kone Village - Yae Tar Shey Village 	These communities live within 3.5 km of the Project and could be potentially impacted by the Project activities and should be consulted.
Government	<ul style="list-style-type: none"> - Village leaders - MONREC (Yangon) - Hmawbi GAD - Other relevant departments 	GAD and local government should be consulted for data gathering and to inform the wider community of the Project.
NGOs / CSOs	<ul style="list-style-type: none"> - Red Cross - Green Network 	Some local CSO groups have voiced opposition to the

Group	Key Stakeholders	Relevance
Businesses	- Myanmar Centre for Responsible Business	Project in the past and should be consulted.
	- Others, as appropriate	
	- Asbestos Plant Workers	Cumulative impacts from the Project should be considered and other businesses consulted.
	- Others, as appropriate	

9.3

SUMMARY OF CONSULTATION AND ACTIVITIES UNDERTAKEN

Consultation in relation to environmental and social issues has been undertaken as part of the local EIA Study prepared for regulatory submission in Myanmar.

The following consultation was undertaken for the Supplementary ESIA:

- Consultation with Hmawbi Township GAD during Scoping in June 2017.
- Consultation with Village Tract Leaders and villagers from four villages during Scoping in June 2017.
- Focus Group Discussions with women and gardeners in four villages in June 2017.
- 72 Household surveys in six villages and one ward within the AOI in August 2017.

To inform this supplementary ESIA Report, engagement was undertaken in four areas covering the 5 villages (Kyade Taung Su was included in Wah Net Chaung); *Table 9.2*. Representative photos taken during the consultation are shown in *Figure 9.1*.

Table 9.2 *Engagement Undertaken*

Date	Location	Venue	Attendees
Scoping Phase			
21/6/2017	Hmawbi	GAD office	Government (8)
21/6/2017	Wah Net Chaung	Village monastery	Government (19), Local Community (37), NGO (3), CSO (8)
22/6/2017	Tha Pyay Kone	Village monastery	Government (4), Local Community (35)
22/6/2017	Yae Tar Shey	Village monastery	Government (9), Local Community (41), CSO (11)
23/6/2017	Nyaung Kone	Village monastery	Government (4), Local Community (35)
ESIA Phase			

Date	Location	Venue	Attendees
Scoping Phase			
16/8/2017	War Net Chaung	Village monastery	Government (5), Local Community (43), CSO (1), NGO (1), local business (5)
16/8/2017	Nyaung Kone	Village monastery	Local Community (33)
17/8/2017	Yae Tar Shey	Village monastery	Government (1), Local Community (55), local business (1)
17/8/2017	Tha Pyay Kone	Village monastery	Local Community (33)

9.3.1 *Household Surveys*

Household (HH) survey questionnaires were used to gather data and solicit views about the Project from the communities around the project area to inform the ESIA. The data is relevant to understanding current socio-economic conditions in the Area of Influence of the Project, historical impacts associated with the construction of the project as well as potential issues associated with the operation of the Project.

Prior to conducting HH surveys, an introductory meeting was convened in the host community to introduce the purpose of the consultation. Each community consultation event consisted of an update of the project by Awba.

The information collected is reflected in the Socio-economic Baseline in *Section 6* of this supplementary ESIA.

9.3.2 *Data Collection*

Data was collected through community meetings, household surveys and face to face discussions with stakeholders. Special attention was given to potentially vulnerable groups such as women who have traditionally faced issues with land tenure (although not for this Project).

Community meetings were arranged by Awba and ERM in collaboration with the Village tract leaders and Village leaders. These meetings provided an opportunity to update stakeholders on the Project as well as gather feedback.

A total of 72 useable household surveys, and 8 group discussions for socio-economic systems were completed across all 6 villages with particular focus on the livelihoods of community (*Table 9.3*).

Table 9.3 *Focus Group Discussions and Questionnaires in each Village*

Date	Village	Village Tract	No. of HH Consulted by Village Tract
21.6.2017			Meeting with Hmawbi GAD officers and other related departments
21.6.2018	War Net Chaung	War Net Chaung	Public Consultation Meeting, Community Questionnaire: 1, Farmer Questionnaire:1
22.6.2017	Tha Pyay Kone	Let Pa Dan	Public Consultation Meeting, Community Questionnaire: 1, Farmer Questionnaire:1
22.6.2017	Yae Thar Shey	War Net Chaung	Public Consultation Meeting, Community Questionnaire: 1, Farmer Questionnaire:1 , Woman Group Discussion:1
23.6.2017	Naung Kone	War Net Chaung	Public Consultation Meeting, Community Questionnaire: 1, Farmer Questionnaire:1
16.8.2017	War Net Chaung	War Net Chaung	Public Consultation Meeting
16.8.2017	Nyaung Kone	Let Pa Dan	Public Consultation Meeting
17.8.2017	Yae Thar Shey	War Net Chaung	Public Consultation Meeting
17.8.2017	Tha Pyay Kone	War Net Chaung	Public Consultation Meeting
17.8.2017	Nyaung Kone	Let Pa Dan	6 HH Surveys
17.8.2017	Yae Thar Shey	War Net Chaung	15 HH Surveys
18.8.2017	War Net Chaung	War Net Chaung	30 HH Surveys
18.8.2017	Kyauk Taung Su Ward	War Net Chaung	5 HH Surveys
21.8.2017	Tha Pyay Kone	War Net Chaung	6 HH Surveys
21.8.2018	Wa Phyu Taw	War Net Chaung	5 HH Surveys
21.8.2019	Zaw Ti Kone	War Net Chaung	5 HH Surveys
Total Surveys			72 HH Surveys, Public Consultation Meeting : 8, Community Questionnaire: 4, Farmer Questionnaire: 4, Women Group Discussion: 1

Key findings of consultation are presented below and summarised in *Table 9.4*.

Table 9.4 *Summary of comments received*

Key Comments Received and Response	Consideration for Supplementary ESIA
<p>Consultation & Information Disclosure</p> <p>One of the key comments received related to the availability of information and transparency in the process. Stakeholders wanted to emphasise that it is important to ensure the community can understand the information provided.</p> <p>Some stakeholder in War Net Chaung noted that Pa Ywet Sate Kone, Kyi Ni San, Poe Dana Kone, and Shan Kone villages are located within 5 km of the Project (upstream) and should be included in the assessment.</p>	<p>The Regulatory EIA Report will have a Myanmar language executive summary to ensure information is easily available to local communities.</p> <p>Awba will undertake further disclosure and consultation in Pa Ywet Sate Kone, Kyi Ni San, Poe Dana Kone, and Shan Kone villages.</p>
<p>Public Health & Safety</p> <p>The key concern related to public health and safety impacts specifically from air and wastewater emissions. These also included concerns related to unplanned events.</p> <p>During rainy season, some villagers from the AOI use the Hmawbi River/Htan Ta Pin River and Sa-Par-Kye creek for domestic and drinking purposes. Villagers does not use the water resource of the Sabagyi creek.</p>	<p>This Supplementary ESIA will assess the impact on Public Health and Safety from air and noise emissions.</p> <p>The baseline survey results from air, noise, soil, water and biodiversity will be disclosed to the community.</p>
<p>Monitoring and Auditing</p> <p>Transparency of the monitoring and auditing process during operation was of key importance to the stakeholders.</p>	<p>The grievance mechanism and future disclosure will be provided to all PAPs in the area.</p>
<p>Use of Existing Infrastructure</p> <p>The quality of the access road was commented on during the public consultation. Some community members mentioned that Awba vehicle use had damaged the road into the Project Site.</p>	<p>The access road to Hmawbi site is a public road under the responsibility of government. Awba has acknowledged receipt of this complaint through its Community Grievance Mechanism. Follow-up corrective action is under the responsibility of the local authorities.</p>
<p>Current Activities/ Historic Activities</p> <p>Some people in Nyaung Kone reported a smell coming from the current operations or store at the Project Site.</p> <p>Also, one main concern was historic contamination from the existing industrial park and factories.</p>	<p>Awba has investigated the odour complaint from the Operation of the existing facility through their community grievance mechanism.</p> <p>Although the actual source of the odour is difficult to identify, Awba has implemented a series of mitigation measures for minimise odour such as; a confined partition room for</p>

Key Comments Received and Response	Consideration for Supplementary ESIA
	<p>solid production, and a scrubber system on the source of emission to reduce odour escaping through the process.</p> <p>Awba have undertaken a baseline assessment and will disclose the results of the baseline to the local communities. Awba will also undertake regular monitoring as outlined in this supplementary ESIA and will disclose monitoring results to the local community.</p>
<p>Land Permitting</p> <p>This village raised concerns with the permitting of the land from the ministry / government and the site selection process.</p>	<p>Awba were given permission from the Ministry of Agriculture, Livestock and Irrigation to construct the Project within this existing Industrial Zone.</p>
<p>Corporate Social Responsibility and Social Benefits</p> <p>All villages mentioned potential social investment opportunities in the village. The two key concerns on inadequacies of services related to road condition and electricity. These were mentioned as potential opportunities for social investment. In Nyaung Kone, it was noted that villagers spend a lot of money on pesticides and Awba could provide a subsidized store for the local community for their products.</p>	<p>Awba will undertake a CSR program once operational and will consider these suggestions in the planning of any social investment.</p>

In addition to questions raised during the ESIA engagement, a number of grievances were collected as part of the Community Grievance Procedure, this are provided in *Table 9.5* with considerations for this Supplementary ESIA.

Table 9.5 Community Grievance Log

Category	Summary of Query	Action for ESIA
Corporate Social Responsibility (CSR)	To conduct the Community Development activities transparently and affectively. Awba should contribute to the local hospital and provide discount pesticide shop for local.	All engagement activities will be conducted transparently. CSR is not part of the ESIA, Awba will consider CSR separately.
ESIA	Who will take responsibility to inspect and monitor following the impact assessment. ERM to involve respective community members for the ESIA survey. Provide communities the result of the ESIA as well as provide guarantee on their result and collect from tube wells.	Monitoring, including roles and responsibilities, will be included in the ESIA Report. Community members will be invited to the baseline surveys. Water will be collected from tube wells and the results will be provided to the community during future engagement.
Accidental events	Information needed on the emergency plan and the potential impacts to villagers.	Accidental events (including impact to communities) will be assessed in the ESIA.
Job opportunities	Provide job opportunities to youth and local community members.	The provision of jobs and potential beneficial impact will be assessed in the ESIA.
Land Issue	The road connecting Phoe Dana Kone village to Nyaung Kone village has been reduced from 13 ft. to 6.5 ft. by the Project fencing.	This is based on the Land Lease Agreement between Awba and the Ministry of Agriculture.
Pollution	Will gas emissions damage crops or agricultural land? There have been historic examples of sickness in the community when the MPI factory produced gas (and/or) smoke.	Emissions and their impact on local communities and the surrounding environment will be assessed in the ESIA. A cumulative assessment of impacts from the Industrial Park will also be undertaken.
Relocation	The Project is located near villagers, why was this land selected? Is it possible to relocate?	This is based on the Land Lease Agreement between Awba and the Ministry of Agriculture.
Road damage	The factory trucks are damaging the roads of the villages. Awba should repair the road.	The access road to Hmawbi site is a public road under the responsibility of government. Awba has acknowledged receipt of this complaint through its Community Grievance Mechanism. Follow-up corrective action is under the responsibility of the local authorities.

Category	Summary of Query	Action for ESIA
Village Information	The village list shared is not correct. Public consultation should be conducted in all the villages surrounding project area and involved in the ESIA survey.	Consultation locations were selected to include all the village tracts within 3.5 km. The second round of engagement will invite villagers from villages in which the meetings are not held during the scoping engagement.
Waste Management	Concerned that waste produced by the factory would impact local water courses, local crops and local communities. Provide an explanation of the waste management system to the villagers.	The potential impact of waste on environmental and social receptors will be considered in the ESIA.

Figure 9.1 Consultation Photos



Wah Net Chaung



Nyaung Kone



Yae Tar Shey



Tha Pyay Kone

9.5

FURTHER ONGOING CONSULTATIONS

Consultation outcomes have been incorporated into the design of mitigation measures for Project and are contained in this ESIA Report. These include:

- Routine air and water monitoring at the Project Site and in communities closest to the Project Site.
- The access road to the Project Site has been damaged by Project vehicles and it is recommended that Awba restore the road to its original condition.
- Development of a formal grievance procedure for use by local residents.
- Undertake consultation and information disclosure in Pa Ywet Sate Kone, Kyi Ni San, Poe Dana Kone, and Shan Kone villages.

During the ESIA disclosure period, Awba has committed to briefing those communities consulted as part of the ESIA process to provide feedback on how the concerns raised are being addressed.

9.5.1 *Grievance Mechanism*

Awba have engaged Conyat Create to prepare a Community Grievance Mechanism for the Project. The proposed Grievance Mechanism is provided in *Figure 9.2*. The roles and responsibilities of the Grievance Mechanism are provided in *Table 9.6*.

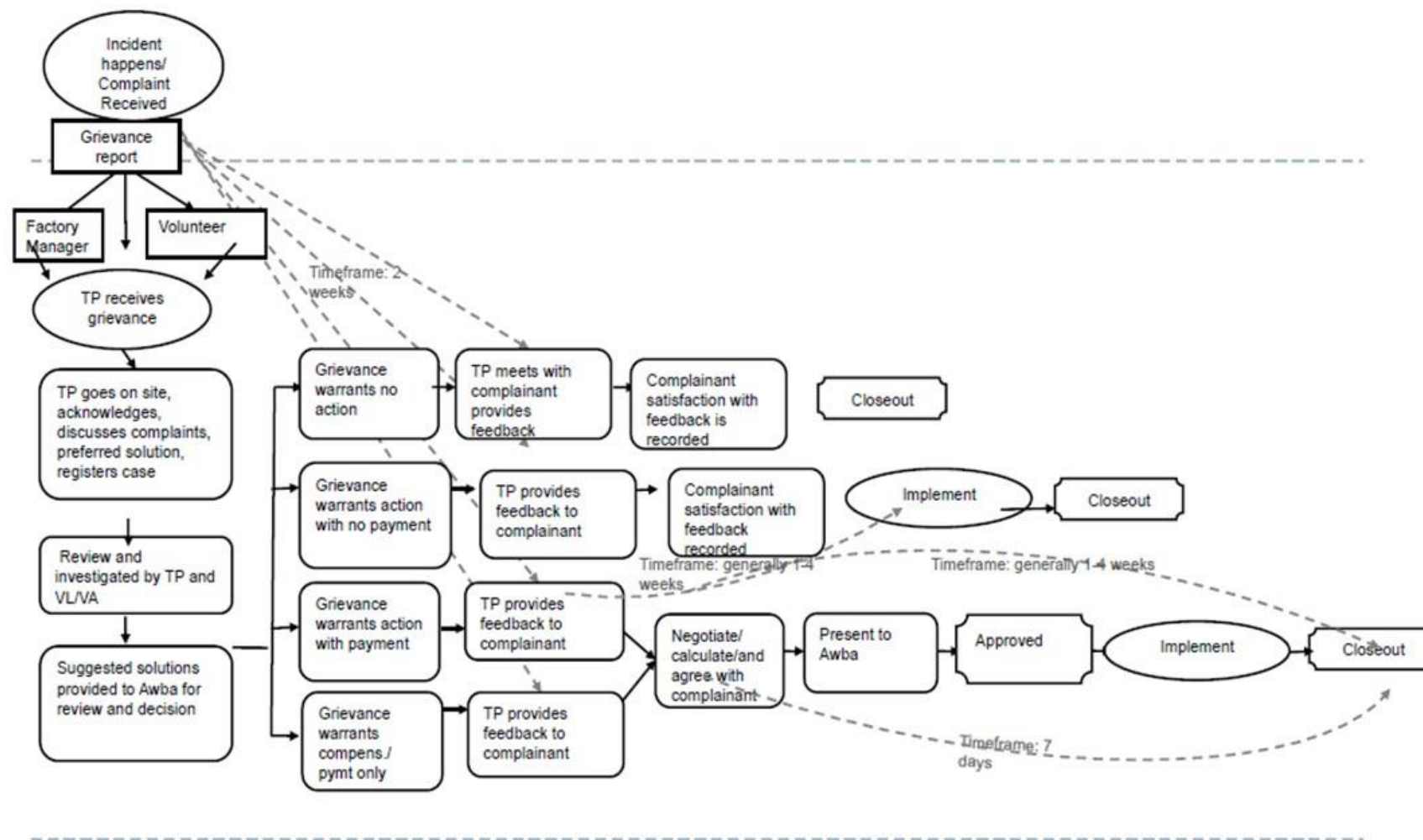
Table 9.6 *Roles and Responsibilities of Grievance Mechanism*

Role	Responsibility
3rd Party Conyat Create	<ul style="list-style-type: none"> • Implement the mechanism during a three-month pilot phase and provide training to key community stakeholders and volunteers • Manage the grievance mechanism • Coordinate with communities and complainants • Collect, record, and monitor grievances • Coordinate with the Awba Grievance Mechanism Committee and provide suggestions for remedy • Close out cases and negotiate on behalf of Awba • Communicate progress • Collect complaints and/or concerns
Community Volunteer	<ul style="list-style-type: none"> • Collaborate with the 3rd Party to communicate and promote instructions, progress, and operation activities • Communicate progress • Coordinate with the 3rd Party once a week
Awba Grievance Mechanism Committee	<ul style="list-style-type: none"> • Review grievance log and suggested solution provided by 3rd Party • Disclose grievance results and progress on corporate website on a quarterly basis • Attend quarterly progress workshop with communities

9.5.2 *Further Engagement*

Continual engagement is an important part of the Project. Awba will disclose this ESIA Report to local communities. Engagement should also be undertaken periodically with local communities to ensure that they are informed on the Project and to present the results of the grievance mechanism.

Figure 9.2 Community Grievance Mechanism



The EIA has been disclosed on Awba's website. Awba disclosed information to local communities on the results of the EIA Report in February 2018. In addition, the Executive Summary of the EIA Report was provided to local communities and any other interested parties.

APPENDIX A

ESIA TERMS OF REFERENCE

1 TERMS OF REFERENCE FOR THE ESIA

1.1 INTRODUCTION

A key outcome of the Scoping Study includes the creation of the Terms of Reference (ToR) for the Supplementary ESIA Study of the Project. The ESIA Study will then be carried out according to the ToR.

This section serves as the ToR which sets out the following:

- ESIA Study objectives;
- Overview of activities to complete the ESIA process;
- Baseline surveys and stakeholder engagement; and
- Impact assessment approach.

1.2 ESIA OBJECTIVES

The purpose of the ESIA is to assess the potential impacts of the Project and Project-related activities on the environment (including biological, physical and socio-economic resources), and where applicable to design mitigation or enhancement measures to remove, reduce or avoid negative impacts.

1.3 ESIA STEPS

Following on from the Scoping stage of the Project, ERM will:

- Update and finalize the technical Project description as further details become available, working closely with the Awba to confirm details such as the layout of the facilities, production design as well as construction and operation plans;
- Conduct additional stakeholder consultation as necessary;
- Collect additional baseline data through desktop research and baseline surveys to complete a comprehensive description of the environmental and social conditions;
- Develop mitigation and enhancement measures and outline an ESMP including an approach for monitoring; and
- Report findings in a comprehensive ESIA Report and presented the mitigation and enhancement measures as well as the monitoring plan in the ESMP (including timeline, cost and center of responsibility).

1.4

BASELINE SURVEYS

The following baseline surveys and stakeholder engagement will be undertaken to fill the data gaps identified which will be necessary to inform the impact assessment.

1.4.1

Baseline Surveys for Air

Overview

It is understood that the Project will operate a solid/hazardous waste incinerator on site. ERM propose to undertake a baseline survey to a) inform the ESIA; b) provide evidence in the event of future complaints regarding operations of the incinerator; and c) provide a basis for the setting of monitoring levels. The potentially significant substances of interest from a waste incinerator include particulate matter (PM_{2.5} and PM₁₀) nitrogen oxides (NO_x), sulphur dioxide (SO₂), carbon monoxide (CO), metals and unburned hydrocarbons.

Methodology

Parameter Selection

The survey will capture existing air quality at sensitive receptors in the vicinity of the Project. The parameters which are monitored should be decided based on a) an understanding of the potentially significant substances of interest released from the Project; and b) an understanding of the substances which may already be elevated in the ambient environment. Further to a review of the process and a preliminary understanding of the existing environment, the parameters which will be included in the baseline assessment include PM_{2.5}, PM₁₀, NO_x, NO₂ and SO₂.

Monitoring Method

Monitoring will be undertaken at five (5) sites around the Project to provide sufficient spatial coverage and to provide a robust and informative data set. NO_x, NO₂ and SO₂ will be monitored using five (5) sets of diffusion tubes, noting that NO_x is only required at agricultural areas and sensitive ecological habitats. The tubes will be deployed at each site for four (4) weeks continuously and then collected and sent back to the laboratory for analysis.

PM_{2.5} and PM₁₀ will be monitored using one (1) active sampler on rotation between the identified monitoring locations.

Monitoring Locations

Whilst the general locations of the monitoring stations can be understood from desk based studies of local mapping performed by ERM, the exact locations of monitoring equipment deployment will be confirmed during the site visit performed by an ERM air quality specialist. The approximate

monitoring locations are presented in *Figure 4.3* which will cover the five (5) ASRs.

Monitoring Duration

Diffusion tubes will be installed on site for four weeks continuously. Automatic sampling of PM_{2.5} and PM₁₀ will be undertaken at each site for 48 hours continuously.

1.4.2 Baseline Surveys for Noise

Potential impacts to NSRs are expected due to the Project construction and operation. Baseline surveys for noise will thus be undertaken in accordance with IFC Standards at two of the five locations for baseline air quality monitoring since the ASRs are at the same time NSRs. Exact sampling locations will be determined during the baseline survey.

During baseline noise monitoring, hourly A-weighted equivalent continuous sound pressure levels (LAeq, 1 hour) will be recorded continuously over 24 hours at each location during both weekday and weekend. At each location, daytime and night-time LAeq will be calculated by averaging the hourly sound pressure levels measured between 0700 and 2200 hours and between 2200 to 0700 hours, respectively.

Noise levels (LAeq) will be recorded using a type II sound level meter at about 1.5 m above ground with no reflecting surface nearby in accordance with IFC guidelines. Sampling frequency will be at 10-minute interval for 24 hours continuously.

1.4.3 Baseline Surveys for Soil, Groundwater and Surface water

Potential impacts to surface water and groundwater quality are expected due to issues related to surface water management, wastewater management and accidental spills etc. from the Project. Baseline surface water quality monitoring will be undertaken at three locations, including the stream at the northwest of the Project Site, water collection point by the local communities downstream of the Project Site as well as a location approximately 500 m upstream of the Project Site. Soil samples will be taken at five (5) locations within the Project Site. During the baseline survey, two water samples will be taken at each sampling location using sampling bottles provided by a laboratory certified under the Hong Kong Laboratory Accreditation Scheme (HOKLAS). These samples will be stored at chilled condition and sent to the laboratory for analysis. Water quality parameters measured will include *in-situ* measurement of pH and temperature as well as laboratory analysis of BOD₅, COD, TSS, Oil and Grease, Phenol, Arsenic, Chromium total, Chromium (Hexavalent), Copper, Chlorinated organics, Nitroorganics, Mercury, Zinc, Ammonia, Total Phosphorus, Total Nitrogen, Total Coliform, AOX, Chlorinated organics, Nitroorganics (Surveyed nitrate as N and Nitrate as N), Zinc, Total Phosphorus (Surveyed Reactive Phosphate as P), Active Ingredients (each), Bioassays/Toxicity. These parameters are pollutants of

concern specified in the WBG EHS Guidelines for Pesticide Manufacturing, Formulation and Packaging (2007) (*Table 3.3*) and WBG General EHS Guidelines (2007) for treated sanitary sewage discharge during operation of the Project (*Table 3.4*). For construction of the Project, it is noted that the Myanmar National Environmental Quality (Emissions) Guidelines specified the guidance levels for site runoff and wastewater discharges, which are the same as those specified for treated sanitary sewage discharge by WBG General EHS Guidelines (2007).

1.4.4 *Baseline Surveys for Biodiversity*

The purpose of biodiversity field surveys is to obtain further information on existing biodiversity values in the Project's AOI.

- Using the information obtained in the desktop review, a list of all the known or potentially occurring global, national and/or local biodiversity values in the project study area will be identified. This will include consideration of any additional assessment of invasive species, if required. This information will be used to:
 - (i) develop a prioritized list of terrestrial areas for field biodiversity surveys; and
 - (ii) make recommendations based on recognized good international practice on focus, seasonality, timing, required expertise and design of survey efforts.
- Using information obtained in the desktop review, a prioritized list of habitat types/areas where additional field biodiversity survey will be developed.

1.4.5 *Socio-economic Baseline Survey and Data Collection*

The ERM team will undertake household surveys and/or focus group discussions in Wah Net Chaung, Tha Pyay Kone, Yae Tar Shey and Nyaung Kone Village which are all within 3.5 km of the Project.

Up to 50 interviews or surveys over a period of up to one week will be conducted to gather information on livelihoods, economy, demographics, infrastructure, utilities, agriculture, education and health care. The household surveys will be used both as a means of consultation and to gather baseline socio-economic data for the ESIA. The household survey questionnaire is attached in *Annex A*. Surveys will include those working at the Awba facility.

1.5 *APPROACH TO ASSESSMENT OF POTENTIAL IMPACTS*

Potential Project risks and impacts should be assessed in accordance with the requirements and standards set out in IFC Performance Standards, WBG guidelines and other relevant guidelines. The assessment will cover all potentially risks and impacts using recognised methods as applicable, but

should focus on the potentially significant impacts. Impacts should be identified in the context of the Project's AOI, covering: the Project footprint and other areas likely to be directly affected by Project activities; indirect impacts from unplanned but predictable activities; and cumulative impacts. Impact avoidance and mitigation measures should be designed for the Project to enable the Project to achieve compliance with national legislation, IFC PSs and WBG EHS Guidelines, whichever is more stringent. These measures shall be incorporated into Project design, construction and operation.

Impact assessment should take into account the views and concerns of key stakeholders, including project affected peoples, representatives of affected communities, relevant authorities and NGOs. Impacts should be described in terms of: being adverse or beneficial, direct / indirect, cumulative, localised / regional / cross-border / global, duration, and permanent / temporary / reversible. Wherever possible impacts shall be objectively described (quantified) rather than simply subjectively described.

Quantitative modelling will be undertaken for air quality assessment. An emissions inventory for the overall Project will be developed. All characteristics of the emission sources would be defined either from plant specific data or from publically available default values used in the development of emission factors (for example USEPA AP-42 or Australian NPi). Once the emission inventory has been acknowledged and agreed with Awba, detailed air dispersion modelling using the USEPA regulatory model AERMOD will be undertaken, as this is internationally recognised as being suitable for this type of near field study in areas of simple terrain and locations away from the coast. The modelling will take into account local meteorological data, terrain data, sensitive receptor locations and the identified potential sources of emissions.

The main assumptions for air quality modelling are as follows:

- The assessment will be undertaken for the worst case operating scenario.
- One single stack height(s) and one emission profile will be assessed. In the event that the base design is not compliant, further modelling scenarios would be required. No further modelling scenarios will be performed prior to discussion and variation approvals from Awba.
- All facility design/layout required for the modelling are to be provided by Awba.
- Known emissions data required for modelling will be provided by Awba.
- The conversion factor for NO_x to NO₂ is a critical factor in the assessment of NO₂ impacts. It is proposed that the current USEPA conversion factors are used.

An outline of the proposed contents of the main volume of the ESIA report is provided in *Table 1.1*.

Table 1.1 *Proposed ESIA Report Structure*

Chapter Number	Contents Heading	Explanatory Note
Cover page	-	Title page, acknowledgments, table of contents (including list of figures, tables and maps)
Executive Summary	-	Executive Summary of entire ESIA Report in non-technical language, including inclusion of the E&S Management Plan
1	Introduction and Overview of the Project	This <i>Chapter</i> will outline the development and structure of the ESIA report including the background, terms of reference, objectives, scope and declaration. The Project Rationale.
2	Project Description	<p>This <i>Chapter</i> will provide a concise description of the project and its geographical and temporal context. It will include a site description, an overview of the Facility Project design and details of project inputs and outputs. Specific points to discuss include:</p> <ul style="list-style-type: none"> • Description of Project facilities, components and activities • Embedded Controls included in the Project design to control impacts and technical specifications • Construction activities • Operational activities • Project schedule
3	Project Alternatives and Project Justification	This <i>Chapter</i> will include discussion of the Project background, objectives, need for the Project, value of the Project, envisioned sustainability, alternatives considered (including no project alternative), development options considered and site selection.
4	Policy, Legal and Administrative Framework	The policy, legal and institutional framework within which the ESIA has been conducted will be discussed in this <i>Chapter</i> . National regulations, if available, will be summarised along with relevant international agreements and conventions to which Myanmar is party, as well as applicable international best practice guidelines and project standards.
5	Assessment Methodology	This Chapter presents the methodology to conduct the Impact Assessment. The systematic approach that predicts and evaluates the impacts the Project and associated facilities could have on aspects of the physical, biological and socio economic and cultural environment shall be outlined in this Chapter. Reference should be made to the initial scoping activities to set the context for the ESIA. Impact assessment terminology, sensitivity and evaluation criteria should be included within this Chapter for specific parameters assessed.
6	Baseline Environment	This <i>Chapter</i> will summarise the available baseline data on the environmental receptors within the Project AOI. These include results of the additional baseline studies recommended in the above. It will be based on both

Chapter Number	Contents Heading	Explanatory Note
		primary and secondary data sources and will consider changes in the baseline condition without the development in place. It will focus on the description of the biological and physical environment.
7	Socio-economic Baseline and Stakeholder Consultation and Disclosure	This <i>Chapter</i> will present the results of consultation and baseline socio-economic survey undertaken as part of the ESIA, plus plans for future consultation. It will identify key Project stakeholders and present their feedback on the Project.
8	Impact Prediction and Evaluation	This <i>Chapter</i> will summarise the predicted positive and negative impacts of the Project. Cumulative impacts will be assessed based on additional agro-formulations plants being under design and construction in the vicinity of the Hawmbi plant. This <i>Chapter</i> will also include a summary of the current socio-economic status and the identification of potential negative and positive impacts.
9	Environmental and Social Management Plan (ESMP)	The ESMP will draw together the possible mitigation measures; group them logically into components with common themes; define the specific actions required and timetable for implementation; identify training needs, institutional roles and responsibilities for implementation; develop a monitoring program and estimate the costs of the measures.
10	Conclusion and Recommendations	This <i>Chapter</i> will summarise conclusions that are made based on the assessment as well as outline any further recommendations.
Annexes		These will include all technical annexes with details of specific technical surveys

APPENDIX B

IMPACT ASSESSMENT METHODOLOGY

1 IMPACT ASSESSMENT METHODOLOGY

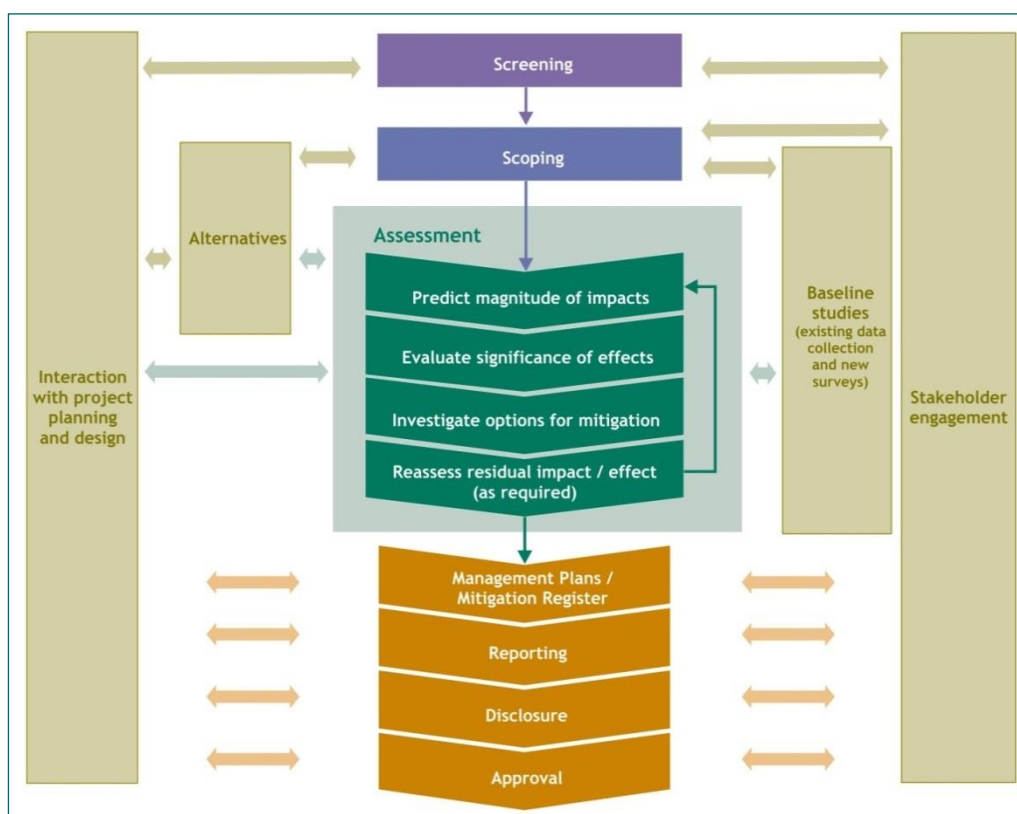
1.1 INTRODUCTION

This section of the EIA presents the methodology used to conduct the impact assessment. This methodology has been developed by ERM and is based on international best practice. The following approach is considered applicable to meet both Myanmar national and IFC requirements on environmental and social performance of the Project.

1.2 IMPACT ASSESSMENT METHODOLOGY

The impact assessment (IA) methodology follows the overall approach illustrated in *Figure B1*. The IA has been undertaken following a systematic process that predicts and evaluates the impacts the Project could have on aspects of the physical, biological, and social/ socio-economic environment, and identifies measures that the Project will take to avoid, minimise/reduce, mitigate, offset or compensate for adverse impacts; and to enhance positive impacts where practicable. The stages of the IA process are described below and further explained in the subsequent sections.

Figure B1 Impact Assessment Process



1.2.1 *Scoping*

Scoping has been undertaken to identify the potential Area of Influence (AOI) for the Project (and thus the appropriate Study Area), to identify interactions between the Project and resources/receptors in the AOI and the impacts that could result from these interactions, and to prioritize these impacts in terms of potential significance.

This phase is intended to ensure that the IA focuses on those issues that are most important for design, decision-making and stakeholder interest.

Scoping also has the benefit of identifying those impacts which are not likely to be significant and hence which warrant little or no further consideration or associated data gathering.

A scoping exercise was undertaken as part of EIA of the Project and the results are presented in *Section 4* of the EIA Report. The scoping of impacts indicates that the majority of identified potential impacts are not expected to be significant (i.e. those scoped out above). For activities predicted to have no significant impact (i.e. those in white in the Matrix), no detailed quantification or further assessment will be conducted in this EIA Report. For activities where possible significant effects could occur, these interactions will be assessed in more detail in *Sections 8-9* of this EIA Report

1.2.2 *Project Description*

The Project Description sets out the scope of the Project features and activities, with particular reference to the aspects which can impact on the environment. Details of the Project facilities' design characteristics, as well as Project activities, are provided in *Section 2* of this EIA Report.

1.2.3 *Stakeholder Engagement*

An effective IA Process requires engagement with relevant stakeholders throughout the key stages. This assists in informing stakeholders about the Project, understanding stakeholder views on the Project and in identifying issues that should be taken into account in the prediction and evaluation of impacts.

Details of the stakeholder engagement activities undertaken for this Project are presented in *Section 5* of this EIA report

1.2.4 *Baseline Environment*

To provide a context within which the impacts of the Project can be assessed, a description of physical, biological and social/socio-economic conditions that would be expected to prevail in the absence of the Project is characterized. The baseline includes information on all resources/receptors that were identified during scoping as having the potential to be affected by the Project.

The baseline environment characterization is reported in *Sections 6-7* of this EIA Report.

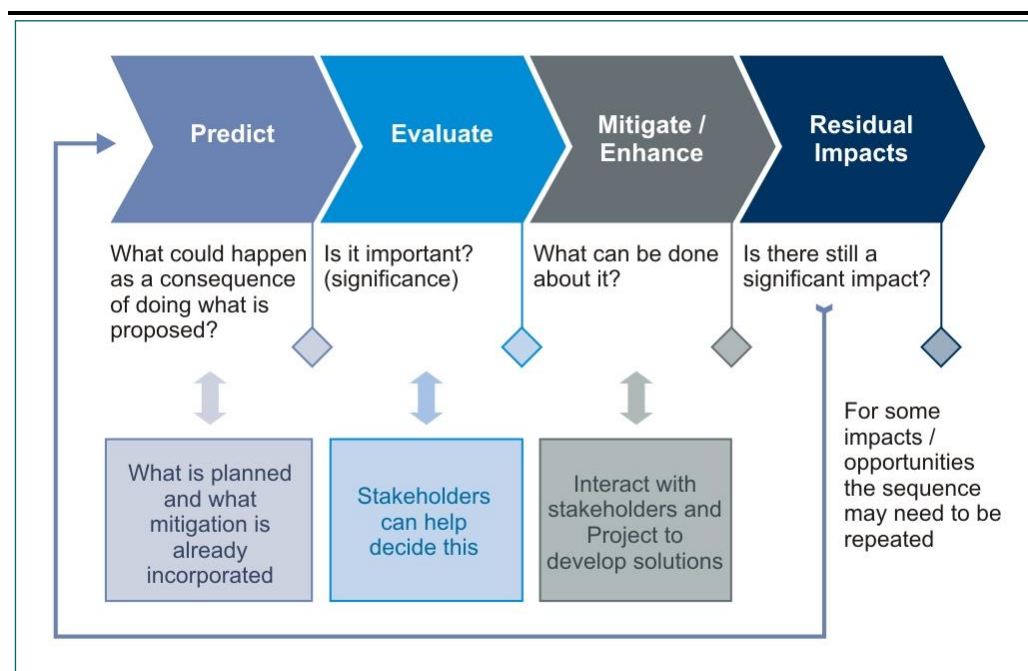
1.2.5

Impact Assessment

Impact identification and assessment starts with scoping and continues through the remainder of the IA Process. The principal IA steps are summarized in *Figure B2* and comprise:

- Impact prediction: to determine what could potentially happen to resources/receptors as a consequence of the Project and its associated activities.
- Impact evaluation: to evaluate the significance of the predicted impacts by considering their magnitude and likelihood of occurrence, and the sensitivity, value and/or importance of the affected resource/receptor.
- Mitigation and enhancement: to identify appropriate and justified measures to mitigate negative impacts and enhance positive impacts.
- Residual impact evaluation: to evaluate the significance of impacts assuming effective implementation of mitigation and enhancement measures.

Figure B2 ***Impact Assessment Workflow***



Prediction of Impacts

Prediction of impacts is essentially an objective exercise to determine what could potentially happen to the environment as a consequence of the Project

and its associated activities. This is essentially a repeat of the process undertaken in scoping, whereby the potential interactions between the Project and the baseline environment are identified. In the impact assessment stage, these potential interactions are updated based on additional Project and baseline information. From these potential interactions, the potential impacts to the various resources/receptors are identified, and are elaborated to the extent possible. The diverse range of potential impacts considered in the IA process typically results in a wide range of prediction methods being used including quantitative, semi-quantitative and qualitative techniques.

Evaluation of Impacts

Once the prediction of impacts is complete, each impact is described in terms of its various relevant characteristics (e.g., type, scale, duration, frequency, extent). The terminology used to describe impact characteristics is shown in *Table B1*.

Table B1 *Impact Characteristic Terminology*

Characteristic	Definition	Designations
Type	A descriptor indicating the relationship of the impact to the Project (in terms of cause and effect).	Direct Indirect Induced
Extent	The “reach” of the impact (e.g., confined to a small area around the Project Footprint, projected for several kilometres, etc).	Local Regional International
Duration	The time period over which a resource / receptor is affected.	Temporary Short-term Long-term Permanent
Scale	The size of the impact (e.g., the size of the area damaged or impacted, the fraction of a resource that is lost or affected, etc)	[no fixed designations; intended to be a numerical value]
Frequency	A measure of the constancy or periodicity of the impact.	[no fixed designations; intended to be a numerical value]

The definitions for the *type* designations are shown in *Table B2*. Definitions for the other designations are resource/receptor-specific, and are discussed in the resource/receptor-specific sections.

Table B2 *Impact Type Definitions*

Designations (Type)	Definition
Direct	Impacts that result from a direct interaction between the Project and a resource/receptor (e.g., between occupation of a plot of land and the habitats which are affected).
Indirect	Impacts that follow on from the direct interactions between the Project and its environment as a result of subsequent interactions within the environment (e.g., viability of a species population resulting from loss of part of a habitat as a result of the Project occupying a plot of land).

Induced	Impacts that result from other activities (which are not part of the Project) that happen as a consequence of the Project (e.g., influx of camp followers resulting from the importation of a large Project workforce).
---------	---

The above characteristics and definitions apply to planned and unplanned events. An additional characteristic that pertains only to unplanned events is *likelihood*. The *likelihood* of an unplanned event occurring is designated using a qualitative scale, as described in *Table B3*.

Table B3 Definitions for Likelihood Designations

Likelihood	Definition
Unlikely	The event is unlikely but may occur at some time during normal operating conditions.
Possible	The event is likely to occur at some time during normal operating conditions.
Likely	The event will occur during normal operating conditions (i.e., it is essentially inevitable).

Once an impact's characteristics are defined, the next step in the impact assessment phase is to assign each impact a 'magnitude'. Magnitude is a function of some combination (depending on the resource/receptor in question) of the following impact characteristics:

- Extent
- Duration
- Scale
- Frequency

Additionally, for unplanned events only, magnitude incorporates the 'likelihood' factor discussed above.

Magnitude essentially describes the intensity of the change that is predicted to occur in the resource/receptor as a result of the impact. As discussed above, the magnitude designations themselves are universally consistent, but the definitions for these designations vary on a resource/receptor-by-resource/receptor basis, as further discussed in each of the resource/receptor-specific sections. The universal magnitude designations are:

- Positive
- Negligible
- Small
- Medium
- Large

In the case of a *positive* impact, no magnitude designation (aside from 'positive') is assigned. It is considered sufficient for the purpose of the IA to indicate that the Project is expected to result in a *positive* impact, without characterising the exact degree of positive change likely to occur.

In the case of impacts resulting from unplanned events, the same resource/receptor-specific approach to concluding a magnitude designation is utilised,

but the 'likelihood' factor is considered, together with the other impact characteristics, when assigning a magnitude designation.

In addition to characterising the magnitude of impact, the other principal impact evaluation step is definition of the sensitivity / vulnerability / importance of the impacted resource/receptor. There are a range of factors to be taken into account when defining the sensitivity / vulnerability / importance of the resource/receptor, which may be physical, biological, cultural or human. Other factors may also be considered when characterising sensitivity/vulnerability/importance, such as legal protection, government policy, stakeholder views and economic value.

As in the case of magnitude, the sensitivity/vulnerability/importance designations themselves are universally consistent, but the definitions for these designations vary on a resource/receptor basis. The universal sensitivity/vulnerability/importance designations are:

- Low
- Medium
- High

Once magnitude of impact and sensitivity/vulnerability/importance of resource/receptor have been characterised, the significance can be assigned for each impact. Impact significance is designated using the matrix shown in *Figure B3*.

Figure B3 **Impact Significances**

		Sensitivity/Vulnerability/Importance of Resource/Receptor		
		Low	Medium	High
Magnitude of Impact	Negligible	Negligible	Negligible	Negligible
	Small	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Critical

The matrix applies universally to all resources/receptors, and all impacts to these resources/receptors, as the resource/receptor-specific considerations are factored into the assignment of magnitude and sensitivity/vulnerability/importance designations that enter into the matrix.

Box B1 provides a context for what the various impact significance ratings signify.

It is important to note that impact prediction and evaluation take into account any embedded controls (i.e., physical or procedural controls that are already planned as part of the Project design, regardless of the results of the IA Process). An example of an embedded control is a standard acoustic enclosure that is designed to be installed around a piece of major equipment. This avoids the situation where an impact is assigned a magnitude based on a hypothetical version of the Project that considers none of the embedded controls.

Identification of Mitigation and Enhancement Measures

Once the significance of an impact has been characterised, the next step is to evaluate what mitigation and enhancement measures are warranted. For the purposes of this IA, ERM has adopted the following Mitigation Hierarchy:

- **Avoid at Source; Reduce at Source:** avoiding or reducing at source through the design of the Project (e.g., avoiding by siting or re-routing activity away from sensitive areas or reducing by restricting the working area or changing the time of the activity).
- **Abate on Site:** add something to the design to abate the impact (e.g., pollution control equipment, traffic controls, perimeter screening and landscaping).
- **Abate at Receptor:** if an impact cannot be abated on-site then control measures can be implemented off-site (e.g., noise barriers to reduce noise impact at a nearby residence or fencing to prevent animals straying onto the site).
- **Repair or Remedy:** some impacts involve unavoidable damage to a resource (e.g. agricultural land and forestry due to creating access, work camps or materials storage areas) and these impacts can be addressed through repair, restoration or reinstatement measures.
- **Compensate in Kind; Compensate Through Other Means:** where other mitigation approaches are not possible or fully effective, then compensation for loss, damage and disturbance might be appropriate (e.g., planting to replace damaged vegetation, financial compensation for damaged crops or providing community facilities for loss of fisheries access, recreation and amenity space).

The priority in mitigation is to first apply mitigation measures to the source of the impact (i.e., to avoid or reduce the magnitude of the impact from the associated Project activity), and then to address the resultant effect to the resource/receptor via abatement or compensatory measures or offsets (i.e., to reduce the significance of the effect once all reasonably practicable mitigations have been applied to reduce the impact magnitude).

Box B1

Context of Impact Significances

An impact of **negligible** significance is one where a resource/receptor (including people) will essentially not be affected in any way by a particular activity or the predicted effect is deemed to be 'imperceptible' or is indistinguishable from natural background variations.

An impact of **minor** significance is one where a resource/receptor will experience a noticeable effect, but the impact magnitude is sufficiently small (with or without mitigation) and/or the resource/receptor is of low sensitivity/ vulnerability/ importance. In either case, the magnitude should be well within applicable standards.

An impact of **moderate** significance has an impact magnitude that is within applicable standards, but falls somewhere in the range from a threshold below which the impact is

minor, up to a level that might be just short of breaching a legal limit. Clearly, to design an activity so that its effects only just avoid breaking a law and/or cause a major impact is not best practice. The emphasis for moderate impacts is therefore on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable (ALARP). This does not necessarily mean that impacts of moderate significance have to be reduced to minor, but that moderate impacts are being managed effectively and efficiently.

An impact of **major** significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. An aim of IA is to get to a position where the Project does not have any major residual impacts, certainly not ones that would endure into the long-term or extend over a large area. However, for some aspects there may be major residual impacts after all practicable mitigation options have been exhausted (i.e. ALARP has been applied). An example might be the visual impact of a facility. It is then the function of regulators and stakeholders to weigh such negative factors against the positive ones, such as employment, in coming to a decision on the Project.

Residual Impact Evaluation

Once mitigation and enhancement measures are declared, the next step in the IA Process is to assign residual impact significance. This is essentially a repeat of the impact assessment steps discussed above, considering the assumed implementation of the additional declared mitigation and enhancement measures.

Management and Monitoring

The final stage in the IA Process is definition of the management and monitoring measures that are needed to identify whether: a) impacts or their associated Project components remain in conformance with applicable standards; and b) mitigation measures are effectively addressing impacts and compensatory measures and offsets are reducing effects to the extent predicted.

An ESMP, which contains a summary of all actions which the Project Proponents have committed to executing with respect to environmental/social/health performance for the Project, is also included as part of the EIA Report. The ESMP includes mitigation measures, compensatory measures and offsets and management and monitoring activities.

APPENDIX C

ENVIRONMENTAL AND SOCIAL ACTION PLAN

Myanmar/Awba (#35880) – Environmental and Social Action Plan (ESAP)

	Description of the Action Item
	Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts
1	<p>Awba will develop and implement a Quality, Environmental and Social Management System (QEHS) in accordance with PS1 requirements – and consistent with ISO9001 and ISO14001 – commensurate with the level of risks and impacts, applying to all its existing and new operations, including the following actions:</p> <ul style="list-style-type: none"> - Corporate QEHS policies applicable to all operations; - EHS Risk Assessment Studies for existing and all new operations; - Standard Operating Procedures (SOPs) and QEHS management program; - Development of a multi-year QEHS training plan; - Development of an Emergency Preparedness and Response Plan, including for transport and sale depots; - Definition of QEHS KPIs for monitoring and reporting; - Community Grievance Mechanism
	Performance Standard 2: Labor and Working Conditions
2	<p>Awba will develop and implement a corporate Human Resource Policy and Manual of Procedures in compliance with applicable national labor laws and regulations and IFC's Performance Standard 2 requirements, including the following actions:</p> <ul style="list-style-type: none"> - Corporate HR policies applicable to all operations; - HR Manual of Procedures and Staff HR Handbook; - Development of a multi-year HR awareness program; - Worker's grievance mechanism for its permanent and casual workers, as well as for construction workers, to enable anonymous complaints and tracking and analysis of systemic issues
3	<p>Awba will develop and implement OHS management system – consistent with OHSAS 18001 – commensurate with the level of risks and impacts, applying to all its new operations, including the following actions:</p> <ul style="list-style-type: none"> - Corporate OHS policy applicable to all operations; - OHS Manual of Procedures (SOPs), including ambient air quality monitoring procedure; - Development of a multi-year OHS training plan for its staff, including centers of responsibilities, budgetary allocations, and schedule of delivery; - Definition of OHS KPIs for monitoring and reporting; - External and internal OHS audits and implementation of Corrective Action Plan (CAP), if required; - Training manuals for end-customers (e.g. farmers); - Consolidated annual OHS performance reports
4	<p>Awba will develop a management procedure to ensure contractor labor and safe working conditions (inclusive of OHS) comply with PS2 requirements. This procedure will be developed based on standards of contract work in Myanmar and approved by the relevant Department / Ministry of Labor. This procedure will identify Awba's roles and responsibilities for monitoring contractor performance and will apply to all new/existing facilities included within this investment.</p> <ul style="list-style-type: none"> - Submission of the procedure and supporting OHS documentation (e.g. safety plan, procedures, work instructions);

	<ul style="list-style-type: none"> - Inclusion of contractual provisions for casual workers and contractors to comply with Performance Standard 2 for all facilities identified within the scope of IFC's investment
	Performance Standard 3: Resource Efficiency and Pollution Prevention
5	<p>Awba will achieve compliance of all its plants with the applicable country legal and regulatory framework and PS3 requirements as well as WBG's generic EHS Guidelines, including establishment of point source's air emissions measurements and establishment of secondary containment for fuel storage.</p> <ul style="list-style-type: none"> - Compliance report of all plants against PS3 requirements and WBG Guidelines
6	<p>Awba will provide:</p> <ul style="list-style-type: none"> - A phase-out strategy for agro-chemical product (ref. carbofuran) that falls in WHO Recommended Classification of Pesticides by Hazard Class Ia (extremely hazardous) and Ib (highly hazardous); - For Class II (moderately hazardous) pesticides, Awba will provide the appropriate controls taken in relation to the manufacture, procurement, or distribution and/or use of these chemicals; - Awba will provide a Technical Academy Program to strengthen competency-based technical development programs for its agronomists; - Awba will provide the structured Field Farmer training curriculum and Implementation Delivery Program.
	Performance Standard 4: Community Health, Safety and Security
7	<p>Awba will develop a Safe Vehicle Policy and Training Safety Procedure for its own transport fleet, including provisions for safe agro-chemical and hazardous waste transport, and will include such requirements in transport contractual agreements, including barge third-party contractors.</p>

APPENDIX D

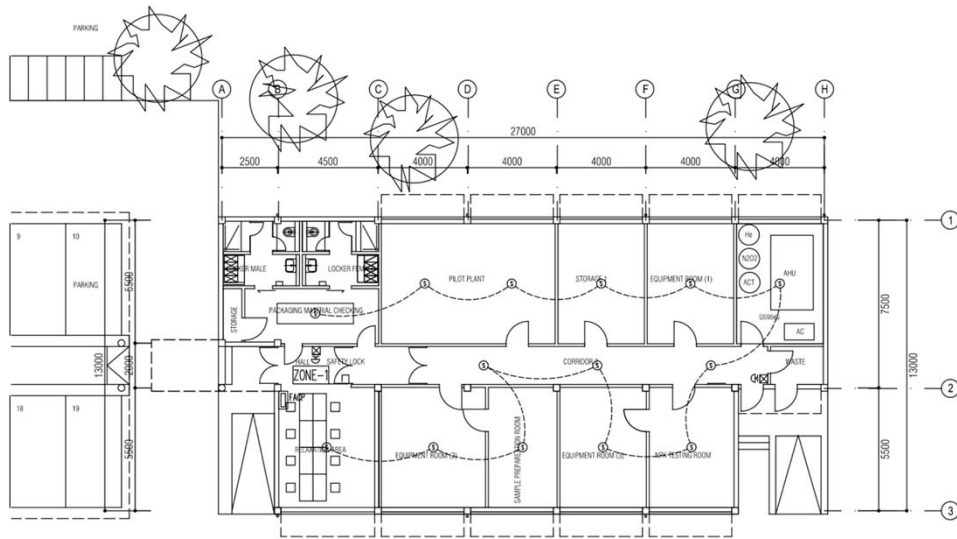
INFORMATION ON WORKPLACE SAFETY SYSTEMS

Lab Building

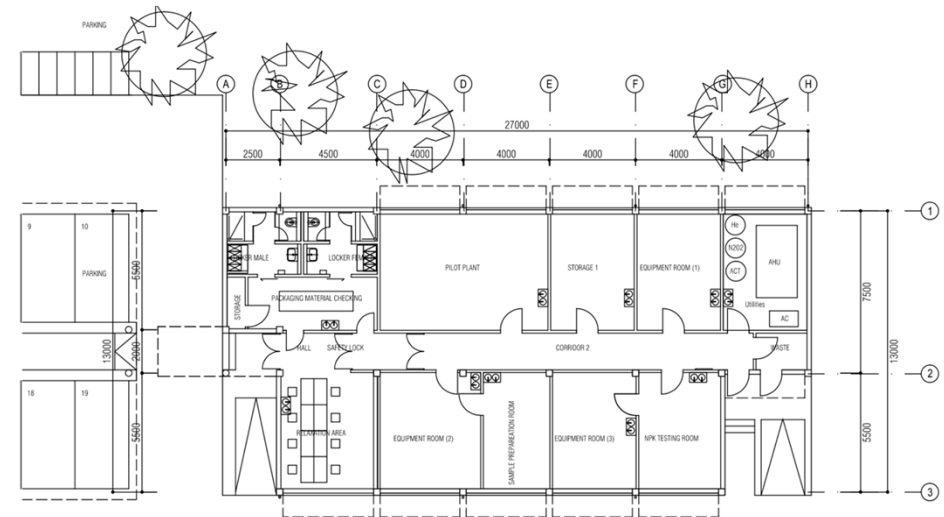


- One story building
- Size: 27.5x13x3.5m
- Square feet: 3,900
- Dedicate for 7~10 people
- State of the art quality testing equipment such as
 - UCFL
 - GCMS
 - Separate storage system for Flammable and Non Flammable chemical.
- Special system such as
 - Mechanical Ventilation system in every room
 - Scrubber system
 - Liquid waste drainage system (Black water drainage)
 - Dedicated solid waste storage area
- Complete with Fire Protection system (Hydrant and alarm)
- Indoor PA, CCTV system

Lab Building Fire Protection System



Fire Alarm and Hose Reel
system



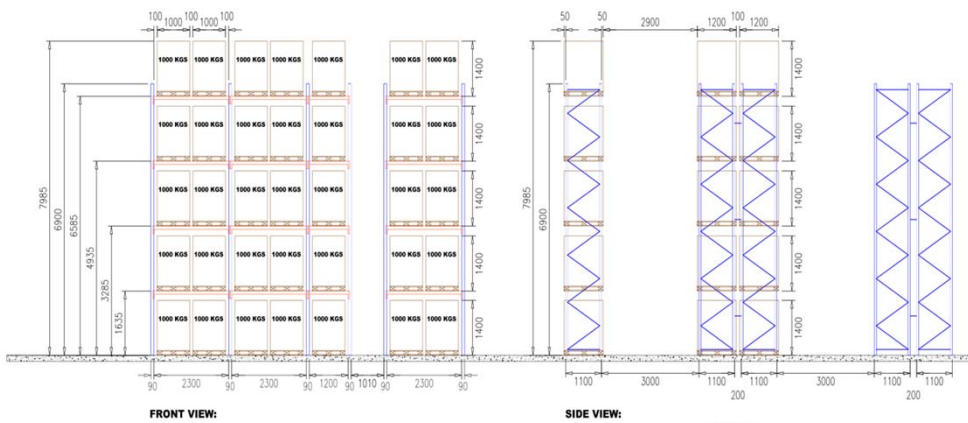
Fire Extinguisher Locations

Warehouse



- Warehouse size: 35,000 sq-ft
- Size: 54x17.5x10.5 m
- Total number of pallets: 2530 pcs
- High density warehouse system
- Good Storage Practice
 - Battery Forklift system
 - 5 layer of racking system
 - Plastic Pellets
- Flood Prevention system
- Fire Protection system
- Lightning protection system
- Good ventilation with >16 air change rate

Good Storage Practice



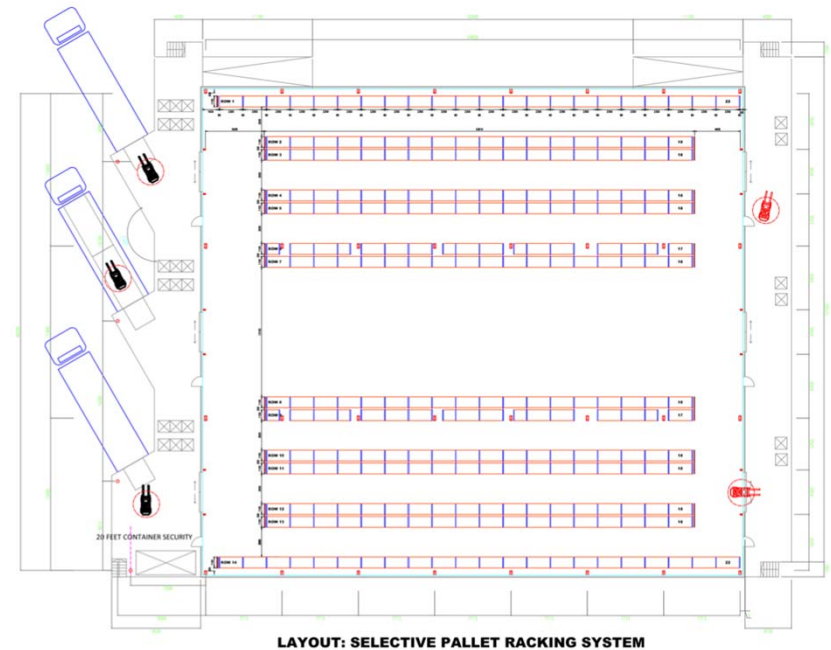
5 pallets (High density storage)



Plastic Pallets



Battery Forklift



Properly designed racking and empty space

EC Building

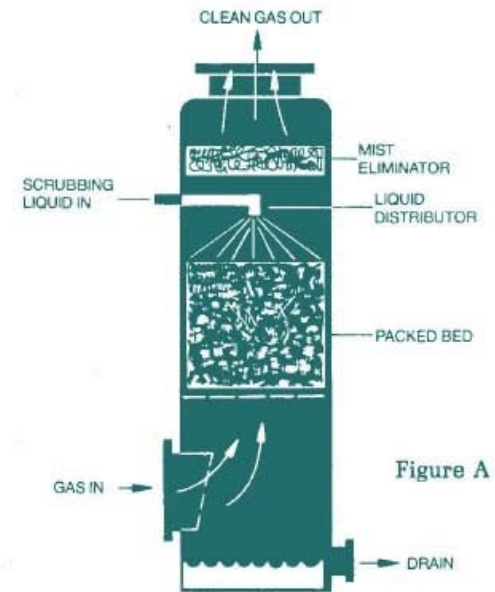


- Building size: 14,424 sq-ft
- Formulation type: EC
- System in place
 - Fire Alarm system
 - Ex-proof formulation line
 - Processing equipment
 - Dust collector system
 - Scrubber system
- Black Water drainage system
- Natural Ventilation system with 6 air change rate

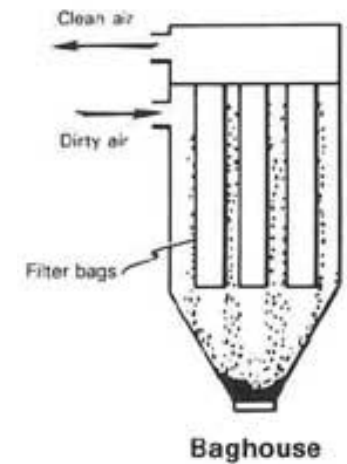
Operational Safety for Environment



Bag Dump



Scrubber



Dust Collector

SL Building

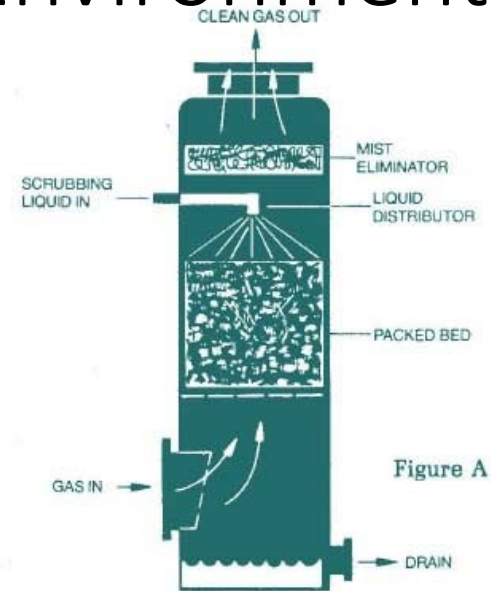


- Building size: 14,424 sq-ft
- Formulation type: SL
- System in place
 - Fire Alarm system
 - Processing equipment
 - Dust collector system
 - Scrubber system
- Black Water drainage system
- Natural Ventilation system with 6 air change rate

Operational Safety for Environment



Bag Dump



Scrubber

WP SP Building

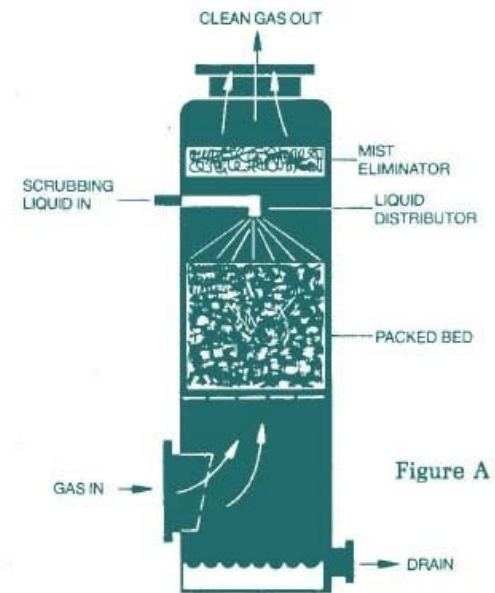


- Building size: 10,120sq-ft
- Size: 43.5x24x14* m
- Formulation type: WP, SP
- System in place
 - Fire Alarm system
 - Processing equipment
 - Dust collector system
 - Scrubber system
- Black Water drainage system
- Natural Ventilation system with 6 air change rate

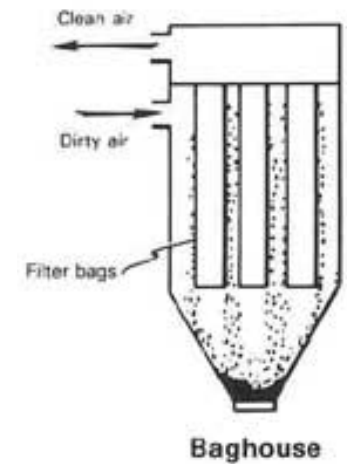
Operational Safety for Environment



Bag Dump



Scrubber



Dust Collector

SC Building



- Building size: 7,100sq-ft
- Size: 31x21x9* m
- Formulation type: SC
- System in place
 - Fire Alarm system
 - Processing equipment
 - Dust collector system
 - Scrubber system
- Black Water drainage system
- Natural Ventilation system with 6 air change rate

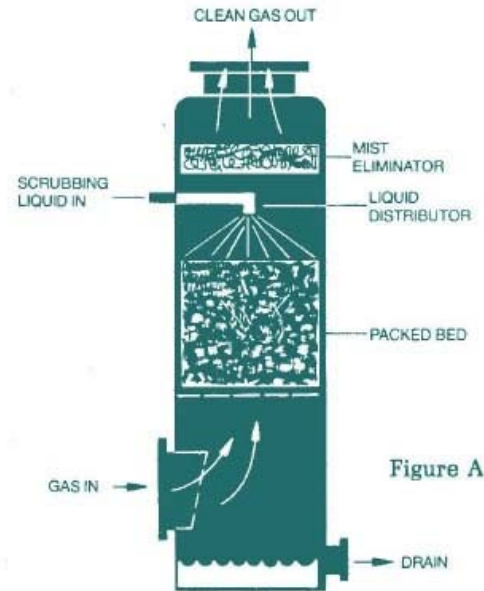
Operational Safety for Environment



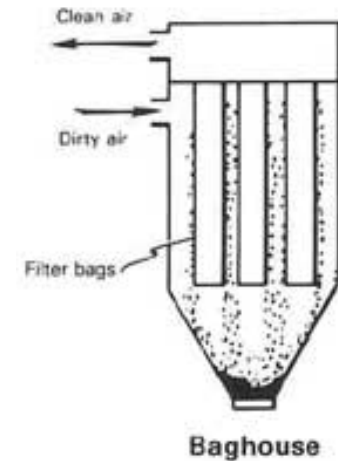
Non Return
Isolation Valve



Bag Dump



Scrubber



Dust Collector

Utility Building



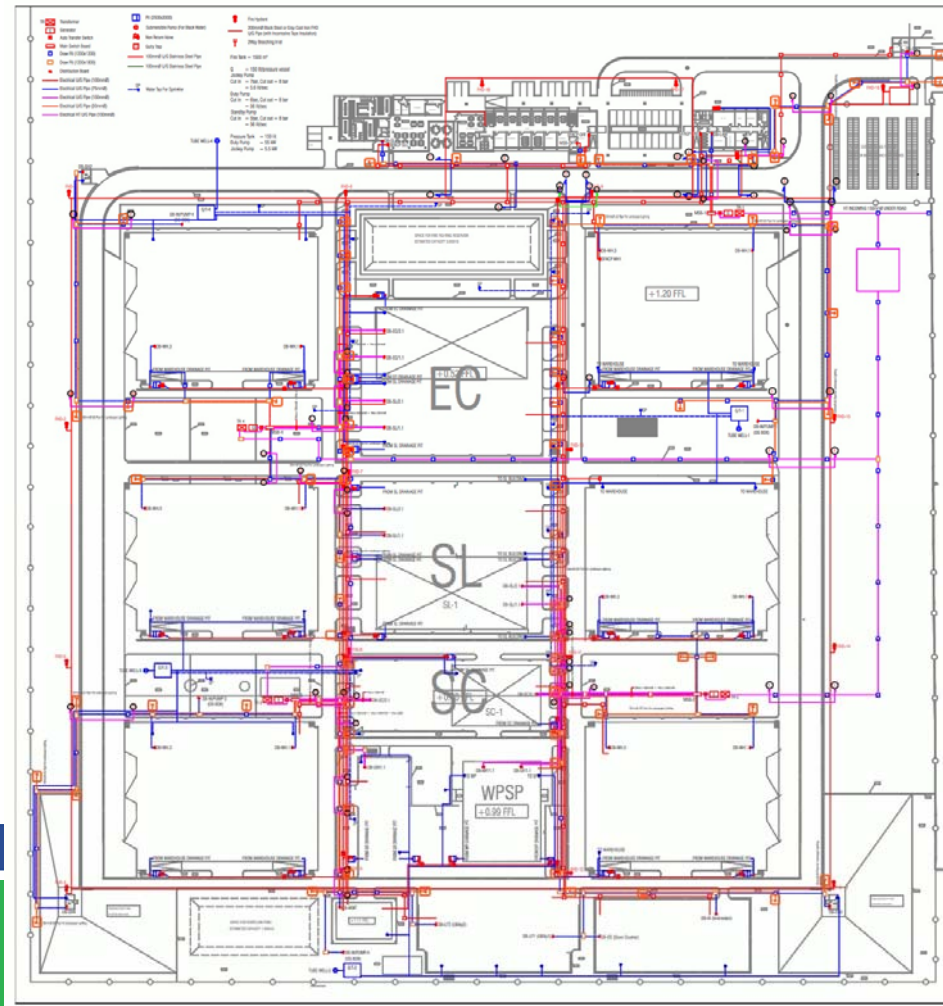
- Building size: 5,537sq-ft
- Size: 48x22.5x 6 m
- Functions in place
 - Compressor systems
 - Workshop
 - Restrooms
 - Spare parts store room
 - Fire alarm system in place
 - Security camera, PA, IP PBX system in place
- Natural Ventilation system with 6 air change rate

Sub Store Building



- Building size: 7,108sq-ft
- Size: 30x20x8.8 m
- Functions in place
 - Temporary storage
 - Fire alarm system in place
 - Security camera, PA, IP PBX system in place
- Natural Ventilation system with 6 air change rate

Infrastructure: All Services



- TR Transformer
- G Generator
- Auto Transfer Switch
- Main Switch Board
- Draw Pit (1200x1200)
- Draw Pit (1200x1800)
- Distribution Board
- Electrical U/G Pipe (100mmØ)
- Electrical U/G Pipe (75mmØ)
- Electrical U/G Pipe (150mmØ)
- Electrical U/G Pipe (50mmØ)
- Electrical HT U/G Pipe (150mmØ)

- Pit (2500x2000)
- Submersible Pump (For Black Water)
- Non Return Valve
- Gully Trap
- 100mmØ U/G Stainless Steel Pipe
- 100mmØ U/G Stainless Steel Pipe
- SP Water Tap For Sprinkler

- Fire Hydrant
- 200mmØ Black Steel or Gray Cast Iron FHD U/G Pipe (with Inconcorrosive Tape Insulation)
- 2Way Breaching Inlet

Fire Tank = 1500 m³

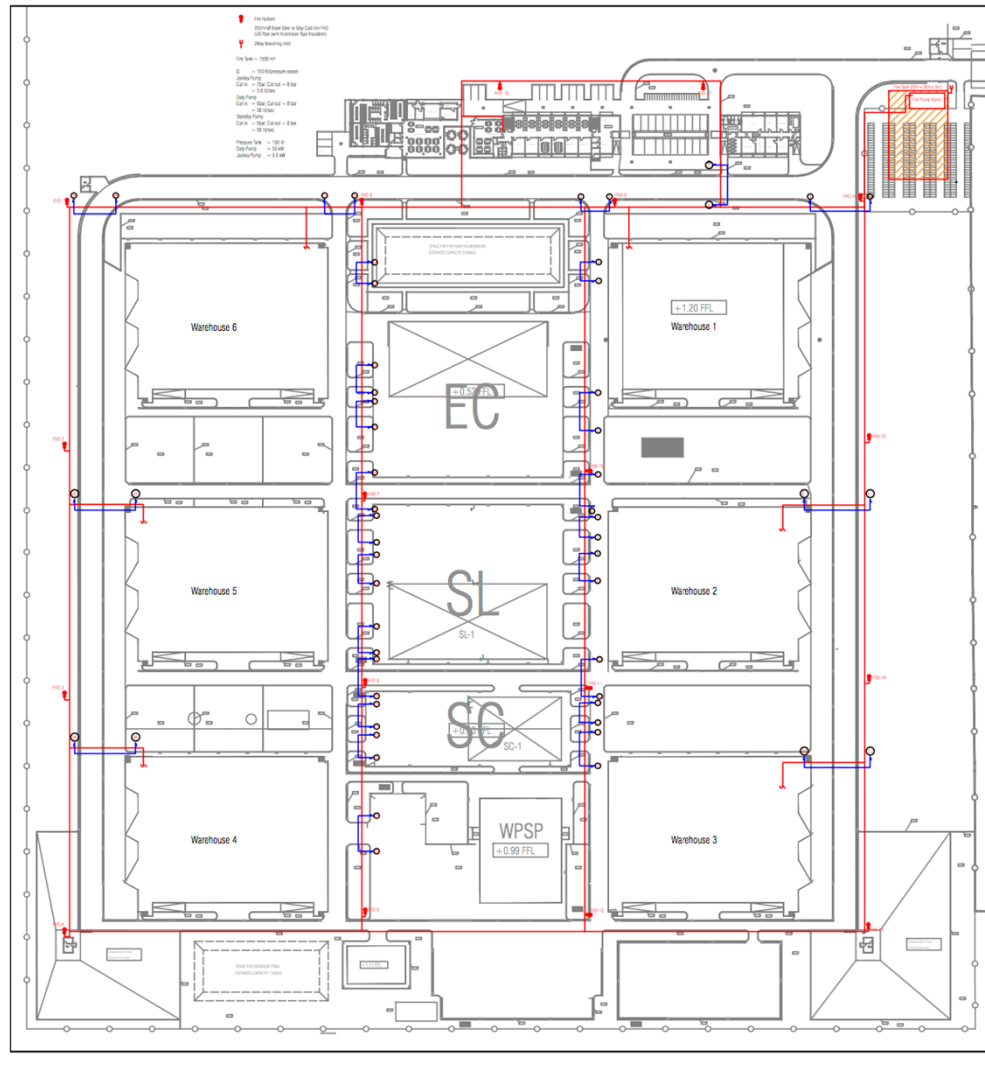
Q = 150 lit/pressure vessel
Jockey Pump
Cut in = 7bar, Cut out = 8 bar
= 5.6 lit/sec

Duty Pump
Cut in = 6bar, Cut out = 8 bar
= 56 lit/sec

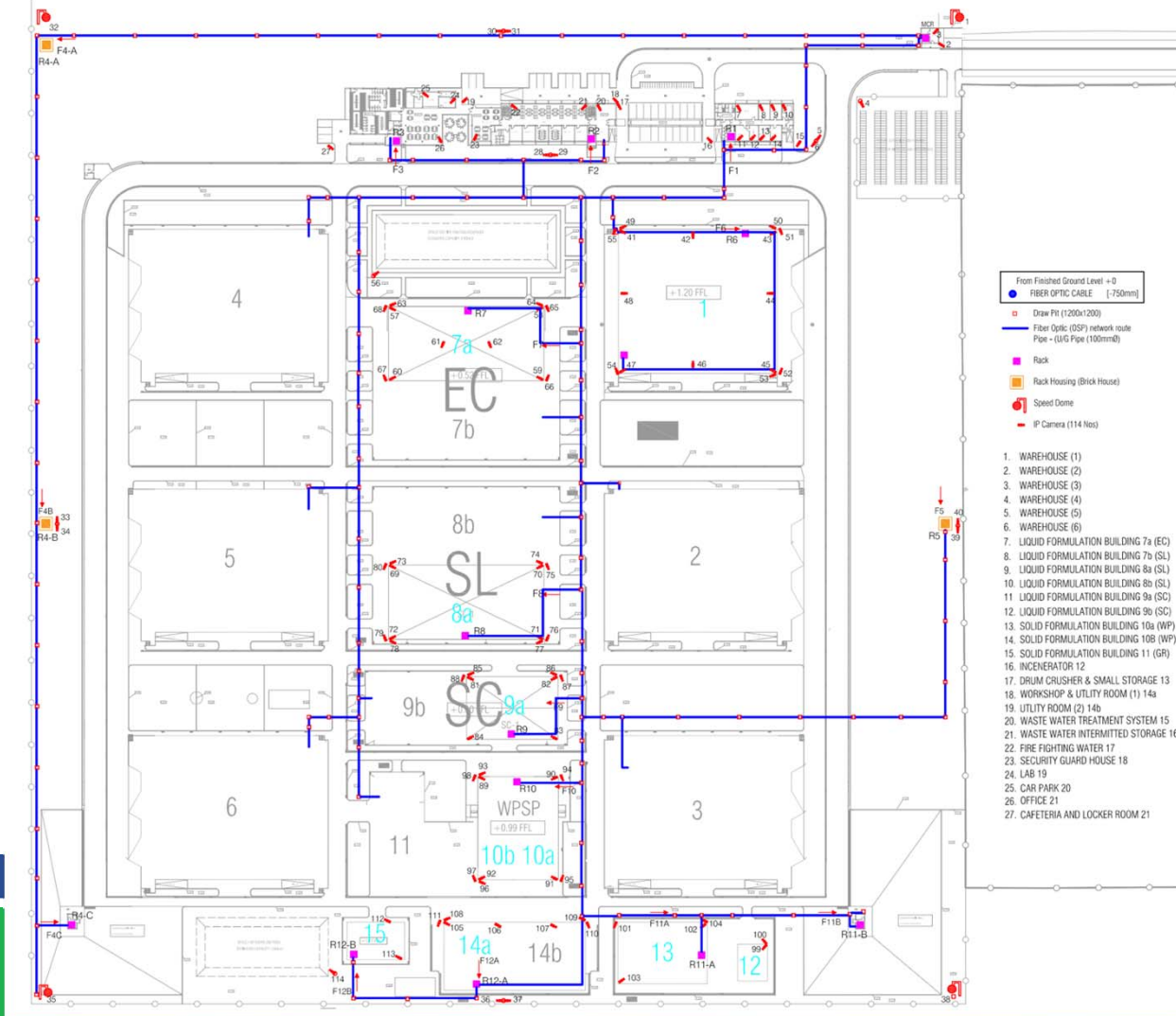
Standby Pump
Cut in = 5bar, Cut out = 8 bar
= 56 lit/sec

Pressure Tank = 150 lit
Duty Pump = 55 kW
Jockey Pump = 5.5 kW

Infrastructure: Fire Protection System



Infrastructure: Security Camera System



From Finished Ground Level +0

● FIBER OPTIC CABLE [-750mm]

□ Draw Pit (1200x1200)

— Fiber Optic (OSP) network route
Pipe - (U/G Pipe (100mmØ))

■ Rack

■ Rack Housing (Brick House)

● Speed Dome

■ IP Camera (114 Nos)

MYANMA AWBA GROUP

awba

PPE



Protective Measures



Signs



APPENDIX E
SUMMARY OF GRIEVANCE MECHANISM
CAMPAIGN

Appendix E

Summary of Grievance Mechanism Campaign

No.	Date	Village	Number of Participants	Duration(Hour)
1	Dec 1, 2017	Tha Pyay Kone Payut Seit Kone	27	3
2	Jan 17, 2017	Tha Pyay Kone	14	2
3	Jan 18, 2017	Wah Net Chaung	28	2
4	Feb 6, 2018	Wah Phyu Taw	39	1.5
5	Feb 7, 2018	Kyauk Taung Su	26	1.5
6	Feb 7, 2018	Ashay Pine 2	16	1.5
7	Mar 20, 2018	San Gyi	45	2
8	Apr 3, 2018	Wah Net Chaung (East)	102	3
9	Apr 26, 2018	Yae Tar Shae	35	2
10	May 9, 2018	Zaw Ti Kone	36	2
11	July 18, 2018	Wah Net Chaung (north) Bo Tal Kone	39	1.5

Summary of Stake Holder Engagement Workshop

Sr.	Date	Engagement Event	Location	Total Cases Registered	Attendants
1	21.6.2017 to 23.6.2017	Scoping Consultation Meeting to Community	5 Village (War Net Chaung, Tha Pyae Kone, Yae Tar Shey, Nyaung Kone, Government Admin Office)	42 Cases out of 170 attendants were registered	170
2	16.8.2017 to 18.8.2017	Stakeholder Consultation Meeting	4 Villages (Nyaung kone, Tha Pyae Kone, War Net Chaung ,Yae Tar Shey)		
3	2.12.2017	First GM Pilot Lunch	2 out of 7 Villages (The Pyay Kone and Pa Yat Sike Kone)	2 GV letters received after Launching (Total of 27 attendants)	27
4	17.1.2018	Second GM Pilot Lunch	2 Villages (Tha Pyae Kone and War Net Chaung)	5 GV letters received (Total of 46 participants attended the sessions)	46
5	27.2.2018	ESIA Disclosure Myanmar Vision to Community & Government Officials	HAIC (attendee from 8 Villages nearby)	1 GV letters received after the Engagements	100
6	28.2.2018	ESIA Disclosure English vision to Subject Matter Experts, NGOs	Chatrium Hotel, Yangon (Attended by All concerned NGO)	4 GV letters received After Engagement up to April 2018	44
7	3.4.2018	ESIA Disclosure at Wah Net Chaung East Village	Hmawbi	2 GV letters received After Engagement up to May 2018	102