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

June 2023

ERM-Hong Kong, Limited
16th Floor, Berkshire House,25 Westlands Road,Quarry Bay, Hong Kong
Telephone 2271 3000Facsimile 2723 5660
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Revised By
EQM Co.,Ltd-Environmental Quality Management Company Limited
No.233, Block 23, Sayee Pin Lane, Thuwanna, Thingangyun Township, Yangon
Ph: (95) 1 2330291, (95) 12331417, (95)9 5016606, Fax: (95) 1 2333994
www.eqm-myanmar.com

The Letter of Commitment

As per the Administrative Instruction of Environmental Impact Assessment procedure 2015, the Myanma Awba Group Co., Ltd required Environmental and Social Impact Assessment (ESIA) along with the Environmental Management Plan (EMP) for Hmawbi Agricultural Inputs Complex (HAIC) located in the Hmabi Township, Wah Net Chaung Village Group to submit the report to the Environmental Conservation Department, Ministry of Natural Resources and Environmental Conservation Department (MONREC) for approval.

The proposed project is located at Tharyar Gone East, Wah Net Chaung Village Group, Hmawbi Township, Yangon Region, Myanmar.

This ESIA study has been completed in accordance with the following articles:

Chapter (2) Article 8, 9, 10, 11,

Chapter (3) Article 23,24,25,26

Chapter (7)Article 76,77,82 of the Myanmar EIA procedure (2015) by the Myanmar registered consultant company Environmental Quality Management Co. Ltd. (EQM).

The Myanma Awba Group Co., Ltd endorses and confirms to the Environmental Conservation Department, Ministry of Natural Resource and Environmental Conservation the following:

- The accuracy and completeness of the ESIA
- The ESIA has been prepared in compliance with applicable Environmental Conservation Law, Rules and Procedures, and
- The AWBA will inform the Environmental and Conservation Department and other pertinent ministries regarding the planned closure of the factory, a significant 5 years prior to entering the decommissioning phase. Following this, the Environmental Management Plan (EMP) for the decommissioning phase will be conscientiously formulated and presented to the ECD, ensuring that it is submitted a minimum of 3 years prior to the conclusive cessation of factory operations.
- That all the information contained in the report is accurate and a truthful representation of all findings as relating to the project.
- The commitments and obligations including all laws and regulations as detailed in the report determined to be relevant with the planned project, mitigation measures and plans set out in the report has been prepared in compliance with the respective Laws and Regulations.
- Myanma Awba Group Co., Ltd. will implement the HAIC project, complying with the laws and regulations outlined in this report throughout the project activities.

The undersigned is authorized to issue this Letter of Commitment on behalf of the Myanma Awba Group Co., Ltd, Yangon, Myanmar.

Yours sincerely,

Director
Hmawbi Agricultural Inputs Complex (HAIC)

Myanma Awba Group Co., Ltd.
No.95-A, Kyaik Wine Pagoda Road, 8th Miles, Mayangone Township, Yangon, The Republic of Union of Myanmar.
Tel : (+95-1) 663536, (+95-1) 663399 Fax : (+95-1) 655763 Website : www.awba-group.com

Environmental
Quality
Management

No.233,Block 23,Sayee Pin Lane,Thuwanna,Thingungyun Township,Yangon.
Ph:(95)1 2330291,(95) 1 2331417,(95) 9 5016606,Fax:(95) 1 2333994
E-mail : contact@eqm-myanmar.com,onhmarmay@eqm-myanmar.com
Website:www.eqm- myanmar.com

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The Environmental Quality Management Co. Ltd. (EQM) endorses and confirms to the Environmental Conservation Department, Ministry of Natural Resource and Environmental Conservation the following:

- The accuracy and completeness of the EIA & ESIA
- The EIA and ESIA has been prepared in compliance with applicable Environmental Conservation Law, Rules and Procedures, and
- That all the information contained in the report is accurate and a truthful representation of all findings as relating to the project.
- The commitments and obligations including all laws and regulations as detailed in the report determined to be relevant with the planned project, mitigation measures and plans set out in the report has been prepared in compliance with the respective Laws and Regulations.

The undersigned is authorized to issue this Letter of Commitment on behalf of the Environmental Quality Management Co., Ltd., Yangon, Myanmar.

Yours sincerely,

Ohnmar May Tin Hlaing
Environmental Health Consultant/ Managing Director
Environmental Quality Management Co., Ltd

TABLE OF CONTENT

List of Commitment Table

Chapter	Description	Commitments
1.	Executive Summary	The overall executive summary describing in this chapter is strongly committed by the project proponent to conduct.
2.	Company Information and Declaration of EIA team	EIA Consultancy team and the project proponent commits that the description about company information and EIA Team declaration in this report are truly stated in chapter 2.
3.	- The National Environmental Policy (1994) - The Environmental Conservation Law (2012) - Environmental Conservation rules (2014) - National Environmental Emission Guidelines (2015) - International Environmental Conventions/ Protocols/Agreements Signed /Ratified by Myanmar - Environmental Impact Assessment Procedures (2015) - Contractual and Other Commitments	The project proponent strongly commits all operations will be performed in an environmentally friendly manner by following Environmental Conservation Law (2012), Environmental Conservation rules (2014), National Environmental Emission Guidelines (2015) and other in line environmental standards along with Mitigation Measures and Monitoring Plan.
5.	Environmental Quality Monitoring	Air, Portable Water, Wastewater, Noise quality monitoring are conducted according to the environmental standards and the project proponent will be monitored the environmental quality monitoring to meet NEQG.
6.	Impact and Risk Assessment	The project proponent has to conduct and follow mitigation measures described in this chapter.
8.	Environmental Management Plan	The project proponent strongly commits to follow the mitigation measures, specific action and monitoring plan and sub-management plan listed in EMP of this chapter
9.	Public Consultation and Disclosure	The project proponent will always take into consideration about concerns of the community on the project resulting from socio-economic survey. The project proponent will address public complaints through grievance mechanism.

Hmawbi Agricultural Inputs Complex (HAIC) Project

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

Final ESIA Report

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Client: Myanma Awba Group		Project No: 0406940			
		Date: 6 June 2023			
This document presents the ESIA Report as part of the Environmental Impact Assessment for the Hmawbi Agricultural Inputs Complex (HAIC)		Approved by:  Craig Reid *Partner*			
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Revision		By	Checked	Approved	Date

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၁ အကျဉ်းချုပ် အစီရင်ခံစာ

၂၀၁၆ ခုနှစ် ဇွန်လ တွင် အပြည်ပြည်ဆိုင်ရာ ဘဏ္ဍာရေး ကော်ပိုရေးရှင်း (IFC) သည် ဩဘာ၏ အဓိကစီးပွားရေးလုပ်ငန်းတိုးချဲ့ရန်အတွက် မြန်မာ့ဩဘာ (ဩဘာ) သို့ အမေရိကန်ဒေါ်လာ ၁၀ သန်းကို ပံ့ပိုးခဲ့ပါသည်။ ၎င်းတွင် ရန်ကုန်တိုင်းဒေသကြီး မှော်ဘီမြို့နယ်ရှိ မှော်ဘီ စိုက်ပျိုးရေး ဆိုင်ရာ ဆေးဝါးများဖျော်စပ်ထုတ်လုပ်သည့်စက်ရုံ (HAIC) (“စီမံကိန်း”) တည်ဆောက်ရေး နှင့် လုပ်ငန်း လည်ပတ်ရေး တို့ ပါဝင်ပါသည်။ Awba သည် IFC သို့ Convention Loan အား ၂၀၁၉ ခုနှစ်တွင် ပြန်လည်ပေးသွင်းခဲ့ပြီး ထိုအချိန်မှစ၍ စီမံကိန်းသည် ပြည်တွင်းပိုင်လုပ်ငန်း (နိုင်ငံသားပိုင်လုပ်ငန်း) အဖြစ်လည်ပတ်ခဲ့ပါသည်။

၂၀၁၅ ဒီဇင်ဘာလတွင် ထုတ်ပြန်ခဲ့ကြသော ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း နှင့် အမျိုးသား ပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များ (NEQEG) အကောင်အထည်ဖော် အတည်မပြုမီထဲကပင် ဤစီမံကိန်းအသေးစိတ်အတွက် ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်း (EIA) ကို ပြင်ဆင်ခဲ့ပါသည်။ သို့ရာတွင် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဆိုင်ရာ လိုက်နာဆောင်ရွက်မှု သက်သေခံလက်မှတ် (ECC) သို့မဟုတ် စီမံကိန်း လျှောက်ထားခြင်း အတွက် ဒေသတွင်းပြင်ဆင်ခဲ့သော ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းလေ့လာချက်တစ်ခုကို သယံဇာတ နှင့် သဘာပတ်ဝန်းကျင်ထိမ်းသိမ်းရေး ဝန်ကြီးဌာန (MONREC) သို့ တင်သွင်းခဲ့ပါသည်။ ဩဘာ သည် ၂၀၁၇ ဩဂုတ်လတွင် MONREC နှင့် EIA ပြည်လည်သုံးသပ်ရေးအဖွဲ့ အစည်းအဝေး တို့တွင် တက်ရောက်ခဲ့ပြီး MONREC မှ လက်ခံရရှိသောမှတ်ချက်များနှင့် လျော်ညီစွာ ပြင်ဆင်ထားသော EIA ကို တင်သွင်းခဲ့ပါသည်။ ၂၀၁၈ ဖေဖော်ဝါရီလ တွင် ပြန်လည်သုံးသပ်ရေး အဖွဲ့ အစည်းအဝေး နောက်တစ်ကြိမ်တက်ရောက်ရန်လိုအပ်မည် သို့မဟုတ် ECC ကို ထုတ်ပေးမည် စသည်နှင့် သက်ဆိုင်သည့် ဝန်ကြီးဌာန၏ အပြီးသတ်ဆုံးဖြတ်ချက်ကို စောင့်ဆိုင်းခဲ့ပါသည်။

ဩဘာသည် ၂၀၁၅ ခုနှစ်ကတည်းက စီမံကိန်းနှင့်သက်ဆိုင်သော ပညာရပ်ဆိုင်ရာဖြစ်နိုင်ခြေရှိမှု ကို ဆောင်ရွက်လျက်ရှိပါသည်။ ၁၉၈၂ ခုနှစ်တွင် မြေကို စက်မှုဝန်ကြီးဌာနက ပိုင်ဆိုင်ခဲ့ပြီး စိုက်ပျိုးရေးဝန်ကြီးဌာနသို့ လွှဲပြောင်းပေးအပ်ခဲ့ပါသည်။ ၎င်းမြေကို စိုက်ပျိုးရေး ဝန်ကြီး ဌာနက ဩဘာသို့ တည်ဆောက်လည်ပတ် လွှဲပြောင်း (BOT) ရေး စနစ်အရ ပေးအပ်ခဲ့ပါသည်။ ၎င်းစက်မှု လုပ်ငန်းနေရာအတွက် 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 ၂၀၁၉ ခုနှစ် ဇွန်လတွင် ဩဘာသည် Environmental Resources Management (ERM) ကို တာဝန်ပေးအပ်ခဲ့ပါသည်။ ထို့အပြင် ၂၀၂၃ ခုနှစ် ဇွန်လတွင်၊ ဩဘာသည် ECD ၏ သုံးသပ်ချက်နှင့်အညီ ဤ ESIA အစီရင်ခံစာကို ပြန်လည်ပြင်ဆင်ရန် Environmental Quality Management (EQM) ကိုတာဝန်ပေးအပ်ခဲ့သည်။ ESIA တွင် IFC PSs နှင့်စပ်လျဉ်း၍ ကွာဟချက်များ နှင့် ပိုးသတ်ဆေးထုတ်လုပ်ခြင်း၊ ဖျော်စပ်ခြင်း နှင့် ထုတ်ပိုးခြင်း တို့အတွက် ကမ္ဘာ့ ဘဏ် အုပ်စု (WBG) ပတ်ဝန်းကျင်ဆိုင်ရာကျန်းမာရေး နှင့် ဘေးကင်းရေး (EHS) လမ်းညွှန်ချက်များ (၂၀၀၇) နှင့် WBG EHS အထွေထွေလမ်းညွှန်ချက်များ (၂၀၀၇) တို့ကဲ့သို့သော အခြားသက်ဆိုင် ရာနိုင်ငံတကာသတ်မှတ်ချက်များကို ထည့်သွင်းပုံဖော်ထားပါ သည်။

Awbaသည် ၂၀၁၈ ခုနှစ် ဖေဖော်ဝါရီလတွင် ESIA ၏ ရလာဒ်များအပေါ် ဒေသခံလူထုသိရှိစေရန် အလို့ငှာ ပွင့်လင်းမြင်သာစွာဖော်ထုတ်ခဲ့ပါသည်။ ထို့အပြင် ESIA အစီရင်ခံစာ၏ အကျဉ်းချုပ်ကိုလည်း ဒေသခံအသိုင်းအဝိုင်းများနှင့် အခြားစိတ်ဝင်စားသည့်အဖွဲ့အစည်းများထံသို့ ပေးအပ်ခဲ့ပါသည်။

၂၀၁၉ ခုနှစ် နောက်ပိုင်းတွင် ဩဘာသည် သယံဇာတနှင့်သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဝန်ကြီးဌာနမှ လမ်းညွှန်ချက်ဖြစ်သည့် အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ(ထုတ်လွှတ်မှု) လမ်းညွှန်ချက် ၂၀၁၅နှင့် အညီ ပတ်ဝန်းကျင်နှင့်လူထုထိခိုက်မှုဆန်းစစ်ခြင်းလုပ်ထုံးလုပ်နည်းများအား လိုက်နာကျင့်သုံးဆောင် ရွက်လျှက်ရှိပါသည်။ ထို့အပြင် EIA လုပ်ထုံးလုပ်နည်း (၂၀၁၅) အရ ESIA အစီရင်ခံစာကို ကုမ္ပဏီ၏ ဝဘ်ဆိုက် www.awba-group.com နှင့် နိုင်ငံပိုင်သတင်းစာများမှ တဆင့် ထုတ်ဝေမည်ဖြစ်ပြီး အစီရင်ခံစာအကျဉ်းချုပ် (မြန်မာ) အား ဒေသခံလူထု (ပုရွက်ဆိတ်ကုန်း၊ ကြိမ်နီစမ်း၊ ဘိုးဒေါနကုန်း နှင့် ရှမ်းကုန်းအပါအဝင် သက်ဆိုင်ရာ ရွာအသီးသီး) နှင့် စိတ်ပါဝင်စားသောအဖွဲ့အစည်းများထံ သို့ ကျေးရွာစီမံအုပ်ချုပ်မှုကော်မတီနှင့် ဒေသခံလုပ်အားပေးများမှတဆင့် အစီရင်ခံစာခွင့်ပြုမိန့်ရရှိပြီး တလ အတွင်း ပေးပို့သွားမည်ဖြစ်ပါသည်။ ထို့အပြင် စီမံကိန်း လုပ်ဆောင်မှုများနှင့်ပတ်သက်၍ မေးမြန်းမှု (သို့မဟုတ်) နစ်နာမှုများရှိပါက တိုင်တန်းမေးမြန်းနိုင်ရန် အတွက် ဩဘာ၏ ဆက်သွယ် မေးမြန်းနိုင်သော ပုဂ္ဂိုလ်၏ အမည်နှင့် ဆက်သွယ်ရန်လိပ်စာများ ပါဝင်သော စီမံကိန်း အကျဉ်းချုပ် လက်ကမ်းစာစောင်များကိုလည်း ဖြန့်ဝေပေးသွားမည်ဖြစ်ပါသည်။
အသေးစိတ်အစီအစဉ်မှာအောက်ပါအတိုင်းဖြစ်ပါသည်။

ဝါးနက်ချောင်း ကျေးရွာမှ ဒေသခံအချို့မှ ပေးသောမှတ်ချက်များအရ စီမံကိန်းနှင့် ၅ကီလိုမီတာ အတွင်းရှိသော ပုရွက်ဆိတ်ကုန်း၊ ကိမ်ခြံနီစမ်း၊ ဘိုးဒါနကုန်း နှင့် ရှမ်းကုန်း စသည့်ကျေးရွာများသည်လည်း ထိခိုက်မှုဆန်းစစ်ခြင်းတွင် ပါဝင်သင့်ပါသည်။ ထို့ကြောင့် လူထုသို့ထုတ်ဖော်ပြသခြင်း အား အောက်ပါတို့မှတဆင့် ထုတ်ဖော်သွားမည်ဖြစ်ပါသည်။

၁။ ဒေသခံလုပ်အားပေး (၄)ဦး
၂။ အသိပေးဆိုင်းဘုတ် (၆) ခု
၃။ ကျေးရွာစီမံအုပ်ချုပ်မှုကော်မတီ
၄။ ဖုန်းဆက်သွယ်မှု
၅။ စာတိုက်ပုံး (၆) ခု
၆။ သတင်းစာများတွင် ထုတ်ဖော်ခြင်း
၇။ လက်ကမ်းစာစောင်

၁.၁ ပတ်ဝန်းကျင် နှင့် လူမှုဘဝ ထိခိုက်မှုဆန်းစစ်ခြင်း (ESIA) လေ့လာချက် ၏ ရည်ရွယ်ချက်များ

ဤအစီရင်ခံစာသည် အဆိုပြုစီမံကိန်းမှ ၏ ပိုးသတ်ဆေး၊ ပေါင်းသတ်ဆေး၊ မှိုသတ်ဆေး ထုတ်လုပ်မှုများကြောင့် ဒေသခံလူထု၏ လူမှုစီးပွားရေးနှင့် ပတ်ဝန်းကျင်ပေါ်သို့ သက်ရောက်နိုင်သည့် ထိခိုက်မှုများအပေါ် ထိရောက်မှုဆန်းစစ်ရန် ရည်ရွယ်ပါသည်။

- စီမံကိန်းမှ ဖြစ်ပေါ်လာနိုင်သည့် အန္တရာယ် 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 ဆက်နွယ်နိုင်သည့် အဆိုပြု စီမံကိန်းလုပ်ငန်းများကို ပြန်လည်သုံးသပ်ရန်၊

- လေ့လာမှုဧရိယာအတွင်း ထိခိုက်လွယ်နိုင်သော ပတ်ဝန်းကျင် နှင့် လူမှုဘဝအစိတ်အပိုင်း ဆိုင်ရာ အခြေခံအချက်အလက်များကို သတ်မှတ်ဖော်ထုတ်ရန်၊

- စီမံကိန်းမှ ဖြစ်ပေါ်လာနိုင်သည့် ပတ်ဝန်းကျင် နှင့် လူမှုဘဝ သက်ရောက်မှုများကို သတ်မှတ် ဖော်ထုတ်အကဲဖြတ်ရန်၊ နှင့်

- ဖြစ်ပေါ်လာနိုင်သည့် ဆိုးကျိုးသက်ရောက်မှုများကို ရှောင်ရှားရန်၊ လျှော့ချရန် သို့မဟုတ် အလျော်ပေးရန်၊ သက်ရောက်မှုလျှော့ချရေး သို့မဟုတ် မြှင့်တင်ရေးအစီအမံများကို အကြံပြုရန်။

၁.၂ စီမံကိန်းအဆိုပြုသူ

ဩဘာသည် မြန်မာနိုင်ငံတွင် စိုက်ပျိုးရေးကဏ္ဍတွင် ဦးဆောင်ကုမ္ပဏီဖြစ်သကဲ့သို့ စိုက်ပျိုးရေး နည်းပညာဖြန့်ဖြူးခြင်းနှင့် ကောက်ပဲသီးနှံကာကွယ်ရေးအတွက် စိုက်ပျိုးရေးဆေးထုတ်လုပ်ခြင်းတွင် အကြီးဆုံး ကုမ္ပဏီတခုဖြစ်ပါသည်။

လိပ်စာ ။ မှော်ဘီ စိုက်ပျိုးရေးသွင်းအားစု ထုတ်လုပ်ရေးစက်ရုံ၊ သာယာကြီးကုန်းအရှေ့၊ ဝါးနက်ချောင်းကျေးရွာအုပ်စု၊ မှော်ဘီမြို့နယ်၊ ရန်ကုန်တိုင်းဒေသကြီး။

ဖုန်းနံပါတ် ။ ၀၉ ၄၂ ၁၁၁၁၁ ၃၂၁

အီးမေးလ် ။ yaminthandar@pt-pyaezone.com

ဆက်သွယ်ရမည့်ပုဂ္ဂိုလ် ။ ဒေါ်ယမင်းသန္တာ

ဝဘ်ဆိုက် ။ www.awba-group.com

၁.၃ မူဝါဒ၊ ဥပဒေဆိုင်ရာ နှင့် အဖွဲ့အစည်းဆိုင်ရာ မူဘောင်

အောက်ပါတို့သည် စီမံကိန်းမှ လိုက်နာဆောင်ရွက်မည့် အကျုံးဝင်သည့် လမ်းညွှန်ချက်များ၊ စံနှုန်းများ နှင့် စည်းမျဉ်းစည်းကမ်းများ ဖြစ်သည်။

- အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များ (၂၀၁၅)
- ရန်ကုန်မြို့တော်စည်ပင်သာယာရေးဥပဒေ (၂၀၁၈)
- ရန်ကုန်တိုင်းဒေသကြီး ရေချိုငါးလုပ်ငန်းဥပဒေ
- ရန်ကုန်တိုင်းဒေသကြီး ငါးလုပ်ငန်းဥပဒေ
- ဧဝမျိုးစုံမျိုးကွဲထိန်းသိမ်းကာကွယ်ရေးဥပဒေ (၂၀၁၈)
- အလုပ်ရုံများအက်ဥပဒေ(၁၉၅၁)
- ဖွဲ့စည်းပုံအခြေခံဥပဒေ (၂၀၀၈)
- ပတ်ဝန်းကျင် ထိန်းသိမ်းကာကွယ်ရေး ဥပဒေ (၂၀၁၂)
- ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးနည်းဥပဒေများ (၂၀၁၄)
- မြန်မာနိုင်ငံပြည်သူ့ကျန်းမာရေးဥပဒေ (၁၉၇၂)

- ကူးစက်ရောဂါများကာကွယ်နှိမ်နှင်းရေးဥပဒေ (၁၉၅၅)
- မြေအောက်ရေဥပဒေ (၁၉၃၀)
- ရေအရင်းအမြစ်နှင့် မြစ်ချောင်းများ ထိန်းသိမ်းရေးဥပဒေ (၂၀၁၆)
- ဘေးအန္တရာယ်ရှိသောဓာတုပစ္စည်းနှင့်ဆက်စပ်ပစ္စည်းများကာကွယ်ခြင်းဥပဒေ (၂၀၁၃)

HAIC သည် EMP တွင် ဖော်ပြထားသည့် ထိခိုက်မှုလျော့ပါးရေး အစီအမံများကို အကောင်အထည် ဖော်ခြင်းဖြင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဥပဒေ (၂၀၁၂)၊ ပတ်ဝန်းကျင် ထိခိုက်မှု ဆန်းစစ်ခြင်း လုပ်ထုံးလုပ်နည်း နှင့် အမျိုးသား ပတ်ဝန်းကျင် အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက် (၂၀၁၅) နှင့် အခြားသော စီမံကိန်းဆိုင်ရာ ဥပဒေများနှင့်အညီ ဆောင်ရွက်သွားမည်ဖြစ်ကြောင်း အခိုင်အမာ ကတိပြုပါသည်။

၁.၄ စီမံကိန်းအကြောင်းအရာ ဖော်ပြချက်

စီမံကိန်းတွင် ရန်ကုန်တိုင်းဒေသကြီး၊ မှော်ဘီမြို့နယ်တွင် တည်ရှိသည့် HAIC တည်ဆောက်မှု နှင့် လည်ပတ်မှု တို့ပါဝင်ပါသည်။ HAIC (Hmawbi Agricultural Input Complex) သည် ပိုးသတ်ဆေး၊ ပေါင်းသတ်ဆေးနှင့် မှိုသတ်ဆေးများအပါအဝင် စိုက်ပျိုးရေးသွင်းအားစု အမျိုးအစားအမျိုးမျိုးကို ထုတ်လုပ်ရန် ဒီဇိုင်းထုတ်ထားသည့် စက်ရုံတစ်ခုဖြစ်သည်။ ဤထုတ်ကုန်များသည် မတူညီသော စိုက်ပျိုးရေးအသုံးချမှုများအတွက် သင့်လျော်သော သီးခြားဖော်မြူလာအမျိုးအစားများကို ဖန်တီးရန် မတူညီသောနည်းပညာများကို အသုံးပြု၍ ဖော်စပ်ထားသည်။

- **ပျစ်ခွဲစွာပျော်ဝင်ခြင်း (EC)** – EC ဖော်မြူလာများကို ပိုးသတ်ဆေးနှင့် ပေါင်းသတ်ဆေးများအတွက် အသုံးများသည်။ အစွမ်းရှိအာနိသင်ပစ္စည်းနှင့် ဖျော်ရည်တို့ပေါင်းစပ်ခြင်းဖြင့် အရည်တမျိုးရရှိလာပြီး ယင်းအရည်နှင့်ရေအားရေစပ်၍ အသုံးပြုနိုင်သည်။ ကုန်ကြမ်း လီတာ ၃၀၀၀ ကို ဖြင့် နောက်ဆုံး ထွက်ကုန်ပြုလုပ်ရန် ၆၀၀၀ လီတာ ဆန့် ဖျော်စပ်ကန် များတွင် အရည်ဖော်မြူလာကို ထုတ်လုပ်ပါသည်။ ကုန်ကြမ်းနှင့် ကုန်ကြမ်းပစ္စည်းများအားလုံးကို သယ်ယူရလွယ်ကူစေရန် ဒရမ်များဖြင့် ပို့ဆောင်ပါသည်။

- **ပျော်ဝင်ပျော်ရည် (SL) အဓိကပါဝင်ပစ္စည်းများ** – အစွမ်းရှိအာနိသင်ပစ္စည်းများ၊ ပျော်ရည်နှင့် ရေတို့ ပါဝင်ပါသည်။ အစွမ်းရှိအာနိသင်ပစ္စည်းများသည် အကျိုးသက်ရောက်မှုကောင်းသော ပိုးသတ် ဆေး သို့မဟုတ် ပေါင်းသတ်ဆေးအာနိသင်ကိုပေးသောကြောင့် ဖော်မြူလာ၏အဓိက အစိတ်အပိုင်း ဖြစ်သည်။ SLဖော်မြူလာကို အညီအမျှပျံ့နှံ့စေပြီး အပင်၏ မျက်နှာပြင်တွင် ကပ်နေစေရန် အစိုဓာတ် သို့မဟုတ် surfactant ကို ပေါင်းထည့်ထားသည်။ နောက်ဆုံးထွက်ကုန် ထုတ်လုပ်ရန် လီတာ ၂၀၀၀ ပမာဏရှိသော ကုန်ကြမ်းပစ္စည်းအားပေါင်းထည့်ပြီး လီတာ ၅၀၀၀ ဆန့်ဖျော်စပ်ကန်များတွင် အရည် ဖော်မျူလာကိုထုတ်လုပ်ပါသည်။ EC ဖော်မျူလာကဲ့သို့ပင် အလွယ်တကူ သိုလှောင်၊ ပို့ဆောင်၊ ကိုင်တွယ်နိုင်ရန် နောက်ဆုံးထွက်ကုန်များကို စည်ပိုင်း အတွင်းထည့်သွင်းထုပ်ပိုးပြီး ပို့ဆောင်ပါသည်။

- **အနည်ကျပျော်ရည် (SC)** ဖော်မြူလာတွင် အစွမ်းရှိအာနိသင်ပစ္စည်းများ၊ စိုစွတ်စေသောပစ္စည်းများ၊ ဓာတ်ပြုကွဲပစ္စည်းများ၊ ပျစ်ခွဲပစ္စည်းများ၊ မအေးခဲစေသော ဓာတုပစ္စည်းများ၊ အမြဲပ်မထစေသော ဓာတုပစ္စည်းများ၊ တာရှည်ခံ ဓာတုပစ္စည်းများ နှင့် ရေ တို့ပါဝင်ပါသည်။ SC ဖော်မြူလာ အား အစို

ကြိတ်ခွဲစက်နှင့် လီတာ ၂၀၀၀ ဆန့် ဖျော်စပ်ကန်များအသုံးပြု၍ အစိုင်အခဲနှင့်အရည် ရောစပ် ဖော်မျူလာဖြင့် ထုတ်လုပ်ပါသည်။ ဤဖျော်စပ်မှုဖော်မျူလာသည် အရည်တွင် အစိုင်အခဲ အစိတ် အပိုင်းများ ကောင်းစွာပျံ့နှံ့နိုင်ရန် အစိုကြိတ်ခွဲစက်ကိုအသုံးပြုရန်လိုအပ်သည်။ အရည်ဖော်မျူလာကဲ့သို့ပင် အရည် ကုန်ကြမ်းများအား စည်ပိုင်းများဖြင့်သယ်ယူ၍ အစိုင်အခဲကုန် ကြမ်းများအား အိတ်ဖြင့်သယ်ယူသည့် အပြင် နောက်ဆုံးထွက်ကုန်အားလည်း အလွယ်တကူ သိုလှောင်၊ ပို့ဆောင်၊ ကိုင်တွယ်နိုင်ရန် စည်ပိုင်း ဖြင့်ထည့်သွင်းထုပ်ပိုးပြီး ပို့ဆောင်ပါသည်။

- **အရည်ဖျော်အမှုန့် (WP)** တွင် အခြေခံပါဝင်ပစ္စည်းများ၊ စုပ်ယူ/ထိန်းသိမ်းပစ္စည်း၊ အရည်ပျော်နိုင် သောပစ္စည်း နှင့် အမျိုးအစားခွဲပစ္စည်းတို့ပါဝင်ပါသည်။ WP ဖော်မျူလာကို ထွက်ကုန်အစိုင်အခဲ အသေး များ ဖြစ်စေရန် ၅၀၀ ကီလိုဂရမ် ရောမွှေစက်နှင့် အမှုန့်ကြိတ်စက် တို့အသုံးပြု၍ ဖော် စပ်ထုတ်လုပ်ပါသည်။ ဤ ဖော်မျူလာသည် ထုတ်ကုန်အရွယ်အစား သေး၍ အသုံးပြုရလွယ်ကူ စေရန် အတွက် အမှုန့်ကြိတ်စက်အသုံးပြုရန်လိုအပ်ပါသည်။ ယခင်ဖော်မျူလာများ ကဲ့သို့ပင် WP ဖော်မျူလာ ၏ ကုန်ကြမ်းပစ္စည်းများအား အိတ်ဖြင့်သယ်ယူ၍ ၂၅ကီလိုဂရမ် နှင့် ၅၀ကီလိုဂရမ်ဆန့် အိတ်များ ဖြင့်ထုတ်ပိုးသယ်ယူပို့ဆောင်သွားမည်ဖြစ်ပါသည်။

- **ပျော်ဝင်အမှုန့် (SP) – SP ဖျော်စပ်ခြင်းနည်းသည်** WP နည်းစနစ်နှင့် ဆင်တူသော်လည်း SP ဖျော်စပ်ခြင်းတွင် အခြေခံပါဝင်ပစ္စည်းများအား **ရေတွင်** ပျော်ဝင်စေပါသည်။ ဆိုလိုသည်မှာ SPဖော် မျူလာသည် ရေတွင် အလွယ်တကူ ပျော်ဝင်စေရန် ဒီဇိုင်းထုတ်ထားခြင်းဖြင့် အရည်ပျော်ရည် ဖြစ်ပေါ် လာစေပြီး အပင်မျက်နှာပြင်တွင် အကျိုးသက်ရောက်အသုံးချနိုင်သော အရည်ပျော်ရည်ဖြစ် အောင် ဖွဲ့စည်းဖော်စပ်ထုတ်လုပ်ထားပါသည်။ SPဖော်မျူလာသည် ထွက်ကုန်အစိုင်အခဲအသေးများ ဖြစ်စေရန် ရောမွှေစက်နှင့် အမှုန့်ကြိတ်စက် တို့အသုံးပြု၍ ဖော်စပ်ထုတ်လုပ်ပါသည်။ ကုန်ကြမ်း ပစ္စည်းများအား အိတ်ဖြင့်သယ်ယူ၍ နောက်ဆုံးထွက်ကုန်များ အား အိတ်များဖြင့် ထုတ်ပိုး သယ်ယူ ပို့ဆောင်သွားမည် ဖြစ်ပါသည်။

- **သေးငယ်သောအစိုင်အခဲများ Granules (GR)** – Granular Formulation (GR)ထုတ်လုပ်ခြင်း၏ အဓိကပါဝင်ပစ္စည်းများမှာ Active Ingredient (အစွမ်းရှိအာနိသင်ပစ္စည်း)၊ သဲများ၊ ရေ၊ ကော်နှင့် ဆိုး ဆေးများဖြစ်သည်။ အဓိကထုတ်လုပ်မှုအဆင့်များမှာ ဓာတုအလွှာများထပ်တင်ခြင်း၊ အခြောက်ခံခြင်း၊ ဆန်ခါထုတ်ခြင်းနှင့် ထုပ်ပိုးခြင်းတို့ ပါဝင်သည်။ အရောအနှောစက်များတွင် ရောနှောပြီးနောက် အမှုန် အမွှားများကို တုန်ခါခြင်း (Vibration)ဖြင့် ခွဲခြားခြင်းနှင့် ပါဝင်ပစ္စည်းများကို စက်အားဖြင့် ရောနှော ခြင်း ပြီးနောက် ထိုအရောအနှောပစ္စည်းအား အခြောက်ခံစက်ဖြင့် အခြောက်ခံပါသည်။ ကုန်ချော များကို ထုပ်ပိုးစက်ဖြင့် ၁ ကီလိုဂရမ် အိတ်များထဲသို့ ထုပ်ပိုးပြီး ဈေးကွက် ဖြန့်ချီရန်အတွက် ပုံး သေတ္တာ များ (တစ်ပုံးလျှင် ၁၀ ထုပ်) တွင် ထည့်သွင်းထုတ်ပိုးပါသည်။ GR တွင် နောက်ဆုံး ထုတ် ကုန်၏ အရည်အသွေးအားကောင်းမွန်စေရန် အဆင့်တိုင်းတွင် အရည်အသွေး ကောင်းမွန်စွာ ထုတ် လုပ်ထားပါသည်။ ဓာတုပစ္စည်းအပေါ်ယံလွှာသည် တက်ကြွသော ပါဝင်ပစ္စည်း များ ကို granules တစ် လျှောက်လုံး အညီအမျှခွဲဝေပေးကြောင်း သေချာစေရန်အတွက် အရေးကြီး သောအဆင့်ဖြစ်သည်။ အခြောက်ခံခြင်းသည် ထုတ်ကုန်၏ တည်ငြိမ်မှုနှင့် သိုလှောင်မှုသက်တမ်းကို ထိခိုက်စေနိုင်သည့် ပို လျှံနေသည့် အစိုဓာတ်ကို ဖယ်ရှားရန် မရှိမဖြစ်လို အပ်ပါသည်။ Granules များကို တိကျသော အရွယ် အစားအကွာအဝေးသို့ ခွဲထုတ်ရန် လုပ်ဆောင်သည်၊ နောက်ဆုံးတွင်၊ သယ်ယူပို့ဆောင်ရေးနှင့် သို လှောင်မှုအတွင်း ထုတ်ကုန်ကို ကာကွယ်ရန် ထုပ်ပိုးမှုကို လုပ်ဆောင်သည်။ ဓာတုအလွှာထပ်တင် ခြင်းအဆင့်သည် (သေးငယ်သောအစိုင်အခဲများ) – granules

ထဲသို့ အစွမ်းရှိအာနိသင်ပစ္စည်းများ (active ingredients) ကောင်းမွန်စွာပျံ့နှံ့စေရန်အတွက် အဓိက အရေးကြီးသောအဆင့်ဖြစ်သည်။ အခြောက်ခံခြင်းသည် ထုတ်ကုန်၏ အရည်အသွေးနှင့် သိုလှောင်မှု သက်တမ်းကို ထိခိုက်စေနိုင်သော ပိုလျှံနေသည့် အစိုဓာတ်ကို ဖယ်ရှားရန် မရှိမဖြစ်လိုအပ်ပါသည်။ ဆန်ခါထုတ်ခြင်းအဆင့်သည် ထုတ်ကုန် အရည်အသွေးကောင်းမွန်စွာ အကျိုးရှိရှိအသုံးချနိုင်စေရန် အတွက် granules များအား သတ်မှတ်ထားသော အရွယ်အစားသတ်မှတ်ခြင်းအတွက် ပြည့်မီအောင် ဆောင်ရွက်ခြင်းဖြစ်သည်။ ထို့နောက် သယ်ယူပို့ဆောင်ရေးနှင့် သိုလှောင်မှုအတွင်း ထုတ်ကုန်ကို ပျက်စီးမှုမရှိစေရန် ထုတ်ပိုးခြင်း ကို သေချာစွာလုပ်ဆောင်ပါသည်။ HAIC သည် WHO အတန်းအစား IA (အလွန်အမင်း အန္တရာယ် ရှိသော) တွင်ကျရောက် သည့် စိုက်ပျိုးရေးဓာတုထုတ်ကုန်ကို ဝယ်ယူ၊ သိမ်းဆည်း၊ အသုံးပြုရန်၊ ထုတ် လုပ်ခြင်း သို့မဟုတ် ရောင်းဝယ်ခြင်းမပြုပါ။ HAIC သည် ပိုးသတ်ဆေးအပါ အဝင် အမျိုးအစား II (အတန်အသင့် အန္တရာယ်ရှိသော) နှင့် Class III (အနည်းငယ် အန္တရာယ်ရှိသော) ပိုးသတ်ဆေးအပါ အဝင် စိုက်ပျိုး ရေးထုတ်ကုန်များကိုသာ ထုတ်လုပ်ရောင်း ချမည်ဖြစ်သည်။ HAIC သည် ထိုကဲ့သို့သော တာဝန်ယူမှုများဖြင့် ဘေးကင်းရေးနှင့် သဘာဝ ပတ်ဝန်းကျင်ဆိုင်ရာ တာဝန်ယူမှုများကို ဆောင်ရွက်ပါသည်။ ဩဘာသည် အစိုင်အခဲနှင့် အရည် ထွက်ကုန် နှစ်မျိုးစလုံးအတွက် ဒီဇိုင်းထုတ်မည် ဖြစ်ပြီး ပထမအဆင့် (၂၀၁၇) တွင် စိုက်ပျိုးရေး ဓာတုဗေဒ ထုတ်ကုန်များ၏ တစ်နှစ်လျှင် ကနဦးစွမ်းရည် ၁၆ လီတာ/ကီလို၀ရမ် ရရှိပါသည်။ မြန်မာ့စိုက်ပျိုးရေး လုပ်ငန်းမှ ဝယ်လိုအား တိုးလာသဖြင့် ၂၀၂၀ ခုနှစ်တွင် တစ်နှစ်လျှင် လီတာ/ကီလို၀ရမ် ပမာဏ သန်း ၃၀ အထိ တိုးလာခဲ့ပါသည်။

ထုတ်လုပ်မှုနှင့် ဖော်မြူလာ အဆောက်အအုံများအပြင် စက်ရုံ၏ လုပ်ငန်းလည်ပတ်မှုကို ပံ့ပိုးပေးရန် အတွက် ဓာတ်ခွဲခန်း၊ အသုံးအဆောင်များ၊ အလုပ်ရုံ၊ ဂိုဒေါင်၊ ရုံးခန်းနှင့် လုံခြုံရေး အဆောက်အဦများအပြင် ကားပါကင်၊ ဝန်ထမ်းနေရာထိုင်ခင်းနှင့် စားသောက်ခန်းတို့ပါဝင်သည်။ HAIC ကို အဆင့်သုံးဆင့်ဖြင့်တည်ဆောက်ခဲ့ပါသည်။ ၂၀၁၇ မေလတွင် ကွင်းဆင်း လေ့လာသည့် ကာလ အတွင်း အဆင့် ၁ အတွက် တည်ဆောက်ရေးကိုစတင်ခဲ့ပြီး ဖြစ်ကြောင်း လေ့လာခဲ့ရပါသည်။ စီမံကိန်းတည်ဆောက်ရေး ကို ၂၀၂၀ ခုနှစ်တွင်ပြီးမြောက်ခဲ့ပါသည်။

ဩဘာ၏ သဘာဝသယံဇာတအသုံးချမှု

HAIC သည် စက်ရုံလည်ပတ်မှုအတွက် လိုအပ်သော လျှပ်စစ်ဓာတ်အားကို အစိုးရ (Electric Power Distribution, EPC) မှ အဓိက အရင်းအမြစ်အဖြစ်အသုံးပြုပါသည်။ 33 kV ဓာတ်အားခွဲရုံနှင့် ထရန်စဖော်မာခြောက်လုံး (5 MV, 50 kV, 0.5 MV, 2 MV, 1 MV, 1 MV နှင့် 1.5 MV) တို့မှ ပံ့ပိုးပေးသော ဓာတ်အားတို့ဖြင့် နှစ်စဉ် 1,500,000 kWh ခန့် သုံးစွဲပါသည်။ စက်ရုံတွင်း ဓာတ်အား ပြတ်တောက်မှုအတွက် သတ်မှတ်ထားသော 275 kVA၊ 60 kVA နှင့် 500 kVA အရန်လျှပ်စစ် ဓာတ်အားပေးစက် နံပါတ်လေးခုကိုလည်း တပ်ဆင်ထားပါသည်။ စီမံကိန်းအတွက် ပျမ်းမျှလစဉ် လျှပ်စစ်ဓာတ်အားသုံးစွဲမှု နှုန်း နှင့် ဓာတ်အားအရင်းအမြစ်များကို ဇယား ၄.၄ တွင် အောက်တွင်ဖော် ပြထားသည်။

ရေအသုံးပြုမှု

စီမံကိန်းအတွက် အဓိက ရေပေးဝေသည့် အရင်းအမြစ်မှာ မြေအောက်ရေဖြစ်ပြီး လက်ရှိတွင် HAIC စက်ရုံအတွင်း၌ ရေတွင်း ၉ တွင်းရှိသည်။ ယင်းမြေအောက်ရေကို လုပ်ငန်းလည်ပတ်မှုဆိုင်ရာ ရည်ရွယ် ချက်များအတွက် အသုံးမပြုမီ ကြိုတင် သန့်စင်ပါသည်။ နှစ်စဉ်ရေသုံးစွဲမှုမှာ ခန့်မှန်းခြေ

အားဖြင့် ကုဗ မီတာ ၅၀၀၀ ဖြစ်ပြီး ကုန်ထုတ်လုပ်မှုနှင့် အခြားသော အထွေထွေ ရည်ရွယ်ချက်များအတွက် အဓိက အားဖြင့် အသုံးပြုပါသည်။ စီမံကိန်းလည်ပတ်မှုအတွက် ရေသုံးစွဲမှုရင်းမြစ်များနှင့် နှုန်းထားများကို ဇယား ၄.၈ တွင် ဖော်ပြထားသည်။

အမှိုက်စီမံခန့်ခွဲမှု

ဘေးအန္တရာယ်ရှိစွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှု

လိုင်စင်ရ အမှိုက်သိမ်းစီမံခန့်ခွဲသည့်ကန်ထရိုက်တာကုမ္ပဏီ (Dowa) မှ စက်ရုံဝန်းအတွင်းရှိ စွန့်ပစ်ပစ္စည်း များကို သီလဝါရှိ အမှိုက်စွန့်ပစ်စည့်နေရာတို့ ပေးပို့ပါသည်။ အစိုင်အခဲ အမှိုက်များကို ရှင်းလင်း စွာ တံဆိပ်တပ်ထားသော ကွန်တိန်နာများတွင် သိမ်းဆည်းထားပါသည်။ ရောင်စုံကုဒ်နံပါတ်များ ဖြင့် အလုပ်သမားများ အလွယ်တကူ နားလည်နိုင်စေရန် မြန်မာဘာသာဖြင့် အမှိုက်အမျိုးအစားများကို ဖော်ပြထားပါသည်။

ဓာတ်ခွဲခန်းမှ စွန့်ပစ်ပစ္စည်းများ

ဓာတ်ခွဲခန်းစွန့်ပစ်ပစ္စည်းများကို ဘေးအန္တရာယ်ရှိသော စွန့်ပစ်ပစ္စည်းများအဖြစ် သတ်မှတ်ပြီး ဘေးအန္တာရယ် ရှိသော အမှိုက်စီမံခန့်ခွဲမှု အစီအစဉ်အရ အထူးကြပ်မတ်စွာ စီမံဆောင်ရွက်ပါသည်။ ဤအမှိုက် များကို စက်ရုံမှထုတ်လုပ်သည့် အခြားအန္တရာယ်ရှိသော စွန့်ပစ်အမှိုက်များနှင့်အတူ ပြင်ပကုမ္ပဏီ လိုင်စင်ရ ကန်ထရိုက်တာ (DOWA) သို့ ပေးပို့ပါသည်။

၁.၅ အခြေခံပတ်ဝန်းကျင်ဆိုင်ရာ အချက်အလက်များ

ယခုအကျဉ်းချုပ်အစီရင်ခံစာအတွက်၊ အခြေခံ ပတ်ဝန်းကျင်ဆိုင်ရာအခြေအနေဖော်ပြချက်ကို အဆိုပြု စီမံကိန်း နှင့် ဥပမာ၊ အနီးဝန်းကျင်လေထုအရည်အသွေး၊ ဆူညံသံ၊ ရေအရည်အသွေး၊ မြေဆီလွှာ နှင့် ဇီဝမျိုးစုံမျိုးကွဲ စသည့် မျှော်လင့်ထားသောသက်ရောက်မှုများနှင့် တိုက်ရိုက်သက်ဆိုင်သည့် ကဏ္ဍများကို ကန့်သတ်ခဲ့ပါသည်။ စီမံကိန်းအတွက် သရုပ်ဖော်ထားသော ESIA ကို ဆောင်ရွက်ရန်အတွက် အခြေခံအချက်အလက်များကိုရရှိနိုင်ရန်၊ ၎င်းကဏ္ဍများအတွက် အခြေခံအချက်အလက်နှင့်စပ်လျဉ်းသည့် စစ်တမ်းများကို ၂၀၁၇ ဇွန်လ နှင့် ဇူလိုင်လတွင် ဆောင်ရွက်ခဲ့ပါသည်။

ထို့ပြင် စီမံကိန်း၏ ပတ်ဝန်းကျင်ဆိုင်ရာ အခြေအနေဖော်ပြချက် တစ်ချက်ဖြစ်သော ရာသီဥတုနှင့် မိုးလေဝသဆိုင်ရာ အခြေခံအချက်အလက်များ (ပျှမ်းမျှအပူချိန်၊ စိုထိုင်းဆ၊ မိုးရေချိန်လက်မ (လစဉ်နှင့် နှစ်စဉ်)၊ လေတိုက်နှုန်း) စသည်တို့အား ၂၀၁၃ ခုနှစ်မှ ၂၀၂၃ ခုနှစ်အထိ ဆောင်ရွက်ထားရှိမှု အခြေအနေများ၊ သုံးသပ်ချက်များအား အစီရင်ခံစာ၏ အခန်း(၅)၊ မိုးလေဝသဆိုင်ရာဖော်ပြချက်တွင် ဖော်ပြထားရှိပါသည်။

မြစ်ချောင်း နှင့် တွင်းရေအရည်အသွေးဆိုင်ရာ အခြေခံအချက်အလက်များကို ဇွန်လ နှင့် ဇူလ တို့ တွင် ကောက်ယူခဲ့ပါသည်။ မြစ်ချောင်းနမူနာကောက်ယူမှုနေရာများအားလုံးတွင် အစိုင်အခဲပါဝင်မှု (ရေတွင်းအနည်အနစ် နှင့် မြေကြီးပါဝင်မှု) သည် သန့်စင်ထားသောမိလ္လာအညစ်အကြေး စွန့်ထုတ်မှု အတွက် WBG အထွေထွေ EHS လမ်းညွှန်ချက်များ (၂၀၀၇) နှင့် WHO သောက်သုံးရေ စံနှုန်းများကို ကျော်လွန်သွားပါသည်။ ၎င်းကျော်လွန်သွားမှုများမှာ မျက်နှာပြင်ရေများ၏ နောက်ကျိတတ်သော သဘောသဘာဝကြောင့် ဖြစ်ပါသည်။ ကျေးရွာသူ/သားများသည် သောက်သုံးရန် ရေအတွက် ရေစစ် အသုံးပြု

ကြပါသည်။ ထို့ပြင်၊ ပိုးမွှားများပါဝင်မှုသည်လည်း မြင့်မားကြောင်း မှတ်တမ်းရရှိပါသည်။ အခြားတိုင်းတာချက်များသည် စိုးရိမ်စရာမလို ညစ်ညမ်းမှုမရှိဘဲ များသော အားဖြင့် WHO နှင့် WBG EHS လမ်းညွှန်ချက်များအတွင်း ကျရောက်ပါသည်။ ရေတွင်းရေအရည် အသွေး သတ်မှတ်ချက်ဘောင်များဖြင့် တိုင်းတာမှုတွင် တိုင်းတာနေကျအတိုင်း pH နှင့် အပူချိန် တို့ပါဝင်ကြပါသည်။ ထို့ပြင် pH ဓာတ်ခွဲစမ်းသပ်ခြင်း၊ အစဉ်အခဲပါဝင်မှု (TSS)၊ Cyanide အက်စစ် ပါဝင်မှု၊ အမိုးနီးယား၊ နိုက်ထရိုက်၊ ဓာတ်ပြုဖော့စဖရတ်၊ ဆီ နှင့် ချောဆီ၊ ဓာတုအောက်ဆီဂျင် လိုအပ်မှု (COD)၊ ဇီဝအောက်ဆီဂျင် လိုအပ်မှု (BOD)၊ ဖီးနော (Phenols)၊ အာဆင်နစ်၊ ကက်ဒမီယံ၊ ခရိုမီယမ်ဟြပ်၊ ကြေးနီ၊ ပြဒါး၊ နှင့် ပိုးမွှား (ဘက်တီးရီးယား) တို့ ပါဝင်ခဲ့ပါသည်။ WHO သောက်သုံးရေ အရည် အသွေးစံနှုန်းများကို ကျော်လွန်သွား သည်မှာ ရေတာရှည် ရေတွင်း ရှိ pH အဆင့်များဖြစ်ပါသည်။ ၎င်းညွှန်းကိန်းသက်သက် ဖြင့် ညစ်ညမ်းမှုရှိသည်ဟု သတ်မှတ်၍မရပါ။ အကြောင်းမှာ ဖော်ထုတ်ခဲ့သော သတ္တုပါဝင်မှုများသည် WHO စံနှုန်းများကို ကျော်လွန်သွားခြင်း မရှိသောကြောင့်ဖြစ်ပါသည်။

ဆူညံသံတိုင်းတာမှုများသည် နေ့ခင်းဘက် (တစ်နေရာမှလွဲ၍) နှင့် ညဘက်ကာလ တို့တွင် NEQ နှင့် WBG အထွေထွေလမ်းညွှန်ချက်ပါတန်ဖိုးများ၌ ဆူညံသံကန့်သတ်ထားချက်တို့ကို ကျော်လွန် သွားကြောင်း တွေ့ရပါသည်။ အခြားကဏ္ဍအခြေခံအချက်အလက်များမှာ များသောအားဖြင့် ရံဖန်ရံခါ ကျော်လွန်သွားသည်မှလွဲ၍ သက်ဆိုင်ရာပတ်ဝန်းကျင်စံနှုန်းများနှင့် ကိုက်ညီနေကြောင်းတွေ့ရှိရပါသည်။

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။

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

လေထုထဲတွင် PM2.5 နှင့် PM10 ပါဝင်နေမှု ပမာဏအား Haz-Scanner Environmental Perimeter Air Station (EPAS) အသုံးပြု၍ ၂၄နာရီကြာတိုင်းတာခဲ့ပါသည်။ ရရှိလာသော အချက်အလက်များအရ AQM1 (ဝါးနက်ချောင်း) နှင့် AQM3 (စီမံကိန်းဆိုဒ် အနီး) တွင် PM2.5 ပါဝင်နေမှု ပမာဏသည် စံချိန်နှုန်းထားထက် မြင့်မားနေပြီး အခြားနေရာများတွင် စံချိန်နှုန်းအတွင်း ရှိပါသည်။ ပျမ်းမျှအားဖြင့် AOI ဧရိယာတလျှောက်တွင် PM2.5 ပါဝင်နေမှု ပမာဏသည် သက်ဆိုင်ရာ လေထုအရည်အသွေးစံနှုန်းအတွင်းတွင်ရှိကာ လေထုဝန်းကျင်သည် ၂၄နာရီတိုင်းတာရေးကာလအတွင်း PM2.5 ပါဝင်နေမှုပမာဏနှင့် ပတ်သတ်၍ 'အရည်အသွေးကျနေခြင်းမရှိ' ဟုအဆင့်အတန်းသတ်မှတ်နိုင်ပါသည်။ PM10 ပါဝင်နေမှု ပမာဏအား စောင့်ကြည့်လေ့လာသော ရလာဒ်များအရ နေရာအားလုံးတွင် သက်ဆိုင် ရာ လေထုအရည်အသွေးစံနှုန်းအတွင်းတွင်ရှိကာ လေထုဝန်းကျင်သည် 'အရည်အသွေး ကျနေခြင်း မရှိ ဟုအဆင့်အတန်းသတ်မှတ်နိုင်ပါသည်။

ဧဝမျိုးစုံမျိုးကွဲနှင့်ပတ်သက်၍၊ အဆိုပြု HAIC အနီးဝန်းကျင်တွင် များသောအားဖြင့် ဧဝတန်ဖိုးအရ နိမ့် သော ပြုပြင်ထားသည့်နေရာများရှိနေသည်ကို စစ်တမ်းရလဒ်များက ညွှန်ပြနေပါသည်။

၁.၆ သက်ဆိုင်သူများနှင့် တိုင်ပင်ဆွေးနွေးမှု

ESIA လုပ်ငန်းစဉ်၏ အစိတ်အပိုင်းတစ်ရပ်အနေဖြင့်၊ စီမံကိန်း၏လွှမ်းခြုံမှုဧရိယာ (AOI) အတွင်းရှိ သွယ်ဝိုက်၍သော်လည်းကောင်း၊ တိုက်ရိုက်သော်လည်းကောင်း ထိခိုက်ခံစားရနိုင်သည့် ပုဂ္ဂိုလ်များ နှင့် တိုင်ပင်ဆွေးနွေးမှုကို ဆောင်ရွက်ခဲ့ပါသည်။ တိုင်ပင်ဆွေးနွေးမှုသည် စီမံကိန်းကြောင့် ဖြစ်ပေါ် လာနိုင် သည့် သက်ရောက်မှုများကို အများပြည်သူထံ အသိပေးတင်ပြခြင်း နှင့် ကိစ္စရပ်များနှင့် စပ်လျဉ်း၍ ရပ်ရွာ မှ အမြင်များကိုလည်းတောင်းခံခြင်းဖြင့် ရည်ရွယ်ချက်နှစ်မျိုးကို အကျိုးပြုပါသည်။

ESIA လေ့လာမှုအတွက် သက်ဆိုင်သူများနှင့်တိုင်ပင်ဆွေးနွေးမှု လုပ်ငန်းများ၏ အကျဉ်းချုပ်ကို ဇယား ၁.၁ တွင် ဖော်ပြထားပါသည်။

ဇယား ၁.၁ ဆောင်ရွက်ခဲ့ပြီးသော ထိတွေ့တိုင်ပင်ဆွေးနွေးမှု

ရက်စွဲ	နေရာ	ကျင်းပရာနေရာ	တက်ရောက်သူများ
နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်းဆိုင်ရာ အဆင့်			
၂၁/၆/၂၀၁၇	မှော်ဘီ	GAD ရုံး	အစိုးရ (၈) ဦး
၂၁/၆/၂၀၁၇	ဝါးနက်ချောင်း	ကျေးရွာရှိ ဘုန်းကြီးကျောင်း	အစိုးရ (၁၉) ဦး၊ ဒေသခံ (၃၇) ဦး
၂၂/၆/၂၀၁၇	သပြေကုန်း	ကျေးရွာရှိ ဘုန်းကြီးကျောင်း	အစိုးရ (၄) ဦး)၊ ဒေသခံ (၃၅) ဦး
၂၂/၆/၂၀၁၇	ရေတာရှည်	ကျေးရွာရှိ ဘုန်းကြီးကျောင်း	အစိုးရ (၉) ဦး)၊ ဒေသခံ (၄၁) ဦး
၂၃/၆/၂၀၁၇	ညောင်ကုန်း	ကျေးရွာရှိ ဘုန်းကြီးကျောင်း	အစိုးရ (၄) ဦး)၊ ဒေသခံ (၃၅) ဦး
ESIA အဆင့်			
၁၆/၈/၂၀၁၇	ဝါးနက်ချောင်း	ကျေးရွာရှိ ဘုန်းကြီးကျောင်း	အစိုးရ (၅) ဦး)၊ ဒေသခံ (၄၃) ဦး
၁၆/၈/၂၀၁၇	သပြေကုန်း	ကျေးရွာရှိ ဘုန်းကြီးကျောင်း	ဒေသခံ (၃၃) ဦး
၁၇/၈/၂၀၁၇	ရေတာရှည်	ကျေးရွာရှိ ဘုန်းကြီးကျောင်း	အစိုးရ (၁) ဦး၊ ဒေသခံ (၅၅) ဦး

ရက်စွဲ	နေရာ	ကျင်းပရာနေရာ	တက်ရောက်သူများ
နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်းဆိုင်ရာ အဆင့်			
၁၇/၈/၂၀၁၇	ညောင်ကုန်း	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
တိုင်ပင်ဆွေးနွေးခြင်း နှင့် သတင်းအချက်အလက်များ ထုတ်ဖော်တင်ပြခြင်း လုပ်ငန်းစဉ် သတင်းအချက်အလက်များရရှိနိုင်မှု နှင့် ပွင့်လင်းမြင်သာမှု တို့နှင့်ဆက်စပ်၍ အဓိက မှတ်ချက် တစ်ခု ကို ရရှိခဲ့ပါသည်။ သက်ဆိုင်သူမှ တင်ပြလို သည်မှာ ပေးသည့်သတင်းအချက်အလက်များကို ရပ် ရွာမှ နားလည်စေရန် အရေးကြီးကြောင်း ဖြစ်ပါ သည်။ စီမံကိန်းမှ ရေဆန်ဘက် ၅ ကီလိုမီတာအတွင်းရှိ ပရွက်ဆိတ်ကုန်း၊ ကြိမ်နီစမ်း၊ ဘိုးဒေါနကုန်း နှင့် ရှမ်းကုန်း ကျေးရွာ တို့ကိုပါ ဆန်းစစ်မှုတွင် ပါဝင်သင့်ကြောင်း ဝါးနက်ချောင်းရှိ သက်ဆိုင်သူ အချို့မှ မှတ်ချက်ပေး ကြပါသည်။	ဒေသခံရပ်ရွာများ အလွယ်တကူလက်လှမ်းမီပြီး သ တင်း အချက်အလက်များကို အသေအချာ ရရှိစေရန် ကြီးကြပ်ရေးဆိုင်ရာ EIA အစီရင်ခံစာတွင် အစီရင်ခံစာ အကျဉ်းချုပ်ကို မြန်မာဘာသာဖြင့် တင်ပြ သွားမည် ဖြစ်ပါသည်။ နောက်ထပ်ထုတ် ပြန်တင်ပြမှု များ နှင့် တိုင်ပင်ဆွေးနွေးမှုများကို ပရွက် ဆိတ်ကုန်း၊ ကြိမ်နီ စမ်း၊ ဘိုးဒေါနကုန်း နှင့် ရှမ်းကုန်း ကျေးရွာ တို့တွင် ဆောင်ရွက်သွားမည်ဖြစ်ပါသည်။
အများပြည်သူ ကျန်းမာရေး နှင့် ဘေးကင်းရေး အများပြည်သူကျန်းမာရေး နှင့် ဘေးကင်းရေးဆိုင်ရာ သက် ရောက်မှုများနှင့် ဆက်စပ်၍ အဓိက စိုးရိမ်းမှုမှာ လေ နှင့် စွန့်ပစ်ရေ ထုတ်လွှတ်မှုများမှ ဖြစ်ပါသည်။ ၎င်းတွင် စီစဉ်မထားသည့်ဖြစ်ရပ်များနှင့်ဆက်စပ်၍ စိုး ရိမ်မှုများလည်း ပါဝင်ပါသည်။ တိုင်ပင်ဆွေးနွေးခဲ့သော ကျေးရွာလေးရွာသည် စီမံ ကိန်း လုပ်ငန်းခွင်နေရာမှ ရေစုန်ဘက်တွင်ရှိနေပြီး မြစ် ချောင်း များမှရေကို အိမ်တွင်းသုံးရန် နှင့် သောက်သုံး ရန် အသုံးပြုပါသည်။	ယခု နောက်ဆက်တွဲ ESIA သည် လေထု နှင့် ဆူညံသံထုတ်လွှတ်မှုများနှင့် ပတ်သက်သည့် သက် ရောက်မှု များကို ဆန်းစစ်သွားမည် ဖြစ်ပါသည်။ လေထု၊ ဆူညံသံ၊ မြေဆီလွှာ၊ ရေ နှင့် ဇီဝမျိုးစုံ မျိုးကွဲ များ ဆိုင်ရာမှ အခြေခံအချက်အလက်ရလဒ်များကို ရပ်ရွာသို့ ဖော်ထုတ်တင်ပြသွားမည် ဖြစ်ပါသည်။
စောင့်ကြပ်ကြည့်ရှုခြင်း နှင့် စစ်ဆေးခြင်း လည်ပတ်ရေးကာလအတွင်း စောင့်ကြည့်ခြင်း နှင့် စစ် ဆေး ခြင်းလုပ်ငန်းစဉ်၏ ပွင့်လင်းမြင်သာမှု အကြောင်း	တိုင်ကြားရေးဆိုင်ရာ ယန္တရား နှင့် အနာဂတ် ဖော် ထုတ်တင်ပြမှုတို့ကို ဧရိယာရှိ PAP များအား လုံးသို့ ဆောင်ရွက် သွားမည် ဖြစ်ပါသည်။

အဓိက လက်ခံရရှိခဲ့သော မှတ်ချက်များ နှင့် ဖြေကြားချက်များ	နောက်ဆက်တွဲ ESIA အတွက် ထည့်သွင်းစဉ်းစားမှု
အရာသည် သက်ဆိုင်သူများ အတွက် အဓိကအရေးပါပါသည်။	
ရှိနေပြီးသော အခြေခံအဆောက်အအုံကို အသုံးပြုခြင်း လမ်းအသုံးပြုမှုဆိုင်ရာအရည်အသွေးနှင့်ပတ်သက်၍ အများပြည်သူနှင့်တိုင်ပင်ဆွေးနွေးမှုတွင် မှတ်ချက်ပြုသွားခဲ့ပါသည်။ အချို့ရပ်ရွာသူ/သားများကတင်ပြသည် မှာ ဩဘာမှ အသုံးပြုသည့် စီမံကိန်း လုပ်ငန်းနေရာ သို့သွားသည့် ယာဉ်များသည် လမ်းများကို ပျက်စီး စေ ကြောင်း ဖြစ်ပါသည်။	မှော်ဘီလုပ်ကွက်အား ဆက်သွယ်ထားသောလမ်းသည် အစိုးရ၏စီမံခန့်ခွဲမှုအောင်တွင်ရှိသော အများပြည်သူ ပိုင်လမ်းဖြစ်သည်။ ဩဘာသည် ၎င်း၏ ရပ်ရွာမှ အကြံပြုတိုင်ကြားရေး ဆိုင်ရာ ယန္တရား မှ တစ်ဆင့် တိုင်းကြားလာသည့် အနှံ့ဆိုင်ရာ ကိစ္စရပ်ကို မှတ်တမ်း တင်ထားပြီးဖြစ်ပြီး နောက်ဆက်တွဲ ဖြေရှင်းရေး လုပ်ငန်းသည် သက်ဆိုင်ရာ ဒေသတွင်းအစိုးရ၏ တာဝန်ဖြစ်ပါသည်။
လက်ရှိဆောင်ရွက်မှုများ / သမိုင်းဝင် ဆောင်ရွက်မှုများ ညောင်ကုန်ရှိ အချို့လူများက စီမံကိန်းလုပ်ငန်းခွင် နေရာ၌ လက်ရှိလည်ပတ်မှုများ သို့မဟုတ် သို့ လှောင်မှုမှ အနှံ့များ ထွက်ကြောင်း တင်ပြကြပါသည်။ အဓိက စိုးရိမ်မှုတစ်ခုမှာလည်း ရှိနေပြီးသော စက်မှုနေရာ နှင့် စက်ရုံများမှ ညစ်ညမ်းမှု ဖြစ်ပေါ်ခဲ့ ကြောင်း ဖြစ်ပါသည်။ လူထုသို့ထုတ်ဖော်ပြသခြင်း အား အောက်ပါ တို့မှတဆင့် ထုတ်ဖော်သွားမည်ဖြစ်ပါသည်။ ၁။ ဒေသခံလုပ်အားပေး (၄)ဦး ၂။ အသိပေးဆိုင်းဘုတ် (၆) ခု ၃။ ကျေးရွာစီမံအုပ်ချုပ်မှုကော်မတီ ၄။ ဖုန်းဆက်သွယ်မှု ၅။ စာတိုက်ပုံး (၆) ခု ၆။ သတင်းစာများတွင် ထုတ်ဖော်ခြင်း ၇။ လက်ကမ်းစာစောင်	ဩဘာသည် ၎င်း၏ ရပ်ရွာမှ တိုင်ကြားရေးဆိုင်ရာ ယန္တရား မှ တစ်ဆင့် တိုင်ကြားလာသည့် တည်ရှိပြီးသော စက်ရုံ အဆောက်အဦး၏ လုပ်ငန်းလည်ပတ်ခြင်းမှ ထွက်ရှိသော အနှံ့ဆိုင်ရာကိစ္စရပ်ကို စုံစမ်းထားပါသည်။ အနံထုက်လွှတ်ရာ မူရင်းအရင်းအမြစ်ကို ရှာဖွေဖော်ထုက်ရန်မှာ ခက်ခဲသော်လည်း၊ အနံကြောင့်ခံစားရခြင်း များကို လျှော့ချရန်အတွက် အစိုင်အခဲထုတ်လုပ်ရာ နေရာမှ လှောင်ပိတ်အကန့်ခွဲခန်းထားရှိကာ အနံ့နှင့် ဖုန်မှုန့်ထွက်ရှိခြင်းကို လျှော့ချခြင်း၊ ဓာတ်ငွေ့စစ်စနစ် ကို ထုက်လွှတ်ရာ အရင်းမြစ်တွင် တပ်ဆင် ခြင်း အစရှိ သော လျှော့ပါးရေး နည်းလမ်းများကို ဩဘာမှ ထည့် သွင်း ပြီးဖြစ်ပါသည်။ ဩဘာသည် အခြေခံအချက်အလက်ဆန်းစစ်မှုကို ဆောင်ရွက်ခဲ့ပြီး အခြေခံအချက်အလက်ရလဒ်များကို ဒေသခံ ရပ်ရွာများထံ ထုတ်ဖော်တင်ပြသွားမည် ဖြစ်ပါသည်။ ဩဘာ သည် ယခု နောက်ဆက်တွဲ ESIA တွင် ပါရှိ သည့်အတိုင်း ပုံမှန်စောင့်ကြည့် ရေး ကိုလည်း ဆောင်ရွက်သွားမည်ဖြစ်ပြီး၊ စောင့်ကြည့်ရေးမှရရှိသည့် ရလဒ်များကိုလည်း ဒေသခံ ရပ်ရွာ ထံသို့ ထုတ်ဖော် တင်ပြသွားမည် ဖြစ်ပါသည်။
မြေယာခွင့်ပြုချက် ကျေးရွာမှမေးမြန်းသည်မှာ ဝန်ကြီးဌာ / အစိုးရက ခွင့်ပြုသောမြေအကြောင်းအရာ နှင့် လုပ်ငန်းခွင်နေရာ ရွေးချယ်မှုလုပ်ငန်းစဉ် နှင့် ဆက်စပ်ပါသည်။	ရှိနေပြီးသော စက်မှုဇုန်နေရာအတွင်း စီမံကိန်း ဆောင်ရွက် ရန် လယ်ယာစိုက်ပျိုးရေး နှင့် ဆည်မြောင်းဝန်ကြီးဌာနမှ ဩဘာသို့ ခွင့်ပြုချက်ပေးခဲ့ ပါသည်။
လူမှုရေးဆိုင်ရာ တာဝန်ယူဆောင်ရွက်မှု နှင့်	ဩဘာသည် CSR အစီအစဉ်ကို လုပ်ငန်း လည်

အဓိက လက်ခံရရှိခဲ့သော မှတ်ချက်များ နှင့် ဖြေကြားချက်များ	နောက်ဆက်တွဲ ESIA အတွက် ထည့်သွင်းစဉ်းစားမှု
လူမှုရေးဆိုင်ရာ အကျိုးအမြတ်များ ကျေးရွာအားလုံးမှ တင်ပြသည်မှာ ဖြစ်လာနိုင်ခြေ ရှိသော လူမှုဖွံ့ဖြိုးရေးအခွင့်အလမ်းများဖြစ်ပါသည်။ အဓိက တင်ပြသည့် နှစ်ရပ်မှာ လမ်းအခြေအနေ နှင့် လျှပ်စစ်မီးတို့နှင့် စပ်လျဉ်းသည့် လုံလောက်မှုမရှိသော ဝန်ဆောင်မှုများနှင့် သက်ဆိုင်ပါသည်။ ၎င်းတို့ကို လူမှုဖွံ့ဖြိုးရေးအတွက် ဖြစ်ပေါ်လာနိုင်သည့် အခွင့် အလမ်းများအဖြစ် တင်ပြခဲ့ခြင်း ဖြစ်ပါသည်။ ညောင်ကုန်းတွင် ကျေးရွာသူ/သားများသည် ပိုးသတ် ဆေးများ အတွက် ငွေအမြောက်အများ ကုန်ကျပြီး၊ သြဘာမှ သူတို့၏ ထုတ်ကုန်များကို ဒေသခံရပ်ရွာ အတွက် ဈေးလျှော့ရောင်းသင့်ကြောင်း ဖြစ်ပါသည်။	ပတ်သည်နှင့် စတင်မည်ဖြစ်ပြီး၊ ၎င်းအကြံပြု ချက်များကို လူမှုဖွံ့ဖြိုးရေး အတွက် စီစဉ်ရာတွင် ထည့်သွင်းစဉ်း စားသွားမည်ဖြစ်ပါသည်။

ESIA ထိတွေ့တိုင်ပင်ဆွေးနွေးမှုအတွင်း မေးခွန်းများကိုမေးမြန်းခဲ့ကြသည်သာမဟုတ်ဘဲ၊ ရပ်ရွာမှ အကြံပြုတိုင်ကြားရေးလုပ်ထုံးလုပ်နည်း၏ အစိတ်အပိုင်းတစ်ရပ်အနေဖြင့် မကျေနပ်ချက်များကို လည်း ကောက်ယူခဲ့ပြီး၊ ယခုနောက်ဆက်တွဲ ESIA အတွက် ထည့်သွင်းစဉ်းစားလျက် ၎င်းကို ဇယား ၁.၃ တွင် တင်ပြထားပါသည်။ အဆိုပါဇယားရှိ လူမှုရေးဆိုင်ရာ တာဝန်ယူဆောင်ရွက်မှု (CSR)များ၊ ESIA ၊ မတော်တဆ ဖြစ်ရပ်များ၊ အလုပ်အကိုင်အခွင့်အလမ်းများ၊ မြေယာကိစ္စ ၊ ညစ်ညမ်းမှု၊ တည်နေရာပြောင်းရွှေ့ခြင်း၊ လမ်းပျက်စီးမှု၊ ကျေးရွာဆိုင်ရာသတင်းအချက်အလက်များ၊ စွန့်ပစ်ပစ္စည်း စီမံခန့်ခွဲမှု စသည့်ကိစ္စရပ်များအား သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဆိုင်ရာ အစီအမံများနှင့် စပ်လျဉ်း၍ မြန်မာနိုင်ငံ ရင်းနှီးမြှုပ်နှံမှု ဥပဒေ (၂၀၁၆) ပါ ပုဒ်မနှင့် ပုဒ်မခွဲများဖြစ်သည့် ၅၁ (က၊ခ၊ဂ၊ဃ၊င၊စ)၊ ၆၅ (ခ၊ဂ၊ဃ၊ဈ)၊ ၆၇ နှင့် မြန်မာနိုင်ငံ ရင်းနှီးမြှုပ်နှံမှုနည်းဥပဒေများ (၂၀၁၇) ပါ ၁၉၀ အချက်များအတိုင်း လိုက်နာဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။

ဇယား ၁.၃ ရပ်ရွာမှ မှတ်ချက်များ မှတ်တမ်း

အမျိုးအစား	မှတ်ချက်အတိုချုပ်	ESIA အတွက် ဆောင်ရွက်မှု
လူမှုရေးဆိုင်ရာ တာဝန်ယူဆောင်ရွက်မှု (CSR)	ကျေးရွာဖွံ့ဖြိုးရေးလုပ်ငန်းများကို ပွင့်လင်းမြင်သာစွာ နှင့် ထိရောက်စွာဆောင်ရွက်ရန်။	တိုင်ပင်ဆွေးနွေးမှုလုပ်ငန်းများအားလုံးကို ပွင့်လင်း မြင်သာစွာဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။
	သြဘာသည် ဒေသရှိဆေးရုံ အတွက် ထောက်ပံ့ပေးသင့်ပြီး ပိုးသတ်ဆေးများ ကို ဒေသခံ များအတွက် လျှော့ဈေးဖြင့် ရောင်းချသည့် ဆိုင်များလုပ်ပေး သင့်ပါသည်။	CSR သည် ESIA ၏ အစိတ်အပိုင်းတစ်ရပ် အဖြစ် CSR ကို ထည့်သွင်းစဉ်းစား သွားမည် ဖြစ်ပါသည်။

အမျိုးအစား	မှတ်ချက်အတိုချုပ်	ESIA အတွက် ဆောင်ရွက်မှု
ESIA	ထိခိုက်မှုဆန်းစစ်ခြင်းနောက် ပိုင်း စစ်ဆေးရေး နှင့် လေ့လာ စောင့်ကြည့် ရေးအတွက် မည် သူကတာဝန်ယူသွားမည်နည်း။ ERM သည် ESIA အတွက် သက် ဆိုင်ရာ ရပ်ရွာက လူများပါ ဝင်စေရန်။ ESIA ရလဒ်များကို ရပ်ရွာသို့ ထုတ်ပြန်ပေးရန် နှင့် ၎င်းရလဒ်များ အပေါ် အာမခံ ပေး ရန် အပြင် စက်ရုံ၏ ရေဆိုး သန့်စင် စက်ရုံနှင့်အနီးဆုံး ရေကန် အမှတ် (၁) – Lagoon 1နှင့် မှ ပြွန် ရေတွင်း နံပါတ် (၃) (Tube Well No.3) မှလည်း ကောက်ယူ ဆောင်ရွက်ရန်။	ESIA အစီရင်ခံစာတွင် အခန်းကဏ္ဍများ နှင့် တာဝန်များအပါအဝင် စောင့်ကြည့်ရေးတို့ကို ထည့် သွင်းပါဝင်သွားမည် ဖြစ်ပါသည်။ အခြေခံအချက်အလက် စစ်တမ်းများအတွက် ရပ်ရွာ ရှိလူများကို ဖိတ်ခေါ်သွားမည် ဖြစ်ပါသည်။ စက်ရုံ၏ ရေဆိုးသန့်စင်စက်ရုံနှင့် အနီးဆုံးရေကန်အမှတ် (၁) – Lagoon 1နှင့် မှ ပြွန်ရေတွင်းနံပါတ် (၃) (Tube Well No.3) မှ ရေများကို ယူဆောင်ပြီး ရလဒ်များကို ရပ်ရွာထံ သို့ တင်ပြသွားမည် ဖြစ်ပါသည်။
မတော်တဆ ဖြစ်ရပ်များ	အရေးပေါ်အစီအစဉ်တွင် လို အပ်သည့် သတင်းအချက်များ နှင့် ကျေးရွာသူ/ သားများထံ ကျရောက်နိုင်သည့် ထိခိုက်မှုများ။	ESIA တွင် မတော်တဆဖြစ်ရပ်များ (ရပ်ရွာများ အပေါ် ကျရောက်နိုင်သော ထိခိုက်မှုများ အပါအဝင်) ကို ဆန်းစစ်သွားမည် ဖြစ်ပါသည်။
အလုပ်အကိုင် အခွင့်အလမ်းများ	လူငယ်များ နှင့် ဒေသခံရပ်ရွာရှိ လူများအတွက် အလုပ်အကိုင် အခွင့် အလမ်းများ ဆောင်ရွက် ပေးမှု။	ESIA တွင် အလုပ်အကိုင်များဆောင်ရွက်ပေးမှု နှင့် အကျိုးရှိနိုင်ခြေတို့ကို ထည့်သွင်း ဆန်းစစ်သွားမည် ဖြစ်ပါ သည်။
မြေယာကိစ္စ	ဘိုးဒေါနကုန်းကျေးရွာ နှင့် ညောင်ကုန်း ကျေးရွာ ဆက် ထားသော လမ်းမှာ ၁၃ ပေ မှ ၆.၅ ပေထိ ကျဉ်းမြောင်း သွား ခြင်း။	ဤသည်မှာ ဩဘာ နှင့် စိုက်ပျိုးရေး ဝန်ကြီးဌာန တို့အကြား မြေငှားရမ်းမှုတို့အပေါ် မူတည်ပါသည်။
ညစ်ညမ်းမှု	ဓာတ်ငွေ့ထုတ်လွှတ်မှုများ သည် သီးနှံ များ သို့မဟုတ် စိုက်ပျိုးရေးမြေအပေါ် ပျက်စီးစေနိုင်ပါသလား။ MPI စက်ရုံမှ ဓာတ်ငွေ့ (နှင့်/ သို့မဟုတ်) အခိုးအငွေ့ ထုတ် လွှတ် သောအခါ ရပ်ရွာတွင် အတိတ်ဖြစ်ရပ် ဖျားနာမှုဥပမာ များ ရှိ နေပါသည်။	ESIA တွင် ထုတ်လွှတ်မှုများ နှင့် ဒေသခံ ရပ်ရွာများ နှင့် အနီးပတ်ဝန်းကျင်တို့အပေါ် ၎င်းတို့၏ သက် ရောက်မှုကို ဆန်းစစ်သွားမည် ဖြစ်ပါသည်။ စက်ရုံနေရာများမှ သက်ရောက်မှု၏ ပေါင်းစပ်ဆန်း စစ်မှုကို ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။

အမျိုးအစား	မှတ်ချက်အတိုချုပ်	ESIA အတွက် ဆောင်ရွက်မှု
တည်နေရာ ပြောင်းရွှေ့ခြင်း	စီမံကိန်းမှာ ကျေးရွာများနှင့် အနီးတွင်ရှိနေပြီး၊ ဘာကြောင့် ၎င်းမြေနေ ရာကို ရွှေးချယ်ခဲ့ပါသလဲ။ တည်နေရာ ကိုရွှေ့ ပြောင်းရန် ဖြစ်နိုင်ပါသလား။	ဤသည်မှာ သြဘာ နှင့် စိုက်ပျိုးရေး ဝန်ကြီးဌာန တို့အကြား မြေငှားရမ်းမှုတို့အပေါ် မူတည်ပါသည်။
လမ်းပျက်စီးမှု	စက်ရုံ ကုန်တင်ကားများသည် ကျေးရွာ လမ်းများကို ပျက်စီးစေပါသည်။ သြဘာက လမ်းများကို ပြုပြင်သင့်ပါသည်။	မှော်ဘီလုပ်ကွက်သို့ဆက်သွယ်ထားသောလမ်းသည်အစိုးရ၏စီမံခန့်ခွဲမှုအောင်တွင်ရှိသော အများပြည်သူပိုင်လမ်းဖြစ်သည်။ သြဘာသည် ၎င်း၏ ရပ်ရွာမှ အကြံပြုတိုင်ကြားရေး ဆိုင်ရာ ယန္တရား မှ တစ်ဆင့် တိုင်းကြားလာသည့် အနှံ့ဆိုင်ရာ ကိစ္စ ရပ်ကို မှတ်တမ်းတင်ထားပြီးဖြစ်ပြီး နောက်ဆက် တွဲ ဖြေရှင်းရေးလုပ်ငန်းသည် သက်ဆိုင်ရာ ဒေသ တွင်း အစိုးရ၏ စီမံခန့်ခွဲမှု ဖြစ်ပါသည်။ မကျေနပ် ချက်များ ဖြေရှင်းမှုဆိုင်ရာ ဆောင်ရွက်ချက် ကို သက်ဆိုင်ရာ လမ်းအာဏာ ပိုင်များ၊ လက်ရှိ လမ်း အသုံးပြုနေသည့် စက်ရုံများနှင့် ဒေသခံပြည်သူများ အကြား ဆွေးနွေးသင့် ပါသည်။ HAIC ရုံးရှိ ပြန်လည်သုံးသပ် ရေးအဖွဲ့မှ ဒေသခံကျေးရွာ ကိုယ်စားလှယ်များ ၏ ပြောကြား ချက်အရ HAIC သည် CSR လုပ်ငန်း အစီအစဉ်အောက်တွင် ရွာလမ်း ဖောက် လုပ်ခြင်းကို အခါအားလျော်စွာ ငွေကြေးပံ့ပိုး ပေးခဲ့ပြီး ဝါးနက်ချောင်း လမ်းမအား ပြန်လည် ပြုပြင်ခဲ့မည်ဆို ပါက CSR လုပ်ငန်း စဉ်၏ အစိတ်အပိုင်း အဖြစ် အခြား Community များနှင့် အတူ ပါဝင်ကူညီပံ့ပိုးမည် ဖြစ်ပါသည်။
ကျေးရွာဆိုင် သတင်းအချက် အလက်များ	ကျေးရွာစာရင်းမှာ မမှန်ကန်ပါ။ အများပြည်သူ နှင့် တိုင်ပင်ဆွေး နွေး မှုကို စီမံကိန်းအနီးရှိ ကျေးရွာ အား လုံးတွင်ဆောင် ရွက်သင့်ပြီး ESIA စစ်တမ်းတွင် ပါဝင်သင့်ပါ သည်။	၃.၅ ကီလိုမီတာအတွင်း ကျရောက်သော ကျေး ရွာ အုပ်စုများအားလုံးကို တိုင်ပင် ဆွေးနွေးမှု တည်နေရာ များကို ရွေးချယ်ရာတွင် ပါဝင်စေခဲ့ ပါသည်။ နယ်ပယ်အတိုင်းအတာ သတ်မှတ်ခြင်း ဆိုင်ရာ တိုင် ပင်ဆွေးနွေးမှု ကာလအတွင်း အ စည်း အဝေးများ မပြုလုပ် သည့် ကျေးရွာများမှ ကျေးရွာသူ/သား များကို ဒုတိယမြောက် ထိတွေ့ တိုင်ပင်မှုတွင် ဖိတ် ခေါ် သွားမည် ဖြစ်ပါသည်။

အမျိုးအစား	မှတ်ချက်အတိုချုပ်	ESIA အတွက် ဆောင်ရွက်မှု
စွန့်ပစ်ပစ္စည်း စီမံခန့်ခွဲမှု	စက်ရုံမှ ထုတ်လွှတ်သည့် စွန့်ပစ်ပစ္စည်း များ သည် ဒေသရှိ ရေလမ်းကြောင်းများ၊ ဒေသရှိ သီးနှံများ နှင့် ဒေသရှိရပ်ရွာများ အပေါ် ထိခိုက်နိုင်ခြေကို စိုးရိမ်ကြောင်း။ စွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှုစနစ်ကို ကျေးရွာ သူ/သားများထံ ရှင်းပြပေး ရန်။	ESIA တွင် သဘာဝပတ်ဝန်းကျင် နှင့် ဇီဝ ပတ်ဝန်းကျင်တို့အပေါ် ဖြစ်ပေါ်လာနိုင်သည့် စွန့်ပစ် ပစ္စည်းကြောင့် သက်ရောက်မှုများကို ဆန်းစစ်သွား မည် ဖြစ်ပါသည်။

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

၁.၇ အဓိက ဖြစ်ပေါ်လာနိုင်သည့် သက်ရောက်မှုများ နှင့် ပဏာမ လျော့ချရေး အစီအမံများ

ထိခိုက်မှုဆန်းစစ်ခြင်းအတွင်း၊ သဘာဝအရင်းအမြစ်များ သို့မဟုတ် လူများ ဆက်နွယ်လာနိုင် ခြေရှိသည့်တို့ကို စီမံကိန်းတွင်ထည့်သွင်းစဉ်းစားလျက် လုပ်ငန်းများ (စီစဉ်းထားခြင်း နှင့် စီစဉ်ထားမှု မရှိခြင်း) အပါအဝင် စနစ်ကျသော နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်း လုပ်ငန်းစဉ်ဖြင့် ဖြစ်ပေါ်လာနိုင်သည့် သက်ရောက်မှုများကို ပထမဦးစွာ သတ်မှတ်ဖော်ထုတ်ခဲ့ပါသည်။ ဖြစ်ပေါ်လာနိုင်သည့် ပတ်ဝန်းကျင်သက်ရောက်မှုဆိုင်ရာ ဆက်နွယ်မှုများသည် စီမံကိန်း၏ တည်ဆောက်မှုကာလ၊ လည်ပတ်မှုကာလ နှင့် မတော်တဆဖြစ်ရပ် (ဥပမာ – ယိုဖိတ်ခြင်း) တို့ ပါဝင်ကြပါသည်။

ဖြစ်ပေါ်လာနိုင်သည့်အရေးပါသောပတ်ဝန်းကျင်ဆိုင်ရာသက်ရောက်မှုများ ကို ESIA လေ့လာမှုတွင် စီမံကိန်းမှ ဖြစ်ပေါ်လာနိုင်သော ဆိုးကျိုးသက်ရောက်မှုများကို လျော့ပါးစေရန် သို့မဟုတ် ဖြစ်ပေါ်လာနိုင်သော အပြုသဘောဆောင်သည့် သက်ရောက်မှုများကို မြှင့်တင်နိုင်ရန် သင့်လျော်သော လျော့ချ ရေး နှင့် မြှင့်တင်ရေး အစီအမံများဖြင့် ဆန်းစစ်ထားပါသည်။ အကြံပြုထားသည့် လျော့ချရေး အစီအမံ များကို စနစ်တကျအကောင်အထည်ဖော်ဆောင်ရွက်ခြင်းဖြင့် စီမံကိန်း၏ တည်ဆောက်ရေး နှင့် လည်ပတ်ရေးကာလအတွင်း ဖြစ်ပေါ်လာနိုင်သည့် ကြွင်းကျန်ပတ်ဝန်းကျင် နှင့် လူမှုဘဝ သက်ရောက်မှုများ သည် အသင့်အတင့် အရေးပါသော အနေအထားထက် ကြီးမားမှု မရှိနိုင်ကြောင်း ESIA လေ့လာမှုတွင် နိဂုံးချုပ်ထားပါသည်။ ကြွင်းကျန်သက်ရောက်မှု (လျော့ချပြီး နောက်) အကျဉ်းချုပ်ကို ဇယား (၁.၄) တွင် တင်ပြထားပါသည်။

ဇယား (၁.၄) သက်ရောက်မှုဆန်းစစ်ခြင်းရလဒ်များ၏ အကျဉ်းချုပ်

သက်ရောက်မှု	လျော့ချရေးဆိုင်ရာ အကျဉ်းချုပ်	ကြွင်းကျန်သက်ရောက်မှု ၏ အရေးပါမှု
လေထုအရည်အသွေး အပေါ် သက်ရောက်မှုများ	– စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးရေးစနစ် ကို အကောင်အထည် ဖော်ဆောင်ရွက်ခြင်း။ – ဖုန်မှုန့်ထိန်းချုပ်ရေးနည်းလမ်းများကို အသုံး ပြုခြင်း။ – ထုတ်လွှတ်မှုများအတွက် မြန်မာ စံနှုန်းများ (NEQ လမ်းညွှန်ချက်များ) နှင့် နိုင်ငံတကာ လမ်း ညွှန်ချက်များနှင့် အညီ ဆောင်ရွက်ခြင်း။	**သာမညဖြစ်သော**
ဆူညံမှုကြောင့် သက်ရောက်မှုများ	– အသေအချာ ပြုပြင်ထိန်းသိမ်းထားသော ကိရိယာ များကိုသာ လုပ်ငန်းခွင်တွင် အသုံးပြုသင့်ပါသည်။ – ထုတ်လွှတ်မှုများအတွက် မြန်မာ စံနှုန်းများ (NEQ လမ်းညွှန်ချက်များ) နှင့် နိုင်ငံတကာ လမ်း ညွှန်ချက် များနှင့် အညီ ဆောင်ရွက်ခြင်း။	**မပြောပလောက်သော**
ရေအရည်အသွေးအပေါ် သက်ရောက်မှုများ	– စဉ်ဆက်မပြတ် စောင့်ကြည့်လေ့လာ ရန် / စွန့်ပစ် ရေ စွန့်ထုတ်မှု အရည်အသွေးကို ထုတ်ဖော်တင်ပြရန် စောင့်ကြည့်လေ့လာရေးစနစ်ကို အကောင်အထည် ဖော်ဆောင်ရွက်ခြင်း။ – မြန်မာ စံနှုန်း (NEQ လမ်းညွှန်ချက်များ) နှင့် နိုင်ငံတကာ လမ်းညွှန်ချက်များနှင့်အညီ စွန့်ထုတ်ခြင်း။	**သာမညဖြစ်သော**
မြေဆီလွှာအရည်အသွေး အပေါ် သက်ရောက်မှုများ	– အထက်ပါ ရေအရည်အသွေး သက် ရောက်မှုအရ။	**မပြောပလောက်သော**
ရပ်ရွာ ကျန်းမာရေး နှင့် ဘေးကင်းရေး	– လုပ်သားများအတွက် လုပ်ငန်းဆိုင်ရာ စည်းကမ်းများ။ – EHS စီမံခန့်ခွဲမှုအစီအစဉ် ကန်ထရိုက်တာ ထားရှိခြင်း။ – တိုင်ပင်ဆွေးနွေးမှုကာလအတွင်း၊ စီမံကိန်းသုံး ယာဉ်များမှ လမ်းများပေါ် သွားလာမှု နှင့် လမ်းများ ပျက်စီးစေမှုတို့ကို တင်ပြခဲ့ကြပါပြီး၊ ၎င်းအတွက် ဩဘာမှ လမ်းများ ကို သူ၏မူလအတိုင်းဖြစ်အောင် ပြုပြင်ရန် အကြံပြုခဲ့ပါသည်။ – ရပ်ရွာမှအကြံပြုတိုင်ကြားရေးဆိုင်ရာ ယန္တရား အကောင်အ ထည် ဖော်ခြင်း။AWBA (HAIC) သည် CSR ပရောဂျက် အတွက် အသားတင် အမြတ်၏ ၂% ကို အသုံးပြုရန် စီစဉ်ထား ပါသည်။ – HAIC ရုံးရှိ ပြန်လည်သုံးသပ်ရေးအဖွဲ့မှ ဒေသခံကျေးရွာကိုယ်စား လှယ်များ၏ ပြောကြားချက်အရ HAIC သည် CSR လုပ်ငန်း အစီအစဉ်အောက်တွင် ရွာလမ်း ဖောက်လုပ်ခြင်းကို အခါအားလျော်စွာ ငွေကြေးပံ့ပိုး ပေးခဲ့ပြီး	**သာမညဖြစ်သော**

သက်ရောက်မှု	လျော့ချရေးဆိုင်ရာ အကျဉ်းချုပ်	ကြွင်းကျန်သက်ရောက်မှု ၏ အရေးပါမှု
	ဝါးနက်ချောင်း လမ်းမအား ပြန်လည်ပြုပြင် ခဲ့မည်ဆိုပါက CSR လုပ်ငန်း စဉ်၏ အစိတ်အပိုင်းအဖြစ် အခြား Community များနှင့်အတူ ပါဝင်ကူညီ ပံ့ပိုးမည်ဖြစ်ပါသည်။	
စီးပွားရေး နှင့် အသက်မွေး ဝမ်းကျောင်း လုပ်ငန်းများ	–	**အပြုသဘော ဆောင်သော**
လုပ်ငန်းခွင် ကျန်းမာရေး နှင့် ဘေးကင်းရေး	အဆောက်အအုံများအတွင်းရှိ လေဝင်လေထွက် စနစ်များ နှင့် လူများ နှင့် မီးဘေးကင်းရေး စနစ်များ ရှိခြင်း။ HAIC သည် အလုပ်ချိန်အတွင်း လုပ်ငန်းခွင်ရှိ ဆေးခန်းရှိ အလုပ်သမားများ အတွက် ကျန်းမာရေး စောင့်ရှောက်မှု ဝန်ဆောင်မှုများကို ဆောင်ရွက်ပေးပြီး အလုပ်သမားများအား ကျန်းမာရေး စစ်ဆေးမှုများလည်း ဆောင်ရွက်ပေးပါ သည် (အလုပ်မဝင်မီ ကျန်းမာရေး စစ်ဆေးမှုများ နှင့် အချိန်အခါအလိုက် ဆေးစစ်ခြင်း)။ စက်ရုံရှိ အလုပ်သမား အားလုံးကို သတ်မှတ်ထားသည့် အချိန် တွင်ကာလ အပိုင်းအခြားအလိုက် ဆေး စစ်ပြီး မှတ်ပုံတင်ထားသော ဆေး ဘက်ဆိုင်ရာဆရာဝန်မှ စစ်ဆေးပေးပါသည်။ ကျန်းမာ ရေးစောင့်ရှောက်မှု ဝန်ဆောင်မှု များမှာ အောက်ပါ အတိုင်း ဖြစ်သည်။ ၁) အလုပ်အကြိုကျန်းမာရေးစစ်ဆေး ခြင်း။ ၂) ကာလ အပိုင်းအခြားအလိုက် ကျန်းမာရေးစစ်ဆေးခြင်း။	**သာမညဖြစ်သော**
ဇီဝမျိုးစုံ မျိုးကွဲအပေါ် သက်ရောက်မှုများ	– မြေရှင်းလင်းရေးကို ကန့်သတ်ခြင်း နှင့် ဖြစ်နိုင်လျှင် သစ်တော သစ်ပင်များ ပြန်စိုက်ခြင်း။ – လုပ်ငန်းခွင်၌ သစ်တောသစ်ပင်များ ပြန်လည် ပြုစုခြင်း။	**သာမညဖြစ်သော**
အခြေခံအဆောက်အအုံ ဆိုင်ရာ ဝန်ဆောင်မှုများ	– ယာဉ်အသွားအလာ စီမံခန့်ခွဲမှုအစီအစဉ်။ – ရပ်ရွာမှအကြံပြုတိုင်ကြားရေးဆိုင်ရာယန္တရား အကောင်အထည်ဖော်ခြင်း။	**သာမညဖြစ်သော**
မတော်တဆဖြစ်ရပ်များ	– စွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှုအစီအစဉ်များ နှင့် အရေးပေါ်တုံ့ပြန်ရေးအစီအစဉ်များ ရှိခြင်း။ – စီမံကိန်းသည် ဓာတုပစ္စည်းများ သိုလှောင်မှုအတွက်	**အတော်အသင့် ဖြစ်သော**

သက်ရောက်မှု	လျော့ချရေးဆိုင်ရာ အကျဉ်းချုပ်	ကြွင်းကျန်သက်ရောက်မှု ၏ အရေးပါမှု
	အလေ့အကျင့် ကောင်းများကို ကျင့်သုံးခြင်း။ – ယိုဖိတ်မှုများပြန့်နှံ့မှုကိုထိန်းနိုင်ရန် မိလ္လာစနစ်များကို ဒီဇိုင်းပြုလုပ်ခြင်း။	
GR Production Line မှ အကျိုးသက်ရောက်မှုကို ဆန်းစစ်ခြင်း	***လေအရည်အသွေးထိခိုက်မှုစီမံခန့်ခွဲမှုအစီအစဉ်*** – ဓာတ်ငွေ့ထုတ်လွှတ်မှုလုပ်ငန်းစဉ်အတွက် ညစ်ညမ်းမှု ထိန်းချုပ်ရေးစနစ်များ (dust collector and scrubber system) ကို ပံ့ပိုးပေးသည်။ – အလုပ်ညွှန်ကြားချက် (SOP); နှင့် – Scrubber ပုံမှန်ထိန်းသိမ်းခြင်းနှင့် စောင့်ကြည့်ခြင်း။ ***အစိုင်အခဲနှင့် အန္တရာယ်ရှိသော အမှိုက်စီမံခန့်ခွဲမှု အစီအစဉ်*** – အရောင်ကုဒ်တံဆိပ်တပ်ထားသောကွန်တိန်နာများအသုံးပြုခြင်း – Baghouses များသန့်ရှင်းခြင်း ***အန္တရာယ်ရှိသော ပစ္စည်းစီမံခန့်ခွဲမှု အစီအစဉ်*** – ဓာတုပစ္စည်းများ အပါအဝင် အန္တရာယ်ရှိသော ပစ္စည်းများ အားလုံးကို သေချာတ်ထားသော အခန်းများနှင့် ဘေး အန္တရာယ် ရှိသော ပစ္စည်းသိုလှောင်သည့်နေရာများ တွင် သေ့ ခတ်ထား သော ဗီရိုများတွင် သီးသန့် သိမ်းဆည်း ထားသည်။ ***ရေဆိုးစီမံခန့်ခွဲမှု အစီအစဉ်*** - လုပ်ငန်းသုံးစက်ပစ္စည်းဆေးကြောခြင်းမှ ထွက်လာသော ရေဆိုးများကို စက်ရုံရှိ ရေဆိုးသန့်စင်စက်တွင် သန့်စင်ပါသည်။	**သာမညဖြစ်သော**
မြေအောက်ရေယိုယွင်းပျက်စီးခြင်းအား ထိခိုက်မှုအကဲဖြတ်ခြင်း	– မြေအောက်ရေစုပ်ထုတ်စမ်းသပ်ခြင်းများကို လုပ်ဆောင်ပြီး မြေအောက်ရေ၏ ထုတ်လုပ်မှုစွမ်းအား/ အားဖြည့်နှုန်းကို အချိန်နှင့်အမျှ စောင့်ကြည့်စစ်ဆေးခြင်း။ – သန့်စင်ထားသော ရေများကို အသုံးပြု၍ မြေအောက်ရေ ပြန်လည်ဖြည့်တင်းခြင်း။	**သာမညဖြစ်သော**
စွမ်းအင်ယိုယွင်းမှုအား ခန့်မှန်းအကဲဖြတ်ခြင်း	– သဘာဝအရင်းအမြစ်နှင့် စွမ်းအင်များ သုံးစွဲမှု လျော့နည်းသွားစေရန် စွမ်းအင်သုံးစွဲမှု စီမံခန့်ခွဲမှု အစီအစဉ်ကို ရေးဆွဲခြင်း။	**သာမညဖြစ်သော**
ဓာတ်ငွေ့အခိုးအငွေ့များ ယို စိမ့်မှုမှ လုပ်ငန်းခွင်ဘေး အန္တရာယ် ကင်း ရှင်းရေးနှင့် ကျန်းမာရေး အပေါ် ထိခိုက်မှု အားဆန်းစစ် ခြင်း	– ဘေးအန္တရာယ်ရှိသော ပစ္စည်းစီမံခန့်ခွဲမှုအစီအစဉ်နှင့် အစိုင်အခဲ နှင့် အန္တရာယ်ရှိသော စွန့်ပစ်ပစ္စည်းများ စီမံခန့်ခွဲရေး အစီအစဉ်ကို အကောင်အထည် ဖော်ဆောင်ရွက် ခြင်း – သင့်လျော်သောအင်ဂျင်နီယာထိန်းချုပ်မှုနှင့်နည်းပညာပိုင်းဆိုင်ရာပြုပြင်မွမ်းမံခြင်း	**သာမညဖြစ်သော**

၁.၈ *ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်*

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

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

ဖော်ပြပြီးသော သက်ရောက်မှု နှင့် လျော့ကျရေးနည်းလမ်းများ အကျဉ်းချုပ်အရ၊ အောက်ပါ အသေးစိတ် စီမံခန့်ခွဲရေးနည်းလမ်းများသည် စီမံကိန်းကာလတလျှောက် ESIA ထည့်သွင်း အသုံးပြုခြင်း (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 တန်ပြန်သက်ရောက်မှုကိုမဆိုလျှော့ချပေးနိုင်ခြင်း နှင့် လုပ်ငန်းလည်ပတ်စဉ်ကာလ ဖုန့်မှုန့် နှင့် လေထုထဲသို့ထုတ်လွှတ်မှု ကိုထိန်းချုပ်သော လမ်းစဉ်များဖော်ဆောင်ရန် လေထုညစ်ညမ်းမှု စီမံခန့်ခွဲမှု အစီအစဉ်ဖြင့် သရုပ်ဖော် ပြသသင့်ပါသည်။ ၎င်းအစီအစဉ်သည် ကုန်ပစ္စည်းအမြောက်အများ အသုံးပြုခြင်း နှင့် ထားသိုခြင်း၊ မြေအစိုင်အခဲများ ရွှေ့လျားရသော ဆောက်လုပ်ရေး လုပ်ငန်းများ သို့ ယာဉ်များသွားလာခြင်းမှ ထွက်သောဖုန်များလည်းပါဝင်ပါသည်။
အရေးပေါ်အခြေအနေ ပြင်ဆင်ရေးနှင့် တုံ့ပြန်ရေး အစီအစဉ်	ဤအစီအစဉ်သည် HAIC စီမံကိန်းတွင် ဖြစ်နိုင်ခြေရှိသော အရေးပေါ်အခြေအနေများအတွက် အရေးပေါ်တုံ့ပြန်ရေး လမ်းစဉ်များကို ဖော်ပြပါမည်။ ၎င်းတို့မှာ မီး၊ ဓာတုယိုစိမ့်မှု၊ အလုပ်သမားထိခိုက် ဒဏ်ရာရမှု၊ လျှပ်စီးမုန်တိုင်း နှင့် ယာဉ်မတော်တဆ ထိခိုက်မှု တို့ဖြစ်သည်။ ထို့ပြင် EHS ဌာန၊ ဆေးကုသမှုအဖွဲ့၊ အရေးပေါ်ကုသရေးအဖွဲ့၊ လုံခြုံရေးအဖွဲ့၊ ဒေသအာဏာပိုင်များ နှင့် ကန်ထရိုက်တာများ နှင့် ဝန်ဆောင်ရေးအဖွဲ့များ ၏ တာဝန်ဝတ်တရားများကိုလည်း ဖော်ဆောင် ပေးမည်။
စွန့်ပစ်ပစ္စည်း စီမံခန့်ခွဲမှု အစီအစဉ်	စွန့်ပစ်ပစ္စည်း လျှော့ချရေး၊ ကိုင်တွယ်ရေးနှင့် စွန့်ပစ်ရေးတို့အတွက် စွန့်ပစ်ပစ္စည်း စီမံခန့်ခွဲမှု အစီအစဉ် သည်လမ်းညွှန် လမ်းပြဖြစ်သည်။ စွန့်ပစ်ပစ္စည်း အမျိုးအစားများအားလုံး ၏ ထွက်ရှိရာ၊ အမှိုက်၏ အမျိုးအစား အဆင့်အတန်း လျှော့ကျစေရန် လုပ်ဆောင်ခြင်း၊ ဖယ်ရှားခြင်း နှင့် ဖျက်ဆီးခြင်း တို့အတွက် အသေးစိတ်အချက် အလက်ပြင်ဆင်ခြင်း တို့ပါဝင်သည်။
စွန့်ပစ်ရေ စီမံခန့်ခွဲမှု အစီအစဉ်	စွန့်ပစ်ရေ စီမံခန့်ခွဲမှု (သန့်စင်ရေး နှင့် ဆက်စပ်အဆောက်အဦးများ နှင့် ဝန်ဆောင်မှုများ) အတွက် စွန့်ပစ်ရေ စီမံခန့်ခွဲမှု အစီအစဉ် ကလမ်းပြဖော်ဆောင်ပါသည်။ ထို့ပြင် အနာဂတ်အတွက် ဖွံ့ဖြိုးတိုးတက်မှု၊ ရေဆိုးစွန့်ပစ်မှုစနစ်အား တိုးချဲ့ခြင်းနှင့် အဆင့်မြှင့်တင်ခြင်းတို့တွင် ပြောင်းလဲမှုများလုပ်ဆောင်ရေးအတွက်လိုအပ်သော လမ်းစဉ်များကို ဖော်ဆောင်ပေးပါသည်။
ကုန်းလမ်းပို့ဆောင်ရေး စီမံခန့်ခွဲမှု အစီအစဉ်	ကုန်းလမ်းပို့ဆောင်ရေး စီမံခန့်ခွဲမှု အစီအစဉ်သည် လုပ်ငန်းခွင်မှ ယာဉ်အသွားအပြန် အပါအဝင် လုပ်ငန်းခွင်ဘေးကင်းရေးနှင့် လုပ်ငန်းခွင်စွမ်းဆောင်မှုဘေးကင်းရေးတို့အား စီမံခန့်ခွဲခြင်းဖြစ်ပြီး ယာဉ်သွားလာသော ပတ်ဝန်းကျင်တွင် လုပ်ကိုင်သော လုပ်ငန်းအားလုံးနှင့် ဆက်စပ်နေပါသည်။
ပတ်သက်ဆက်နွယ်သူများနှင့်	SEMPက အမျိုးမျိုးသော ပတ်သက်ဆက်နွယ်သူများကို ထိရောက်ကျွမ်းကျင်သော ဆက်သွယ်မှုများ ရရှိနိုင်ရန် စီစဉ်ပေးသည်။

စီမံခန့်ခွဲမှု အစီအစဉ်များ	အဓိကရည်မှန်းချက်နှင့် ပါဝင်မှု
တွေ့ဆုံခြင်း စီမံခန့်ခွဲမှု အစီအစဉ်	၎င်းမှာ စီမံကိန်းဆက်သွယ်မှုများ မည်ကဲ့သို့ ဖြစ်ပေါ်နေသည်ကို ဖော်ပြသည်။ ကောင်းမွန်သော ဆက်သွယ်မှု အစီအစဉ်များတွင် ယေဘုယျအားဖြင့် အောက်ပါ အချက်များ ပါဝင်ကြသည် ။
Contractors EHS စီမံခန့်ခွဲမှု အစီအစဉ်	Contractors EHS စီမံခန့်ခွဲမှု အစီအစဉ်သည် EMP နှင့် ဆက်နွယ်နေသည့်အပြင် အားလုံးသော Contractor များမှာ ပတ်ဝန်းကျင် ကျန်းမာရေး စီမံမှု၊ ဘေးကင်းလုံခြုံမှုအန္တရာယ်များ လျှော့ချမှု နှင့် စီမံကိန်းနှင့် ပတ်သက်သော သက်ရောက်နိုင်ချေများ လျှော့ချမှုများကို 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 ပတ်ဝန်းကျင် အရည်အသွေး စောင့်ကြည့်ရေးကို ကျင့်ကြံပြုမူနိုင်ရန် ပြည့်စုံသော အစီအစဉ်တရပ်အဖြစ် ဖော်ပြသည်။
ဘေးအန္တရာယ် ရှိ ပစ္စည်းများစီမံခန့်ခွဲမှု အစီအစဉ်	ဘေးအန္တရာယ်ရှိ ပစ္စည်းများ စီမံခန့်ခွဲမှု အစီအစဉ်၏ ခြုံငုံရည်ရွယ်ချက်မှာ ဘေးအန္တာရာယ်ရှိ ပစ္စည်းများအား ကိုင်တွယ်နေသူ အလုပ်သမားများအား ကာကွယ်ရန်၊ ဘေးကင်းစွာ အသုံးပြုခွင့်ပြုရန်နှင့် ရှောင်ရှားခြင်းမဖြစ်နိုင်သည့်အခါ ၎င်းတို့ ကိုင်တွယ်နေစဉ် မီးလောင်ပေါက်ကွဲ ခြင်းအပါအဝင် ထိခိုက်မှုများ သို့မဟုတ် မထိန်းချုပ်နိုင်သော အန္တရာယ် ရှိပစ္စည်း များထုတ်လွှတ်မှု အနည်း ဆုံးဖြစ်စေရန် သိလှောင်သော အလေ့အကျင့်ကို ခွင့်ပြုရန်၊ ထိုသို့ သိလှောင် အသုံးပြုခြင်းဖြင့် ပတ်ဝန်းကျင်နှင့် လုပ်သား အင်အားနှစ်ခုလုံးအား ကာကွယ်ရန် ဖြစ်သည်။
လုပ်ငန်းခွင်အတွင်း စီးဆင်းသော ရေအား စီမံခန့်ခွဲမှု အစီအစဉ်	(RDMP) သည် HAIC ပရောဂျက်တွင် ချောင်းရေ၏ ရေမျက်နှာပြင်အရည်အသွေးကို ထိခိုက်စေသော မထိန်းချုပ်နိုင်သည့် ရေစီးဆင်းမှု၊ မသင့်လျော်သော ရေဆိုးများ၊ စွန့်ပစ်အစိုင်အခဲများ၊ အလုပ်ခွင်အတွင်း ဘေးအန္တရာယ်ရှိပစ္စည်းများအား စီမံခန့်ခွဲရာ လျော့ကျစေရန် ရှာဖွေသည်။

စီမံခန့်ခွဲမှု အစီအစဉ်များ	အဓိကရည်မှန်းချက်နှင့် ပါဝင်မှု
ဆောက်လုပ်ရေး စီမံခန့်ခွဲမှု အစီအစဉ်	ဆောက်လုပ်ရေး စီမံခန့်ခွဲမှု အစီအစဉ်သည် ဆောက်လုပ်ရေးစင်၏ ဒုတိယနှင့် တတိယအဆင့်များအတွင်း ထိခိုက်မှုကို လျှော့ချရန် လိုအပ်သော တိုင်းတာချက်အားလုံးကို စုဆောင်းသည်။

ထိုစာရွက်စာတမ်းများသည် စီမံကိန်း၏ ဆောက်လုပ်ရေးအဆင့်ကို လွှမ်းခြုံရာတွင် ပြင်ဆင်ရန် ရည်ရွယ်သည်။ လုပ်ငန်းအဆင့်များအားလွှမ်းခြုံရန် လိုအပ်သော စာရွက်စာတမ်းများကို လုပ်ငန်းမစတင်မီ ကြိုတင် ပြင်ဆင်ထားသင့်သည်။

သီးခြား အစီအစဉ်တစ်ခုချင်းစီကို ပတ်သက်ဆက်နွယ်သူများထံသို့ သင့်တော်သော အချိန်တွင် အသိပေးချပြသွားမည်ဖြစ်သည်။

ရုပ်ပိုင်းဆိုင်ရာ၊ ဇီဝဗေဒနှင့် လူမှုရေးပတ်ဝန်းကျင်ဆိုင်ရာ အထူးအရေးပါသော အစိတ်အပိုင်းများ စီမံခန့်ခွဲမှုသည် စွမ်းဆောင်နိုင်မှုရည်ညွှန်းကိန်းကို ဖော်ထုတ်သည်။ ဩဘာမှ ဆောင်ရွက်လျှက်ရှိသည့် ပတ်ဝန်းကျင်ညစ်ညမ်းစေသည့်လုပ်ဆောင်မှုများအတွက် လျော့ပါးသက်သာစေရေး အစီအမံများ ပါဝင်သည့် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်များကို ဇယား ၁.၆ တွင်ဖော်ပြထားပါသည်။

စွမ်းဆောင်နိုင်မှုရည်ညွှန်းကိန်းတခုချင်းစီ၏ ပြည့်စုံသော စောင့်ကြည့်လေ့လာရေးအစီအစဉ်သည် စီမံကိန်းအဆင့်အားလုံးအတွက် ပြင်ဆင်ထားပြီးဖြစ်ပြီး ဇယား ၁.၇ တွင် ဖော်ပြထားသည်။

စက်ရုံမှထွက်ရှိသောစွန့်ပစ်ပစ္စည်းများကို သီလဝါရှိလိုင်စင်ရ ကန်ထရိုက်တာထံသို့ ပို့ဆောင်၍ အမှိုက်စွန့်ပစ်သွားမည်ဖြစ်ပါသည်။ အမှိုက်မီးရှို့စက်အား အရံအနေဖြင့်သာ အကယ်၍ အမှိုက်မီးရှို့စက်ကို အသုံးပြုမည့်အခြေအနေသို့ရောက်ရှိပါက မီးရှို့စက်မှထွက်ရှိ သော ပြာများ အားလည်း ဘေးအန္တရာယ်ရှိသော စွန့်ပစ်ပစ္စည်းများ စီမံခန့်ခွဲရေး အစီအစဉ်အတိုင်း စီမံဆောင်ရွက်သွားမည်ဖြစ်ပါသည်။

ဇယား ၁.၆ လုပ်ငန်းလည်ပတ်မှုအဆင့် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်

အမှတ်စဉ်	စီမံကိန်းအဆင့်/ထိခိုက်မှုပုံစံ	စီမံကိန်းလုပ်ငန်းစဉ်/ထိခိုက်မှုဇရိယာ	ထိခိုက်မှုအလားအလာ	လျော့ပါးသက်သာစေးလုပ်ငန်းစဉ်များ	ကြွင်းကျန်မှုအန္တရာယ်	အသေးစိတ်လုပ်ငန်းဆောင်တာများ	လျော့ပါးသက်သာရေးလုပ်ငန်းစဉ်အတွက်တာဝန်ရှိသူများ	လျော့ပါးသက်သာရေးလုပ်ငန်းစဉ်အတွက်ကြီးြပြင်းဆိုင်ရာတာဝန်ရှိသူများ	အချိန်ကာလ	လိုအပ်ချက်များကိုမှတ်တမ်းတင်ပြခြင်း
၉.၁	လေအရည်အသွေး	ထုတ်လုပ်ခြင်းလုပ်ငန်းစဉ်မှလေအရည်အသွေးထုတ်လွှတ်မှုများ	လေအရည်အသွေးညစ်ညမ်းခြင်း	- ခေါင်းတိုင်နှင့် ချိတ်ဆက် ထားသော နေရာများတွင် အိတ်ဇောလေဝင်ေထွက်စနစ် ပံ့ပိုးပေးသင့်သည်။ - ဓာတ်ငွေ့ထုတ်လွှတ်မှု လုပ်ငန်းစဉ်အတွက် ညစ်ညမ်းမှုထိန်းချုပ်ရေးစနစ်များ (အမှုန်အမွှားစုပ်ယူကိရိယာနှင့် Scrubber) ဆောင်ရွက်သင့်သည်။ - လုပ်ငန်းခွင် လမ်းညွှန်ချက် SOP အတိုင်းဆောင်ရွက်သင့်သည်။ - Scrubber များအား ပုံမှန်စစ်ဆေးစောင့်ကြည့်သင့်သည်။ - လမ်းဖုန်မှုန့်များ ကိုထိန်းချုပ်ရန်အတွက် လမ်းမခင်း ထားသော နေရာ	နည်းပါးသော	- ခေါင်းတိုင်နှင့် ချိတ်ဆက်ထားသော နေရာများတွင် အိတ်ဇောလေဝင်လေထွက် စနစ် ပံ့ပိုးခြင်း - ဓာတ်ငွေ့ထုတ်လွှတ်မှု လုပ်ငန်းစဉ် အတွက် ညစ်ညမ်းမှု ထိန်းချုပ်ရေးစနစ်များ (အမှုန်အမွှားစုပ်ယူ ကိရိယာ နှင့် Scrubber) - လုပ်ငန်းခွင်လမ်းညွှန်ချက် SOP အတိုင်းဆောင်ရွက်ခြင်း - Scrubber များအား ပုံမှန် စစ်ဆေး စောင့်ကြည့်သင့်ခြင်း - လမ်းဖုန်မှုန့်များကို ထိန်းချုပ်ရန် အတွက်၊ လမ်းမခင်းထားသော နေရာများ တွင် ရေပက်ဖြန်းခြင်း - အသက်ရှူ လမ်းကြောင်းဆိုင်ရာ ကာကွယ်ပေးသည့် PPE အား ရောဂါဖြစ်ပွား နိုင်ချေမြင့်မား သော လေထုအန္တရာယ်ရှိသောနေရာတွင် အလုပ် လုပ်နေချိန်တွင် ဝတ်ဆင်သင့် သည်။	လျော့ပါးသက်သာရေးအစီအစဉ်များ အကောင်အထည်ဖော်ေဆာင်ရွက်ရန်ခန့်အပ်ထားသော အဖွဲ့	စီမံကိန်းအုပ်ချုပ်သူအဖွဲ့နှင့် ကျန်းမာရေးနှင့် ဘေးကင်းလုံခြုံရေးအဖွဲ့	လုပ်ငန်းလည် ပတ်စဉ်တလျှောက်	ြဿာအားမှတ်တမ်းတင်ပြခြင်း

အမှတ်စဉ်	စီမံကိန်းအဆင့်/ထိခိုက်မှုပုံစံ	စီမံကိန်းလုပ်ငန်းစဉ်/ထိခိုက်မှုဧရိယာ	ထိခိုက်မှုအလားအလာ	လျော့ပါးသက်သာစေးလုပ်ငန်းစဉ်များ	ကြွင်းကျန်မှုအန္တရာယ်	အသေးစိတ်လုပ်ငန်းဆောင်တာများ	လျော့ပါးသက်သာရေးလုပ်ငန်းစဉ်အတွက် တာဝန်ရှိသူများ	လျော့ပါးသက်သာရေးလုပ်ငန်းစဉ်အတွက်ကြီးြပ်ခြင်းဆိုင်ရာတာဝန်ရှိသူများ	အချိန်ကာလ	လိုအပ်ချက်များကို မှတ်တမ်းတင်ပြခြင်း
				များတွင် ရေပက်ဖြန်းခြင်း ဆောင်ရွက်သင့် သည်။ - အသက်ရှူလမ်းကြောင်းဆိုင်ရာကာကွယ်ပေး သည့် PPE အားရောဂါဖြစ်ပွားနိုင်ချေမြင့်မားသော လေထုအန္တရာယ်ရှိေသေနရာတွင် အလုပ်လုပ်နေချိန်တွင် ဝတ် ဆင်သင့် သည်။		-				

အမှတ်စဉ်	စီမံကိန်းအဆင့်/ထိခိုက်မှုပုံစံ	စီမံကိန်းလုပ်ငန်းစဉ်/ထိခိုက်မှုဧရိယာ	ထိခိုက်မှုအလားအလာ	လျော့ပါးသက်သာစေးလုပ်ငန်းစဉ်များ	ကြွင်းကျန်မှုအန္တရာယ်	အသေးစိတ်လုပ်ငန်းဆောင်တာများ	လျော့ပါးသက်သာရေးလုပ်ငန်းစဉ်အတွက် တာဝန်ရှိသူများ	လျော့ပါးသက်သာရေးလုပ်ငန်းစဉ်အတွက်ကြီးြပ်ခြင်းဆိုင်ရာတာဝန်ရှိသူများ	အချိန်ကာလ	လိုအပ်ချက်များကို မှတ်တမ်းတင်ပြခြင်း
၉.၂	လေအရည်အသွေး	ဓာတုပစ္စည်းသိုလှောင်ထားသောနေရာနှင့် ထုတ်လုပ်မှုမှ ဓာတ် ငွေ့ အခိုးအငွေ့ယို စိမ့် ထုတ်လွှတ်မှုများ		- သင့်လျော်သော အင်ဂျင်နီယာထိန်းချုပ်မှု နှင့် နည်းပညာဆိုင်ရာ ပြုပြင်မွမ်းမံ ခြင်းများ မှတစ်ဆင့် ဓာတ်ငွေ့ အခိုး အငွေ့ယိုစိမ့် ထုတ်လွှတ်မှု များ အား လျှော့ချခြင်း (ဥပမာ- Valve Design များကို အဆင့် မြှင့်တင်ခြင်းနှင့် ပြုပြင် မွမ်းမံခြင်းများ မှတစ်ဆင့် ဓာတ်ငွေ့ ထုတ်လွှတ်မှုကို ထိန်း ချုပ်ခြင်း) - ယုံကြည် စိတ်ချရသော ယိုစိမ့်မှု ရှာဖွေခြင်း နည်း လမ်းကို အသုံးပြု၍ ယိုစိမ့်မှု များ အတွက် စနစ်ကို ပုံမှန် စောင့်ကြည့်ခြင်း။ - (bubble emission	သာမညဖြစ်သော	- သင့်လျော်သော အင်ဂျင်နီယာထိန်းချုပ်မှု နှင့် နည်းပညာဆိုင်ရာ ပြုပြင်မွမ်းမံခြင်းများ မှတစ်ဆင့် ဓာတ်ငွေ့ အခိုး အငွေ့ယိုစိမ့်ထုတ်လွှတ်မှုများ အား လျှော့ချ ခြင်း (ဥပမာ- Valve Design များကို အဆင့် မြှင့်တင်ခြင်းနှင့် ပြုပြင် မွမ်းမံခြင်းများ မှတစ်ဆင့် ဓာတ်ငွေ့ထုတ်လွှတ် မှုကို ထိန်း ချုပ်ခြင်း) - HAIC သည် ဓာတုပစ္စည်း သိုလှောင်ခြင်းနှင့် ထိန်းချုပ် ခြင်းပါဝင်သော အန္တရာယ် ရှိစွန့်ပစ်ပစ္စည်း စီမံခန့်ခွဲမှု အစီအစဉ်ကို အကောင်အထည်ဖော်ဆောင်ရွက်ခြင်း၊ - အန္တရာယ်ရှိစွန့်ပစ်ပစ္စည်း သိုလှောင်ခြင်း စစ်ဆေးမှု အား ပုံမှန်လုပ်ဆောင်ခြင်း - အန္တရာယ်ရှိစွန့်ပစ်ပစ္စည်းသိုလှောင်ခြင်းနှင့် ကိုင်တွယ်ခြင်းအားအလုပ်သမားများကို သင်တန်းပေးခြင်း - အန္တရာယ်ရှိစွန့်ပစ်ပစ္စည်းကိုင်တွယ်ရန် ခွင့်ပြုမိန့် စနစ်ဖော်ဆောင်ခြင်း၊ - လုံလောက်သော လုပ်ငန်းခွင် လေ့ကျင့်	လျော့ပါးသက်သာရေးအစီအစဉ်များ အကောင်အထည်ဖော် ဆောင်ရွက်ရန် ခန့်အပ်ထားသော အဖွဲ့	စီမံကိန်းအုပ်ချုပ်သူအဖွဲ့ နှင့် ကျန်းမာရေးနှင့် ဘေးကင်း လုံခြုံရေးအဖွဲ့	လုပ်ငန်းလည် ပတ်စဉ် တလျှောက်	ဩဘာအား မှတ်တမ်းတင်ပြခြင်း

				techniques ASTM E515–11(2022) ကို အသုံး ပြု၍ ဓာတ် ငွေ့ အခိုး အငွေ့ ယို စိမ့် မှုအား စမ်း သပ်နိုင်ခြင်း၊ ခြေ ရာခံနိုင် ခြင်း၊		မှုများဖြင့် ဓာတ်ငွေ့ထုတ်လွှတ်မှုကို ထိန်း ချုပ်ရန် (အလုပ်သမား များအနေဖြင့် ဓာတ် ငွေ့ယိုစိမ့်ထုတ်လွှတ်မှုကို ကာကွယ် ရန် အတွက် ချမှတ်ထားသော ရည်ရွယ်ချက် များ ကိုလိုက်နာကြောင်း သေချာစေရန်) – ဝန်ထမ်းများသည် စက်ရုံတွင် အလုပ် လုပ်နေစဉ် အတွင်း လုံလောက်သော PPE နှင့် အသက်ရှူမျက်နှာဖုံးစွပ် (Respirator Mask) များ ဝတ်ဆင် ထား ကြောင်း သေချာ စေခြင်း၊				
အမှတ်စဉ်	**စီမံကိန်း အဆင့်/ထိခိုက်မှုပုံစံ**	**စီမံကိန်းလုပ်ငန်းစဉ်/ ထိခိုက်မှု ဧရိယာ**	**ထိခိုက်မှု အလားအလာ**	**လျော့ပါးသက်သာစေး လုပ်ငန်းစဉ်များ**	**ကြွင်းကျန်မှု အန္တရာယ်**	**အသေးစိတ်လုပ်ငန်းဆောင်တာများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက် တာဝန်ရှိသူများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက်ကြီးြ ပြင်ခြင်းဆိုင်ရာတာဝန်ရှိ သူများ**	**အချိန်ကာလ**	**လိုအပ်ချက်မျ ားကို မှတ်တမ်း တင်ပြခြင်း**
				– ဓာတ်ငွေ့ယို စိမ့်ထုတ် လွှတ် မှုကို လျော့ချရန် ပြုပြင်ထိန်း သိမ်းမှု အလေ့အကျင့်များ နှင့် လိုက်နာ ကျင့် သုံး ခြင်း အား ကြို တင် လုပ်ဆောင် ခြင်းဖြင့် ကြိုတင် ကာကွယ် ခြင်း – လုပ်ငန်းခွင်ဆိုင် ရာ ကျွမ်းကျင် သေ ချာစေမှုတို့ဖြင့် ဓာတ် ငွေ့ယိုစိမ့် ထုတ်လွှတ်မှုကို လျော့ချခြင်း၊ (ဓာတ်ငွေ့ယိုစိမ့် ထုတ်လွှတ်မှုအား ကာကွယ်သည့် လုပ်ငန်းစဉ်၏		– လမ်းမခင်းရသေးသော ဖုန်ထနိုင်သော နေရာများတွင် ဓာတ်ငွေ့ယိုစိမ့်မှုမှ ထွက်ပေါ် လာသော အမှုန်အမွှား များ နှင့် PM အတွက် ရေဖြန်းခြင်း၊				

				ရည်ရွယ် ချက်ကို လုပ်ဆောင်ခြင်းဖြင့် လုပ်ငန်းခွင်တွင် ကျွမ်းကျင် သေချာ စေရန် လုပ်ဆောင်ခြင်း၊ - လေမှ သယ် ဆောင်လာ သော ထိခိုက် နိုင်သည့် အန္တရာယ် များကို ကာကွယ်ရန် တကိုယ်ရေ အကာ အကွယ် သုံး ပစ္စည်း						
အမှတ် စဉ်	**စီမံကိန်း အဆင့်/ထိခိုက် မှုပုံစံ**	**စီမံကိန်းလုပ် ငန်းစဉ်/ ထိခိုက်မှု ဧရိယာ**	**ထိခိုက်မှု အလားအလာ**	**လျော့ပါးသက်သာ စေး လုပ်ငန်းစဉ်များ**	**ကြွင်းကျန် မှု အန္တရာယ်**	**အသေးစိတ်လုပ်ငန်းဆောင်တာများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက် တာဝန်ရှိသူများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက်ကြီး ြပ်ခြင်းဆိုင်ရာတာဝန်ရှိ သူများ**	**အချိန်ကာလ**	**လိုအပ်ချက်မျ ားကို မှတ်တမ်း တင်ပြခြင်း**
				နှင့် အသက် ရှူ မျက်နှာဖုံး စွပ် များ ဝတ်ဆင် ခြင်း၊ - သင့်လျော်သော အသက် ရှူကိရိယာ အသုံးပြုမှုနှင့် ဖြစ်နိုင်ချေရှိသော အန္တရာယ် များ အတွက် ဝန်ထမ်း များ အား လေ့ကျင့် ပေးခြင်း - လုပ်ငန်းခွင် အ တွင်း အဆုတ် ထိ ခိုက်နိုင်မှုအား အ သက်ရှူ လမ်း						

				ကြောင်း ထိခိုက်နိုင်မှုမြင့်မားနိုင်သည့် အလုပ်သမားများအား (pulmonary functioning test) စစ်ဆေးပေးခြင်း - မတော်တဆ ဓာတ်ငွေ့ယို စိမ့်ထုတ်လွတ်မှုများကို ထိန်း ချုပ်နိုင်ရန် ဘေး အန္တရာယ်ရှိ ပစ္စည်းများ စီမံခန့်ခွဲမှု အစီအစဉ် တွင် ဖော်ပြ ထား သည့်အတိုင်း ဘေးအန္တာရယ်ရှိ ပစ္စည်းများ နှင့်							
အမှတ်စဉ်	**စီမံကိန်း အဆင့်/ထိခိုက်မှုပုံစံ**	**စီမံကိန်းလုပ်ငန်းစဉ်/ ထိခိုက်မှု ဧရိယာ**	**ထိခိုက်မှု အလားအလာ**	**လျော့ပါးသက်သာစေး လုပ်ငန်းစဉ်များ**	**ကြွင်းကျန်မှု အန္တရာယ်**	**အသေးစိတ်လုပ်ငန်းဆောင်တာများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက် တာဝန်ရှိသူများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက်ကြီးြပ်ခြင်းဆိုင်ရာတာဝန်ရှိသူများ**	**အချိန်ကာလ**	**လိုအပ်ချက်များကို မှတ်တမ်းတင်ပြခြင်း**
				စွန့်ပစ် ပစ္စည်း များအား သေချာ ကိုင်တွယ် သိုလှောင် ထားရှိ ရန်၊ - လမ်းမခင်းရသေးသော မြေ သားနေရာ များတွင် ဓာတ်ငွေ့အမှုန်အမွှားနှင့် သေးငယ်သော အန္တရာယ်ရှိ အမှုန်အမွှားများ						

				လျော့နည်း အောင် ရေဖြန်းခြင်း၊						
၉.၃	ဆူညံသံ	စက်လည်ပတ်ခြင်း	ပတ်ဝန်းကျင် ဆူညံသံအဆင့် တိုးလာခြင်း	- BS5228: Part 1: 2009; မှ အသံစွမ်းအင် အဆင့် အတန်း (Sound Power Level) ရှိသည့် စက်အား ရွေးချယ် အသုံး ပြုခြင်း၊ - ဆူညံသံ အဆင့်ကို လျော့ ချရန်အတွက် အသံတိတ် စက်များ၊ mufflers သို့မဟုတ် acoustic အကာ အရံများကို တပ်ဆင်ခြင်း - လုံလောက် ကောင်းမွန်သောအ ကွာအဝေးနှင့် အကာအရံ ရရှိရန် ဆူညံသံ	နည်းပါးေ ော	- ဆူညံသံ အဆင့်ကို လျော့ချရန်အတွက် အသံတိတ် စက်များ၊ mufflers သို့မဟုတ် acoustic အကာအရံများ ကို တပ်ဆင်ခြင်း - လုံလောက်ကောင်းမွန်သော အကွာအဝေးနှင့် အကာအရံ ရရှိရန် ဆူညံသံ အရင်းအမြစ်များကို ထိခိုက်မှုနည်းသည့် ဇရိယာတွင် နေရာချထားရှိခြင်း၊ - လူထုအား အနှောင့်အယှက် မဖြစ် စေရန် ညအချိန်ယာဉ်သွားလာမှုကို ရှောင်ကြဉ်ခြင်း - ဆူညံသံထုတ်လွှတ်မှုပါဝင်မည့် ပရောဂျက်အတွက် လည်ပတ်မှုအဆင့် စောင့် ကြည့်ရေးအစီအစဉ်တစ်ခု ရေးဆွဲခြင်း၊ လည်ပတ်နေစဉ် Leq၊ Leq နေ့၊ Leq ညနှင့် နာရီအလိုက် Leq ကို မီတာ 500 အကွာ အဝေးတွင် နှစ်အလိုက် တိုင်းတာခြင်း၊ - ပုံ ၅.၁၄ တွင် ပြထားသည့် ပရောဂျက် နယ်နိမိတ် အတိုင်း ၂၄ နာရီ တိုင်း တာခြင်း၊	လျော့ပါးသက်သာရေးအ စီအစဉ်များအကောင်အ ထည်ဖော်ဆောင်ရွက်ရန် ခန့်အပ်ထားသော အဖွဲ့	စီမံကိန်းအုပ်ချုပ်သူအဖွဲ့ နှင့် ကျန်းမာရေးနှင့်ဘေးကင်း လုံခြုံရေးအဖွဲ့	လုပ်ငန်း လည်ပတ် စဉ် တလျှောက်	ဩဘာအား မှတ်တမ်းတင် ပြခြင်း
အမှတ် စဉ်	**စီမံကိန်း အဆင့်/ထိခိုက် မှုပုံစံ**	**စီမံကိန်းလုပ် ငန်းစဉ်/ ထိခိုက်မှု ဇရိယာ**	**ထိခိုက်မှု အလားအလာ**	**လျော့ပါးသက်သာ ေး လုပ်ငန်းစဉ်များ**	**ကြွင်းကျန် မှု အန္တရာယ်**	**အသေးစိတ်လုပ်ငန်းဆောင်တာများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက် တာဝန်ရှိသူများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက်ကြီး ြပ်ခြင်းဆိုင်ရာတာဝန်ရှိ သူများ**	**အချိန်ကာလ**	**လိုအပ်ချက်မျ ားကို မှတ်တမ်း တင်ပြခြင်း**
				အရင်းအမြစ်များကို ထိခိုက် မှုနည်းသည့် ဇရိယာတွင် နေရာချထားရှိခြင်း၊ - စီမံကိန်းတွင် အမြဲ ထား ရှိမည့် စီမံ ကိန်းပစ္စည်းများကို လူနေဇရိယာနှင့်						

				အဝေးတွင်ထားရှိခြင်း။ - အဆောက်အအုံတည် ဆောက်စဉ် သဘာဝမြေ မျက်နှာသွင်ပြင်အနေအထားတည်ရှိမှုကို အခွင့်ယူ၍ ဆူညံသံအတားအဆီးအဖြစ်ထားရှိခြင်း။ - ယာဉ်များအား ပုံမှန်စစ် ဆေးခြင်း။ - လူထုအား အနှောင့် အယှက် မဖြစ် စေရန် ည အချိန် ယာဉ်သွား လာမှုကို ရှောင်ကြဉ်ခြင်း - ဆူညံသံ ထုတ်လွှတ်မှု ပါဝင်မည့် ပရောဂျက် အတွက် လည်ပတ်မှု အဆင့် စောင့်ကြည့်ရေးအစီအစဉ်၊ လည်ပတ်နေစဉ်၊ Leq၊ Leq နေ့၊ Leq ညနှင့်							
အမှတ်စဉ်	**စီမံကိန်းအဆင့်/ထိခိုက်မှုပုံစံ**	**စီမံကိန်းလုပ်ငန်းစဉ်/ ထိခိုက်မှုဧရိယာ**	**ထိခိုက်မှုအလားအလာ**	**လျော့ပါးသက်သာစေး လုပ်ငန်းစဉ်များ**	**ကြွင်းကျန်မှုအန္တရာယ်**	**အသေးစိတ်လုပ်ငန်းဆောင်တာများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက် တာဝန်ရှိသူများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက်ကြီးကြပ်ခြင်းဆိုင်ရာတာဝန်ရှိသူများ**	**အချိန်ကာလ**	**လိုအပ်ချက်များကို မှတ်တမ်းတင်ပြခြင်း**
				နာရီအလိုက် Leq ကို မီတာ 500 အကွာအဝေး တွင် နှစ်အလိုက်						

				တိုင်းတာ မည်ဖြစ်သည်။ - ပုံ ၅.၁၄ တွင် ပြထားသည့် ပရောဂျက် နယ်နိမိတ် အတိုင်း ၂၄ နာရီ တိုင်းတာ ခြင်း၊ - ဆူညံသံ ထုတ်လွှတ်မှုအား စောင့်ကြည့် မည့် အစီအစဉ် တစ် ခု အားရေးဆွဲခြင်း - ပုံ ၅-၁၄ တွင် ဖော်ပြထား သည့် စီမံကိန်းမှ မီတာ ၅၀၀အကာအဝေး အတွင်း တွင် ဆူညံသံအဆင့်များ (Leq, Leq day, Leq night and hourly Leq) အား ၂၄နာရီ ဖြစ် တကြိမ်တိုင်း တာ ခြင်း၊							
၉.၄	မြေပေါ်/မြေအောက်ရေနှင့် စွန့်ထုတ်ရေ	အထိန်းအကွပ်မဲ့ လျှံကျ စီးဆင်းလာသော ရေများ၊ စွန့်ထုတ်ရေ/ အစိုင်အခဲစွန့်ပစ်ပစ္စည်းများမှ	ရေအရည်အသွေးကိုထိခိုက်ခြင်း	- လုပ်ငန်းဆောင်ရွက်မှု အဆင့် အတွင်း မြေပေါ်ရေ အရည် အသွေးအပေါ် ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများ	Minor	- လုပ်ငန်းဆောင်ရွက်မှု အဆင့် အတွင်း မြေပေါ်ရေ အရည် အသွေးအပေါ် ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများကို လျော့ပါးသက်သာစေရန် တည်ဆောက် ရေးအဆင့် နံပါတ် ၈.၃ တွင် ဖော်ပြထား သော အချက်များကို လိုက်နာ ဆောင်ရွက်ခြင်း၊	လျော့ပါးသက်သာရေး အစီအစဉ်များအကောင်အထည်ဖော်ဆောင်ရွက်ရန်ခန့်အပ်ထားသော အဖွဲ့	စီမံကိန်းအုပ်ချုပ်သူအဖွဲ့နှင့် ကျန်းမာရေးနှင့်ဘေးကင်းလုံခြုံရေးအဖွဲ့	လုပ်ငန်းလည်ပတ်စဉ် တလျှောက်	ဩဇာအားလစဉ်မှတ်တမ်းတင်ပြခြင်း
အမှတ်စဉ်	**စီမံကိန်းအဆင့်/ထိခိုက်မှုပုံစံ**	**စီမံကိန်းလုပ်ငန်းစဉ်/ ထိခိုက်မှုဧရိယာ**	**ထိခိုက်မှုအလားအလာ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်များ**	**ကြွင်းကျန်မှုအန္တရာယ်**	**အသေးစိတ်လုပ်ငန်းဆောင်တာများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက် တာဝန်ရှိသူများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက်ကြီးကြပ်ခြင်းဆိုင်ရာတာဝန်ရှိသူများ**	**အချိန်ကာလ**	**လိုအပ်ချက်များကို မှတ်တမ်းတင်ပြခြင်း**

		ရေအရည်အသွေးကိုထိခိုက်ခြင်း		ကို လျော့ပါး သက်သာစေရန် တည်ဆောက် ရေးအဆင့် နံပါတ် ၈.၃ တွင် ဖော်ပြထား သော အချက်များကိုလိုက် နာဆောင်ရွက်ခြင်း၊ - အထက်ပါအချက်များအပြင်ထုတ် လုပ် မှု လုပ်ငန်း စဉ်မှ ရေဆိုး စွန့် ထုတ်မှုများကို NEQEG လမ်းညွှန်ချက် (၂၀၁၅) နှင့်အညီ ဖြ လတကြိမ် စစ်ဆေး စောင့် ကြည့် သင့်သည်။ - စက်ရုံတွင်း မိလ္လအညစ် အကြေးများကို မိလ္လာကန် စနစ် နှင့် ဒီဇိုင်းကောင်းမွန်စွာ တည် ဆောက်ပြီး EQEG guideline နှင့်အညီ စစ်ဆေး သင့်သည်။ - သန့်စင်ပြီး ရေဆိုး ထုတ် နှုန်းအတွက် လုံလောက် သော မြေဆီလွှာတွင်း စိမ့်ဝင် မှုရှိသော ဒီဇိုင်းများတည် ဆောက်သင့်သည်။ - ဆီထွက်နိုင်သော		- အထက်ပါအချက်များအပြင် ထုတ် လုပ်မှု လုပ်ငန်းစဉ်မှ ရေဆိုး စွန့်ထုတ်မှုများကို NEQEG လမ်းညွှန်ချက် (၂၀၁၅) နှင့်အညီ ဖြ လတကြိမ် စစ်ဆေးစောင့်ကြည့်သင့်သည်။ စက်ရုံတွင်း မိလ္လာအညစ်အကြေးများကို မိလ္လာကန် စနစ် နှင့် ဒီဇိုင်းကောင်းမွန်စွာ တည် ဆောက်ပြီး EQEG guideline နှင့်အညီ စစ်ဆေးသင့်သည်။ ရေဆိုးနှင့် စက်ရုံတွင်း မြောင်း များမှ မိုးရေများမှ သန့်စင် ရေဆိုး များကို EQEG guideline နှင့်အညီသန့်စင်၍ ဖြန်းရေ အဖြစ်ပြန် လည်အသုံးပြုသင့်သည်။ (TSS, oil and grease, pH). - ရေဆိုးသန့်စက်စက်ရုံမှ ရေများကို အဆိုပြု စံချိန်စံညွှန်းများနှင့်အညီ သန့်စင် ခြင်း၊ - ရေဆိုးထုတ်လွှတ်မှုများကို စဉ်ဆက် မပြတ် တိုင်းတာစောင့်ကြည့်ခြင်း၊ - စီမံကိန်းအတွက် လုပ်ငန်း လည်ပတ်မှု အဆင့် စောင့် ကြည့်ရေး အစီအစဉ်တွင် မြေပေါ် ရေမျက်နှာပြင် အရည် အသွေး စောင့်ကြည့်ရမည်။ - စီမံကိန် မီတာ ၁၀၀ အထက် အကွာ တွင် တည်ရှိသော စမ်းချောင်းနှင့် ရေတွင်း (၃) တွင် ရှိသော ရေများကို မြေပေါ်/ မြေအောက်ရေ အရည်အသွေးစောင့်ကြည့် ခြင်း၊ - ကန် (၁) မှ ကန်(၂) သို့ စီးလာသော ရေများကို မြေပေါ်/မြေအောက်ရေ အရည် အသွေးစောင့်ကြည့်ခြင်း၊ - စက်ရုံတွင်း ရေမြောင်းများမှတဆင့် နောက်ဆုံး စွန့်ထုတ်သည့်မြောင်းမှ ရေများ ကို စောင့်ကြည့်စစ် ဆေး ခြင်း၊			

အမှတ်စဉ်	စီမံကိန်းအဆင့်/ထိခိုက်မှုပုံစံ	စီမံကိန်းလုပ်ငန်းစဉ်/ထိခိုက်မှုဧရိယာ	ထိခိုက်မှုအလားအလာ	လျော့ပါးသက်သာစေးလုပ်ငန်းစဉ်များ	ကြွင်းကျန်မှုအန္တရာယ်	အသေးစိတ်လုပ်ငန်းဆောင်တာများ	လျော့ပါးသက်သာရေးလုပ်ငန်းစဉ်အတွက် တာဝန်ရှိသူများ	လျော့ပါးသက်သာရေးလုပ်ငန်းစဉ်အတွက်ကြီးြပ်ခြင်းဆိုင်ရာတာဝန်ရှိသူများ	အချိန်ကာလ	လိုအပ်ချက်များကို မှတ်တမ်းတင်ပြခြင်း
				နေ ရာ (ဥပမာ- မီးဖိုချောင်) ကဲ့သို့ နေရာများတွင် အဆီဖမ်း ကိရိယာ (Grease Trap)ကိုတပ်ဆင် သင့် သည်။ - ရေဆိုးနှင့် စက်ရုံတွင်း မြောင်းများမှ မိုးရေများမှ သန့်စင်ရေဆိုးများကို EQEG guideline နှင့်အညီ သန့်စင်၍ ဖြန်းရေအဖြစ်ပြန် လည်အသုံးပြုသင့် သည်။ (TSS, oil and grease, pH). - စီမံကိန်းအတွက် လုပ်ငန်း လည် ပတ်မှု အဆင့် စောင့်ကြည့်ရေး အစီအစဉ်တွင် မြေပေါ် ရေမျက်နှာ ပြင် အရည်အသွေး စောင့် ကြည့်ရမည်။ ဆောက်လုပ်ရေးကာလအတွင်း၊ မြေပေါ်ရေမျက်နှာ ပြင် အရည်အသွေး						

				စောင့်ကြည့်စစ်ဆေးခြင်း တွင် pH၊ DO၊ COD၊ BOD5၊ ဆီနှင့်						
အမှတ်စဉ်	**စီမံကိန်းအဆင့်/ထိခိုက်မှုပုံစံ**	**စီမံကိန်းလုပ်ငန်းစဉ်/ ထိခိုက်မှုဧရိယာ**	**ထိခိုက်မှုအလားအလာ**	**လျော့ပါးသက်သာစေး လုပ်ငန်းစဉ်များ**	**ကြွင်းကျန်မှုအန္တရာယ်**	**အသေးစိတ်လုပ်ငန်းဆောင်တာများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက် တာဝန်ရှိသူများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက်ကြီးြ ြပ်ခြင်းဆိုင်ရာတာဝန်ရှိ သူများ**	**အချိန်ကာလ**	**လိုအပ်ချက်မျ ားကို မှတ်တမ်း တင်ပြခြင်း**
				ဆီ၊ TN၊ TP၊ TSS နှင့် စုစုပေါင်း coliform တို့ ပါဝင်မည်ဖြစ် သည်။ - ပုံ ၅.၂ နှင့် စီမံကိန်း မိတာ ၁၀၀ အထက် အကွာတွင် တည်ရှိသော စမ်းချောင်းတွင် ရေနမူနာ ကောက်ယူခြင်းများ ဆောင်ရွက်မည်ဖြစ် ပါသည်။ - ဩဘာသည် Class II (အတန်းအသင့် အန္တရာယ်ရှိသော) ပိုး သတ်ဆေးများ အတွက် သင့်လျော် သောထုတ် လုပ်ခြင်း၊ ဝယ်ယူခြင်း၊ သို့မဟုတ် ဖြန့်ဖြူးခြင်း နှင့် သို့မဟုတ် အသုံးပြုခြင်းနှင့် စပ်လျဉ်းသည့် ထိန်း						

				ချုပ် စောင့် ကြည့်မှုများဆောင် ရွက်မည်ဖြစ်သည်။ (Myanmar/Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 6 အရ).						
အမှတ်စဉ်	**စီမံကိန်းအဆင့်/ထိခိုက်မှုပုံစံ**	**စီမံကိန်းလုပ်ငန်းစဉ်/ ထိခိုက်မှုဧရိယာ**	**ထိခိုက်မှုအလားအလာ**	**လျော့ပါးသက်သာစေး လုပ်ငန်းစဉ်များ**	**ကြွင်းကျန်မှုအန္တရာယ်**	**အသေးစိတ်လုပ်ငန်းဆောင်တာများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက် တာဝန်ရှိသူများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက်ကြီးြ ကြပ်ခြင်းဆိုင်ရာတာဝန်ရှိ သူများ**	**အချိန်ကာလ**	**လိုအပ်ချက်များကို မှတ်တမ်းတင်ပြခြင်း**
				ရေဆိုးသန့်စက်စက်ရုံမှ ရေများကို အဆိုပြု စံချိန်စံ ညွှန်းများနှင့်အညီ သန့်စင်ခြင်း၊ – ရေဆိုး ထုတ်လွှတ်မှုများကို စဉ်ဆက်မပြတ် တိုင်းတာစောင့်ကြည့်ခြင်း၊						
၉.၅	မြေအောက်ရေအရင်းအမြစ်နှင့် လူထုရေဖြန့်ဝေမှု	လုပ်ငန်းလည်ပတ်မှုအတွက် မြေအောက်ရေအသုံးပြုမှု	စီမံကိန်းရေပေးဝေရေးအတွက် မြေအောက်ရေအရင်းအမြစ်များ လျော့နည်းလာြခင်း ဒေသခံလူထု၏ မြေ အောက်ရေ	– လုပ်ငန်း လည်ပတ်မှု တစ်လျှောက် မြေအောက် ရေပြန်လည်ဖြည့်တင်းနိုင်မှု ရှိ/မရှိအား သိရှိနိုင်စေရန် မြေအောက်ရေစုပ်ထုတ်ခြင်း စမ်းသပ်မှုများ ပြု လုပ်ပြီး မြေအောက်ရေ၏ ထုတ်လုပ်မှု/	လျော့ပါးေ ော	– လုပ်ငန်း လည်ပတ်မှုတစ်လျှောက် မြေအောက် ရေပြန်လည်ဖြည့်တင်းနိုင်မှု ရှိ/မရှိအား သိရှိနိုင်စေရန် မြေအောက်ရေ စုပ်ထုတ်ခြင်း စမ်းသပ်မှုများ ပြုလုပ်ပြီး မြေအောက်ရေ၏ ထုတ်လုပ်မှု/အားဖြည့်နှုန်း ကို အချိန်နှင့်အမျှ စောင့်ကြည့်ခြင်းဖြင့် ပင်မ မြေအောက်ရေကြောရေဖြည့်တင်းနိုင်မှု ရှိ/မရှိ စောင့် ကြည့်ခြင်း – HAIC သည် ထိရောက်သော ရေသုံးစွဲမှု စီမံခန့်ခွဲမှု အစီအစဉ်ကို အကောင်အထည်	လျော့ပါးသက်သာရေး အစီအစဉ်များအကောင် အထည်ဖော်ဆောင်ရွက်ရန်ခန့်အပ်ထားသော အဖွဲ့	စီမံကိန်းအုပ်ချုပ်သူအဖွဲ့နှင့် ကျန်းမာရေးနှင့်ဘေးကင်းလုံခြုံရေးအဖွဲ့	လုပ်ငန်းလည်ပတ်စဉ်တလျှောက်	ြဘာအားလစဉ်မှတ်တမ်းတင်ပြခြင်း

			သုံးစွဲနိုင်မှုကို ထိခိုက်စေပြီး ဒေသခံလူထု၏ ရေ လုံခြုံရေးကို ထိခိုက်ခြင်း	အားဖြည့်နှုန်းကို အချိန်နှင့်အမျှ စောင့် ကြည့် ခြင်း ဖြင့် ပင်မ မြေအောက် ရေကြောရေဖြည့်တ င်းနိုင်မှု ရှိ/မရှိစောင့် ကြည့်ခြင်း(Briefing Note Series for Groundwater Management, World Bank, 2002) - သို့သော် ဆိုးရွား		ဖော်ဆောင်ရွက်ခြင်း၊ - ရေထုတ်ယူသုံးစွဲမှုထိရောက်ရန် • ရေဖြန့်ဝေမှုစနစ်တိုးမြှင့်ခြင်းနှင့်အစော ပိုင်းရေအရည်အသွေးဆန်းစစ်မှုလုပ် ဆောင်ခြင်း • ရေသုံးစွဲမှုနှုန်းကို တိုင်းတာရန်အတွက် Water Meter ကို တပ်ဆင်ခြင်း၊				
အမှတ် စဉ်	**စီမံကိန်း အဆင့်/ထိခိုက် မှုပုံစံ**	**စီမံကိန်းလုပ် ငန်းစဉ်/ ထိခိုက်မှု ဧရိယာ**	**ထိခိုက်မှု အလားအလာ**	**လျော့ပါးသက်သာစေ ေး လုပ်ငန်းစဉ်များ**	**ကြွင်းကျန် မှု အန္တရာယ်**	**အသေးစိတ်လုပ်ငန်းဆောင်တာများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက် တာဝန်ရှိသူများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက်ကြီး ြပ်ခြင်းဆိုင်ရာတာဝန်ရှိ သူများ**	**အချိန်ကာလ**	**လိုအပ်ချက်မျ ားကို မှတ်တမ်း တင်ပြခြင်း**
				သော သဘာဝ ပတ်ဝန်းကျင်ဆိုင်ရာ အကျိုးဆက်များ မရှိဘဲ ရေထုတ်ယူသုံးစွဲနိုင် ရန် ရေကန်အနီးရှိ မြေအောက် ရေအရည်အသွေးကို ပုံမှန်စောင့်ကြည့် သင့်သည်။ - HAIC သည် ထိရောက် သော ရေသုံးစွဲမှု စီမံခန့်ခွဲမှု အစီ အစဉ်ကို အကောင်အထည် ေဆောင်ရွက်ခြင်း - ရေသုံးစွဲမှု မျှခြေအား အချိန်		• ရေအမြောက်အမြားသုံးစွဲသည့် စက်ပစ္စည်းများကို မှတ်တမ်းတင်၍ ရေယိုစိမ့်မှုနှင့် စက်ပစ္စည်းပျက်စီးမှု များကို ရှာဖွေကာ ရေချေတာသော ကိရိယာ များဖြင့် အစားထိုးခြင်းဖြင့် ရေရှည်ရေကို သိသိသာသာချေတာနိုင်မည်ဖြစ်သည်။ - စက်မှုလုပ်ငန်းသုံး ရေထိန်းသိမ်းခြင်း ဆိုင်ရာ ကိစ္စရပ် များအား ဝန်ထမ်းများအား အသိပညာပေးခြင်း - 3 Rs (လျှော့ချ၊ ပြန်လည်အသုံးပြုခြင်းနှင့် ပြန်လည်အသုံးပြုခြင်း) မူဝါဒဖြင့် ဥယျာဉ်ခြံ လုပ်ငန်းအတွက်၊ သန့်စင်မှု လုပ်ငန်း များအတွက်၊ မီးဘေးကာကွယ် ရေးအတွက် အသုံးပြု၍ ရေပြန်လည် အသုံးပြုခြင်း၊				

				အခါအလိုက် မှတ်တမ်းတင်စောင့်ြ ကြည့်ထိန်းသိမ်း ခြင်း၊ - အသေးစိတ် ရေ အသုံးပြုမှု (တစ်ယူ နစ်ထုတ်လုပ် ရာ တွင် အသုံးပြု သော ရေပမာဏဖြင့်တိုင်း တာသည်) ကို အကဲ ဖြတ်မည် ဖြစ်ပါ သည်။ လုပ်ငန်း ဆောင်ရွက်သည့် အခါ ရေအသုံးပြု မှုအတွက်		- အခြားသူများရေအသုံးပြုခြင်းကို ထိခိုက်မှု နည်းစေရန် စည်ပင်မှရေ အသုံးပြု ခြင်း၊ မိုးရေခံ၍ အသုံးပြုခြင်းဖြင့် အခြား အစား ထိုးနိုင်သော ရွေးချယ်စရာ နည်းလမ်းများ အသုံးပြုခြင်း၊ အနီးအနားရွာများတွင် မြေ အောက်ရေ (မီတာ ၃၀ အတွင်း) အရည်အသွေးနှင့် ပတ်သက်၍ အငြင်း ပွားဖွယ်ကိစ္စများ၊				
အမှတ်စဉ်	**စီမံကိန်း အဆင့်/ထိခိုက်မှုပုံစံ**	**စီမံကိန်းလုပ်ငန်းစဉ်/ ထိခိုက်မှုဧရိယာ**	**ထိခိုက်မှု အလားအလာ**	**လျော့ပါးသက်သာစေး လုပ်ငန်းစဉ်များ**	**ကြွင်းကျန်မှု အန္တရာယ်**	**အသေးစိတ်လုပ်ငန်းဆောင်တာများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက် တာဝန်ရှိသူများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက်ကြီးြ ပြင်ခြင်းဆိုင်ရာတာဝန်ရှိ သူများ**	**အချိန်ကာလ**	**လိုအပ်ချက်မျ ားကို မှတ်တမ်း တင်ပြခြင်း**
				စက်မှုလုပ် ငန်း စံနှုန်းများထား ရှိ ရမည်။ - ရေထုတ်ယူသုံးစွဲ မှုထိရောက်ရန် -ရေဖြန့်ဝေမှု စနစ် တိုးမြှင့် ခြင်းနှင့် အ စောပိုင်းရေအရည် အသွေးဆန်းစစ်မှု လုပ်ဆောင်ခြင်း - ရေသုံးစွဲမှုနှုန်းကို တိုင်းတာရန် အ		ပုံမှန်မဟုတ်သော ကိစ္စရပ်များအား ရှာဖွေ ဖော်ထုတ်ပြီး သင့်တော်သလို ကိုင်တွင် ဖြေရှင်းခြင်း၊ ထိုကိစ္စရပ်များအား မှတ်တမ်း တင်၍ နောက်ဆက်တွဲ ဆောင်ရွက်ရန်ရှိ သည် များ ကိုဆောင်ရွက်ခြင်း၊ - ရေဆိုးသန့်စင်စက်ရုံကြောင့်ရေ အရည်အသွေးထိခိုက်မှုများကို သိရှိနိုင်ရန် ရေဆိုးသန့်စင်စက်ရုံနှင့်အနီးဆုံးရှိ ရေတွင်းနံပါတ် (၃) (Tube well No.3) အား ရေအရည်အသွေး စောင့်ကြည့်ခြင်း၊ (artificial water recharge)				

				တွက် ရေမီတာများကို တပ်ဆင်ခြင်း၊ - ရေမီတာများသည် စက်ရုံသို့ ပေးဝေ နေသည့် ရေပမာဏကို တိုင်းတာပြီး စဉ်ရေအသုံးပြုမှု၊ သို့မဟုတ် ရှုခင်း ပဒဿ ရေအသုံးပြုမှုကဲ့သို့သော အသုံးပြုမှုကို တိုင်းတာသည်။ ရေ အမြောက်အမြား သုံးစွဲသည့် စက် ပစ္စည်းများကို မှတ် တမ်း တင်၍ ရေယို စိမ့်မှုနှုန့်						
အမှတ်စဉ်	**စီမံကိန်း အဆင့်/ထိခိုက်မှုပုံစံ**	**စီမံကိန်းလုပ်ငန်းစဉ်/ ထိခိုက်မှု ဧရိယာ**	**ထိခိုက်မှု အလားအလာ**	**လျော့ပါးသက်သာစေး လုပ်ငန်းစဉ်များ**	**ကြွင်းကျန်မှု အန္တရာယ်**	**အသေးစိတ်လုပ်ငန်းဆောင်တာများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက် တာဝန်ရှိသူများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက်ကြီးြ ပြင်ခြင်းဆိုင်ရာတာဝန်ရှိ သူများ**	**အချိန်ကာလ**	**လိုအပ်ချက်မျ ားကို မှတ်တမ်း တင်ပြခြင်း**
				စက် ပစ္စည်း ပျက်စီးမှုများကို ရှာဖွေကာ ရေချေတာသော ကိရိယာများ အစားထိုးခြင်းဖြင့် ရေရှည်ရေကို သိသိသာ သာချေတာနိုင်မည်ဖြစ်သည်။ - စက်မှုလုပ်ငန်းသုံး ရေ ထိန်းသိမ်း ခြင်း ဆိုင်ရာ ကိစ္စ ရပ်များ					

				အား ဝန်ထမ်းများ အားအသိပညာ ပေးခြင်း - ဝန်ထမ်းအားလုံး သည်ရေအသုံးပြုမှု တွင် ပါဝင်သဖြင့် ရေခြွေတာ ခြင်းလုပ်ငန်းစဉ်နှင့် ရေချွေ တာရေးလက်တွေ့ လိုက်နာကျင့်သုံးမှုမျ ား ရှိရမည်ဖြစ်ပါသည်။ - 3 Rs (လျှော့ချ၊ ပြန် လည်အသုံး ပြု ခြင်းနှင့် ပြန်လည် အသုံးပြုခြင်း) မူဝါဒ ဖြင့် ဥယျာဉ်ခြံ လုပ် ငန်း အတွက်၊ သန့် စင်မှု လုပ်ငန်း များ အတွက်၊ မီးဘေး ကာကွယ် ရေး အတွက် အသုံး ပြု၍ ရေပြန်လည်						
အမှတ်စဉ်	**စီမံကိန်းအဆင့်/ထိခိုက်မှုပုံစံ**	**စီမံကိန်းလုပ်ငန်းစဉ်/ ထိခိုက်မှုဧရိယာ**	**ထိခိုက်မှုအလားအလာ**	**လျော့ပါးသက်သာစေး လုပ်ငန်းစဉ်များ**	**ကြွင်းကျန်မှုအန္တရာယ်**	**အသေးစိတ်လုပ်ငန်းဆောင်တာများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက် တာဝန်ရှိသူများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက်ကြီးြ ပြင်ခြင်းဆိုင်ရာတာဝန်ရှိ သူများ**	**အချိန်ကာလ**	**လိုအပ်ချက်မျ ားကို မှတ်တမ်း တင်ပြခြင်း**
				အသုံးပြုခြင်း၊ - ရေရရှိမှု အရင်း အမြစ်အား အခြား ရွေးချယ်စရာများ ဖြင့် အစားထိုး အသုံး ပြုခြင်းသည် ရေလိုအပ်မှုအား						

				လုံလောက်စေသကဲ့သို့ စီမံကိန်း တည်နေရာအား အခြားအစားထိုးစရာများ ဆုံးဖြတ်နိုင်ခြင်း၊ အခြားသူများ ရေအသုံးပြု ခြင်းကို ထိခိုက်မှု နည်းစေရန် စည်ပင် မှ ရေ အသုံးပြုခြင်း၊ မိုးရေခံ၍ အသုံးပြု ခြင်း ဖြင့် အခြား အစားထိုးနိုင်သော ရွေးချယ်စရာ နည်းလမ်းများအသုံး ပြု ခြင်း၊ - အနီးအနား ရွာများတွင် မြေ အောက်ရေ (မီတာ ၃၀ အတွင်း) အရည် အသွေးနှင့် ပတ် သက် ၍ အငြင်းပွား ဖွယ်ကိစ္စများ၊ ပုံမှန် မဟုတ်သော ကိစ္စ ရပ်များအားရှာဖွေ						
အမှတ်စဉ်	**စီမံကိန်း အဆင့်/ထိခိုက်မှုပုံစံ**	**စီမံကိန်းလုပ်ငန်းစဉ်/ ထိခိုက်မှု ဧရိယာ**	**ထိခိုက်မှု အလားအလာ**	**လျော့ပါးသက်သာစေး လုပ်ငန်းစဉ်များ**	**ကြွင်းကျန်မှု အန္တရာယ်**	**အသေးစိတ်လုပ်ငန်းဆောင်တာများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက် တာဝန်ရှိသူများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက်ကြီးြပ်ခြင်းဆိုင်ရာတာဝန်ရှိသူများ**	**အချိန်ကာလ**	**လိုအပ်ချက်များကို မှတ်တမ်းတင်ပြခြင်း**
				ဖော်ထုတ်ပြီး သင့်တော်သလိုကိုင်တွင် ဖြေရှင်းခြင်း၊ ထိ ကိစ္စ ရပ်များ အား						

				မှတ်တမ်းတင်၍ နောက်ဆက်တွဲ ဆောင် ရွက်ရန်ရှိသည်များကိုဆောင် ရွက်ခြင်း - ရေဆိုးသန့်စင်စက်ရုံ ကြောင့်ရေအရည် အသွေးထိခိုက်မှုများ ကို သိရှိနိုင်ရန် ရေဆိုးသန့်စင်စက်ရုံ နှင့်အနီးဆုံးရှိ ရေတွင်း (၃) အား ရေ အရည်အသွေး စောင့်ကြည့်ခြင်း၊ (artificial water recharge)						
၉.၆	မြေအရည်အ သွေး	စီမံကိန်း အတွင်း အန္တရာယ်ရှိစွန့် ပစ်ပစ္စည်းစီမံ ခန့်ခွဲမှုနှင့် အမှိုက် စွန့်ပစ်မှု	မြေအရည် အသွေး ထိခိုက်ခြင်း	မြေဆီလွှာအရည် အသွေးအပေါ် ဖြစ်ပေါ်လာနိုင်သော အကျိုးသက်ရောက် မှုများကို လျော့ပါး စေရန်၊ အထက် ဖော်ပြပါ အကြောင်း အရာ ၈.၃ တွင် ဖော်ပြ ထားသည့် အန္တာ ရယ် ရှိသော ပစ္စည်း နှင့် အစိုင် အခဲစွန့်ပစ်ပစ္စည်းမျ ား စီမံခန့်ခွဲမှု အ တွက် ရေးဆွဲ ထား	လျစ်လျူ ရှုနိုင်သော	- အန္တရာယ်ရှိသောစွန့်ပစ်ပစ္စည်းများေ ေချာစွာ စီမံခန့်ခွဲသင့်ပါသည်။ - ဖိတ်စင်မှုစီမံခန့်ခွဲမှုစနစ်များထားရှိ ခြင်း၊	လျော့ပါးသက်သာရေး အစီအစဉ်များ အကောင်အထည်ဖော် ဆောင်ရွက်ရန်ခန့်အပ် ထားသော အဖွဲ့	စီမံကိန်းအုပ်ချုပ်သူအဖွဲ့ နှင့် ကျန်းမာရေးနှင့် ဘေး ကင်းလုံခြုံရေးအဖွဲ့	လုပ်ငန်း လည်ပတ် စဉ် တလျှောက်	သြဘာအား လစဉ်မှတ် တမ်းတင်ပြ ခြင်း
အမှတ် စဉ်	**စီမံကိန်း အဆင့်/ထိခိုက် မှုပုံစံ**	**စီမံကိန်းလုပ် ငန်းစဉ်/ ထိခိုက်မှု ဧရိယာ**	**ထိခိုက်မှု အလားအလာ**	**လျော့ပါးသက်သာ ေး လုပ်ငန်းစဉ်များ**	**ကြွင်းကျန် မှု အန္တရာယ်**	**အသေးစိတ်လုပ်ငန်းဆောင်တာများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက် တာဝန်ရှိသူများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက်ကြီး ြပ်ခြင်းဆိုင်ရာတာဝန်ရှိ သူများ**	**အချိန်ကာလ**	**လိုအပ်ချက်မျ ားကို မှတ်တမ်း တင်ပြခြင်း**

				သည့်လျော့ပါးသက်သာရေး အစီအမံများကို လိုက်နာဆောင်ရွက်သင့်ပါသည် - စီမံကိန်းအတွင်းမှ ထွက် ရှိလာသော အမှိုက်များနှင့် အမှိုက် များကို စုဆောင်း၊ ကိုင် တွယ်ပြီး စနစ်တကျ စွန့်ပစ်သင့်သည်။ - ဆီများ၊ လောင်စာများနှင့် ဓာတု ပစ္စည်းများကို ညစ်ညမ်းမှု ကာကွယ်ရေး အထောက်အကူပြုပစ္စည်းများရှိသော သတ်မှတ်နေရာ များ တွင်သာ အသုံးပြုပြီး သိမ်းဆည်းသင့်ပါသည်။		-				
၉.၇	ရှုခင်းပဒဿ	စီမံကိန်း အတွင်းအမှိုက် စီမံခန့်ခွဲမှု အစီအစဉ်	ရှုခင်းပဒဿအား ထိခိုက်မှု	အထက်ဖော်ပြပါ အကြောင်း အရာ ၈.၃ တွင်ဖော်ပြထားသည့် အတိုင်း အမှိုက် စီမံခန့် ခွဲမှု အတွက် လျော့ပါးသက်သာစေရေး အစီအမံ များ လိုက်နာသင့်သည်၊ ထို့အပြင် စီမံကိန်း	လျစ်လျူရှုနိုင်သော	အစိုင်အခဲစွန့်ပစ်ပစ္စည်းများစီမံခန့်ခွဲခြင်း	လျော့ပါးသက်သာရေး အစီအစဉ်များ အကောင်အထည်ဖော်ဆောင်ရွက်ရန်ခန့်အပ်ထားသော အဖွဲ့	စီမံကိန်းအုပ်ချုပ်သူအဖွဲ့နှင့် ကျန်းမာရေးနှင့်ဘေးကင်းလုံခြုံရေးအဖွဲ့	လုပ်ငန်းလည်ပတ်စဉ် တလျှောက်	ဩဘာအား လစဉ်မှတ်တမ်းတင်ပြခြင်း

အမှတ်စဉ်	စီမံကိန်းအဆင့်/ထိခိုက်မှုပုံစံ	စီမံကိန်းလုပ်ငန်းစဉ်/ထိခိုက်မှုဧရိယာ	ထိခိုက်မှုအလားအလာ	လျော့ပါးသက်သာစေး လုပ်ငန်းစဉ်များ	ကြွင်းကျန်မှုအန္တရာယ်	အသေးစိတ်လုပ်ငန်းဆောင်တာများ	လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက် တာဝန်ရှိသူများ	လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက်ကြီးြပ်ခြင်းဆိုင်ရာတာဝန်ရှိသူများ	အချိန်ကာလ	လိုအပ်ချက်များကို မှတ်တမ်းတင်ပြခြင်း
				ဧရိယာ တဝိုက်တွင် ရှုခင်းပဒဿ ဖြစ်စေသော နေရာများ ဆောင်ရွက်ရမည်။						
၉.၈	လူထုကျန်းမာရေးနှင့်ဘေးအန္တရာယ်ကင်းရှင်းရေး	စီမံကိန်းမှ ယာဉ်သွားလာမှုများများပြားလာမှုကြောင့် လေ/ရေ/မြေ ထိခိုက်ခြင်း	လူထုကျန်းမာေးနှင့်ဘေးအန္တရာယ်ကင်းရှင်းရေးအား ထိခိုက်မှု	လျော့ပါးရေးအစီအမံများအတွက် အကြံပြုထားသော အထက်ဖော်ပြပါ အကြောင်း အရာ ၈.၆ ကို ပြန်လည်ရည်ညွှန်းပါသည်။ ရပ်ရွာကျန်းမာရေးနှင့်ဘေးကင်းရေးအပေါ် ထိခိုက်မှုလျော့ချရန် လျော့ပါးရေး အစီအမံများစွာရှိပါသည်။ ထို လျော့ ပါးရေးအစီအမံများတွင် – - လူထုအငြင်းပွားဖွယ်ရာ နှင့်မကျေနပ်ချက်များတုံ့ပြန်မှုအစီအစဉ်များ ဆောင်ရွက် ရမည်။ (ြဘာ ၏ Myanmar/ Awba (#35880) – Environmental	လျော့ပါးေော	လျော့ပါးရေးအစီအမံများအတွက် အကြံပြုထားသော အထက်ဖော်ပြပါ အကြောင်းအရာ၈.၆ ကို ပြန်လည်ရည်ညွှန်း ပါသည်။ အခြားသော လျော့ပါး သက်သာရေးအစီအစဉ် များ တွင်– - ြဘာသည် လူထုအငြင်းပွားဖွယ်ရာ နှင့် မကျေနပ် ချက်များတုံ့ပြန်မှုအစီအစဉ်များ ဆောင်ရွက်ရမည်။ - ြဘာသည် Safe Vehicle Policy and Training Safety Procedure အားရေးဆွဲပြီး ဘေးကင်းသော စိုက်ပျိုးမာတုဆေးနှင့် အန္တရာယ်ရှိသော စွန့်ပစ်ပစ္စည်း များသယ်ယူပို့ဆောင်ခြင်းအစီအစဉ်အား ဆောင်ရွက်ခြင်း	လျော့ပါးသက်သာရေး အစီအစဉ်များ အကောင်အထည်ဖော်ဆောင်ရွက်ရန်ခန့်အပ်ထားသော အဖွဲ့	စီမံကိန်းအုပ်ချုပ်သူအဖွဲ့နှင့် ကျန်းမာရေးနှင့်ဘေးကင်းလုံခြုံရေးအဖွဲ့	လုပ်ငန်းလည်ပတ်စဉ် တလျှောက်	ြဘာအားလစဉ် မှတ်တမ်းတင်ပြခြင်း

				and Social Action Plan (ESAP) No. 1 အရ).						
အမှတ်စဉ်	**စီမံကိန်းအဆင့်/ထိခိုက်မှုပုံစံ**	**စီမံကိန်းလုပ်ငန်းစဉ်/ထိခိုက်မှုဧရိယာ**	**ထိခိုက်မှုအလားအလာ**	**လျော့ပါးသက်သာစေး လုပ်ငန်းစဉ်များ**	**ကြွင်းကျန်မှုအန္တရာယ်**	**အသေးစိတ်လုပ်ငန်းဆောင်တာများ**	**လျော့ပါးသက်သာရေးလုပ်ငန်းစဉ်အတွက် တာဝန်ရှိသူများ**	**လျော့ပါးသက်သာရေးလုပ်ငန်းစဉ်အတွက်ကြီးြပ်ခြင်းဆိုင်ရာတာဝန်ရှိသူများ**	**အချိန်ကာလ**	**လိုအပ်ချက်များကို မှတ်တမ်းတင်ပြခြင်း**
				- သြဘာသည် Safe Vehicle Policy and Training Safety Procedure အားရေးဆွဲပြီး ဘေးကင်းသော စိုက်ပျိုး ဓာတုဆေးနှင့် အန္တရာယ်ရှိသော စွန့်ပစ် ပစ္စည်းများ သယ် ယူပို့ဆောင်ခြင်းအစီအစဉ် (သယ်ယူပို့ဆောင် ရေးဆိုင်ရာ သဘော တူ စာချုပ်များ၊ အပါအဝင်) အား ဆောင်ရွက်ရမည်။(Myanmar/Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 7) အရ)		၊				
၉.၉	လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးအန္တရာ	လုပ်ငန်းခွင်နှင့် ဝန်ထမ်းအေ ာင်	လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေးအ	-လျော့ပါးရေးအစီအမံများအတွက် အကြံ ပြုထားသော အ ကြောင်း အရာ	လျော့ပါးေ ော	- လျော့ပါးရေးအစီအမံများအတွက် အကြံပြုထားသော အကြောင်း အရာ ၈.၆ နှင့် ၉.၁.၂ တို့ကို ပြန်လည် ရည်ညွှန်းပါသည်။ လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေး	လျော့ပါးသက်သာရေး အစီအစဉ်များ အကောင်အထည်ဖော် ဆောင် ရွက်ရန်ခန့်အပ်	စီမံကိန်းအုပ်ချုပ်သူအဖွဲ့ နှင့် ကျန်းမာရေးနှင့်ဘေးကင်း လုံခြုံရေးအဖွဲ့	လုပ်ငန်း လည်ပတ် စဉ် တလျှောက်	ြဘာအား လစဉ်မှတ်တမ်းတင်ပြခြင်း

	ရယ်ကင်းရှင်းရေး	- လုပ်ငန်းဆောင်ရွက်ခြင်းနှင့် ဘေးအန္တရာယ်ရှိ ပစ္စည်းများသိုလှောင်ကိုင်	ားထိခိုက်မှု	၈.၆ နှင့် ၉.၁.၂ တို့ကို ပြန် လည် ရည်ညွှန်း ပါ သည်။ လုပ်ငန်း ခွင် ကျန်းမာရေးနှင့် ဘေးကင်းရေးဆိုင်ရ ာ ထိခိုက်မှုများကို လျှော့ချရန် အစီအမံများစွာရှိပါ သည်။		ကင်း ရေးဆိုင်ရာ ထိခိုက်မှုများကို လျှော့ချ ရန် အစီအမံများစွာရှိပါသည်။ - လေဝင်လေထွက်စနစ်နှင့် မီးဘေး အန္တရာယ် ကာကွယ်ရေး စနစ်များ အ ဆောက်အဦအားလုံး တပ်ဆင် ထားခြင်း၊	ထားသော အဖွဲ့			
အမှတ်စဉ်	**စီမံကိန်းအဆင့်/ထိခိုက်မှုပုံစံ**	**စီမံကိန်းလုပ်ငန်းစဉ်/ ထိခိုက်မှုဧရိယာ**	**ထိခိုက်မှုအလားအလာ**	**လျော့ပါးသက်သာစေး လုပ်ငန်းစဉ်များ**	**ကြွင်းကျန်မှု အန္တရာယ်**	**အသေးစိတ်လုပ်ငန်းဆောင်တာများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက် တာဝန်ရှိသူများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက်ကြီးြ ပြခြင်းဆိုင်ရာတာဝန်ရှိ သူများ**	**အချိန်ကာလ**	**လိုအပ်ချက်မျ ားကို မှတ်တမ်း တင်ပြခြင်း**
		တွယ်ခြင်းမှ ထွက်ရှိလာေ ော ယိုစိမ့်ပြန့်နှံေ ော အမှုန်အမွှား ထုတ်လွှတ်မှု		- လေဝင်လေထွက် စနစ်နှင့် မီးဘေး အန္တရာယ်ကာကွယ် ရေးစနစ်များ အဆောက် အဦအားလုံးတပ် ဆင်ထား ခြင်း၊ - ရေငွေ့နှင့် အမှုန် အမွှား များ ပြန့်လွှင့် မှု ကာကွယ်ရန် ၊လုံလောက်သော တကိုယ် ရေ အကာ အကွယ်ပေးပစ္စည်းမ ျားနှင့် အငွေ့အမှုန် ဖမ်း (suction hoods) များ တပ် ဆင် ထားခြင်း၊ - စီမံကိန်းသည် အမြဲ တမ်းနှင့် ကျပန်း		- ရေငွေ့နှင့် အမှုန်အမွှားများ ပြန့်လွှင့်မှု ကာကွယ်ရန် လုံလောက်သော တကိုယ်ရေ အကာအကွယ် ပေးပစ္စည်းများနှင့် အငွေ့အမှုန်ဖမ်း (suction hoods) များတပ် ဆင်ထားခြင်း၊ - စီမံကိန်းသည် အမြဲတမ်းနှင့် ကျပန်း အလုပ်သမား များအပြင် ဆောက်လုပ်ရေး လုပ်သားများအတွက် အလုပ်သမားများ၏ မကျေနပ်ချက်ယန္တရားကို ဖော် ဆောင်ပြီး စနစ်ကျသောပြဿနာများကို ဖော်ထုတ် ဖြေရှင်းရန် (Myanmar/Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 2)အရ၊			

				အလုပ်သမားများ အပြင် ဆောက် လုပ်ရေး လုပ်သားများ အတွက် အလုပ် သမား များ၏ မကျေ နပ်ချက်ယန္တရားကို ဖော်ဆောင် ဖြီး ပြ သနာကို ဖော် ထုတ် ဖြေရှင်းရန် (Myanmar/ Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 2)အရ						
အမှတ် စဉ်	**စီမံကိန်း အဆင့်/ထိခိုက် မှုပုံစံ**	**စီမံကိန်းလုပ် ငန်းစဉ်/ ထိခိုက်မှု ဧရိယာ**	**ထိခိုက်မှု အလားအလာ**	**လျော့ပါးသက်သာ စေး လုပ်ငန်းစဉ်များ**	**ကြွင်းကျန် မှု အန္တရာယ်**	**အသေးစိတ်လုပ်ငန်းဆောင်တာများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက်တာ ဝန်ရှိသူများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက်ကြီး ပြပ်ခြင်းဆိုင်ရာတာဝန်ရှိ သူများ**	**အချိန်ကာလ**	**လိုအပ်ချက်မျ ားကို မှတ်တမ်း တင်ပြခြင်း**
၉.၁၀	စီးပွားရေးနှင့် အသက်မွေး ဝမ်းကျောင်းမှု	အလုပ်အကိုင် အခွင့်အလမ်း များတိုးတက် လာခြင်းနှင့် ဒေသထွက် ကုန်ဆိုင်များ တိုးများလာ ခြင်း၊	အသက်မွေး ဝမ်းကျောင်းမှု များတိုးတက် လာခြင်း(positi ve impacts)	– အရည်အချင်း ပြည့်မီသောဒေသ ခံကို ခန့်အပ်ခြင်း – သတ်မှတ်ချက် များဖြင့် ဒေသတွင်း ထောက်ပံ့ရေးနှင့် ဝန်ဆောင်မှုများကို အသုံးပြုခြင်း၊	ကောင်းေ ော အကျိုး သက် ရောက်မှု	– အရည်အချင်းပြည့်မီသော ဒေသခံကို ခန့်အပ်ခြင်းနှင့် – သတ်မှတ်ချက်များဖြင့် ဒေသတွင်း ထောက်ပံ့ရေးနှင့် ဝန်ဆောင်မှုများကို အသုံး ပြုခြင်း၊	လျော့ပါးသက်သာရေး အစီအစဉ်များအကောင် အထည်ဖော်ဆောင်ရွက် ရန်ခန့်အပ်ထားသော အဖွဲ့	စီမံကိန်းအုပ်ချုပ်သူအဖွဲ့ နှင့် ကျန်းမာရေးနှင့် ဘေးကင်းလုံခြုံရေးအဖွဲ့	လုပ်ငန်း လည်ပတ် စဉ်တ လျှောက်	သြဘာအား လစဉ်မှတ် တမ်းတင်ပြ ခြင်း
၉.၁၁	အခြေခံအ ောက် အဦ ဝန်ဆောင်မှုမျ ား	ယာဉ်သွားလာ မှုနှင့် အလုပ်သမားမ ျား၏ လူဝင်မှုကြီး ကြပ်ရေး	လူထုအခြေခံ အဆောက်အဦ များဆောက် လုပ်ပြီးစီးခြင်း	လျော့ပါးရေးအစီ အမံများအတွက် အကြံပြုထားသော အထက်ဖော်ပြပါ အကြောင်းအရာ ၈.၆ ကို ရည်ညွှန်းပါသည်။	လျစ်လျူရှု နိုင်သော	– လျော့ပါးရေးအစီအမံများအတွက် အကြံပြုထားသော အထက်ဖော်ပြပါ အကြောင်းအရာ ၈.၆ ကို ရည်ညွှန်းပါသည်။	လျော့ပါးသက်သာရေးအ စီအစဉ်များအကောင်အ ထည်ဖော်ဆောင်ရွက်ရန် ခန့်အပ်ထားသော အဖွဲ့	စီမံကိန်းအုပ်ချုပ်သူအဖွဲ့ နှင့် ကျန်းမာရေးနှင့်ဘေးကင်း လုံခြုံရေးအဖွဲ့	လုပ်ငန်း လည်ပတ် စဉ် တလျှောက်	သြဘာအား လစဉ် မှတ်တမ်းတင် ပြခြင်း

၉.၁၂	မတော်တဆ ယိုစိမ့်မှုဖြစ်ပွား ခြင်း	စီစဉ်မထားသော ယိုစိမ့်မှုများ	ရေထုကို ညစ်ညမ်း အနည်ကျစေခြင်း နှင့် လူထုကျန်းမာရေး ထိခိုက်ခြင်း	- သယ်ယူပို့ဆောင်ရေးနှင့် အရောင်း နေရာများ အပါအဝင် ၎င်းတို့အတွက် အရေးပေါ်ကြိုတင် ပြင်ဆင်မှုနှင့် တုံ့ပြန်မှုအစီအစဉ် ကို ဖော်ဆောင်ခြင်း။ (Myanmar/Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 1) အရ၊ - လောင်စာဆီ ကန်များနှင့် ဓာတု သိုလှောင် ရာ	အလယ်အလတ်	- သယ်ယူပို့ဆောင်ရေးနှင့် အရောင်း နေရာများ အပါအဝင် ၎င်းတို့အတွက် အရေးပေါ် ကြိုတင် ပြင်ဆင်မှုနှင့် တုံ့ပြန်မှုအစီအစဉ်ကို ဖော်ဆောင်ခြင်း။ - လောင်စာဆီကန်များနှင့် ဓာတု သိုလှောင်ရာနေရာကို အလုံပိတ်နေရာများ တွင် နေရာချထားသင့်သည်။ လောင်စာဆီသို လှောင်မှုနှင့် အန္တရာယ်ဖြစ်စေနိုင်သော ပစ္စည်းများအတွက် Secondary Containment (အန္တရာယ်ဖြစ်စေနိုင်သော ပစ္စည်းများ ဖိတ်စင်မှု အတွက် ဆောင်ရွက်ရန်ထားရှိသောစနစ်) များထား ရှိခြင်း၊ (Myanmar/Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 5) အရ၊ - ညစ်ညမ်းမှုကာကွယ်ရေး Facilities ရှိသော သတ်မှတ်နေရာများတွင်သာ ဆီ၊ လောင်စာဆီနှင့် ဓာတုပစ္စည်းများကို ထားရှိခြင်း။ မိုးရွာပြီးနောက် မိုးရေများ	လျော့ပါးသက်သာရေး အစီအစဉ်များ အကောင်အထည်ဖော်ဆောင်ရွက်ရန်ခန့်အပ်ထားသော အဖွဲ့	စီမံကိန်းအုပ်ချုပ်သူအဖွဲ့နှင့် ကျန်းမာရေးနှင့်ဘေးကင်းလုံခြုံရေးအဖွဲ့	လုပ်ငန်းလည်ပတ်စဉ် တလျှောက်	ဩဇာအားလစဉ် မှတ်တမ်းတင်ပြခြင်း
အမှတ်စဉ်	**စီမံကိန်းအဆင့်/ထိခိုက်မှုပုံစံ**	**စီမံကိန်းလုပ်ငန်းစဉ်/ ထိခိုက်မှုဧရိယာ**	**ထိခိုက်မှုအလားအလာ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်များ**	**ကြွင်းကျန်မှုအန္တရာယ်**	**အသေးစိတ်လုပ်ငန်းဆောင်တာများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက် တာဝန်ရှိသူများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက်ကြီးကြပ်ခြင်းဆိုင်ရာတာဝန်ရှိသူများ**	**အချိန်ကာလ**	**လိုအပ်ချက်များကို မှတ်တမ်းတင်ပြခြင်း**
				နေရာကို အလုံ ပိတ် နေရာများတွင် နေရာချထား သင့်သည်။ လောင်စာဆီသိုလှောင်မှုနှင့် အန္တရာယ်ဖြစ်စေနိုင်သော ပစ္စည်းများအတွက် Secondary Containment (အန္တရာယ်ဖြစ်စေ		စီဆင်းနိုင်ရန် ရေကျဆင်ခြေ လျှောများ ထားရှိခြင်း၊ - ရေမြောင်းစနစ်ထဲသို့ မစွန့်ပစ်မီ ဆီ/အဆီဖမ်းသော ကိရိယာများတွင် ရေကျဆင်ခြေလျှောမှ ရေများကို ဖြတ်သန်းစေခြင်း၊ - ဆီပါသောရေများ မတော်တဆ ဖိတ်စင်မှုအား ကာကွယ်ရန် ရေ/ဆီ ခွဲခြားသန့်စင်မှု စနစ်/ပစ္စည်း များတပ်ဆင်ထားရှိခြင်း၊ - ဆီအနည်ကျနေသောရေများကို လိုင်စင်ရ ရေဆိုးသိမ်းဆည်းသူဖြင့် စုဆောင်းရမည်				

				နိုင်သော ပစ္စည်းများ ဖိတ်စင်မှုအတွက် ဆောင်ရွက်ရန်ထားရှိသော စနစ်) များထား ရှိသင့်သည် (Myanmar/Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 5) အရ၊ – ညစ်ညမ်းမှုကာကွယ်ရေး Facilities ရှိသော သတ်မှတ်နေရာများတွင်သာ ဆီ၊ လောင်စာ ဆီနှင့် ဓာတု ပစ္စည်းများကို ထားရှိရမည်။ မိုးရွာပြီးနောက် မိုးရေများ စီဆင်းနိုင်ရန် ရေကျဆင်ခြေ လျှောများ ထားရှိရမည်။		(နောက်ပိုင်း အဆင့်များတွင်သာ အသုံးပြုရန်) – ဆီ၊လောင်စာဆီ၊ ဓာတုပစ္စည်း ဖိတ်စင်မှုများအတွက် ချက်ချင်းသန့်ရှင်းရေး လုပ်ငန်းများအတွက် လမ်းညွှန်ချက်များ ထားရှိခြင်း၊				
အမှတ်စဉ်	**စီမံကိန်းအဆင့်/ထိခိုက်မှုပုံစံ**	**စီမံကိန်းလုပ်ငန်းစဉ်/ထိခိုက်မှုဧရိယာ**	**ထိခိုက်မှုအလားအလာ**	**လျော့ပါးသက်သာစေး လုပ်ငန်းစဉ်များ**	**ကြွင်းကျန်မှုအန္တရာယ်**	**အသေးစိတ်လုပ်ငန်းဆောင်တာများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက်တာဝန်ရှိသူများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက်ကြီးြပ်ခြင်းဆိုင်ရာတာဝန်ရှိသူများ**	**အချိန်ကာလ**	**လိုအပ်ချက်များကို မှတ်တမ်းတင်ပြခြင်း**
				– ရေမြောင်းစနစ်ထဲသို့ မစွန့်ပစ်မီ ဆီ/အဆီ ဖမ်းသောကိရိယာများတွင် ရေကျဆင်ခြေလျှောမှ ရေများကို						

				ဖြတ်သန်းစေခြင်း၊ - ဆိပါသောရေများ မတော် တဆ ဖိတ် စင်မှုအား ကာ ကွယ် ရန် ရေ/ဆီ ခွဲခြား သန့်စင်မှု စနစ် /ပစ္စည်းများ တပ်ဆင်ထားရှိခြင်း၊ - ဆီအနည်ကျနေ သော ရေများကို လိုင်စင်ရ ရေဆိုး သိမ်းဆည်းသူဖြင့် စု ဆောင်းရမည် (နောက်ပိုင်းအဆင့်မ ျားတွင်သာ အသုံးပြုရန်) - ဆီ၊လောင်စာဆီ၊ ဓာတု ပစ္စည်းဖိတ် စင်မှုများအတွက် ချက်ချင်း သန့်ရှင်း ရေး လုပ် ငန်းများ အတွက် လမ်းညွှန် ချက် များထားရှိရ မည်။						
အမှတ် စဉ်	**စီမံကိန်း အဆင့်/ထိခိုက် မှုပုံစံ**	**စီမံကိန်းလုပ် ငန်းစဉ်/ ထိခိုက်မှု ဧရိယာ**	**ထိခိုက်မှု အလားအလာ**	**လျော့ပါးသက်သာ စေး လုပ်ငန်းစဉ်များ**	**ကြွင်းကျန် မှု အန္တရာယ်**	**အသေးစိတ်လုပ်ငန်းဆောင်တာများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက်တာ ဝန်ရှိသူများ**	**လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက်ကြီး ြပ်ခြင်းဆိုင်ရာတာဝန်ရှိ သူများ**	**အချိန်ကာလ**	**လိုအပ်ချက်မျ ားကို မှတ်တမ်း တင်ပြခြင်း**
၉.၁၃	မတော်တဆ ထိခိုက်မှု၊	မတော်တဆ ထိခိုက်မှု၊	အလုပ်သမားမျ ားနှင့်	- မီးဘေး ကာ ကွယ်ရေး စနစ်အား	အလယ်အ လတ်	- မီးဘေးကာကွယ်ရေးစနစ် အား အဆောက်အဦ၊ ဓာတ်ခွဲခန်း၊ ဂိုထောင်၊ SL	လျော့ပါး သက်သာ ရေး အစီအစဉ်များ	လျော့ပါးသက်သာရေး အစီအစဉ်များအကောင်	စီမံကိန်းအုပ် ချုပ်သူအဖွဲ့	လုပ်ငန်းလည် ပတ်စဉ်

	မီးဘေးအန္တရာယ်	မီးဘေးအန္တရာယ်	ပြည်သူလူထုပေးကင်းလုံခြုံရေး	အဆောက်အဦ၊ ဓာတ်ခွဲခန်း၊ ဂိုထောင်၊ SL Building, WP Building, SP Building, SC Building, Utility Building, Drum Crusher Building တို့တွင် တပ်ဆင်ထားခြင်း၊ - မီးလောင်မှုဖြစ်ပွားသည့် အခါ တဦးချင်း လုပ် ဆောင်ရန် မဖြစ်မနေ လေ့ ကျင့်ထားရမည့် အရာများကို လေ့ကျင့်ထား ခြင်း၊ - မီးဘေးလေ့ ကျင့်ရေး သင် တန်းနှင့် မီးဘေးကာကွယ် ရေးကြိုတင် လေ့ကျင့်မှုများ ပြင်ဆင်ထားခြင်း၊		Building, WP Building, SP Building, SC Building, Utility Building, Drum Crusher Building တို့တွင် တပ်ဆင်ထားခြင်း၊ - HAIC သည် မြန်မာနိုင်ငံ အမျိုးသား လမ်းညွှန်ချက်များနှင့်အညီ မီးဘေး အန္တရာယ် စီမံခန့်ခွဲမှု အစီအမံများ နှင့် အရေးပေါ် တုံ့ပြန်ရေး ကြိုတင်ပြင်ဆင်မှု အစီအစဉ်ကို ရေးဆွဲသင့်ပါသည်။ - မီးလောင်မှုဖြစ်ပွားသည့်အခါ တဦးချင်းလုပ် ဆောင်ရန် မဖြစ်မနေ လေ့ကျင့်ထားရမည့် အရာများကို လေ့ကျင့်ထားခြင်း၊ - မီးဘေးလေ့ကျင့်ရေး သင် တန်းနှင့် မီးဘေးကာကွယ် ရေးကြိုတင်လေ့ကျင့်မှုများ ပြင်ဆင်ထားခြင်း၊	အကောင်အထည်ဖော်ဆောင်ရွက်ရန်ခန့် အပ်ထားသော အဖွဲ့	အထည်ဖော်ဆောင်ရွက်ရန်ခန့်အပ်ထားသော အဖွဲ့	နှင့် ကျန်းမာရေးနှင့်ဘေးကင်းလုံခြုံရေးအဖွဲ့	တလျှောက်
၉.၁၄	သဘာဝသယံဇာတ (စွမ်းအင် နှင့် ရေသုံးစွဲမှု	လုပ်ငန်းလည်ပတ်စဉ် အတွင်းစွမ်းအင်အသုံးပြုခြင်း	ဓာတ်အား ထုတ်လုပ်ခြင်းနှင့် စက်မှုလုပ်ငန်းများတွင် လောင်စာတိုက်	- လျှပ်စစ်ဓာတ်အား သုံးစွဲ မှု လျှော့ချရန်နှင့် စက်ရုံ အတွင်း စွမ်းအင်ထိရောက်မှု မြှင့်တင်ရန်	လျော့ပါးစေ	- လျှပ်စစ်ဓာတ်အားသုံးစွဲမှု လျှော့ချရန်နှင့် စက်ရုံ အတွင်း စွမ်းအင်ထိရောက်မှု မြှင့်တင်ရန် စွမ်းအင်သုံး စွဲမှု စီမံခန့်ခွဲမှု အစီအစဉ်ကို ရေးဆွဲခြင်း၊ - အချို့သောစွမ်းအင်အသုံးချမှုအစီအစဉ်များ	လျော့ပါး သက်သာ ရေး အစီအစဉ် များ အကောင်အထည်ဖော်ဆောင်ရွက်ရန်ခန့် အပ်ထားသော အဖွဲ့	လျော့ပါးသက်သာရေးအစီအစဉ်များအကောင်အထည်ဖော်ဆောင်ရွက်ရန်ခန့်အပ်ထားသော အဖွဲ့	စီမံကိန်းအုပ်ချုပ်သူအဖွဲ့ နှင့် ကျန်းမာရေးနှင့်ဘေးကင်းလုံခြုံ	လုပ်ငန်းလည်ပတ်စဉ် တလျှောက်
အမှတ်စဉ်	**စီမံကိန်းအဆင့်/ထိခိုက်**	**စီမံကိန်းလုပ်ငန်းစဉ်/**	**ထိခိုက်မှုအလားအလာ**	**လျော့ပါးသက်သာရေး**	**ကြွင်းကျန်မှု**	**အသေးစိတ်လုပ်ငန်းဆောင်တာများ**	**လျော့ပါးသက်သာရေးလုပ်ငန်းစဉ်အတွက်**	**လျော့ပါးသက်သာရေးလုပ်ငန်းစဉ်အတွက်ကြီးြ**	**အချိန်ကာလ**	**လိုအပ်ချက်များကို**

	မူပုံစံ	ထိခိုက်မှု ဧရိယာ		လုပ်ငန်းစဉ်များ	အန္တရာယ်		တာဝန်ရှိသူများ	ပြဿနာဆိုင်ရာ တာဝန်ရှိသူများ		မှတ်တမ်း တင်ပြခြင်း
			ရိုက်အသုံးပြုခြင်း ရုပ်ကြွင်းလောင်စာများကို အလွန်အကျွံသုံးစွဲခြင်းကြောင့် သဘာဝသယံဇာတများ ဆုံးရှုံးခြင်း (ပြန်လည်ပြည့်ပြီးမြဲမဟုတ်သော)၊ ဒေသခံလူထု၏ လျှပ်စစ်ဓာတ်အားခွဲဝေမှုကို ဆိုးဆိုးရွားရွား ထိခိုက်စေပြီး ဒေသခံလူထုအတွက် လျှပ်စစ်မီး ရရှိမှုနည်းပါးလာနိုင်ခြင်း	စွမ်းအင်သုံးစွဲမှု စီမံခန့်ခွဲမှုအစီအစဉ်ကို ရေးဆွဲခြင်း၊ - အချို့သောစွမ်းအင်အသုံးချမှု အစီအစဉ်များမှာ အောက်ပါအတိုင်းဖြစ်ပါသည်။ - အဆောက်အဦများအား သဘာဝပတ်ဝန်းကျင်နှင့် သဟဇာတဖြစ်သော ဒီဇိုင်းများဖြင့်ဆောက်လုပ်ခြင်း၊ ဥပမာ- လျှပ်စစ်စွမ်းအင်ခွဲတာရန် အောက်ပါတို့ ကိုလုပ်ဆောင်သင့်သည်၊ - အဆောက်အဦတစ်ခု၏ ဧရိယာအားလုံးကို မီးထွန်းထားရန် မလိုအပ်ပါ၊ အလို အလျောက် ထိန်းချုပ်မှုများနှင့် အာရုံခံကိရိယာများကို လိုအပ် သလို အလင်းရောင် ပေးစွမ်း မှုနှင့်		မှာ အောက်ပါအတိုင်းဖြစ်ပါသည်- - အလင်းရောင် ရှိသည့် နေရာတွင် မီးအလင်းရောင် ထား ရှိမှု ကိုလျှော့ချခြင်း၊ အလိုအလျောက် ထိန်းချုပ်မှုများနှင့် အာရုံခံကိရိယာများကို လိုအပ်သလို အလင်းရောင် ပေးစွမ်းနိုင်မှုရှိခြင်း၊ - လျှပ်စစ်မီးကို ချွေတာရန် ပိုမိုစွမ်းအင်သက်သာသော Light Emitting Diode (LED) အလင်းရောင် အသုံးပြုခြင်း၊ - Printers - ရုံးသုံးကွန်ပျူတာ၊ ပရင့်တာ၊ မော်နီတာများကို ရုံးဆင်းချိန်တွင် ပိတ်ထားခဲ့ခြင်း၊ ပရင့်ထုတ်သည့် အခါ ဖြစ်နိုင်သမျှ စွမ်းအင် အသက်သာဆုံး Mode ကို အသုံးပြုပြီး မလိုအပ်သော ပရင့်ထုတ်ခြင်း အားလုံးကို ရှောင်ကြဉ်ခြင်းနှင့် ပြန်လည် အသုံးပြုသည့်အခါမှသာ ဖွင့်ခြင်း၊ - Photocopiers သုံးကွန်ပျူတာ၊ ပရင့်တာ၊ မော်နီတာများကို ရုံးဆင်းချိန်တွင် ပိတ်ထားခဲ့ခြင်း၊ စွမ်းအင်အသက်သာဆုံး Mode ကို အသုံးပြုပြီး တစုတဝေးတည်း ပရင့်ထုတ်ခြင်းကိုသာဆောင်ရွက်ရန် - Printers - ရုံးသုံးကွန်ပျူတာ၊ ပရင့်တာ၊ မော်နီတာများကို ရုံးဆင်းချိန်တွင် ပိတ်ထားခဲ့ခြင်း၊ ပရင့်ထုတ်သည့် အခါ ဖြစ်နိုင်သမျှ စွမ်းအင် အသက်သာဆုံး Mode ကို အသုံးပြုပြီး မလိုအပ်သော ပရင့်ထုတ်ခြင်း အားလုံးကို ရှောင်ကြဉ် သင့်ပါသည်။ - မော်တာများကို အသုံးမပြုပါက			ရေးအဖွဲ့	

						ပိတ်ထားသင့်သည်။ အရည်၊ လေ သို့မဟုတ် ဓာတ်ငွေ့လည်ပတ်မှု စနစ် များရှိ				
အမှတ်စဉ်	စီမံကိန်းအဆင့်/ထိခိုက်မှုပုံစံ	စီမံကိန်းလုပ်ငန်းစဉ်/ထိခိုက်မှုဧရိယာ	ထိခိုက်မှုအလားအလာ	လျော့ပါးသက်သာစေးလုပ်ငန်းစဉ်များ	ကြွင်းကျန်မှုအန္တရာယ်	အသေးစိတ်လုပ်ငန်းဆောင်တာများ	လျော့ပါးသက်သာရေးလုပ်ငန်းစဉ်အတွက် တာဝန်ရှိသူများ	လျော့ပါးသက်သာရေးလုပ်ငန်းစဉ်အတွက်ကြီးြပ်ခြင်းဆိုင်ရာတာဝန်ရှိသူများ	အချိန်ကာလ	လိုအပ်ချက်များကို မှတ်တမ်းတင်ပြခြင်း
				ကိုက်ညီစေရန် ဖြန့်ကျက်ထားနိုင်သည်။ - အလင်းရောင်ရှိသည့် နေရာတွင် မီးအလင်းရောင်ထား ရှိမှု ကိုလျော့ချခြင်း၊ - လျှပ်စစ်မီးကို ချွေတာရန် ပိုမိုစွမ်းအင်သက်သာသော Light Emitting Diode (LED) အလင်းရောင်အသုံးပြုခြင်း၊ - Printers - - ရုံးသုံးကွန်ပျူတာ၊ ပရင့်တာ၊ မော်နီတာများကို ရုံးဆင်းချိန်တွင် ပိတ်ထားခဲ့ခြင်း၊ ပရင့်ထုတ်သည့်အခါ ဖြစ်နိုင်သမျှ စွမ်းအင်အသက်သာဆုံး Mode ကို အသုံးပြုပြီး မလို အပ်သော ပရင့်ထုတ်ခြင်း အားလုံးကို ရှောင်		ပန့်များအတွက်၊ သတ်မှတ်ထားသော အဆင့်သို့ရောက်သည့်အခါ မော်တာပိတ်သည့် Sensor များအသုံးပြုခြင်းသည် အရည် သို့မဟုတ် လေစီးဆင်းမှုကို ထိန်းချုပ် Valves များကို အစားထိုးနိုင်သော်လည်း မော်တာအား အချိန်တိုင်းလည်ပတ်နေစေမည်ဖြစ်သည်။ - စက်များအား မလည်ပတ်သည့်ကာလများတွင် ကာလများတွင် အင်ဂျင်ပိတ်ထားခြင်း။ - သယ်ယူပို့ဆောင်ခြင်းလမ်းကြောင်းတလျှောက် သုံးစွဲခဲ့သည့် လောင်စာဆီ (သို့မဟုတ်) မီးစက်အသုံးပြုမှု အသုံးပြုမှုကို မှတ်တမ်းတင် ထားရှိခြင်း ပြီး လောင်စာသုံး စွဲမှုသက်သာ စေမည့် နည်းလမ်းများအား ရှာဖွေခြင်း - ဝန်ထမ်းများအား စွမ်းအင်ထိန်းသိမ်းမှုဆိုင်ရာ အသိပညာ ပေးခြင်းကို မြှင့်တင်ခြင်း၊				

				ကြည်သင့်ပါ သည်။ – Photocopiers သုံးကွန်ပျူတာ၊ ပရင့်တာ၊ မော်နီတာများကို						
အမှတ်စဉ်	စီမံကိန်းအဆင့်/ထိခိုက်မှုပုံစံ	စီမံကိန်းလုပ်ငန်းစဉ်/ထိခိုက်မှုဧရိယာ	ထိခိုက်မှုအလားအလာ	လျော့ပါးသက်သာစေသော လုပ်ငန်းစဉ်များ	ကြွင်းကျန်မှုအန္တရာယ်	အသေးစိတ်လုပ်ငန်းဆောင်တာများ	လျော့ပါးသက်သာရေးလုပ်ငန်းစဉ်အတွက် တာဝန်ရှိသူများ	လျော့ပါးသက်သာရေးလုပ်ငန်းစဉ်အတွက်ကြီးြပ်ခြင်းဆိုင်ရာတာဝန်ရှိသူများ	အချိန်ကာလ	လိုအပ်ချက်များကို မှတ်တမ်းတင်ပြခြင်း
				ရုံးဆင်းချိန်တွင် ပိတ်ထားခဲ့ခြင်း၊ စွမ်းအင် အသက်သာဆုံး Mode ကို အသုံး ပြုပြီး တစုတဝေးတည်း ပရင့်ထုတ်ခြင်းကိုသာဆောင်ရွက်ရန် – မော်တာများကို အသုံးမပြုပါက ပိတ်ထားသင့်သည်။ အရည်၊ လေ သို့မဟုတ် ဓာတ်ငွေ့လည်ပတ်မှုစနစ်များရှိ ပန့်များအတွက်၊ သတ်မှတ်ထားသော အဆင့်သို့ရောက်သည့်အခါ မော်တာပိတ်သည့် Sensor များအသုံးပြုခြင်း သည် အရည်သို့မဟုတ် လေစီးဆင်းမှုကို ထိန်းချုပ် Valves များကို အစား ထိုး နိုင်သော်						

				လည်း မော်တာအား အချိန်တိုင်းလည်ပတ်နေစေမည်ဖြစ်သည်။ - လေ၊ရေ၊ ဓာတ်ငွေ့ လည်ပတ်မှုစနစ်များအတွက် Sensor များအသုံးပြုခြင်းဖြင့် အတိုင်းအတာတခု ထိရောက်သည့်						
အမှတ်စဉ်	စီမံကိန်းအဆင့်/ထိခိုက်မှုပုံစံ	စီမံကိန်းလုပ်ငန်းစဉ်/ထိခိုက်မှုဧရိယာ	ထိခိုက်မှုအလားအလာ	လျော့ပါးသက်သာစေးလုပ်ငန်းစဉ်များ	ကြွင်းကျန်မှုအန္တရာယ်	အသေးစိတ်လုပ်ငန်းဆောင်တာများ	လျော့ပါးသက်သာရေးလုပ်ငန်းစဉ်အတွက် တာဝန်ရှိသူများ	လျော့ပါးသက်သာရေးလုပ်ငန်းစဉ်အတွက်ကြီးြပ်ခြင်းဆိုင်ရာတာဝန်ရှိသူများ	အချိန်ကာလ	လိုအပ်ချက်များကို မှတ်တမ်းတင်ပြခြင်း
				အခါ မော်တာအား အလို အလျောက် ပိတ်သွား စေပြီး အရည်နှင့် လေ လည်ပတ်မှုကို ထိန်းချုပ်ပေးသော Valves များနေရာတွင် အစားထိုး နိုင်သည့်အပြင် Motor တချိန်လုံး လည်ပတ်မှု နှုန်းအား ကျစေပါသည်၊ - စက်များအား မလည် ပတ် သည့် ကာလ များတွင် အင်ဂျင်ပိတ်ထားခြင်း။ - သယ်ယူ ပို့ဆောင်ခြင်း လမ်းကြောင်းတလျှောက် သုံးစွဲခဲ့သည့် လောင်						

				စာဆီ (သို့မဟုတ်) မီးစက် အသုံး ပြု မှု အသုံးပြုမှုကို မှတ် တမ်းတင်ထား ရှိ ခြင်း ပြီး လောင်စာ သုံးစွဲမှု သက်သာ စေ မည့်နည်း လမ်း များ အား ရှာဖွေ ခြင်း၊ - ဝန်ထမ်းများအား စွမ်းအင်ထိန်း သိမ်းမှုဆိုင်ရာ အသိ ပညာပေး ခြင်းကို ဖြင့်တင်ခြင်း၊						
အမှတ် စဉ်	စီမံကိန်း အဆင့်/ထိခိုက် မှုပုံစံ	စီမံကိန်းလုပ် ငန်းစဉ်/ ထိခိုက်မှု ဇရိယာ	ထိခိုက်မှု အလားအလာ	လျော့ပါးသက်သာ ေး လုပ်ငန်းစဉ်များ	ကြွင်းကျန် မှု အန္တရာယ်	အသေးစိတ်လုပ်ငန်းဆောင်တာများ	လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက် တာဝန်ရှိသူများ	လျော့ပါးသက်သာရေး လုပ်ငန်းစဉ်အတွက်ကြီး ြပ်ခြင်းဆိုင်ရာတာဝန်ရှိ သူများ	အချိန်ကာလ	လိုအပ်ချက်မျ ားကို မှတ်တမ်း တင်ပြခြင်း
				- လျှပ်စစ်မီး မလုံ ခြုံခြင်းနှင့်ပတ်သက် သည့် တူညီသော လျှပ်စစ်ဓာတ် အား ပေးဝေမှု အရင်း အမြစ်ဖြင့် ဒေသခံ အသိုင်း အဝိုင်းထံမှ တိုင် ကြားမှုများကို စုံစမ်း စစ်ဆေးပြီး သင့် လျော်သလို ကိုင်တွယ် ဖြေရှင်း ခြင်း - တိုင်ကြားစာများ နှင့် နောက် ဆက် တွဲမှတ်တမ်းများကို သိမ်းဆည်း ထားပါ။ - လျှပ်စစ်မီး ရရှိမှု						

				အရင်း အမြစ်တူညီသော ဒေသခံများ ထံမှ အငြင်းပွား ဖွယ် မကျေနပ်ချက် အား ကိုင်တွယ် ဖြေရှင်းခြင်း၊						

ဇယား ၁.၇ ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးနှင့် လူမှုစောင့်ကြည့်လေ့လာရေး အစီအစဉ် (ဆောက်လုပ်ရေးနှင့် ပြုလုပ်ပုံ အဆင့်)

စီမံကိန်းအဆင့်/ အကျိုးသက်ရောက်သော 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 စီမံကိန်းနယ်နမိတ်မှ ၅၀၀ မီတာအတွင်း NSRsကို ခွဲခြားဖော်ထုတ်ခြင်း	၂၄ နာရီ	ဆောက်လုပ်ရေးကာလ အတွင်း လစဉ် (၆) လတကြိမ်
			ထုက်လုပ်ရေးလိုင်း (point source measurement)	၂၄ နာရီ	လုပ်ငန်းစဉ်မပြီးမြောက်သေးသရွေ့ လစဉ် (၆) လတကြိမ်

စီမံကိန်းအဆင့်/ အကျိုးသက် ရောက်သော အစိတ်အပိုင်း	အလားအလာရှိသော သက်ရောက်မှု	စောင့်ကြည့်ခံရန်အတွက် သတ်မှတ်ချက်များ	နေရာ	အတိုင်းအတာ	ကြိမ်နှုန်း
မြေပေါ်ရေ မြေအောက်ရေ မိုးရွာသွန်းရေ	ရေမျက်နှာပြင် ညစ်ညမ်းခြင်း	BOD_5, Active ingredients, Absorbable organic halogens, Ammonia, Arsenic, COD, Chlorinated Organics, Chromium, Copper, Mercury, Nitrorganics, Oil and Grease, pH, Phenol, Total Phosphorus, Total Suspended Solid, Zinc	၁) စွန့်ပစ်ရေအား ရေဆိုးစွန့် ပို့ဆောင်ရေကန် (Lagoon 1) 17°9'59.84"N 96° 4'37.16"E နှင့် ၂) ပြွန်ရေတွင်း နံပါတ် (၃) Tube well No. (3) 17°10'2.50"N 96° 4'35.71"E ၃) Factory Compound Outlet Point 17°10'9.92"N 96° 4'41.17"E တို့တွင် စောင့်ကြည့် သွားမည်ဖြစ် သည်။	သတ်မှတ်ထားသော ခွဲခြမ်းစိတ်ဖြာ နည်းလမ်းများ	လုပ်ငန်းစဉ်မပြီး မြောက်သေးသရွေ့ လစဉ် (၆) လတကြိမ်
လေထု	ဖုန်မှုန့်နှင့် အမှုန်များ ထုတ်လွှတ်မှု တိုးမြင့်ခြင်း ထုက်ကုန် ဖော်စပ်ရေး နည်းလမ်းစဉ်	Ammonia, gaseous inorganic chlorine compounds, Bromines, Cyanides, Fluorines, Hydrogen sulfide, Chloride, Chlorine, PM10, Total Organic Carbon, VOC	AQM1 Workplace Air Quality Monitoring Points assigned in Facility Area Point 1 at Office Point 2 at Ware house Point 3 at Production	AQM 1 Haz Dust Scanner (EPAS	ဆောက်လုပ်ရေးကာလ အတွင်း လစဉ် (၆) လတကြိမ်

စီမံကိန်းအဆင့်/ အကျိုးသက် ရောက်သော အစိတ်အပိုင်း	အလားအလာရှိသော သက်ရောက်မှု	စောင့်ကြည့်ခံရန်အတွက် သတ်မှတ်ချက်များ	နေရာ	အတိုင်းအတာ	ကြိမ်နှုန်း
			AQM 2 Stack Emission Point (1): Granules Production Point (2): Solvent and Liquid based Production Point (3): Powder Production	AQM 2 Monitoring instrument Mx-6	
			AQM 3 Fence Line- Fence line Monitoring Corner Point	AQM3 Haz Dust Scanner (EPAS)	

၁.၉ အကျဉ်းချုပ် နှင့် နိဂုံးချုပ် အကြံပြုချက်များ

- စီမံကိန်းတွင် ရန်ကုန်တိုင်းဒေသကြီး၊ မှော်ဘီမြို့နယ်တွင် တည်ရှိသည့် ဩဘာမှ စိုက်ပျိုးရေးဆိုင်ရာ ဆေးဝါးများဖျော်စပ်ထုတ်လုပ်သည့်စက်ရုံ HAIC တည်ဆောက်မှု နှင့် လည်ပတ်မှု တို့ပါဝင်ပါသည်။ စီမံကိန်းကို အပြည်ပြည်ဆိုင်ရာ ဘဏ္ဍာရေး ကော်ပိုရေးရှင်း (IFC) မှ ရန်ပုံငွေဖြင့် ဩဘာ၏ အဓိက စီးပွားရေးလုပ်ငန်းတိုးချဲ့ရန်အတွက် ဩဘာသို့ အမေရိကန်ဒေါ်လာ ၁၀ သန်းကို ပံ့ပိုးပေးခဲ့ပါသည်။

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

- ဒေသတွင်း ESIA ကို MONREC အတွက် ပြင်ဆင်ရေးသားခဲ့ပြီး လက်ရှိတွင် MONREC မှ ပြန်လည် သုံးသပ်လျက်ရှိ ပါသည်။ လည်ပတ်ရေးလုပ်ငန်းများမစတင်မီ ဩဘာအနေဖြင့် ခွင့်ပြုချက်ကို စောင့်ဆိုင်းရန် အကြံပြု ထားပါသည်။

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

- စီမံကိန်းလုပ်ငန်းခွင် နှင့် စီမံကိန်းလုပ်ငန်းခွင်နေရာအနီးဆုံးရှိ ရပ်ရွာများ၌ ပုံမှန် လေထု နှင့် ရေ တို့ကို စောင့်ကြည့် လေ့လာခြင်း။

- စီမံကိန်းဘက်သို့သွားရာလမ်းသည် စီမံကိန်းသုံး ယာဉ်များကြောင့် ပျက်စီးခဲ့ပြီး၊ ၎င်းလမ်းကို ဩဘာမှ နဂိုမူအနေ အထားအတိုင်းပြန်လည် ပြုပြင်ရန် အကြံပြုထားခြင်း။

- ဒေသခံများမှ အသုံးပြုရန်အတွက် တရားဝင်အကြံပြုတိုင်ကြားရေးဆိုင်ရာ လုပ်ထုံးလုပ်နည်းကို ရေးဆွဲခြင်း။

- ပုရွက်ဆိတ်ကုန်း၊ ကြိမ်နီစမ်း၊ ဘိုးဒေါနကုန်း နှင့် ရှမ်းကုန်းကျေးရွာတို့တွင် တိုင်ပင်ဆွေးနွေးမှု ပြုလုပ်ခြင်း နှင့် သတင်းအချက်အလက်များကို ထုတ်ဖော်တင်ပြခြင်း။

- အကြံပြုထားသည့် လျှော့ချရေးအစီအမံများကို 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 လျှော့ချရေးအစီအမံများ စနစ်တကျဆောင်ရွက်မှု ကို သေချာစေရန်၊ ပတ်ဝန်းကျင် နှင့် လူမှုဘဝ စီမံခန့်ခွဲမှုအစီအစဉ် (ESMP) တစ်ရပ် ကို စီမံကိန်းအတွက် ပြင်ဆင်ခဲ့ပြီး ဖြစ်ပါ

သည်။ ၎င်းတွင် စီမံကိန်း၏ တည်ဆောက်ရေးကာလ နှင့် လည်ပတ်ရေးကာလတို့အတွင်း လျှော့ချရေး လုပ်ငန်းများ သည် နှင့် ထိရောက်မှု ကိုက်ညီမှု ရှိ မရှိ ကို လေ့လာစောင့်ကြည့် စစ်ဆေးရန် အသုံးပြုရမည့် လုပ်ထုံးလုပ်နည်းများ နှင့် လုပ်ငန်းစဉ်များ ပါဝင်ပါသည်။ ထို့ပြင်၊ ယခု ESIA ကို ဥပဒေအရ သတ်မှတ်ချက်များ နှင့် အညီဖြစ်စေရန် နှင့် ဘေး ကင်းရေး နှင့် ပတ်ဝန်း ကျင်ဆိုင်ရာ မူဝါဒများနှင့်ပေါင်းစပ် သေချာစေရန် အသုံးပြုသွားမည် ဖြစ်ပါသည်။ ခြုံငုံဆိုရလျှင်၊ ESMP ကို စနစ်တကျ အကောင်အထည်ဖော်ဆောင်ရွက်ခြင်းဖြင့် လက်ခံ နိုင်ဖွယ်ရှိသော ပတ်ဝန်းကျင် နှင့် လူမှုရေး လုပ်ဆောင်မှုတို့နှင့် အညီ စီမံကိန်းကို တည်ဆောက် လည်ပတ်သွားမည်ဟု တွက်ချက်ထားပါသည်။

စီမံကိန်းတွင် တည်ဆောက်ရေးအဆင့် နှင့် လည်ပတ်ရေးအဆင့် ဆိုင်ရာ စောင့်ကြပ်ကြည့်ရှု စစ် ဆေးရေး အစီအစဉ်ကို လည်း စီမံကိန်းအတွက် ထည့်သွင်းသွားရန် လိုအပ်ပါသည်။ ၎င်းတွင် လေထု အရည်အသွေး၊ ဆူညံသံ၊ နှင့် ရေထု အရည်အသွေး ဆိုင်ရာ သက်ရောက်မှုများ ပါဝင်သွားမည် ဖြစ်ပါသည်။ ဤလျှော့ချရေးအစီအမံများ၏ ထိရောက်မှုကို ခြေရာ ခံနိုင်ရန် စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးမှုကို ဆောင်ရွက်အရေးကြီးပြီး၊ လိုအပ်သောအပြောင်းအလဲများကိုလည်း သင့်တော်သလို စီမံခန့်ခွဲ သွားရမည် ဖြစ်ပါသည်။

1 EXECUTIVE SUMMARY

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"). In 2019, AWBA repaid the Convertible loan to IFC and since then the project has been operating as a locally owned business (citizen-owned business).

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) or 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. On February 2018, Awba is 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) has been commissioned by Awba to undertake a supplemental Environmental and Social Impact Assessment (ESIA) in June 2019. In June 2023, Awba has also commissioned **Environmental Quality Management (EQM)** to revise this ESIA report in accordance with ECD's review. 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). Awba disclosed the information to local communities on the results of the ESIA Report in February 2018. Besides, the Executive Summary of the ESIA Report was provided to local communities and any other interested parties.

After 2019, Awba has been complying with the ESIA procedures in accordance with National Environmental Quality (Emission) Guidelines, 2015 stated by the Environmental Conservation Department, Ministry of Natural Resources and Environmental Conservation. Furthermore, according to the EIA procedure (2015), the project disclosure will be conducted publishing the final revised ESIA report on the company's web site (www.awba-group.com.) and National Newspapers, distributing the executive summary of ESIA report in Myanmar version to the local communities

(respective villages including Pa Ywat Sate Gone, Kyi Ni San, Poe Dana Gone and Shan Gone villages) and any other interested parties through VDAC and community volunteers within 1 month of approval period. In addition, the brochures of the project summary together with the names of the person who can be contacted by the community in case of any queries or grievances on the project activities will be circulated accordingly.

In detail plans are identified as follow:

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. Awba is planning publicly disclosure of project information to the local community through

1. Four local community volunteers
2. Six notice boards
3. VDA Committee
4. Telephone communication
5. Six Post boxes.
6. Disclosures in Newspapers
7. The brochures

1.1 PURPOSE AND OBJECTIVES OF THE ESIA STUDY

This ESIA report focused only on the impacts of agrochemicals including pesticides, herbicides, and fungicides manufactured by the Proposed Project which can likely effect on the natural environment, and socio-economic aspects of the community. 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 PROPONENT

Awba is the Myanmar's largest manufacturer and distributor of agricultural technology with a focus on crop protection as well as the leading group of companies in Myanmar in the agricultural sector. 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: 09-421111321
- Email: yaminthandar@pt-pyaezone.com
- Contact Person: Ms. Ya Min Thandar
- Website : www.awba-group.com

1.3 POLICY, LEGAL AND INSTITUTIONAL FRAME WORK

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

Yangon City Development Committee (YCDC) Law (2018)

- Yangon Region Fresh Water Fisheries Law (Yangon Region Hluttaw Law No.3,2013)

- The Law Relating to Aquaculture, 1989
- The Protection of Biodiversity and Conservation Areas Law 2018

- The Factories Act, 1951 (Amended in 1953, 1954, 1962, 2016)

- The Constitution of the Republic of the Union of Myanmar (2008);

- Myanmar Environmental Conservation Laws (2012);

- Environmental Conservation Rules (2014);

- National Environmental Quality (Emission) Guideline (2015);

- Public Health Law (1972);

- The Prevention and Control of Communicable Disease Law (1995);

- Fresh Water Fisheries Law (1991 Section 40);

- The Underground Water Act (1930);

- Conservation of Rivers, Creeks and Water Resources Law, 2006 (Section 24 (b),21(a)(b), 19, 11(a) (b));

- The Prevention of Danger of Hazardous Chemical and related Substances Law, 2013 (Section 16,17,23,27)

HAIC strongly commits that the operation will be performed in accordance with The Environmental Conservation Law (2012), Environmental Impact Assessment Procedure and National Environmental Quality (Emission) Guideline (2015) and

other project related laws through the implementation of mitigation measures revealed in EMP of this report. (EIA of the Hmawbi Agricultura Input Complex).

1.4 PROJECT DESCRIPTION

The Project involves the construction and operation of the HAIC, which is located in the Hmawbi Township of Yangon Region. The HAIC (Hmawbi Agricultural Input Complex) is a facility designed to produce various types of agricultural inputs, including pesticides, herbicides and fungicides. These products are formulated using different techniques to create specific types of formulations that are suitable for different applications.

Emulsifiable Concentrate (EC). EC formulations are commonly used for pesticides and herbicides. They are made by mixing the active ingredient with a solvent, which creates a liquid concentrate that can be diluted with water before use. The liquid formulation is produced using a formulation vessel with a capacity of 6,000 litres, where 3,000 litres of raw materials are added and Mix to create the finished product. All the raw materials and finish products are delivered in drums for easy transportation and handling.

Soluble Liquid (SL). SL formulation contains three main ingredients - active ingredients, wetter, and water. The active ingredients are the key component of the formulation, as they provide the desired pesticidal or herbicidal effect. The wetter or surfactant is added to help the formulation spread evenly and stick to the surface of the plants. Water is used as a solvent to dissolve the active ingredients and to create the final liquid formulation. The liquid formulation is produced using a formulation vessel with a capacity of 5,000 litres, where 2,000 litres of raw materials are added to create the finished product. Similar to EC formulation, all the raw materials are delivered in drums, and the finished product is packed into drums for easy storage, transportation, and handling.

Suspension Concentrate (SC). SC formulation contains several main ingredients including active ingredients, wetting agent, dispersant, thickener, antifreeze agent, anti-form agent, preservative, and water. The SC formulation is a liquid and solid mixing formulation that is produced using 2,000 litre formulation vessels and wet milling machines. This type of formulation typically requires the use of a wet milling machine to ensure that the solid components are well dispersed and suspended evenly in the liquid. Similar to other liquid formulation, all the raw liquid materials are delivered in drums and solid raw materilas are deliver in bags, and the finished product is packed into drums for easy storage, transportation, and handling.

Wettable Powder (WP). WP formulation contains several main ingredients, including active ingredients, absorbent/carrier, wetting agent, and dispersant. The WP formulation is a solid formulation produced using a 500kg mixing hopper and a micronizer to reduce the particle size of the product. This type of formulation typically requires the use of a micronizer to ensure that the particle size of the formulation is suitable for its intended use.As with the previous formulations, raw

materials for the WP formulation are delivered in bags and the finished product is packed in 25kg and 50kg bags for easy storage, transportation, and handling of the formulation.

Soluble Powder (SP). SP formulation process is similar to the WP formulation process, but with the key difference being that the active ingredients in the SP formulation are dissolved in water. This means that the SP formulation is a solid formulation that is designed to dissolve easily in water, forming a liquid solution that can be applied to the target surface. This means that the SP formulation is a solid formulation that is designed to dissolve easily in water, forming a liquid solution that can be applied to the target surface. As with the WP formulation, the SP formulation is a solid formulation produced using a mixing hopper and a micronizer to reduce the particle size of the product. Raw materials for the SP formulation are delivered in bags, and the finished product is also typically packed in bags.

Granular Formulation (GR). The product is in solid form and consists of active ingredients, sands, water, glue, and dye solution. The main production steps include chemical coating, drying, sieving, and packaging. After mixing in a mechanical mixer, the product mixtures are dried using a dryer tunnel, and the size of the product particle is separated under vibration. The finished product is then packed into 1 kg sachets using a packaging machine and placed into carton boxes, with 10 sachets per box, for distribution in the market. The production of GR involves several steps to ensure the quality and consistency of the final product. The chemical coating is a crucial step to ensure the active ingredients are evenly distributed throughout the granules. Drying is essential to remove any excess moisture, which can affect the stability and shelf life of the product. Sieving is done to separate the granules into a specific size range, which can be important for efficient application in the field. Finally, packaging is done to protect the product during transportation and storage.

HAIC has a policy of not purchasing, storing, using, manufacturing, or trading any agrochemical product that falls under the WHO class IA, which is considered extremely hazardous. Instead, the company will only manufacture or trade agrochemical products that fall under class II (moderately hazardous) and class III (slightly hazardous), including pesticides. This indicates the company's commitment to safety and environmental responsibility.

The plant where the agrochemical products are manufactured is designed to produce both solid and liquid products. In the first phase of production, which started in 2017, the plant is expected to have a capacity of producing 16 million litres/kilograms per annum of agrochemical products. The production capacity had increased to 30 million litres/kilograms per annum in 2020 due to growing demand from Myanmar's agriculture industry.

In addition to the production and formulation facilities, HAIC will also have laboratory, utility, workshop, warehouse, office, and security facilities, as well as a car park, staff accommodation, and canteen to support the operations of the plant.

The construction of the HAIC will be done in three phases, and as of May 2017, construction had started for Phase 1. The construction phase was completed in 2020.

1.5 ENVIRONMENTAL CONDITION

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.

One of the descriptions of the baseline environmental conditions near the surrounding environment of the HAIC project, climate and meteorology sector, has been described in the chapter 5 of ESIA report with the suggestions of baseline climatological data such as average temperature, relative humidity, wind speed and rainfall.

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 PM_{10}, $PM_{2.5}$, NOx, NO_2, and SO_2.

The results from the monitoring indicated that ambient concentrations of NOx, NO_2 and SO_2 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 gas pollutants.

Ambient concentrations of $PM_{2.5}$ and PM_{10} were measured using a Haz-Scanner Environmental Perimeter Air Station (EPAS) over the 24-hour period for each location. The data collected indicateds that ambient concentration of $PM_{2.5}$ met the air quality guideline except the air quality at AQM1 (Wah Net Chaung) and AQM3 (near the Project Site) which did not meet the guideline. . On average across the AOI, the $PM_{2.5}$ concentration met the air quality guideline . Therefore, the airshed can be classified as non-degraded for $PM_{2.5}$ 24-hour period survey. The monitoring results for PM_{10} indicated that ambient concentrations met the air quality guideline 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.

1.6 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	Village	Government (19), Local Community

Date	Location	Venue	Attendees
Scoping Phase			
	Chaung	monastery	(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)
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
Consultation & Information Disclosure 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. 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. Awba is planning publicly disclosure of project information to the local community through	The Regulatory EIA Report will have a Myanmar language executive summary to ensure information is easily available to local communities. Awba will undertake further disclosure and consultation in Pa Ywet Sate Kone, Kyi Ni San, Poe Dana Kone, and Shan Kone villages.

Key Comments Received and Response	Consideration for Supplementary ESIA
1. Four local community volunteers 2. Six notice boards 3. VDA Committee 4. Telephone communication 5. Six Postboxe 6. Disclosures in newspapaer 7. Distribution of the brochures	
Public Health & Safety The key concern related to public health and safety impacts specifically from air and wastewater emissions. These also included concerns related to unplanned events. During rainy season, some villagers from the AOI use the Hmawbi River and Htan Ta Pin River for domestic and drinking purposes although villages do not use the water resource of the Sabagyi creek.	This Supplementary ESIA will assess the impact on Public Health and Safety from air and noise emissions. The baseline survey results from air, noise, soil, and water will be disclosed to the community for their reference.
Monitoring and Auditing Transparency of the monitoring and auditing process during operation was of key importance to the stakeholders.	The grievance mechanism and future disclosure will be provided to all PAPs in the area.
Use of Existing Infrastructure 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.	The access road to Hmawbi site is a public road which is under the management of the government. Awba has acknowledged receipt of this complaint through its Community Grievance Mechanism. Follow-up corrective action should be discussed between the respective road authority, the factories currently using the roads and local community. .
Current Activities / Historic Activities Some people in Nyaung Kone reported a smell coming from the current operations or store at the Project Site. In addition, one main concern was historic contamination from the existing industrial park and factories.	Awba has investigated the odour complaint from the operation of the existing facility through their community grievance mechanism. Although the actual source of the odour is difficult to identify, Awba has implemented a series of mitigation measures to minimise

Key Comments Received and Response	Consideration for Supplementary ESIA
	odour such as; a confined partition room for solid production, and a scrubber system at 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. The activities in the Community Grievance Procedure such as Corporate Social Responsibility (CSR), ESIA, accidental events, job opportunities, land issue, pollution, relocation, road damage, village information and waste management are implemented in compliance with sections, sub-sections of Myanmar Investment Law (2016) as 51(a,b,c,d,e,f), 65(b,c,d,i) and 190 rules of Myanmar Investment Rue (2017).

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 which is under the management of the government. Awba has acknowledged receipt of this complaint through its Community Grievance Mechanism. Follow-up corrective action should be discussed between the respective road authority, the factories currently using the roads and local community. According to the local village representatives from the review team at the HAIC office, HAIC has from time to time provided financial support for village road construction under the CSR work program, and if the Wanet Chaung road is repaired, it will participate with other communities as part of the CSR process.
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.

1.7 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	− Implement monitoring system. − Apply intensive dust suppression methods. − Emissions in line with Myanmar Standards (NEQ Guidelines) and	**Minor**

Impact	Summary of Mitigation	Residual Impact Significance
	international guidelines.	
Impacts from Noise	− 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	− 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	− As per water quality impacts above.	**Negligible**
Community Health and Safety	− 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	− None recommended.	**Positive**
Occupational health and safety	Ventilation systems, and life and fire safety systems in the buildings	**Minor**
Impacts to Biodiversity	− Limit clearance of land and re-establish vegetation where possible.	**Minor**

Impact	Summary of Mitigation	Residual Impact Significance
	− Potential re-instatement of vegetation on site.	
Infrastructure services	− Road Transport Management Plan. − Community Grievance Mechanism.	**Minor**
Accidental Events	− 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**

1.8 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	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

Management Plans	Key Objectives and Content
	following elements: 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.
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 stak8eholders 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. The Environmental Management Plans, which include mitigation measures for environmental polluting activities are listed in Table 1.6. A comprehensive monitoring plan for each performance indicator has been prepared for all phases of the Project and is presented in *Table 1-7*.

Table 1-6 Environmental Management plan employed by Awba to mitigate adverse environmental impacts

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
9.1	Air Quality	Air emissions from production formulation process	Deteriorate to air quality	- Provision of local exhaust ventilation system connected to process stacks; - Provision of pollution control systems (dust collector and scrubber system) for the process emissions - Operation as per work instructions (SOP); and - Regular maintenance and monitoring of scrubbers. - For road dust control, water suppression on the unpaved dirt roads - Respiratory PPE should be worn while working in the	Minor	■ Provision of local exhaust ventilation system connected to process stacks; ■ Provision of pollution control systems for process stacks; ■ Operation as per **work instructions (WI)** or **Standard Operation Procedure (SOP)**; and ■ Regular maintenance and monitoring of scrubbers - For road dust control, water suppression on the unpaved dirt roads - Respiratory PPE should be worn while working in	Appointed Operations team for mitigation measures and implementation	On site Project Management team and designated EHS team	Throughout the operational phase	Monthly report to the Awba

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				place with high potential air born hazard		the place with high potential air born hazard				
9.2	Air Quality	Fugitive emissions from Production Line and Hazardous Chemical Storage areas		- Reduce fugitive emissions through proper engineering control and technical modification (for example: controlling emissions through upgrading and modifying valve designs) - Regularly monitor the system for leaks using a reliable method of leak detection (leaks of fugitive emissions can be detected or located using standard bubble emission techniques ASTM E515-11(2022)) - Preventive	Minor	- Reduce fugitive emissions through proper engineering control and technical modification (for example: controlling emissions through upgrading and modifying valve designs) - Regularly monitor the system for leaks using a reliable method of leak detection ■ HAIC (Awba) should develop and implement Hazardous Material Management Plan and shall adhere to it in terms of	Appointed Operations team for mitigation measures and implementation	On site Project Management team and designated EHS team	Throughout the operational phase	Monthly report to the Awba

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				maintenance practices should be incorporated into operations and maintenance practices to reduce fugitive emissions - Control the emissions through adequate work practices (workers ensure that their work practices adhere to the objective of achieving fugitive emissions protection) - Make sure the employees wear adequate PPE and respirators while working in the industry to prevent airborne hazards - Employee training in proper		storage management and control ■ Conduct regular Hazardous material storage inspections; ■ Workers training in hazardous material handling and storage; and ■ Work permit system to handle hazardous materials - Control the emissions through adequate work practices (workers ensure that their work practices adhere to the objective of achieving fugitive emissions protection) - Make sure the employees wear adequate PPE and				

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				respirator uses and potential reparable hazards - Workplace pulmonary functioning test for selected workers with a high potential to expose to respiratory hazards - Make sure the hazardous materials and wastes are stored and handled as per described in Hazardous material management plan to control accidental release of fugitive emissions - Apply water suppression for fugitive dust and other loose particulate matters PM on the unpaved dirt road		respirators while working in the industry to prevent airborne hazards - Apply water suppression for fugitive dust and other loose particulate matters PM on the unpaved dirt road				

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
9.3	Noise	Operation of fixed plant and machinery during operational phase	Increase in ambient noise levels	□ 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	Minor	□ 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; □ 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	Appointed Operations team	On site Project Management team and designated EHS team	Throughout the operational phase	

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				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 biannually at the NSRs within 500 m from the Project boundary as shown in Figure 5.14. These will be measured for 24-hours.		operation , ambient noise levels in Leq, Leq day, Leq night and hourly Leq will be measured biannually at the NSRs within 500 m from the Project boundary as shown in Figure 5.14. These will be measured for 24-hours.				

Item no	**Project Stage/ Affected Aspect**	**Project Activity and Affected Area**	**Potential Impacts**	**Mitigation Measures**	**Residual Risk**	**Specific Actions**	**Responsibility for Mitigation Implementation**	**Responsibility for supervision of mitigation implementation**	**Schedule**	**Reporting Requirement**
9.4	Surface, Ground Water Quality and Effluent	Uncontrolled runoff, improper wastewater, solid waste and hazardous material management at the site, affecting surface water quality of watercourse.	Impact to surface water quality	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: □ Discharges from the production process should be treated and monitored biannually for compliance with effluent levels specified in NEQEG guideline (2015). □ Sewage from the operation workforce should be treated on-	Minor	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. Additional measures are □ Discharges from the production process should be treated and monitored biannually for compliance with effluent levels specified in NEQG Guidelines for Pesticide	Appointed Operations team for mitigation measures and implementation 3rd Party Environmental Consultant for monitoring & audit	On site Project Management team and designated EHS team	Throughout the operational phase	Monthly report to the Awba

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				site by a septic tank and seepage field properly designed and maintained according to EQEG guideline (2015).WBG Genera 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		Manufacturing, Formulation and Packaging. □ Sewage from the operation workforce should be treated on-site by a septic tank. - 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 Biannually for compliance with Myanmar National Environmental Quality (Emissions) Guidelines for site runoff and				

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				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		wastewater discharges (for TSS, oil and grease, pH). □ 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. □ An Operational Phase Monitoring Plan should be required for the Project which will include				

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				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		wastewater discharge point and groundwater quality (including Tube well No.3) to determine the potential impact of surface water and groundwater respectively due to the Project operation. Besides, the effluent discharge point from lagoon 1 to lagoon 2 receiving the overflow will be monitored along with the above surface and ground water monitoring. The storm water discharge point: the final discharge of				

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				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		all drains will be monitored				

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				quality.						
9.5	Ground Water Resources and Public water supply	Use of groundwater for Project Operation	Groundwater resource depletion due to over exploitation for Project water supply Negatively affect the groundwater accessibility of these local community threatening the water security of the local community	- Determine the sustainable yield of the major aquifer by conducting groundwater pumping tests and monitor the groundwater productivity/recharge rate over time in order to detect any imbalance of groundwater recharge throughout operation - Perform artificial aquifer recharge enhancement using treated wastewater. The treated wastewater in the Lagoons can infiltrate to the ground and thereby recharge the	Minor	. Perform artificial aquifer recharge enhancement using treated wastewater. The treated wastewater in the Lagoons can infiltrate to the ground and thereby recharge the groundwater) (Briefing Note Series for Groundwater Management, World Bank, 2002) However, in order to accomplish the uses without deleterious environmental consequences, the groundwater quality nearby the Lagoon should be monitored on a	Appointed Operations team for mitigation measures and implementation	On site Project Management team and designated EHS team	Throughout the operational phase	Monthly report to the Awba

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				groundwater) (Briefing Note Series for Groundwater Management, World Bank, 2002) However, in order to accomplish the uses without deleterious environmental consequences, the groundwater quality nearby the Lagoon should be monitored on a regular basis. - Implement/adopt efficient water consumption management measures to manage and protect the water resources. These will include (but not limited to) - A detailed water		regular basis. - Implement/adopt efficient water consumption management plan and HAIC should adhere to that plan. - Opportunities for improvement in water use efficiency will be identified and implemented; • Optimize water distribution system and early water detection. • Water meters should be installed to measure the water consumption				

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				balance will be developed, maintained, monitored and reported periodically; • Specific water use (measured by volume of water used per unit production) will be assessed; and • Operations must be benchmarked to available industry standards of water use efficiency. - Opportunities for improvement in		rate by the facility over a period of time. Water meters measure the amount of water being supplied to the facility, while sub meters measure usage for specific activities such as process use, or landscape water use. • Identifying appliances which consume				

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				water use efficiency will be identified and implemented; • Optimize water flow and early water detection. • Water meter should be installed to measure the water consumption rate by the facility over a period of time. Water meters measure the amount of water being supplied to the facility, while sub meters		huge amounts of water and identifying appliance failures, water leakage and damage and substituting with water saving appliances/equipment, it can result in significant long-term water savings. - Engage and educate employees about industrial water conservation - Perform 3 Rs (Reduce, Reuse and				

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				measure usage for specific activities such as process use, or landscape water use. • Identifying appliances which consume huge amounts of water and identifying appliance failures, water leakage and damage and substituting with water saving		Recycle) policy in water use such as use of treated wastewater for gardening works, for process washing, industrial fire protection etc. - Installation of alternatives sources for Project water supply such as rainwater harvesting and use of municipal piped water to avoid depleting the resource to the detriment of other users. - Investigate any complaints/ abnormal event of groundwater wells (within 30 m)				

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				appliances/equipment, it can result in significant long-term water savings. - Engage and educate employees – • Every employee has a responsibility to play in water usage. Make certain that they are educated and informed about water conservation and follows the water consumption management practices - Perform 3 Rs (Reduce, Reuse and		depletion in nearby villages and handle appropriately. Keep records of complaints and follow-up. - - An Operational Phase Monitoring Plan should be required for the Project which will include groundwater quality (Tube well 3. New) which is nearest to the WWTP to determine the potential impact of groundwater quality due to the WWTP (artificial water recharge)				

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				Recycle) policy in water use such as use of treated wastewater for gardening works, for process washing, industrial fire protection etc. - The use of alternative water supplies, water consumption offsets to maintain total demand for water resources within the available supply, and evaluation of alternative project locations: • Installation of alternatives sources for Project water supply such as rainwater harvesting						

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				and use of municipal piped water to avoid depleting the resource to the detriment of other users. - Investigate any complaints/ abnormal event of groundwater wells (within 30 m) depletion in nearby villages and handle appropriately. Keep records of complaints and follow-up. - An Operational Phase Monitoring Plan should be required for the						

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				Project which will include groundwater quality (Tube well 3. New) to determine the potential impact of groundwater quality due to the WWTP (artificial water recharge)						
9.6	Soil Quality	Improper solid waste and hazardous material management at the site	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. □ Debris and refuse generated on-site should be collected, handled and disposed of properly.	Negligible	- Hazardous waste should be managed properly. - Set up spillage containment system	Appointed Operations team	On site Project Management team and designated EHS team	Throughout the operational phase	Monthly report to the Awba

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				□ Oils, fuels and chemicals should only be used and stored in designated areas which have pollution prevention facilities.						
9.7	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	Negligible	Solid waste should be managed properly.	Appointed Operations team	On site Project Management team and designated EHS team	Throughout the operational phase	Monthly report to the Awba
9.8	Community Health and Safety	Project activities, increased traffic activity as well as	Impacts to community health and safety	Please refer to **Item 8.6** above for mitigation measures recommended. A number of mitigation measures	Minor	Please refer to **Item 8.6** above for mitigation measures recommended. Additional actions	Appointed Operations team	On site Project Management team and designated CSR team	Throughout the operational phase	Monthly report to the Awba

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
		environmental impacts to air quality, noise, surface water quality and soil quality from the Project		could be adopted to reduce impact on community health and safety, these measures may include the following: □ 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		to be measured include: □ Awba should prepare and implement a Community Grievance Mechanism. □ Awba should develop a Safe Vehicle Policy and Training Safety Procedure for its own transport fleet, including provisions for safe agro-chemical and hazardous waste transport.				

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				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).						
9.9	Occupational Health and Safety	Operational activities as well as workers camp. Fugitive emission released during process activities and	Impacts to occupational health and safety	Please refer to **Item 8.6** and **Item 9.1.2** above for mitigation measures recommended. A number of measures should be adopted to reduce impacts to occupational health and safety: □ Ventilation systems and life and fire safety systems in	Minor	Please refer to **Item 8.6** and **Item 9.1.2** above for mitigation measures recommended. Additional numbers of measures recommended are □ Ventilation systems and life and fire safety systems in all buildings.	Appointed Operations team	On site Project Management team and designated EHS and CSR teams	Throughout the operational phase	Monthly report to the Awba

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
		hazardous materials handling and storage		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).		□ Adequate PPE and suction hoods will be used to collect vapours and other fugitive emissions. □ HAIC should 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.				

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
9.10	Economy and Livelihoods	Contractual employment is expected to increases and increase in business of local shops	Livelihood opportunities (positive impacts)	Employ qualified local workers whenever possible. Purchase local supplies and services with required specifications, whenever possible.	Positive	Employ qualified local community as the factory's workers and purchase local supplies and services.	Appointed Contractor	On site Project Management team and designated CSR team		Monthly report to the Awba
9.11	Infrastructure Services	Project traffic and immigration of workers	Completion of infrastructures with local communities	Please refer to Item 8.6 above for mitigation measures recommended.	Negligible	Please refer to Item 8.6 above for mitigation measures recommended.	Appointed Operations team	On site Project Management team and designated EHS and CSR teams	Throughout the operational phase	Monthly report to the Awba
9.12	Accidental Events – Leaks and Spills	Unplanned Spills	Contamination to water course and impact to human health	Development of an Emergency Preparedness and Response Plan, including for transport and sale depots (as per Myanmar/Awba (#35880) – Environmental and Social Action Plan	Moderate	Development of an Emergency Preparedness and Response Plan, including for transport and sale depots. Fuel tanks and chemical storage areas should be provided with locks	Appointed Operations team	On site Project Management team and designated EHS team	Throughout the operational phase	Monthly report to the Awba

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				(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		and be sited on sealed areas. Establishment of secondary containment for fuel storage and hazardous materials □ 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				

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				event. □ Surface run off from bunded areas should pass through oil/grease 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		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.				

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				be established for immediate clean up actions following any spillages of oil, fuel or chemicals.						
9.13	Accidental Events –Fire	Accidental Events – Fire	Health and safety risk to workers and local community.	□ 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	Moderate	□ HAIC should install fire protection system to all buildings as a norm including office building, laboratory building, warehouse, EC Building, SL Building, WP Building, SP Building, SC Building, GR Building Utility Building, Drum Crusher Building to mitigate fire risk during operation of the Project. □ HAIC should develop Emergency	Appointed Operations team	On site Project Management team and designated EHS team	Throughout the operational phase	Monthly report to the Awba

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				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.		Response and Preparedness Plan pertaining fire risk management measures and protocols in compliance with Myanmar National Guidelines. □ 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 internally and externally in collaboration with related Fire Department.				

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
9.14	Natural resource (Energy resource) and Pubic electricity supply	Energy consumption during Project operation	Natural resource depletion (Non-renewable) due to over exploitation of fossil fuels for power generation and direct usage of fuel in industrial activities Negatively affect the electricity share of local community and can	(1) Develop and establish the energy consumption management plan to reduce the usage of electricity and enhance the energy efficiency in the facility. Some energy consumption management measures from this plan are as follows: • Design and modify the building and equipment design into energy and environmental friendly, for example in order to save the electricity	Minor	HAIC should develop and adhere to internal energy consumption management plan to save energy use and seek any opportunity for energy efficiency. Some electricity and fuel saving measures are as follows: - Not all areas of a building should be lighted all of the time. Automatic controls and sensors can be deployed to match lighting provision to need. - Reducing the lighting levels	Appointed Operations team	On site Project Management team and designated EHS team	Throughout the operational phase	Monthly report to the Awba

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
			happen electricity insecurity to the local community	use for lighting purposes, the following measures are recommended; - Not all areas of a building should be lighted all of the time. Automatic controls and sensors can be deployed to match lighting provision to need. - Reducing the lighting levels where there is over lamping. -		where there is over lamping. - Implementing more energy-efficient Light Emitting Diode (LED) lighting to save electricity. - Photocopiers - always make sure that copiers are switched off out of office hours. Enable all energy-saving standby features and encourage staff to do their copying in batches and avoid all unnecessary copying. • For power consuming office equipment, such as computers, printers, photocopiers and				

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				Implementing more energy-efficient Light Emitting Diode (LED) lighting to save electricity • For power consuming office equipment, such as computers, printers, photocopiers and monitors - ensure that monitors are switched off when users are away from their desks for a		monitors - ensure that monitors are switched off when users are away from their desks for a period. Always switch off computers and monitors at the end of the day unless they need to remain on. - Printers - as with computers, switch off all printers at the end of the day. When printing, use the most energy-efficient mode possible and avoid all unnecessary printing. - Photocopiers - always make sure that copiers are				

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				period. Always switch off computers and monitors at the end of the day unless they need to remain on. - Printers - as with computers, switch off all printers at the end of the day. When printing, use the most energy-efficient mode possible and avoid all unnecessary printing.		switched off out of office hours. Enable all energy-saving standby features and encourage staff to do their copying in batches and avoid all unnecessary copying. - Motors should be turned off when they are not in use. For pumps in liquid, air or gaseous circulation systems, the use of sensors that switch off a motor when a certain level is reached can substitute for valves that control liquid or airflow but keep the motor running at all times.				

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				- Photocopiers - always make sure that copiers are switched off out of office hours. Enable all energy-saving standby features and encourage staff to do their copying in batches and avoid all unnecessary copying. • Motors should be turned off when they are not in use. For pumps in liquid, air or		• Engine shut down during periods of inactivity of machines. • Record the feed data about fuel consumption during transportation and or during the operation of generator sets and find the opportunity to save fuel usage in these activities • Promote employee education on energy conservation awareness				

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				gaseous circulation systems, the use of sensors that switch off a motor when a certain level is reached can substitute for valves that control liquid or airflow but keep the motor running at all times. • Engine shut down during periods of inactivity of machines. • Record the feed data about fuel consumption						

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				during transportation and or during the operation of generator sets and find the opportunity to save fuel usage in these activities • Promote employee education on energy conservation awareness (2) Investigate any complaints from the local community with the same source of electricity supply related to electricity insecurity and						

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				handle appropriately. Keep records of complaints and follow-up.						

Table 1.7 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 Biannually during Operation
			Production line (point source measurement)	24-hour	Monthly until completion of operation Biannually during Operation

Project Stage/ Affected Component	Potential Impact	Parameters to be Monitored	Location	Measurements	Frequency
Surface Water Ground Water Storm Water	Contamination of surface water.	$BOD_{5,}$ Active ingredients, Absorbable organic halogens, Ammonia, Arsenic, COD, Chlorinated Organics, Chromium, Copper, Mercury, Nitrorganics, Oil and Grease, pH, Phenol, Total Phosphorus, Total Suspended Solid, Zinc	1) WWTP discharge/ outlet point (lagoon 1) 17°9'59.84"N 96° 4'37.16"E 2) Groundwater monitoring well (Tube well no.3) 17°10'2.50"N, 96° 4'35.71"E 3) Factory Compound Outlet Point 17°10'9.92"N 96° 4'41.17"E	Standard analytical methods.	Biannually during Operation
Air	Increase in emissions of dust and particulates, Production Formulation Process	Ammonia, gaseous inorganic chlorine compounds, Bromines, Cyanides, Fluorines, Hydrogen	AQM1 Workplace Air Quality Monitoring Points assigned in Facility Area Point 1 at Office Point 2 at Ware house Point 3 at Production	AQM 1 Haz Dust Scanner (EPAS	Biannually during Operation

Project Stage/ Affected Component	Potential Impact	Parameters to be Monitored	Location	Measurements	Frequency
		sulfide, Chloride, Chlorine, PM10, Total Organic Carbon, VOC	AQM 2 Stack Emission Point (1): Granules Production Point (2): Solvent and Liquid based Production Point (3): Powder Production	AQM 2 Monitoring instrument Mx-6	
			AQM 3 Fence Line- Fence line Monitoring Corner Point	AQM3 Haz Dust Scanner (EPAS)	

1.9 SUMMARY AND CONCLUSIONS

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.

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"). AWBA repaid the Convertible loan to IFC and since then the project has been operating as a locally owned business (citizen-owned business).

MYANMA AWBA GROUP CO., LTD.
(AGRICULTURAL PRODUCTS FACTORY , HMAWBI)
INVESTMENT

Schedule - 9
Kyat in Million

Sr No	Particulars	Kyat	US$	Kyat
	Investment Type			
1	**(To be Imported)**			
	(a) Machinery & Equipment		6.1000	7,320.00
	(b) Vehicles		0.2250	270.00
	(c) Electrical Equipment		0.1250	150.00
2	**(Local Purchase)**			
	(a) Building	7,877.50		7,877.50
	(b) Electrical Equipment	450.00		450.00
	(c) Road & Infrastructure	300.00		300.00
	(d) Vehicles	724.00		724.0000
3	Cash	200.00		200.00
	TOTAL CAPITAL	9,551.50	6.4500	17,291.50

Exchange Rate
US$ 1 = K.1200/-

Figure 2-1; The Investment type of Agricultural Products Factory, Hmawbi Investment

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 : 09-421111321
- Email: yaminthandar@pt-pyaezone.comContact Person: Ms. Ya Min Thandar
- Website : www.awba-group.com

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	MSc 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

Name	Organisation	Academic Experience	Years' Experience	Area of Expertise
Stuart Mackenzie	ERM	BSc Environmental Geography	10	Waste Management
Piers Touzel	ERM	MBA Business Administration	15	Facilitation of meeting, Socio-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	MSC 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.

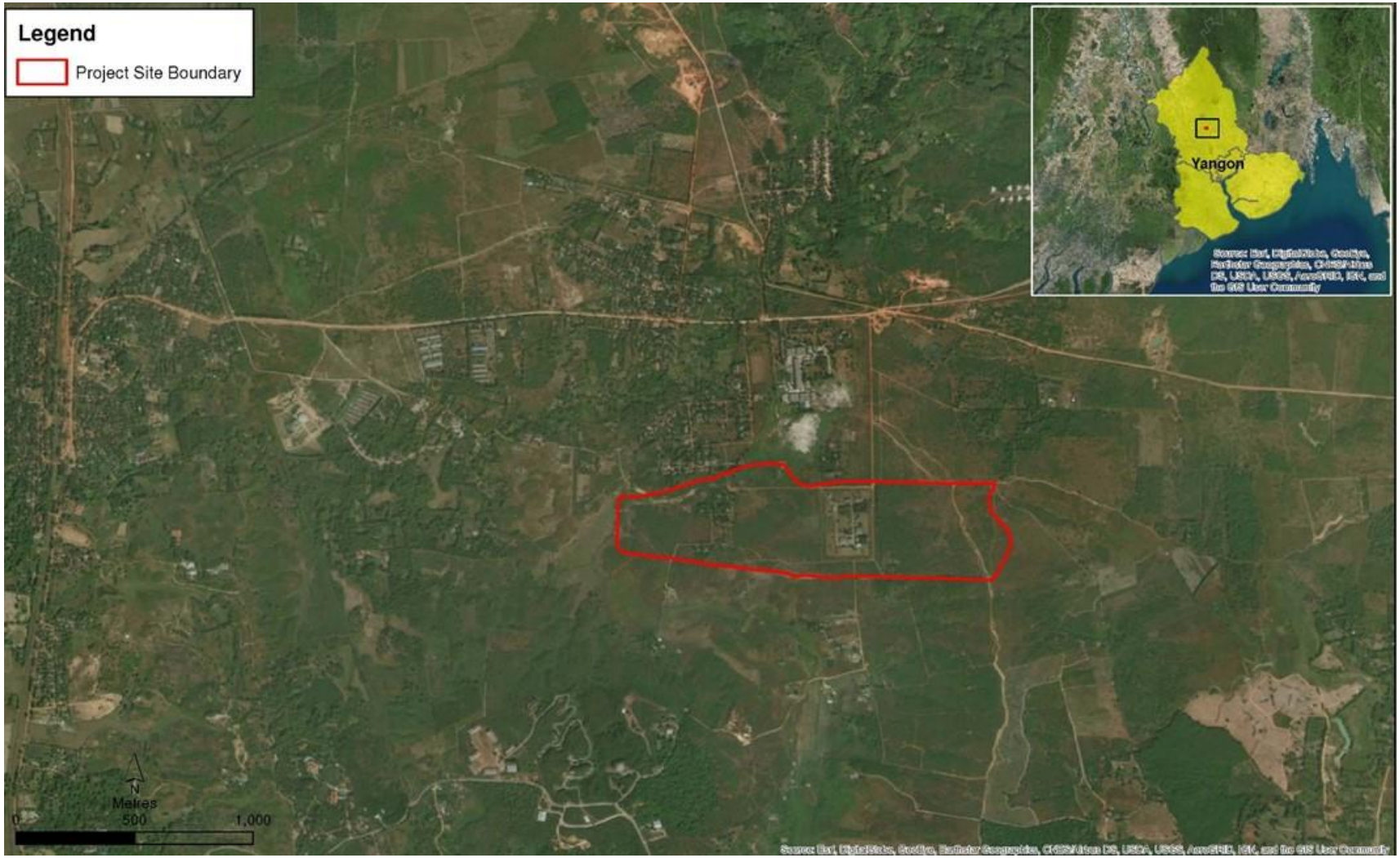
Specifically, the objectives of the ESIA are:

- 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



3 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

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

- Myanmar National Environmental Quality (emissions) (NEQ) Guidelines (2015);
- 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).

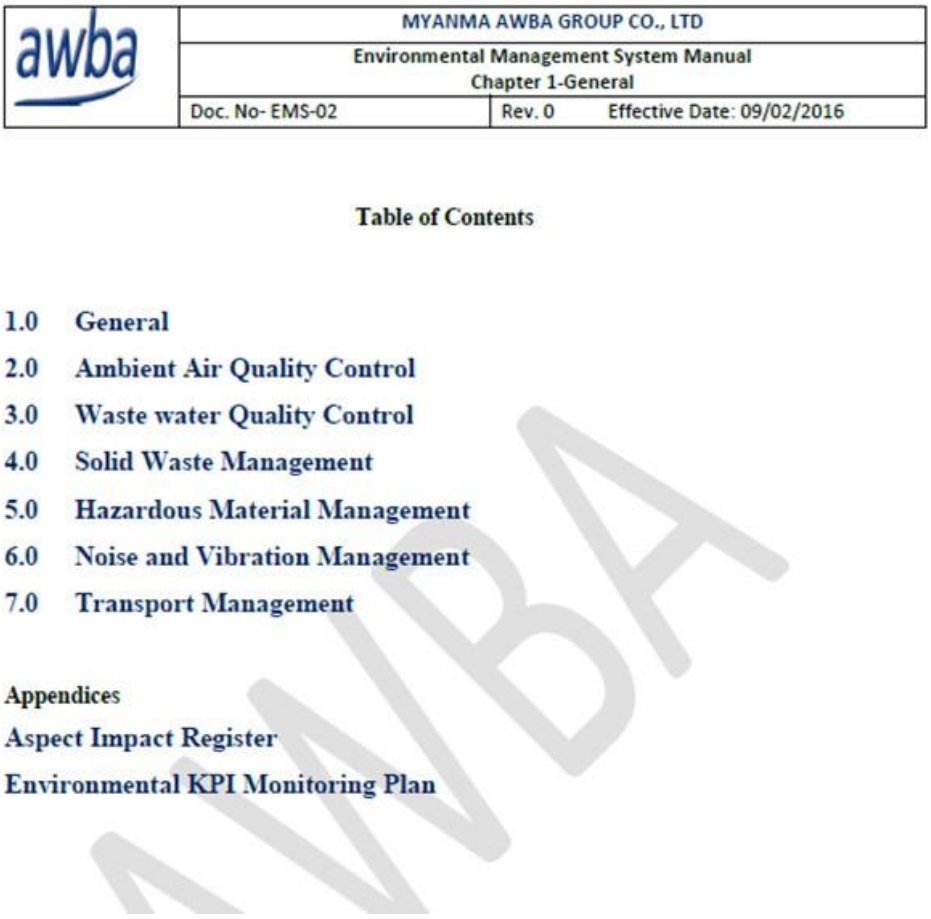
The local Myanmar requirements on emissions from the Project (for pesticide manufacturing, formulation and packaging) are specified in the NEQ Guidelines which are noted to be the same as those recommended by the relevant WBG EHS Guidelines.

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



awba	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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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)]. **W**hereas 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 – Ethnic Group, Ethnic People
- P8 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: Ethnic Group, Ethnic People

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 Ethnic Group, Ethnic People
- 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 Guideline and National Environmental Quality (Emission) Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). These Guidelines contain the performance levels and measures that are considered achievable in new facilities by existing technology at reasonable costs.

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

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

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

Parameter	Unit	Maximum Concentration
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	Section 37 (a)(b) , 42, 390	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. 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 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: (a)preservation and safeguarding of cultural heritage; (b)environmental conservation; (c) striving for development of human resources; (d)protection and preservation of public property.
Notification No. 2/2021 concerning the prohibited pesticide list (This Notification No. 2/2021 prevails over the Notification No. 1/2020)	Article (2) & (3)	The Project Proponent commits to comply with the stipulation • Any person, government department, or organization shall not register, import, manufacture, distribute, repackage, sell, or use the 55 prohibited pesticides listed in

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		this Notification. The Project will not register, import, formulate, repackage, sell, or utilize the restricted and or prohibited pesticides under Pesticide Registration Board Notification No. (1/2020). The Project will also comply with the requirements of Pesticide Registration Board legislation and guidelines. The **55 prohibited pesticides** are Aldrin, Aldicarb, Alachlor, Alpha Hexachlorocyclohexane, Arsenic Compound, Beta- Hexa chlorocyclohexane (BHC), Binapacryl, Captafol, Chlordimeform, Chlordane, Chlordecone, Chlorobenzilate, Cyhexatin, Dieldrin, Dinoseb, DNOC, Ethylene Dibromide (EDB), Ethylene Dichloride, Endosulfan, Endrin, EPN, Ethylene Oxide, Fluoroacetamide, Hexachlorobenzene (HCB), Heptachlor, Lindane(Gama Hexachlorocyclohexane), Methomyl, Mercury Compounds, Methamidophos, Methyl Parathion, Monocrotophos, Mirex, Parathion Ethyl, Pentachlorophenol (PCP), Phosphamidon, Strabane (Polychloroterpenes), 2,4,5 –T and 2,4,5- TP, Toxaphene, Tributyltin, Trichlorfon, D.D.T (Dichlorodiphenyltrichloroethane), Tridemorph, Triflumizole, Diafenthiuron, Terbufos, Borax Decahydrate, Hydramethylnon, Metaflumizone, Mineral oil, Boric acid, Carbofuran, Carbendazim, Benomyl, Glufosinate-ammonium, and Chlorpyrifos.

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
Environmental Conservation Law (Pyidaungsu Hluttaw Law No.9/2012)	Section 7(o), 14, 15, 29	The Project Proponent commits to comply as there prescribes 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 and procedures under the Environmental Conservation Law.
Environmental Conservation Rules (notification no 50/2014)	Rule 69(a) (b)	The Project Proponent (Project Proponent) commits: 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

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		Ministry for the interest of the people.
Environmental Impact Assessment Procedure, 2015	Article 102(a)(b),103, 104, 105, 106, 107, 108, 110, 113, 115, 117	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. The Project Proponent (Project Proponent) commits to bear full legal and financial responsibility: 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. ***For EMP,*** The Project Proponent commits to comply: 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,

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		EIA Procedure and standards. Project commitments and conditions when providing services to the Project and inform the Ministry with detailed information as to the propose project's potential adverse impacts. ***For monitoring and reporting,*** The Project Proponent(the Project Proponent) commits to comply: 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

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		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. ***For the purposes of monitoring and inspection, the event of emergency,*** The Project Proponent commits to grant the ministry and/or its representatives, at any time during normal working hours, access to the Project's offices and to the Project site and any other location at which the Project activities or activities related to the Project are performed; 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.

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
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 these emissions standards in its environment impact assessment and environmental management plan.
Myanmar Engineering Council Law, 2013	Section 34,37	The project proponent has to comply with section 34, 37. **Section 34.** The Executive Committee may, if it finds the violation of any of the provisions of this Law, or any prohibition of rules, orders and directives issued under this Law, or any condition mentioned in the register certificate by any person who has obtained the register certificate, impose any of the following administrative penalties against him/her: a) warning; b) causing to pay the stipulated fine; c) suspending the register certificate for a limited period; d) cancelling the register ceftificate **Section 37.** Any person without the register certificate issued by the Council, except engineering civil service personnel appointed at the Government departments and Government organizations carrying out the public works, shall not practice engineering and technical works which may endanger the public safety and which are stipulated under the rules made under this Law.
Myanmar Investment Law, 2016	Section (50)(d), (51), (65), (73)	The Project Proponent commits to comply 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,

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		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: . To respect and comply with the customs, traditions and traditional culture of the ethnic groups in the Union; . 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; 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; . 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; . 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; 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; . 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; 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;). To respect and comply with the

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		labour laws; . To have the right to sue and to be sued in accordance with the laws; . 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; . To allow the Commission to inspect in any places, when the Commission informs the prior notice to inspect the investment; . 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. 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.
Myanmar Investment Rules, 2017	Rule 202, 203, 206, 212,	The Project Proponent commits: 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.

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		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 project proponents strongly commits to the rules 190 of the Myanmar Investment Rules, 2017.
Myanmar Company Act, 1914		The project proponents commits to comply; The company is responsible for its actions and omissions and those of its contractors, subcontractors, officers, employees, agents, representatives, and consultants employed, hired, or authorized by the company acting for or on behalf of the Project. The company also provide rights and benefits including but not limited to, leave, holidays, overtime pay, compensation and social security. Most of the relevant particulars are in the Myanmar Companies Act.
The Import and Export Law, 2012	Section 7	The Project Proponent, as a license holder, commits to comply not to violate the conditions contained in the license.
The Forest Law (2018)	Section 12	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. The Project Proponent commits to comply the stipulation . For requiring prior approval from the Ministry if desirous to implement the

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		development work or economic project within a forest land and forest covered land. . 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)	Rule 27, 32	The Project Proponent commits to comply: 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	Section 6, 8(b), 21(b), 22	The Project Proponent commits to comply prohibitions for the following activities: "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." 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

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		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. The Project Proponent commits 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,
Conservation of Water Resources and Rivers Rules, 2013	Rule 4(a),(b),(c) 8(d),(e)	The project proponent commits - 4(a) to follow prescribed laws and rules not to pollute water body and the environment. (b) to repair immediately if project activities can pollute water quality, environment and the water routes. (c) to pay repaired charges to department if the project proponent failures to commit section 4(b). 8(d) to follow prescribed laws and rules and regulations related to the disposal of atomic radiation substances, toxic/hazarded/chemical/oil and sewages into water body. 8(e) to follow applicable international standards with proper protection system not to infiltrate and discharge of sewages and impurities to water body.

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
The Protection of Biodiversity and Conservation Areas Law 2018	Section 39 (d)(e),	The Project Proponent commits to comply the stipulation that there may be charge with fine or imprisonment or both if finds guilty of 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)		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.
The Protection and Preservation of Antique Objects Law (2015)	Section 12, 13	The Project Proponent commits to comply the stipulation: For person who finds any object which has no owner or custodian, needs to inform to the village head of Villages Development Advisory Committee (VDAC). 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)	Section 12, 13, 15, 20	The Project Proponent commits to comply the stipulations: For person who finds any object which has no owner or custodian, needs to inform to the village head of Villages Development Advisory Committee (VDAC). 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

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		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	Section 8, 9, 14, 15	The Project Proponent commits to comply: The Right of The fertilizer Committee 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. 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: abide by this Law and the rules, procedures, notifications, orders and directives issued hereunder; abide by the conditions contained in the registration certificate; perform in accordance with the stipulations the quality assurance, label, and specifications submit to the inspection of the relevant manager and inspectors when they come for inspection The stipulation: 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

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		with the stipulations, apply to the State and Divisional Manager to obtain the business license. For a license holder to: abide by this Law and the rules, procedures, notifications, orders and directives issued hereunder; abide by the conditions contained in the license;
Myanmar Fire Brigade Law 2017	Section 25	The Project Proponent commits: 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; . Not fail to form the reserve fire brigade .Not fail to provide materials and apparatuses for fire safety; in conformity with the directive of the Fire Services Department.
Pesticide Law, 2016	Section 18, 23, 24	The Project Proponent commits: To comply for the stipulation for the right of the Director General to issue or refuse the license applying in accordance with section 17, subsection (a) (b) and (c) to order the administrative order if fail to comply the conditions mentioned in license regarding for issuing licence. Can occasionally order to the officers in relation to testing the pesticides to the crops and selling pesticides if necessary. The stipulation for the person holding export license: to abide the conditions mentioned in licence; to comply the orders, directions issued by registration board in case of necessary 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

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		for selling the pesticide, repacking and selling to pay the license fees and charges for laboratory tests. 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)	Section 8, 13, 20, 22, 15, 16, 17, 23, 27	The Project Proponent commits to comply the stipulations: 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: . before works, license holder to be inspected by the relevant supervising and inspection team for safety and machinery/equipment check and . 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 . follow the license regulations, . follow directives on safe handling and

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		shall ask workers to strictly follow . shall provide necessary safety equipment and issue free personal protective equipment to workers, . provide training in occupational safety . determine the hazard to the environment, people and animals provide fit for work medical check-up and keep records . send permission letter to Department of Township Administration if the chemicals and associated material are permitted to store . acquire in advance guidance and agreement from fire service department if using inflammable materials or explosives transport only the permitted amount of chemicals in accordance with prescriptive stipulations obtain approval of central supervising body if transporting chemical and associated material from the permitted region to any other region . 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: . To classify the hazard level of chemicals and related substances in advance . To show Material Safety Data Sheet and warning signage . To provide safety equipment, personal protective equipment and training on their use . To possess, transport, store, use and discharge chemicals and related materials in accordance with stipulations, . Not to import or export chemicals and

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		related materials banned by the central supervising board.
Prevention from Danger of Hazardous Chemical and Associated Material Rule (notification No 85/2015-2016)	Rule 61 (a)	The Project Proponent commits to comply the stipulations: For organizations and license holders who store the chemical and related substances to abide by the following facts for safety: . 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 storing the chemical and related substances; . sticking the warning sign according to hazard class, and keeping the safety equipment at the stored places; . 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; To be safe, for the user of chemical and related substances: . To use only the registered restricted or conditional chemical and related substances; . Not to use the unregistered, without labelled, unknown, damaged or expired chemical and related substances;
Yangon City Development Committee (YCDC) Law (2018)		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.

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
Underground Water Act, 1930	Act 3, 6	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: 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)	Section 15, 16	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: 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 property of the public or may pollute the environment to have General Liability Insurance with the Myanma Insurance.
Third-Party Liability insurance Rules (notification no.64/2003)	Rule 3(a) (b)	The Project Proponent commits to comply the stipulations for the motor vehicles using in project: To compulsorily insured with the Myanma Insurance against third-party liability for having his vehicle. To pay the premium charged by the Myanma Insurance to it or the organization authorized thereby on registration of his motor vehicle or

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		renewal of the registration.
The Law On Standardization (2014)	Section 3, 5	The Project Proponent commits to comply the stipulations: 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)		The Project Proponent commits to comply the stipulations and its objectives: 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; • To nurture luminaries required for the development of Science and Technology and for Research and Development and to improve their qualifications.
Vehicle Safety and Motor Vehicle Management Law (2020)	Section 1, 2(v)	The Project Proponent commits to comply the stipulations: 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.

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		For taking actions to conserve the green environment and the reduction in pollution of air, water, land and noises caused by motor vehicles. For the safety and good management of vehicle and motor vehicle, commits to implement with each section of chapters in the Vehicle Safety and Motor Vehicle Management Law (2020).
Road Safety and Motor Vehicle Management Rules (2022)	Rule (245-251)	The Project Proponent commits to comply the stipulations: For Vehicles, Driving License and Spare Man License to operate cross-order transport, commits to operate with the chapter 8 of Road Safety and Motor Vehicle Management Rules (2022).
The Farmland Law 2012	Section 30 (a) (b)	The Project Proponent commits to comply the stipulations for empowering to utilize the farmland for other purposes in the interest of the public in respect of the application: 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)	Section 20 (f)	The Project Proponent commits to comply the stipulation for the Leading Body, in respect of agriculture and livestock breeding, to carry out the followings: 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	Section 16, 19	The Project Proponent commits to comply the stipulation

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
Management Law, 2012, (Pyidaungsu Hluttaw Law No.10 of 2012)		for Person who is granted the right to use the vacant, fallow and virgin lands to comply the following conditions: . 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 resume the area required therefrom. For the Central Committee to resume the area required in the authorized land, if one of the following situations arises: If ancient culture heritage is found in the authorized land; If infrastructure project or Special project are desired to be constructed on the authorized land, in the interest of the State; Except the permitted minerals, if other natural resources are found in the authorized land which are permitted for production of mining; If natural resources are found in the authorized land which are permitted for the purposes described in Section4, Sub-section (a), (b), and (d);

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
Yangon Region Fresh Water Fisheries Law (Yangon Region Hluttaw Law No.3,2013)	Section 53, 55	This was enacted for the purposes of development in Fisheries, preserve Fish species and to get loyalties. The Project Proponent commits to comply: 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; Fisheries materials causing toxic, hazardous, harm to health and impact to environment.
The Law Relating to Aquaculture, 1989	Section 29(b)	The Project Proponent commits to comply the stipulation: For deterring transport by water and flow or pollution or mean to happen that at the territory of fishing area.
Public Health Law, 1972	Section 3, 5	The Project Proponent commits to cooperate with the authorized person or organization in line with the stipulations 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 Communicable Disease Law, 1995	Section 3(a), 9, 11	The Project Proponent commits to comply the stipulations: 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	Section 9(a-d),	The Project Proponent commits to comply the stipulation:

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
Consumption of Tobacco Product Law, 2006		For the person-in-charge 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)		The Project Proponent commits to comply the stipulations 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)	Section 19 (a)	The Project Proponent commits to comply the prohibition 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	Section 5, 14, 15, 30	The Project Proponent commits to comply the stipulation . For the agreement, training and probation period as prescribed in: 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 be related with the

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		stipulation of sub-section (1). . For particulars to be included in the employment agreement: the type of employment; the probation period; wage, salary; location of the employment; the term of the agreement; working hour; day off, holiday and leave; overtime; meal arrangement during the work hour; accommodation; medical treatment; ferry arrangement to worksite and travelling; regulations to be followed by the employees; if the employee is sent to attend the training, the limited time agreed by the employee to continue to work after attending the training; resigning and termination of service; termination of agreement; the obligations in accord with the stipulation of the agreement; the cancellation of employment agreement mutually made between employer and employee; other matters; specifying the regulation of the agreement, amending and supplementing; Miscellaneous. . 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. . 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

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		due to various conditions. . 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. 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. . 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. . 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. 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

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		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)		The Project Proponent commits to comply the provisions for the requirement 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	Section 4, 13, 15	The Project Proponent commits 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: Any person desirous of conducting any private enterprise, Any person conducting any private industrial enterprise on the day this Law is enacted, by using any type of power which is three horsepower and above or manpower of ten wage- earning workers and above shall register under this Law. To comply the statement for the duties of the entrepreneur are as in: - to abide by the terms and conditions of the registration certificate; to submit to the inspection of the person or inspection body assigned by the Directorate or Supervisory Body; to shift the place of enterprise, change the nature of enterprise, amalgamate enterprises and split up enterprises only with the approval of the Directorate; 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

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		out the followings: - appointing foreign exports and technicians with the approval of the Ministry; 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	Section 38, 39, 40, 51	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. The Project Proponent commits to comply: 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)		The Workmen's compensation act had been promulgated in 1923, amended in 2005, The Project Proponent commits to comply the stipulations: 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, compensation to be paid when due and penalty for default, method of calculating

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		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. For any updating for revising the monetary amount as per the amendment law.
Labour Organization Law (The Pyidaungsu Hluttaw Law No. 7/2011)	Section 17, 18, 19, 20, 21, 22	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. The Project Proponent commits to comply the stipulations as there mentions: 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

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		collective actions in accordance with the relevant procedures, regulations and law.
Minimum Wages Law, 2013	Section 12 (a-e), 13 (a-g)	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. The Project Proponent commits to comply the stipulations: 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 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.
Payment of Wages Law, 2016	Section 3, 4, 5, 7 (ii), 8, 9, 10, 14	The Project Proponent commits to comply the stipulations: 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

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		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	Section 11 (a)(b), 15(a), 16 (a), 18(b), 48(a), 49(a)(b), 51(a)(b), 53(a), 54(a)(b), 75	The Project Proponent commits to comply the stipulations: 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: production industries doing business

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		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; Government departments, Government organizations and regional administrative organizations doing business; development organizations; financial organizations, companies, associations, organizations and their subordinate departments and branch offices doing business; shops, commercial establishments, public entertaining establishments; 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; construction works carried out for a period of one year and above under employment agreement; works carried out with foreign investment or citizen investment or joint ventured businesses; works relating to mining and gemstone contained in any existing law; works relating to the Petroleum and Petroleum Products Law, 2017 and Rule No 3, 4 of Petroleum Rules 1937; works relating to petroleum and natural gas contained in any existing law; ports and out-ports contained in any existing law; works and organizations carried out with freight handling workers; Ministry of Labour and its subordinate departments and organizations; 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

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		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: carrying out work by employing under stipulated minimum number of workers but more than one worker; changing the employer or changing the type of business. 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

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		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 relevant township social security office in accord with the stipulations. For keeping records of work and lists.

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
The Petroleum and Petroleum Products Law, 2017	Section 9,10,11	The Petroleum and Petroleum Products Law (the "PPPL") 2017 was enacted by Pyaydaungsu Htuttaw as Pyaydaungsu Htuttaw Law No. 20/2017 on 1st August 2017 to repeal the Petroleum Act 1934. The PPPL contains the provisions on import and export, transportation, storage, refinery, distribution, inspection and testing of petroleum and petroleum products and issuance of relevant licenses. The project proponent has to comply with section 9,10,11. **Section 9.** The Ministry of Transport and Communications shall carry out the following functions relating to any petroleum and petroleum product; (a) issuing license to vehicles, vessels and barges that carry any petroleum and petroleum product; (e) determining procedures and conditions to be abided by in carrying out transport business except transport by pipeline. **Section 10.** The Ministry of Natural Resources and Environmental Conservation shall carry out the following functions relating to any petroleum and petroleum product; a) issuing licence for the right to store for the storage tanks and warehouses; b) issuing transport permit for the vehicles, vessels and barges that shall carry any petroleum and petroleum

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		product; c) determining the period, form and terms and conditions, manners of applying licence, permitting authority and fees to be assessed, for licence under subsection (a) and permit under subsection (b); d) if it occurs environmental impacts in carrying out petroleum and petroleum product business activities, taking action, as necessary , in accordance with the existing laws of on-site inspection; **Section 11.** On all receptacles containing any dangerous petroleum and petroleum product, the warning sign of danger by stamping, embossing, painting, printing or any other means shall be expressed. If it is impossible to express as such, similar warning signs of the nature of danger of gasoline, spirit or petroleum shall be expressed in writing at the ostensible place in salient words or signs near the receptacle. In addition, the project proponent commits to follow Petroleum rules, 1937 related to guidelines concerned with chapter (3) of the transportation of petroleum and chapter (4) of license requiring for storage of petroleum under this law.
The Ethnic Rights Protection Law, 2015	Section 5	The Project Proponent commits to comply the stipulations For the Equal right between the Ethnics living in Myanmar. It enacted that if an ethnic loose the right, he can complain to the Regional or State Government to get

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		the equal chance and find the equal right. That project matters shall be informed, coordinated and undertaken in consultation with ethnic groups if projects are in areas with ethnic groups. The Project Proponent also commits to comply the Succeeding laws to protect the right of Myanmar national: **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. **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. **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. **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

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		directives of the Ministry and region or state government and the Union Territory Governing body.
The Ethnic Rights Protection Rules (2019)	Rule 20,21	The Project Proponent commits to comply the stipulations; **Protection of the Rights of Ethnic Groups;** This is for getting protection in the case of the failure of ethnic rights and it ensure to take responsibility when the ethnic groups submit to protect the rights of their groups from top to bottom such as Union to Region or State level. In relation to the project to be developed in the area inhabited by ethnic peoples, the project proponent: (a) The advantages and disadvantages of the project must be fully and accurately explained in advance, using languages and methods that they can understand, so that the local ethnic groups living in the area where the project will be implemented can understand. (b) Policy directions of the Myanmar Sustainable Development Plan (MSDP); strategies; It must be carried out in accordance with the procedures. (c) In order to find out whether there is any impact on the environment and socio-economic life in the area, environmental impact analysis and socio-economic development impact analysis shall be carried out in accordance with the guidelines of the relevant department. (d) In all stages of the environmental impact assessment and socio-economic development impact assessment process, discussions and consultations with indigenous peoples shall be carried out in an open and transparent manner. The project proponent: (a) According to rule 20, before the start of the project, a comprehensive report must be submitted to the Ministry and an opinion must be obtained. (b) Upon completion of project

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		implementation, pre-arranged activities and progress conditions shall be submitted to the Ministry. For getting the protection of the rights of ethnic groups, commits to implement with rule 20 and 21 of the ethnic rights protection rules (2019).
Leaves and Holidays Act, 1951	Act 4.	The Project Proponent commits to comply the stipulations: 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, depending on the date of the variable holidays. 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.
Occupational Health and Safety Law, 2019, (The Pyidaungsu Hluttaw Law No. 8/2019)		The project proponent has to comply Section 12, The project proponent has to comply in accordance with the stipulations of the Ministry: (a) appoint the Person In-charge for Occupational Safety and Health to closely supervise safety and health of Workers in line with the type of Industry/Business; and (b) form the respective Occupational Safety and Health Committee in line with the type of Industry/Business comprising

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		equal number of Employer and Worker representatives to become safe and healthy Workplace on condition that the number of Workers in his/her Industry/Business exceeds the number determined by the Ministry for that purpose. The Occupational Safety and Health of female Workers shall be considered according to the nature of Industry/Business when forming such Occupational Safety and Health Committee. The project proponent has to comply with Section 14, The project proponent make persons In-charge for Occupational Safety and Health comply with this Law and rules, orders, directives and procedures made under this Law to make the Workplace to be a safe Workplace that is good for health. The project proponent has to comply with Section 26, The has to be responsible to: - (a) arrange as required to assess the risks of Workplace, Process and machines and materials used thereat; (b) arrange as required to assess the likelihood of occurrence of hazards at the Workplace and to the environment; (c) arrange to have Workers medical checked-up by the

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		Recognized Doctor in accordance with stipulations whether they suffer from any Occupational Disease; (d) arrange to improve the Workplace until it is safe and good for health based on the findings as per sub-sections (a), (b) and (c); (e) provide Workers with sufficient number of personal protective clothing, materials and facilities prescribed and approved by the Department on free of charge basis and cause Workers to wear them while working; (f) prescribe precautionary plans and plans for emergency; (g) provide a clinic, appoint the Registered Doctors and nurses and provide medicines and supporting equipment for any Industry/Business where the number of Workers is not less than the number determined by the Ministry; (h) make necessary arrangements for managers, Workers and members of the Occupational Safety and Health Committee including (Employer) himself/herself to attend Occupational Safety and Health training courses stipulated by the Ministry in accordance with their departments or types of work; (i) make necessary arrangements to

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		enable immediate reporting to the Person In-charge for Occupational Safety and Health or manager in case where a Worker suffers an Occupational Accident or his/her life or health is likely to be in danger; (j) arrange to prevent any persons in the Workplace from Occupational Safety and Health risks occurred due to materials, machines or wastes used in the Workplace or Process; (k) immediately stop the Process, evacuate Workers and conduct necessary rescue plans if any Occupational Accident is about to occur. If possible, Workers will be relocated to another appropriate safe Workplaces; (l) display Occupational Safety and Health instructions, danger signs, notices, posters and signage for directions in accordance with stipulations; (m) arrange to be complied with precautions when entering restricted hazardous Workplaces; (n) arrange to disseminate Occupational Safety and Health manuals and guidelines issued by the relevant Ministries for knowledge, technology, information and skills not only to Workers but

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		also to related persons or raise their awareness or knowledge thereof; (o) lay down the fire safety plan, perform fire drilling and train Workers to use fire extinguishers systematically; (p) allow the Chief Inspection Officer and Inspection Officers to enter Workplaces, inquire, request documents and information or seize exhibits; (q) cause Workers to work only for the specified working hours if they have to work in Hazardous Industry/Business and Workplace; and (r) Incur the expenses for Occupational Safety and Health matters. The project proponent has to comply with Section 27, No Employer has to dismiss or demote a Worker: - (a) during any period before a medical certificate is issued by the Registered Doctor for occupational injury or by the Recognized Doctor for contact with Occupational Disease; (b) because the said Worker has addressed a complaint for hazardous or health detrimental condition; (c) because the said Worker has

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		conducted the responsibilities of Occupational Safety and Health Committee; or (d) because the said Worker has refused to work in any condition where an Occupational Accident or Occupational Disease is about to occur. The project proponent has to comply with Section 28, If any Worker who has been injured due to an Occupational Accident or contacted with Occupational Disease is not covered under the Social Security Law 2012, the Employer must pay for medical expenses to check the extent of capacity reduction and class of disability of such Worker. The project proponent has to comply with Section 29, The project proponent (a) can prohibit or restrict any Worker to work if he/she does not meet the health standards due to medical check-up results done by the Registered Doctor in accordance with the needs and nature of the Industry/Business; (b) must, without delay, employ any Worker who has been prohibited or restricted to work subject to sub-section (a) in his/her original position or at the relevant Workplace upon

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		his/her submission of health improvement evidence; and (c) must make necessary arrangements in the Workplace in order not to damage health of female Workers who are pregnant or breast-feed. The project proponent has to comply with Section 48, (a) Any person who is currently operating or wants to operate any Industry/Business to which this Law applies shall not fail to lodge the registration with the Department. (b) No one shall fail to notify the Department in accordance with the stipulations that he/she will build, extend or restructure a building, place, install, extend or change the use of machines in respective Processes for the Industry/Business to which this Law applies in accordance with Occupational Safety and Health stipulations. The project proponent has to comply with Section 49, No Employer: - (a) shall fail to comply with an order to close the Workplace temporarily in accordance with Section 18; (b) shall fail to comply with the conditions prescribed under Section 20 sub-section (b);

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		(c) shall fail to comply with the instructions issued by the Inspection Officer in accordance with Section 21 sub-section (a); (d) shall ask Workers to work for more than the specified hours in accordance with Section 26 sub-section (q); or (e) shall fail to pay for Occupational Safety and Health expenses subject to Section 26 sub- section (r)

Awba Group will not produce or use any of the chemicals listed in Myanmar Pesticide Registration Board's Notification No. (1/2020) dated 7th January 2020. Awba does not use any of the chemicals banned in Myanmar under the Stockholm Convention including 9 POPS (Aldrin, Chlordane, Dieldrin, DDT, Endrin, HCB, Heptachlor, Mirex, and Toxaphene). Awba will act in compliance with related laws and regulations as its commitments. / Awba will adhere to regulatory requirements as its commitments.

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 shown in Table 3-7 and 3.8 respectively.

Table 3.7 EQEG Air Emissions Parameters

Parameter	Guideline Value µg/m^3 [a]
Ammonia, gaseous inorganic chlorine compounds	30
Bromines, Cyanides, Fluorines, Hydrogen sulphide	3
Chloride	5
Chlorine	3
Particulate matter PM10[b]	20, 5[c]
Total organic carbon	50
Volatile organic compounds	20

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

Parameter	Unit	Guideline Value
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
Nitroganics	mg/l	0.05
Oil and grease	mg/l	10
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, Livestock and Irrigation 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).

HAIC will distribute/disclose the comments and feedback on the ESIA report, commitments by HAIC, and executive summary (both in English and Myanmar) which reflects legislation requirements and guidelines complied by HAIC to main

stakeholders and other interested parties *(representative villages, Pa Ywat Sate Gone,* Kyi Ni San, Poe Dana Gone and Shan Gone villages and any other interested parties) through VDAC and community volunteers within 1 month of approval period.

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
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	

Awba – EHS Officer and Site Engineer	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

(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]

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 (µg/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 ($PM_{2.5}$) [(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 x 10^{-7}	Ontario [(3)]

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

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

Pollutant	Averaging Period and Statistic	Assessment Criteria ($\mu g/m^3$) (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/m^2/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"). However, AWBA repaid the Convertible loan to IFC and since then the project has been operating as a locally owned business (citizen-owned business).

4.2 PROJECT LOCATION

The Hmawbi Agriculture Input Complex is located in the Hmawbi Township of the Yangon Region. The AWBA Hmawbi Agricultural Input Complex (HAIC) is situated at coordinates 17.1692° N latitude and 96.0779° E longitude. 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*.

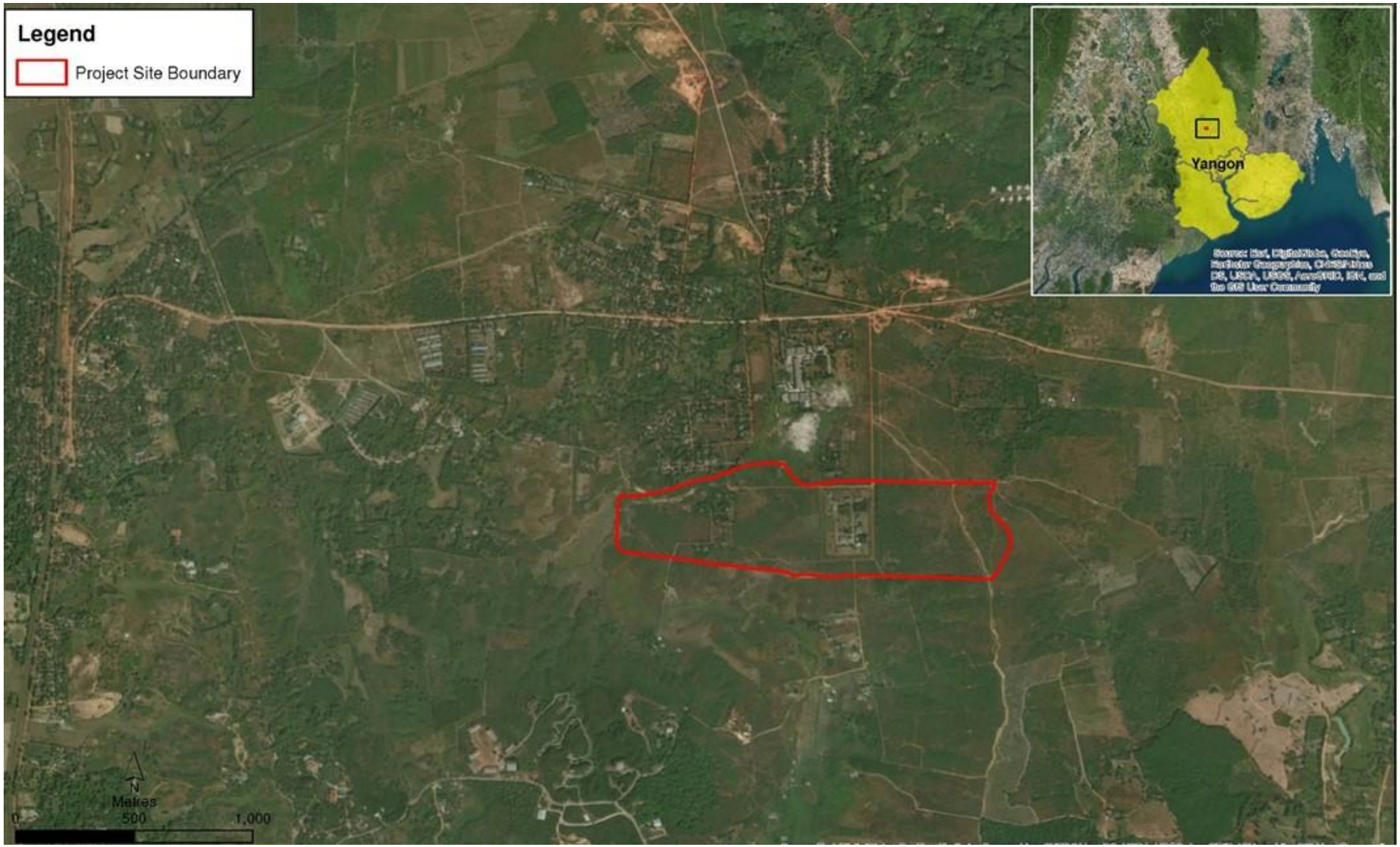


Figure 4.1 Project Location

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.

4.4.2 *Construction Phase*

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 m^2 composed of one warehouse, one liquid formulation buildings, two solid formulation buildings, one incinerator, one drum crasher 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 m^2 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 m^2 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

4.4.3 *Operational Phase*

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,. Incinerator and wastewater treatment facilities will be constructed to treat the solid/hazardous and liquid wastes generated from the HAIC. At the actual operation phase, only wastewater treatment facility is being operated along with the operation activities.

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

Office Building

There will be a two-story office building that can accommodate up to 100 people. (Figure 4.4 The building size will be 40 meters by 13 meters by 7 meters, which is equivalent to 11,800 square feet. The size of the building is capable of accommodating a range of different functions, including office space, meeting rooms, and other facilities. The office building will feature a range of safety and security systems, including a fire protection system, sprinkler and alarm system, CCTV system, and an indoor public address (PA) system.

Figure 4.3 Layout of Hmawbi Agriculture Input Complex

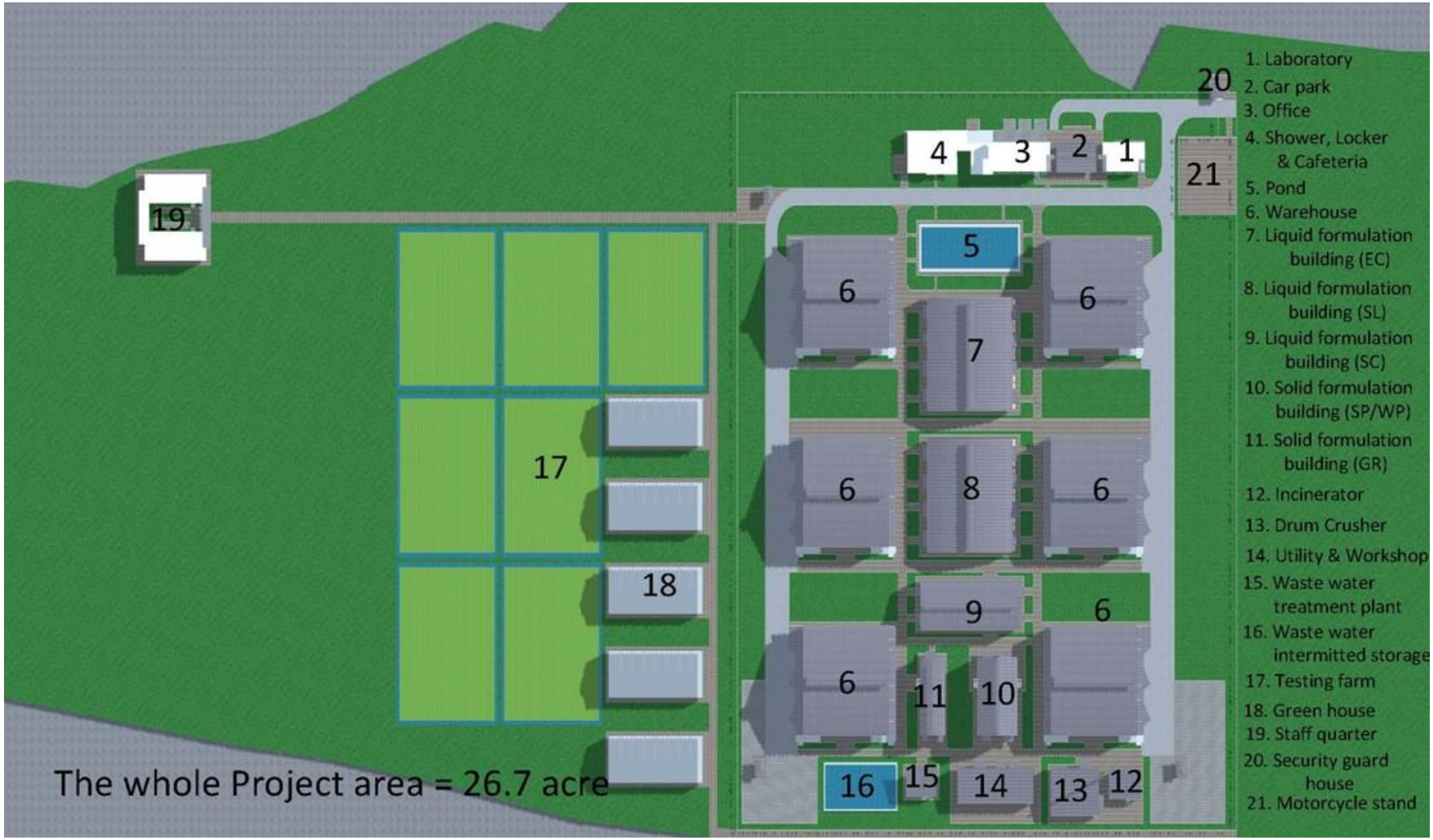


Figure4.4
OfficeBuilding

Laboratory Building

The laboratory is a one-story building designed to accommodate 7 to 10 people. The building is expected to be 28 meters by 13 meters by 4 meters in size, which is equivalent to 3,900 square feet. The laboratory will be equipped with state-of-the-art quality testing equipment such as UCFL and GCMS, which are important tools for ensuring the quality and safety of the agrochemical products produced by the HAIC.

The laboratory will also feature a range of safety and environmental systems. A mechanical ventilation system will be installed in every room to ensure that the air is constantly refreshed and that any hazardous fumes or vapors are removed. A scrubber system will be used to clean the exhaust air before it is released outside, and a liquid waste drainage system will be used to safely dispose of any liquid waste generated during testing.

The laboratory will also have a dedicated storage area for flammable and non-flammable chemicals, as well as a black water drainage and solid waste storage area. These systems are important for managing the environmental impact of the laboratory and ensuring that any hazardous waste is safely and responsibly disposed of. Information on the fire system is provided in Appendix D

Worker Facilities

The worker Facilities is a large one-story building with several amenities to support up to 350 people. The building is 50.5 meters long, 19.5 meters wide, and 3.5 meters high, which gives it a total area of 85,000 square feet. (Figure 4.5).

The security camera and PA system are in place to ensure the safety and security of the workers who use the facilities. The cafeteria is designed to serve up to 100 people at a time. The shower room and locker room are essential amenities for workers who need to change and clean up after work. The clinic is staffed with medical professionals who can provide basic medical care to workers who need it. The facilities also include convenient store, and food distribution area.

Figure 4.5 Worker Facilities

Warehouse

Warehouse is a high-ceilinged building with several important systems in place to protect the goods stored inside. The building is 54 meters long, 17.5 meters wide, and 10.5 meters high, giving it a total area of 35,000 square feet. The high-density warehouse (five-layer racking system) is in placed to maximize the amount of storage space available in the warehouse.

The flood prevention system, firefighting system, the lightning protection system are in place to prevent damage from water, fire and electrical storms. The building is designed for good ventilation system to prevent the buildup of heat, moisture, and airborne contaminants that can damage goods and create unsafe working conditions for employees. The plastic pellets will be used to prevent degradation or contamination.

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 several important systems in place to ensure safety and quality control.

- The fire alarm system is an essential safety feature that will alert workers in case of a fire.
- The ex-proof formulation lines are designed to prevent the ignition of flammable materials during the formulation process, which can be dangerous.
- The dust collector system is in place to prevent the buildup of dust and other particulates that can be hazardous to workers or compromise the quality of the final product.
- The scrubber system is designed to remove any harmful chemicals or fumes generated during the formulation process, ensuring that the air inside the building remains safe to breathe.
- The black water drainage system will be used to dispose of wastewater generated during the formulation process or the inside the building.
- The natural ventilation system will help to ensure a comfortable working environment for the workers and prevent the buildup of heat and moisture that can affect the quality of the finished product.
- ESE (Early Streamer Emission) lightening arrestor system is in placed to reduce the risk of damage or injury due to lightning strikes 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

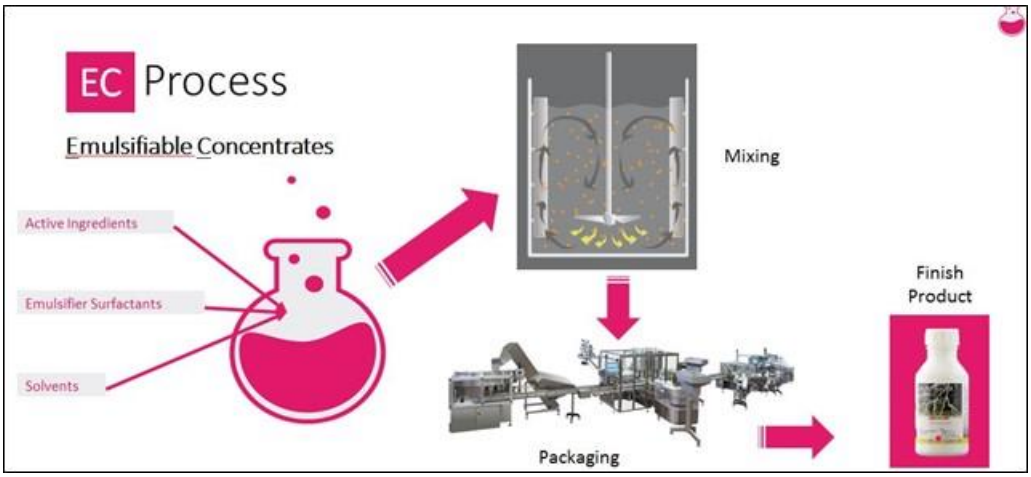
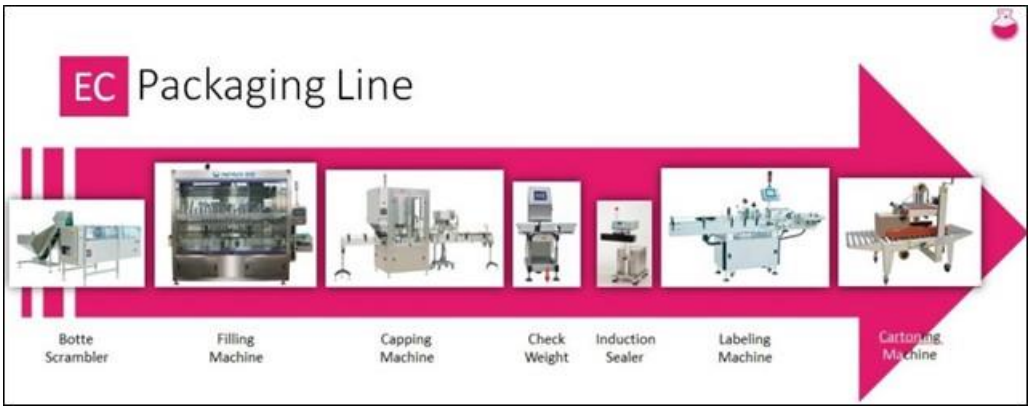


Figure 4.9 EC Packaging line



Soluble Liquid (SL) Building

The Soluble Liquid (SL) building will be 14,424 square feet and will have several important systems in place to ensure safety and quality control. Same like EC Building following system are in placed

- The operation process system,
- The fire alarm system,
- The scrubber system,
- The black water drainage system
- The natural ventilation system. (*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

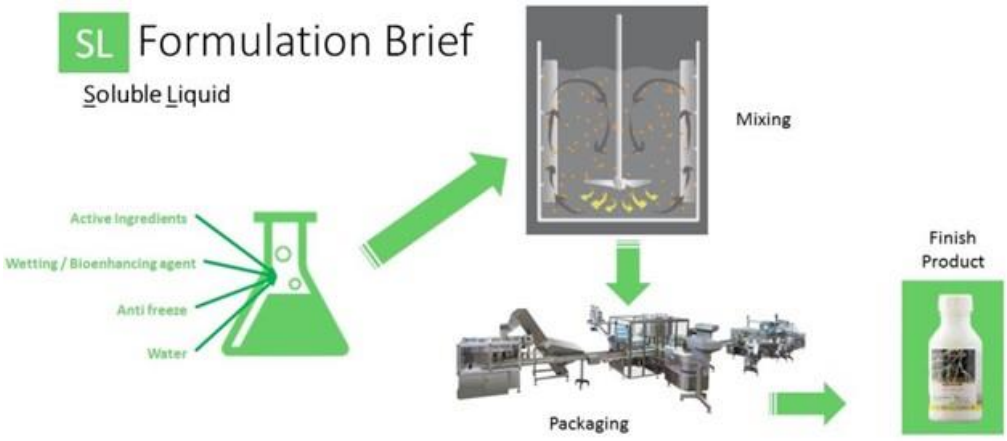


Figure 4.12 SL Packaging Line

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

The wettable powder (WP) and soluble power (SP) building is 43.5 meters by 24 meters by 14 meters, which translates to approximately 10,120 square feet. Like other building, following systems are in placed

- The operation process system,
- The fire alarm system,
- The dust collector system,
- The scrubber system,
- The black water drainage system,
- The natural ventilation system
- ESE (early streamer emission) lightening protection system.
- Moistures are very sensitive to the powder product; dehumidification system are installed in the WPSP formulations lines. (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

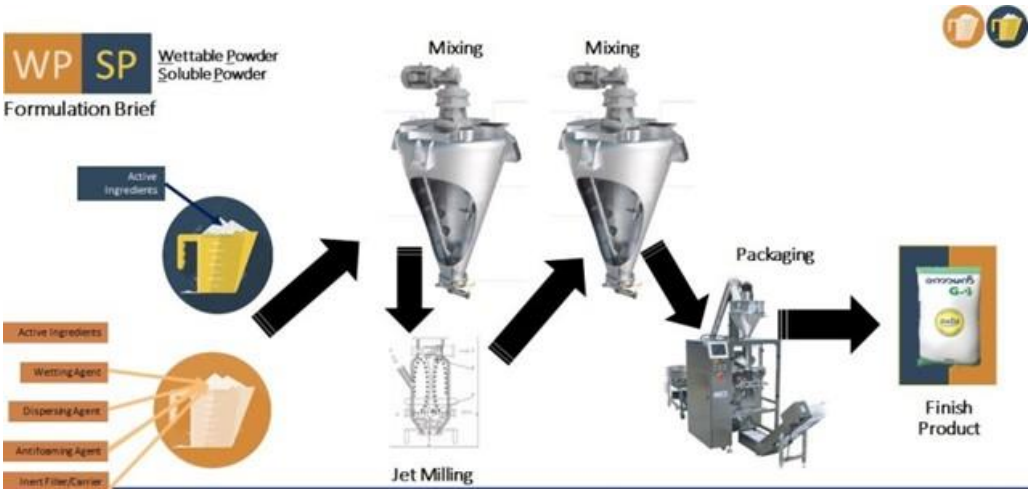


Figure 4.15 WP and SP Packaging

Suspension Concentrates (SC) Building

The SC building measures 43 meters by 21 meters by 9 meters, which is approximately 7,100 square feet. Similar to the other buildings following systems are in placed

- The operation process system,
- The fire alarm system,
- The dust collector system,
- The scrubber system,
- The black water drainage system
- The natural ventilation system. Figure 4.16 and the packaging process in Figure 4.17.

Figure 4.16 SC Formation Line

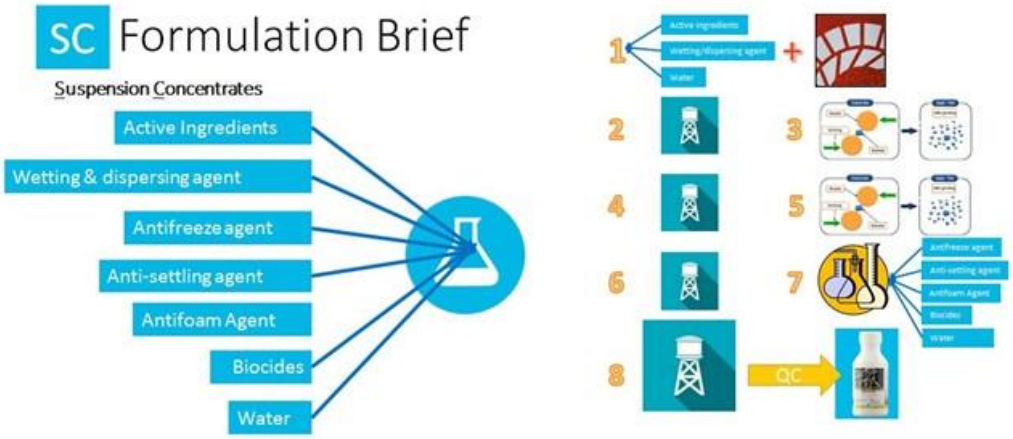


Figure 4.17 SC Packaging Process

GR (Granules) Formulation building

GR building measures 35.5 meters by 28.7 meters and covers an area of approximately 10,961 square feet. Like other buildings following systems are in placed

- The operation process system,
- The fire alarm system,
- The dust collector system,
- The scrubber system,
- The black water drainage system,
- The natural ventilation system
- ESE (early streamer emission) lightening protection system (Figure 4.18)

Figure 4.18 GR Formulation Building

GR Process

GR building contains various processing equipment, including weighing equipment, mixers, holding vessels, a dryer tunnel, a size separation conveyor using vibration, and a packaging machine.

The production process for GR formulations typically involves several steps, including.

1. Raw Materials Receiving: raw materials are transported from a storage warehouse to the receiving area of a production line where they are weighed and scaled according to a specific recipe in order to produce a final product.

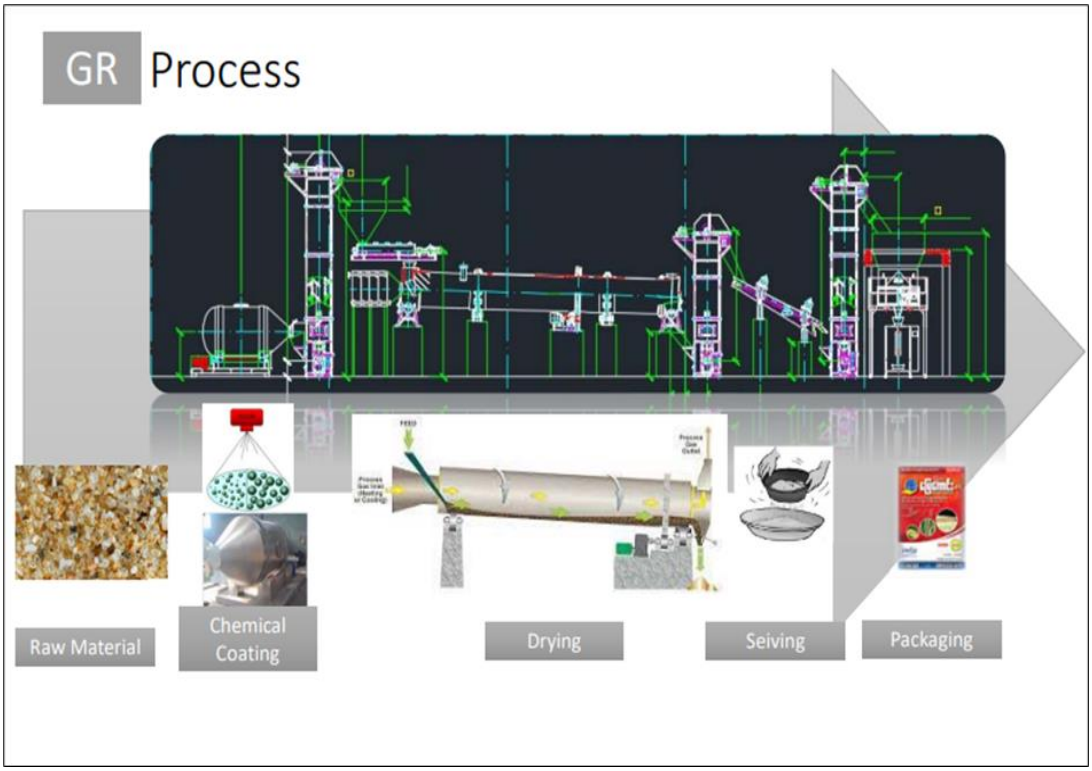
2. Chemical coating: In this step, the raw materials for the GR formulation are mixed with various chemicals such as Active Ingredients, solvents, stickers, deactivators, dedusting agents, dye, glue and water to create a homogenous mixture.

3. Drying: The coated mixture is then moved into temperature controlled drying tunnel, where it is heated to remove any moisture and create a dry. Drying the granules is an important step in the formulation process, as moisture can affect the stability and shelf-life of the final product. Drying the granules also helps to promote a firm chemical coating of the granules, which can improve the effectiveness and efficiency of the product.

3. Sieving: The dried mixture is then passed through a vibration seive process to separate the finished product granules from unwanted materials, debris and control the particle size distribution of the product.

4. Packaging: The final step, the qualified products are then packed into stamped and labelled bags (sachets) using a packaging machine. The packed products are then checked for final quality control, which involves scanning and weighing to ensure that the correct amount of product has been packed into each bag and that there are no defects or issues with the packaging. After passing the final quality control checks, the packed boxes are then arranged systematically and prepared for distribution to the market.

Figure 4.19 Simplified process diagram of GR formulation



The detail stages of HAIC's GR production line are presented in the Table below.

Table 4.2 Process of HAIC's GR Production Line

Sr.	GR Formulation and Packaging Working Process	Picture
1	Put the weighed sand into a mixer to make GR formulation.	
2	Add water, glue and dye solution into the mixer.	Adding dye solution
3	Add Active Ingredient (AI) into the mixer once the dye solution is completely mixed with sand.	Mixing Mixer
4	Thoroughly mix all the components (sand fillers and dye solution) in the mixer.	
5	Transfer the products from the mixer into a holding vessel before conveying them into a dryer tunnel in the next stage.	
6	Dry the products by passing them through the dryer tunnel.	

7	Size separation of the dried products (passing from the dryer) under vibration.	
8	Transfer the size separated products into a packaging holding vessel.	
9	Finished good products from the packaging holding vessel are packed (into 1 kg sachet) using a packaging machine.	
10	Scan and weigh the sachets and place them into the labelled carton boxes which are designed to pack 10 sachets per box.	

11	Organize the finished goods (packed carton boxes) on the wooden pellets while awaiting the market distribution.	

The process is operating in accordance with the Standard Operation Procedure (SOP) based on the manufacture guidelines for good manufacturing practice (GMP).

In terms of occupational health and safety, all employees in the production area are provided with proper PPE to prevent all possible health hazards and injuries. A spill kit is also set up to clean up the hazardous substances in case of chemical spillage and leakage during operation.

Regarding environmental aspect, the GR building has been installed with proper air emission control measures including a dust collector and a wet scrubber system to enhance the quality of indoor air in the production building. The dust collector removes dirt, dust, and other gaseous impurities while a wet scrubber removes particulate matter, and controls harmful airborne pollutants and gases, and odor in the process exhaust stream. A natural ventilation system is designed to enhance the good ventilation inside the building.

Wastewater generated from this production line is initially collected in a wastewater collection pit which is connected to the WWTP through a well-controlled HDPE pipeline before being treated by an on-site wastewater treatment plant. In addition, sewage from the operation workforce is treated onsite by a septic tank. Solid wastes and hazardous materials generated from the production line are properly managed as described in the Solid wastes and hazardous wastes management plan.

All the production processes in HAIC including GR formulation are operated in adherence to their individual SOPs (Standard Operation Procedure) and OHSMP (Occupational Health and Safety Management Plan) which can help the workers prevent accidents by providing clear instructions on safely performing tasks and ensure the safety of the employees while promoting work consistency, quality, and productivity of the industry. The detail functions of environmental control systems in the GR line are exhibited in the following table.

Table 4.3 Environmental Control Systems in the GR production line

Sr.	Environmental control systems in the GR production line	Pictures
1	A dust collector system pulls through the fine particles from the holding vessels and dryer tunnel and separates the fine particles from the heavier particles. The heavier particles settled into a hopper and collected in a dust collector check valve located underneath the dust collector. These particles are then reused in the production process.	
2	A scrubber system allows the very fine particles (separated and released from the dust collector) to settle at the bottom by spraying water through water circulation pump nozzles.	
3	During the scrubber overall maintenance process, sediments settling at the bottom of the scrubber (sludge) are drained into the black water pit. The scrubber is then washed and replace the water.	

Utility Building

Utility Building size is 44.8 meters by 22.5 meters by 6 meters, which translates to approximately 5,537 square feet. This building includes;

- Compressor to supply compressed air for various equipment and tools used in the manufacturing process.
- Workshop for equipment maintenance, repairs, and fabrication.
- Spare parts storeroom to store replacement parts for equipment and machinery used in the manufacturing process.
- Restroom to provide essential facilities for workers in the building.
- Fire alarm, CCTV, PA and PABX systems
- Natural Ventilation

Drum Crusher Building

The drum crusher building size is 30 meters by 20 meters by 8.8 meters, which translates to approximately 7,108 square feet. This building includes;

- Machines: The drum crushing machine is used to crush and compact empty drums, reducing their volume for easier storage and disposal. The drum washing machine is used to clean drums before they are reused or crushed or disposed of.
- The temporary waste storage area is dedicated are to store the crushed drums and other waste materials until they can be properly disposed of.
- Fire alarm, CCTV, PA and PABX systems
- Natural Ventilation

Wastewater Treatment System Building

Wastewater Treatment System Building size is 23 meters by 16 meters by 10 meters, which translates to approximately 8,124 square feet.

The building contains several key components and equipment, including the collecting basin, equalization tank, reaction tanks, flocculation and sedimentation tanks, aeration tank, effluent tank, slug dehydrator, sludge tank, filters and control panel.

The wastewater treatment process is carried out in three main steps.

- In the first step, wastewater is discharged from black water pit from all the buildings are capture through collecting basin and collected in the equalization tank.

- In the second step, the collected wastewater is treated sequentially using chemical, biological, sludge treatment and filtration processes according to standard operating procedures. This includes treatment in reaction tanks, flocculation and sedimentation tanks, and an aeration tank. After treatment, the water is stored in an emergency storage tank for five working days retention time to allow for inhouse lab testing of parameters including pH, COD, TSS, BOD, and oil & grease.

- In the third step, the results of all the parameters are within the standard guidelines, the treated wastewater is released into Lagoon-1 (Concrete storage tank) and then water from Lagoon 1 is overflow into Lagoon-2 (Earth Pond).

- The process then repeats with newly collected wastewater being filled into the equalization tank.

- The treated wastewater samples are regularly taken for third party testing.

***Incinerator* Building**

Incinerator Building size is approximately 2,518 square feet. The building contains 1000kg/day capacity incinerator with low and high degree burning chamber, cyclone separator, quenching tank, exhaust gas treatment unit, high temperature exhaust heat filtration system and chimney. Currently, the incinerator is not in operation.

4.4.4 Energy consumption (Electricity and Fuel)

1) The electricity usage

The electricity required for the operation of the HAIC is mainly sourced from the government (Electric Power Distribution, EPC). The project operation annually consumes approximately 1,500,000 kWh which is supplied via a 33 kV substation and six transformers (5 MV, 50 kV, 0.5 MV, 2 MV, 1 MV and 1.5 MV) located within the site premises. The site also installs four numbers of 275 kVA, 60 kVA and 500 kVA backup electricity generator set for power outages (**Figure 4.20**). The average monthly electricity consumption rate and power sources for the Project under the fully operational phase are presented below in **Table 4.4.**

Sub-Station Information			
Main Line		Sub-Station	
33KV		33KV to 11KV	
Transformers Arrangement (11KV to 0.4KV)			
Power House (1)	Power House (2)	Power House (3)	Power House (4)
500KVA Transformer	2,000KVA Transformer	1,000KVA Transformer	1,500KVA Transformer
Generators System			
Power House (1)	Power House (2)	Power House (3)	Power House (4)
Phase (1) 275KVA x 1	Phase (1) 550KVA x 1	Phase (1) 550KVA x 1	Phase (1) 550KVA x 1
Final Phase 275KVA x 2	Final Phase 550KVA x 3	Final Phase 550KVA x 1	Final Phase 550KVA x 2

Table 4.4 Average Monthly Electricity Usage & Source/s during Operational Phase

Source/s	Average Monthly Usage (kWh)
Substation	**~ 115,000 to 164,000**
Generator Sets	**~ 21,000 to 36,000**

The electricity consumption rate of the Project from the generators sets varies from approximately 200 MWh to 400 MWh per year based on the frequency of power shortage happened in the region and the fuel type used for these generators is diesel. The capacity of each generator sets and its hourly fuel consumption rate are presented in **Table 4.5**.

Table 4.5: Capacity of each generator set and its hourly fuel usage

Generator Name	Capacity (kVA)	Hourly Fuel Consumption (liter per hour)
Power House 1	275	40
Power House 1	60	10
Power House 2	500	70

Generator Name	Capacity (kVA)	Hourly Fuel Consumption (liter per hour)
Power House 3	500	70
Power House 4	500	70

2) Fuel consumption

The average annual fuel consumption by the Project is approximately 70,000 L and the overwhelming majority of this figure is contributed by the generator sets and other ancillary equipment/machines including diesel forklifts, fire protection trucks, tractors and other miscellaneous consumes around 5,000 L of diesel annually.

Table 4.6: Breakdown of annual fuel consumption rate

Type	Fuel Consumption in FY 2019/2020	Fuel Consumption in FY 2020/2021	Average Annual Fuel Consumption
Power House 1	7,206	8,800	8,000
Power House 1	3,135	925	2,000
Power House 2	13,854	22,481	18,200
Power House 2	12,187	23,037	17,600
Power House 3	-	9,892	9,900
Power House 4	7,613	11,222	9,400
Diesel Forklift 1	3,385	2,759	3,000
Diesel Forklift 1	3,103	2,156	2,600
Fire Protection Truck	-	36	36
Tractor	-	537	537
Other usage	196	307	250

The rate of fuel consumption varies depending on the frequency of power outages in a period of time. The outage frequently occurs during the rainy season when hydroelectric turbines can run at full. However, when the dry season approaches, these hydroelectric power plants cannot produce enough electricity, and outages become a daily event and as a consequence, generator running hours are longer in these dry seasons. The generators are run for around 200 to 400 hours based on the frequency and duration of blackouts. The record of recent generators' running hours in HAIC are shown in Table 4.7.

Table 4.7 : Recent generator running hours of HAIC

Generator Running Hours	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Total RH
Gen 1	77:00:00	94:00:00	42:09:00	43:00:00	143:29:00	**399:38:00**
Gen 2	51:04:00	73:00:00	29:00:00	38:00:00	91:00:00	**282:04:00**
Gen 3	50:11:00	74:13:00	27:00:00	15:21:00	114:00:00	**280:45:00**
Gen 4	57:00:00	69:03:00	45:12:00	40:00:00	95:42:00	**306:57:00**
Gen 5	69:18:00	89:00:00	44:09:00	43:18:00	167:00:00	**412:45:00**

4.4.5 Water Consumption

The primary source of water supply for the project is groundwater and currently, the site has nine numbers of tube wells within the HAIC premises. The abstracted groundwater is pre-treated onsite prior to being used for operational purposes. According to the raw ground water quality analysis test conducted in each tube wells by HAIC in 2017, 2018 and 2020, all tube wells have generally good quality of water in terms of WHO drinking water standards excepting pH, color and turbidity, iron and TDS which are higher than permissible level. Low pH and high iron content in groundwater is considered due to the soil and bed rock underlain by the Project area which is ferrosols (iron rich soil and acidic in general) based on Soil Type Map of GMS Countries, 2012. The internal process water analysis test is conducted in a regular basis (biannually) which includes pH, color, total hardness, total alkalinity, phenolphthalein alkalinity, TSS, TDS and total solids and observed all these parameters comply with WHO drinking water guidelines.

The annual water consumption is approximately 5,000 cubic meter and it is mainly used for manufacturing process and other general purposes. The water consumption sources and rates for the Project operational are presented in **Table 4.8**.

The existing tube wells list and specification are described in **Table 4.9** and the location of each well is presented in **Figure 4.21**.

Table 4.8 Water consumption sources and rates during Operational Phase

Purposes	Monthly Consumption (m^3/month)	Source/s
Production Line Uses	~70 to 130	Tube wells
Sanitary/Bathing Uses	~20	
Landscaping	~150 to 300	
Total	~350 to 500	

Source: HAIC, November, 2022

Table 4.9 HAIC tube wells list and specification

Sr.	Tube Well	Location	Diameter	Depth (ft.)

1	Tube well (1)	17.168190,96.078472	Ø 4”	180
2	MBP Tube well	17.166661,96.078862	Ø 4”	180
3	Tube Well (2)	17.166472,96.078561	Ø 6”	420
4	Tube Well (3 OLD)	17.167389,96.076533	Ø 4”	180
5	Tube Well (3 New 400ft)	17.167361,96.076586	Ø 2”	400
6	Tube Well (4)	17.169155,96.076999	Ø 6”	160
7	Farm Tube Well	17.166615,96.075855	Ø 2”	190
8	Staff Quarter (OLD)	17.168311,96.074780	Ø 8”	unknown
9	New Tube Well	17.168327,96.075027	Ø 6”	240

Source: HAIC, November, 2022

Figure 4.21: Location of tube wells in HAIC

As water conservative measures, HAIC is seeking any opportunity to minimize the water usage and improve water efficiency by tracking the amount of water supply to the process and discharge from the process. Source meters and sub meters are therefore installed to measure the water consumption rate by the facility over a period of time. Source meters measure the amount of water being supplied to the facility, while sub meters measure usage for specific activities such as cooling towers, process use, or landscape water use. (**Figure 4.2**2)

Figure 4.22: Water meter installed in the process water line

4.4.6 Waste Management

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

Hazardous 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. In addition, The Project will not register, import, formulate, repackage, sell, or utilize the restricted and or prohibited pesticides under Pesticide Registration Board Notification No. (1/2020). The Project will also comply with the requirements of Pesticide Registration Board legislation and guidelines. 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.

4.4.6.1 Solid Waste Management

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 system for cleaning, and

The estimated types and quantities of waste material are provided in *Table 4.*10

Table 4.11 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 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
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

Stack Parameter[(1)]	Unit	Value
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}

Incinerator stack

Actual stack data provided and confirmed by Awba

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]

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]

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

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

The PM concentration is used to conservatively estimate emissions of both $PM_{2.5}$ and $PM_{10.}$

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.

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).

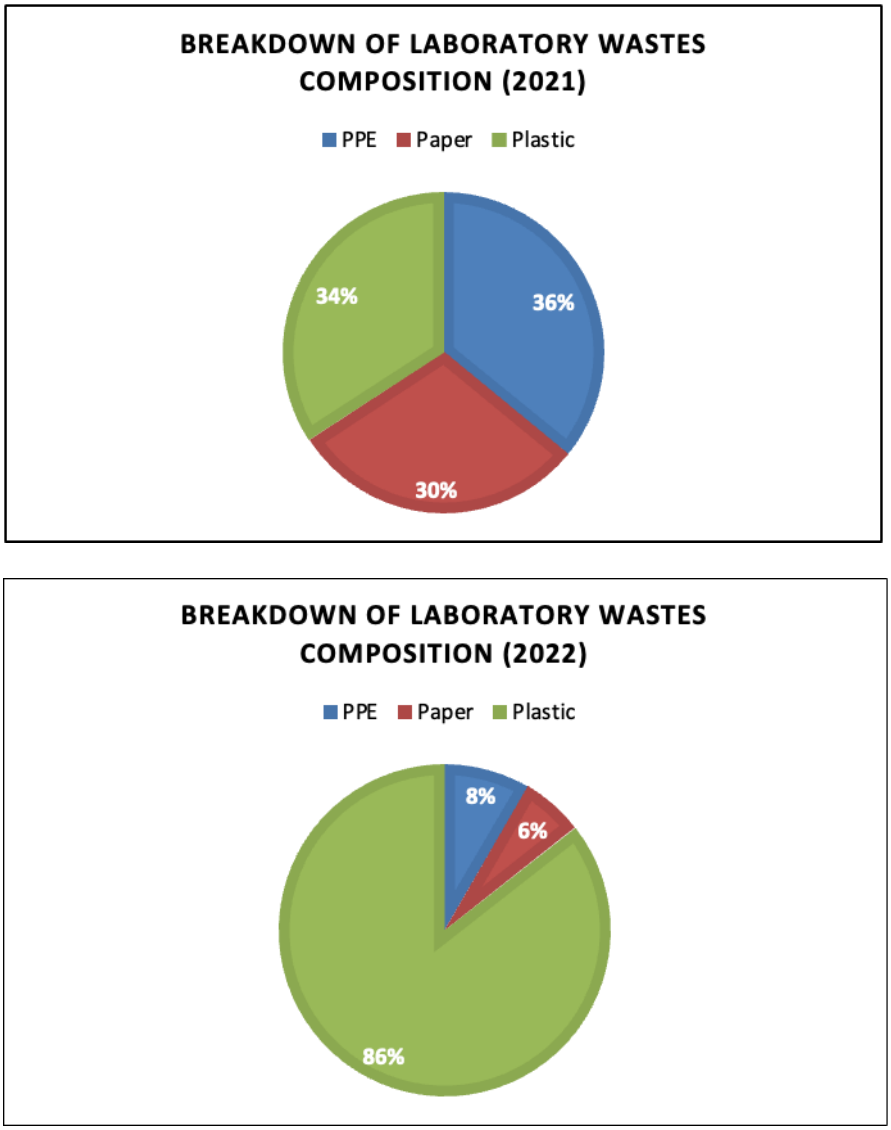
Even though the onsite incinerator was used for solid waste management, it is currently not in operation.

4.4.6.2 Waste from Laboratory

The waste from the HAIC laboratory mainly comprises PPE Waste (Glove, Mask, Tissue, etc.), Paper Waste (Carton boxes, Paper Card, Tissue, etc.), and Plastic Waste (Plastic bags, Plastic Bottle & Materials). Additionally, some amount of glass bottles, sludge, and wastewater

The annual generation rate of the major wastes is 463 units (kg) in 2021 and 2670 units (kg) in 2022. The breakdown of major laboratory waste composition for each year is presented in Figure 4.24.

Figure 4.24: Breakdown of HAIC major laboratory wastes composition (2021-2022)



The data for the annual laboratory waste generation inventory is presented in the following table.

Table 4.12: Annual Laboratory Waste Generation

Waste Type	Unit	Feb 2021 to Dec 2021	Jan 2022 to Oct 2022
PPE	kg	166	263
Paper	kg	139	188
Plastics	kg	158	2670
Total	kg	463	3121

Source: HAIC, November 2022

These laboratory wastes are regarded as hazardous wastes and managed with intensive care according to Hazardous Waste Management Plan. These wastes are sent to a third-party licensed contractor (DOWA) for offsite disposal along with other hazardous wastes generated from the production line.

The following table presents the list of lab wastes sent to DOWA for further waste disposal process.

Table 4.13 List of Laboratory Wastes

Sr No	Waste Name	HAIC Waste Code	Dowa Waste Code
1	PPE Waste	SW-306	HZS 1025
2	Paper Waste	SW-306	HZS 1025
3	Plastic Waste	SW-306	HZS 1025
4	Sludge	SW-306	HZM 1001
5	Carbon Pellet	SW-306	HZM 1001

Source: HAIC November 2022

Wastewater Management

Wastewater generated from washing of formulation lines (~20 m^3 / day), laundry (~1m^3 / day) and cleaning of process area (~3 m^3 / day) in the HAIC will be treated by an on-site wastewater treatment plant. *Table 4.14* shows the design basis of the influent characteristics for the on-site wastewater treatment plant.

Table 4.14 Design Basis of the Influent Characteristics for the On-site Wastewater Treatment Plant

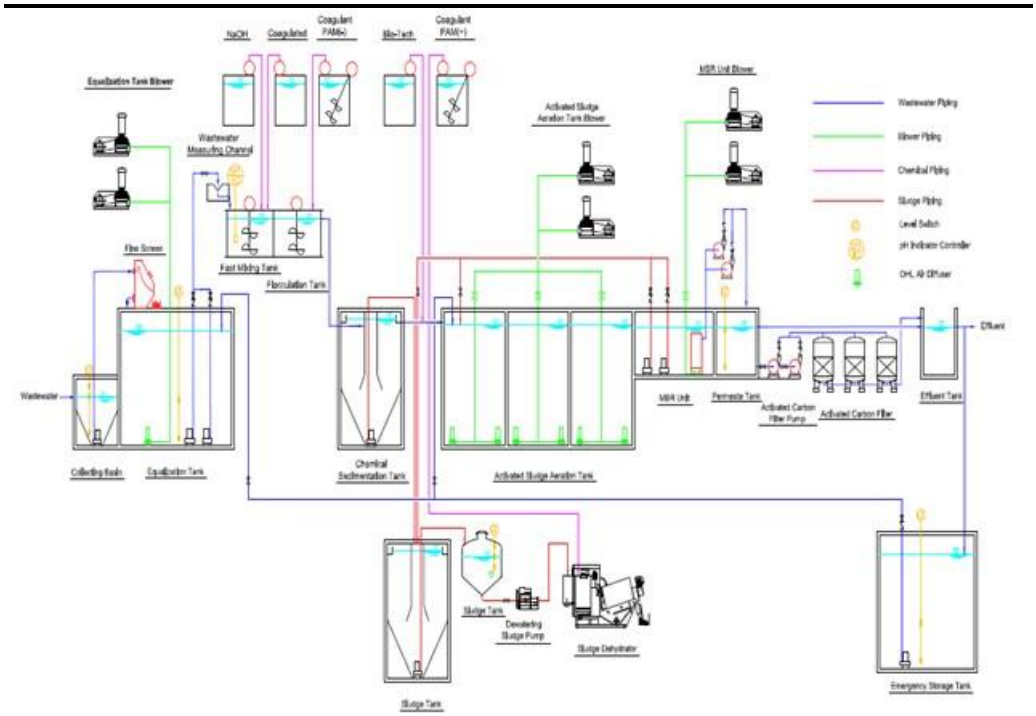
Parameters	Unit	Value
Flow Rate	m^3/hr	1
Ph	S.U.	3-9
BOD_5	mg/L	8,750
COD	mg/L	10,000
TSS	mg/L	3,000

Figure 4.20 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 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 4.25 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°16'66.23"N, 69.90"N.** 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 m^3 / 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.

Link ; https://myanmaawba.com/fertilizers/

5 DESCRIPTION OF THE SURROUNDING ENVIRONMENT

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).

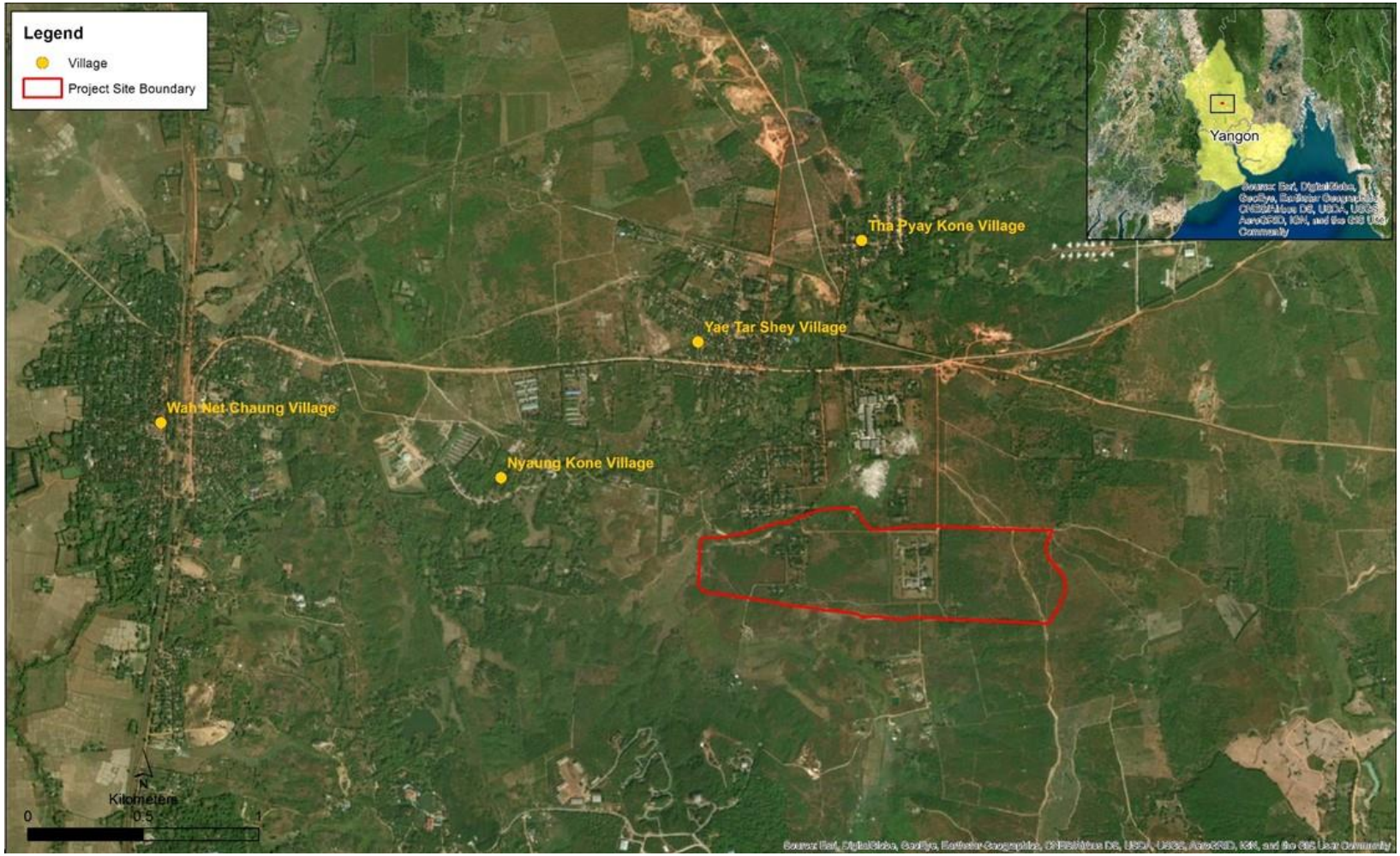
The administrative area falling within Awba's AOI is shown in *Table 5-1***.**

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 (including Kyauk Thaung Su)	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 NOx measurements. Diffusion tubes for 3 weeks measuring PM2.5, PM10, SO_2 and NOx.
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 km^2. 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 km^2, 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*.

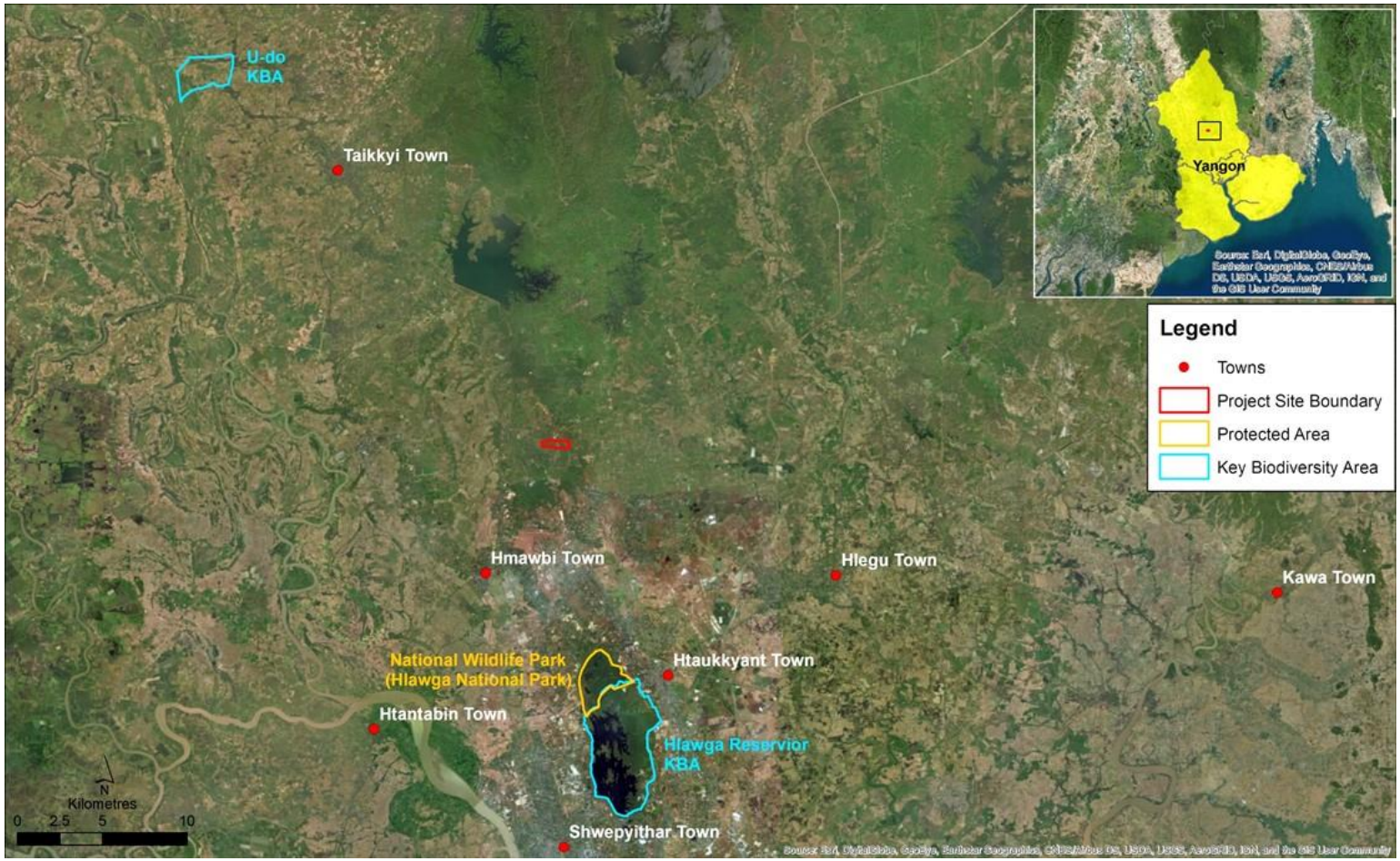
Hlawga National Park is a national park located in Mingaladon Township, Yangon Region, Myanmar, 22 miles (35 km) north of Yangon. The park was established in 1982 with joint-funding by the UNDP and the Burmese government. The 1,540-acre (623-hectare) park includes an 818-acre (313 hectare) wildlife park, 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)	Size	• 6 km^2
	KBA year	2012
	Key Species	Pale-capped Pigeon (VU) (CO)
Key Biodiversity Area	**Properties**	**Details**
Hlawga Reservoir	Size	23 km^2
	KBA year	2012
	Key Species	*Dalbergia cultrata* (EN)(CO), *Dipterocarpus alatus* (EN)(CO), *Hopea odorata* (VU)(CO), *Holarrhena pubescens* (EX)(CO)
U-do Terrestrial KBA (25 km south)	Size	5 km^2
	KBA year	2012
	Key Species	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, PM_{10} and $PM_{2.5,}$ NO_2, NO_x and SO_2.

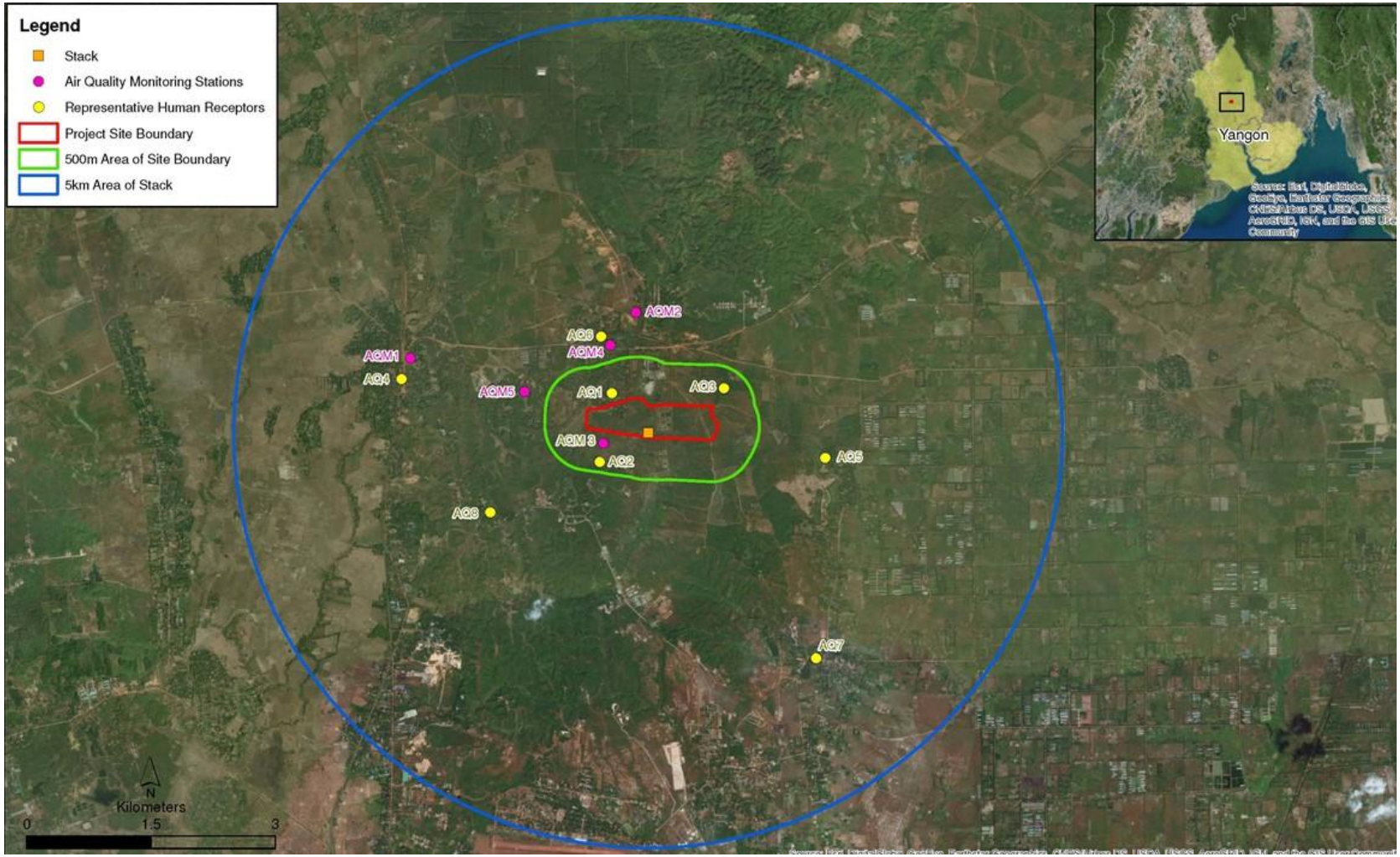
- Agricultural - these are locations where there are crop growing activities, as crop growth may be detrimentally affected and crops soiled as a result of project activities. The relevant pollutants of interest for sensitive agricultural receptors are particulate matter as dust, SO_2 and NO_x.

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 NO_2 and SO_2 were measured by means of a diffusion tube survey undertaken by ERM in June to July 2017. Ambient concentrations of $PM_{2.5}$ and PM_{10} 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 PM_{10}, $PM_{2.5}$, NO_x, NO_2, and SO_2 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, NO_2 and SO_2 were undertaken using Palmes type diffusion tubes and measurements of PM_{10} 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.skcinc.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 PM_{10} in ambient air using 90° infrared light scattering technology.

Baseline Results and Summary – NO_x, NO_2 and SO_2

The monitoring data from the air quality survey undertaken between 30 June and 17 July 2017 for NO_x, NO_2, and SO_2 are presented below in *Table 5-8.*

The diffusion tube data have conservatively been used to represent indicative annual background concentrations of NO_x, NO_2, and SO_2. A review of the baseline data collected concludes that the baseline concentrations are consistently below the relevant annual air quality standards. Baseline concentrations of SO_2 were found to be low and below the limit of detection at all monitoring sites.

Table 5.8 Derived Long Term NO_x, NO_2 and SO_2 Background Concentrations

Site	Land-use	Tube No.	NO_x µg/m^3	NO_2	SO_2[(1)]
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)]

(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 NO_2 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/m³		
WHO Annual Mean Air Quality Standard (Human Health)			*n/a*	40	*n/a*
WHO Annual Mean Air Quality Standard (Agriculture)			30	*n/a*	20
Status of airshed in Study Area[3]			Non-degraded	Non-degraded	Non-degraded

Results reported as <0.03µgS on tube are below the detection limit.
The detection limit will be used as indicative of the long term background as a conservative approach.
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 SO_2 10-minute averaging period, the power law [2] has been applied to the derived hourly SO_2 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 NO_2 and SO_2 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

Average across all five sites
Based on the average concentration.

The results from the monitoring conducted in the AOI indicated that ambient concentrations of NO_2 and SO_2 are likely to be below the relevant air quality standards.

(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 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 PM_{10}

The monitoring data from the air quality survey undertaken between 30 June and 5 July 2017 for $PM_{2.5}$ and PM_{10} are presented below in *Table 5-10.*

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 PM_{10}, 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 PM_{10} Background Concentrations (24-hour Average)

Site	Land-use	$PM_{2.5}$ µg/m^3	PM_{10}
AQM1	Residential	**29**	39
AQM2	Residential	17	30
AQM3	Residential	**26**	41
AQM4	Residential	21	24
AQM5	Residential	20	34
Average[(1)]		**23**	**34**
National Air Quality (Emission) Guideline		25	50
Status of airshed in study area[(2)]		Non-degraded	Non-degraded

Average across all five sites
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 PM_{10}. The results from applying this methodology are presented below in *Table 5-11.*

Table 5.11 Derived Long Term $PM_{2.5}$ and PM_{10} Background Concentrations

Site	Land-use	$PM_{2.5}$ µg/m^3	PM_{10}
AQM1	Residential	**14.5**	19.5
AQM2	Residential	8.5	15
AQM3	Residential	**13**	20.5

Site	Land-use	$PM_{2.5}$	PM_{10}
		µg/m^3	
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

Average across all five sites
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 PM2.5 exceed the WHO standard specified at four out of five monitoring stations. Concentrations of PM_{10} 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 PM_{10} respectively. The airshed is classified as degraded for PM2.5 long term period based on the average baseline concentration (11.3ug/m3) at all monitoring locations (AQM1 to AQM5). PM2.5 particles can result from burning of fossil fuels and organic matter, therefore elevated ambient PM2.5 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*

The climate of Myanmar is dominated by the Southeast Asian (SEA) monsoon; about 70% of the total annual rainfall is received during monsoon season (June to September). The mountain ranges in Myanmar are generally running N-S, so that they present effective climate barriers for the SW monsoon in the summer and the NE monsoon in the winter. Most of Myanmar has a tropical monsoon climate with three seasons: Hot, Cool and Rainy Season.

Yangon falls under the tropical monsoon climate category according to the Köppen climate classification system. The specific code for this climate type is "Am." In the Köppen system, "A" represents a tropical climate, and "m" indicates a monsoon climate characterized by distinct wet and dry seasons.

Therefore, Monsoon rains are the most persistent in Yangon, and the south, east, west and in the center of the Yanogn. The climate in Yangon features a wet season (monsoon) from May to October, during which the city experiences heavy rainfall, and a dry season from November to April. The temperatures in Yangon remain consistently warm throughout the year, with relatively high humidity levels, typical of tropical climates.

The monthly average temperature and monthly average rainfall for 10years (2013-2023) are presented in Table 5-11 and 5-12 respectively. The 10 years interpretation (2013-2023) of precipitation and temperature are exhibited in Figure 5.7. The 10 years (2013-2023) interpretation of Relative humidity is shown in Figure 5.8.

The annual rainfall from 2013-2023 in Yangon typically exceeds 1,200 millimeters. Yangon experiences high humidity levels throughout the year. During the monsoon, rainfall is short and intense – often more than 100 mm of water falls in an hour resulting in localized flooding.

Total Precipitation from 2013-2023: For the most part, February exhibits a notable absence of precipitation across the months. However, in June, precipitation levels initiate at a substantial magnitude of 213.94 mm of water falls. Throughout the months of June, July, and August and Septemeber, the precipitation attains its peak, measured in millimeters and exhibited a gradual decline over time after October to December. During the monsoon, rainfall is short and intense – often more than 400 mm of water falls in an hour resulting in localized flooding.

Annual Average Temperature from 2013-2023: During the hottest months, which are typically from March to May, the mean maximum temperatures in Yangon can range from 32 to 36 degrees Celsius (90 to 100 degrees Fahrenheit). In the coolest months, which are usually from December to February, the mean minimum temperatures in Yangon can range from 18 to 24 degrees Celsius (64 to 75 degrees Fahrenheit). April emerges as the warmest month of the year, characterized by an average temperature of approximately 87.65 degrees Farenheit. In July and August, there are relatively consistent uniform temperatures. The period spanning December to late January is characterized by the lowest temperatures, ranging from 79.74 degrees Farhenheit in December to 78.08 degrees Farhenheit at the end of January.

The mean relative humidity from 2013-2023 is about 75 often exceeds 70% and can be much higher, especially during the wet season (monsoon season) when rainfall is more frequent. The combination of warm temperatures and high humidity contributes to the overall tropical climate of the region.

Annual Mean Relative Humidity from 2013-2023: The peak relative humidity occurs during the monsoon season, notably in July, reaching its highest level at 86.25%. Throughout June, July, and August, there is a relatively consistent and uniform humidity pattern. Conversely, February experiences the lowest humidity levels due to its association with the summer season. The months of January through April exhibit a relatively stable humidity range, fluctuating between 60% and 67%. It is noteworthy that across all seasons, humidity levels vary within the broad range of 60% to 90%.

Annual Win Speed from 2013-2023: The mean wind speeds for each month vary throughout the year, ranging from a minimum of 4.45 mph in January to a maximum of 6.39 mph in April. During the spring months (March to May), the mean wind speed experiences an upward trend, with values reaching 5.65 mph in March, 6.39 mph in April, and 6.28 mph in May. In the summer months (June to August), the mean wind speed remains relatively consistent, with values ranging from 5.77 mph in July to 5.90 mph in August.As autumn approaches, the mean wind speed shows a gradual decrease, reaching 4.53 mph in November after a peak of 5.14 mph in SeptemberThe winter months (December to February) exhibit lower mean wind speeds, with values ranging from 4.46 mph in December to 4.89 mph in FebruaryAnalyzing the annual cycle, the mean wind speed demonstrates a noticeable fluctuation, reflecting the seasonal changes

and weather patterns throughout the yearComparing the mean wind speeds, April stands out as the windiest month with a mean speed of 6.39 mph, while January has the lowest mean wind speed at 4.45 mph

Table 5-12 Average Maximum, Minium Temperature and Relative Humidity of Yangon

Month	Average min temp	Average max temp	Relative Humidity
January	18(64)	32(90)	60%
February	19(66)	34(94)	61%
March	22(70)	36(96)	64%
April	24(75)	36(98)	67%
May	25(77)	33(92)	82%
June	24(76)	30(86)	86%
July	24(75)	29(85)	88%
August	24(75)	29(85)	88%
September	24(75)	30(86)	87%
October	24(75)	31(88)	80%
November	23(72)	31(89)	75%
December	19(66)	31(88)	68%

Table 5-13 Monthly mean temperature and monthly Rainfall of Yangon Region (Years 2013-2023) (10 Years)

Year (2013-2023)	Jan	Feb	Mar	Apr	May	Jun	July	August	Sep	Oct	Nov	Dec
Average Monthly Temperature (°F)	78.08	80.95	84.98	87.65	85.79	81.37	80.61	80.59	81.42	82.20	82.69	79.74
Total Monthly Precipitation (mm)	3.71	0.05	0.77	5.27	74.56	213.94	260.11	297.57	231.19	107.20	33.43	1.89

Source: WeathreUnderground, WeatherandClimate

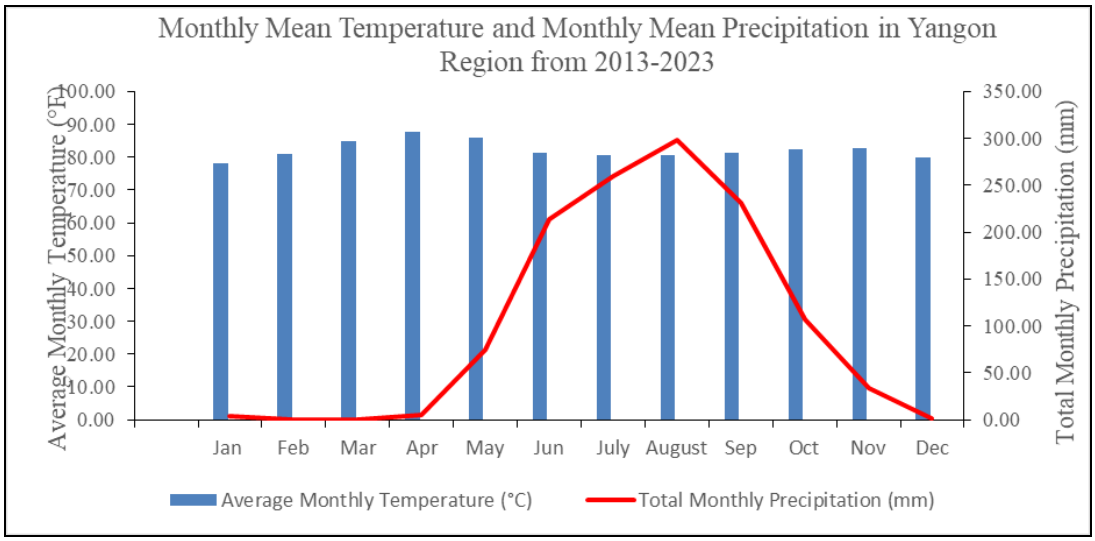


Figure 5.9 10 Years Monthly mean temperature and monthly rainfall of Yangon Region from 2013-2023

Table 5-14 Annual Mean Teamperature (°F) in Yangon Region from 2013-2023

Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2013	78.34	83.89	86.05	89.11	85.11	80.58	78.92	79.71	79.84	81.79	82.82	76.32
2014	76.43	79.63	84.27	87.32	85.13	81.34	79.92	80	81.04	82.3	81.5	80.25
2015	77.81	80.18	85.17	87.72	85.33	81.36	80.77	80.37	81.69	81.77	83.22	80.22
2016	76.5	81.07	86.24	90.13	87.43	81.74	81.39	81.01	81.4	82.24	82.3	81.41
2017	79.37	82.69	85.8	86.89	86.54	82.24	80.29	80.72	82.88	81.93	83.16	79.32
2018	78.45	80.67	83.83	87.23	85.18	81.12	79.91	80.43	82.16	82.65	82.09	80.9
2019	78.49	81.91	84.31	88.74	86.78	82.19	80.58	80.26	81.4	83.52	82.4	77.00
2020	77.41	79.9	83.64	87.06	86.69	81.18	81.66	80.6	81.89	81.62	82.39	79.53
2021	78.72	80.33	85.14	84.64	85.73	80.92	80.71	81.85	80.81	81.85	83.6	78.16

Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2022	79.22	79.86	85.88	87.37	83.32	81.49	81.48	79.95	81.39	82.66	82.39	80.83
2023	78.16	80.35	84.49	87.95	86.46	80.89	81.04	81.59	81.1	81.89	83.67	83.16
Annual Mean Temperature	**78.08**	**80.95**	**84.98**	**87.65**	**85.79**	**81.37**	**80.61**	**80.59**	**81.42**	**82.20**	**82.69**	**79.74**

Table 5-15 Total Annual Precipitation (mm) in Yangon Region from 2013-2023

Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2013	0.3	0.2	0.2	0	60.2	132	215.6	201.1	139.7	78.7	11.2	1.2
2014	0	0	0.4	2.4	80.6	223.1	266.5	215.1	180.5	48.1	53.7	0.8
2015	0.2	0.1	7	7.9	102.9	187.7	218.5	207.4	210.2	64.3	2.6	0.4
2016	0.1	0.2	0	7.7	106.6	140.2	225.2	183.9	139.6	69.8	5.8	0.4
2017	1.5	0	0	21.9	91	167.5	233.9	311.9	215.5	153.6	14.1	0
2018	0.4	0	0.5	3.5	152.4	300.6	389	439.1	195.6	87.5	4.1	10.1
2019	38.3	0	0.4	0.3	114	676.1	841.7	861	867.7	136	147.5	2.2
2020	0	0	0	14.3	112.5	526.1	470.8	853.8	594.3	541.2	128.7	5.7
2021	0	0	0	0	0	0	0	0	0	0	0	0
2022	0	0	0	0	0	0	0	0	0	0	0	0
2023	0	0	0	0	0	0	0	0	0	0	0	0
2013-2023	**3.71**	**0.05**	**0.77**	**5.27**	**74.56**	**213.94**	**260.11**	**297.57**	**231.19**	**107.20**	**33.43**	**1.89**

Table 5-16 Annual Mean Relative Humidity in Yangon Region from 2013-2023

Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2013	64.23	59	60.56	61.38	76.48	91.24	91.73	90.66	92.41	85.39	82.6	82.45
2014	78.99	77.22	69.52	66.84	68.77	87.59	90.38	89.37	86.76	83	80.1	69.23
2015	62.95	57.49	59.24	62.73	74.26	87.67	89.85	90	88.01	84.1	74.66	68.97
2016	61.76	61.27	63.11	60.02	53.2	51.56	50.61	55.5	49.51	70	76.05	69.45
2017	65.33	58.97	58.12	65.6	74.95	86.92	91.01	81.64	52.92	56.26	74.99	73.75
2018	69.63	64.76	67.9	66.44	74.78	89.04	91.64	89.91	84.56	82.96	77.55	76.22
2019	72.03	63.78	63.89	62.64	72.19	84.72	89.31	90.58	85.97	80.11	79.71	70.63
2020	68.28	63.73	65.56	67.52	72.89	87.47	86	89.44	86.58	86.53	78.77	74.13
2021	70.98	66.5	66.39	76.11	75.68	88.6	90.05	86.7	89.14	86.18	81.36	72.96
2022	72.33	68.24	69.96	71.23	82.5	88.51	87.67	90.07	87.59	82.06	79.73	79.46
2023	72.71	69.66	70.05	70.3	77.18	91.35	90.49	88.91	90.67	87.83	79.1	79.13
Mean Relative Humidity	**69.02**	**64.60**	**64.94**	**66.44**	**72.99**	**84.97**	**86.25**	**85.71**	**81.28**	**80.40**	**78.60**	**74.22**

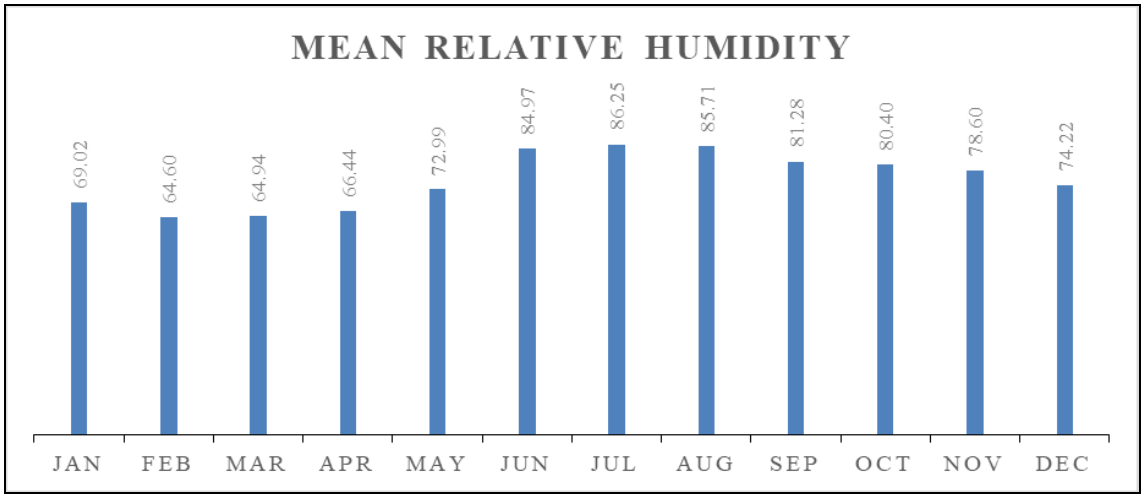


Figure 5.10 Monthly Mean Relative Humidity in Yangon Region from 2013-2023

Table 5-17 Monthly WIND SPEED(m.p.h) AT (06:30)hrs M.S.T from 2013-2023

Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2013	3.14	3.81	4.78	6.4	6.1	4.47	5.58	5.44	4.87	4.7	4.5	4.42
2014	4.11	4.85	5.34	6.27	5.68	5.55	5.59	5.32	4.83	4.46	4.15	4.54
2015	4.15	4.3	5.45	6.19	5.97	5.45	6.1	5.32	5.25	4.57	4.25	4.02
2016	4.23	4.74	5.55	6.39	5.94	5.79	5.64	5.85	4.76	4.55	4.46	4.73
2017	4.73	5.07	5.88	6.01	6.13	6.19	5.94	5.63	5.07	4.91	5.03	4.75
2018	4.55	5.02	5.43	6.1	6.05	6.58	5.8	6.38	5.26	4.23	4.14	4.06
2019	4.57	4.64	5.58	6.22	6.43	6.15	6.1	6.65	6.16	4.94	4.67	4.41
2020	4.81	5.34	6.61	6.61	6.27	6.05	5.02	6.09	4.9	5.46	4.43	4.21
2021	4.56	5.1	5.06	5.86	6.16	7.04	6.14	5.74	4.88	4.74	4.77	5.11
2022	5.72	5.74	6.16	6.85	6.27	5.27	5.49	5.92	5.47	5.26	4.73	4.48
2023	4.41	5.2	6.34	7.43	8.09	5.23	6.09	6.6	5.12	4.59	4.65	4.33
Mean Wind Speed	**4.45**	**4.89**	**5.65**	**6.39**	**6.28**	**5.80**	**5.77**	**5.90**	**5.14**	**4.76**	**4.53**	**4.46**

Source: WeathreUnderground, WeatherandClimate

Table 5-18 Annual rainfall, temperature, and relative humidity (Years 2013-2023)

Annual rainfall (mm)	Temperature (ºC)	Mean relative humidity (%)
1229.69	Mean Average	75.78
	27.87	

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 5.19 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

Station ID	Description	GPS Coordinates	
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 ($L_{Aeq, 1\ hour}$) 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 5.20 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 5.21 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

Figure 5.16 Location of Baseline Noise Monitoring Station

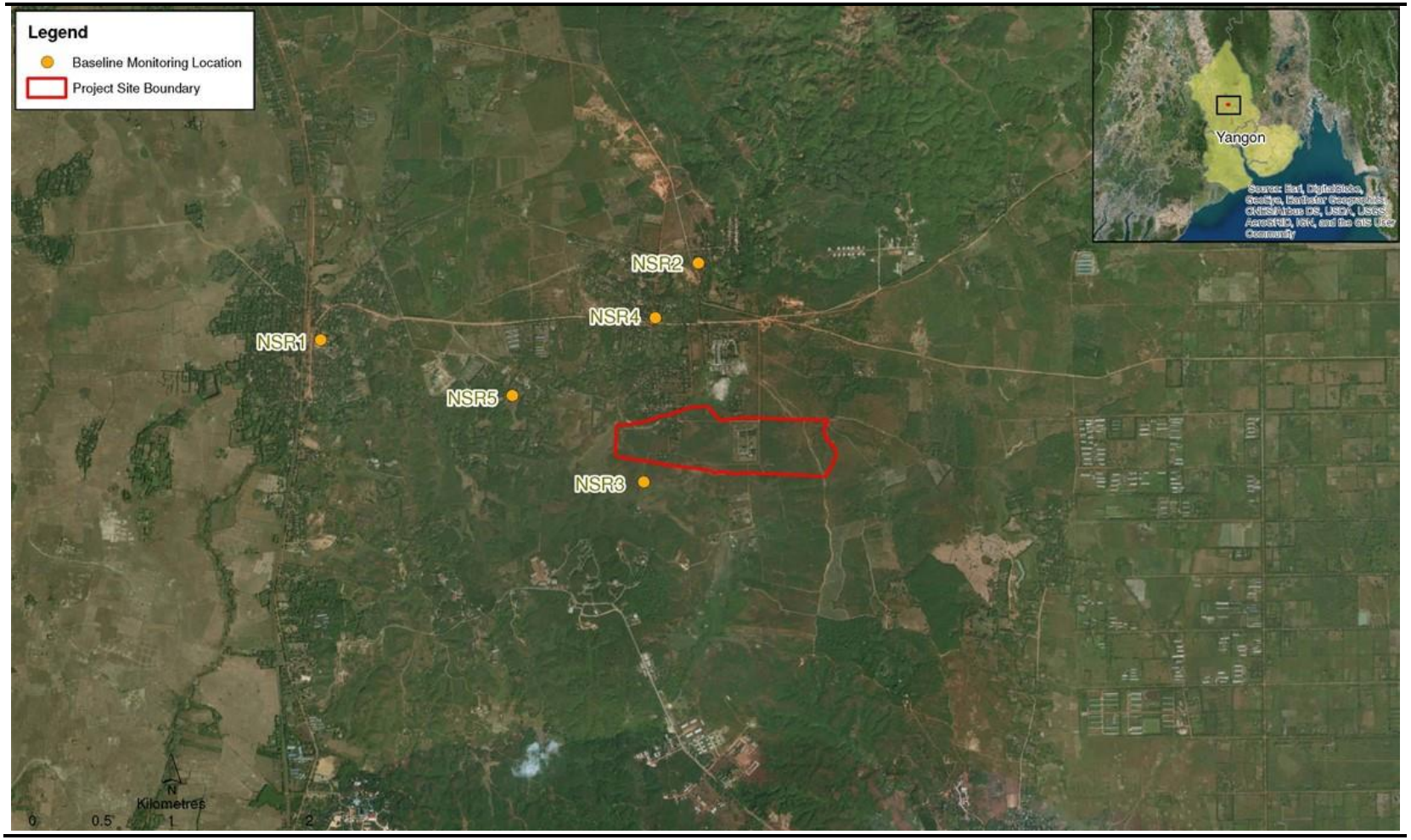


Figure 5.17 Noise Monitoring Station at NSR1

Figure 5.18 Noise Monitoring Station at NSR2

Figure 5.19 Noise Monitoring Station at NSR3

Figure 5.20 Noise Monitoring Station at NSR4

Figure 5.21 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 5.22 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:
Daytime refers to the hours from 0700 hrs to 2200 hrs while night-time refers to the hours from 2200 hrs to 0700 hrs.
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.

5.5.4 *Surface Water Quality*

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 5.23 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	17˚10' 12.01"	96˚04' 31.87"
SW-2	1.7.2017	War Net Chaung	17˚10' 06.98"	96˚02' 57.37"
SW-3	1.7.2017	War Net Chaung	17˚10' 10.44"	96˚03' 02.33"
SW-4	2.7.2017	Nyaung Kone	17˚10' 06.23"	96˚03' 58.59"
SW-5	3.7.2017	Yae Thar Shay	17˚10' 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 5.22 ***Surface Water Sampling Locations Stations***

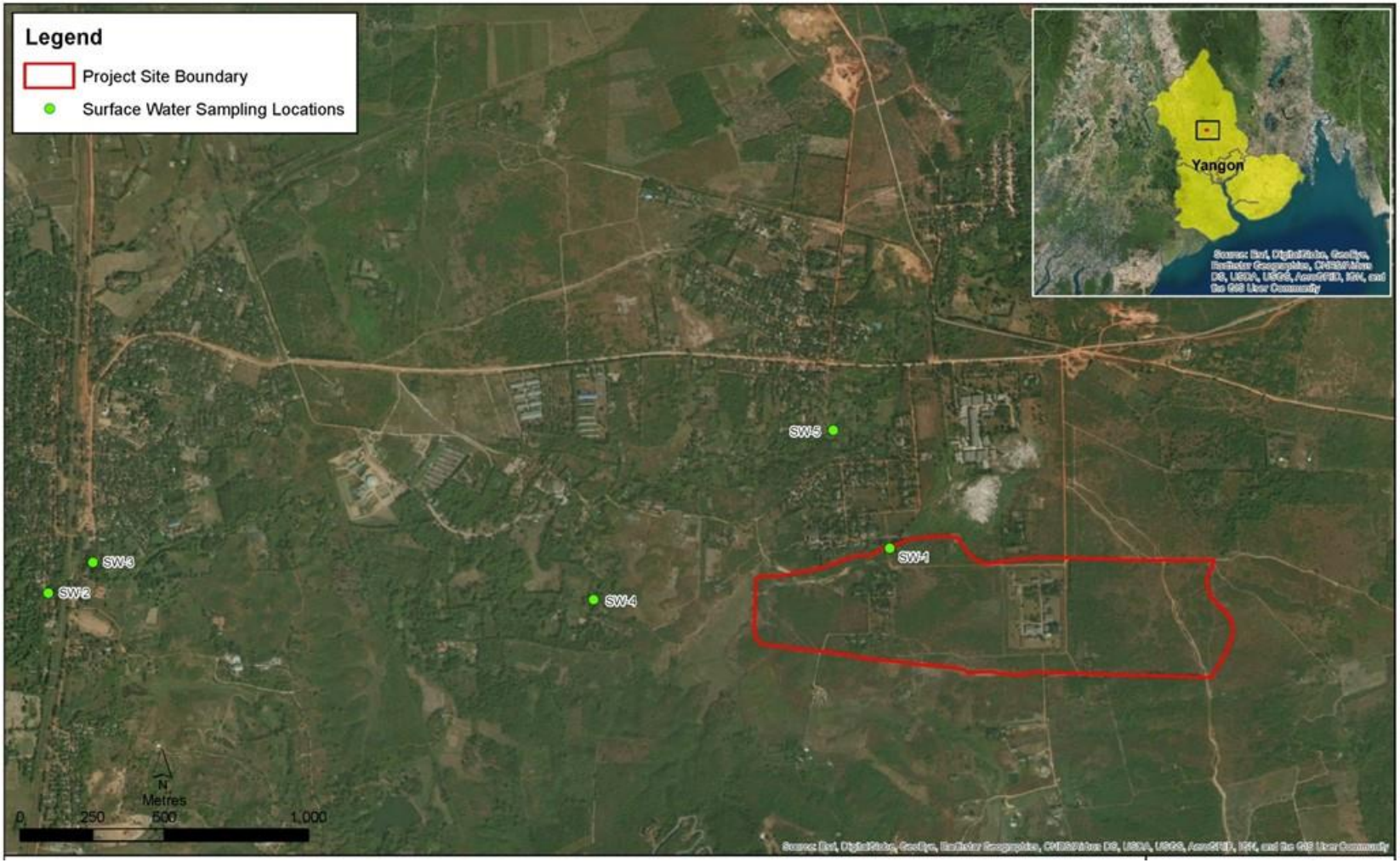


Figure 5.23 Surface Water Quality Sampling Station at SW1

Figure 5.24 Surface Water Quality Sampling Station at SW2

Figure 5.25 Surface Water Quality Sampling Station at SW3

Figure 5.26 Surface Water Quality Sampling Station at SW4

Figure 5.27 Surface Water Quality Sampling Station at SW5

Table 5.24 Baseline Surface Water Quality Data, June and July 2017

Parameter	Unit	SW1	SW2	SW3	SW4	SW5	NATIONAL DRINKING WATER QUALITY STANDARDS	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	Not available	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	Not available	N/A
Nitrate as N	mg/L	0.34	0.13	0.12	0.17	0.12	50	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	Not available	10
Chemical Oxygen Demand	mg/L	23	11.33	12.33	14.67	9.33	Not available	150
Biochemical Oxygen Demand	mg/L	2.33	<2	<2	2	<2	Not available	30

Parameter	Unit	SW1	SW2	SW3	SW4	SW5	NATIONAL DRINKING WATER QUALITY STANDARDS	WBG EHS Treated Sanitary Water / NEQ Guidelines
Phenols (Total)	mg/L	<0.2	<0.2	<0.2	<0.3	0.57	Not available	0.5
Arsenic	µg/L	<10	<10	<10	<10	<10	0.05	100
Cadmium	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	Not available	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	0	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 5.25 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 5.28 Ground Water Sampling Locations Stations

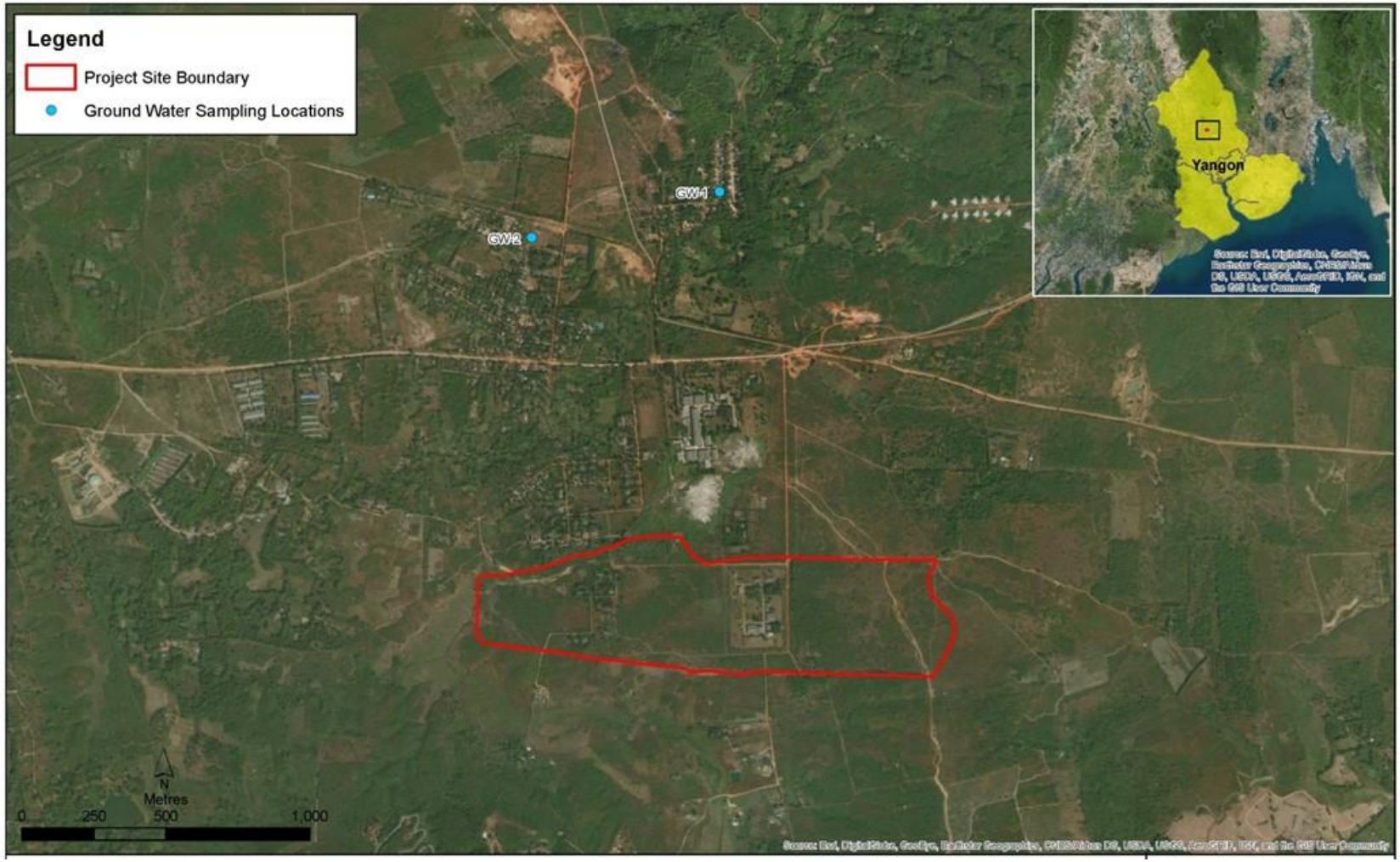


Figure 5.29 Ground Water Quality Sampling Station at GW1

Figure 5.30 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 5.26 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.

Figure 5.31 Locations for Soil Sampling within the Project Area

Table 5.27 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 5.28 **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	*Copsychus saularis*	Oriental Magpie Robin	LC
2	Muscicapidae	*Saxicola caprata*	Pied Bushchat	LC
3	Covidae	*Dicrurus macrocercus*	Black Drongo	LC
4	Covidae	*Aegithina tiphia*	Common Iora	LC
5	Leiothrichidae	*Heterophasia melanoleuca*	Dark-Backed Sibia	LC
6	Passeridae	*Passer domesticus*	House Sparrow	LC
7	Passeridae	*Passer montanus*	Eurasian Tree Sparrow	LC
8	Passeridae	*Anthus rufulus*	Paddy field Pipit	LC
9	Ploceidae	*Lonchua punctulata*	Scaly-Breasted Munia	LC
10	Sturnidae	*Acridotheres tristis*	Common Myna	LC
11	Columbidae	*Streptopelia chinensis*	Spotted Dove	LC
12	Columbidae	*Columba livia*	Rock Pigen	LC
13	Pycnonotidae	*Pycnonotus blanfordi*	Streak Eared Bulbul	LC
14	Pycnonotidae	*Pycnonotus cafer*	Red-vented Bulbul	LC
15	Cisticolidae	*Prinia inornata*	Plain Prinia	LC
16	Cisticolidae	*Prinia hodgsonii*	Grey-Breasted Prinia	LC
17	Laniidae	*Lanius cristatus*	Brown Shrike	LC

No.	Order/Family	Scientific Name	Common Name	IUCN Red List Status
18	Sylviidae	*Turdoides gularis*	White Throated Babbler	LC
19	Sylviidae	*Chrysomma sinense*	Yellow-Eyed Babbler	LC
II	**Apodiformes**			
20	Apodidae	*Cypsiurus balasiensis*	Asian Palm Swift	LC
III	**Coraciiformes**			
21	Meropidae	*Merops orientalis*	Green Bee-Eater	LC
IV	Piciformes			
22	Megalaimidae	*Megalaima haemacephala*	Coppersmith Barbet	LC
V	Charadriiformes			
23	Turnicidae	*Turnix suscitator*	Barred buttonquail	LC
VI	**Gruiformes**			
24	Rallidae	*Gallicrex cinerea*	Watercock	LC
VII	**Cuculiformes**			
25	Centropodidae	*Centropus sinensis*	Greater Coucal	LC

LC= Least Concern

Figure 5.32 Photos of Bird Species in the Study Area

Watercock *Grallicrex 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 5.29 ***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	*Caltoes versicolor*	Garden Fence Lizard	LC	Observed
2	Agamidae	*Calotes mystaceus*	Blue Crested Lizard	LC	Observed
3	Agamidae	*Calotes jerdoni*	Jerdon's Forest Lizard	NE	Observed
4	Scincidae	*Mabuya multifasciata*	East Indian Brown Mabuya	LC	Observed
II	**Squamata (Snake)**				
5	Viperidae	*Trimeresurus gramineus*	Common Green Pit Viper	LC	Observed
6	Viperidae	*Daboia russelii*	Russell's viper	LC	Interviewed
7	Colubridae	*Dendrelaphis pictus*	Painted Bronzeback Tree Snake	LC	Observed
8	Colubridae	*Oligodon spp*	kukri snakes	LC	Interviewed
9	Colubridae	*Xenochrophis flavipunctatus*	Water snake	LC	Interviewed
10	Elapidae	*Bungarus fasciatus*	Banded Krait	LC	Interviewed
III	**Anura**				
1	Dicroglossidae	*Fejervarya limnocharis*	Paddy frog	LC	Observed
2	Dicroglossidae	*Euphlyctis cyanophylyctis*	Skittering frog	LC	Observed

LC= Least Concern, Not Evaluated =NE

Figure 5.33 Photos of Herpetofauna Observed in the Study Area

	
Paddy frog *Fejervarya limnocharis*	Painted Bronzeback Tree Snake *Dendrelaphis pictus*
	
Blue Crested Lizard *Calotes mystaceus*	Garden Fence Lizard *Caltoes versicolor*
	
Jerdon's Forest Lizard *Calotes jerdoni*	East Indian Brown *Mabuya multifasciata*

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 5.30 ***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	*Papilio polytes*	Common Mormon	NE
2	Papilionidae	*Papilio demoleus*	Lime butterfly	NE
3	Pieridae	*Catopsilia pomona*	Common Emigrant	NE
4	Pieridae	*Catopsilia crocale*	Common Emigrant	NE
5	Pieridae	*Catopsilia pyranthe*	Mottled Emigrant	NE
6	Pieridae	*Eurema hecabe*	Common grass yellow	NE
7	Danaidae	*Euploea core*	Common Crow	LC
8	Danaidae	*Danaus genutia*	Striped- Tiger	NE
9	Danaidae	*Danaus limniace*	Blue Tiger	NE
10	Nymphalidae	*Hypolimnas bolina (Male)*	Great Eggfly	NE
11	Nymphalidae	*Athyma perius*	Common Sergeant	NE
12	Nymphalidae	*Acraea violae*	Tawny Coster	NE
13	Nymphalidae	*Junonia hierta (Male)*	Yellow Pansy	LC
14	Nymphalidae	*Junonia atlites (Male)*	Gray Pansy	NE
15	Satyridae	*Ypthima baldus*	Common Five ring	NE
16	Lycaenidae	*Chilades pandava (Male)*	plains Cupid	NE
17	Lycaenidae	*Chilades pandava*	plains Cupid	NE

Sr.	Order/Family	Species	Common Name	IUCN Red List
		(Female)		
18	Lycaenidae	*Loxura atymnus*	Yamfly	NE
19	Riodinidae	*Abisara abnormis*	-	NE
20	Hesperiidae	*Caltoris sp.*	Swift	-
I	**Odonata (Dragonfly)**			
1	Libellulidae	*Orthetrum sabina*	Slender Skimmer/ Green Marsh Hawk	LC
2	Libellulidae	*Brachythemis contaminate*	Ditch Jewel (Male)	LC
3	Libellulidae	*Rhyothemis phyllis*	Yellow-striped Flutterer	VU
4	Libellulidae	*Potamarcha congener*	Yellow-Tailed Ashy Skimmer	LC
5	Libellulidae	*Neurothemis tullia (Female)*	Pied Paddy Skimmer	LC
6	Libellulidae	*Brachythemis fuscopalliata*	Dark-winged Groundling	LC
7	Libellulidae	*Crocothemis erythraea*	Carmine Darter	LC
8	Libellulidae	*Diplacodes trivialis (Male & Female)*	Ground Skimmer/Chalky Percher	LC
9	Libellulidae	*Diplacodes pumila (Male)*	Dwarf Percher	LC
10	Libellulidae	*Orthetrum pruinosum (Male)*	Crimson-tailed Mash Hawk	LC
11	Libellulidae	*Lathrecista asiatica (Male & Female)*	Asiatic Blood Tail	LC
12	Libellulidae	*Pantala flavescens*	Wandering Glider	LC
13	Libellulidae	*Crocothemis servilia*	Scarlet Skimmer/Ruddy	LC

Sr.	Order/Family	Species	Common Name	IUCN Red List
			Marsh Skimmer	
14	Libellulidae	*Trithemis pallidinervis*	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 5.34 Photos of Butterfly and Dragonfly Species in Study Area

	
Common Crow *Euploea core*	Yellow Pansy *Junonia hierta* (Male)
	
Yellow-striped Flutterer *Rhyothemis phyllis*	Ditch Jewel (Male) *Brachythemis contaminate*

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 acidumis* (10%). Some examples of flora species observed are provided in *Figure 5.33*.

Figure 5.35 Photos of Flora Species in Study Area

	
Ampelocissus Latifolia	*Convolvulus arvensis*
	
Lagerstroemia macrocarpa	*Semecarpus subpanduriformis*

5.7 INFRASTRUCTURE AND SERVICES

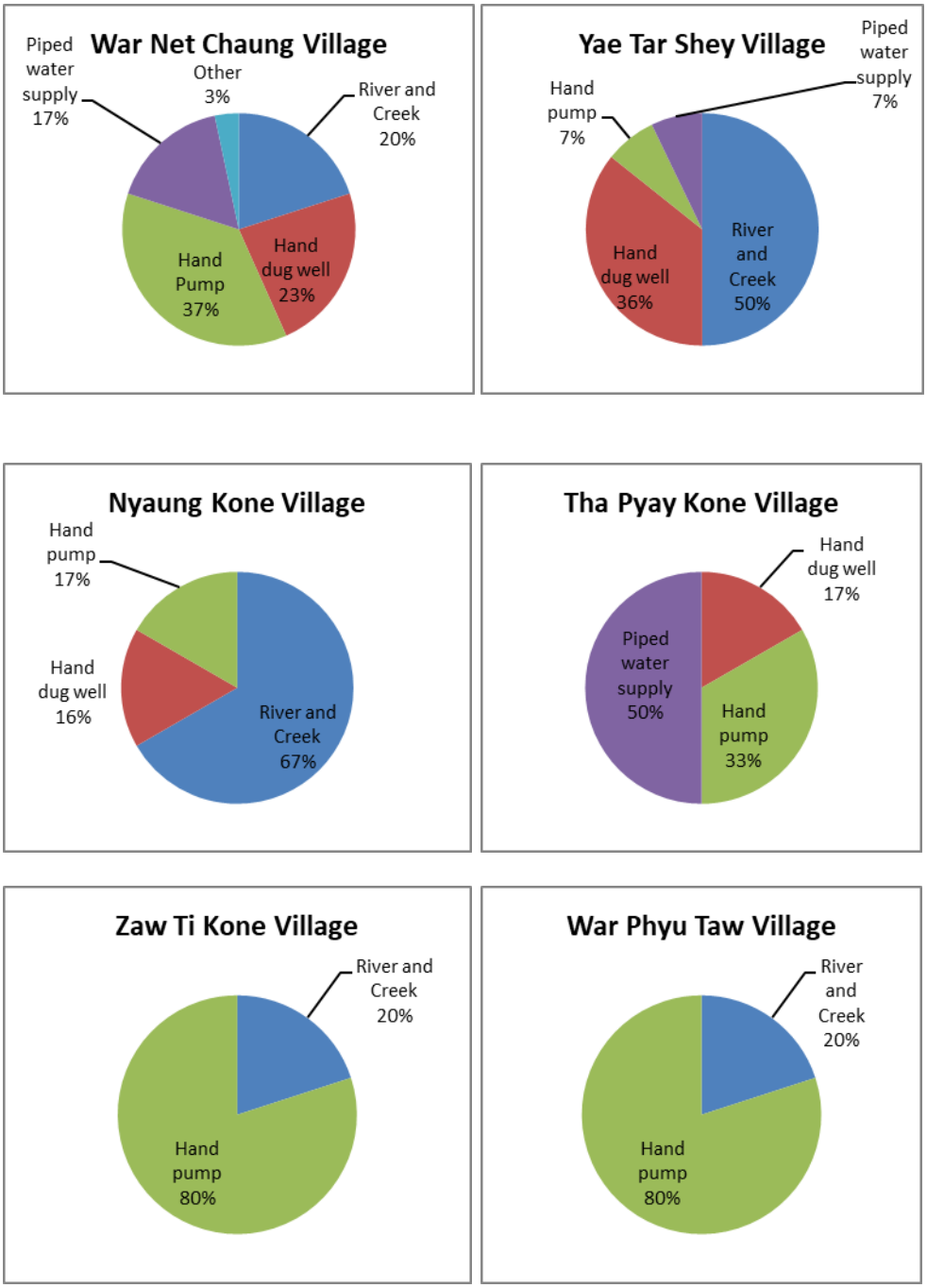
5.7.1 *Utilities and Infrastructure*

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 basic, only few of them have problem during summer time. They received water from in the village level and see the quality as good.

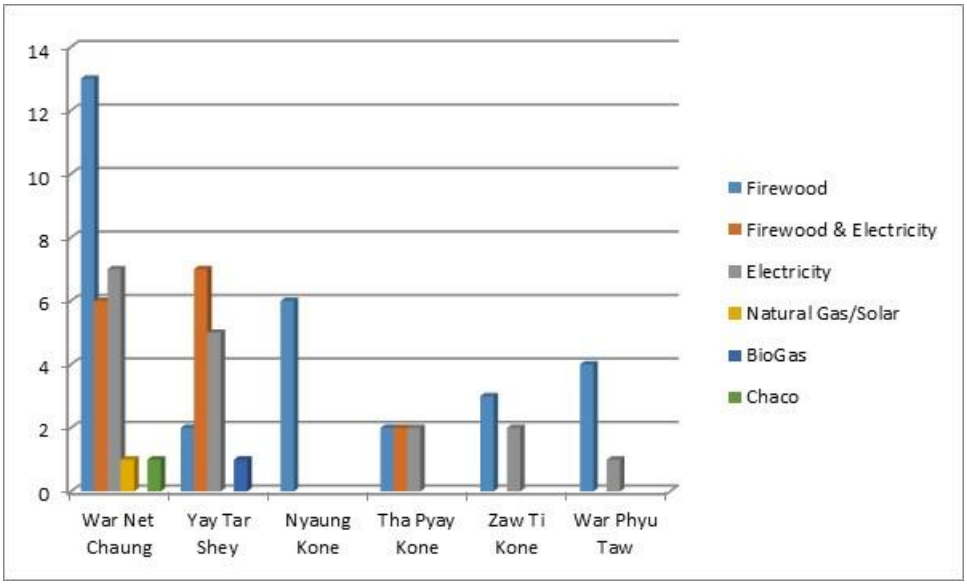
In War Net Chaung, 37% of households receive drinking water from hand pump well (37%), 23% from hand dug wells, 20% from Hmawbi River/Htan Ta Pin River and Sa-Par-Kye Creek, 17% from piped water supply and 3% from other sources (such as bottled). For Yae Tar Shey and Nyaung Kone villages over 50% of household get their drinking water from Hmawbi Rive and Htan Ta Pin River during rainy season. During the dry season, most of the villagers in Yae Tar Shey and Nyaung Tone 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 5.36 Source of Drinking Water in Villages



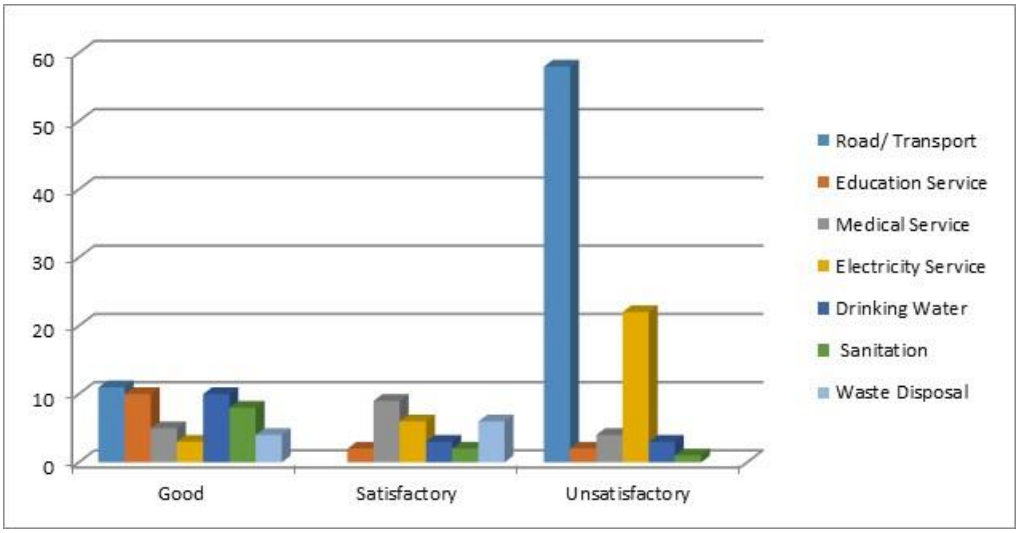
Most households in the area use firewood or charcoal for cooking as this is easily available from the local forest although villages also have access to use electric and gas stove. Villagers from most villages use both firewood and electricity as main source of cooking. Nyaung Kone is the only village 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 5.37 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 5.38 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 5.31 Secondary data on Population Statistics from the Townships and Villages in the Study Area (Myanmar Population Census 2015)

Township / Village	Male	Female	Total	No. o 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 5.32 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 5.33 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

5.8.2 *Livelihood and Economy*

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 5.39 Photos of Cultivation in Tha Pyay Kone

Table 5.34 Main Crops and Cooking Fuels in Village Tracts

Village	Village Tract	Main Crops/ Vegetable	Cooking Fuel
War Net Chaung	War Net Chaung	Egg Plant Gourd Paddy Rubber Roselle Cucumber Green beans Betel leave Banana) Lime	45 % of households (HHs) use firewood and charcoal, and 50 % use electricity and 5 % use gas.
Tha Pyay Kone	Let Pa Dan	Flower	-

Village	Village Tract	Main Crops/ Vegetable	Cooking Fuel
		Jasmine Monsoon Paddy Sugar Cane Bean Vegetables	
Nyaung Kone	War Net Chaung	Egg Plant Jasmine Flower Vegetables Gourd Cucumber Green beans	Most of households (HHs) use firewood.
Yae Thar Shey	War Net Chaung	Egg Plant Groundnut Bean Cucumber Vegetables Flower	All households (HHs) use firewood, charcoal and electricity.

Table 5.35 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 %	70 %	90 %	30 %
Agricultural labourer				-
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 5.36 Average Monthly Income and Expenses Distribution per Village

Monthly Income	War Net Chaung	Tha Pyay Kone	Nyaung Kone	Yae Thar 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 5.37 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

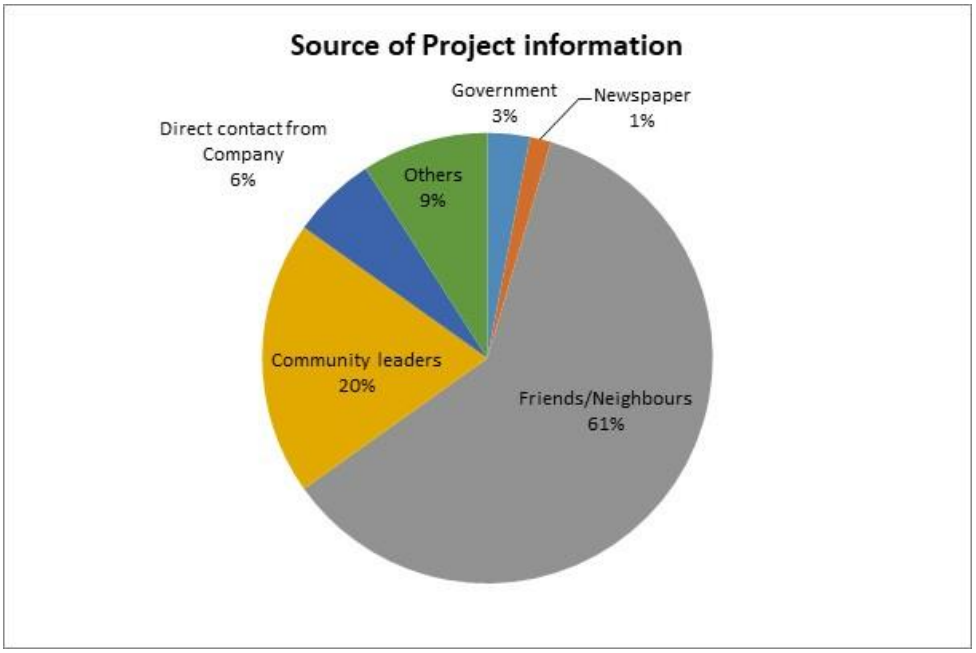
The average agricultural land holding size for consulted villages is approximately 0.5 acre to 2 acre. Villagers mentioned that selling and buying land among villagers is not common but some villagers sell the land to people from other areas for higher prices. Villagers mostly inherited the land from 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 5.40 Source of Project Information

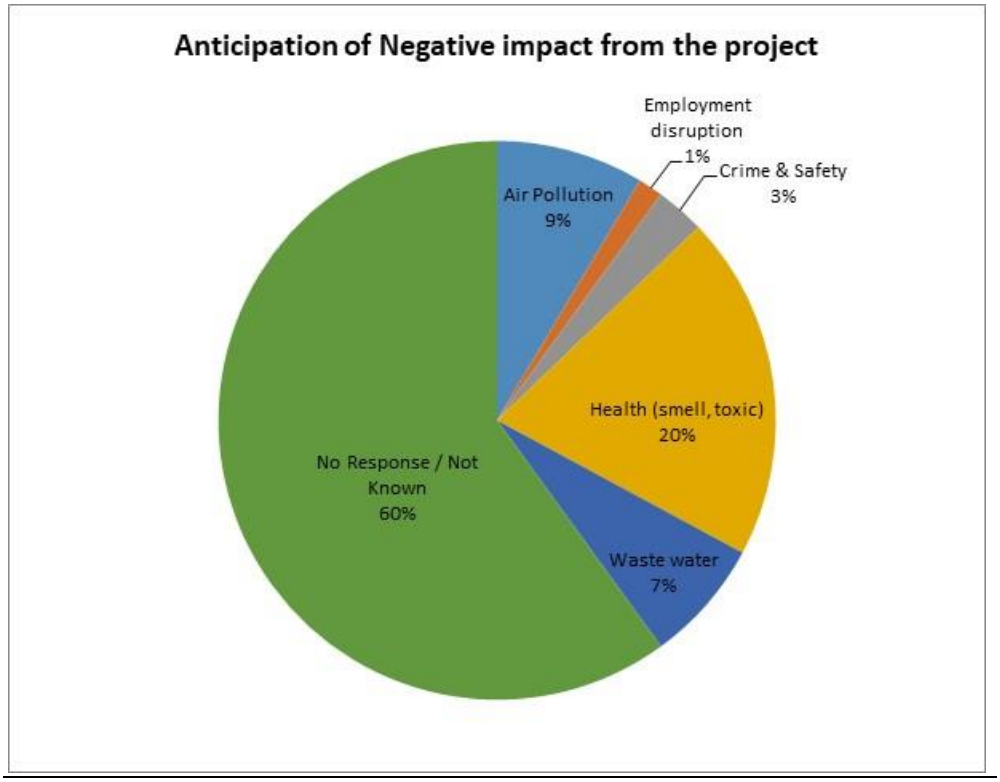


21% of households consulted mentioned that the project may bring positive impact for their livelihoods while 43% of villagers anticipated that the project will generate impacts. The 43% of respondent do not give any answer.

The most common issue rasied 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 5.41 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

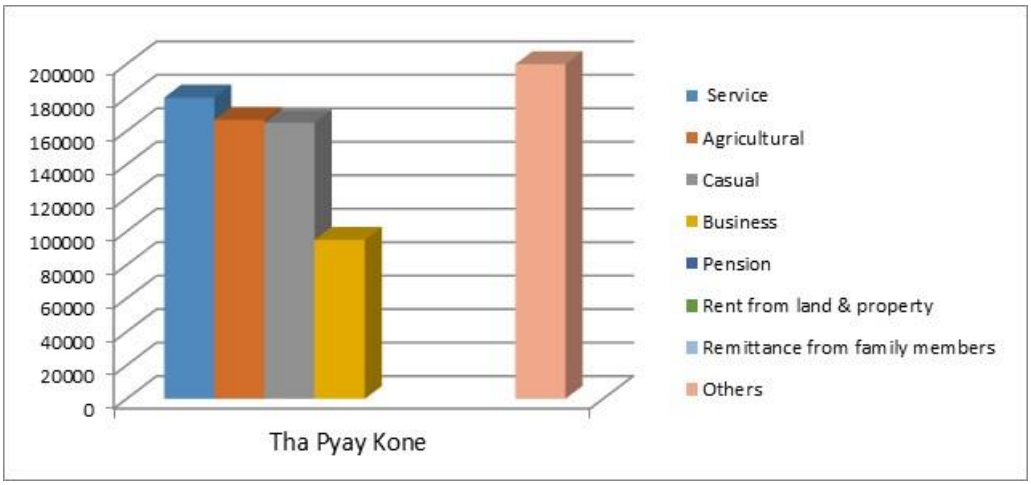
Background

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.*

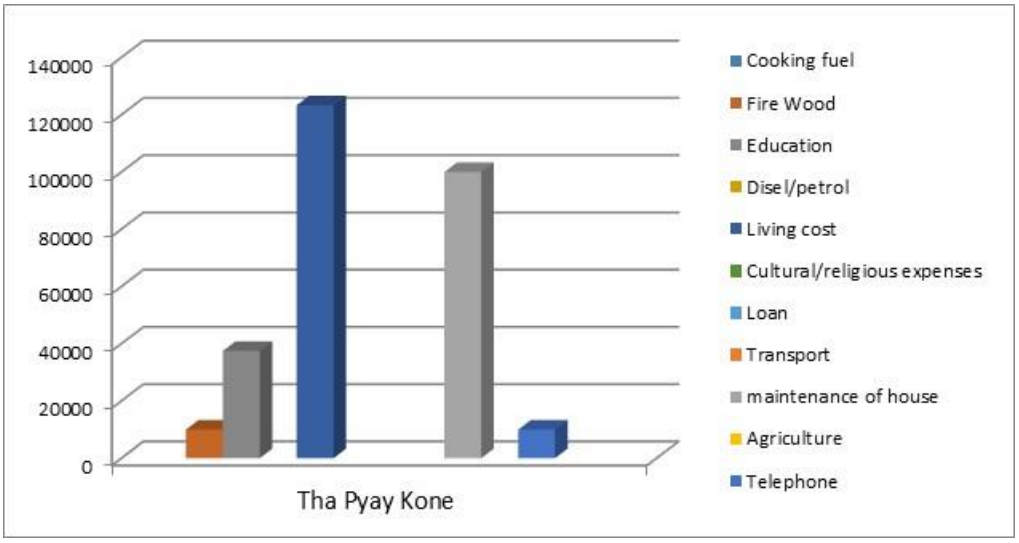
Figure 5.42 Different Source of Income in Tha Pyay Kone Village



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 5.43 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 *Figur*e *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 5.44 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).

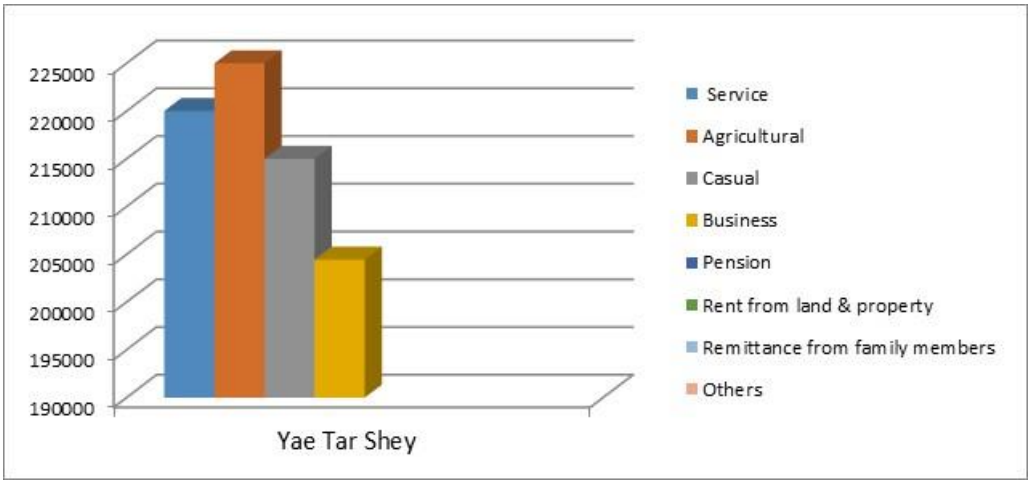
Livelihood and Income

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 5.45 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 5.46 Different Source of Income in Yae Tar Shey village



Income in Kyats shown on the Y Axis

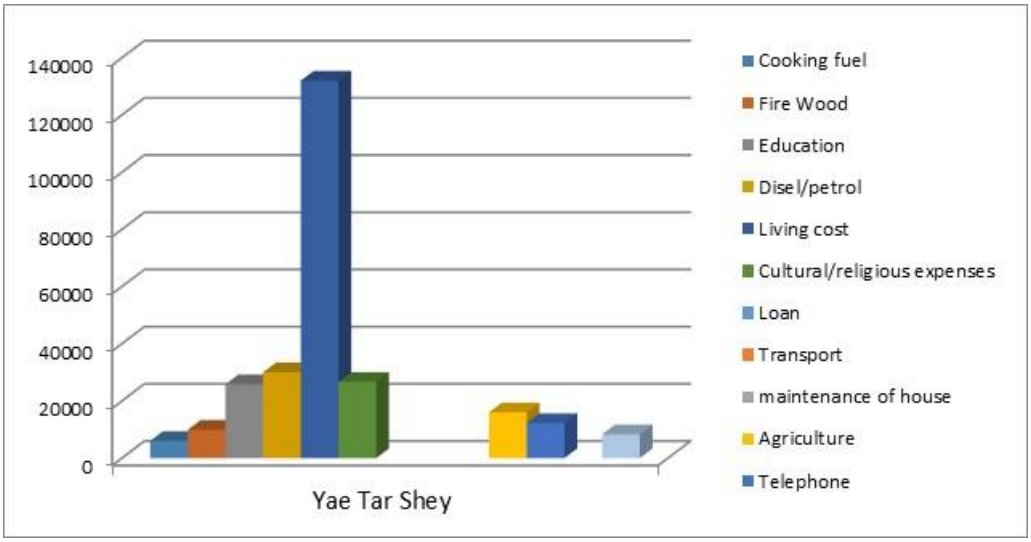
In this village, 90% of agricultural land is irrigated using water pumps. Generally all family members are involved in farming however sometimes additional labourers are hired from neighbouring villages. The wages paid per day are provided in *Table 5-31*. There are also poultry and pig farms for domestic and commercial purposes in this village.

Table 5.38 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 5.47 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 5.48 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

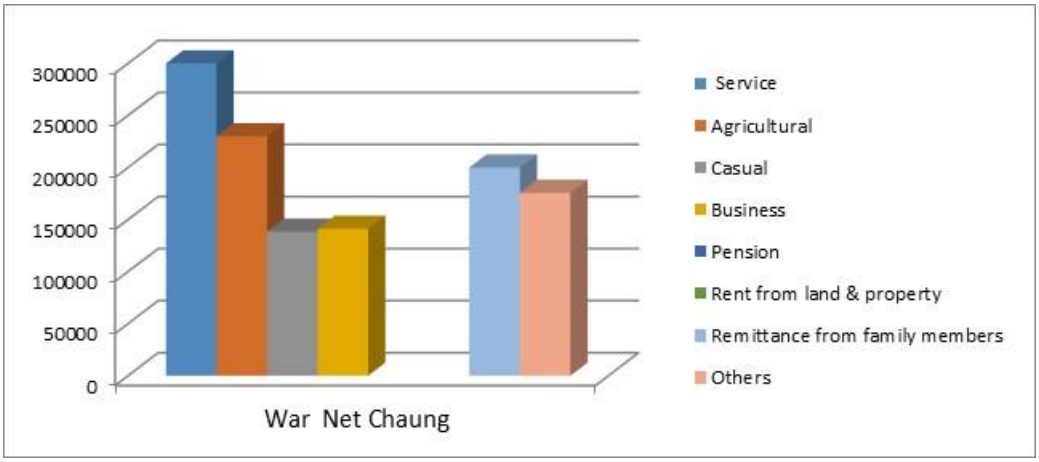
where HAIC has situated. The village was established over 100 years ago and is located near the Sa-Par-Kye Creek, which flows into the Htan Ta Pin River (9 miles from the village).

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.

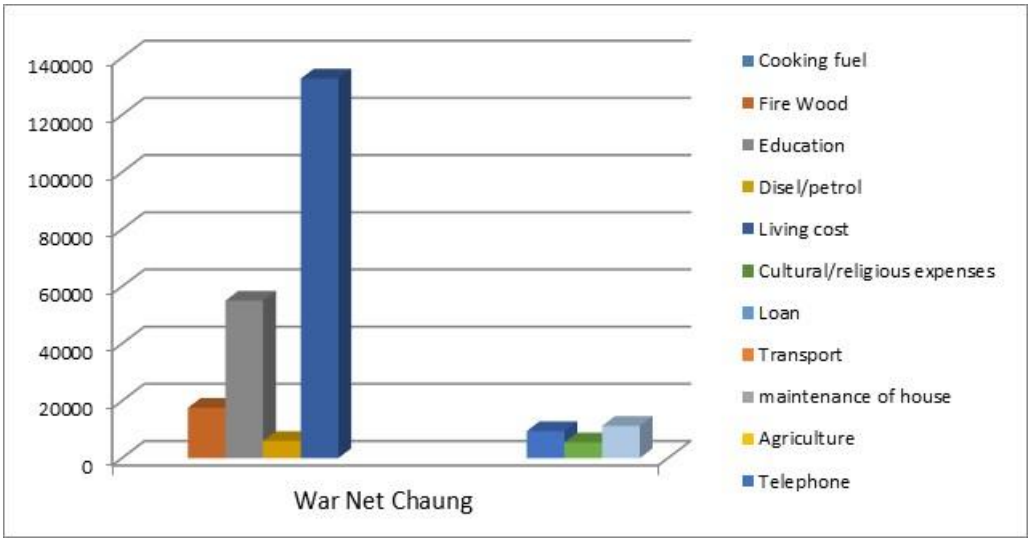
In War Net Chaung village, the higher amount of income comes from the source of general service and agriculture. Causal labourer work, remittance from family members and others also provided for family income. The detail sources of household income are provided in the *Figure 5.47.*

Figure 5.49 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 5.50 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 5.51 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

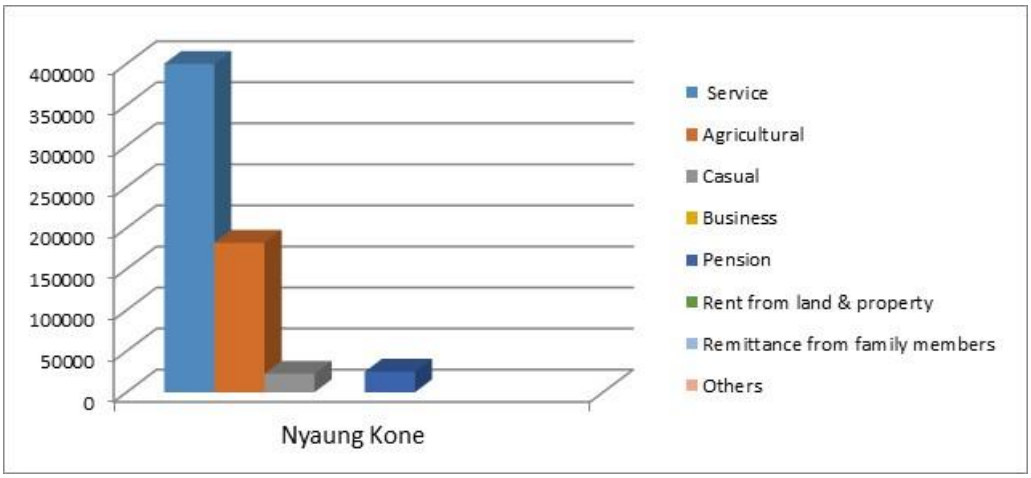
Par Kye Creek which flows into Hmawbi River. This village is the smallest of the villages consulted. Nyaung Kone village is home to some 58 households for a population of 271 (4.7 members per household on average).

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.

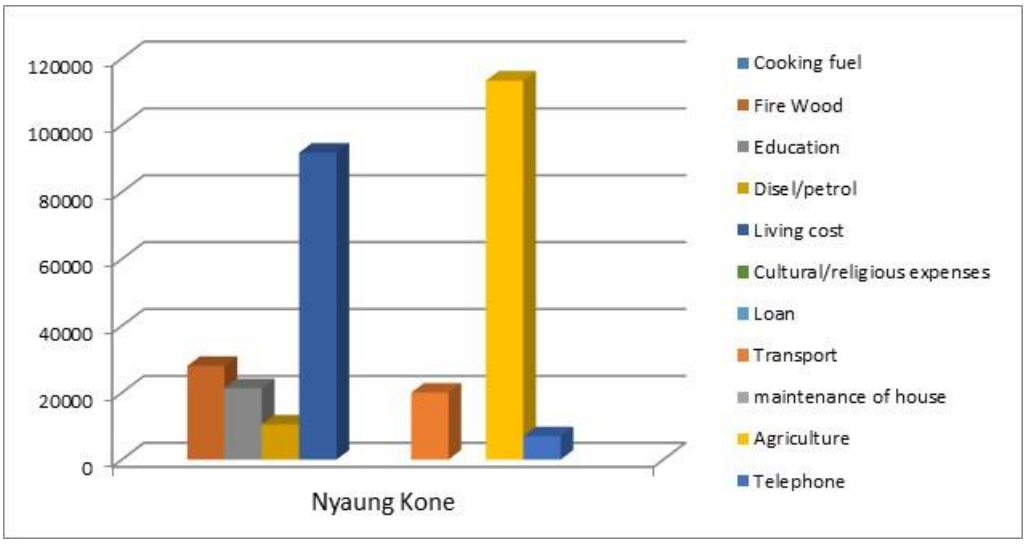
In Nyaung Kone village, most of the income comes from services and agriculture. It is the only village which has income from pension compared to other villages. Information on income sources is provided in the *Figure 5.50*.

Figure 5.52 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 5.53 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 5.54 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 villgers 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, hyptension, 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 the Hmawbi Township.

Some monasteries provide Buddhist monastic education to children who are unable 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 5.55 Monastery within 500m of the Project Site

Figure 5.56 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 5.57 Trees surrounding the Project Site

Figure 5.58 Fields surrounding the Project Site

6 IMPACT ASSESSMENT AND MITIGATION MEASURES

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
Construction Phase																
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			■		■		■	■	■	■	■	■		■		
Operational Phase																
Incineration	■											■		■		
Presence of the structures				■		■										
Labour, equipment and services supply												■	■	■	■	
Transportation of equipment,	■	■										■		■	■	

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
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			■		■		■					■		■		
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.
Impacts on air quality due to the use of PMEs	During construction of the Project, potential short-term, localized impacts to air quality may arise from gaseous emissions from equipment and vehicles. Pollutants emitted during the construction phase are likely to include NOx 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.
Impacts on hydrology, hydrogeology and landscape and visual character due to presence of the structure	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. 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.

Impact	Rationale for scoping out of assessment
Impacts on air quality due to the use of PMEs	During operation of the Project, potential localized impacts to air quality may arise from gaseous emissions from equipment and vehicles. Pollutants emitted during the operation phase are likely to include NOx and NO_2, SO_2 and particulate matter (PM_{10} 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.

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 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

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

waste will be sent to a licensed contractor in Thilawa and the incinerator will only be use 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*

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.

Current Actions taken by HAIC on Occupational Health Measures

AWBA (HAIC) plans to use 2 % of net profit from the Project for CSR program. At present, HAIC employed a total of 156 local persons from Hmawbi Township as permanent and day workers where 134 numbers of males and 22 females are included. The breakdown for the workforce in gender and percent of local workers are presented under the following table.

Employment Type	**Total headcount**	**Number of local employees (from Hmawbi Township)**			**Percent of local employees**
		Male	**Female**	**Total**	
Permanent	73	20	7	27	37 %
Day Workers	129	114	15	129	100 %

HAIC provides health care services for the workers in the workplace clinic during working hours and also provides medical examinations to the workers (pre-employment medical checkups and periodic medical examinations.) All workers in

the factory are medically examined at the time of appointment and thereafter every six months by a registered medical practitioner.

Pre-employment medical checkup

After a successful interview with the HR Department candidate is sent to the Clinic where the medical officer/nurse takes the history and physical examination of the candidate with a health assessment form. The candidate undergoes physical/clinical examination as a pre-employment medical checkup which includes:

(1) Complete checkup of all body systems including the cardiovascular system, respiratory system, central nervous system

(2) Blood pressure

(3) Absence of any skin disease

(4) Absence of any contagious disease.

(5) No abnormality regarding vision with or without correction

(6) Gynaecological and Pregnancy tests for female candidates

Periodic medical examination

After identification of employees exposed to hazardous occupation /working in dangerous operation, they are sent to the Occupational and Environmental Health Division, Department of Public Health, Ministry of Health and Sports (or) other Private Hospital for a complete medical checkup which includes following

(1) Complete checkup of all body systems including the cardivascular system, respiratory system, central nervous system

(2) Blood pressure, weight, and height

(3) Absence of any skin disease

(4) Absence of any contagious disease

(5) No abnormality regarding vision with or without correction

(6) Chest X-ray

(7) ECG

(8) Haemoglobin

(9) Serum Cholinesterase

HAIC assigned the workers only based on the medical examination results.

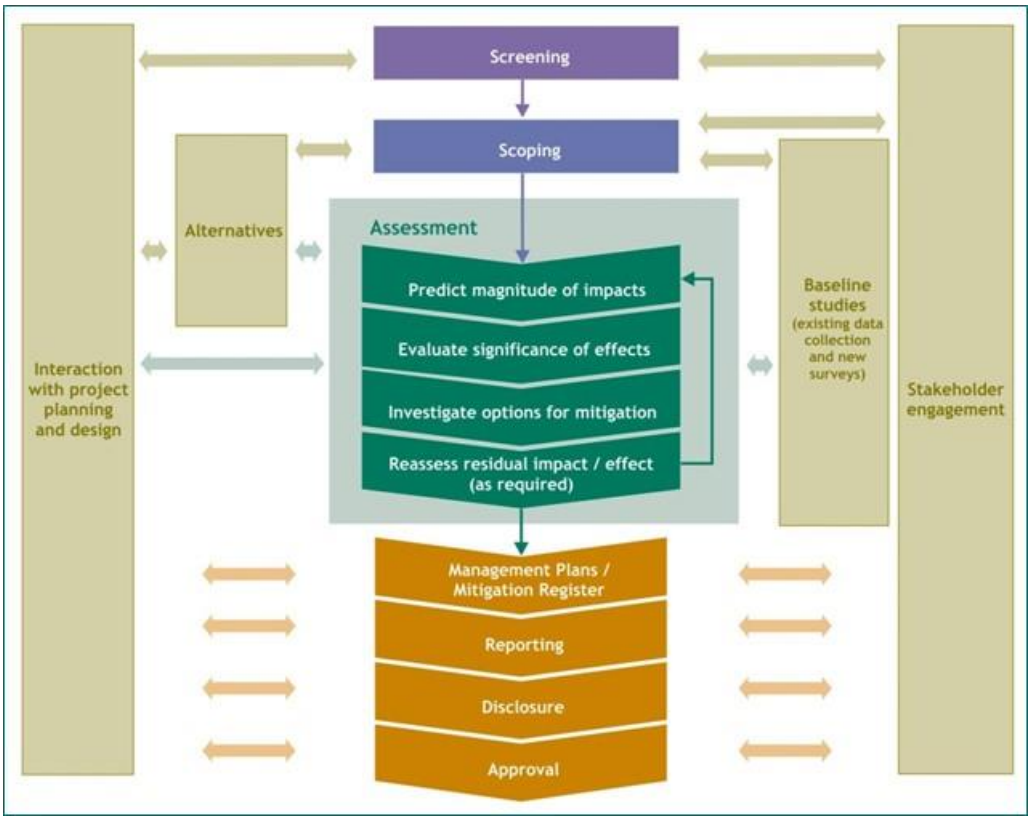
6.2.8 *Potential Impacts on Infrastructure Services*

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.

6.3 IMPACT ASSESSMENT METHODOLOGY

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:

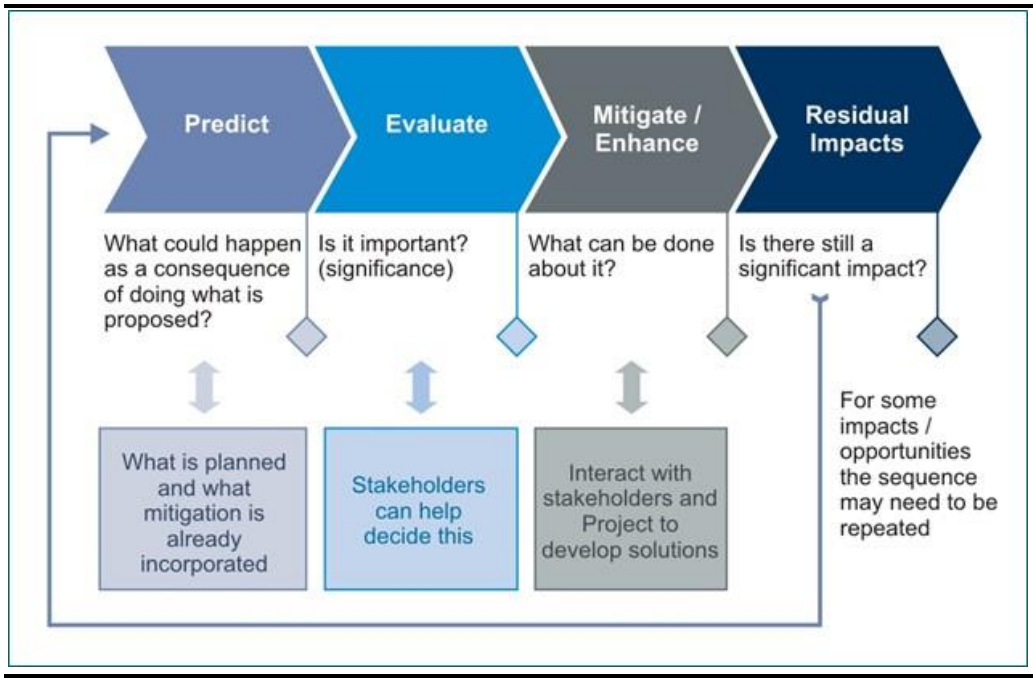
- Impact prediction: to determine what could potentially happen to resources/receptors as a consequence of the Project and its associated activities.

- 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
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 ley 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.
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

	Extent / Duration / Scale / Frequency
	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
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. 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

Category	Designation / Importance / Vulnerability
	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	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).

Box 6.1 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.

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.

6.4 CONSTRUCTION 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.

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 basis,

(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}

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

(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]

unmitigated and uncontrolled at receptors within a conservative distance of 500 m of 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/m^2/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, NO_2, and SO_2 will be monitored monthly at the ASRs. NO_2 and SO_2 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 PM_{10}, $PM_{2.5}$, NO_2, and SO_2. More information is provided in *Section 8.8.4*.

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 NEQG 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:
SWL is calculated from the Sound pressure level at 10m provided by the Client.
The figures are rounded up to a whole number.
The overall SWL represents the maximum potential noise impact during construction phase.

(1) 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

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
NSR3	615	55
NSR4	1,026	50
NSR5	1,564	45

Notes:
The SWL from *Table 8.4* has been adopted in the calculation.
Predicted noise level = overall SWL + distance correction + façade reflection
= 123 – (25 x log D + 1) + 3
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)**
NSR 1	45	66	66	0	Yes
NSR 2	47	59	59	0	Yes
NSR 3	55	61	62	1	Yes
NSR 4	50	50	53	3	Yes
NSR 5	45	67	67	0	Yes

Notes:
Cumulative Noise Level (C) = 10 x log ($10^{(A/10)}$+ $10^{(B/10)}$)
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 8.8.4.

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 do 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 will 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	Local	Regional	International	

Extent	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 8.8.4*.

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 sols 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	Negative	Positive	Neutral

Nature	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* 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	Local	Regional	Global	

Extent	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/grease 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 production line activities. 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° 09'59.99"N 96° 04'43.8"E
Actual Stack Conditions [2]		
Stack height	m	25
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}

Stack Parameter[(1)]	Unit	Value
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] 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] Normalised flow rate at 7% oxygen, dry gas, 273K and a pressure of 101.3 kPa. Myanmar National Environmental Quality (Emission) Guidelines (NEQEG) (2015) The PM concentration is used to conservatively estimate emissions of both $PM_{2.5}$ and PM_{10}.		

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 (NO_2) 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	8.78	200	41.1	21%	49.9	24.9%	Negligible
AQ1			4.72	2%	13.5	6.7%	Negligible
AQ2			6.62	3%	15.4	7.7%	Negligible
AQ3			5.45	3%	14.2	7.1%	Negligible
AQ4			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

Air Quality Standard

Process Contribution

Predicted Environmental Contribution

Table 6.29 Nitrogen Dioxide (NO_2) 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	4.19	40	0.428	1.1%	4.62	11.5%	Negligible
AQ1			0.0510	<1%	4.24	10.6%	Negligible
AQ2			0.0435	<1%	4.23	10.6%	Negligible
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
Air Quality Standard							
Process Contribution							
Predicted Environmental Contribution							

Table 6.30 Sulphur Dioxide (SO_2) 10-minute Average

Site	Baseline(µg/m^3)	AQS[(1)] (µg/m^3)	PC[(2)] (µg/m^3)	PC/AQS (%)	PEC[(3)]	PEC/AQS (%)	Impact Significance

Site	Baseline(µg/m^3)	AQS[(1)] (µg/m^3)	PC[(2)] (µg/m^3)	PC/AQS (%)	PEC[(3)]	PEC/AQS (%)	Impact Significance
Maximum	4.69	500	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			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
AQ8			0.553	<1%	5.25	1.0%	Negligible

Air Quality Standard

Process Contribution

Predicted Environmental Contribution

Table 6.31 Sulphur Dioxide (SO_2) 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	1.94	20	0.478	2.4%	2.41	12.1%	Negligible

Site	Baseline(µg/m^3)	AQS[(1)] (µg/m^3)	PC[(2)] (µg/m^3)	PC/AQS (%)	PEC[(3)]	PEC/AQS (%)	Impact Significance
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			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

Air Quality Standard

Process Contribution

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	22.6	25	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			$8.34x10^{-3}$	<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
Air Quality Standard							
Process Contribution							
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

Site	Baseline(µg/m^3)	AQS[(1)] (µg/m^3)	PC[(2)] (µg/m^3)	PC/AQS (%)	PEC[(3)]	PEC/AQS (%)	Impact Significance
Maximum	11.3	10	0.01426	<1%	11.3	113%	Negligible
AQ1			1.70 x10^{-3}	<1%	11.3	113%	Negligible
AQ2			1.45 x10^{-3}	<1%	11.3	113%	Negligible
AQ3			2.21 x10^{-3}	<1%	11.3	113%	Negligible
AQ4			3.90 x10^{-4}	<1%	11.3	113%	Negligible
AQ5			1.04 x10^{-3}	<1%	11.3	113%	Negligible
AQ6			7.80 x10^{-4}	<1%	11.3	113%	Negligible
AQ7			4.10 x10^{-4}	<1%	11.3	113%	Negligible
AQ8			4.10 x10^{-4}	<1%	11.3	113%	Negligible

Air Quality Standard

Process Contribution

Predicted Environmental Contribution

Table 6.34 Particulate Matter (PM_{10}) 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	33.6	50	0.0957	<1%	33.7	67.4%	Negligible
AQ1			0.0303	<1%	33.6	67.3%	Negligible
AQ2			0.0186	<1%	33.6	67.2%	Negligible
AQ3			0.0222	<1%	33.6	67.2%	Negligible
AQ4			$8.34x10^{-3}$	<1%	33.6	67.2%	Negligible
AQ5			$9.46 x10^{-3}$	<1%	33.6	67.2%	Negligible
AQ6			0.0165	<1%	33.6	67.2%	Negligible
AQ7			$9.68 x10^{-3}$	<1%	33.6	67.2%	Negligible
AQ8			$9.37 x10^{-3}$	<1%	33.6	67.2%	Negligible

Air Quality Standard

Process Contribution

Predicted Environmental Contribution

Table 6.35 Particulate Matter (PM_{10}) 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

Site	Baseline(µg/m^3)	AQS[(1)] (µg/m^3)	PC[(2)] (µg/m^3)	PC/AQS (%)	PEC[(3)]	PEC/AQS (%)	Impact Significance
Maximum	16.8	20	0.01426	<1%	16.8	84%	Negligible
AQ1			1.70 x10^{-3}	<1%	16.8	84%	Negligible
AQ2			1.45 x10^{-3}	<1%	16.8	84%	Negligible
AQ3			2.21 x10^{-3}	<1%	16.8	84%	Negligible
AQ4			3.90 x10^{-4}	<1%	16.8	84%	Negligible
AQ5			1.04 x10^{-3}	<1%	16.8	84%	Negligible
AQ6			7.80 x10^{-4}	<1%	16.8	84%	Negligible
AQ7			4.10 x10^{-4}	<1%	16.8	84%	Negligible
AQ8			4.10 x10^{-4}	<1%	16.8	84%	Negligible
Air Quality Standard							
Process Contribution							
Predicted Environmental Contribution							

Table 6.36 Hydrogen Fluoride (HF) 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			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	$7.29x10^{-3}$	<1%	$7.29x10^{-3}$	<1%	Negligible
AQ5			$7.09 x10^{-3}$	<1%	$7.09 x10^{-3}$	<1%	Negligible
AQ6			0.0115	<1%	0.0115	<1%	Negligible
AQ7			$5.20 x10^{-3}$	<1%	$5.20 x10^{-3}$	<1%	Negligible
AQ8			$7.73 x10^{-3}$	<1%	$7.73 x10^{-3}$	<1%	Negligible
Air Quality Standard							
Process Contribution							
Predicted Environmental Contribution							

Table 6.37 Mercury (Hg) 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

Site	Baseline(µg/m^3)	AQS[(1)] (µg/m^3)	PC[(2)] (µg/m^3)	PC/AQS (%)	PEC[(3)]	PEC/AQS (%)	Impact Significance
Maximum			$1.40x10^{-4}$	<1%	$1.40x10^{-4}$	<1%	Negligible
AQ1			$1.00 x10^{-5}$	<1%	$1.00 x10^{-5}$	<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	1	0.00	0%	0.00	0%	Negligible
AQ5			$1.00 x10^{-5}$	<1%	$1.00 x10^{-5}$	<1%	Negligible
AQ6			$1.00 x10^{-5}$	<1%	$1.00 x10^{-5}$	<1%	Negligible
AQ7			0.00	0%	0.00	0%	Negligible
AQ8			0.00	0%	0.00	0%	Negligible
Air Quality Standard							
Process Contribution							
Predicted Environmental Contribution							

Table 6.38 Lead (Pb) 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			$1.43x10^{-3}$	<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
Air Quality Standard							
Process Contribution							
Predicted Environmental Contribution							

Table 6.39 Carbon monoxide (CO) 15-minute Average

Site	Baseline(µg/m^3)	AQS[(1)] (µg/m^3)	PC[(2)] (µg/m^3)	PC/AQS (%)	PEC[(3)]	PEC/AQS (%)	Impact Significance

Site	Baseline(µg/m^3)	AQS[(1)] (µg/m^3)	PC[(2)] (µg/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			4.09	<1%	4.09	<1%	Negligible
AQ3			3.37	<1%	3.37	<1%	Negligible
AQ4	n/a	100,000	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

Air Quality Standard

Process Contribution

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
Air Quality Standard							
Process Contribution							
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

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			0.799	<1%	0.799	<1%	Negligible
AQ3			0.842	<1%	0.842	<1%	Negligible
AQ4	n/a	10,000	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

Air Quality Standard

Process Contribution

Predicted Environmental Contribution

Table 6.42 Cadmium (Cd) 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			1.40×10^{-4}	<1%	1.40×10^{-4}	<1%	Negligible
AQ1			2.00×10^{-5}	<1%	2.00×10^{-5}	<1%	Negligible
AQ2			1.00×10^{-5}	<1%	1.00×10^{-5}	<1%	Negligible
AQ3			2.00×10^{-5}	<1%	2.00×10^{-5}	<1%	Negligible
AQ4	n/a	0.005	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
Air Quality Standard							
Process Contribution							
Predicted Environmental Contribution							

Table 6.43 Hydrochloric Acid (HCl) 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

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%	0.0957	<1%	Negligible
AQ1			0.0303	<1%	0.0303	<1%	Negligible
AQ2			0.0186	<1%	0.0186	<1%	Negligible
AQ3			0.0222	<1%	0.0222	<1%	Negligible
AQ4	n/a	600	$8.34x10^{-3}$	<1%	$8.34x10^{-3}$	<1%	Negligible
AQ5			$9.46\ x10^{-3}$	<1%	$9.46\ x10^{-3}$	<1%	Negligible
AQ6			0.0165	<1%	0.0165	<1%	Negligible
AQ7			$9.68\ x10^{-3}$	<1%	$9.68\ x10^{-3}$	<1%	Negligible
AQ8			$9.37\ x10^{-3}$	<1%	$9.37\ x10^{-3}$	<1%	Negligible
Air Quality Standard							
Process Contribution							
Predicted Environmental Contribution							

Table 6.44 Dioxins and Furans 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			0.00	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
Air Quality Standard							
Process Contribution							
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

Air Quality Standard

Process Contribution

Predicted Environmental Contribution

Table 6.46 SO_2 – 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

Air Quality Standard
Process Contribution
Predicted Environmental Contribution

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 theWBG 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 6-49*).

Table 6.47 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	Local	Regional	International	
	Noise impact from the operation activities is **local**.			

Extent					
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 measures 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 8.8.4.*

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 m^3 / day), laundry (~1m^3 / day) and cleaning of process area (~3 m^3 / 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 6-50*).

Table 6.48 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.

- 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, Nitrorganics, Mercury, Zinc, Active Ingredient (each), , Ammonia, Total Phosphorus,. More information is provided in *Section 8.8.4*.

6.5.4 *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.

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 sols 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 6-51).

Table 6.49 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 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* 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 6-52*).

Table 6.50 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.**				
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;
- 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 Impact Assessment of GR Production Line

Source of Impacts

Having the similar nature as other production lines, the impacts type and nature of GR line is same as each other. The operation activities of the GR production can also release several air pollutants such as TOC, VOC, Chloride, HBr, HCN, HF, Hydrogen Sulphide, Chlorine, Ammonia, and Gaseous Inorganic Chlorine Compounds. Air pollutants in the atmosphere have adverse impacts on human health and damage to animal life, vegetation, and buildings, and the degradation of visibility.

During the operation process, there is wastewater generation from the washing and cleaning process of formulation lines and black water from the sanitary services. Direct discharge of untreated process wastewater and black water into the environment can deteriorate the soil, surface water course, groundwater quality and their dependent ecosystems such as aquatic and terrestrial ecosystems. In addition, more groundwater is required to extract and more electricity is required to supply the GR production, it is likely to affect the groundwater and energy resources.

The GR production process also generates noise from the use of PME for plant operation (e.g. mixer and rotary kiln) and the operation activities may lead to potentially significant noise impacts on workers and nearby NSRs. The disturbing or excessive acoustic emission of noise may harm the activities or balance of human and animal life. During the operation, there is likely to increase the use of vehicles and road transportation to and from the project site and it is expected to increase the risk of traffic accidents due to fuel spillage, traffic collisions with other vehicles, road dust generation and air emission from combustion fuels throughout the access road.

A significant amount of solid wastes (hazardous and non-hazardous) are generated throughout the production process which may have negative impacts on soil, groundwater, and surface water quality if they are not properly managed. Inadequate housing keeping and waste management can attract vectors and cause vector-borne diseases in the factory area and nearby community.

From the occupational health and safety perspective, workers in this production process and nearby working areas have a high potential for health hazard risks. Inhalation of contaminated air and absorption of floating particulates in the surrounding air, handling of hazardous materials and wastes without proper PPE can lead to airborne diseases and respiratory chronic diseases. Improper lifting, awkward postures, and repetitive motions can cause sprains and other musculoskeletal disorders. Working with unguarded machinery, and poorly maintained or improperly handled vehicles during the manufacturing process can also lead to fatal accidents and injuries at the plant site.

Apart from the negative impacts in terms of environmental emissions and occupational health and safety aspects, the operation of the GR production line increases job opportunities in the local community and promotes the livelihood of the local people. Employment income from the project will have a substantial role in

social livelihood improvement in the project area. These will involve other sources of employment such as direct service provision to the domestic sector e.g. traders, office operators, engineers, security personnel, etc. There will be a positive gain for the revenue system arising from the tax being paid by the HAIC to the government and other lead agencies.

Existing/In-place Controls

The GR building has been installed with proper air emission control measures such as a dust collector and a wet scrubber system to enhance the quality of indoor air in the production building. The dust collector removes dirt, dust, and other gaseous impurities while a wet scrubber removes particulate matters, control of harmful airborne pollutants and gases and odor in process exhaust stream. A spill kit is also set up to clean up the hazardous substances in case of chemical spillage and leakage during operation. Wastewater generated from this production line is initially collected in a wastewater collection pit which is connected to the WWTP through a well-controlled HDPE pipe line before being treated by an on-site wastewater treatment plant.

HAIC performs regular maintenance in every possible leakage position along HDPE enclosed pipe and makes sure to separate the wastewater generated from Formulation Line from the offsite drainage network during the transfer process from the wastewater pit to the wastewater treatment plant. The existing WWTP has a mass balance system (mass in mass out) to check the quantity of influent and effluent whenever wastewater from the collection pits is transferred to WWTP. The volume balance is always checked to detect any chance of leakage. As the wastewater line and internal drainage system are separately installed, the process wastewater will not combine with the stormwater.

Based on the observation during the site survey on 17th Aug 2022, the HDPE pipeline system and WWTP are operating in good condition and well controlled.

There are ventilation systems, and life and fire safety systems also installed in the building as the occupational health and safety measure. Noise and air borne hazards to the workers are prevented by wearing adequate PPE and respirators and the production process are running in compliance with AWBA's OSHMP and SOP.

Impact Significance

Assessment of impacts from the GR production line

The impact nature of GR production line on air quality, ground water and surface water quality, soil quality and occupational health and safety are negative while there are some positive social benefits on local community and government. Some of the impacts from GR production activities directly affect the receptors. For example: air pollution, noise pollution, surface water contamination, sub soil contamination and occupational accidents and injuries during operation are direct impacts of GR production line. The indirect negative impacts include groundwater contamination and vector borne diseases in the factory due to improper waste

management. Positive impact on social benefit of local community is also indirect impact as a consequence of increasing job opportunities due to GR production. Most of the impacts are temporary or short-term which are of short duration during process operation and last only for a limited period. However, if not managed well, the impacts will be long-term throughout the Project operational phase.

The impact scale is moderate and the magnitude of the impact from GR production line is considered as medium. The receptor sensitivity ranges medium to high, as a result of these impact criteria consideration, the impact significant is ranked as **Moderate** for both human and physical environment. Therefore, specific mitigation measures for each impact is vital.

Table 6-51 Assessment of impacts from the GR production line

Impact	**Impacts of GR production line on air, water (surface and groundwater), soil and occupational health and safety**			
Impact Nature	**Negative**	**Positive**	Neutral	
	The impacts of GR production line on air quality, ground water and surface water quality, soil quality and occupational health and safety are negative whereas it has some positive social benefits on local community and government.			
Impact Type	**Direct**	**Indirect**	Induced	
	Some of the impacts from GR production activities directly affect the receptors. For example: air pollution, noise pollution, surface water contamination, sub soil contamination and accidents and injuries during operation. The indirect negative impacts include groundwater contamination, vector borne diseases in the factory due to improper waste management. Positive impacts on social benefit of local community is indirect impact as a consequence of increasing job opportunities.			
Impact Duration	**Temporary**	**Short-term**	Long-term	Permanent
	Most of the impacts are temporary or short-term which are of short duration and last only for a limited period. However, if not managed well, the impacts will be long-term throughout the Project operational phase.			
Impact Extent	**Local**	Regional	International	
	The extent of the impact can be localized (in the factory, workers and nearby community).			
Impact Scale	**Moderate**			
Frequency	Air emissions and noise from the operation will occur **frequently**			

	during the operation phase. Contamination due to improper wastewater, solid waste and hazardous material management and accidents and incidents are expected to be **infrequent** during the operation phase.				
Impact Magnitude	Positive	Negligible	Small	**Medium**	Large
	A temporary or short-term impact on physical receptors (air, surface water, groundwater and soil), biological receptors (aquatic and terrestrial ecosystem) and social receptors (workers and nearby communities) that may extend beyond the local scale and may bring about an order of magnitude change in the quality or functionality of those receptors. Therefore, the magnitude of the impact from GR production line is considered as medium.				
Receptor Sensitivity	Low	**Medium**	**High**		
	The receptor sensitivity ranges Medium to High. The receptors (air, surface water and groundwater) are important for wider ecosystem services considering the dependence by the local residents. They may not resistant to change, but can be actively restored to pre-impact status.				
Impact Significance	Negligible	Minor	**Moderate**	Major	
	As a result of these impact criteria consideration, the impact significant is ranked as **Moderate** for both human and environment and specific mitigation measures for each impact is necessary.				

	Level and Type of Impact				
	+1	**0**	**-1**	**-2**	**-3**
Impact Criteria	Positive	Negligible	Low	**Medium**	High
Extent			<1km	**1-5 km**	>5km
Duration			0-1 yr	1-5 yr	**>5yr**
Magnitude	Positive	Negligible	Low	**Medium**	High
Receptor Sensitivity	Positive	Negligible	Low	**Medium**	High
Significance	Positive	Negligible	Low	**Medium**	High

Mitigation/Management Measures

All these aforementioned impacts can be reduced by practicing the management measures detailed in the following management plans.

- **Air Pollution Management Plan**; (dust (indoor and road dust), fugitive and gaseous emissions control)
  - Provision of local exhaust ventilation system connected to process stacks;
  - Provision of pollution control systems (dust collector and scrubber system) for the process emissions
  - Operation as per work instructions (SOP); and
  - Regular maintenance and monitoring of scrubbers.
  - For road dust control, water suppression on the unpaved dirt roads
  - Respiratory PPE should be worn while working with

- **Solid and Hazardous Waste Management Plan**;
  - All HAIC Project's workers are responsible for ongoing good housekeeping practices for waste handling as per the work instruction and procedure manual - avoiding over-ordering, poor storage and maintenance, mishandling or improper operating procedures.
  - Only trained personnel is authorized to handle hazardous waste and in case of spillage of leakage of hazardous wastes, should follow the measures detailed in Emergency Preparedness and Responses Plan.
  - Solid waste is segregated accordingly with the respective colour code and stored in clearly labelled containers in the central storage area before transporting offsite via the licensed contractor.
  - Baghouses (used for collecting dusts from dust collector) are periodically washed and the resulting wastewater leachate collected to be treated via the onsite wastewater treatment plant. Baghouse filters that need to be replaced are aggregated on site and stored in dedicated covered areas. Baghouses that cannot be reused or sold are disposed through the licensed contractor.
  - Minimum PPEs while handling chemicals and hazardous materials and wastes at the HAIC Project's premises include safety goggles and gloves, cotton clothing non-porous safety shoes and appropriate masks.

- **Contractor Management Plan;**
  - All the contractors will comply with the Solid and Hazardous Waste Management Plan, Emergency Preparedness and Response Plan, Occupational Health and Safety Management Plan, Site Runoff and Drainage Management Plan and Construction Management Plan (these plans will be contractual requirements);

- **Road Transport Management Plan**;
  - Restrict vehicle speeds on the access road to a maximum of 40km/h;
  - All vehicles will be selected and maintained to meet Myanmar Road Transport Authority standards and will be used and maintained vehicles/equipment in accordance with good international industry practices.
  - All drivers will attend an induction and a training program which specifies speed limits and critical social receptors identified over the access. Driver induction training will include: response in case of an off-site accident resulting in spillage of hazardous substances or collision. The training will also include brief introduction about the hazardous material.

- Minimize traffic during rush hours to reduce pressure on road infrastructure and at times of entry
and exit of the school located next to the access road.
- All the vehicles have to be equipped with an emergency spill kit, list of emergency phone numbers, Material Safety Data Sheets, fire extinguisher and first aid kit.

- **Emergency Preparedness and Responses Plan**;
  - Fire prevention systems including extinguishers, fire horse reels and alarm system are installed at the respective buildings.. Fire evacuation plans and extinguishers' instructions are displayed in visible places by employees.
  - All HAIC Project's workers present at the site participate in fire drills in order to familiarize themselves with the escape routes and gain experience from a planned evacuation.
  - In case of hazardous materials/chemical spills, the spill containment system shall be set up, the spills should be accessed in terms of its quantity, potential of its contamination to environment and should be removed based on the nature of spills. Make sure the appropriate PPE is equipped during the removal of spills/contaminated materials. Contaminated materials will be removed to the waste management facility and stored in impermeable containment (lined pits or
  compactable containers as necessary).
  - Chemical spill emergency response briefing and drill shall be given to relevant staff and contractors.
  - Every HAIC 's employees are responsible to report right away to the rep department or person regardless of minor or acute, when they witness or suffer the injury or illness and provide the assistance to injured person.
  - In terms of emergency response equipment and installations, all the HAIC Project's premises will have a detection and firefighting alarm system equipment, which works with both diesel and electricity. There is also an underground fire protection tank with a holding capacity of 550 Kg of water, one concrete pond with a holding capacity of 24 m3 of water and a second pond with a holding capacity of 720 m3 of water. All these water reservoirs were built as part of the first stage of the construction phase and are currently filled. In addition, HAIC Project will have the following equipment, on site at key areas of the HAIC Project's premises, at all times and in good working order:
  - ■ First-aid boxes;
  - ■ Oxygen bottle;
  - ■ Chemical spill emergency equipment; and
  - ■ Personal Protective Equipment (PPE).
  - A medical team will also be set up to provide medical aid to the emergency and serious cases and to provide the professional medical advice and training in the first aiders.

- **Hazardous Materials Management Plan**;
  - All personnel handling chemical and hazardous materials (including drivers) are trained on chemical

hazards and safe handling. HAIC Project workers, employees, visitors and contractor/subcontractors use adequate and appropriate safety equipment when handling chemicals and hazardous materials. PPE requirements for each material are specified in the MSDS.

- Minimum PPEs while handling chemicals and hazardous materials and wastes at the HAIC Project's premises include safety goggles and gloves, cotton clothing non-porous safety shoes and appropriate masks.
- All hazardous materials, including chemicals, are stored in locked rooms and locked cupboards in dedicated Hazardous Material Storage areas in which:

■ All hazardous materials and chemicals are kept in a container appropriate to each type clearly marked with the names and hazard warning symbols of the hazardous materials and chemicals, including date-stamped on the date of arrival to enable a hazardous materials and chemicals management of 'first in, first out';

■ Incompatible hazardous materials, chemicals and hazardous wastes are identified and stored separately;

■ Flammable hazardous materials and chemicals are storage away from any heat source and near to a fire extinguisher;

■ Storage areas for hazardous materials and chemicals are provided with sufficient fresh air and ventilation;

■ Hazardous materials and chemicals in containers are regularly checked to spot any signs of change, leakage or spillage: once detected, damaged container is replaced by a proper undamaged one

- Hazardous waste is primarily collected in stream points and then temporarily disposed in the central storage. At all storage points, hazardous waste is segregated accordingly with the colour code before the final disposal by a licensed contractor transports
- Spillage of chemical and hazardous materials should be handled according to the instructions detailed in **Emergency Preparedness and Responses Plan**

- **Site Runoff Drainage Management Plan**;

  - Expand and maintain an effective permanent site drainage system during the operation phase that should cover all existing and future HAIC's premises. The drainage system should reduce flow velocity and sediment load;
  - Regularly, and particularly following rainstorms, inspect drainage systems and erosion control measures to ensure the drainage system is operating properly and efficiently at all times;
  - Install and maintain in working order oil water separators and grease traps at refuelling facilities, workshops, parking areas, fuel storage and containment areas; and
  - Provide bounded hardstand in operational areas to prevent absorption of spillages.
  - Set up the spillage containment system

- **Wastewater Management Plan**

- Process wastewater generated from the washing of formulation line, and cleaning of process area are treated in onsite wastewater treatment
- The wastewater from sanitary facilities is channelled to a septic tank, while the wastewaters generated in the dining room and showers is discharged into the main and peripheral culvert. Additional recommended mitigation measures to follow include:

■ Wastewater collected from basins, sinks and floor drains, is discharged into foul sewers via grease traps;

■ Sewage from the operation workforce will be treated on-site by a septic tank.

The impacts on groundwater and energy resources can be minimised by saving the usage of energy (electricity and fuel) and groundwater and finding the alternative source for water supply (e.g. rain water harvesting).

In addition, HAIC 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. This OHSMP is developed in consistent with OHSAS 18001 – commensurate with the level of risks and impacts, applying to all its new operations including GR production line in terms of accidents and incidents investigation, hazard identification and risk assessments, permit of work, engineering and management change, operating procedure for different machines, training systems, emergency response and PPE procedure for specific buildings.

Additional measures recommended to mitigate the occupational health and safety impacts in terms of labour welfare are as follow:

- HAIC should abide by Myanmar laws and regulations such as Myanmar Labour Law, Factory Act and Occupational Health and Safety Law; and

- 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.

Significance of Residual Impacts

With mitigation measures for each impact described in management plans mentioned above, it is considered the residual risk can be reduced to **Minor.** .

Characteristic					
Magnitude	Extent	Duration			
1 (Low)	1 (Low)	1 (Low)	Equivalent Characteristics	Importance	
Characteristics = 1+1+1 = 3			1 (Low)	1 (Low)	Significance

	Significance = Characteristics x Importance	1 (Low))

Residual Significance	Positive	Negligible	**Low**	Medium	High

Monitoring Plan

Monitoring for mitigation measures of the impacts from GR production line will be undertaken according to the specific monitoring plans under each management plan.

6.5.8 Impact Assessment the Long-Term Use of Groundwater

Scope of Assessment

Resource/Receptor	Project Phase	Activity	Impact
Natural Groundwater Resource (Aquifer)	Operation	Project water use (groundwater extraction through nine tube wells for the Project water supply)	Natural groundwater resource depletion
Local Community	Operation		Groundwater accessibility of local community

Impact on Natural Resource Depletion

Groundwater is a primary source of Project water supply during the operational phase, it is therefore considered to potentially impact the natural water resource (aquifer). Currently, in the Project operational phase, there are nine groundwater tube wells installed on the site premises in order to supply water for manufacturing processes and domestic uses such as sanitary, canteen, gardening and accommodation, etc. So far, groundwater is the only source of water supply and HAIC has no alternative methods for water supply. It is noted that approximately a total of 5,000 $m^3$of water is consumed annually for the manufacturing process and general purposes on an annual basis and the whole water demand for the Project is supplied by the existing groundwater tube wells.

For the project site, sustained pumping of groundwater faster than it is replenished over the long term can cause a lowering in the water table and drying up of wells nearby in the dry seasons. Over-exploitation of groundwater can eventually lead to groundwater depletion which has significant negative effects on the project's surrounding environment and nearby community who depends on both ground water and surface water. . It includes the reduction of water in streams and lakes nearby, land subsidence, and saltwater intrusion/contamination which affects water quality for other future users of this natural resource.

In Yangon Region where the Project Site is located, mostly 60 % of residents rely on groundwater, through private tube wells which are more convenient for accessing water than YCDC's water distribution system. Due to the fact that private wells are unregulated by the government since 1988, increasing more than 250 thousand associated tube wells in 2020 (Myint Thein, 2022). Owning to the continuous pumping out of groundwater, the water table of Yangon Region has significantly declined, with more than 25 feet down in some cities and experienced saltwater intrusion in areas close to the tidewater influence zone (Myint Thein, 2022). The report of "Drought Conditions and Management in Myanmar" prepared by Tin Yi (Deputy Director of the Department of Meteorology and Hydrology) states that Yangon Division suffered a severe drought in 2010. In 2010, many groundwater wells in Yangon Region dried up due to the depletion of the underground water supply in the late onset of the monsoon season. Therefore, it can be regarded that groundwater as the Project primary source of water supply may somewhat partly contribute to the threat of the depletion of Yangon's groundwater aquifer.

In addition, some industrial facilities are observed within the surrounding landuses of the Project Site which may have the effect of compounding impacts on the same stretch of aquifer. Hmawbi Abestos Cement Plant is located approx. 400 m to the north and 9 & 9 Brick Manufacturing Factory is located approx. 300 m to the south of the Project Site. The nature of these industries which consumes significant amount of water and the inaccessibility of municipal piped water in that area can cause more groundwater abstractions in the area and have a potential to add up the negative impacts (cumulative impact) on the groundwater resource.

Social Impact on Local Community

The social impact from the groundwater abstraction for Project water supply mainly reaches the local community within the Project Site AOI who depends on the groundwater for domestic and irrigation purposes. According to the socio economic survey (Refer to Section 5.7.1), a significant number of the residents in neighboring villages including Wa Net Chaung, Tha Pyay Gone, Zaw Ti Kone and War Phyu Taw utilize groundwater (via hand dug wells and hand pumps) as their main potable water sources. Some villages (Yae Tar Shey and Nyaung Toe) rely on groundwater for agricultural purposes as well especially in the dry season. Continuous abstraction of groundwater from the Project Site can lower the groundwater table and affect the groundwater accessibility of community nearby (as majority of domestic water supply sources from shallow water body (up to 10 m) through dug wells and hand pumps) threatening the water security of the local people. Thereby negatively affect their livelihood (reduce the yield of crops productivity due to the insufficient of water) and wellbeing (health problem due to deficient of domestic water). However, it is also noted that there are other alternative sources of domestic water supply such as rivers and creeks and municipal water available in these villages and the nearest village is Yay Tar Shay which is located approximately 800 m (1 km) to the north of the Project Site.

Existing /In place controls

There are no existing or in place controls for the impacts on the use of groundwater for Project water supply. At present, there is no alternative source of water supply excepting groundwater tube wells.

i) Artificial aquifer recharge system

The existing treated effluent lagoon located in the east of the Site is assumed to perform as an artificial aquifer recharge system. The treated effluent from this lagoon infiltrate to the ground over time and can naturally recharge the aquifer.

ii) Water consumption management measure

Water flowmeters were installed to identify the amount of water being supplied to the facility and discharge to the environment over time to seek any opportunities for improvement in water use efficiency in the facility.

In addition, HAIC is installing source meter and sub meter to measure the water consumption rate by the facility over a period of time. Source meters measure the amount of water being supplied to the facility, while sub meters measure usage for specific activities such as process use, or landscape water use.

Impact Significant

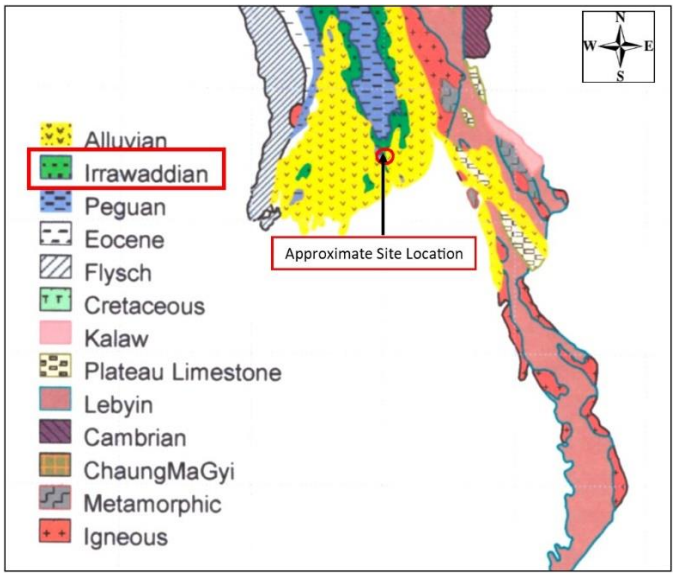
Impact of Natural Resource Depletion

The impact from the long term use of groundwater on the natural resource will be localized in first place which is within 1 km however, if not managed well, it can extend beyond the localized project footprint and becomes regional in extent. The impact duration is considered long term and larger magnitude and irreversible (in the worst case scenario, drought condition is expected to happen again as stated by Dr. Tin Yi 'many groundwater wells in Yangon Region dried up due to the depletion of the underground water supply and suffered a draught condition in 2010').

The Hydrogeological Map of Myanmar prepared by Water Utilization Department (2018) and Geology Map of Myanmar published by Myanmar Geoscience Society in 2014 indicates that a potential aquifer is present beneath the Subject Property in the deeper interbedded sand, gravel and shale of the Irrawaddy Formation. The sandstone of the Irrawaddy Formation serves as good aquifer, which occurs under confined or semi-confined conditions with an estimated maximum yield of 1,500 gph to 2,300 gallons per hour (gph) (Maung Maung Khin, 1980) (Tun Naing & Khin,Soe Moe, 2018). It is also indicated that these types of aquifer enhance a higher replenishing rate and viability of this aquifer to provide enough supply for the community water supply and small-irrigation scale

Moreover, one scientific research conducted about hydraulic characteristics of the aquifer underlain by Hmawbi Township by Khin Chan Myae Cherry Maung in 2018 concludes that the recharge rate and storage capacity of the aquifer in Hmawbi area is high in terms of transmissivity KD, discharge rate (Q) and drawdown (Δs) based on the pumping out test and recovery analysis.

Figure 6.4 Hydrogeology Map Extract of Project Site



Source: Water Resources Utilization Department, Union of Myanmar, 2018

Scale: Not to Scale

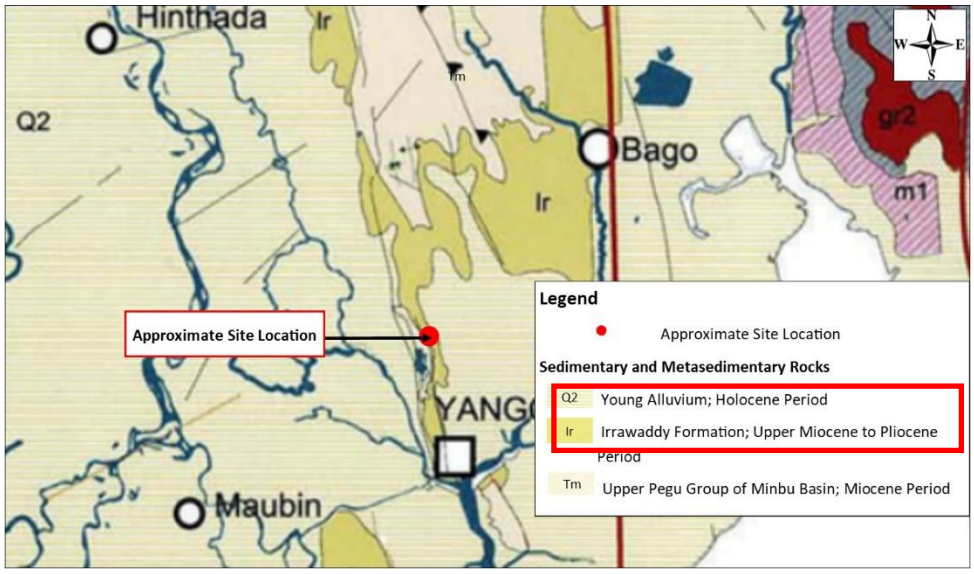


Figure 6.5 Geology Map Extract of Project Site

Source: Geology Map of Myanmar, Myanmar Geoscience Society, 2014

Scale: Not to Scale

The existing treated effluent lagoon located in the east of the Site is assumed to perform as an artificial aquifer recharge system. The treated effluent from this lagoon infiltrates the ground over time and can naturally recharge the aquifer.

The impact magnitude is potentially large in the original as aforementioned. The impact on the groundwater aquifer may result in an order of magnitude change on a local scale or larger scale (regional) that is irreversible in the worst case scenario of draught. The change may alter the long-term character of the resource/receptor. However, considering the existing lagoon (artificial aquifer recharge) in the Project

Site and the type of aquifer underlain which enhances a higher replenishing rate, the impact magnitude is ranked as **Medium.**

The resource or receptor (aquifer) that is important for wider ecosystem functions and services. It may not be resistant to change but can be actively restored to pre-impact status or will revert naturally over time. Therefore, the receptor sensitivity of the impact is ranked as **Medium**.

Overall, as a result of these impact criteria consideration, hydrogeology setting, and aquifer type of the area underlays, the impact from the use of groundwater is regarded **Moderate/Medium** for potential natural resource depletion impact.

The significant ranking of impacts of the use of groundwater on natural resource depletion is presented in the following tables.

Table 6-52 Assessment of Impacts of the Long-Term Use of Groundwater on Natural Resource Depletion

Impact	**Impacts of the Long Term Use of Groundwater on Natural Resource Depletion**			
Impact Nature	**Negative**	Positive	Neutral	
	Over-exploitation of groundwater can eventually lead to groundwater depletion which has some negative effects on the environment and humans who make use of the water. It includes the reduction of water in streams and lakes nearby, land subsidence, and saltwater intrusion/contamination which affects water quality for other future users of this natural resource.			
Impact Type	**Direct**	Indirect	Induced	
	The impact results from the direct interaction between a planned Project activity (sustained pumping of groundwater) and the receiving environment (aquifer). Moreover, the nature of the industries located nearby the Project Site which consumes a significant amount of water, and the inaccessibility of municipal piped water in that area cause more groundwater abstractions in the area and have a potential to add up the negative impacts (cumulative impact) on the groundwater resource.			
Impact Duration	Temporary	Short-term	**Long-term**	Permanent
	If not managed well, the impact will be long-term throughout the Project operational phase.			
Impact Extent	**Local**	**Regional**	International	

	The impact extent can be localized at present, however, it becomes likely to be regional if not properly managed.				
Impact Scale	**Large** The footprint of the impact can be large as it is not well managed.				
Frequency	Potential groundwater depletion in water wells in local community occur **mainly in the dry season**, however, without proper management, it can occur throughout the operational phase.				
Impact Magnitude	Positive	Negligible	Small	**Medium**	Large
	The impact magnitude is potentially large in the original**.** The impact on the groundwater aquifer that may result in an order of magnitude change in a local scale or larger scale (regional) that is irreversible. The change may alter the long term character of the resource/receptor. However, considering the existing lagoon (artificial aquifer recharge) in the Project Site and the type of aquifer underlain which enhances higher replenishing rate, the impact magnitude is ranked as **Medium.**				
Receptor Sensitivity	Low	**Medium**	High		
	The aquifer underlain by the Project area (the receptor) is Irrawadian Group which enhances a higher replenishing rate and viability of this aquifer to provide enough supply for the community water supply and small-irrigation scale. Moreover, the existing treated effluent lagoon located in the east of the Site is assumed to perform as an artificial aquifer recharge system. The treated effluent from this lagoon infiltrate to the ground over time and can naturally recharge the aquifer. The resource or receptor that is important for wider ecosystem functions and services. It may not be resistant to change but can be actively restored to pre-impact status or will revert naturally overtime. Therefore, the receptor sensitivity of the impact is **Medium**.				
Impact Significance	Negligible	Minor	**Moderate**	Major	
	As a result of these impact criteria consideration, hydrogeology setting and aquifer type of the area underlays, the impact significant is ranked as **Moderate** for potential natural resource depletion impact.				

	Level and Type of Impact

	+1	0	-1	-2	-3
Impact Criteria	Positive	Negligible	Low	Medium	High
Extent			<1km	1-5 km	**>5km**
Duration			0-1 yr	1-5 yr	**>5yr**
Magnitude	Positive	Negligible	Low	**Medium**	High
Receptor Sensitivity	Positive	Negligible	Low	**Medium**	High
Significance	Positive	Negligible	Low	**Medium**	High

Characteristic					
Magnitude	Extent	Duration			
2 (Medium)	3 (High)	3 (High)	Equivalent Characteristics	Importance	
Characteristics = 2+3+3 =8			3 (High)	2 (Medium)	Significance
			Significance = Characteristics x Importance		**6 (Medium)**

Social Impact on Local Community

The Project's social impact from the long term use of groundwater on the local community (human use and quality of life value) will be localized, long term in duration, reversible and medium magnitude. The impact disturbs an area which is currently being used as an agricultural and residential landuses with low income level and poor infrastructure services. The receptor sensitivity is rated as medium because majority of the residents in neighboring villages within AOI rely on groundwater wells as their main potable water sources and in some villages for agricultural purposes in the dry season.

The nearest village to the Project Site is Yay Tar Shay which is located approximately 800 m to the north of the site. According to the Groundwater Department, Government of Kerala, India, it is recommended to install the tube well or bore well within 30 meters from existing open water wells where water is pumped for public purpose to protect the source of a public water supply scheme. Therefore, it can be regarded that the tube wells in the Project Site are not likely to affect the water level of open water wells in the community.

Considering these impact criteria, the impact significant is **Moderate/Medium.**

The significant ranking of social impacts from the use of groundwater on local community is presented in following tables.

Table 6-53 Assessment of Social Impacts from the Long Term Use of Groundwater on Local Community

Impact	**Social Impacts from the Long Term Use of Groundwater on Local Community**				
Impact Nature	**Negative**	Positive	Neutral		
	Over-exploitation of groundwater can eventually lead to groundwater depletion which has some negative effects on the local community who are relying on the waterbody nearby. . Continuous abstraction of groundwater from the Project Site can affect the groundwater accessibility of these local community threatening the water security of the local community and thereby negatively affect their livelihood (reduce the yield of crops productivity due to the insufficient of water) and wellbeing (health problem due to deficient of domestic water).				
Impact Type	Direct	**Indirect**	Induced		
	Impacts that follow on from the primary interactions between the Project ‘s use of groundwater and aquifer as a subsequent interaction within that area. A subsequent impact of groundwater depletion due to sustained pump of groundwater for Project use.				
Impact Duration	Temporary	Short-term	**Long-term**	Permanent	
	If not managed well, the impact will be long-term throughout the Project operational phase.				
Impact Extent	**Local**	Regional	International		
	The impact extent can be localized nearby the Project footprint.				
Impact Scale	**Medium** The impact scale is ranked as medium as it can negatively affect the local community which depends the groundwater resources.				
Frequency	Potential groundwater depletion in water wells in local community **occur mainly in the dry season**, however, without proper management, it can occur throughout the operational phase.				
Impact Magnitude	Positive	Negligible	Small	**Medium**	Large
	The impact magnitude is potentially **Medium**. The impact on the local communities’ water accessibility that may bring about some negative effect in the status of socio economy value (such as livelihood (reduce the yield of crops productivity due to the insufficient of water) and wellbeing (health problem due				

	to deficient of domestic water) for an extended duration but does not threaten the overall stability of communities as there are other alternative sources of domestic water supply such as rivers and creeks and pipe water.			
Receptor Sensitivity	Low	**Medium**	High	
	The impact disturbs an area which is currently being used as an agricultural and residential landuse with low income level and poor infrastructure services. The receptor sensitivity is rated as **Medium** because majority of the residents in neighboring villages within AOI rely on groundwater wells as their main potable water sources and some villages for agricultural purposes in the dry season.			
Impact Significance	Negligible	Minor	**Moderate**	Major
	Considering aforementioned impact criteria, the impact significant is **Moderate.**			

	Level and Type of Impact				
	+1	**0**	**-1**	**-2**	**-3**
Impact Criteria	Positive	Negligible	Low	**Medium**	High
Extent			<1km	**1-5 km**	>5km
Duration			0-1 yr	1-5 yr	**>5yr**
Magnitude	Positive	Negligible	Low	**Medium**	High
Receptor Sensitivity	Positive	Negligible	Low	**Medium**	High
Significance	Positive	Negligible	Low	**Medium**	High

Characteristic					
Magnitude	Extent	Duration			
2 (Medium)	2 (Medium)	3 (High)	Equivalent Characteristics	Importance	
Characteristics = 2+2+3 =7			3 (High)	2 (Medium)	Significance
			Significance = Characteristics		**6**

	x Importance	**(Medium)**

Impact and Risk Mitigation Measures

Impacts from the use of groundwater on natural resource and social impact on local community will be mitigated through the use of following measures:

Table 6-54 Mitigation Measures on the use of groundwater on natural resource and social impact on local community

Groundwater resource impact assessment			
Environmental Factors/Events	**Activity**	**Potential Impacts**	**Mitigation Measures**
Natural Resource	Use of groundwater for Project Operation	Groundwater resource depletion due to over exploitation	1. Determine the sustainable yield of the major aquifer by conducting groundwater pumping tests and monitor the groundwater
Social impact assessment			
Environmental Factors/Events	**Activity**	**Potential Impacts**	**Mitigation Measures**
		for Project water supply	productivity/recharge rate over time in order to detect any imbalance of groundwater recharge throughout operation 2. Perform artificial aquifer recharge enhancement using treated wastewater (. The treated wastewater in the Lagoons can infiltrate to the ground and thereby recharge the groundwater) (Briefing Note Series for Groundwater Management, World Bank, 2002) However, in order to accomplish the uses without deleterious environmental consequences, the groundwater quality nearby the Lagoon should be monitored on a regular basis. 3. Implement/adopt efficient water consumption management measures to

			manage and protect the water resources. These will include (but not limited to) 3.1 A detailed water balance will be developed, maintained, monitored and reported periodically; • Specific water use (measured by volume of water used per unit production) will be assessed; and • Operations must be benchmarked to available industry standards of water use efficiency.
Social impact assessment			
Environmental Factors/Events	**Activity**	**Potential Impacts**	**Mitigation Measures**
			3.2 Opportunities for improvement in water use efficiency will be identified and implemented; • Optimize water flow and early water detection. Separated water meters should be installed to measure the water consumption rate by each facility over a period of time. Separated water metets measure the amount of water being supplied to each facility for specific activites, such as cooling towers, process use, or landscape water use. Identifying appliances which consume huge amounts of water and identifying appliance failures, water leakage and damage and substituting with water saving appliances/equipment, it can

			result in significant long-term water savings. 3.3 Engage and educate employees – • Every employee has a responsibility to play in water usage. Make certain that they are educated and informed about water conservation and follows the water consumption management practices 3.4 Perform 3 Rs (Reduce, Reuse and Recycle) policy in water use such as use of
Social impact assessment			
Environmental Factors/Events	**Activity**	**Potential Impacts**	**Mitigation Measures**
			treated wastewater for gardening works, for process washing, industrial fire protection etc. 3.5 The use of alternative water supplies, water consumption offsets to maintain total demand for water resources within the available supply, and evaluation of alternative project locations: Installation of alternatives sources for Project water supply such as rainwater harvesting and use of municipal piped water to avoid depleting the resource to the detriment of other users. 2. Investigate any complaints/ abnormal event of groundwater wells (within 30 m) depletion in nearby villages and handle appropriately. Keep records of

			complaints and follow-up.
Public water supply	Use of groundwater for Project Operation	Negatively affect the groundwater accessibility of these local community threatening the water security of the	1. Installation of alternatives sources for Project water supply such as rainwater harvesting and use of municipal piped water to avoid depleting the resource to the detriment of other users.

Residual Impact and Risk

With these management measures, the impact magnitude and duration will be reduced resulting in a residual significance of impacts from groundwater use to natural water resource, human use values and quality of life values is ranked as **Low/Minor Significance**.

Residual Significance	Positive	Negligible	**Low**	Medium	High

Characteristic				
Magnitude	Extent	Duration		
1 (Low)	1 (Low)	1 (Low)	Equivalent Characteristics	Importance
Characteristics = 1+1+1 = 3			1 (Low)	1 (Low)

Significance
1 (Low)

Significance = Characteristics x Importance

6.5.9 Impact Assessment of Potential Impacts from Electricity Consumption

Scope of Assessment

Resource/Receptor	Project Phase	Activity	Impact
Local Community	Construction	For the project construction activities , energy supply is mainly sourced from national grid line and consume a significant amount of electricity	
Electricity Resources			
Local Community	Operation	Project energy supply is mainly sourced from national grid line	Public use of electricity in nearby villages with the same

		and consume a significant amount of electricity	source of electricity
Electricity Resources (non-renewable sources/ fossil fuels)	Operation		Non-renewable energy resources (oil and gas) depletion
Local Community	Decommissioning phase	For the project decommissioning activities , energy supply is mainly sourced from national grid line and consume a significant amount of electricity during the decommissioning.	

Impacts on Natural Resources

The electricity required for the operation of the HAIC is mainly sourced from the government (Electric Power Distribution, EPC). The project operation annually consumes approximately 1,500,000 kWh which is supplied via a 33 kV substation and six transformers (5 MV, 50 kV, 0.5 MV, 2 MV, 1 MV and 1.5 MV) located within the site premises. The site also installs four numbers of 275 kVA, 60 kVA and 500 kVA backup electricity generator sets for power outages. The electricity consumption rate of the Project from the generators sets varies from approximately 200 MWh to 400 MWh per year based on the frequency of power shortage happened in the region and the fuel type used for these generators is diesel.

The main electricity generation sources of Myanmar are hydropower and thermal power (natural gas). In 2018, thermal power (coal, natural gas, and oil) accounted for 44% of total electricity generation and hydropower accounted for 56% therefore, it is noted that Myanmar energy sector significantly account on the exploration of fossil fuels.

In terms of electricity consumption by sector, in 2012/2013 and onwards the industrial sector ranked first, accounted for 44% of total electricity consumption due to industrialization in country even though the residential sector used to be a major consumer of country's electricity share in the past. (MOEE, 2019) (see in Table 1 below). In the regional scale, Yangon where the Project Site located alone consumes 42 % to 50 % of total electricity consumed in Myanmar in 2013 to 2018 and majority of consumers are industrial sectors. Therefore, it can be assumed that and industrial sectors including HAIC, somewhat partially contribute as a driven force for energy generation and exploration of non-renewable resources mainly natural gas.

Figure 6.5: Installed capacity and power generation by fuel type, 2017-2018 (Source: MOGE)

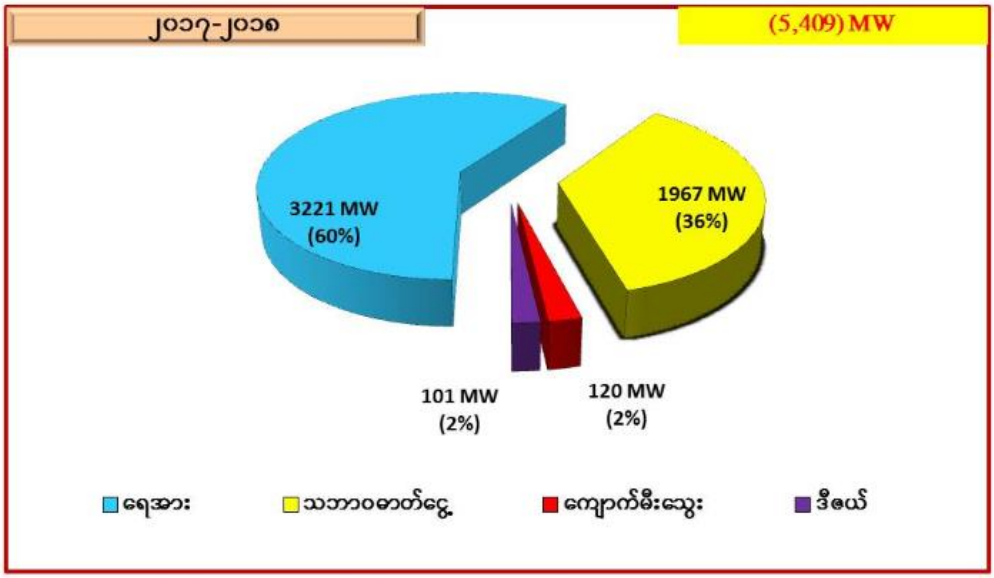


Figure 6.6 Electricity consumption by sector, 2000 to 2013

Sector	Year												
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Residential	1,361	1,245	1,431	1,612	1,662	1,812	1,614	1,647	1,799	2,015	2,653	3,378	2,681
Industrial	1,295	1,148	1,417	1,577	1,549	1,756	1,854	1,872	1,904	1,850	2,287	2,711	3,650
Commercial	527	564	552	578	613	695	827	864	945	1,071	1,306	1,531	1,643
Other	85	85	84	83	85	89	61	55	53	57	66	76	281
TOTAL (GWh)	3,268	3,041	3,484	3,850	3,909	4,353	4,355	4,438	4,701	4,993	6,312	7,696	8,254

Source: Energy Planning Department, MOE

Referring to Myanmar Country Report by MOE (2021) , natural gas is mainly used for electricity generation and in industry. Natural gas, coal and oil are fossil fuels and non-renewable resources. Sustained extraction of these fossil fuels to meet the need of energy and electricity requirement in the country can lead to running out of the natural resources finally leading to depletion. Fossil fuel depletion is the reduction in future availability of fossil fuels caused by the primary extraction of fossil fuels linked to fuel use, energy use and to produce other inputs, such as mineral fertilizer. (Huijbregts et al., 2017). Therefore, a significant consumption of electricity by the Project as an agrochemical industry may partially contribute to the natural resource depletion especially the source of electricity generation is non-renewable fossil fuel.

Social Impacts on Local Community

Consuming a significant figure of electricity, all villages in Project AOI have access to government facility electricity schemes except Nyaung Kone Village which depends on solar panels used for electricity.

Therefore, it can be considered that HAIC potentially affects the electricity demand of a group of households in the local community. Thereby, households can face electricity insecurity if its consumption is insufficient to meet the basic needs of daily life in terms of the requirements for cooking, lighting, washing and cooling the house.

Potential Cumulative Impacts

Some industrial facilities are observed within the surrounding landuses of the Project Site which may have the effect of compounding impacts on the same source of electricity. Hmawbi Abestos Cement Plant is located approx. 400 m to the north and 9 & 9 Brick Manufacturing Factory is located approx. 300 m to the south of the Project Site. The nature of these industries which consumes significant amount of electricity and which is mainly sourced by national electricity grid line therefore have a potential to add up the negative impacts (cumulative impact) on the depletion of natural resources (fossil fuels) and the electricity demand of local community.

Existing /In place controls

There are no existing or in place controls for the impacts of the electricity consumption in the facility.

Impact Significance

Impact of Natural Resource Depletion

Even though nationwide energy consumption by the industrial sector ranked first in the list, the contribution by chemical and petrochemical industries to the total national energy consumption is only 9 % with major fuel source of electricity according to the data of MOEE collected in 2019. (Myanmar Energy Statistic, 2019) Therefore, it can be regarded that the share of energy consumption by HAIC to this figure (9%) is only a small fraction.

In terms of nationwide endeavor to energy resources sustainability, the country is striving to promote the use of renewable energy sources since the recent years including hydropower, biomass energy, solar energy, wind energy, geothermal and tidal power to meet the sustainability goal of energy sector. According to the Myanmar National Master Plan 2015, the preferred energy scenario shows energy generation mix of 57% hydropower, 30% coal, 8% natural gas and 5% solar and wind by 2030 and in order to achieve that, the Ministry strives to put in place multiple rural electrification schemes including various renewable energy options including solar energy, wind farms, biomass, biomass thermo-chemical energy, and mini-hydro. Therefore, the non-renewable resources depletion impact is expected to prevent in the future by magnifying the use of renewable energy resources.

Table 6-55 Impact assessment of energy consumption on natural resource (non-renewable) depletion

Impact	Impacts of energy consumption on non-renewable resource depletion

Impact Nature	**Negative**	Positive	Neutral		
	A significant consumption of electricity is likely to contribute to the natural resource depletion especially the source of electricity depending on energy generation which is non-renewable energy particularly natural gas in Myanmar.				
Impact Type	**Direct**	**Indirect**	Induced		
	The direct impact from the energy consumption follows on from the primary interaction between the use of electricity by the Project and electricity provider (power plant) as a subsequent interaction which is over burden to the power plant and lead to more extraction of fossil fuels. The indirect impact on the fuel consumption by the project operation which can affect the non-renewable resource depletion of fossil fuels.				
Impact Duration	Temporary	Short-term	**Long-term**	Permanent	
	Impacts can be long term if the factory operates for long term in accordance with MIC permission using electricity and also not properly managed leading to the sustained exploitation of fossil fuels.				
Impact Extent	**Local**	**Regional**	International		
	Firstly, the impact extent can be local affecting the nearby community and then to regional if not properly managed in the HAIC operations. .				
Impact Scale	**Large** The footprint of the impact can be large as it is not well managed.				
Frequency	The impact can be throughout the operation without any energy conservation measures.				
Impact Magnitude	Positive	Negligible	Small	**Medium**	Large
	The impact magnitude is potentially large in the original**.** The impact on the natural resource that may result in an order of magnitude change in larger scale (regional) that is irreversible in the worst case scenario (fossil fuel depletion). The change may alter the long term character of the resource/receptor. However, the Project is considered to contribute a very small fraction to the country wide electricity and energy consumption and so does its consequences impacts of fossil fuels depletion. Currently the major source of electricity generation in Myanmar is hydropower and since the recent years the country has strived to promote the use of renewable energy sources including				

	hydropower, biomass energy, solar energy, wind energy, geothermal and tidal power. Therefore, the magnitude of the impact is as **Medium.**			
Receptor Sensitivity	Low	Medium	**High**	
	The resource or receptor that is critical to ecosystem function and services and in the worst case scenario of fossil fuel depletion, it cannot be restored to pre-impact status. Therefore, the receptor sensitivity of the impact is **High.**			
Impact Significance	Negligible	Minor	**Moderate**	Major
	As a result of these impact criteria consideration, the impact significant is ranked as **Moderate** for potential natural resource depletion impact.			

	Level and Type of Impact				
	+1	**0**	**-1**	**-2**	**-3**
Impact Criteria	Positive	Negligible	Low	**Medium**	**High**
Extent			<1km	**1-5 km**	>5km
Duration			0-1 yr	1-5 yr	>5yr
Magnitude	Positive	Negligible	Low	**Medium**	High
Receptor Sensitivity	Positive	Negligible	Low	Medium	**High**
Significance	Positive	Negligible	Low	**Medium**	High

Characteristic					
Magnitude	Extent	Duration			
2 (Medium)	2 (Medium)	3 (High)	Equivalent Characteristics	Importance	
Characteristics = 2+2+3 =7			3 (High)	2 (Medium)	Significance
			Significance = Characteristics x Importance		**6 (Medium)**

Social Impact on Local Community

Using the high amount of electricity by industries (HAIC) from the same source of electricity supply with the local community, it can burden the electricity distribution system and affect the electricity share in local community. Thereby, households can face electricity insecurity if its consumption is insufficient to meet the basic needs of daily life in terms of the requirements for cooking, lighting, washing and cooling the

house. It is noted that all villages in Project AOI except Nyaung Kone Village have access to government facility electricity schemes and in Nyaung Kone solar panels are used for electricity

The Project's social impact from the electricity consumption on the local community (human use and quality of life value) will be localized, long term in duration, reversible and medium magnitude. The impact disturbs an area which is currently being used as an agricultural and residential landuses with low income level and poor infrastructure services. The receptor sensitivity is rated as medium because majority of the residents in neighboring villages within AOI rely on government electricity facility scheme. Considering these impact criteria, the impact significant is **Moderate/Medium.**

The significant ranking of social impacts from the use of electricity on local community is presented in following tables.

Table 6-56 Assessment of Social Impacts from the Use of Electricity on Local Community

Impact	**Social Impacts from the Long Term Use of Electricity on Local Community**			
Impact Nature	**Negative**	Positive	Neutral	
	It can be considered that HAIC potentially affects the electricity demand of a group of households in the local community. Thereby, households can face electricity insecurity if its consumption is insufficient to meet the basic needs of daily life in terms of the requirements for cooking, lighting, washing and cooling the house.			
Impact Type	Direct	**Indirect**	Induced	
	Impacts that follow on from the primary interactions between the Project 's use of electricity and community as a subsequent interaction within that area. As the industrial sector is crucial for the country's economy, it is used to be a priority sector for government electrification compared to household sectors.			
Impact Duration	Temporary	Short-term	**Long-term**	Permanent
	The HAIC will operate for long term . Therefore, if not managed well, the impact will be long-term throughout the Project operational phase.			
Impact Extent	**Local**	**Regional**	International	
	The impact extent can be localized nearby the Project footprint. But if not managed well, the impact can potentially extend to regional scale.			
Impact Scale	Medium The impact scale is ranked as medium as it can negatively affect the local community which uses the same source of electricity supply.			
Frequency	Without proper management, it can occur throughout the			

	operational phase.				
Impact Magnitude	Positive	Negligible	Small	**Medium**	Large
	The impact magnitude is potentially **Medium**. The impact on the local communities' electricity share that may bring about some negative effect in status of socio economy value for an extended duration but does not threaten the overall stability of communities. It is also noted that there is an alternative source of electricity supply such as solar panels in Nyaung Kone village.				
Receptor Sensitivity	Low	**Medium**	High		
	The impact disturbs an area which is currently being used as an agricultural and residential landuse with low income level and poor infrastructure services. The receptor sensitivity is rated as **Medium** because majority of the residents in neighboring villages within AOI rely on government electricity facility scheme.				
Impact Significance	Negligible	Minor	**Moderate**	Major	
	Considering aforementioned impact criteria, the impact significant is **Moderate.**				

	Level and Type of Impact				
	+1	**0**	**-1**	**-2**	**-3**
Impact Criteria	Positive	Negligible	Low	Medium	High
Extent			<1km	1-5 km	>5km
Duration			0-1 yr	1-5 yr	>5yr
Magnitude	Positive	Negligible	Low	Medium	High
Receptor Sensitivity	Positive	Negligible	Low	Medium	High
Significance	Positive	Negligible	Low	Medium	High

Characteristic					
Magnitude	Extent	Duration			
2 (Medium)	2 (Medium)	3 (High)	Equivalent Characteristics	Importance	
Characteristics =2+2+3 = 7			3 (High)	2 (Medium)	Significance
			Significance = Characteristics x Importance		6 (Medium)

Impact and Risk Mitigation Measures

Impacts from the use of electricity on natural resource and social impact on local community will be mitigated through the use of following measures:

Table 6-57 Mitigation Measures on the use of electricity on natural resource and social impact on local community

Electricity resource impact assessment			
Environmental Factors/Events	**Activity**	**Potential Impacts**	**Mitigation Measures**
Natural Resource	Energy Consumption	Natural resource depletion (Non-renewable) due to over exploitation of fossil fuels for power generation and direct usage of fuel in industrial activities	(1) Develop and establish the **energy consumption management plan** to reduce the usage of electricity and enhance the energy efficiency in the facility. Some energy consumption management measures from this plan are as follows: • Design and modify the building and equipment design into energy and environmental friendly, for example in order to save the electricity use for lighting purposes, the following measures are recommended; - Not all areas of a building should be lighted all of the time. Automatic controls and sensors can be deployed to match lighting provision to need. - Reducing the lighting levels where there is over lamping. - Implementing more energy-efficient Light Emitting Diode (LED) lighting to save electricity

Social impact assessment			
Environmental Factors/Events	**Activity**	**Potential Impacts**	**Mitigation Measures**
			• For power consuming office equipment, such as computers, printers, photocopiers and monitors - ensure that monitors are switched off when users are away from their desks for a period. Always switch off computers and monitors at the end of the day unless they need to remain on. - Printers - as with computers, switch off all printers at the end of the day. When printing, use the most energy-efficient mode possible and avoid all unnecessary printing. - Photocopiers - always make sure that copiers are switched off out of office hours. Enable all energy-saving standby features and encourage staff to do their copying in batches and avoid all unnecessary copying. Motors should be turned off when they are not in use. For pumps in liquid, air or gaseous circulation systems, the use of sensors that switch off a motor when a certain level is

Social impact assessment			
Environmental Factors/Events	**Activity**	**Potential Impacts**	**Mitigation Measures**
			reached can substitute for valves that control liquid or airflow but keep the motor running at all times. • Engine shut down during periods of inactivity of machines. • Record the feed data about fuel consumption during transportation and or during the operation of generator sets and find the opportunity to save fuel usage in these activities • Promote employee education on energy conservation awareness .
Public electricity supply	Electricity Consumption	Negatively affect the electricity share of local community and can happen electricity insecurity to the local community	(1) Develop and establish the **energy consumption management plan** to reduce the usage of electricity and enhance the energy efficiency in the facility. Some energy consumption management measures from this plan are as follows: • Design and modify the building and equipment design into energy and environmental friendly, for example in order to save the electricity use for **lighting** purposes, the following measures are recommended;

Social impact assessment			
Environmental Factors/Events	**Activity**	**Potential Impacts**	**Mitigation Measures**
			- Not all areas of a building should be lighted all of the time. Automatic controls and sensors can be deployed to match lighting provision to need. - Reducing the lighting levels where there is over lamping. • - Implementing more energy-efficient Light Emitting Diode (LED) lighting to save electricityFor power consuming office equipment, such as computers, printers, photocopiers and monitors - ensure that **monitors** are switched off when users are away from their desks for a period. Always switch off computers and monitors at the end of the day unless they need to remain on. - **Printers** - as with computers, switch off all printers at the end of the day. When printing, use the most energy-efficient mode possible and avoid all unnecessary printing.- **Photocopiers** - always make sure that copiers are switched off out of office hours. Enable all energy-saving standby features and encourage staff to do their copying in batches and avoid all unnecessary copying.

Social impact assessment			
Environmental Factors/Events	**Activity**	**Potential Impacts**	**Mitigation Measures**
			• **Motors** should be turned off when they are not in use. For pumps in liquid, air or gaseous circulation systems, the use of sensors that switch off a motor when a certain level is reached can substitute for valves that control • liquid or airflow but keep the motor running at all times. • Engine shut down during periods of inactivity machines. • Record the feed data about fuel consumption during transportation and or during the operation of generator sets and find the opportunity to save fuel usage in these activities. • Promote **employee education** on energy conservation awareness • (2) Investigate any complaints from the local community with the same source of electricity supply related to electricity insecurity and handle appropriately. Keep records of complaints and follow-up.

Residual Impact and Risk

With these management measures, the impact magnitude and duration will be reduced resulting in a residual significance of impacts from electricity consumption to non-renewable natural resources, human use values and quality of life values is ranked as **Low/Minor Significance**.

Residual Significance	Positive	Negligible	Low	Medium	High

Characteristics					
Magnitude	**Extent**	**Duration**			
1(Low)	1 (Low)	3 (High)	**Equivalent Characteristics Score**	**Importance**	
Characteristics = 1 + 1 + 3 =5			2 (Median)	1 (Low)	**Significance Rating**
			Significance = Characteristics x Importance		1 (Low)

6.5.10 *Fugitive Emission on impacts on occupational health and safety, community health within Project AOI*

Source of Impact

In terms of occupational health and safety, the potential issues derived by the HAIC include exposure to dust, process line emissions, hazardous materials /wastes released from hazardous chemical storage and handling activities and, and emission during the use of heavy equipment.

In addition, Fugitive emissions can be released unintentionally due to undesirable leakage occurring throughout the process wherever there are discontinuities or seals between the process fluids and the external environment. This may include the discharge of gases or vapors from pressure-containing equipment or facilities, and from components inside the proposed plant such as valves, piping flanges, pumps, storage tanks, compressors, etc.

According to the IFC General EHS guidelines for environmental air emissions and ambient air quality, fugitive source air emissions refer to emissions that are distributed spatially over a wide area and not confined to a specific discharge point. They originate in operations where exhausts are not captured and passed through a stack. Fugitive emissions have the potential for much greater ground-level impacts per unit than stationary source emissions, since they are discharged and dispersed close to the ground. The two main types of fugitive emissions are Volatile Organic Compounds (VOCs) and particulate matter (PM).

Volatile Organic Compounds (VOCs)

The possible sources of fugitive VOC emissions in HAIC are associated with production activities that store, handle, transport and use VOC-containing liquids or gases where the material is under pressure, exposed to a lower vapor pressure, or displaced from an enclosed space. Typical sources include equipment leaks, open vats and mixing tanks, storage tanks, unit operations in wastewater treatment systems, and accidental releases.

Particulate Matter (PM)

The most common pollutant involved in fugitive emissions is dust or particulate matter (PM). This is released during certain operations of HAIC, such as transport and open storage of solid materials, and from exposed soil surfaces, including unpaved roads.

In addition, it is expected that hazardous chemical storage and handling activities can also release fugitive emissions of VOCs and PM. The unplanned spillage and accidental release of VOC containing chemical during road transport can cause fugitive emission and potentially impact on human health of local community. Where flammable liquids and gases are contained under pressure, leaks also increase the risk of fire and explosion.

Potential Impacts of Fugitive Emissions

Fugitive emissions are the main sources of the continuous exposure of workers to toxics in chemical plant industries including agrochemical industry. Workers are at risk since a wide range of toxic substances are directly released as fugitive emissions to the

workers' breathing zone in the plant on a daily basis. The routine exposure, even at low concentrations, to these toxic substances could impact their health.

In addition, emissions of volatile organic compounds releasing from equipment leaks and accidental releases/spillage of chemicals pose a health risk to workers and local communities. This includes eye, nose, and throat irritation; headaches and loss of coordination; nausea; and damage to the liver, kidneys, or central nervous system. Some VOCs are suspected to proven carcinogen.

Existing/In-place control

There are ventilation systems in the buildings as outlined in the project description. Information on these systems is provided in Appendix C. Adequate PPE including (respirators) 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 and can potentially be beyond the project footprint (local community throughout the access road) in case of the unplanned spillage and accidental release of VOC containing chemical during road transport., 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 as presented in Table below.

Table 6-58 Assessment of impact of fugitive emissions on occupational health and safety

Impact	Impacts on occupational health and safety during operation			
Impact Nature	Negative	Positive	Neutral	
	Workers are at risk since a wide range of toxic substances are directly released as fugitive emissions to the workers' breathing zone in the plant on a daily basis. The routine exposure, even at low concentrations, to these toxic substances could impact their health. emissions of volatile organic compounds releasing from equipment leaks and accidental releases/spillage of chemicals pose a health risk to workers and local communities. This includes eye, nose, and throat irritation; headaches and loss of coordination; nausea; and damage to the liver, kidneys, or central nervous system. Some VOCs are suspected to proven carcinogen.			
Impact Type	Direct	Indirect	Induced	
	The impact could directly affect the workers and even community in case of the unplanned spillage and accidental release of VOCs containing chemical during road transport.			
Impact	Temporary	Short-term	Long-	Permanent

Duration			term		
	The impact is expected to be most significant during operation phase.				
Impact Extent	Local	Regional	International		
	The impact is especially localized as it mainly affects the workers within the project site and nearby community located close to the project footprint.				
Impact Scale	N/A				
Frequency	The impact is likely to occur during operation phase.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
	The impact magnitude is potentially medium as it affects the specific groups (workers) of people that may bring about change in status for an extended duration (carcinogenic health impact for long term exposure).				
Receptor Sensitivity	Low	Medium	High		
	The receptor sensitivity is high in initial as it directly affects the health of workers and people in the vicinity area in case of unplanned spillage and leakage of chemical during road transport. Considering the existing control measures equipped to the receptors, the sensitivity of receptor is considered as medium.				
Impact Significance	Negligible	Minor	Moderate	Major	
	As a result of these impact criteria consideration, the impact significant is ranked as Moderate for potential occupational and public health and safety .				

	Level and Type of Impact				
	+1	0	-1	-2	-3
Impact Criteria	Positive	Negligible	Low	Medium	High
Extent			<1km	1-5 km	>5km
Duration			0-1 yr	1-5 yr	>5yr

Magnitude	Positive	Negligible	Low	Medium	High
Receptor Sensitivity	Positive	Negligible	Low	Medium	High
Significance	Positive	Negligible	Low	Medium	High

Characteristic					
Magnitude	Extent	Duration			
2 (Medium)	2 (Medium)	3 (High)	Equivalent Characteristics	Importance	
Characteristics = 2+2+3 =7			3 (High)	2 (Medium)	Significance
			Significance = Characteristics x Importance		**6 (Medium)**

Impact Significance

Provided the impacts will effect on nearby community in case of the unplanned spillage and accidental release of VOC containing chemical during road transport., the magnitude of the impact is likely to be small. The sensitivity of local community is considered small with the in-place controls. This impact is assessed as of small significance as presented in Table below.

Table 6-59 Assessment of impact of fugitive emissions on local community

Impact	Impacts on occupational health and safety during operation			
Impact Nature	Negative	Positive	Neutral	
	Local community residing in the vicinity within 2km of the HAIC can be at risk since a wide range of toxic substances are directly released as fugitive emissions to the nearby surrounding in case of emergency.			
Impact Type	Direct	Indirect	Induced	
	The impact could directly affect community only in case of the unplanned spillage and accidental release of VOCs containing chemical during road transport.			
Impact Duration	Temporary	Short-term	Long-term	Permanent
	The impact is expected to be short-term impacts that are limited to a few days or months in case of emergency.			
Impact	Local	Regional	International	

Extent					
	The impact is especially localized as it mainly affects nearby community within 1-2 km located close to the project footprint.				
Impact Scale	N/A				
Frequency	The impact is likely to occur during emergency phase.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
	The impact magnitude is potentially small since the small degree of variation from baseline conditions.				
Receptor Sensitivity	Low	Medium	High		
	The receptor sensitivity is small as the local community is residing not close to the HAIC. The community can be affected only in case of unplanned spillage and leakage of chemical during road transport. Considering the existing control measures equipped to the receptors, the sensitivity of receptor is considered as small.				
Impact Significance	Negligible	Minor	Moderate	Major	
	As a result of these impact criteria consideration, the impact significant is ranked as Minor for potential community health and safety.				

	Level and Type of Impact				
	+1	0	-1	-2	-3
Impact Criteria	Positive	Negligible	Low	Medium	High
Extent			<1km	1-5 km	>5km
Duration			0-1 yr	1-5 yr	>5yr
Magnitude	Positive	Negligible	Low	Medium	High
Receptor Sensitivity	Positive	Negligible	Low	Medium	High
Significance	Positive	Negligible	Low	Medium	High

Characteristic					
Magnitude	Extent	Duration			
1 (Small)	1 (Small)	3 (High)	Equivalent Characteristics	Importance	
Characteristics = 1+1+3 =5			2 (Medium)	1 (Medium)	Significance

	Significance = Characteristics x Importance	2 **(Low)**

Mitigation and/or Management Measures

- Health impact of fugitive emissions can effectively be minimised by taking the management actions as described in hazardous material management plan and solid and hazardous waste management plan in terms of hazardous materials and hazardous wastes storage and handling and personal protection system
- Reduce fugitive emissions through proper engineering control and technical modification (for example: controlling emissions through upgrading and modifying valve designs)
- Regularly monitor the system for leaks using a reliable method of leak detection (leaks of fugitive emissions can be detected or located using standard bubble emission techniques **ASTM E515-11(2022**))
- Preventive maintenance practices should be incorporated into operations and maintenance practices to reduce fugitive emissions
- Control the emissions through adequate work practices (workers ensure that their work practices adhere to the objective of achieving fugitive emissions protection)
- Make sure the employees wear **adequate PPE** and **respirators** while working in the industry to prevent airborne hazards
- Employee training in proper respirator uses and potential reparable hazards
- **Workplace pulmonary functioning test** for selected workers with a high potential to expose to respiratory hazards
- Make sure the hazardous materials and wastes are stored and handled as per described in Hazardous material management plan and solid and hazardous waste management plan to control accidental release of fugitive emissions
- Use of water suppression for fugitive dust and other loose particulate matters PM on the unpaved dirt road

Additional mitigation measures from **IFC** general EHS guidelines for environmental air emissions and ambient air quality are summarized below.

The recommended prevention and control techniques for VOC emissions associated with equipment leaks include

-The modification of equipment to control VOC emissions as shown in **Table 6-68**.

-Implementing a leak detection and repair (LDAR) program that controls fugitive emissions by regularly monitoring to detect leaks, and implementing repairs within a predefined time period.

For VOC emissions associated with handling of chemicals in open vats and mixing processes,

- Substitution of less volatile substances, such as aqueous solvents;
- Collection of vapors through air extractors and subsequent treatment of gas stream by removing VOCs with control devices such as condensers or activated carbon absorption;
- Collection of vapors through air extractors and subsequent treatment with destructive control devices such as:
  o Catalytic Incinerators: Used to reduce VOCs from process exhaust gases exiting paint spray booths, ovens, and other process operations

o Thermal Incinerators: Used to control VOC levels in a gas stream by passing the stream through a combustion chamber where the VOCs are burned in air at temperatures between 700º C to 1,300º C

o Enclosed Oxidizing Flares: Used to convert VOCs into CO2 and H2O by way of direct combustion

- Use of floating roofs on storage tanks to reduce the opportunity for volatilization by eliminating the headspace present in conventional storage tanks.

Recommended prevention and control of PM emissions sources include:

- Use of dust control methods, such as covers, water suppression, or increased moisture content for open materials storage piles, or controls, including air extraction and treatment through a baghouse or cyclone for material handling sources, such as conveyors and bins;
- Use of water suppression for control of loose materials on paved or unpaved road surfaces.

Significance of Residual Impacts

With the additional management and mitigation measures, the residual impact is considered of **minor** significance.

Table 6-60 Example of equipment modification in control of fugitive emissions for VOCs (IFC general EHS guidelines for environmental air emissions and ambient air quality)

Equipment Type	Modification	Approximate Control Efficiency (%)
Pumps	Seal-less design	100
	Closed- vent system	90
	Dual mechanical seal with barrier fluid maintenance at a higher pressure than the pumped fluid	100
Compressors	Closed- vent system	90
	Dual mechanical seal with barrier fluid maintenance at a higher pressure than the pumped fluid	100
Pressure relief devices	Closed- vent system	variable
	Rupture disk assembly	100
Valves	Seal-less design	100
Connectors	Weld together	100
Open-ended lines	Blind, cap, plug, or second valve	100
Sampling connections	Closed-loop sampling	100

Air Monitoring

Air monitoring for fugitive emissions (VOC and PM) will be conducted regularly during operation within the factory as described in **Air Emission Monitoring Plan**.

	Level and Type of Impact				
	+1	**0**	**-1**	**-2**	**-3**
Impact Criteria	Positive	Negligible	Low	Medium	High
Extent			<1km	1-5 km	**>5km**
Duration			0-1 yr	1-5 yr	**>5yr**
Magnitude	Positive	Negligible	Low	**Medium**	High
Receptor Sensitivity	Positive	Negligible	Low	**Medium**	High
Significance	Positive	Negligible	Low	**Medium**	High

Characteristic					
Magnitude	Extent	Duration			
2 (Medium)	3 (High)	3 (High)	Equivalent Characteristics	Importance	
Characteristics = 2+3+3 =8			3 (High)	2 (Medium)	Significance
			Significance = Characteristics x Importance		**6 (Medium)**

6.5.11 *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 6-81*).

Table 6.61 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 8.8.4*.

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.

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 6.4.8* 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 6-64*).

Table 6.62 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.				
Impact	Positive	Negligible	Small	Medium	Large

Magnitude	The impact magnitude is **Small**.			
Receptor Sensitivity	Low	Medium	High	
	The receptor sensitivity is **High**.			
Impact Significance	Negligible	Minor	Moderate	Major
	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**.

7 *CUMULATIVE IMPACT ASSESSMENT*

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.

(i) Fugitive dust and air pollutants

Short term generation of dust around the factory area and the particulates emission from the factory process would increase due to the emissions released from the nearby factories, mobile vehicles when the other nearby factories emissions and mobile vehicles as well as seasonal variation and atmospheric conditions.

(ii) Noise

The existing baseline noise level of the factory would intensify due to noise generation of the existing mobile vehicles gen sets and human activities in nearby the factory.

(iii) Ground water

Discharge of contaminated wastewater from the closet industrial activities could compound adverse impacts on the sub-soil and groundwater and lead to contamination of soil and groundwater. Unplanned spill of chemicals and leakage of fuels of these industries may also result in groundwater and sub soil contamination.

A number of industrial facilities observed within the surrounding landuses of the Project Site including Abestos Cement Plant located approx. 400 m to the north and Brick Manufacturing Factory located approx. 300 m to the south of the Project Site may have the effect of compounding impacts on the same stretch of aquifer and groundwater resource.

The nature of these industries which consumes significant amount of water and the inaccessibility of municipal piped water in that area can cause more groundwater abstractions in the area and have a potential to add up the negative impacts (cumulative impact) on the groundwater resource.

(iv) Surface water

The nearest surface water course, (a tributary of Sa Pa Gyi creek) is located approx. 100 m to 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 and nearby industries. The stream flows through the agricultural fields and other industries in the vicinity of the site. The lack of maintenance of the stream banks and agricultural activities throughout the stream stretch can exacerbate the impacts of surface water quality.

In addition, deterioration of surface water quality in the stream can escalate due to uncontrolled runoff, improper wastewater, solid waste and hazardous material management of the nearby industries and agricultural activities along the stream.

(v) Electricity

Some industrial facilities are observed within the surrounding landuses of the Project Site which may have the effect of compounding impacts on the same source of electricity which is national gridline. Hmawbi Abestos Cement Plant is located approx. 400 m to the north and 9 & 9 Brick Manufacturing Factory is located approx. 300 m to the south of the Project Site. The nature of these industries which consumes significant amount of electricity and which is mainly sourced by national electricity grid line therefore have a potential to add up the negative impacts (cumulative impact) on the depletion of natural resources (fossil fuels) and affects the electricity demand of local community, households can face electricity insecurity if its consumption is insufficient to meet the basic needs of daily life in terms of the requirements for cooking, lighting, washing and cooling the house.

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.

8 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

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. 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 *NEQG 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 NEQG 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 NEQG 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 MANAGEMENT PLAN

HAIC will adhere to EIA Procedure 2015 in preparation for the Environmental quality monitoring report (for air quality, wastewater, noise, solid waste, and any others required to monitor) and submit it to ECD bi-annually (once in six months) or as per instruction of the Ministry. HAIC will monitor all parameters under NEQG guidelines.

The management plans of the Project are provided in *Table 8.1, Table 8.2, Table 8.3.*

Table 8.1 Environmental and Social Management Plan of the Project (Construction Phase)

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
8.1	Air quality	Vehicle movements over unpaved access roads and within construction areas.	Dust	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;	Minor	An Air Pollution Management Plan shall be produced Water suppression should be used on exposed open earthworks Where unpaved roads are utilised by vehicles, water suppression at a rate of 2 litres/m2/hr should be used 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 Drop heights of material should be	Appointed Contractor	On site Project Management team and designated EHS team	Throughout Construction Phase	Monthly report to the Awba.
		Site clearance, site formation and levelling involving excavation and material transfer								
		Construction of the main Project infrastructure.								

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				□ 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 minimised; □ Wind breaks should be erected around the key construction activities □ Visual monitoring of dust deposition onto surfaces on and off-site should be undertaken regularly; □ 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 as shown in Figure 5.3. □ Provide personal protective equipment to exposed field workers.				

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				PM10, PM2.5, 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. Provide personal protective equipment to exposed field workers.						
8.2	Noise	Overall construction activities including heavy machinery operations for construction works.	Increase in ambient noise levels	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; Use material stockpiles and other structures, where practicable, to screen noise sensitive receptors from on-site construction activities;	Negligible	Well-maintained equipment to be operated on-site; Regular maintenance of equipment and replacing worn out components; Shut down or throttled down between work periods for machines and construction plant items (e.g. trucks); Reduce the number of equipment operating simultaneously as far as practicable; Orientate equipment known to emit noise strongly in one direction; Locate noisy plant as far away from receptors as practicable; Avoid transportation of materials on- and off-site through existing community areas; Use material stockpiles and other structures, where practicable, to screen noise sensitive receptors from on-site construction activities; A Construction Phase Monitoring Plan will be required for the Project	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	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				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 Figure 5.14. These will be measured for 24-hours.		which will include noise emissions and the noise levels during construction phase will be measured at the NSRs as shown in Figure 5.14.				
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	**Construction Site Run-off and Drainage** □ 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	Minor	**Construction Site Run-off and Drainage** □ Exposed soil surfaces should be protected by paving or fill material; □ 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 □ Provide measures to reduce the ingress of site drainage into excavations. Discharge any water pumped out from trenches or foundation excavations into storm drains via silt removal facilities; □ Provide measures to prevent the washing away of construction materials into any drainage system	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	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				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.		of open stockpiles of construction materials; □ 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 Figure 5.20 and one upstream station located 100m upstream of the Project Site.				

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				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.						
				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	Minor	**Sewage Generated from On-site Workforce** □ 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).				

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				(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; and □ Surface run-off from bunded areas should pass through oil water separators and grease traps prior to discharge to the storm water system.	Minor	**Hazardous Material Management** □ Oils, fuels and chemicals should only be used and stored in designated areas with secondary containment and bund hardstand. □ 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	Minor	**Solid Waste Management** □ A solid waste management plan (SWMP) for the Project should be developed that sets out plans and actions for construction waste (both non-hazardous and hazardous wastes) and the Project shall adhere to that plan. □ A hazardous waste management system covering waste classification, separation, collection, storage, transfer and disposal should be set up and				

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				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		operated. The waste management system shall comply with applicable regulation of the government. □ Ensure HAIC and its contractors comply with the measures as shown in SWMP.				

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				prohibited; □ Chain of custody documents should be used for construction waste to monitor disposal; and □ Waste segregation should be practiced at the worker's camps with an emphasis placed on reducing, reusing and recycling of waste streams as appropriate.						
8.4	Soil Quality	Improper solid waste and hazardous material management at the site	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.	Negligible	□ Ensure HAIC and its contractors comply with the measures as shown in **Item 8.3** in order to mitigate potential impacts on soil due to improper management of hazardous waste and wastewater (site runoff and sanitary discharge)	Appointed Contractor	On site Project Management team and designated EHS team		Monthly report to the Awba
8.5	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: □ 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.	Negligible	□ Ensure HAIC and its contractors comply with the measures as shown in **Item 8.3** in order to mitigate potential impacts on visual and aesthetic due to improper management of solid waste □ The extent of the construction areas should be limited; and □ Construct site hoarding around the construction site.	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	Impacts to community health and safety.	□ 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	Minor	□ HAIC should develop a Contractor EHS Management Plan and HAIC(Awba) itself and its contractors should adhere to that plan; □ Awba should prepare and implement a Community Grievance	Appointed Contractor	On site Project Management team and designated CSR team		Monthly report to the Awba

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
		soil quality from the 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.		Mechanism; □ Awba should develop road transport management plan to indicate the traffic routes to be followed and speed limit to be complied with in order to reduce risk to the local communities; A Safe Vehicle Policy and Training Safety Procedure should also be developed for its own transport fleet, including provisions for safe agro-chemical and hazardous waste transport; □ During the construction phase, a speed limit of 40km/h shall be enforced.				
8.7	Economy and Livelihoods	Contractual employment is expected to	Livelihood opportunities (positive	□ Employ qualified local workers whenever possible. □ Purchase local supplies and	Positive	Employ qualified local workers and purchase local supplies and	Appointed Contractor	On site Project Management team and		Monthly report to the Awba

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
		increases and increase in business of local shops during construction phase.	impacts) during construction	services with required specifications, whenever possible.		services.		designated CSR team		
8.8	Occupational Health and Safety	Construction activities as well as construction camp.	Impacts to occupational health and safety	□ 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	Minor	□ HAIC should design an occupational health and safety management plan tailored to the needs of the projects and all contractors and HAIC itself should adhere to that plan. □ All workers shall 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 Myanmar Government Laws (at a minimum) regarding minimum living areas, provision of potable drinking water (meeting WHO parameters), electricity, and latrine services. □ Awba shall develop and implement a corporate Human Resource Policy and Manual of Procedures in compliance with applicable national labour laws and regulations - Worker's grievance mechanism for its permanent and casual workers, as well as	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	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				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		for construction workers, to enable anonymous complaints and tracking and solving.				

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				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. 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						

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				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 immigration of workers	Completion of infrastructures with local communities..	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.	Minor	Camps for construction and operational workforces should be properly sited and designed to reduce demand on local infrastructure services. Awba should develop and implement road transport management plan and stakeholder management plan.	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	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).	Moderate	Awba shall develop and implement Emergency Preparedness and Response Plan and make sure all the workers and contractors comply with the plan. 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. Oils, fuels and	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	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				□ 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/grease 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.		chemicals should only be used and stored in designated area with secondary containment and bund system. □ Surface run off from bunded areas should pass through oil/grease traps prior to discharge to the storm water system. □ On site oil-water separators and holding facilities should be installed. □ The oil contaminated water will be collected and handled by local licensed waste water sub-contractors. Make sure the workers and contractors follow the immediate clean up actions for any spillages of oil, fuel or chemicals as per Emergency Preparedness and Response Plan.				

Table 8.2 Environmental and Social Management Plan of the Project (Operation Phase)

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
9.1	Air Quality	Air emissions from production formulation process		- Provision of local exhaust ventilation system connected to process stacks; - Provision of pollution control systems (dust collector and scrubber system) for the process emissions - Operation as per work instructions (SOP); and - Regular maintenance and monitoring of scrubbers. - For road dust control, water suppression on the unpaved dirt roads - Respiratory PPE should be worn while working in the place with high potential air born hazard	Minor	■ Provision of local exhaust ventilation system connected to process stacks; ■ Provision of pollution control systems for process stacks; ■ Operation as per **work instructions (WI)** or **Standard Operation Procedure (SOP)**; and ■ Regular maintenance and monitoring of scrubbers - For road dust control, water suppression on the unpaved dirt roads - Respiratory PPE should be worn while working in the place with high potential air born hazard	Appointed Operations team for mitigation measures and implementation	On site Project Management team and designated EHS team	Throughout the operational phase	Monthly report to the Awba
9.2	Air Quality	Fugitive emissions from Production Line and Hazardous Chemical Storage areas		- Reduce fugitive emissions through proper engineering control and technical modification (for example: controlling emissions through upgrading and modifying valve designs) - Regularly monitor the system for leaks using a reliable method of leak detection (leaks of fugitive emissions can be detected or located using standard bubble emission techniques ASTM E515-11(2022)) - Preventive maintenance practices should be incorporated into operations and maintenance practices to reduce fugitive emissions - Control the emissions through adequate work practices (workers ensure that their work practices adhere to the objective of achieving fugitive emissions protection) - Make sure the	Minor	- Reduce fugitive emissions through proper engineering control and technical modification (for example: controlling emissions through upgrading and modifying valve designs) - Regularly monitor the system for leaks using a reliable method of leak detection ■ HAIC (Awba) should develop and implement Hazardous Material Management Plan and shall adhere to it in terms of storage management and control ■ Conduct regular Hazardous material storage inspections; ■ Workers training in hazardous material handling and storage; and ■ Work permit system to handle hazardous materials - Control the emissions through adequate work practices (workers ensure that	Appointed Operations team for mitigation measures and implementation	On site Project Management team and designated EHS team	Throughout the operational phase	Monthly report to the Awba

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				employees wear adequate PPE and respirators while working in the industry to prevent airborne hazards - Employee training in proper respirator uses and potential reparable hazards - Workplace pulmonary functioning test for selected workers with a high potential to expose to respiratory hazards - Make sure the hazardous materials and wastes are stored and handled as per described in Hazardous material management plan to control accidental release of fugitive emissions - Apply water suppression for fugitive dust and other loose particulate matters PM on the unpaved dirt road		their work practices adhere to the objective of achieving fugitive emissions protection) - Make sure the employees wear adequate PPE and respirators while working in the industry to prevent airborne hazards - Apply water suppression for fugitive dust and other loose particulate matters PM on the unpaved dirt road				
9.3	Noise	Operation of fixed plant and machinery during operational phase	Increase in ambient noise levels	□ 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	Minor	□ 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; □ 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 biannually at the NSRs within 500 m from the Project boundary as shown in Figure 5.14. These will be	Appointed Operations team	On site Project Management team and designated EHS team	Throughout the operational phase	

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				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 biannually at the NSRs within 500 m from the Project boundary as shown in Figure 5.14. These will be measured for 24-hours.		measured for 24-hours.				
9.4	Surface, Ground Water Quality and Effluent	Uncontrolled runoff, improper wastewater, solid waste and hazardous material management at the site, affecting surface water quality of watercourse.	Impact to surface water quality	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: □ Discharges from the production process should be treated and monitored biannually for compliance with effluent levels specified in NEQEG guideline (2015). □ Sewage from the operation workforce should be treated on-site by a septic tank and seepage field properly designed and maintained according to EQEG guideline (2015).WBG Genera 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	Minor	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. Additional measures are □ Discharges from the production process should be treated and monitored biannually for compliance with effluent levels specified in NEQG Guidelines for Pesticide Manufacturing, Formulation and Packaging. □ Sewage from the operation workforce should be treated on-site by a septic tank. - 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 Biannually for compliance with Myanmar National Environmental Quality (Emissions) Guidelines for site runoff and wastewater discharges (for TSS, oil and	Appointed Operations team for mitigation measures and implementation 3rd Party Environmental Consultant for monitoring & audit	On site Project Management team and designated EHS team	Throughout the operational phase	Monthly report to the Awba

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				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.		grease, pH). □ 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. □ An Operational Phase Monitoring Plan should be required for the Project which will include surface water quality (stream located 100 m downstream of the Project Site) and groundwater quality (including Tube well 3. New) to determine the potential impact of surface water and groundwater respectively due to the Project operation. Besides, the effluent discharge point from lagoon 1 to lagoon 2 receiving the overflow will be monitored along with the above surface and ground water monitoring. The storm water discharge point: the final discharge of all drainswill be monitored				

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				□ Implement monitoring system to continuously monitor / disclose waste water discharge quality.						
9.5	Ground Water Resources and Public water supply	Use of groundwater for Project Operation	Groundwater resource depletion due to over exploitation for Project water supply Negatively affect the groundwater accessibility of these local community threatening the water security of the local community	- Determine the sustainable yield of the major aquifer by conducting groundwater pumping tests and monitor the groundwater productivity/recharge rate over time in order to detect any imbalance of groundwater recharge throughout operation - Perform artificial aquifer recharge enhancement using treated wastewater. The treated wastewater in the Lagoons can infiltrate to the ground and thereby recharge the groundwater) (Briefing Note Series for Groundwater Management, World Bank, 2002) However, in order to accomplish the uses without deleterious environmental consequences, the groundwater quality nearby the Lagoon should be monitored on a regular basis. - Implement/adopt efficient water consumption management measures to manage and protect the water resources. These will include (but not limited to) - A detailed water balance will be developed, maintained, monitored and reported periodically; • Specific water use (measured by volume of water used per unit production) will be	Minor	. Perform artificial aquifer recharge enhancement using treated wastewater. The treated wastewater in the Lagoons can infiltrate to the ground and thereby recharge the groundwater) (Briefing Note Series for Groundwater Management, World Bank, 2002) However, in order to accomplish the uses without deleterious environmental consequences, the groundwater quality nearby the Lagoon should be monitored on a regular basis. - Implement/adopt efficient **water consumption management plan** and HAIC should adhere to that plan. - Opportunities for improvement in water use efficiency will be identified and implemented; • Optimize water distribution system and early water detection. • Source meter and sub meter should be installed to measure the water consumption rate by the facility over a period of time. Source meters measure the amount of water being supplied to the facility, while sub meters measure usage for specific activities	Appointed Operations team for mitigation measures and implementation	On site Project Management team and designated EHS team	Throughout the operational phase	Monthly report to the Awba

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				assessed; and • Operations must be benchmarked to available industry standards of water use efficiency. - Opportunities for improvement in water use efficiency will be identified and implemented; • Optimize water flow and early water detection. • Source meter and sub meter should be installed to measure the water consumption rate by the facility over a period of time. Source meters measure the amount of water being supplied to the facility, while sub meters measure usage for specific activities such as process use, or landscape water use. • Identifying appliances which consume huge amounts of water and identifying appliance failures, water leakage and damage and substituting with water saving appliances/equipment, it can result in significant long-term water savings. - Engage and educate employees – • Every employee has a		such as process use, or landscape water use. • Identifying appliances which consume huge amounts of water and identifying appliance failures, water leakage and damage and substituting with water saving appliances/equipment, it can result in significant long-term water savings. - Engage and educate employees about industrial water conservation - Perform 3 Rs (Reduce, Reuse and Recycle) policy in water use such as use of treated wastewater for gardening works, for process washing, industrial fire protection etc. - Installation of alternatives sources for Project water supply such as rainwater harvesting and use of municipal piped water to avoid depleting the resource to the detriment of other users. - Investigate any complaints/ abnormal event of groundwater wells (within 30 m) depletion in nearby villages and handle appropriately. Keep records of complaints and follow-up. - - An Operational Phase Monitoring Plan should be				

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				responsibility to play in water usage. Make certain that they are educated and informed about water conservation and follows the water consumption management practices - Perform 3 Rs (Reduce, Reuse and Recycle) policy in water use such as use of treated wastewater for gardening works, for process washing, industrial fire protection etc. - The use of alternative water supplies, water consumption offsets to maintain total demand for water resources within the available supply, and evaluation of alternative project locations: • Installation of alternatives sources for Project water supply such as rainwater harvesting and use of municipal piped water to avoid depleting the resource to the detriment of other users. - Investigate any complaints/ abnormal event of groundwater wells (within 30 m) depletion in nearby villages and handle appropriately. Keep records of complaints and follow-up. - An Operational Phase Monitoring Plan should be required for the Project which will include groundwater		required for the Project which will include groundwater quality (Tube well 3. New) which is nearest to the WWTP to determine the potential impact of groundwater quality due to the WWTP (artificial water recharge)				

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				quality (Tube well 3. New) to determine the potential impact of groundwater quality due to the WWTP (artificial water recharge)						
9.6	Soil Quality	Improper solid waste and hazardous material management at the site	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. □ 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.	Negligible	- Hazardous waste should be managed properly. - Set up spillage containment system	Appointed Operations team	On site Project Management team and designated EHS team	Throughout the operational phase	Monthly report to the Awba
9.7	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	Negligible	Solid waste should be managed properly.	Appointed Operations team	On site Project Management team and designated EHS team	Throughout the operational phase	Monthly report to the Awba
9.8	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	Impacts to community health and safety	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: □ Awba will prepare and implement a Community Grievance Mechanism (as per Myanmar/Awba (#35880) – Environmental and Social Action Plan (ESAP) No. 1).	Minor	Please refer to **Item 8.6** above for mitigation measures recommended. Additional actions to be measured include: □ Awba should prepare and implement a Community Grievance Mechanism. □ Awba should develop a Safe Vehicle Policy and Training Safety Procedure for	Appointed Operations team	On site Project Management team and designated CSR team	Throughout the operational phase	Monthly report to the Awba

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		the Project		□ 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).		its own transport fleet, including provisions for safe agro-chemical and hazardous waste transport.				
9.9	Occupational Health and Safety	Operational activities as well as workers camp. Fugitive emission released during process activities and hazardous materials handling and storage	Impacts to occupational health and safety	Please refer to **Item 8.6** and **Item 9.1.2** above for mitigation measures recommended. A number of measures should be adopted to reduce impacts to occupational health and safety: □ 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).	Minor	Please refer to **Item 8.6** and **Item 9.1.2** above for mitigation measures recommended. Additional numbers of measures recommended are □ 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. □ HAIC should 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.	Appointed Operations team	On site Project Management team and designated EHS and CSR teams	Throughout the operational phase	Monthly report to the Awba
9.10	Economy and Livelihoods	Contractual employment is expected to increases and increase in business of local shops	Livelihood opportunities (positive impacts)	□ Employ qualified local workers whenever possible. □ Purchase local supplies and services with required specifications, whenever possible.	Positive	Employ qualified local community as the factory's workers and purchase local supplies and services.	Appointed Contractor	On site Project Management team and designated CSR team		Monthly report to the Awba

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9.11	Infrastructure Services	Project traffic and immigration of workers	Completion of infrastructures with local communities	Please refer to Item 8.6 above for mitigation measures recommended.	Negligible	Please refer to Item 8.6 above for mitigation measures recommended.	Appointed Operations team	On site Project Management team and designated EHS and CSR teams	Throughout the operational phase	Monthly report to the Awba
9.12	Accidental Events – Leaks and Spills	Unplanned Spills	Contamination to water course and impact to human health	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/grease 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	Moderate	Development of an Emergency Preparedness and Response Plan, including for transport and sale depots. 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 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/grease 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.	Appointed Operations team	On site Project Management team and designated EHS team	Throughout the operational phase	Monthly report to the Awba

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				stage). □ Guidelines and procedures should be established for immediate clean up actions following any spillages of oil, fuel or chemicals.						
9.13	Accidental Events –Fire	Accidental Events – Fire	Health and safety risk to workers and local community.	□ 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.	Moderate	□ HAIC should install fire protection system to all buildings as a norm including office building, laboratory building, warehouse, EC Building, SL Building, WP Building, SP Building, SC Building, GR Building Utility Building, Drum Crusher Building to mitigate fire risk during operation of the Project. □ HAIC should develop Emergency Response and Preparedness Plan pertaining fire risk management measures and protocols in compliance with Myanmar National Guidelines. □ 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 internally and externally in collaboration with related Fire Department.	Appointed Operations team	On site Project Management team and designated EHS team	Throughout the operational phase	Monthly report to the Awba
9.14	Natural resource (Energy resource) and Pubic electricity supply	Energy consumption during Project operation	Natural resource depletion (Non-renewable) due to over exploitation of fossil fuels for power generation and direct usage of	(1) Develop and establish the energy consumption management plan to reduce the usage of electricity and enhance the energy efficiency in the facility. Some energy consumption management measures from this plan are as follows: • Design and modify the building and	Minor	HAIC should develop and adhere to internal energy consumption management plan to save energy use and seek any opportunity for energy efficiency. Some electricity and fuel saving measures are as follows:	Appointed Operations team	On site Project Management team and designated EHS team	Throughout the operational phase	Monthly report to the Awba

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
			fuel in industrial activities Negatively affect the electricity share of local community and can happen electricity insecurity to the local community	equipment design into energy and environmental friendly, for example in order to save the electricity use for lighting purposes, the following measures are recommended; - Not all areas of a building should be lighted all of the time. Automatic controls and sensors can be deployed to match lighting provision to need. - Reducing the lighting levels where there is over lamping. - Implementing more energy-efficient Light Emitting Diode (LED) lighting to save electricity • For power consuming office equipment, such as computers, printers, photocopiers and monitors - ensure that monitors are switched off when users are away from their desks for a period. Always switch off computers and monitors at the end of the day unless they need to remain on. - Printers - as with computers, switch off all printers at the end of the day. When printing, use the most energy-efficient mode possible and avoid all unnecessary printing.		- Not all areas of a building should be lighted all of the time. Automatic controls and sensors can be deployed to match lighting provision to need. - Reducing the lighting levels where there is over lamping. - Implementing more energy-efficient Light Emitting Diode (LED) lighting to save electricity. - Photocopiers - always make sure that copiers are switched off out of office hours. Enable all energy-saving standby features and encourage staff to do their copying in batches and avoid all unnecessary copying. • For power consuming office equipment, such as computers, printers, photocopiers and monitors - ensure that monitors are switched off when users are away from their desks for a period. Always switch off computers and monitors at the end of the day unless they need to remain on. - Printers - as with computers, switch off all printers at the end of the day. When printing, use the most energy-efficient mode possible and avoid all unnecessary printing. - Photocopiers - always make sure that copiers are switched off out of office hours. Enable all energy-saving standby features and encourage staff to do their copying in batches and avoid all unnecessary copying.				

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				- Photocopiers - always make sure that copiers are switched off out of office hours. Enable all energy-saving standby features and encourage staff to do their copying in batches and avoid all unnecessary copying. • Motors should be turned off when they are not in use. For pumps in liquid, air or gaseous circulation systems, the use of sensors that switch off a motor when a certain level is reached can substitute for valves that control liquid or airflow but keep the motor running at all times. • Engine shut down during periods of inactivity of machines. • Record the feed data about fuel consumption during transportation and or during the operation of generator sets and find the opportunity to save fuel usage in these activities • Promote employee education on energy conservation awareness (2) Investigate any complaints from the local community with the same source of electricity supply related to electricity insecurity and handle appropriately. Keep		- Motors should be turned off when they are not in use. For pumps in liquid, air or gaseous circulation systems, the use of sensors that switch off a motor when a certain level is reached can substitute for valves that control liquid or airflow but keep the motor running at all times. • Engine shut down during periods of inactivity of machines. • Record the feed data about fuel consumption during transportation and or during the operation of generator sets and find the opportunity to save fuel usage in these activities • Promote employee education on energy conservation awareness				

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				records of complaints and follow-up.						

Table 8 .3 Environmental and Social Management Plan of the Project (Decommissioning Phase)

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
10.1	Air quality	Vehicle movements over unpaved access roads and within construction areas.	Dust	Please refer to **Item 8.1** above for mitigation measures recommended in construction phase.	Minor	Please refer to **Item 8.1** above for mitigation measures recommended in construction phase.	Appointed Contractor	On site Project Management team and designated EHS team	Throughout Decommissioning Phase	Report to ECD and YCDC.
		Site clearance, site formation and levelling involving excavation and material transfer								
		Construction of the main Project infrastructure.								
10.2	Noise	Overall construction activities including heavy machinery operations for construction works.	Increase in ambient noise levels	Please refer to **Item 8.2** above for mitigation measures recommended in construction phase.	Negligible	Please refer to **Item 8.2** above for mitigation measures recommended in construction phase.	Appointed Contractor	On site Project Management team and designated EHS team	Throughout Decommissioning Phase	Report to ECD and YCDC.
10.3	Surface Water Quality	Uncontrolled runoff, improper wastewater, solid waste and hazardous material	Impact to surface water quality	**Decommissioning Site Run-off and Drainage** Please refer to **Item 8.3** above for mitigation measures recommended in construction phase.	Minor	**Decommissioning Site Run-off and Drainage** Please refer to **Item 8.3** above for mitigation measures recommended in construction phase.	Appointed Contractor	On site Project Management team and designated EHS team	Throughout Decommissioning Phase	Report to ECD and YCDC.

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
		management at the site, affecting surface water quality of watercourse.								
				Sewage Generated from On-site Workforce Please refer to **Item 8.3** above for mitigation measures recommended in construction phase.	Minor	**Sewage Generated from On-site Workforce** Please refer to **Item 8.3** above for mitigation measures recommended in construction phase.				
				Hazardous Material Management Please refer to **Item 8.3** above for mitigation measures recommended in construction phase.	Minor	**Hazardous Material Management** Please refer to **Item 8.3** above for mitigation measures recommended in construction phase.				
				Solid Waste Management Please refer to **Item 8.3** above for mitigation measures recommended in construction phase.	Minor	**Solid Waste Management** Please refer to **Item 8.3** above for mitigation measures recommended in construction phase.				
10.4	Soil Quality	Improper solid waste and hazardous material management at the site	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.	Negligible	Ensure HAIC and its contractors comply with the measures as shown in **Item 8.3** in order to mitigate potential impacts on soil due to improper management of hazardous waste and wastewater (site runoff and sanitary discharge)	Appointed Contractor	On site Project Management team and designated EHS team	Throughout Decommissioning Phase	Report to ECD and YCDC.
10.5	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: The extent of the construction areas should be limited; and	Negligible	Ensure HAIC and its contractors comply with the measures as shown in **Item 8.3** in order to mitigate potential impacts on visual and aesthetic due to improper management of solid waste	Appointed Contractor	On site Project Management team and designated EHS team	Throughout Decommissioning Phase	Report to ECD and YCDC.

Item no	Project Stage/ Affected Aspect	Project Activity and Affected Area	Potential Impacts	Mitigation Measures	Residual Risk	Specific Actions	Responsibility for Mitigation Implementation	Responsibility for supervision of mitigation implementation	Schedule	Reporting Requirement
				□ Construct site hoarding around the construction site. The colour of the hoarding should blend in with the surrounding environment.		□ The extent of the construction areas should be limited; and □ Construct site hoarding around the construction site.				
10.6	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.	Please refer to **Item 8.6** above for mitigation measures recommended in construction phase.	Minor	Please refer to **Item 8.6** above for mitigation measures recommended in construction phase.	Appointed Contractor	On site Project Management team and designated CSR team	Throughout Decommissioning Phase	Report to ECD and YCDC.
10.7	Economy and Livelihoods	Contractual employment is expected to increases and increase in business of local shops during construction phase.	Livelihood opportunities (positive impacts) during construction	□ Employ qualified local workers whenever possible. □ Purchase local supplies and services with required specifications, whenever possible.	Positive	Employ qualified local workers and purchase local supplies and services.	Appointed Contractor	On site Project Management team and designated CSR team	Throughout Decommissioning Phase	Report to ECD and YCDC.
10.8	Occupational Health and Safety	Construction activities as well as construction camp.	Impacts to occupational health and safety	Please refer to **Item 8.8** above for mitigation measures recommended in construction phase.	Minor	Please refer to **Item 8.8** above for mitigation measures recommended in construction phase.	Appointed Contractor	On site Project Management team and designated EHS and CSR teams	Throughout Decommissioning Phase	Report to ECD and YCDC.
10.9	Infrastructure Services	Project traffic and immigration of workers	Completion of infrastructures with local communities..	Please refer to **Item 8.9** above for mitigation measures recommended in construction phase.	Minor	Please refer to **Item 8.9** above for mitigation measures recommended in construction phase.	Appointed Contractor	On site Project Management team and designated EHS and CSR teams	Throughout Decommissioning Phase	Report to ECD and YCDC.
10.10	Accidental Events – Leaks and Spills	Unplanned Spills	Contamination to water course and impact to human health	Please refer to **Item 8.10** above for mitigation measures recommended in construction phase.	Moderate	Please refer to **Item 8.10** above for mitigation measures recommended in construction phase.	Appointed Contractor	On site Project Management team and designated EHS and CSR teams	Throughout Decommissioning Phase	Report to ECD and YCDC.

8.3.1 Air Quality Management Plan

Effective air pollution management is an essential element of the HAIC Project success and a key component of mitigating the HAIC Project potential social and environmental impacts. This Air Pollution Management Plan (APMP) has been developed to guide HSE staff actions to manage the stack and fugitive emissions from HAIC and minimize impacts on the HAIC Project's stakeholders.

8.3.1.1 Objectives

The main objectives for air pollution management plan in the HAIC project are undertaken as follows;

1) To manage the emissions from the HAIC Project to the environment in accordance with the Awba Environmental Policy and National Environmental and Quality (Emission) Guidelines- NEQG, and

2) To provide the awareness activities for the impacts of air pollution from the HAIC project to the workers.

8.3.1.2 Policy and legal frame work

The Project's Environmental and Social Policies, Legal Requirements and Institutional requirements have been detailed in Chapter 3.

8.3.1.3 Related Governmental Law and Rule

According to the air emission guidelines of National Environmental Quality (Emission) Guidelines (2015), Myanma Awba Group Co., Ltd carry out these guidelines in the HAIC project.

8.3.1.4 Sources of Impacts and Mitigation Measures

In the HAIC project, the production process is being operated only with highly automated machines. The types of chemical raw material are powder, solid and liquid.

According to ESIA and ESMP reports of the HAIC project, the potential sources of stack emissions during operation phase are:

1) Hazardous Chemicals storage area;

2) Stack emissions from the Production Lines (Seven buildings). There is a wide range of dust collection processes and equipment to be chosen for the pollutants control. Depending on the volume and composition of potential dusts, HAIC has installed filters bag houses and scrubbers at every production lines.

The following typical collection efficiency curves figures show the various types of particulate collectors, layout plan and fabric filter bag house, roof exhaust fan and axial

fan for the type of appropriate PM controller which has been installed in the HAIC project.

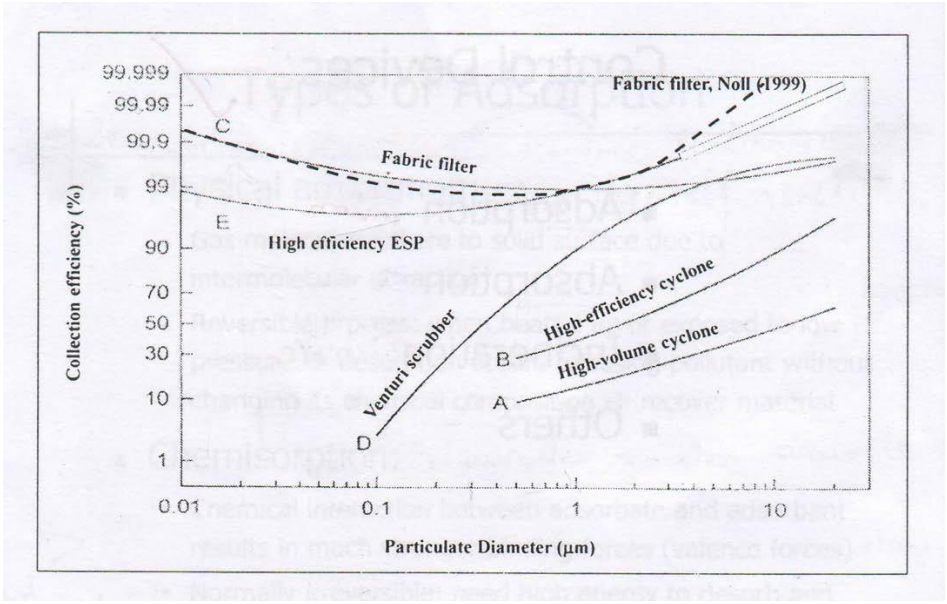


Figure 8-1 Typical collection efficiency curves for various types of particulate collectors

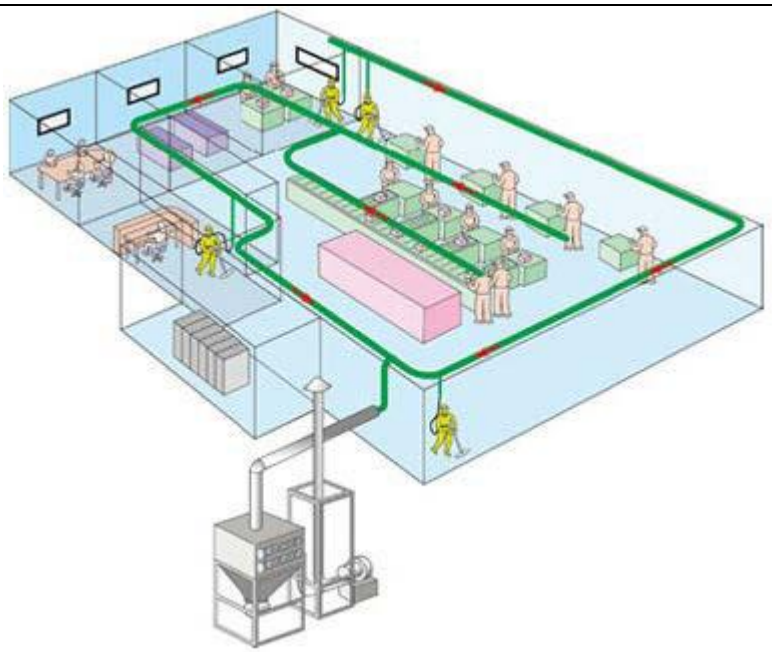


Figure 8-2 Sample Layout plan for dust collection system in HAIC at each production line

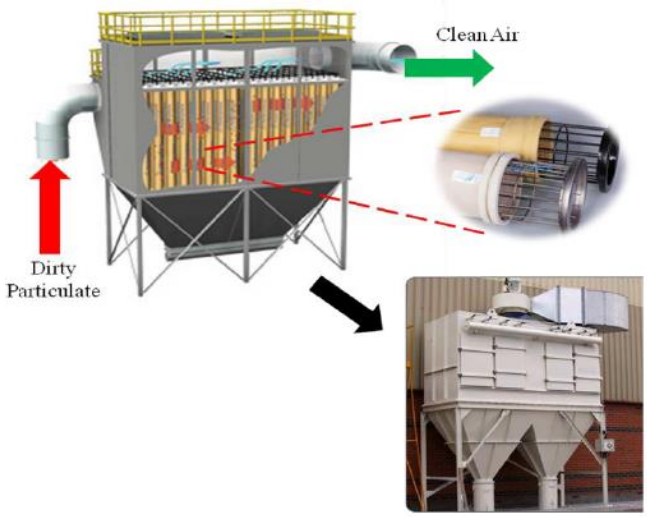


Figure 8-3 Installation of fabric filter bag house in HAIC at each production line

Figure 8-4 Roof exhaust fan and axial fan for ventilation systems installed at HAIC

8.3.1.5 Key Performance Indicators

a) Number of inspections performed in the chemicals storage area;
b) Stack emissions and ambient air quality monitoring data showing compliance with applicable requirements;
c) Number of non-compliances and corrective action implemented; and
d) Number of accidents/incidents/Non-Conformity Reports (NCR) caused by chemical leaks.

Overview Map and Site Layout of Air Monitoring Location

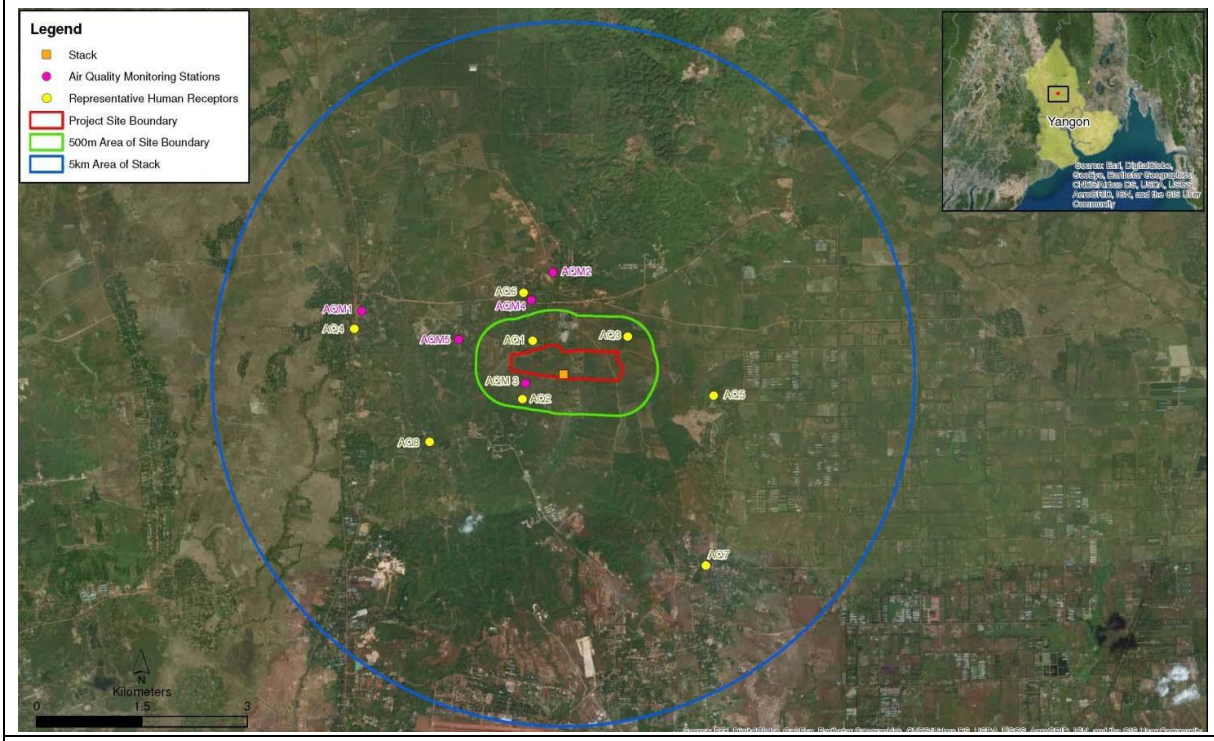


Figure 8-5 Representative Air Sensitive Receptors around the Project Site

Figure 8-6 Air Sampling Locations of Hmawbi Agricultural Inputs Complex (HAIC)

8.3.1.6 Air Quality Management Sub-plan

Source of Impact	Control Measures	Frequency	Responsible Person
Fugitive emissions from Hazardous Chemical Storage areas	- Storage management and control according to the Hazardous Material Management Plan - Hazardous material storage inspections; - Workers training; and - Work permit system. ***(http://www.awba-group.com/) Pg.3 ESMP report of Awba/ Project No.: 0406940***	- Monthly - Annually and periodically meetings and trainings to workers.	HSE Team
Stack emission for Production Line (seven buildings)	- Provision of local exhaust ventilation system connected to process stacks; - Provision of pollution control systems for process stacks;	- As per process design based on risk assessment.	HSE Team

Source of Impact	Control Measures	Frequency	Responsible Person
	- Operation as per work instructions (WI); and - Regular maintenance and monitoring of scrubbers. ***(http://www.awba-group.com/)*** ***Pg.3 ESMP report of Awba Project No.: 0406940***		

8.3.1.7 Air Quality Monitoring Plan according to NEQG

Parameter	Unit	Sampling Locations	Frequency	Responsible
1)Ammonia, gaseous inorganic chlorine compounds 2)Bromines, Cyanides, Fluorines, Hydrogen sulfide 3) Chloride 4) Chlorine 5) PM_{10} 6) Total organic carbon 7) Volatile organic compounds, VOC	mg/Nm^3	- Workplace air quality monitoring points assigned in facility area Point 1 at Office Point 2 at Ware house Point 3 at Production area	Biannually	HSE Department

8.3.1.8 Implementation Schedule

The management actions and monitoring plan will be performed as mentioned in the tables above. The Plan has to be revised accordingly after every project activity conducted, in order to guarantee the compliance with Myanmar laws.

8.3.1.9 Responsibilities

Day to day supervision will be done by relevant supervisors of the production lines and warehouses and over all supervision will be done by HAIC's Management and HSE Department. Roles and responsibilities are as follows:

- Factory Manager review and take action for any issues in relation to the report from supervisor, manager through HSE in-charge.
- The Awba's HSE Committee will be on charge of monitoring the compliance of these air quality management, sub-management and monitoring plan in accordance with NEQG guideline and submit monitoring report to ECD biannually. Any non-compliance and its recommended corrective action will be recorded by the HSE Committee in their meeting's minutes.
- The HSE Supervisor will be tasked with monthly reporting on the stack emissions and air quality monitoring results to the HSE Manager or on an ad-hoc basis in case of major or repetitive minor issues. The HSE Manager will ensure these are reported to and discussed within the HSE Department within the regular HSE Committee meetings.
- HAIC's Management and HSE officer has to report, as soon as possible, the failures of his or her responsibility. If dangerous impact caused by this failure or failure should be known by the Ministry, the project proponent has to submit within 24 hours and other than this situation has to submit within 7 days from knowing it.
- On an annual basis, Awba will keep relevant authorities (MONREC/ECD) informed of the HAIC Project HSE performance with respect to air quality management. In addition, Awba is considering preparing an annual Sustainability/HSE report at Group-level (using Global Reporting Initiative/G-4 Guidelines).

8.3.1.10 Budget allocation for air quality sub-management plan

HAIC will use 2% of the total investment for EMP cost. The total investment of HAIC is 17,291,500,000 MMK (MMK 17291.5 million). Then the estimated cost for the management plan is 345,830,000 MMK. Among the total management plan, the budget allocation for the mitigation measures and monitoring plan will include for air/odor/noise, waste (solid and hazardous waste), potable & wastewater, Occupational Health & Safety and Community Health & Safety. Thus, the budget is allocated for Air/Odor management plan would be around 69,166,000 MMK while 27,666,400MMK for monitoring plan and 41,499,600 MMK for mitigation measures.

Table 8-4 Budget allocation of Air Quality Sub-Management Plan

Environmental Factors	Activities	Responsibility	Estimated Budget
Operation phase			

Air Quality + Odor	Air/ Quality +Odor Management+ Noise (Air monitoring plan + Mitigation measure)	HSE Team	69,166,000 MMK
	Air/Odor Monitoring plan		27,666,400MMK
	Air/Odor Mitigation measure		41,499,600 MMK

*8.3.*2Water Consumption Management Plan (Groundwater)

The primary source of water supply for the project is groundwater and currently, the site has nine numbers of tube wells within the HAIC premises. The abstracted groundwater is pre-treated onsite prior to being used for operational purposes. According to the raw ground water quality analysis test conducted in each tube wells by HAIC in 2017, 2018 and 2020, all tube wells have generally good quality of water in terms of WHO drinking water standards excepting pH, color and turbidity, iron and TDS which are higher than permissible level. Low pH and high iron content in groundwater is considered due to the soil and bed rock underlain by the Project area which is ferrosols (iron rich soil and acidic in general) based on Soil Type Map of GMS Countries, 2012. The internal process water analysis test is conducted in a regular basis (biannually) which includes pH, color, total hardness, total alkalinity, phenolphthalein alkalinity, TSS, TDS and total solids and observed all these parameters comply with WHO drinking water guidelines.

8.3.2.1 Example of water mass balance chart

A water balance chart compares the total water supplied to the facility, the actual water consumed within all the water end uses in the facility, and the total water leaving the facility. This will help to identify areas of significant water usage and problem areas, including leaks and uncontrolled losses.

Water input to be included in a water balance chart consists of:

a) Water supplied by different sources (e.g. piped water, groundwater, rainwater, surface water, etc.)

Water output to be included in a water balance chart consists of:

a) Water that is lost through evaporation and drift e.g. cooling towers (if applicable)

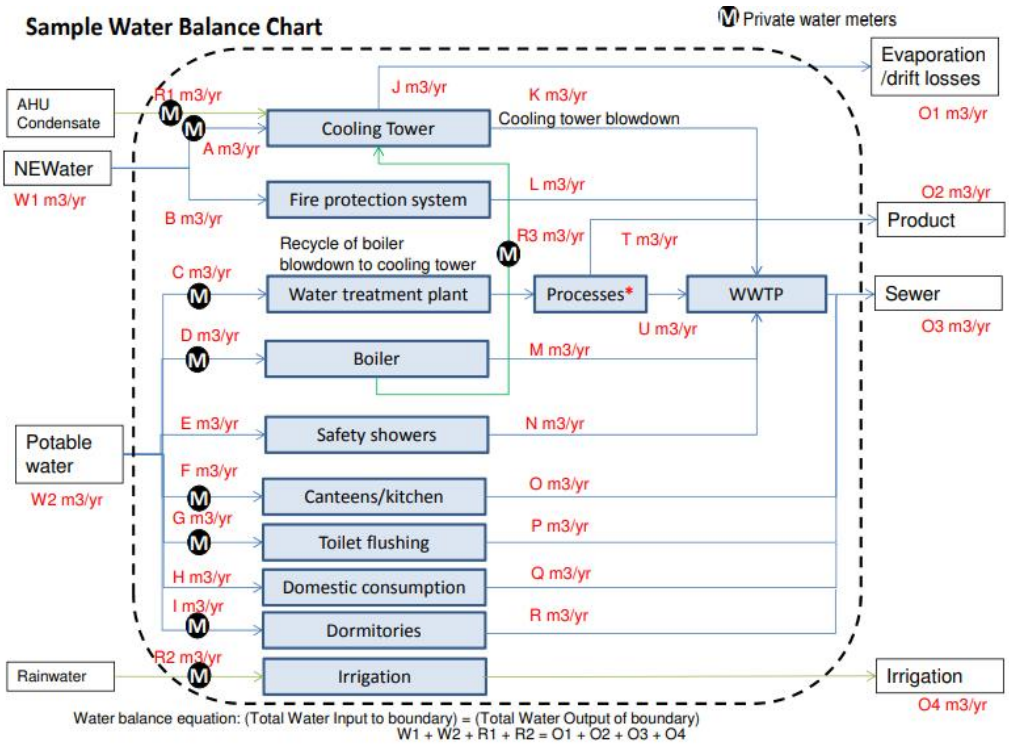
b) Water that is contained in the products

c) Water that is used for cleaning/rinsing the processing areas, machines, etc.

d) Water used for irrigation

e) Used water discharged from the facility into the sewer system which shall include effluent from the on-site wastewater treatment facility and sanitary wastewater

Figure 8.7 Sample Water Balance Chart



Water Balance Equation
Water balance equation: Total water input = Total water output Should total water input exceed the total water output, the difference could be due to leaks and uncontrolled losses.

8.3.2.2 Objectives

The water consumption management plan has the following objectives:

- Monitor water consumption: this plan will set procedures for estimating water used by the project, identifying activities that use this resource, and following a reporting procedure for registering volumes of water used;

- Minimise water consumption: the plan will provide a series of measures to conserve water at its facilities and minimise landscaping water use;

- Monitor groundwater quality (the primary source of Project water supply): this plan will provide a monitoring plan for groundwater quality to examine whether the Project operational activities contaminate/deteriorate the groundwater quality or not;

- Monitor groundwater yield and recharge rate: this plan will provide a monitoring plan for sustained groundwater yield and recharge rate to detect any imbalance of groundwater recharge rate throughout the operation.

8.3.2.3 Legal Requirements

Myanmar's applicable legislation and regulation regarding water resources include:

- Yangon City Development Committee (YCDC) Law (2018)

- Yangon Region Fresh Water Fisheries Law (Yangon Region Hluttaw Law No.3,2013)

- The Law Relating to Aquaculture, 1989
- The Protection of Biodiversity and Conservation Areas Law 2018

- The Factories Act, 1951 (Amended in 1953, 1954, 1962, 2016)

- The Constitution of the Republic of the Union of Myanmar (2008);

- Myanmar Environmental Conservation Laws (2012);

- Environmental Conservation Rules (2014);

- National Environmental Quality (Emission) Guideline (2015);

- Public Health Law (1972);

- The Prevention and Control of Communicable Disease Law (1995);

- Fresh Water Fisheries Law (1991 Section 40);

- The Underground Water Act (1930);

- Conservation of Rivers, Creeks and Water Resources Law, 2006 (Section 24 (b),21(a)(b), 19, 11(a) (b));

- The Prevention of Danger of Hazardous Chemical and related Substances Law, 2013 (Section 16,17,23,27)

The groundwater quality laboratory testing results should be compared against Myanmar National Emission Quality Guidelines (2015) for effluent levels for pesticide formulation, manufacturing and packaging.

Table 8.5 Effluent levels for pesticide formulation, manufacturing and packaging (NEQG 2015)

Parameter	Unit	Guideline Value
5-day Biochemical oxygen demand	mg/L	50
Active ingredients (each)	mg/L	0.05
Absorbable 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
Nitrorganics	mg/L	0.05
Oil and grease	mg/L	10
pH	S.U	6-9
Phenols	mg/L	0.5
Total phosphorus	mg/L	2
Total suspended solids	mg/L	10-20
Zinc	mg/L	2

The IFC Performance Standard 3: Resource Efficiency and Pollution Prevention and Management and World Bank Environmental and Social Framework (ESF) considered relevant to the project are summarized in Table 8.6.

Table 8.6 Applicable IFC PS 3 and World Bank Environmental and Social Framework (ESF), 2016

Environmental Topic/Theme	**Applicable IFC PS 3 and WBESF 2016**
Resource Efficiency	**Requirement 3 of IFC PS 3** provides guidelines to improve water resource efficiency in industry by ***building benchmarks**** used to evaluate project performance on the water resource efficiency.
Environmental Topic/Theme	**Applicable IFC PS 3 and WBESF 2016**
	The requirement includes the following recommendation: The client will implement technically and financially feasible and cost effective measures for improving efficiency in its consumption of water with a focus on areas that are considered core business activities. Such measures will integrate the principles of

	cleaner production into product design and production processes with the objective of conserving water. Where benchmarking data are available, the client will make a comparison to establish the relative level of efficiency. **** Building benchmarks may refer to energy or water use per dwelling, inhabitant, or per guest night in a hotel, or energy use per unit area in other building types with corrections for climatic variations.***
Water consumption	**Requirement 9 of IFC PS 3 and Article 7 of WB ESF 2016** provides the recommendation for the project with significant water consumption rate including: When the project is a potentially significant consumer of water, the client shall adopt measures that avoid or reduce water usage so that the project's water consumption does not have significant adverse impacts on others. These measures include, but are not limited to, the use of additional technically feasible water conservation measures within the client's operations, the use of alternative water supplies, water consumption offsets to reduce total demand for water resources to within the available supply, and evaluation of alternative project locations.
Water consumption	**Article 8 of WB ESF 2016** For projects with a high water demand that have potentially significant adverse impacts on communities, other users or the environment, the following will apply:
Environmental Topic/Theme	**Applicable IFC PS 3 and WBESF 2016**
	• A detailed water balance will be developed, maintained, monitored and reported periodically; • Opportunities for improvement in water use efficiency will be identified and implemented • Specific water use (measured by volume of water used per unit production) will be

	assessed; and • Operations must be benchmarked to available industry standards of water use efficiency.
Cumulative impacts of water use upon communities	**Article 9 of WB ESF 2016** The client will assess, as part of the environmental and social assessment, the potential cumulative impacts of water use upon communities, other users and the environment and will identify and implement appropriate mitigation measures.

8.3.2.4 Overview Maps and Site Layout

The monitoring activities will be performed as mentioned in the tables above. Monitoring of groundwater in the immediate vicinity of the lagoon will be conducted on an annual or bi-annual basis to monitor any adverse changes to groundwater quality due to infiltration from artificial aquifer recharge systems and salt water intrusion from water table lowering. The groundwater productivity and recharge rate of the aquifer will be monitored on a yearly basis during a low recharge period (dry season). A pumping test is a good time to collect groundwater quality samples to assess the chemical, physical and bacterial properties of the water (Sterrett, R. J. 2007). Water samples will be collected when conditions have stabilized (usually near the end of the pumping test). Ground water monitoring well should be installed not further than 250 feet from the outer edge of the wastewater lagoon. (Nevada Division of Environmental Protection Bureau of Water Pollution Control, 2017) As the existing tube well 3 new is located nearest to the Lagoon 2 (~75 meter (or) 240 ft. to the north of the Lagoon 2), it can be considered to be as a monitoring well.

Tentative monitoring locations are shown in Figure below. Monitoring Coordinates are also provided in Table.

Figure 8.8 Location of tube wells related to Lagoon 2

Location Reference	Rationale for Position	North	East
GW (Monitoring well) – Tube well 3 new	Proximate to the treated wastewater lagoon located ~75 meter (or) 240 ft. to the north of the Lagoon 2	17.167361	96.076586

Note: The exact location plan figure will be updated after confirming the available location of wells to drill.

8.3.2.5 Role and Responsibilities

The supervision on groundwater monitoring process shall be done by the third parties (geotechnical research service company, environmental service company and or HAIC HSE laboratory staff).

Over all supervision will be done by HAIC ‘s management and HSE officer.

Roles and responsibilities are as follows:

- HAIC HSE officer oversees the collecting the water sample, drilling of control well and pumping well, and provides coordination of well operations and planning, technical support and emergency support.

- The third party (geotechnical research service company) will supply all drilling equipment, including operators, and all related sampling equipment to complete the aquifer test.

- The third party (environmental service company/laboratory) will supply all sampling equipment, collect groundwater sampling, test for required parameters to complete the groundwater quality testing.

HAIC Management

HAIC Management has ultimate responsibility for ensuring that effective measures are in place to fulfil the spirit and intent of all project activities.

i. Ensuring implementation of water consumption management plan and related monitoring plan

ii. Ensuring compliance to applicable legal and other requirements including timely submission of monitoring reports, statements, returns etc. to the statutory authorities

iii. Ensuring arranging resources needed for the HSE Management system

iv. Review/update the implementation of this plan and recommend the corrective actions

HSE Officer (HAIC)

i. HSE Officer is responsible to ensure that all activities are carried out as per HSE requirements for the safety of all personnel involved in the operation.

ii. Responsible for conducting all required environmental monitoring and preparation of monitoring reports.

iii. Support the contractors in coordinating in monitoring process and in emergency handling activities.

iv. Record the incident/ accident event in case of incident/accident occurs during monitoring process

v. Record keeping, documentation and inspect on complaints from community related to abnormal drying of wells and tube wells nearby the Project

vi. Ensure emergency preparedness and response as per procedure

During sampling process, HSE officer shall make sure the contractors to perform decontamination of boring equipment and sampling equipment to avoid cross contamination to the samples during sampling process. He/she will make sure personal protective equipment and disposable nitrile gloves are used by all personnel engaged in logging, sampling and decontamination activities.

Decontamination of Boring Equipment

Before transferring to the first borehole/well and between drilling each well, the auger and associated tools were thoroughly cleaned and decontaminated using the following procedure.

1. Rinse with tap water

2. Wash carefully using non-Phosphate detergent and rinse with tap water and

3. Dry the tools in air

Sample Storage and Transit

HSE officer shall make sure that contractors/laboratory staff use laboratory-certified clean sample containers for sampling process and all collected samples were stored/preserved properly according to the Standard Methods and sample chain of custody documentation was completed for all samples which detailed the date and time of sampling, how the samples were preserved and when they were dispatched to the laboratory.

8.3.2.6 Management Actions

To mitigate the negative impacts due to over exploitation of groundwater abstraction, following measures are recommended to perform.

1. Determine the sustainable yield of the major aquifer by conducting groundwater pumping tests and monitor the groundwater productivity/recharge rate over time in order to detect any imbalance of groundwater recharge throughout operation

2. Perform artificial aquifer recharge enhancement using treated wastewater (The wastewater recharge occurs by on-site sanitation facilities with direct soil discharge on a diffuse basis via septic tanks and latrines. The treated wastewater in the Lagoons can infiltrate to the ground and thereby recharge the groundwater) (Briefing Note Series for Groundwater Management, World Bank, 2002) However, in order to accomplish the uses without deleterious environmental consequences, the groundwater quality nearby the Lagoon should be monitored on a regular basis.

3. Implement/adopt efficient water consumption management measures to manage and protect the water resources. These will include (but not limited to)

3.1 A detailed water balance will be developed, maintained, monitored and reported periodically;

- Specific water use (measured by volume of water used per unit production) will be assessed; and
- Operations must be benchmarked to available industry standards of water use efficiency.

3.2 Opportunities for improvement in water use efficiency will be identified and implemented;

- Optimize water flow and early water detection.
- Source meter and sub meter should be installed to measure the water consumption rate by the facility over a period of time. Source meters measure the amount of water being

supplied to the facility, while sub meters measure usage for specific activities such as cooling towers, process use, or landscape water use.

- Identifying appliances which consume huge amounts of water and identifying appliance failures, water leakage and damage and substituting with water saving appliances/equipment, it can result in significant long-term water savings.

3.3 Engage and educate employees –

- Every employee has a responsibility to play in water usage. Make certain that they are educated and informed about water conservation and follows the water consumption management practices

3.4 Perform 3 Rs (Reduce, Reuse and Recycle) policy in water use such as use of treated wastewater for gardening works, for process washing, industrial fire protection etc.

3.5 The use of alternative water supplies, water consumption offsets to maintain total demand for water resources within the available supply, and evaluation of alternative project locations:

- Installation of alternatives sources for Project water supply such as rainwater harvesting and use of municipal piped water to avoid depleting the resource to the detriment of other users.

4. Investigate any complaints/ abnormal event of groundwater wells depletion in nearby villages (within 30 ft. from the tube wells) and handle appropriately. Keep records of complaints and follow-up.

8.3.2.7 Water Consumption Management Sub-plan

Source of Impact	Control Measures	Frequency	Responsible Person
Manufacturing process	- Production Line Uses and Tube wells. - Detailed measures are mentioned in 8.3.2.6 Management Actions.	Annually and periodically	HSE Team
Other general process	- Sanitary/Bathing Uses and Tube wells. - Detailed measures are mentioned in 8.3.2.6 Management Actions.	Annually and periodically	HSE Team

8.3.2.8 Implementation Schedule

The mitigation measures for energy consumption of HAIC will be performed as mentioned in the table above. The Plan has to be revised accordingly after every project activity conducted, in order to guarantee the compliance with applicable laws.

8.3.2.9 Monitoring Plans

Monitoring of groundwater within the Project sites will be conducted at regular intervals as detailed in the monitoring plan during Project Operation to monitor any adverse changes to groundwater quality such as saltwater intrusion as a consequence of groundwater depletion and contamination from the artificial aquifer recharge system (treated effluent lagoon). The groundwater productivity/recharge rate should also be monitored over time in order to detect any imbalance of groundwater recharge rate throughout the operation. To enhance the water resource efficiency and water consumption management, HAIC should internally develop and monitor the water use survey and water balance (measuring water use flows of the facility) periodically to identify the water efficiency opportunities.

Table 8.7 Environmental Monitoring plan on ground water resources

Factor	Index/Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location
Groundwater	*Physical Parameter* pH, Temperature increase *Chemical Parameter* Salinity (TDS), EC (as saltwater intrusion indicator), BOD_5, Active ingredients (each), absorbable organic halogens, ammonia, arsenic, COD, chlorinated organics, chromium (hexavalent), chromium (total), copper, mercury, nitrorganics, oil and greases, pH, phenol, total phosphorous, total suspended solids and zinc.	- Monitoring will be conducted based on the equipment and methods acceptable to the Myanmar National Emission Guidelines for Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges for general application - Monitoring well will be installed based on ASTM D5092/D5092M-	Biannually	_Selected tube well 1,2,3 (new) and 4 at the Project Site

Factor	Index/Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location
	(Note: These parameters have been selected to align with Myanmar National Environmental Quality (Emission) Standards for monitoring. Salinity and EC are proposed to monitor the salt water intrusion)	16,2017 (existing AWBA standard)		
Aquifer	1. Specific yield of the major aquifer	Constant rate pumping test /aquifer test will be monitored in order to identify	Annually/ during a low recharge period (dry season)	Select the largely used tube well among the total at the Project Site
	2.Groundwater productivity/recharge rate over time	The specific yield and recharge rate of the aquifer. (ASTM D6034-96)		
		Standard Test Method (Analytical Procedure) For Determining The Efficiency Of A Production Well In A Confined Aquifer From A Constant Rate Pumping Test	Annually	Project Site
Water consumption	1. water-use survey report 2. water mass balance (Example of water mass balance chart is present Figure 8.2 overleaf)	- Source meter and sub meter should be installed to measure the water consumption rate by the facility	Annually	Project Site

Factor	Index/Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location
		over a period of time. Source meters measure the amount of water being supplied to the facility, while sub meters measure usage for specific activities such as cooling towers, process use, or landscape water use. Record the water flow to the facility, develop the water mass balance to identify water efficiency opportunities.		

8.3.3 Wastewater Management Plan

This Wastewater Management Plan (WWMP) outlines the recommended wastewater management measures (treatment and associated infrastructure and services) to be implemented during operation phase of the HAIC Project and identifies plans for the future development, expansion or upgrade of wastewater systems to accommodate changing needs. This WWMP is required by Hwmabi ESIA study. This plan falls under Awba Environmental Policy. The performance-based wastewater requirement in this Management Plan is Myanmar National Guidelines and WBG HSE Guidelines for Pesticide Manufacturing, Formulation, and Packaging (Table 2).

8.3.3.1 Objectives

During the operation phase of the HAIC Project, Awba ensures that the industrial and domestic effluents receive treatment before being discharged to a receiving body. The overall objectives of responsible wastewater management are the following:

1) All wastewater is adequately treated prior to discharge, in compliance with Myanmar legal requirement (NEQG) and without causing any significant adverse impacts to the biophysical environment or surrounding communities;
2) Awba monitors the quality, quantity, frequency and sources of liquid effluents of all operation activities and workers facilities. This includes knowledge of the exact locations, routes and integrity of internal drainage systems and discharge points (lowest point); and
3) Awba plans and implements the segregation of liquid effluents principally along industrial, utility, sanitary, and drainage water categories, in order to limit the volume of water requiring specialized treatment and makes measurable efforts to reduce its generation.

8.3.3.2 Legal Requirements

Myanmar's applicable legislation and regulation regarding water resources include:

a) Yangon City Development Committee (YCDC) Law (2018)
b) Yangon Region Fresh Water Fisheries Law (Yangon Region Hluttaw Law No.3,2013)
c) The Factories Act, 1951 (Amended in 1953, 1954, 1962, 2016)
d) The Constitution of the Republic of the Union of Myanmar (2008);
e) Myanmar Environmental Conservation Laws (2012);
f) Environmental Conservation Rules (2014);
g) National Environmental Quality (Emission) Guideline (2015);
h) The Underground Water Act (1930);
i) Conservation of Water Resources and Rivers Law, 2006 (Section 24 (b),21(a)(b), 19, 11(a) (b));

The groundwater quality laboratory testing results should be compared against Myanmar National Emission Quality Guidelines (2015) for effluent levels for pesticide formulation, manufacturing and packaging.

8.3.3.3 Sources of Impact and Control Measures

The sources of potential adverse impacts to watercourses are the followings:

1)Operation line (production); and
2)Domestic wastewater (from sanitation worker facilities, sinks and showers)

8.3.3.4 Wastewater Management

8.3.3.4.1 Operation line (production)

Wastewater generated from washing of formulation lines (~20 m3 / day), laundry (~1m3 / day) and cleaning of process area (~3 m3 / day) in the HAIC is treated by an on-site wastewater treatment plant. The process of the wastewater treatment plant is shown in the Figure xxx.

Wastewater is firstly 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 is settled in the chemical sludge sedimentation tank while water pass as overflow into the activated sludge aeration tank. In this tank, aerobic bacteria is used to digest organic matters to reduce the biological oxygen demand (BOD) with the aid of oxygen supplied through air diffusers.

Next, the overflow passed into the second sedimentation tank where the sludge is settled and transferred into the sludge tank while the water is forced through the membrane filter. Thereafter, the water is passed through activated carbon filters to remove odor and color and then temporarily stored in the effluent tank where water samples is taken and analyzed before being discharged into the pond next to the treatment facility. Awba disposes the sludge from the wastewater through license hazardous waste management facility in Thilawa.

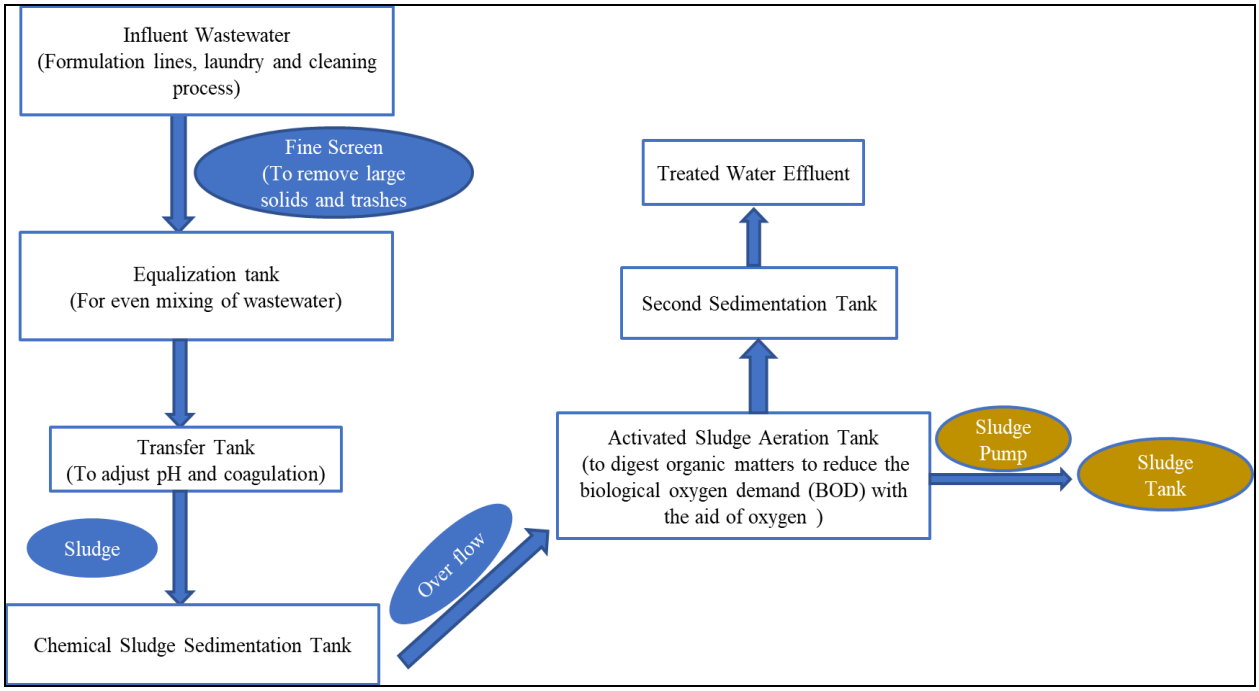


Figure 8-9, Process Flowchart of Waste Water Treatment Plant

There are two types of ponds in this area. The first pond is able to hold seven days of treated effluent from the waste water treatment system. It is a water proof concrete pond. The second pond is more natural which has enough capacity to hold over one and half years of effluent. This pond is developed to include natural flora and fauna (e.g., fishes and lotus flowers). The final discharge is done via the factory main drainage system which could maintain ~1015470 litre can be recycled for internal use and only if overflow will leads to the nearest stream.

In order to be sure that there will be no impact on downstream water quality and no harmful substances in wastewater (e.g., pesticides and fertilizer wastes.), 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. In addition, water quality monitoring will be conducted as part of the Environmental Monitoring Plan.

Overview Map and Site Layout of Wastewater Monitoring Locations

Figure 8-10 Wastewater sampling of Hmawbi Agricultural Inputs Complex

The Piti Pyae Zone company's YIP releases effluent, which is then stored in 200-liter fiber tanks containers within the designated storage room of the factory. Once 46 tanks, suitable for transport in one vehicle, are collected, they are dispatched to the Hmawbi Agricultural Input Complex (HAIC) wastewater treatment site, accompanied by a waste disposal form (Gate Pass), for the final disposal process.

8.3.3.4.2 Domestic wastewater (from sanitation worker facilities, sinks and showers)

The wastewater from sanitary facilities is channeled to a septic tank, while the wastewaters generated in the dining room and showers is discharged into the main and peripheral culvert. Then, drain waters join with the runoff rainwater waste and directly discharge to the Sabagyi creek.

Additional recommended mitigation measures to follow include;

1) Wastewater collected from basins, sinks and floor drains, is discharged into foul sewers via grease traps;
2) Separate storm-water runoff channels from the sewerage system have been constructed during phase 1, additional drainage channel will be constructed during phase 2 and 3; and
3) 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.

Overview Map and Site Layout of Domestic Wastewater Monitoring Locations

Figure 8-11: Domestic water and storm water sampling of Hmawbi Agricultural Inputs Complex

8.3.3.5 Wastewater Management Sub-plan

Source of Impact	Control Measures	Frequency	Responsible Person
Operation line (production)	- Influent wastewater is collected into solid separation zone to screen out solids and trashes and then into the equalization tank. - In the equalization tank, air diffusers are used for even mixing of the wastewater. - And then into the fast mixing tank to adjust pH level. - After that, chemical coagulation are conducted to settle the sludge. - The sludge pass through the activated sludge aeration tank, and - An Aerobic bacteria is used to digest organic matters to reduce the biological oxygen demand (BOD) with the aid of oxygen supplied through air diffusers. - The detailed process is mentioned in the 8.3.3.4.1 Operation Line. ***(http://www.awba-group.com/) Pg.36 ESMP report of Awba Project No.: 0406940***	Biannually	HSE Team
Domestic wastewater (from sanitation worker facilities, sinks and showers)	- Wastewater from sanitary facilities is channeled to a septic tank. - Wastewaters generated in the dining room and showers is discharged into the main and peripheral culvert, and The detailed is mentioned in 8.3.3.4.2 Domestic wastewater**.** ***(http://www.awba-group.com/) Pg.36 ESMP report of Awba Project No.: 0406940***	Biannually	HSE Team

8.3.3.6 Water Quality Monitoring Plan

Parameter	Unit	Monitoring Locations	Frequency	Responsible
BOD_5	mg/L	WWTP discharge/outlet point (lagoon 1) 17°9'59.84"N 96° 4'37.16"E and groundwater monitoring well (Tube well no.3) 17°10'2.50"N 96° 4'35.71"E	Biannually	HSE
Active ingredients (each)	mg/L			
Absorbable organic halogens	mg/L			
Ammonia	mg/L			
Arsenic	mg/L			
COD	mg/L			
Chlorinated organics	mg/L			
Chromium (hexavalent)	mg/L			
Chromium (hexavalent)	mg/L			
Chromium (total)	mg/L			
Copper	mg/L			
Mercury	mg/L			
Nitrorganics	mg/L			
Oil and grease	mg/L			
pH	S.U			
Phenol	mg/L			
Total phosphorus	mg/L			

8.3.3.7 Implementation Schedule

The mitigation measures and management plan & Sub Plan will be performed as mentioned in the tables above. The Plans have to be revised accordingly after every project activity conducted, in order to guarantee the compliance with applicable laws.

8.3.3.9 Responsibilities

The supervision on water quality monitoring process shall be done by the third parties or HAIC HSE laboratory staff.

Over all supervision will be done by HAIC ‘s management and HSE officer.

Roles and responsibilities are as follows:

- HAIC HSE officer oversees the collecting the water sample, tube well and pumping well, wastewater discharge point from lagoon 1 and provides coordination of well operations and planning, technical support and emergency support.
- The third party will supply operators, and all related sampling equipment to complete the sampling procedures.
- The third party will supply all sampling equipment, collect water sampling, test for required parameters to complete the water quality monitoring.

8.3.3.8 Budget allocation for Wastewater sub-management plan

HAIC will use 2% of the total investment for EMP cost. The total investment of HAIC is 17,291,500,000 MMK (MMK 17291.5 million). Then the estimated cost for the management plan is 345,830,000 MMK. Among the total management plan, the budget allocation for the mitigation measures and monitoring plan will include for air/odor/noise, waste (solid and hazardous waste), potable & wastewater, Occupational Health & Safety and Community Health & Safety. Thus, the budget is allocated for Air/Odor management plan would be around 69,166,000 MMK while 27,666,400MMK for monitoring plan and 41,499,600 MMK for mitigation measures. The budget allocation for wastewater management plan including mitigation measures and monitoring is under the following table.

Table 8-8 Budget allocation of Wastewater Sub-Management Plan

Environmental Factors	Activities	Responsibility	Estimated Budget

Operation phase			
Surface Water/Ground Water	Water/ Quality (Surface water and ground water) (Water quality monitoring plan + Mitigation measure)	HSE Team	69,166,000 MMK
	Water Quality monitoring plan		27,666,400MMK
	Water Quality Mitigation measure		41,499,600 MMK

8.3.4 Solid Waste Management Plan

This document is the Solid Waste Management Plan (SWMP) of the HAIC Project. This Plan incorporates the recommendations of the Environmental and Social Impact Assessment (ESIA) of HAIC Project (2018). This document aims to guide Awba on how to implement these recommendations in a practical manner given the context of HAIC Project's premises (i.e. warehouses, incinerator plant, testing laboratory, offices, etc.)

8.3.4.1 Objectives

The purpose of this document is to provide general guidance to employees, contractors, subcontractors and, generally, anyone generating, handling, collecting and managing solid and hazardous waste at any of HAIC Project facilities, on responsible waste management. The overall objective of responsible waste management is to avoid or, when avoidance is not feasible, minimize, reuse and recycle waste when it is generated, handled, collected (i.e. sorted) for transfer to collection points where it 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.

This objective can be achieved through the following targets:

1) Awba will comply with the Myanmar law and regulation related to waste management: Environmental Conservation Law (2012), The Factories Act 1951 Amended by law No 12/2016 and Yangon City Development Committee (YCDC) Law (2018);
2) Awba will apply to each waste stream the principles of the waste hierarchy in the most responsible manner (reduce, reuse, recycle, reclaim, dispose);
3) Awba will adopt responsible methods for collection, storage, transportation and treatment/disposal of all waste streams; and
4) Awba will put in place the procedures and training proposed in this plan to ensure monitoring, verification and continuous improvement are carried out throughout the lifetime of HAIC Project's activities to enable responsible waste management practices.

8.3.4.2 Sources of Impact

During the operation phase of the HAIC it is foreseen to generate the following types of solid waste:

1) Hazardous waste: (Sludge from the wastewater treatment plant, plastic packaging and paper packaging with residuals of chemicals, metal drums, ash and activated carbon, spent oil/lubricants;) and
2) Non-hazardous waste: (Paper and cardboard, plastic, metal and food waste)

8.3.4.3 Design and Management of Solid Waste

There are two different types of solid wastes are hazardous and non-hazardous solid waste;

1)Hazardous (Sludge, Plastic Packaging, Paper Packaging, Metal drums, Bottom ash, Activated Carbon, Oil/lubricants)

2)Non-hazardous (Paper, cardboard, Plastic, Metal and cans, Food Waste)

8.3.4.4 Waste Handling

All HAIC Project's workers are responsible for ongoing good housekeeping practices for waste handling as per the work instruction and procedure manual. All workers receive training on these topics as part as the workers induction. These include avoiding over-ordering, poor storage and maintenance, mishandling or improper operating procedures.

Good waste handling practices generally reduce waste that can be generated at all HAIC Project's premises. All contaminated surface water run-off are collected and treated it as hazardous waste.

Only trained personnel is authorized to handle hazardous waste. Handling of waste requires a work permit. In case of hazardous material leak and spill, should be follow the measures detailed in the Emergency Preparedness and Response Plan.

8.3.4.5 Storage

There are two kinds of solid waste storages. The temporary storages or waste collection sites at the point of waste generation and a central storage.

For the storage of solid waste at the generation point, called "Waste Collection and Classification Points", solid waste is segregated accordingly with the color code showed in Table xxx. Once the waste bins are filled, the solid waste is transported to the central storage area, which keeps the same color code.

Solid waste is stored in clearly labeled containers/skips. Color code receptacles labels state the waste types in Myanmar language, which is easily understandable by the workforce, and any coding system that is used is also presented on the labels.

No	Type of Waste	Color Code
1.	Non-hazardous waste: domestic, plastics, papers, bottles (not including packaging or from process).	Green Color

2.	Hazardous waste from packaging and process: 1. Disposed containers, drums, cardboard, bags or equipment contaminated with chemicals, pesticides; 2. Wastes from clinic; 3. Expiry product, and 4. Waste generated from spillage	Red Color
3.	Other types of hazardous waste: 1. Drums, sludge from WTTS; and 2. Spent lubricating oil/hydraulic oil	Yellow Color
4.	1. Contaminated soil, debris, or matter resulting from spill. 2. Industrial waste (drums, sludge from WTTS)	Black Color

Containers are allocated depending on the waste type. Lightweight waste articles such as light plastics or paper/cardboard are stored in enclosed skips and kept securely closed at all times to prevent such waste from flying around. Waste receptacles are installed at key areas on HAIC Project's premises.

Waste receptacles are placed on impermeable surfaces to prevent the contamination of ground conditions in the case of an accidental release, such as on paved areas not prone to flooding.

Waste segregation helps with reducing, reusing and recycling the different waste streams on-site and off-site. The HSE Department ensures that all workers, employees and contractors are well trained and provided enough information to recognize the types of waste being generated at HAIC Project's premises. The HSE Department also ensures ongoing communication on responsible waste segregation practices (e.g. posters in canteens, offices, laboratory, etc.).

The central waste storage should comply with the following requirements:

1)It has a concrete slab to avoid leachate contact with the ground;
2)It is implemented with a roof to protect waste against rain;
3)It is not close to places where food is handled, consumed and stored;
4)It is not close to sources of heat and watercourses;
5)It is an easy access for the licensed contractor fleet;
6)It has a water supply system for cleaning;
7)Non-hazardous waste and hazardous waste are separated, labelled and with containers demarcated;
8)Keep bunded areas are locked and access is restricted to not trained personnel;
9)For hazardous waste the central waste storage is equipment with shelves which are fitted with a leak-proof sill or spill catcher trays in its base to retain the capacity of the

largest container or 20% of the total storage capacity in that shelf (whichever is the greater volume) and a ventilation holes of 30mm diameter located at the top and bottom (above the sill) of the side panels of the cabinet/cupboard.

Temporary and central waste storages are inspected and monitored on a weekly basis. These inspections are documented and reported to the HSE Director.

Figure 8-12 Solid waste storage area of Hmawbi Agricultural Inputs Complex

8.3.4.6 Solid Waste Transport and Disposal

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

The licensed contractor delivers a copy of the Waste Discharge/Disposal Record (manifest) to the Awba's HSE Supervisor/Admin and Logistic Department. This record indicates the type of waste to be transported, weight, number of packages, the name of the transporter, plus of the name of the responsible supervisor who performed the verification.

The hazardous waste shall be disposed at a licensed contractor/authorized waste facility. Awba has entered into an annual contract with DOWA for the transport and disposal of the hazardous waste listed in the Table xxx.

The solid waste is to be dispose towards waste disposal sites (Licensed third party / Authorized waste facility) by using the guide line stated in Waste management Procedure Manual.

8.3.4.7 Design and Emergency Preparedness

The central waste storage has measures in place to cater for cases of accidental releases of waste likely to have adverse impacts, such measures to be in accordance with the Emergency Preparedness and Response Plan:

1)Spill kits;
2)Absorbents;
3)Firefighting equipment; and
4)Cleaning equipment.

8.3.4.8 Process Dust Collected via Baghouses/Dust Waste from the Cleaning Process

Process dust is collected via baghouses. Baghouses are periodically washed and the resulting wastewater leachate collected to be treated via the onsite wastewater treatment plant. Baghouse filters that need to be replaced are aggregated on site and stored in dedicated covered areas. Baghouses that cannot be reused or sold are disposed through the licensed contractor. Wastewater leachate containing dust waste from maintenance cleaning process (e.g. from boiler tubes, refractory bricks, etc.) are collected to be treated via the onsite wastewater treatment plant.

8.3.4.9 Medical Waste

Medical waste should be disposed through the licensed contractor as a hazardous waste authorized facility

.

8.3.4.10 Solid Waste Management Sub-plan

Source of Impact	Control Measures	Frequency	Responsible Person
Hazardous Solid Waste (Sludge, Plastic Packaging, Paper Packaging, Metal drums, Bottom ash, Activated Carbon, Oil/lubricants)	- Segregate the waste in the temporary storages. - Once it is segregated and has a relevant quantity, deliver it to the central storage at HAIC. - Before central storage be in its 80% of capacity, waste must be sent to a license contractor. ***(http://www.awba-group.com/)*** ***Pg.15, ESMP report of Awba*** ***Project No.: 0406940***	- monthly for sludge - monthly for plastic packaging - monthly for paper packaging - monthly for metal drums - monthly for bottom ash - Biannually for activated carbon - monthly for oil/lubricants	HSE Team
Non-hazardous waste: (Paper and cardboard, plastic, metal and food waste)	- To be sent to the municipal. ***(http://www.awba-group.com/)*** ***Pg.15, ESMP report of Awba*** ***Project No.: 0406940***	- monthly for Paper, cardboard - monthly for plastic - monthly for metal and cans - monthly for food waste.	HSE Team

8.3.4.11 Implementation Schedule

The mitigation measures and management plan & Sub Plan will be performed as mentioned in the tables above. The Plans have to be revised accordingly after every project activity conducted, in order to guarantee the compliance with applicable laws.

8.3.4.12 Responsibilities and Monitoring

HAIC Project has a duty of care to ensure that appropriate disposal of hazardous waste streams takes place. HSE staff will retain copies of all records of disposal at HAIC Project's premises (manifests) for the purpose of internal and external audits. Any regulatory reporting to the relevant authorities must be delivered in the form and at intervals stipulated by the relevant authorities, as applicable.

Operation Department maintains inventory records of waste streams and associated quantities of waste generated, recycled, reused, disposed of at the locations under

their responsibility. This is reviewed by the HSE Department. The inventory shall comprise of:

- Type of waste;
- Generation source;
- Quantity (kg);
- Disposal method; and
- Disposal destination and manifest.

The waste generation data is generated on a monthly basis. The HSE Director ensures these data and records are discussed within the HSE Committee meetings.

8.3.4.13 Budget allocation for Solid waste sub-management plan

HAIC will use 2% of the total investment for EMP cost. The total investment of HAIC is 17,291,500,000 MMK (MMK 17291.5 million). Then the estimated cost for the management plan is 345,830,000 MMK. Among the total management plan, the budget allocation for the mitigation measures and monitoring plan will include for air/odor/noise, waste (solid and hazardous waste), potable & wastewater, Occupational Health & Safety and Community Health & Safety. Thus, the budget is allocated for Air/Odor management plan would be around 69,166,000 MMK while 27,666,400MMK for monitoring plan and 41,499,600 MMK for mitigation measures.

The budget allocation for solid waste management plan including mitigation measures and monitoring is under the following table.

Table 8-9 Budget allocation of solid waste management plan

Environmental Factors	Activities	Responsibility	Estimated Budget
Operation phase			
Solid/hazardous waste Management	Operation	HSE Team	69,166,000 MMK

*8.3.*5 Hazardous Material Management Plan

The purpose of this Hazardous Material Management Plan (HMMP) is to provide the user and handler of hazardous materials at HAIC Project' premises with general guidelines on safe storage, handling, use and disposal of such hazardous materials in compliance with local regulatory requirements and with reference to international best practices such as the UN Globally Harmonized System of Classification and Labeling of Chemicals (GHS). These general guidelines aim to enable good practices of hazardous materials management at HAIC Project's premises.

8.3.5.1 Objectives

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. This objective can be achieved by:

1) Establishing hazardous materials management priorities based on hazard analysis of risky operation activities identified through ongoing Hazard Identification and Risk Assessments (HIRA);
2) Preventing uncontrolled releases of hazardous materials to the environment or uncontrolled reactions that might result in fire or explosion;
3) Using engineering controls (containment, automatic alarms) commensurate with the nature of hazards to control; and
4) Implementing management controls (inspections, communications, training and drills) to address residual risks that have not been prevented or controlled through engineering measures.

8.3.5.2 Sources of Impact

The following hazardous materials are used in the production line:

Table 8-10 : Current and Future Amount of Hazardous Material

Type of hazardous material	Current/month	After expansion
Solvent (Kg)	70,000	90,000
Active Ingredients (Kg)	40,000	60,000
Surfactant (Kg)	30,000	50,000
Absorbent/Carrier (Drum)	600	1000
Fuels (Lit)	2,000	4,000
Oils and Lubricants (Lit)	400	600
Batteries and accumulators (kg)	0.05	0.1

8.3.5.3 Design and Management

8.3.5.3.1 Characterization

The level of risk associated with the storage and handling of hazardous materials is established through an ongoing assessment process based on the following information:

1) Name and description (e.g. composite of a mixture) of the hazardous material;
2) Classification (e.g. code, class or division) of the hazardous material; and
3) Characteristic(s) that make(s) the material hazardous (e.g. flammability, toxicity, corrosively, reactivity).

8.3.5.3.2 Hazardous Material Handling

Material Safety Data Sheets (MSDS) for all hazardous materials handled at HAIC Project's premises are readily available in English and Myanmar language in each relevant facilities and areas.

MSDS provides important hazardous information about the materials and chemicals, including the chemical constituents, hazards, safe storage and handling procedures, first-aid measures and emergency response procedures. Reference shall be made to the GHS guidance on preparing material safety data sheets.

All personnel handling chemical and hazardous materials (including drivers) are trained on chemical hazards and safe handling. HAIC Project workers, employees, visitors and contractor/subcontractors use adequate and appropriate safety equipment when handling chemicals and hazardous materials. PPE requirements for each material are specified in the MSDS.

Minimum PPEs while handling chemicals and hazardous materials at the HAIC Project's premises include safety goggles and gloves, cotton clothing and non-porous safety shoes. These minimum PPEs apply unless otherwise specified under the MSDS:

1) Safety spectacles or vented goggles are worn when handling chemicals/hazardous materials. Scratched or defective safety spectacles are replaced without delay because they may affect visibility and cause strain to the eyes or fail to serve their protective purpose. Dirty safety spectacles should be cleaned with detergent or disinfectant as appropriate;
2) Chemical resistant gloves made of appropriate materials, such as nitrile, are worn when handling chemicals. Users check the integrity of gloves by visual inspection or inflating them with air before usage; damaged gloves are replaced immediately;
3) Cotton clothing (including long trousers and sleeved shirts) and non-porous safety shoes are worn for body protection; and
4) Non-porous shoes are worn while handling chemical/hazardous materials to prevent slipping and provide protection for the feet in case of any spills.

8.3.5.3.3 Hazardous Material Storage

All hazardous materials, including chemicals, are stored in locked rooms and locked cupboards in dedicated Hazardous Material Storage areas:

1) All hazardous materials and chemicals are kept in a container appropriate to each type clearly marked with the names and hazard warning symbols of the hazardous materials and chemicals, including date-stamped on the date of arrival to enable a hazardous materials and chemicals management of 'first in, first out';
2) Incompatible hazardous materials, chemicals and hazardous wastes are identified and stored separately;
3) Flammable hazardous materials and chemicals are storage away from any heat source and near to a fire extinguisher;
4) Storage areas for hazardous materials and chemicals are provided with sufficient fresh air and ventilation;

5) Hazardous materials and chemicals in containers are regularly checked to spot any signs of change, leakage or spillage: once detected, damaged container is replaced by a proper undamaged one; and
6) Inventory of the types and quantities of hazardous materials and wastes being stored are kept and regularly updated by designated staff and checked and copies kept by HSE Supervisor.

8.3.5.3.4 Chemical Spills

HSE Supervisor, with the support of the HSE Manager, establishes and implements effective emergency measures to handle and clean up spillage of hazardous materials and chemicals. Methods of safe handling of hazardous materials and chemicals and of dealing with spillages are provided in the Material Safety Data Sheets (MSDS). Adequate safety equipment (e.g. spill control kits, barrier tape, etc.) and personal protective equipment (e.g. protective gloves, respirators, safety goggles, etc.) are available in the central material storage.

Guidelines on clean-up of some chemical spills are as detailed in Table 8-11.

Nature of Spillage	**Clean-up**
Acids	Cover with solid sodium carbonate to completely neutralize the acids. Mop up with water.
Alkalis	Cover with solid sodium hydrogen sulphate or citric acid to completely neutralize the alkalis. Mop up with water.
Organic Liquids: Flammable, Non-Flammable	Emulsify with detergent. Mix with water. Mop up. Absorb in sand or mineral absorbent. Shovel into a metal bucket and dispose of as chemical waste.

The Emergency Preparedness and Response Plan (Chapter 7) should be followed in incidents where the spillage may result in significant contamination of an area or where there is a risk of pollution. Standard equipment for handling any emergencies or spill is kept in good working conditions and at hand in the central material storage and include the following:

1)Fire extinguishers;
2)Dustpan and brush;
3)Dry soft sand;
4)Mop and bucket;
5)Paper tissue and towels;
6)Plastic bags, empty containers or drums;
7)Absorbent e.g. vermiculite, sawdust, sand etc.;
8)Scoop; and

9)Tweezers or forceps

8.3.5.3.5 Hazardous Disposal

Hazardous waste is primarily collected in stream points and then temporarily disposed in the central storage. In the stream points called "Waste Classification Points", hazardous waste is segregated accordingly with the color code. Once the waste bins are filled, the solid waste is transported to the central storage area, which keeps the same color code. Color code is detailed in the Solid and Hazardous Waste Management Plan.

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

The licensed contractor delivers a copy of the Waste Discharge Record (manifest) to the Awba's HSE Supervisor. This record indicates the type of waste to be transported, weight, number of packages, the name of the transporter, plus of the name of the responsible supervisor who performed the verification.

8.3.5.4 Key Performance Indicators

Key Performance Indicators (KPIs) to assess its hazardous materials management are presented in:

1)Number of inspections, NCR and CAR with the mitigation controls identified in this Management Plan; and
2)Number of incidents of hazardous material releases leading to actual or potential (i.e. near-misses) harm to humans or the environment.

8.3.5.5 Hazardous Material Management Sub-plan

Source of Impact	**Control Measures**	**Frequency**	**Responsible Person**
Characterization	- Name and description of the hazardous material (eg- solvent, active ingredients, Surfactant, Preservative, Absorbent/Carrie, Fuels, Oils and Lubricants) - Classification (e.g. code, class or division) of the hazardous material; - Characteristic(s) that make(s) the material hazardous (e.g. flammability, toxicity, corrosively, reactivity). ***(http://www.awba-group.com/) Pg.28, ESMP report of Awba Project No.: 0406940***	- At least to characterize hazardous material every twelve months or biannually in the factory.	HSE Team

Hazardous Material Handling	- Detailed activities of all hazardous materials handled are mentioned in 8.3.5.3.2 Hazardous Material Handling. ***(http://www.awba-group.com/)*** ***Pg.28, ESMP report of Awba Project No.: 0406940***	-Biannually trainings of hazardous material handling to workers	
Hazardous Material Storage	- Detailed activities of storage for all hazardous materials are mentioned in 8.3.5.3.3. ***(http://www.awba-group.com/)*** ***Pg.28, ESMP report of Awba Project No.: 0406940***	-Regularly check to any spots of change, leakage or spillage	HSE Team
Chemical Spills	- Detailed activities of a clean-up of some chemical spills are mentioned in 8.3.5.3.4. (***http://www.awba-group.com/)*** ***Pg.28, ESMP report of Awba Project No.: 0406940***	-Regularly check to the nature of spillage of hazardous materials.	HSE Team
Hazardous Disposal	- Detailed activities of hazardous wastes are mentioned in 8.3.5.3.5. ***(http://www.awba-group.com/)*** ***Pg.28, ESMP report of Awba Project No.: 0406940***	-Connect to Dowa Eco-System in Myanmar to dispose hazardous material.	HSE Team

8.3.5.6 Implementation Schedule

The mitigation measures and management plan & Sub Plan will be performed as mentioned in the table above. The Plans have to be revised accordingly after every project activity conducted, in order to guarantee the compliance with applicable laws.

8.3.5.7 Responsibilities and Monitoring

HSE Department is conducting this plan to ascertain the progress it has made in achieving the set aim. Any significant changes made to the Plan will be communicated to all staff, and training provided to ensure relevant staff are made aware of updates.

Annually reports will be prepared by HSE Department. Reporting shall include:

- A summary of activities undertaken during the reporting period;
- Any material deviations or non-compliances to this Management Plan, with their respective corrective action, implemented;
- Planned activities during the next reporting period; and
- Any other issues of concern. The reports will be provided to and discussed within the HSE Committee meetings.

8.3.5.8 Budget allocation for Hazardous Waste Management Plan

HAIC will use 2% of the total investment for EMP cost. The total investment of HAIC is 17,291,500,000 MMK (MMK 17291.5 million). Then the estimated cost for the management plan is 345,830,000 MMK. Among the total management plan, the budget allocation for the mitigation measures and monitoring plan will include for air/odor/noise, waste (solid and hazardous waste), potable & wastewater, Occupational Health & Safety and Community Health & Safety. Thus, the budget is allocated for Air/Odor management plan would be around 69,166,000 MMK while 27,666,400MMK for monitoring plan and 41,499,600 MMK for mitigation measures.

The budget allocation for hazardous waste management plan including mitigation measures and monitoring is under the following table.

Table 8-12 Budget allocation of Wastewater Management Plan

nvironmental Factors	**Activities**	**Responsibility**	**Estimated Budget**
Operation phase			
Solid/Hazardous Waste Management	Operation	HSE Team	69,166,000 MMK

8.3.6 Site Run-off Drainage Management Plan

The Site Runoff Drainage Management Plan (SRDMP) seeks to prevent and avoid uncontrolled runoff contaminated with wastewater, at the site, that may affect the surface water quality of watercourse near HAIC's Project.

8.3.6.1 Objectives

The overall objectives of responsible site runoff drainage management recommended under this SRDMP are the following:

1) All runoff is adequately drained without causing any significant impacts on the surface water resources (Sabagyi creek);
2) Awba develops a drainage system; and
3) Awba conducts inspections activities relevant to site runoff drainage management, including the identification and reporting of non-compliances to this RDMP and the proposed related corrective actions.

8.3.6.2 Sources of Impact

Contaminated rainwater runoff is the main source to impact. The rainwater runoff and surface water can get contaminated with process chemicals or wastes if any uncontrolled discharge from the operations reaches the storm water drains and ultimately reaches the surface water bodies.

The Sabagyi creek was identified during the Environmental and Social Impact (ESIA) process. The Sabagyi is a seasonal creek and it is located at the north-west corner of the HAIC (Figure 9.1). This creek runs through the lowest points of the site and is subjected to wastewater runoff from the HAIC Project. The stream flows

northwest and into the villages of Nyaung Kone and Wah Net Chaung. Villagers do not use the water resource of the Sabagyi creek.
Treated wastewater from the company is stored in a wastewater lagoon. In rainy season, this may get mixed up with rainwater and reach the surface water body. This part is not covered by the SRDMP but is covered under wastewater management plan.

Figure 8-13 Locations of the tube wells and ground water sampling at tube well 3 new

8.3.6.3 Design and Management

At the time of writing this Plan, the HAIC has a drainage system in place which covers all the existing premises (Figure 9.2). Awba foresees to expand its drainage system to the new facilities that will be built as part of the second and third stages of the construction phase. The pipes and culverts will conduct the water into the main channel that is installed along the periphery of the HAIC. In addition to water quality monitoring activities, the following mitigation measures are implemented:

1)Expand and maintain an effective permanent site drainage system during the operation phase that should cover all existing and future HAIC's premises. The drainage system should reduce flow velocity and sediment load;
2)Regularly, and particularly following rainstorms, inspect drainage systems and erosion control measures to ensure the drainage system is operating properly and efficiently at all times;
3)Install and maintain in working order oil water separators and grease traps at refueling facilities, workshops, parking areas, fuel storage and containment areas; and

4)Provide bounded hardstand in operational areas to prevent absorption of spillages.

8.3.6.4 Key Performance Indicators

The following Key Performance Indicators (KPI's) should be used for this Plan:

1)number of maintenances done to the drainage system; and
2)number of inspections reports performed, NCR and CAR proposed and attended.

8.3.6.5 Site Run-off Drainage Management Sub-plan

Source of Impact	Control Measures	Frequency	Responsible Person
Number of maintenances done to the drainage system	- Expand and maintain an effective permanent site drainage system during the operation phase that should cover all existing and future HAIC's premises. - The drainage system should reduce flow velocity and sediment load. ***(http://www.awba-group.com/) Pg.32, ESMP report of Awba Project No.: 0406940***	Weekly check to the drainage system of factory area.	HSE Team
Number of inspections reports performed	- Regularly inspect drainage systems and erosion control measures to ensure the drainage system is operating properly and efficiently at all times. ***(http://www.awba-group.com/) Pg.32, ESMP report of Awba Project No.: 0406940***		HSE Team

8.3.6.6 Implementation Schedule

The mitigation measures and management plan & Sub Plan will be performed as mentioned in the table above. The Plans have to be revised accordingly after every project activity conducted, in order to guarantee the compliance with applicable laws.

8.3.6.7 Responsibilities and Monitoring

Awba ensures that appropriate measures have been implemented by its own and contractor workers' in order to avoid/minimize runoff. Inspections and coordination meetings will be undertaken in order to identify in time non-compliances and propose corrective actions. Reporting is done in the HSE Committee meetings.

8.3.7 Energy Consumption Management Plan

8.3.7.1 Background Information of Project Energy Supply

The electricity required for the operation of the HAIC is mainly sourced from the government (Electric Power Distribution, EPC). The project operation annually consumes approximately 1,500,000 kWh which is supplied via a 33 kV substation and six transformers (four main transformers and two auxiliary transformers) located within the site premises. The site also installs four numbers of 275 kVA, 60 kVA and 500 kVA backup electricity generator sets for power outages. The electricity consumption rate of the Project from the generators sets varies from approximately 200 MWh to 400 MWh per year based on the frequency of power shortage happened in the region and the fuel type used for these generators is diesel.

Consuming a significant figure of electricity, it can be assumed that HAIC potentially affects the electricity demand of a group of households in the local community. Thereby, households can face energy insecurity if its consumption is insufficient to meet the basic needs of daily life in terms of the requirements for cooking, lighting, washing/cleaning, and warming/cooling the house. Moreover, the cumulative impact of electricity and fuel consumption by nearby industries can potentially be a burden to the requirement of local and regional electricity demand and become a driven force to explore more fossil fuels for energy generation.

In order to reduce these potential negative impacts, individual awareness on energy and electricity conservation is vital. This Energy Consumption Management Plan is aimed to set out the measures that will be undertaken throughout the operation of the HAIC to reduce energy consumption and continually improve energy efficiency in the facility.

8.3.7.2 Objectives

The aim of this energy consumption management plan is to improve the energy efficiency of the HAIC by identifying project specific initiatives to reduce electricity consumption and fuel use. Monitoring of electricity and fuel usage is used to inform the success of the initiatives and identify how further energy efficiencies can be achieved.

8.3.7.3 Legal Requirements

There is currently no national legal framework for improvement of energy efficiency and conservation in Myanmar.

National plan for improvement of energy conservation and energy efficiency (NEECP): National Energy Efficiency and Conservation Policy was drafted under National Energy Management Committee. Policy goal as national energy efficiency targets are 12% energy

consumption reduction by 2020 and 20% by 2030 based on 2012.Policy Measures under NEECP are:

(i) To adopt energy efficient process technologies in all industrial sectors

(ii) To incorporate energy efficiency aspects in new building design and refurbishment of existing building

(iii) To specify energy performance standards and labeling for electrical home appliances

The IFC Performance Standard 3: Resource Efficiency and Pollution Prevention and World Bank Environmental and Social Framework Guidelines considered relevant to the project are summarized in **Table 8.3**.

Table 8.13 Applicable IFC PS 3 and WB ESFG

Factor	**Applicable IFC PS 3**
Energy Resource Efficiency	**Article 6 of IFC PS 3 and Section 6 of WB ESFG** The client will implement technically and financially feasible and cost effective measures for improving efficiency in its consumption of **energy**, water, as well as other resources and material inputs, with a focus on areas that are considered core business activities. Such measures will integrate the principles of cleaner production into product design and production processes with the objective of conserving raw materials, energy, and water. Where benchmarking data are available, the client will make a comparison to establish the relative level of efficiency.

8.3.7.4 Proposed Energy Reduction Measures for HAIC

Energy use during the Project operational phase can be measured by metering the electricity consumption, measuring fuel consumption during the power shortage and fuel usage associated with the transportation of materials. There are a number of onsite and offsite based measures that can be implemented to reduce energy

consumption, some of which (if not all) will be used to achieve the objective of this plan. Specific consideration will be given for installing Power Correction in order to improve performance of energy supply to the works.

(On site) Office and Manufacturing based Energy (electricity) Saving Measures

HAIC will be implementing the below onsite based energy saving measures:

Table 8.14 Mitigation Measures on onsite based energy saving

Location/Process	Management Measures
Buildings	Compared to the energy intensive manufacturing process, the buildings contribute a small proportion of total energy use. According to Myanmar NEECP, the energy efficiency potential for commercial buildings is 20 % by substituting high efficacy HE lighting, air conditions and office equipment. Three common areas where energy savings can be found in buildings are: the building fabric, the Heating, Ventilating and Air Conditioning (HVAC) systems and lighting. <u>Building Fabric</u> • Window frames can be tested to ensure that they can be closed tightly and draught-proofing applied. Shading can prevent over-heating. • Door frames can be tested to ensure they can be closed tightly and draught-proofing applied. Thicker doors and self-closing mechanisms can be deployed. • For roofs and walls gaps can be closed, and additional insulation be applied. In hot climates, thermal insulation reduces the transfer of heat from the outside air to the inside of a building from overheating. <u>HVAC systems</u> Well-controlled HVAC systems are another effective way to save energy in all climates and can maximise comfort and health by controlling humidity, temperature and air

	quality with the minimum input of energy. <u>Lighting</u> Lighting energy savings arise in three ways:
Location/Process	**Management Measures**
	• Not all areas of a building should be lighted all of the time. Automatic controls and sensors can be deployed to match lighting provision to need. • Reducing the lighting levels where there is over lamping. • Implementing more energy-efficient Light Emitting Diode (LED) lighting to save electricity
Office Equipment	Computers and monitors - ensure that monitors are switched off when users are away from their desks for a period. Always switch off computers and monitors at the end of the day unless they need to remain on. Printers - as with computers, switch off all printers at the end of the day. When printing, use the most energy-efficient mode possible and avoid all unnecessary printing. Photocopiers - always make sure that copiers are switched off out of office hours. Enable all energy-saving standby features and encourage staff to do their copying in batches and avoid all unnecessary copying.
Motors and driven systems	Motors and driver systems are heavy energy consumers and need proper management. There are several ways by which major energy savings in motors and motor-driven systems can be achieved. <u>Existing Motors</u> Motors should be turned off when they are not in use. For pumps in liquid, air or gaseous circulation systems,

	the use of sensors that switch off a motor when a certain level is reached can substitute for valves that control liquid or airflow but keep the motor running at all times.
Location/Process	**Management Measures**
	<u>Motor alignment</u> Pump and motor should be in alignment as a misaligned motor and pump can lead to premature failure and more power consumption. <u>Sizing of motors</u> Select the correctly sized motor to avoid unnecessary power consumption. <u>Variable Speed Drives</u> The following measures are recommended to follow to save energy consumption due to the usage of variable speed drivers. • Centrifugal fans and pumps that do not need to run at full capacity all of the time • Heating, Ventilation and Air Conditioning (HVAC) systems for areas where occupancy varies • Heating and chilled water circulation pumps • Air compressors (where the average load on the compressor is less than 75% and it is frequently off) • Processes or systems driven by a centrifugal pump or fan where dampers and valves control the flow • Extraction fans in dry areas • Combustion air fans on large burners, where motorised dampers adjust the air to fuel ratio
Promote Employees Energy Awareness	- Train the employee about energy conservation practices - Make sure the employees aware the impact of energy consumption on environment and its contribution to carbon emission and global warming

8.3.7.5 Offsite based Energy (Fuel) Saving Measures

Fuel usage offsite is likely to be one of the main contributors to the energy footprint during transportation the products and raw materials. Another source of fuel consumption is generator sets which are operated during power shortage. The following measures will be implemented for fuel usage:

- Engine shut down during periods of inactivity
- Record the feed data about fuel consumption during transportation and or during the operation of generator sets and find the opportunity to save fuel usage in these activities

8.3.7.5.1 Roles and Responsibilities

HSE team has conducted energy audits to assess and analyze the factory's energy consumption patterns.(such as oil and sludge from WWTP will be reused in energy recovery process). HSE team established systems for monitoring and reporting energy consumption data regularly. The team will also provide reports to HAIC's management on energy usage trends, efficiency improvements, and any deviations from established targets.

HAIC Management

- Overall responsibility for implementation of Energy Consumption Management Plan.

- Assessing training needs along with HSE Officer and others.

- Reviewing roles and responsibilities

HSE Officer

- Ensure implementation of this management plan and review the plan

- Identify and implement energy-saving opportunities on site, including minimisation and reuse.

- Carry out weekly inspections to ensure energy saving measures are implemented in the facility

- Develop and implement the energy data management system (establish baseline data about monthly/yearly electricity consumption and fuel consumption) to monitor energy supply and consumption over time

- Arrange training for all staff personnel on the contents of this management plan

- Ensure energy-saving measures are implemented in all possible areas in the facility

- Review staff's performance against targets and discusses where improvements can be made

- Investigate any unexpected rises in energy consumption

- Ensure energy audits and inspections are undertaken on a regular basis

Logistics Manager

- Maintain the vehicle management booking system

- Feed data on vehicle movements to the HSE Officer

All staff personnel

- Follow the instructions stated in the Energy Consumption Management Plan

- Attend environmental training

Training

A programme of training on energy saving measures and efficiencies is rolled out across the project team through briefings, toolbox talks and awareness posters. The aim of which is to change environmental behaviours e.g. it is not acceptable to leave plant running when not in use or office building with air condition opening overnight when empty of staff insdie. Information on the Project's energy use is to be made visible to the workforce through the use of graphs, tables or toolbox talks as appropriate.

8.3.7.6 Energy Consumption Management Sub-plan

Source of Impact	Control Measures	Frequency	Responsible Person
The electricity usage	- Average Monthly Electricity Usage & Source/s during Operational Phase. - Detailed usage for the electricity is mentioned in 8.3.7.4	Monthly	HSE Team
Fuel Consumption	- Breakdown of annual fuel consumption rate. - Detailed usage for annual fuel consumption rate is mentioned in 8.3.7.5.	Annually and periodically	HSE Team

8.3.7.7 Implementation Schedule

The mitigation measures for energy consumption of HAIC will be performed as mentioned in the table above. The Plan has to be revised accordingly after every project activity conducted, in order to guarantee the compliance with applicable laws.

8.3.7.8 Energy Audit and Performance Monitoring

Audits and inspections will be carried out as detailed in the **Table 1-** Monthly site inspections will include checks to ensure that energy minimisation is being utilised on site and in the office. Audits on energy minimisation, measurement and reporting and will be carried out as a minimum annually, for every site. Audits of all energy using processes, activities and equipment on site is undertaken to identify the high energy demand areas that can be targeted for reduction measures. These audits are to be used to measure the success of energy saving measures, and to flag up any areas of high usage that may not have been predicted in the energy forecast.

Energy audits compare the energy consumption and energy efficiency internally and externally. Production at every facility includes several processes and each process consumes energy. Thus, an industry's production process is intrinsically linked to its energy consumption. Conducting regular energy audits, where auditors inspect, analyze and evaluate the energy consumption of the industry and assess how much energy the industry uses and to pinpoint opportunities for potential energy and cost savings.

Internal Comparison

• Energy consumption or energy performance this month should be compared with last month, or the best month in the past years

External Comparison

• Compare the level of energy consumption to other similar industries, facilities and sites

• what level of consumption is achievable with the best operating practices and industry benchmarks

Table 8.15 Monitoring plan of Energy consumption

Factor	Key Performance Indicator	Procedure	Frequency
Energy consumption	• Kilowatt hours (kWh) consumed per facility • kWh per linear metre of product produced • kWh per number of staff • kWh per square meter of occupied office space	- Conduct auditing the electricity consumption data on monthly basis or yearly basis and compare internally and externally	Annually
	• Fuel consumption per trip • Fuel consumption rate per kWh	- Conduct auditing the fuel consumption data on monthly basis or yearly basis and	

Factor	Key Performance Indicator	Procedure	Frequency
		compare	
Energy awareness training	- Number of training or campaign conducted internally - Number of attendees	- Record the information about training such as attendance list, agenda, etc.	

8.3.8 Pathogen Management Plan

Description

Pathogens play a vital role in causing infectious diseases and four major types of pathogens are bacteria, viruses, fungi, and protozoa. There are several routes of transmission of pathogens spread from a host body to others and the five main routes of them are direct contact, fomites, aerosol (airborne), oral (ingestion), and vector borne. Some microorganisms can be transmitted by more than one route.

The potential areas/mediums identified in HAIC where pathogens may take up their residence include general workplaces, factory clinic, laboratory, canteen, waste storage bins and areas, sanitary systems(toilets), drainage networks, wastewater collection pits, wastewater treatment plant and people (employees, visitors, contractors, suppliers, etc.). Occupational exposure to pathogens in the workplace may occur while conducting normal activities and having casual interaction or physical contact with pathogenic agents. Other activities with potential pathogenic exposure are during providing or receiving direct medical and supportive care in the workplace clinic, performing cleaning and maintenance works to sanitary systems and drainages, handling, transporting, treating, and disposing of wastes and wastewater. The locations and activities within HAIC with respect to occupational pathogenic exposure risks and their possible routes of transmission are presented in **Table** below.

Table 8.16 Locations and activities within HAIC with respect to occupational exposure to pathogens and their possible routes of transmission

Location	Activities during which occupational pathogen exposure is likely to occur	Possible Routes of Transmission
General Workplaces	Normal working activities	Fomites, aerosol and vector borne
Factory Clinic	Providing or receiving	Direct contact, fomites,

	direct medical/supportive care	aerosol
Laboratory	Working with contaminated (water/wastewater) samples	Direct contact and fomites
Canteen/cafeteria	- Canteen produces waste and stores it temporarily before disposal. This poses some potential problems: • Food scraps will attract hungry pests, e.g. insects, rodents and birds, that are likely to be carrying pathogens. • Food scraps provide a good growth medium for bacteria, including pathogens. • Pathogens may grow on discarded packaging material, e.g. cardboard boxes or crates, particularly if it is wet.	Oral (ingestion)
Location	**Activities during which occupational pathogen exposure is likely to occur**	**Possible Routes of Transmission**
	- Pathogen can enter to human body by directly eating contaminated food or water as well as by licking or chewing on contaminated objects or surfaces such as contaminated utensils and plates.	
Waste storage areas (especially food wastes/ biodegradable	- Handling, transporting and disposal of wastes - Performing cleaning	Direct contact, fomites and aerosol

wastes and biomedical wastes)	and maintenance works	
Sanitary systems (toilets)	Using the toilets and performing cleaning and maintenance works	Direct contact, fomites, vector borne
Drainage system	Performing cleaning and maintenance works	Direct contact, fomites, vector borne
Wastewater collection pits	- Performing cleaning and maintenance works In case the wastewater is stagnant and stable in the pit for a period of time, vectors can reside and transfer pathogenic microorganisms to other animals or locations and include arthropod vectors (e.g., mosquitoes, fleas, ticks) and rodents or other vermin.	Direct contact, fomites, vector borne
Wastewater Treatment System	Performing cleaning and maintenance works	Direct contact, fomites, vector borne
People (e.g. staffs, visitors, contractors)	Casual interaction, physical contact during working	Direct contact, aerosol and fomites

8.3.8.1 Objectives

In order to respond the pathogenic risks in the workplace, a pathogen management plan is developed and the objectives of this plan are:

- to support the prevention and management of risks to the health and safety of people (staffs, visitors, contractors) arising from exposure to pathogens, during the course of their work.

- to prevent and minimize the spread of pathogens within the workplace areas and to the community, and

- to raise occupational awareness of pathogens and its health impacts on community

8.3.8.2 Legal Requirements

Myanmar's applicable legislation and regulation regarding pathogenic prevention and management include:

- The Factories Act, 1951 (Amended in 1953, 1954, 1962, 2016)

- Public Health Law (1972);

- The Prevention and Control of Communicable Disease Law (1995);

The IFC General EHS Guidelines considered relevant to the project are summarized in table 8.17:

Table 8.17 Applicable IFC General EHS Guidelines

Factor	Applicable IFC General EHS Guidelines
Communicable Diseases	**Section 3.6** provides guidelines for disease prevention in terms of **communicable diseases and vector borne diseases.** Under communicable diseases prevention, following interventions are recommended to perform: (1) Providing surveillance and active screening and treatment of workers (2) Preventing illness among workers in local communities by: o Undertaking health awareness and education initiatives o Training health workers in disease treatment o Conducting immunization programs for workers in local communities to improve health and guard against infection
Factor	**Applicable IFC General EHS Guidelines**
	Providing health services (3) Providing treatment through standard case management in on-site or community health care facilities. Ensuring ready access to medical treatment, confidentiality and appropriate care, particularly with respect to migrant workers (4) Promoting collaboration with local authorities to enhance access of workers' families and the community to public health services and promote immunization
Vector-borne Diseases	In order to reduce the impact of vector-borne disease on the long-term health of workers, the Project Sponsor in close collaboration with community health authorities, can implement an integrated control strategy for mosquito and other arthropod-borne diseases that might

	involve: (1) Prevention of larval and adult propagation through sanitary improvements and elimination of breeding habitats close to human settlements (2) Elimination of unusable impounded water (3) Increase in water velocity in natural and artificial channels (4) Considering the application of residual insecticide to dormitory walls (5) Implementation of integrated vector control programs (6) Promoting use of repellents, clothing, netting, and other barriers to prevent insect bites (7) Use of chemoprophylaxis drugs by non-immune workers and collaborating with public health officials to help eradicate disease reservoirs (8) Monitoring and treatment of circulating and migrating populations to prevent disease reservoir spread
Factor	**Applicable IFC General EHS Guidelines**
	(9) Collaboration and exchange of in-kind services with other control programs in the project area to maximize beneficial effects (10) Educating project personnel and area residents on risks, prevention, and available treatment (11) Monitoring communities during high-risk seasons to detect and treat cases (12) Distributing appropriate education materials (13) Following safety guidelines for the storage, transport, and distribution of pesticides to minimize the potential for misuse, spills, and accidental human exposure

IFC EHS Guidelines for Pesticide Manufacturing, Formulation and Packaging (2007) recommended the prevention and control measures for exposure to pathogens as follow:

Exposure to pathogens is an occupational hazard associated with isolation and growth of micro-organisms in laboratories and during fermentation processes in biopesticide manufacturing. Recommended hazard prevention and control measures include the following:

· Non-pathogenic microbes should be selected;
· Process equipment should be enclosed and spent broth should be treated before discharge;
· Implementation of appropriate biohazard control measures (e.g. process modifications, material handling and transfer minimization, local exhaust ventilation (LEV), filtration and inertization, decontamination, administrative practices, and use of personal and respiratory protective equipment);
· Installation of downward and inward, laminar flow biological safety hoods.

8.3.8.3 Management Actions

Theme	Sub Theme	Location	Activity	Management Actions
Services	- Drinking Water - Domestic Water - Canteen Utensils	- General Workplaces - Canteen	- Normal working activities - Eating contaminated food or water as well as by licking or	(1) Ensure that potable water and domestic water is effectively treated, e.g., by chlorination, U.V., ozone, or filtration. (2) Make sure the canteen utensils are washed and
Theme	**Sub Theme**	**Location**	**Activity**	**Management Actions**
			Using on the contaminated objects or surfaces such as contaminated utensils and plates.	sanitized to prevent the spread of bacteria.
Controlled Access	People (e.g. staff, visitors, contractors)	- General Workplaces	- Normal working activities - Casual interaction, physical contact during working	(1) Personal Health: People entering a working area should be free of illness, or symptoms, that could put the workplace at risk. Temperature checks should happen before the individual enters the facility on a daily basis. (2) Personal Hygiene: People entering the

				workplace should understand the role of personal hygiene in spreading pathogens.
	Handwashing and sanitizing	- General Workplaces	- Normal working activities	(1) Hand-washing facilities should include a dedicated sink (piped directly into the drains), clean water, soap and suitable hand drying materials (e.g., paper towels). These facilities should be maintained in a clean and tidy condition. Staff members must know when it is appropriate to wash their hands, e.g.: •before eating and drinking • after going to the toilet • after working with raw products, products and any suspicious contaminated things • after working with raw product contact surfaces
Theme	**Sub Theme**	**Location**	**Activity**	**Management Actions**
				• after rubbish removal and cleaning operations. (2) Hand disinfection facilities may also be provided. These can provide some additional protection but only if appropriate hand washing has been carried out first. Examples of hand disinfection available include: • alcohol gel dispenser • dipping in sanitiser
	Eating, Drinking and Smoking etc	- General Workplaces - Canteen	- Normal working activities	There are some activities that should not be carried out in the processing environment e.g eating, drinking, smoking, spitting. This is to protect from

				entering the bacteria from the processing environment and can spread the pathogens through spitting. . Food or drink so should not be taken into processing areas.
	Protective Clothing / Equipment	- General workplaces - Laboratory - Clinic - Canteen - Waste storage areas (especially food wastes/ biodegradable wastes and biomedical wastes)	- Handling, transporting and disposal of wastes - Performing cleaning and maintenance works	Protective clothing/equipment must be worn/applied to anyone who works in areas with highly potential of pathogen exposure Protective clothing may include: (but not limited to) • overalls • masks (all time working in the industry) • boots (during performing cleaning and maintenance
Theme	**Sub Theme**	**Location**	**Activity**	**Management Actions**
		- Sanitary system - Drainage system - Wastewater Collection Pit - WWTP		activities in wastewater collection pit, drainage and WWTP) • hairnets, hats, aprons (in canteen) •gloves (during waste handling process) The wearer should keep protective clothing as clean as practically possible. Consideration should be given to the potential for transfer of contamination via protective clothing
House Keeping	- Cleaning - Decontamination -Sanitizing	-General workplaces	- Handling, transporting and disposal of wastes - Performing cleaning and maintenance works	Not only do all equipment, floors and processing areas surfaces need to be adequately cleaned, decontaminated and sanitised on a regular basis, but particular attention should also be given to areas where potentially hazardous materials accumulate and present a pathogen risk, such as: • Waste accumulation areas

				• Drains • Oil and Grease traps, • Wastewater Collection Pit
Waste Control	Waste Storage and Management	Inside the workplace		• Wherever possible, waste should be discarded to designated areas/bins as it is produced, • Waste segregation practices should be applied (Biodegradable, non-biodegradable and biomedical wastes)
Theme	**Sub Theme**	**Location**	**Activity**	**Management Actions**
				• All waste bins should be covered. • Clearly differentiate waste bins from product bins • Waste bins used in canteens should be emptied and cleaned at least daily. • Dispose of disposal masks to the designated bin • Use bins with foot-operated lid openers to reduce the risk of contaminating hands
	Waste Storage and Management	Outside the workplace		Locate bulk waste bins away from canteen and food storage area • Store wet waste in metal or plastic containers with tight-fitting lids to avoid the spread of pathogens • Wet waste should be removed from the premises every working day • Clean bins regularly to prevent build-up of pathogen-containing residues • Wash bins in a well-drained yard area

				• Store dry waste in enclosed containers • Yard areas should be kept clean and tidy
Control of Absorbent Materials		-General workplaces		Pathogens will survive and grow in any absorbent material including; • wood • foam • cloths
Theme	**Sub Theme**	**Location**	**Activity**	**Management Actions**
				• scourers • cardboard • rope • nylon fabric • conveyor fabric These materials cannot be effectively sanitized, therefore, should be regularly replaced with sanitary, easily cleaned, non-absorbent alternatives.
Vector Control	Pest Management	Outside the workplace		Pathogens may be carried into the environment by animals such as rodents, insects, and birds other than humans. The chemical or non-chemical method can be applied to control pests. The chemical method can be conducted using pesticides or hiring pest control services regularly. In terms of non-chemical methods following measures should be practiced inside and outside of the facility. • The exterior area around a facility (within 50 feet) should be kept free of litter, excessive foliage, and standing water sources. • Mulch, which can provide a burrowing area for rodents and other pests, should be replaced with

				rock on perforated plastic directly adjacent to the building. • Trash should be removed from the facility on a timely basis, and the garbage
Theme	**Sub Theme**	**Location**	**Activity**	**Management Actions**
				containers, including dumpsters, should be kept clean and covered when not in use. • Roofs and walls should be in good repair and free from bird nesting sites.
		Inside the workplace		• Inside the workplace/facility, floors should be in good repair, free of cracks. • Cracks should be caulked and sealed, especially at floor/wall junctions. • Any food/ food wastes spills should be addressed immediately, and removed as soon as possible.
	Vector borne insects Management	Inside and Outside of Workplace		In order to reduce the impact of vector-borne disease on the long-term health of workers, the following measures should be performed. • Prevention of larval and adult propagation through sanitary improvements and elimination of breeding habitats close to human settlements • Elimination of unusable impounded water • Increase in water velocity in natural and artificial channels • Promoting use of repellents, clothing, netting, and other barriers to prevent insect bites

				• Following safety guidelines for the storage,
Theme	**Sub Theme**	**Location**	**Activity**	**Management Actions**
				transport, and distribution of pesticides to minimize the potential for misuse, spills, and accidental human exposure
Health awareness and education initiatives	Infectious Diseases			• Employees should be educated on the background knowledge of common types of work-related communicable diseases. • Teach the employees the good practices to avoid contracting and spreading the infectious diseases such as COVID-19, flu, TB and sexually transmitted diseases such as HIV/AIDS and STI. • Raise the public awareness and inform on necessary individual prevention measures through posters and flyers For example, in COVID 19 awareness campaign, pamphlets containing information about preventive measures such as social distancing, methods of disinfecting surfaces and properly hand washing techniques, access and proper use of mask are distributed.

8.3.8.4 Role and Responsibilities

8.3.8.4.1 Management Commitment and Employee Involvement

In order to manage for prevention of pathogen exposure in the workplace, management or the HSE Supervisor of HAIC should take responsibility for the following:

- Have an effective infection prevention and control strategy and provide a safe working environment that minimizes the risk of exposure to pathogens.
- Provide adequate numbers of **personal protection equipment (PPE)** and protecting clothing and make sure the employees wear suitable PPE to work free from exposure to pathogens while working in pathogenic areas
- Provide first aid facility
- Provide proper instruction, education & training to the employees as is necessary to undertake work free from exposure to pathogens
- Conduct surveillance audit to the working areas with high potential for pathogenic exposure and monitor the performance of employees on pathogenic prevention measures
- Documentation and reporting to the related government department in case of work-related infectious diseases outbreaks occurred in the facility

Employees of HAIC should

- Follow safe work procedures to prevent or minimize the potential for exposure to infection and pathogen
- Wear appropriate personal protective equipment (PPE) and protective clothing as required and use it as instructed
- Participate in education and training sessions relating to the prevention of transmission of pathogens and infectious disease
- Report incidents of exposure to infectious disease to the employer and HSE and follow proper response procedures, obtain immediate first aid and medical treatment when required

Recommended Preventive Measures for Pathogens

Recommended practices for preventing pathogen exposure for both management and employee include the following:

- Wearing the correct PPE and respirators while working in places with a high potential for pathogenic exposure
- Proper staffing and limiting worker exposure to contaminated materials
- Routine and targeted decontamination of contaminated work areas
- Good personal hygiene after handling, containerization, storage, transport, or disposal of contaminated materials
- Disinfection and sterilization of contaminated equipment and work areas.
- Written procedures for reporting and recording exposures or cases
- Reporting to public health authorities for fatal and emergency cases as per National Regulations
- Employee education on the awareness of pathogens exposure and donning and doffing of PPE
- Vaccinations and medical treatment as necessary in case of incidents of exposure to infectious disease

8.3.8.5 Pathogen Management Sub-plan

Theme	Sub Theme	Location	Activity	Management Actions	Frequ
Services	- Drinking Water - Domestic Water - Canteen Utensils	- General Workplaces - Canteen	- Normal working activities - Eating contaminated food or water as well as by licking or Using on the contaminated objects or surfaces such as contaminated utensils and plates.	(1) Ensure that potable water and domestic water is effectively treated, e.g., by chlorination, U.V., ozone, or filtration. (2) Make sure the canteen utensils are washed and sanitized to prevent the spread of bacteria. (3) Detailed activities are mentioned in 8.3.8.3.	Weekl
Controlled Access	People (e.g. staff, visitors, contractors)	- General Workplaces	- Normal working activities - Casual interaction, physical contact during working	(1) Personal Health: People entering a working area should be free of illness, or symptoms, that could put the workplace at risk. Temperature checks should happen before the individual enters the facility on a daily basis. (2) Personal Hygiene: People entering the workplace should understand the role of personal hygiene in spreading pathogens. (3) Detailed activities are mentioned in 8.3.8.3	Weekl
	Handwashing and sanitizing	- General Workplaces	- Normal working activities	(1) Hand-washing facilities should include a dedicated sink (piped directly into the drains), clean water, soap and suitable hand drying materials (e.g., paper towels). These facilities should be maintained in a clean and tidy condition. Staff members must know when it is appropriate to	Weekl

Theme	Sub Theme	Location	Activity	Management Actions	Frequ
				wash their hands, e.g.: • before eating and drinking • after going to the toilet • after working with raw products, products and any suspicious contaminated things • after working with raw product contact surfaces	
				• after rubbish removal and cleaning operations. (2) Hand disinfection facilities may also be provided. These can provide some additional protection but only if appropriate hand washing has been carried out first. Examples of hand disinfection available include: • alcohol gel dispenser • dipping in sanitiser (3) Detailed activities are mentioned in 8.3.8.3.	Weekl
	Eating, Drinking and Smoking etc	- General Workplaces - Canteen	- Normal working activities	There are some activities that should not be carried out in the processing environment e.g eating, drinking, smoking, spitting. This is to protect from entering the bacteria from the processing environment and can spread the pathogens through spitting. . Food or drink so should not be taken into processing areas.	Weekl
	Protective Clothing / Equipment	- General workplaces	- Handling, transporting and disposal	Protective clothing/equipment must be worn/applied to anyone	Weekl

Theme	Sub Theme	Location	Activity	Management Actions	Frequ
		- Laboratory - Clinic - Canteen - Waste storage areas (especially food wastes/ biodegradable wastes and biomedical wastes)	of wastes - Performing cleaning and maintenance works	who works in areas with highly potential of pathogen exposure Protective clothing may include: (but not limited to) • overalls • masks (all time working in the industry) • boots (during performing cleaning and maintenance	
		- Sanitary system - Drainage system - Wastewater Collection Pit - WWTP		activities in wastewater collection pit, drainage and WWTP) • hairnets, hats, aprons (in canteen) •gloves (during waste handling process) The wearer should keep protective clothing as clean as practically possible. Consideration should be given to the potential for transfer of contamination via protective clothing	Weekl
House Keeping	- Cleaning - Decontamination -Sanitizing	-General workplaces	- Handling, transporting and disposal of wastes - Performing cleaning and maintenance works	Not only do all equipment, floors and processing areas surfaces need to be adequately cleaned, decontaminated and sanitised on a regular basis, but particular attention should also be given to areas where potentially hazardous materials accumulate and present a pathogen risk, such as: • Waste accumulation areas • Drains	Weekl

Theme	Sub Theme	Location	Activity	Management Actions	Frequ
				• Oil and Grease traps, • Wastewater Collection Pit	
Waste Control	Waste Storage and Management	Inside the workplace		• Wherever possible, waste should be discarded to designated areas/bins as it is produced, • Waste segregation practices should be applied (Biodegradable, non-biodegradable and biomedical wastes)	Daily
				• All waste bins should be covered. • Clearly differentiate waste bins from product bins • Waste bins used in canteens should be emptied and cleaned at least daily. • Dispose of disposal masks to the designated bin • Use bins with foot-operated lid openers to reduce the risk of contaminating hands	
	Waste Storage and Management	Outside the workplace		Locate bulk waste bins away from canteen and food storage area • Store wet waste in metal or plastic containers with tight-fitting lids to avoid the spread of pathogens • Wet waste should be removed from the premises every working day • Clean bins regularly to prevent build-up of pathogen-containing residues • Wash bins in a well-	Weekl connec YCDC

Theme	Sub Theme	Location	Activity	Management Actions	Frequ
				drained yard area • Store dry waste in enclosed containers • Yard areas should be kept clean and tidy	
Control of Absorbent Materials		-General workplaces		Pathogens will survive and grow in any absorbent material including; • wood • foam • cloths	Weekl
				• scourers • cardboard • rope • nylon fabric • conveyor fabric These materials cannot be effectively sanitized, therefore, should be regularly replaced with sanitary, easily cleaned, non-absorbent alternatives.	
Vector Control	Pest Management	Outside the workplace		Pathogens may be carried into the environment by animals such as rodents, insects, and birds other than humans. The chemical or non-chemical method can be applied to control pests. The chemical method can be conducted using pesticides or hiring pest control services regularly. In terms of non-chemical methods following measures should be practiced inside and outside of the facility.	Weekl

Theme	Sub Theme	Location	Activity	Management Actions	Frequ
				• The exterior area around a facility (within 50 feet) should be kept free of litter, excessive foliage, and standing water sources. • Mulch, which can provide a burrowing area for rodents and other pests, should be replaced with rock on perforated plastic directly adjacent to the building. • Trash should be removed from the facility on a timely basis, and the garbage	
				containers, including dumpsters, should be kept clean and covered when not in use. • Roofs and walls should be in good repair and free from bird nesting sites.	
		Inside the workplace		• Inside the workplace/facility, floors should be in good repair, free of cracks. • Cracks should be caulked and sealed, especially at floor/wall junctions. • Any food/ food wastes spills should be addressed immediately, and removed as soon as possible.	Weekl
	Vector borne insects Management	Inside and Outside of Workplace		In order to reduce the impact of vector-borne disease on the long-term health of workers, the following measures should be performed. • Prevention of larval and adult propagation through	Weekl

Theme	Sub Theme	Location	Activity	Management Actions	Frequ
				sanitary improvements and elimination of breeding habitats close to human settlements • Elimination of unusable impounded water • Increase in water velocity in natural and artificial channels • Promoting use of repellents, clothing, netting, and other barriers to prevent insect bites • Following safety guidelines for the storage,	
				transport, and distribution of pesticides to minimize the potential for misuse, spills, and accidental human exposure	
Health awareness and education initiatives	Infectious Diseases			• Employees should be educated on the background knowledge of common types of work-related communicable diseases. • Teach the employees the good practices to avoid contracting and spreading the infectious diseases such as COVID-19, flu, TB and sexually transmitted diseases such as HIV/AIDS and STI. • Raise the public awareness and inform on necessary individual prevention measures through posters and flyers For example, in COVID 19 awareness campaign, pamphlets containing information about	Annua periodi

Theme	Sub Theme	Location	Activity	Management Actions	Frequ
				preventive measures such as social distancing, methods of disinfecting surfaces and properly hand washing techniques, access and proper use of mask are distributed.	

8.3.8.6 Monitoring and Surveillance Audit Plans

To prevent workplace pathogenic exposure effectively, a monitoring and evaluation process should be conducted internally on an annual or bi-annual basis. The environmental monitoring program for drinking water and domestic water along with the surveillance audit provides verification that the pathogen control systems in place are effective.

Table 8.18 Monitoring and Surveillance Audit Plans

Factors	Key Performance Indicators	Procedure	Proposed Duration and Frequent of Monitoring	Location
Performance of workplace pathogenic prevention measures	Number of surveillance audit and inspection performed in the selected areas and employees with high pathogenic risks	Audit/inspect, monitor and record the performance of employees, housekeeping practices in the selected locations to ensure satisfactory implementation of workplace pathogenic management actions	Annually	- General workplaces - Laboratory - Clinic - Canteen - Waste storage areas (especially food wastes/ biodegradable wastes and biomedical wastes) - Sanitary system - Drainage system - Wastewater Collection Pit - WWTP - Employees
Workplace pathogenic /infectious diseases	- Number of cases caused by pathogenic or infectious diseases in the workplace - Number of complaints from	Record keeping and documentation the cases/ complaints and make proper investigation for the root cause and recommend for the	Annually	Workplace Clinic

	the community to the facility related to work-related infectious diseases outbreaks	corrective actions		
Factors	**Key Performance Indicators**	**Procedure**	**Proposed Duration and Frequent of Monitoring**	**Location**
Employee and community awareness promotion of pathogenic and infectious diseases	- Number of awareness campaign held internally and in community - Detail record of awareness campaign including attendance list, agenda and so on.	- Conduct awareness training and/or campaign internally or community - Record the participation/involvement of employee and community		
Water services	Number of potable water and domestic water samples which is noncompliance with WHO drinking water quality in terms of pathogens (E coli and Coliform Bacteria)	• Monitoring will be conducted based on the equipment and methods acceptable to Myanmar Government and results will be compared with WHO Drinking Water Guidelines	Bi-annually	Drinking Water Domestic Water

8.3.9 Occupational Health and Safety Management Plan

The Occupational Health and Safety Management Plan for Myanma Awba Group Co,Ltd is the action for the the anticipation, recognition, evaluation and control of hazards (including airborne dust, noise, unplanned events/ incidents and injuries, shift works) arising in or from the work place , the HAIC (Hmawbi Agricultural Input Complex) that could impair the health and well-being of workers taking into account the possible impact on the surrounding communities and the general environment.

8.3.9.1 Objectives

For the HAIC (Hmawbi Agricultural Input Complex), the following objectives are undertaken as;

(1) To provide the protection and mitigation measures for the occupational health and safety for the workers and their environment in the HAIC (Hmawbi Agricultural Input Complex), and
(2) To provide the education programs how to reduce the impacts of the occupational health and safety in the HAIC (Hmawbi Agricultural Input Complex).
(3) To Assist Awba in defining OHS and Labour requirements to comply with the requirements of the IFC Performance Standards and Myanmar National Guidelines
(4) To provide employee worker's safe working conditions and labour benefits; and
(5) To provide employee workers with access to Employee Grievance Mechanism.

8.3.9.2 Policy and legal frame work

The Project's Environmental and Social Policies, Legal Requirements and Institutional requirements have been detailed in Chapter 3.

8.3.9.2.1 Myanmar Laws and regulations

The AWBA commits to compliance to all applicable legal & other requirements; sustainable development; prevention of pollution, injury and ill health apart from other aspects of HSE. These would include –

1) Occupational Safety and Health Law, 2019

2) Public Health Law (1972)

3) Myanmar Fire Brigade Law (2017)

4) Labour Organization Law (2011)

5) Settlement of Labour Dispute Law (2012)

6) Employment and Skill Development Law (2013)

7) Social Security Law (2012)

8) The Prevention and Control of Communicable Disease Law, 1995

9) The Control of Smoking and Consumption of Tobacco Product Law, 2006

10) The Pesticide Law (2016)

8.3.9.2.2 International Finance Cooperation (IFC) Guideline

AWBA commits to adopt Occupational Health and Safety Management as described in IFC Occupational Health and Safety Section 2.0 including

- Identify job safety analysis to specific potential occupational hazards and industrial hygiene surveys, and as appropriate, to monitor and verify chemical exposure levels, and compare with applicable occupational exposure standards.
- Prepare hazard communication and training programs for employee to recognize and response to workplace chemical hazards
- Programs should include aspects of hazard identifications, safe operation and materials handling procedures, safe work practices, basic emergency procedures, and special hazards unique to their jobs.
- Instruct and train all employees to use control measures properly and tell about the health risk
- Replace the hazardous substance with a less hazardous substitute
- Implement of engineering and administrative control measure to avoid or minimize the release of hazardous substance to the working area to keep the level of exposure below recognized limits
- Plant shall be implementing the safety and health program designed to identify, evaluate, monitor and control safety and health hazards
- Ensure all rooms are well ventilated and Lighting
- Provide and wear of full PPE for handing of hazardous waste

8.3.9.3 Sources of Impact

The risks and potential impacts of a lack of OH Management Plan for Awba include the following

- General employee, and service providers hiring for the HAIC Project do not have a management system which establishes OHS requirements so may not commit to Awba's expected OHS requirements at the HAIC Project; and
- Lack of a contract and/or legal resources between Awba, General Employees that would allow Awba's OHS Department to demand the proper and full standards compliance.

8.3.9.4 Occupational Health and Safety Sub-Management Plan

Source of Impact	Control Measures	Frequency	Responsible Person
General employee, and service providers	- Number of OHS non-compliances with existing OHS standards (Unsafe Acts & Conditions) of the employees, - Number of Accidents, Incidents within regular periods (Monthly monitoring) ***(http://www.awba-group.com/) Pg.18 OHS Management Plan of Awba/***	- Monthly - Annually and periodically meetings and trainings to workers.	HSE Team

Source of Impact	Control Measures	Frequency	Responsible Person
	Project No.: 0406940		
Lack of a contract and/or legal resources between Awba, General Employees	- Percent of accomplishment on Minimum HSE training required as per Training matrix set by HSE which agreed and confirmed by department. - Number of HSE non-compliances with existing OHS regulations ***(http://www.awba-group.com/)*** ***Pg. 18 OHS Management Plan of Awba Project No.: 0406940***	- As per process design based on risk assessment.	HSE Team

Table 8-19 Environmental Impact Assessment – Operation Phase

Source of Impact	Activities	Impacts	Control Measures	Frequency
2. Occupational Health and safety (Operation Activities)	2.1 Chemical Exposure (Insecticide)	2.2.1 - Adverse effect on employee's health, burns from exposure to spilled corrosive chemicals, - Respiratory tract injury from inhalation of irritant gases, combustion products, Poisoning from exposure to spilled	Conducting specific action of operation phase mentioned in mitigation measures at Item no. 2.2.1.1 to Item no. 2.2.1.3.	

		chemicals and the consumption of contaminated food or water.		
	2.2 Storage and Handling of hazardous substances (Chemical Insecticide)	2.2.1 Adverse health impacts to workers	Conducting specific action of operation phase mentioned in mitigation measures at Item no. 2.2.1.1 to 2.2.1.5.	
	2.3 Machinery Related Risks	2.3.1 Accidents and injuries	Conducting specific action of operation phase mentioned in mitigation measures at Item no. 2.3.1.1 to 2.3.1.4.	
	2.4 Noise	2.4.1 Noise Nuisance to Workers	Conducting specific action of operation phase mentioned in mitigation measures at Item no. 2.4.1.1 to 2.4.1.3.	
	2.5 Shift Works	2.5.1 Physical and Psychological health impacts to workers	Conducting specific action of operation phase mentioned in mitigation measures at Item no. 2.5.1.1.	

8.3.9.5 Implementation Schedule

The mitigation measures and management plan & Sub Plan will be performed as mentioned in the tables above. The Plans have to be revised accordingly after every project activity conducted, in order to guarantee the compliance with applicable laws.

8.3.9.6 Responsibilities

Day to day supervision will be done by operation team and maintenance team and HSE team. Over all supervision will be done by Factory Manager. Roles and responsibilities are as follows:

• Factory Manager and HR manager review and take action for any issues in relation to the report from Operation manager, maintenance manager and HSE in charge.
• HSE Department including but not limited to the representatives of ERT, Medical Team, Area Wardens, First Aiders and HAIC's security team have to report, as soon as possible, the failures of their, incidents and abnormality, occurred in their respective workplace according to their responsibilities and other implementation of EMP. If dangerous impact caused by this failure or failure should be known by the Ministry the project proponent has to submit within 24 hours and other than this situation has to submit within 7 days from knowing it.

• HSE team leader is providing relevant operation activities according to their relevant section on a daily basis and reported to Factory manager.

• HSE is conducting environmental quality monitoring through Third Party and submit the monitoring report biannually to ECD.

8.3.9.7 Budget allocation for Occupational Health and Safety sub-management plan

HAIC will use 2% of the total investment for EMP cost. The total investment of HAIC is 17,291,500,000 MMK (MMK 17291.5 million). Then the estimated cost for the management plan is 345,830,000 MMK. Among the total management plan, the budget allocation for the mitigation measures and monitoring plan will include for air/odor/noise, waste (solid and hazardous waste), potable & wastewater, Occupational Health & Safety and Community Health & Safety. Thus, the budget is allocated for Air/Odor management plan would be around 69,166,000 MMK while 27,666,400MMK for monitoring plan and 41,499,600 MMK for mitigation measures.

The budget allocation for occupational health and safety management plan including mitigation measures and monitoring is under the following table.

Table 8-20 Budget allocation of Occupational Health and Safety sub-management plan

Environmental Factors	Activities	Responsibility	Estimated Budget
Operation phase			
Occupational Health and Safety	Occupational Health and Safety Plan	HSE Team	69,166,000 MMK

8.3.10 Community Health and Safety Management Plan

The community health and safety management plan is developed to describe the actions that will be undertaken by HAIC during the **construction** and **operational phase** to manage potential risks and impacts relating to:

- Community health
- Community safety and
- Community security

8.3.10.1 Objective

The objectives of this Plan are to:

• Avoid or limit risks to, and impacts on, the health, safety and security of the community during the production phase from both routine and non-routine circumstances. This is achieved through implementing targeted prevention programs to reduce risks, along with the implementation of an effective monitoring and evaluation program.

• Ensure that safeguarding of personnel and property is conducted in an appropriate manner that avoids or limits risks to the community's safety and security.

• Maintain a monitoring and evaluation program that is community-based, participatory, transparent

This Plan should be read in conjunction with Road Transport Management Plan, Stakeholder Engagement Plan, Emergency Preparedness and Response Plan and Contractor Management Plan.

8.3.10.2 Legal Requirements

Myanmar's applicable legislation and regulation regarding community health and safety management include;

• National Environmental Quality (Emission) Guideline (2015)

• Public Health Law (1972)

• The Prevention and Control of Communicable Disease Law (1995)

• The Myanmar Fire Brigade Law, 2015

• The Explosive Act (1887)

• The Explosive Substances Act (1908)

• The Prevention of Hazard from Chemical and Related Substances Law , 2013

8.3.10.3 Applicable International Standards and Guidelines

Various international standards and guidelines apply to community health, safety and security. Those that are relevant to the Project include:

IFC Performance Standard 4:

Community Health, Safety and Security (International Finance Corporation, 2006), and its objectives are:

• To anticipate and avoid adverse impacts on the health and safety of the affected communities throughout the Project from both routine and non-routine circumstances

• To ensure the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimises risks to affected communities

IFC Performance Standard 1: Social and Environmental Assessment and Management Systems

(International Finance Corporation, 2006), and some of its objectives are:

• To adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimise, and where residual impacts remain, compensate/offset for risks and impacts to workers, affected communities, and the environment

• To ensure that grievances from affected communities and external communications from other stakeholders are responded to and managed appropriately

• To promote and provide means for adequate engagement with affected communities throughout the Project cycle on issues that could potentially affect them and to ensure that relevant environmental and social information is discloses and disseminated

IFC EHS General Guidelines for Pesticide Manufacturing, Formulation and Packaging (International Finance Corporation, 2007) recommended the following measures to minimize the community health and safety hazard

The most critical community health and safety hazards during the operation of pesticides manufacturing, formulation and packaging derive from accidental leaks of toxic compounds, and the presence of flammable gases and liquids. Plant design and operations should include safeguards to minimize and control hazards to the community through the following:

· Identifying reasonable design leak cases;

· Assessing the effects of the potential leaks on the surrounding areas, including groundwater and soil pollution;

· Assessing the risk due to hazardous material transport and selecting the most appropriate transport routes, minimizing the risks with respect to community interference and third party interaction;

· Properly selecting the plant location with respect to inhabited areas, meteorological conditions (e.g. prevailing wind directions), and water resources (e.g. groundwater vulnerability), and identifying safe distances between the plant area, especially the storage tank farms, and the community areas;

· Identifying the prevention and mitigation measures required to avoid or minimize the community hazards;

· Developing an Emergency Management Plan, prepared with the participation of local authorities and potentially affected communities.

8.3.10.4 Good international industry practice

International standards, guidelines and good international practice that will be referenced by the Project, relevant to community health, safety and security include:

• Voluntary Principles

• Protect, Respect and Remedy Guideline (United Nations, 2011)

• Code of Conduct for Law Enforcement Officials (United Nations, 1979)

• Basic Principles on the Use of Force and Firearms by Law Enforcement Officials (United Nations 1990)

• Guidelines for Drinking Water Quality, 4th Edition (World Health Organisation, 2011)

• Introduction to Health Impact Assessment (International Finance Corporation, 2009)

• Projects and People: A Handbook for Addressing Project Induced In-Migration (International Finance Corporation, 2009

8.3.10.5 Source of Impacts

The following impact on **provisioning (water and energy)** are expected to occur during the HAIC operational phase,

- Reduced community use of and access to ecosystem services especially groundwater and electricity due to sustained exploitation of groundwater and significant electricity consumption rate during the production phase

The following **health impacts** are expected to occur during the HAIC construction and operational phases,

- Potential increase in respiratory diseases due to dust and air emission during construction phase
- Potential increase in infectious diseases such as Covid 19 outbreaks in the community

- Potential for work camp personnel to provide opportunities for increases in STIs, and HIV/AIDs (workers entering and leaving the worksite could attract service and sex workers creating the conditions for an increase in STIs)
- Potential increase in vector borne diseases due to poor waste management in Project site

The following impacts related to **the safety and security** of the local community are expected to occur during the HAIC constriction and operational phases,

- Increased roadway traffic and associated accidents (livestock and people) from HAIC transportation assets.
- Increase in traffic due to Projects activities (both construction and operation phases) leads to increased risk of road accidents.
- Community exposure to chemicals (insecticides) during project activities within HAIC premises via air, soil, and water routes
- Treated wastewater /Lagoons overflow in to the community water course
- Spills, leaks, and other accidental releases from Project facilities or Project-related activities (transport) resulting in community safety-related risks and impacts (e.g., contamination of water supplies, soil contamination, etc.)
- Unplanned chemical explosion or fire event at the Project facility or due to Project-related activities

The potential risk and impact of an insufficient or poor communication with the stakeholders is the following:

- Perception of lack of interest to collect and resolve the local concerns about possible dust pollution, traffic and road safety, air emissions from incinerators, noise, odour, water contamination, or any other discomfort that may be related to the HAIC Project activities that may lead in social conflicts, strikes and impact on the social image of Awba and its HAIC Project

8.3.10.6 Overview Maps and Site Layout

The area includes local communities within a 2-km radius of the Project Site.

Table 8.21 Mitigation Measures for community

Impacts	Mitigation Measures
Community provisioning (water and electricity)	Re-assess Project impacts on community-dependent ecosystem services and develop corresponding mitigation measures.
Community health	• Pre-employment and periodic medical checkup (per minimum health requirements for Project) to the workers including local workers. • Provide information for the training of workers in infectious diseases such as Covid 19 awareness so they can take knowledge back to communities. • Offer immunisation program (including Covid 19 vaccinations) for HAIC workers focused on higher risk profiles • Worker education to focus attention on the identification and treatment of curable STIs in HAIC workers, including making

	condoms and femidoms available to workers. • Maintain voluntary counseling and testing at HAIC ‘s clinic and referral testing for HIV. • Implement an infectious disease outbreak management measures for workers to reduce the potential for outbreaks and if they occur contain them and reduce the risk of migration out to local communities. • Prevent, avoid, or minimize exposure of communities to diseases caused by air, noise and water pollution by improving pollution prevention as defined in environmental management and monitoring plan • Raise the public awareness on health education and inform on necessary individual prevention measures through posters and flyers For example, in COVID 19 awareness campaign, pamphlets containing information about preventive measures such as social distancing, methods of disinfecting surfaces and properly hand washing techniques, access and proper use of mask are distributed.
Impacts	Mitigation Measures
Community safety and security	• Communicate transport route(s) and predicted schedule to communities where the transport route(s) run close to or through villages. • A road safety and traffic awareness program will be implemented with local communities along heavily used transport routes. • Hazardous materials should be stored and managed in accordance with Hazardous Material Management Plan. • Store incompatible materials (acids, bases, flammables, oxidizers, reactive chemicals) in separate areas, and with containment facilities separating material storage areas. The storage and use of hazardous substances will be performed in conditions of maximum security, in order to avoid the possibility of their accidental spill. • Accidental leaks of fuel or oil will be quickly collected and removed with absorbent material, collected in closed and labeled containers - temporarily stored in specially designed spaces until their delivery to an operator authorized for the collection/disposal of oil waste. • Perform simulations regarding the emergency situations in case accidental pollution is caused, having an impact on the soil and water resources. • Implement measures to avoid spills affecting communities, as defined in the Emergency Preparedness and Response Plan. • Implement measures to avoid fire and explosion, chemical and acid spill as defined in the Emergency Preparedness and Response Plan.

	• Introduction of new staff as a guarantee of security in order to avoid conflicts, accidents, or other forms of disturbance of public peace and healthy social local climate. • Establish the community grievance mechanism to provide a simple and effective means for interested and affected parties to communicate issues, concerns or grievances to HAIC and to receive timely feedback about issue resolution.

8.3.10.7 Key Performance Indicator

The effectiveness of the management measures described above will be assessed using the following Key Performance Indicators (KPIs):

■ KPI 1: Number of community complaints related to health, safety and security received through grievance mechanism

■ KPI 2: Number of workshops, surveys and focus group meetings conducted for community health and safety awareness on road safety, infectious diseases, etc.

■ KPI 3: Number of road traffic accidents involving injuries or spillages of hazardous material

■ KPI 4: Number of complaints from the communities related to the transport fleet

■ KPI 5: Number of inspections to the hazardous storage areas, non-compliances and corrective actions with the mitigation controls as identified in Hazardous Material Management Plan

■ KPI 6: Number of incidents of hazardous material releases leading to actual or potential (i.e. near-misses) harm to humans or the environment

■ KPI 7: Number of infectious disease cases / clinical documentation/records including referrals for health impact monitoring

■ KPI 8: Number of environmental quality monitoring performed per year

■ KPI 9: Number of values (air, noise and wastewater) that exceeded the maximum emission permissible limit

■ KPI 10: Number of environmental quality monitoring conducted accordingly with the schedule.

■ KPI 11: Number of fire drills and training conducted

■ KPI 12: Number of social conflicts occurred

■ KPI 13: Number of health promotion campaign conducted internally and externally

8.3.10.8 Construction Phase of HAIC project

8.3.10.8.1Assessment of Impacts on Community Health and Safety

Health Impact Assessment in the construction phase

(I) Screening

The proposed project preliminary evaluated whether the project activities likely to pose any significant health effects on the local community. In line with the requirements of the project, which mandates the completion of an Environmental and Social Impact Assessment (ESIA), a rapid appraisal Health Impact Assessment (HIA) has been designated to ascertain the health impacts on the local community based on the available baseline data. This assessment aims to unveil and understand the potential health effects associated with the construction phase of project.

(II) 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.

For the purpose of Health Impact Assessment (HIA), Area of Influence (AOI) of the project has been defined including the following areas:

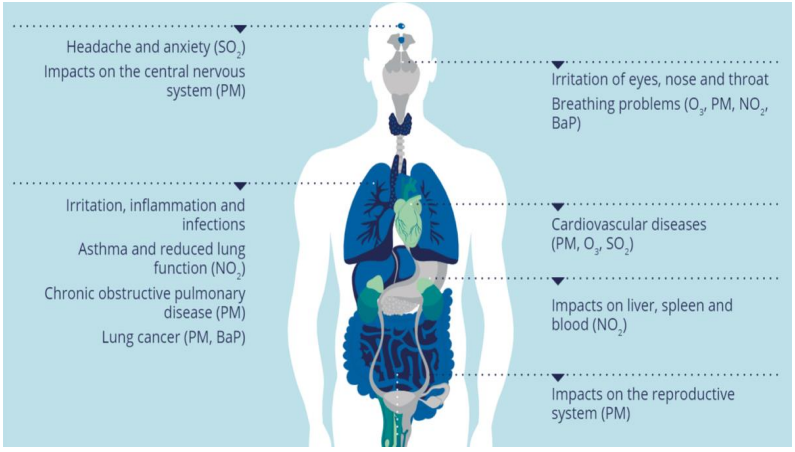
- The Project Area;
- The major village tracts around the Project Area and other villages including ***Pa Ywat Sate Gone, Kyi Ni San, Poe Dana Gone and Shan Gone villages*** which are ***located at the upstream of the project site***
- the Township is Hmawbi and the ***closest village tract is War Net Chaung***; and
- Location of decision-making centres and location of the key government agencies (Yangon, and Naypyidaw).

(A) The potential health impacts need to be evaluated /Issue identification

Regarding the potential, and sometimes unintended ***health impacts due to the project construction activities*** of a proposed project, the local community can be affected by the impacts of project activities, specifically in terms of ***air quality, noise levels, water and soil conditions***, as well as the potential for ***accidents and injuries***.

(i) Health effects due to air pollution likely affected by the project activities

The exposure to air pollution can lead to the following health effects.



Note: Particulate matter with a diameter of 2.5 µm or less ($PM_{2.5}$), particulate matter with a diameter of 10 µm or less (PM_{10}), ozone (O_3), nitrogen dioxide (NO_2), *benzo*[a]pyrene (BaP) and sulphur dioxide (SO_2).
Source: **https://www.eea.europa.eu/en/topics/in-depth/air-pollution/eow-it-affects-our-health**

(ii) Health effects due to Noise pollution likely affected by the project activities

The exposure of noise pollution can lead to ***hearing loss, tinnitus, sleep loss, and cardiovascular and metabolic diseases.***

Source:https://www.eea.europa.eu/en/about/contact-us/faqs/how-does-environmental-noise-pollution-impact-my-health

(iii) Health effects due to water pollution likely affected by the project activities

The exposure of water contaminants/pollution can result in ***gastrointestinal illnesses, nervous system or reproductive effects, and chronic diseases such as cancer*** based on the type of contaminant, its concentration in the water, individual susceptibility, the amount of water consumed, and the duration of exposure.

(iv) Health effects of chemical exposure. Chemical exposure through drinking water can lead to a variety of short- and long-term health effects. Exposure to high doses of chemicals can lead to ***skin discoloration or more severe problems such as nervous system or organ damage and developmental or reproductive effects***. Exposure to lower doses over long periods of time can lead to chronic, longer-term conditions such as cancer. The effects of some drinking water contaminants are not yet well understood.

(v) Health effects of consuming water with disease-causing microbes. Most ***life-threatening waterborne diseases*** caused by microbes (such as ***typhoid fever or cholera***). The more common illnesses caused by viruses, bacteria, and parasites can result in ***stomach pain, vomiting, diarrhea, headache, fever, and kidney failure.*** Infectious diseases such as ***hepatitis*** can also occur.

Source: https://www.epa.gov/report-environment/drinking-water#effects

(vi) Health effects due to soil pollution/contaminants

The long-term exposure to soil pollution can affect the local community particularly in ***vulnerable groups, such as children and the elderly*** depending on the ***chemicals involved*** as well as ***a limited range of pollutants***.

The soil pollutants can affect various organs, such as the ***lungs, skin, gut, liver and kidneys.*** These pollutants can also affect ***the immune, reproductive, nervous and cardiovascular systems***, and more. Evidence suggests that the health impacts of soil pollution disproportionally affect ***poorer households***; for example, poorer households have ***higher chances of living close to industrial sites and being exposed to contaminated soils***

https://www.eea.europa.eu/publications/zero-pollution/health/soil-pollution

(vii)Accidents and injuries

Due to the project activities, traffic accidents have become one of the most significant causes of injuries and fatalities among members of the community

residing within the vicinity of the project site. Environmental, Health, and Safety (EHS) Guidelines: COMMUNITY HEALTH AND SAFETY.

(III) Impact Assessment

In the Health Impact Assessment, ***community health indicators***, encompassing both ***present health conditions*** and the ***prevailing environmental baseline quality***, are prioritized in alignment with their significance.

(A) Baseline Data

Concerning the baseline data, the ***majority of villages are situated to the north and west*** of the Project Area, with industrial and army land occupying the south and east, devoid of residential areas. Consequently, the population and socio-demographic profile of the village tracts within a 3.5 km radius around the Project Area have already been assessed. Therefore, the health impact assessment on the selected Area of Interest (AOI) including the major immediate villages and others namely ***Pa Ywat Sate Gone, Kyi Ni San, Poe Dana Gone, and Shan Gone villages*** is based on ***the existing data*** as the local community in these areas closely adheres to a similar socio-demographic and land-use pattern.

(i) Health profile

The main illnesses are ***common fever, hypertension, kidney problems, and stomach aches***. The ***main hospital in the AOI is in War Net Chaung village.***

(ii) The air monitoring data during the construction phase

An AOI of 500 m and 5 km around the Project Site has been established for the baseline air monitoring during the construction phase.

Figure 8-14: Representative air sensitive receptors around the project Site

Based on the findings, the ***ambient gas quality (both short term and long term) of the local community*** is assumed as ***clean. (Chapter 5.5.1) (Table 5.8 and Table .5.9)***

Based on the findings, the ***ambient particulates quality (both short term and long term)*** of the local community is assumed as ***clean*** except in some villages including ***War Net Chaung Village, Monastery near the Project Site and Yae Tar Shae Village. (Chapter 5.5.1) (Table 5.10 and Table .5.11)***

(iii) The existing baseline noise data

The ***background noise levels*** at the surroundings of the ***local community exceeded the noise limits set out in NEQ guideline*** values during daytime (***except Yae Tar Shay Village***) and night-time periods. ***(Chapter 5.5.1) (Table 5.15).***

Figure 8-15: Representative noise sensitive receptors around the project Site

(iv) The existing baseline surface water and ground water data

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 basic, only few of them have problem during summer time. They received water from in the village level and see ***the quality as good***. ***(Chapter 5.5.1) (Table 5.17 and Table 5.19).***

Figure 8-16 : Representative water bodies around the project Site

(v)The existing baseline soil data

These parameters have been selected to align with the relevant WBG EHS Myanmar National Environmental Quality (Emission) Standards for monitoring. ***(Chapter 5.5.1) (Table 5.17 and Table 5.19).***

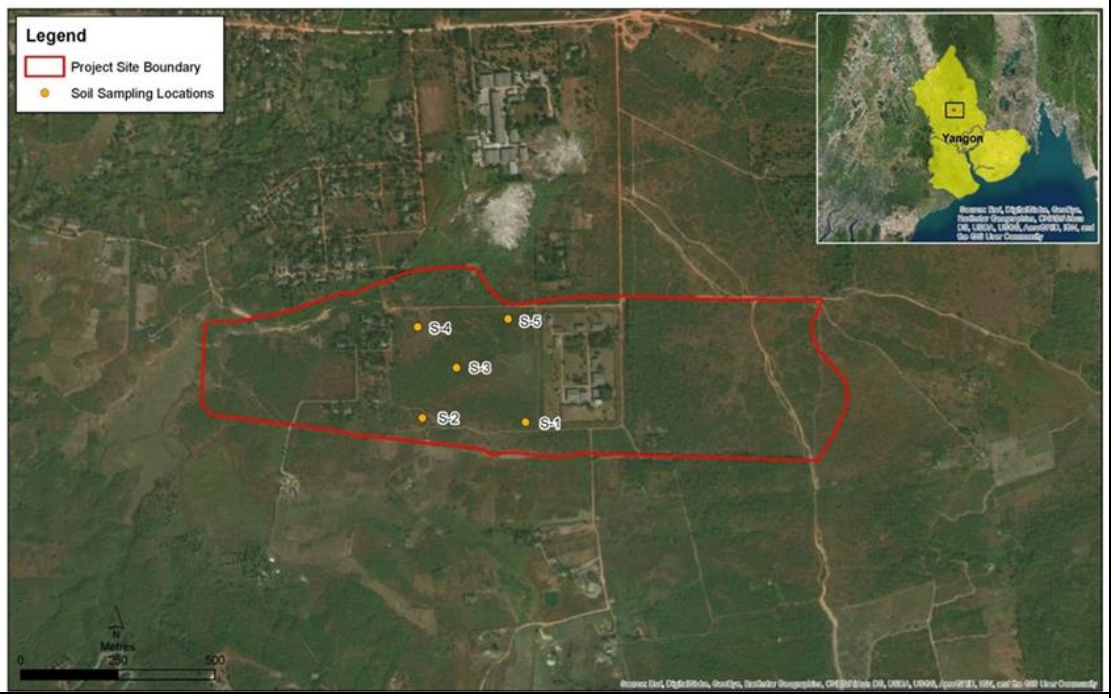


Figure 8-17: Representative soil sampling around the project Site

(vi) The community's perception

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***. ***60% of villages did not respond*** or did not know what the potential impacts / benefits

(B) Detail impact assessment likely affected by the activities of the project constriction

These health impacts are assessed in accordance with the ***Scoping Matrix for Construction phase of HAIC (Table 6.1, Impact Assessment Process (figure 6.1 and 6.2).***

The ***detail impact assessments*** are presented in the following table:

(I) Air quality impact on the local community

Impact	Impact on community health and safety during construction			
Impact Nature	Negative	Positive	Neutral	
	Air quality impact to the local community 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 will be effected by the air pollution / fugitive dust emitted from the project activities including site preparation, excavation and foundation works together with transportation 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 **Medium**.				
Significance	Negligible	Minor	Moderate	Major	
	The significance is likely to be **Moderate**				

The residual impact is of ***minor significance*** after applying the mitigation measures.

(II) Noise quality impact on the local community

Impact	Impact on community health and safety during construction			
Impact Nature	Negative	Positive	Neutral	
	Noise quality impact 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 effected by the noise impact released from the construction activities including heavy machinery 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 **Medium**				
Significance	Negligible	Minor	Moderate	Major	
	The significance is likely to be **Moderate**				

The residual impact is of ***minor significance*** after applying the mitigation measures.

(III) Water quality impact on the local community

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 affected by the water contamination as well as water consumption due to construction activities which are generation of sediment-laden run off which can 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 .				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
	The impact magnitude is potentially **Medium.**				
Receptor Sensitivity	Low	Medium	High		
	The receptor sensitivity is considered **Medium.**				
Significance	Negligible	Minor	Moderate	Major	
	The significance is likely to be **Moderate.**				

(IV) Soil quality impact on the local community

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	Local	Regional	Global		

Extent	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 affected by the soil contamination due to improper solid waste management. In addition, 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.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
	The impact magnitude is potentially **Medium.**				
Receptor Sensitivity	Low	Medium	High		
	The receptor sensitivity is considered **Medium.**				
Significance	Negligible	Minor	Moderate	Major	
	The significance is likely to be **Moderate.**				

The residual impact is of ***minor significance*** after applying the mitigation measures.

(V) Potential injury on the local community

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	Temporary	Short-term	Long-term	Permanent

Duration	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.**				

The residual impact is of ***minor significance*** after applying the mitigation measures.

Following the evaluated findings, the perceived ***impact significance*** on the community during the ***project's construction phase*** for ***Air, Noise, Water, and Soil*** was deemed to be of M***oderate.*** These impacts can be ***negligible after*** complying the ***mitigation measures***.

(IV) Recommendation

1) To ***record the underlying causes of death in the Township, Station and Sub-centers***.
2) To record the ***incidence*** when the people residing the affected vicinity come to the either clinics or hospitals
3) To conduct ***feedback surveys on the local stakeholders' perception*** on the proposed project whether they are acceptable to the change.
4) To ***monitor ambient air, noise, water (surface and ground)/ wastewater*** at the proposed project and vicinity ***during the operation phase***/production phase
5) To provide ***health education how to reduce the potential health impacts*** likely affected by the community's existing socioeconomic life style and the activities of the proposed project

(V) Potential mitigation measures

1) To ***reduce pollution exposures*** at the workplace and in the vicinity around the proposed project
2) ***Comprehensive details*** regarding relevant ***mitigation measures*** are outlined in ***Chapter 6, while Chapter 8*** provides an in-depth presentation of the monitoring plans.

8.3.10.8.1 Management and Monitoring Sub-plans (Construction phase)

No	Activities	Specific Action	Frequency	Responsibility
1.	Structural safety of project facility	-Strictly follow the principle of good engineering practice and structural integrity during the designing and construction of the facility. -Avoid or reduce potential hazards posed to the public while accessing project facilities. Undertake hazard analysis to identify opportunities to reduce the consequence of a failure or accident.	Annually and Periodically	HSE Team
2.	Life and Fire Safety (L & F)	-Design, construct and operate all now buildings accessible to the public in accordance with building, regulation and requirement and internationally accepted Life and Fire Safety (L & F) standards. -Provide fire prevention, means of egress (fire exit), detection and alarm system and emergency response plan. Train some staffs for firefighting and first aid training. Provide adequate firefighting equipment eg. fire extinguisher.	Annually and Periodically	HSE Team
3.	Traffic safety	- Also conduct road safety education campaign for the local community during the construction phase.	Annually and Periodically	HSE Team
4.	Disease prevention	- Prevent the occurrence and spread of communicable disease by all means. Undertake health awareness and education initiative (health education campaign) in local community and also provide health service for them as practical as possible. - Avoid/minimize water-borne, water-based, water-releted and vector borne disease and communicable diseases that would result from project activities.	Annually and Periodically	HSE Team

		- Avoid/minimize by all means spread of diseases from workers. Provide adequate medical treatment. Regularly liaise with Township Healthy Authority.		
5.	Emergency preparedness and response	- Develop Emergency Preparedness and Response Plan and Contingency Plan (action plan) for effective implementation when necessary. - Provide operation manuals for External Emergency Plan and Internal Emergency Plan for all staffs, local community and government inspector. Conduct rehearsal or drills for such plans. Cooperate with local community and authority in preparation of emergency plan and review and update the plan occasionally. - Notify competent authority in the event of emergency that has occurred on the site, if any. - Implement safety audits for the facility and promote the execution of the overall environmental management system.	Annually and Periodically	HSE Team

8.3.10.8.2 Monitoring

The Awba's HSE Committee will be in charge of monitoring the compliance of this CHSMP in collaboration with logistic department and health department (workplace clinic's representative). Any non-compliance and its recommended corrective action will be record by the HSE Committee in their meeting's minutes.

8.3.10.8.3 Reporting

Non-compliances related to this Community Health and Safety Management Plan will be reported to the HSE Department for investigation and record in the HSE committee meetings. Any social complaint received regarding community safety and health will be reported to the HSE Supervisor and acted upon accordingly in coordination with the Community Grievance Coordinator.

8.3.10.8.4 Implementation Schedule

The management actions will be performed as mentioned in the tables above. The actions have to be revised accordingly after every project activity conducted, in order to guarantee the compliance with applicable laws.

8.3.10.8.5 Budget allocation for Community Health and Safety sub-management plan (Construction)

HAIC will use 2% of the total investment for EMP cost. The total investment of HAIC is 17,291,500,000 MMK (MMK 17291.5 million). Then the estimated cost for the management plan is 345,830,000 MMK. Among the total management plan, the budget allocation for the mitigation measures and monitoring plan will include for air/odor/noise, waste (solid and hazardous waste), potable & wastewater, Occupational Health & Safety and Community Health & Safety. Thus, the budget is allocated for Air/Odor management plan would be around 69,166,000 MMK while 27,666,400MMK for monitoring plan and 41,499,600 MMK for mitigation measures.

The budget allocation for Community health and safety management plan during construction phase is under the following table.

Table 8-22 Budget allocation of Community health and safety Management Plan (Construction)

Environmental Factors	Activities	Responsibility	Estimated Budget
Operation phase			
Community Health and Safety	Total	HSE Team	69,166,000 MMK
	Construction Phase	HSE Team	27,666,400 MMK
	Monitoring Plan of	HSE Team	11,066,560 MMK

	Construction Phase (40%)		
	Mitigation Plan of Construction Phase (60 %)	HSE Team	16,599,840 MMK

8.3.10.9 Operation Phase

8.3.10.9.1 Health Impact Assessment during the operation phase

(I) Screening

The proposed project preliminary evaluated whether the project activities likely to pose any significant health effects on the local community. In line with the requirements of the project, which mandates the completion of an Environmental and Social Impact Assessment (ESIA***), a rapid appraisal Health Impact Assessment (HIA)*** has been designated to ascertain the health impacts on the local community based on the available baseline data. This assessment aims to unveil and understand the potential health effects associated with operation phase of the project.

(II) 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.

For the purpose of Health Impact Assessment (HIA), Area of Influence (AOI) of the project has been defined including the following areas:

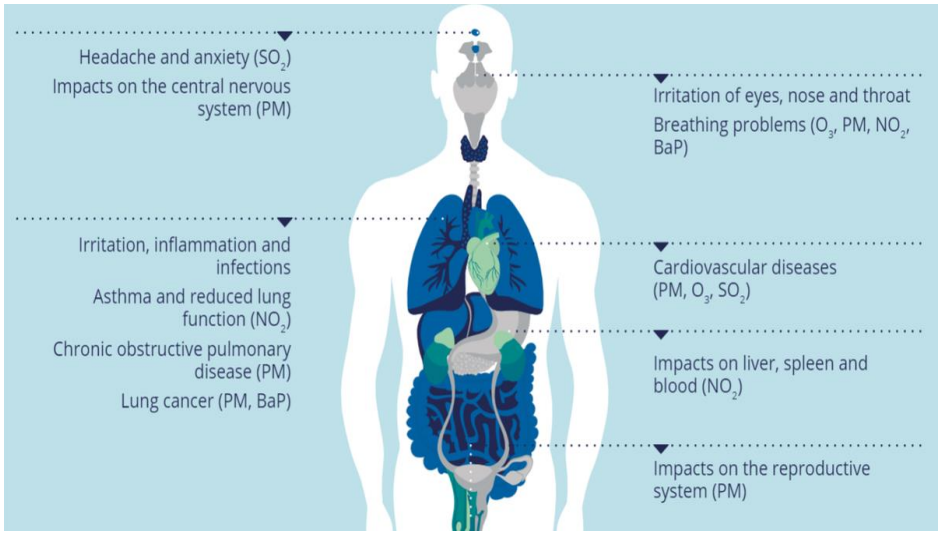
- The Project Area;
- The major village tracts around the Project Area and other villages including (***Pa Ywat Sate Gone, Kyi Ni San, Poe Dana Gone and Shan Gone villages***) which are ***located at the upstream of the project site***
- the Township is Hmawbi and the closest village tract is War Net Chaung; and
- Location of decision-making centres and location of the key government agencies (Yangon, and Naypyidaw).

(A) The potential health impacts need to be evaluated /Issue identification

Regarding the potential, and sometimes unintended ***health impacts due to the project operation activities*** of a proposed project, the local community can be affected by the impacts of project activities, specifically in terms of ***air quality, noise levels, water and soil conditions***, as well as the potential for ***accidents and injuries***.

(i) Health effects due to air pollution likely affected by the project activities

The exposure to air pollution can lead to the following health effects.



Note: Particulate matter with a diameter of 2.5 µm or less ($PM_{2.5}$), particulate matter with a diameter of 10 µm or less (PM_{10}), ozone (O_3), nitrogen dioxide (NO_2), *benzo*[a]pyrene (BaP) and sulphur dioxide (SO_2).

Source: https://www.eea.europa.eu/en/topics/in-depth/air-pollution/eow-it-affects-our-health

(ii) Health effects due to Noise pollution likely affected by the project activities

The exposure of noise pollution can lead to ***hearing loss, tinnitus, sleep loss, and cardiovascular and metabolic diseases.***

Source:https://www.eea.europa.eu/en/about/contact-us/faqs/how-does-environmental-noise-pollution-impact-my-health

(iii) Health effects due to water pollution likely affected by the project activities

The exposure of water contaminants/pollution can result in ***gastrointestinal illnesses, nervous system or reproductive effects, and chronic diseases such as cancer*** based on the type of contaminant, its concentration in the water, individual susceptibility, the amount of water consumed, and the duration of exposure.

(iv) Health effects of chemical exposure. Chemical exposure through drinking water can lead to a variety of short- and long-term health effects. Exposure to high doses of chemicals can lead to ***skin discoloration or more severe problems such as nervous system or organ damage and developmental or reproductive effects***. Exposure to lower doses over long periods of time can lead to chronic, longer-term conditions such as cancer. The effects of some drinking water contaminants are not yet well understood.

(v) Health effects of consuming water with disease-causing microbes. Most ***life-threatening waterborne diseases*** caused by microbes (such as ***typhoid fever or cholera***). The more common illnesses caused by viruses, bacteria, and parasites can result in ***stomach pain, vomiting, diarrhea, headache, fever, and kidney failure.*** Infectious diseases such as ***hepatitis*** can also occur.

Source: https://www.epa.gov/report-environment/drinking-water#effects

(vi) Health effects due to soil pollution/contaminants

The long-term exposure to soil pollution can affect the local community particularly in ***vulnerable groups, such as children and the elderly*** depending on the ***chemicals involved*** as well as ***a limited range of pollutants***.

The soil pollutants can affect various organs, such as the ***lungs, skin, gut, liver and kidneys.*** These pollutants can also affect ***the immune, reproductive, nervous and cardiovascular systems***, and more. Evidence suggests that the health impacts of soil pollution disproportionally affect ***poorer households***; for example, poorer households have ***higher chances of living close to industrial sites and being exposed to contaminated soils***

https://www.eea.europa.eu/publications/zero-pollution/health/soil-pollution

(vii)Accidents and injuries

Traffic accidents have become one of the most significant causes of injuries and fatalities among members of the community within the vicinity of the project site.. Environmental, Health, and Safety (EHS) Guidelines: COMMUNITY HEALTH AND SAFETY.

(III) Impact Assessment

In the Health Impact Assessment, ***community health indicators***, encompassing both ***present health conditions*** and the ***existing environmental baseline quality monitored during the operation phase*** are prioritized in alignment with their significance.

(A) Baseline Data

Concerning the baseline data, the ***majority of villages are situated to the north and west*** of the Project Area, with industrial and army land occupying the south and east, devoid of residential areas. Consequently, the ***population*** and ***socio-demographic profile*** of the village tracts within a 3.5 km radius around the Project Area have already been assessed. Therefore, the health impact assessment on the selected Area of Interest (AOI) including the major immediate villages and others namely ***Pa Ywat Sate Gone, Kyi Ni San, Poe Dana Gone, and Shan Gone villages*** is based on the ***existing data*** as the local community in these areas closely adheres ***to a similar socio-demographic and land-use pattern.***

(i) Health profile

The main illnesses are ***common fever, hypertension, kidney problems, and stomach aches***. The ***main hospital in the AOI is in War Net Chaung village.***

(ii) The ambient air data during the operation phase

In order to determine the existing air quality status of the proposed Hmawbi Agricultural Inputs Complex (HAIC), ambient air monitoring was conducted 24 hr continuously at the following factory's process locations during the operation phase in align with the monitoring schedule plan.

• Point 1(EC2)

• Point 2 (SC2)

• Point 3 (SP)

• Point 4 (GR)

• Point 5 (WP)

• Point 6 (SL)

• Point 7 (WH2)

• Point 8 (WH1)

• Point 9 (SW corner of the factory compound)

• Point 10 (NW corner of the factory compound)

• Point 11 (NE corner of the factory compound)

• Point 12 (SE corner of the factory compound)

The existing particulates level ***(PM10 and PM 2.5)*** of the selected production sites ***met the guidelines***. In terms of gases level, ***all gases levels (one-hour average level of NO2 and 24 hr average level of SO2, H2S, VOC and NH3) met the guidelines***. The detailed data can be found in the appendix (I).

Thus, it can be assumed as the ***good air quality for these particulates and gases***. The potential sources mainly come from mobile emission, machine and human activities.

Figure 8-18 : Air monitoring locations at the factory during the operation phase

(iii)The ambient noise data during the operation phase

In order to determine the existing noise quality status of the proposed Hmawbi Agricultural Inputs Complex (HAIC), ambient noise monitoring was conducted 24 hr continuously at the following factory's process locations during the operation phase in align with the monitoring schedule plan

• Point 1(EC2)

• Point 2 (SC2)

• Point 3 (SP)

• Point 4 (GR)

• Point 5 (WP)

• Point 6 (SL)

• Point 7 (WH2)

• Point 8 (WH1)

The 24 hr average noise levels of ***point 1 (EC2), point 4 (GR), point 5 (WP), point 6 (SL), point 8 (WH1) met the EQEG guideline*** while the 24hr average noise level of point 2, 3, and 7 did not meet the guideline.

Particularly, the ***day time noise levels of point 2 (SC2), 3 (SP), and 7 (WH2)*** more or less ***increased than of the day time of EQEG*** guideline but ***the night time noise levels met*** the ***guideline.***

Looking at the source of noise emission, the vehicles activities (Cars, Machine and forklifts),motorcycles, people activities etc. were the main contributors toward the noise emission.

Figure 8-19 : Noise monitoring locations at the factory during the operation phase

(iv) The wastewater data during the operation phase

In order to determine the treated wastewater discharge, storm water and tube well water quality status of the proposed Hmawbi Agricultural Inputs Complex (HAIC), water monitoring was conducted at the lagoon (1), drainage and tube well respectively during the operation phase in align with the monitoring schedule plan. The following parameters were tested:

1)pH
2)Total Suspended solid
3)Ammonia

4)Total Phosphorus
5)Arsenic
6)BOD
7)COD
8)Chromium Total
9)Chromium Hexavalent
10) Copper
11) Phenol
12) Zinc
13) Oil & Grease
14) Mercury
15) Chlorinated organics: Non detected and meet the Guideline value (0.05mg/l)
16) Niro-organic compounds meet the Guideline value (0.05mg/l)
17) Adsorbable Organic Halogens are slightly higher than the guideline value (1 mg/l)

All abovementioned ***wastewater parameters of the selected locations met the EQEG guideline*** except some parameters namely (***COD and Copper and Adsorbable Organic Halogens***) tested at the lagoon (1) were ***slightly higher than*** of the ***EQEG guideline.***

Figure 8-20 : Wastewater, Storm water and Tube water monitoring locations at the factory during the operation phase

(B) Detail impact assessment likely affected by the activities of the project operation phase

These impacts are assessed in accordance with the ***Scoping Matrix for Operation phase of HAIC (Table 6.1, Impact Assessment Process (figure 6.1 and 6.2).***

The ***detail impact assessments*** are presented in the following tables:

(I) Air quality impact on the local community

Impact	Impact on community health and safety during operation				
Impact Nature	Negative	Positive	Neutral		
	Air quality impact to the local community 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 operation phase.				
Impact Extent	Local	Regional	Global		
	Impact is limited to communities near the operation site.				
Impact Scale	N/A				
Impact Frequency	The emission from the factory operation process and vehicles will be almost continuously throughout the operation period.				
Likelihood	Unlikely but certainly possible given that residents will be affected by the air pollution / fugitive dust emitted from the project process activities together with transportation 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 **Medium**.				
Significance	Negligible	Minor	Moderate	Major	
	The significance is likely to be **Moderate**				

The residual impact is of ***minor significance*** after applying the mitigation measures.

(II) Noise quality impact on the local community

Impact	Impact on community health and safety during construction				
Impact Nature	Negative	Positive	Neutral		
	Noise quality impact 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 operation phase.				
Impact Extent	Local	Regional	Global		
	Impact is limited to communities near the operation site.				
Impact Scale	N/A				
Impact Frequency	The emission from the factory operation process and vehicles will be almost continuously throughout the operation period				
Likelihood	Unlikely but certainly possible given that residents will be affected by the air pollution / fugitive dust emitted from the project process activities together with transportation 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 **Medium**				
Significance	Negligible	Minor	Moderate	Major	
	The significance is likely to be **Moderate**				

The residual impact is of ***minor significance*** after applying the mitigation measures.

(III) Water quality impact on the local community

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 operation 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 affected by the water contamination as well as water consumption due to operation activities which are generation of sediment-laden run off which can be transferred to the nearby Sabagyi creek.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
	The impact magnitude is potentially **Medium.**				
Receptor Sensitivity	Low	Medium	High		
	The receptor sensitivity is considered **Medium.**				
Significance	Negligible	Minor	Moderate	Major	
	The significance is likely to be **Moderate.**				

The residual impact is of ***minor significanc***e after applying the mitigation measures.

(IV) Soil quality impact on the local community

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 affected by the soil contamination due to improper solid waste management. In addition, 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.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
	The impact magnitude is potentially **Medium.**				
Receptor Sensitivity	Low	Medium	High		
	The receptor sensitivity is considered **Medium.**				
Significance	Negligible	Minor	Moderate	Major	
	The significance is likely to be **Moderate.**				

The residual impact is of ***minor significance*** after applying the mitigation measures.

(V) Potential injury on the local community

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 operation 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 **Moderate**				

The residual impact is of ***minor significance*** after applying the mitigation measures.

Following the evaluated findings, the perceived ***impact significance*** on the community during the ***project's operation phase*** for ***Air, Noise, Water, and Soil*** was deemed to be of M***oderate.*** These impacts can be ***negligible after*** complying the ***mitigation measures***.

(VI) Recommendation

6) To ***record the underlying causes of death in the Township, Station and Sub-centers***.
7) To record the ***incidence*** when the people residing the affected vicinity come to the either clinics or hospitals
8) To conduct ***feedback surveys on the local stakeholders' perception*** on the proposed project whether they are acceptable to the change.
9) To ***monitor ambient air, noise, water (surface and ground)/ wastewater and soil*** at the proposed project and vicinity ***during the operation phase***/production phase
10) To provide ***health education how to reduce the potential health impacts*** likely affected by the community's existing socioeconomic life style and the activities of the proposed project

(VII) Potential mitigation measures

3) To ***reduce pollution exposures*** at the workplace and in the vicinity around the proposed project
4) ***Comprehensive details*** regarding relevant ***mitigation measures*** are outlined in ***Chapter 6, while Chapter 8*** provides an in-depth presentation of the monitoring plans.

Table 8-23 Community Health and Safety Management and Monitoring Sub-plans (Operation phase)

No	Activities	Specific Action	Frequency	Responsibility
1.	Evaluation of risk and impact	-First of all evaluate potential risk and impact on the community and subsequent mitigation measures. -Avoid/minimize the risk as far as possible.	Annually and Periodically	HSE Team
2.	Water quality and availability	-Avoid/prevent adverse impact to the quality and availability of ground water and surface water resources, especially protect public drinking water sources at all times. -Avoid the adverse impact on ground water (and soil) as far as possible.	Annually and Periodically	HSE Team
3.	Traffic safety	- Also conduct road safety education campaign for the local community.	Annually and Periodically	HSE Team
4.	Transport of hazardous materials	- Comply with law and regulation relevant to transportation of hazardous materials. - Also plan for measures for preventing and/or mitigating the consequence of accidental release of hazardous materials (chemicals, substances). - Avoid/minimize potential for community exposure to hazardous materials.	Annually and Periodically	HSE Team
5.	Disease prevention	- Prevent the occurrence and spread of communicable disease by all means. Undertake health awareness and education initiative (health education campaign) in local community and also provide health service for them as practical as possible.	Annually and Periodically	HSE Team

		- Avoid/minimize water-borne, water-based, water-releted and vector borne disease and communicable diseases that would result from project activities. - Avoid/minimize by all means spread of diseases from workers. Provide adequate medical treatment. Regularly liaise with Township Healthy Authority.		
6.	Emergency preparedness and response	- Develop Emergency Preparedness and Response Plan and Contingency Plan (action plan) for effective implementation when necessary. - Provide operation manuals for External Emergency Plan and Internal Emergency Plan for all staffs, local community and government inspector. Conduct rehearsal or drills for such plans. Cooperate with local community and authority in preparation of emergency plan and review and update the plan occasionally. - Notify competent authority in the event of emergency that has occurred on the site, if any. - Implement safety audits for the facility and promote the execution of the overall environmental management system.	Annually and Periodically	HSE Team

8.3.10.9.1 Monitoring

The Awba's HSE Committee will be in charge of monitoring the compliance of this CHSMP in collaboration with logistic department and health department (workplace clinic's representative). Any non-compliance and its recommended corrective action will be record by the HSE Committee in their meeting's minutes.

8.3.10.9.2 Reporting

Non-compliances related to this Community Health and Safety Management Plan will be reported to the HSE Department for investigation and record in the HSE committee meetings. Any social complaint received regarding community safety and health will be reported to the HSE Supervisor and acted upon accordingly in coordination with the Community Grievance Coordinator.

8.3.10.9.3 Current Actions taken by HAIC in response to Community Health and Safety

AWBA is planning to launch a Corporate Social Responsibility CSR program to perform using 2% of the annual net profit.

At present in HAIC, a workplace clinic is providing medical healthcare services for the employees (the majority of the workforce is sourced from local villages) during working hours.

According to the local village representatives from the review team at the HAIC office, HAIC has from time to time provided financial support for village road construction under the CSR work program, and if the Wanet Chaung road is repaired, it will participate with other communities as part of the CSR process.

A Grievance Mechanism was set up for communities and individuals to formally communicate their concerns, complaints and grievances to the company and facilitate resolutions that are mutually acceptable by the parties. (Refer to Section 9.5.1)

8.3.10.9.4 Implementation Schedule

Remark: Implementation Schedule, Responsibilities and Monitoring of community health and safety will be the same with Stakeholder Management Plan and Public Health Management Plan for the 2.5 km vicinity of the project site will be developed collaborating with the nearby factories and immediate community likely affected by the factories located in the industrial zone in accordance with the respective guidelines.

8.3.10.9.5 Budget allocation for Community Health and Safety sub-management plan (Operation)

HAIC will use 2% of the total investment for EMP cost. The total investment of HAIC is 17,291,500,000 MMK (MMK 17291.5 million). Then the estimated cost for the management plan is 345,830,000 MMK. Among the total management plan, the budget allocation for the mitigation measures and monitoring plan will include for air/odor/noise, waste (solid and hazardous waste), potable & wastewater, Occupational Health & Safety and Community Health & Safety. Thus, the budget is allocated for Air/Odor management plan would be around 69,166,000 MMK while

27,666,400MMK for monitoring plan and 41,499,600 MMK for mitigation measures.

The budget allocation for Community health and safety management plan under operation phase including mitigation measures and monitoring is under the following table.

Table 8-24 Budget allocation of Wastewater Management Plan

Environmental actors	Activities	Responsibility	Estimated Budget
Operation phase			
Community Health and Safety	Total	HSE Team	69,166,000 MMK
	Operation Phase	HSE Team	41,499,600 MMK
	Monitoring Plan of Operation Phase (40%)	HSE Team	16,599,840 MMK
	Mitigation Plan of Operation Phase (60 %)	HSE Team	24,899,760 MMK

8.3.11 Stakeholders Engagement Management Plan

This Stakeholders Engagement Management Plan (SEMP) contains the guidelines established to regulate the recommended communication from the HAIC Project with the different social stakeholders of the area of social influence. The methods and strategies proposed in this Plan will help Awba manage its interactions with the relevant governments and authorities, local villages and other social organizations that may be based in the area of influence of the HAIC Project.

8.3.11.1 Objectives

This Stakeholders Engagement Management Plan (SEMP) seeks to lay the foundations to maintain the highest standard of business conduct, the proactive communication and engagement with the stakeholders of the HAIC Project, in order to be able to transmit clear, timely and effective information to them and receive timely feedback, especially as it relates to the effective implementation of the ESMPs outlined in this document and overall HSE performance.

This SEMP also aims at meeting the following secondary objectives:

1) Identify the main social stakeholders and propose specific dissemination strategies among them;
2) Align the way to establish communication methods with affected local villages in an inclusive, structured, and culturally appropriate manner to ensure their free, prior, and informed participation;

3) Implement bi-directional communication mechanisms, permanent and accessible to the villages and population within the AOI (Area of Influence), on the activities of the HAIC Project and the actions linked to social and environmental management plans and overall HSE performance, thus contributing to people's understanding, clarification of doubts and concerns; and
4) Ensure key stakeholders are properly informed throughout the operation processes of the HAIC Project.

8.3.11.2 Sources of Impact

The potential risks and impacts of an insufficient or poor communication with the stakeholders are the following:

1) Perception of lack of interest to collect and resolve the local concerns about possible dust pollution, traffic and road safety, air emissions from incinerators, noise, odour, water contamination, or any other discomfort that may be related to the HAIC Project activities that may lead in social conflicts, strikes and impact on the social image of Awba and its HAIC Project; and
2) Lack of knowledge about the existence and compliance of environmental and social measures to mitigate the impacts of the HAIC Project.

8.3.11.3 Design and Management

Awba's HSE Department will comply with the following actions:

1) Continue with the implementation of the Community Grievance Mechanism to record and attend all the complaints;
2) Updated the stakeholder mapping on an annual basis. A stakeholder mapping and engagement has been done in February 2018 during the updated ESIA preparation process and another one was prepared on October 2018 by external consultancy service. This identify the following stakeholders' groups:
   i. Government officials;
   ii. Neighboring communities and monastery;
   iii. Employees and contractors; and
   iv. NGO's and conservation organizations.
3) Submit the executive summary of the ESIA Study in Myanmar language to MONREC and other relevant stakeholders.

Submit the executive summary of the ESIA Study in Myanmar language to MONREC and other relevant stakeholders.

8.3.11.3.1 Community Grievance Mechanism

Awba has established a Community Grievance Mechanism to provide a simple and effective means for interested and affected parties to communicate issues, concerns or grievances to Awba and to receive timely feedback about issue resolution.

Aggrieved stakeholders ("complainants") are able to file their grievances through a variety of channels (e.g. standard submission form, phone, in-person, etc.). Standard submission forms and submission collection boxes are available in a central location in all project affected communities. Community volunteers in each community monitor submissions

collection box, collect, and hand over grievance reports to the Awba field team twice a week (every Wednesday and Friday). Complainant may submit forms to volunteers on any other day. If complainants wish to orally report a grievance, volunteers will record information on a standard submission form on behalf of a complainant; then explains what he or she has written, and the complainant provides a signature to confirm that it is correct. Complainant may inform to the field team about grievances directly by phone.

After receipt of a complaint, field team will make a register for the complaint and assign a case number. Field team will provide the Complainant with a brief description of the process that will be followed and a case number for reference. The purpose of the registration is to use the case number to reference for calculating the KPI, as well as monitoring and evaluating the process.

Awba field team will review the grievance reports to discuss, categorize and record them. The relevance of the issue being raised to the Awba's project can be categorized as follows:

1) The compliant pertains to the project;
2) The issues raised in the complaint fall within the scope of issues the grievance mechanism is mandated to address; and
3) The complainant has standing or a valid reason to file.

After receipt of a complaint, field team, together with the volunteer, will visit the complainant to acknowledge that their grievance has been received, and collect and record any additional details the complainant wishes to communicate. The initial site visit and acknowledgement should be completed within one to seven days from date of receipt.

Awba field team will work closely with local authorities and community volunteers to investigate the grievance, initiate dialogue and negotiation to resolve the complaint. In more complex cases requiring negotiation or mediation, appropriate central or local government officials may be involved in support of the process. In all investigations, supporting evidence should include, as appropriate, measurements, photos, the compensation amount for the damages, etc. Findings of the field team shall also be included within the grievance report.

The grievance mechanism is responsible for communicating the proposed response back to the complainant within 14 days from the date of receipt. If the grievance is complex and the predetermined deadline for providing feedback cannot be met, provide an interim response – an oral or written communication – that informs the person of the delay, explains the reasons, and offers a revised date for next steps.

Field team, together with the volunteer, will set up a face-to-face meeting to provide feedback to the complainant. The response will include a clear explanation of the results of the investigation, why the response is being proposed, and what the response would be, and the next steps and actions to be taken for resolution, if any.

After the discussion on the complaint with the complainant has been made, if the complainant is satisfied, the field team shall record and confirm the complainant's satisfaction with the feedback provided. Both the complainant and the witness will sign the form for confirmation.

The deadline of the implementation shall be determined based on the scope of the case but generally within 45 days from the date of receipt. The volunteers shall monitor during the time of implementation and seek the confirmation of implementation with the complaints and inform the field team.

8.3.11.3.2 Worker Grievance Mechanism

Awba has established a Workers Grievance Mechanism to ensure that appropriate complaint procedures are in place for the fair effective and expeditious handling of workers' complaint alleging breach of the requirements of company policies and national labour law. This will be available also to contractor's workers.

All employees will receive training about the complaint procedure during their induction briefing and a complete set of Complaint Procedure provided by Group HR Department is handed to the joining employee. The worker/staff with a complaint shall have ability to have the matter addressed by bringing to attention of the proper authority as provided below;

1) Immediate Superior;
2) Group HR Department; and
3) Labor Committee.

- The worker shall have right to be accompanied or represented by Members of Labour Committee during the complaint procedure and not be victimized;
- Complaint shall be sought to be resolved at the lowest level possible; and only when the matter cannot be resolved to the satisfaction of both parties, shall it be elevated to the next level;
- Anonymous complaints are allowed to be sent;
- Notwithstanding above, the worker shall have the right to complain directly to the HR Department and where they consider it necessary, or to the Complaint Handling Officer of Township Labor Office;
- In accordance with applicable Labor Law, the worker shall have 14 days from the date of the alleged occurrence of the labor grievance (complaint) to bring the matter to the labor's superior officer, and the head of HR Department, each of whom has a further step 7 days to bring about a solution to the grievance (complaint);
- If the Head of Department is unable to resolve the matter, the worker shall have 7 days to bring it through the Group HR to the management team. However, if the complaint may be to the prejudice of the worker may complain directly to the labor worker committee. The company and the worker concerned shall have a period of 14 days to bring about conciliation; and
- All complaints and the decision on them should be recorded and a copy provided to the worker concerned.

A Human Resource person has to be allocated on HAIC for monitoring the proper implementation of the Workers Grievance Mechanism.

8.3.11.3.3 Villages Development Advisory Committee Meetings

The Villages Development Advisory Committee (VDAC) is founded according to Myanmar Awba Group's development plan in order to implement the operations to improve the living standard of the people from the surrounding villages, which includes

having access to drinking water, road and transportation, health, education, fire prevention and having access to electricity.

The target of the VDAC is to suggest and carry out necessary improvements for the village according to the priority level on behalf of the local resident and to do so transparently and effectively, consequently raising the living standard of the local population from the neighboring villages.

The VDAC will be established as the following with thirty-four members ranging from representatives from the villages and its governing committees as well as from HAIC. The VADC's term will be the same as the governing committee of the villages.

The VDAC responsibilities are:

1) Develop standard forms for consistency when submitting the development operation suggestions for the improvement of the village;
2) Conduct field inspections on the necessities submitted by the villages, verify the priority level and submit to the company;
3) Select transparently in front of all the members providing the situation analysis. The improvement operations will be managed and conducted by the company and the committee will be responsible for the daily supervision of said operations and to submit the monthly progress report to the company;
4) Plan the budget for improvement projects that cannot be covered by the first year in order to be able to get it covered in the following year;
5) Submit the expected expenses of the following year according to the projects latest by 31st January;
6) Submit the yearly expenses to Myamar Awba Audit and to provide suggestions and opinions through the committee; and
7) Set the committee meeting records as classified and keep them.

Community volunteers from War Net Chaung, Nyaung Kone, Yae Tar Shey and Tha Pyay Kone villages have been selected during the ESIA, tasked with the mission to submit to Awba/HAIC all concerns related to potential impacts and for monitoring their proper record and response. The volunteers will thus held a social leadership role and are expected to participate in the regular meetings to be organised by Awba in relation to the HAIC Project progress and activities. These meetings are expected to be held on a monthly basis.

The Community Grievance Coordinator of Awba is the person in a charge of leading these meetings. All the matters discussed and agreements in each meeting will be minute in Myanmar language.

Below is the proposed agenda for each meeting (noting that it is not necessarily to be limited to this):

1) HAIC should provide continuous information to local stakeholders on its ESMPs implementation progress, including E&S Action Plan (ESAP) agreed upon with IFC at appraisal;
2) Response status of any concerns/questions recorded during the previous meeting;
3) Report of the results of the stack air emissions from incinerator, noise and water quality monitoring carried out during the previous month (if applicable). If the maximum permissible limit of any parameter has been exceeded, the corrective measures that are intended to be performed will be explained;
4) Communicate the mitigation measures defined in the Emergency Preparedness and Response Plan, especially related to firefighting and major hazardous materials spills;

5) Inform the measures implemented during the previous month to mitigate any adverse impacts to the environment (e.g. noise, dust pollution, odour, traffic and road safety, etc) in the HAIC Project area of influence;
6) Inform about any unforeseen operation activity that may generate an unexpected impact and explain the planned mitigation actions;
7) Inform about the social responsibility activities performed during the previous month and disclose KPIs;
8) Include doctor or nurses involve in the VDAC meeting in order to support village communities for acknowledging potential health impacts;
9) Register any new concern related to a possible environmental impact (noise, dust pollution, odour, traffic and road safety, etc.) or social (alteration of public order, health, etc.) and addressed it through the Grievance Mechanism; and
10) Continuously socialize the Community Grievance Mechanism and jointly review any grievances registered in the log books.

HAIC Project site visits with Yangon and Naypido based stakeholders should be organised, when required. These information is going to be delivery by Awba volunteers and through the Villages Development Advisory Committee (VDAC).

Figure 8-21 Consultation meeting photos of the HAIC project

8.3.11.3.4 Notice Boards

To reinforce the communication activities, information should be posted once a month on the villages' notice boards within the area of influence, including takeaway material like brochures and flyers, to disclose on matters, such as:

1) Recent social responsibility activities developed and disclose KPIs;
2) Emergency response procedure in case of a fire and/or significant hazardous waste spill;
3) Publication of phone contact number for channeling community grievances;
4) Main environmental mitigation measures implemented; and
5) Hiring practices and local job opportunities given.

A summary of this information will be published on Awba website and updated on a regular basis.

8.3.11.4 Key Performance Indicators

The effectiveness of the management measures described above will be assessed using the following Key Performance Indicators (KPIs):

1) Number of community and workers complains received by each channel (phone, email, one-on-one interview, labor union, etc);
2) Percent of Satisfied on GM process and outcome;
3) Number of workshops, surveys and focus group meetings conducted;
4) Number of VDAC's meetings performed;
5) Number of issues noted and addressed in the VDAC's meeting minutes; and
6) Number of activities disclosed in the notice boards.

8.3.11.5 Stakeholders Engagement Management Sub-plan

Source of Impact	**Control Measures**	**Frequency**	**Responsible Person**
Perception of lack of interest to collect and resolve the local concerns about possible dust pollution, traffic and road safety, air emissions from incinerators, noise, odour, water contamination, or any other discomfort that may be related to the HAIC Project activities that may lead in social conflicts, strikes and impact on the social image of Awba and its HAIC Project.	- Community Grievance Mechanism 1. Detailed activities for community grievance process are mentioned in 8.6.3.1. - Worker Grievance Mechanism ***1. Detailed activities for worker grievance process are mentioned in 8.6.3.2. (http://www.awba-group.com/) Pg.8,9 ESMP report of Awba/ Project No.: 0406940***	Biannually meetings with stakeholders for grievance process. Biannually meetings with factory workers for grievance process. Depend on the instructions of related governmental organizations.	HSE Team

Lack of knowledge about the existence and compliance of environmental and social measures to mitigate the impacts of the HAIC Project.	- Villages Development Advisory Committee Meetings 1. Detailed responsibilities for VDAC are mentioned in 8.6.4. - Notice Boards 1. Detailed information for communication activities are mentioned in 8.6.5. (http://www.awba-group.com/) Pg.8,9 ESMP report of Awba/ Project No.: 0406940	- Biannually meetings with local community and VDAV for grievance process. - Depend on the instructions of related governmental organizations.	HSE Team

8.3.11.6 Implementation Schedule

The management actions will be performed as mentioned in the tables above. The actions have to be revised accordingly after every project activity conducted, in order to guarantee the compliance with applicable laws.

8.3.11.7 Responsibilities and Monitoring

Factory Manager and HR manager review and take action for any issues in relation to the report from Operation manager, maintenance manager, and HSE officer and .

In addition, the Community Grievance Coordinator will assess progress towards the key performance indicators listed above on a monthly basis. In cases where monitoring identifies significant divergence from the terms of this SEMP, the HSE Manager will be notified and remedial actions taken as necessary.

To facilitate satisfaction of the commitments set out in this SEMP, the HSE Manager will report the progress of the grievance mechanisms to top management monthly and annually to the Board. The budget allocation for the stakeholder management plan will be the same with the budget allocation of community health and safety management plan.

8.3.12 Aquatic Biological Monitoring

The internal storm water of HAIC is discharged offsite into the nearest surface watercourse (a tributary of Sa Pa Gyi Creek) located approximately 100 m to the northern boundary of the Project site which finally discharges into Sa Pa Gyi Creek. HSE personnel of HAIC confirmed that treated wastewater from Lagoon 2 is designed to discharge to the stream in case of overflow through the internal storm water drainage network. The HSE personnel also confirmed that the Lagoon has never overflowed since the commencement of HAIC even in the rainy season and the treated wastewater quality in Lagoon 2 is reportedly compliant with Myanmar National Emission Quality Guidelines.

Moreover, according to the baseline surface water quality conducted in June and July 2017, the water quality of the stream is compliant with the guidance levels of National Emission Guidelines and WBG Guidelines for treated sewage discharge except for TSS. An exceedance of TSS level is considered due to poor water course management and sediments flowing during rainy season when the water sample was collected.

Considering the aforementioned facts, the impact of the Project on aquatic animals is considered **Medium**.

In addition, in case of unplanned chemical spillage and contaminated wastewater flow to the stream, an aquatic biological monitoring plan is recommended to examine the biological condition of aquatic organisms in the particular stream.

There are various established approaches to monitoring individual organisms, species, and biological communities in aquatic environments, known as ‘biological monitoring.’ Aquatic biomonitoring can access the ecological condition of rivers, lakes, streams, and wetlands by examining the organisms that live there. The organisms used in biomonitoring as an indicator are called bio monitors and these indicator species within the aquatic environment can highlight when there are sudden abrupt changes and long-term gradual shifts in water quality. The recommended monitoring plan is presented in Table below.

Table 8.25 Aquatic Biological Monitoring Plan

Factor	Key Performance Indicator/Parameter	Procedure	Frequency	Location	Responsible
Aquatic Biodiversity	Baseline data for aquatic animals in the stream -Type of fish (species) -Frequency of occurrence	- Conduct baseline aquatic biodiversity survey focusing on aquatic animals (fishes) which can be used as indicators for biomonitoring - Random survey with questionnaire (photo, questions, etc.) and observation	Wet season Dry season	random participants such as fisher men, local residents living throughout the Stream within project AOI (for example: 2 km radius stretch)	HSE and 3rd Party
	Monitoring data for aquatic animals in the stream after the unplanned cases happen	- Monitor the aquatic animals in the stream to identify the changes after the unplanned chemical spillage or contaminated wastewater discharged to the stream - Compare the data with baseline data to examine any negative changes happened to the aquatic environment in the stream		random participants such as fisher men, local residents living throughout the Stream within project AOI (for example: 2 km radius stretch)	HSE and 3rd Party

Factor	Key Performance Indicator/Parameter	Procedure	Frequency	Location	Responsible
Surface and storm water quality	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 - Number of surface water samples which is noncompliance with Myanmar National Emission Guidelines and WBG Guidelines for treated sewage discharge	- Monitor the surface water quality of the stream and compared with Myanmar National Emission Guidelines and WBG Guidelines for treated sewage discharge	Rainy season	Stream and storm water discharge outlet	HSE and 3rd Party

The storm water quality laboratory testing results should be compared against Myanmar National Emission Quality Guidelines (2015) for general wastewater and site runoff effluent level.

Table 8.26: Effluent levels for general wastewater and site runoff (NEQG 2015)

Parameter	Unit	Guideline Value
5-day Biochemical oxygen demand	mg/L	50
Ammonia	mg/L	10
Arsenic	mg/L	0.1
Cadmium	mg/L	0.1
Chemical Oxygen Demand	mg/L	250
Chlorine (total residue)	mg/L	0.2
Chromium (hexavalent)	mg/L	0.1
Chromium (total)	mg/L	0.5
Copper	mg/L	0.5
Cyanide (free)	mg/L	0.1
Cyanide (total)	mg/L	1
Fluoride	mg/L	20
Heavy metals (total)	mg/L	10
Iron	mg/L	3.5
Lead	mg/L	0.1
Mercury	mg/L	0.01
Nickel	mg/L	0.5
Oil and grease	mg/L	10
pH	S.U	6-9
Phenols	mg/L	0.5
Selenium	mg/L	0.1
Silver	mg/L	0.5
Sulphide	mg/L	1
Temperature increase	°C	<3
Total coliform bacteria	mg/L	400
Total phosphorus	mg/L	2
Total suspended solids	mg/L	50
Zinc	mg/L	2

8.3.13 Offensive Odour Management Plan

8.3.13.1 Objective

The objective of the HAIC project is to minimize adverse impact on indoor air quality and working environment of the factory area.

8.3.13.2 Policy and legal frame work

The Project's Environmental and Social Policies, Legal Requirements and Institutional requirements have been detailed in Chapter 3.

8.3.13.3 Major Odorous Compound in General Pesticide Industry

In general, process emissions can be classified into point source and fugitive emissions. The point source emission is from process operations and the fugitive emission is an uncontrolled emission from storage tanks/drums, spills, leaks, overflows etc. In pesticide industry, odour is mainly imparted by Phosphorous, Sulphides and Chlorides. Some common odorous compound in a general pesticide industry are listed in table below.

Table 8.27 List of common odorous compound in a general pesticide industry

Sr.no	Pesticide	Odourous Compounds
1	Acephate (pungent smell)	HCL
2	Dimethoate	H_2S
3	Cypermethrin	Cl_2 , HCl and SO_2
4	Isoproturon	NH_3
5	Ethion	H_2S and C_2H_5SH
6	Malathion	H_2S
7	Phorate (rotten eggs)	H_2S and C_2H_5SH

Odorous compounds and their health impacts are summarised in table below.

Table 8.28 Odorous compounds and their health impacts

Sr.no	Properties	Exposure & odor	Health Impact
1. Ammonia	Colourless, Stable at room temperature	TWA-50ppm at Ammoniacal strong, high corrosive in presence of Cu and its alloys	Exposure can cause coughing chest pain difficulty in breathing
2. Chlorine	Greenish, yellow gas, extremely reactive	TVL.0.5 ppm, pungent suffocating, bleach like odour	Can cause itching and burning of the eyes, throat
3. Hydrogen Sulphide	Colourless gas, stable, highly imflammable,	TWA-10ppm, smell of rotten eggs,	High toxic may be fatal if inhaled, skin contact may

			burn
4. Ethyl mercaptan	Colourless gas, stable, Under normal storage condition	Odor threshold is 0.001 ppm	Highly toxic affects the central nervous system
5. Sulphur dioxide	Colourless gas, stable, omcompatible with strong reduction or oxidizing agent	TWA 2ppm, irritating pungent odor	Can cause fatal

8.3.13.4 Existing Odour Mitigation Measures

Although the actual source of the odour is difficult to identify, Awba has implemented a series of mitigation measures to 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.

Wet scrubbing and gas washing oxidation for odor control is considered one of the most fundamental and universal deodorization technologies. More than 90% of odorous compounds are water soluble and offensive odor substances were decomposed, oxidized, or converted into non odorous substances by adding water.

Awba also implemented Grievance Mechanism in order to communicate the local community upon their worries, concern and complaint about the nuisance odour issues.

8.3.13.5 Offensive Odour Management Sub-plan

Source of Impact	**Control Measures**	**Frequency**	**Responsible Person**
Common Odour Compounds (Ammonia, Chlorine, Hydrogen Sulphide, Ethyl mercaptan, Sulphur dioxide)	- Stable at room temperature - High inflammable and keep away from fire. - Under normal storage condition - Incompatible with strong reduction or oxidizing agent - Detailed activities for common odour compounds are mentioned in 8.14.3.1 and 8.14.3.2.	Biannually	HSE Team
Existing mitigation measures (a confined partition room for solid production, and a	- Deodorization Technologies 1) wet scrubbing, and 2) gas washing oxidation - Grievance Mechanism for nuisance odour issues.	Biannually	HSE Team

scrubber system on the source of emission)			

8.3.13.6 Implementation Schedule

The mitigation measures and management plan & Sub Plan will be performed as mentioned in air quality management plan and subplan. Odor Management and monitoring will be conducted the same with air quality management plan.

Table 8-29 Odour Monitoring Plan

Factor	Key Performance Indicator/Parameter	Procedure	Proposed Duration and Frequent of Monitoring	Location
Nuisance odour	Number of nuisance odour complaint received from the local community	Record keeping and documentation the cases/ complaints and make proper investigation for the root cause and recommend for the corrective actions		Grievance Mechanism
	Hydrogen Sulphide (3 mg/Nm3), Chloride (5 mg/Nm3), Ammonia, Gaseous Inorganic Chlorine Compounds (as HCl) HCL (30 mg/Nm3), Sulphur Dioxide (20(24Hr),500(10min)	Odour monitoring will be conducted together with air emission monitoring process.	Quarterly, if not detected, change to biannually	Odour monitoring will be carried out at representative Air Sensitive Receivers (ASRs) nearest to the odour generating activities such as process emission outlets. Odour sampling or H2S measurements should be taken outside the premises of the identified

Factor	Key Performance Indicator/Parameter	Procedure	Proposed Duration and Frequent of Monitoring	Location
Odour Measurement	- Olfactometry analysis test	- Olfactometry analysis test should be conducted according to Industrial odour control. 2002. Environmental guideline No.9, Danish Environmental Protection Agency, Ministry of Environment. (NEQG, 2015) According to the National Environmental Quality Emission Guidelines, odour levels should not exceed **five to ten odorant units** at the edge of populated areas in the vicinity of a project.		

8.3.14 Road Transport Management Plan

This Road Transport Management Plan (RTMP) is designed to control and minimize potential negative impacts within HAIC area of influence that are associated with the flow of vehicles during operation phase. The Plan recognizes that some adverse impacts will result from the movement of limited numbers of vehicles and sets out a systematic approach to minimize environmental and occupational health and safety risks through the implementation of good practice procedures, as identified within the ESIA.

8.3.14.1 Objectives

The objectives of this Road Transport Management Plan are to define the operational procedures, controls and mitigation measures for transportation; roles and responsibilities; monitoring; reporting procedures; and training requirements.
This Road Transport Management Plan (RTMP) is part of the suite of the ESMP. The plan covers all operation phase activities that have the potential to result in transport induced impacts.

8.3.14.2 Legal Framework

a) Yangon City Development Committee (YCDC) Law (2018)
b) Vehicle Safety and Motor Vehicle Management Law (2020)
c) Vehicle Safety and Motor Vehicle Management Rules (2022)
d) The Road Transport Operations Law, (2016)
e) The Law related to Road Transport Tax, (Amendment 2015)

8.3.14.3 Sources of Impact

The following types of transport vehicles are expected to be used at HAIC:

1)Vehicles carrying personnel from/to the HAIC Yangon city;
2)Trucks carrying agrochemical merchandise (incoming raw materials and outgoing finished products); and
3)Trucks carrying waste from other Awba facilities, brought to HAIC for treatment and sent to outside of HAIC for disposal as per the environmental permit.

The unpaved access road to the HAIC (12 kilometres) is a public way that is currently used by general public and trucks, which haul red earth that extracted from the adjacent areas of the road in order to sell it in the construction industry. In addition, along the access road, there is the presence of tea shops, a monastery and a school. The latter represents a social receptor where specific measures should be implemented to decrease the risk of accident, considering the time of entry and exit of the children.

This Road Transport Management Plan seeks to minimize the potential impacts associated with an increase of HAIC Project vehicles on the access road that include:

1)Increased risk of road traffic accidents resulting in spillage of fuel or another hazardous material;
2)Increased risks of collisions with other vehicles, pedestrians or domestic animals resulting in injury or death;
3)Dust generation; and
4)Air emissions from combustion engines.

8.3.14.4 Design and Management

The following measures are applicable for operation phase:

1) Restrict vehicle speeds on the access road to a maximum of 40km/h;
2) All vehicles will be selected and maintained to meet Myanmar Road Transport Authority standards and will be used and maintained vehicles/equipment in accordance with good international industry practices. For this purpose, own trucks and service providers will follow Awba's Vehicle Checklist;
3) All drivers will attend an induction and a training program which specifies speed limits and critical social receptors identified over the access. Driver induction training will include: Emergency response in case of an off-site accident resulting in spillage of hazardous substances or collision. The training will also include brief introduction about the hazardous material.
4) All the incidents and accidents will be record through the incident/accident report form;
5) All the vehicles have to be equipped with an emergency spill kit, list of emergency phone numbers, Material Safety Data Sheets, fire extinguisher and first aid kit;
6) All drivers will attend safe driving awareness training;
7) Awba is in the process of adopting a Safety Road Policy and a Transport Management Procedure which capture detailed instructions for drivers to safe transport agrochemical products including strict zero alcohol and drug policy for all drivers at all times;
8) Minimize traffic during rush hours to reduce pressure on road infrastructure and at times of entry and exit of the school located next to the access road;
9) Awba and General Contractor vehicles will inscribe in their chassis the logo of HAIC so the villagers will be able to recognize the vehicles of the Project and whom the vehicles can be associated with. A telephone number to call for any complaints /grievances about the way of the vehicle has been driven or the driver has been behaving (as part of the Community Grievance Mechanism) will be available on HAIC face book page and 6xGM Posts located in the village areas;
10) All permanently employed drivers of the HAIC Project vehicles will hold appropriate driving licenses applicable to the type of vehicle that they drive and to undergo an annual health check up as per AWBA medical program and practices; and
11) The Community Grievance Coordinator will address any community concerns that may be raised related to increase of traffic and dust through the Grievance Mechanism.

8.3.14.5 Key Performance Indicators

Awba will continue monitoring these KPIs through logistic department,

1) Number of NCR of drivers and vehicles;
2) Number of road traffic accidents involving injuries or spillages of hazardous material; and
3) Number of complaints from the communities related to the transport fleet.

Table 8-30 Road Transport Management Sub-plan

Source of Impact	**Control Measures**	**Frequency**	**Responsible Person**
Vehicles carrying personnel from/to the HAIC Yangon city	- Detailed measures for road transport are mentioned in 8.5.3 Design and Management. (http://www.awba-group.com/) Pg.5,6 ESMP report of Awba/ Project No.: 0406940	Depend on the numbers of vehicles for transportation.	HSE Team
Trucks carrying agrochemical merchandise	- Detailed measures for road transport are mentioned in 8.5.3 Design and Management. (http://www.awba-group.com/) Pg.5,6 ESMP report of Awba/ Project No.: 0406940	Depend on the numbers of vehicles for transportation.	HSE Team
Trucks carrying waste from other Awba facilities, brought to HAIC for treatment and sent to outside of HAIC for disposal as per the environmental permit.	- Detailed measures for road transport are mentioned in 8.5.3 Design and Management. (http://www.awba-group.com/) Pg.5,6 ESMP report of Awba/ Project No.: 0406940	Depend on the numbers of vehicles for transportation.	HSE Team

8.3.14.6 Implementation Schedule

The mitigation measures and management plan & Sub Plan will be performed as mentioned in the table above. The Plans have to be revised accordingly after every project activity conducted, in order to guarantee the compliance with applicable laws.

8.3.14.7 Responsibilities and Monitoring

HSE Department and Logistic Department will be responsible for the implementation and monitoring of this plan. Any inspection results in NCR with the Road Transport Management Plan will be investigated by the HSE Department and Corrective Actions Reports (CAR) will be prepared and initiated.
Non-compliances related to this Road Transport Management Plan will be reported to the HSE Department for investigation and record in the HSE committee meetings. Any social complaint received regarding safety and health on the road access will be reported to the HSE Supervisor and acted upon accordingly in coordination with the Community Grievance Coordinator.

8.3.15 Emergency Preparedness and Response Plan

This 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. Each facility and warehouse has its own EPRP.

8.3.15.1 Objectives

The purpose of this Plan is to provide guidelines for emergency preparedness and response, and documents methods for the HAIC Project to help protect employees, contractors and visitors in the event of an emergency situation associated with the activities and facilities. This Plan provides directions for a coordinated and effective response to an emergency by:

1) Identifying potential emergency scenarios that could occur;
2) Identifying the procedures which apply to emergency events and the tactical response plans to be used in the event of an incident;
3) Defining the roles and responsibilities of personnel in an emergency event;
4) Determining resources, tools and equipment required in an emergency event; and
5) Describing training, practices, inspections and monitoring required to ensure site emergency procedures are effective.

8.3.15.2 Sources of Impact

Potential emergency events that could impact HAIC Project-related activities might include;

1) Fire (contained and conflagration);
2) Heavy rainstorm/typhoon/thunderstorm;
3) Road incident or road obstruction;
4) Workers injury; and

5) Spillage of hazardous or potentially-hazardous materials (on or off-site).

8.3.15.3 Design and Management

The HSE Manager leads the development and annual review of this Emergency Preparedness and Response Plan. The below paragraphs describe the general emergency response procedures to be undertaken for each of the main potential emergency events that may occur at the HAIC Project.

HAIC Project's premises are divided into emergency wards. For each wards, emergency area wardens are identified by the HSE Department and provided with dedicated training and materials to enable the implementation of this Plan. HSE Manager retains an updated list of area wardens and area deputy wardens, and ensure that at least one of them is onsite at all times.

The area deputy warden act as the area warden when the area warden is not available to do so. They both are trained as first aiders and received refresher training as recommended by good international practices.

8.3.15.3.1 General Fire Emergency Response

Step 1:

1. Move away from immediate danger;
2. Raise the alarm by manually activating the nearest fire alarm "pull station";
3. Raise a vocal alarm to alert nearby persons and get help;
4. Advise your area warden and line manager supervisor immediately

Step 2;

1. If it is a small fire, attempt to use a portable fire extinguisher to control the fire from spreading;
2. Check for casualties/injured persons;
3. Attempt to help, if it does not pose any danger to you, surrounding people;

Step 3;

1. Evacuate using the emergency exists;
2. Follow the instructions from your area warden;
3. Do not re-enter the site until the HAIC Factory Manager or HSE Supervisor gives the all clear;
4. When in doubt, evacuate.

If you are trapped in smoke or heat:

1) Before you open any door, feel the doorknob with the back of your hand: if the doorknob is warm to the touch, do not attempt to open the door;
2) Stuff the cracks around doors with towels, rags, clothing or tape, and cover vents to keep out smoke;
3) Stay low to the floor, and if possible, cover your mouth and nose with a damp cloth or dust mask to help you breathe;

4) If there is a phone in the room where you are trapped, call control room/outside to tell them exactly where you are located, even if you hear or see emergency services nearby.

Fire safety briefing is given to all new staff, contractor and visitors (likely to be present on site for more than 1 day). A refresher fire safety briefing is provided to all staff at least once a year. The content of fire safety briefing cover:

1) The general concept of fire prevention;
2) Response to a fire alarm;
3) Emergency exits and evacuation routes;
4) Use of fire extinguishers; and
5) Current fire services installations.

All HAIC Project's workers present at the site participate in fire drills in order to familiarize themselves with the escape routes and gain experience from a planned evacuation. HSE Supervisor informs the time and date of the fire drill in advance for all staff, at least one week before.

The HSE Manager and HSE Supervisor review the result of the fire drill and evacuation procedures. During the fire drill, HSE Supervisor facilitates the planned evacuation and gather the total number of staff and contractors involved that counted by each fire wardens. Fire drills at HAIC Project's premises are carried out at least once a year.

8.3.15.3.2 General Chemical Release Response

If you spot chemical spillage:

1) Move people in immediate danger to safety;
2) Close or, where immediate closure is not possible, isolate by appropriate catchment provisions the source of the spill;
3) If safe to do so, assist and care for injured personnel and call for first aid assistance;
4) Inform your area warden and Line Manager immediately;
5) Restrict access to the area; and
6) Wait for instructions from your area warden or HSE personnel (HSE Supervisor).

The HSE Supervisor should carry out a brief first assessment of the quantity spilt; the environment affected (e.g. confined within site, spillage to surrounding land, etc.); and the type of oil or chemical (e.g. hazardous or non-hazardous, poisonous, explosive, etc.)

The spilt material will be contained using booms, earthen dams, or other techniques. Oil-free product should be recovered as technically feasible. Absorbent material, such as sawdust or synthetic sorbents, may be used to soak the free oil for small-scale spills. For hazardous materials/chemical spills appropriate PPE requirements will be assessed and implemented.

Contaminated materials will be removed to the waste management facility and stored in impermeable containment (lined pits or compactable containers as necessary).

Chemical spill emergency response briefing and drill shall be given to relevant staff and contractors. A refresher briefing shall be provided at least once a year. The content of the chemical spill emergency response briefing shall cover, at a minimum;

1)The general concept of safe chemical storage, different kinds of spill containment, the materials' characteristics and storage requirements, compatibility and reactions, etc.;
2)Response to spills for different materials;
3)Area containment/cordon;
4)Evacuation of irrelevant people from the area;
5)Use of spill control and clean-up kits;
6)PPE requirements; and
7)Disposal of clean up material.

8.3.15.3.3 General Worker Injuries Response

If you witness a worker injury:

1) Raise alarm by shouting "Help! Help! Help!";
2) Inform your Line Manager and your area warden immediately;
3) Warn other people to stay away; and
4) If safe to do so, provide assistance to any injured personnel.

8.3.15.3.4 General Heavy Rainstorm/Typhoon/Thunderstorm Response

For personnel outdoors in exposed areas at the time of general heavy rainstorm/ typhoon/ thunderstorm, they should:

1) Suspend all outdoor activities;
2) Take shelter in a safe place until heavy rain, wind, and thunderstorm has passed. If you are driving off-site the HAIC Project:
3) Turn-off the motor;
4) If a safe shelter is not available, stay in the car and close all the windows;
5) Avoid parking on hilltops or near any highly conductive objects such as masts, aerials, water taps, pipes, wire fences and similar metal installations; and
6) Avoid using the telephone or other plugged-in electrical appliance, including computers

8.3.15.3.5 General Vehicle Accident Response

If you are involved in a vehicle accident:

1) Ensure the safety of staff and passengers from your and the other vehicle involved first;
2) Activate the emergency communication flow (Figure 7.1);
3) Warn other people to stay away from the vehicle(s); and
4) If safe to do so, provide assistance to any injured personnel.

8.3.15.4 Responsibilities

To effectively handle an emergency, an Emergency Preparedness and Response Team (ERT) must be organized and remain appointed at all times (replaced by appointed substitutes when required), aware of and able to carry out its responsibilities should an emergency event occurs, at all times. In addition, all staff members should be aware of their respective roles to ensure safety, efficiency and communication in the event of an emergency.

The Emergency Response Team (ERT) is appointed by the HSE Department as prime personnel to implement emergency preparedness and response plans at HAIC Project. The ERT includes, but not be limited to, HAIC Factory Manager, relevant supervisors, area wardens, HSE Manager, HSE Supervisor, trained personnel for responding in different emergency situations (such as fire and explosions, confined space, rescue from heights, etc.), medical (doctor, nurse and first-aiders as available on site), security personnel and other representatives from different relevant departments.

The ERT is headed by the HSE Department. The ERT is responsible for executing emergency response actions, setting up emergency evacuation assembly areas for each operational location, site or area, activation of an emergency alarm and organizing the evacuations. The ERT is also in charge of coordinating the rescue of personnel and cooperating with the Line Managers, Firefighting Team, ambulance and First Aid Team to do so, and external local emergency agencies (firefighting department, ambulance, health and medical centres).

8.3.15.4.1 HSE Department

1) Lead the development and maintain the Emergency Response Plans;
2) Keep the risk map published in each HAIC area;
3) Schedule coordination meetings with the ERT;
4) Plan and implement emergency response training/drills;
5) Set up a field incident command post;
6) Lead the emergency evacuation at the site;
7) Lead the review of ERP post training/drills;
8) Report the emergency response training/drill findings and ERP review outcomes to the HAIC Factory Manager and the CEO on a regular basis;
9) Prepare the report of emergency response after 24 hours from the emergency;
10) Ensure emergency response equipment/installations are maintained, up-to-date and inspected as required (perform fire extinguishers, hydrants and first aid kit inspections and keep records) through a checklist;
11) Establish specific evacuation routes;
12) Publish an emergency telephone contact list of main staff, area wardens, doctor, HSE Department team and emergency numbers (including ambulance and the nearest hospital) in each HAIC's area
13) Post in key areas of HAIC Project's premises such as staff canteen, health centre, main offices, main staff entrance, or any other places deemed relevant, the emergency telephone contact list;

14) Delineate, on a map, the best route to the nearest medical facilities (on site and off site) to be posted on the safety bulletin board;
15) Ensure all relevant emergency response forms and records are maintained and up-to-date in accordance with HSE management system requirements;
16) Ensure the availability of relevant and up-to-date Material Safety Data Sheets (MSDS) in prominent locations;
17) Ensure emergency response teams (area wardens, doctor, nurses, first aiders, fire safety managers, site security, divers as well as managers and contractors) receive regular training that enables each of their members to fulfil their respective roles under this plan: inform and reinstruct and retrain as deemed necessary the HAIC Project's emergency response team for each emergency assembly areas;
18) Set up an Incident/Accident Reporting Procedure in order to record all incidents including injury, damage, environmental damage, non-conformance, as well as near misses, regardless of severity; and
19) Elaborate monthly incident, accident and near-misses statistics.

8.3.15.4.2 Area Wardens

Area wardens are responsible for overseeing and ensuring the safe and complete evacuation of staff, contractors and visitors in their respective operational locations, sites or areas during an emergency situation under HSE Department personnel (manager or supervisor, depends on who is at the HAIC's Project site at the moment of the emergency). The responsibilities of area wardens are:

1) Evacuate all personnel from their respective work areas (operational location, site or area) upon activation of the emergency alarm, assist any person who requires any help, assemble their personnel at their relevant emergency assembly area;
2) Perform headcount at their respective areas;
3) Perform a methodical sweep of their areas to check all persons have evacuated;
4) Direct the evacuation of the persons in their respective areas should an evacuation be ordered by HSE personnel;
5) Prevent unauthorized entry into the incident scene; and
6) Report all information after an emergency or a drill.

8.3.15.4.3 Medical Team

It shall be the responsibilities of the doctor to:

1) Provide medical aid to the serious cases;
2) Establish the casualty collection point or medical post or first aid area;
3) Manage triage situation, if any;
4) Provide medical status updates to the HSE Manager;
5) Provide professional medical advice and training in First Aiders;

6) Assess the medical needs, determine outside emergency support requirements and establish first aid area, with the support of the nurse on site; and
7) Coordinate, direct and report to the external professional medical personnel any injured personnel.

8.3.15.4.4 First Aiders

Qualified first-aiders are responsible for administering first-aid operations in an event of medical emergencies or injuries, render first-aid to any injured personnel (employees, workers, contractors, visitors, etc.), where applicable under the supervision of doctor or nurse. The First Aiders receive regular and dedicated training that enables them to fulfil their role under this procedure.

8.3.15.4.5 HAIC Security Team

The responsibilities of the HAIC Security team are:

1) Establish perimeter security to prevent unauthorized entry into the incident scene;
2) Control and monitor the movement of vehicles and people coming in or out of HAIC Project's premises, of keeping a count of the contractors manpower on site at all times, and of informing the HSE Manager on such number in case of an emergency situation; and
3) Stop all personnel/ vehicles from entering HAIC Project's premises in the event of an emergency. The HAIC Security members receive regular and dedicated training that enables them to fulfill their respective roles under this plan.

8.3.15.5 Emergency Response Equipment and Installations

All the HAIC Project's premises have a detection and firefighting alarm system equipment, which works with both diesel and electricity. There is also an underground fire protection tank with a holding capacity of 550 Kg of water, one concrete pond with a holding capacity of 24 m3 of water and a second pond with a holding capacity of 720 m3 of water. All these water reservoirs were built as part of the first stage of the construction phase and are currently filled. In addition, HAIC Project has the following equipment, on site at key areas of the HAIC Project's premises, at all times and in good working order:

1) First-aid boxes;
2) Oxygen bottle;
3) Chemical spill emergency equipment; and
4) Personal Protective Equipment (PPE).

Figure 8-22: PPE of the Hmawbi Agricultural Inputs Complex

8.3.15.6 Emergency Categorization

The Emergency Response Plan is a tiered system that will activate different levels of response and responsibilities, depending on the nature and severity of the medical emergency. The plan establishes three levels of emergency that will require different answers, detailed in this Plan. The HAIC Project's doctor is the HAIC Project's representative responsible to execute the triage method to determine the urgency of medical/specialized care for both common and occupational accidents and illnesses. Any incident that occurs within or outside the HAIC Project will be notified to the HSE Department in accordance with the established emergency communication flowchart presented in this Plan.

8.3.15.6.1 Level 1- Green Code

1) Mild work or illness accidents;
2) Medical cases that can be treated on an outpatient basis; and
3) Patients under observation and/or hospitalized for 24-48 hours.

Destination: Evacuation to the HAIC Project's onsite medical centre.

8.3.15.6.2 Level 2- Yellow Code

1) Occupational accident potentially invalidating (according to the doctor's triage), requires evacuation provided to Yangon city;
2) Patient requires evaluation/ treatment in a hospital.

Destination: Evacuation to a Yangon's Hospital

8.3.15.6.3 Level 3- Red Code

1) Serious work accident, with risk of invalidating life that requires immediate evacuation to a Yangon city hospital with facilities appropriate to the case and to the patient's condition.

Destination: Evacuation to a Yangon's Hospital

8.3.15.7 Communications

In the case of incident or accident the following emergency communication flowchart will be followed:

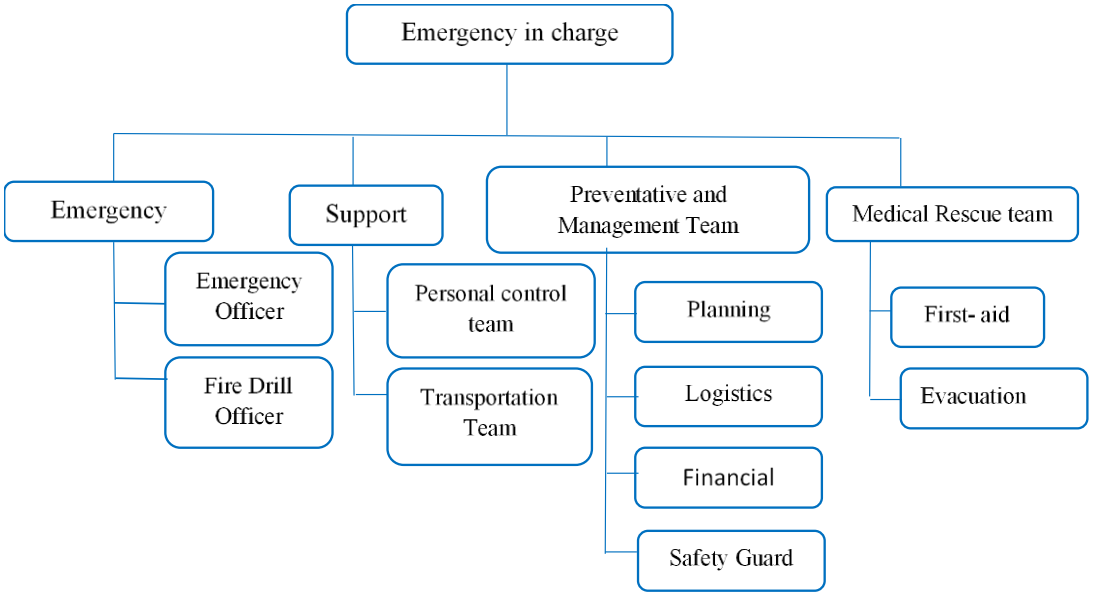


Figure 8-23 Communication chart for emergency team

Table 8-31 Emergency Preparedness and Response Sub-plan

Source of Impact	Control Measures	Frequency	Responsible Person
Fire (contained and conflagration)	- General Fire Emergency Response (http://www.awba-group.com/) Pg.20 ESMP report of Awba/ Project No.: 0406940	Annually and Periodically	HSE Team
Heavy rainstorm/ typhoon/thunderstorm	- General Heavy Rainstorm/ Typhoon/Thunderstorm Response (http://www.awba-group.com/) Pg.20 ESMP report of Awba/ Project	Annually and Periodically	HSE Team

	No.: 0406940		
Road incident or road obstruction;	- General Vehicle Accident Response (http://www.awba-group.com/) Pg.20 ESMP report of Awba/ Project No.: 0406940	Annually and Periodically	HSE Team
Workers injury; and	- General Worker Injuries Response (http://www.awba-group.com/) Pg.20 ESMP report of Awba/ Project No.: 0406940	Annually and Periodically	HSE Team
Spillage of hazardous or potentially-hazardous materials (on or off-site).	- General Chemical Release Response (http://www.awba-group.com/) Pg.20 ESMP report of Awba/ Project No.: 0406940	Annually and Periodically	HSE Team

8.3.15.8 Implementation Schedule

The management actions will be performed as mentioned in the table above. The Plan has to be revised accordingly after every project activity conducted, in order to guarantee the compliance with Myanmar laws.

8.3.16 Fire Emergency Response Plan

All the emergency Preparedness and Response Plans/systems for anticipated and unanticipated emergencies (such as fire and explosion, chemical and acid spills, and other natural disasters, etc.) are prepared and implemented effectively in compliance with the relevant laws and regulations (Myanmar Fire Brigade Law, 2015). HAIC conducts fire and emergency response drills internally and externally in coordination with Hmawbi Township Fire Service Department on an annual basis.

Figure 8.17 Photos taken during emergency response fire drill with Fire Service Department record dated 4th Sep 2021.

Figure 8.24 Photos taken during foam trolley training and drill with Fire Service Department dated 13th May 2022

Fire and explosion preventive measures are carried out in compliance with the Myanmar Fire Department's feedback and comments provided during drills and pieces of training. Some photos taken during the fire drills are presented in Figure 8.3 and 8.4.

In case of fire, explosion, and chemical spillage, HAIC will dial and report to Myanmar Fire Department, Hmawbi Township at its emergency telephone number 01620030. The contact information for the Hmawbi fire station is posted in visible places by all workers on the site premises.

8.3.16.1 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.

8.3.16.2 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 8.32 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	The EPRP will describe the general emergency response procedures to be undertaken for each of the follow potential emergency events that may

Management Plans	Key Objectives	Content
	control the impacts on occupational health and safety, the environment and the HAIC Project premises in the event of emergency situations.	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.	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: Plastic and paper packaging Sludge Bottom ash Metal (drums) Medical Waste Active Carbon
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	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

Management Plans	Key Objectives	Content
	wastewater systems to accommodate changing needs.	materials. Water quality monitoring of the water treated by the water treatment plant has been in-place (whenever the wastewater treatment system discharges treated water).
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.	The RTMP seeks to minimise the following potential impacts associated with an increase of HAIC Project vehicles on the access road: 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	The SEMP proposes different communication mechanisms, which are grouped as follows: Villages Development Advisory Committee (VDAC) meetings,

Management Plans	Key Objectives	Content
	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 organizations that may be based in the area of influence of the HAIC Project.	workshops with the main social stakeholders, notice boards, and a community grievance mechanism. Awba's ESHS Department will develop stakeholder mapping and perform continuous informative events to keep the population updated on progress 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	The Environmental Monitoring Plan describes the	The plan defines the parameters, sampling points, frequency and

Management Plans	Key Objectives	Content
Plan	comprehensive program to conduct environmental quality monitoring accordingly with the World Bank Group EHS Guidelines and Myanmar National Environmental Quality (Emission) Guidelines.	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.
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.	The plan recommends preventive and mitigation measures to ensure: 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

Management Plans	Key Objectives	Content
		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.

8.3.16.3 Legal Requirements

The legislative requirements are presented in *Section 3.5* of this ESIA.

8.3.16.4 Overview maps

The maps are presented in *Sections 1-5* of this ESIA.

8.3.16.5 Implementation Schedule

General EHS inspections will be implemented weekly to ensure compliance with mitigation measures presented in this EMP.

8.3.16.6 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 Performance Standards National Environmental Quality Emission 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 8.33 Proposed Environmental Monitoring Plan – based on Myanmar National Emission Guidelines (2015) for Pesticide Formulation, Manufacturing and Packaging

1. Air Emission Monitoring – NEGQ, 2015 for Pesticide formulation, manufacturing and packaging

Workplace

Parameter	Unit	Guideline Value (NEQG)	Type of Measurement	Sampling Locations	Frequency	Responsible
Ammonia, gaseous inorganic chlorine compounds	mg/Nm^3	30	Workplace air quality monitoring	- Workplace air quality monitoring points assigned in facility area Point 1 at Office Point 2 at Ware house Point 3 at Production area	Biannually, If not detected, change to Annually	HSE & Community Manager, Operations Manager
Bromines, Cyanides, Fluorines, **Hydrogen sulfide**	mg/Nm^3	3	Workplace air quality monitoring	- Workplace air quality monitoring points assigned in facility area Point 1 at Office Point 2 at Ware house Point 3 at Production area	Biannually, If not detected, change to Annually	
Chloride	mg/Nm^3	5	Workplace air quality monitoring	- Workplace air quality monitoring points assigned in facility area Point 1 at Office Point 2 at Ware house Point 3 at Production area	Biannually, If not detected, change to Annually	
Parameter	**Unit**	**Guideline Value (NEQG)**	**Type of Measurement**	**Sampling Locations**	**Frequency**	**Responsible**
Chlorine	mg/Nm^3	3	Workplace air	- Workplace air quality	Biannually, If not	

			quality monitoring	monitoring points assigned in facility area Point 1 at Office Point 2 at Ware house Point 3 at Production area	detected, change to Annually	
PM_{10}	mg/Nm^3	20, 5*	- Workplace air quality monitoring -	- Workplace air quality monitoring points assigned in facility area - Point 1 at Office Point 2 at Ware house Point 3 at Production area	Biannually, If not detected, change to Annually	
Total organic carbon	mg/Nm^3	50	Workplace air quality monitoring	Point 1 at Office Point 2 at Ware house Point 3 at Production area	Biannually, If not detected, change to Annually	
Volatile organic compounds, VOC	mg/Nm^3	20	Workplace air quality monitoring	Point 1 at Office Point 2 at Ware house Point 3 at Production area	Biannually, If not detected, change to Annually	

* Applicable where very toxic compounds are present

Parameter	Unit	Guideline Value (NEQG)	Type of Measurement	Sampling Locations	Frequency	Responsible
Ammonia, gaseous inorganic chlorine compounds	mg/Nm^3	30	Process emission monitoring	Point (1): Granules Production Point (2) : Solvent and Liquid based Production Point (3) : Powder Production	Biannually, If not detected, change to Annually	HSE & Community Manager, Operations Manager
Bromines, Cyanides, Fluorines, **Hydrogen sulfide**	mg/Nm^3	3		Point (1): Granules Production Point (2) : Solvent and Liquid based Production Point (3) : Powder Production	Biannually, If not detected, change to Annually	
Chloride	mg/Nm^3	5		Point (1): Granules Production Point (2) : Solvent and Liquid based Production Point (3) : Powder Production	Biannually, If not detected, change to Annually	
Chlorine	mg/Nm^3	3		Point (1): Granules Production Point (2) : Solvent and Liquid based Production Point (3) : Powder Production	Biannually, If not detected, change to Annually	
Parameter	**Unit**	**Guideline Value (NEQG)**	**Type of Measurement**	**Sampling Locations**	**Frequency**	**Responsible**

PM_{10}	mg/Nm^3	20, 5*		Point (1): Granules Production Point (2) : Solvent and Liquid based Production Point (3) : Powder Production	Biannually, If not detected, change to Annually	
Total organic carbon	mg/Nm^3	50		Point (1): Granules Production Point (2) : Solvent and Liquid based Production Point (3) : Powder Production	Biannually, If not detected, change to Annually	
Volatile organic compounds, VOC	mg/Nm^3	20		Point (1): Granules Production Point (2) : Solvent and Liquid based Production Point (3) : Powder Production	Biannually, If not detected, change to Annually	

Table 8.34: General Guidelines (Air Emission) (Ambient)- NEQG, 2015 for general guidelines

Parameter	Averaging Period	Guideline Value µg/m^3	Type of Measurement	Sampling Locations	Frequency
Nitrogen dioxide	1-year 1-hour	40 200	Fence line monitoring	Fence line monitoring corner point	Biannually, If not detected, change to Annually
Ozone	8-hour daily maximum	100	Fence line monitoring	Fence line monitoring corner point	Biannually, If not detected, change to Annually
PM_{10}	1-year 24-hour	20 50	Fence line monitoring	Fence line monitoring corner point	Biannually, If not detected, change to Annually
$PM_{2.5}$	1-year 24-hour	10 25	Fence line monitoring	Fence line monitoring corner point	Biannually, If not detected, change to Annually
Sulfur dioxide	24-hour 10-minute	20 500	Fence line monitoring	Fence line monitoring corner point	Biannually, If not detected, change to Annually

Table 8.35 Noise level monitoring – NEQG, 2015 for general guidelines

Parameter	Unit	Residential; Institutional; educational		Industrial; commercial		Type of measurement	Sampling locations	Frequency	Responsible
		Daytime 07:00-22:00	Night time 22:00-07:00	Daytime 07:00-22:00	Night time 22:00-07:00				
One Hour LAeq (dBA)	db	55	45	70	70	Point Source	Production line	Biannually	HSE & Community Manager, Operations Manager

Table 8.36 Odour Monitoring

Parameter	Unit	Guideline Value (Air emission value from (NEQG, 2015) for pesticide formulation, manufacturing and packaging)	Type of measurement	Sampling Locations	Frequency	Responsible
Hydrogen Sulphide	mg/Nm^3	3	Fence line monitoring	Fence line monitoring corner points	Biannually, If not detected, change to annually	HSE & Community Manager, Operations Manager
Chloride	mg/Nm^3	5	Fence line monitoring	Fence line monitoring corner points	Biannually, If not detected, change to annually	
Ammonia, Gaseous Inorganic Chlorine Compounds (as HCl) HCL	mg/Nm^3	30	Fence line monitoring	Fence line monitoring corner points	Biannually, If not detected, change to annually	
Sulphur Dioxide	mg/Nm^3	(20(24Hr),500(10min))	Fence line monitoring	Fence line monitoring corner points	Biannually, If not detected, change to annually	
Odour Measurement	Odorant unit	5 to 10 (NEQG, 2015)			Biannually, If not detected, change to annually	

Table 8.37 Wastewater/storm water Effluent and groundwater (monitoring well) Monitoring - NEQG effluent level for pesticide formulating, manufacturing and packaging

Parameter	Unit	Guideline Value (NEQG)	Type of measurement	Sampling Locations	Frequency	Responsible
BOD_5	mg/L	30	Point Source	1) WWTP discharge/ outlet point (lagoon 1) 17°9'59.84"N 96° 4'37.16"E 2) Groundwater monitoring well (Tube well no.3) 17°10'2.50"N 96° 4'35.71"E	Biannually	HSE & Community Manager, Operations Manager
Active ingredients (each)	mg/L	0.05			Biannually, If not detected, change to Annually	
Absorbable organic halogens	mg/L	1			Biannually, If not detected, change to Annually	
Ammonia	mg/L	10			Biannually, If not detected, change to Annually	
Arsenic	mg/L	0.1			Biannually, If not detected, change to Annually	
COD	mg/L	150			Monthly	
Chlorinated organics	mg/L	0.05			Biannually, If not detected, change to Annually	
Chromium (hexavalent)	mg/L	0.1			Biannually, If not detected, change to Annually	

Parameter	Unit	Guideline Value (NEQG)	Type of measurement	Sampling Locations	Frequency	Responsible
Chromium (hexavalent)	mg/L	0.1		1) WWTP discharge/ outlet point (lagoon 1) 17°9'59.84"N 96° 4'37.16"E 2) Groundwater monitoring well (Tube well no.3) 17°10'2.50"N 96° 4'35.71"E	Biannually, If not detected, change to Annually	
Chromium (total)	mg/L	0.5			Biannually, If not detected, change to Annually	
Copper	mg/L	0.5			Biannually, If not detected, change to Annually	
Mercury	mg/L	0.01			Biannually, If not detected, change to Annually	
Nitrorganics	mg/L	0.01			Biannually, If not detected, change to Annually	
Oil and grease	mg/L	10			Biannually, If not detected, change to Annually	
pH	S.U	6-9			Weekly	
Phenol	mg/L	0.5			Biannually, If not detected, change to Annually	
Total phosphorus	mg/L	2			Biannually, If not detected, change to Annually	
Total suspended solids	mg/L	10-20**			Biannually	

Parameter	Unit	Guideline Value (NEQG)	Type of measurement	Sampling Locations	Frequency	Responsible
Zinc	mg/L	2		1) WWTP discharge/ outlet point (lagoon 1) 17°9'59.84"N 96° 4'37.16"E 2) Groundwater monitoring well (Tube well no.3) 17°10'2.50"N 96° 4'35.71"E	Biannually, If not detected, change to Annually	

** Lower value for pesticide manufacturing, higher value for pesticide formulation

Table 8.38 Strom Water monitoring – NEQG, 2015 Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges

Parameter	Unit	Guideline Value (NEQG)	Type of measurement	Sampling Locations	Frequency	Responsible
BOD_5	mg/L	30	Point Source	Factory Compound Outlet Point 17°10'9.92"N 96° 4'41.17"E	Biannually	HSE & Community Manager, Operations Manager
Active ingredients (each)	mg/L	0.05			Biannually, If not detected, change to Annually	
Absorbable organic halogens	mg/L	1			Biannually, If not detected, change to Annually	
Ammonia	mg/L	10			Biannually, If not detected, change to Annually	

Arsenic	mg/L	0.1			Biannually, If not detected, change to Annually	
COD	mg/L	150			Monthly	
Chlorinated organics	mg/L	0.05			Biannually, If not detected, change to Annually	
Chromium (hexavalent)	mg/L	0.1			Biannually, If not detected, change to Annually	

Parameter	Unit	Guideline Value (NEQG)	Type of measurement	Sampling Locations	Frequency	Responsible
Chromium (hexavalent)	mg/L	0.1			Biannually, If not detected, change to Annually	
Chromium (total)	mg/L	0.5			Biannually, If not detected, change to Annually	
Copper	mg/L	0.5			Biannually, If not detected, change to Annually	
Mercury	mg/L	0.01			Biannually, If not detected, change to Annually	
Nitrorganics	mg/L	0.01			Biannually, If not detected, change to Annually	
Oil and grease	mg/L	10			Biannually, If not detected, change to Annually	
pH	S.U	6-9			Weekly	
Phenol	mg/L	0.5			Biannually, If not detected, change to	

					Annually	
Total phosphorus	mg/L	2			Biannually, If not detected, change to Annually	
Total suspended solids	mg/L	10-20**			Biannually	

Parameter	Unit	Guideline Value (NEQG)	Type of measurement	Sampling Locations	Frequency	Responsible
Zinc	mg/L	2			Biannually, If not detected, change to Annually	

Table 8.39: Drinking water (Village/ Community surface water and ground water including tube wells)

Parameter	Unit	National Drinking Water Standards 2019	Type of measurement	Sampling Locations	Frequency	Responsible
Total Coliforms	MPN/ 100 ml	0	1) Surface and Ground water monitoring within the factory compound. 2) 13 villages in 5 km radius within AOI.	1) Point source (factory tube well 3 and new tube well) 2) 2 samples for each 13 villages in 5 km radius within AOI.	Biannually, If not detected, change to Annually	
Faecal Coliforms	MPN/ 100 ml	0				
Taste	-	Acceptable/ No objectionable taste				
Odor	-	Acceptable/ No objectionable taste				
Colour	TCU	15 cu				
Turbidity	NTU	<5				
Arsenic	mg/l	0.05				
Lead	mg/l	0.01				
Nitrate	mg/l	50				
Manganese	mg/l	0.4				
Chloride	mg/l	250				

Total Hardness	mg/l as $CaCO_3$	500				
Iron	mg/l	1				
pH	-	6.5~8.5				
Sulfate	mg/l	250				
Total Dissolved Solid	mg/l	1000				
Total Coliforms	MPN/ 100 ml	0				

Table 8.40 Aquatic biomonitoring

Parameter	Type of measurement	Sample Type	Sampling Locations	Frequency	Responsible
Type of fish (species) Frequency of occurrence	Photos, questionnaire and observation	Random	random participants such as fisher men, local residents living throughout the Stream within project AOI (for example: 2 km radius stretch)	Wet season and Dry season	HSE & Community Manager, Operations Manager

Projected Budgets and Responsibilities

The estimated budgets and responsible parties are provided in *Table 8.4*.

Table 8.41 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	3rd Party Environmental Consultant	Air monitoring will be 2,500-5,000 USD monthly A monitoring machine costs 20,000-30,000 USD Long term plan refers to 8.3.1.10
Noise	Increase in ambient noise levels	Noise levels in Leq, Leq day, Leq night and hourly Leq	3rd 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	pH, DO, COD, BOD5,	3rd Party	Water monitoring will

Project Stage/ Affected Component	Potential Impact	Parameters to be Monitored	Responsibility	Estimated Budget (USD)
	water	oil and grease, TN, TP, TSS and total coliform.	Environmental Consultant	cost 3,000 USD monthly (including laboratory fees) Long term plan refers to 8.3.3.10.
Operation				
Air	Production formulation process	Ammonia, gaseous inorganic chlorine compounds, Bromines, Cyanides, Fluorines, Hydrogen sulfide, Chloride, Chlorine, PM10, Total Organic Carbon, VOC	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	$BOD_{5,}$ Active ingredients, Absorbable organic halogens, Ammonia, Arsenic,	On site EHS team of Awba	As above

Project Stage/ Affected Component	Potential Impact	Parameters to be Monitored	Responsibility	Estimated Budget (USD)
		COD, Chlorinated Organics, Chromium, Copper, Mercury, Nitrorganics, Oil and Grease, pH, Phenol, Total Phosphorus, Total Suspended Solid, Zinc		
Occupational H&S	Emissions inside factory	Particulate (Inert or Nuisance Dust), Carbon Monoxide, Nitrogen dioxide, Sulphur dioxide	On site EHS team of Awba	Air monitoring will be 2,500 USD monthly. Long term plan refers to 8.3.9.6

8.4.1 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*.

8.4.2 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.

8.4.3 TRAINING

8 .4.3.1 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.

8.4.3.2 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.

8.4.3.3 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.

9 PUBLIC CONSULTATION AND DISCLOSURE

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	- 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	- 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	- Red Cross - Green Network - Myanmar Centre for Responsible Business - Others, as appropriate	Some local CSO groups have voiced opposition to the Project in the past and should be consulted.
Businesses	- Asbestos Plant Workers - Others, as appropriate	Cumulative impacts from the Project should be considered and other businesses consulted.

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.

- Total 72 Household surveys conducted in six villages including War Net Chaung, Tha Pyay Kone, Yae Thar Shey, Naung Kone, Wa Phyu Taw, Zaw Ti Kone and one ward namely Kyauk Taung Su Ward which is under the War net Chaung village respectively.

- and one ward within the AOI in August 2017.

To inform this supplementary ESIA Report, engagement was undertaken in four areas covering the 6 villages (Kyauk 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			
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

Date	Village	Village Tract	No. of HH Consulted by Village Tract
			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**

9.4 *RESULTS OF THE CONSULTATIONS*

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
Consultation & Information Disclosure 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. 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.	The Regulatory EIA Report will have a Myanmar language executive summary to ensure information is easily available to local communities. Awba will undertake further disclosure and consultation in Pa Ywet Sate Kone, Kyi Ni San, Poe Dana Kone, and Shan Kone villages.
Public Health & Safety The key concern related to public health and safety impacts specifically from air and wastewater emissions. These also included concerns related to unplanned events. 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.	This Supplementary ESIA will assess the impact on Public Health and Safety from air and noise emissions. The baseline survey results from air, noise, soil, water and biodiversity will be disclosed to the community.
Monitoring and Auditing Transparency of the monitoring and auditing process during operation was of key importance to the stakeholders.	The grievance mechanism and future disclosure will be provided to all PAPs in the area.
Use of Existing Infrastructure The quality of the access road was commented on during the public	The access road to Hmawbi site is a public road under the responsibility of government. Awba has acknowledged

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. Also, one main concern was historic contamination from the existing industrial park and factories.	Awba has investigated the odour complaint from the Operation of the existing facility through their community grievance mechanism. 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	Awba will undertake a CSR program once operational and will consider these suggestions in the planning of any social investment. According to the local village representatives from the review team at the HAIC office, HAIC has from time to time provided financial support for village road construction under the CSR work program, and if the Wanet Chaung road is repaired, it will participate with other communities as part of the CSR

Key Comments Received and Response	Consideration for Supplementary ESIA
for their products.	process.

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.	All engagement activities will be conducted transparently.
	Awba should contribute to the local hospital and provide discount pesticide shop for local.	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.	Monitoring, including roles and responsibilities, will be included in the ESIA Report.
	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.	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?	Emissions and their impact on local communities and the surrounding environment will be assessed in the ESIA.
	There have been historic examples of sickness in the community when the MPI factory produced gas (and/or) smoke.	A cumulative assessment of impacts from the Industrial Park will also be undertaken.

Category	Summary of Query	Action for ESIA
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. According to the local village representatives from the review team at the HAIC office, HAIC has from time to time provided financial support for village road construction under the CSR work program, and if the Wanet Chaung road is repaired, it will participate with other communities as part of the CSR process.
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

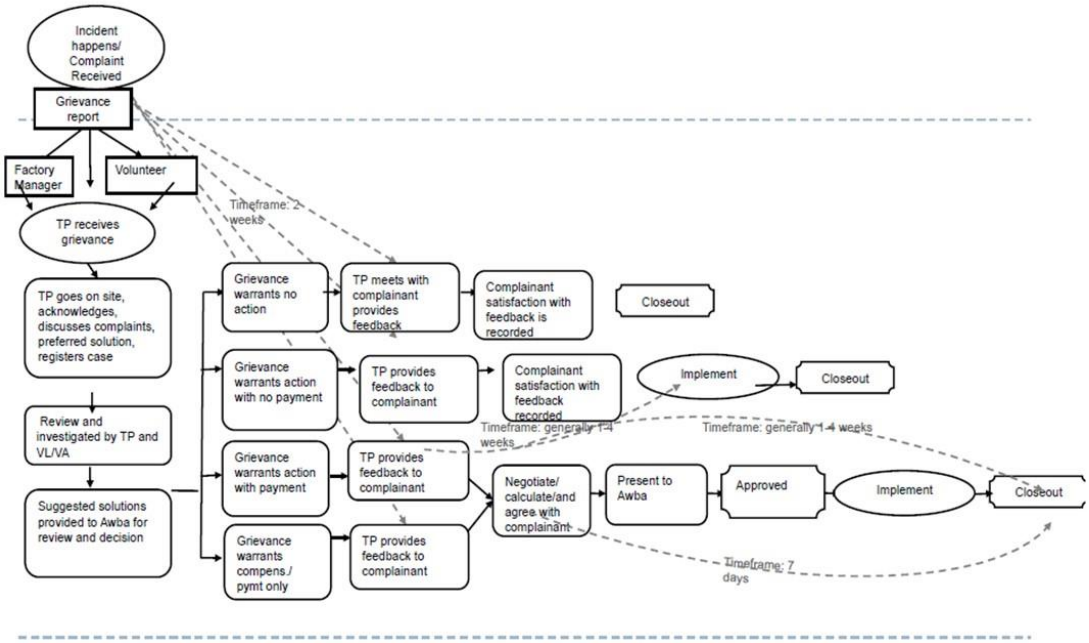
Role	Responsibility
3rd Party	• Implement the mechanism during a three-month pilot phase and provide training to key community stakeholders and volunteers • Manage the grievance mechanism • Coordinate with communities and complainants • Collect, record, and monitor grievances • Coordinate with the Awba Grievance Mechanism Committee and provide suggestions for remedy • Close out cases and negotiate on behalf of Awba • Communicate progress
Community Volunteer	• Collect complaints and/or concerns • Collaborate with the 3rd Party to communicate and promote instructions, progress, and operation activities • Communicate progress

Awba Grievance Mechanism Committee	• Coordinate with the 3rd Party once a week • 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. Awba will distribute EIA report to the local communities (representative villages, Pa Ywat Sate Gone, Kyi Ni San, Poe Dana Gone and Shan Gone villages and any other interested parties through VDAC and community volunteers within 1 month of approval period.

Figure 9.2 Community Grievance Mechanism



9.6 DISCLOSURE

The EIA has been disclosed in compliance with EIA procedure. Awba will discose the report via awba's official website link *www.awba-group.com* and https://awba-group.com/mm/. Both English & Myanmar Awba will distribute EIA report to the local communities (representative villages, Pa Ywat Sate Gone, Kyi Ni San, Poe Dana Gone and Shan Gone villages and any other interested parties through VDAC and community volunteers within 1 month of approval period. 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.

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. Awba is planning publicly disclosure of project information to the local community through

1. Four local community volunteers
2. Six notice boards
3. VDA Committee
4. Telephone communication
5. Six Post-boxes.
6. Disclosures in Newspaper
7. Disclosures in brochures