

Environment Management Plan (EMP) Report for Zawtika Offshore Development Project



PTTEP International Limited

PTT Exploration and Production International (PTTEPI)

Final Report

November 2022

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PTT Exploration and Production International (PTTEPI)

Environment Management Plan (EMP) Report for Zawtika Offshore Development Project

November 2022

Project 0352810

Prepared by: ERM-Siam Co Ltd

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| For and on behalf of ERM-Siam Co Ltd |
| Approved by: <u>Kamonthip Ma-oon</u> |
| Signed: <u></u> |
| Position: <u>Partner</u> |
| Date: <u>November 2022</u> |

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Acronyms and Abbreviations

| | |
|-----------------|--|
| BCP | Blowout Contingency Plan |
| BOD | Biological Oxygen Demand |
| BPD | Barrel Per Day |
| CCTV | Closed circuit television |
| CSR | Corporate Social Responsibility |
| ECD | Environmental Conservation Department |
| EQEG | Myanmar's National Environmental Quality (Emission) Guidelines |
| EHS | Environmental Health and Safety Guidelines |
| EIA | Environmental Impact Assessment |
| E&P | Exploration and Production |
| EMP | Environmental Management Plan |
| EMT | Emergency Management Team |
| ERT | Emergency Response Team |
| GEM | Golden Dowa Eco-System Myanmar Co., Ltd. |
| GHG | Greenhouse gas |
| HC | Hydrocarbon |
| HP flare | High Pressure flare |
| IFC | International Finance Corporation |
| IUCN | The International Union for the Conservation of Nature |
| LP flare | Low Pressure flare |
| MARPOL | Maritime Policy |
| MOGE | Myanma Oil and Gas Enterprise |
| MONREC | Ministry of Natural Resources and Environmental Conservation |
| MMscfd | Million standard cubic feet per day |
| NADF | Non-Aqueous Phase Drilling Fluid |
| NOAA | National Oceanic and Atmospheric Administration |
| NORM | Naturally Occurring Radioactive Materials |
| OOO | Oil concentration on drilled cutting |
| OSHA | Occupational Safety and Health Administration |
| OSRL | Oil Spill Response Limited |
| PTTEPI | PTT Exploration and Production International Company Limited |
| ROW | Right of way |
| SSHE | Safety, Security, Health, and Environment |
| SSHE MS | Safety, Security, Health, and Environment Management System |
| TKA supply base | Thaketa supply base |
| WBM | Water Based Mud |
| WP | Wellhead Platform |
| YCDC | Yangon City Development Committee |
| ZMS | Zawtika Metering Station |
| ZOC | Zawtika Operating Center |
| ZPQ | Zawtika Processing and Quarter Platform |

နိဒါန်း

ဇောတိက ကမ်းလွန်သဘာဝဓာတ်ငွေ့တူးဖော်ရေး စီမံကိန်း (“စီမံကိန်း”) သည် PTT အပြည်ပြည်ဆိုင်ရာ ရေနံနှင့် သဘာဝဓာတ်ငွေ့တူးဖော်ရေးနှင့် ထုတ်လုပ်ရေး လီမိတက်(PTTEPI) က လက်ရှိတာဝန်ယူ လုပ်ကိုင် ဆောင်ရွက်နေသော စီမံကိန်းတစ်ခုဖြစ်ပါသည်။ ၎င်းတွင် ZPQ (ဝန်ထမ်းအဆောင်များနှင့် ပေါင်းစပ် ဖွဲ့စည်းထားသော ထုတ်လုပ်ရေးစင်)၊ တံတားဖြင့် သွယ်တန်းဆက်သွယ်ထားသော အဓိကတူးဖော် ရေးစင် WP1၊ WP2 မှ WP7 အထိ အစွယ်အပွား တူးဖော်ရေးစင်နှစ်စင်၊ ၎င်းနှင့် ဆက်စပ်ပိုက်လိုင်းများနှင့် ၂၃၀ ကီလိုမီတာ အရှည်ရှိသောကမ်းလွန် သဘာဝဓာတ်ငွေ့ပို့ဆောင်ရေး ပိုက်လိုင်းများ ပါဝင်ပါသည်။

၂၀၁၅ ခုနှစ် ဒီဇင်ဘာလ ၂၉ ရက်နေ့တွင် ပြဌာန်းထားသော ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်းအရ PTTEPI သည် ၎င်း၏လက်ရှိ လည်ပတ်နေသော လုပ်ငန်းများအတွက် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် ဆောင်ရွက်ရမည်ဖြစ်ပြီး ၎င်း၏ လက်ရှိ ဆောင်ရွက်နေသော ဇောတိကကမ်းလွန် သဘာဝဓာတ်ငွေ့ တူးဖော်ထုတ်လုပ်ရေး စီမံကိန်း အတွက် ပတ်ဝန်းကျင်ဆိုင်ရာ ထိန်းသိမ်းရေးဆိုင်ရာ လိုက်နာဆောင်ရွက်မှု သက်သေခံလက်မှတ်ရရှိရန် သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဝန်ကြီးဌာန (MONREC) (ယခင် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးနှင့် သစ်တောရေးရာဝန်ကြီးဌာန (MOECF)၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဦးစီးဌာန (ECD) သို့ တင်သွင်းရမည် ဖြစ်သည်။ စီမံကိန်းအသေးစိတ် အချက်အလက်များကို အခန်း ၃ တွင် ဖော်ပြထားသည်။

စီမံကိန်းအဆိုပြုသူအကြောင်းအကျဉ်းဖော်ပြချက်

PTT အပြည်ပြည်ဆိုင်ရာရေနံ နှင့် သဘာဝဓာတ်ငွေ့တူးဖော်ရေး နှင့် ထုတ်လုပ်ရေး လီမိတက် (PTTEP) ၏ ကုမ္ပဏီခွဲဖြစ်သည့် PTTEPI သည် မြန်မာနိုင်ငံ၌ ရေနံရှာဖွေရေး နှင့် ထုတ်လုပ်ရေး လုပ်ငန်းများ အပြင် ၎င်းနှင့်ဆက်သွယ်သော စီးပွားရေးလုပ်ငန်းကို ဆောင်ရွက် ရန် အတွက် လုပ်ငန်းဆောင်ရွက်သူ အော်ပရေတာ ဖြစ်ပါသည်။

PTTEP ၏ မစ်ရှင်မှာ ယှဉ်ပြိုင်နိုင်သောစွမ်းဆောင်မှု၊ အဆင့်မြင့်သော နည်းပညာ နှင့် ထိန်းသိမ်းရေးလုပ်ငန်းများနှင့် မောင်းနှင်သည့် ဦးဆောင် အာဆီယံ E&P ကုမ္ပဏီ ဖြစ်လာစေ ရန် ခိုင်မာသောရည်မှန်းချက်ဖြင့် ပါဝင်သက်ဆိုင်သူများအားလုံးထံသို့ ယုံကြည်စိတ်ချရသော

စွမ်းအင် ပေးသွင်းမှု နှင့် ရေရှည်တည်တံ့သော တန်ဖိုးတို့ကို ပေးစွမ်းရေးအတွက် တစ်ကမ္ဘာလုံးတွင် လည်ပတ်ဆောင်ရွက်ရန် ဖြစ်ပါသည်။

PTTEP မြန်မာ ကုမ္ပဏီ၏ SSHE မူဝါဒတွင်၊ PTTEP မြန်မာကုမ္ပဏီသည် (၁) ထိခိုက်နာကျင်မှု သုည၊ (၂) ကြီးမားသောမတော်တဆမှု သုည၊ (၃) ပမာ၊ ကြီးမားသော ဟိုက်ဒရိုကာဗွန် ယိုစိမ့်မှု သုည၊ ယာဉ်မတော်တဆမှု သုည၊ ရေယာဉ် တိုက်မိမှု သုည၊ နှင့် (၃) ယိုဖိတ်မှု သို့မဟုတ် အပြင်မှ တိုင်းကြားခံရမှု သုည၊ (၄) ပမာ၊ အာဏာပိုင်များ/ ရပ်ရွာလူထုများ/ ပင်လယ်အသုံးပြုသူများက တိုင်ကြားခြင်း သုည၊ တို့ပါဝင်သည့် “ဦးတည်ချက် သုည - ကျွန်ုပ်တို့၏ လုပ်ငန်းလည်ပတ်ဆောင်ရွက်မှု၌ မည်သူတစ်စုံတစ်ဦးမှ ထိခိုက်နာကျင်မှု မရှိစေရ” ဟူသည့် အန္တိမပန်းတိုင်ဖြင့် မြန်မာနိုင်ငံတွင် ဘေးကင်းသော ရှာဖွေတူးဖော်မှု နှင့် ထုတ်လုပ်မှုတို့ကို ဆောင်ရွက်ရန် အာမခံထားပါသည်။

PTTEPI ကို ဆက်သွယ်ရန် အသေးစိတ်ဖော်ပြချက်ကို **ဇယား ၁ -၁** တွင် ဖော်ပြပေး ထားပါသည်။

ဇယား (၁-၁) PTTEPI ကို ဆက်သွယ်ရန် အသေးစိတ်ဖော်ပြချက်

| အကြောင်းအရာ | ဖော်ပြချက် |
|-------------|---|
| ကုမ္ပဏီအမည် | PTTEP International Limited |
| လိပ်စာ | ဗန်းတေ့ချ် တာဝါ၊ အမှတ် (၆၂၃) ပြည်လမ်း၊ ကမာရွတ်မြို့နယ်၊ ရန်ကုန်၊ ပြည်ထောင်စုသမ္မတ မြန်မာနိုင်ငံ |
| ဖုန်းနံပါတ် | +၉၅(၁)၆၅၇၀၀ |
| ဖက်စ်နံပါတ် | +၉၅(၁)၆၆၇၇၈၃ |

၁.၃ စီမံကိန်းအကြောင်းအရာ ဖော်ပြချက်

ဇောတိကစီမံကိန်းသည် သဘာဝဓာတ်ငွေ့တူးဖော်ထုတ်လုပ်ရေး စီမံကိန်းဖြစ်ပြီး လုပ်ကွက် အမှတ် M9 နှင့် လုပ်ကွက်အမှတ် M11 ၏အစိတ်အပိုင်း အနည်းအငယ်ပါဝင်သော နေရာတွင် တည်ရှိပါသည်။ ဤစီမံကိန်းတွင် ကုမ္ပဏီနှစ်ခုပါဝင်၍ PTTEPI သည် ရှယ်ရာ ၈၀ ရာခိုင်နှုန်း ပါဝင်ပြီး မြန်မာရေနံနှင့် သဘာဝဓာတ်ငွေ့လုပ်ငန်း သည် ရှယ်ရာ ၂၀ ရာခိုင်နှုန်း အသီးသီး ပါဝင်ကြပါသည်။ PTTEPI သည် စီမံကိန်းဖော်ဆောင်သူဖြစ်သည်။ စီမံကိန်း လုပ်ကွက်သည် မုတ္တမကွေ့တွင် တည်ရှိပြီး ရန်ကုန်မှ ၂၂၅ ကီလိုမီတာခန့်နှင့် မြန်မာ့ကမ်းရိုးတန်းမှ အနောက် ဘက်သို့ ၂၀၇ ကီလိုမီတာခန့် အကွာတွင် တည်ရှိပါသည်။

လက်ရှိဆောင်ရွက်နေသောဇောတိက ကမ်းလွန်သဘာဝဓာတ်ငွေ့တူးဖော်ထုတ်လုပ်ရေးတွင် အဆင့် 1A, 1B နှင့် 1C တို့အပြင် နောင်ဖြစ်ပေါ်လာမည့် ထပ်ပေါင်း ဖော်ဆောင်ရေး အဆင့် များ လည်းပါဝင်ပါသည်။ အခြားအဆင့်များမှာ ထပ်ပေါင်း ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်း စစ်ခြင်းများ နှင့်သို့မဟုတ် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်များ အရ နောင်တွင်ဆောင်ရွက် မည့်လုပ်ငန်းများဖြစ်၍ ယခုပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ် သည် အဆင့် 1A နှင့် 1B အတွင်းရှိလုပ်ငန်းများအတွက်သာ ပြုလုပ်ထားသည်။ ဇောတိက အဆင့် 1A ကမ်းလွန် တူးဖော်ရေးတွင် ZPQ (ဝန်ထမ်းအဆောင်များနှင့် ပေါင်းစပ်ဖွဲ့စည်းထားသော ထုတ်လုပ် ရေးစင်၊ တံတားဖြင့် သွယ်တန်းဆက်သွယ်ထားသော အဓိကတူးဖော် ရေးစင် WP1၊ အစွယ်အပွား တူးဖော်ရေးစင်နှစ်စင် WP2 နှင့် WP3၊ ဆက်စပ်ပိုက်လိုင်းများနှင့် အချင်း ၂၈ လက်မရှိ ၂၃၀ ကီလိုမီတာအရှည်ရှိ ကမ်းလွန်သဘာဝဓာတ်ငွေ့ပို့ဆောင်ရေး ပိုက်လိုင်း တို့ပါဝင်ပါသည်။ ယခုလက်ရှိလုပ်ဆောင်နေသော ဇောတိကစီမံကိန်းဖော်ဆောင်ရေး အဆင့် 1B သည် WP4, WP5, WP6, နှင့် WP7 ဟုခေါ်တွင်သည့် အစွယ်အပွားတူးဖော်ရေးစင် လေးခု နှင့် ယင်းတို့နှင့် ဆက်စပ်နေသည့် ပိုက်လိုင်းများ ပါဝင်သည်။ ဇောတိကစီမံကိန်း အစိတ်အပိုင်းများ နှင့် ကမ်းလွန်နေရာ အဆောက်အအုံများ ၏ ခြုံငုံသုံးသပ်ချက်ကို **ပုံ ၃-၁** တွင်ဖော်ပြထားသည်။

ဇောတိက ကမ်းလွန် ထုတ်လုပ်ရေးလုပ်ငန်းများမှ အန္တရာယ်မရှိသော စွန့်ပစ်ပစ္စည်းများ နှင့် ပမာဏ အလွန်နည်းသော အန္တရာယ်ရှိသော စွန့်ပစ်ပစ္စည်းများကို ထွက်ရှိစေပါသည်။ စွန့်ပစ် ပစ္စည်းနှစ်မျိုးလုံးကို PTTEPI ၏ စွန့်ပစ်ပစ္စည်း စီမံခန့်ခွဲမှုလုပ်ထုံးလုပ်နည်းပါ ပြဌာန်းချက် များနှင့်အညီ စီမံခန့်ခွဲသွားမည် ဖြစ်ပါသည်။ တူးဖော်ရေးလုပ်ငန်းများကာလအတွင်း ထွက်ရှိသည့် စွန့်ပစ်ပစ္စည်းတစ်မျိုးချင်းစီ၏ ခန့်မှန်း ခြေ ပမာဏကို အောက်ပါ **ဇယား ၁-၂** တွင် တင်ပြထားပါသည်။ ၎င်းတို့၏ အမျိုးအစားအလိုက် PTTEPI ၏ စွန့်ပစ်ပစ္စည်း စီမံခန့်ခွဲမှုလုပ်ထုံးလုပ်နည်း အသေးစိတ်ကို **ဇယား ၃-၃** တွင် ဖော်ပြထားပါသည်။

ဇယား ၁ - ၂ ၂၀၁၉ ဇန်နဝါရီ မှ ဒီဇင်ဘာလအထိ လများတွင် ဝန်ထမ်းအဆောင်များနှင့် ပေါင်းစပ်ဖွဲ့စည်းထားသော ထုတ်လုပ်ရေး စင် ZPQ က လစဉ်ထွက်ရှိသည့် အန္တရာယ်မရှိသော စွန့်ပစ်ပစ္စည်းနှင့် အန္တရာယ်ရှိသော စွန့်ပစ်ပစ္စည်း ပမာဏ

| စွန့်ပစ်ပစ္စည်းအမျိုးအစား | စွန့်ပစ်ပစ္စည်းအမည် | အလေးချိန် (ကီလိုဂရမ်) |
|------------------------------------|--|--------------------------|
| အန္တရာယ်မရှိသော စွန့်ပစ်ပစ္စည်း | ယေဘုယျအားဖြင့် အန္တရာယ်မရှိသောစွန့်ပစ်ပစ္စည်းများ (စွန့်ပစ်ပစ္စည်း အရော) | ၁၀၃၀၄၇ |
| | ပလတ်စတစ် ရေဘူးများ | ၁၂၀ |
| | ထုတ်လုပ်ရေးလုပ်ငန်းစဉ်မှ ထွက်ရှိသော ညစ်ညမ်းသောသဲများ (produced sand*) | ၀ |
| အန္တရာယ်ရှိသော စွန့်ပစ်ပစ္စည်း | ထုတ်လုပ်ရေးလုပ်ငန်းစဉ်မှ ထွက်ရှိသော ညစ်ညမ်းသောသဲများ (produced sand*) | ၅၀၆၄၀ |
| | အန္တရာယ်ရှိသော စွန့်ပစ်ပစ္စည်းအရောအနှောများ (ဥပမာ - ညစ်ညမ်းနေသော အဝတ်စများ) | ၂၀၀၄၀ |
| | စက်ချောဆီ | ၁၅၇၂ |
| | သက်တမ်းလွန်နေသော အန္တရာယ်ရှိ ဓာတု ပစ္စည်းများ | ၅၈၅ |
| | လုပ်ငန်းဆောင်ရွက်နေသော ပစ္စည်းကိရိယာများမှ ညစ်ညမ်းသော အနည်အနှစ်များ | ၃၆၆၆ |
| | ညစ်ညမ်းသော ပလတ်စတစ် စည်ပိုင်းများ | ၃၅၅၅ |
| | ညစ်ညမ်းသော သတ္တု စည်ပိုင်းများ | ၁၄၄၈ |
| | ခဲ ဘက်ထရီများ | ၇၄၅ |
| | Jet A 1 လောင်စာဆီ | ၆၀၂ |
| | မီးအိမ်မီးချောင်း/မီးလုံး | ၄၉၀ |
| | နီကယ်-ကက်ဒမီယမ် ဘက်ထရီများ | ၂၁၀ |
| | ဓာတုပစ္စည်း အိတ်များ | ၄၀ |
| | ဆီများစွန်းထင်းနေသော လုပ်ငန်းခွင်သုံး တစ်ကိုယ်ရည်ကာကွယ်ရေး ပစ္စည်းများ | ၃၇ |
| | အန္တရာယ်ရှိသော သက်တမ်းလွန် သုတ်ဆေး | ၂၀ |

မှတ်ချက်။ ။ ထုတ်လုပ်ရေးလုပ်ငန်းစဉ်မှ ထွက်ရှိသော ညစ်ညမ်းသောသဲများ (produced sand*) ကို အန္တရာယ်ရှိသော စွန့်ပစ်ပစ္စည်း နှင့် အန္တရာယ်မရှိသော စွန့်ပစ်ပစ္စည်း နှစ်မျိုးလုံးအဖြစ်သတ်မှတ်နိုင်ပါသည်။ PTTEPI သည် ယခုအချိန်အထိ ထုတ်လုပ်ရေးလုပ်ငန်းစဉ်မှ ထွက်ရှိသော ညစ်ညမ်းသောသဲများကို အန္တရာယ်ရှိသော စွန့်ပစ်ပစ္စည်းအနေဖြင့် စွန့်ပစ်လျက်ရှိပါသည်။

ကိုးကား - PTTEPI, ၂၀၂၀

ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်ကို စီမံကိန်း၏ လုပ်ငန်းအဆင့်များအားလုံးအတွက် ကြီးကြပ်ရေး နှင့် ကြီးကြပ်ရေးမဟုတ်သည့် ဆောင်ရွက်မှုသတ်မှတ်ချက်များနှင့်အညီ ပြုစုထားပါသည်။ အမျိုးသားအဆင့် သတ်မှတ်ချက်များ နှင့် သက်ဆိုင်ရာ နိုင်ငံတကာ သဘောတူစာချုပ်များ နှင့် ကွန်ဗင်းရှင်းများပါဝင်လျက် စီမံကိန်းအတွက် မူဝါဒ နှင့် ဥပဒေ မူဘောင် တို့ကို အခန်း (၄) တွင် ဖော်ပြထားပါသည်။

ပတ်ဝန်းစီမံခန့်ခွဲမှုအစီအစဉ်သည် အောက်ပါတို့ကို ရည်ရွယ်ပါသည် -

- ဤဇောတိက တူးဖော်ထုတ်လုပ်ရေးဆောင်ရွက်မှု နှင့် ကမ်းလွန်သဘာဝဓာတ်ငွေ့သယ်ယူရေးစနစ် စီမံကိန်းကို PTTEPI က ထောက်ပံ့ပေးသော သတင်းအချက်အလက်များ အပေါ်အခြေခံ၍ ရှင်းပြရန်၊
- ပတ်ဝန်းကျင် နှင့် လူမှု ဆိုင်ရာ ထည့်သွင်းစဉ်းစားချက်များကို စီမံကိန်းနှင့်ပတ်သက်၍ ဆုံးဖြတ်ချက်များချမှတ်ရာတွင် ရှင်းလင်းစွာ ထည့်သွင်းအသုံးပြုသွားနိုင်စေရန်၊
- အကြံပြုထားသော လုပ်ထုံးလုပ်နည်းများ နှင့် အလေ့အကျင့်များကို ပတ်ဝန်းကျင် နှင့် လူမှုဆိုင်ရာ သက်ရောက်မှုများကို ရှောင်ကြဉ်ရန်၊ လျော့ချရန် သို့မဟုတ် လျော့ကျစေရန် စီမံကိန်းကာလအတွင်း လေးစားလိုက်နာဆောင်ရွက်ရန်၊ နှင့်
- စာရင်းစစ်ခြင်း နှင့် အရေးပေါ်အစီအစဉ်များအပါအဝင် ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှု အစီအစဉ်များနှင့်ပတ်သက်၍ လမ်းညွှန်ပေးနိုင်ရန်။

၁.၅ အနီးပတ်ဝန်းကျင် အကြောင်းအရာဖော်ပြချက်

၁.၅.၁ ရှုပရှုပ်သွင်ပတ်ဝန်းကျင်

မြန်မာနိုင်ငံတွင် မုတ်သုံရာသီပုံစံဖြင့် လွှမ်းမိုးနေသည့် ပူပြင်း၍ စိုထိုင်းသောရာသီဥတုရှိပါသည်။ ၎င်း၏ ရာသီဥတုကို ပြင်းထန်သော မုတ်သုံလွှမ်းမိုးမှုများ၊ သိသိသာသာ နေရောင်ရရှိမှု၊ မိုးရေချိန်မြင့်မှုတို့ လက္ခဏာဆောင်သည့် အပူပိုင်းမုတ်သုံရာသီအဖြစ် ဖော်ပြနိုင်ပါသည်။

ကမ်းရိုးတန်းဒေသများ၌ ပုံမှန်နှစ်စဉ်မိုးရေချိန်မှာ မြောက်ပိုင်းတွင် ၁,၅၀၀-၂,၀၀၀ မီလီမီတာခန့်ရှိပြီး၊ အရှေ့တောင်ပိုင်းတွင် ၂,၅၀၀ မီလီမီတာခန့်တိုးလာကာ၊ အနောက်တောင်ပိုင်းတွင် ၃,၅၀၀ မီလီမီတာခန့်အထိ တိုးသွားပါသည်။ နှစ်တစ်နှစ်၏ အလွန်မိုးရွာသွန်းမှုသည် မေလလယ် နှင့် နိုဝင်ဘာလလယ်တို့အကြား ဖြစ်ပေါ်သည်။ ၂၀၀၂ နှင့် ၂၀၀၄ တို့အကြား

MODIS ဂြိုဟ်တုအချက်အလက်များအရ ပင်လယ်ပြင်မျက်နှာပြင်အပူချိန် (SST) သည် ၂၈ နှင့် ၃၀၀ ဒီဂရီဆဲလ်စီယပ် အပိုင်းအခြားရှိကြောင်း ဖော်ပြသည်။

လုပ်ကွက်အမှတ် M9 နှင့် လုပ်ကွက်အမှတ် M11 တို့ကို အပူပိုင်းမုန်တိုင်းများအသင့်လျော်ဆုံး ဖြစ်သော သဘာဝဘေးများစွာကြုံတွေ့နိုင်သည့် နေရာများအဖြစ် စဉ်းစားပါသည်။ (OCHA, ၂၀၁၃)။ မြန်မာနိုင်ငံ၌ ဆိုက်ကလုန်းများသည် ဧပြီ မှ မေအထိ နှင့် အောက်တိုဘာ မှ နိုဝင်ဘာအထိ မုတ်သုံ အကြို နှင့် မုတ်သုံအလွန်အချိန်တို့၌ ဘင်္ဂလားပင်လယ်တွင် စတင်ဖြစ်ပေါ်တတ်ပါသည်။ ဤဆိုက်ကလုန်းများသည် မိုးအလွန်အကျွံရွာသွန်းမှုများ၊ ရေကြီးမှုများ နှင့် မုန်တိုင်း တလိပ်လိပ်တက်မှုများကို အထူးသဖြင့် ရခိုင်ပြည်နယ်၏ ကမ်းရိုးတန်းဒေသများ၌ ဖြစ်ပေါ်စေတတ်ပါသည်။

၁.၅/ ဇီဝပတ်ဝန်းကျင်

ကမ်းလွန်ဇောတိက တူးဖော်ရေးလုပ်ငန်းသည် အတန်အသင့်ဝေးလွန်းသောနယ်မြေဧရိယာ တွင် တည်ရှိသဖြင့်၊ လေ့လာမှုနယ်မြေဧရိယာ၏ ဇီဝသဘာဝမှာ ကမ်းနီးနယ်မြေဧရိယာများ နှင့်နှိုင်းယှဉ်ပါက ဂေဟတန်ဖိုးနိမ့်မည်ဟု တွက်ချက်ပါသည်။ သို့ရာတွင်၊ နို့တိုက်သတ္တဝါများ၊ ပင်လယ်လိပ်များ နှင့် ပင်လယ်ပျော်ငှက်များသည် ဤရေနေပိုင်းနယ်မြေဧရိယာများကို အခါအားလျော်စွာ ဖြတ်သန်းသွားနိုင်ကြောင်း မှတ်သားရမည် ဖြစ်ပါသည်။

အထက်ပါအကြောင်းအရာအပြင်၊ ၂၀၀၉ တွင် ဆောင်ရွက်ခဲ့သည့် အခြေခံအချက်အလက် များ နှင့် ၂၀၁၆ တွင် ဆောင်ရွက်ခဲ့သည့် အဏ္ဏဝါပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးမှုတို့ ကာလအတွင်း ကောက်ယူခဲ့သည့် လုပ်ကွက်အမှတ် M9 ၏ ပတ်ဝန်းကျင်အခြေအနေများနှင့် ပတ်သက်၍ မူလအချက်အလက်များသုံးသပ်မှုကို (အခန်း ၆ တွင် နောက်ထပ်ဆွေးနွေး သွားမည်) အောက်ပါအတိုင်း အနှစ်ချုပ်ထားပါသည်။ -

- ရေအောက်ကြမ်းပြင်နေ သက်ရှိသတ္တဝါများ နှင့် မျောလှေများ - မျောလှေများ၊ ငါး ကောင်အသေးများ နှင့် ရေအောက်ကြမ်းပြင်နေ သက်ရှိသတ္တဝါများ သည် ပုံမှန်အနေ အထားကာလအတွင်း ပေါများမှု၊ သိပ်သည်းမှု နှင့် မျိုးစုံမှု တို့ကို တွေ့ရပြီး၊ ၂၀၀၉ နှင့် ၂၀၁၆ တို့အကြား တိုင်းတာမှုများတွင် ပုံမှန်လျော့ကျမှုများ မတွေ့ရှိရပါ (အချို့ ပါရာမီတာများမှာ တိုးပွားလာကြောင်း နှင့် အချို့မှာ လျော့ကျလာကြောင်း ပြသသည့် သို့ရာတွင် လျော့ကျမှုမှာ အချိန်ကာလအကြာ ဂေဟစနစ်ကောင်းမွန်မှုဖြင့် လျော့ကျမှု တို့အကြား ခိုင်လုံသောချိန်ဆက်မှုများ မရှိပါ။)
- ပင်လယ်ရေအရည်အသွေး - ပင်လယ်ရေအရည်အသွေးအတွက် တိုင်းတာခဲ့သည့် ပါရာ မီတာများအားလုံးလောက်မှာ သက်ဆိုင်ရာစံနှုန်းများနှင့် ကိုက်ညီမှုရှိပါသည်။ သို့ရာတွင်

တစ်ခုတည်းသောခြွင်းချက်အနေဖြင့် အောက်ဆီဂျင်ပါဝင်မှုအတွက် တိုင်းတာမှုများတွင် အောက်ဆီဂျင်ပါဝင်မှုအဆင့်များသည် ယေဘုယျအားဖြင့် နိမ့်မည် ဟုမျှော်လင့်ထားသည့် မီတာ ၅၀ ကျော် နက်သည့်နေရာများတွင် စံနှုန်းအောက် ရောက်ကြောင်း တွေ့ရှိခဲ့ပါသည်။ ထို့ပြင်၊ ပါရာမီတာအများစုမှာ ၂၀၀၉ နှင့် ၂၀၁၆ စစ်တမ်းများအရ အချိန်ကာလ အကြာတွင် သိသိသာသာတိုးလာမှုကို ပြသသည့် ဘာရီယံ၊ ခရိုမီယံ၊ သံ နှင့် မာကျူရီ တို့မှလွဲ၍ သိသာသောပြောင်းလဲမှုကို မပြပါ။ ဤပါရာမီတာများ၏ ပါဝင်မှုများတွင် တိုးပွားလာမှုတို့သည် အချိန်ကာလတစ်ခုအတွင်း ဆောင်ရွက်ခဲ့သည့် တူဖော်ရေး နှင့် ထုတ်လုပ်ရေး လုပ်ငန်းများကြောင့် မှတ်ယူနိုင်ပါသည်။ သို့ရာတွင်၊ အဆင့်များမှာ သက်ဆိုင်ရာစံနှုန်းများ၏ အောက်တွင်သာ ရှိသေးပါသည်။ ခြုံ၍ကြည့်လျှင်၊ စီမံကိန်း နယ်မြေဧရိယာရှိ ပင်လယ်ရေအရည်အသွေးကို ကောင်းမွန်သော သက်ရောက်မှုများ အတွက် ထိခိုက်လွယ်မှုနိမ့်ကြောင်း စဉ်းစားပါသည်။

- နုန်းအရည်အသွေး - စစ်တမ်းနှစ်ရပ်လုံးမှ ရလဒ်များတွင် တိုင်းတာခဲ့သည့်ပါရာမီတာ အားလုံး နီးပါးမှာ NOAA နုန်းအရည်အသွေးလမ်းညွှန်များ နှင့် ကိုက်ညီမှုရှိကြောင်း တွေ့ရှိရပါသည် (ERL နှင့် ERM)။ ခြွင်းချက်မှာ နီကယ်ဖြစ်ပြီး၊ ၂၀၀၉ တွင် ၂၉.၆၃ mg/kg နှင့် ၂၀၁၆ စစ်တမ်းတွင် ၅.၉၉-၃၉.၅၆ mg/kg အထိ ပြောင်းလဲခဲ့သည်။ အာဆင်နစ် (As) ကို ၂၀၀၉ တွင် အထက်ပါ ERL က တိုင်းတာခဲ့ပြီး ၃-၂၀ mg/kg ရှိပါသည်။ နီကယ် နှင့် အာဆင်နစ်နှစ်မျိုးလုံးပါဝင်မှုသည် ၂၀၀၉ နှင့် ၂၀၁၆ တို့အကြားတွင် လျော့ကျသွားကြောင်း မှတ်သားရမည် ဖြစ်ပါသည်။ အခြားမှတ်သားစရာ ကောင်းသော ရလဒ်များမှာ ၂၀၀၉ နှင့် ၂၀၁၆ တို့အကြား နုန်းတွင် ဘာရီယံပါဝင်မှု သိသိသာသာတိုးလာခြင်း ဖြစ်ပါသည်။

၁.၅.၃ လူမှုစီးပွားပတ်ဝန်းကျင်

သက်ရောက်မှုရှိစေမည့် လူမှုနယ်မြေဧရိယာ (SAOI) သည် အဓိကအားဖြင့် ဒေသသုံးခု ပါဝင် မည် ဖြစ်ပါသည်။ ၎င်းတို့မှာ တနင်္သာရီ၊ ရန်ကုန် နှင့် မွန်ပြည်နယ်တို့ဖြစ်ကြပါသည်။ နယ်မြေ ဧရိယာတွင် လုပ်ကွက်အမှတ် M9 မှ ၈၃ နှင့် ၁၄၉ ကီလိုမီတာ အသီးသီးကွာဝေး သည့် နာကိုဒန်း နှင့် ကိုကိုး ကျွန်းတို့တွင် ခရီးသွားလုပ်ငန်းရှိနေသည့် အတွက် ၎င်းကျွန်းများ လည်း ပါဝင်မည် ဖြစ်ပါသည်။

တနင်္သာရီတိုင်းဒေသကြီးရှိ လူများသည် ရေလုပ်ငန်းမွေးမြူရေး လုပ်ငန်းများနှင့်ဆက်စပ် သော ငါးဖမ်းလုပ်ငန်းအပေါ်တွင် အဓိက မှီခိုနေကြပြီး၊ ဤတိုင်းဒေသကြီးရှိ နေထိုင်သူ လူများအတွက် အဓိက ဖြစ်နိုင်သည့် အလုပ်အကိုင် နှင့် ဝင်ငွေရင်းမြစ်ဖြစ်ပါသည်။ ဒေသတွင် အသက်မွေးဝမ်းကျောင်း၏ အဓိကရင်းများများထဲမှ တစ်ခုမှာ စိုက်ပျိုးရေးဖြစ်ပြီး ရော်ဘာ များ နှင့် စားအုန်းဆီစိုက်ပျိုးရေးလုပ်ငန်းများ ရှိကြပါသည်။ ဒေသအတွင်း သတ္တုတူး ဖော်မှုလုပ်ငန်းကိုလည်း တွေ့ရှိနိုင်ပါသည်။

စိုက်ပျိုးရေး၊ ခြံမွေးတိရစ္ဆာန်များမွေးမြူရေး နှင့် ငါးဖမ်းလုပ်ငန်းများသည် ရန်ကုန်တိုင်း ဒေသကြီးရှိ ကျေးလက်ဒေသများ၌ အဓိကအခန်းကဏ္ဍတွင် ပါဝင်နေပါသည်။ စပါး၊ ပဲတောင့်များ နှင့် ပဲများသည် အဓိက သီးနှံများဖြစ်ကြသော်လည်း၊ ဂုန်လျှော်၊ ရော်ဘာ၊ မြေပဲ နှင့် ကြံတို့ကိုလည်း တွေ့ရှိရပါသည်။

စိုက်ပျိုးရေးသည် မွန်ပြည်နယ်တွင် အဓိကစီးပွားရေးလုပ်ငန်းဖြစ်ပြီး၊ စိုက်ပျိုးနိုင်သောမြေ ဧကသုံးသန်းခန့် ရှိပါသည်။ စပါး၊ ပြောင်းဖူး၊ မြေပဲ၊ နေကြာ၊ သီးဟိုဠ်သရက်၊ ကြံ၊ စားအုန်းဆီ၊ ကိုကိုး နှင့် များစွာသော အသီးပင်များကို ဒေသအတွင်း တွေ့ရှိရပါသည်။

SAOI သည် မွန် နှင့် တနင်္သာရီငါးဖမ်းနယ်မြေဧရိယာများဖြစ်ကြသည့် ကမ်းဝေးငါးဖမ်းဇုန် နှစ်ခု ပါဝင်ပါသည်။ ကိုကိုး နှင့် နာကိုဒန်းကျွန်းများအနီး ငါးဖမ်းလုပ်ငန်းများလည်း ရှိနိုင် ပါသည်။ စီမံကိန်းနယ်မြေဧရိယာအနီး ကမ်းဝေးငါးဖမ်းလုပ်ငန်းများအတွက် အဖမ်းအများ ဆုံး ကာလမှာ ဧပြီ၊ မေ၊ စက်တင်ဘာ၊ အောက်တိုဘာ၊ နိုဝင်ဘာ၊ နှင့် ဒီဇင်ဘာလ တို့ဖြစ်ကြပြီး၊ မေလမှာ အဖမ်းအများဆုံးလများ၏ အကောင်းဆုံးလ ဖြစ်သည်။

၁.၆ *ဖြစ်ပေါ်လာနိုင်သည့် အဓိကအရေးကြီးသော ထိခိုက်မှုများ နှင့် လျှော့ချရေး အစီအမံများကို ဖော်ပြချက်*

ဆောင်ရွက်လည်ပတ်နေသည့် စီမံကိန်းလုပ်ငန်းများမှ ဖြစ်ပေါ်လာနိုင်သည့် အဓိက အရေး ကြီးသော ထိခိုက်မှုများ နှင့် အဓိကလျှော့ချရေး အစီအမံများ၏ အနှစ်ချုပ်ကို **ဇယား ၁-၃** တွင်ဖော်ပြထားသည်။ ၎င်းဖော်ပြချက်များသည် အဓိကအရေးပါဆုံးသော ထိခိုက်မှုများနှင့် လျှော့ချရေးအစီအမံများကို အကျဉ်းချုံးထားသည့် ဖော်ပြချက်သာ ဖြစ်သည်။ လုပ်ငန်း တစ်ခုစီတိုင်းမှ ဖြစ်ပေါ်လာနိုင်သည့် သက်ရောက်မှုများ၏ အသေးစိတ် ဖော်ပြချက်များကိုမူ **အခန်း(၆)** တွင် ဖော်ပြထားပြီး သက်ရောက်မှုတစ်ခုစီတိုင်းအတွက် လျှော့ချရေး အစီအမံ များစာရင်းကိုမူ **အခန်း(၇)** တွင် ဖော်ပြထားသည်။

ဖော်ထုတ်သတ်မှတ်ထားသည့် လျှော့ချရေး အစီအမံများကို ထိခိုက်မှုများ၏ ဖြစ်နိုင်ခြေ ကို လျှော့ချရန် နှင့်သို့မဟုတ် ထိခိုက်မှုဖြစ်ပွားလျှင် ၎င်း၏ အတိုင်းအတာပမာဏ သို့မဟုတ် ပြင်းထန်မှု ကိုကန့်သတ်ရန် အသုံးပြုသည်။ အဆိုပြုလျှော့ချရေးအစီအမံများ၏ ရည်ရွယ် ချက်မှာ ဖော်ထုတ်သတ်မှတ်ထားသည့် ထိခိုက်နိုင်မှုများကို စီမံခန့်ခွဲရန်၊ နည်းဥပဒေများကို လိုက်နာရန် နှင့် စီမံကိန်းလုပ်ငန်းများအား အကောင်အထည် ဖော်ဆောင်နေစဉ်အတွင်း နိုင်ငံတကာ စက်မှုလုပ်ငန်းဆိုင်ရာ အလေ့အကျင့်များ၏ စံချိန်စံညွှန်းများကို လိုက်နာ ကျင့်သုံးကြောင်းသေချာစေရန် ဖြစ်ပါသည်။

ဖော်ထုတ်သတ်မှတ်ထားသည့် ဖြစ်နိုင်ခြေရှိသော ထိခိုက်မှုများအားလုံးသည် အဆိုပါ လျှော့ချရေး အစီအမံများကို အကောင်အထည်ဖော်ဆောင်ခြင်းဖြင့် သင့်တော်စွာ စီမံ ခန့်ခွဲနိုင်မည်ဖြစ်ပြီး၊ စီမံကိန်းလုပ်ငန်းများမှ အရေးကြီးသောထိခိုက်မှုများ ရှိမည်မဟုတ် အကြောင်း မှတ်သားသင့်ပါသည်။

လျှော့ချရေး အစီအမံများကို အကောင်အထည်ဖော်ရန် ကုန်ကျစရိတ်ကို PTTEPI ၏ လုပ်ငန်းလည်ပတ်မှုကုန်ကျစရိတ်တွင် ထည့်သွင်းထားသောကြောင့် တစ်ခုချင်းစီအတွက် ဖြစ်နိုင်ချေရှိသော စရိတ်ကို သတ်မှတ်ဖော်ပြရန် မဖြစ်နိုင်ပါ။ သို့သော် PTTEPI သည် လျှော့ချရေး အစီအမံများအားလုံးအတွက် တစ်နှစ်လျှင် အမေရိကန်ဒေါ်လာ ၁ မီလီယံ ကျော် ကုန်ကျမည်ဟု ခန့်မှန်းထားပါသည်။

ဇယား (၁-၃) ဖြစ်ပေါ်လာနိုင်သည့် အဓိကအရေးကြီးသော ထိခိုက်မှုများ နှင့် လျှော့ချရေး အစီအမံများကို ဖော်ပြချက်

| ကဏ္ဍများ | ဖြစ်ပေါ်လာနိုင်သည့် အဓိကအရေးကြီးသော ထိခိုက်မှုများ | အဓိက လျှော့ချရေး အစီအမံများ |
|--|--|---|
| ထုတ်လုပ်ရေး/လည်ပတ်ရေးအဆင့်ကာလတွင် ဖြစ်ပေါ်လာနိုင်သည့် အဓိက ထိခိုက်မှုများ | | |
| ၁။ လေထု အရည်အသွေး | ၁.၁။ သင်္ဘောများ ၊ စက်ပစ္စည်းများ ၊ တွင်းတူးစက် နှင့် အင်ဂျင်များ လည်ပတ်ခြင်းကြောင့် လောင်ကျွမ်းမှု များမှ အခိုးအငွေ့များထွက်ရှိစေနိုင်ပါသည်။ | ၁.၁.၁ အဆက်မပြတ် လေဝင်လေထွက်ရှိစေခြင်းနှင့် ပုံမှန်မဟုတ်သော မီးလောင်ခြင်းများကို ရှောင်ရှားပါမည်။ |
| | | ၁.၁.၂ ဓာတ်ငွေ့မီးတောက်လောင်မှုကို လျှော့ချရန် ဓာတ်ငွေ့အပိုသုံးစွဲမှုကို တတ်နိုင်သလောက် လျှော့ချပါမည်။ |
| | | ၁.၁.၃ အကယ်၍ အရေးပေါ် အခြေအနေ သို့ စက်ပစ္စည်း ချို့ယွင်းမှုဖြစ်ပါက ပိုမိုသောဓာတ်ငွေ့များကို မီးတောက်ဓာတ်ငွေ့စနစ်သို့ ပို့ဆောင်သွားပါမည်။ |
| | | ၁.၁.၄ မီးတောက်ဖြစ်ရပ်များ အားလုံးအတွက်ဓာတ်ငွေ့မီးတောက်၏ ပမာဏကို မှတ်တမ်းတင်ပါမည်။ |
| | | ၁.၁.၅။ စက်ပစ္စည်း ပြုပြင်သည့် အချိန်ဇယားနှင့် ထုတ်လုပ်သူများမှ သတ်မှတ်ထားသည့် လောင်ကျွမ်းနှုန်းများအရ စက်ပစ္စည်းများအား ပုံမှန်စစ်ဆေးခြင်း နှင့် စက်များအား ပြုပြင်ထိန်းသိမ်းခြင်းများ ပြုလုပ်ခြင်း။ |
| | ၁.၂။ စီမံကိန်းမှ ဖန်လုံအိမ်ဓါတ်ငွေ့ထွက်ရှိခြင်းသည် ကမ္ဘာကြီးကို ပူနွေးစေနိုင်ပါသည်။ | ၁.၂.၁။ စီမံကိန်းမှ ဖန်လုံအိမ်ဓါတ်ငွေ့ထုတ်လွှတ်မှုကို စောင့်ကြပ်ကြည့်ရှုရန် နှစ်စဉ်ထုတ်လွှတ်သည့် ညစ်ညမ်းမှုများကို စစ်တမ်းပြုလုပ်ခြင်း။ |
| ၂။ ပင်လယ်ရေနှင့် နံနံ အရည်အသွေး | ၁.၃။ ငွေ့ရည်ဖွဲ့လောင်ကျွမ်းခြင်းမှလေထုထုတ်လွှတ်မှုသည် လေထုအရည်အသွေး သို့မဟုတ် GHG အပေါ်အကျိုးသက်ရောက်နိုင်သည် | ၁.၃.၁။ လေဝင်လေထွက်ရှိစေခြင်းနှင့် မီးလောင်ခြင်းများနှင့် ပတ်သတ်၍ အတိုင်းအတာများ ချမှတ်ခြင်း ၁.၃.၂။ ပြုပြင်ထိန်းသိမ်းမှု အချိန်ဇယား၊ လောင်ကျွမ်းခြင်း၏ထိရောက်မှုကို သေချာစေရန် ထုတ်လုပ်သူများက အကြံပြုထားသည့်အတိုင်း လောင်ကျွမ်းစေနိုင်မှုများအတွက် ပုံမှန်စစ်ဆေးခြင်းနှင့် ကြိုတင်ကာကွယ်ရေးကို ပြုလုပ်ခြင်း။ |
| | ၂.၁။ စီမံကိန်း၏ ကမ်းလွန်ရေနံတူးဖော်ခြင်းမှ စွန့်ထုတ်နိုင်သည့် အမျိုးမျိုးသော ရေဆိုးများ (အင်ဂျင်ခန်း နှင့် သင်္ဘောကုန်းပတ်မှ ထွက်လာသော ရေဆိုးများ၊ တွင်းတူးကျစ်စာများ၊ သင်္ဘော နှင့် တူးဖော်ကိရိယာများမှ စွန့်ထုတ်မှုများ ပါဝင်သည့် ဆီ-ဓာတုဗေဒပစ္စည်းများ၊ ဝမ်းဗိုက် | ၂.၁.၁။ စီမံကိန်းသင်္ဘောများကို ပင်လယ်ရေကြောင်းသွားလာခြင်းဆိုင်ရာစည်းကမ်း (MARPOL 73/78) နှင့် PTTEPI မြန်မာကုမ္ပဏီ၏ စွန့်ပစ်ပစ္စည်း စီမံခန့်ခွဲမှု အစီအစဉ် မှ သတ်မှတ်ချက်များနှင့်အညီ စီမံကိန်းရေယာဉ်များကို လည်ပတ်ဆောင်ရွက်ခြင်း။ |

| ကဏ္ဍများ | ဖြစ်ပေါ်လာနိုင်သည့် အဓိကအရေးကြီးသော ထိခိုက်မှုများ | အဓိက လျှော့ချရေး အစီအမံများ |
|---|--|--|
| | တွင်းရှိရေများ နှင့် မိလ္လာရေများအပါအဝင် များသည် ပင်လယ်ရေ အရည် အသွေးကို ထိခိုက်စေနိုင်ပါသည်။ | |
| | ၂၂။ စီမံကိန်းမှ အန္တရာယ်ရှိသော စွန့်ပစ်ပစ္စည်း နှင့် အန္တရာယ်မရှိသော စွန့်ပစ်ပစ္စည်း အမျိုးမျိုးကို စွန့်ထုတ်နိုင်ပါသည်။ မနစ်မကျသော စွန့်ပစ်ပစ္စည်း စီမံခန့်ခွဲမှု (သယ်ယူပို့ဆောင်ခြင်း၊ သိုလှောင်ခြင်း နှင့် စွန့်ထုတ်ခြင်းများ အပါအဝင်) သည် ပင်လယ်ရေအရည်အသွေး ကို ထိခိုက်စေနိုင်ပါသည်။ | ၂၂.၁။ ကမ်းလွန်ရေနံတူးဖော်ရာတွင် ပင်လယ်ရေကြောင်းသွားလာခြင်းဆိုင်ရာစည်းကမ်း (MARPOL 73/78) နှင့် PTTEPI မြန်မာကုမ္ပဏီ၏ စွန့်ပစ်ပစ္စည်း စီမံခန့်ခွဲမှု အစီအစဉ် မှ သတ်မှတ်ချက်များနှင့်အညီ စွန့်ပစ်ပစ္စည်းများကို စီမံခန့်ခွဲခြင်း။ |
| ၃။ ဇီဝဗေဒမျိုးစုံ မျိုးကွဲနှင့် ဂေဟစနစ် | ၃.၁။ ပင်လယ်ရေ (သို့) နန်း အရည်အသွေး လျော့ကျခြင်းသည် တစ်ဆင့်ခံ ထိခိုက်မှုဖြစ်နိုင်ပါသည်။ | ၃.၁.၁။ ပင်လယ်ရေ နှင့် နန်း အရည်အသွေး ထိခိုက်မှုများအတွက် လျှော့ချမည့် နည်းလမ်းများကို အကောင်အထည်ဖော် ဆောင်ရွက်ခြင်း။ |
| | | ၃.၁.၂။ ယာဉ်ကြောပိတ်ဆို့မှုကိုသတိပေးရန်အထောက်အကူပြုရေယာဉ်များကိုသုံးခြင်း |
| | | ၃.၁.၃။ ZPQ ၊ WP နှင့် တွင်းတူးစက် များပတ်ဝန်းကျင်မီတာ ၅၀၀ အကွာအဝေး ဘေးကင်းလုံခြုံရေးဇုန်ကို သတ်မှတ်ပြီး တိုက်မိခြင်းမှကာကွယ်ရန် ဘေးကင်းလုံခြုံရေးဇုန်သို့ ချဉ်းကပ်သောငါးဖမ်းခြင်းနှင့် ကူးသန်းရောင်းဝယ်ရေး ရေယာဉ်များအား စောင့်ကြည့်လေ့လာရန်အထောက်အကူပြုရေယာဉ်များကို ထားရှိခြင်း။ |
| ၄။ ရေကြောင်းသွား လာမှုအတွက် အဟန့်အတားများ | ၄.၁။ ပင်လယ်ကူး သင်္ဘောများ နှင့် ကမ်းလွန်ရေနံတူးဖော်ရာတွင် အသုံးပြုမည့် ဆက်စပ်ပစ္စည်း များ သည် ကမ်းလွန်ရေနံတူးဖော်သည့် ဧရိယာ နှင့် သာကေတအခြေစိုက်ကမ်းတို့တွင် ဓာတုဗေဒ ပစ္စည်းများ နှင့် စွန့်ပစ်ပစ္စည်းတို့ သယ်ယူပို့ဆောင်ချိန်တွင် ရေကြောင်း သွားလာမှု များကို အဟန့်အတားဖြစ်စေနိုင်ပါသည်။ | ၄.၁.၁။ ဓာတ်ငွေ့တူးဖော်မီ ရက်၃၀ အလိုတွင် စီမံကိန်းလုပ်ငန်းများအလိုက် သက်ဆိုင်ရာ အဖွဲ့အစည်းများ (ဆိုလိုသည်မှာ ငါးလုပ်ငန်းဦးစီးဌာန၊ မွေးမြူရေး ဝန်ကြီးဌာန၊ ငါးလုပ်ငန်း နှင့် ကျေးလက်ဖွံ့ဖြိုးရေး ဦးစီးဌာန နှင့် မြန်မာနိုင်ငံရေတပ်) ကို ရေလုပ်သားသို့ “ပင်လယ်ရေကြောင်းသတိပေးစာ” ကို ထုတ်ပေးရန် မြန်မာ့ရေနံနှင့် သဘာဝဓာတ်ငွေ့ လုပ်ငန်းနှင့် ပူးပေါင်းဆောင်ရွက်ခြင်း။ ၄.၁.၂။ ယာဉ်သွားလာမှုများကို သတိပေးရန် ထောက်ပံ့ သင်္ဘောများကို အသုံးပြုခြင်း။ ၄.၁.၃။ ZPQ ၊ WP နှင့် တွင်းတူးစက် အနီးတွင် ၅၀၀ မီတာရှိသော ဘေးကင်းဇုန် ကိုသတ်မှတ်ပြီး ငါးဖမ်းခြင်းကို စောင့်ကြည့်ရန် နှင့် ဘေးကင်းဇုန်သို့ ချဉ်းကပ်လာသော ကုန်သွယ်ချ သင်္ဘောများတိုက်မိခြင်းကို ကာကွယ်ရန် ထောက်ပံ့ ရေယာဉ်များ ပြင်ဆင်ပေးခြင်း။ |
| ၅။ လုပ်ငန်းခွင် ကျန်းမာရေးနှင့် | ၅.၁။ စီမံကိန်းလုပ်ဆောင်မှု အမျိုးမျိုးကြောင့် ဒဏ်ရာရရှိခြင်း နှင့် ဖျားနာမှုများ ဖြစ်စေနိုင်ပါသည်။ | ၅.၁.၁။ PTTEPI ၏ SSHE စီမံခန့်ခွဲမှုစနစ် (နောက်ဆက်တွဲ) က မှ ဆက်စပ်ပါဝင်သော အရာများကို အကောင်အထည်ဖော်ဆောင်ရွက်ခြင်း။ |

| ကဏ္ဍများ | ဖြစ်ပေါ်လာနိုင်သည့် အဓိကအရေးကြီးသော ထိခိုက်မှုများ | အဓိက လျှော့ချရေး အစီအမံများ |
|--|--|---|
| ဘေးအန္တရာယ် ကင်းရှင်းရေး | | |
| စီစဉ်မထားသည့်ဖြစ်ရပ်များကြောင့် ဖြစ်ပေါ်လာနိုင်သည့် အဓိက ထိခိုက်မှုများ | | |
| ၆။ သင်္ဘောများ တိုက်မိခြင်း | ၆.၁။ ပစ္စည်းများသယ်ယူပို့ဆောင်ချိန် နှင့် ကမ်းခြားချိန် တွင် ရေယာဉ် တိုက်မိခြင်းများ ဖြစ်ပွားစေနိုင်ပါသည်။ | <p>၆.၁.၁။ PTTEPI ၏ SSHE စီမံခန့်ခွဲမှုစနစ် (နောက်ဆက်တွဲ- က) အတိုင်းဆောင်ရွက်ခြင်း။</p> <p>၆.၁.၂။ ဓာတ်ငွေ့တူးဖော်မီ ရက်၃၀ အလိုတွင် စီမံကိန်းလုပ်ငန်းများအလိုက် သက်ဆိုင်ရာ အဖွဲ့အစည်းများ (ဆိုလိုသည်မှာ ငါးလုပ်ငန်းဦးစီးဌာန၊ မွေးမြူရေးဝန်ကြီးဌာန၊ ငါးလုပ်ငန်း နှင့် ကျေးလက်ဖွံ့ဖြိုးရေး ဦးစီးဌာန နှင့် မြန်မာနိုင်ငံရေတပ်) ကို ရေလုပ်သားသို့ “ပင်လယ်ရေကြောင်းသတိပေးစာ” ကို ထုတ်ပေးရန် မြန်မာ့ရေနံနှင့် သဘာဝဓာတ်ငွေ့ လုပ်ငန်းနှင့် ပူးပေါင်းဆောင်ရွက်ခြင်း။</p> <p>၆.၁.၃။ ZPQ ၊ WP နှင့် တွင်းတူးစက် များပတ်ပတ်လည်တွင် ၅၀၀မီတာအကွာအဝေးကို ဘေးကင်းရေးဇုန်အဖြစ် သတ်မှတ်ခြင်း။</p> <p>၆.၁.၄။ အကူရေယာဉ်များ အသုံးပြု၍ လမ်းကြောင်းရှင်းလင်းခြင်း။</p> <p>၆.၁.၅။ မတော်တဆ တိုက်မိမှုမှ ကာကွယ်ရန် ရေယာဉ်တိုင်း၌ သင့်တော်သော မီးဆလိုက်များနှင့် သတိပေး အချက်ပြ ကိရိယာများ တပ်ဆင်ခြင်း။</p> |
| ၇။ မတော်တဆ ယိုဖိတ်မှုများ | ၇.၁။ ချောဆီများ၊ ဓါတုပစ္စည်း (သို့မဟုတ်) ဒီဇယ်လောင်စာဆီများ မတော်တဆယိုဖိတ်မှုများသည် စီမံကိန်းအဆင့်တိုင်း၌ ဖြစ်ပေါ်နိုင်ပြီး၊ ၎င်းတို့သည် ရေမျက်နှာပြင် အရည်အသွေးကို တိုက်ရိုက် ထိခိုက်နိုင်သကဲ့သို့ ပင်လယ်ကြမ်းခင်းအနယ် အရည်အသွေးနှင့် ပင်လယ်ဂေဟစနစ်ကို သွယ်ဝိုက်ထိခိုက်စေနိုင်ပါသည်။ | <p>၇.၁.၁။ PTTEPI ၏ SSHE စီမံခန့်ခွဲမှုစနစ် (နောက်ဆက်တွဲ- က) ၏ သက်ဆိုင်ရာ အပိုင်းအလိုက် အကောင်အထည်ဖော်ခြင်း။</p> <p>၇.၁.၂။ စုစုပေါင်းတန်ချိန် (၄၀၀)ထက် ကြီးသော ရေယာဉ်တိုင်းတွင် လောင်စာဆီသိုလှောင်မှု၊ စွန့်ပစ်ပစ္စည်း ကိုင်တွယ် စီမံမှုနှင့် စွန့်ပစ်မှုတို့ကို လုပ်ထုံးလုပ်နည်း၊ အစီအစဉ်များ (ပင်လယ်ရေကြောင်းသွားလာခြင်းဆိုင်ရာစည်းကမ်း MARPOL 73/78 လိုအပ်ချက်၊ PTTEPI နှင့် လုပ်ငန်းဆောင်ရွက်သူများ၏ အစီအစဉ်များ) နှင့် အညီလုပ်ကိုင် ဆောင်ရွက်ခြင်း။</p> |
| | | ၇.၁.၃။ မြန်မာနှင့် အပြည်ပြည်ဆိုင်ရာ ပင်လယ်ရေကြောင်း သွားလာရေးအဖွဲ့အစည်း (IMO) ၏ ရေယာဉ်များ ပင်လယ်ခရီး စိတ်ချရမှုနှင့် ရေကြောင်းသွားလာရေး လုံခြုံမှုနှင့် သက်ဆိုင်သော လုပ်ထုံးလုပ်နည်းများနှင့် စံနှုန်းများနှင့် အညီ လိုက်နာဆောင်ရွက်ခြင်း။ |

| ကဏ္ဍများ | ဖြစ်ပေါ်လာနိုင်သည့် အဓိကအရေးကြီးသော ထိခိုက်မှုများ | အဓိက လျှော့ချရေး အစီအမံများ |
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| | | <p>၇.၁.၄။ ဓါတုပစ္စည်းများကို ၎င်းတို့၏ သဘာဝသဘာဝ အလိုက် ခွဲခြားသိုလှောင်ခြင်း။</p> <p>၇.၁.၅။ ချောဆီများ၊ လောင်စာဆီများ၊ သုတ်ဆေးများနှင့် အခြားသော ဓါတုပစ္စည်းများကို လိုအပ်သလောက်သာ သိုလှောင်ခြင်း။</p> <p>၇.၁.၆။ ရေနံယိုဖိတ်မှုမတော်တဆဖြစ်မှုတွင် ရေနံကြောင့်ညစ်ညမ်းသွားသည့်ဧရိယာကို ပြန်လည် သန့်စင်ခြင်း (ရေနံစုပ်ယူခြင်းဖြင့် သန့်စင်ခြင်း အစရှိသဖြင့်)၊ စွန့်ပစ်ရန်ရေနံနှင့်အတူ ညစ်ညမ်းသည့်ပစ္စည်းများအားလုံးကို ကုန်းတွင်းသို့ ပေးပို့စွန့်ပစ်ခြင်း။</p> <p>၇.၁.၇။ ZPQ ၊ WP နှင့် တွင်းတူးစက် များ အားလုံးတွင် ဆီနှင့် ဓါတုပစ္စည်းများ ယိုဖိတ်မှုကို ကာကွယ်ရန် (Drip tray) စုပ်ခွက်များ၊ ဘန်းများတပ်ဆင်ခြင်း။ ယိုဖိတ်ဆီနှင့် ဓါတုပစ္စည်းများကို အလုံပိတ် ထည့်စရာ (Sealed container) များအတွင်း၌ စုဆောင်းထားခြင်း။</p> <p>၇.၁.၈။ မတော်တဆမှုများကို ကာကွယ်ရန် ZPQ ၊ WP နှင့် တွင်းတူးစက် များမှ အချင်းဝက်-၅၀၀ မီတာ စက်ဝိုင်းအတွင်း လုံခြုံရေးဇုန်သတ်မှတ်ပြီး ပုံမှန်စောင့်ကြည့်ခြင်း။</p> <p>၇.၁.၉။ မတော်တဆ တိုက်မိမှုမှ ကာကွယ်ရန် ရေယာဉ်တိုင်း၌ သင့်တော်သော မီးဆလိုက်များနှင့် သတိပေး အချက်ပြ ကိရိယာများတပ်ဆင်ခြင်း။</p> <p>၇.၁.၁၀။ အရည်သိုလှောင်ရေး (လောင်စာဆီ၊ ဆီနှင့် ဓါတုပစ္စည်းများစသည့်) တွင် အသုံးပြုသော ကိရိယာများ၏ စိမ့်ထွက်မှု၊ ထိခိုက်မှုများနှင့် ကြိုတင်ထိမ်းသိမ်းရေး လုပ်ငန်းများကို ပုံမှန် စစ်ဆေးမှု ပြုလုပ်ခြင်း။</p> <p>၇.၁.၁၁။ အရေးပေါ် ပြန်လည်တုန့်ပြန်မှု နည်းလမ်းနှင့် အရေးပေါ် အပူပိုင်း မှန်တိုင်းသတိပေးချက်များအတိုင်း ကြိုတင်လေ့ကျင့်မှုများပြုလုပ်ခြင်း။</p> <p>၇.၁.၁၂။ တွင်းများမှ ရေနံများနှင့် အခြားသော ဒြပ်ပေါင်းများ ယိုစိမ့်မှုမရှိစေရန် သင့်လျော်မည့် Plug & Abandonment နည်းလမ်းများကို ကျင့်သုံးခြင်း။</p> <p>၇.၁.၁၃။ ကန်ထရိုက်တာများအားလုံးက ဓာတုပစ္စည်းများ ကိုင်တွယ်အသုံးပြုမှုကို ဘေးကင်းစေရန် သင်တန်းပေးခြင်း များ နှင့် ဘေးကင်းရေးစံနှုန်းသတ်မှတ်ချက်များ အကောင်အထည်ဖော်ဆောင်ရွက်ခြင်း။</p> <p>၇.၁.၁၄။ ဖိတ်စဉ်မှုကို ပြန်လည်သန့်စင်မည့်ပစ္စည်းကိရိယာ အစုံအလင်ထားရှိခြင်း။</p> |

| ကဏ္ဍများ | ဖြစ်ပေါ်လာနိုင်သည့် အဓိကအရေးကြီးသော ထိခိုက်မှုများ | အဓိက လျှော့ချရေး အစီအမံများ |
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| | | ၇.၁.၁၅။ ဓာတုဗေဒပစ္စည်းများ အသုံးချမှုလမ်းညွှန်မှချမှတ်ထားသော စံချိန်စံညွှန်းများနှင့်အညီ ဓာတုပစ္စည်းများကိုကိုင်တွယ်ဆောင်ရွက်ခြင်း။ |
| | | ၇.၁.၁၆။ အမှိုက်စုပုံမှုများ၊ ခွဲခြားမှုများ၊ သယ်ယူပို့ဆောင်မှုများကို စနစ်တကျ ဆောင်ရွက်ခြင်း။ |
| | | ၇.၁.၁၇။ အန္တရာယ်ရှိသော အမှိုက်များအကြောင်း ရှင်းလင်းပြသထားခြင်း။ |
| | | ၇.၁.၁၈။ ဓာတုပစ္စည်းများ အသုံးပြုမှုနှင့် လောင်စာသယ်ယူခြင်း လုပ်ငန်းများတွင် သင့်လျော်သော ထိန်းချုပ်ရေး ကိရိယာများ တပ်ဆင်ခြင်း။ စစ်ဆေးခြင်းများကို လုပ်ငန်း မလည်ပါတ်မီ အချိန်တိုင်း ဆောင်ရွက်ခြင်း။ |
| ၈။ အပူပိုင်း မှန်တိုင်း | ၈.၁။ အပူပိုင်းမှန်တိုင်းများကြောင့် ပင်လယ်ပြင်လုပ်ကိုင်နေကြသော အလုပ်သမားများ၏ ဘေးကင်းရေးအပေါ်စိုးရိမ်ရမှုနှင့် အခြားသော ပျက်စီးမှုများကို ဖြစ်ပေါ်စေနိုင်သည်။ | ၈.၁.၁။ PTTEPI ၏ မြန်မာနိုင်ငံဆိုင်ရာ အပူပိုင်းမှန်တိုင်းကာကွယ်ရေးလမ်းစဉ်များ၊ အရေးပေါ်အခြေအနေနှင့် အကျပ်အတည်း စီမံခန့်ခွဲရေး အစီအစဉ် (နောက်ဆက်တွဲ-က) ပါ အကြောင်းအရာများအား သက်ဆိုင်ရာအပိုင်းအလိုက် အကောင်အထည်ဖော်ဆောင်ရွက်ခြင်း။ |
| ၉။ တွင်းပေါက်ကွဲ ခြင်း | ၉.၁။ တွင်းပေါက်ကွဲခြင်းသည် ဆီနှင့်သဘာဝဓာတ်ငွေ့များပင်လယ်ပြင်နှင့်၎င်းပတ်ဝန်းကျင်သို့ မြင့်မားသည့် တွန်းကန်အားကြောင့်ပေါက်ကွဲထွက်ခြင်းကြောင့် ဖြစ်ပေါ်နိုင်ပြီး ပင်လယ်ရေ နုန်း အရည်အသွေး၊ ပင်လယ်သက်ရှိများနှင့်ဂေဟစနစ် နှင့်ကျန်းမာရေး၊ ဘေးကင်းရေး တို့ကိုလည်း ထိခိုက် မှုများကိုဖြစ်ပေါ်စေနိုင်သည်။ | ၉.၁.၁။ PTTEPI ၏ SSHE စီမံခန့်ခွဲမှုစနစ်မှ ဆက်စပ်ပါဝင်သော အရာများကို အကောင်အထည်ဖော်ဆောင်ရွက်ခြင်း။ |
| ၁၀။ မီးလောင်မှု နှင့် ပေါက်ကွဲမှု | ၉.၁။ မီးလောင်မှုနှင့် ပေါက်ကွဲမှုတို့သည် လေအရည်အသွေးညစ်ညမ်းမှု၊ အလုပ်သမားများ၏ ကျန်းမာရေး၊ ဘေးကင်းရေးနှင့် အဆောက်အအုံများပျက်စီးခြင်းစသောထိခိုက်မှုများ ဖြစ်ပေါ်စေနိုင် သည်။ ဓာတုပစ္စည်းများ ထွက်ရှိမှု/ယိုဖိတ်မှုတို့မှ ပင်လယ်ရေ/နုန်းအရည်အသွေး၊ ဂေဟနှင့် ဇီဝမျိုးစုံမျိုးကွဲများကိုလည်း တစ်ဆင့်ခံထိခိုက်စေနိုင်သည်။ | ၉.၁.၁။ ကမ်းဝေးနေရာအဆောက်အအုံများတွင် မီးသတ်ဆေးဘူးများ နှင့် အချက် အပေးစနစ်များ အပါအဝင် မီးသတ်ကိရိယာများ ထားပေးခြင်း။ ၉.၁.၂။ မီးသတ်ပစ္စည်းကိရိယာများကို အချိန်မရွေးအသုံးပြုနိုင်စေရန် ပုံမှန် စစ်ဆေး ဆောင်ရွက်မှုများ ဆောင်ရွက်ခြင်း။ ၉.၁.၃။ အရေးပေါ်မီးကာကွယ်ရေး နှင့် ပေါက်ကွဲမှုတို့အတွက် အရေးပေါ် နှင့် အကျဉ်း အကျပ် စီမံခန့်ခွဲမှု အစီအစဉ် (နောက်ဆက်တွဲ-က) ကို အကောင်အထည်ဖော် ဆောင်ရွက်ခြင်း။ |

မြန်မာနိုင်ငံ၏ အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များတွင် ပါဝင်သည့် အသေးစိတ်အချက်အလက်များအရ “လုပ်ငန်းစီမံကိန်းများသည် ဆက်လက်၍ စဉ်ဆက်မပြတ် တက်ကြွစွာ ဘက်စုံထောင့်စုံမှ ကိုယ်တိုင်စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးပြီး လမ်းညွှန်ချက်များ နှင့် စံချိန်စံညွှန်းများကို လိုက်နာဆောင်ရွက်ရမည်။ ဤလမ်းညွှန်ချက်များကို ဖြည့်ဆည်းနိုင်ရန်အတွက် လုပ်ငန်းစီမံကိန်း၏ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ် နှင့် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဆိုင်ရာ လိုက်နာဆောင်ရွက်မှု သက်သေခံလက်မှတ်ပါ သတ်မှတ်ချက်များအတိုင်း အထွေထွေလမ်းညွှန်ချက်နှင့် လုပ်ငန်း ကဏ္ဍအလိုက် လမ်းညွှန်ချက်များကို လိုက်နာဆောင်ရွက်မှုအပေါ် လုပ်ငန်း စီမံကိန်းများက ကိုယ်တိုင်စောင့်ကြပ်ကြည့်ရှုရန် တာဝန်ရှိသည်။”

စောင့်ကြပ်ကြည့်ရှု စစ်ဆေးခြင်းသည် ဥပဒေရေးရာကန့်သတ်မှတ်ချက်များ (ဆိုလိုသည်မှာ မြန်မာနိုင်ငံ၏ အမျိုးသားပတ်ဝန်းကျင်အရည်အသွေးလမ်းညွှန်များ) နှင့် PTTEPI ၏ စီမံကိန်းသတ်မှတ်ချက်များနှင့်အညီ ဆောင်ရွက်သွားရန် လိုအပ်မည် ဖြစ်ပါသည်။ ထို့ပြင် အကောင်အထည်ဖော်သည့် လျော့ချရေးထိန်းချုပ်မှု အစီအမံများ၏ လွှမ်းခြုံခံခြင်း နှင့် ထိရောက်မှု ဖြစ်ပေါ်မှုတို့ကိုလည်း ဆောင်ကြဉ်းပေးသွားမည် ဖြစ်ပါသည်။ EQEG နှင့်အညီဖြစ်စေရန် ဇောတိက စီမံကိန်းက စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးမည့် ကဏ္ဍများမှာ အောက်ပါတို့ဖြစ်ကြသည် -

- ပင်လယ်ရေအရည်အသွေး
- အနည်အနှစ် အရည်အသွေး
- တူးဖော်ထုတ်လုပ်ရေးစင်မှ ရေဆိုး
- တူးဖော်ထုတ်လုပ်ရေးစင်မှ ထွက်သော သဲများ
- တွင်းတူးရာမှထွက်လာသော မြေကျစ်စာများ (ဆီကိုအခြေခံသော ရွှံ့ NADF)
- တွင်းတူးရာမှထွက်လာသော မြေကျစ်စာများ (ရေကိုအခြေခံသော ရွှံ့ WBM)လေထုအရည်အသွေး
- ဆူညံသံ
- မိလ္လာရေ

ပတ်ဝန်းကျင်ဆိုင်ရာ စောင့်ကြပ်ကြည့်ရှုခြင်းအစီအစဉ် အသေးစိတ်အပြည့်အစုံကို အခန်း (၉) တွင် တင်ပြထားပါသည်။

စောင့်ကြပ်ကြည့်ရှုခြင်းအစီအစဉ်များ အကောင်အထည်ဖော်ရန် အတွက် တစ်နှစ်လျှင် အမေရိကန်ဒေါ်လာ ၁၀၀,၀၀၀ ကျော် နှင့် ပင်လယ်ရေအရည်အသွေး နှင့် အနည်အနှစ် အရည်အသွေး တို့ ၃ နှစ် တစ်ကြိမ်တိုင်းတာရန်အတွက် အမေရိကန်ဒေါ်လာ ၅၀၀,၀၀၀ ကျော် ကုန်ကျမည်ဟု ခန့်မှန်းထားပါသည်။

ပတ်ဝန်းကျင်ဆိုင်ရာ စောင့်ကြပ်ကြည့်ရှုခြင်းအစီအစဉ်အသေးစိတ်ကို ဇယား ၁.၄ တွင်
ဖော်ပြထားပါသည်။

ဇယား ၁.၄ ထုတ်လုပ်ရေးလုပ်ငန်းဆောင်ရွက်စဉ်အဆင့်များအတွက် စောင့်ကြပ်ကြည့်ရှုခြင်းဆိုင်ရာ အတိုင်းအတာများ

| ပတ်ဝန်းကျင် ဆိုင်ရာ ကဏ္ဍများ | အတိုင်းအတာများ | နည်းလမ်း | နေရာ | ကြာမြင့်သည့်ကာလ/ စောင့်ကြပ်ကြည့်ရှုခြင်းအကြိမ်ရေ | တာဝန်ယူခြင်း |
|---------------------------------|--|--|--|--|--------------|
| ၁. လေထု အရည်အသွေး | <p>IFC ၏ ကမ်းလွန် ရေနံနှင့် သဘာဝဓာတ်ငွေ့အတွက် ပတ်ဝန်းကျင်ဆိုင်ရာ ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေးလမ်းညွှန်ချက်အရ လေထုအရည်အသွေးဆိုင်ရာ စောင့်ကြပ်ကြည့်ရှုခြင်းမှာ အောက်ပါအတိုင်းဖြစ်ပါသည်။</p> <ul style="list-style-type: none"> • စွန့်ပစ်ဓာတ်ငွေ့မီးရှို့သည့်ပမာဏ • လောင်စာဆီဓာတ်ငွေ့ပမာဏ • ဒီဆယ်သုံးစွဲမှု • ဖန်လုံအိမ်ဓာတ်ငွေ့ထွက်ရှိမှု • စွန့်ပစ်ဓာတ်ငွေ့များ၊ လောင်စာဆီများနှင့် ဒီဇယ်များ လောင်ကျွမ်းခြင်းကြောင့် ထွက်ရှိလာသော ဓာတ်ငွေ့များ (ဥပမာ - နိုက်ထရိုဂျင်အောက်ဆိုဒ်၊ ဆိုဒီယမ်အောက်ဆိုဒ်၊ အငွေ့ပျံလွယ်သော အော်ဂဲနစ်ကွန်ပေါင်းများ (VOC) နှင့် အမှုန်များ (TSP)။ | <p>နည်းလမ်း</p> <ul style="list-style-type: none"> • စွန့်ပစ်ဓာတ်ငွေ့များ၊ လောင်စာဆီများနှင့် ဒီဇယ် ပမာဏတို့ကို တိုင်းတာခြင်းစနစ်အသုံးပြု၍ စုဆောင်းသွားပါမည်။ • ဖန်လုံအိမ်ဓာတ်ငွေ့ထွက်ရှိမှုနှင့် အခြားဓာတ်ငွေ့ထွက်ရှိမှုကို စွန့်ပစ်ဓာတ်ငွေ့များ၊ လောင်စာဆီများနှင့် ဒီဇယ် ပမာဏတို့ကိုအသုံးပြု၍ တွက်ချက်သွားပါမည်။ | <ul style="list-style-type: none"> • လုပ်ငန်းဆောင်ရွက်ရာ ရေနံစင် • တွင်းတူးစက် | <ul style="list-style-type: none"> • လစဉ် | PTTEPI |

| ပတ်ဝန်းကျင် ဆိုင်ရာ ကဏ္ဍများ | အတိုင်းအတာများ | နည်းလမ်း | နေရာ | ကြာမြင့်သည့်ကာလ/ စောင့်ကြပ်ကြည့်ရှုခြင်းအကြိမ်ရေ | တာဝန်ယူခြင်း |
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| ၂. ဆူညံသံ | ဆူညံသံဆိုင်ရာ စောင့်ကြပ်ကြည့်ရှုခြင်းမှာ အောက်ပါအတိုင်းဖြစ်ပါသည်။ <ul style="list-style-type: none"> ဆူညံသံ ကွန်တို ဆူညံသံ ပမာဏ ဆူညံသံအဆင့် | နည်းလမ်း <ul style="list-style-type: none"> နမူနာများကို လုပ်ငန်းခွင်ဆိုင်ရာ ဘေးအန္တရာယ်ကင်းရှင်းရေးနှင့် ကျန်းမာရေးစီမံခန့်ခွဲမှု (OSHA)၊ United States Department of Labour ၊ Regulation (Standard - 29 CFR)၊ Standard Number 1910.95 နှင့် လုပ်ငန်းခွင်ဆိုင်ရာ ဆူညံသံ သတ်မှတ်ချက်တို့အရ စိစစ်သွားမည်ဖြစ်ပါသည်။ | <ul style="list-style-type: none"> လုပ်ငန်းဆောင်ရွက်ရာ ထုတ်လုပ်ရေးစင် နှင့် ကိုယ်စားပြု WP တစ်ခု | <ul style="list-style-type: none"> ဆူညံသံ ကွန်တို စစ်တမ်းကို လုပ်ငန်းဆောင်ရွက်ချိန်မှစ၍ ၂ နှစ်အတွင်း ဆောင်ရွက်ခြင်း။ စစ်တမ်းကို ၅နှစ်တိုင်း ပြန်လည်ဆောင်ရွက်ခြင်း (သို့) လုပ်ငန်းလည်ပတ်မှုဆိုင်ရာ သိသိသာသာပြောင်းလဲခြင်းနှင့် ဆူညံသံအဆင့်သိသိသာသာ ပြောင်းလဲသော နေရာအတွက်သာ စစ်တမ်းပြန်လည်ကောက်ယူခြင်း။ ဆူညံသံပမာဏ ကို နားကြားခြင်းဆိုင်ရာ ပုံမှန်မဟုတ်သည်ဟု နှစ်စဉ် ကျန်းမာရေးစစ်ဆေးချက်အရ သတ်မှတ်ထားသူများအတွက် ဆောင်ရွက်ခြင်း။ ဆူညံသံအဆင့် ကို တိုင်ကြားချက်များပေါ်ပေါက်သည့် အခါတိုင်း ဆောင်ရွက်ခြင်း။ | PTTEPI မှတစ်ဆင့် တရားဝင်ခွင့်ပြု ထားသော ကန်ထရိုက်တာ |

| ပတ်ဝန်းကျင် ဆိုင်ရာ ကဏ္ဍများ | အတိုင်းအတာများ | နည်းလမ်း | နေရာ | ကြာမြင့်သည့်ကာလ/ စောင့်ကြပ်ကြည့်ရှုခြင်းအကြိမ်ရေ | တာဝန်ယူခြင်း |
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| ၃. ပင်လယ်ရေ အရည်အသွေး | ပင်လယ်ရေ အရည်အသွေးအတွက် ရွေးချယ်ဆန်းစစ်ထားသောအတိုင်းအတာ များမှာ အောက်ပါအတိုင်း ဖြစ်ပါသည်။ <ul style="list-style-type: none">• ရေအနက်• ကြည်လင်မှု• pH ပမာဏ• နောက်ကျိမှု• အောက်ဆီဂျင်ပျော်ဝင်မှု• ရေတွင်မပျော်ဝင်နိုင်သော အစိုင်အခဲများ• ဆီနှင့် ချောဆီ• စုစုပေါင်းသတ္တုဓါတ်များ• Total Petroleum Hydrocarbon (TPH) | <u>နည်းလမ်း</u> <ul style="list-style-type: none">• နမူနာများကို တစ်ကမ္ဘာလုံးဆိုင်ရာ သတ်မှတ်ထားသော စံချိန်စံညွှန်းအရ ဆန်းစစ်သွားပါမည်။ (ဥပမာ - US EPA) <u>နမူနာကောက်ယူမည့်နေရာ</u> <ul style="list-style-type: none">• ထုတ်လုပ်ရေးစင်မြေမီတာ၁၀၀ အကွာရေဆန် နှင့်ရေစုန် ၂ နေရာ• ထုတ်လုပ်ရေးစင်မြေမီတာ၁၀၀ အကွာရေဆန် နှင့်ရေစုန် ရေစီးနှင့် ထောင့်မှန်ကျသော ၂ နေရာ• ကိုယ်စားပြု ၁ နေရာ <u>နမူနာအရေအတွက်</u> <ul style="list-style-type: none">• တစ်နေရာတွင် နမူနာတစ်ခု | <ul style="list-style-type: none">• လုပ်ငန်း ဆောင်ရွက်ရာ ထုတ်လုပ်ရေးစင် | <ul style="list-style-type: none">• EMP အစီရင်ခံစာ ခွင့်ပြုမိန့် ရပြီးနောက် ၃ နှစ် လျင်တစ်ကြိမ် | PTTEPI မှတစ်ဆင့် တရားဝင်ခွင့်ပြု ထားသော ကန်ထရိုက်တာ |
| ၄ အနည်အနှစ် အရည်အသွေး | အနည်အနှစ် အရည်အသွေးအတွက် ရွေးချယ်ဆန်းစစ်ထားသောအတိုင်းအတာ များမှာ အောက်ပါအတိုင်းဖြစ်ပါသည်။ <ul style="list-style-type: none">• Total Petroleum Hydrocarbon• သတ္တုဓါတ်များ | <u>နည်းလမ်း</u> <ul style="list-style-type: none">• နမူနာများကို တစ်ကမ္ဘာလုံးဆိုင်ရာ သတ်မှတ်ထားသော စံချိန်စံညွှန်းအရ ဆန်းစစ်သွားပါမည်။ (ဥပမာ - US EPA) <u>နမူနာကောက်ယူမည့်နေရာ</u> <ul style="list-style-type: none">• ထုတ်လုပ်ရေးစင်နှင့်ကိုယ်စားပြု WP မှ မီတာ၁၀၀ အကွာရေဆန် နှင့်ရေစုန် ၂ နေရာစီ | <ul style="list-style-type: none">• လုပ်ငန်း ဆောင်ရွက်ရာ ထုတ်လုပ်ရေးစင်• ကိုယ်စားပြု WP တစ်ခု | <ul style="list-style-type: none">• EMP အစီရင်ခံစာ ခွင့်ပြုမိန့် ရပြီးနောက် ၃ နှစ် လျင်တစ်ကြိမ် | PTTEPI မှတစ်ဆင့် တရားဝင်ခွင့်ပြု ထားသော ကန်ထရိုက်တာ |

| ပတ်ဝန်းကျင် ဆိုင်ရာ ကဏ္ဍများ | အတိုင်းအတာများ | နည်းလမ်း | နေရာ | ကြာမြင့်သည့်ကာလ/ စောင့်ကြပ်ကြည့်ရှုခြင်းအကြိမ်ရေ | တာဝန်ယူခြင်း |
|--|---|---|---|--|---|
| | | <ul style="list-style-type: none"> ထုတ်လုပ်ရေးစင်နှင့်ကိုယ်စားပြု WP မှ မီတာ၁၀၀ အကွာရေဆန် နှင့်ရေစုန် ရေစီးနှင့် ထောင့်မှန်ကျသော ၂ နေရာစီ ကိုယ်စားပြု ၁ နေရာ <u>နမူနာအရေအတွက်</u> တစ်နေရာတွင် နမူနာတစ်ခု | | | |
| ၅ တူးဖော်ထုတ်လုပ်ရေး စင်မှ ရေဆိုး | <p>တူးဖော်ထုတ်လုပ်ရေးစင်မှ ရေဆိုး အတွက် ရွေးချယ်ဆန်းစစ်ထားသော အတိုင်းအတာများမှာ အောက်ပါအတိုင်းဖြစ်ပါသည်။</p> <p>အမျိုးသား ပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များ အရ လိုအပ်ချက်များ</p> <ul style="list-style-type: none"> ဆီနှင့် ချောဆီ | <p>နည်းလမ်း</p> <ul style="list-style-type: none"> ရေထဲသို့စွန့်ပစ်မှုမပြုခင် ပြုပြင်ခြင်းဆောင်ရွက်ပြီးနောက် တူးဖော်ထုတ်လုပ်ရေးစင်မှ ရေဆိုး ပမာဏကို မှတ်တမ်းတင်ခြင်း တူးဖော်ထုတ်လုပ်ရေးစင်မှ ရေဆိုး များကို ဆန်းစစ်ခြင်း | <ul style="list-style-type: none"> လုပ်ငန်း ဆောင်ရွက်ရာ ထုတ်လုပ်ရေးစင် | <ul style="list-style-type: none"> စွန့်ပစ်သည့်ပမာဏ နှင့် စိစစ်တွေ့ရှိချက်ရလဒ်ကို လစဉ်အနှစ်ချုပ်ခြင်း | PTTEPI မှတစ်ဆင့် တရားဝင်ခွင့်ပြု ထားသော ကန်ထရိုက်တာ |
| ၆ တူးဖော် ထုတ်လုပ်ရေး စင်မှ ထွက်သော သဲများ | <p>တူးဖော် ထုတ်လုပ်ရေး စင်မှ ထွက်သော သဲများအတွက် ရွေးချယ်ဆန်းစစ်ထားသော အတိုင်းအတာများမှာ အောက်ပါအတိုင်းဖြစ်ပါသည်။</p> | <p>နည်းလမ်း</p> <ul style="list-style-type: none"> တူးဖော် ထုတ်လုပ်ရေး စင်မှ ထွက်သော သဲများ ပမာဏကို မှတ်တမ်းတင်ထားခြင်း တူးဖော် ထုတ်လုပ်ရေး စင်မှ ထွက်သော သဲ နမူနာများကို ကောက်ယူ၍ USEPA ကဲ့သို့သော နိုင်ငံတကာဆိုင်ရာ လမ်းညွှန်ချက်များ နှင့် လိုအပ်ချက်များအရ ဆန်းစစ်သွားပါမည်။ | <ul style="list-style-type: none"> လုပ်ငန်း ဆောင်ရွက်ရာ ထုတ်လုပ်ရေးစင် | <ul style="list-style-type: none"> စွန့်ပစ်သည့်ပမာဏ နှင့် စိစစ်တွေ့ရှိချက်ရလဒ်ကို လစဉ်အနှစ်ချုပ်ခြင်း | PTTEPI မှတစ်ဆင့် တရားဝင်ခွင့်ပြု ထားသော ကန်ထရိုက်တာ |

| ပတ်ဝန်းကျင် ဆိုင်ရာ ကဏ္ဍများ | အတိုင်းအတာများ | နည်းလမ်း | နေရာ | ကြာမြင့်သည့်ကာလ/ စောင့်ကြပ်ကြည့်ရှုခြင်းအကြိမ်ရေ | တာဝန်ယူခြင်း |
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| | <u>အမျိုးသား ပတ်ဝန်းကျင်ဆိုင်ရာ</u> <u>အရည်အသွေး (ထုတ်လွှတ်မှု)</u> <u>လမ်းညွှန်ချက်များ အရ လိုအပ်ချက်များ</u> <ul style="list-style-type: none"> တူးဖော် ထုတ်လုပ်ရေး စင်မှ ထွက်သော သဲများ တွင်ဆီပါဝင်မှုရာခိုင်နှုန်း (OOC %) (ပင်လယ်တွင်းသို့စွန့်ပစ်မှုရှိလျှင်သာ) | | | | |
| ၇ တွင်းတူးရာမှ ထွက်လာသော မြေကျစ်စာများ (ဆီကိုအခြေခံသော ရွှံ့ NADF) | <u>အမျိုးသား ပတ်ဝန်းကျင်ဆိုင်ရာ</u> <u>အရည်အသွေး (ထုတ်လွှတ်မှု)</u> <u>လမ်းညွှန်ချက်များ အရ</u> <u>တွင်းတူးကျစ်စာများ</u> <u>အတွက်လိုအပ်ချက်များ</u> <ul style="list-style-type: none"> တွင်းတူးကျစ်စာများ တွင်ဆီပါဝင်မှုရာခိုင်နှုန်း (OOC %) ဘာရိုက်ရှိ မာကျူရီပါဝင်မှု ဘာရိုက်ရှိ ကတ်မီယမ်ပါဝင်မှု | <u>နည်းလမ်း</u> <ul style="list-style-type: none"> နမူနာများကို တစ်ကမ္ဘာလုံးဆိုင်ရာ သတ်မှတ်ထားသော စံချိန်စံညွှန်းအရ ဆန်းစစ်သွားပါမည်။ (ဥပမာ - US EPA) | <ul style="list-style-type: none"> တွင်းတူးစက် | <ul style="list-style-type: none"> တွင်းတူးစင်တစ်ခုမှတွင်းတစ်တွင်းအတွက် ကိုယ်စားပြု နမူနာတစ်ခု | PTTEPI မှတစ်ဆင့် တရားဝင်ခွင့်ပြု ထားသော ကန်ထရိုက်တာ |
| ၈ တွင်းတူးရာမှ ထွက်လာသော မြေကျစ်စာများ (ရေကိုအခြေခံသော ရွှံ့ WBM) | <u>အမျိုးသား ပတ်ဝန်းကျင်ဆိုင်ရာ</u> <u>အရည်အသွေး (ထုတ်လွှတ်မှု)</u> <u>လမ်းညွှန်ချက်များ အရ</u> <u>တွင်းတူးကျစ်စာများ</u> <u>အတွက်လိုအပ်ချက်များ</u> | <u>နည်းလမ်း</u> <ul style="list-style-type: none"> နမူနာများကို တစ်ကမ္ဘာလုံးဆိုင်ရာ သတ်မှတ်ထားသော စံချိန်စံညွှန်းအရ ဆန်းစစ်သွားပါမည်။ (ဥပမာ - US EPA) | <ul style="list-style-type: none"> တွင်းတူးစက် | <ul style="list-style-type: none"> တွင်းတူးစင်တစ်ခုမှတွင်းတစ်တွင်းအတွက် ကိုယ်စားပြု နမူနာတစ်ခု | PTTEPI မှတစ်ဆင့် တရားဝင်ခွင့်ပြု ထားသော ကန်ထရိုက်တာ |

| ပတ်ဝန်းကျင် ဆိုင်ရာ ကဏ္ဍများ | အတိုင်းအတာများ | နည်းလမ်း | နေရာ | ကြာမြင့်သည့်ကာလ/ စောင့်ကြပ်ကြည့်ရှုခြင်းအကြိမ်ရေ | တာဝန်ယူခြင်း |
|---------------------------------|--|---|--|--|---|
| | <ul style="list-style-type: none"> ဘာရိုက်ရှိ မာကျူရီပါဝင်မှု ဘာရိုက်ရှိ ကတ်မီယမ်ပါဝင်မှု ကလိုရိုက်ပါဝင်မှု | | | | |
| ၉ မိလ္လာရေ | <p>မိလ္လာရေအတွက် ရွေးချယ်ဆန်းစစ်ထားသော အတိုင်းအတာများမှာ အောက်ပါအတိုင်းဖြစ်ပါသည်။</p> <p>အမျိုးသား ပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များ (ပင်လယ်ရေကြောင်းသွားလာခြင်းဆိုင်ရာ စည်းကမ်း (MARPOL 73/78) အရ လိုအပ်ချက်များ</p> <ul style="list-style-type: none"> Thermotolerant Coliforms Biochemical Oxygen Demand (BOD) Chemical Oxygen Demand (COD) pH | <p>နမူနာကောက်ယူခြင်းနှင့်ဆန်းစစ်ခြင်းအတွက် နည်းလမ်းများမှာပင်လယ်ရေကြောင်းသွားလာခြင်းဆိုင်ရာ စည်းကမ်း (MARPOL 73/78) နှင့် ဆက်စပ် စံနမူနာများအရ အောက်ပါအတိုင်း ဖြစ်သင့်ပါသည်။</p> <ul style="list-style-type: none"> Thermotolerant Coliform Standard- စစ်ထုတ်အလွှာပါးကိရိယာ၊ ပြန်အဆင့်ဆင့်ဖြင့်အချဉ်ဖောက်ခြင် သို့တူညီသော ပိုင်းခြားစိတ်ဖြာခြင်းဆိုင်ရာနည်းလမ်း တို့ဖြင့် ဆုံးဖြတ်ခြင်း TSS - စမ်းသပ်မှုအတွက် နည်းလမ်းသည် - <ul style="list-style-type: none"> ၁။ ကိုယ်စားပြုနမူနာကို ၀.၄၅ မိုက်ခရိုမီတာရှိသော စစ်ထုတ်အလွှာပါးကိုဖြတ်၍ ၁၀၅ ဒီဂရီစင်တီဂရိတ်တွင် အခြောက်ခံ၍ အလေးချိန် ချိန်ခြင်း (သို့) ၂။ ကိုယ်စားပြုနမူနာကို မွေခြင်း (အနည်းဆုံး ၅မိနစ်လျှင် အရှိန် ၂၈၀၀ - ၃၂၀၀ g)၊ ၁၀၅ ဒီဂရီစင်တီဂရိတ်တွင် အခြောက်ခံခြင်းနှင့် အလေးချိန်ချိန်ခြင်း (သို့) ၃။ အခြားနိုင်ငံတကာဆိုင်ရာလက်ခံထားသော စစ်ဆေးမှုစံနှုန်း | <ul style="list-style-type: none"> လုပ်ငန်းဆောင်ရွက်ရာ ထုတ်လုပ်ရေးစင် | <ul style="list-style-type: none"> လေတိုင်းလျှင် တစ်ကြိမ် | PTTEPI မှတစ်ဆင့် တရားဝင်ခွင့်ပြု ထားသော ကန်ထရိုက်တာ |

| ပတ်ဝန်းကျင် ဆိုင်ရာ ကဏ္ဍများ | အတိုင်းအတာများ | နည်းလမ်း | နေရာ | ကြာမြင့်သည့်ကာလ/ စောင့်ကြပ်ကြည့်ရှုခြင်းအကြိမ်ရေ | တာဝန်ယူခြင်း |
|---------------------------------|----------------|---|------|---|--------------|
| | | <ul style="list-style-type: none"> BOD and COD - စစ်ဆေးမှုနည်းလမ်းဆိုင်ရာ စံသတ်မှတ်ချက်မှာ COD အတွက် ISO 15705:2002 နှင့် BOD5အတွက် ISO 5815-1:2003 (သို့) အခြားနိုင်ငံတကာဆိုင်ရာ လက်ခံထားသောစစ်ဆေးမှုစံနှုန်းများ | | | |

မှတ်ချက်။ ။ ဘေးအန္တရာယ်မရှိသောနေရာပေါ်မူတည်ပြီး တိုင်းတာသည့်အကွာအဝေး ၁၀၀ မီတာသည် အပြောင်းအလဲရှိနိုင်ပါသည်။

* ANNEX 26 RESOLUTION MEPC.159 (55) အောက်တိုဘာ ၁၃ရက် ၂၀၀၆ခုနှစ်တွင် ပြန်လည်ပြင်ဆင်ထားသော REVISED GUIDELINES ON IMPLEMENTATION OF EFFLUENT STANDARDS AND PERFORMANCE TESTS FOR SEWAGE TREATMENT PLANT

ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် အစီရင်ခံစာ ၏ တစ်စိတ်တစ်ပိုင်းအဖြစ်နှင့် စီမံကိန်း အကောင်အထည်ဖော် ဆောင်ရွက်ရန် တာဝန်အတွက် အောက်ဖော်ပြပါ အစီအမံခွဲများကို ပြင်ဆင်ထားပြီး စီမံကိန်း၏ ရှုထောင့်အမျိုးမျိုးမှ အကောင်အထည်ဖော်ရန် ထည့်သွင်း စဉ်းစားပါမည်။

- အရေးပေါ် စီမံခန့်ခွဲမှုအစီအစဉ် နှင့် အကျပ်အတည်းစီမံခန့်ခွဲမှုအစီအစဉ်
- ပိုင်ဆိုင်မှု အကျပ်အတည်းစီမံခန့်ခွဲမှုအစီအစဉ်
- ယိုဖိတ်မှုအတွက် အရေးပေါ်အစီအစဉ်
- တွင်းပေါက်ကွဲ ခြင်း အတွက် အရေးပေါ်အစီအစဉ်
- အပူပိုင်းမုန်တိုင်း တုန်ပြန်မှုအစီအစဉ်
- စွန့်ပစ်ပစ္စည်းနှင့်ရေဆိုးစီမံခန့်ခွဲမှုအစီအစဉ် /လုပ်ထုံးလုပ်နည်း
- လုပ်ငန်းခွင်ကျန်းမာရေးစီမံခန့်ခွဲမှုအစီအစဉ် /လုပ်ထုံးလုပ်နည်း
- ပြည်သူ့ကျန်းမာရေးစီမံခန့်ခွဲမှုအစီအစဉ်
- ပြုပြင်ထိန်းသိမ်းမှုအစီအစဉ်

အသေးစိတ်ဆိုင်ရာ အစီအမံခွဲများကို အပိုင်း ၁၁ တွင် ဖော်ပြထားပါသည်။

အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးခြင်း နှင့် ထုတ်ဖော်တင်ပြခြင်း

အများပြည်သူနှင့်တိုင်ပင်ဆွေးနွေးမှုများကာလတွင် စီမံကိန်းနှင့် ပတ်သက် သည့်များကို သက်ဆိုင်သူများနှင့် သူတို့၏ အမြင်များ၊ စိုးရိမ်မှုများကို ဆွေးနွေးခဲ့ကြပြီး၊ PTTEPI ကလည်း ဖြေကြားမှုအချို့ ဆောင်ရွက်ခဲ့ပါသည်။ ၎င်းအဓိကစိုးရိမ်မှုများ နှင့် PTTEPI ၏ ဖြေဆိုမှုတို့ကို အောက်တွင် အနှစ်ချုပ်ဖော်ပြထားပါသည်။

- မြန်မာနိုင်ငံ ကမ်းရိုးတန်းနယ်မြေဒေသများ၏ နုနယ်မှု နှင့် ထိခိုက်လွယ်မှု။ PTTEPI က ရှာဖွေတူးဖော်မှုအဆင့်တစ်ခုလုံးကို ညစ်ညမ်းအန္တရာယ်ကို အတတ်နိုင်ဆုံးလျှော့ချပြီး စည်းမျဉ်းစည်းကမ်းများ (PTTEPI ၏ ရေနံဆီ ယိုဖိတ်မှုတုံ့ပြန်ရေး အစီအစဉ် နှင့် အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး(ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များ(EQEG)) နှင့် အညီ ဆောင်ရွက်သွားမည် ဖြစ်ကြောင်း ဖြေဆိုခဲ့ပါသည်။
- ကမ်းဝေး ငါးဖမ်းလုပ်ငန်းကဏ္ဍ နှင့်၊ ငါးဖမ်းလုပ်ငန်းများ နှင့် စီမံကိန်းအဆိုပြုသူတို့ အကြား ဖြစ်ပေါ်လာနိုင်သော ပဋိပက္ခများနှင့်ပတ်သက်၍ ထိခိုက်နိုင်မှုဆိုင်ရာ အဆိုပြု ဆောင်ရွက်မှုလုပ်ငန်းများ။ စီမံကိန်းလုပ်ငန်း လည်ပတ်ဆောင်ရွက်မှုအကြောင်းကို

တံငါသည်များသိရှိစေရန် ရေကြောင်း သတိပေးချက် ကို မီဒီယာ နှင့် သတင်းစာများက တစ်ဆင့် ကြော်ငြာပေးသွားပါမည်။ ထို့ပြင်၊ ဘေးကင်းရေးဇုန်များသို့ ငါးဖမ်းစက်လှေများ ဝင်လာလျှင် သတိပေးဆောင်ရွက်မည့် ထောက်ပံ့ရေးရေယာဉ်များလည်း ပံ့ပိုးအားဖြင့် ရှိနေမည် ဖြစ်ပါသည်။

- စီမံကိန်းအတွက် ဆောင်ရွက်ထားသည့် လူမှုအကျိုးပြုလုပ်ငန်းများ CSR အစီအစဉ်။ PTTEP ၏ CSR အစီအစဉ်များကို ၂၀၀၈ ကတည်းက ဆောင်ရွက်ခဲ့ပြီး၊ PTTEP ၏ နှစ်စဉ် CSR အစီအစဉ်များကို မြန်မာ့ရေနံနှင့် သဘာဝဓာတ်ငွေ့လုပ်ငန်း (MOGE) နှင့် သက်ဆိုင်ရာ ဌာနများကို တင်သွင်းခဲ့ပါသည်။
- ဒေသတွင်းစီမံကိန်းကို ပံ့ပိုးဆောင်ရွက်မှု။ ဟိုက်ဒရိုကာဗွန်များကို စီးပွားဖြစ် လောက် လောက်သည့်ပမာဏဖြင့် ရှာတွေ့လျှင်၊ ဒေသခံများအနေဖြင့် ဒေသဖွံ့ဖြိုးရေး အတွက် မိတ်ဖက်များဆောင်ရွက်လိုသည် ဥပမာ၊ လျှပ်စစ်လုပ်ငန်း။ PTTEPI သည် မှတ်ချက်ကို မှတ်တမ်းယူခဲ့ပါသည်။

ESHIA လေ့လာမှုကာလအတွင်း ဆောင်ရွက်ခဲ့သည့် အများပြည်သူနှင့်တိုင်ပင်ဆွေးနွေးမှု နှင့် ဖော်ထုတ်တင်ပြမှုတို့ကို အခန်း (၁၃) တွင် တင်ပြထားပါသည်။ ဤအခန်းအတွက် ဆောင် ရွက်ခဲ့သည့် အဓိကလုပ်ငန်းများအနှစ်ချုပ်ကို ဖော်ပြထားပါသည်။

၁.၉.၁ စီမံကိန်းထုတ်ဖော်တင်ပြချက်

စီမံကိန်းသတင်းအချက်အလက်များအားလုံးကို စီမံကိန်းရှိ မတူကွဲပြားသော သက်ဆိုင်သူ များ အားလုံးအတွက် လက်လှမ်းမီသောပုံစံ (ဒေသသုံးဘာသာစကားကဲ့သို့သော နားလည် လွယ်သည့် ပုံစံ) ဖြင့် သတင်းအချက်အလက်ကို ထုတ်ပြန်ပေးသွားမည် ဖြစ်ပါသည်။ အများပြည်သူနှင့်တိုင်ပင် ဆွေးနွေးမှုလုပ်ငန်းများကို ၂၀၀၉ ဇန်နဝါရီ ၁၀-၁၁ ရက်တို့တွင် ဖော်ထုတ်သတ်မှတ်ထားသည့် သက်ဆိုင်သူအုပ်စုများနှင့် ဆောင်ရွက်ခဲ့ပါသည်။ ထိခိုက်ခံ စားရနိုင်သည့်ရပ်ရွာလူထုများအတွက်၊ တိုင်ပင်ဆွေးနွေးမှု နှင့် ဖော်ထုတ်တင်ပြမှုတို့ကို အခန်း (၁၃) တွင် ဖော်ပြထားသည့်အတိုင်း ဓမင်းဆိပ် (Daminseik) နေရာတွင် ဆောင်ရွက်ခဲ့ပါသည်။

၁.၉.၂ လူမှုအကျိုးပြုလုပ်ငန်းများ CSR အစီအစဉ်

လက်ရှိတွင် PTTEPIမှ ဇောတိကစီမံကိန်းအောက်တွင် လူမှုအကျိုးပြုလုပ်ငန်းများ CSR လုပ်ငန်းစဉ်များ ကို ဆောင်ရွက်လျက်ရှိပါသည်။ ဤလုပ်ငန်းစဉ်များသည် ဘဝ၏ အရည်အသွေးကိုမြှင့်တင်ရန်နှင့် လုပ်ငန်းနယ်ပယ်ရှိ သက်ဆိုင်သူများအားလုံးထံမှ ကောင်းမွန်သော ဆက်ဆံရေးရရှိစေရန်ရည်ရွယ်သည်။ ဇောတိကစီမံကိန်းအတွက်

လူမှုအကျိုးပြု လုပ်ငန်းများ CSR အစီအစဉ်တွင် “ကျန်းမာရေး၊ ပညာရေး နှင့် ပြည်သူ့လူထု ဖွံ့ဖြိုးတိုးတက်ရေး ကဏ္ဍ” ဟူ၍ ကဏ္ဍခွဲရပ် ပါဝင်ပါသည်။

ဤစီမံကိန်းအတွက် လူမှုအကျိုးပြုလုပ်ငန်းများ CSR ရန်ပုံငွေအတွက် MOGE မှ နှစ်စဉ် အတည်ပြုရန်လိုအပ်ပြီး PTTEP မှ ယခင်နှစ်အသုံးပြုခဲ့သော ပမာဏနှင့် ညီမျှသော ခန့်မှန်းခြေအမေရိကန် ဒေါ်လာ ၅၀၀၀၀၀ မှ ၆၀၀၀၀၀ သုံးစွဲရန် အဆိုပြုထားပါသည်။ သို့သော် MOGE ၏ အတည်ပြုချက်အပေါ်မူတည်၍ ပြောင်းလဲနိုင်ပါသည်။ ၂၀၁၉ ခုနှစ်တွင် အသုံးပြုခဲ့သော CSR ရန်ပုံငွေမှာ အမေရိကန်ဒေါ်လာ ၅၈၈၅၀၀ ဖြစ်သည့်အတွက် ၂၀၂၀ ခုနှစ်အတွက် ရန်ပုံငွေမှာ အမေရိကန်ဒေါ်လာ ၆၀၀၀၀၀ နီးပါး အဆိုပြုထား ပါသည်။ ရန်ပုံငွေမှာ အောက်ဖော်ပြပါတို့ပါဝင်သော လုပ်ငန်းအစီအစဉ် ဖွံ့ဖြိုးတိုးတက်ရန်အတွက် သုံးစွဲရန် ရည်ရွယ်ထားပါသည်။

- ဖွံ့ဖြိုးရေးပညာသင်ဆုအတွက်အဆင့်မြင့်ပညာရေးအကူအညီ
- ပညာရေးဆိုင်ရာအစီအစဉ်
- ကပ်ပါးရောဂါ ကင်းစင်သောကျောင်းအစီအစဉ်
- ပြည်သူ့အခြေခံအဆောက်အအုံသို့မဟုတ်အသုံးအဆောင်များတည်ဆောက်ခြင်း
- စွန့်ပစ်ပစ္စည်းမှစွမ်းအင်ကူးပြောင်းရေး အစီအစဉ်
- ဘုန်းတော်ကြီးကျောင်းများကို ထောက်ပံ့ခြင်း
- ရပ်ရွာလူထုကို ထောက်ပံ့ပေးမှု နှင့်အရေးပေါ်ကယ်ဆယ်ရေး
- သက်မွေးဝမ်းကျောင်းဆိုင်ရာဒီပလိုမာပညာသင်ဆု
- ဘုန်းတော်ကြီးကျောင်း /ယဉ်ကျေးမှုဆိုင်ရာပံ့ပိုးမှု
- ဝန်ထမ်းနှင့်မိသားစု၊ အစိုးရ၊ ကန်ထရိုက်တာများအကြားလူဒါန်းမှုဆိုင်ရာ CSR လုပ်ငန်းစဉ်များ
- စွမ်းအင်ဝန်ကြီးဌာန နှင့် အလုပ်သမားဝန်ကြီးဌာနတို့နှင့် ပူးပေါင်း၍ နည်းပညာစွမ်းရည် တည်ဆောက်ခြင်းနှင့် ဖွံ့ဖြိုးတိုးတက်မှုအစီအစဉ်

၁.၁၀ လုပ်ငန်းအစီအစဉ်နှင့် လုပ်ငန်းအကောင်အထည်ဖော်သည့် အချိန်ဇယား

ဤစီမံကိန်းအတွက် ဆောက်လုပ်ခြင်း၊ ပြင်ဆင်ခြင်း နှင့် တူးဖော်ခြင်းများကို ဆောင်ရွက်လျက်ရှိပြီး အဆင့် 1A နှင့် အဆင့် 1Bတို့မှာ ဆောင်ရွက်ပြီးဖြစ်ကြပါသည်။

ဇောတိက အဆင့် 1A ကမ်းလွန် တူးဖော်ရေးတွင် ZPQ (ဝန်ထမ်းအဆောင်များနှင့် ပေါင်းစပ်ဖွဲ့စည်းထားသော ထုတ်လုပ် ရေးစင်၊ တံတားဖြင့် သွယ်တန်းဆက်သွယ်ထားသော အဓိကတူးဖော် ရေးစင် WP1၊ အစွယ်အပွား တူးဖော်ရေးစင်နှစ်စင် WP2 နှင့် WP3၊

ဆက်စပ်ပိုက်လိုင်းများနှင့် အချင်း ၂၈ လက်မရှိ ၂၃၀ ကီလိုမီတာအရှည်ရှိ ကမ်းလွန်သဘာဝဓါတ်ငွေ့ပို့ဆောင်ရေးပိုက်လိုင်းတို့ပါဝင်ပါသည်။

ဇောတိကစီမံကိန်းဖော်ဆောင်ရေး အဆင့် 1B သည် WP4, WP5, WP6, နှင့် WP7 ဟုခေါ်တွင်သည့် အစွယ်အပွားတူးဖော်ရေးစင် လေးခု နှင့် ယင်းတို့နှင့် ဆက်စပ်နေသည့်ပိုက်လိုင်းများပါဝင်သည်။ လက်ရှိတွင် နှင့် အဆင့် 1Bတို့မှာ လုပ်ငန်းလည်ပတ်မှုနှင့်အတူ ထုတ်လုပ်ရေးအဆင့်ကို ဆောင်ရွက်လျက်ရှိသည်။

အဆင့် 1A နှင့် အဆင့် 1Bတို့၏ အသေးစိတ်အချက်အလက်များကို အပိုင်း ၃.၃ တွင် ဖော်ပြထားပါသည်။

1 EXECUTIVE SUMMARY

1.1 INTRODUCTION

The Zawtika Offshore Development Project (“the Project”) is an existing development operated by PTT Exploration and Production International Limited (PTTEPI), consisting of ZPQ (Processing platform integrated with Living Quarter module), a bridged-link wellhead platform WP1, remote wellhead platforms WP2 to WP7, associated intra-field sealines and 230 km offshore gas transportation pipeline.

To comply with requirements of the Environmental Impact Assessment (EIA) Procedure, promulgated on 29th December 2015, PTTEPI is required to undertake an Environmental Management Plan (EMP) for its current operations, and submit to Ministry of Natural Resources and Environmental Conservation (MONREC) (formerly Ministry of Environmental Conservation and Forest (MOECAF)/Environmental Conservation Department (ECD) for consideration and approval to obtain an Environmental Compliance Certification (ECC), for its existing Zawtika Offshore Development Project. Further details of the Project are described in *Chapter 3*.

1.2 SUMMARY OF PROJECT PROPONENT

PTTEPI, a subsidiary of PTT Exploration and Production Company Limited (PTTEP), is the operator for the Project to carry out petroleum exploration and production activities and related business in Myanmar.

PTTEP’s mission is to operate globally to provide reliable energy supply and sustainable value to all stakeholders with a strong vision to become a leading Asian E&P company driven by competitive performance, advanced technology and green practices.

In PTTEP Myanmar Asset’s SSHE Policy, PTTEP Myanmar Asset is committed to safe Exploration and Production (E&P) Operations in Myanmar with an ultimate goal of “Target Zero - Nobody Gets Hurts in Our Operations” which covers (1) Zero Injury, (2) Zero Major Accident (e.g. zero major hydrocarbon leak, vehicle accident, ship collision), and (3) Zero Spill or External Complaint (e.g. zero complaint by authorities/communities/sea users)

Contact details of PTTEPI are provided in *Table 1.1*.

Table 1.1 **Contact Details of PTTEPI**

| Aspect | Description |
|--------------|--|
| Company Name | PTTEP International Limited |
| Address | Vantage Tower, 623 Pyay Road, Kamayut Township, Yangon, Republic of the Union of Myanmar |
| Phone Number | +95(1) 652700 |
| Fax Number | +95(1) 667783 |

1.3 **DESCRIPTION OF PROJECT**

The Zawtika Development Project is a gas field development project located on Block M9 and a small portion of Block M11. Two organization joined in this Project, PTTEPI (80%) and Myanma Oil and Gas Enterprise (MOGE) (20%). PTTEPI is the operator for the Project. The field lies in the Gulf of Martaban, approximately 225 km south of Yangon and 207 km west of the Myanmar coast.

The existing development of offshore Zawtika is comprised of Phase 1A, 1B and 1C, as well as additional potential future development phases. This EMP's scope will cover only the activities in Phase 1A and 1B, as the other phases are developed under additional EIAs and/or EMPs. The Zawtika Phase 1A offshore facilities consists of ZPQ (Processing platform integrated with Living Quarter module), a bridged-link wellhead platform WP1, two remote wellhead platforms WP2 and WP3, associated intra-field sealines and 28" diameter with 230 km long offshore gas transportation pipeline. The development of Zawtika Phase 1B consists of 4 remote wellhead platforms, namely WP4, WP5, WP6, and WP7 including their associated pipelines. The overview of Zawtika components and offshore facilities are illustrated in *Figure 3.1*.

Zawtka offshore operations produce non-hazardous waste and very low amounts of hazardous waste. Both wastes will be managed in accordance with the provisions of the waste management procedures of PTTEPI. The estimated quantities of each waste generated during operation are presented in the following *Table 1.2*. Details on PTTEPI's waste management procedures according to its type are provided in *Error! Reference source not found.*.

Table 1.2 *Amount of non-hazardous and hazardous waste produced monthly of ZPQ, from the months January to December in 2019.*

| Type of Waste | Waste Name | Weight (kg) |
|-----------------|--|-------------|
| Non-Hazardous | General non-hazardous waste (Mixed wastes) | 103,047 |
| | Plastic Bottles | 120 |
| | Contaminated sand from production process (Produced sand*) | 0 |
| Hazardous Waste | Contaminated sand from production process (Produced sand*) | 50,640 |
| | Mixed hazardous wastes e.g. contaminated fabric, | 20,040 |
| | Lubricating oil | 15,722 |
| | Off-spec/expired hazardous chemicals | 5,285 |
| | Contaminated sludge from process equipment | 3,666 |
| | Contaminated plastic drum | 3,555 |
| | Contaminated metal drum | 1,448 |
| | Lead batteries | 745 |
| | Jet A 1 | 602 |
| | Fluorescent lamp/tube/bulb | 490 |
| | Ni-Cd Batteries | 210 |
| | Chemical sack | 40 |
| | Oil contaminated PPE | 37 |
| | Expired hazardous paint | 20 |

*Note: Produced sand can be classified as both non-hazardous waste and hazardous waste based on the lab results of % Oil concentration. For the time being, PTTEP disposes Produced sand as hazardous waste.

Source: PTTEPI, 2020

1.4 **POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK**

The EMP was prepared in compliance with the regulatory and non-regulatory performance requirements for all stages of the Project. The policy and legal framework for the Project, covering national requirements as well as applicable international treaties and conventions is outlined in **Chapter 4**.

The EMP aims are to:

- Explain this Zawtika Production Development and Offshore Gas Transportation System project, on the basis of information provided by PTTEPI;
- Ensuring that environmental and social considerations are clearly quoted and integrated in the decision-making process of the project;
- Recommending procedures and practices to be followed during the project to ensure that environmental and social effects are avoided, minimized or mitigated; and
- Providing guidance on environmental management programs, including auditing and contingency planning.

1.5 DESCRIPTION OF SURROUNDING ENVIRONMENT

1.5.1 *Physical environment*

Myanmar has a hot and humid climate dominated by monsoon pattern. Its climate can be described as tropical monsoon characterized by strong monsoon influences, a considerable amount of sun, a high rate of rainfall.

In the coastal regions, the average annual rainfall is about 1,500-2,000 mm in the north, increasing to 2,500 mm in the southeast and 3,500 mm in the southwest. Heavy rainfall occurs between mid-May and mid-November of the year. MODIS satellite data between 2002 and 2014 show that sea surface temperature (SST) ranges between 28 and 30°C.

Block M9 and Block M11 are considered to be potentially exposed to multiple natural hazards; tropical storms being the most relevant (OCHA, 2013). In Myanmar, cyclones originate in the Bay of Bengal during pre- and post-monsoon seasons from April to May and from October to November. These cyclones result in heavy rains, floods and storm surges, especially in the coastal region of Rakhine State. Biological environment

1.5.2 *Biological environment*

As the development of offshore Zawtika is located in a relatively remote area, it is expected that the biological nature of the Study Area to be of low ecological value when compared to the more productive near shore areas. However, it is noted that marine mammals, marine turtles and seabirds may occasionally pass through these deep water areas.

In addition to the above, a review of primary data pertaining to the environmental conditions of Block M9 collected during a baseline survey in 2009 and marine environmental monitoring in 2016 (as discussed further in Chapter 6), has been summarized as follows:

- Benthos and Plankton - it was found that the abundance, density and diversity of plankton, fish larvae, and benthos is within normal condition and did not show a consistent decrease between the 2009 and 2016 surveys (some parameters showed increases while others showed decreases, but there was no conclusive link between a decrease in the overall health of the ecosystem over time).
- Seawater Quality - almost all measured parameters for seawater quality complied with the relevant standards. The only exception was Dissolved Oxygen, however, the measurements that were found to be below the standard were at depths of more than 50 m, where dissolved oxygen levels are generally expected to be lower. Additionally, most parameters did not show a significant change between the 2009 and 2016 surveys, with the exception of barium, chromium, iron, and mercury, which showed substantial increases over time. The increases in the concentrations of these

parameters are possibly attributable to the drilling and production activities that have taken place during that period of time. However, the levels are still far below the relevant standards. Overall, seawater quality in the Project area is considered as good, with low sensitivity to impacts.

- Sediment Quality - The results from both surveys found that almost all measured parameters complied with the NOAA Sediment Quality Guidelines (ERL and ERM). The only exceptions were nickel, which varied from 29 -63 mg/kg in the 2009 survey and 5.99 -39.56 mg/kg in the 2016 survey, and Arsenic (As), which measured above the ERL during the 2009 survey at 3-20 mg/kg. It is noted that there was actually a decrease in both nickel and arsenic concentration between 2009 and 2016. Other notable results were a substantial increase in the concentration of barium in sediments between 2009 and 2016.

1.5.3 *Socio-economic environment*

The social area of influence (SAoI) will mainly cover three regions; Tanintharyi, Yangon, and Mon State. The area will also cover the Narcondam and Coco Island 83 and 149 km. from the Block M9 due to their significant in tourism.

People in the Tanintharyi Region relies heavily on fishery related activities with Aquaculture as potential significant source of income and employment for people living in this division. Agriculture is also one of the main sources of livelihood in the region with vast rubber and plam oil plantation. Mining can also found within the region.

Agriculture, livestock, and fishery plays an important role in the rural economy in Yangon region. Rice, beans and pulses are the main crops, but jute, rubber, groundnut and sugarcane are also found.

Agriculture is the main economic activities in Mon State with approximately three million acres of cultivatable land. Rice paddies corn, groundnut, sunflower, cashew nuts, sugarcane, coconut, palm oil, cocoa and various fruit are found within the region.

The SAoI cover two zones of offshore fishing area which are Mon and Tanintharyi Fishing areas. Fishing activities near the Coco and Narcondam Island is also expected. The peak months for offshore fishing near the Project area are April, May, September, October, November, and December, with May being the best of the peak months.

A summary of key impacts from the ongoing project operations, as well as key mitigation measures, are listed in *Table 1.3*. This is only a brief summary of the most important impacts and mitigation measures. Full details on all potential impacts from each activity are presented in *Chapter 6*, and a list of mitigation measures for each impact is presented in *Chapter 7*.

The mitigation measures are employed to reduce the likelihood of the impacts identified, and/or to limit the extent or severity of impact if one does occur. The purpose of the proposed mitigation measures is to manage identified impacts, comply with regulations and ensure that standards of international industry practice are adopted during the execution of all Project activities.

It should be noted that all identified potential impacts can be appropriately managed with the implementation of these mitigation measures, and there are no major residual impacts from Project activities.

The cost for implementation of mitigation measures are included within PTTEPI's operation costs, and are therefore not possible to individually specify, but PTTEPI has estimated the cost to be over 1 million USD per year for all mitigation measures.

Table 1.3 Highlights of Key Potential Impacts and Mitigation Measures

| Aspects | Potential Impacts | Mitigation Measures |
|--|---|--|
| Key Potential Impacts during Production/Operation Phase | | |
| 1. Air Quality | 1.1. Air emission from combustion due to operation of vessels, rig, machines and engines, and from venting and flaring activities | 1.1.1. Avoid continuous venting and non-routine flaring. |
| | | 1.1.2. Utilize excessive gas as much as possible in order to minimize gas flaring. |
| | | 1.1.3. In the event of an emergency or equipment breakdown, send excess gas to flare gas system. |
| | | 1.1.4. Record the volumes of gas flared for all flaring events. |
| | | 1.1.5. Carry out routine inspection and preventive maintenance for all machinery as per maintenance schedule/ recommended by manufacturers to ensure efficiency of combustion. |
| | 1.2. Air emission from fugitive emissions | 1.2.1. Inspection and maintenance program will be implemented during the operational phase to control fugitive emissions. |
| | 1.3. Air emissions from burning of condensate may impact air quality or GHG | 1.3.1. Implement measures above relating to venting and flaring (Item 1.3). |
| | | 1.3.2. Carry out routine inspection and preventive maintenance for burners as per maintenance schedule/ recommended by manufacturers to ensure efficiency of combustion. |
| | | 1.3.3. Conduct annual pollutant release inventory to monitor the GHG emissions from the Project. |
| 2. Seawater & Sediment Quality | 2.1. Offshore operations of the Project could generate various types of offshore wastewaters, including sewage, cuttings, bilge water, oil-chemical containing wastewater from engine room and deck drain, discharges from vessels, etc. may impact seawater quality. | 2.1.1. Operate Project vessels in compliance with the requirements under MARPOL 73/78 and PTTEP Myanmar Asset Waste Management Procedure. |
| | 2.2. Project could generate various types of hazardous and non-hazardous wastes. Inappropriate management (including transportation, storage, and disposal) of waste could impact seawater quality. | 2.2.1. Manage waste at offshore facilities in compliance with the requirements under MARPOL 73/78 and PTTEP Myanmar Asset Waste Management Procedure. |
| 3. Ecology and Biodiversity | 3.1. Secondary impacts due to decrease in seawater or sediment quality | 3.1.1. Implement all mitigation measures for impacts to seawater and sediment quality. |
| | | 3.1.2. Use support vessels to warn off traffic. |

| Aspects | Potential Impacts | Mitigation Measures |
|--|--|--|
| | | 3.1.3. Establish a 500 m safety zone around the ZPQ, WPs and Rig and provide support vessels to observe fishing and commercial vessels approaching the safety zone to prevent collision. |
| 4. Fishing | 4.1. Reduced fishing area due to presence of ZPQ, WPs and Rig | 4.1.1. Establish 500 m safety zone around the ZPQ, WPs and Rig. 4.1.2. Use support vessels to warn off traffic. 4.1.3. Provide appropriate lights and warning signals on ZPQ, WPs, Rig and all vessels to prevent accidental collision. |
| 5. Occupational Health and Safety | 5.1. Injuries or illness due to various Project activities. | 5.1.1. Implement relevant components of PTTEPI's SSHE Management System (<i>Annex A</i>). |
| Key Potential Impacts due to Unplanned Events | | |
| 6. Vessel Collision | 6.1. Collisions could potentially occur during transport of materials | 6.1.1. Implement PTTEPI's SSHE Management System (<i>Annex A</i>). 6.1.2. Establish 500 m safety zone around ZPQ, WPs and Rig. 6.1.3. Use support vessels to warn off traffic. 6.1.4. Provide appropriate lights and warning signals on all vessels to prevent accidental collision. |
| 7. Spills | 7.1. Spills of chemicals, or diesel fuel could occur throughout all Project phases, and they may directly affect surface water quality, and indirectly affect sediment quality and marine ecology. | 7.1.1. Implement the relevant components of PTTEPI's SSHE Management System (<i>Annex A</i>). 7.1.2. Each vessel greater than 400 gross tons will comply with all fuel storage, waste treatment and disposal regulations/procedures (MARPOL 73/78 requirements, PTTEPI and contractor procedures). 7.1.3. Comply with all Myanmar and International Maritime Organization (IMO) regulations or standards regarding vessel seaworthiness and maritime safety. 7.1.4. Separate and store chemicals according to their characteristics. 7.1.5. Store only necessary amounts of lubricants, fuels, paints, and other chemicals. 7.1.6. In case an oil spill accident, must recover and properly clean the oil contaminated area (such as clean with absorbent etc.), and collect all materials contaminated with oil to dispose of onshore. 7.1.7. The ZPQ, WPs and Rig shall be equipped with drip tray to prevent oil and chemical spills. Any spilled oil and chemical will be collected into a sealed container. |

| Aspects | Potential Impacts | Mitigation Measures |
|-----------------------|--|---|
| | | 7.1.8. Regularly monitor safety zone within 500 m-radius surrounding ZPQ, WPs and Rig to prevent any accidents. |
| | | 7.1.9. Provide appropriate lights and warning signals on all vessels to prevent accidental collision. |
| | | 7.1.10. Conduct routine inspections for any leakage and damages, and preventative maintenance of equipment/facilities used in fluid storage (fuel, oil, chemicals, etc). |
| | | 7.1.11. Conduct exercises according to Emergency Response Plan and Tropical Storm Emergency Plan. |
| | | 7.1.12. Use the appropriate well Plug & Abandonment method in order to prevent the leakage of petroleum hydrocarbons and other compounds from well |
| | | 7.1.13. Ensure proper training in the use and handling of the relevant chemicals and standard safety procedures implemented by all contractors. |
| | | 7.1.14. Provide spill clean up kits. |
| | | 7.1.15. Handle all chemicals according to their SDS. |
| | | 7.1.16. Store, separate, transport and dispose of waste using appropriate procedures and disposal facilities. |
| | | 7.1.17. Ensure manifest or confirmation record of hazardous waste is kept. |
| | | 7.1.18. Install an appropriate control valve for pipe work relating to chemical and fuel transfer. Perform valve inspection and conduct a pressure test before every use. |
| 8. Tropical Cyclone | 8.1. Tropical cyclones represent a threat to the safety of offshore personnel and could result in multiple fatalities and damage to assets. | 8.1.1. Implement PTTEPI's Myanmar Asset Tropical Cyclone Procedure and Emergency and Crisis Management Plan. |
| 9. Well Blowout | 9.1. A blowout can result in the release of hydrocarbons (oil or gas) into the sea and surrounding environment at high pressure, potentially impacting seawater/sediment quality, marine life and marine ecology, occupational health and safety and public health | 9.1.1. Implement PTTEPI's SSHE Management System and Well Blowout Contingency Plan. |
| 10. Fire or Explosion | 10.1. Fire or explosion could potentially impact air quality, health and safety concerns to PTTEPI's employees and | 10.1.1. Provide fire protection equipment, including fire extinguishers and alarms, on all offshore facilities. |

| Aspects | Potential Impacts | Mitigation Measures |
|---------|--|--|
| | contractors, and damage to structures. Secondary impacts from release/spill of chemicals could occur to seawater/sediment quality, ecology and biodiversity. | 10.1.2. Conduct regular inspections and drills for fire protection equipment. 10.1.3. Implement Emergency and Crisis Management Plan in case of fire or explosion occurrence. |

As detailed in Myanmar's National Environmental Quality (Emission) Guidelines (EQEG), *“projects shall engage in continuous, proactive and comprehensive self-monitoring of the project and comply with applicable guidelines and standards. For purposes of these Guidelines, projects shall be responsible for the monitoring of their compliance with general and applicable industry-specific Guidelines as specified in the project EMP and ECC.”*

Monitoring will be required in order to demonstrate compliance with legal limits (i.e. Myanmar's National Environmental Quality (Emission) Guidelines), and PTTEPI's Project requirements, and will also provide verification of the overall design and effectiveness of the implemented mitigation/control measures. Aspects to be monitored by the Zawtika project for compliance with EQEG, MARPOL and IFC EHS Guideline are as follows:

- Air Quality
- Noise
- Seawater Quality
- Sediment Quality
- Produced water
- Produced sand
- Mud and Cuttings (Non-Aqueous Drilling Fluid, NADF)
- Mud and Cuttings (Water-Based Mud, WBM)
- Sewage

Full details of the environmental monitoring program are presented in **Chapter 9**.

The estimated costs for implementation of the annually monitoring program is 100,000 USD and Tri-annually program is 500,000 USD due to high cost of seawater and sediment monitoring.

Detail of the environmental monitoring program are presented in **Table 1.4**.

Table 1.4 Monitoring Measures for the Project during Production Operations Phases

| Environmental Aspects | Parameters | Method | Location | Duration / Frequency of Monitoring | Responsibility |
|-----------------------|--|--|---|--|----------------------------------|
| 1. Air Quality | <p>According to IFC EHS Offshore Oil and Gas Guideline, air quality monitoring are as follows:</p> <ul style="list-style-type: none"> • Flare volume • Fuel gas volume • Diesel consumption • Greenhouse Gas (GHG) emissions • Other air emission from combustion sources of flare gas, fuel gas and diesel (eg. NO₂, SO₂, VOC and TSP) | <p><u>Method</u></p> <ul style="list-style-type: none"> • Volume of flare gas, fuel gas and diesel will be collected from metering system • GHG emissions and other air emissions will be calculated by using the volume of flare gas, fuel gas and diesel. | <ul style="list-style-type: none"> • Processing Platform • Rig | <ul style="list-style-type: none"> • Monthly | PTTEPI |
| 2. Noise | <p>Noise monitoring are as follows:</p> <ul style="list-style-type: none"> • Noise contour • Noise dose and • Noise level | <p><u>Method</u></p> <ul style="list-style-type: none"> • Samples shall be analyzed according to Occupational Safety and Health Administration (OSHA), United States Department of Labour, Regulation (Standard - 29 CFR), Standard Number 1910.95, Occupational Noise Exposure | <ul style="list-style-type: none"> • Processing Platform and one representative WP | <ul style="list-style-type: none"> • Noise contour survey, conduct within 2 year after starting operation. The survey will be revisited every 5 years or when significant change of operation and the survey will be conducted again only for the area that have the significant change of noise level. • Noise dose, conduct for personnel who is analysed as abnormal hearing from annual health checking. • Noise level, conduct when any complaint raised | PTTEPI via Authorized Contractor |

| Environmental Aspects | Parameters | Method | Location | Duration / Frequency of Monitoring | Responsibility |
|-----------------------|---|---|--|---|----------------------------------|
| 3. Seawater Quality | Parameters to be selectively analyzed for seawater quality are as follows: <ul style="list-style-type: none"> Water Depth Transparency pH Turbidity Dissolved Oxygen Total Suspended Solids Oil and Grease Total Heavy Metal Total Petroleum Hydrocarbon (TPH) | <u>Method</u> <ul style="list-style-type: none"> Samples shall be analyzed according to globally recognized standard e.g. US EPA. <u>Number of stations</u> <ul style="list-style-type: none"> 2 stations at 100 m distance from ZPQ upstream and downstream 2 stations at 100 m distance from ZPQ perpendicular to the current direction 1 station at reference station <u>Number of samples</u> <ul style="list-style-type: none"> 1 sample per station. | <ul style="list-style-type: none"> ZPQ | <ul style="list-style-type: none"> Every 3 years after this EMP report approval | PTTEPI via Authorized Contractor |
| 4. Sediment Quality | Parameters to be selectively analyzed for sediment quality are as follows: <ul style="list-style-type: none"> Total Petroleum Hydrocarbon Total Heavy Metal | <u>Method</u> <ul style="list-style-type: none"> Samples shall be analyzed according to globally recognized standard e.g. US EPA. <u>Number of stations</u> <ul style="list-style-type: none"> 2 stations at 100 m distance from both ZPQ and WP upstream and downstream 2 stations at 100 m distance from both ZPQ and WP perpendicular to the current direction 1 station at reference station <u>Number of samples</u> <ul style="list-style-type: none"> 1 sample per station. | <ul style="list-style-type: none"> ZPQ One representative Wellhead platform (WP) | <ul style="list-style-type: none"> Every 3 years after this EMP report approval | PTTEPI via Authorized Contractor |
| 5. Produced water | Parameters to be analyzed for produced water as follows: <u>Required by EOEG</u> <ul style="list-style-type: none"> Oil & Grease | <u>Method</u> <ul style="list-style-type: none"> Record produced water volume after treatment prior to discharge overboard. Produced water samples analysed onboard. | <ul style="list-style-type: none"> ZPQ | <ul style="list-style-type: none"> Monthly summary of volume discharged and analysis results | PTTEPI or Authorized Contractor |

| Environmental Aspects | Parameters | Method | Location | Duration / Frequency of Monitoring | Responsibility |
|---|---|--|---|--|----------------------------------|
| 6. Produced sand | Parameters to be analyzed for produced sand as follows: Required by EQEG <ul style="list-style-type: none">• OOC % (only in case of discharge) | <u>Method</u> <ul style="list-style-type: none">• Record produced sand volume.• Produced sand samples will be collected for analysis according to international guidelines and requirements such as USEPA. | <ul style="list-style-type: none">• ZPQ | <ul style="list-style-type: none">• Monthly summary of volume discharged and analysis results | PTTEPI or Authorized Contractor |
| 7. Mud and Cuttings (Non-Aqueous Drilling Fluid NADF) | Parameters to be analyzed for cuttings samples as follows: Required by EQEG <ul style="list-style-type: none">• OOC %• Total Mercury (Total Hg) dry weight in stock barite• Cadmium (Cd) dry weight in stock barite | <u>Method</u> <ul style="list-style-type: none">• Samples shall be analyzed for heavy metals according to globally recognized standard e.g. US EPA. | <ul style="list-style-type: none">• Rig | <ul style="list-style-type: none">• Once during drilling by selecting one representative well for each WHP | PTTEPI via Authorized Contractor |
| 8. Mud and Cuttings (Water-Based Mud, WBM) | Parameters to be analyzed for cuttings samples as follows: Required by EQEG <ul style="list-style-type: none">• Total Mercury (Total Hg) dry weight in stock barite• Cadmium (Cd) dry weight in stock barite• Chloride (Cl-) | <u>Method</u> Samples shall be analyzed for heavy metals according to globally recognized standard e.g. US EPA. | <ul style="list-style-type: none">• Rig | <ul style="list-style-type: none">• Once during drilling by selecting one representative well for each WHP | PTTEPI via Authorized Contractor |
| 9. Sewage | Parameters to be analyzed for sewage as follows: Required by EQEG (as per MARPOL 73/78^{*)}: <ul style="list-style-type: none">• Thermotolerant Coliforms• Biochemical Oxygen Demand (BOD)• Chemical Oxygen Demand (COD)• pH | <u>Methods used for sampling/analysis should be as specified in MARPOL 73/78 and associated standards, as follows:</u> <ul style="list-style-type: none">• Thermotolerant Coliform Standard- determined by membrane filter, multiple tube fermentation or an equivalent analytical procedure.• TSS - Method of testing should be by: 1. Filtration of representative sample through a 0.45 µm filter | <ul style="list-style-type: none">• ZPQ• Rig | <ul style="list-style-type: none">• Once every 6 months | PTTEPI via Authorized Contractor |

| Environmental Aspects | Parameters | Method | Location | Duration / Frequency of Monitoring | Responsibility |
|-----------------------|------------|---|----------|------------------------------------|----------------|
| | | membrane, drying at 105°C and weighing; or 2. Centrifuging of a representative sample (for at least five minutes with mean acceleration of 2,800-3,200 g), drying at least 105°C and weighing; or 3. Other internationally accepted equivalent test standard. • BOD and COD - The test method standard should be ISO 15705:2002 for COD and ISO 5815-1:2003 for BOD5, or other internationally accepted equivalent test standards. | | | |

Note: The distance of 100 meter can be adjustable based on the safety condition.

* ANNEX 26 RESOLUTION MEPC.159 (55) Adopted on 13 October 2006 REVISED GUIDELINES ON IMPLEMENTATION OF EFFLUENT STANDARDS AND PERFORMANCE TESTS FOR SEWAGE TREATMENT PLANT

As part of the EMP report and responsible project implementation, the following sub plans were prepared and executed to accommodate various aspect of the project:

- Emergency Management Plan and Crisis Management Plan
- Asset Crisis Management Plan
- Spill Contingency Plan
- Blow Out Contingency Plan
- Tropical Storm Response Plan
- Waste and Wastewater Management Plan / Procedure
- Occupational Health Management Plan / Standard
- Public Health Management Plan
- Maintenance Plan

Detail of each sub plan is described in *Chapter 11*.

During the public consultations, stakeholders discussed their views and concerns in relation to the project, about which PTTEPI made some responses. Those main concerns and PTTEPI's answers are summarized below:

- Fragility and vulnerability of the Myanmar coastal areas. PTTEPI assures that the entire phase will be carried out according to the rules of the art (PTTEP's Oil Spill Response Plan and National Environmental Quality (Emission) Guidelines (EQEG)), reducing as much as possible the risks of pollution;
- Proposed actions regarding potential impacts on offshore fishery sector and potential conflicts between fisheries and the project proponent. Mariner notice will be announced through media and newspaper in order to let fishermen about project operation. Then, the chase vessels are usually allocated providing and notifying the entrance of fishing boats into the exclusion zone;
- CSR program adopted for the project. PTTEP's CSR plans were developed since 2008 and PTTEP's annual CSR plans are submitted to MOGE and respective departments; and
- Support to local project. In case hydrocarbons are discovered in enough quantity for economic, local people wished partnerships for local development (electricity for instance). PTTEPI took notice of the remark.

Public consultation and disclosure to be undertaken during the ESHIA study are presented in *Chapter 13*. A summary of key activities that were undertaken are described in this chapter.

1.10.1 Project Disclosure

All project information shall be disclosed to provision the information in an accessible manner (a manner which allows for easy understanding, such as in the local language) to the various stakeholders in Project. Public consultations were undertaken during January 10-11 2009 across the various stakeholder groups identified. For the potentially affected communities, consultation and disclosure was undertaken in Daminseik area, as described in *Chapter 13*.

1.10.2 Corporate Social Responsibility (CSR) Program

There are currently a number of ongoing CSR activities taking place by PTTEPI under the Zawtika Project. These activities have the objective to uplift quality of life and gain favourable relations from all stakeholders in the operating area. The CSR program for the Zawtika Project consists of 3 main sectors: "Health, Education and Community Development Sector".

The CSR budget for this Project is required to be approved by MOGE annually, PTTEP will therefore propose approximately 500,000-600,000 USD which is similar amount with previous years; however, this can vary depending on MOGE's approval. The CSR budget used for 2019 was 588,500 USD; therefore, the proposed budget for 2020 is nearly 600,000 USD. The budget is planned to be used for continuing the development of work program, which includes:

- Higher Education Assistance for Development Scholarship
- Educational Program
- Parasite Free School Program
- Construction of Public Infrastructure or Utility
- Waste to Energy Program
- Monastery support
- Community support and Emergency relief
- High Vocational Diploma Scholarship
- Monastery / Cultural Support
- Charitable CSR Activities among Staff & Family, Government, Contractors
- Technical Capability Building and Development Program incorporative with Ministry of Energy and Ministry of Labor

Construction, preparation, and drilling phases have already taken place for this Project, and Phase 1A and Phase 1B have already been completed.

Zawtika Phase 1A consist of ZPQ (Zawtika Process and Living Quarter Platform), a bridged-link wellhead platform WP1, two remote wellhead platforms WP2 and WP3, associated intra-field sealines and 230 km offshore gas transportation pipeline.

Zawtika Phase 1B consists of 4 remote wellhead platforms (i.e. WP4, WP5, WP6 and WP7) and their associated pipelines. Currently, it is undergoing the production phase for both Phase 1A and 1B. Further detail of Phase 1A and Phase 1B is described in *Section 3.3*.

The Zawtika Offshore Development Project (“the Project”) is an existing development operated by PTT Exploration and Production International Limited (PTTEPI), consisting of ZPQ (Processing platform integrated with Living Quarter module), a bridged-link wellhead platform WP1, remote wellhead platforms WP2 to WP7, associated intra-field sealines and 230 km offshore gas transportation pipeline.

To comply with requirements of the Environmental Impact Assessment (EIA) Procedure, promulgated on 29th December 2015, PTTEPI is required to undertake an Environmental Management Plan (EMP) for its current operations, and submit to Ministry of Natural Resources and Environmental Conservation (MONREC) (formerly Ministry of Environmental Conservation and Forest (MOECF)/Environmental Conservation Department (ECD) for consideration and approval to obtain an Environmental Compliance Certification (ECC), for its existing Zawtika Offshore Development Project. Further details of the Project are described in *Chapter 3*.

2.1

PRESENTATION OF THE PROJECT PROPONENT/PROJECT DEVELOPER

PTTEPI, a subsidiary of PTTEP, is the operator for the Project to carry out petroleum exploration and production activities and related business in Myanmar.

PTTEPI's mission is to operate globally, providing reliable energy supplies and sustainable value to all stakeholders. Part of a vision to be the Energy Partner of Choice through competitive performance and innovation for long-term value creation. PTTEPI's Vision, Mission, and Corporate Values Policy are shown in *Figure 2.1*.

Figure 2.1 *PTTEPI's Vision, Mission, Corporate Values and Sustainable Development Policy*

Vision Mission and Corporate Values



Vision

"Energy Partner of Choice" through Competitive Performance and Innovation for Long-term Value Creation

Mission

PTTEP operates globally to provide reliable energy supply and sustainable value to all stakeholders.

Corporate Strategy (EXPAND and EXECUTE)

PTTEP has launched a new strategy EXPAND and EXECUTE in order to enhance the company's competitive advantage and maintain sustainable growth amid the challenges the industry is facing now and in the future.

| Expand | Execute |
|---|--|
| <p>Coming-Home Strategy: Focuses investments in Thailand and South East Asia</p> <p>Strategic Alliance Strategy: Aims to capture investment opportunity in other petroleum prolific areas with strategic alliances</p> <p>Sustainable Development Strategy: Invest in businesses focusing on technology and innovation as well as R&D capability</p> | <p>Create full value from existing assets with the emphasis on increasing production from key assets</p> <p>Maintain cost competitiveness through digital and organizational transformation</p> <p>Increase petroleum reserves by accelerating development projects that are awaiting Final Investment Decision (FID)</p> <p>Effectively execute Bongkot and Erawan transition Reposition in non-core assets</p> |

Source: PTTEP, 2020

Figure 2.1 PTTEPI's Vision, Mission, Corporate Values and Sustainable Development Policy (Cont.)

Corporate Values



Source: PTTEPI, 2019

A list of the specific team members of PTTEPI that were involved in the preparation of this EMP report are presented in *Table 2.1*.

Table 2.1 Offshore Zawtika Key Persons for the EMP Study

| Key Persons for EMP Study | |
|--|---|
| Name | Position/Specialization |
| Udom Arayatanon | Safety, Security, Health and Environmental Manager |
| Wichean Kaewkong | Senior Environmental Engineer |
| Zar Chi Saint | Environmental Engineer |
| Anucha Thippayawarn | Asset Planning Manager |
| Alongkorn Rodthip/Sayan Charoensook | Zawtika Offshore Field Manager |
| Apichai On-Dam/Sathit Chitkla | Zawtika Offshore Production Superintendent |
| Perapon Sirijitt/ Anucha Leelaratsameephanit | Zawtika Offshore Production Engineer |
| Pisarn Ananmaythakul/ Chatri Saosub | Zawtika Offshore SSHE Officer |
| Contact Details | |
| Company Name and Address | PTTEP International Limited Vantage Tower, 623 Pyay Road, Kamayut Township, Yangon, Republic of the Union of Myanmar |
| Phone Number | +95(1) 652700 |
| Fax Number | +95(1) 667783 |

Source: PTTEPI, 2019

Environmental Resources Management (ERM-Siam) has been contracted by PTTEPI to prepare this EMP for the operation phase of the Project. This report presents the objectives, methodology and outcomes of the EMP.

ERM is a leading global provider of environmental, health, safety, risk, social consulting, and sustainability-related services. ERM has more than 160 offices in 40 countries and territories and employ more than 5,000 people. ERM has a 40-year track record of excellence on complex and challenging projects.

An overview of the environmental, social and health experts involved with the preparation of this EMP report are presented in *Table 2.2*, and brief descriptions of their backgrounds are included below.

Table 2.2 *Environmental, Social and Health Specialists for the Offshore Zawtika EMP*

| Organization/ Company | Name | Qualifications | Position/ Specialization |
|--------------------------|-------------------------|--|---|
| ERM-Siam | Kamonthip Ma-oon | <ul style="list-style-type: none"> Executive Study: General Management Programme, Judge Business School, University of Cambridge, UK MSc. (DIC) in Environmental Engineering and Business Management, Imperial College, London BEng. in Environmental Engineering, Chulalongkorn University, Thailand | Partner in Charge |
| | Craig Reid | <ul style="list-style-type: none"> BSc (Hons), Marine Biology, University of Stirling, Scotland, United Kingdom, 1997 | Partner, Asia Pacific |
| | Sylvia Jagerroos | <ul style="list-style-type: none"> MSc Biological Sciences with Environmental Science BSc Biological Sciences | Environmental Specialist, Project Manager |
| | Bongkoch Tongsadayu | <ul style="list-style-type: none"> M.Sc. in Technology of Environmental Management B.Sc., Environmental Science | Environmental Specialist |
| | Rattinan Thirananthasit | <ul style="list-style-type: none"> BSc Social Sciences. Major in Environment and Development | Social Impact Assessment Specialist |

| Organization/ Company | Name | Qualifications | Position/ Specialization |
|--------------------------|-----------------------------|--|--|
| | Kanokphorn Chaivoraphorn | <ul style="list-style-type: none"> • M.A. (Social Development – Social Organization and Development) • B.Sc. (Industrial Chemistry) B.P.H. Major in Occupational Health and Safety | Principal Consultant, Health Specialist |
| | Busaya Jutatipatai | <ul style="list-style-type: none"> • MSc (Environmental Management) • BSc (Environmental Science) | Associate Consultant |

Partner-In-Charge – Ms. Kamonthip Ma-oon

Ms. Kamonthip Ma-oon is a Partner with the Capital Project Support (CPS) Team at ERM-Siam, based in Bangkok Office.

Kamonthip has extensive experience in managing Environmental and Social aspects for large-scale projects in various sectors i.e. Oil & Gas, Power and Transportation both in Europe and South East Asia regions. Kamonthip also has key experience as Business Partner to the Clients in Oil & Gas and Power Sectors with her support on Environmental, Social, Health and Safety aspects including EIAs, ESIAs, ESMPs, EM&As, Resettlement to satisfy local requirement and applicable international standards i.e. IFC PS, WB, ADB SPS, as well as providing advise on EHS Risk Management.

Partner, Asia Pacific (Myanmar) – Mr. Craig Reid

Mr Reid is a Partner with over fifteen years' experience in environmental management at ERM. Mr Reid is the Manager of the Marine Sciences Team in Hong Kong, with overall responsibility for a wide range of projects spanning across sectors including power, oil and gas, infrastructure, utilities, property and mining. Mr Reid is also highly active in Myanmar, providing direct support to ERM's operations there.

Project Manager – Ms. Sylvia Jagerroos

Ms. Sylvia Jagerroos, Marine specialist, has over 15 years' experience in the field of Climate Change adaptation, Conservation biology, and Environmental planning and Impact assessment. She has managed several big Environmental and Social cross border projects working as a Team Leader or Project Manager. She has gained valuable expertise in Coral reef assessment, Community participation work and Institutional and Capacity support especially in South East Asia and in the Pacific. Sylvia she has collaborated with international donors, governments and non-government organizations (NGOs) as well as with the Oil and Gas sector.

Environmental Specialist - Ms. Bongkoch Tongsadayu

Ms. Bongkoch Tongsadayu is a Senior Consultant of Impact Assessment and Planning Team (IAP) based in ERM-Siam office. Bongkoch has 12 years' experience in Environmental Impact Assessment (EIA) for the Onshore Oil & Gas sectors. She conducted various due diligences EIA and Environmental Monitoring and Auditing (EM&A) programs in Thailand. These investigations have covered a wide range of project development including for Oil & Gas sector. Bongkoch was a Project Manager, Project coordinator and Consultant in environmental studies of exploration drilling, flow line and petroleum production for onshore projects about 8 years. Additionally, she has experiences in regulatory review for Initial Environmental Examination (IEE) Study for a gas-fired Co-Generation System (CGS) in Thailand and EIA studies for Petroleum pipeline, Petrochemical industries, Landfill, Power sector and Steel industry.

Social Impact Assessment Specialist - Ms. Rattinan Thirananthasit

Ms. Rattinan Thirananthasit has joined ERM based in Thailand, and has worked as part of the Capital Project Support Team. Rattinan graduated from Ritsumeikan Asia Pacific University (APU), Bachelors of Social Science, College of Asia Pacific Studies (International Program), Majoring in Environment and Development with 80% tuition reduction scholarship. Her thesis of work was under the topic of State's policy making and influential social factor on Environmental policies prioritization. Rattinan has interned at The Education for Development Foundation (EDF) as project management coordinator in 2017. Rattinan has support in social aspects, including development of social baseline and social impact assessment (SIA) for ERM's projects.

Health Specialist - Ms. Kanokphorn Chaivoraphorn

Ms. Kanokphorn Chaivoraphorn is a Thailand EIA License Holder (Environmental Expert) and Principal Consultant of ERM with experience in various type of environmental studies, e.g. Environmental Impact Assessment (EIA), Initial Environmental Examination (IEE), Environmental and Safety Assessment (ESA), Code of Practices (CoP) in the Oil & Gas and Power sectors. My experience is including managing large-scale projects e.g. PTTEP EIAs in concession block S1, involving in ESIA for Petrochemical Complex in Southern Vietnam with various stakeholders.

Her expertise includes in details understanding of regulatory and legislations, Equator Principles, International Finance Corporation (IFC) Performance Standards (PS) and the relevant Environmental, Health, and Safety (EHS) Guidelines and their application to various type of projects including power sector. Prior to joining ERM, She I worked for Consultants of Technology Co., Ltd. for more over 12 years, completed a number of EIA studies for petrochemical development, metal/non-metal plant, pulp mill, power plant, etc in Thailand, including with Environmental Compliance Audit and Monitoring.

Associate Consultant (General Environmental SME) – Ms. Busaya Jutatipatai

Ms. Busaya Jutatipatai is an Assistant Consultant within ERM based in Bangkok, Thailand with a background of environmental science.

Busaya experience almost 5 years in the field of Environmental Impact Assessment (EIA) for the Onshore Oil & Gas sectors, Environmental Examination (IEE) Study and Code of Practices (CoP) for power sector, especially renewable energy e.g. Solar farm, Wind farm, Environmental Monitoring Project, HES Risk Management Process, and other technical support.

3.1 PROJECT OVERVIEW AND BACKGROUND

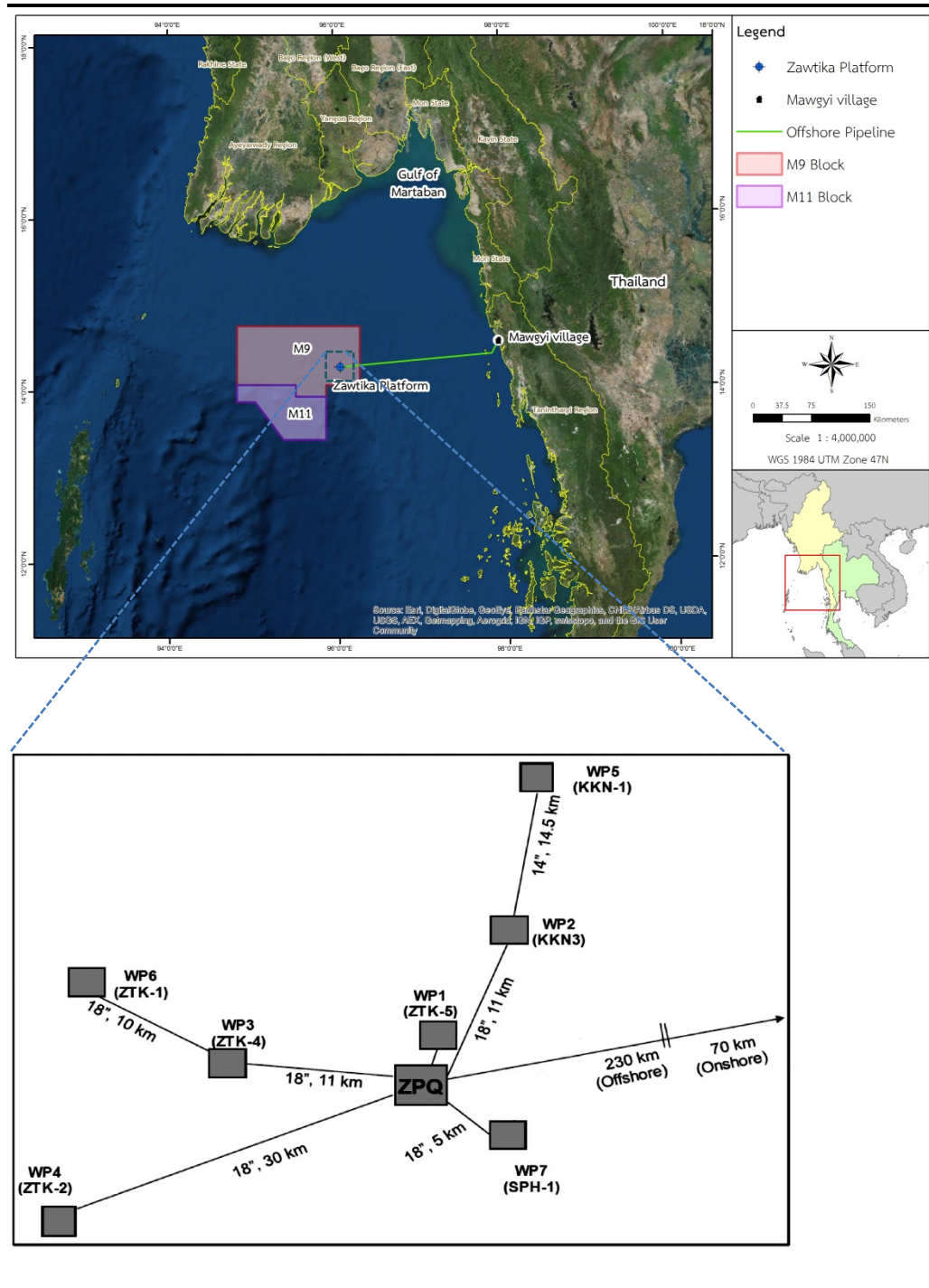
The Zawtika Development Project is a gas field development project located on Block M9 and a small portion of Block M11. Two organizations joined in this Project, PTTEPI (80%) and Myanmar Oil and Gas Enterprise (MOGE) (20%). PTTEPI is the operator for the Project. The field lies in the Gulf of Martaban, approximately 225 km south of Yangon and 207 km west of the Myanmar coast.

The existing development of offshore Zawtika is comprised of Phase 1A, 1B and 1C, as well as additional potential future development phases. This EMP's scope will cover only the activities in Phase 1A and 1B, as the other phases are developed under additional EIAs and/or EMPs. The Zawtika Phase 1A offshore facilities consists of ZPQ (Processing platform integrated with Living Quarter module), a bridged-link wellhead platform WP1, two remote wellhead platforms WP2 and WP3, associated intra-field sealines and 28" diameter with 230 km long offshore gas transportation pipeline. The development of Zawtika Phase 1B consists of 4 remote wellhead platforms, namely WP4, WP5, WP6, and WP7 including their associated pipelines. The overview of Zawtika components and offshore facilities are illustrated in *Figure 3.1*.

An Environmental, Social and Health Impact Assessment (ESHIA) study, including an Environmental Management Plan (EMP), was undertaken for the Zawtika Production Development and Offshore Gas Transportation System in August 2010 and has already been submitted to MOGE. In addition, an ESHIA was undertaken for PTTEPI's Zawtika additional condensate burner at WP1 in 2015.

Referring to new EIA Procedure issued on 29th December 2015 by Ministry of Environmental Conservation and Forestry (MOECF) (name of ministry has been revised and is currently called Ministry of Natural Resources and Environmental Conservation (MONREC)), an Environmental Management Plan (EMP) for current operations is required for MONREC/ECD consideration and approval to obtain an ECC for its existing Offshore Zawtika Project.

Figure 3.1 Overview of Zawtika Offshore Facilities



3.2 ZAWTIKA PRODUCTION DEVELOPMENT

The existing development of offshore Zawtika comprise of Phase 1A and 1B. Details for key Project activities are presented in the following section.

3.2.1 Phase 1A

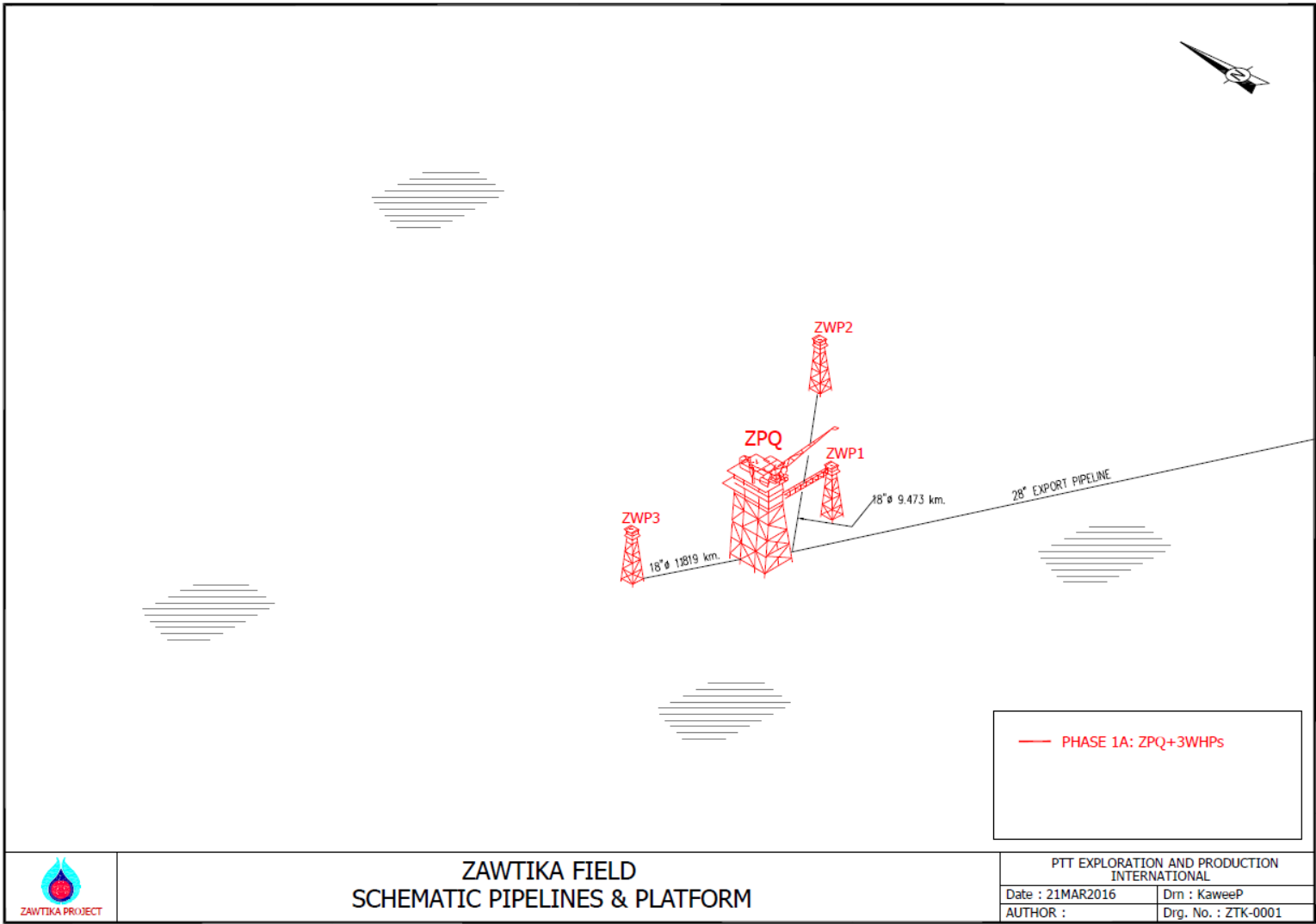
Zawtika Phase 1A consists of ZPQ, a bridged-link wellhead platform WP1, two remote wellhead platforms WP2 and WP3, associated intra-field sealines and 28" diameter with 230 km long offshore gas transportation pipeline, illustrated in *Figure 3.2*.

The Engineering, Procurement, Construction, Installation & Commissioning (EPCIC) of Phase 1A was conducted during 2011-2014. The drilling of development well have been started in 2014, which was developed over three biggest prospects at Zawtika-4, Zawtika-5 and Kakonna-3. Prospects location and well information of Phase 1A are provided in *Table 3.1*. The first gas production for domestic gas was achieved on 14th March 2014 and export gas to Thailand was achieved on 5th August 2014.

Table 3.1 *Location and well information of Phase 1A*

| ZPQ WPs | Prospect Name | Total slots (Well) | Drilled Slots | Remaining Slots | UTM : WGS1984 Zone 46N | |
|---------|---------------|--------------------|---------------|-----------------|---------------------------|---------|
| | | | | | X | Y |
| ZPQ | - | - | - | | 504924 | 1568857 |
| WP-1 | Zawtika-5 | 20 | 8 | 12 | 505070 | 1568904 |
| WP-2 | Kakonna-3 | 20 | 17 | 3 | 504463 | 1578319 |
| WP-3 | Zawtika-4 | 20 | 15 | 5 | 494225 | 1565293 |

Figure 3.2 Zawtika Phase 1A



Source: PTTEPI, 2016

3.2.2

Phase 1B

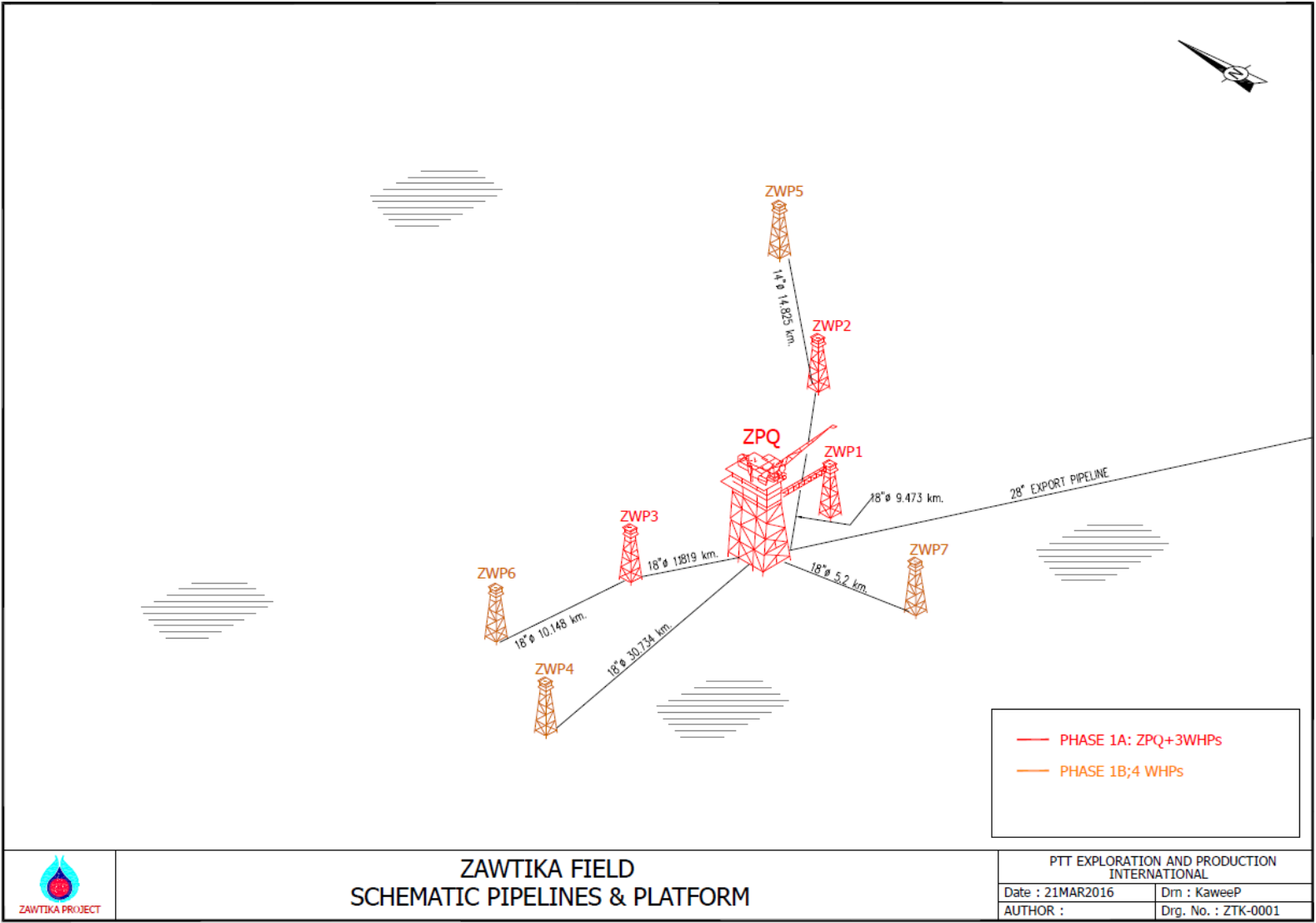
Offshore Zawtika Development Project in Phase 1B consists of 4 remote wellhead platforms, namely WP4, WP5, WP6, and WP7 including their associated pipelines, as illustrated in *Figure 3.3*. The wellhead platforms and associated pipelines installation began on 8th October 2015. Installation of WP4 was completed on 18th December 2015 and WP5, WP6 and WP7 were finished in February 2016. The development drilling campaign for Phase 1B commenced on 22nd December 2015. The first gas of the first platform in Phase 1B was achieved in April 2016. The location and well information of Phase 1B are provided in (*Table 3.2*).

Currently, it is undergoing the production phase for both phase 1A and 1B. The infill well drilling of remaining slot for each wellhead platform will be proceeded under the mitigation measure and monitoring program proposed in this EMP since all activities are same.

Table 3.2 *Location and well information of Phase 1B*

| WPs | Prospect Name | Total slots (Well) | Drilled Slots | Remaining Slots | Coordinates | |
|-----|-------------------------|--------------------|---------------|-----------------|-------------|---------|
| | | | | | X | Y |
| WP4 | Zawtika-2, Zawtika-6 | 20 | 18 | 2 | 480838 | 1550623 |
| WP5 | Kakonna-1 | 20 | 5 | 15 | 503667 | 1592941 |
| WP6 | Zawtika-1A | 12 | 9 | 3 | 484552 | 1563358 |
| WP7 | Zawtika-10, SPH-1 | 20 | 13 | 7 | 508633 | 1567325 |

Figure 3.3 Zawtika Phase 1B



Source: PTTEPI, 2016

Zawtika platform has the capacity of processing 345 Million Standard Cubic Feet per day (MMscfd) of gas and the capacity can be maximized for 400 MMscfd, approximately 3.33 bbl/day of condensate and approximately 66.67 m³/day of produced water.

Sales Gas Specification for Zawtika Project are as follows;

| Composition | Limit |
|----------------------------------|--|
| N ₂ + CO ₂ | 25 mol% max |
| O ₂ | 0.1 mol% max |
| Water | 7 lb/MMscf max |
| H ₂ S | 50 ppmv |
| Sulphur | 50 ppmw |
| Mercury | 50 µg/Nm ³ |
| Hydrocarbon Dew point | 50°F (10°C) |
| Gas Calorific Value | Minimum 880 BTU/scf, Maximum 1000 BTU/scf Minimum 880 BTU/scf is to be met via production planning & gas blending |

Descriptions for each component for Zawtika offshore development are summarised in below subsections.

3.3.1

Zawtika Processing and Living Quarter Platform (ZPQ)

ZPQ is an integrated living quarters and processing platform, located in a water depth of approximately 140 m in the Gulf of Martaban, Blocks M9 and M11, Myanmar. ZPQ constructed as an integrated deck with eight-leg platform to facilitate a transverse float-over installation. Deck levels consists of Boat landing, Sea Deck, Lower deck, Mzzanine deck, Main deck, Upper deck a Cooler deck and Helideck. These decks are segregated by fire/blast walls into two main areas; production area and living quarters, building and utilities area.

This facility receives gas from Zawtika wellhead platforms (WP1-WP7) and then sends the gas onwards to processing facilities prior to transporting onshore via a 28" diameter export pipeline. The offshore pipeline is connected to the onshore pipeline at the landfall point in Mawgyi village, Yabyu Township, Tanintharyi Region.

ZPQ installations will be permanently manned around the clock. The ZPQ has a maximum on board capacity of 183 personnel.

Figure 3.4 *Zawtika Processing and Living Quarter Platform (ZPQ)*



Source: PTTEPI, 2016

3.3.1.1 *ZPQ Processing Facilities*

The processing facilities on the ZPQ can be categorized into the following groups:

- **Receiving Facilities** including pig receivers and manifolds to receive well fluids from remote wellhead platforms, wellhead coolers (either air cooler or seawater cooler) to cool the production fluids received from the bridge connected wellhead platform (WP-1) and the 3 phase Inlet Separator to remove the gas from well fluids, condensate from the water phase, and to absorb pipeline. Additionally, to send fluid long distances from the project area of remote platforms, the fluid will be transferred via intrafield pipeline that is connected from wellhead platforms to ZPQ. As the characteristic of gas at the Zawtika Field has low content of Mercury, H₂S and CO₂; there is no specific removal system required in Zawtika Field.
- **Gas Processing Facilities**
 - 1st Stage Gas Compression: The gas from the inlet separator is compressed to approximately 58 barg (841 psig) by three 1st Stage Gas Compression trains. Each train includes a suction scrubber, a discharge cooler (Air cooling) and a gas turbine driven centrifugal compressor.
 - Glycol Dehydration and Regeneration: The gas will be dehydrated after the 1st stage of compression. The dehydration specification is 5lb/MMscf based giving a margin below the 7 lb/MMscf sales gas specification.

- 2nd Stage Gas Compressor: The export gas is compressed further using three compression trains and metered (not fiscal meter) before being exported to ZOC onshore via an export subsea pipeline.
- **Condensate System:** The condensate is treated to remove the light ends and water via heating and a low pressure 3 phases separator and then routed to storage after cooling. The system includes an electric heater at flash vessel, and stabilized condensate is stored at the condensate storage vessel prior to burning at WP-1 (via smokeless burner), or alternatively utilizing for glycol regeneration package for fuel burner. There is also an option to load the condensate tank and send onshore for sale.
- **Produced Water Treatment:** Produced water from the inlet separator is treated for removal of sand, suspended solid particulate matter and associated hydrocarbon removal before being disposed overboard to the sea. Produced water that is discharged overboard will comply with Myanmar's EQEG Standards; the maximum per day and 30 days average for oil and grease discharge should not exceed 42 mg/l and 29 mg/l, respectively. Management methods for produced water at Zawtika are discussed in *Error! Reference source not found.*
- **Produced Sand Management** - produced sand, removed from pigging operations, is generated at Zawtika in quantities of approximately 40 tons/year. Produced sand management is discussed in *Error! Reference source not found.*

3.3.1.2 *Living Quarter Module (LQM)*

ZPQ also supports a Living Quarters Module (LQM) located on the west side of the platform at upper deck level. LQM is a self-contained four level building including helideck, central control room, office area, canteen, recreational area, clinic, radio room, and lounge that designed for a single lift prior to topsides loadout. This module is designed for permanently accommodating 88 people and temporarily accommodating up to 183 people (during platform commissioning, shutdown and major maintenance activities).

3.3.2 *Zawtika Wellhead Platforms (WP)*

Currently, there are 7 WPs (WP 1-7) in Zawtika field. They are automated for unmanned operations, with personnel presence required for replenishing consumables (e.g., corrosion inhibitor, diesel etc.), maintenance and restart following emergency shut down only. Sufficient operating data is communicated to ZPQ to monitor the status of safety and production critical systems.

WP1 is bridge linked to ZPQ, while WP2 to WP7 are structurally identical remote wellhead platforms. Remote platform access is by means of helicopter or boat during daylight hours and in calm conditions. The frequency of regular

visits to the remote wellhead platforms is once every 2 weeks, depending on operations' activities.

Figure 3.5 *Zawtika Wellhead Platforms (WP)*



Source:

PTTEPI,

2016

3.3.3 *Zawtika Offshore Gas Transportation System*

The Zawtika offshore gas pipeline system comprises of the following pipeline networks:

- Six Intra-field Seelines
 - 18" Seeline from WP2 to ZPQ with approximately length of 10.8 km;
 - 18" Seeline from WP3 to ZPQ with approximately length of 11.05 km;
 - 18" Seeline from WP4 to ZPQ with approximately length of 30 km;
 - 14" Seeline from WP5 to WP2 with approximately length of 14.5 km;
 - 18" Seeline from WP6 to WP3 with approximately length of 10 km; and
 - 18" Seeline from WP7 to ZPQ with approximately length of 5 km.
- Gas Export Pipeline
 - 28" Offshore Gas Export Pipeline from ZPQ to land fall point near Mawgyi village with approximately length of 230 km.

The design life of the intra-field seelines and export pipeline are 30 years. The design of the pipeline system complies with the requirements of the latest editions of ASME B31.8 and International Codes and Standards.

The Zawtika offshore gas transportation system end at landfall point, Kilometre Pipeline (KP) 0, at Mawgyi village where offshore Zawtika pipeline is connected to onshore Zawtika pipeline, then gas pipeline runs to onshore Zawtika Operating Center (ZOC), approximately 12 km from the landfall.

Topography of landfall is generally coastal geomorphology, with a broad sandy beach backed by low hills, the majority of which are covered in degraded forest.

Geotubes have been installed at the landfall as an erosion control measure. Two geotubes were placed on the shoreline in parallel to the subsurface onshore pipeline, in order to slow water movement and prevent the sand from being eroded and subsequently exposing the pipeline. The geotubes are regularly inspected and maintained to be in good condition and detail information are provided in the Zawtika Onshore EMP report.

The generic layout of ZPQ and WP 1 are presented in *Figure 3.6* and *Figure 3.7* respectively. The overall processing scheme for the ZPQ is shown in *Figure 3.8*. The process starts with well fluids from remote wellhead platforms flowing into the ZPQ via intra-field pipeline. They are cooled by seawater and arrive marginally above seawater temperature. Well fluids from bridge connected wellhead platform (WP1) are cooled (by air cooler system) before being mixed with the rest of the well fluids.

The incoming well fluids will be transferred from wellhead platforms to Zawtika Offshore Processing platform then pass through the production separators, where they are separated into gas, condensate and water streams. Separated gas from separators is compressed in the 1st stage gas compressor to remove some condensate prior to delivery to gas dehydration, where water is removed. Dry gas passed from the dehydration unit is cooled and compressed at 2nd stage gas compressor train and passed to the 28" offshore export pipeline to the onshore section. Some of dry gas is diverted to be used as fuel for other processes and power generation supplied for the ZPQ.

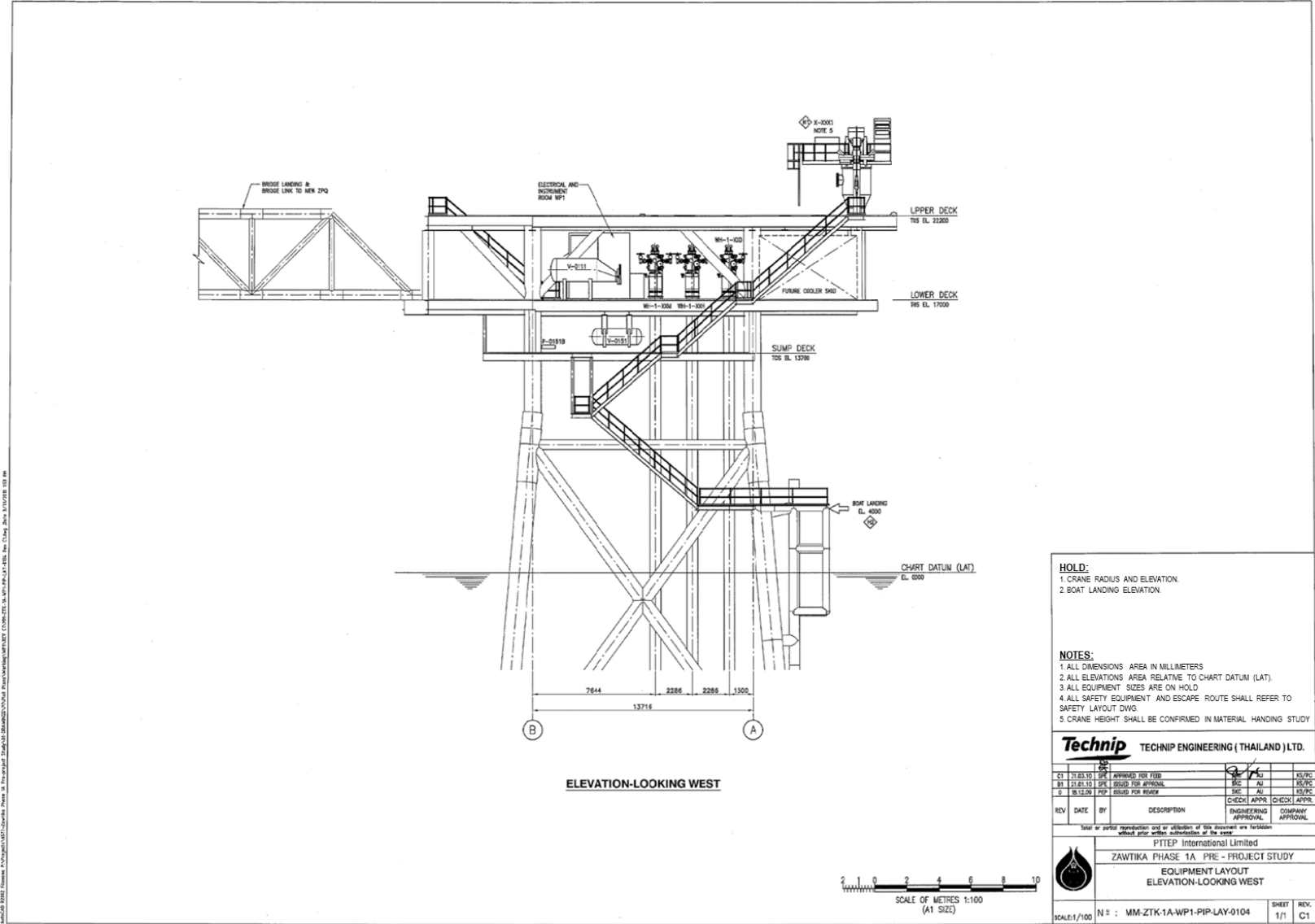
Production liquids separated from the gas consist of condensate and produced water. Condensate will be burned using smokeless burner at WP1.

Regarding produced water, there is no evidence of heavy metal Hg and As from gas and water analysis for all the explored areas. PTTEPI has conducted monthly produced water analysis since the beginning of their operations, and no heavy metals have been found. As such, produced water separated from the production separators and some from the condensate flash drum at the maximum design of 20,000 bpd is being sent to a de-oiler unit to separate residual condensate back to flash drum prior to tipping overboard with the treated water to meet the Myanmar's National Environmental Quality (Emission) Guidelines (EQEG) Standard.

Source: PTTEPI, 2016

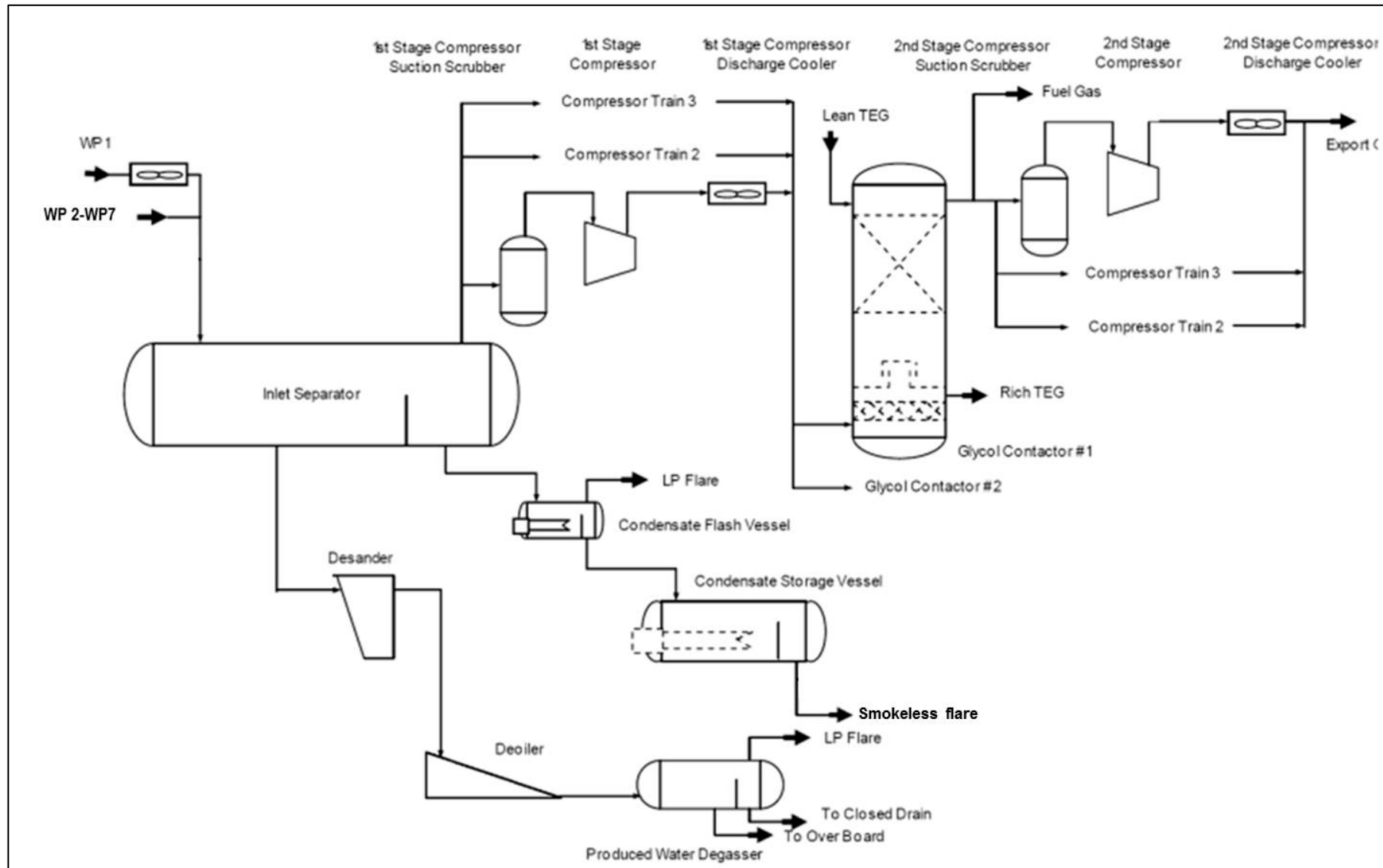


Figure 3.7 Generic Layout of WP1



Source: PTTEPI, 2016

Figure 3.8 Simplified Diagram of ZPQ Processing System



Source: PTTEPI, 2016

3.5 PRODUCTION DRILLING OR INFILL WELL DRILLING

3.5.1 Drilling Rig

The infill wells will be drilled by using Tender Assist Rig installed over the existing wellhead platform together with supporting barge, which is capable of operating in sea water depths up to 200 m (*Figure 3.9*).

Figure 3.9 Example of Tender Assisted Rigs



3.5.2 Rig Mobilization

Tow-out of the drilling rig from the rig's previous location will be conducted by three towing vessels, which will tow them to the Project's proposed WP positions. The duration and distance for drilling rig tow-out to the Project's proposed WP depend on the distance between its last operational drilling location and the proposed WP position.

3.5.3 Well and Casing Design

Drilling and installation of casing consists of the same procedure for each well, and can be divided into 3 intervals. During drilling, the drill bit, with pressure from drill string, casing and drill collar, penetrates to the formation, while seawater or mud is pumped through drill pipe to the drill bit to assist the penetration and sweep cuttings to the rig.

3.5.4 Drilling Fluids and Drilled Cuttings

Zawtika's production well drilling can be divided into three (3) intervals. Various types of drilling fluids can be used e.g. seawater, water based mud (WBM) and synthetic vegetable oil based mud (SBM). Mud types and components for each section are as follows:

- **Section 1 Surface Hole Drilling** (14-3/4" hole drilling) – seawater-native clay system is used for drilling and supplemented by pre-hydrated bentonite (PHB) sweeps and displaced well with water based mud (WBM) at casing depth. This step is considered an open system, therefore drilling fluid and cuttings cannot be brought up to the surface and discharge overboard. The composition of drilling fluid comprises seawater, freshwater, API bentonite, caustic soda, starch and API barite.

- **Section 2 Intermediate Hole Drilling** (12-1/4" interval drilling) – similar seawater-native clay are used for drilling and supplemented by PHB sweeps in an open system. At approximately 30-60 m (1 or 2 stands) prior to reaching target depth, the well is displaced to WBM and drilling continued in a closed circulating system in order to maintain wellbore security. The composition of drilling fluid for this section comprises seawater, freshwater, API bentonite, caustic soda, starch, xanthan gum, API barite, cellulose fibres, soda ash, biocide and ground marble.
- **Section 3 Bottom Hole Drilling** (8-1/2" interval drilling) – This hole section is drilled with synthetic vegetable oil based mud (SBM). This step is considered a closed-system. The composition of drilling fluid for this section comprises freshwater, vegetable base oil, calcium chloride, emulsifiers, lime, hectoric/organophilic clay, gilsonite, polymeric additives, ground marble, API barite.

Dimensions of the holes and volume of cuttings, as well as the quantities of drilling fluids used in drilling at each interval are shown in **Error! Reference source not found..**

Table 3.3 *Hole Interval, and Volume of Cuttings and Fluid*

| Hole Interval | Hole Size (in.) | Open Hole Depth (m) ⁽¹⁾ | Interval Length | Estimated Cuttings Volume | Quantity of Drilling Fluid |
|-------------------------------|-----------------|------------------------------------|-----------------|---------------------------|---|
| Section 1 - Surface Hole | 14 ¾ " | 405 m | 223 m | 71 m ³ | PHB 32 m ³ WBM 77 m ³ |
| Section 2 - Intermediate Hole | 12 ¼ " | 1,341 m | 936 m | 103 m ³ | PHB 16 m ³ WBM 164 m ³ |
| Section 3 - Bottom Hole | 8 ½ " | 2,288 m | 946 m | 50 m ³ | SBM 200 m ³ (recyclable) |

Note: ⁽¹⁾ Depth measured from platform along the wellbore's path to the final depth.

As the bottom section of the drilling system that utilizes SBM is within a closed-loop system, SBM mud loss would be limited to only two factors: 1) lost into formation and 2) lost on cuttings. The amount of mud lost into formation cannot be determined until it actually occurs, because it is an operational uncertainty. As soon as mud loss into formation occurs, engineers will pump the pre-mixed Loss Circulation Materials (LCM) into the well to seal the cracks and continue the drilling operation. Response to loss into formation is usually very quick. Immediately pump rates are reduced and drilling of new formation is completely stopped until major losses are cured. Minor seepage losses are sometimes tolerated and controlled drilling is exercised. Mud that is lost into formation will not cause harm to the environment and will not be returned.

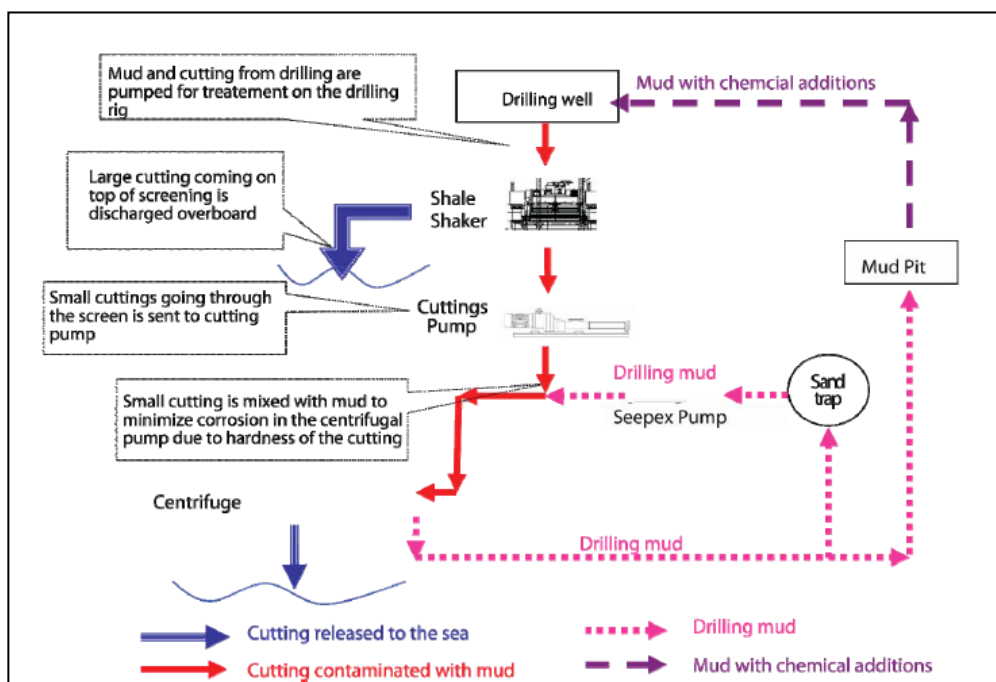
The cuttings management system of the project is a cuttings wet wash system; comprising of a shale shaker and centrifuge. The system is designed to remove

base fluid from cuttings as much as possible prior to discharge to sea. The procedure is shown in *Figure 3.10* and details can be summarized as below.

Drill cuttings will be sent to the shale shaker first. The scalped cuttings coming off the top scalper deck and primary deck of the shale shaker are discharged overboard, while the underflow from the lower primary deck of the shale shaker are directed to a series of settling tanks and mixed with active mud to reduce abrasions to the centrifuge due to the hardness of cuttings. After that, the small particles still remaining with mud will be sent to the centrifuge to remove finer cuttings.

Some SBM is expected to be lost due to being attached to the cutting particles that are discharged. PTTEPI will control percent of oil on cuttings (OOC) after passing shale shaker to be on average of 10-14% by weight of dry cuttings, and after passing centrifuges to be on average of 10-12% by weight of dry cuttings. Further explanation on this matter is provided in *Box 3.1* below.

Figure 3.10 Drilling Mud and Cuttings Management for Bottom Hole Intervals



Note: The sand traps are located underneath the shale shakers to capture underflow. The first trap is used as the main settling tank while the ones after are used to feed the centrifuges for further solids separation.

A summary of mud and cuttings management for each drilling interval is shown in

Table 3.4 *Mud and Cuttings Management for Each Well Interval*

| Interval | Drilling Fluid | Management |
|--------------------------------|----------------|--|
| Surface hole (14-3/4") | WBM | <ul style="list-style-type: none"> WBM and cuttings flow from the well at the seabed level (as drilling starts at the seabed without casing installed, cuttings are therefore discharged to the seabed). |
| Intermediate hole (12-1/4") | WBM | <ul style="list-style-type: none"> WBM and cuttings are passed through shale shaker and discharged overboard. |
| Bottom hole (8-1/2") | SBM | <ul style="list-style-type: none"> SBM and cuttings are passed through shale shaker and centrifuge. Separated SBM will be stored in mud pit and recycled for the next drilling. No direct discharge to the sea. Cuttings will be discharged overboard at depth below 15 meter from sea surface. |

Box 3.1: A Note on Oil-on-Cuttings Limits in Myanmar's National Environmental Quality (Emission) Guidelines

Section 2.4.1 Oil and Gas Development, Effluent Levels, of the existing EQEG, issued by Ministry of Environmental Conservation and Forestry (MOECF), stipulates that the offshore discharge of Non Aqueous Drilling Fluid (NADF) oil concentration on drilled cuttings (OOC) limit is 1% by weight on dry cuttings.

However, the following are noted:

- In Article 3 of Scope of Application for EQEG, that *"Application of these Guidelines to existing facilities may involve the establishment of site-specific targets, with an appropriate timetable for achieving them."*
- In Article 11 of Implementation Procedures for EQEG, *"While these Guidelines generally apply to all projects subject to the EIA Procedure, it is the prerogative of the Ministry to decide how the Guidelines should be applied to existing projects as referred to in the EIA Procedure, as distinguished from new projects. At the Ministry's discretion less stringent levels or measures than provided for in these Guidelines may be specified as appropriate, and a timeframe agreed for a project to fully comply with these Guidelines."*

It is additionally noted that the EQEG are largely derived from the The International Finance Corporation (IFC) Environmental Health and Safety (EHS) Guidelines. However, in the IFC EHS Guidelines for Offshore Oil and Gas Development, Table 1: Effluent Levels from Offshore Oil and Gas Development, there are some caveats that were omitted from the EQEG, as follows:

"For new facilities^a: Organic Phase Drilling Fluid^b concentration lower than 1% by weight on dry cuttings;

For existing facilities^c: Use of Group III non-aqueous base fluids and treatment in cutting dryers. Maximum residual Non Aqueous Phase Drilling Fluid (NADF) 6.9% (C16 -C18 internal olefins) or 9.4% (C12-C14 ester or C8 esters) on wet cuttings;

where:

a New facilities include offshore drilling rigs which have been newly designed or structurally modified for the project.

b As defined by OSPAR (2000) Decision 2000/3

c Applicable to existing offshore drilling rigs deployed for development well drilling programs. Applicable to exploratory well drilling programs. Technically and financially feasible techniques, including installation of thermo-mechanical cutting cleaning systems, to meet the guidelines for new facilities should be considered for implementation, in relation to the number of wells (including producers and injectors) included in development drilling programs, and/or to potential impacts on critical habitats."

Further to the above, after a workshop in September 2016 with ECD together with MOGE and oil and gas operators in Myanmar, ECD agreed to grant an exception to the Myanmar EQEG and instead to follow the limits from 2015 IFC EHS Guidelines for Offshore Oil and Gas Development, Table 1: Effluent Levels from Offshore Oil and Gas Development as the country regulation instead of EQEG. A letter of correspondence between MOGE and PSC companies operating in Myanmar is included in **Annex B** as reference.

PTTEPI currently commits to control readily degradable green base oil in cuttings (also called oil-on-cuttings or "OOC") to be on average of 10-12% by weight of dry cuttings before discharge.

3.6.1

Air Emissions (Flaring)

Zawtika offshore project is equipped with High Pressure (HP) and Low Pressure (LP) gas flare systems that cater for safe and reliable disposal of planned and unplanned releases of hydrocarbon gas from the production facilities. Both planned and unplanned flashed/bleeding gas (Hydrocarbon including methane) that collected from production facilities e.g. tank/vessel header, Pressure Safety Valve (PSV), etc will be transferred to burn at HP or LP flare depend on its pressure.

The HP and LP flare tip is mounted on an inclined cantilevered boom with a rectangular lattice structure, away from platform to avoid excessive radiation on platform, approximately 100 m long, on the east side of the ZPQ. The length of this boom is based on radiation and dispersion studies undertaken during this project.

HP flare tip is Sonic type and sub sonic LP flare tip is pipe flare. Design of HP and LP tip ensure stable operation of smokeless flare and flame lift off. Flare tip is designed to avoid atmospheric air ingress and flame lick during normal plant operations when only pilots are lit and strong winds are prevalent.

The design pressures of both HP and LP flare systems are as follows:

- HP Flare - 10barg (145psig)
- LP Flare - 3.5barg (51psig)

The design temperatures for the flare headers are as follows:

- HP flare: 46°C/149°C
- LP flare: -29°C/149°C

The design HP flare capacity is based on blocked outlet of the Inlet separator, 420 MMscfd gas (400MMscfd export plus 20MMscfd Fuel gas allowance). There is no continuous source for HP flare gas, except the purge gas to maintain positive pressure in HP flare system.

The design LP flare capacity is 65 MMscfd based on gas blow by PSV from produced water degasser. The LP flare will have continuous flaring of condensate flash gas, produced water flash gas and flash gas from the glycol regeneration units.

The liquid knock-out drum was installed to trap liquid out from the gas before burning. The maintenance program has been available and maintain for flare equipment to ensure the completed combustion of hydrocarbon. These can minimize the smoke or hydrocarbon gas that may affect to environment. In

additional, the project provides the maintenance program for the production facility that can limit or reduce the volume of hydrocarbon that sent to flare.

At all wellhead platforms (WP1-WP7), a temporary (removable type) flare boom and a gas-liquid burner for well clean up is provided. Two tie-in points (one at East and one at West sides of the platform) are provided for the temporary burner on all of the WPs.

PTTEPI has also installed a smokeless burner at WP1, primarily for the disposal of excess condensate.

The actual GHG emission (Ton CO₂e) from flaring unit of PTTEPI Zawtika offshore operation during 2019-2021 is shown in *Error! Reference source not found.*.

Table 3.5 *Project GHG emission from flaring unit (Ton CO₂e) during 2019-2021*

| Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 2019 | 613 | 353 | 417 | 307 | 522 | 164 | 394 | 478 | 389 | 629 | 444 | 528 |
| 2020 | 542 | 429 | 444 | 485 | 416 | 648 | 443 | 436 | 365 | 349 | 370 | 334 |
| 2021 | 483 | 390 | 421 | 364 | 343 | 325 | 377 | 316 | 228 | 556 | 217 | 282 |

Source: PTTEPI, 2022

3.6.2 *Noise Emissions*

Noise from generators and turbines will be in line with EQEG standards.

3.6.3 *Waste and Wastewater*

3.6.3.1 *PTTEPI Waste Management Procedure*

Waste generated from the Project activities will be segregated into 2 main types according to criteria of danger as non-hazardous waste and hazardous waste.

3.6.3.1(1) *Non-Hazardous Waste*

Non-Hazardous waste is the waste which, although not harmless, present a lower level of risk to human health and the environment. There are 2 types of non-hazardous waste as follows:

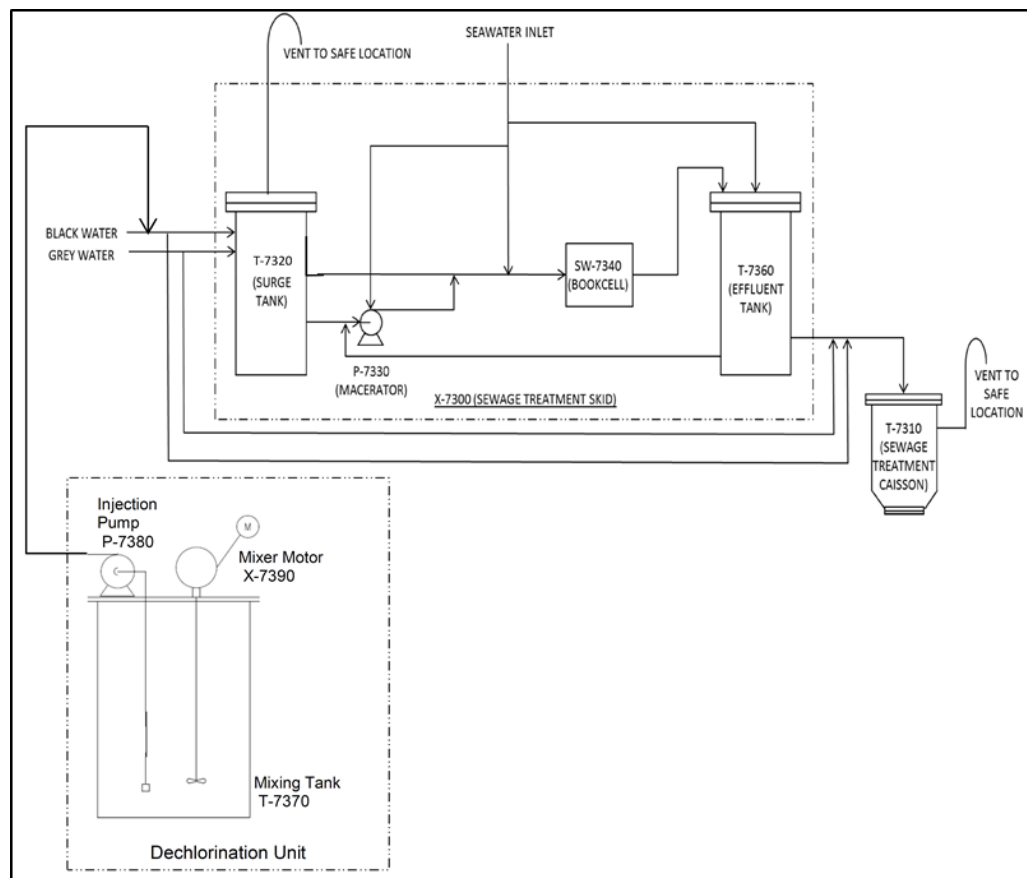
- 1) General non-hazardous wastes from office, catering services, laundry, household, etc. from industrial activities, e.g.
 - General waste (e.g. scrap metal, non-biodegradable waste);
 - Recyclable or reusable waste (e.g. paper, wood, drinking plastic bottle, glass); and
 - Biodegradable waste (e.g. food waste, sewage).

2) Waste containing or contaminated with hazardous substances in concentrations that, before or after treatment, are considered low enough to meet the specified international or regulatory discharge criteria which do not exceed the standard limit of the country, e.g.

- Produced water; and
- Produced sand.

The ZPQ is equipped with an onboard sewage treatment system. *Error! Reference source not found.*11 shows the diagram of sewage treatment system. Further details and process of the sewage treatment system is shown in *Annex B*.

Figure 3.11 Sewage Treatment System Diagram

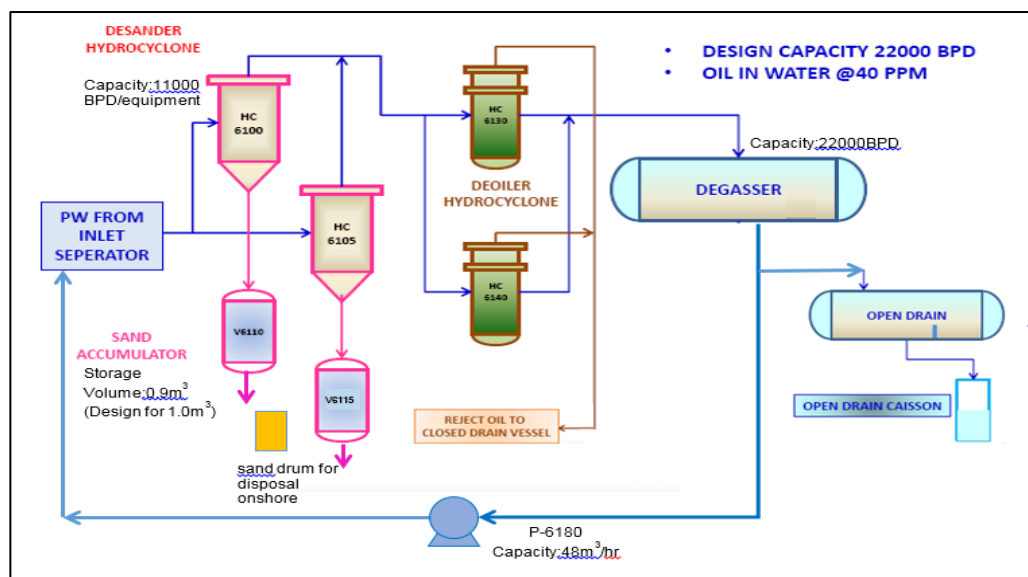


Source: PTTEPI, 2020

Moreover, ZPQ is also equipped with onboard produced water treatment system and produced sand management as shown in *Error! Reference source not found.*. The design produced water capacity of ZPQ is 22,000 Barrel Per Day (BPD). Produced water and sand treatment system consists of Desander Hydrocyclone (2 unit x 50% capacity each), Sand Accumulator (2 unit x 50% capacity each), Deoiler Hydrocyclone (2 unit x 50% capacity each) and Produced water degasser (1 unit x 100% capacity) and Permanent sand jetting pump (1 unit x 100% capacity).

Produced water from the inlet separator will be treated for removal of sand, suspended solid particulate matter and associated hydrocarbon removal before being disposed overboard to the sea. Sand and suspended particulate matter presents in produced water are separated in desander hydrocyclones where 99% of solid particles bigger than 10µm are removed and separated sand are stored in the sand accumulator. Deoiler hydrocyclones further remove oil in water content to meet less than or equal to 42 mg/l for one day. At the last stage of treatment, degasser flash out the dissolved gas in the produced water and skim out remaining oil residual from the produced water deoiler outlet before discharge to open drain caisson via the open drain vessel. Produced water in the degasser shall be utilized by the permanent sand jetting pump to jet into the inlet separator to evacuate sand accumulation in the vessel and sand jetting activity shall be carried out periodically to avoid sand accumulation in inlet Separator vessel.

Figure 3.12 *Produced Water Treatment System and Produced Sand Management*



Source: PTTEPI, 2020

3.6.3.1(2) *Hazardous Waste*

Hazardous waste is defined as any waste which causes or is likely to cause danger to health or the environment by reason of their chemical activity or toxic, flammable, explosive, corrosive, or other characteristics, whether alone or when coming into contact with other wastes. Forms of hazardous waste include solids, sludge, liquid and containerized gas and hydrocarbon waste.

Hazardous waste shall be categorized into 2 main types as follows:

- 1) Wastes creating nuisance due to flammability, reactivity, corrosiveness, radioactive, infection, toxicity for humans & the environment or, e.g.
 - General hazardous wastes (e.g. chemical waste and residue, paint, spent and used oil, contaminated packing material, special

maintenance waste, contaminated sludge, combustion residue, photocopy machine, PC printers polluting cartridge, medical waste, filter, fluorescent, bulb);

- Heavy metal wastes (e.g. mercury, arsenic, cadmium); and
- Batteries.

It is noted that, if there will be a presence of incoming heavy metals from reservoir, the incurred wastes in contact with the incoming gas or fluid shall be considered as being contaminated with the heavy metal (e.g. mercury, arsenic, cadmium), and therefore is classified as hazardous waste which will require specific additional handling and management procedures.

- 2) Waste containing or contaminated with hazardous substances in concentrations which exceed the standard limit of country regulation or international hazardous waste standard, for example oil concentration or waste containing heavy metal.

Details on PTTEP's Myanmar Asset Waste Management Procedures according to its type are provided in *Error! Reference source not found.* and waste records during April to January 2019 for each type of waste is provided in

Table 3.6 **Management of Waste and Wastewater for Offshore Operation**

| Type of Waste | Waste Management |
|---------------------|--|
| Non-hazardous waste | <ul style="list-style-type: none"> • Store in durable container and clearly label. • Transferred to Thaketa Support Base (TKA) then immediately continue delivery to either MOGE or Yangon City Development Committee (YCDC) or other qualified waste management facilities for final disposal e.g Golden Dowa Eco-System Myanmar Co., Ltd.(DOWA) facility for waste treatment and disposal. |
| Hazardous waste | <ul style="list-style-type: none"> • Stored in waste skip and appropriate container at Offshore • Provide clearly label and spill containment • Provide fire extinguisher and spill kits for any emergency case • Transfer to TKA supply base for temporary storage and continue to certified or qualified waste management facilities for final disposal facility for waste treatment and disposal. • Used oil will be sent back to shore for safe disposal at certified or qualified waste management facilities, or it can be blend with current condensate and burned at smokeless WP-1 burner. |
| Food waste | <ul style="list-style-type: none"> • Treat onsite aligning with MARPOL and Discharge to the sea. |
| Sewage | <ul style="list-style-type: none"> • Treat onsite aligning with MARPOL and Discharge to the sea. |
| Produced Water | <p>Produced water is managed as follows:</p> <ul style="list-style-type: none"> • Control oil and grease content in discharge water not to exceed 42 mg/l daily maximum or 29 mg/l at 30 days average as required by Myanmar's National Environmental Quality (Emission) Guidelines (EQEG). • Treatment of produced water will comply with the EQEG. • Discharge treated produced water to the sea. <p><i>(Note: Total Petroleum Hydrocarbon (TPH) onboard analyzer has been provided at ZPQ to ensure that concentration of oil and grease content in water or wastewater is in the discharge limits)</i></p> <p>Zawtika Produced Water Treatment System treats produced water by the following methods:</p> <ul style="list-style-type: none"> • By removing sand and coarse suspended particles in the produced water from Inlet Separator V-4100 during first stage using two (2x50%) Desander Hydrocyclone HC-6100/6105 with the associated Sand Accumulator Vessels V-6110/6115. Desander shall remove about 99% of particulate larger than 10 micron in produced water. • By removing oil in the produced water from Inlet Separator V-4100 during second stage using two (2x50%) Deoiler Hydrocyclones HC-6130/6140. Oil concentration shall not be more than 40 ppmv in treated water. |

| Type of Waste | Waste Management |
|---------------|---|
| | <ul style="list-style-type: none"> By removing gas entrained in produced water in the third stage in one (1x100%) Produced Water Degasser V-6150. Initially, this vessel will perform as a degasser and will be designed so that it can be modified later to be an Induced Gas Floatation Vessel by providing gas spray bubble nozzle flanges and an oil skimming weir and condensate trough without hot work requirement. This is a contingency in case the deoiling hydrocyclones do not perform as expected or the oil in water specification is reduced by local authorities in future (see V-6150 GA drawing in the attachment). In addition, water clarifier injection facility has provided at ZPQ lower deck area by utilize the existing chemical pump with tubing connection. |
| Produced Sand | <ul style="list-style-type: none"> Treatment of produced sand will comply with the EQEG. Follow EQEG (discharge overboard when % oil concentration less than 1%) Ship back to shore and dispose by the certified and qualified waste management contractor e.g. DOWA continue for waste treatment and disposal. (when % oil concentration more than 1%) |

Table 3.7

Waste Generation Records for ZPQ Offshore Operation in January –December 2019

| Type of Waste | Waste Name | Weight (kg) |
|-----------------|--|-------------|
| Non-Hazardous | General non-hazardous waste (Mixed wastes) | 103,047 |
| | Plastic Bottles | 120 |
| | Contaminated sand from production process (Produced sand*) | 0 |
| Hazardous Waste | Contaminated sand from production process (Produced sand*) | 50,640 |
| | Mixed hazardous wastes e.g. contaminated fabric, | 20,040 |
| | Lubricating oil | 15,722 |
| | Off-spec/expired hazardous chemicals | 5,285 |
| | Contaminated sludge from process equipment | 3,666 |
| | Contaminated plastic drum | 3,555 |
| | Contaminated metal drum | 1,448 |
| | Lead batteries | 745 |
| | Jet A 1 | 602 |
| | Fluorescent lamp/tube/bulb | 490 |
| | Ni-Cd Batteries | 210 |
| | Chemical sack | 40 |
| | Oil contaminated PPE | 37 |
| | Expired hazardous paint | 20 |

*Produced sand can be classified as both non-hazardous waste and hazardous waste based on the lab results of % Oil concentration. For the time being, PTTEP disposes Produced sand as hazardous waste.

Source: PTTEPI, 2020

According to the volume of wastes generated in 2019, the estimated volume of non-hazardous and hazardous wastes in 2020 generated from Zawtika offshore are about 8,600 kg and 8,500 kg per month, respectively.

PTTEP monitored the volume and quality of produced water and sewage discharge. According to *Error! Reference source not found.* the average volume of produced water and sewage discharged are 2,800 m³ and 1,250 m³ monthly, respectively.

Table 3.8 *Monthly Estimated Produced Water and Sewage Discharge (m³) and Monitoring results during 2020-2021*

| | Sewage | | | | Produced Water |
|---|----------------------|-----------|------------|----------------|----------------------|
| Monthly average discharge volume | 1,200 m ³ | | | | 3,000 m ³ |
| Monitoring Parameter | pH | BOD | COD | Total Coliform | Oil and Grease |
| Unit | - | mg/l | mg/l | MPN/100 ml | mg/l |
| Jan – Jun 2020 | 8.1 | 8.2 | 20.4 | 23 | 4-17 |
| Jul – Dec 2020 | 8.4 | ND (<2.0) | 108 | 4.5 | 6-10 |
| Jan – Jun 2021 | 7.0 | ND (<2.0) | 51.6 | <1.8 | 9 – 14.3 |
| Jul – Dec 2021 | 7.2 | ND (<2.0) | 10.4 | <1.8 | 3-9 |
| EQEG Standard/ MARPOL Standard | 6-8.5 | 25 | 125 | 100 | 29 |

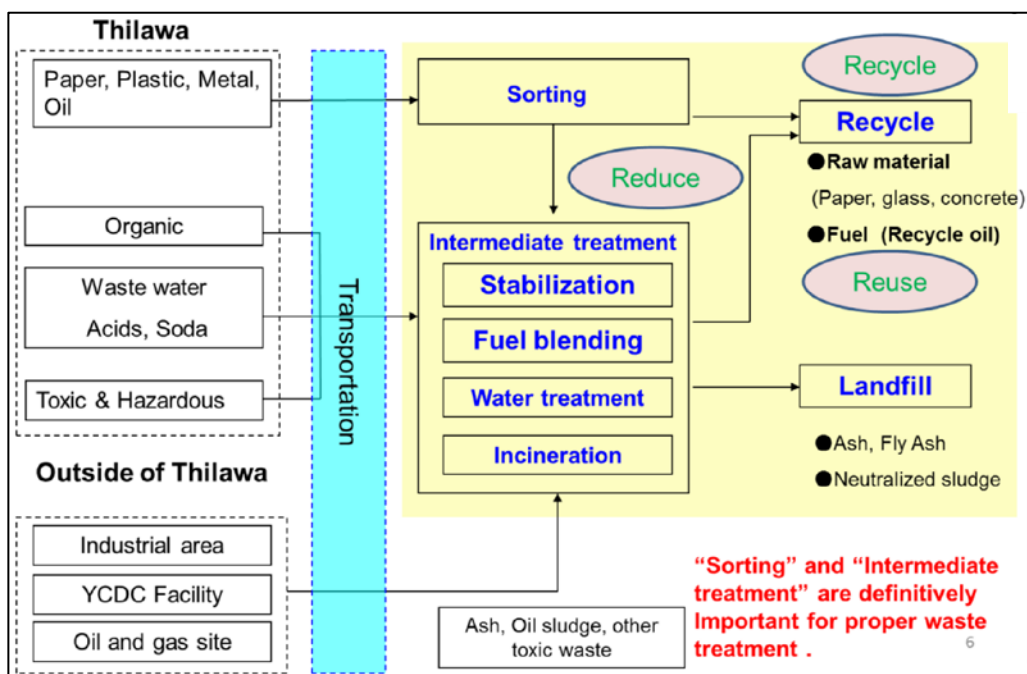
Source: PTTEPI, 2022

3.6.3.1(3) Licensed Waste Contractor and Authorized Waste Disposal Facilities

For the Project, PTTEP will use a licensed contractor to manage its hazardous waste. Waste contractor is Golden Dowa Eco-System Myanmar Co., Ltd. (DOWA) has been awarded the contract to treat and dispose waste from the project that is shipped back onshore. Their facility is located in the Thilawa Special Economic Zone, and contains the following facilities:

1. Controlled Secured Landfill (Phase 1)
 - a. Landfill Area: 80m X 80m, 2 sites (hazardous and non-hazardous)
 - b. Capacity: 44,000 m³ (non-hazardous), 43,000 m³ (hazardous)
 - c. Once phase 1 has reached full capacity, a new phase will be developed beside phase 1
 - d. The total capacity is approximately 400,000 m³ during operation
2. Sorting/Stabilization Facilities
3. Wastewater and leachate water treatment facility
 - a. Ability: 35 m³/day
 - b. Treatment Method: Biological treatment + Flocculation
 - c. Pond Capacity: 300 m³ X 3 units
4. Office with Laboratory
5. Incinerator

Figure 3.13 DOWA Waste Management Flow Diagram



Source: PTTEPI, 2020

Further information regarding GEM is shown in *Annex C*. DOWA got EIA approval for their disposal facility at Thilawa SEZ on 30 June, 2015¹.

3.7 UTILITIES

ZPQ facilities contain utility and safety systems to support production operations. Details of each group are discussed in the following sections.

3.7.1 Power and Energy Use

ZPQ is equipped with 3 dual fuel gas turbine power generation units, each of 3.7 MW site rated capacity, which supply all required power to ZPQ and WP1. Multiple gas turbine driven units with adequate capacity to ensure availability of power when a unit is not operational are provided.

A treble fuel design (fuel gas, condensate and diesel) for all three power generation units has been selected, but the connection is made for fuel gas and diesel only. Electric motor start systems are provided for all three power generators.

Emergency diesel power generation of 1.28 MW is provided for essential load in case of turbine generator trip. A black start diesel generator of 280 kW is also provided for initial start.

3.7.2 Water Use

Two reverse osmosis water production units with capacity of 1.5 m³/hr, total 3 m³/hr are provided for freshwater production using RO membrane. The water produced by these units is suitable for consumption, plus other intermittent uses, such as eyewash, safety shower, etc. Fresh water from the freshwater units is supplied and stored in freshwater storage tanks. The stored fresh water is then transferred via pumps to the pressurized freshwater vessel for distribution to various users. Potable water suitable for drinking is supplied after treatment of freshwater by a sterilizer.

Drinking water supply will be transferred from TKA supply base every two weeks. Each supply trip with transfer 800 packs of drinking bottled water, with each pack containing 12 bottles of 0.5 liters. Daily estimated drinking water consumption is 40 – 50 packs.

² Britannica Encyclopaedia, 2009

Desalinated seawater (freshwater) is stored in an atmospheric storage tank. The tanks (2 x 126 m³ compartments) are sized for the following:

- Average daily freshwater consumption 500 liters/man/day; and
- 7 days storage for maximum continuous consumption of 128 personnel at above rate assuming only 50% water production unit is available.

3.8 *EMERGENCY SHUTDOWN SYSTEM*

ZPQ is designed to provide fully automatic, integrated and centralised platform/process control. The control room operator is able to monitor, detect, and handle process upsets from the control room through Process Control system (PCS), Safety Instrument System and Fire and Gas System (SIS and FGS) for facilities on ZPQ, the bridge connected wellhead platform and remote wellhead platforms.

The ZPQ semi-automatic start-up sequences and automatic safe shutdowns are implemented in the control system. Closed circuit television (CCTV) monitors are provided in the control room to monitor critical process equipment/systems. Online analyzers are provided to monitor the content in the feed/sales gas.

3.9 *DECOMMISSIONING*

All fixed equipment will be considered to remove or handover to MOGE at the end of the operational life in compliance with accepted environmental practice and industry standards at the time.

A detailed decommissioning plan for Zawtika field will be prepared and get approved from MOGE prior to decommissioning activities. Therefore, the decommissioning budget will be proposed for further approval depend on the acceptable environmental practice and approval method before ending of project life span.

4.1 *PROJECT'S ENVIRONMENTAL, SOCIAL AND HEALTH POLICIES*

PTTEPI management is fully committed to providing a safe, secured and healthy workplace and conducting its operations in a manner that protects the environment. These commitments are in accordance with PTTEP's Corporate Vision, Mission, and Values and PTTEPI's SSHE Policy. Proactive individual involvement, responsibility and accountability are expected of all employees, contractors and third party personnel. PTTEPI SSHE Management System (SSHE MS) is designed to align all stakeholders' efforts to enable attainment of these principles.

All levels of line management at PTTEPI are responsible for implementing and maintaining its SSHE policy and SSHE MS. Both documents are reviewed and revised at regular intervals.

4.1.1 *PTTEPI's SSHE Policy*

PTTEP Corporate Vision

PTTEP will be a zero incident organization and the energy partner of choice where SSHE is regarded as a license to operate.

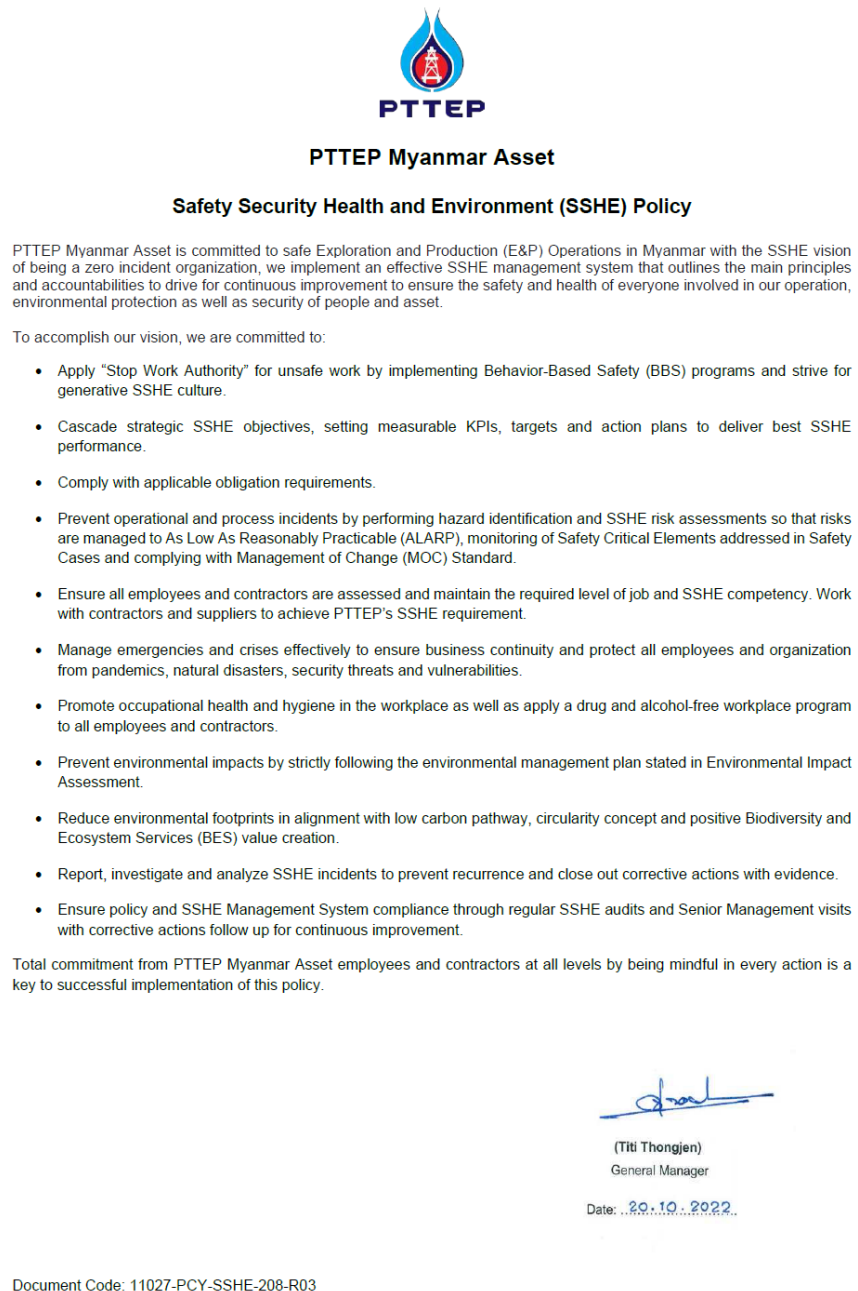
PTTEP Corporate Mission

- *To achieve zero incidents through personal and process safety management.*
- *Recognize the contribution of SSHE towards competitive performance and innovation for long term value creation.*
- *Comply with the SSHE management system which is subject to continuous improvement, and seek opportunities for SSHE transformation.*
- *Prepare for and respond effectively to emergencies, crises and security-related events.*
- *Create a generative SSHE culture that is based on leadership at every level including contractors and where everybody understands the crucial importance of SSHE risks.*
- *Achieve top quartile SSHE performance in exploration and production industry.*

PTTEPI SSHE Policy

The English and Myanmar versions of the latest PTTEPI's SSHE Policy of 2022 are shown in *Figure 4.1* and *Figure 4.2*.

Figure 4.1 PTTEPI's 2022 SSHE Policy (English Version)



Source: PTTEPI, 2022

Figure 4.2 PTTEPI's 2022 SSHE Policy (Myanmar Version)



ပီတီပီအီးပီ ကုမ္ပဏီ (ပြန်ဟုမိမိကုန်)

ဘေးအန္တရာယ်ကင်းရှင်းရေး၊ လုံခြုံရေး၊ ကျန်းမာရေးနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဆိုင်ရာ (SSHE) မူဝါဒ

ပီတီပီအီးပီ ပြန်ဟုမိမိကုန်သည် ရေနံနှင့် သဘာဝဓာတ်ငွေ့ရှာဖွေရေးနှင့် ထုတ်လုပ်ရေး (E&P) လုပ်ငန်းများ ဆောင်ရွက်ရာတွင် ကုမ္ပဏီ၏ ဘေးအန္တရာယ်ကင်းရှင်းရေး၊ လုံခြုံရေး၊ ကျန်းမာရေးနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဆိုင်ရာ မူဝါဒများကို လုပ်ငန်းခွင်တစ်ခုလုံးတွင် လုပ်ငန်းခွင်ပတ်ဝန်းကျင်တွင် လုပ်ငန်းခွင်ပတ်ဝန်းကျင်တွင် ကျန်းမာရေးနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေး၊ လုံခြုံရေး၊ ကျန်းမာရေးနှင့် ပစ္စည်းဥစ္စာများ၏ လုံခြုံရေးတို့ကို ထည့်သွင်းထားသော စီမံခန့်ခွဲမှုစနစ်တစ်ခု စင်ဆာယ်ပြုတ်တိုက်စနစ်၊ အကောင်အထည်ဖော် ဆောင်ရွက်လျက် ရှိပါသည်။

ဤသို့ လုပ်ငန်းများပြုလုပ်ရာတွင် အောင်မြင်စေရန် ဝန်ထမ်းများနှင့်အတူ ကန့်သတ်ထားသော ကတိကဝတ်ပြုထားသည်များမှာ -

- အန္တရာယ်ရှိသည့် လုပ်ငန်းများ၊ ရန်ကင်းခြင်းကို ကျင့်သုံးခြင်းအားဖြင့် အပြစ်ဒဏ်ပေးခြင်းသော ဘေးအန္တရာယ်ကင်းရှင်းရေး (EBS - Behavioral Based Safety) ညွှန်ကြားချက်များကို လိုက်နာလျက် အမြင်ဆိုင်ရာဆိုင်ရာ SSHE အလေးအထားထားသော အကောင်အထည်ဖော်မှုများကို အကောင်အထည်ဖော် ပြုလုပ်ခြင်း။
- အမြင်ဆိုင်ရာ SSHE စွမ်းဆောင်ရည်များရှိရန်အတွက် ဘေးအန္တရာယ်ကင်းရှင်းရေး၊ လုံခြုံရေး၊ ကျန်းမာရေး သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဆိုင်ရာ ဦးတည်ချက်များ၊ ကိုယ်စားပြုခြင်းသော အဓိကလုပ်ဆောင်မှုဆိုင်ရာ ညွှန်ကြားချက်များ၊ ရည်မှန်းချက်များနှင့် ဆောင်ရွက်ရမည့် အသေးစိတ်အစီအစဉ်များကို လက်ဆင့်ကမ်းဆောင်ရွက်ပေးခြင်း။
- လိုက်နာကျင့်သုံးရန် လိုအပ်သော စံနှုန်းညွှန်းကြားများကို အတိအကျလိုက်နာခြင်း။
- အန္တရာယ်များကို ဖော်ထုတ်ခြင်း၊ ဘေးအန္တရာယ်ကင်းရှင်းရေး၊ လုံခြုံရေး၊ ကျန်းမာရေး သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေး(SSHE) စသည်တို့နှင့် သက်ဆိုင်သည့် အကဲဖြတ်ချုံးချိမ်းခြင်းတို့ကို လုပ်ဆောင်ခြင်းဖြင့် ကျင့်ကျင့်လျက်ရှိသော အန္တရာယ်များကို ရှောင်ရှားနိုင်ရန်၊ ရှောင်ရှားရန် လက်တွေ့ကျင့်သုံးနိုင်သည့် ရည်ရွယ်ချက်များ၊ အသုံးပြုခြင်း၊ ဘေးအန္တရာယ်ကင်းရှင်းရေးဆိုင်ရာ သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေး (safety cases) တွင် စီမံ ဖြတ်သော အန္တရာယ်ကင်းရှင်းရေးအတွက် အရေးကြီးသည့်ပစ္စည်းများ၏ ခြုံငုံမှုကို စောင့်ကြည့်စစ်ဆေးခြင်း၊ ပုံစံပြောင်းလဲမှု၊ လုပ်ငန်းခွင်၊ စံနှုန်း၊ သွေဖည်မှု၊ လုပ်ငန်းများကို စီမံခန့်ခွဲမှုထားသည့် စံနှုန်းများ (MOC) အား လိုက်နာဆောင်ရွက်ခြင်းဖြင့် လုပ်ငန်းခွင်ဆိုင်ရာနှင့် ထုတ်လုပ်မှုဆိုင်ရာ မတော်တဆမှုများကို ဖြိုတင်ကာကွယ်နိုင်ခြင်း။
- ပီတီပီအီးပီ၏ ဘေးအန္တရာယ်ကင်းရှင်းရေး၊ လုံခြုံရေး၊ ကျန်းမာရေး သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေး(SSHE)ဆိုင်ရာ လိုအပ်ချက်များ ပြုပြင်ဆင်ဆင်ခြင်းဖြင့် ကုမ္ပဏီ၏ ကန့်သတ်ထားသော၊ ပစ္စည်းပေးသွင်းသူများနှင့် စီမံဆောင်ရွက်ခြင်း။
- အရေးယူဆောင်ရွက်မှုများနှင့် ကပ်ဆောင်ရွက်ခြင်းများကို ကောင်းစွာစီမံခန့်ခွဲခြင်းဖြင့် လုပ်ငန်းများဆက်လက်ဆောင်ရွက်နိုင်စေရန်နှင့် ဝန်ထမ်းများအားလုံးနှင့်အတူ အစွဲအမည်တူလုပ်ငန်း၊ ကပ်ဆောင်ရွက်မှုများ၊ သဘာဝဘေးအန္တရာယ်များ၊ လုံခြုံရေးဆိုင်ရာခြိမ်းခြောက်မှုများနှင့် ထိခိုက်မှုများကို ကာကွယ်ဆောင်ရွက်နိုင်စေခြင်း။
- လုပ်ငန်းခွင်အတွင်း ကျန်းမာရေးနှင့် သန္နိဋ္ဌာန်ရေး အဆင့်မြှင့်တင်ရန် ဆောင်ရွက်ခြင်းများအားလုံးနှင့် ကန့်သတ်ထားသော၊ ပုံစံပြောင်းလဲမှု၊ လုပ်ငန်းခွင်၊ စံနှုန်း၊ သွေဖည်မှု၊ လုပ်ငန်းများကို စီမံဆောင်ရွက်ခြင်း။
- သဘာဝပတ်ဝန်းကျင်အား ထိခိုက်မှုမရှိစေရန် ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းစနစ်ဆိုင်ရာတွင် ပါရှိသော သဘာဝပတ်ဝန်းကျင်ဆိုင်ရာ အစီအစဉ်ကို တိကျစွာ လိုက်နာဆောင်ရွက်ခြင်းဖြင့် သဘာဝပတ်ဝန်းကျင်ထိခိုက်မှုကို ရှောင်ရှားနိုင်ရန်အတွက် ဆောင်ရွက်ခြင်း။
- ကာကွယ်ဆောင်ရွက်ခြင်းနှင့်လမ်း၊ မြန်လည်အသုံးပြုခြင်းမီယာ၊ စီမံခန့်ခွဲမှုများနှင့် ဂေဟစနစ်ကောင်းကျိုးရရှိစေမှုများအတွက် သဘာဝပတ်ဝန်းကျင်ထိခိုက်မှုများကို လျော့နည်းစေခြင်း။
- ဘေးကင်းလုံခြုံရေး၊ ကျန်းမာရေး၊ သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးနှင့် သက်ဆိုင်သည့် မတော်တဆမှုများကို ကာကွယ်ရန်နှင့် အလားတူထိခိုက်မှုမျိုး ထပ်မံမဖြစ်ပွားစေရန် ယင်းတို့ကို အစီအစဉ်ခြင်း၊ စစ်ဆေးခြင်း၊ ထိခိုက်မှုဖြစ်စေသည့် အခြေခံအကြောင်းရင်းကို စိစစ်ခြင်း၊ ပြင်ဆင်ရမည့် အချက်များကို အကဲဖြတ်ခြင်း၊ အဆောက်အအုံနှင့်အတူ ပြင်ဆင်လုပ်ဆောင်ခြင်းဖြင့် တားဆီးကာကွယ်ခြင်း။
- စင်ဆာယ်ပြုတ်တိုက်စနစ်အတွက် လုပ်ငန်းခွင်များသို့ အကြီးတန်းစီမံခန့်ခွဲသူများမှ ပုံမှန်ကွင်းဆင်း စစ်ဆေးခြင်းဖြင့် ပြုပြင်ဆောင်ရွက်ရမည့်အချက်များ၊ ဘေးအန္တရာယ်ကင်းရှင်းရေး၊ လုံခြုံရေး၊ ကျန်းမာရေး သဘာဝပတ်ဝန်းကျင် ထိန်းသိမ်းမှုစံနှုန်းနှင့် ချမှတ်ထားသည့် မော်လီမီယာ(မှတ်ချက်)အား လိုက်နာကျင့်သုံးမှု ရှိမရှိကို သေချာစေခြင်း။

ပီတီပီအီးပီဝန်ထမ်းများနှင့် ကန့်သတ်ထားသော၊ လုပ်ငန်းအဆင့်တိုင်းတွင် သက်ဆိုင်ဆောင်ရွက်ရန် ကတိကဝတ်ထားရှိမှုများသည် ချမှတ်ထားသည့် ဤမော်လီမီယာ(မှတ်ချက်)အား အကောင်အထည်ဖော်နိုင်ရန် အဓိကသော့ချက်ဖြစ်သည်။



(Titi Thonglen)

အထွေထွေမန်နေဂျာ

နေ့စွဲ ၂၀.၁၀.၂၀၂၂

Document Code: 11027-PCY-SSHE-208-R03

Souce: PTTEPI, 2022

4.1.2 *PTTEPI'S Environmental, Social and Health Management System*

4.1.2.1 *Roles and Responsibilities*

Role of PTTEPI

As well as having overall responsibility for the Project, PTTEPI also have responsibility for monitoring the performance of all contractors. Where the mitigation measures do not result in the achievement of the objectives, PTTEPI will work with contractor(s) to refine the measures.

The responsibility for implementation of the environmental monitoring and for the associated reporting lies with the PTTEPI Survey Representative. It is expected that this person would be present during the seismic survey and will have responsibility for safety and environment on site.

Roles of Contractors

Contractors will be responsible for ensuring compliance with all relevant legal requirements, PTTEPI procedures, as well as adherence to all environmental controls and mitigating measures.

Contractors will also be responsible under the contract for minimizing the potential environmental, social and health impacts of all contracted activities.

Contractors will need to demonstrate to the satisfaction of PTTEPI how compliance with the mitigation measures will be ensured. They will also be expected to show to demonstrate commitment to the mitigation measures in all levels of their management structure.

4.1.2.2 *Supporting Management Plans*

SSHE Management System Manual

The objective of PTTEPI's SSHE MS Manual is to serve as a practical interpretation of the Company's SSHE policy with respect to their moral obligations for SSHE issues for all persons working on, visiting or affected by operations at sites for which PTTEPI has responsibility.

The manual covers details on the areas specified in *Table 4.1*. The document is designed to serve as a comprehensive guide for all Operational Assets to develop its own SSHE management system and related documents. This document also provides an overview of the SSHE management system approach.

PTTEPI's primary SSHE documents are included in *Annex A*. Additional SSHE documents are available from PTTEPI upon request as needed.

Table 4.1 *PTTEPI SSHE Management System Standards*

| Document Code | Document |
|--------------------------------------|---|
| PTTEP Corporate Documents | |
| - | PTTEP SSHE Policy |
| - | PTTEP Sustainable Development Policy |
| 11038-STD-SSHE-000-R05 | Corporate SSHE Management System |
| 11038-STD-SSHE-101-R02 | SSHE Roles and Responsibilities Standard |
| 11038-STD-SSHE-303-R06 | SSHE Communications Standard |
| 11038-STD-SSHE-305-R05 | SSHE Training and Competence Standard |
| 11003-STD-SSHE-350-004-R03 | SSHE Regulatory Compliance Standard |
| 11038-STD-SSHE-401-R06 | SSHE Risk Management Standard |
| SSHE-106-STD-500 | Emergency and Crisis Management Standard |
| 11038-STD-SSHE-510-010-R04 | Permit to Work Standard |
| 11038-STD-SSHE-520-009-R01 | Environmental Management Standard |
| SSHE-106-STD-530 | Security Management Standard |
| SSHE-106-STD-540 | Operational Safety Management Standard |
| 11003-STD-SSHE-550-003-R03 | Corporate SSHE Plan Standard |
| SSHE-106-STD-560 | Occupational Health Management Standard |
| SSHE-106-STD-580 | PTTEP Personal Protective Equipment Standard |
| 11003-STD-SSHE-590-005-R02 | Chemical Management Standard |
| 11038-STD-SSHE-600-011-R06 | Incident Management Standard |
| 11038-STD-SSHE-701-R05 | Audit and Review Standard |
| 11003-GDL-SSHE-561-005-R01 | Fitness to Work Guideline |
| SSHE-106-STD-310 | SSHE Contractor Management Standard |
| PTTEP Myanmar Asset Documents | |
| 11027-PCY-SSHE-208-R00 | PTTEP Myanmar Asset SSHE Policy |
| Myanmar-SSHE-11027-PCY-207 | Myanmar Asset Use of Electrical Equipment |
| 11027-PDR-SSHE-340-007-R01 | Myanmar Asset SSHE Management System |
| 11027-PDR-SSHE-340-003-R01 | SSHE Training & Competence -Procedure |
| Myanmar 13036-PDR-078 | PTTEP SSHE Requirement for Contractor |
| 11027-PDR-SSHE-503/01-R02 | Myanmar Asset Waste Management Procedure |
| 11027-PDR-SSHE-501/03-R02 | Myanmar Asset Spill Contingency Plan |
| 11027-PDR-SSHE-501-005-R00 | Myanmar Asset Crisis Management Plan |
| 11027-PDR-SSHE-507-R04 | Myanmar Asset Tropical Cyclone Procedure |
| 11027-PDR-SSHE-306/01-R03 | Myanmar Asset Compliance Obligation and Procedure |
| 11027-PDR-SSHE-401-R02 | Working in Adverse Weather Procedure (Offshore) |
| 11027-PDR-SSHE-502-006-R01 | Myanmar Asset Emergency Management Plan |
| Myanmar-0550-PDR-008 | PTTEPI Crisis Communication Plan |
| Myanmar-SSHE-11027-PDR-506 | Offshore Medical Emergency Response Plan (MERP) |

| Document Code | Document |
|-----------------------------|--|
| Myanmar-SSHE-11027-PDR-508 | Fitness to Work Procedure |
| Myanmar-SSHE-11027-PDR-516 | Offshore Helicopter Emergency Landing Procedure |
| 11027-PDR-SSHE-530-004-R00 | Myanmar Asset Security Management Procedure |
| 11027-PDR-SSHE-564-002-R00 | Myanmar Asset Alcohol and Drugs Testing Procedure |
| 13266-SSHE-PDR-320-001-R002 | Zawtika Offshore Operations, Field Emergency Response Plan |
| 12140-GDL-009-R00 | Grievance Handling Guideline |

4.2 *POLICY AND LEGAL FRAMEWORK*

This section of the EMP report details the policy and legal framework for the Project, covering national requirements as well as applicable international treaties and conventions. The intent is to lay out the regulatory and non-regulatory performance requirements for all stages of the Project.

4.2.1 *Overview of Myanmar Legislation*

4.2.1.1 *The Constitution*

The latest enacted Constitution (May 2008) provides information on governing laws and regulations in Myanmar. The Constitution takes precedence over any other national legislation or international agreements. The general provisions of the Constitution that relate to the Project are the requirement for Myanmar citizens to assist in:

- Preservation and safeguarding of cultural heritage;
- Environmental conservation;
- Striving for development of human resources; and
- Protection and preservation of public property.

4.2.1.2 *Administrative Divisions of Myanmar*

Myanmar is divided into twenty-one (21) main administrative subdivisions, which include:

- Seven states;
- Seven regions (Note that regions were previously referred to as “divisions”, prior to August 2010);
- Five self-administered zones;
- One self-administered division; and
- One union territory.

The administrative subdivisions are detailed in *Table 4.2*, and an administrative map is presented in *Figure 4.3*.

Table 4.2 *Administrative Regions of Myanmar*

| Name | Capital | Population | Area |
|---------------------------------|-------------|------------|---------|
| Ayeyarwady Region | Patheingyi | 6,663,000 | 35,138 |
| Bago Region | Bago | 5,099,000 | 39,404 |
| Chin State | Hakha | 480,000 | 36,019 |
| Kachin State | Myittha | 1,270,000 | 89,041 |
| Kayah State | Loileik | 259,000 | 11,670 |
| Kayah State | Pa-an | 1,431,377 | 30,383 |
| Magway Region | Magway | 4,464,000 | 44,819 |
| Mandalay Region | Mandalay | 7,627,000 | 37,021 |
| Mon State | Mawlamyaing | 2,466,000 | 12,155 |
| Rakhine State | Sittoung | 2,744,000 | 36,780 |
| Sagaing Region | Sagaing | 5,300,000 | 93,527 |
| Shan State | Taunggyi | 4,851,000 | 155,801 |
| Tanintharyi Region | Dawei | 1,356,000 | 43,328 |
| Yangon Region | Yangon | 5,560,000 | 10,170 |
| Naypyidaw Union Territory | Naypyidaw | 925,000 | N/A |
| Danu Self-Administered Zone | Pindaya | N/A | N/A |
| Kokang Self-Administered Zone | Laukkai | N/A | N/A |
| Naga Self-Administered Zone | Lahe | N/A | N/A |
| Pa-O Self-Administered Zone | Hopong | N/A | N/A |
| Pa Laung Self-Administered Zone | Namhsan | N/A | N/A |
| Wa Self-Administered Division | Hopang | N/A | N/A |

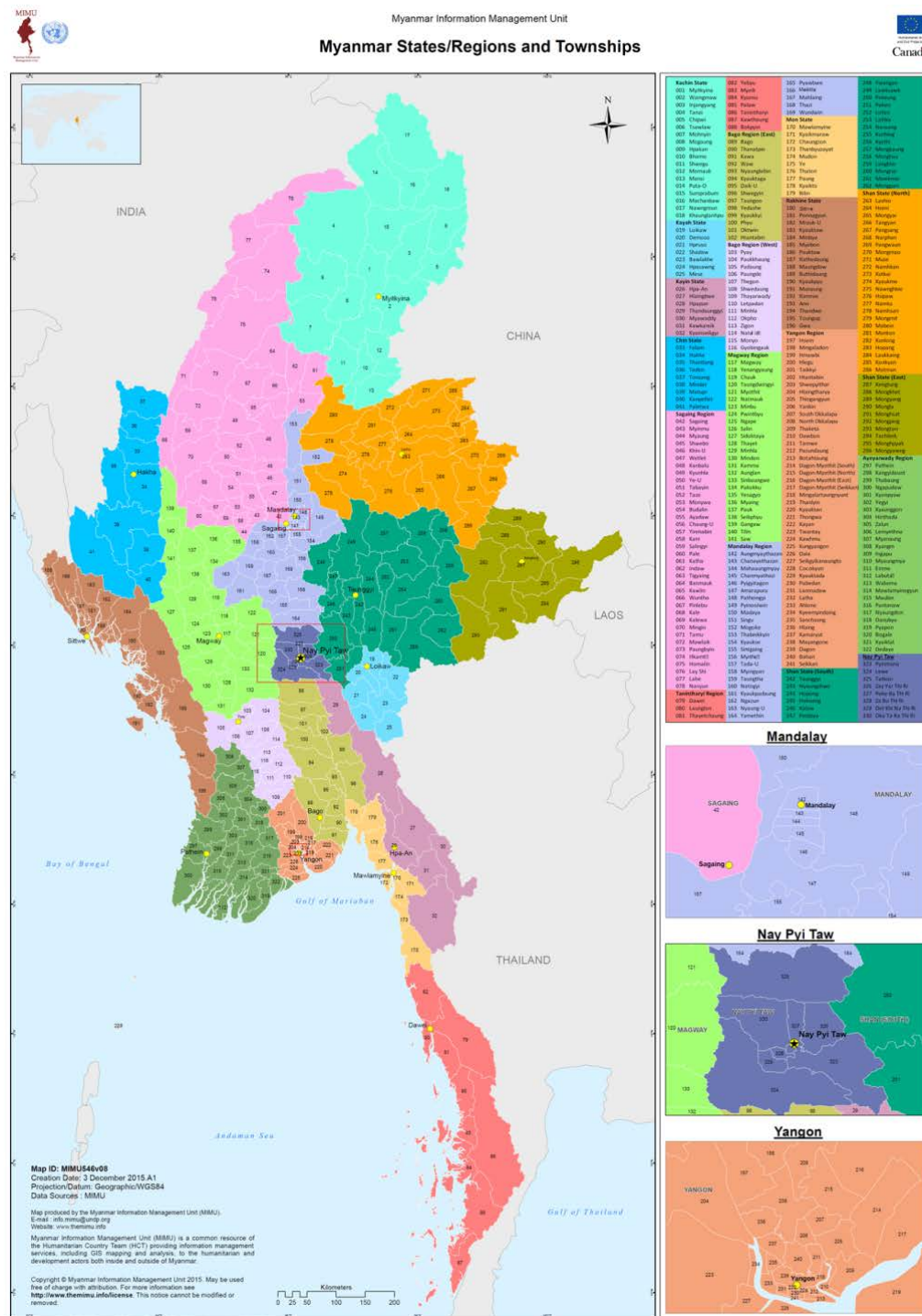
States and regions are divided into districts. Districts consist of townships, which are composed of towns, wards and village-tracts. Village-tracts are groups of adjacent villages. The administrative structure of the states, regions and self-administering bodies is defined in the Constitution.

Each region and state has a Regional/State Government, consisting of a Chief Minister, Ministers and an Advocate General. Legislative authority resides with the State/Regional “Hluttaw” (a parliament or legislative body), which are made up of elected civilian members and representatives of the military.

The Constitution states that Naypyidaw is a Union Territory under the direct administration of the President. The Naypyidaw Council, led by a Chairperson, carries out general functions on behalf of the President. The Chairpersons of the Naypyidaw Council are appointed by the President, and include civilians and representatives of the military.

Self-Administered Zones and Self-Administered Divisions are administered by a Leading Body, which is headed by a Chairperson, and has executive and legislative powers. The Leading Body consists of elected State/Regional Hluttaw members and military personnel.

Figure 4.3 Myanmar States/Regions and Townships



Source: Myanmar Information Management Unit, 2018

The first legal instrument related to protected areas, which designated a wildlife sanctuary in the environs of the Royal Mandalay City, was promulgated in 1859. The first piece of wildlife legislation to be enacted was the Wild Elephant Protection Act of 1879. The Forest Act of 1902 gave responsibility for wildlife management to the Forest Department. Legislation specific to wild animals followed in 1927, and broader legislation followed nine years later with the Wildlife Protection Act of 1936. This provided for designation of wildlife sanctuaries with species-specific conservation objectives. Legislation was revised in 1994 with issue of the Protection of Wildlife and Wild Plants and Conservation of Natural Areas Law. The 1994 Law, which was issued by the State Law and Order Restoration Council, provides for:

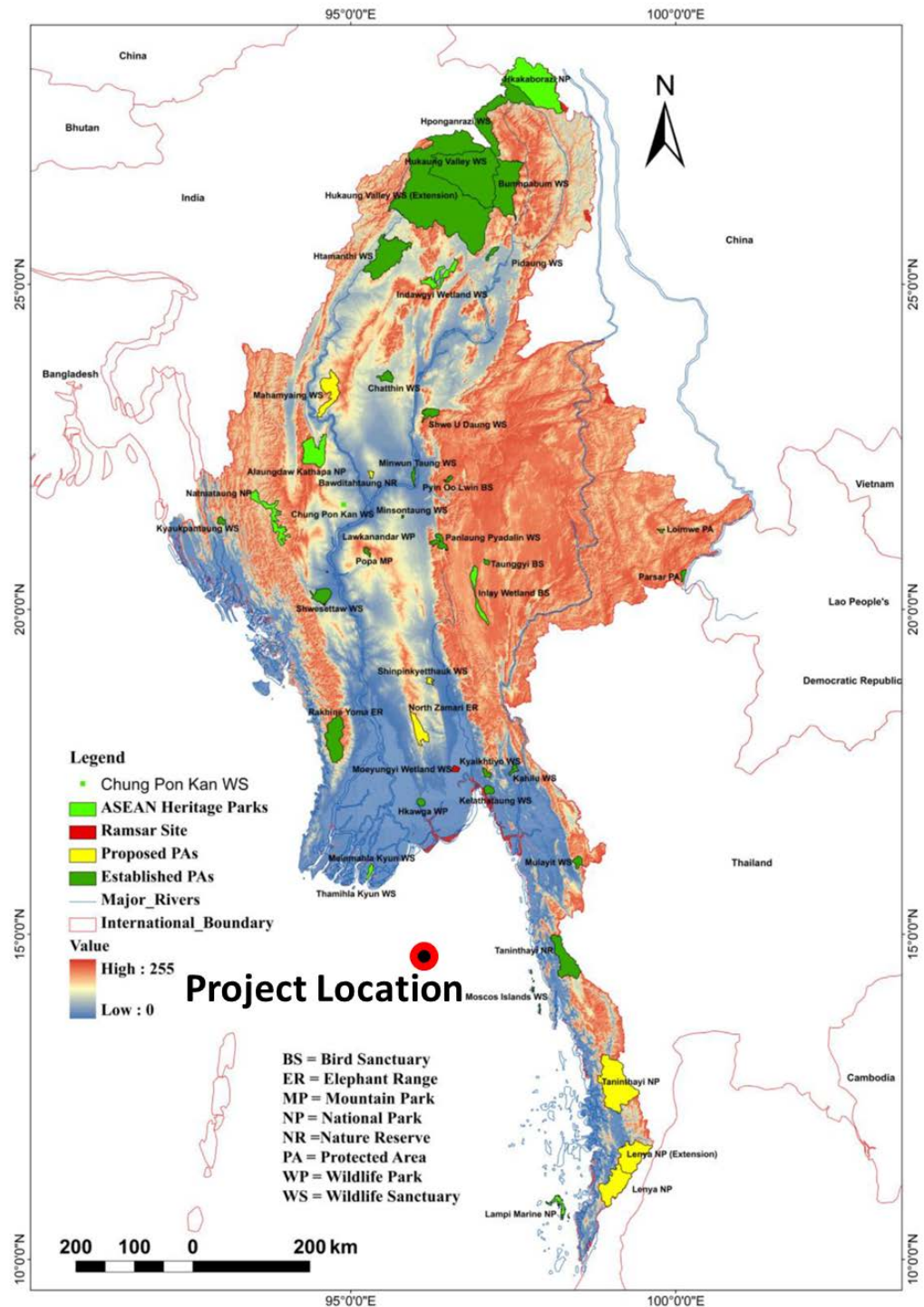
- A Committee for the Protection of Wildlife and Wild Plants and Conservation of Natural Areas, which is to serve as an advisory body to the Minister of Forestry; supervise implementation of the Law; give guidance in matters of research, conserving species in danger of extinction and international cooperation;
- Categories of 'natural areas' and zoological and botanical gardens, their declaration and uses;
- Categories of protected wild animals (almost the same as provided for under earlier law): completely protected, normally protected and seasonally protected;
- Hunting licences;
- Establishment of zoological and botanical gardens;
- Registration of ownership of completely protected animals or trophies thereof;
- Administrative actions;
- Appeals; and
- Offences and penalties.

The categories of so-called 'natural areas' are defined in the Law described above as:

- Scientific Nature Reserve;
- National Park;
- Marine National Park;
- Nature Reserve;
- Wildlife Sanctuary;
- Geo-Physically Significant Reserve; and
- Other Nature Reserve Determined by the Minister.

A total of 43 protected areas have been established or proposed in Myanmar, and are shown in *Figure 4.4*. However, there are no Marine National Parks, National Park and other protection areas nearby the offshore facilities of the Zawtika Offshore Project.

Figure 4.4 Protected Areas in Myanmar and Project Location



Source: Fifth National Report to the United Nations Convention on Biological Diversity, Ministry of Environmental Convention and Forestry, March 2014

4.2.1.4 EMP Requirements

4.2.1.4(1) General EMP Requirement

The following article mentions the general requirements for development of an EMP:

EIA Procedures, Article 3

Pursuant to Section 21 of the Law and Articles 52, 53 and 55 of the Rules, all Projects and Project expansions undertaken by any ministry, government department, organization, corporation, board, development committee and organization, local government or authority, company, cooperative, institution, enterprise, firm, partnership or individual and/or all Projects, field sites, factories and businesses including expansions of such Projects, field sites, factories and businesses identified by the Ministry, which may cause impact on environmental quality and are required to obtain Prior Permission in accordance with Section 21 of the Law, and Article 62 of the Rules) having the potential to cause Adverse Impacts, are required to undertake IEE or EIA or to develop an EMP, and to obtain an ECC in accordance with this Procedure.

4.2.1.4(2) EMP Requirements for Existing Projects and Changes to Existing Projects

In addition, there are particular articles relevant to existing projects, as well as changes to projects, which is directly applicable to the Zawtika facilities:

EIA Procedures, Article 8

Any Project already in existence prior to the issuance of the Procedure, or the construction of which has already commenced prior to the issuance of the Rules, and which, in either case, shall be required to undertake, within the timeframe prescribed by the Department, an environmental compliance audit, including on-site assessment, to identify past and/or present concerns related to that Project's Environmental Impacts, and to:

a) develop an EIA or IEE or EMP;

b) obtain an ECC; and

c) take appropriate actions to mitigate Adverse Impacts in accordance with the Law, the Rules, and other applicable laws.

It is noted that Article 8 of the EIA Procedures indicates there may also be requirement for IEE or EIA for projects already in existence. This determination is ultimately up to the discretion of MNREC (formerly MOECF) on a project-by-project basis. However, the further elaboration in Articles 9 and 11 below indicate that an EMP alone may be sufficient to obtain the ECC, so long as any project changes or expansions are not large enough to warrant new IEEs or EIAs themselves.

EIA Procedures, Article 9

Any Project already in existence prior to the issuance of the Rules, or the construction of which has already commenced prior to the issuance of the Rules, shall be required to carry out an IEE or EIA as determined by the Ministry in accordance with this Procedure in respect of any proposed extension or expansion of such Project which would increase the Project size or production or would necessitate additional construction, renovation, installation or other extension or expansion related activities, if the nature and scale of such extension or expansion are such that, regarded as an independent Project without reference to the nature or scale of the Project already in existence or under construction, they would have been subject to the requirement to carry out an IEE or EIA. If no IEE or EIA is required to be carried out in respect of such Project extension or expansion, then the EMP and ECC for such Project shall be revised as necessary within the timeframe prescribed by the Department to take into consideration such extension or expansion.

EIA Procedures, Article 11

Any expansion in respect of a Project implemented after the issuance of the Rules and which does not require an IEE or EIA (as the case may be), but such expansion would cause that Project to require an IEE or EIA (as the case may be), then the Department shall determine whether an IEE or EIA (as the case may be) of that Project shall be required and/or whether an updated, revised EMP shall be required, and then report to the Ministry.

It is also noted that future revisions to EMPs may be required, as prescribed in Article 101 of the EIA Procedures below:

EIA Procedures, Article 101

In case the Department finds that changes to the Project, the Project site or Adverse Impacts of the Project warrant revisions to the EMP, Construction Phase EMP, or Operational Phase EMP as the case may be, then the Department may require the Project Proponent to prepare and submit a revised EMP, Construction Phase EMP, or Operational Phase EMP, as the case may be to the Department for review and approval.

4.2.1.4(3) Authority of MNREC (formerly MOECAP) for Determining EMP Requirements

As noted in Article 24 of the EIA Procedures, the final decision of whether an EMP is required for a particular project is to be determined by MNREC (formerly MOECAP).

EIA Procedures, Article 24

The Ministry shall also make a determination whether an EMP shall be required in respect of any Project.

4.2.1.4(4) *Review and Approval Process*

With regards to the review and approval process after submission of the EMP to MONREC (formerly MOECAP), this is clearly stated in Articles 80 and 81 below. It is also noted that MONREC (formerly MOECAP) may, after review of the EMP, determine that an IEE or EIA is required for the Project.

Article 80

Upon completion of its review of the EMP, the Ministry shall;

- a) approve the EMP, subject to any conditions it may prescribe, and issue an ECC; or*
- b) require that the Project carry out an IEE or EIA, citing the reasons for this decision and informing the Project Proponent of its decision; and, in either case*
- c) publicly disclose its decision.*

Article 81

The Department shall deliver the final decision of the Ministry within thirty (30) working days of receipt of an EMP. If the Ministry requires an EMP to be amended, then the due date for delivery of the Ministry's decision shall be extended accordingly.

4.2.1.4(5) *Report Format*

The report format for an EMP is clearly described within the *Myanmar Administrative Instruction of Environmental Impact Assessment Procedure*, under Annex 5 “Format for an Environmental Management Plan”.

4.2.1.4(6) *Environmental Standards*

The *Myanmar National Environmental Quality Emission Guidelines (2015)* provide the basis for regulation and control of noise and vibration, air emissions, and liquid discharges from various sources in order to prevent pollution for purposes of protection of human and ecosystem health. These guidelines will provide the basis for compliance determination when implementing mitigation and monitoring requirements for the EMP. These are discussed further in **Section 5 – Governing Parameters**.

4.2.1.5 *Other Project-Relevant Legislation in Myanmar*

Laws related to environmental and social issues and hence relevant to this EMP are included in **Table 4.3**. Some of these laws are elaborated further below.

Table 4.3 Myanmar Legislation and Relevance to Project

| Relevant Laws, Rules and Regulations | Relevant Sections | Commitments |
|--|-------------------|---|
| POLICIES AND STRATEGIES | | |
| The National Environment Policy, 2019 | - | <p>This new National Environmental Policy provides long-term, strategic guidance for government organizations, civil society, the private sector and development partners on the achievement of environmental protection and sustainable development objectives in Myanmar. It requires the mainstreaming of environmental protection into planning and decision-making at all levels of government and in all sectors. Its detailed principles respect livelihood needs and development objectives while at the same time recognizing the full value of our ecosystems and the implications of our changing climate. This Policy ensures that environmental protection continues to be a central objective in Myanmar's sustainable development without losing sight of the importance of a pragmatic approach based on an awareness of the constantly evolving world around us. This National Environmental Policy will serve as a guide in mapping out detailed action plans for environmental protection and sustainable development, and set the direction for the on-going implementation and enhancement of relevant laws and policies.</p> <p>The Project Proponent commits to comply and implement the project as per this policy requirement and to ensure the project set this policy up as a guiding principle for the project's environment policy.</p> |
| Myanmar Agenda 21, 1997 and National Sustainable Development Strategy for Myanmar, 2009 | - | <p>With a view to implementing a National Environment Policy (NEP), the National Commission for Environmental Affairs (NCEA) formulated Myanmar Agenda 21 in 1997 under the guiding principles established at the United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro in 1992. The Agenda 21 provided the first framework for integrating environmental considerations into national development plans in Myanmar. The purpose of Agenda 21 is to mobilize and focus national efforts to achieve sustainable development, and is intended to have the following functions. The Project Proponent commits;</p> <ol style="list-style-type: none"> To define the choices, set the goals and targets, and establish the standards for sustainable development in Myanmar; To illuminate the environmental and ethical dimensions underlying the choices to be made and goals to be achieved in sustainable development; To analyze the ecological, economic and social issues in the country in a comprehensive and integrated fashion, clarifying the links between them, identifying the policy gaps, and showing how to reduce conflicts between environment and development; To identify and evaluate options for addressing priority issues, problems and opportunities, including the identification of appropriate programmes for legal reform, development of economic instruments, institutional development, capacity-building and other measures; To set out sectoral and cross-sectoral policies and plans which rationalize the responsibilities for sustainable development, reduce duplication, close gaps, prevent or reduce conflicts, and take advantage of compatibilities and synergies among sectors and interest groups; |

| Relevant Laws, Rules and Regulations | Relevant Sections | Commitments |
|--------------------------------------|-------------------|--|
| | | <ul style="list-style-type: none"> f) To improve decision-making and policy formulation through better information and analytical techniques, and by enabling those most affected by decisions to participate in the decision-making process; g) To develop understanding and build consensus so that decisions have strong support; h) To identify, promote and support actions leading to sustainable development and to reduce, abate and put a stop to actions impeding sustainable development; i) To identify and apply practices which sustain the resource base of the economy, achieve sustainable levels of resource use, restore degraded natural resources, make use of unused or under-used resource potential, improve the efficiency of existing resource use, and diversify the use or seek substitution of existing resources; j) To determine priorities for action, evaluating costs and benefits and the trade-offs between the different concerns affecting all levels of society; k) To provide a basis for the allocation and optimal use of limited resources; l) To develop and strengthen institutions for sustainable development; and m) To build up the capacity of institutions and the population of the country to handle complex and inter-related issues through frameworks which integrate environmental concerns with planning. <p>Subsequently in 2007, the NCEA developed the National Sustainable Development Strategy (NSDS) for Myanmar. It incorporated the aspirations of the Agenda 21 as well as Myanmar's Millennium Development Goals. The NSDS was approved in 2009 and served as the main guiding principal on environmental protection in the country.</p> <p>Specific strategies are outlined under each goal. For example, the goal for Sustainable Management of Natural Resources suggests strategies for forest resource management, sustainable energy production and consumption, biodiversity conservation, sustainable freshwater resources management, sustainable management of land resources, sustainable management for mineral resources utilization, etc.</p> <p>The aim of NSDS is to achieve sustainable development through three sectors, focused on natural resource management, economic development, and social development. Relevant government ministries are expected to institutionalize NSDS principles into their sectoral development through short-term, medium-term and long-term actions.</p> <p>Although much of the NSDS guidelines are for adoption and integration into the government legislation and regulation body, some are targeted at the private sector, such as the polluter pay principle, and reduction of energy consumption and greenhouse gas emission from industries.</p> |

| Relevant Laws, Rules and Regulations | Relevant Sections | Commitments |
|--------------------------------------|-------------------|--|
| Myanmar Climate Change Policy, 2019 | - | <p>The purpose of the policy is to provide guidance on promoting climate change adaptation and mitigation actions, integrating these actions in national and sectoral priorities and taking decisions on enhancing business opportunities for sustainable, low carbon and climate resilient development in Myanmar. To achieve the purpose, Myanmar will be guided, inter alia, by the following guiding principles. The Project Proponent commits for;</p> <ul style="list-style-type: none"> • Sustainable development - Develop sustainably to meet the needs of the present without compromising the ability of future generations to meet their own needs, by ensuring the promotion of an economically, socially and environmentally sustainable future and a fair and equitable society; • Precaution - Take cost-effective measures to avoid, minimise and protect from environmentally harmful consequences where there are threats of serious or irreversible damage even if there is a lack of full scientific certainty; • Prevention - Take anticipatory action to prevent or minimise environmental damage before it occurs by avoiding, prohibiting or controlling threatening activities; • Environmental integrity - Promote, protect and conserve the natural environment and recognise its complete and intrinsic value, whether tangible or non-tangible, economic or non-economic, to the natural, cultural and spiritual heritage of Myanmar; • Shared responsibility and cooperation - Encourage, support and embrace the common and shared responsibility of all people for the protection, conservation, and equitable sharing of benefits and resources of the environment, and encourage wide cooperation across sectors and stakeholders at all levels, including the private sector. • (f) Inclusiveness - Engage all people at all levels in decision-making and action, by supporting and embracing their diverse social, economic and cultural perspectives, participation and contributions without discrimination, particularly with respect to gender, ethnicity and age, in order to equitably share the benefits and opportunities of climate change adaptation, mitigation and low-carbon, climate-resilient development; • Good governance - Adopt transparent, participatory, and responsive processes to ensure that decision-making at all levels is inclusive, equitable, and accountable to all people in Myanmar, in accordance with the rule of law; • Climate justice and equity - Promote and protect the rights of the people of Myanmar, in particular the poorest, most vulnerable and marginalised segments of society, including indigenous peoples, all ethnic groups, local communities, women, children, the elderly, and persons with disabilities to live in a healthy environment and a fair, equitable and sustainable society; • Gender equality and women's empowerment - Promote and protect gender equality and women's equal rights through strengthening gender-responsive climate change policy concerning adaptation, mitigation, |

| Relevant Laws, Rules and Regulations | Relevant Sections | Commitments |
|--------------------------------------|-------------------|--|
| | | <p>finance, technology development and transfer and capacity building, and ensuring full and equal participation of women in decision-making.</p> <p>The Government of the Republic of the Union of Myanmar will take sector-relevant measures to implement this Policy and achieve its purpose by taking the comprehensive actions primarily in the six sectoral clusters. Among them, the following are related to the Project.</p> <p>Healthy ecosystems;</p> <ul style="list-style-type: none"> • Ensure that actions undertaken under Myanmar's national policies on environment, land use and forestry, including Myanmar's National Environmental Policy integrate climate change adaptation and mitigation considerations and are complementary to and/or support actions under this Policy; • Promote sustainable natural resource management, preserve, conserve, and rehabilitate biodiversity and natural ecosystems in order to ensure the provision of ecosystem services, recognising their contribution to climate change adaptation and mitigation, the benefits they generate to the people and Myanmar's high dependence on the quality and availability of ecosystem services; • Adopt environmentally sound technologies and good management practices, including ecosystem-based adaptation interventions, to improve and maintain the health and resilience of all ecosystems, including forest, water, land, coastal ecosystems and air quality in the face of future climate change impacts; • Enhance greenhouse gas sinks and reservoirs, and promote the reduction of greenhouse gas emissions from deforestation and forest degradation through sustainable management of forests and land use planning, based on the best available science; <p>Low-carbon and resilient growth;</p> <ul style="list-style-type: none"> • Ensure that actions undertaken under Myanmar's Green Economy Framework and energy policies integrate climate change adaptation and mitigation considerations, are complementary to and/or support actions under this Policy, and encourage public-private partnerships to support a green economy; • Ensure that the energy, transport and industry sectors, including infrastructure, are well-integrated among each other, reliable, sustainable and resilient to current and future climate change impacts, recognising that they are vital to Myanmar's economic growth; • Decouple Myanmar's continued growth from increasing greenhouse gas emissions and contribute to the global climate change mitigation effort through sustainable, low-carbon energy, transport, industrial, and waste management systems, while ensuring that Myanmar's social and economic development needs are met; iv. Promote and prioritise sustainable and renewable energy sources and energy efficiency, in order to meet Myanmar's growing energy needs and ensure energy security in a low-carbon manner; • Ensure equitable access to affordable, reliable, sustainable, and modern energy for all as a pathway to inclusive and sustainable development and eradicating poverty; |

| Relevant Laws, Rules and Regulations | Relevant Sections | Commitments |
|--|-------------------|--|
| | | <ul style="list-style-type: none"> Promote sustainable natural resource extraction through transparent and responsible investments which are consistent with climate change adaptation and mitigation priorities, while generating local employment and economic benefits and protecting the environment and public health; Ensure that urban and inter-city transportation networks and infrastructure are sustainable, low carbon and climate-resilient for all modes of transport, in particular for mass transit; Increase the productivity and resource-efficiency of the industrial sector, an important sector for Myanmar's economy, through low-carbon growth and by developing competitive and innovative green industries, recognising the relative importance of this sector for Myanmar's economy, including its potential for job creation <p>Resilient urban and rural settlements:</p> <ul style="list-style-type: none"> Ensure that actions undertaken under Myanmar's national, sub-national, and local policies and plans on urban and rural settlements, including national building regulations, township and local development plans and land-use plans, integrate climate change adaptation and mitigation considerations and are complementary to and/or support actions under this Policy; Ensure that human settlements are planned and developed in a climate-resilient manner and incentivise low-carbon approaches, while promoting long-term inclusivity, liveability, economic development and a high quality of life in rural and urban areas, recognising the interdependencies between urban and rural areas and the potential impact of climate change on rural urban migration, food security, water supply and livelihoods; Ensure the active involvement of city, township and village stakeholders in identifying climate change challenges at local level, and devise plans, strategies and practical actions to adapt to climate change, mitigate its effects, and develop in a sustainable low carbon manner; Ensure that territorial spatial planning at regional, district, city, township and village level fully addresses current and future climate-related risks and opportunities, and regularly assess and mitigate these risks in a timely and equitable manner through inclusive and participatory assessment and planning processes which take into account and strengthen local knowledge and capacities, including in land-use planning, rural and urban planning and city or township specific disaster risk management plans and actions. <p>The Project Proponent commits to comply and implement the project as per this policy requirement and to ensure the project set this policy up as a guiding principle for the project's environment policy.</p> |
| Myanmar's National Biodiversity Strategy and Action Plan 2015-2020 | - | The Project Proponent commits to be aware of the legislation. This is relevant to national government. |
| Myanmar Climate Change Strategy and Action Plan (MCCSAP) | - | The Project Proponent commits to be aware of the legislation. This is relevant to national government. |

| Relevant Laws, Rules and Regulations | Relevant Sections | Commitments |
|---|-------------------|---|
| Waste Management Strategy and Action Plan for Myanmar (2017-2030) | - | <p>The Project Proponent commit to follow the below guiding principles:</p> <ul style="list-style-type: none"> • Zero Waste: Emphasise waste prevention as opposed to end-of-pipe waste management. • Waste Hierarchy: Prioritises actions for waste management. This consists of the 3Rs including Reduce - reducing waste that is generated and which is directed to the landfill (including composting); Reuse - repairing products that can be repaired, or finding alternative uses for waste; and Recycle - returning waste with recoverable value for re-processing. • Resource Conservation: Promoting the most efficient use of resources, including resource recovery and waste avoidance. • Polluter-pays Principle: Those responsible for causing pollution or generating solid waste should pay the cost for dealing with the pollution, or managing the solid waste (collection and disposal) in order to maintain ecological health and diversity • Precautionary Principle: A lack of scientific data/information certainty should not be used as a reason for not acting to prevent serious or irreversible environmental damage or degradation. • Proximity Principle: Waste should be dealt with as close to the source of generation as possible. This reduces transportation costs, as well as risks of contamination of the environment during transport. • Consultation principle: The importance of all levels of Government consulting and working with people and organisations throughout the development and implementation of waste management strategies and action plans. <p>Shared Responsibility: Zero Waste is a shared responsibility and requires partnerships and collaborations between all sectors of government, industry, research institutions, NGO's, and the general community</p> |
| Disaster Management Laws and Rules, 2013 | Section 13 - 18 | <p>The Project Proponent commits:</p> <ul style="list-style-type: none"> • To undertake functions after laying down the plan in accord with the natural disaster management plans in order to reduce damage and losses that are likely to be caused by disaster • To provide preparatory measures for natural disaster risk reduction before natural disaster • To provide preparatory measures to be organised before natural disaster in the area where is likely to strike natural disaster • To provide preventive measures to be carried out in the area where is likely to strike natural disaster before it happens • To carry out emergency response actions including search and rescue • To carry out rehabilitation and reconstruction activities after disaster |

| Relevant Laws, Rules and Regulations | Relevant Sections | Commitments |
|---|-----------------------------|---|
| National Energy Policy, 2014 | Chapter 3, Section 4 | <p>The national energy policy aims to systematically explore the available energy resources of the country in order to supply the demand of the country and to export as value added products for surplus resources, thus ultimately targeting to sustainably improve the living standard of the country people.</p> <p>It mentions national energy policy, energy sector development plan, energy and electric power sector restructuring program, energy sector framework and strategy and work program.</p> <p>The Project Proponent shall commit to implement the project to support this policy.</p> |
| The Constitution of the Republic of the Union of Myanmar, 2008 | Section 37 (a)(b) , 45, 390 | <p>The Constitution of the Union of Myanmar is the supreme law of the country and has provisions regarding the protection of the environment in Myanmar. The Project Proponent commits to comply as these following three Articles in the Constitution provide a basis for legalising and institutionalising environmental health impact assessment and social impact assessment. The Project Proponent commits that:</p> <ul style="list-style-type: none"> • The Union is the ultimate owner of all lands and all natural resources above and below the ground, above and beneath the water and in the atmosphere in the Union; The Union shall enact necessary law to supervise extraction and utilization of State owned natural resources by economics forces; • The Union shall protect and conserve natural environment; • Every citizen has the duty to assist the Union in carrying out the following matters: <ul style="list-style-type: none"> ○ preservation and safeguarding of cultural heritage; ○ environmental conservation; ○ striving for development of human resources; and ○ protection and preservation of public property. |

ENVIRONMENTAL LAWS

| | | |
|---|-------------------------|--|
| Environmental Conservation Law, 2012 | Section 7(o), 14,15, 29 | <p>The Project Proponent commits to comply with the following:</p> <ul style="list-style-type: none"> • That MONREC has the right to manage a proponent to (1) provide compensation for environmental impact and contribute funds, (2) the need for prior permission from MONREC for businesses that have been categorized for potentially causing impact on the environment and (3) the right to issuing permit with terms and conditions relating to environmental conservation. • To treat, emit, discharge and deposit substances which cause pollution in the environment in accordance with stipulated environmental quality standards. 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 accordance with environmentally sound methods. • To not violate any prohibition contained in the rules, notifications, orders, directives and procedures under the Environmental Conservation Law. |
|---|-------------------------|--|

| Relevant Laws, Rules and Regulations | | | Relevant Sections | Commitments |
|--|--------|------------|---|--|
| Environmental Conservation Rules, 2014 | | | Section 69(a)(b) | <p>The Project Proponent commits:</p> <ul style="list-style-type: none"> Not to emit, cause to emit, dispose, by any means, the pollutants and the hazardous waste or material (stipulated as such under the Law) at any place which may affect the public directly or indirectly. Not to damage the ecosystem and the natural environment which is changing due to such system, except for carrying out with the permission of MONREC in the interest of the people. |
| Environmental Procedure, 2015 | Impact | Assessment | Section 87, 102(a)(b), 103, 104, 105, 106, 107, 108, 110, 113, 115, 117 | <p>The EIA Procedure sets out the procedures for completing an IEE, EIA and/or EMP in Myanmar. This includes information on project categorisation, responsibilities of project developers and ministries, EIA review, monitoring and auditing, amongst other issues.</p> <p>The Project Proponent commits to bear full legal and financial responsibility:</p> <ul style="list-style-type: none"> For their actions and omissions and those of its contractors, subcontractors, officers, employees, agents, representatives, and consultants employed, hired, or authorised by the Project acting for or on behalf of the Project, in carrying out work on the Project; and To support programs for livelihood restoration and resettlement in consultation with the PAPs, related government agencies, and organizations and other concerned persons for all Adverse Impacts until PAPs have achieved socio-economic stability at a level not lower than that in effect prior to the commencement of the Project. <p>For EMP, the Project Proponent commits to:</p> <ul style="list-style-type: none"> Implement the EMP, all Project commitments, and conditions, 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. Be responsible for, and fully and effectively implement the requirements and conditions set forth in ECC, applicable Laws, Rules, EIA Procedure and standards. Maintain the Project commitments and conditions when providing services to the Project and inform the Ministry with detailed information as to the proposed project's potential adverse impacts. <p>For monitoring and reporting, Project Proponent commits to:</p> <ul style="list-style-type: none"> Notify and identify in writing to the Ministry, providing detailed information as to the proposed Project's potential Adverse Impacts. Engage in continuous, proactive, and comprehensive self-monitoring of the Project and activities related thereto, all Adverse Impacts, and compliance with applicable laws, Rules, EIA Procedure, standards, the ECC, and the EMP during all phases of the Project (pre-construction, construction, operation, decommissioning, closure and post-closure). 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 |

| Relevant Laws, Rules and Regulations | Relevant Sections | Commitments |
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| | | <p>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.</p> <ul style="list-style-type: none"> • 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. • Make sure the monitoring report 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 a monitoring report as contemplated in Article 97 and Article 98 in accordance with the EMP schedule • Submit a digital copy of a monitoring report within ten (10) days upon receiving the request from an organization or a person, via email or as may otherwise be agreed upon with the requestor for the request of any organisation or person. <p>For the purposes of monitoring and inspection, the event of emergency, the Project Proponent commits to:</p> <ul style="list-style-type: none"> • Grant the ministry and/or its representatives, at any time during normal working hours, access to the Project's offices 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. <p>Ensure that the Ministry's rights of access can extend to access by the Ministry to the Project's contractors and subcontractors.</p> <p>For the Conditions and Revisions to Conditions prescribed in Environmental Compliance Certificate, the Project Proponent commits to commence the implementation of the Project in accordance with the conditions attached to the ECC and including the EMP, within such time as may be prescribed by the Ministry upon receipt of the written approval from the relevant authority.</p> |
| Environmental Quality (Emissions) Guidelines (EQEG), 2015 | | <p>The Project Proponent commits to comply with the EQEG guidelines and its setting out for emission standards for air, noise, and effluent discharges for sector specific operations. The Project Proponent considers this emissions standards in its environment impact assessment and environmental management plan.</p> |

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| Development Committee Law, 1993 | - | This law provides provisions relating to environmental sanitation, pollution of air and water, and public health. The Project Proponent commits to consider any respective township development committee laws. Within this remit, state and region governments have the authority to pass their own Development Affairs Laws as the guiding basis. Starting in late 2012, all 14 state and region governments developed their own Development Affairs Laws, which can effectively be considered their 'municipal laws'. Considering this common origin, the 14 state and region laws are quite similar in terms of basic structure and provisions. The only notable differences concern TDAC (Township Development Affairs Committee) structures and processes and fines and penalties. |
| Protection of Biodiversity and Protected Areas Law, 2018 | Section 39 (d) (e), | <p>The Project Proponent commits to comply the stipulation that there may be charge with fine or imprisonment or both if guilty of:</p> <ul style="list-style-type: none"> • Polluting soil, water and air intentionally. • Damaging the watercourse or poisoning water. • Electrification, using chemical or explosive materials with a Protected Area. • Disposing or handling chemical waste and poisoning materials in the conservation area. |
| AQUATIC RESOURCES | | |
| The Law related to Aquaculture, 1989 | | <p>The law aims at propagation of fish species, and the breeding of fish through different stages of growth in natural or artificial waters.</p> <p>The Project Proponent commits that no person from project shall obstruct navigation and flowing of water or pollute the water within the fisheries' waters or abet such acts.</p> |
| Myanmar Port Authority Law, 2015 | Section 19(a)(b), 23(b), (74), (78(b), 80(a,c), 83 | <p>The Project Proponent commits;</p> <ul style="list-style-type: none"> • Not to build or operate any kind of wharf, shipyard, dry dock and slip way without an operation license within a port limit (section 74) • Not to operate any business of supplying fuels and other requirements to vessels by a private vessel businessman without an operation licence permitted under this law; • Not to carry out the business of towing, tugging, dredging or salvaging of a vessel by a private businessman without an operation licence permitted under this law; <p>Concerning water pollution or destruction to the environmental resources, the Project Proponent commits:</p> <ul style="list-style-type: none"> • Not to cause oil spill or discharge of sludge from the petroleum tanker, oil tanker and chemical tanker navigated within a port limit, or from oil test wells, oil wells and oil pipelines or from collision or grounding of vessels; • Not to discharge, dispose or cause to fall dangerous materials, toxic materials, garbage, sludge and waste from the vessels, above and underwater natural resource exploration rigs and structures within a port limit; |

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| | | <ul style="list-style-type: none"> Not to discharge, dispose or cause to fall other materials which cause obstacle to the navigation, from the vessels, into a port; Not to fail to comply with any order or directive issued by the Myanmar Port Authority, by the person assigned duty by the Myanmar Port Authority or by the port conservator. |
| Myanmar Territorial Sea and Maritime Zones Law, 2017 | Section 10(a) (b), 30, 31 | <p>The Proponent commits to comply with the following:</p> <p>Section (10) (a) The ships that carried the petroleum, ships that are operated by nuclear power or by mean of nuclear in any way , ships that carried the hazardous or toxic materials, shall pass the route being set aside by the State.</p> <p>(b) As per passage as by sub-section (a), the ship shall carry the necessary documents and comply the plans being assigned by the precautionary management by international agreements.</p> <p>Section (30) No one without the prior approval from the Government, shall move antiques objects and historical objects present on the sea bed in Contiguous Zone.</p> <p>Section (31) In the exclusive economic zone, no one, without the approval of Union government, is allowed to undertake;</p> <ul style="list-style-type: none"> a) Exploration b) Drilling or Production of natural resources c) Research d) Production or drilling with what purposes it may be e) Constructing, maintain or using artificial island; offshore base; infrastructure and related facilities |
| Freshwater Fisheries Law, 1991 | Section 40 | The Project Proponent commits to comply the law by not causing harassment of fish and other aquatic organisms or pollution of the water in a freshwater fisheries waters. |
| Protection of Wildlife and Protected Areas Rule, 1995 | - | The Project Proponent commits to comply with provisions for the protection of biodiversity through the protection of natural habitats and wildlife. The new rule is in the draft. If the new rules is enacted, this will be repealed. This rules list a number of protected species in Myanmar. |
| SECTOR SPECIFIC AND INDUSTRY | | |
| Myanmar Investment Law, 2016 | Section (50)(d), (51), (65), 73 | <p>The stipulation to register the land lease contract at the office of Registry of Deeds in accordance with the Registration Act. To mention appointment, replacement, providing employment of staff and workers, ensuring to comply the entitlements and rights in the labour laws and rules, settling dispute regarding human rights issues.</p> <p>The Project Proponent commits to comply with the following stipulation:</p> <ul style="list-style-type: none"> To respect and comply with the customs, traditions, and traditional culture of the ethnic groups; To inform the Commission if natural mineral resources or antique objects are found that are not related to the investment permitted; |

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| | | <ul style="list-style-type: none"> • 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 recognised accounting standards; • To close and discontinue the investment only after the payment of compensation to employees in accordance with applicable laws for any breach of employment contracts, closure of investment, sale and transfer of investment, discontinuation of investment, or reduction of workforce; • 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 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. <p>The stipulation: The investor shall insure the types of insurance stipulated in the provision of the rules at any insurance enterprise which is entitled to carry out insurance business within the Union.</p> |

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| Myanmar Investment Rules, 2017 | Section 202, 203, 206, 212, | <p>The Project Proponent commits;</p> <ul style="list-style-type: none"> To comply with all terms and conditions in the permit and other applicable laws when the investment is carried out. To fully assist while negotiating with the Authority for settling the grievances of the local community that have been effected due to Investments. To appoint expert foreigner as senior manager, technical and operational expert or advisor according to subsection (a) of the section 51 of the Law. To obtain the permit or tax exemption or relief to insure the relevant insurance out of the following types of the insurance at any insurance business entitled to carry out insurance business within the Union based on the nature of the business: Property and Business Interruption Insurance; Engineering Insurance; Professional Liability Insurance; Bodily Injury Insurance; Marine Insurance; or Workmen Compensation Insurance; Life Insurance; Fire Insurance. |
| Notifications for Investment, 2013 | - | <p>Although the law does not specifically define legislation for EIAs, the Project Ponent commits to comply with Notification 1/2013 provides a categorization of the business activities in which foreigners will be allowed to engage. Under this, "oil & gas" projects fall under "Category 4: activities allowed only following an Environmental Impact Assessment".</p> |
| 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. |
| Myanmar Insurance Law, 1993 (amended in 2015) | Section 15, 16, 18, 19 | <p>The Project Proponent commits to comply with the followings;</p> <ul style="list-style-type: none"> An entrepreneur or an organization operating an enterprise which may cause loss to State-owned property or which may cause damage to the life and property of the public or which may pollution to the environment shall effect compulsory General Liability Insurance with the Myanma Insurance. State Organizations and enterprises which have fifty percent and above of the capital investment subscribed by the State, shall effect insurance only with the Myanma Insurance, if the class of Insurance they desire to effect is of the class which is accepted by the Myanma Insurance Economic Organizations which have been formed under a permit under the Union of Myanma Foreign investment Law shall effect only with the Myanma Insurance the classes of insurance which the Myanma Insurance determines from time to time. However from amongst the classes of insurance which the said Economic Organizations are to effect the Ministry of Finance and Revenue may exempt from effecting insurance of any class or more than one class, in the interest of the State. |
| Myanmar Companies Law, 2017 | Section 43(a), 49 | <p>The Project Proponent commits:</p> <ul style="list-style-type: none"> To register as per requirements for an overseas corporation. |

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| | | <ul style="list-style-type: none"> To comply as per requirements for the registration of overseas corporation |
| Myanmar Engineering Council Rules (2013) | Section 20, 24, 25, 37, 31 (a) | <p>The Project Proponent commits to comply with the following:</p> <ul style="list-style-type: none"> Engineering Discipline Accreditation Working Committee- The executive committee shall form the Working Committee with a member of the executive committee as chairman and the Council Members not more than 15 as members and shall assign the duties to the Committee Working Committee for Sustainable Engineering Teaching Program- The executive committee shall form this Working Committee with an executive member as a chairman and the Council Members not more than 15 as members and shall assign the duties to the Committee Working Committee for Accreditation and Assessment of Engineering Companies and Organizations- The executive committee shall form the Working Committee with an executive member as a chairman and the Council Members not more than 15 as members and shall assign the duties to the Committee. Working Committee Meeting - The coordination meetings of the Working Committee shall be convened as and when necessary. |
| Petroleum and Petroleum Product Law, 2017 | Section 7(a)(c), 8(a)(c)(e)(f)(j)(k), 9(a)(d), 10(a)(b)(d), 13, 32, 33 | <p>The Ministry of Commerce shall carry out, among others, the following functions relating to any Petroleum and Petroleum product:</p> <ul style="list-style-type: none"> Issuing licences relating to import or export; Determining procedures, and conditions relating to import or export; <p>The Ministry shall carry out, among others, the following functions relating to any Petroleum and Petroleum product:</p> <ul style="list-style-type: none"> Issuing licences relating to refining, transit, transport by pipeline, sale and distribution, inspection, and testing; issuing joint licence or compound licence for carrying out more than a type of business activities; Determining procedures and conditions, relating to refining, transit, transport by pipeline, sale and distribution, inspection and testing; Determining standard and quality of receptacles for transport, and procedures and conditions for the pipelines; Determining and prohibiting portion and volume of toxic chemicals and metal chemicals that may damage the machineries, to be contain in any petroleum and petroleum product, which do not contain in the prohibition and restrictions under the existing laws; Determining procedures and conditions to have correctness in standard, quality and measurement; Determining procedures and conditions necessary to appropriately supervise petroleum and petroleum product business activities; <p>The Ministry of Transport and Communications shall carry out, among others, the following functions relating to any petroleum and petroleum product;</p> <ul style="list-style-type: none"> Issuing licence to vehicles, vessels and barges that carry any petroleum and petroleum product; |

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| | | <ul style="list-style-type: none"> Taking action, as necessary, in accordance with the existing laws if it occurs spill or accident in carrying out import, export, transport, and sale and distribution of petroleum and petroleum product by water; <p>The Project Proponent commits to comply by displaying a danger warning sign in the shape of easily visible words or signs on a pipeline which is used for the transportation of petroleum or petroleum products, receiving the inspection of the petroleum or petroleum products business or container or transportation vehicle, machine, watercraft and pipeline by an authorized officer or organization.</p> <p>The Project Proponent commits also to comply to immediately notify and give the necessary information of the accident if there is an explosion or fire caused by any types of petroleum and petroleum products business or there is potential cause for a fire near the storage place of petroleum and petroleum products.</p> |
| The Oilfields Act (1918) (amended in 1919, 2010) | - | <p>This act provides clarification on activities within the oil and gas industry, and provides the Government with the power to define and alter limits of any notified oilfield. In addition, the Government may make rules for regulating all matters connected with many operations related to the extraction of oil and/or gas.</p> <p>The Project Proponent commits to comply guidance and issues such as preventing oil and gas wastes, reporting of fires, accidents and other occurrences and regulating the collection and disposal of both oil and gas.</p> |
| Oilfields (Labour & Welfare) Act (1951) (amended in 1953) and Ministry of Electricity and Energy (MOEE) order No. 356/2019 | - | <p>For the labours' working hours:</p> <ul style="list-style-type: none"> Higher physical danger risk establishment (e.g. an oil rig): 8 hours/day or 40 hours/week, Medium physical danger risk establishment (e.g. factory, oilfield, open mine): 8 hours/day or 44 hours/week. If factory work is part of a continuous process (i.e. technical reasons): admissible 48 hours/week, 10 hours a day Max. 6 days/week (i.e. Sunday = weekly holiday). For Overtime: 2x normal pay rate. Work on weekly holiday = alternative day off within a period of 2 months. <p>In Practice, the Project Proponent commits to comply with the MOEE direction of (Order No. 356/2019) as follows</p> <p>Due to the nature of business and in order to be in line with the international best practices, Ministry of Electricity and Energy, applying its authority as per 1951 Oilfield Act, Clause 42 Subclause 1 and with agreement of Union Government, issue an order below on Working Hours, Holidays and Rest Days and Overtime entitlement of employees who work in Yadana, Yetagun, Shwe and Zawtika fields:</p> <ul style="list-style-type: none"> Normal working hours of the employees shall be 12 hours a day Employees shall work on rotational basis with 28 consecutive days on shift and 28 consecutive days off shift. Employees shall be entitled to full basic salary during off shift. Rest period (off shift) specified in above no. 2 shall include weekends and public holidays. If employees have to work more than the working hours specified in no. 1, employees shall be entitled to overtime pay as per the employment agreement and calculated as per the applicable laws. If employees have to work longer than number of days specified in no 2 consecutively, the employees shall be entitled to overtime pay for all the extra days calculated as per the applicable laws. |

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| Prevention from Danger of Hazardous Chemical and Associated Materials Rule (notification No 85/2015-2016) | Section 61 (a) | <p>For organizations and licence holders who store the chemical and related substances to abide by the following facts for safety, the Project Proponent commits to comply with the following;</p> <ul style="list-style-type: none"> 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; <p>Regarding the safety, the Project Proponent commits to:</p> <ul style="list-style-type: none"> Use only the registered restricted or conditional chemical and related substances; Not use the unregistered, without labelled, unknown, damaged or expired chemical and related substances. |
| Prevention from Danger of Hazardous Chemical and Associated Materials Law, 2013 | Section 8, 13, 15, 16, 17, 20, 22, 23, 27 | <p>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".</p> <p>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.</p> <p>For the registered certificate holder to abide by the regulations contained in the registered certificate and shall follow the order and directives issued from time to time by the central supervising body".</p> <p>The Project Proponent commits to comply with the requirements:</p> <ul style="list-style-type: none"> 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. <p>The Project Proponent commits to;</p> <ul style="list-style-type: none"> Follow the license regulations, Follow directives on safe handling and 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 |

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| | | <ul style="list-style-type: none"> 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. <p>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.</p> <p>For the registered certificate holder shall apply again for using chemical which are not in the registered list.</p> <p>The Project Proponent commits to:</p> <ul style="list-style-type: none"> Classify the hazard level of chemicals and related substances in advance Show Material Safety Data Sheet and warning signage Provide safety equipment, personal protective equipment and training on their use Possess, transport, store, use and discharge chemicals and related materials in accordance with stipulations, Not import or export chemicals and related materials banned by the central supervising board. |
| The Industrial Use Explosive Substance Law, 2018 | Section 8 and 9 | <p>A license is required to apply for make, import, transport, carry the industrial use explosive substances</p> <p>The Proponent commits to comply with Section 9:</p> <ol style="list-style-type: none"> (a) not to import, transport, store, use, keep in hand, transfer the industrial use explosive substance without the approval as per this law. (b) not to destroy the industrial use explosive substances without the approval of executives of department of defence as per section 8 (c) no breaching to comply the rule, regulations, notifications, directions issued as by this law |
| The Water Power Act, 1927 | Section 3 | <p>The Project Proponent commits to comply with prohibitions on the pollution of public water; and provisions for the use of water in the pursuit of energy production and mining in a manner which does not harm land, watersheds or "localities". This law states that there is a license requirement for the use of public water for mining activity or energy;</p> <p>When rules made under this Act prescribe licenses for the use of any public water for obtaining energy or for mining operations, no person shall use, or attempt to use, any such water for any such purpose, or pollute or obstruct the flow of any such water, or discharge therein any mining refuse, except under and in accordance with the terms of such license or any grant, lease, or license from the President of the Union of, or in respect of, any land.</p> |

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| Factories Act, 1951 (amended in 2016) | Chapter 3, 4 and 5 | <p>This law lays down the provisions for the proper disposal of waste and effluents in factories; treatment of waste water; regulations for health and cleanliness in factories, and the prevention of hazards. The Project Proponent commits to comply with the following;</p> <ul style="list-style-type: none"> • For Health (Chapter 3): to arrange clean and free from any odors, solid waste and any seepage, to provide temperate and good ventilations, to well manage the particulate matters and emissions, to set up a moisture level that may be comfortable, not to populate in the factory, to get enough light, to provide clean drinking water, to provide toilets, • For Safety (Chapter 4): to arrange protection for machinery, to care and assign duty to operate the running machines, to obey the direction for appointing youth in high risk machines, to arrange precautionary measure relating to emission that may harm, to prepare plan for fire, to maintain, re-build, re-assemble the factory and machine for the safety. • For worker accommodation (Chapter 5), to support first aid kits, to create a better environment for living, shops for worker, rest rooms, and nursery. |
| Control of Smoking and Consumption of Tobacco Product Law, 2006 | Section 6 (a) (b) (j) (l), Section 9 (a) (b) (c) | <p>The Project Proponent commits:</p> <ul style="list-style-type: none"> • To comply with the following non-smoking areas; <ul style="list-style-type: none"> ○ Hospital buildings, offices, compounds and other buildings in the compound except staff houses and apartments in the hospital compound; ○ Medical treatment centres and clinics; ○ Elevators and escalators; ○ Air-conditioned public room • To comply with the following duties <ul style="list-style-type: none"> ○ To keep the caption and mark referring that it is a non-smoking area at the place mentioned in section 6 in accordance with the stipulations. ○ Arrange the specific place where smoking is allowed as mentioned in section 7, and keep the caption and mark also referring that it is a specific place where smoking is allowed, in accordance with the stipulations. ○ To accept the inspection when the supervisory body comes to the place for which he is responsible. |
| The Law amending the Narcotic Drugs and Psychotropic Substances Law, 2018 | - | The Project Proponent commits to be aware of this guidelines in terms of employment. |

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| Myanmar Fire Force Law, 2015 | Section 25 | <p>The Project Proponent commits:</p> <ul style="list-style-type: none"> To obtain the opinion of the Fire Services Department for the purpose of fire precaution and prevention, when laying down plans for construction for town, village and downtown or village development plans. 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 a reserve fire brigade Not fail to provide materials and apparatuses for fire safety; in conformity with the directive of the Fire Services Department. |
| Yangon City Development Committee Law, 2014 (amended in 2018) | - | <p>It has stated that the committee has the right to:</p> <ul style="list-style-type: none"> To incorporate for the inspection with the concerning authority and To stipulate orders for the carriage, storage of chemical and related substances for not harming to public health and life To manage the waste regarding for the hazardous. <p>There it has been prohibited for disposing chemical and its related substances in areas, which are not being allowed in the City Development area and mentioned offenses and penalties.</p> <p>The Project Proponent commits to comply the stipulations and undertake the necessary proceeding as per this law and notification issued by the committee.</p> |
| CULTURAL HERITAGE | | |
| Protection and Preservation of Cultural Heritage Regions Law, 2019 | Section 46 | <p>Section 46. For the National interest, concerning the exploration for oil, natural gas, gemstones and minerals. The Project Proponent commits to comply with the following;</p> <ol style="list-style-type: none"> It is prohibited to undertake in the area being confirmed for world cultural heritage region and national cultural heritage region. Apart from the region prescribed in sub-section (a), it can undertake in other cultural heritage region with the approval of government. In undertaking in a region as per sub-section (b), it needs to resettle cultural heritage object (monuments) that can be impacted in accordance with the international good practice. |
| Protection and Preservation of Antique Objects Law, 2015 | Section 12, 13 | <p>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.</p> <p>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</p> |

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| Protection and Preservation of Ancient Monuments Law, 2015 | Section 12, 13, 15, 20 | <p>Project Proponent commits to comply with the stipulations:</p> <ul style="list-style-type: none"> For a person who finds an ancient monument over one hundred years old under the water or above ground to promptly inform the relevant Ward or Village-Tract Administrative Office. For procedure to inform and the responsibility to inspect whether it is a real ancient monument or not and keep or cause to protect as may be necessary in accordance with the stipulation. <p>To apply prior permission from the Department before implementing extending towns, wards and villages;</p> <ul style="list-style-type: none"> Constructing or extending or repairing new buildings including hotels, factories and residential buildings or fencing or extending a fence; Digging to search petroleum, natural gas, gem or mineral, piping petroleum and natural gas, constructing factories, connecting national grid, constructing communication tower, constructing or extending infrastructures such as road, bridge, airfield, irrigation and embankment; Connecting underground electric cable, communication cable and other underground works; Digging or extending wells, lakes, canals and ponds; Gold sieving, digging, burning bricks, digging well, lake, creek, ditch, gully, pit digging, refilling, levelling, mining, quarry, gravel digging and unearthing sand, removing the mounds and hills which can damage the physical feature of the land; Placing and fencing ancient monuments in a private compound and area; Constructing a building which is not consistent with the terms and conditions stipulated according to the region by the Ministry near and at the surrounding of an ancient monument. <p>For prohibitions not to damage to an ancient monuments within the specified area of an ancient monument without a written prior permission by carrying out:</p> <ul style="list-style-type: none"> Taking photo, video, film or copying and modelling an ancient monument stipulated as a listed ancient monument for commercial purposes; Using machines which causes vibration within the specified place of an ancient monument and running various types of vehicles; Cultivating, gardening, breeding, fencing by blocking nearby an ancient monument or doing any other act which can affect an ancient monument; emission of gas such as hot-air balloon which can affect an ancient monument; Landing and taking off and, flying airplane and helicopter which can directly or indirectly affect an ancient monument; Discarding chemical substance and rubbish which can affect an ancient monument and the environment. |

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| PUBLIC HEALTH | | |
| Public Health Law, 1972 | Section 3, 5 | <p>The Project Proponent commits to cooperate with the authorized person or organization in line with the stipulations:</p> <ul style="list-style-type: none"> • To abide by any instruction or stipulation for public health. • To accept any inspection, anytime, anywhere if it is needed. |
| Protection and Prevention of Communicable Disease Law, 1995 | Section 3, 4(a), 9, 11 | <p>This law is for the Department of Health to carry out immunisations and health education activities related to communicable diseases. The Project Proponent commits to comply with the following;</p> <ul style="list-style-type: none"> • The public shall abide by the measures undertaken by the Department of Health in case when a Principal Epidemic Disease or a Notifiable Disease occurs. • 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. |
| LABOUR LAW | | |
| Labour Organisation Law, 2011 | Section 17, 18, 19, 20, 21, 22 | <p>This Law was enacted, to protect the rights of the workers, to have good relations among the workers or between the employer and the worker, and to enable to form and carry out the labour organizations systematically and independently. The Project Proponent commits to comply with the following;</p> <ul style="list-style-type: none"> • That Labour Organisations are free to organise and negotiate workers' rights when 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 to labour laws. • That Labour Organisations have the right to send representatives to conciliation tribunals. • That Labour Organisations have the right to participate and discuss workers' rights and interests with government and employers • That Labour Organisation have the right to participate in collective bargaining in accordance with labour laws. • That Labour Organisation may take collective actions in accordance with the relevant procedures, regulations and law. |

| Relevant Laws, Rules and Regulations | Relevant Sections | Commitments |
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| Minimum Wages Law, 2013 | Section 12 (a-e), 13 (a-g) | <p>This Law was enacted to meet with the essential needs of the workers, and their families, who are working at the commercial, production and service, agricultural and livestock breeding businesses and with the purpose of increasing the capacity of the workers and for the development of competitiveness. The Project Proponent commits to comply with the following;</p> <ul style="list-style-type: none"> • For the employer not to pay wage less than the minimum wage stipulated, do not have the right to deduct any other wage • For the employer to inform rates of minimum wage relating to the business, allow the entry and inspection of the inspection officer, give the sick worker 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. |
| Employment and Skill Development Law, 2013 | Section 5, 14, 15, 30 | <p>For the agreement, the Project Proponent commits to include training and probation period as prescribed in:</p> <ul style="list-style-type: none"> • If the employer has appointed the employee to work for an employment, the employment agreement shall be made within 30 days. But it shall not be related with government department and organization for a permanent employment. • If pre training period and probation period are stipulated before the appointment the said trainee shall not be related with the stipulation of sub-section (1). <p>For particulars, the Project Proponent commits to be included in the employment agreement:</p> <ul style="list-style-type: none"> • 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; |

| Relevant Laws, Rules and Regulations | Relevant Sections | Commitments |
|--------------------------------------|-------------------|--|
| | | <ul style="list-style-type: none"> • 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. <p>For the worksite regulations contained in the employment agreement to be in compliance with any existing law and the benefits of the employee not to be less than those of the any existing law.</p> <p>For the employment agreement, the Ministry can issue the notification for paying the stipulated compensation to the employee by the employer, if the work is completed earlier than the stipulated period or the whole work or any part of it have to be terminated due to unexpected condition or the work has to be terminated due to various conditions.</p> <p>For the employment agreement made under sub-section (a) to be related with daily wage workers, piece rate workers who are appointed temporarily in the government department and organization.</p> <p>For the worksite regulations and benefits contained in the employment agreement mutually made between the employer and employee or among the employees to be amended as necessary, in accord with the existing law.</p> <p>For the employer to send a copy of the employment agreement made between the employer and employee, to the relevant employment and labour exchange office within the stipulated period and to get the approval of it.</p> <p>For the employment agreement made before the enforcement of this law has to be confirmed up to the end of the term of the original agreement.</p> <p>To carry out the training program in accordance 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.</p> <p>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;</p> <p>For appointing the youths of 16 years as apprentices, to arrange the training for technology relating to the employment systematically in accord with the regulations prescribed by the skill development team.</p> <p>For the employer of the industry and service business to put in to the fund monthly as put in fees without fail for the total wages of the subordinates and the supervisors' salary for not less than 0.5%;</p> <p>To put in money paid under the previous sub-section not to be deducted from the wage and salary of the employees.</p> |

| Relevant Laws, Rules and Regulations | Relevant Sections | Commitments |
|---|---------------------------------------|--|
| Settlement of Labour Dispute Law, 2012 | Section 38, 39, 40, 51 | <p>The Project Proponent commits to comply:</p> <ul style="list-style-type: none"> • Not to fail to negotiate and coordinate in respect of a complaint within the prescribed period without sufficient cause • Not to alter the conditions of service of workers involved in disputes prior to investigation by tribunals • For no party to strike or lock-out without negotiation, conciliation and arbitration by Arbitration Body. For the employer if commits acts without sufficient cause, to be liable to pay full compensation to workers as determined by Arbitration Body or Tribunal. |
| Workmen Compensation Act, 1923 (amended in 1955, 1957, 2005) | Section 3 | <p>The Project Proponent commits to comply with the stipulations:</p> <ul style="list-style-type: none"> • For the payment by certain classes of employers to their workmen of compensation for injury by accident. • For the liability for compensation of employer's, amount of compensation, compensation to be paid when due and penalty for default, method of calculating wages, review, commutation of half-monthly payments, payment of a lump sum amount, distribution of compensation, compensation not to be assigned, attached or charged, notice and claim, power to require from employers statements regarding fatal accidents, reports of fatal accidents and serious bodily injuries, medical examination, contracting, remedies of employer against stranger, compensation to be first charge on assets transferred by employer, special provisions relating to masters and seamen. • For any updating for revising the monetary amount as per the amendment law. |
| Payment of Wages Law, 2016 | Section 3, 4, 5, 7 (ii), 8, 9, 10, 14 | <p>The Project Proponent commits 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.</p> <ul style="list-style-type: none"> • The Project Proponent commits; to pay for salary either Myanmar Kyats or Foreign Cash permitted by National Bank of Myanmar. When delivery the salary • If the employer needs to pay the other opportunities or advantages, he can pay cash together with other materials according employee's attitude. • For finishing the contract, employer need to pay the salary (not more than one month) to employees. For the permanent worker, need to pay per monthly. If more than 100 employees, need to pay within the 5 days from the end of month. If fire the employees, need to pay salary within two days after fire. When employee dies due to the accident, need to pay money as an insurance to employee's family within two days. • For the employer to report to the Department with evidence of payment at later date agreed with the employee if the employer has difficulties to pay wages on time because of significant events (e.g. natural disaster). |

| Relevant Laws, Rules and Regulations | Relevant Sections | Commitments |
|--------------------------------------|---|--|
| | | <ul style="list-style-type: none"> 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 Section 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. |
| Leaves and Holidays Act, 1951 | Section 4 | <p>The Project Proponent commits;</p> <ul style="list-style-type: none"> For employee to be granted to pay public holidays as announced by the Government in the Myanmar Gazette. On average, Myanmar has 26 public holidays per year, 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. |
| 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 | <p>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.</p> <ul style="list-style-type: none"> Production industries doing business whether or not they utilize mechanical power or a certain kind of power, works of production, repairing or services, or engineering works, mills, warehouses, establishments; 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; |

| Relevant Laws, Rules and Regulations | Relevant Sections | Commitments |
|--------------------------------------|-------------------|--|
| | | <ul style="list-style-type: none"> • Works relating to mining and gemstone contained in any existing law; • 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; <p>Establishments determined by the Ministry of Labour from time to time, in co-ordination with the Social Security Board and with the approval of the Union Government; that they shall be applied with the provisions of compulsory registration for Social Security System and benefits contained in this Law. For provisions of compulsory registration under sub-section (a) to continue to be applied by this Law even though any of the following situations occurs if it continues to carry out such work: The Project Proponent commits for</p> <ul style="list-style-type: none"> • 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. • 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. • Arranging insurance for the workers to enable to enjoy social security benefits by contributing to the social security fund. • 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. • 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. • The inapplicability to the Workmen's compensation act. • The employer (a) to pay contribution monthly to Employment Injury Benefit Fund at the rates stipulated under section 50. Moreover he shall also bear the expenses for paying as such; (b) to pay defaulting fee stipulated under section 88, in addition to the contribution if fails to contribute after effecting insurance for employment injury benefit. • 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; |

| Relevant Laws, Rules and Regulations | Relevant Sections | Commitments |
|---|---|---|
| | | <ul style="list-style-type: none"> 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. Keeping records of work and lists. |
| Occupational Safety and Health Law, 2019 | Section 12(a) (b), 16, 17, 18, 19, 20, 21, 22, 23, 26, 27, 34, 36 | <p>The Project Proponent commits:</p> <ul style="list-style-type: none"> To appoint the occupational safety and health responsible person in order to closely inspect for the safe and health of workers as per types of business defined by Ministry of Labour, Immigration and Population. To organize the Safety and Health Committee in accordance with the stipulations of the Ministry including the equal numbers of representative from employees and employers for the purposes to implementing the working environment, which is in safe and healthy for the business where the number of workers are not less than the number stipulated by the Ministry. In this case, the committee will be formed for the considerations. To support the inspection officer responsible for occupational safety and health and comply the instructions. To comply and care the right and responsibilities of the inspection officer as per section 17, 18, 19, 20, 21, 22 and 23) To arrange properly, manage as per requirement for accessing potential hazard, provide the physicians, supports the personnel protective covering, material in free. Not to dismiss or demote for the complains concerning the potential health and occupational hazards, undertaking the duty for the occupational health and safety committee, not working for the unsafe in health To undertake to inform the heavy accident arising, to submit the report of approved physicians and inform to the department in case of infected the occupation disease or toxic due to the materials use or operations process. To care the responsibilities of inspection officers and prohibitions for not removing, adding, altering without the approval of inspection officer for the occupational accident outbreak |

| Relevant Laws, Rules and Regulations | Relevant Sections | Commitments |
|--|-------------------|--|
| NATIONAL RACE | | |
| Law protecting Ethnic Right, 2015 | Section 5 | <p>For the Equal right between the Ethnic living in Myanmar. It enacted that if an ethnic loose the right, he can complain to the Regional or State Government to get the equal chance and find the equal right.</p> <p>That project matters shall be informed, coordinated and undertaken in consultation with ethnic groups if projects are in areas with ethnic groups.</p> <p>The Project Proponent also commits to comply the Succeeding laws to protect the right of Myanmar nationals.</p> <p>Monogamy Law (2015): Concerning all those who are living in Myanmar, Myanmar Citizens who live outside of Myanmar, and foreigners who marry Myanmar citizens while living in Myanmar for preventing misconducting marriages.</p> <p>Buddhist Women Special Marriage Law (2015): Concerning the marriage between Buddhist Woman and other religious man. There prescribed the legal procedure, the conditions to be complied by non-Buddhist husband, the customs for dividing property when divorcing.</p> <p>Religious Conversion Law (2015): This is enacted for the freedom to convert from one religion to another, or a person without a religion has the freedom to convert to a religion. There prohibited to apply for a religious conversion with an intent to insult, disrespect, destroy, or abuse a religion.</p> <p>Population Control Healthcare Law (2015): this is for alleviate poverty, provide adequate quality healthcare, and ensure that family planning improves maternal and child health in the country. This Empowers region or state government that concerned with the special zone for healthcare to form region or state population control healthcare group to implementing the task as per the directives of the Ministry and region or state government and the Union Territory Governing body</p> |

4.2.2 *International Conventions*

A list of Project-relevant international treaties and conventions of which Myanmar is a signatory is provided in *Table 4.4*.

4.3 *STATEMENT OF COMMITMENTS*

PTTEPI will at all times comply fully with the commitments, mitigation measures, and plans that have been presented in this EMP Report.

PTTEPI shall fully implement the EMP, all Project commitments, and conditions, and is liable to ensure that all contractors and subcontractors of the Project comply fully with all applicable Laws, including the Environmental Conservation Law (2012), Environmental Conservation Rules and Environmental Impact Assessment Procedure (2015), as well as the EMP, Project commitments and conditions.

PTTEPI and ERM hereby confirm that:

- (1) The EMP Report is accurate, consolidated and complete;
- (2) The EMP has been conducted in accordance with relevant laws, including the EIA Procedure (2015).
- (3) The Project will fully follow the commitments, mitigation measures and plans set out in this EMP Report.

Table 4.4 Project-Relevant International Conventions Ratified by Myanmar

| Legislation | Description | Relevance to the Project | Ratification Status |
|---|--|--|--|
| Environmental | | | |
| The International Convention for the Prevention of Pollution from Ships 1973, as modified by the Protocol of 1978 relating thereto and by the Protocol of 1997 (MARPOL) | <p>Regulates waste, emission and discharges from vessels. Contains the following Annexes:</p> <ul style="list-style-type: none"> Annex I: Regulations for the Prevention of Pollution by Oil (October 1983) Annex II: Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk (1986) Annex III: Regulations for the Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form (1992) Annex IV: Regulations for the Prevention of Pollution by Sewage from Ships (September 2003) Annex V: Regulations for the Control of Pollution by Garbage from Ships (December 1998) Annex VI: Regulations for the Prevention of Air Pollution from Ships (1997) | <p>The Project vessels will comply with emissions and discharge standards.</p> <p>Annex I, IV, V and VI are of relevance to the Project.</p> | Entered into force 4 th August 1988; (Annexes I and II only) |
| Vienna Convention for the Protection of the Ozone Layer 1988 and Montreal Protocol on Substances that Deplete the Ozone Layer 1989 | Aims at the protection of the ozone layer, including requirements for limiting the production and use of ozone depleting substances. | Not relevant to the Project as the Project will not use any ozone depleting substances. | Accession 16 th Sep 1998 (Vienna) & Accession 24 th Nov 1993 (Montreal) |
| Convention on Biological Diversity 1992 | Aims to promote national policies for the conservation of wild flora, fauna and habitat that needs to be included in planning policies. The three main goals are: (1) the conservation of the biological diversity; (2) the sustainable use of its components; (3) fair and equitable sharing of the benefits. | The Project will be undertaken in offshore habitats. | Ratified 25 th Nov 1994 |
| Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal | The Convention regulates the transboundary movements of hazardous wastes and provides obligations to its parties to ensure that such wastes are managed and disposed of in an environmentally sound manner. | The Project may generate hazardous wastes. | Entered into force 6 th April 2015 |
| United Nations Framework Convention on Climate Change 1992 (UNFCCC) and Kyoto Protocol 1997 | Provide a framework for intergovernmental efforts to tackle climate change. Recognises that the climate system is a shared resource whose stability can be affected by industrial and other emissions of carbon dioxide and other greenhouse gases. | The Project will form part of Myanmar's total emissions output. | Entered in force 23 rd Feb 1995 (UNFCCC) and 16 th Feb 2005 (Kyoto Protocol) |

| Legislation | Description | Relevance to the Project | Ratification Status |
|--|--|--|--|
| Asia Least Cost Greenhouse Gas (GHG) Abatement Strategy (ALGAS) 1998 | Develop national and regional capacity for preparation of GHG inventories. Assist in identifying GHG abatement options and preparation of a portfolio of abatement projects for each country. | The Project will produce air emissions from the vessels. | 1998 |
| United Nations Agenda 21 | Formed by the National Commission for Environmental Affairs (NCEA) in Myanmar. Provides a framework of programmes and actions for achieving sustainable development in the country. Building on the National Environment Policy of Myanmar, takes into account principles contained in the Global Agenda 21. Myanmar Agenda 21 also aims at strengthening and promoting systematic environmental management in the country. | Not relevant to Project. Relevant to the government. | Since 1997 |
| Social | | | |
| The International Convention for the Safety of Life at Sea (SOLAS) 1974 | Ensures that ships flagged by signatory states comply with minimum safety standards in construction, equipment and operation. | The Project vessels will comply with safety standards. | Entered into Force 11 th Feb 1988 |
| Convention on the International Regulations for Preventing Collisions at Sea (COLREG) 1972 | Sets out the navigation rules to be followed by ships and other vessels at sea to prevent collisions between two or more vessels. | The Project vessels will comply with navigation rules. | Entered into Force 11 th Nov 1987 |
| International Convention on Standards of Training, Certification and Watch-keeping for Seafarers 1978 (STCW) | Sets out requirements for marine environment awareness training and training in leadership and teamwork including new training guidance for personnel operating Dynamic Positioning (DP) Systems. | The Project vessels will comply with training requirements including for DP. | Entered into Force 1988 |
| Relevant ILO Conventions in force in Myanmar <ul style="list-style-type: none"> • C1 Hours of Work (Industry) • C14 Weekly Rest (Industry) • C17 Workmen's Compensation (Accidents) • C19 Equality of Treatment (Accident Compensation) • C26 Minimum Wage Fixing Machinery • C29 Forced Labour Convention • C42 Workmen's Compensation (Occupational Diseases) Revised 1934 • C52 Holidays with Pay • C87 Freedom of Association and Protection of the Right to Organize | Sets out legal instruments drawn up by the ILO's constituents (governments, employers and workers) and setting out basic principles and rights for workers. | The Project will comply with the recommendations for workers. | |

Myanmar's National Environmental Quality (Emission) Guidelines (EQEG) were promulgated on December 29th, 2015. The Guidelines are largely based on International Finance Corporation (IFC) Environmental Health and Safety (EHS) Guidelines, and provide the basis for regulation and control of various environmental parameters, including noise and vibration, air emissions, and effluent discharges, from various sources.

Relevant excerpts from the guidelines are as follows:

“6. Provisions of the general and applicable industry-specific Guidelines shall be reflected in project environmental management plan (EMP) and environmental compliance certificate (ECC) and together constitute a project's commitment to take necessary measures to avoid, minimize and control adverse impacts to human health and safety, and the environment through reducing the total amount of emissions generation; to adopting process modifications, including waste minimization to lower the load of pollutants requiring treatment; and as necessary, to apply treatment techniques to further reduce the load of contaminants prior to release or discharge.

7. Recognizing that these Guidelines are intended to prevent pollution through reducing the mass of pollutants emitted to the environment, dilution of air emissions and effluents to achieve maximum permitted values is not acceptable. Specified guideline values should be achieved, without dilution, at least 95 percent of the time that a project is operating, to be calculated as a proportion of annual operating hours.

8. Further reference should be made by projects to applicable industry-specific IFC EHS guidelines for advice on means of achieving guideline values set out in Annex 1.

9. As specified in the EIA Procedure, all projects are obliged to use, comply with and refer to applicable national guidelines or standards or international standards adopted by the Ministry. These Guidelines will henceforth be applied by the Ministry in satisfying this requirement until otherwise modified or succeeded by other guidelines or standards.

11. While these Guidelines generally apply to all projects subject to the EIA Procedure, it is the prerogative of the Ministry to decide how the Guidelines should be applied to existing projects as referred to in the EIA Procedure, as distinguished from new projects. At the Ministry's discretion less stringent levels or measures than provided for in these Guidelines may be specified as appropriate, and a timeframe agreed for a project to fully comply with these Guidelines.

12. As specified in the EIA Procedure, projects shall engage in continuous, proactive and comprehensive self monitoring of the project and comply with applicable guidelines and standards. For purposes of these Guidelines, projects shall be responsible for the

monitoring of their compliance with general and applicable industry-specific Guidelines as specified in the project EMP and ECC.

A summary of environmental standards that are relevant to the Project are shown below.

5.1 INDUSTRY-SPECIFIC REQUIREMENTS FOR OFFSHORE OIL AND GAS DEVELOPMENT

Table 5.1 Effluent and Emission Standards for Offshore Oil and Gas Development

| Parameter | Guideline |
|---|--|
| Produced water | <ul style="list-style-type: none"> Re-inject, discharge to sea maximum one day oil and grease discharge should not exceed 42 mg/l; 30 day average should not exceed 29 mg/l |
| Produced sand | <ul style="list-style-type: none"> Ship-to-shore or re-inject, no discharge to sea except when oil concentration lower than 1% by weight on dry sand |
| Hydrotest water | <ul style="list-style-type: none"> Send to shore for treatment and disposal Discharge offshore following environmental risk analysis, careful selection of chemicals Reduce use of chemicals |
| Drilling fluids and cuttings (non-aqueous drilling fluid) | <ul style="list-style-type: none"> Non-aqueous drilling fluid, re-inject or ship-to-shore; no discharge to sea Drilled cuttings, re-inject or ship-to-shore; no discharge except: <ul style="list-style-type: none"> Oil concentration lower than 1% by weight on dry cuttings Mercury maximum 1 mg/kg dry weight in stock barite Cadmium maximum 3 mg/kg dry weight in stock barite Discharge via a caisson at least 15 meters below sea surface |
| Drilling fluids and cuttings (water-based drilling fluid) | <ul style="list-style-type: none"> Water-based drilling fluid, re-inject or ship-to-shore; no discharge to sea Water-based drilling fluids and cuttings, re-inject or ship-to-shore; no discharge to sea except: <ul style="list-style-type: none"> Mercury 1 mg/kg dry weight in stock barite Cadmium 3 mg/kg dry weight in stock barite Maximum chloride concentration must be less than four times ambient concentration of fresh or brackish receiving water Discharge via a caisson at least 15 meters below sea surface |
| Sewage | <ul style="list-style-type: none"> Compliance with MARPOL 73/78b; <ul style="list-style-type: none"> The discharge of sewage is permitted when the operation has an approved sewage treatment plant; Discharging of comminuted and disinfected sewage using an approved system at a distance of more than three (3) nautical miles from the nearest land; and Sewage which is not comminuted or disinfected has to be discharged at a distance of more than 12 nautical miles from the nearest land. |
| Food waste | <ul style="list-style-type: none"> Compliance with MARPOL 73/78b; <ul style="list-style-type: none"> Only comminuted or ground food waste no larger than 25 mm is permitted to discharge into sea |

Note:

^a Standard unit

^b In nearshore waters, carefully select discharge location based on environmental sensitivities and assimilative capacity of receiving waters

Source: Environmental Quality (Emission) Guideline Annex 1, 2015

The following section describes the existing environmental conditions within the offshore Zawtika area. The main environmental and social information within the project area have been taken from published sources as well as available PTTEPI and ERM and in-house literature. Moreover, the information provided are also based on a review of primary data collected in 2016 near Block M9 as well as in 2017 near Block M11 from marine baseline surveys. This information gave a better understanding about the baseline condition of physical and biological components of the marine environment within the project area.

The literature review identified include:

- AEE RSE. 2018. *Offshore Exploration Drilling in Block M11. Environmental Impact Assessment Report. PTTEP. November 2018.*
- Pro-En Technologies, Limited. 2018. *Environmental Impact Assessment (EIA) Report of Zawtika Development Phase 1C and 1D. Main Report. PTTEPI. April 2017.*

6.1 PHYSICAL COMPONENTS

This section presents the physical setting of the Project Study Area and includes a discussion of the following parameters:

- Climate and Meteorology;
- Oceanography;
- Geology;
- Seawater quality; and
- Sediment.

Each of the above aspects are discussed below.

6.1.1 Climate and Meteorology

Blocks M9 and M11 are located in the south-western portion of the Gulf of Martaban, in the Andaman Sea, south of the Deltaic Coastal Zone, and west of Dawei, in the Tanintharyi Coastal Zone. The weather in this region is primarily influenced by the Northeast (NE) Monsoon and the Southwest (SW) Monsoon, and the short transitional periods between them.⁽¹⁾

⁽¹⁾ Britannica Encyclopaedia, 2009

The Andaman Sea's monsoon regime generates four (4) distinct seasons, which can be described as follows:

- Winter (December to April) - The Northeast Monsoon brings sparse rainfall, mild temperatures, and lower humidity.
- Spring (April and May) - This transition period between monsoons is hot with highly variable weather.
- Summer (June to September) - The Southwest Monsoon is characterized by cloudiness, overcast skies, frequent light rain, and interspersed with thunderstorms.
- Autumn (October and November) - This post-monsoon transition period is generally dry and cool.

6.1.1.1 *Sea Surface Temperature (SST)*

Data from the northern Myeik archipelago (located over 302 km from Block M9) shows that the temperature is very uniform. MODIS satellite data ⁽¹⁾ between 2002 and 2014 show that SST averages between 28 and 30°C. During the period, the highest SST was in 2005 (33.5°C) with the lowest in 2009 (26°C).

Similarly, within the Block M11, SST was found to range from 27.6°C to 29.2°C; and bottom seawater temperatures ranged from 19.1°C to 24.8°C. SST was largely similar among all the monitoring locations at similar depths.

6.1.1.2 *Rainfall*

Rainfall is highly seasonal in Myanmar; at least 75% of the precipitation occurs during the southwest monsoon. In the Deltaic Coastal Zone, the average annual rainfall is about 1,500-2,000 mm in the north, increasing to 2,500 mm in the southeast and 3,500 mm in the southwest. Over 90% of the rain falls between mid-May and mid-November. Annual average rainfall of Yangon is about 2,681 mm⁽²⁾.

Table 6.1 shows monthly rainfall data for Coco Island, with September receiving the most average rainfall (761 mm), and March receiving the least (4 mm). Annual rainfall is recorded to be 2,836 mm.

⁽¹⁾ Flora and Flora International. Tanintharyi Conservation Programme. Coral Diversity and Reef Resilience in the Northern Myeik Archipelago, Myanmar. TCP Report No. 3. October 2014.

⁽²⁾ <http://www.yangon.climatemps.com/precipitation.php>

Table 6.1 *Monthly Average Rainfall Data for Coco Island*

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|
| Average Rainfall (mm) | 29 | 9 | 4 | 32 | 246 | 472 | 437 | 464 | 761 | 184 | 161 | 37 | 2,836 |

Source: Rainfall/Precipitation in Coco Island, Myanmar, Accessed: 22 September 2019. Retrieved from: <http://www.coco-island.climatemps.com/precipitation.php>

6.1.1.3 *Tropical Storms and Cyclones*

Myanmar is particularly vulnerable to cyclones originating in the Bay of Bengal during pre- and post-monsoon seasons from April to May and from October to November. These cyclones result in heavy rains, floods and storm surges, especially in the coastal region of Rakhine State.

The Arakan Coast, northwest of Block M9, is more likely to be struck by a cyclone during the autumn transitional season, but the Gulf of Martaban is rarely affected. Cyclone-related disasters occur in this region every 3 to 4 years, generating flooding the low-lying and densely populated Ayeyarwady river delta region, and other coastal regions along the Gulf of Martaban.

Figure 6.1 shows historical cyclone tracks in the vicinity of Blocks M9 and M11.

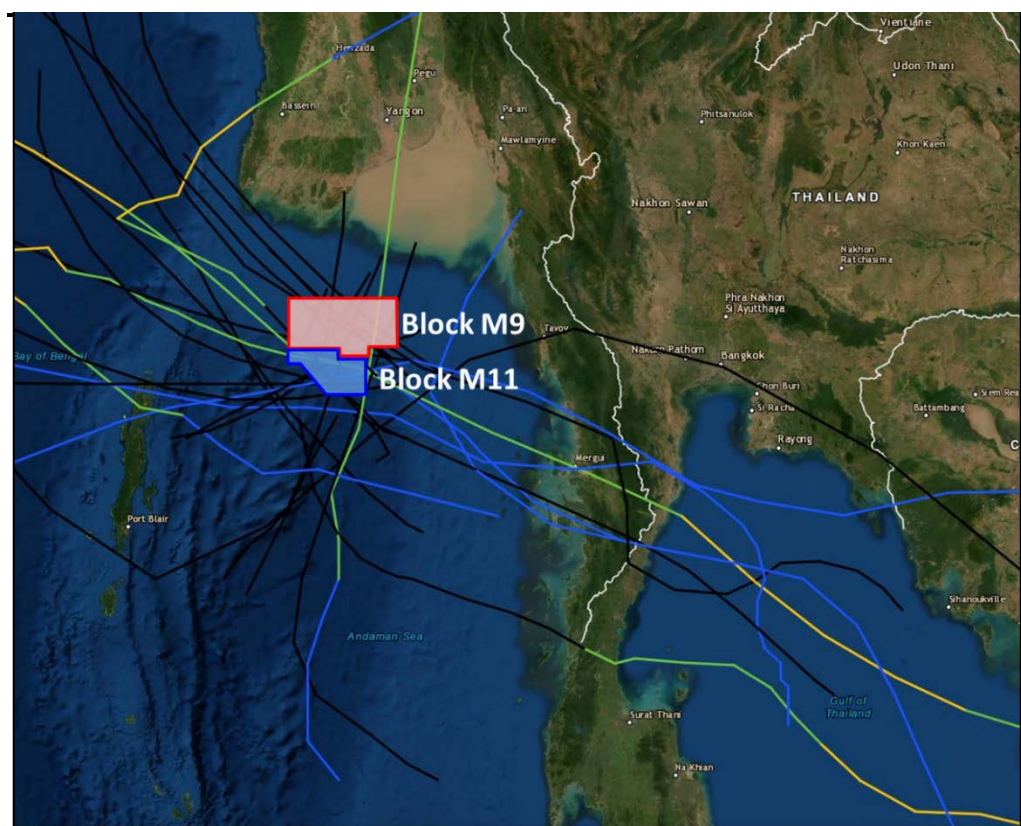


Figure 6.1 *Historical Cyclone Track within 200 km of Block M9 (2017)*

Source: Historical Hurricane Tracks. Retrieved from: <http://www.csc.noaa.gov/hurricanes>

The winds in the Northern Andaman Sea are generally gentle to moderate, with mean monthly wind speeds ranging from 3.5 to 7.5 m/s. Strong winds (>11.0 m/s) occur less than 2% of the time during the year and are generally limited to the monsoonal seasons. Mean winds are stronger during the summer Southwest Monsoon (~6.5 m/s, from the south-west to west sector) than during the winter Northeast Monsoon (~4.5 m/s). Winds in excess of 14 m/s can occur during any season but are most common during the monsoonal seasons. Strong surges of the Northeast Monsoon, squalls associated with the Southwest monsoon and the occasional tropical cyclones can occasionally cause gale force winds (> 17.5 m/s) in the Northern Andaman Sea.

The least windy season is the spring (Pre-monsoon) transition period with a mean wind speed of 4.2 m/s, when land/sea breezes (i.e. onshore – offshore wind flow) dominate. The autumn transition season is windier than the Northeast Monsoon, with a mean wind speed of 4.8 m/s.

Predominant wind direction within the project area blows from North-Northeast from November to April. From May to October, the predominant wind direction is southwest. The wind regime in the vicinity of the project area is gentle to moderate, with 50% of the winds throughout the year exceeding 4.5 m/s and 10% exceeding 8.4 m/s.

Tornadoes recorded in the area are considered small scale and while very destructive, they are rare in the study area. Waterspouts are more common, and their destructive path is more limited. They occur throughout the wider region, mainly in the south.

Table 6.2 shows maximum observed 10-minute and 1-minute wind velocities at return periods of 1, 10, and 50 years in the Block M9 area, which is directly adjacent to the north of Block M11.

Table 6.2 *Extreme Wind Parameters for Block M9 (10 m above Water)*

| Return Period | 10 Minute Mean Velocity (m/s) | 1 Minute Mean Velocity (m/s) |
|---------------|-------------------------------|------------------------------|
| 1 year | 15.3 | 16.6 |
| 10 years | 17.7 | 19.3 |
| 50 years | 19.4 | 21.2 |

Source: PTTEPI, 2008

6.1.2 Oceanography

6.1.2.1 Currents

A 13 year average schematic of ocean current direction in the Bay of Bengal is shown in *Figure 6.2*. Ocean currents around the project area are strongly dominated by the monsoon winds. Mean speed are 0.4 m/s with possible peaks approaching 2.0 m/s due to relatively steady monsoon winds. These currents decrease rapidly with depth below the surface (mean speeds 0.15 m/s near the bottom). The rate of the flow is dependent on the strength and duration of the winds. The currents to the northeast usually persist much longer and flow at a greater speed because of the stronger southwest monsoons. An important vertical circulation in the Bay of Bengal is a surge very similar to up-welling. In this process, sub-surface water is brought toward the surface.

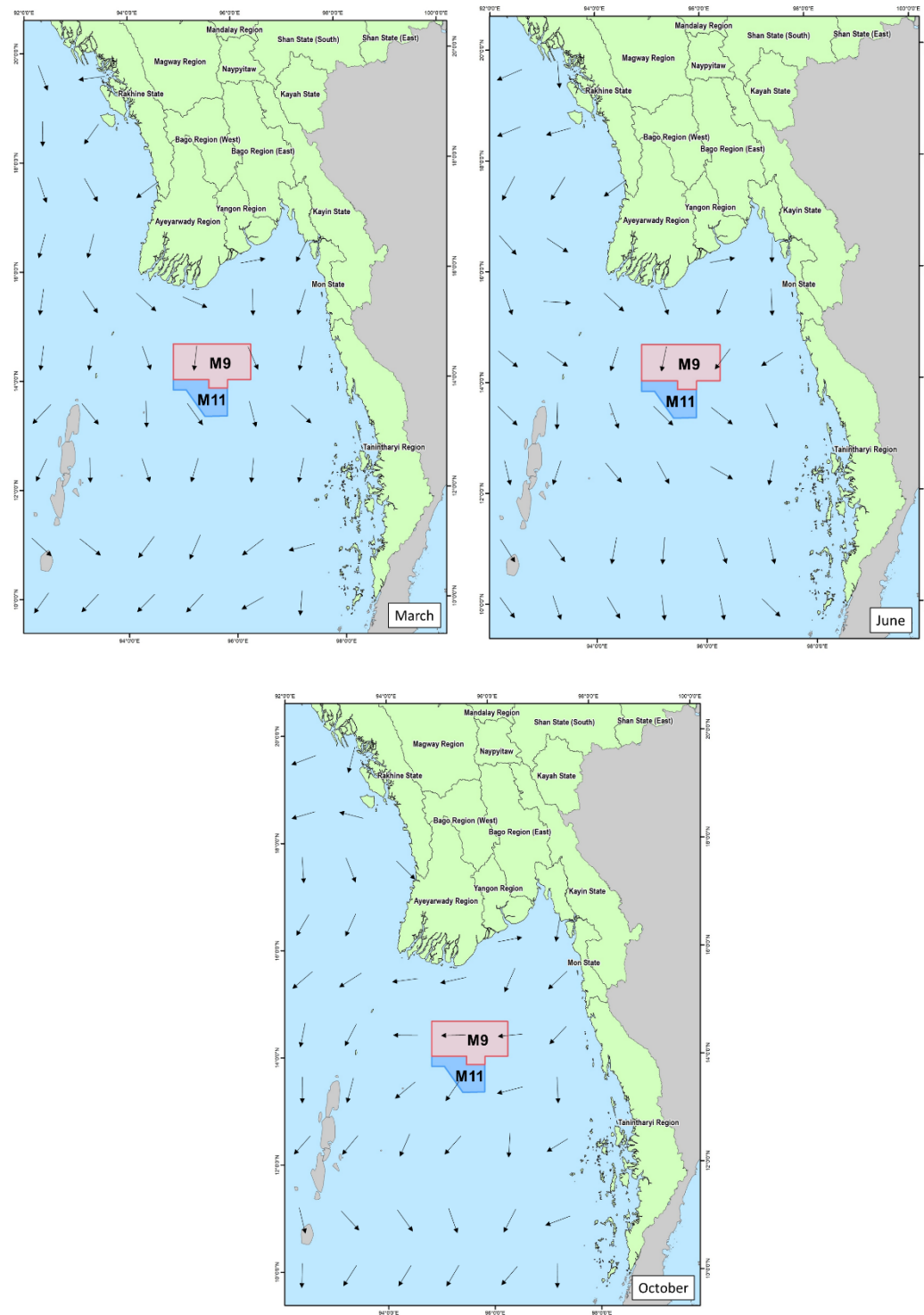
In the Bay of Bengal, anticyclonic flow in the surface waters occurs during the northeast monsoons and its transition to a weaker cyclonic gyre in late summer, creating interannual patterns of the circulation in the Bay of Bengal⁽¹⁾. *Figure 6.3 (a)* shows the eddy circulation patterns during the northeast monsoon during the month of February 2012. The eddy circulation eddies are centered at 13° N 85° E and 8° N 90° E, and the anticyclonics at 11° N 90° E at 17° N 90° E and near the north boundaries of the bay. Similarly, *Figure 6.2* and *Figure 6.3 (b)* shows a current along the coast of India, up to 20° N during April⁽²⁾. This can be assumed that it is the western boundary current (WBC) of a seasonal anticyclonic subtropical gyre which forms in the Bay during January and is best developed during March-April⁽³⁾. This northward current carries warm water from the south and its characteristic feature is the inshore more saline side.

⁽¹⁾ Limpsaichol, Undated

⁽²⁾ Rammou, A. 2012. Ocean Circulation Modeling: The Bay of Bengal. *OPB205*. Accessed: 4 September 2019. Retrieved from: https://people.mio.osupytheas.fr/~doglioli/Rammou_rapport.pdf

⁽³⁾ Shetye, S. R., A. D. Gouveia, S. S. C. Shenoi, D. Sundar, G. S. Michael, and G. Nampoothiri. 1993. The Western Boundary Current of the Seasonal Subtropical Gyre in the Bay of Bengal, *J. Geophys. Res.*, 98(C1), 945-954, doi:10.1029/92JC02070.

Figure 6.2 Ocean current direction in the Bay of Bengal (13 year average: 2003-2015)

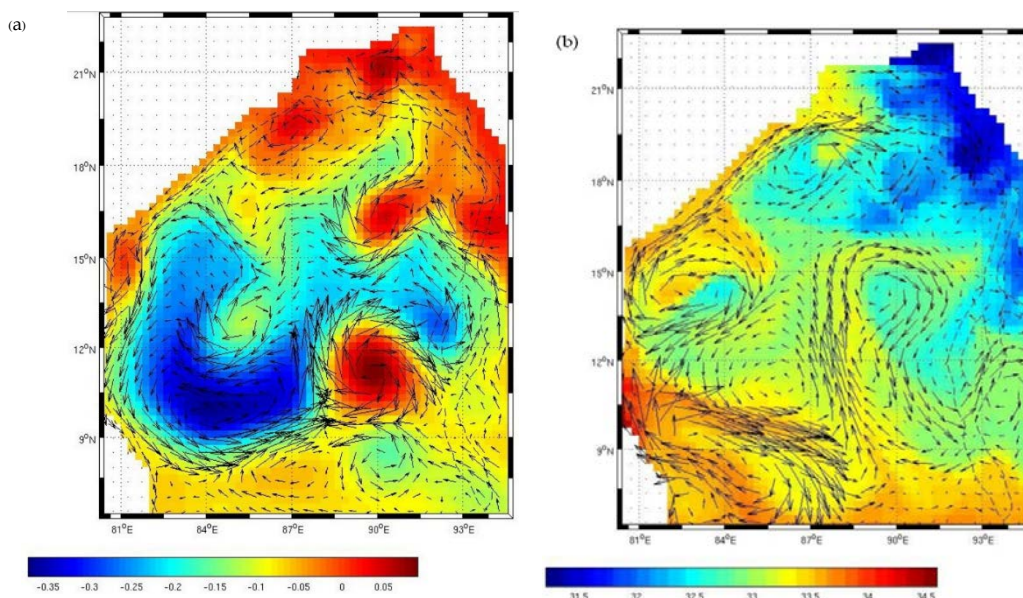


Note: Surface current direction is displayed using a directional arrow.

Source: Birch *et al.*, 2016⁽¹⁾

⁽¹⁾ Birch, F. C. H., Pikesley, S. K., Bicknell, A. W. J., Callow, M., Doherty, P. D., Exeter, O., Godley, B. J., Kerry, C. R. K., Metcalfe, K., Turner, R. A., Witt, M. J. (2016) Myanmar Marine Biodiversity Atlas. University of Exeter, UK. 79p.

Figure 6.3 *Surface Circulation Pattern in the Bay of Bengal and Andaman Sea during (a) February and (b) during April at 10m*



Source: Rizal *et al.*, 2012⁽¹⁾

6.1.2.2 Tide

The Gulf of Martaban has a tide-dominated coastline, with a tidal range of four to seven meters. During spring tide, when the tidal range rises up to around 6.6 m, the turbid zone covers an area of more than 45,000 km², making it one of the largest perennially turbid zones of the world's oceans. During neap tide, with tidal range of 2.98 m, the highly turbid zone coverage drops to 15,000 km². The edge of the highly turbid zone migrates back-and-forth in-sync with every tidal cycle by nearly 150 km ⁽²⁾.

The tides along the Tanintharyi Region (Tenasserim coast) and along the west coast of Thailand are semidiurnal, with a small diurnal inequality in both time and height. The tides approach these coasts from the south-southwest and progress north. The mean spring ranges increase from about 3 m at the Myanmar-Thailand border to over 5.2 m at Mergui. The currents flow at an average rate of 0.4 knots, with a maximum of about 0.7 knots. Near the coast, the tidal currents will also exert great influence and will either augment or deter the non-tidal currents ⁽³⁾.

⁽¹⁾ Syamsul Rizal *et al.*, GENERAL CIRCULATION IN THE MALACCA STRAIT AND ANDAMAN SEA: A NUMERICAL MODEL STUDY / American Journal of Environmental Science 8 (5) (2012) 479-488

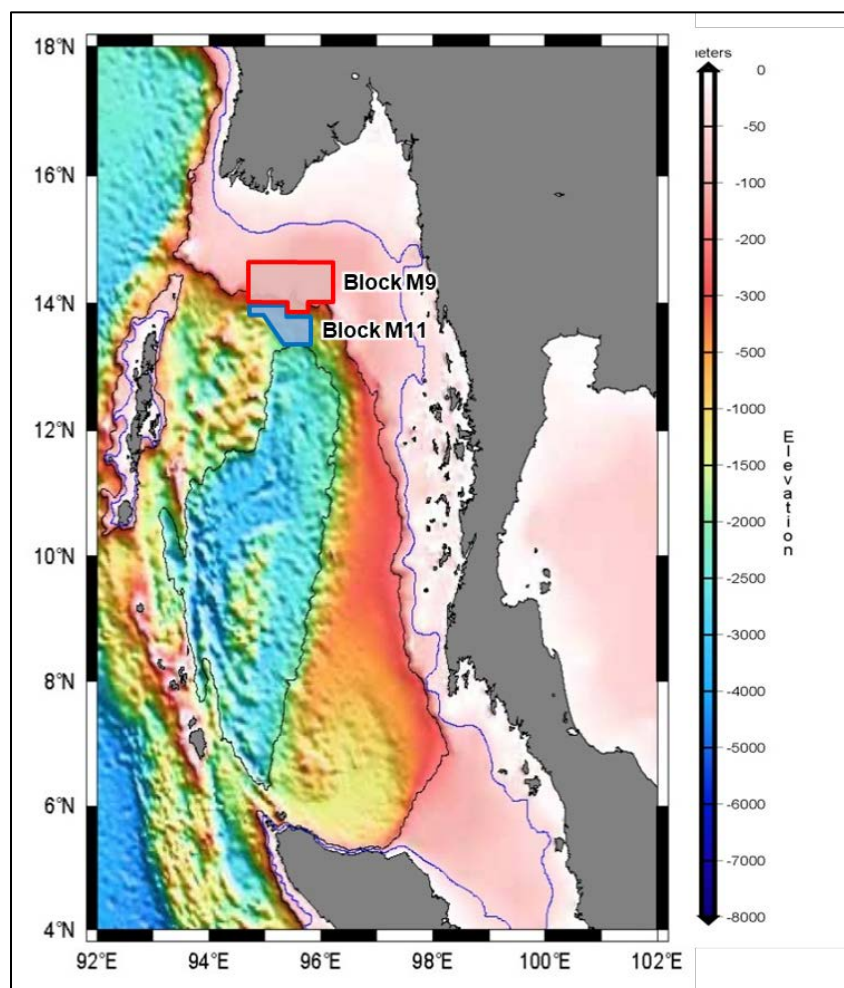
⁽²⁾ <http://www.eosnap.com/sediments/sediments-by-ayeyarwady-delta-and-gulf-of-martaban-myanmar-february-28th-2012/>

⁽³⁾ National Geospatial-Intelligence Agency, 2005

Bathymetry within the project area ranges from 600 to 1,500 m. The blocks are situated at the boundary of the continental shelf (Sunda Shelf) and mostly located on the continental slope.

Within Block M9, water depth ranges from 50 m to 800 m whereas the water depth within Block M11 is slightly lower in the north (200 m) and deeper in the south (2,300 m). According to surveys conducted for Blocks M9 and M11 projects, both blocks were found to contain general seabed features such as carbonate build-up, minor seabed depressions, sand ripples, sonar contacts, possible gas seepage, high sonar reflective seabed, and existing pipeline and trawl scars. The northern portions of the Gulf of Martaban are relatively shallow within its limits, reaching maximum depths of about 20 m at the imaginary line between Baragua Point and Kalegauk Island^①. A map of bathymetry surrounding Blocks M9 and M11 is shown in *Figure 6.4*.

Figure 6.4 Bathymetry Surrounding Blocks M9 and M11



Source: Geomap/MGDS, modified by ERM, 2019

^① National Geospatial-Intelligence Agency, 2005

6.1.3 *Geology*

6.1.3.1 *Geological Setting*

The Moattama Basin, Offshore Myanmar, lies in a back-arc setting relative to the Nicobar/Andaman ridge and the Sunda trench, which are interpreted as remnants of Paleocene subduction.

Block M9 and Block M11 are located in the back arc basin and/or magmatic arc trend (Western Basement High), offshore Myanmar. The Andaman Sea formed an oblique subduction zone and magmatic arc with massive volcanogenics as a result of subduction of the Indian Plate beneath the Sundaland Craton during Late Cretaceous to Eocene pre-rift stage. The lacustrine sediment was deposited during Early Oligocene syn-rift stage.

Seabed features of Moattama Basin show a variation in distance from the shelf edge to the possible basin floor fan deposited from 50 km up to more than 100 km.

6.1.3.2 *Earthquakes and Tsunamis*

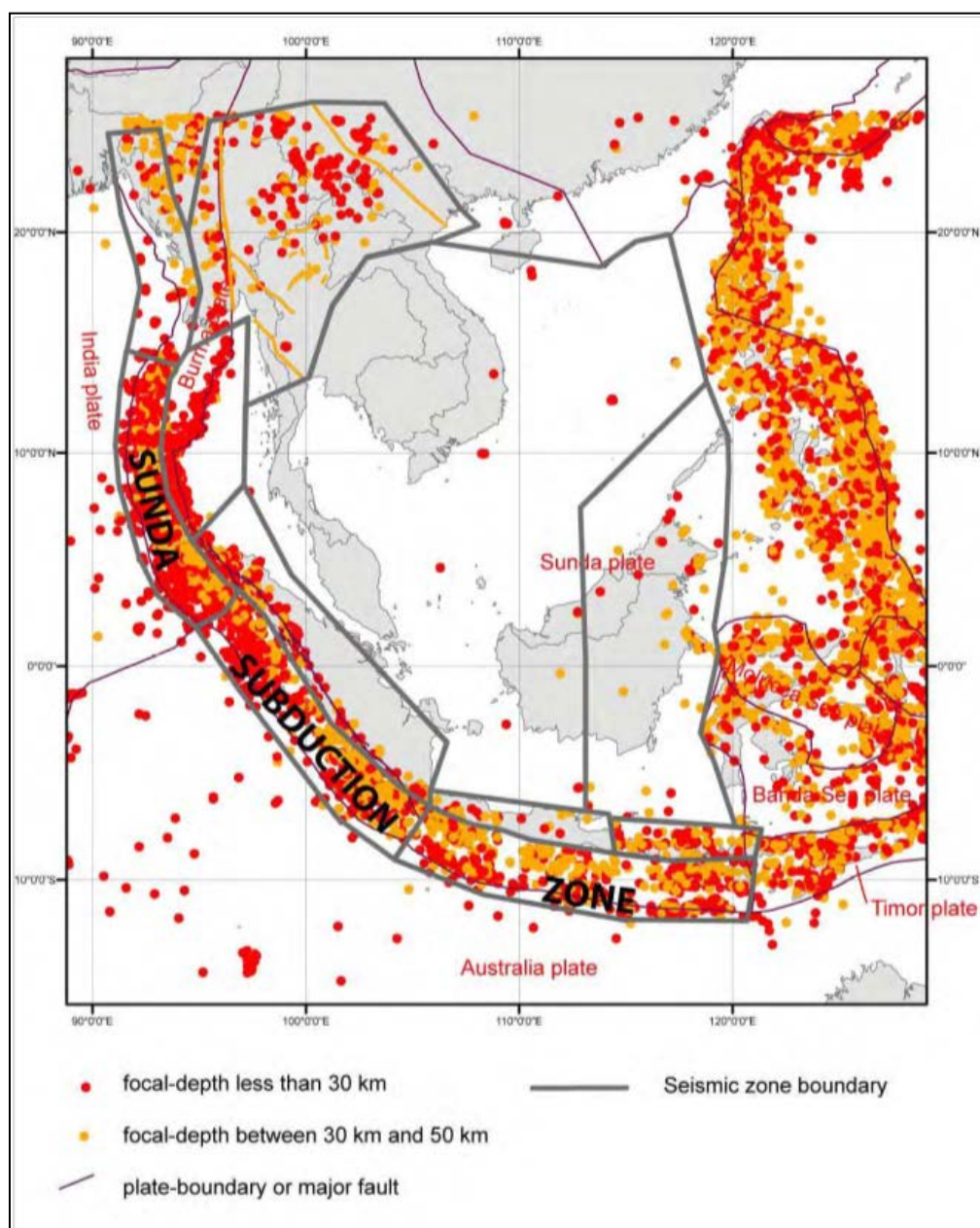
According to a literature review, Myanmar is seismologically unstable and vulnerable to earthquakes due to its location in the active Alpide seismotectonic belt and the young Alpine-Himalayan-Sumatran orogenic belt^①. Historic records show that at least 15 major earthquakes with magnitudes $M \geq 7.0$ RS have occurred in Myanmar in the last hundred years.

Recent earthquakes include one in April 2016 near Mawtaik on the India and Sunda (Eurasia) plates at 6.9 magnitude, as well as a magnitude 6.8 earthquake that occurred on the Sagaing fault in Myanmar on November 11, 2012^②. The Sagaing fault is a major fault in Southeast Asia between the India and Sunda (Eurasia) plates. This strike-slip fault (side-to-side motion) is part of a broad zone of deformation that includes the India-Asia collision zone to the north and extension of the Andaman Sea to the south. The November 11 earthquake and its four aftershocks (with magnitudes ranging from M-5 to M-5.8) occurred north of the city of Mandalay, along a stretch of the Sagaing fault. A map of earthquakes in the SE Asian region is shown in *Figure 6.5* and a historical earthquake map of Myanmar is shown in *Figure 6.6*.

^① Theilen and Pararas-Carayannis (2009) Op cit.

^② <http://www.earthobservatory.sg/news/strong-quake-myanmar#.U4wB1ncxXmQ>, Accessed May 2014

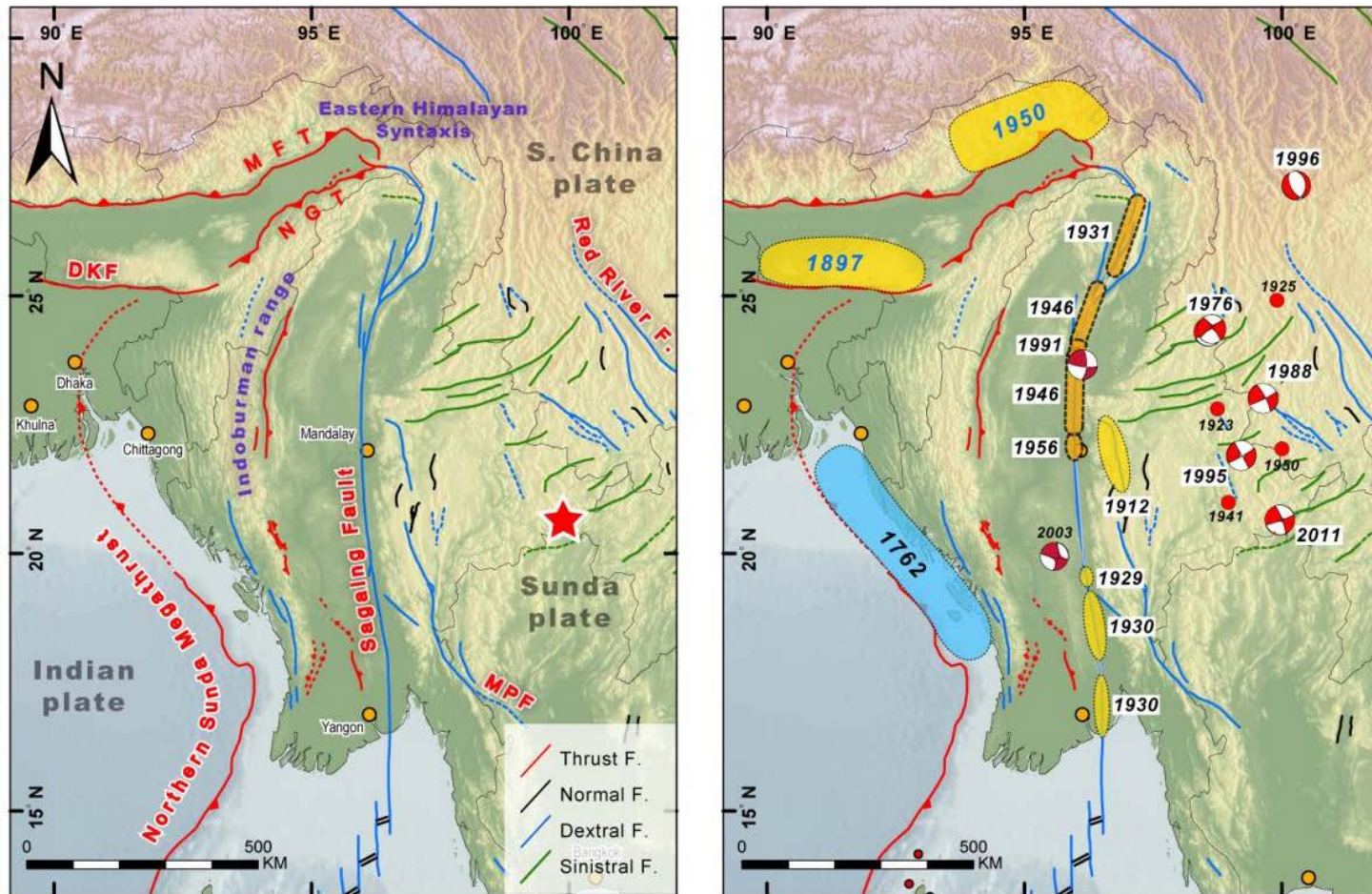
Figure 6.5 Map of Earthquakes with Shallow-Focus Epicentre for Period 1965-2005



Source: USGS, 2016^①

^① <http://www.usgs.gov/>

Figure 6.6 Neotectonic Map of Myanmar



Note: The coloured patches show estimated rupture patches of older earthquakes, while the "beach-ball" symbols show earthquakes recorded by seismometers in modern times. The "beach ball" represents a focal mechanism, which shows an estimate of motion along the earthquake fault.

Left - Main tectonical features around the Sagaling fault

Right - Major earthquake since the 18th century

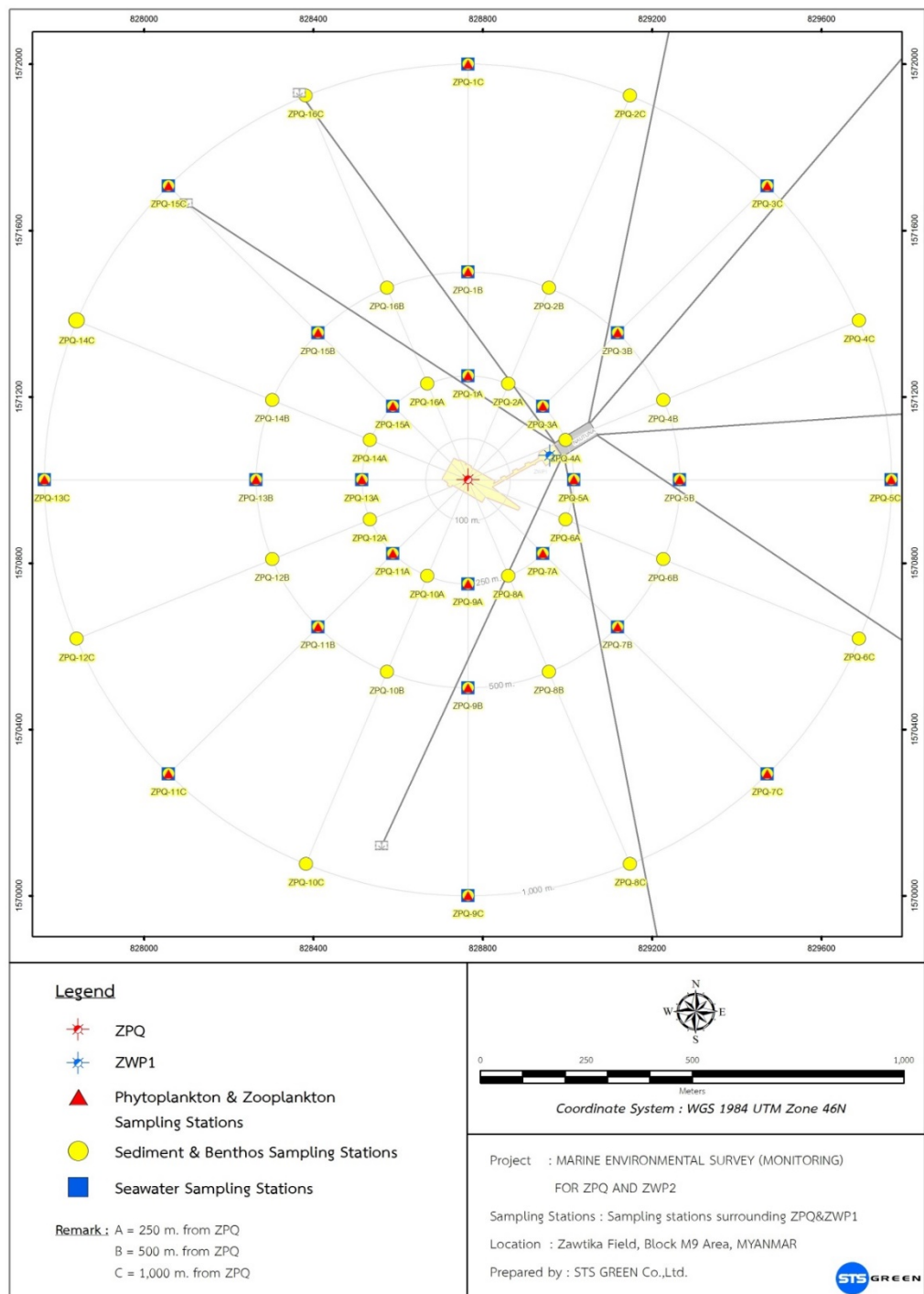
Source: <http://www.earthobservatory.sg/news/strong-quake-myanmar#.U4wB1ncxXmQ> , Accessed: October 2016.

Primary seawater quality data collected previously from the Block M9 during 2016 marine environmental monitoring (MEM) at stations surrounding ZPQ as shown in *Figure 6.7* and 2009 Baseline Survey by STS Green are applicable for this study due to its close proximity to Block M11. All seawater quality results were compared to the EQEG (Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges (general application) as well as to two other applicable standards, as follows:

- USEPA Water Quality Criteria (WQC) for Toxic Priority Pollutants; and
- Marine Water Quality Criteria for the ASEAN Region for aquatic life protection.

An overview of the seawater quality results for the 2016 Block M9 MEM and 2009 Block M9 Baseline Survey are shown in *Table 6.3* below. All measured parameters were found to comply with the Standards, with the exception of dissolved oxygen. For most of the measured parameters, there was not a significant variation between the 2016 monitoring and 2009 baseline survey results. Exceptions included barium, chromium, iron, and mercury, which showed substantial increases over time. The increases in the concentrations of these parameters are possibly attributable to the drilling and production activities that have taken place during that period of time. However, the levels are still far below the relevant standards. Overall, seawater quality in the Project area is considered as good, with low sensitivity to impacts.

Figure 6.7 2016 Block M9 Marine Environmental Monitoring (MEM) Sampling Locations at Stations Surrounding ZPQ



Note: 2016 Marine Environmental Survey was conducted to represent as baseline data for operation phase.

Source: STS Green, 2016

Table 6.3 Summary of Seawater Quality Results for 2016 Block M9 MEM and 2009 Block M9 Baseline Survey

| Parameters | Unit | 2016 Block M9 MEM at Stations Surrounding the ZPQ | 2009 Block M9 Baseline Survey at ZPQ Station | Standards - Criteria Value | | |
|------------------------|-------|---|--|----------------------------|-------------------|------------------|
| | | | | Std 1 | Std 2 | Std 3* |
| pH | - | 7.03-8.45 | 7.99 -8.10 | N/A | 6.5 –8.5 | 6-9 |
| Temperature | °C | 16.04-29.63 | 22.2 -29.0 | ^{1b} | N/A | Increase <3 |
| Dissolved Oxygen | mg/L | 1.22-6.79 | 2.66-6.68 | 4 | N/A | N/A |
| Turbidity | NTU | 0.05-2.96 | 0.31-0.47 | N/A | N/A | N/A |
| Salinity | ppt | 31.30-35.55 | 31.3-35.6 | N/A | N/A | N/A |
| Total Suspended Solids | mg/L | < 2.5 | <2.5 | ^{2b} | N/A | 50 |
| Oil and Grease | mg/L | <2.0-4.0 | N/A | 0.14 | N/A | 10 |
| Petroleum Hydrocarbon | µg/L | <0.20-0.38 | <0.2 | N/A | N/A | N/A |
| Arsenic (As) | µg/L | < 5.0 | <0.0020 -0.0029 | N/A | 36 | 0.1 |
| Barium (Ba) | µg/L | 4.052-8.935 | 0.0063 – 0.0078 | N/A | N/A | N/A |
| Cadmium (Cd) | µg/L | <0.002-0.088 | <0.0020 | 10 | 7.9 | 0.1 |
| Total Chromium (Cr) | µg/L | 0.066-2.024 | <0.0020-0.0024 | 48 | 50 | 0.1 (hexavalent) |
| Copper (Cu) | µg/L | <0.250-0.597 | <0.0050 | 8 | 3.1 | 500 |
| Iron (Fe) | µg/L | <2.000-83.040 | <0.20 | N/A | N/A | 3500 |
| Nickel (Ni) | µg/L | <0.100-0.870 | <0.0020 | N/A | 8.2 | 500 |
| Lead (Pb) | µg/L | <0.025-0.149 | <0.0020 | 8.5 | 8.1 | 100 |
| Manganese (Mn) | µg/L | <0.025-2.983 | <0.0020 | N/A | N/A | N/A |
| Zinc (Zn) | µg/L | <0.250 | <0.0070 | 50 | 81 | 2000 |
| Total Mercury (Hg) | µg /L | 5.05-25.50 | 1.49-2.15 | 160 | 940 ^{4a} | 10,000 |

Note: ^{1a} Increase not exceed 1°C from the natural condition.

^{1b} Increase not more than 2°C above the maximum ambient temperature.

^{2a} Changed not exceed 10% of minimum salinity measured.

^{2b} Permissible 10% maximum increase over seasonal average concentration

^{3a} Increased not exceed combining of average value for 1 day or 1 month or 1 year and standard variation value of such average value.

^{4a} Criteria value for Methyl Mercury

Standards:

Std 1 - ASEAN Marine Water Quality Criteria for Aquatic Life Protection ⁽¹⁾.

Std 2- USEPA National Recommended Water Quality Criteria for Aquatic Life ⁽²⁾, Saltwater, acute/chronic, whichever value is stricter

⁽¹⁾ <http://environment.asean.org/wp-content/uploads/2015/07/ASEAN-Marine-Water-Quality-Criteria.pdf>

⁽²⁾ <https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table>

Std 3 – Myanmar National Environmental Quality Guidelines, Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges (general application)

- * It is noted that Myanmar's EQEG are for emissions only (i.e., discharges), and are therefore not relevant to "ambient conditions". However, Myanmar's EQEG for Wastewater has been added for comparison.

Source: STS Green Co., Ltd., July 2016

6.1.5

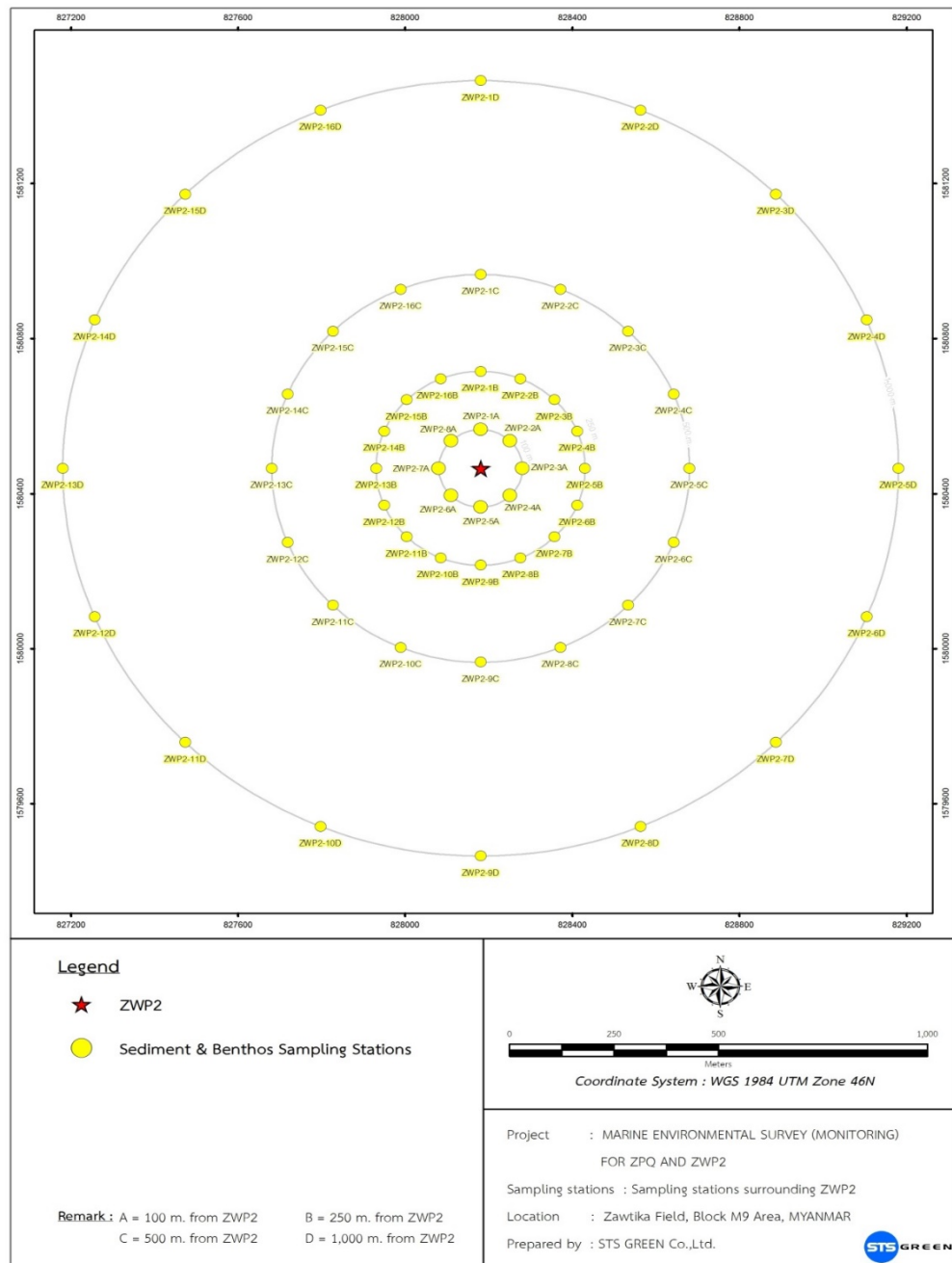
Sediments

Primary sediment quality data was not collected for the Block M11 Project. However, data collected during the 2016 Block M9 MEM sampling locations at stations surrounding ZPQ (as shown in *Figure 6.7* and *Figure 6.8*) and the 2009 Block M9 Baseline Survey, by STS Green, are applicable baseline data due to its close proximity. Sediment quality results have been compared to NOAA Sediment Quality Guidelines. The proposed guidelines adopt the Effects Range-Low (ERL)⁽¹⁾/Effects Range-Median (ERM)⁽²⁾ approach used by the USEPA. Sediment quality results for the 2016 Block M9 MEM and 2009 Block M9 Baseline Survey are summarized in *Table 6.4* below. The results from both surveys found that almost all measured parameters complied with the NOAA Sediment Quality Guidelines (ERL and ERM). The only exceptions were nickel, which varied from 29 - 63 mg/kg in the 2009 survey and 5.99 - 39.56 mg/kg in the 2016 survey, and Arsenic (As), which measured above the ERL during the 2009 survey at 3-20 mg/kg. It is noted that there was actually a decrease in both nickel and arsenic concentration between 2009 and 2016. Other notable results were a substantial increase in the concentration of barium in sediments between 2009 and 2016. This is expected given the drilling activities that took place during this period due to concentration of barium in drilling fluid. In the 2009 Baseline Survey, Barium concentrations in the sediment in the Project Area were found to range between 7.7 - 160 mg/kg, and in the 2016 Block M9 MEM, concentrations were found to range between 28.67 - 2,081 mg/kg. This substantial increase over time is almost certainly due to previous drilling activities.

⁽¹⁾ ERL = concentration of a contaminant above which harmful effects may be expected to occur.

⁽²⁾ ERM = the concentration of a contaminant above which harmful effects always or almost always occur.

Figure 6.8 2016 Block M9 Sediment and Benthos Sampling Locations at Stations Surrounding ZPQ



Note: 2016 Marine Environmental Survey was conducted to represent as baseline data for operation phase.

Source: STS Green, 2016

Table 6.4 *Summary of Sediment Quality Results from the 2016 Block M9 MEM and 2009 Baseline Survey*

| Parameters | 2016 Block M9 MEM at Stations Surrounding the ZPQ | 2009 Block M9 Baseline Survey at ZPQ Station | NOAA Sediment Quality Guidelines (mg/kg dry wt) | |
|--|---|--|---|------|
| | | | ERL | ERM |
| Total Petroleum Hydrocarbon (mg/kg) | <20.00-2,995 | <0.258-19.4 | - | - |
| Trace Metals (mg/kg dry wt) | | | | |
| - Arsenic (As) | 0.51-7.63 | 14 | 8.2 | 70 |
| - Barium (Ba) | 28.67-2,081 | 8.9 | - | - |
| - Cadmium (Cd) | <0.01 | <0.24 | 1.2 | 9.6 |
| - Chromium (Cr) | 11.97-50.80 | 25 | 81 | 370 |
| - Copper (Cu) | 1.77-21.97 | 4.8 | 34 | 270 |
| - Iron (Fe) | 12,017-35,256 | 26,000 | - | - |
| - Lead (Pb) | 4.31-31.53 | 12 | 46.7 | 218 |
| - Manganese (Mn) | 135.92-670.47 | 290 | - | - |
| - Nickel (Ni) | 5.99-39.56 | 29 | 20.9 | 51.6 |
| - Zinc (Zn) | 17.92-67.84 | 45 | 150 | 410 |
| - Total Mercury (Hg) | <0.030-0.089 | <0.023 | 0.15 | 0.71 |

Source: STS Green, 2016

6.2 *BIOLOGICAL COMPONENTS*

This section describes the biological environment of the Study Area. The discussion is limited to the biological components of the environment likely to be present in the Study Area and potentially affected by the Project activities, as follows:

- Plankton and zooplankton communities;
- Marine fishes;
- Sharks;
- Marine mammals;
- Sea turtles;
- Seabirds; and
- Sensitive ecosystems

Each of the above are discussed in the following sections.

6.2.1 *Plankton and Zooplanktonic Communities*

The Andaman Sea is very productive with high phytoplankton densities during the Northeast Monsoon (November). Results from the phytoplankton and zooplankton survey showed that species composition and abundance were similar among sampling. Although rich abundance of zooplankton groups occur in the Andaman Sea, lower abundance for crab larvae, planktonic shrimps

and larvaceans are observed. The density of phytoplankton was recorded to be 1,000 – 3,000 cell/L with 6 species identified; while the density of zooplankton was reported to be 1,000 -3,000 individuals/L with at least 4 species (ERM, 2018). Results of low abundance and diversity was considered consistent with low nutrients content of the offshore waters. That is, the oligotrophic conditions (low nutrients) of the survey area was thought to have limited the growth of the phytoplankton, which may also account for the low population of their predators, such as zooplanktons.

Overall, the Andaman Sea, including in the Project Area, is considered to be highly productive with high phytoplankton. At the same time, the Gulf of Martaban has also shown to contain a rich abundance of zooplankton groups, but lower abundance of crab larvae, planktonic shrimps, and larvaceans, whereby diversity index of zooplankton ranged from 1.53 to 2.19.

The 2016 Block M9 phytoplankton and zooplankton sampling locations at stations surrounding ZPQ are shown in *Figure 6.7*. The results of the phytoplankton community survey during the 2016 Block M9 MEM and 2009 Block M9 Baseline Survey are shown in *Table 6.5* and are summarized as follows:

- The taxonomical classification of phytoplankton community showed that three divisions of phytoplankton were found surrounding the ZPQ during the 2016 Block M9 MEM and 2009 Block M9 Baseline Survey: division Cyanophyta (Blue-green algae), division Bacillariophyta (Diatom), and division Pyrrophyta (Dinoflagellates).
- Pyrrophyta (dinoflagellate) was the most diverse phytoplankton group represented by the largest number of species at stations surrounding the ZPQ during the 2016 Block M9 MEM and 2009 Block M9 Baseline Survey.
- Cyanophyta (blue green algae) was the most abundant phytoplankton group represented by the largest density surface at stations surrounding the ZPQ as well as the reference station during the 2016 Block M9 MEM and 2009 Block M9 Baseline Survey.
- During the 2016 Block M9 MEM, the average diversity index of phytoplankton was 1.05 at 1-2 meters below surface at stations surrounding the ZPQ (compared to 1.23 at the reference station, and 0.74 at the base of the euphotic zone (approximately 30-50 m), (compared to 1.20 at the reference station).
- During the 2009 Block M9 Baseline Survey, the diversity index of phytoplankton was 0.33 at the ZPQ sample stations and 0.63 at the reference station.

Table 6.5 Summary of Number of Phytoplankton Species and Density from 2016 Block M9 MEM and 2009 Block M9 Baseline Survey

| Parameters | ZPQ | | Reference Station | |
|----------------------------------|---|---|---|---|
| | 2016 Block M9 MEM stations surrounding ZPQ | 2009 Block M9 Baseline Survey stations at ZPQ | 2016 Block M9 MEM Reference Station | 2009 Block M9 Baseline Survey Reference Station |
| | Depth: 1-2 meters below surface / the base of the euphotic zone | Depth: 140 m | Depth: 1-2 meters below surface / the base of the euphotic zone | Depth: 150 m |
| Average Number of Species | | | | |
| Division Cyanophyta | 1 / 1 | 2 | 1 / 1 | 1 |
| Division Bacillariophyta | 4 / 3 | 15 | 3 / 2 | 9 |
| Division Pyrrophyta | 4 / 3 | 16 | 1 / 1 | 13 |
| Average Density | | | | |
| Division Cyanophyta | 173,813 / 269,554 | 236,790 | 49,686 / 75,454 | 137,052 |
| Division Bacillariophyta | 16,806 / 11,696 | 2,754 | 23,660 / 36,510 | 5,358 |
| Division Pyrrophyta | 41,869 / 29,235 | 12,312 | 14,196 / 36,510 | 19,035 |
| Average Diversity Index | 1.05 / 0.74 | 0.33 | 1.23 / 1.20 | 0.63 |

The 2016 M9 benthos sampling locations at stations surrounding ZPQ are presented in *Figure 6.7* and *Figure 6.8*. The results of benthic structure community analysis during the 2016 Block M9 MEM and the 2009 Block M9 Baseline Survey are summarized in *Table 6.6* as follows:

- The taxonomical classification of benthos showed that four phyla of benthos were found surrounding ZPQ and ZWP-2: phylum Annelida (Annelid); phylum Arthropoda (Arthropod); phylum Mollusca (Mollusk); and phylum Echinodermata (Echinoderm) during the 2016 Block M9 MEM and 2009 Block M9 Baseline Survey.
- Phylum Annelida was the most diverse benthic structure group represented by the largest number of species followed by Arthropoda at stations sampled during the 2016 Block M9 MEM and 2009 Block M9 Baseline Survey.
- *Solemya* sp. (phylum Mollusca) was the benthic structure group represented by the highest density at stations surrounding ZPQ and ZWP-2, followed by family Sigalionidae (phylum Annelida) and *Callianassa* sp. (phylum Arthropoda), respectively) during the 2016 Block M9 MEM.
- At the reference station, family Arabellidae (phylum Annelida) and family Gammaridae (phylum Arthropoda) were the highest density benthic structure groups during the 2016 Block M9 MEM.
- During the 2016 Block M9 MEM, the average diversity index of benthic structure was 1.06 at stations surrounding ZPQ (compared to 1.98 during the 2009 Block M9 Baseline Survey), 1.37 at stations surrounding ZWP-2 and 0.69 at the reference station (compared to 2.01 during the 2009 Block M9 Baseline Survey).

Comparison of the 2009 and 2016 surveys have shown that the number and diversity of benthos is within normal condition and did not show a consistent decrease over that time (some parameters showed increases while others showed decreases, but there was no conclusive link between a decrease in the overall health of the ecosystem over time), despite numerous exploration and production activities taking place. In addition, for species that showed a decrease over time, proportional decreases were also observed at the Reference Station, suggesting that the decrease was not due to petroleum exploration or production activities. The number of species, and density were also found to be similar (or higher) in comparison to reference stations outside the Project Area.

Table 6.6 *Summary of Number of Benthos Species and Density from 2016 Block M9 MEM and 2009 Block M9 Baseline Survey*

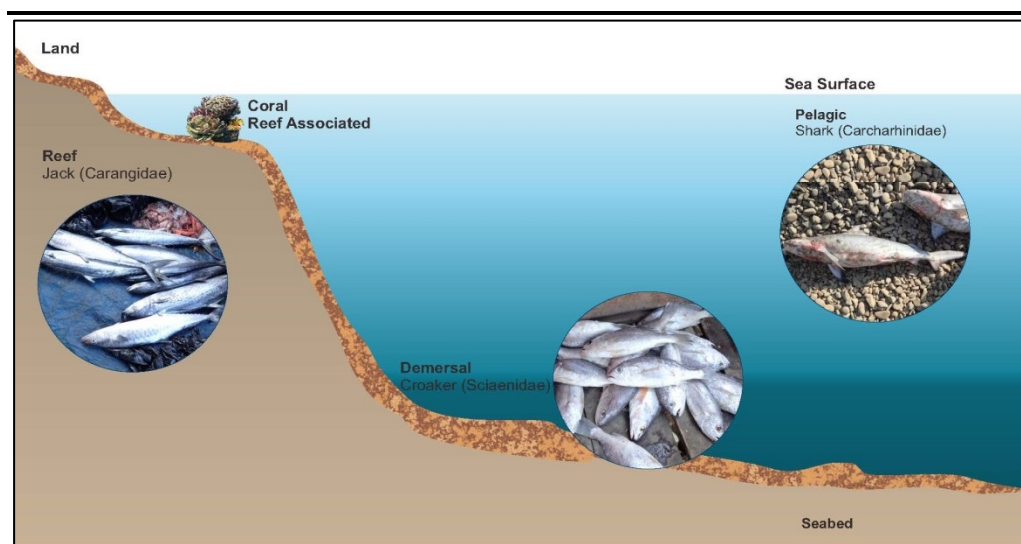
| Parameter | ZPQ | | Reference Station | |
|---|--|---|-------------------------------------|---|
| | 2016 Block M9 MEM stations surrounding ZPQ | 2009 Block M9 Baseline Survey stations at ZPQ | 2016 Block M9 MEM Reference Station | 2009 Block M9 Baseline Survey Reference Station |
| Average Number of Species | | | | |
| Phylum Annelida | 2 | 3 | 1 | 2 |
| Phylum Arthropoda | 1 | 2 | 1 | 2 |
| Phylum Mollusca | 1 | 0 | 0 | 0 |
| Phylum Echinodermata | 1 | 1 | 0 | 1 |
| Average Density (Inds/m²) | | | | |
| Phylum Annelida | 28 | 51 | 20 | 33 |
| Phylum Arthropoda | 26 | 61 | 20 | 37 |
| Phylum Mollusca | 81 | 0 | 0 | 0 |
| Phylum Echinodermata | 4 | 5 | 0 | 9 |
| Average Diversity Index | 1.06 | 1.98 | 0.69 | 2.01 |

6.2.3 *Marine Fishes*

In open areas, pelagic species inhabit and generally undertake large migrations between feeding grounds and spawning areas throughout the year. They are economically important to Myanmar and are widespread in their distribution. A wide variety of jacks, tunas, barracudas, flying fish, sharks and rays are included in this community that extends across the entire Indian Ocean. A total of 37 species were identified by the IUCN as threatened with different levels of vulnerability in Andaman Sea and Bay of Bengal. The family Clupeidae (herring and anchovies) and Scombridae (mackerel and tuna) are likely to be present in portions of Block M11. This family is known to be sensitive to underwater sound generation as they are classified as “hearing specialists”.

Fish communities that may be present in the Area of Interest range from coastal or reef associated species, such as grouper and snapper, to demersal (bottom living) and pelagic (open water) species and may occupy a range of habitats (see *Figure 6.9*).

Figure 6.9 *Fish Types in Myanmar Waters*



Source: ERM, 2017

Pelagic species inhabit open water areas and generally undertake large migrations between feeding grounds and spawning areas throughout the year. The family Clupeidae (herring and anchovies) and Scombridae (mackerel and tuna) are likely to be present in portions of Block M9. This family is known to be sensitive to underwater sound generation as they are classified as “hearing specialists.” This means that they have the ability to hear underwater sound as they have a connection between their swim bladder and their hearing apparatus and they can thus be sensitive to pressure changes (i.e. underwater sounds).

Demersal species are associated with the seabed. They generally feed on the invertebrates and other organisms living with the seabed. Demersal species such as snapper and croaker are known to be caught in Mon State and could be present in Blocks M9 and M11⁽¹⁾.

Coastal or reef species are range restricted species and generally inhabit rocky, coral or coastal areas for the majority of the life, using these areas as both feeding and spawning grounds. In coastal areas, seagrass and mangrove habitats serve as areas of enhanced biological productivity and nursery areas for juvenile fishes. Rocky shores and coral reefs are also expected to be areas supporting fish aggregations, site-attached species and serve as nursery areas. These nursery areas lie outside the Activity Area. Any potential coral habitat is over 80 km from the 3D seismic survey area, and therefore range restricted reef species are unlikely to be in the vicinity of the 2D or 3D seismic survey areas.

In 2004, South East Asian Fisheries Development Center (SEAFDEC) conducted a joint research survey on pelagic fisheries resources in Myanmar. The results from this survey indicated that many commercially important species, such as

⁽¹⁾ Foundation for Ecological Recovery (FER). Abundance of Parlain Natural Resources and Communities.

Swordfish (*Xiphias gladius*), Yellowfin Tuna (*Thunnus albacares*), Striped marlin (*Tetrapturus audax*) and Sainfish (*Istiophorus platypus*) inhabit Myanmar offshore waters. Bigeye Thresher (*Alopias pelagicus*), Whit-tipped shark (*Carcharhinus longimanus*), Escolar, Pelagic stingray (*Dasyatis* sp.), Common dolphin (*Coryphaena bipinnulata*) and Snake mackerel (*Gympylus surpens*) were also found as by-catch in this survey.

Similar results were also found in 2007, when “The Collaborative Marine Fishery Resources Survey in Myanmar Water” was jointly conducted by scientists from SEAFDEC and Myanmar. From these survey results, Swordfish were found to be the most dominant species in Myanmar offshore waters, and can be considered as one of the key commercial fishes for offshore fisheries (Table 6.7).

Table 6.7 Species-Wise Catch of Big Pelagic Fish

| Operation No. | Catch | | | | | | |
|------------------|----------------|------------|-----------|------|--------|-------|-------|
| | Thresher Shark | Sword Fish | Sail Fish | Ray | Lancet | Other | Total |
| 1 | 0 | 1 | 0 | 0 | 0 | 1 | 2 |
| 2 | 2 | 5 | 0 | 1 | 1 | 0 | 9 |
| 3 | 4 | 6 | 0 | 2 | 1 | 0 | 13 |
| 4 | 2 | 1 | 1 | 0 | 0 | 0 | 4 |
| 5 | 4 | 0 | 1 | 2 | 0 | 0 | 7 |
| 6 | 1 | 3 | 0 | 0 | 0 | 0 | 4 |
| Total Catch | 13 | 16 | 2 | 5 | 2 | 1 | 39 |
| CPUE (1000 hook) | 3.82 | 4.7 | 0.59 | 1.47 | 0.59 | 0.29 | 11.47 |

Source: SEAFDEC (March 2007 in National paper prepared for the FAO/SEAFDEC workshop on “Assessment and Management of the Offshore Resources of South Asia”). Retrieved from http://www.apfic.org/uploads/smartsection/360_offshore_myanmar.pdf

Whale Sharks (*Rhincodon typus*) are known to inhabit the Bay of Bengal and have been sighted along the Myanmar coast. Whale sharks are known to occur in the waters of the Bay of Bengal from December to March in the north (Bangladesh) and November to May in the south (Thailand). In Myanmar, whale shark is a protected species under the “Notification for control of endangered fish species”.

Southern Myanmar has a known shark fishing industry and is one of three major ports in Myanmar for shark landings ⁽¹⁾. Sharks are captured as target species of shark-longline and also as by catch from trawling. There are a larger number of sharks caught throughout Myanmar waters including some listed as species of concern on the IUCN-Red List, as shown in *Table 6.8*.

According to the order number 2/2004 issued by the Department of Fisheries on 2 May 2004, it is not permitted to conduct shark fishing operation in the protected areas starting from Ross Island (12° 13' N, 98° 05.2' E) to Lampi Island (10° 48' N, 98° 16.1' E)⁽²⁾.

Table 6.8 *IUCN Red List - Shark Species found in Myanmar Waters*

| Scientific Name | English Name | IUCN Classification |
|---------------------------------------|--------------------------|---------------------|
| <i>Carcharhinus leucas</i> | Bull shark | NT |
| <i>Carcharhinus sorrah</i> | Spot-tail shark | NT |
| <i>Carcharhinus amblyrhynchoideus</i> | Graceful shark | NT |
| <i>Carcharhinus brevipinna</i> | Spinner shark | NT |
| <i>Carcharhinus melanopterus</i> | Blacktip reef shark | NT |
| <i>Carcharhinus limbatus</i> | Blacktip shark | NT |
| <i>Carcharhinus dussumieri</i> | Whitecheek shark | NT |
| <i>Carcharhinus albimarginatus</i> | Silvertip shark | NT |
| <i>Carcharhinus borneensis</i> | Borneo shark | NT |
| <i>Carcharhinus falciformis</i> | Silky shark | NT |
| <i>Carcharhinus plumbeus</i> | Sandbar shark | NT |
| <i>Carcharhinus amboinensis</i> | Pigeye shark | NT |
| <i>Galeocerdo cuvier</i> | Tiger shark | NT |
| <i>Chiloscyllium griseum</i> | Grey Bamboo shark | NT |
| <i>Carcharhinus plumbeus</i> | Sandbar shark | VU |
| <i>Stegostoma fasciatum</i> | Zebra shark | VU |
| <i>Carcharhinus borneensis</i> | Borneo shark | EN |
| <i>Sphyrna mokarran</i> | Great hammerhead | EN |
| <i>Sphyrna lewini</i> | Scalloped hammerhead | EN |
| <i>Chiloscyllium punctatum</i> | Brownbanded bamboo shark | EN |

Source: Department of Fisheries, as cited in Pyi Taw, 2009⁽³⁾

⁽¹⁾ Status and trends of sharks fisheries in South East Asia 2004, Myanmar Shark Fisheries Fact Sheet
Citation, Outcomes from the Study on Shark Fisheries in Southeast Asia: Myanmar
<http://firms.fao.org/firms/fishery/363/en>

⁽²⁾ FAO, 2004

⁽³⁾ Pyi Taw. 2009. Government of the Union of Myanmar Ministry of Forestry, National Commission for Environmental Affairs, Fourth National Report to the United Nations Convention on Biological Diversity, March, 2009, NAY PYI TAW.

Myanmar's coastal and offshore waters support marine mammals within the order of Cetaceans (whales, dolphins and porpoises) and Sirenia (sea cows) and a small number of freshwater otters that sometimes occur in coastal marine habitats. Moreover, Lampi Island and the larger Shark Protected Area, which is 413 km from the Block M11, are likely to be the home to marine mammals, sharks and giant clams on the near shore reefs.

Two major groups of marine mammals occur in the waters of the Union of Myanmar; namely sirenians and cetaceans. A total of 21 cetaceans (whale and dolphin) and one (1) sirenian species have been reported from Myanmar waters. Two marine mammals, the Irrawaddy dolphin (*Orcaella brevirostris*) and dugong (*Dugong dugon*), have been protected under the Myanmar Protection of Wildlife and Conservation of Natural Areas Law since 1994 under the category "completely protected". **Table 6.9** shows a current list of marine mammals found in Myanmar.

Table 6.9 Marine Mammals found in Myanmar

| Common Name | Scientific Name | IUCN Status |
|----------------------------------|-----------------------------------|-------------|
| Cetaceans | | |
| Common Minke Whale | <i>Balaenoptera acutorostrata</i> | LC |
| Blue Whale | <i>Balaenoptera musculus</i> | EN |
| Fin whale | <i>Balaenoptera physalus</i> | EN |
| Pygmy Bryde's Whale | <i>Balaenoptera edeni</i> | DD |
| Pygmy Killer Whale | <i>Feresa attenuate</i> | DD |
| Finless Porpoise | <i>Neophocaena phocaenoides</i> | VU |
| Pacific Pilot Whale | <i>Globicephala macrorhynchus</i> | DD |
| Risso's Dolphin | <i>Grampus griseus</i> | LC |
| Frazer's dolphin | <i>Lagenodelphis hosei</i> | LC |
| Ayeyarwady Dolphin | <i>Orcaella brevirostris</i> | VU |
| Sperm Whale | <i>Physeter macrocephalus</i> | VU |
| Indo-Pacific Humpbacked Dolphin | <i>Sousa chinensis</i> | NT |
| Bridled Dolphin | <i>Stenella attenuate</i> | LC |
| Longbeaked Dolphin | <i>Stenella longirostris</i> | DD |
| Rough-toothed dolphin | <i>Steno bredanensis</i> | LC |
| Indian Ocean Bottlenosed Dolphin | <i>Tursiops aduncus</i> | DD |
| Sirenians | | |
| Dugong | <i>Dugon</i> | VU |

IUCN categories ver. 3.1 (2014.1):

NE=Not Evaluated, DD= Data Deficient LC=Least Concern NT=Near Threatened,
VU= Vulnerable, EN=Endangered CR= Critically Endangered, EW=Extinct in the Wild,
EX= Extinct.

Source: List of Mammals of Burma⁽¹⁾

⁽¹⁾ <http://www.iucnredlist.org/search>

The International Union for the Conservation of Nature (IUCN)-listed threatened cetacean species in Myanmar include the blue whale (*Balaenoptera musculus*) (Endangered), fin whale (*Balaenoptera physalus*) (Endangered) and sperm whale (*Physeter macrocephalus*) (Vulnerable). The blue whale and the fin whale are also listed as endangered species recognized as of prime importance to the region and deserving special attention under the ASEAN Agreement on the Conservation of Nature and Natural Resources⁽¹⁾. Other common species such as humpback whale (*Megaptera novaeangliae*) and bryde's whale (*Balaenoptera edeni*) are known to occur in offshore waters in Myanmar; however, these are not listed as vulnerable on the IUCN Red List.

Larger cetacean species have been recorded in offshore deeper waters which would be in line with their typical life histories. As Blocks M9 and M11 are located offshore, it is assumed that cetacean species may occasionally pass within or close by the block.

The Irrawaddy Dolphin is found in the Mekong, Ganga, Brahmaputra and Ayeyarwady rivers. There is currently insufficient data to accurately assess the population status in Myanmar. IUCN estimates a population of 58-72 in the Ayeyarwady River⁽²⁾. Research in Myanmar conducted by the Wildlife Conservation Society and supported by WDSCS has shown promising results, with Irrawaddy dolphin habitat identified and protected by the Department of Fisheries along a 46 mi (74 km) stretch of the Ayeyarwady River and surveys conducted in the Mergui (Myeik) Archipelago.

Most of the whale and dolphin species found in the Andaman Sea are listed by the IUCN as “data deficient”. Hump-backed dolphin, *Tursiops aduncus*, has been Red-Listed as “Near Threatened”. Three (3) species, Sperm whale, *Physeter macrocephalus*, Irrawaddy dolphin, *Orcaella brevirostris* and Finless porpoise, *Neophocaena phocaenoides*, have been listed as “Vulnerable”. Five (5) species have been listed as “Least Concerned”.

Marine Environmental Survey in Block M11

An observational marine environmental survey was conducted over a period of six days in 2018 by the ERM team. A total of three groups of Pantropical Spotted Dolphin (*Stenella attenuate*) were observed. This species is reported to be among the most commonly sighted marine mammal species in Myanmar marine waters and is not a species of particular conservation concern, being listed as ‘Least Concern’ on the IUCN 2018 Red List of Threatened Species.

⁽¹⁾ ASEAN Agreement on the Conservation of Nature and Natural Resources. Kuala Lumpur, 9 July 1985

⁽²⁾ IUCN, 2011

The Dugong (*Dugong dugong*) is a large, herbivorous, exclusively marine mammal and is the only extant (living) member of the family Dugonidae. It is one of the only four extant species of the order Sirenia.

The Dugong is listed as vulnerable to extinction by the IUCN Red List of Threatened Species⁽¹⁾, on the Convention on the Conservation of Migratory Species of Wild Animal (Bonn Convention), and on Appendix 1 of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES).

Dugongs are rare and are mostly found west of the Ayeyarwady Delta and further north of the main coastline. Occurrence of dugong at some islands of Myeik Archipelago such as Sular Island, La Ngan Island, Bo Lut Island and War Kyunn Island, as well as waters in the Rakhine Coast, has been reported by local communities⁽²⁾.

6.2.6

Sea Turtles

Five (5) of the world's seven (7) sea turtle species are regularly seen nesting and foraging in the coast of Myanmar. These include the Hawksbill (*Eretmochelys imbricata*), Green (*Chelonia mydas*), Loggerhead (*Caretta caretta*), Olive Ridley (*Lepidochelys olivacea*), and Leatherback (*Dermochelys coriacea*) as shown in **Table 6.10**. However, Loggerhead and Leatherback turtles are assumed to be almost extinct in Myanmar waters⁽³⁾.

The Project Area may be on a migration path for turtles that reach Myanmar beaches during the nesting period from the end of September to March, with a peak in January-February. Most observations of turtles are typically within 15 km of mainland shores in protected, relatively shallow marine waters (22-25 m), far away from the project area. Nevertheless, some species may be encountered in the area to be explored as they are migratory species.

Since 2011, the Department of Fisheries (DOF) of Myanmar has been conducting marine turtle conservation and management in collaboration with international agencies and organizations. At present, Myanmar is cooperating and collaborating with many institutions, namely ASEAN-SEAFDEC as well as the IOSEA Marine Turtle Memorandum of Understanding.

Turtle nesting site distribution in Myanmar is shown in **Figure 6.10**. Important nesting areas in Myanmar include the Ayeyarwady Coastline (for all 5 turtle species – Green, Hawksbill, Leatherback, Loggerhead, and Olive Ridley), and along the Tanintharyi Coast for Green turtles, including Moscos Island. There are no known nesting sites on Narcondam Island, Preparis Island, or the Coco

⁽¹⁾ IUCN, 2013

⁽²⁾ Ilangakoon and Tun, 2007

⁽³⁾ http://www.ioseaturtles.org/pom_detail.php?id=61

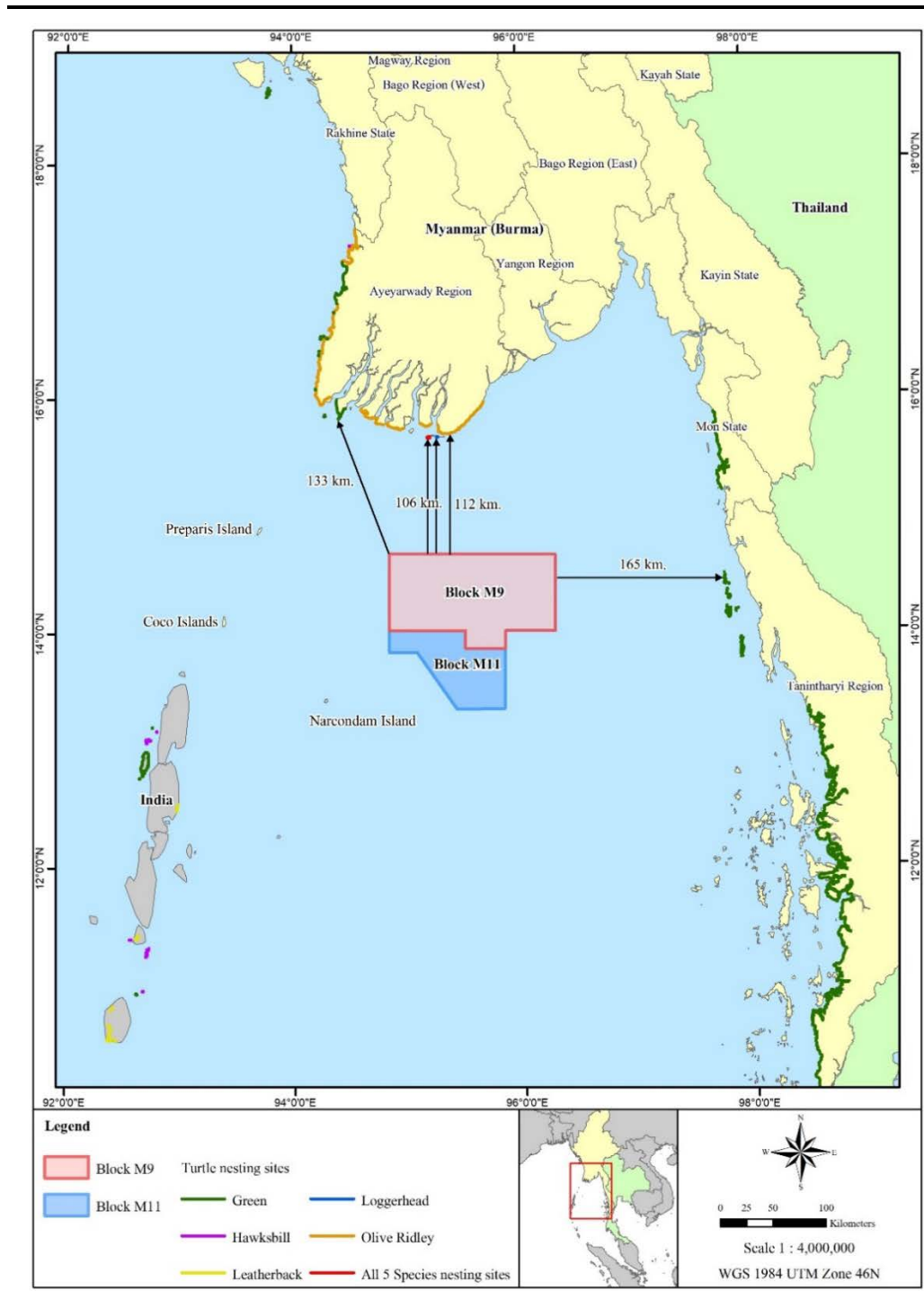
Islands. All of the nesting sites are far from Blocks M9 and M11, with the closest being the Ayeyarwady Coast, over 100 km away.

Table 6.10 *Distribution of Marine Turtles in Andaman Sea*

| Locations | Species | | | | |
|--------------------------------|--|--|--|---|---|
| | Leatherback (<i>Dermochelys coriacea</i>) | Hawksbill (<i>Eretmochelys imbricata</i>) | Loggerhead (<i>Caretta caretta</i>) | Green (<i>Chelonia mydas</i>) | Olive Ridely (<i>Lepidochelys olivacea</i>) |
| Myanmar | Ayeyarwady Region, Tanintharyi Region and Yangon Region | Ayeyarwady Region, Rakhine State, Tanintharyi Region and Yangon Region (Coco Island) | Rakhine State | Ayeyarwady Region, Rakhine State, Mon State, Tanintharyi Region and Yangon Region (Coco Island) | Ayeyarwady Region, Rakhine State, Mon State, Tanintharyi Region and Yangon Region (Coco Island) |
| Thailand | Along the west coast of Phrathong islands, Thaimuang beach and west coast of Phuket Island | Surin and Similan Islands | - | Surin and Similan Islands | Along the west coast of Phrathong islands, Thaimuang beach and west coast of Phuket Island |
| IUCN Status¹ | Vulnerable | Critically Endangered | Endangered | Endangered | Vulnerable |

Source: IUCN (2014) The IUCN Red List of Threatened Species Version 3.1 (latest version)
http://bim.aseanbiodiversity.org/mmchm/index.php?option=com_content&view=article&id=21&Itemid=27

Figure 6.10 *Turtle Nesting Sites in Myanmar*



Source: <http://data.unep-wcmc.org/datasets/22> Zockler (2013)(1), modified by ERM, 2017

⁽¹⁾ Zockler C., Delany S., & Barber J. 2013. Sustainable Coastal Zone Management in Myanmar. Retrieved from http://www.lighthouse-foundation.org/fileadmin/LHF/PDF/Myanmar_-_Scoping_Paper_Myanmar_Coastal_Zone_Management_211113_96dpi.pdf,

A total of 63,298 shorebirds, comprising 33 species and 7,027 water birds, consisting of 45 species, were identified between the mouth of Yangon River and Ayeyarwady Delta. Among these species, eighty-four individuals of Spoon-billed Sandpiper at five sites and one Nordmann's Greenshank, which are globally endangered species, were recorded (Wetlands International, 2008).

Offshore Myanmar waters, including Block M9, are used by seabirds for foraging and loafing (resting). The seabird species of Myanmar, according to Avibase and Birdlife International, are listed *Table 6.11*.

PTTEPI's project is mostly concerned with the East Asian Australasian Flyway. More than 50 million migratory waterbirds, including 8 million waders, are using this route annually. In addition, 21 species of migratory birds have more than 95% of their entire global population within the East Asian Australasian Flyway (which covers the majority of the Asian Central Flyway) including the Spoon-billed Sandpiper (*Eurynorhynchus pygmeus*) and Chinese Crested Tern (*Sterna bernsteini*) (both Critically Endangered).

According to the BirdLife association, the closest Important Bird Areas are the Ayeyarwady Delta and the Lampi Island National Park; both at more than 200 km from the Project Area. Taking into account the typical habitat of these seabirds, offshore Myanmar waters, including Block M11, are used by seabirds for foraging and loafing (resting).

Myanmar's important areas for seabirds/shorebirds are the Ayeyarwady Delta, Central Tanintharyi Coast and northern Mergui Archipelago, and Moscos Islands Wildlife Sanctuary⁽¹⁾.

⁽¹⁾ IUCN, 1989

Table 6.11 Seabird Species in Myanmar

| Family | | Species | |
|--------------------------|-------------------------|----------------------------------|------------------------------|
| Scientific Name | Common Name | Scientific Name | Common Name |
| <i>Hydrobatidae</i> | Storm-petrels | <i>Oceanodroma monorhis</i> | Swinhoe's Storm Petrel |
| | | <i>Oceanites oceanicus</i> | Wilson's Storm-Petrel |
| | | <i>Fregetta tropica</i> | Black-bellied Storm-Petrel |
| <i>Phaethontidae</i> | Tropicbirds | <i>Phaethon lepturus</i> | White-tailed Tropicbird |
| | | <i>Phaethon aethereus</i> | Red-billed Tropicbird |
| <i>Sulidae</i> | Gannets and boobies | <i>Sula leucogaster</i> | Brown Booby |
| | | <i>Fregata andrewsi</i> | Christmas Island Frigatebird |
| | | <i>Stercorarius pomarinus</i> | Pomarine Jaeger |
| | | <i>Stercorarius parasiticus</i> | Parasitic Jaeger |
| <i>Laridae</i> | Gulls and terns | <i>Anous stolidus</i> | Brown Noddy |
| | | <i>Larus vegae</i> | East Siberian Gull |
| | | <i>Larus ichthyaetus</i> | Great Black-headed Gull |
| | | <i>Larus ridibundus</i> | Black-headed Gull |
| | | <i>Chlidonias hybrida</i> | Whiskered Tern |
| | | <i>Chlidonias leucopterus</i> | White-winged Tern |
| | | <i>Gelochelidon nilotica</i> | Gull-billed Tern |
| | | <i>Hydroprogne caspia</i> | Caspian Tern |
| | | <i>Sterna hirundo</i> | Common Tern |
| | | <i>Onychoprion anaethetus</i> | Bridled Tern |
| | | <i>Sterna sumatrana</i> | Black-naped Tern |
| | | <i>Sterna dougallii</i> | Roseate Tern |
| | | <i>Onychoprion fuscatus</i> | Sooty Tern |
| | | <i>Thalasseus bergii</i> | Great Crested Tern |
| | | <i>Thalasseus bengalensis</i> | Lesser Crested Tern |
| | | <i>Sternula albifrons</i> | Little Tern |
| | | <i>Larus argentatus</i> | Herring Gull |
| | | <i>Larus cachinnans</i> | Yellow-legged Gull |
| | | <i>Larus brunnicephalus</i> | Brown-headed Gull |
| | | <i>Sterna aurantia</i> | River Tern |
| | | <i>Sterna acuticauda</i> | Black-bellied Tern |
| <i>Spheniscidae</i> | Penguins | <i>Chlidonias leucopterus</i> | White-winged Tern |
| <i>Gaviidae</i> | Loons | <i>Anous stolidus</i> | Brown Noddy |
| <i>Diomedeidae</i> | Albatrosses | <i>Rynchops albicollis</i> | Indian Skimmer |
| <i>Pelecanidae</i> | Pelicans | <i>Pelecanus onocrotalus</i> | Great White Pelican |
| | | <i>Pelecanus philippensis</i> | Spot-billed Pelican |
| <i>Phalacrocoracidae</i> | Cormorants | <i>Phalacrocorax niger</i> | Little Cormorant |
| | | <i>Phalacrocorax fuscicollis</i> | Indian Cormorant |
| | | <i>Phalacrocorax carbo</i> | Great Cormorant |
| <i>Stercorariidae</i> | Skuas and jaegers | <i>Stercorarius pomarinus</i> | Pomarine Jaeger |
| <i>Procellariidae</i> | Petrels and shearwaters | - | - |
| <i>Pelecanoididae</i> | Diving-petrels | - | - |
| <i>Fregatidae</i> | Frigatebirds | - | - |
| <i>Alcidae</i> | Auks | - | - |

Source: Avibase, Bird Life International

The Project area is located on the Tanintharyi continental shelf. This coastal zone covers south of the Gulf of Martaban up to the mouth of Pakchan River, and includes Myeik Archipelago and the Andaman Sea.

Block M9 and Block M11 area located offshore, far from the three Myanmar's coastal regions (the Rakhine coastal region, the Ayeyarwady region and the Tanintharyi coastal region), as shown in *Figure 6.11*. These regions contain large numbers of estuaries and islands, whereby some of which contain sensitive ecosystems.

6.2.8.1

Coral Reefs

A total of 51 coral species have been identified in Myanmar by the DOF. Among anthozoan coral polyps, 51 species belonging to 20 families and 30 genera along Rakhine coast, 3 species belonging to 2 families and 2 genera from Delta areas and 93 species belonging to 21 families and 47 genera from Tanintharyi coast have been recorded by Aung Kyi (1982), San Win (1993), Mya Than Tun (2000) and Mya Than Tun and Tint Tun (2002). (Bay of Bengal Large Marine Ecosystem Project, 2012). According to UNEP (2004), coral reefs in Myanmar represent 0.66% of the world's reefs, covering an area of 1,870 km². 56% of Myanmar's reefs are threatened⁽¹⁾. The main threats to Myanmar's corals are storms, coral bleaching, diving, fishing gear, blast fishing, dredging, and land-based pollutants.

Coral Reef formation in the Irrawaddy coastal zone is restricted to the Coco, Prepara and Narcondam islands, which lie far outside the zone of influence of river runoff. Block M11 is located at about 149, 148 and 65 km from the three islands, respectively; while, Block M9 is located at about 153, 122, and 83 km from the three islands⁽²⁾, as shown in *Figure 6.11*. A study on Narcondam Island by Raman *et al.* (2013)⁽³⁾ found that coral growth was common on rock substrate, and prolific and dense in the northeast and southern locations. The reefs included a mixture of common hard and soft corals and sponges. Hard coral distribution was more abundant at depths of 5-25 m, while soft coral (especially fan and whip coral) was more abundant along deeper ridges (20-50 m) that were prone to stronger currents. Barrel sponges *Xestospongia* sp. appeared prolific in the reefs and many large, healthy individuals were observed between 12 and 50 m depth⁽⁴⁾.

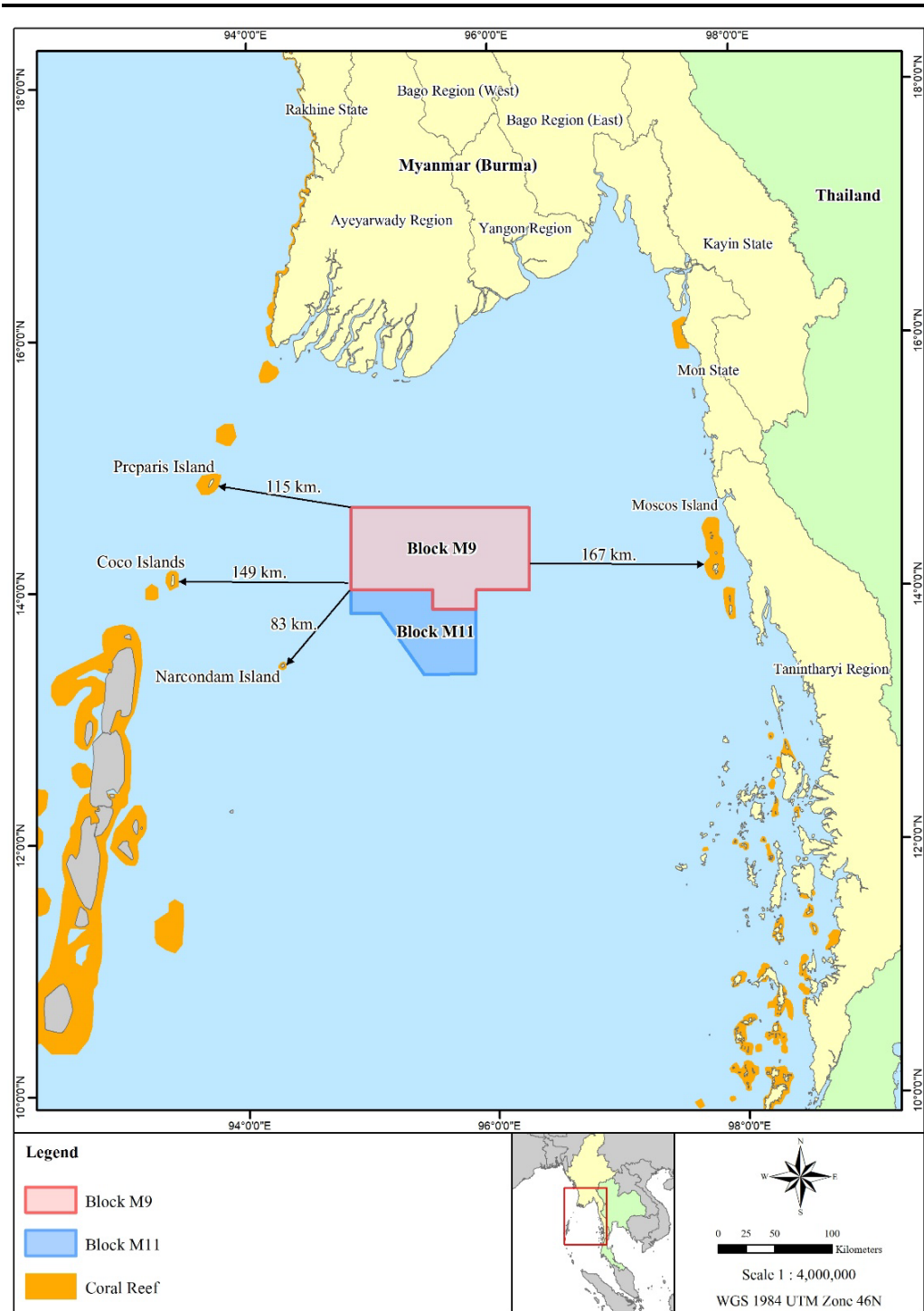
⁽¹⁾ Burke et al, 2002

⁽²⁾ Pe. 2004. National Report of Myanmar, On the Sustainable Management of the Bay of Bengal Large Marine Ecosystem (BOBLME) GCP/RAS/179/WBG. Prepared by Myint Pe (National Consultant).

⁽³⁾ Raman, T. R. Shankar; Mudappa, Divya; Khan, Tasneem; Mistry, Umeed; Saxena, Ajai; Varma, Kalyan; Ekka, Naveen; Lenin, Janaki; Whitaker, Romulus (2013). "An expedition to Narcondam: observations of marine and terrestrial fauna including the island-endemic hornbill" (PDF). *Current Science*. 105 (3): 346-350.

⁽⁴⁾ CURRENT SCIENCE, VOL. 105, NO. 346 3, 10 AUGUST 2013

Figure 6.11 Coral Reef in Myanmar



Source: ERM, 2019

6.2.8.2 Seaweed

According to the National Report of Myanmar on Sustainable Management of the Bay of Bengal Large Marine Ecosystem, some 122 genera and 307 species of seaweeds from Myanmar have been reported (Department of Fisheries Myanmar, 2003).

Among the species observed in Myanmar, Sargassum and Hypnea are the most abundant. The standing stock of Sargassum is estimated at 2,500 tonnes dry weight and 1,500 mt dry weight for Hypnea. Sargassum beds formed along the Tanintharyi coastal region provide good habitats, refuges and spawning grounds for commercially important fishery resources.

6.3 *SOCIO-ECONOMIC COMPONENTS*

The social conditions of the entire concession block and its vicinity (hereinafter referred to as the “Study Area”) will be described in this section are based primarily on a desk-top review of existing information.

Narcondam Island is located 83 km southwest, Coco Island 153 km west and Preparis Island 122 km northwest from Block M9, respectively. Although significantly far from the Project, these islands are considered to be within the Study Area. The water depth throughout the block ranges from 50 to 800 m. In addition, wider area has also been examined for some socio-economic components, particularly the discussion of fisheries. The most appropriate onshore Study Area for fisheries data was within Tanintharyi Region, Mon State, and Yangon Region.

6.3.1 *Demographic Profile*

6.3.1.1 *Tanintharyi Region*

According to Myanmar Information Management Unit (MIMU), the total population for Tanintharyi Region in 2015 was 1,408,401 people, with 24% urban population and 76% rural population.

Tanintharyi Region is sparsely populated due to its mountainous terrain with the majority of the population living either near the coast or along the rivers and tributaries.

The majority of residents in Tanintharyi were Bamar, although some self-identify as sub-groups such as the Dawei/Tavoyan. Likewise, while nearly all Tanintharyi inhabitants speak Myanmar language, various local dialects are also found. Buddhism is the dominant religion in Tanintharyi, although Islam and Christianity are also observed, particularly in Karen communities.

6.3.1.2 *Yangon Region*

With approximately 7.4 million inhabitants, Yangon Region has the highest inhabitants than other Regions or States and represents 14.3% of the total population of Myanmar (2014, MPHC). As a home to the largest city and former capital of Myanmar, the population density of Yangon Region in 2014 was 716 persons per km².

The total population of Mon State in 2014 was 2,054,393, with 24,824,586 males and 26,661,667 females. The population density of Mon in 2014 was 167 persons per km².

Majority of the populations are Bamar, Rakhine and Karen ethnic groups. Buddhism is also common in the state. The Mon people are one of the oldest civilizations in Southeast Asia and are considered to be a major source of influence for the cultures of Myanmar and Thailand. (UNHCR, 2014)

A brief demographic overview of Tanintharyi Region, Ayeyarwady Region, and Mon State is summarised in *Table 6.12*.

Table 6.12 *Broad Demographic Overview of Tanintharyi Region, Ayeyarwady Region, and Mon State*

| Attribute | Tanintharyi Region | Yangon Region | Mon State |
|---|---------------------------|---------------------------|---------------------------|
| Total Population | 1,408,401 | 7,360,703 | 2,054,393 |
| Area | 43,344.91 km ² | 35,031.88 km ² | 12,296.64 km ² |
| Population Density (persons per km ²) | 32 | 716 | 167 |
| Sex Ratio | 99 males per 100 females | 92 males per 100 females | 93 males per 100 females |
| Rural Population % | 76% | 68% | 72% |
| Urban Population % | 24% | 24% | 28% |
| Median age | 24 | 28.3 | 26.7 |
| Mean household size | 4.8 | 4.4 | 4.6 |
| Literacy rate (persons aged 15+) | 92.8% | 96.6% | 86.6% |
| Unemployment rate, age 15-64 | 4.6% | 4.1% | 6.2% |

Source: Census data by MIMU, 2015^①

^① <http://www.dop.gov.mm/moip/>

6.3.2 *Overview of Social Economy*

6.3.2.1 *Tanintharyi Region*

Tanintharyi Region has an average household expenditure of 0.6 US\$/day/household, which is relatively high for Myanmar, but below the international poverty line. People in the Region relies heavily on fishery related activities (80 %). Aquaculture has potential to be a significant source of income and employment for people living in this division⁽¹⁾.

Similar to other places in southeast Myanmar, subsistence agriculture, both permanent and shifting, is the primary livelihood in the predominantly rural Tanintharyi Region although the mountainous terrain limits cultivation in northern townships.

A prominent and controversial driver of the Tanintharyi economy are the vast rubber and palm oil plantations, most of which are in the lowland south and are often connected to their own processing plants.

Mining has also emerged as a significant industry in resource-rich Tanintharyi for the same reason, with Tanintharyi supplying up to two-thirds of Myanmar's tin and tungsten. As demonstrated by the number of mines and plantations throughout the region, many of which are owned by foreign corporations. It is believed that Tanintharyi's stability opened it to foreign investment.

6.3.2.2 *Yangon Region*

Although the administrative capital was shifted to Nay Pyi Taw in 2005, Yangon is considered the economic capital of Myanmar. The Greater Yangon city area is the most developed and advanced part of Myanmar, estimated to account for one quarter to one third of the country's economy. The rural areas of Yangon Region are far less developed and maintain a predominantly agricultural character. Rice, beans and pulses are the main crops, but jute, rubber, groundnut and sugarcane are also being produced. Livestock and fisheries also play an important role in the rural economy of Yangon Region.⁽²⁾

6.3.2.3 *Mon state*

The people of Mon State rely extensively on agriculture for their livelihoods. With a total of approximately three million acres of cultivatable land, most are used for rice paddies. Other major crops in Mon State include corn, groundnut, sunflower, cashew nuts, sugarcane, coconut, palm oil, cocoa and various fruit. Fishing along the western coast is another important source of livelihood, both

⁽¹⁾ FAO, 2003

⁽²⁾ http://www.themimu.info/sites/themimu.info/files/documents/-Report_Local_Governance_Mapping_Yangon_UNDP_Feb2015.pdf

for wholesale markets, as well as processing of dried fish and algae for production of various food products. Mining is also an emerging industry, with antimony, granite and gold mined in the state. There are also some state-owned enterprises, including rubber and tire factories, and a coal power station.⁽¹⁾

6.3.3 Marine Fisheries

The Department of Fisheries (DOF) has instituted two fishing zones - inshore and offshore, which offer protection to fisheries resources as follows:

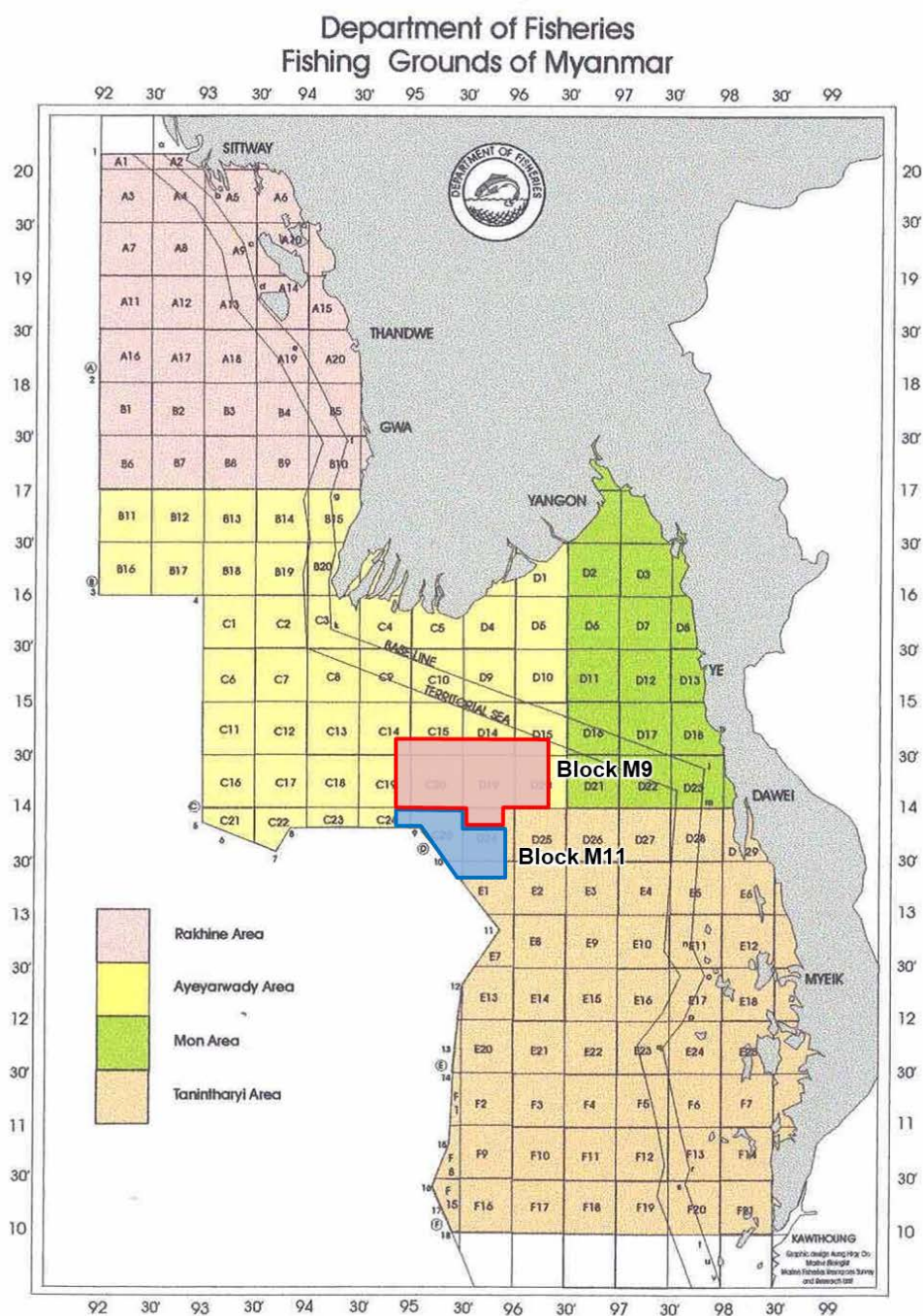
- **Inshore fisheries** – this includes fishing grounds from lowest tide level, up to about 48 feet (15 m) depth, which generally is from five to ten nautical miles from the coast. Small boats of less than 30 feet and 12 HP (Horsepower), including traditional boats, are used in this zone.
- **Offshore fisheries** – this includes the fishing grounds from the demarcation line of inshore fisheries out to the edge of the EEZ. Vessels over thirty feet and/or engine power more than 12 HP are used in offshore fisheries. Large-scale fishing such as bottom trawling, purse seining, surrounding, drift netting and long lining are common in offshore fishing. In order to properly administer and monitor fisheries activities, the DOF has divided Myanmar's offshore fisheries into 140 grid blocks of 30x30 nautical miles each. Using these grid blocks, 4 fishing areas are identified as follows (*Figure 6.12*):
 - Rakhine Fishing Area - Includes grounds A1 to A20, B1 to B10. Total 30 grounds.
 - Ayeyarwady Fishing Area - Includes grounds B11 to B20, C1 to C25 and D1, D4, D5, D9, D10, D14, D15, D19, D20. Total 44 grounds.
 - Mon Fishing Area - Includes grounds D2, D3, D6, D7, D8, D11, D12, D13, D16, D17, D18, D21, D22, D23. Total 14 grounds.
 - Tanintharyi Fishing Area - Includes grounds D24 to D29, E1 to E25, F1 to F21. Total 52 grounds.

The main types of fish gear used for marine fisheries in Myanmar are composed of commercial gears such as trawl nets, purse seines, drift nets and gill nets as well as traditional gear including hook and line, cast net, bag nets, trammel gill net, lift net and traps.

Block M9 is located within the Ayeyarwady, Mon and Tanintharyi Fishing Areas. In addition to offshore fisheries, there are likely fishing activities on the islands closest to Block M9 (Coco Islands, Narcondam Island, and Preparis Island), but little documented information is available.

⁽¹⁾ <http://data.unhcr.org/thailand/download.php?id=222>

Figure 6.12 Myanmar Coastal Zone and Designation of Fishing Grounds in Myanmar Sea



Source: Department of Fisheries (2011)⁽¹⁾, modified by ERM, 2019

⁽¹⁾ [http://map.seafdec.org/workshop/workshop-07-09-09-2011/WPpaper/WP10_Status%20and%20potential%20of%20TUNA%20resources%20in%20Myanmar\(%20Final%20\).pdf](http://map.seafdec.org/workshop/workshop-07-09-09-2011/WPpaper/WP10_Status%20and%20potential%20of%20TUNA%20resources%20in%20Myanmar(%20Final%20).pdf)

6.3.3.1 *Seasonality of Fishing*

Dry Season (November to April): November to April is the best season for fishing in terms of weather condition. With good weather conditions, fishing boats are able to travel greater distances a safer manner during this dry winter season. Fishing takes place during this period in shallow-water, across the continental slope and in deep-water.

Rainy Season (May to October): Fishing during the rainy season is difficult for offshore fishing due to poor weather conditions. From June to August 2015, only 50% of the offshore fishing vessels were allowed by the DoF to go fishing. The closed period and also percentage of vessels allowed to fish are reported to vary between years.

For inshore fishing by small boats, the best period of fishing in terms of catch value is reported to be from April to October and the exact window appears to be varied across villages.

The peak months for offshore fishing near the Project area are April, May, September, October, November, and December, with May being the best of the peak months.

6.3.4 *Ports and Marine Transportation*

Myanmar has a total of nine ports that serve coastal and seaborne trade. Port of Yangon, situated on the Yangon River about 32 km inland from Elephant Point on the Gulf of Martaban, is the primary port of Myanmar and handles about 90 % of the country's exports and imports.⁽¹⁾

The coastal area including the Ayeyarwady delta is used by some river traffic including traffic to Yangon.⁽²⁾

6.3.5 *Regional Oil and Gas Exploration*

Zawtika Field Development takes place in Block M9 and M11, which includes the development of the Zawtika, Kakonna and Gawthaka fields. The development started delivering natural gas for domestic use in Myanmar in March 2014 and exporting natural gas to Thailand in August 2014⁽³⁾.

⁽¹⁾ Myanmar Port Authority, 2012

⁽²⁾ Hydrographer of the Navy 1978

⁽³⁾ Offshore Technology Online: <http://www.offshore-technology.com/projects/zawtika-gulf-martaban-myanmar-burma/>

The nearest tourist attractions to the Project are Narcondam Island and Coco Island, located approximately 83 and 149 km. from Block M9.

Narcondam Island is a small volcanic island located in the Andaman Sea, covering an area of 6.81 sq.km. The island is declared a sanctuary and is the only abode of Narcondam Hornbill. The waters surrounding Narcondam Island are known to be a diver's paradise. The island is very remote and diving is accessible only via a live-aboard.

Coco islands has a lodge constructed on an old section from the hospital. There are currently only 30 tourist passes issued for tourists to visit the island at one time. The island's attractions include an Old Monastery, a school, and an old rest house on the island belonging to an elder Burmese.

An Environmental, Social and Health Impact Assessment (ESHIA) study, including an Environmental Management Plan (EMP), was undertaken by Pro-En Technologies, Ltd., for the Zawtika Production Development and Offshore Gas Transportation System in August 2010 and was submitted to MOGE. Additionally, an ESHIA was undertaken by ERM for the Condensate Burning Process at Zatwtika Platform in 2015. These ESHIAs have been used as a basis for identifying and summarizing the key impacts arising from the Offshore Zawtika operations. In addition, further key impacts that would be expected, based on ERM's extensive previous experience with similar offshore production operations, were added to this summary.

A summary of potential impacts during the operation phase, and unplanned events are presented in *Table 7.1*, and *Table 7.2*, respectively.

Table 7.1 *Summary of Potential Impacts*

| Aspects | Potential Impacts |
|--------------------------------|---|
| Environmental Resources | |
| 1. Air Quality | 1.1. Air Emissions from combustion due to operation of machines and engines installed at offshore facilities, rig, support, and supply vessels. |
| | 1.2. GHG emissions from the Project may add to global warming issue. |
| | 1.3. Air emission from venting and flaring. |
| | 1.4. Air emission from fugitive emissions. |
| | 1.5. Air emissions from burning of condensate may impact air quality or GHG. |
| 2. Seawater & Sediment Quality | 2.1. Discharge of oil-containing wastewater (i.e. bilge water, cuttings, oil-chemical containing wastewater from engine room and deck drain) from offshore facilities may impact seawater quality. |
| | 2.2. Discharge of wastewater and sewage from ZPQ, and WPs, and support vessels may impact seawater quality. |
| | 2.3. Discharge of produced water may impact seawater quality. |
| | 2.4. Project could generate various types of hazardous and non-hazardous wastes. Inappropriate management (including transportation, storage, and disposal) of waste could impact seawater quality. |

| Aspects | Potential Impacts |
|-----------------------------------|---|
| 3. Ecology and Biodiversity | 3.1. Discharge of oil-containing wastewater (i.e. bilge water, cuttings, oil-chemical containing wastewater from engine room and deck drain) from vessels and ZPQ, WPs and Rig may impact seawater and sediment quality, which could have secondary impacts to marine ecology and biodiversity. |
| | 3.2. Discharge of wastewater and sewage from ZPQ, WPs and Rig and support vessels may impact seawater and sediment quality, which could have secondary impacts to marine ecology and biodiversity. |
| | 3.3. Discharge of produced water may impact seawater quality, which could have secondary impacts to marine ecology and biodiversity. |
| | 3.4. Project could generate various types of hazardous and non-hazardous wastes. Inappropriate management (including transportation, storage, and disposal) of waste could impact seawater and sediment quality, which could have secondary impacts to marine ecology and biodiversity. |
| Social Resources | |
| 4. Fishing | 4.1. Reduced fishing area due to presence of ZPQ, WPs and Rig |
| 5. Obstruction to Navigation | 5.1. The presence of the offshore facilities and may obstruct navigation. |
| | 5.2. Potential impact to nearby vessels due to heat radiation from condensate burning. |
| Health Resources | |
| 6. Occupational Health and Safety | 6.1. Injuries or illness due to exposure to harmful substances or accident |
| | 6.2. Injuries due to working in noisy areas |
| | 6.3. Heat radiation and air emissions from the operation of the condensate burner may affect workers on the ZPQ and WP-1 platforms. |

Table 7.2 *Summary of Potential Impacts from Unplanned Events*

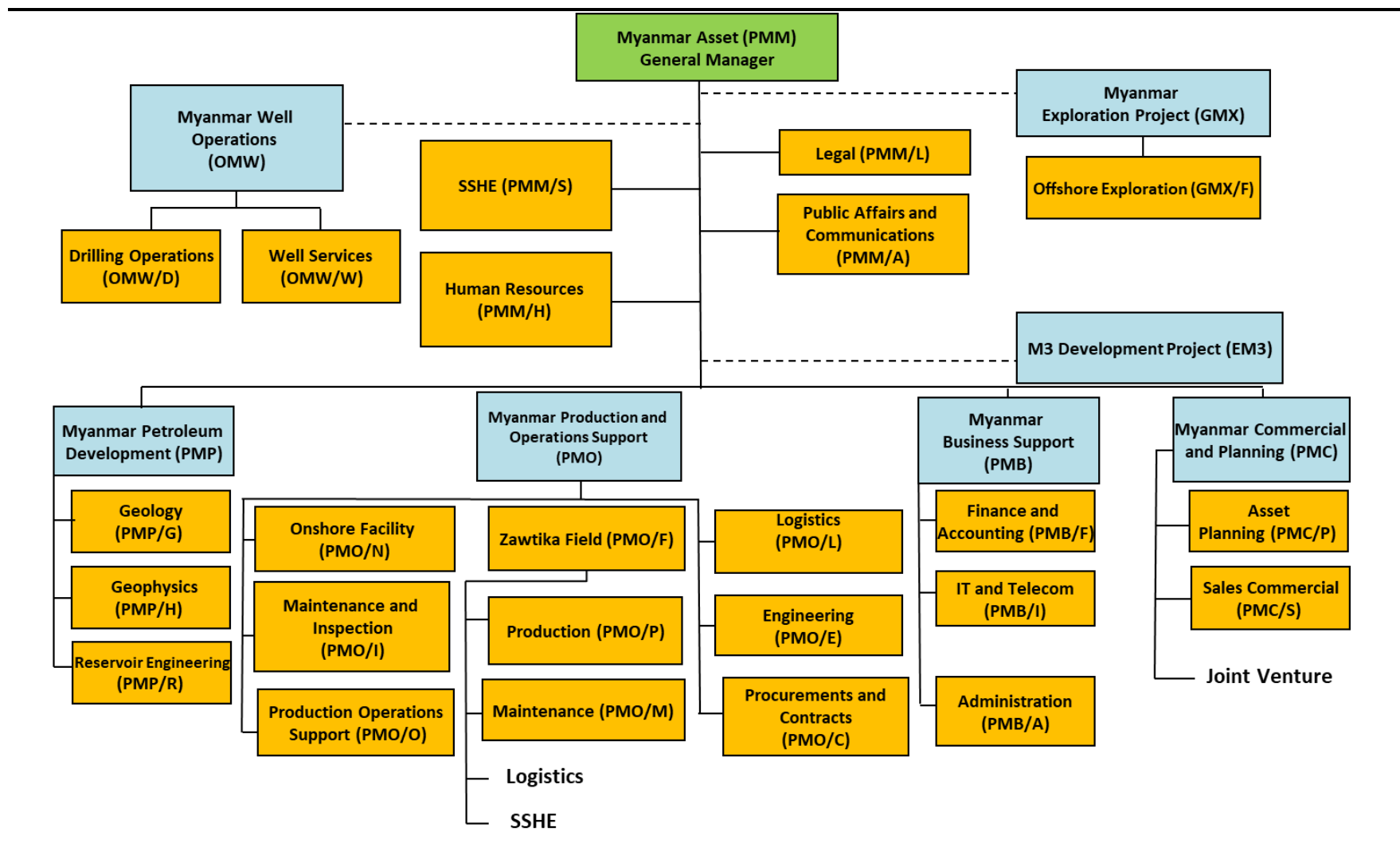
| Aspects | Potential Impacts |
|-----------------------------|--|
| 1. Vessel Collision | 1.1. Collisions could potentially occur during transport of materials. |
| 2. Accidental Spills | 2.1. Accidental spills of chemicals, or diesel fuel could occur throughout theProject, and they may directly affect surface water quality, and indirectly affect sediment quality and marine ecology. |
| | 2.2. Operation of the condensate burners may potentially pose a risk of accidental condensate release if improperly managed. |
| 3. Tropical Revolving Storm | 3.1. Tropical Revolving Storms (TRS) represent a threat to the safety of offshore personnel and could result in multiple fatalities and damage to assets. |
| 4. Well Blowout | 4.1. A blowout can result in the release of hydrocarbons (oil or gas) into the sea and surrounding environment at high pressure, potentially impacting seawater/sediment quality, marine life and marine ecology, occupational health and safety and public health |
| 5. Fire or Explosion | 5.1. Fire or explosion could potentially impact air quality, health and safety concerns to PTTEPI's employees and contractors, and damage to structures. Secondary impacts from release/spill of chemicals could occur to seawater/sediment quality, ecology and biodiversity. |
| | 5.2. Failure or improper operation of the condensate burners could lead to potential fire or explosion. |

7.1 *EMP ORGANIZATIONAL FRAMEWORK*

Figure 7.1 shows the organizational framework of PTTEPI responsible for EMP.

Figure 7.1

PTTEPI's EMP Organizational Framework



Source: PTTEPI, 2020

The costs for implementation of mitigation measures are included within PTTEPI's operation costs, and are therefore not possible to individually specify, but PTTEPI has estimated the cost to be over 1 million USD per year for all mitigation measures.

The estimated costs for implementation of the annually monitoring program is 100,000 USD per year and Tri-annually program is 500,000 USD due to high cost of seawater and sediment monitoring. In addition, the total contribution on CSR from 2009-2018 was 4,591,729 USD and the CSR budget used for 2019 was 588,500 USD. The planned CSR covered a varied area within Myanmar (e.g. the operating areas, and Yangon). The type of project is be divided into four categories: basic needs, education, culture, and environment.

This section outlines the mitigation measures that are to be employed to reduce the likelihood of the impacts identified in *Chapter 6*, and/or to limit the extent or severity of impact if one does occur. The purpose of the proposed mitigation measures is to manage identified impacts, comply with regulations and ensure that standards of international industry practice are adopted during the execution of all Project activities.

The majority of the most significant impacts of the Project have already been mitigated through the implementation of mitigation measures incorporated in the Project design. These elements of the Project design were summarized in *Chapter 3* and will not be discussed further here. The Project has already followed the prescribed measures in the original ESHIA.

This section will focus on the mitigation measures that will be implemented during the Project's operation phases for Phase 1A and Phase 1B, such that potential adverse impacts are reduced to As Low As Reasonably Practical (ALARP). The recommended mitigation measures are presented in *Table 8.1* and *Table 8.2*

Table 8.1 Mitigation Measures for Project

| Aspects | Potential Impacts | Mitigation Measures | Specific Actions | Location | Period/Frequency | Responsibility |
|--|--|---|---|--|-----------------------------|----------------|
| Environmental Mitigation Measures | | | | | | |
| 1. Air Quality | 1.1. Air Emissions from combustion due to operation of machines and engines installed at offshore facilities, rig, support and supply vessels. | 1.1.1. Combustion efficiency from all machinery. | Carry out routine inspection and preventive maintenance for all machinery as per maintenance schedule/ recommended by manufacturers to ensure efficiency of combustion. | ZPQ WPs All project vessels Rig | Throughout operation period | PTTEPI |
| | 1.2. GHG emissions from the Project may add to global warming issue | 1.2.1. GHG emissions monitoring | Conduct annual pollutant release inventory to monitor the GHG emissions from the Project. | ZPQ WPs All project vessels Rig | Throughout operation period | PTTEPI |
| | 1.3. Air emission from venting and flaring | 1.3.1. Avoidance of continuous venting and non-routine flaring. | Strictly follow venting schedule and procedures. | ZPQ WPs Rig | Throughout operation period | PTTEPI |
| | | 1.3.2. Minimisation of gas flaring. | Utilize excessive gas as much as possible in order to minimize gas flaring. | | | |
| | | 1.3.3. Gas emergencies response | In the event of an emergency or equipment breakdown, send excess gas to flare gas system. | | | |
| | | 1.3.4. Flaring volume guideline | Record the volumes of gas flared for all flaring events. | | | |
| | 1.4. Air emission from fugitive emissions | 1.4.1. Fugitive emissions control during operational phase. | Inspection and maintenance program will be implemented during the operational phase to control fugitive emissions. | ZPQ WPs | Throughout operation period | PTTEPI |
| | 1.5. Air emissions from burning of condensate may impact air quality or GHG | 1.5.1. Measures relating to venting and flaring | Implement measures above relating to venting and flaring (Item 1.3). | ZPQ WPs | Throughout operation period | PTTEPI |
| | | 1.5.2. Burner combustion efficiency | Carry out routine inspection and preventive maintenance for burners as per maintenance schedule/ recommended by manufacturers to ensure efficiency of combustion. | | | |

| Aspects | Potential Impacts | Mitigation Measures | Specific Actions | Location | Period/Frequency | Responsibility |
|--------------------------------|---|---|---|-----------------------------------|-----------------------------|----------------|
| 2. Seawater & Sediment Quality | 2.1. Discharge of oil-containing wastewater (i.e. bilge water, oil-chemical containing wastewater from engine room and deck drain) and cuttings from offshore facilities may impact seawater quality. | 2.1.1. Operate offshore facilities in compliance with the requirements under MARPOL 73/78 and PTTEP's Myanmar Asset Waste Management Procedure. | <p>Follow MARPOL 73/78 and PTTEP's Myanmar Asset Waste Management Procedure:</p> <ul style="list-style-type: none"> Large operating vessels (over 400 gross tons) shall comply with the requirements of MARPOL 73/78. Oil contaminated bilge water shall be de-oiled (i.e. by oil-water separator) prior to discharge into the sea. Discharge water shall contain less than 15 ppm oil content, as per requirements of MARPOL 73/78 Annex IV. Oil-contaminated wastewater separated by the Oil Filtering Equipment on vessels over 400 gross tons shall be stored in appropriate drums for disposal onshore as per MARPOL 73/78 requirements. Maintain the cleanness of deck to minimise oil and chemical contamination in rainwater. Provide drip tray to collect runoff from equipment at all operational areas. Contaminated wastewater shall be treated before discharge to meet MARPOL 73/78 requirements prior discharge to sea. Oil absorbent used in case of spill on deck will be stored onboard and disposed as hazardous waste onshore. If possible, use slim hole drillings to minimize the quantity of mud and cuttings. For NADF drilling, conduct the drilling within a closed system to recycle the mud as much as possible. | ZPQ All project vessels Rig | Throughout operation period | PTTEPI |

| Aspects | Potential Impacts | Mitigation Measures | Specific Actions | Location | Period/Frequency | Responsibility |
|---------|---|---|---|-----------------------------------|-----------------------------|----------------|
| | 2.2. Discharge of wastewater and sewage from ZPQ, WPs, Rig and support vessels may impact seawater quality. | 2.2.1. Discharged wastewater requirements as outlined by MARPOL 73/78 and Myanmar's EQEG. | Sewage shall be treated by a wastewater treatment system on vessels prior to discharge into the sea when in transportation more than 12 nautical miles (22.22 km) from the nearest land. | ZPQ All project vessels Rig | Throughout operation period | PTTEPI |
| | | 2.2.2. Good treatment efficiency of the wastewater treatment system. | Perform routine inspection and maintenance of wastewater treatment system. | | | |
| | 2.3. Discharge of produced water and produced sand may impact seawater quality. | 2.3.1. Water volume monitoring | Record produced water volumes daily at each WPs. | ZPQ WPs | Throughout operation period | PTTEPI |
| | | 2.3.2. Water management | Send produced water to treatment system onboard prior discharge to sea. Treated produced water shall contain oil and grease less than 42 mg/l daily, or 29 mg/l monthly average as required by Myanmar's EQEG. | | | |
| | | 2.3.3. Reduction of oil and grease content in water or wastewater. | Use Total Petroleum Hydrocarbon (TPH) onboard analyzer to monitor oil and grease content in water or wastewater prior discharge to sea. | | | |
| | | 2.3.4. Management of produced sand | Follow EQEG regarding produced sand (discharge overboard when % oil concentration less than 1%) | | | |
| | | 2.3.5. Disposal of produced sand | Ship produced sand back to shore and dispose by the certified and qualified waste management contractor. | | | |
| | 2.4. Project could generate various types of hazardous and non-hazardous wastes. Inappropriate management (including transportation, storage, and disposal) of waste could impact seawater quality. | 2.4.1. Operate Project vessels in compliance with the requirements under MARPOL 73/78 and PTTEP's Myanmar Asset Waste Management Procedure. | Follow the requirements under MARPOL 73/78 and PTTEP's Myanmar Asset Waste Management Procedure, including the following: <ul style="list-style-type: none"> Hazardous Waste <ul style="list-style-type: none"> Separate hazardous waste from general waste and store in proper labelled container and storage area according to types of wastes. | ZPQ All project vessels Rig | Throughout operation period | PTTEPI |

| Aspects | Potential Impacts | Mitigation Measures | Specific Actions | Location | Period/Frequency | Responsibility |
|---------|-------------------|---------------------|---|----------|------------------|----------------|
| | | | <ul style="list-style-type: none"> Hazardous wastes must be stored in a safe and durable container, suitable for transfer, and be placed in a location far from ignition sources until disposal/treatment. Prohibit any discharge of hazardous waste into the sea. Used oil and oil-contaminated waste shall be stored separately with labels for disposal onshore or burned at smokeless WP-1 burner. The vessel deck shall be cleaned to minimise the impact from oil and chemical contamination into the sea during periods of rain. Oil absorbents are required in the case of a small spill and the used absorbent shall be stored in containers onboard and disposed of onshore. Dispose hazardous waste at onshore treatment facilities in accordance with the law of Myanmar and PTTEP's Myanmar Asset Waste Management Procedure. Ensure manifest or confirmation record of hazardous waste is kept. Non-Hazardous Waste <ul style="list-style-type: none"> Segregate non-hazardous waste including food waste, paper, aluminium can, glass, rag and other wastes in separate containers or proper areas. Grind food waste to a size less than 25 mm before discharge into the sea at a distance of 12 nautical miles (22.22 km) from shore, in a location that is not | | | |

| Aspects | Potential Impacts | Mitigation Measures | Specific Actions | Location | Period/Frequency | Responsibility |
|-----------------------------|---|---|--|--|-----------------------------|----------------|
| | | | <p>located in coral reef area, according to the requirements under MARPOL 73/78.</p> <ul style="list-style-type: none"> Separate and store each type of waste (separate non-hazardous waste and hazardous waste) into appropriate containers having clear labels. Dispose non-hazardous waste at onshore treatment facilities in accordance with the law of Myanmar and PTTEP's Myanmar Asset Waste Management Procedure. Keep the records of waste inventories including types and quantities updated. | | | |
| 3. Ecology and Biodiversity | 3.1. Discharge of oil-containing wastewater (i.e. bilge water, oil-chemical containing wastewater from engine room and deck drain) from vessels and ZPQ and WPs, and cuttings from Rig may impact seawater and sediment quality, which could have secondary impacts to marine ecology and biodiversity. | 3.1.1. Implement all mitigation measures for Item 2.1 above. | Implement all mitigation measures for Item 2.1 above. | ZPQ WPs All project vessels Rig | Throughout operation period | PTTEPI |
| | 3.2. Discharge of wastewater and sewage from ZPQ, and WPs, Rig and support vessels may impact seawater and sediment quality, which could have secondary impacts to | 3.2.1. Implement all mitigation measures for Item 2.2 above. | Implement all mitigation measures for Item 2.2 above. | ZPQ WPs All project vessels Rig | Throughout operation period | PTTEPI |

| Aspects | Potential Impacts | Mitigation Measures | Specific Actions | Location | Period/Frequency | Responsibility |
|------------|---|---|--|--|-----------------------------|----------------|
| | marine ecology and biodiversity. | | | | | |
| | 3.3. Discharge of produced water may impact seawater quality, which could have secondary impacts to marine ecology and biodiversity. | 3.3.1. Implement all mitigation measures for Item 2.3 above. | Implement all mitigation measures for Item 2.3 above. | ZPQ WPs | Throughout operation period | PTTEPI |
| | 3.4. Project could generate various types of hazardous and non-hazardous wastes. Inappropriate management (including transportation, storage, and disposal) of waste could impact seawater and sediment quality, which could have secondary impacts to marine ecology and biodiversity. | 3.4.1. Implement all mitigation measures for Item 2.4 above. | Implement all mitigation measures for Item 2.4 above. | ZPQ WPs All project vessels Rig | Throughout operation period | PTTEPI |
| 4. Fishing | 4.1. Reduced fishing area due to presence of platforms and ZPQ | 4.1.1. Establishment of safety zone. | Establish 500 m safety zone around the ZPQ, WPs and Rig. | ZPQ WPs All project vessels Rig | Throughout operation period | PTTEPI |
| | | 4.1.2. Demarcate platforms and ZPQ areas. | Use support vessels to warn off traffic. | | | |
| | | 4.1.3. Signalling on ZPQ, WPs, Rig and all vessels. | Provide appropriate lights and warning signals on ZPQ and WPs and all vessels to prevent accidental collision. | | | |

| Aspects | Potential Impacts | Mitigation Measures | Specific Actions | Location | Period/Frequency | Responsibility |
|-----------------------------------|--|---|--|--|-----------------------------|----------------|
| 5. Obstruction to Navigation | 5.1. The presence of the offshore facilities and may obstruct navigation. | 5.1.1. Implement all mitigation measures for Item 4.1 above. | Implement all mitigation measures for Item 4.1 above. | ZPQ WPs All project vessels Rig | Throughout operation period | PTTEPI |
| | 5.2. Potential impact to nearby vessels due to heat radiation from condensate burning. | 5.2.1. Measures for impacts to Navigation | Implement above measures for impacts to Navigation (<i>Item 6.1</i> and <i>Item 6.2</i>). | ZPQ WPs | Throughout operation period | PTTEPI |
| | | 5.2.2. Crane and offloading handling | Burning is to be stopped during crane operations or offloading of ships. | | | |
| | | 5.2.3. Avoidance of vessel navigation during emergency | Ensure a marine no-go zone is enforced when burner operations are conducted. | | | |
| | | 5.2.4. Signal of burner's operations. | Warn all vessels before conducting burner operations. | | | |
| 6. Occupational Health and Safety | 6.1. Injuries or illness due to exposure to harmful substances or accident | 6.1.1. PTTEPI's SSHE Management System (<i>Annex A</i>) | Implement relevant components of PTTEPI's SSHE Management System (<i>Annex A</i>), including the following: <ul style="list-style-type: none"> Implement PTTEPI's Occupational Health Management Standard. Ensure that all employees wear appropriate PPE and implement PTTEPI's Personal Protective Equipment Standard. Personnel will be provided with safety training to ensure that all workers practice under safety operation and regulation of work, as per PTTEPI's SSHE Training & Competency Standard. Implement PTTEPI's Safety Case Standard. Implement PTTEPI's Life Saving Program Standard. Implement PTTEPI's Offshore Medical Emergency Response Plan (MERP). Implement PTTEPI's Crisis Communications Plan. | ZPQ WPs All project vessels Rig | Throughout operation period | PTTEPI |

| Aspects | Potential Impacts | Mitigation Measures | Specific Actions | Location | Period/Frequency | Responsibility |
|---------|---|---|---|--|-----------------------------|----------------|
| | | 6.1.2. Provision of safety equipment on ZPQ. | Provide first-aid kits and first-aid rooms on ZPQ. | | | |
| | | 6.1.3. Provision of proper sanitary systems. | Provide proper sanitary systems including drinking water, potable water, toilet, and waste management. | | | |
| | | 6.1.4. Emergency communication system and preparedness | Cooperate with the nearest health center/hospital in order to immediately support response to emergency events, as per PTTEPI's MERP. | | | |
| | | 6.1.5. Safety method for working with machines/equipment. | Provide detailed method for working with machines/equipment. | | | |
| | | 6.1.6. Procedure for safety operation. | Provide detailed for safety operation. | | | |
| | | 6.1.7. Safety Data Sheet (SDS) for all chemicals. | Provide SDS for all chemicals present on site (including storage area and transfer vehicles) | | | |
| | 6.2. Injuries due to working in noisy areas | 6.2.1. Routine inspection and preventive maintenance. | Carry out routine inspection and preventive maintenance for all machinery as per maintenance schedule/ recommended by manufacturers. | ZPQ WPs All project vessels Rig | Throughout operation period | PTTEPI |
| | | 6.2.2. Provision of personal protection equipment. | Provide personal protection equipment (PPEs/earmuff/ear plug) to workers working on high level noise activities. | | | |
| | | 6.2.3. Warnings for high noise exposure | Provide warning labels/signs and limit working duration in high noise area. | | | |
| | 6.3. Heat radiation and air emissions from the operation of the condensate burner may affect workers on the ZPQ and WP-1 platforms. | 6.3.1. Implement all measures above from Items 6.1 and Items 6.2 above. | Implement all measures above from Items 6.1 and Items 6.2 above. | ZPQ WPs All project vessels Rig | Throughout operation period | PTTEPI |
| | | 6.3.2. Accessibility to safety equipment | Ensure all safety equipment is moved to operable locations when the burner is installed. | | | |
| | | 6.3.3. Instructions to safely shut down the system. | Ensure that there are instructions and procedures on how to quickly shut down the | | | |

| Aspects | Potential Impacts | Mitigation Measures | Specific Actions | Location | Period/Frequency | Responsibility |
|---------|-------------------|--|--|----------|------------------|----------------|
| | | | burner to prevent a possible ignition, in case of gas release on WP-1. | | | |
| | | 6.3.4. Lighting maintenance | Ensure area lighting is adequate for operation. | | | |
| | | 6.3.5. Availability of sufficient communication channel for emergency. | Provide radios to operators to inform operations to stop burning when necessary. | | | |
| | | 6.3.6. Availability of fire safety equipment. | Ensure all firefighting equipment including fire hose reel are ready to use at location. | | | |
| | | 6.3.7. Perform pre-start up tests. | Inspect the burners for damage to pumps, connections, hoses etc., as a part of a pre-start up process. | | | |
| | | 6.3.8. Availability of air flow for operation. | Check the air consumption of the burner package and pumps to ensure adequate air flow and no conflict with ZPQ operations. | | | |
| | | 6.3.9. Firewater system preparedness | Ensure that firewater system is pressure tested. | | | |
| | | 6.3.10. Supervision during operation | Ensure that operations are continuously manned. | | | |
| | | 6.3.11. When there is sufficient water, burning is to be stopped. | On loss of water to firewater system, stop burning immediately. | | | |
| | | 6.3.12. Burner monitoring | Install CCTV to enable constant monitoring of burners. | | | |
| | | 6.3.13. Fire preventive measures are installed and operable. | Ensure that adequate fire detection equipment is installed and operable. | | | |
| | | 6.3.14. Operation of burner | Burning is only to be allowed to take place according to schedule only, (during daylight hours). | | | |

Table 8.2 Mitigation Measures Proposed for Project for Unplanned Events

| Aspects | Potential Impacts | Mitigation Measures | Location | Duration | Responsibility |
|---------------------|--|---|--|-----------------------------|----------------|
| 1. Vessel Collision | 1.1. Collisions could potentially occur during transport of materials. | 1.1.1. Implement PTTEPI's SSHE Management System (<i>Annex A</i>), including the following: <ul style="list-style-type: none"> In case of vessel collision, follow PTTEPI's Emergency and Crisis Management Plan, including procedures in the event of an accidental vessel collision. | All project vessels | Throughout project duration | PTTEPI |
| | | 1.1.2. Establish 500 m safety zone around WPs; | | | |
| | | 1.1.3. Use support vessels to warn off traffic. | | | |
| | | 1.1.4. Provide appropriate lights and warning signals on all vessels to prevent accidental collision. | | | |
| 2. Spills | 2.1. Spills of chemicals, or diesel fuel could occur throughout all Project phases, and they may directly affect surface water quality, and indirectly affect sediment quality and marine ecology. | 2.1.1. Implement the relevant components of PTTEPI's SSHE Management System (<i>Annex A</i>), including the following: <ul style="list-style-type: none"> PTTEPI Emergency and Crisis Management Plan (in case of oil or chemical spills). PTTEPI Spill Contingency Plan. PTTEPI SSHE Training & Competency Standard. PTTEPI Incident Management Standard. PTTEPI's Myanmar Asset Waste Management Procedure. 2.1.2. Each vessel greater than 400 gross tons will comply with all fuel storage, waste treatment and disposal regulations/procedures (MARPOL 73/78 requirements, PTTEPI and contractor procedures). | ZPQ WPs All project vessels Rig | Throughout project duration | PTTEPI |

| Aspects | Potential Impacts | Mitigation Measures | Location | Duration | Responsibility |
|---------|-------------------|---|----------|----------|----------------|
| | | 2.1.3. Comply with all Myanmar and International Maritime Organization (IMO) regulations or standards regarding vessel seaworthiness and maritime safety. | | | |
| | | 2.1.4. Separate and store chemicals according to their characteristics. | | | |
| | | 2.1.5. Store only necessary amounts of lubricants, fuels, paints, and other chemicals. | | | |
| | | 2.1.6. The ZPQ and WPs shall be provided with drip tray to prevent oil and chemical spills. Any spilled oil and chemical will be collected into a sealed container. | | | |
| | | 2.1.7. Regularly monitor safety zone within 500 m-radius surrounding ZPQ and WPs to prevent any accidents. | | | |
| | | 2.1.8. Provide appropriate lights and warning signals on all vessels to prevent accidental collision. | | | |
| | | 2.1.9. Conduct routine inspections for any leakage and damages, and preventative maintenance of equipment/facilities used in fluid storage (fuel, oil, chemicals, etc). | | | |
| | | 2.1.10. Conduct exercises according to Emergency Response Plan and Tropical Storm Emergency Plan. | | | |
| | | 2.1.11. Use the appropriate well Plug & Abandonment method in order to prevent the leakage of petroleum hydrocarbons and other compounds from well | | | |
| | | 2.1.12. Ensure proper training in the use and handling of the relevant chemicals and standard safety procedures implemented by all contractors. | | | |
| | | 2.1.13. Provide spill clean up kits. | | | |
| | | 2.1.14. Handle all chemicals according to their SDS. | | | |
| | | 2.1.15. Store, separate, transport and dispose of waste using appropriate procedures and disposal facilities. | | | |

| Aspects | Potential Impacts | Mitigation Measures | Location | Duration | Responsibility |
|---------------------|---|--|--|-----------------------------|----------------|
| | | 2.1.16. Ensure manifest or confirmation record of hazardous waste is kept | | | |
| | | 2.1.17. Install an appropriate control valve for pipe work relating to chemical and fuel transfer. Perform valve inspection and conduct a pressure test before every use. | | | |
| | 2.2. Operation of the condensate burners may potentially pose a risk of accidental condensate release if improperly managed. | 2.2.1. Implement above measures as per Item 2.1. | | Throughout project duration | PTTEPI |
| | | 2.2.2. Ensure that air pressure gauges are installed and operating correctly. | | | |
| | | 2.2.3. Install CCTV to enable constant monitoring of burners. | | | |
| | | 2.2.4. Conduct air hose pressure testing before use. | | | |
| | | 2.2.5. Ensure that operations are continuously manned. | | | |
| | | 2.2.6. If pilot flame for the burners goes out, it is to be re-ignited immediately. | | | |
| | | 2.2.7. Ensure all air hoses are properly pressure tested, pressure rated with whip checks. | | | |
| | | 2.2.8. Provide radios to operators to inform operations to stop burning when necessary. | | | |
| | | 2.2.9. Ensure that contractors develop and maintain emergency plans, have equipment that are readily available for use, and their personnel are trained to respond to oil spill. | | | |
| | | 2.2.10. Monitor down-hole pressure at all times. | | | |
| | | 2.2.11. Conduct regular trainings and spill response drills at least once a year. | | | |
| | | 2.2.12. Prepare and maintain oil spill response equipment for Tier I spill that is ready to use at all times. | | | |
| 3. Tropical Cyclone | 3.1. Tropical cyclones represent a threat to the safety of offshore personnel and could result in multiple fatalities and damage to assets. | 3.1.1. Implement PTTEPI's Tropical Revolving Storm Procedure and Emergency and Crisis Management Plan. | ZPQ WPs All project vessels Rig | Throughout project duration | PTTEPI |

| Aspects | Potential Impacts | Mitigation Measures | Location | Duration | Responsibility |
|----------------------|--|--|--|-------------------------------|----------------|
| 4. Well Blowout | 4.1. A blowout can result in the release of hydrocarbons (oil or gas) into the sea and surrounding environment at high pressure, potentially impacting seawater/sediment quality, marine life and marine ecology, occupational health and safety and public health | 4.1.1. Implement the relevant components of PTTEPI's SSHE Management System 4.1.2. Install blowout preventer and shear ram appropriately. 4.1.3. Employ experienced drilling contractors that have well maintained equipment and train their employees regarding inspection and prevention of blowouts. 4.1.4. Ensure that drilling contractors develop and maintain emergency plans, have equipment that are readily available for use, and their personal are trained to respond. 4.1.5. Monitor down-hole pressure at all times. 4.1.6. Conduct regular training and drill. | Rig | Throughout drilling operation | PTTEPI |
| 5. Fire or Explosion | 5.1. Fire or explosion could potentially impact air quality, health and safety concerns to PTTEPI's employees and contractors, and damage to structures. Secondary impacts from release/spill of chemicals could occur to seawater/sediment quality, ecology and biodiversity 5.2. Failure or improper operation of the condensate burners could lead to potential fire or explosion. | 5.1.1. Provide fire protection equipment, including fire extinguishers and alarms, on all offshore facilities. 5.1.2. Conduct regular inspections and drills for fire protection equipment. 5.1.3. Implement Emergency and Crisis Management Plan in case of fire or explosion occurrence. 5.2.1. Implement above measures as per Item 4.1. 5.2.2. Ensure that firewater system is pressure tested. 5.2.3. Ensure that operations are continuously manned. 5.2.4. On loss of water to firewater system, stop burning immediately. 5.2.5. Ensure all firefighting equipment including fire hose reel are ready to use at location. 5.2.6. Inspect the burners for damage to pumps, connections, hoses etc., as a part of a pre-start up process. | ZPQ WPs All project vessels Rig | Throughout project duration | PTTEPI |

| Aspects | Potential Impacts | Mitigation Measures | Location | Duration | Responsibility |
|---------|-------------------|---|----------|----------|----------------|
| | | 5.2.7. Check the air consumption of the burner package and pumps to ensure adequate air flow and no conflict with ZPQ operations. | | | |
| | | 5.2.8. Ensure that the gas detection system at WP-1 is installed and operational. | | | |
| | | 5.2.9. Ensure that there are instructions and procedures on how to quickly shut down the burner to prevent a possible ignition, in case of gas release on WP-1. | | | |
| | | 5.2.10. Install CCTV to enable constant monitoring of burners. | | | |

As detailed in the Myanmar's National Environmental Quality Guidelines, *“projects shall engage in continuous, proactive and comprehensive self-monitoring of the project and comply with applicable guidelines and standards. For purposes of these Guidelines, projects shall be responsible for the monitoring of their compliance with general and applicable industry-specific Guidelines as specified in the project EMP and ECC.”*

Monitoring will be required in order to demonstrate compliance with legal limits EQEG (i.e. Myanmar National Environmental Quality (Emission) Guidelines), IFC Offshore Oil and Gas Development EHS Guideline and PTTEPI's Project requirements and will also provide verification of the overall design and effectiveness of the implemented mitigation/control measures. Details of the environmental monitoring program are presented in *Table 9.1*.

In regard to *Table 9.1*, under the “Responsibility” column, “PTTEPI” will consist of the SSHE Department in cooperation with the ZPQ operation team, which will conduct monitoring. The “Authorized Contractor” will be a contractor who has been awarded by PTTEP to collect samples conduct analysis as per monitoring program that stated in the EMP, and write-up of the monitoring report to be submitted to PTTEP. PTTEP will further submit the monitoring report to ECD via MOGE.

Note that, based on monitoring results, in the future PTTEPI may decide to (or be required to) implement changes to the Project design or existing mitigation measures, in order to achieve compliance. In this case, the EMP will be updated as necessary.

The estimated costs for implementation of the annually monitoring program is 100,000 USD and Tri-annually program is 500,000 USD due to high cost of seawater and sediment monitoring.

Table 9.1 Monitoring Measures for the Project during Production Operations Phases

| Environmental Aspects | Parameters | Method | Location | Duration / Frequency of Monitoring | Responsibility | Estimated Budget |
|-----------------------|--|--|---|---|----------------------------------|------------------|
| 1. Air Quality | <p>According to IFC EHS Offshore Oil and Gas Guideline, air quality monitoring are as follows:</p> <ul style="list-style-type: none"> • Flare volume • Fuel gas volume • Diesel consumption • Greenhouse Gas (GHG) emissions • Other air emission from combustion sources of flare gas, fuel gas and diesel (eg: NO₂, SO₂, VOC and TSP) | <p><u>Method</u></p> <ul style="list-style-type: none"> • Volume of flare gas, fuel gas and diesel will be collected from metering system • GHG emissions and other air emissions will be calculated by using the volume of flare gas, fuel gas and diesel. | <ul style="list-style-type: none"> • Processing Platform • Rig | <ul style="list-style-type: none"> • Monthly | PTTEPI | 10,000 USD/year |
| 2. Noise | <p>Noise monitoring are as follows:</p> <ul style="list-style-type: none"> • Noise contour • Noise dose and • Noise level | <p><u>Method</u></p> <ul style="list-style-type: none"> • Samples shall be analyzed according to Occupational Safety and Health Administration (OSHA), United States Department of Labour, Regulation (Standard - 29 CFR), Standard Number 1910.95, Occupational Noise Exposure | <ul style="list-style-type: none"> • Processing Platform and one representative WP | <ul style="list-style-type: none"> • Noise contour survey, conduct within 2 years after starting operation. The survey will be revisited every 5 years or when significant change of operation and the survey will be conducted again only for the area that have the significant change of noise level. • Noise dose, conduct for personnel who is analysed as abnormal hearing from annual health checking. • Noise level, conduct when any complaint raised | PTTEPI via Authorized Contractor | 20,000 USD/year |

| Environmental Aspects | Parameters | Method | Location | Duration / Frequency of Monitoring | Responsibility | Estimated Budget |
|-----------------------|---|--|--|---|----------------------------------|------------------|
| 3. Seawater Quality | Parameters to be selectively analyzed for seawater quality are as follows: <ul style="list-style-type: none"> Water Depth Transparency pH Turbidity Dissolved Oxygen Total Suspended Solids Oil and Grease Total Heavy Metal Total Petroleum Hydrocarbon (TPH) | <u>Method</u> <ul style="list-style-type: none"> Samples shall be analyzed according to globally recognized standard e.g.US EPA. <u>Number of stations</u> <ul style="list-style-type: none"> 2 stations at 100 m distance from ZPQ upstream and downstream 2 stations at 100 m distance from ZPQ perpendicular to the current direction 1 station at reference station <u>Number of samples</u> <ul style="list-style-type: none"> 1 sample per station. | <ul style="list-style-type: none"> ZPQ | <ul style="list-style-type: none"> Every 3 years after this EMP report approval | PTTEPI via Authorized Contractor | 250,000 USD/year |
| 4. Sediment Quality | Parameters to be selectively analyzed for sediment quality are as follows: <ul style="list-style-type: none"> Total Petroleum Hydrocarbon Total Heavy Metal | <u>Method</u> <ul style="list-style-type: none"> Samples shall be analyzed according to globally recognized standard e.g.US EPA. <u>Number of stations</u> <ul style="list-style-type: none"> 2 stations at 100 m distance from both ZPQ and WP upstream and downstream 2 stations at 100 m distance from both ZPQ and WP perpendicular to the current direction 1 station at reference station <u>Number of samples</u> <ul style="list-style-type: none"> 1 sample per station. | <ul style="list-style-type: none"> ZPQ One representative Wellhead platform (WP) | <ul style="list-style-type: none"> Every 3 years after this EMP report approval | PTTEPI via Authorized Contractor | 250,000 USD/year |
| 5. Produced water | Parameters to be analyzed for produced water as follows: <u>Required by EQEG</u> <ul style="list-style-type: none"> Oil & Grease | <u>Method</u> <ul style="list-style-type: none"> Record produced water volume after treatment prior to discharge overboard. Produced water samples analysed onboard. | <ul style="list-style-type: none"> ZPQ | <ul style="list-style-type: none"> Monthly summary of volume discharged and analysis results | PTTEPI or Authorized Contractor | 20,000 USD/year |

| Environmental Aspects | Parameters | Method | Location | Duration / Frequency of Monitoring | Responsibility | Estimated Budget |
|---|---|---|---|--|----------------------------------|------------------|
| 6. Produced sand | Parameters to be analyzed for produced sand as follows: Required by EQEG <ul style="list-style-type: none"> • OOC % (only in case of discharge) | <u>Method</u> <ul style="list-style-type: none"> • Record produced sand volume. • Produced sand samples will be collected for analysis according to international guidelines and requirements such as USEPA. | <ul style="list-style-type: none"> • ZPQ | <ul style="list-style-type: none"> • Monthly summary of volume discharged and analysis results | PTTEPI or Authorized Contractor | 20,000 USD/year |
| 7. Mud and Cuttings (Non-Aqueous Drilling Fluid NADF) | Parameters to be analyzed for cuttings samples as follows: Required by EQEG <ul style="list-style-type: none"> • OOC % • Total Mercury (Total Hg) dry weight in stock barite • Cadmium (Cd) dry weight in stock barite | <u>Method</u> Samples shall be analyzed for heavy metals according to globally recognized standard e.g. US EPA. | <ul style="list-style-type: none"> • Rig | <ul style="list-style-type: none"> • Once during drilling by selecting one representative well for each WHP | PTTEPI via Authorized Contractor | 10,000 USD/year |
| 8. Mud and Cuttings (Water-Based Mud, WBM) | Parameters to be analyzed for cuttings samples as follows: Required by EQEG <ul style="list-style-type: none"> • Total Mercury (Total Hg) dry weight in stock barite • Cadmium (Cd) dry weight in stock barite • Chloride (Cl-) | <u>Method</u> Samples shall be analyzed for heavy metals according to globally recognized standard e.g. US EPA. | <ul style="list-style-type: none"> • Rig | <ul style="list-style-type: none"> • Once during drilling by selecting one representative well for each WHP | PTTEPI via Authorized Contractor | 10,000 USD/year |
| 9. Sewage | Parameters to be analyzed for sewage as follows: Required by EQEG (as per MARPOL 73/78*): <ul style="list-style-type: none"> • Thermotolerant Coliforms • Biochemical Oxygen Demand (BOD) • Chemical Oxygen Demand (COD) • pH | <u>Methods used for sampling/analysis should be as specified in MARPOL 73/78 and associated standards, as follows:</u> <ul style="list-style-type: none"> • Thermotolerant Coliform Standard- determined by membrane filter, multiple tube fermentation or an equivalent analytical procedure. | <ul style="list-style-type: none"> • ZPQ | <ul style="list-style-type: none"> • Once every 6 months | PTTEPI via Authorized Contractor | 10,000 USD/year |

| Environmental Aspects | Parameters | Method | Location | Duration / Frequency of Monitoring | Responsibility | Estimated Budget |
|-----------------------|------------|---|----------|------------------------------------|----------------|------------------|
| | | <ul style="list-style-type: none"> TSS - Method of testing should be by: <ol style="list-style-type: none"> filtration of representative sample through a 0.45 µm filter membrane, drying at 105°C and weighing; or centrifuging of a representative sample (for at least five minutes with mean acceleration of 2,800-3,200 g), drying at least 105°C and weighing; or other internationally accepted equivalent test standard. BOD and COD - The test method standard should be ISO 15705:2002 for COD and ISO 5815-1:2003 for BOD5, or other internationally accepted equivalent test standards. | | | | |

ANNEX 26 RESOLUTION MEPC.159) 55 (Adopted on 13 October 2006 REVISED GUIDELINES ON IMPLEMENTATION OF EFFLUENT STANDARDS AND PERFORMANCE TESTS FOR SEWAGE TREATMENT PLANTS

Note: Authorized contractor will be chosen by bidding process time by time throughout the project.

This section outlines the reporting frequencies and types of reports to be prepared for the Project with regards to environmental management, monitoring, and compliance.

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 ensure regular flow of information from the Project site to the Project headquarters and, as necessary, to regulatory authorities. The reporting system will provide a mechanism to ensure that the measures proposed in the Project's EMP are implemented.

10.1

REPORTING REQUIREMENTS TO MYANMAR AUTHORITIES

There are a number of reporting requirements to Myanmar Authorities, as per the EIA Procedures and Administrative Instruction of Environmental Impact Assessment Procedure. These are summarized in *Table 10.1*.

Table 10.1 Reporting Requirements to Myanmar Authorities

| Report | Requirements | Frequency | Reference |
|-------------------|--|------------------------------|------------------------------------|
| Monitoring Report | <ul style="list-style-type: none"> • 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. • Within ten (10) days of completing monitoring report, the Project Proponent shall make such report (except as may relate to National Security concerns) publicly available on the Project's website, at public meeting places (e.g. libraries, community halls) and at the Project offices. Any organization or person may request a digital copy of a monitoring report and the Project shall, within ten (10) days of receiving such request, submit a digital copy via email or as may otherwise be agreed upon with the requestor. • Monitoring reports shall include: <ul style="list-style-type: none"> ○ documentation of compliance with all conditions; ○ progress made to date on implementation of the EMP against the submitted implementation schedule; ○ difficulties encountered in implementing the EMP and recommendations for remedying those difficulties and steps proposed to prevent or avoid similar future difficulties; ○ number and type of non-compliance with the EMP and proposed remedial measures and timelines for completion of remediation; ○ accidents or incidents relating to the occupational and community health and safety, and the environment; ○ monitoring data of environmental parameters and conditions as committed in the EMP or otherwise required; ○ monitoring data of waste amount that is generated; and ○ incidents or interactions with commercial fisheries. | Not less than every 6 months | EIA Procedure, Article 108 and 109 |

| Report | Requirements | Frequency | Reference |
|--|---|--|--|
| Report in Case of Breach of ECC or EMP | <ul style="list-style-type: none"> Notify and identify in writing to the Ministry any breaches of its obligations or other performance failures or violations of the ECC and the EMP as soon as reasonably possible | <ul style="list-style-type: none"> In case of any breach which would have a serious impact or where the urgent attention of the Ministry is or may be required, within not later than twenty-four (24) hours of PTTEPI becoming aware of such incident. In all other cases: within seven (7) days of PTTEPI becoming aware of such incident. | EIA Procedure, Article 107 |
| Report of Any Accident or Incident | <ul style="list-style-type: none"> Inform appropriate authorities as soon as practicably in the event of any accident or incident. As per conditions of ECC | As per conditions of ECC | Administrative Instruction of Environmental Impact Assessment Procedure, Annex 5, Page 3 |
| Additional Reporting Requirements as per ECC | <ul style="list-style-type: none"> The Ministry may prescribe conditions in the ECC. Such conditions may include additional reporting requirements, such as: <ul style="list-style-type: none"> General management documentation, reporting and information disclosure procedures Monitoring documentation and reporting Documentation and reporting on (i) parameters and issues that must be documented and reported; (ii) types and methods; (iii) frequency and timing; (iv) quality controls; and (v) recipients. | As per conditions of ECC | EIA Procedure, Article 91 |

10.2 PTTEPI'S INTERNAL MONITORING AND INSPECTION

10.2.1 Internal Monitoring and Inspection

PTTEPI conducts internal monitoring and inspection. Inspections are primarily conducted to identify deviations/non-conformities/unsafe conditions. Where identified, temporary corrective measures are implemented or discussed.

Reporting and follow-up are conducted as follows:

- Inspection report issued by the Team Leader;
- Includes corrective action recommendations;
- Draft forwarded to relevant Site SSHE Representative for comments and validation prior to distribution;
- Final Action plan discussed with the relevant Department Head prior to issue; and
- Highlight main findings for report to SSHE Committee.

10.2.2 Incident, Accident and Emergency Reporting

PTTEPI will report all incidents, accidents and emergencies as per their Incident Management Procedure.

10.2.3 Performance Indicators

In general, performance indicators for monitoring and inspection include whether EMP implementation has been undertaken according to the planned arrangements and is being appropriately updated when necessary, as well as whether identified corrective actions and mitigation measures have been appropriately undertaken. Other criteria include whether objectives and targets have been met and whether there are any deviations from the EMP and legal requirements.

The levels of specific environmental and social parameters should be compliant with laws, regulations, standards and guidelines, as applicable, in particular Myanmar's EQEG, commitments of the EMP, as well as the conditions stipulated in the ECC.

10.2.4 Training Programs

PTTEPI has a detailed SSHE Training and Competency Management Standard, which is described in detail in *Chapter 11*.

11.1 EMERGENCY MANAGEMENT PLAN AND CRISIS MANAGEMENT PLAN

11.1.1 Objectives

PTTEPI's Emergency Management Plan and Crisis Management Plan (the Plan) covers roles, responsibilities, systems and processes that PTTEPI's Emergency Management Team (EMT) & Crisis Management Team (CMT) will follow when responding to an emergency or crisis. The Plan covers all operations and activities carried out by PTTEPI, including incidents of, but not limited to, the following nature:

- Offshore Operational Incidents
- Environmental (Spill /Hydrocarbon Leak) incidents
- Security Incidents
- Logistics Related Incidents
- Occupational Health Incidents
- PTTEPI Personnel Incidents

11.1.2 Legal Requirements

The Emergency Management Plan will be conducted with consideration to the following laws and regulations:

- Disaster Management Laws and Rules, 2013;
- Environmental Impact Assessment Procedure, 2015;
- Public Health Law, 1972;
- Oil and Gas exploration drilling, appraisal and Production, 2019;
- Prevention from Danger of Hazardous Chemical and Associated Materials Rule (notification No 85/2015-2016);
- Prevention from Danger of Hazardous Chemical and Associated Materials Law;
- Factories Act, 1951 (amended in 2016);
- Myanmar Fire Force Law, 2015;
- Social Security Law, 2012; and
- Occupational Safety and Health Law, 2019.

Other internal requirements and policies that will govern the conduct of this management plan includes:

- Following Myanmar Asset Emergency Management Plan (11027-PDR-SSHE-502-006-R01), the organizational structure of Myanmar Asset emergency and crisis management is categorized into a 3-Tier response level. Myanmar Asset Emergency Management Team will be activated

on Tier 2 and/or Tier 3 since the notification and request support from ERT Leader (OSC); and

- Myanmar Asset Emergency Management Plan (11027-PDR-SSHE-502-006-R01) and Myanmar Asset Crisis Management Plan (1102-PDR-SSHE-501-005-R00) applies to the Offshore and Onshore Operational of PTTEP operations in Myanmar as same as and Myanmar Asset Tropical Cyclone Procedure (11027-PDR-SSHE-507-R04) is a significant impact on offshore operations but also onshore work sites and domestic office facilities will be applied.

11.1.3 Implementation Schedule

Emergency Management Plan will be implemented throughout the entire operation phase of the Project.

11.1.4 Management Actions

Following PTTEP Emergency and Crisis Management Standard (SSHE-106-STD-500), the organizational structure of Myanmar Asset emergency and crisis management is categorized into a 3-Tier response level. Myanmar Asset Emergency Management Team will be activated on Tier 2 and/or Tier 3 since the notification and request support from ERT Leader (OSC).

Figure 11.1 shows the Myanmar Emergency Management Team organization structure.

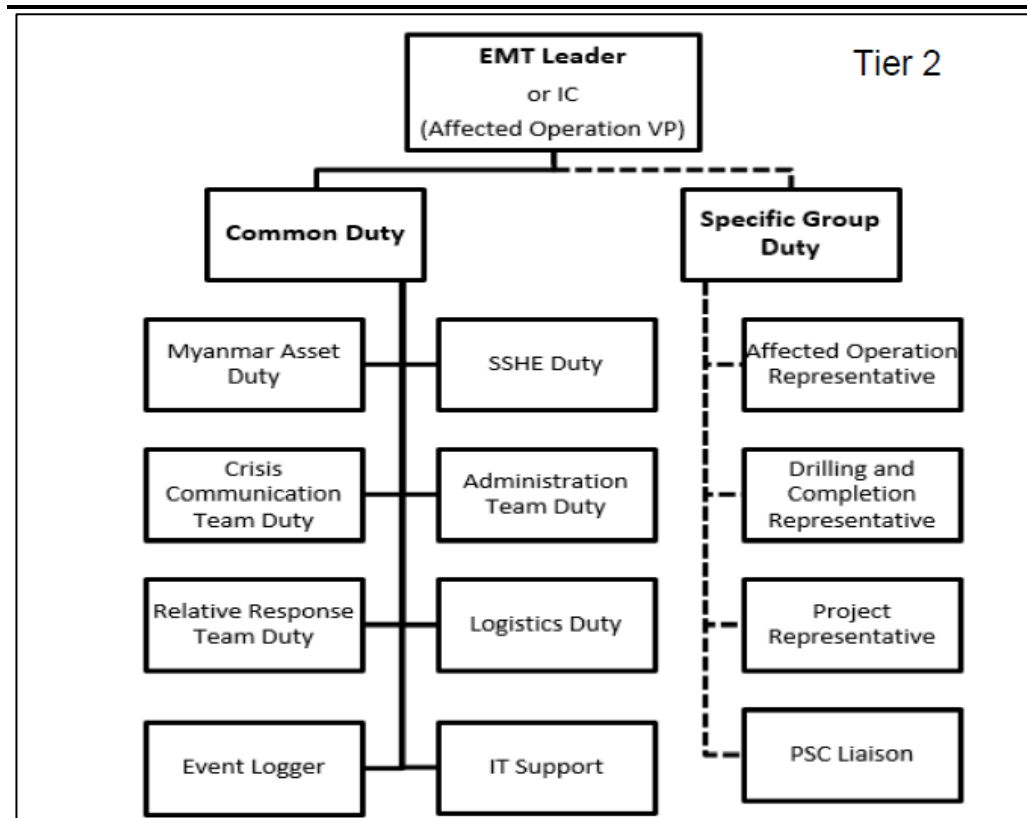
PTTEP emergency & crisis organization includes representatives of PTTEPI management team, from all departments. This organization also liaises with PTTEP Corporate, Myanmar authorities and other strategically important stakeholders. In case of any emergencies, all employees, contractors and third party personnel have an emergency role to play as specified in site specific ERP and PTTEPI Emergency & Crisis management plan respectively. The emergency duties range from standing by to directly carrying out emergency response operations.

The structure of emergency organization and communication flowchart is shown in *Figure 11.1* and *Figure 11.2*.

Full details on PTTEPI's emergency plan are provided in PTTEP's SSHE Management System.

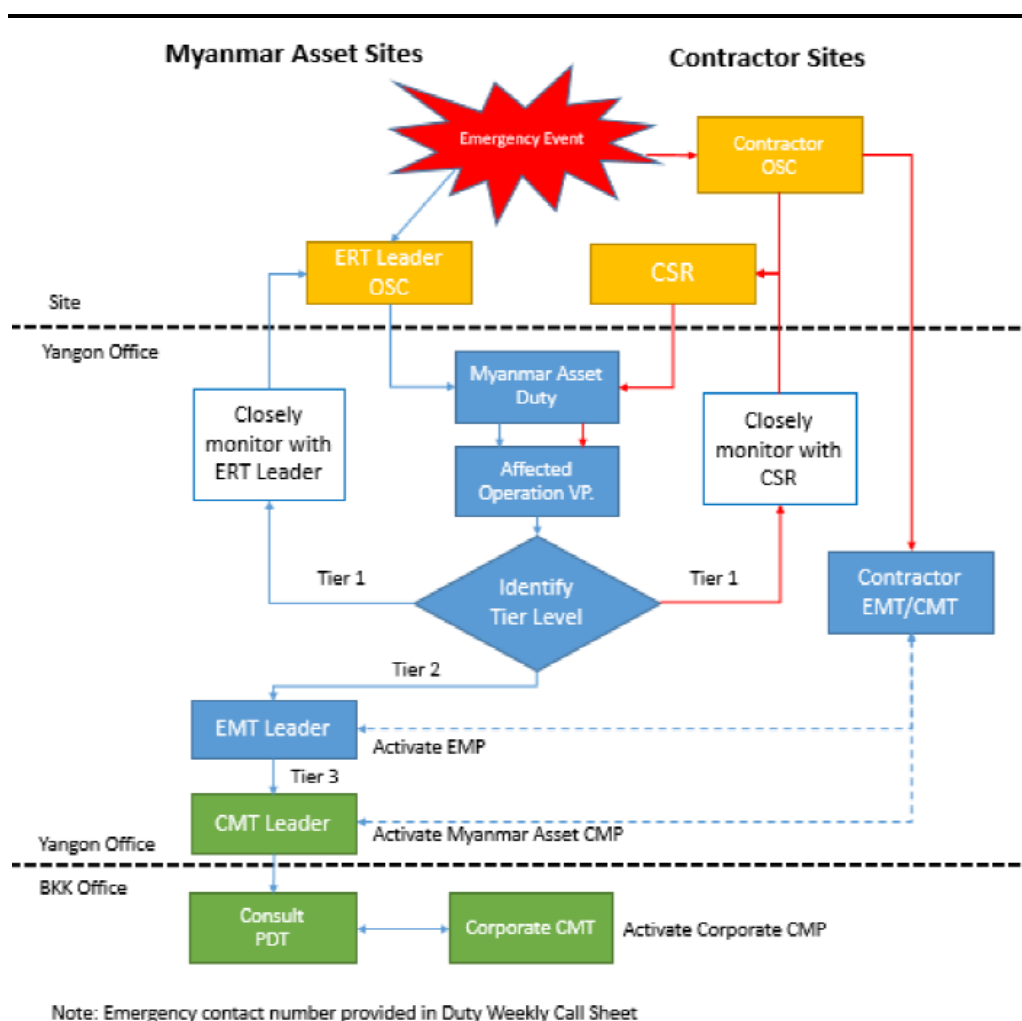
During an incident, PTTEP will communicate the event to the relevant Myanmar authorities.

Figure 11.1 Myanmar Emergency Management Team Organization



Source: PTTEPI, 2019

Figure 11.2 Notification and Communication Flowchart



Source: PTTEPI, 2019

11.1.5 Monitoring Plans

The ETM Leader (Affected Operation VP) to continual monitor and identify the situation of the emergency and decide whether the situation is or likely to escalate to become a crisis. Also, the ETM leader will monitor and follow up Incident Action Plan implementation. The Environmental Report will include the item listed in *Table 11.1*.

Table 11.1 *Environmental Monitoring Recording*

| Project Activity / Environmental Aspect | Monitoring Measures | Reporting |
|---|--|-------------------------|
| Incident reporting | Details of any environment or social Incidents | Incident report forms |
| Accidental Releases and Leaks | Safety record | Safety record |
| Non-Compliance Reporting | Non-Compliance with EMP | Inspection check sheets |

Source: PTTEPI, 2019

11.1.6 *Projected Budget and Responsibilities*

The budget for the emergency response is within the operational cost of the Project. The estimated budget for the emergency response is 100,000 USD/year.

The responsible parties for conducting this management plan are presented in *Figure 11.2*.

11.2 *ASSET CRISIS MANAGEMENT PLAN*

11.2.1 *Objectives*

The PTTEP's Myanmar Asset Crisis Management Plan covers the processes to manage potential crisis or crisis situation to all Myanmar Asset operations, activities and projects by the Crisis Management Team (CMT). The purpose of this plan is to clearly define roles and responsibilities of the CMT and to efficiently and effectively manage the potential crisis or crisis situation then to resume normal operations as soon as possible.

11.2.2 *Legal Requirements*

The Asset Crisis Management Plan will be conducted with consideration to the identified laws and regulations for Emergency Management Plan and Crisis Management Plan in *Section 11.1.2*.

11.2.3 *Implementation Schedule*

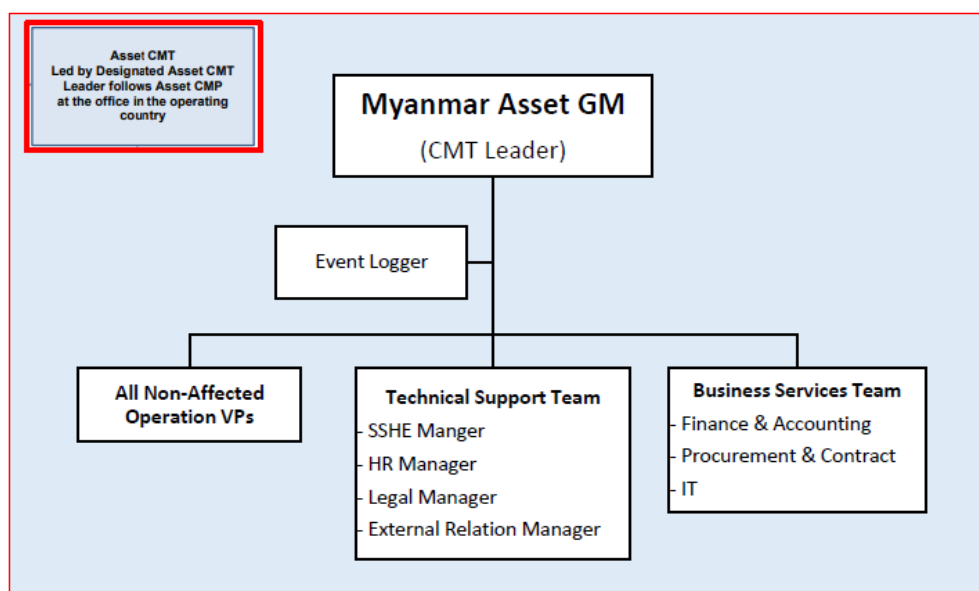
The Asset Crisis Management Plan will be implemented throughout the entire operation phase of the Project.

11.2.4 Management Actions

A crisis is determined as a major or catastrophic event (out of control emergency). A crisis could result in sustained national impacts over a prolonged period of time. An example of a crisis situation includes terrorism that results in extraordinary levels of mass casualties, damage, or disruption severely affecting the population, infrastructure, environment, economy, company reputation, national morale, and/or government functions. During an incident, PTTEP will communicate the event to the relevant Myanmar authorities.

Figure 11.3 shows the Myanmar Crisis Management Team (CTM) organization structure.

Figure 11.3 CMT Organization



Source: PTTEPI, 2019

11.2.5 Monitoring Plans

After an emergency and crisis are over and no further actions are outstanding, the Business Continuity Plan (BCP) shall be monitored and assessed until return to normal status.

11.2.6 Projected Budget and Responsibilities

The budget for the emergency response is within the operational cost of the Project.

The responsible parties for conducting this management plan are presented in Figure 11.3.

11.3 SPILL CONTINGENCY PLAN

11.3.1 Objectives

PTTEP Myanmar Asset Spill Contingency Plan (11027-PDR-SSHE-501/03-R02) is developed to provide detailed actions to be implemented to personnel who may be involved in a spill response related to PTTEP Myanmar Asset's operations, specifically PTTEP Myanmar Asset's Emergency Response Team (ERT) in case of spills with the objective to:

- Ensure minimal adverse effect to the environment,
- Minimize the spread of hydrocarbons,
- Provide the tools to identify the most appropriate response tactics,
- Protect sensitive areas and
- Mitigate negative effects.

11.3.2 Legal Requirements

The Asset Crisis Management Plan will be conducted with consideration to the identified laws and regulations for Emergency Management Plan and Crisis Management Plan in *Section 11.1.2* with addition of:

- Myanmar Port Authority Law, 2015
- Petroleum and Petroleum Product Law, 2017

11.3.3 Implementation Schedule

The Spill Contingency Plan applies to all operational sites within Myanmar Asset and to all personnel including contractors.

11.3.4 Management Actions

Generally the response structure for a spill is the same as a response to any incident as defined in the Zawtika Offshore Field Emergency Response Plan (Myanmar-0550-PLN-006), Emergency Management Plan (11027-PDR-SSHE-502-006-R00). Localised spills (known as Tier 1) will be managed by personnel and equipment on site / vessels. Vessels are required to have their own Shipboard Oil Pollution Emergency Plans (SOPEP's). For larger spills (known as Tier 2 or 3) which would require Regional or International assistance then PTTEP Myanmar Asset via PTTEP/PTT has in place a worldwide agreement with Oil Spill Response Limited (OSRL) in Singapore. OSRL will make ready their equipment (including aircraft) while awaiting the official mobilisation notification from PTTEP. Other operators in Myanmar could assist for Tier 2 and 3 but their stock of spill equipment is minimal within Myanmar as the production is generally gas / condensate. During an incident, PTTEP will communicate the event to the relevant Myanmar authorities.

Moreover, Myanmar Asset Spill Contingency Plan, under “International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC-1990)” and “National Contingency Plan for Marine Pollution” so any incident must be reported to Department of Marine Administration as following:

Name: Myanmar Maritime Police Force,
Hot Line (24 Hour): +95 1 555006, +95 9 426564152

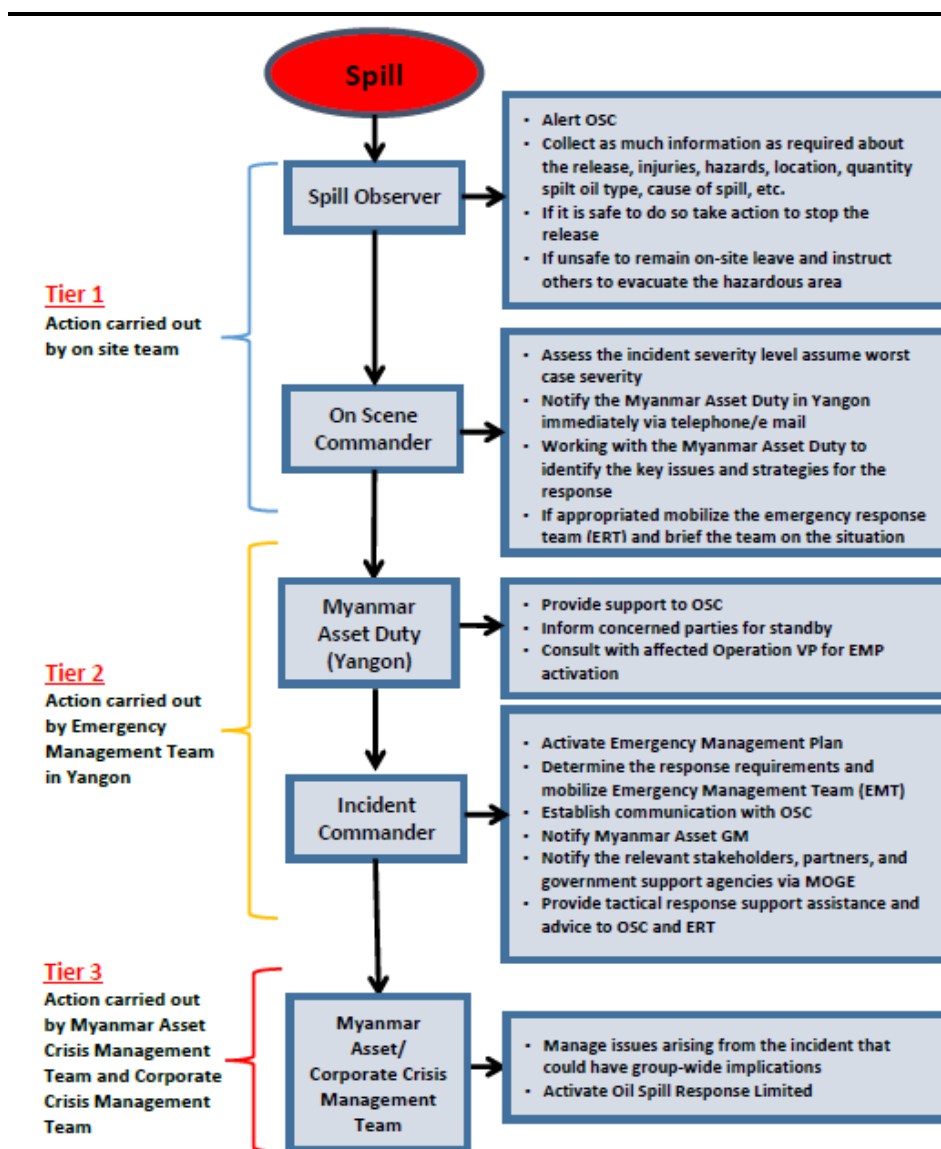
Name: Maritime Rescue Coordination Centre
Address: Monkey Point Street, Botataung Township, Yangon
 Myanmar
Telephone: +95 1 202417
Fax: +95 1 202417
Email: mrcc.myanmar2012@gmail.com;
 mrcc.yangon@mptmail.com.mm

| Competent National Authority: | Department of Marine Administration |
|--------------------------------------|--|
| National Contact Point: | Director Maritime Safety, Security and Environmental Protection Division, Department of Marine Administration, Ministry of Transport and Communications |
| Phone: | Duty Officer (Hot Line): +95 1 9010038 Ph: +95 1 556097, Fax: +95 1 397641 |
| Email: | sse@dma.gov.mm , dma@motc.gov.mm |
| Address: | No-363/421, Corner of Merchant & Theinbyu Road, Botataung Township, Yangon, Myanmar |

| | |
|-----------------|---|
| Name: | Marine Environment, Myanmar Port Authority (MPA), Pollution Report |
| Address: | Duty Officer (Port Tower) |
| Phone : | +951 388 068 |
| E-mail : | mpa@mptmail.net.mm |

Spill incident alert procedure and action are shown in *Figure 11.4*

Figure 11.4 Spill Alert Procedures and Actions



Source: PTTEPI, 2019

11.3.5 Monitoring Plans

- Undertake gas monitoring before entering high risk area
- Maintain continuous gas monitoring to ensure there is no explosive risks and no health and safety risks associated with the operation

Table 11.2 **Spill Monitoring Recording**

| Project Activity / Environmental Aspect | Monitoring Measures | Reporting |
|---|---|-------------------------|
| Incident reporting | Details of any spill incidents (e.g., source of spills, amount of spills, types of hydrocarbon spill) | Incident report forms |
| Accidental Releases and Leaks | Safety record | Safety record |
| Non-Compliance Reporting | Non-Compliance with EMP | Inspection check sheets |

Source: PTTEPI, 2019

11.3.6 *Projected Budget and Responsibilities*

The budget for the emergency response is within the operational cost of the Project.

There are two (2) levels of emergency organization managed in the PTTEPI as follows:

- The on-site emergency organization level that is under the responsibility of the On Scene Commander (OSC) including On-Site Spill Response Team Leader (SRTL), On-Site Spill Response Team (SRTL), Administration and Logistic Team, and Event Log Keeper; and
- The Emergency and Crisis Management level which is under the responsibility of Duty Manager in Yangon.

11.4 *BLOWOUT CONTINGENCY PLAN*

11.4.1 *Objectives*

Blowout Contingency Plan (BCP) is to enable the swift and effective mobilization of the PTTEP Operations, external resources to combat and minimize the effects of a blowout. Because of the nature of this type of emergency initial actions can considerably affect the latter stages of control. Delays of critical actions can cause knockon effects, which would hamper later efforts to control the situation. For example, a minor leak can be easily controlled, but given time, it may escalate into a major fire and explosion. Therefore, it may be important to act quickly in the initial stages of the event. The Contingency Plan provides, or indicates, the source of information to enable all those involved in combating the emergency to take the initial, crucial actions required.

The BCP is not a replacement for other manuals such as the PTTEP "Duty Officer and Emergency Control Group Manual". The BCP is to be used in

conjunction with these manuals and bring specific information to handling a blowout. The BCP does not discuss procedures intended to prevent a loss of well control. The BCP presents only the reactions expected for well control incidents.

11.4.2 *Legal Requirements*

- The Management Plans will be completed in accordance with MARPOL requirements and National Emission (Quality) Guideline by MONREC. The plans also consider national legislation is provided in Chapter 4.

11.4.3 *Implementation Schedule*

The BCP will be enacted throughout the life of the Project.

11.4.4 *Management Actions*

This BCP covers drilling and well intervention activity for Myanmar Asset Offshore Myanmar (Bay of Bengal, Gulf of Martaban) and Myanmar Asset Onshore.

Well control situations require unique equipment, services and procedures to ensure safety, to minimize loss and deal with the problem in an efficient and effective manner. This BCP addresses the need for an operational plan completes with evaluation of the situation and a mobilization scheme.

The most important consideration in the early stages of a blowout, second only to personnel safety, is the mitigation of damage. The BCP includes damage control measures that may be implemented before the Blowout Contingency Task Force (BCTF) takes command of the well control situation and a Well Control Team arrives.

At times these procedures may conflict with personnel safety which must remain the paramount consideration. These situations require common sense and professional judgment on the part of the person(s) who are directing any mitigation efforts and are in charge of operations. NOTE: No operation should be undertaken without prior assessment of the risks to personnel involved.

11.4.5 *Monitoring Plans*

The monitoring plan for the BCP shall follow the same monitoring plan as per the Emergency Management Plan.

11.4.6 *Projected Budget and Responsibilities*

The budget for the emergency response is within the operational cost of the Project.

11.5 *TROPICAL STORM RESPONSE PLAN*

11.5.1 *Objectives*

The purpose of this procedure is to provide guidance on coordination of response to a Tropical Storm, Severe Tropical Storm, Cyclone or Super Cyclone with the following objectives:

- Protect life and maximize safety of personnel;
- Prevent damage to the environment (e.g. oil spill);
- Prevent damage to facilities and vessels; and
- Safely minimise disruption to operations and protect company reputation (Crisis & Business).

11.5.2 *Legal Requirements*

The Asset Crisis Management Plan will be conducted with consideration to the identified laws and regulations for Emergency Management Plan and Crisis Management Plan in *Section 11.1.2*.

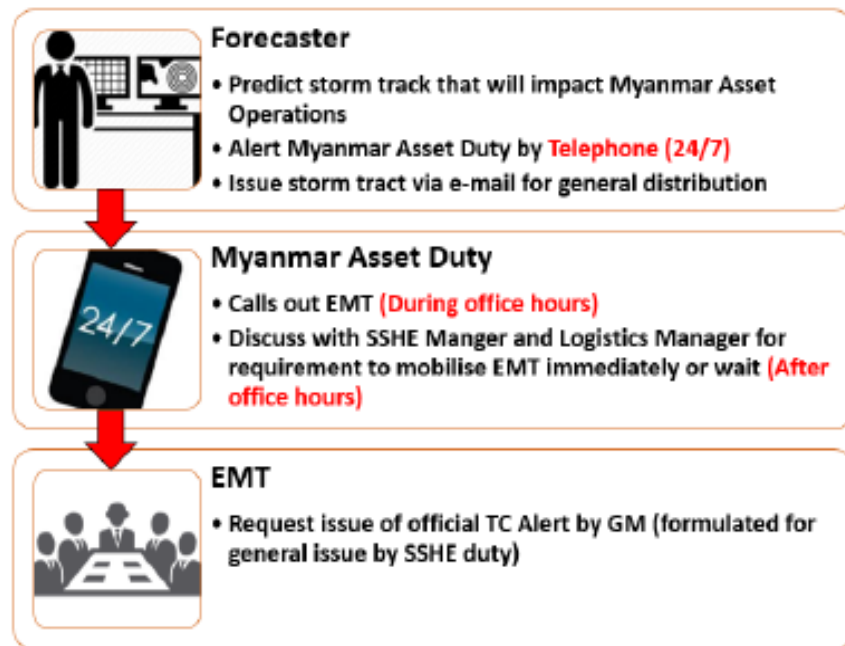
11.5.3 *Implementation Schedule*

PTTEP's Myanmar Asset Tropical Cyclone Procedure (11027-PDR-SSHE-507-R05) applies to the full scope of PTTEP operations in Myanmar as TC can have a significant impact not only on offshore operations but also onshore work sites and domestic office facilities due to the associated risks presented including high winds, increased rainfall, flooding and flash flooding and potential damage to critical infrastructure presented by these natural hazards.

11.5.4 *Management Actions*

Myanmar Asset response to a TC is based on the Assets conventional Emergency Management and Response Teams being assembled and directing appropriate actions. Emergency Management Team (EMT) is convened at EMR in Yangon, Emergency Response Teams (ERT) are convened at the sites concerned. Generally the response structure for a TC is the same as a response to any incident as defined in the Zawtika Offshore Field Emergency Response Plan (Myanmar-0550-PLN-006), Emergency Management Plan (11027-PDR-SSHE-502-006-R00), and Crisis Management Plan (11027-PDR-SSHE-501-005-R00). The make-up of the ERT and EMT are the same as for responding to a major accident or emergency, however IC or EMT Leader for TC response shall be production and Operation support VP or his/her designated person. During an incident, PTTEP will communicate the event to the relevant Myanmar authorities. The Tropical Cyclone (TC) Notification Scheme, as below:

A Tropical Cyclone (TC) will be notified to Myanmar Asset by the following means:



The Alert Zones for PTTEP Myanmar Asset Operations are as follows:

| Alert Zone | Nautical Miles from Installation | TC Travel Time To Myanmar fields (hours-days) | | |
|------------|----------------------------------|---|----------------|----------------|
| | | At 5 Knots | At 10 Knots | At 15 Knots |
| Green | 750 | 150 (6.25 days) | 75 (3.15 days) | 50 (2.08 days) |
| Yellow | 600 | 120 (5 days) | 60 (2.5 days) | 40 (1.66 days) |
| Orange | 450 | 90 (3.75) | 45 (1.8 days) | 30 (1.25 days) |
| Red | 300 | 60 (2.5 days) | 30 (1.25 days) | 20 (0.83 days) |

Personnel category and evacuation strategy for fixed or installations can be mapped as follows:

| Personnel Category | Description | Evacuation Strategy |
|--------------------|---|---|
| A: Green | Visitors to sites | Normally evacuate during Green Alert |
| B: Yellow | Non-essential personnel (e.g. painters, deck hands) | Normally evacuate during Yellow Alert |
| C: Orange | Key personnel (e.g. production, maintenance team) | Normally evacuate during Orange Alert |
| D: Red | Site Skeleton team | Normally evacuated during Orange Alert e.g. last flights. |

11.5.5 *Monitoring Plans*

- Emergency Response Team (ERT) to prepare and report TC readiness monitoring and ensure the report is submitted to Offshore Marine Controller for distribution to Management and Emergency Management Team (EMT);
- When the alert being issued, weather forecast and track update and monitoring should be conducted according to levels of alert as shown in *Table 11.3*.

Table 11.3 *Weather Forecast and TC Monitoring*

| Alert Level | Forecast and Track Update Frequency | Monitoring |
|---------------|--|---|
| Green | <ul style="list-style-type: none"> • 6 hourly weather forecast • Track Visitor to evacuate | <ul style="list-style-type: none"> • Monitor TC path • Monitor storm location and time approaching the rig/barrage/installation |
| Yellow | <ul style="list-style-type: none"> • 6 hourly weather forecast • Track non essential personnel to evacuate | <ul style="list-style-type: none"> • Monitor predicted path of TC and wind/wave conditions at site |
| Orange | <ul style="list-style-type: none"> • 3 hourly weather forecast • Track all personnel to evacuate | <ul style="list-style-type: none"> • Monitor storm location and time approaching the rig/barrage/installation |
| Red | <ul style="list-style-type: none"> • 3 hourly weather forecast • Track no evacuation | |

11.5.6 *Projected Budget and Responsibilities*

The budget for the TC emergency response is within the operational cost of the Project.

The ERT and EMT responsible for conducting the Tropical Storm Management Plan are the same organization as defined in Emergency Management Plan and Crisis Management Plan. However, the Incident Commander (IC)/EMT leader for TC response shall be Production and Operation support VP or his/her designated person.

11.6 WASTE AND WASTEWATER MANAGEMENT PLAN/PROCEDURE

11.6.1 Objectives

A Waste and Wastewater Management Plan will be prepared to outline the methods and practices to meet the requirements of this EMP and applicable regulations.

The objectives of the plan are to:

- Ensure waste is managed in a controlled and appropriate manner in compliance with statutory requirements concerning the management of waste;
- Ensure resources are recovered where possible and safe to do so, for re-use and recycling;
- Detail responsibilities, both offshore and onshore (supply bases) for waste management;
- Outline the appropriate handling, storage, transportation and disposal of waste; and
- Describe the recording and tracking for all wastes generated (i.e. waste manifest).

11.6.2 Legal Requirements

The Waste and Wastewater Management Plan will be conducted in accordance with Myanmar National Environmental (Quality) Emission Guidelines (2015).

Additionally, the Waste Management Plan will be conducted with consideration to the following laws and regulations:

- Myanmar Agenda 21 (1997);
- Environmental Conservation Law (2012);
- Environmental Conservation Rules, (notification no. 50/2014);
- Environmental Impact Assessment Procedure, (notification no 616/2015);
- National Environmental Quality (Emissions) Guidelines, (notification no. 615/2015);
- Petroleum exploration, drilling, appraisal and production law (2019);
- The Oilfields Act (1918) (amended in 2010);
- Conservation of Water Resources and Rivers Law (2006);
- The Protection of Biodiversity and Conservation Areas Law 2018;
- Freshwater Fisheries Law, 1991;
- Waste Management Strategy and Action Plan for Myanmar (2017-2030);
- The International Convention of Pollution from Ships (MARPOL);
- Factories Act, 1951; and

- The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (2015).

Other internal requirements and policies that will govern the conduct of Waste Management Plan includes:

- PTTEP Myanmar Asset Waste Management Procedure (11027-PDR-SSHE-503/01-R02) where it aimed to provide compulsory requirement for effective waste management covers waste management planning, classification, segregation, packing, labelling, storing, transportation, treatment, disposal and reporting. The requirement shall be applied to non-hazardous, hazardous waste and Naturally-Occurring Radioactive Materials (NORM) waste which are generated from PTTEP Myanmar Asset sites;
- PTTEP Myanmar Asset Safety, Security, Health and Environment (SSHE) Policy whereby states their commitment to safe Exploration and Production (E&P) Operations in Myanmar with an ultimate goal of “Target Zero – Nobody Gets Hurts in Our Operations” which covers (1) Zero Injury, (2) Zero Major Accident (e.g. zero major hydrocarbon leak, vehicle accident, ship collision), and (3) Zero Spill or External Complaint (e.g. zero complaint by authorities/communities/sea users); and
- PTTEP Myanmar Asset SSHE Management System (11027-PDR-SSHE-000-001-R01), whereby this document concentrates on SSHE critical activities, ensuring that at Asset Management level they are identified, properly monitored and controlled. By alignment with the Corporate SSHE MS, this SSHE MS is aligned to industry models and ISO 14001 standards.

11.6.3 *Implementation Schedule*

Waste Management Plan will be implemented throughout the entire operation phase of the Project.

11.6.4 *Management Actions*

The following management actions and mitigation measures for controlling and managing waste generated from the Project operation will be undertaken. These actions have been extracted from *Chapter 8* of the EMP Report and summarised as below:

General

- Waste will be handled, stored and transported in a manner that reduces risks to the environment. Different treatment or procedures are provided according to its type;
- Store waste in the secure container with proper label;
- Separate hazardous waste and material from the non-hazardous;

- Labelled all dispose waste;
- All the waste shall be temporarily stored at ZPQ waste storage building. Hazardous waste will be transferred to approved waste management facilities while non-hazardous waste will be sent to disposed at Myanmar Oil and Gas Enterprise (MOGE) or Yangon City Development Committee (YCDC) for final disposal by means of disposal yard and incineration; and
- Keep the records of waste inventories including types and quantities updated.

Hazardous Waste

- Separate hazardous waste from general waste and store in proper labelled container and storage area according to types of wastes;
- Hazardous wastes must be stored in a safe and durable container, suitable for transfer, and be placed in a location far from ignition sources until disposal/treatment;
- Prohibit any discharge of hazardous waste into the sea;
- Used oil and oil-contaminated waste shall be stored separately with labels for disposal;
- Ensure manifest of hazardous waste is kept; and
- Harzadous waste will be stored on the hazardous waste skip then trnasfering to Thaketa Support Base (KTA) for temporary storage and continue to certified or qualified waste management facilities for final disposal.

Non-Hazardous Waste

- Segregate non-hazardous waste including food waste, paper, aluminium can, glass, rag and other wastes in separate containers or proper areas;
- Separate and store each type of waste (separate non-hazardous waste and hazardous waste) into appropriate containers having clear labels;
- General non-hazardous waste will be transferred to (TKA) then immediately delivery to either MOGE or YCDC for final disposal;
- Biodegradable waste (food waste and sweage) will be treated on site in line with MARPOL and dumpted at sea; and
- Recyclable and reusable waste shall be handed over to local villagers for further reuse or recycling shop for further process, as appropriate.

Wastewater

- Treat all domestic wastewater discharge according to Myanmar requirement;
- Large operating vessels (over 400 gross tons) shall comply with the requirements of MARPOL 73/78;
- Operate offshore facilities in compliance with the requirements under MARPOL 73/78 and PTTEP's Myanmar Asset Waste Management Procedure;
- Discharged wastewater requirements as outlined by MARPOL 73/78 and Myanmar's Environmental Quality Emission Guideline;
- Good treatment efficiency of the waste water treatment system. Perform routine inspection and maintenance of waste water treatment system;
- Reduction of oil and grease content in water or wastewater. Use Total Petroleum Hydrocarbon (TPH) onboard analyzer to monitor oil and grease content in water or wastewater prior discharge to sea;
- Produced water will be treated to meet the country regulation (EQEG's criteria) and dump at sea;
- Oil contaminated bilge water shall be de-oiled (i.e. by oil-water separator) prior to discharge into the sea. Discharge water shall contain less than 15 ppm oil content, as per requirements of MARPOL 73/78 Annex IV;
- Oil-contaminated wastewater separated by the Oil Filtering Equipment on vessels over 400 gross tons shall be stored in appropriate drums for disposal onshore as per MARPOL 73/78 requirements;
- Maintain the cleanness of deck to minimise oil and chemical contamination in rainwater;
- Provide drip tray to collect runoff from equipment at all operational areas. Contaminated wastewater shall be treated before discharge to meet MARPOL 73/78 requirements prior discharge to sea;
- Oil absorbent used in case of spill on deck will be stored onboard and disposed as hazardous waste onshore; and
- Sewage shall be treated by a wastewater treatment system on vessels prior to discharge into the sea when in transportation more than 12 nautical miles (22.22 km) from the nearest land.

11.6.5 *Monitoring Plans*

Detail of the monitoring plan for waste management plan, is presented in the below table (*Table 11.4*):

Table 11.4 **Monitoring Detail of Waste Management Plan**

| Type of Waste | Waste Name | Frequency | Monitor |
|---------------------|--|-----------|---|
| Non-hazardous waste | Food Waste | Monthly | <ul style="list-style-type: none"> • Generation Volume • Storage Unit • Disposal |
| | General non-hazardous waste (Mix wastes) | | |
| | Plastic Bottles | | |
| Hazardous waste | Mixed hazardous wastes e.g. contaminated fabric, empty container, etc. | | |
| Wastewater | Wastewater | Monthly | <ul style="list-style-type: none"> • Generation Volume • Storage Unit • Disposal |

Source: PTTEPI, 2019

11.6.6 **Projected Budget and Responsibilities**

The budget for this Waste Management and Wastewater Plan is within the operational cost of the Project.

The responsible parties for conducting this management plan are as follows:

- PMMS (Myanmar Asset SSHE Department);
- PMO/L (Myanmar Asset Logistic Department); and
- Site SSHE or Waste Management Operational Personnel.

11.7 **OCCUPATIONAL HEALTH MANAGEMENT PLAN/STANDARD**

11.7.1 **Objectives**

The objective of the occupational health management plan/standard is to:

- Protect, promote and maintain the health, safety and welfare of people at work
- Advise on the provision of safe and healthy conditions by informed assessment of the physical and psychological aspects of the working environment
- Identify and advise management on the causes of occupational disease and injury and the means of their prevention
- Advise on the rehabilitation and placement in suitable work of those temporarily or permanently incapacitated by illness or injury and
- Assist in the planning and preparedness of emergency response plans.

To achieve these aims, a team approach should be taken by occupational physicians, occupational nurses, industrial hygienists, other occupational health professionals, and administrative and other staff.

11.7.2 Legal Requirements

The system shall be applied to field operations in oil and gas activities, include activity in all of the following:

- Health risk assessment and planning;
- Industrial hygiene and control of workplace exposures;
- Medical emergency management;
- Management of ill health in the workplace;
- Fitness for task assessment and health surveillance;
- Health impact assessment;
- Health reporting and record management;
- Public health interface and promotion of good health; and
- Control of food, water and sanitation issues.

Other internal requirements and policies that will govern the conduct of this management plan includes:

- PTTEP Myanmar Asset Safety, Security, Health and Environment (SSHE) Policy whereby states their commitment to safe Exploration and Production (E&P) Operations in Myanmar with an ultimate goal of “Target Zero – Nobody Gets Hurts in Our Operations” which covers (1) Zero Injury, (2) Zero Major Accident (e.g. zero major hydrocarbon leak, vehicle accident, ship collision), and (3) Zero Spill or External Complaint (e.g. zero complaint by authorities/communities/sea users);
- PTTEP Myanmar Asset SSHE Management System (11027-PDR-SSHE-000-001-R01), whereby this document concentrates on SSHE critical activities, ensuring that at Asset Management level they are identified, properly monitored and controlled. By alignment with the Corporate SSHE MS, this SSHE MS is aligned to industry models and ISO 14001 standards; and
- PTTEP Occupational Health Management Standard (SSHE-106-STD-560).

11.7.3 Implementation Schedule

Occupational Health Management Plan/Standard will be implemented throughout the entire operation phase of the Project.

11.7.4 *Management Actions*

The following management actions and mitigation measures for minimizing impact towards occupational health will be undertaken. These actions have been extracted from *Chapter 8* of the EMP Report and summarised as below:

Implement relevant components of PTTEPI's SSHE Management System (Annex A), including the following:

- Implement PTTEPI's Occupational Health Management Standard.
- Ensure that all employees wear appropriate PPE, and implement PTTEPI's Personal Protective Equipment Standard.
- Personnel will be provided with safety training to ensure that all workers practice under safety operation and regulation of work, as per PTTEPI's SSHE Training & Competency Standard.
- Implement PTTEPI's Safety Case Standard.
- Implement PTTEPI's Life Saving Program Standard.
- Implement PTTEPI's Offshore Medical Emergency Response Plan (MERP).
- Implement PTTEPI's Crisis Communications Plan.
- Provide first-aid kits and first-aid rooms on ZPQ.
- Provide proper sanitary systems including drinking water, potable water, toilet, and waste management.
- Cooperate with the nearest health center/hospital in order to immediately support response to emergency events, as per PTTEPI's MERP.
- Provide detailed method for working with machines/equipment.
- Provide detailed for safety operation.
- Provide SDS for all chemicals present on site (including storage area and transfer vehicles).
- Carry out routine inspection and preventive maintenance for all machinery as per maintenance schedule/ recommended by manufacturers.
- Provide personal protection equipment (PPEs/ear muff/ear plug) to workers working on high level noise activities.
- Provide warning labels/signs and limit working duration in high noise area.
- Ensure all safety equipment is moved to operable locations when the burner is installed.
- Ensure that there are instructions and procedures on how to quickly shut down the burner to prevent a possible ignition, in case of gas release on WP-1.
- Ensure area lighting is adequate for operation.

- Provide radios to operators to inform operations to stop burning when necessary.
- Ensure all firefighting equipment including fire hose reel are ready to use at location.
- Inspect the burners for damage to pumps, connections, hoses etc., as a part of a pre-start up process.
- Check the air consumption of the burner package and pumps to ensure adequate air flow and no conflict with ZPQ operations.
- Ensure that firewater system is pressure tested.
- Ensure that operations are continuously manned.
- On loss of water to firewater system, stop burning immediately.
- Install CCTV to enable constant monitoring of burners.
- Ensure that adequate fire detection equipment is installed and operable.
- Burning is only to be allowed to take place according to schedule only, (during daylight hours).

In case of emergency or major health care is needed, the site doctor will conduct stabilization treatment; once completed, PTTEP will transport the patient via MEDEVAC helicopter to shore and to a hospital for further treatment.

11.7.5 *Monitoring Plans*

Detail of the monitoring plan for Occupational Health Management Plan, is presented in the below table (*Table 11.5*):

Table 11.5 *Monitoring Detail of Occupational Health Management Plan*

| Monitoring Aspect | Parameters | Method | Location | Monitoring Frequency |
|---------------------|--|-------------------------|-------------------------|---------------------------------------|
| Occupational Health | <ul style="list-style-type: none"> • Determined case-by-case • Injury or incident case | Determined case-by-case | Determined case-by-case | Monitor when concerns has been raised |

Source: PTTEPI, 2019

11.7.6 *Projected Budget and Responsibilities*

The budget for this procedure is within the operational cost of the Project.

The budget for this procedure is within the operational cost of the Project. The responsible party for conducting this management plan is PTTEPI

11.8 COMMUNITY SAFETY, SECURITY, HEALTH AND ENVIRONMENT MANAGEMENT PLAN

11.8.1 Objectives

The objective of a community Safety, Security, Health, and Environmental (SSHE) Management Plan is to provide a clear procedures and processes which will be conducted throughout the Project operation to monitor and measure the effectiveness of mitigation and management plans implementation. This will aim to reduce the negative impacts towards the community health and safety while maximizing area for positive contribution. Currently, there is no community found nearby the offshore operation area, however Occupational Health Management Plan will be implemented for Public Health Management to achieve the aim of protecting integrity of public health.

11.8.2 Legal Requirements

The Community, Safety, Security, Health and Environment Management Plan will be conducted with consideration to the following laws and regulations:

- Public Health Law, 1972;
- Protection and Prevention of Communicable Disease Law, 1995;
- Labour Organisation Law, 2011;
- Minimum Wages Law, 2013;
- Employment and Skill Development Law, 2013;
- Settlement of Labour Dispute Law, 2012;
- Workmen Compensation Act, 1923;
- Payment of Wages Law, 2016;
- Leaves and Holidays Act, 1951; and
- Social Security Law, 2012.

Other internal requirements and policies that will govern the conduct of this management plan includes:

- PTTEP Myanmar Asset Safety, Security, Health and Environment (SSHE) Policy whereby states their commitment to safe Exploration and Production (E&P) Operations in Myanmar with an ultimate goal of “Target Zero – Nobody Gets Hurts in Our Operations” which covers (1) Zero Injury, (2) Zero Major Accident (e.g. zero major hydrocarbon leak, vehicle accident, ship collision), and (3) Zero Spill or External Complaint (e.g. zero complaint by authorities/ communities/ sea users).

11.8.3 Implementation Schedule

This management plan will be implemented throughout the Project operation phase.

The following management actions and mitigation measures for community SSHE will be undertaken to minimise the impact generated by operation of the Project. These actions have been extracted from *Chapter 8* of the EMP Report and summarised as below:

- Hiring of locals from “affected communities” in semi-skilled and unskilled jobs;
- Announce job vacancies positions in advance through local sources;
- Ensure transparent recruitment procedures;
- Provide training to locals;
- Support local business by sourcing material from local and national business;
- Provide awareness on local culture and customs as part of worker induction training;
- Continue CSR ;
- Initiate or support development programs that catered to the local need;
- Implement PTTEP Corporate’s Grievance Handling Guideline;
- Develop and implement a waste management plan to ensure adequate and legally acceptable control and management of transport and responsible disposal of all waste onsite and offsite are in place;
- Frequently communicate with related community and sensitive receptor for good relationship;
- Provide health workers and clinics on-site;
- Provide a referral to nearby hospitals;
- Provide awareness on health training to all workers;
- Implement vector control measurements (i.e. fumigation for mosquitoes);
- Provide Safety Data Sheet (SDS) for all chemicals present on site;
- Hire or train workers for qualification of transport, use, and disposal of hazardous material;
- Inform communities about Myanmar Asset Emergency Management Plan in detail; and
- Set up warning signs, lighting, and fences as proper to warn locals of access road and the pipeline safety zones.

11.8.5 *Monitoring Plans*

Table 11.6 *Monitoring Detail of Occupational Health Management Plan*

| Monitoring Aspect | Parameters | Method | Location | Monitoring Frequency |
|-----------------------------|--|-------------------------|-------------------------|---------------------------------------|
| Community Health and Safety | <ul style="list-style-type: none"> Determined case-by-case Injury or incident case | Determined case-by-case | Determined case-by-case | Monitor when concerns has been raised |

Source: PTTEPI, 2019

11.8.6 *Projected Budget and Responsibilities*

The budget for this procedure is within the operational cost of the Project.

The budget for this procedure is within the operational cost of the Project. The responsible party for conducting this management plan is PTTEPI.

11.9 *MAINTENANCE PLAN*

Depending on the equipment, there are different maintenance schedules such as weekly, monthly, 3 monthly, 6 monthly, yearly and so on according to their respective manufacturing instruction/manual. PTTEP will ensure all maintenance activities for all equipment are conducted appropriately, and according to schedule.

Pipeline maintenance will be conducted according to the Pipeline Integrity Management System (PIM), which also presides over three (3) parts as follows:

- 1) Corrosion Management (As per Myanmar-13264-GDL-028: Zawtika Corrosion Management Guideline)
 - o Corrosion management activities and their frequency are listed in *Table 11.7*.
- 2) Inspection (As per Myanmar-13264-GDL-192: Pipeline Internal Inspection Guideline and PTTEP Corporate PEGS Pipeline External Inspection Guidelines)
 - o Inspection activities and their frequency are listed in *Table 11.8*.
- 3) EPRS (Emergency Pipeline Repair System as per PTTEP Corporate PEGS guidelines)
 - o As per PTTEP Corporate EPRS guideline, all EPRS materials were purchased and stocked at RSB - Ranong Supply Base, Ranong, Thailand.

Table 11.7 Corrosion Management Activities

| No | Activity Description | Purpose of Activity | Frequency of Activity |
|----|---|----------------------|--------------------------------------|
| 1 | Corrosion Probe | Corrosion Monitoring | Every 1-2 months |
| 2 | Residual Corrosion Inhibitor | Corrosion control | Monthly |
| 3 | Residual Iron Content | Corrosion Monitoring | Monthly |
| 4 | Residual Free Chlorine | Corrosion Monitoring | Monthly |
| 5 | SRB - Sulphate Reducing Bacteria monitoring | SRB monitoring | Monthly |
| 6 | BiDi Cleaning | Corrosion Control | Every 4 months + With MFL inspection |

Table 11.8 Inspection Activities

| No | Activity Description | Purpose of Activity | Frequency of Activity |
|----|--|------------------------------|-----------------------------------|
| 1 | In Line Inspection-ILI (Magnetic Flux Leakage - MFL Inspection) | Pipeline Internal Inspection | Every 5 Year or PIM study results |
| 2 | Remotely Operated Vehicle (ROV) Inspection (Note - Freespan Rectifications are performed after ROV inspection and Freespan analysis Study) | Pipeline External Inspection | Every 5 Year or PIM study results |
| 3 | Pipeline Riser Part inspection (Above MSL - Mean Sea Level) | Riser Inspection | Every 1 Year and 5 Year |

The budget for implementation of the following sub-plans are included in the operational cost as stated in the EIA, and therefore is not possible to separate the budget for each of the project sub-plan individually.

PTTEPI has an SSHE Training & Competency Standard. The purpose of this PTTEPI SSHE Training and Competency Standard is to ensure that:

- SSHE Training and Competency requirements defined for each position are appropriate to the workplace, job and risks involved.
- Ensure that these requirements are translated into reality by developing an appropriate programme of competency assessment and training.
- Ensure that personnel competency standards are established and personnel competencies assessed against those standards.

There are the following specific requirements within PTTEPI's Training and Competency Standard:

- For all persons working offshore require T-BOSIET with Emergency Breathing System (EBS) and Travel Safely by Boat (TSB). Four year refresher at an OPITO approved training provider. Persons without the Emergency Breathing System (EBS) or Travel Safety by Boat (TSB) can still go offshore. Thailand equivalent courses are acceptable but personnel are recommended to attend the OPITO course as soon as practicable.
- All persons working offshore (Category B or C) require International Minimum Standard Safety Training (IMIST OPITO approved course). For those personnel working on drilling rigs this is recommended. IMIST is an e-learning based course.
- All personnel who visit or work on ZPQ require during the first day on board a specific free fall lifeboat induction including how to board and how to be secure inside the lifeboat. This needs refreshing annually for all personnel. This is a practical course including entering the lifeboat.
- ZPQ coxswains must attend the OPITO Offshore Lifeboat coxswain training for Freefalls. Refresher two years.
- E-learning is in many cases the preferred training method for routine SSHE training.
- Where they exist, OPITO Competence Standards are the basis for the training and competence requirements within PTTEPI. Attention is drawn to OPITO Guidance for 'Effective Management of Competence and Training in Emergency Response in the Oil and Gas Industry.'

13.1 SUMMARY OF PREVIOUS PUBLIC CONSULTATION CONDUCTED DURING ESHIA

As part of the ESHIA carried out by Pro-En Technologies, Ltd., in 2010, public consultation activities were conducted. Details of these activities are presented in this section. It is noted that many of the public consultation activities were focused on the onshore components of the Zawtika Project. However, given the interconnected synergy between offshore and onshore activities, the consultations are still relevant to the offshore activities as well.

13.1.1 Purpose of the Public Consultation

The purpose of the previous Public Consultation activities was to:

- Inform relevant stakeholders of the project details and to get feedback, suggestions and recommendation from such stakeholders;
- Study the general social and health conditions of the relevant stakeholders of the project;
- Provide the information to stakeholders and to gain an appreciation and understanding of the project and to qualify and quantify socially sensitive receptors; and
- Assess potential positive and negative impacts of the project on social and health conditions and to propose mitigation measures to minimize or eliminate impacts.

13.1.2 Methodology and Approach

The public consultation activities were conducted during January 10-11 2009. Activities primarily consisted of focused group discussion meetings with the targeted communities, in-depth interviews with key informants of each community, community visits and interviews with questionnaires for household level.

13.1.2.1 Study Area

The study area focused on Daminseik communities where the offshore pipeline connected with onshore pipeline route, and especially the fishery concessionaries Block D18 to D24 from the Department of Fisheries, Myanmar and Fishing Companies, Thailand.

13.1.2.2 Stakeholder Identification

Prior to conducting the survey, key stakeholders were identified based on project location and potential impacts from project activities in order to ensure that the samples were representative.

Based on screening and stakeholder identification, the following key stakeholders were focused on for the consultation activities:

- Community leaders of target community which comprise of the Village Peace and Development Chairman (VPDC) of Daminseik village and other key participants.
- Key informants of the community (School master, Doctor).
- Government agencies such as MOGE and the Department of Fisheries, Myanmar.
- Head of households in Daminseik local communities.
- Fishing concessionaires and fishing companies.

13.1.2.3 Population Size and Sample Distribution

Sample size was statistically analyzed from a total number of households in each target community or from 1,788 households. The Taro Yamane method (1970) was applied to estimate sample size. The number of samples in each community was determined depending on zone of influence or location of each target community along the Zawtika onshore gas pipeline route. The number of samples collected from each community is shown in *Table 13.1*.

Table 13.1 *Number of Samples Collected from Each Community*

| Community | Number of Household | Number of Target Samples | | |
|--------------|---------------------|--------------------------|----------------------------------|--------------------------|
| | | Sampling Proportion (%) | No. of Samples as Planned (±10%) | No. of Samples Collected |
| Daminseik | 110 | 20 | 72-88 | 96 |
| Phaungdaw | 455 | 15 | 54-66 | 86 |
| Kaunghmu | 230 | 15 | 54-66 | 70 |
| Ohnbinkwin | 550 | 20 | 72-88 | 96 |
| Mighaungaing | 400 | 15 | 54-66 | 79 |
| Shinbyan | 43 | 15 | 54-66 | 61 |
| Total | 1,788 | 100 | 360-400 | 478 |

The field survey during public consultation primarily consisted of focus group meetings and interviews with questionnaires, as follows:

1. Focused Group Meeting

This method was used with the concerned community leaders, referred to as Village Peace and Development Chairman (VPDC) of each target community and the key informants in each community such as school masters, teachers, doctors and related local government agencies.

The focused group meetings in the Daminseik area were conducted during January 10-11 2009 in order to disseminate project information, obtain cooperation and support in terms of community data and information and a sharing of viewpoints on the project.

The topics discussed and information disseminated during the consultation meetings with stakeholders included project information, socio-economic data, environmental/cultural resources, health data and opinion/suggestion including recommendations to the project operation.

2. Consultation Meeting with the Representative of Department of Fisheries, Myanmar

The appointment with the representative of the Myanmar Fishery Office, Mr. Hla Win, Dy. Director – General (Rtd.), Department of Fisheries and Advisor of Myanmar Fisheries Federation, was held in Yangon, Myanmar on January 22, 2010.

The meeting aimed to inform him about the project, disseminate project information, give him the tentative schedule and get his opinion, explore details of fishing ground areas and fishing companies who granted the fishing blocks and get his suggestions and recommendations toward the project.

3. Consultation by Telephone with the Fishing Companies

Based on data obtained from the consultation meeting, there are three (3) fishing companies granted fishing rights of Myanmar offshore fishing areas offcoast of Thanintharyi Division, i.e. Siam Jonathan, Saeng Arun Fishing and Ryuji International (Thailand), all of which are Thai companies.

The meeting was made with representative of *Siam Jonathan, Mr. Jirawat Supaseanand and Mr. Chai*, using telephone interview on February 15, 2010.

The meeting aimed to inform about the project, disseminate project information, give them the tentative schedule and get their opinion,

explore details of fishing status, and perceive opinions, suggestions and recommendations toward the project.

4. Interview with Questionnaire

Interviews were performed with the head of the households and the owner of the commercial units in each target community. The survey was performed using a social and health questionnaire, which collected key information on Demographics, Livelihood and Socio-economics, and Health.

Structure of the questionnaire consisted of personal description of interviewee, Description of household member, Description of land, house and settlement, Description of household occupation and economy, Public health and use of local amenities and Marketing survey.

13.1.2.5 *Data Evaluation and Analysis*

Data from the survey was analyzed by SPSS software. The results were interpreted using in-depth interview data to describe the existing socio-economic and health conditions of each community.

13.1.3 *Summary of Consultation Activities Carried Out*

A schedule of the stakeholder engagement and public consultation activities carried out is shown in *Table 13.2*.

Table 13.2 *Details of Stakeholder Engagement and Public Consultation Activities*

| Date | Location | Stakeholders | Main Events and Tools | Number of participants | Objectives |
|----------------|-----------|--|--|--|--|
| 10-11 Jan 2009 | Daminseik | <ol style="list-style-type: none"> 1. Village Peace and Development Chairman (VPDC) and master of Daminseik village and other key participants. 2. Master of Daminseik post primary school. 3. Key informants such as household leader, fishermen and rubber tree agriculturalists. | <ul style="list-style-type: none"> • Focused group meeting • Consultation meeting • Interview with questionnaires | <ul style="list-style-type: none"> • Approximately 20 people • 2-3 people • 96 households | <ul style="list-style-type: none"> • Introduce project and project operator. • Disseminate project information, impact and benefits to local. • Get feedback, suggestion and recommendation toward the project. • Collect socio-economic and health data of the community. |
| 22 Jan 2010 | Yangon | <ol style="list-style-type: none"> 1. Representative of Department of Fisheries, Myanmar and Myanmar Fisheries Federation. | <ul style="list-style-type: none"> • Consultation meeting | <ul style="list-style-type: none"> • 5 people | <ul style="list-style-type: none"> • Inform of project activity. • Explore key issues and concerns of stakeholder regarding fishing activity. • Get feedback, suggestion and recommendation toward the project. |
| 15 Feb 2010 | Bangkok | <ol style="list-style-type: none"> 1. Fishing companies who granted offshore fishing area from Myanmar government. | <ul style="list-style-type: none"> • Consultation meeting by telephone | <ul style="list-style-type: none"> • 3 people | <ul style="list-style-type: none"> • Inform of project activity. • Explore key issues and concerns of stakeholder regarding fishing activity. • Get feedback, suggestion and recommendation toward the project. |

13.1.4

Summary of the Results from Public Consultation

The public consultation activities were conducted with input and coordination from all stakeholders such as community leaders, school masters, doctors/public health officers, government agencies from PTTEPI, Pro-En, MOGE and subcontractor GEOCOMP, and the target stakeholders of Daminseik communities.

Feedback, recommendations and suggestions from all participants regarding environmental, socio-economic and health mitigation measures are summarized in *Table 13.3* and *Table 13.4* below:

Table 13.3 *The Findings from the Meeting*

| Date/ Locations | Participants | Results from the meeting |
|--|--|--|
| January 10, 2009 | | |
| Daminseik village at Village hall | <ul style="list-style-type: none"> - VPDC Chairman - VPDC's Secretary - VPDC's member - Fire Brigade staff - Villagers - ESHIA team <i>No. of participants was 15 people</i> | <ol style="list-style-type: none"> 1. The participants agreed with the project. 2. Community requested support from the project on the following issues; <ul style="list-style-type: none"> - Local employment - Improve the public health system - Support school activity - Support new generator. 3. Community concerned was fire especially in the dry season. |
| January 11, 2009 | | |
| Daminseik village at <ul style="list-style-type: none"> - Daminseik School - Health care center - Fishery group | <ul style="list-style-type: none"> - School master - Doctor - Fishermen - ESHIA team <i>No. of participants was 3 people</i> | <ol style="list-style-type: none"> 1. The participants agreed with the project. 2. They requested for project support on educational and medical tools. |

Source: Pro-En Technologies Limited, 2009.

Table 13.4 *Summary of the Findings from the Consultation with the Department of Fisheries, Myanmar and Fishing Company*

| Topic of Discussion | Finding results from the meeting |
|---|---|
| Department of Fisheries, Myanmar | |
| 1. Project information | <ul style="list-style-type: none"> No question on project information because the department was familiar with oil and gas activity. Require more information on exact pipeline routes and construction schedule. |
| 2. Fishing data | <ul style="list-style-type: none"> There are 2 patterns of fishing in Myanmar waters, fishing right and joint venture. In Tharnintharyi offshore (project area), apart from local vessels, there are 700 fishing boats from 3 fishing companies granted commercial fishing rights in Myanmar waters. All are Thai companies and are as follows; <ul style="list-style-type: none"> - Siam Jonathan 500 fishing boats. - Ryuji International (Thailand) 100 fishing boats. - Saeng Arun Fishing 100 fishing boats. |
| 3. Recommendations towards the project | <ul style="list-style-type: none"> The government is pleased to cooperate with PTTEPI and think that there will be no problem or impact to the fishery. It is not required to contact all fishing companies regarding project construction. The Department of Fisheries will inform to all relevant fishing companies. He requested to send project details of the pipeline route and project schedule to the department prior to commencing construction. |
| Fishing Company | |
| 1. Project information | <ul style="list-style-type: none"> No question on project information but require construction schedule to inform to all joint fishing boats. |
| 2. Fishing data | <ul style="list-style-type: none"> The company is licensed for 500 fishing boats but currently only 300 fishing boats operate. Some of the fishing area is close to the project location. Fishing season is during October to December on each year. |
| 3. Recommendations towards the project | <ul style="list-style-type: none"> No recommendations or suggestions towards the project. |

Source: Results from interview on 15th February 2010, Pro-En Technologies Limited, 2010

PTTEPI took the above points into consideration when preparing mitigation measures for the Project.

13.2 ONGOING AND FUTURE CONSULTATION

Currently Zawtika Offshore Project is in the operation phase of gas production for domestic use and export to Thailand. There are a number of ongoing consultation activities onshore near Daminseik village, Kanbauk village, Yebyu Township and Dawei Township for Zawtika Operation as well as other project drilling activities. Therefore, PTTEP maintain good relationship and understanding with the surrounding communities and Government Authorities. These ongoing activities include project information disclosure,

grievance procedure, and corporate social responsibility (CSR) activities, which are summarized in this section

13.2.1 Project Information Disclosure

PTTEPI's Project Information Disclosure for this project will provide information on environmental, social and health as per regulatory requirements.

PTTEPI will disclose any reports or documentation (such as this EMP) on their company website (<https://myanmar.pttep.com>), as well as at the PTTEPI office in Yangon, if required by Myanmar authorities. MONREC will also disclose all EMP, IEE and EIA reports on their website accordingly.

13.2.2 Grievance Procedure

A grievance, or opportunity to comment, mechanism will be created by the Project Proponent so that stakeholders can raise questions or concerns with the Project and have the concerns addressed in a prompt and respectful manner. Should a grievance or complaint be made, the complaint/grievance will be received by a Community Liaison Officer or similar. The grievance will be recorded and investigated and responded to. Should the complainant not accept the response, a review will be carried out. Once resolved, the grievance will be closed out and recorded in the grievance register.

13.2.2.1 Purpose

The aim of Grievance Handling Guideline is to establish a formal process allowing people, communities or groups to raise complaints regarding any impact related to activities of PTTEPI or its subsidiaries, and also to ensure that these complaints are addressed and resolved appropriately.

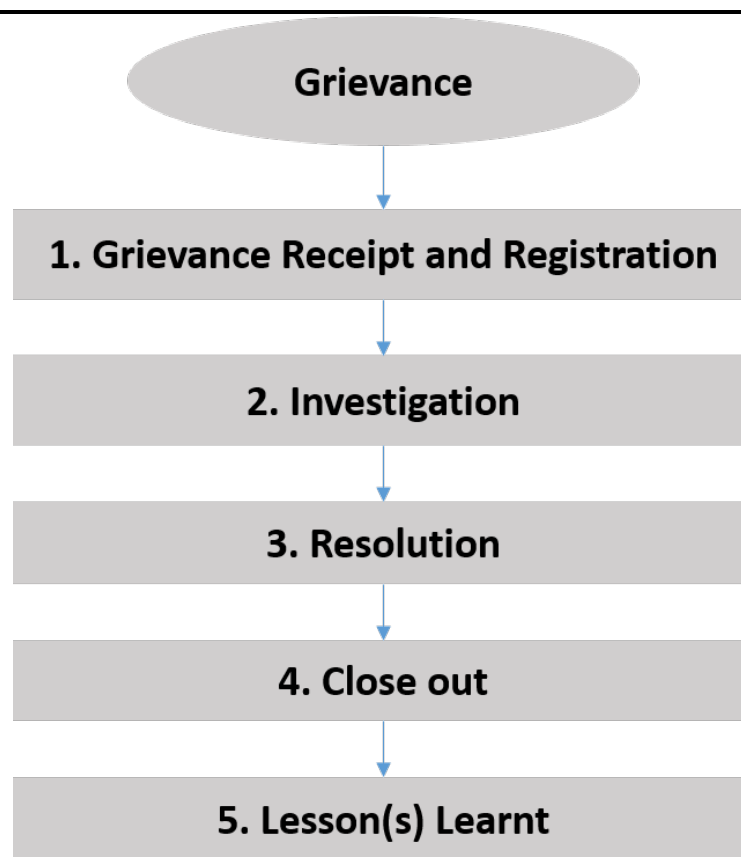
The Guideline included many topics from personnel roles and responsibilities, grievance process and registration to the investigation, resolution, and closeout process (Accepted or Rejected).

13.2.2.2 Grievance Handling Process

There is two (2) forms of data collection in the grievance handling process. On one hand, the Grievances will be record all grievance throughout the process in the Grievance Record Form. On the other hand, the grievance management process will be record with PTTEP web based Incident Management System (IMS). The tool will track and record all the processes from the grievance registration to closeout.

The Grievance Handling Process is presented in *Figure 13.1*

Figure 13.1 *Grievance Handling Process*



Source: PTTEP, 2019, modify by ERM, 2019

This Grievance Handling Guideline is applied to all of PTTEP's assets, domestic and international, and covers the entire lifecycle of the assets or operations from inception through decommissioning and abandonment. PTTEP's Grievance Handling Guideline, which defines all scope and processes of the grievance process in detail.

13.2.3 *Corporate Social Responsibility (CSR) Activities*

There are currently a number of ongoing CSR activities taking place by PTTEPI under the Zawtika Project. These activities have the objective to uplift quality of life and gain favourable relations from all stakeholders in the operating area. The CSR program for the Zawtika Project consists of 3 main sectors: "Health, Education and Community Development Sector".

The CSR budget for this Project is required to be approved by MOGE annually, PTTEP will therefore propose approximately 500,000-600,000 USD which is similar amount with previous years; however, this can vary depending on MOGE's approval. The CSR budget used for 2019 was 588,500 USD; therefore, the proposed budget for 2020 is nearly 600,000 USD. The budget is planned to be used for continuing the development of work program, which includes:

- Higher Education Assistance for Development Scholarship
- Educational Program
- Parasite Free School Program
- Construction of Public Infrastructure or Utility
- Waste to Energy Program
- Monastery support
- Community support and Emergency relief
- High Vocational Diploma Scholarship
- Monastery / Cultural Support
- Charitable CSR Activities among Staff & Family, Government, Contractors
- Technical Capability Building and Development Program incorporative with Ministry of Energy and Ministry of Labor

The above listed work program and budget will be implemented based on approval from MOGE.

Full details of the program can be found in *Annex E*. All CSR activities are conducted in compliance with MOGE's Guidelines for Implementation of CSR Programmes, which is shown in *Annex F*.

14.1 SCHEDULE

As stated, construction, preparation, and drilling phases have already taken place for this Project, and Phase 1A and Phase 1B are ongoing for the production phase which infill well drilling may be proceeded for the remaining slot of existing wellhead platform in order to maintain the gas production from Zawtika project.

14.2 COSTS FOR IMPLEMENTATION

The costs for implementation of mitigation measures are included within PTTEPI's operation costs, and are therefore not possible to individually specify, but PTTEPI has estimated the cost to be over 1 million USD per year for all mitigation measures.

The estimated costs for implementation of the annually monitoring program is 100,000 USD and Tri-annually program is 500,000 USD due to high cost of seawater and sediment monitoring. In addition, the total contribution on CSR from 2009-2018 was 4,591,729 USD and the CSR budget used for 2019 was 588,500 USD. The planned CSR covered a varied area within Myanmar (e.g. the operating areas, and Yangon). The type of project is be divided into four categories: basic needs, education, culture, and environment.

Example of the projects from each category are as follows:

- Parasite Free School Program: a basic needs theme project with the objective to reduce parasite infection rate of the students in the project area. About 5,000 students in 35 schools benefit from the program. The program also won Stevie Award in 2016.
- Technical Capability Building and Development: an education theme project with the objective to increase the supply of local skilled workers for Myanmar's development. The project initiated by corporate with the Skill Training Center (Yankin) focusing on three training courses: welding, electrical and Air con installation, and National Skill Standard Authority (NSSA) level (2) assessment occupation. About 900 labours has been trained.
- Annual Kathina and Monastery Support: a cultural theme project that provide fund raising activities for monastery and cultural and tradition activities. Natural Resources Preservation Support Program: an environment theme program through financial supporting to Tanintharyi Natural Resource Project (TNRP): tree plantation project.

More details about CSR project were present in *Annex E*.

Revision Notes for the Comments from the ECD

| Comment no. | Additional ECD Findings | Additional ECD Comments | Responses and Revisions |
|--|--|---|--|
| 1. Executive Summary | | | |
| - | - | - | - |
| 2. Project Information | | | |
| 2.1. | In section 3.4.1.1, described that "Produced water is discharged overboard with maximum oil in water of 40 ppm". | To describe separately that maximum oil in water of 40 ppm is for one day or for 30 days. | <ul style="list-style-type: none"> Revised in section 3.5.3.1 (1) Added 42 mg/l which is for one day according to EQEG. |
| 2.2. | In section 3.6.1, flaring system has been described | To provide the amount of flaring and to describe about the flaring gas metering system (whether it is available or not). | <ul style="list-style-type: none"> Revised in section 3.5.1 Revised by adding further information on the flaring which includes the flare pressure, temperature, and capacity. |
| 2.3. | Table 3-6 Described Non-Hazardous, Hazardous (General) and Hazardous (Oil) etc. | <p>According to Table 3-5, each waste and wastewater amount should be described.</p> <p>- Like explanation in Produced Water Produced Sand treatment and EQEG guideline compliance should described.</p> <p>- Ship back to shore and dispose by the certified and qualified waste management contractor" should described in details.</p> | <ul style="list-style-type: none"> Revised in section 3.5.3 and its sub-sections and Annex B (Detail and process of the sewage treatment system) Revised by adding on board sewage treatment system diagram, referencing of produced wastewater management with reference to EQEG Adding detail on the licensed waste contractor and authorized waste disposal facilities (DOWA). |
| 3. Maps and Figures | | | |
| - | - | - | - |
| 4. Policy, Legal and Institutional Framework | | | |
| 4.1. | Table 4-3 described about obsolete/lifted law. | To update law from Table 4.3 and to include section that Project Proponent have to comply from each law. | <ul style="list-style-type: none"> Revised in section 4.2.1.5, table 4.3 Revised to update law that the Project Proponent have to comply |
| 5. Description of Surrounding Environment | | | |
| - | - | - | - |
| 6. Impact and Mitigation Measures | | | |
| - | - | - | - |

| Comment no. | Additional ECD Findings | Additional ECD Comments | Responses and Revisions |
|-----------------------------------|--|---|--|
| 7. Monitoring Program | | | |
| 7.1. | Mud and Cuttings, Produced Water, Produced Sand and Sewage monitoring schedule has been described in Monitoring Program which is in Chapter 10 of Monitoring Reporting Requirements. | <p>Table 9-1 to include the following</p> <ul style="list-style-type: none"> - Air Quality monitoring - Noise Emission monitoring - Water Quality and Seabed Sediment monitoring (Note: Water Quality and Seabed sediments monitoring (frequency) to be described according to International Practice. - Table 10-1 to include the following Monitoring <ul style="list-style-type: none"> > Waste generation > Commercial Fishery Interaction | <ul style="list-style-type: none"> • Revised in chapter 9 and table 9.1 • Revised by adding monitoring detail for air quality, noise, water quality, sediment quality (this is also reflected in section 1.7) • Revised in section 10.1 and table 10.1 by adding waste generation and commercial fishery interaction as part of the monitoring report |
| 7.2. | In Response Table provide Section 9 (page 156-157), however there is no information at described section. Table 9-1 described that PTTEPI via Authorized Contractor. | PTTEPI to provide which organization will undertake Monitoring Program and also need to describe their roles and responsibilities. | <ul style="list-style-type: none"> • Revised in chapter 9 and table 9.1 • Revised by adding foot note of PTTEP will choose the authorized contractor by bidding process time by time throughout the project life-span. |
| 8. Waste Management Plan | | | |
| 8.1. | In Section 1.3, Table 1-2 and Section 3.6.3 Table 3-6 described additional information. Annex A-2 Myanmar Asset Waste Management Procedure also included. | <p>- Apart from Annex A-2 Myanmar Asset Waste Management Procedure, Section 1.3, Section 3.6.3 and Annex A-2 should be combined and clearly described as compact Waste Management Plan.</p> <p>- Produced Water, Produced Sand and Sewage discharge from this project should provide (daily or monthly)</p> <p>- To provide treatment details of wastewater.</p> <p>(Remark: Waste Management Plan should described as Sub-Plan according to EIA Procedure Article 63 (h) (6).</p> | <ul style="list-style-type: none"> • Revised in section 11.5 • Revised by revising content but PTTEP Myanmar Asset Waste Management Procedure have been removed from Annex A |
| 9. Emergency Response Plan | | | |
| 9.1. | Spill Response Plan has not been described. | <p>- In Chapter 11, Emergency Plan to describe as Sub-Plan according to EIA Procedure 63 (h) (6).</p> <p>- To summarize only key content from Emergency Plan to provide in Sub-Plan (e.g., to describe Myanmar Asset's Emergency</p> | <ul style="list-style-type: none"> • Revised in chapter 11 • Revised by adding sub plan details with reference to Spill Contingency Plan, Emergency Management Plan and Crisis Management Plan (with note that during an |

| Comment no. | Additional ECD Findings | Additional ECD Comments | Responses and Revisions |
|--|---|---|---|
| | | Management Plan is for which kind of emergency etc.) - Myanmar Asset Spill Contingency Plan to describe in Annex - Myanmar Asset's Emergency Management Plan, Myanmar Asset Spill Contingency Plan to include that company will inform to concern Myanmar Government if there is any emergency. | incident, PTTEP will communicate the event to the relevant Myanmar authorities) • Added contact information of Myanmar authorities in case of spills. |
| 10. Corporate Social Responsibilities (CSR) | | | |
| 10.1. | CSR Program for the Zawtika Project has been described in Annex E. | To provide the future plan, budget (estimated) information. | <ul style="list-style-type: none"> Revised in section 13.2.3 Revised by adding budget estimated for 2020 |
| 10.2. | 2019 budget information has been described. | To provide the future plan, annual budget (estimated) information. | <ul style="list-style-type: none"> Revised in section 13.2.3 Revised by adding budget estimated for 2019 |
| 11. Occupational Health, Safety, Environmental and Security Management Plan | | | |
| 11.1. | As Zawtika Offshore Project is long term project, Occupational Health, Safety, Environmental and Security Management Plan shall have it. | To provide Occupational Health, Safety, Environmental and Security Management Plan. (Remark: To provide as Sub-Plan according to EIA Procedure 63 (h) (6).) | <ul style="list-style-type: none"> Revised in section 11.6 Revised by adding sub plan for Occupational Health, Safety, Environmental and Security Management Plan |
| 11.2. | As Zawtika Offshore Project is long term project, Occupational Health, Safety, Environmental and Security Management Plan shall have it. | To provide additional Community Health, Safety, Environmental and Security Management Plan. (Remark: To provide as Sub-Plan according to EIA Procedure 63 (h) (6).) | <ul style="list-style-type: none"> Revised in section 11.7 Revised by adding sub plan for Community Health, Safety, Environmental and Security Management Plan |
| 12. Control and Maintenance Plan | | | |
| 12.1. | Onshore EMP described about Subsea Pipeline Control and Maintenance, therefore, Offshore EMP should describe about Control and Maintenance of Subsea pipeline | To include Control and Maintenance as Sub-Plan in Offshore EMP. (Remark: Apart from Control Maintenance, Platform Maintenance also need to include in this Offshore EMP) | <ul style="list-style-type: none"> Revised in section 11.8 Revised by adding detail of the maintenance plan as sub plan |

| Comment no. | Additional ECD Findings | Additional ECD Comments | Responses and Revisions |
|-------------|--|-------------------------|--|
| 13. General | | | |
| 13.1. | Annex to include in the Table of Contents with arrangement. To check and correct the title of Annex A6 and Annex A-7 which are the same. | - | <ul style="list-style-type: none"> • Revised in section 1 • Annex A6 and Annex A-7 have been removed • Revised according to ECD comment |
| 13.2. | Apart from PTTEP Plan, above mentioned Sub-Plan need to include according to EIA Procedure 63 (h) (6). | - | |
| 13.3. | All the above revision to summarize and include in the Executive Summary. | - | |

Revision Notes
Responding to Comments from ECD for
approved EMP Report of Zawtika Offshore
Development Project

| Comment no. | ECD's Comment | Responses and Revisions |
|-------------|--|--|
| 13.4. | To include the information of Mawgyi village which is pipeline landfall area in the revised report. | <ul style="list-style-type: none"> Mawgyi village information is provided in section 3.3.4 |
| 13.5. | To include the air quality, water quality, noise, water discharge measurement result in the revised report. | <ul style="list-style-type: none"> Included in section 3.6 For offshore Oil and Gas there is no requirement for air emission and noise mentioned in EQEG, however, PTTEPI will monitor the GHG emission and noise level from the operation |
| 13.6. | To include the comparison table of air quality, water quality, noise, water discharge measurement result with the National Environmental Quality (Emission) Guideline. | <ul style="list-style-type: none"> Included in section 3.6 and Table 3.8 |
| 13.7. | To separately provide the Emergency Management Plan budget in the revised report. | <ul style="list-style-type: none"> Included in section 11.1.6 |
| 13.8. | ECD suggested to include the decommissioning budget in the revised report. | <ul style="list-style-type: none"> A detailed decommissioning plan for Zawtika field will be prepared and get approved from MOGE prior to decommissioning activities. Therefore, the decommissioning budget will be proposed for further approval depend on the acceptable environmental practice and approval method before ending of project life span, mentioned in section 3.9 |
| 13.9. | To include Acronyms and Abbreviation for the reader's and reviews' understanding. | <ul style="list-style-type: none"> Included after the table of content |
| 13.10. | To provide the detail information of hazardous waste management such as how to store, where to store and where to dispose. | <ul style="list-style-type: none"> Included in section 3.6.3.1 (2) |
| 13.11. | To monitor at least 6 monthly for Sediment, surface water and ground water since the report mentioned to monitor 3 yearly for the mentioned parameter. | <ul style="list-style-type: none"> The monitoring of surface water and ground water, which is related to Zawtika onshore operation, have been already proposed in Zawtika Onshore EMP. The monitoring to prevent the environmental impact to sediment at offshore operation is proposed in term of monitoring of mud and cutting sample if there is any drilling activity, and sewage sample collection which will be collected at least one time per 6 months. The monitoring report will be submitted to relevant government authorities every 6 month as per EIA procedure requirements. |
| 13.12. | ECD suggested to include monitoring budget separately for each parameter in the revised report. | <ul style="list-style-type: none"> Monitoring budget information separated for each parameter are provided in table 9.1 |
| 13.13. | To disclose the EMP report in company website for any further suggestion from the stakeholders | PTTEP have noted on the information. |
| 13.14. | According to the Environmental Conservation Rules, Article 29, 30 and 31, to provide funding to ECD from the natural resources production business when EMP funding guideline implemented. | PTTEP have noted on the information. |
| 13.15. | ECD requested to submit 6 hard copies of the revised EMP according to the comments in the approval letter within 30 days from signed date (4 th October 2022) | PTTEP have noted on the information and submitted the revised EMP report to MOGE for further submission to ECD as per required timeline. |

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Annex A

PTTEPI's SSHE Management System

Annex A-1
SSHE Policy



PTTEP Myanmar Asset

Safety Security Health and Environment (SSHE) Policy

PTTEP Myanmar Asset is committed to safe Exploration and Production (E&P) Operations in Myanmar with the SSHE vision of being a zero incident organization, we implement an effective SSHE management system that outlines the main principles and accountabilities to drive for continuous improvement to ensure the safety and health of everyone involved in our operation, environmental protection as well as security of people and asset.

To accomplish our vision, we are committed to:

- Apply “Stop Work Authority” for unsafe work by implementing Behavior-Based Safety (BBS) programs and strive for generative SSHE culture.
- Cascade strategic SSHE objectives, setting measurable KPIs, targets and action plans to deliver best SSHE performance.
- Comply with applicable obligation requirements.
- Prevent operational and process incidents by performing hazard identification and SSHE risk assessments so that risks are managed to As Low As Reasonably Practicable (ALARP), monitoring of Safety Critical Elements addressed in Safety Cases and complying with Management of Change (MOC) Standard.
- Ensure all employees and contractors are assessed and maintain the required level of job and SSHE competency. Work with contractors and suppliers to achieve PTTEP’s SSHE requirement.
- Manage emergencies and crises effectively to ensure business continuity and protect all employees and organization from pandemics, natural disasters, security threats and vulnerabilities.
- Promote occupational health and hygiene in the workplace as well as apply a drug and alcohol-free workplace program to all employees and contractors.
- Prevent environmental impacts by strictly following the environmental management plan stated in Environmental Impact Assessment.
- Reduce environmental footprints in alignment with low carbon pathway, circularity concept and positive Biodiversity and Ecosystem Services (BES) value creation.
- Report, investigate and analyze SSHE incidents to prevent recurrence and close out corrective actions with evidence.
- Ensure policy and SSHE Management System compliance through regular SSHE audits and Senior Management visits with corrective actions follow up for continuous improvement.

Total commitment from PTTEP Myanmar Asset employees and contractors at all levels by being mindful in every action is a key to successful implementation of this policy.

(Titi Thongjen)
General Manager

Date: 20.10.2022.



ပီတီတီအီးပီ ကုမ္ပဏီ (မြန်မာ့စီမံကိန်း)

ဘေးအန္တရာယ်ကင်းရှင်းရေး၊ လုံခြုံရေး၊ ကျန်းမာရေးနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဆိုင်ရာ (SSHE) မူဝါဒ

ပီတီတီအီးပီ မြန်မာ့စီမံကိန်းသည် ရေနံနှင့် သဘာဝဓာတ်ငွေ့ရှာဖွေရေးနှင့် ထုတ်လုပ်ရေး (E&P) လုပ်ငန်းများ ဆောင်ရွက်ရာတွင် ကုမ္ပဏီ၏ ဘေးအန္တရာယ်ကင်းရှင်းရေး၊ လုံခြုံရေး၊ ကျန်းမာရေးနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဆိုင်ရာ မျှော်မှန်းချက်များနှင့်အညီ လုပ်ငန်းခွင်မတော်တဆမှု လုံးဝမရှိစေရေးအတွက် ကြိုးပမ်းဆောင်ရွက်ရန် သန္နိဋ္ဌာန်ချမှတ်ထားသည်နှင့်အညီ အခြေခံမူများ၊ တာဝန်ယူတာဝန်ခံမှုများအားဖြင့် လုပ်ငန်းတွင် ပါဝင်ပတ်သတ်နေသူများအားလုံး၏ ဘေးအန္တရာယ်ကင်းရှင်းရေးနှင့် ကျန်းမာရေးအတွက်သာမက သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေး၊ လူပုဂ္ဂိုလ်များနှင့် ပစ္စည်းဥစ္စာများ၏ လုံခြုံရေးတို့ကိုပါ ထည့်သွင်းထားသော စီမံခွဲခွဲမှုစနစ်တစ်ခု စဉ်ဆက်မပြတ်တိုးတက်စေရန် အကောင်အထည်ဖော် ဆောင်ရွက်လျက် ရှိပါသည်။

ဤသို့ လုပ်ငန်းများပြီးမြောက်အောင်မြင်စေရန် ဝန်ထမ်းများနှင့်အတူ ကန်ထရိုက်တာများ ကတိကဝတ်ပြုထားသည်များမှာ -

- အန္တရာယ်ရှိသည့် လုပ်ငန်းအား ရပ်တန့်ခွင့်ကို ကျင့်သုံးခြင်းအားဖြင့် အပြုအမူအခြေခံသော ဘေးအန္တရာယ်ကင်းရှင်းရေး (BBS - Behavioral-Based Safety) ညွှန်ကြားချက်များကို လိုက်နာလျက် အမြင့်ဆုံးအဆင့်ဖြစ်သော SSHE အလေ့အထကောင်းများအတွက် အပတ်တကုတ် ကြိုးပမ်းခြင်း။
- အမြင့်ဆုံးသော SSHE စွမ်းဆောင်ရည်များရရှိပိုင်ဆိုင်ရေးအတွက် ဘေးအန္တရာယ်ကင်းရှင်းရေး၊ လုံခြုံရေး၊ ကျန်းမာရေး၊ သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဆိုင်ရာ ဦးတည်ချက်များ၊ တိုင်းတာမှုပြုနိုင်သော အဓိကလုပ်ဆောင်မှုဆိုင်ရာ ညွှန်းကိန်းများ၊ ရည်မှန်းချက်များနှင့် ဆောင်ရွက်ရမည့် အသေးစိတ်အစီအစဉ်များကို လက်ဆင့်ကမ်းချမှတ်ပေးခြင်း။
- လိုက်နာကျင့်သုံးရန် လိုအပ်သော စံချိန်စံညွှန်းများအားလုံးကို အတိအကျလိုက်နာခြင်း။
- အန္တရာယ်များကို ဖော်ထုတ်ခြင်း၊ ဘေးအန္တရာယ်ကင်းရှင်းရေး၊ လုံခြုံရေး၊ ကျန်းမာရေး၊ သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေး(SSHE) စသည်တို့နှင့် သက်ဆိုင်သည့် အကဲဖြတ်ချင့်ချိန်ခြင်းတို့ကို လုပ်ဆောင်ခြင်းဖြင့် ကျိုးကျောင်းလျော်ညီစွာ အန္တရာယ်များကို နည်းနိုင်သမျှ နည်းစေမည့် လက်တွေ့ကျင့်သုံးနိုင်သည့် နည်းလမ်းများအား အသုံးပြုခြင်း၊ ဘေးအန္တရာယ်ကင်းရှင်းရေးဆိုင်ရာ သာဓကလေ့လာမှုများ (safety cases)တွင် ဖော်ပြထားသော အန္တရာယ်ကင်းရှင်းမှုအတွက် အရေးကြီးသည့်ပစ္စည်းများ၏ ကြံ့ခိုင်မှုကို စောင့်ကြည့်စစ်ဆေးခြင်း၊ မူလပစ္စည်း၊ လုပ်ငန်းစဉ်၊ စံနှုန်းမှ သွေဖီမည့် လုပ်ငန်းများကို စီမံထိန်းချုပ်ထားသည့် စံနှုန်းများ (MOC)အား လိုက်နာဆောင်ရွက်ခြင်းဖြင့် လုပ်ငန်းခွင်ဆိုင်ရာနှင့် ထုတ်လုပ်မှုဆိုင်ရာ မတော်တဆမှုများကို ကြိုတင်ကာကွယ်နိုင်ခြင်း။
- ပီတီတီအီးပီ၏ ဘေးအန္တရာယ်ကင်းရှင်းရေး၊ လုံခြုံရေး ၊ ကျန်းမာရေး၊ သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေး(SSHE)ဆိုင်ရာ လိုအပ်ချက်များ ပြီးမြောက်အောင်မြင်ရန် ကုမ္ပဏီ၏ ကန်ထရိုက်တာများ၊ ပစ္စည်းပေးသွင်းသူများနှင့် စီမံဆောင်ရွက်ခြင်း။
- အရေးပေါ်အခြေအနေများနှင့် ကပ်ဘေးဆိုင်ခြင်းများကို ကောင်းစွာစီမံထိန်းချုပ်နိုင်ခြင်းဖြင့် လုပ်ငန်းများဆက်လက်ဆောင်ရွက်နိုင်စေရန်နှင့် ဝန်ထမ်းများအားလုံးနှင့်တကွ အဖွဲ့အသင်းတခုလုံးကိုပါ ကပ်ရောဂါဘေးဆိုးများ၊ သဘာဝဘေးအန္တရာယ်များ၊ လုံခြုံရေးဆိုင်ရာခြိမ်းခြောက်မှုများနှင့် ထိရောက်သည့်ခြင်းများမှ အကာအကွယ်ပေးထားခြင်း။
- လုပ်ငန်းခွင်အတွင်း ကျန်းမာရေးနှင့် သန့်ရှင်းရေး အဆင့်မြှင့်တင်ရန် ဆောင်ရွက်ခြင်းများသာမက ဝန်ထမ်းများနှင့် ကန်ထရိုက်တာများအားလုံးသည် အရက်နှင့် မူးယစ်ဆေး လုံးဝကင်းစင်သော လုပ်ငန်းခွင်ကို ဖော်ဆောင်ခြင်း။
- သဘာဝပတ်ဝန်းကျင်အား ထိခိုက်မှုမရှိစေရန် ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းအစီရင်ခံစာတွင် ပါရှိသော သဘာဝပတ်ဝန်းကျင်ဆိုင်ရာ အစီအမံတို့ကို တိကျစွာ လိုက်နာဆောင်ရွက်ခြင်းဖြင့် သဘာဝပတ်ဝန်းကျင်ထိခိုက်မှုကို နည်းနိုင်သမျှနည်းအောင် ဆောင်ရွက်ခြင်း။
- ကာဗွန်လျှော့ချခြင်းနည်းလမ်း၊ ပြန်လည်အသုံးပြုခြင်းနိယာမ၊ စီမံမျိုးစုံမျိုးကွဲနှင့် ဂေဟစနစ်ကောင်းကျိုးရရှိစေမှုများမှတစ်ဆင့် သဘာဝပတ်ဝန်းကျင်ထိခိုက်မှုများကို လျော့နည်းစေခြင်း။
- ဘေးကင်းလုံခြုံရေး၊ ကျန်းမာရေး၊ သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးနှင့် သက်ဆိုင်သည့် မတော်တဆမှုများကို ကာကွယ်ရန်နှင့် အလားတူထိခိုက်မှုမျိုး ထပ်မံမဖြစ်ပွားစေရန် ယင်းတို့ကို အစီရင်ခံခြင်း၊ စစ်ဆေးခြင်း၊ ထိခိုက်မှုဖြစ်စေသည့် အခြေခံအကြောင်းရင်းကို စိစစ်ခြင်း၊ ပြင်ဆင်ရမည့် အချက်များကို အကုန်အကျ အထောက်အထားနှင့်တကွ ပြင်ဆင်လုပ်ဆောင်ခြင်းဖြင့် တားဆီးကာကွယ်ခြင်း။
- စဉ်ဆက်မပြတ်တိုးတက်စေရန်အတွက် လုပ်ငန်းခွင်များသို့ အကြီးတန်းစီမံခန့်ခွဲသူများမှ ပုံမှန်ကွင်းဆင်း စစ်ဆေးခြင်းဖြင့် ပြုပြင်ဆောင်ရွက်ရမည့်အချက်များ၊ ဘေးအန္တရာယ်ကင်းရှင်းရေး၊ လုံခြုံရေး၊ ကျန်းမာရေး၊ သဘာဝပတ်ဝန်းကျင် ထိန်းသိမ်းစီမံခန့်ခွဲမှုစနစ်နှင့် ချမှတ်ထားသည့် ပေါ်လစီ(မူဝါဒ)အား လိုက်နာကျင့်သုံးမှု ရှိမရှိကို သေချာစေခြင်း။

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(Titi Thongjen)

အထွေထွေမန်နေဂျာ

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Annex A-2
Myanmar Asset SSHE Management System



PTT Exploration and Production Public Company Limited

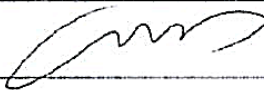
**Myanmar Asset
SSHE Management System**

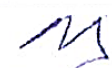


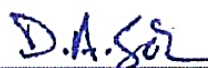
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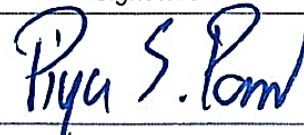
Revision 1

May 2018

| Approval Register | |
|-------------------|--------------------------------------|
| Document Subject | Myanmar Asset SSHE Management System |
| Document Code | 11027-PDR-SSHE-000-001-R01 |
| Document Owner | Sutus Preuksjamas |
| Prepared by | Suthat Kanjanakanti |

| Document Custodian | | | |
|--------------------|-------|--|---------|
| Name | Title | Signature | Date |
| Sutus Preuksjamas | PMM/S |  | 29/5/18 |

| Technical Review | | | |
|--------------------------|----------|--|----------|
| Name | Title | Signature | Date |
| Natthawut Choosuwan | PMM/S |  | 29/5/18 |
| Pichet Sangjan | PMO |  | 30/5/18 |
| Khomsan Lertwiriayaprapa | PDT SSHE |  | 30/05/18 |
| David Antony John | CPA |  | 30/5/18 |

| Approval | | | |
|--------------------|---------------------------|--|---------|
| Name | | Signature | Date |
| Approval Authority | Piya Sukhumpanumet PMM |  | 1/06/18 |

THIS DOCUMENT WILL BE REVIEWED EVERY **5 YEARS** FROM DATE OF APPROVAL OR REVISED
EARLIER IF NECESSARY.

| Revision History | | | |
|------------------|--|---------------|-----------|
| Rev. | Description of Revision | Authorized by | Date |
| 0 | New (Myanmar-SSHE-11027-MNL-000) | PMM/S | July 2016 |
| 1 | Revise Myanmar Asset SSHE Management System to be aligned with ISO14001:2015 requirement, cover all operations in Myanmar, and supersede Myanmar-SSHE-11027-MNL-000, ZPQ SSHE MS Rev.0 (Myanmar-1006-WI-001-ZTK-FSAF-I-001) and ZOC SSHE MS Rev.1 (SSHE-13265-MNL-007) | PMM/S | May 2018 |

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1.0 PURPOSE

PTTEP operates under a common set of business principles. Supported by policies, standards and business controls and implemented through the organization structure. In support of the business principles there is a Corporate PTTEP Safety, Security, Health and Environment (SSHE) Commitment and Policy which requires every PTTEP Asset to manage Safety, Security, Health and Environment in a systematic manner by having a Safety, Security, Health and Environment Management System (SSHE MS) in place.

Myanmar Asset has established a Myanmar Asset specific SSHE Management System in line with the Corporate [SSHE Management System Document 11038-STD-SSHE-000](#).

The Myanmar Asset SSHE MS concentrates on SSHE critical activities, ensuring that at Asset Management level they are identified, properly monitored and controlled. By alignment with the Corporate SSHE MS, this SSHE MS is aligned to industry models and ISO 14001 standards.

This SSHE MS also covers activities of main contractors engaged with the Asset. Key Contractors should have their own SSHE MS aligned with the Myanmar Asset SSHE MS and as defined in the Safety Cases and Contract Bridging Documents.

The Myanmar Asset SSHE MS documents the systems used for managing SSHE in the Myanmar Asset Operations. It refers to rather than repeats, existing procedures and systems for managing the various aspects of SSHE. It therefore provides an overview and principal source of reference for SSHE aspects to be used by:

- The Management Team for Myanmar Asset level activities which are not covered by specific SSHE Cases, such as planning, design, data analysis, etc.
- Existing Staff to increase SSHE awareness
- New Staff to become familiarised with the Myanmar Asset SSHE MS
- Contractors to ensure alignment between their SSHE MS and the Myanmar Asset SSHE MS

Corporate Standards and Procedures are mandatory to be followed. Only when there is a conflict with National Laws and standards, Myanmar Asset will deviate from the standard and document the deviation.

2.0 SCOPE

The scope of the Myanmar Asset SSHE MS applies to all the processes and activities associated to the Myanmar Asset business operating in Offshore M3, M9, M11, MD7 and Onshore MOGE3 concessions, as well as the operating of Zawtika Offshore and Onshore Project.

Within Myanmar Asset processes and activities, those identified by the Hazard & Effect Management Process (HEMP) as vital to ensure asset integrity, prevent incidents and/or to prevent/control/mitigate the potential adverse SSHE effects, are considered SSHE critical activities. SSHE Critical activities are also those that could cause deviations from National Legislations and /or Asset and Corporate Standards.

Where contractors are used to perform specific activities, it is the responsibility of the Myanmar Asset to determine through Mode of Contract assessment whether the Myanmar Asset SSHE MS will apply to those activities. The same conditions apply to all sub-contracted personnel. In all circumstances, the Myanmar Asset will attempt to positively influence SSHE aspects of the work as far as practicable.

3.0 REFERENCES

3.1 PTTEP SSHE CONTROLLING DOCUMENTS

| Document Number | Document Title |
|--------------------|------------------------|
| 11038-STD-SSHE-000 | SSHE Management System |

3.2 OTHER REFERENCE DOCUMENTS

| Document Number | Document Title |
|-------------------------|---|
| OGP Report No. 6.36/210 | International Association of Oil and Gas Producers (OGP), Guidelines for the development and application of health, safety and environmental management systems |
| ISO14001:2015 | Environmental management systems – Requirements with guidance for use |

4.0 DEFINITIONS

| Terminology | Description |
|---|---|
| As Low As Reasonably Practicable (ALARP) | A term used to define tolerable risk acceptance only where risk reduction is impractical or cost benefit analysis is carried out and a judgment is made that the cost of further risk reduction is grossly disproportionate when compared to the actual risk reduction that would be achieved. |
| SSHE Management System (MS) | A comprehensive guide to the PTTEP SSHE management system and the associated SSHE standards, which are issued to address all of its elements, and provide an overview of the approach. |
| SSHE Policy | The highest level document containing a formal statement of principles that identifies PTTEP expectations in managing SSHE. |
| SSHE Standard | Sets the minimum requirements for the way risks and opportunities are managed and for the result to be achieved. It defines WHAT is to be realised in terms of processes, activities and the required results and deliverables. A standard may serve to clarify how a policy is to be implemented, or to set expectations when major risks or opportunities require common treatment across the organisation |
| SSHE Procedure | <p>An activity description that describes the purpose and scope of an activity, the responsibilities of those performing it and the tasks or steps that are needed to achieve a satisfactory result.</p> <ul style="list-style-type: none"> A procedure defines WHO does WHAT, WHEN and with what RESULT. A description HOW to do an activity may be put within a procedure if brief, otherwise a specification or work instruction should be created and referenced from the procedure. <p>If there is a SSHE Standard the procedure shall be in compliance.</p> |

| Terminology | Description |
|-----------------------------|---|
| Work Instruction | Describes, briefly and succinctly, HOW an activity or task is properly executed. A work instruction can only exist where it supports a procedure or activity description |
| Supporting Documents | Associated documents supporting the implementation of the SSHE management system. These documents must be consistent with the SSHE policy, SSHE management system manual, standards and procedures. |
| Tool | A form, template or computer programme used to perform the tasks in a procedure or work instruction. A Tool enables an activity to be executed as prescribed |
| Guideline | Provides guidance on to develop required procedure or work instruction to manage a work process or carry out an activity or task. A guideline is normally based on established good practices in the organisation or industry. |

4.1 LANGUAGE

In this document, the words may, should, and shall have the following meanings:

| | |
|---------------|---|
| May | Indicates a possible course of action |
| Should | Indicates a preferred course of action |
| Shall | Indicates a course of action with a mandatory status |

4.2 ORGANISATION AND DEPARTMENTS

In this document, the terms Corporate, Division and Asset have the following meanings:

| | |
|----------------------|---|
| Corporate | Refers to the PTTEP Business Groups hierarchically above Asset level, and located in the PTTEP headquarters, Bangkok. |
| Group | Refers to a corporate level Business Group. These may have associated Divisions, Departments, or operational Assets within their hierarchy. |
| Division | A Business Group may have one or more distinct groups within its hierarchy. These are referred to as Divisions. |
| Myanmar Asset | Refers to an operational Asset, site, or location within PTTEP Business Groups in Myanmar Country. |
| Department | A subgroup within a Business Group, Division or Asset. |

4.3 COMMON ACRONYMS

Set out below are common specific terms presented in alphabetical order:

| | |
|-----|-------------------------|
| CEO | Chief Executive Officer |
|-----|-------------------------|

| | |
|-------|--|
| EVP | Executive Vice President |
| SVP | Senior Vice President |
| CSH | Safety , Security, Health and Environment Division |
| SSHE | Safety, Security, Health and Environment |
| MS | Management System |
| SLA | Services Level Agreement |
| ALARP | As Low As Reasonably Practicable |
| ATS | SSHE Action Tracking System |
| SAP | PTTEP SAP Database |
| IMS | Incident Management System |
| PDT | Production Asset Group |

5.0 ROLES AND RESPONSIBILITIES

5.1 OWNERSHIP OF THE DOCUMENT

The owner of Myanmar Asset SSHE Management System is the Myanmar Asset SVP (the General Manager), with responsibilities for:

- Approval and issuing the SSHE Management System and its revisions
- Ensuring effective implementation of the standard
- Assuring leadership and commitment.

5.2 CUSTODIAN OF THE DOCUMENT

The custodian of SSHE Management System is the Myanmar Asset SSHE Manager with responsibilities for:

- Keeps the Myanmar Asset SSHE MS aligned with the corporate SSHE MS
- Ensuring the SSHE Management Objectives are understood
- Advising Line Functions/departments on implementation
- Initiating periodic revision
- Updating personnel of the updates when issued.
- Maintaining revision history and document status register

6.0 SSHE MS ELEMENTS

Myanmar Asset manages each of these elements to insure continuous improvement in its SSHE Performance and the achievement of SSHE Objectives.

6.1 LEADERSHIP AND COMMITMENT

Myanmar Asset Management recognises the need for SSHE risk management and are committed to achieve high SSHE standards. They lead and motivate all staff and contractors to adopt high SSHE

standards, provide resources to identify eliminate or reduce and manage SSHE risks in balance with business performance, to effectively achieve the Myanmar Asset and PTTEP Corporate objectives.

The commitment is demonstrated through management visibility; SSHE targets setting and informed involvement in SSHE issues. Examples of this commitment are:

- Monthly SSHE Management Committee meetings dedicated to discuss the performance, incident investigation results, SSHE Plan status
- Attendance and chairing SSHE meetings with contractors.
- Management participation in inspections, audits investigations and reviews.
- Communicating SSHE matters to contractors
- Promoting SSHE topics at Myanmar Asset meetings, newsletters and other publications
- Setting Myanmar Asset SSHE targets in line with Corporate SSHE Targets and cascading them down to the departments and sections.

For detailed activities see the Myanmar Asset's SSHE Plan.

6.2 POLICY AND STRETEGID OBJECTIVES

6.2.1 MYANMAR ASSET SSHE POLICY

[Myanmar Asset SSHE Policy](#) is cascaded from the [Corporate SSHE Policy](#). The Policy is communicated to PTTEP SSHE Corporate and is reviewed periodically or if the Management Review Process identifies the need for a change to the policy.

As part of the policy dissemination process; the Myanmar Asset SSHE Policy:

- Is available in Myanmar language and English,
- Is displayed at company facilities and contractors offices on site,
- Is included in the SSHE induction to new staff,
- Is contained in every invitation to tender, in all contract requests and is provided to all Myanmar Asset contractors,
- Is available on Myanmar Asset website.

Apart from SSHE Policy, Myanmar Asset has other SSHE related policies as follows:

- [Stop Work Authorization Policy](#)
- [Alcohol and Drugs Policy](#)
- [Driver Seat Belts Authorization Policy](#)
- [Use of Electrical Equipment Policy](#)

6.2.2 MYANMAR ASSET SSHE STRATEGIC OBJECTIVES

Strategic objectives are documented in the Myanmar Asset Business Plan and are reviewed annually by top management. The Myanmar Asset strategic objectives are as a minimum in line with the PTTEP Corporate strategic objectives.

Effective SSHE Management enables these objectives to be achieved in an efficient and responsible way. SSHE objectives have equal status to Myanmar Asset primary business objectives. It is the line management's responsibility to implement these objectives.

The Myanmar Asset SSHE Commitment also establishes the following strategic objectives:

- To achieve zero Lost Time Incidents with in our operations.
- To comply with the applicable SSHE Laws and regulations and international standards
- To have Top Quartile IOGP SSHE performance.
- To protect the environment
- To have identified all risks and have managed them to ALARP

6.3 ORGANIZATION, RESOURCES AND DOCUMENTATION

6.3.1 ORGANISATION AND RESOURCES

Organisation

Myanmar Asset supports the SSHE MS by ensuring the availability of human resources necessary to meet the SSHE objectives and targets.

The Myanmar Asset has defined an organization that allows it to achieve SSHE targets and its business objectives. The organizational chart is illustrated in Figure 1.

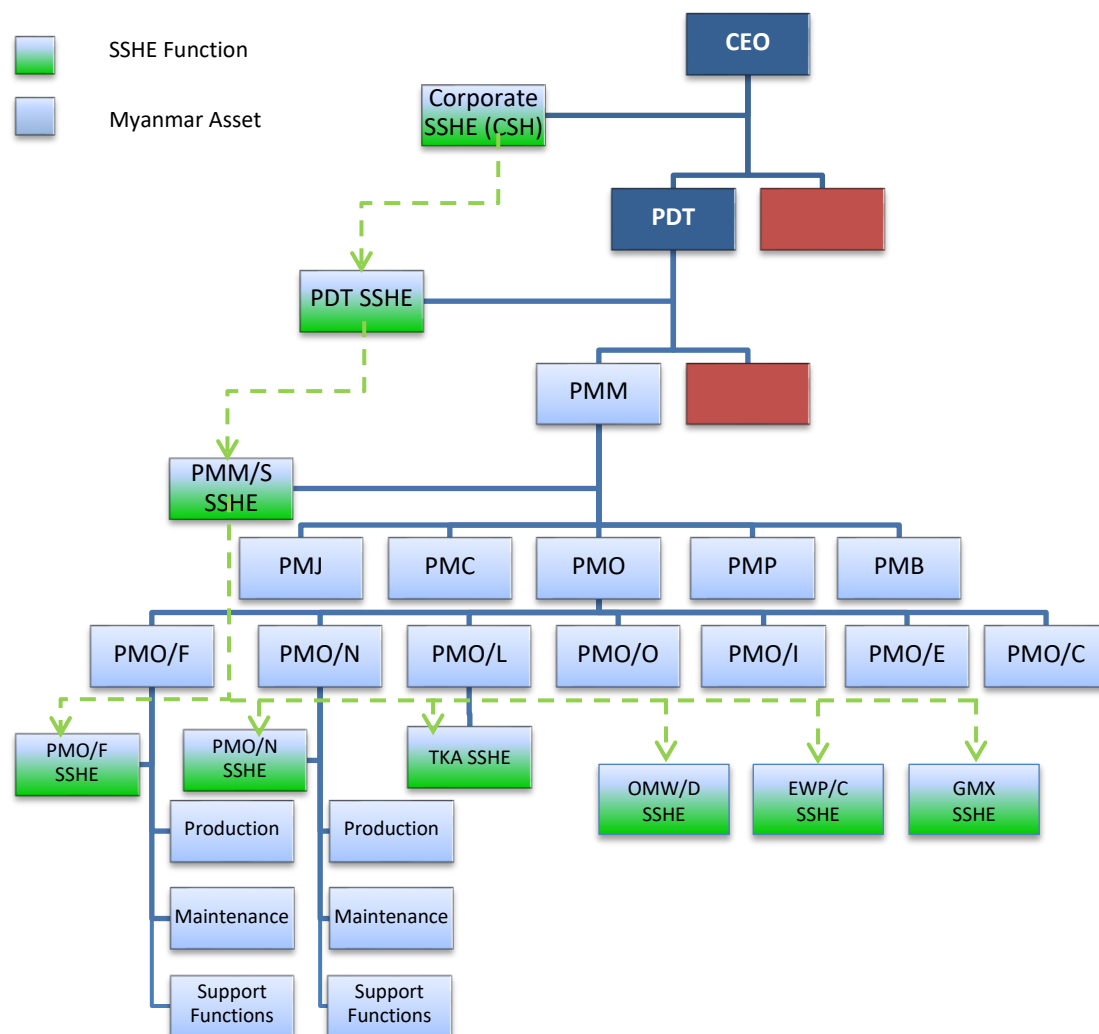


Figure 1: Myanmar Asset Organization

All position job descriptions have clearly identified when they are Safety Critical and what the Roles, responsibilities and accountabilities are for the position.

The SSHE Manager has access to the Corporate SSHE Division TSH for all SSHE related issues.

The Corporate SSHE department acts in support of the line for all SSHE MS related matters, providing expert advice as and when requested.

SSHE Roles and Responsibilities follow the requirements as stipulated in Corporate [SSHE Roles and Responsibilities Standard, 11038-STD-SSHE-101](#).

Vice President Production Operations (PMO) or his/her delegate are assigned as Myanmar Asset SSHE Management Representative or MR by position.

Resources

Myanmar Asset is committed to maintaining an adequate level of resources to effectively implement the SSHE MS.

The risks inherent in operations, emergency procedures, shifts, leave and competency levels are all taken into account when determining resourcing levels.

The SSHE department is staffed with professionals specialised in, Safety, Security, Health and Environment disciplines, to advise and support Line Management.

Financial resources are assigned from the annual budget approved by the EVP.

6.3.2 CONTRACTOR MANAGEMENT

Some 75 to 80 % of all activities are executed by contractors. The Myanmar Asset considers contractor management to be a SSHE critical issue. SSHE issues are handled proactively in all phases of the contract process to ensure contractors manage SSHE in line with The Myanmar Asset SSHE commitment and Policy.

The Myanmar Asset uses the PTTEP Corporate SSHE Standards and Procedures for SSHE Contractor Management.

By following the SSHE Contractor Management Procedure, SSHE-106-PRD-310, all SSHE risks will be assessed, controlled and monitored throughout the lifetime of the contracts.

The SSHE Contractor Management documentation and tools to be used are:

| Document Number | Document Title | Information |
|------------------|---|---|
| SSHE-106-STD-310 | SSHE Contractor Management Standard | High level document stating the minimum requirements. |
| SSHE-106-PRD-310 | SSHE Contractor Management Procedure | Detailed description how to implement the minimum SSHE requirements into the contracting process and into the |
| SSHE-106-GDL-311 | Contract SSHE Plan Guideline | Information on what can and should be in the Contract SSHE Plan |
| PTTEP Tool | Contractor SSHE Capability Assessment Questionnaire | OGP Standard Questionnaire for a consistent approach to evaluate contractors. |

| Document Number | Document Title | Information |
|-----------------|--|---|
| PTTEP Tool | Contractor SSHE Capability Questionnaire evaluation tool (XLS) | <p>OGP based evaluation of SSHE Capability Questionnaire against Standard benchmarks with a. banding Scoring system:</p> <ul style="list-style-type: none"> Red denotes 'capability is below PTTEP's SSHE requirement' Amber denotes 'capability conditionally meets PTTEP's SSHE requirements' Green denotes 'capability unconditionally meets PTTEP's SSHE requirements' |

6.3.3 COMMUNICATION

Myanmar Asset Communications are managed in line with the requirements as stipulated in the [SSHE Communication Standard, SSHE-106-STD-320](#).

6.3.3.1 INTERNAL COMMUNICATION OF SSHE ISSUES

The key objective for internal communication of SSHE issues is to ensure that employees, contractors, partners and other interested parties are aware of:

- The SSHE MS and its requirements.
- Their roles and responsibilities in achieving compliance with defined policies, objectives and targets.
- The SSHE hazards / risks (including significant environmental aspects and impacts) associated with jobs and activities, their identification, evaluation, the preventive, control and recovery associated measures.
- Emergency Preparedness, Response and Management.
- The Myanmar Asset SSHE performance against targets.
- Lessons learnt from incidents investigation; audits and inspections made and management review process.

Significant effort is put into measuring KPIs and compiling statistics. Feedback to staff on SSHE performance is documented and provided using the SSHE indicators section in the SSHE web site or on site notice boards. Verbal feedback is given by Line Managers at monthly function / departmental SSHE meetings and SSHE committee meetings.

6.3.3.2 HIERARCHY OF SSHE MEETINGS

There is a hierarchy of SSHE meetings and information flows within the organization.

- At Corporate level: A Quarterly SSHE Steering Committee Meeting chaired by the CEO.
- At Myanmar Asset level: A Quarterly SSHE Management Committee Meeting is conducted by the Management Team Meeting chaired by the GM.
- Contract Holders conduct Monthly SSHE Meetings with Contractors to review SSHE plan execution and performance.
- Monthly Operation SSHE Committee Meeting chaired by Site or Field Manager for ZPQ, ZOC, Drilling and Thaketa Supply Base.

- Quarterly SSHE Meeting for Yangon Office chaired by VP Business Support
- All employees (company and contractor) are made aware of their SSHE responsibilities during their induction. Records of the SSHE induction process shall be maintained.

Myanmar Asset SSHE Management Committee

The SSHE Management Committee is a central body with the Asset chaired by the Asset SVP (General Manager). It meets on a quarterly basis and comprises of the following members or their nominated deputies:

- SVP (GM)
- All VPs in Myanmar Asset
- All Managers in Myanmar Asset
- Myanmar Asset SSHE Manager

Other SSHE Engineers/Advisors or functional Supervisors or Line representatives will participate as necessary

The Purpose and activities of the SSHE Management Committee is:

- To review and assure SSHE Legal Compliance
- To review the SSHE MS to ensure its continuing suitability, adequacy and effectiveness. This review is documented.
- To review the SSHE Policy and Security Standard.
- To review and approve the SSHE Risk Assessments of the business.
- To review and approve the Myanmar Asset Annual SSHE Plan and Audit Plan and ensure that it will address the management of SSHE risks to the business, will identify the deficiencies and will achieve the desired SSHE performance if implemented effectively.
- To review and agree the necessary resources to achieve the effective implementation of the SSHE plan.
- Recognition and award the SSHE Employee of the month
- To identify SSHE trends and review high potential incidents and ensure lessons learned' are considered and actions taken on corporate/Asset management level on a business risk level.
- To promote continual improvement of SSHE management and performance.
- To review Management SSHE inspections, SSHE audit status and follow up
- To review and agree and Asset wide SSHE initiatives.

The Myanmar Asset SSHE Manager has been designated to act as meeting secretary; he/she will accordingly issue the meeting minute. Once approved the minutes are distributed to each committee member.

Committee members are responsible for ensuring interfacing with the SSHE department and for disseminating relevant SSHE information to line staff via function / departmental SSHE meetings.

Operation/Site SSHE Meetings

Each operation/site holds a monthly meeting, in which SSHE and other operational issue are discussed, including:

Objectives and activities:

- To stimulate effective two-way communication on SSHE issues between management and personnel e.g. for the review of policies and procedures.
- To engage all staff in the implementation of SSHE management.
- To recognize and nominate SSHE Employee of the Month to the SSHE Committee Meeting.
- To serve as SSHE advisory bodies to management and promoting suggestions for improvement.
- To monitor measures taken for the prevention of accidents, their implementation and adherence.
- To organize inspections and audits focused on unsafe, unhealthy or environmentally unfriendly practices.
- To review SSHE plan and progress, reports of inspection and audits.
- To monitor follow-up of accidents and incidents (including security) that have occurred.
- To endeavour to secure the co-operation of all persons in the promotion of SSHE.
- To advise on SSHE training, instructions and guidance of Supervisor and workers.

Daily Operations Meetings

Operations SSHE issues are raised and discussed at Daily Operations Meeting. SSHE issues shall be communicated amongst the Operation team.

Toolbox Meetings

These are brief, informal meetings, held by supervisors and work groups at the beginning of the job, day or work period to discuss the job in hand, main hazards/aspects and the cause of incidents, poor working habits and share their own experiences.

Formal contractor meetings

Regular SSHE meetings are held between operations staff and SSHE critical contractors, as defined in the Safety Cases to reinforce awareness on SSHE issues. Meetings are chaired and supported by line staff. Meetings are held once a month and the topics discussed are recorded. Minutes of meeting are distributed to all participants:

Topics discussed include:

| | |
|--|---|
| • Current Myanmar Asset SSHE concerns | • New legislation / Regulations |
| • New Hazards caused by changes in operations. | • SSHE issues related to facilities and equipment standards |
| • Lessons learnt from incidents | • SSHE promotional activities |
| • Competence and training | • Near Miss incidents and unsafe acts |
| • Quality improvement | • Progress against SSHE Plan |

Key contractors are required to attend Myanmar Asset SSHE Management Committee chaired by the SVP or Operations VP/Manager (Includes Drilling) and the SSHE Manager at which performance against SSHE plans is reviewed.

For specific SSHE critical or complex activities, such as major plant shutdown, major maintenance activity, project works or upgrades, dedicated SSHE meetings are held.

SSHE News letters

The SSHE department periodically publishes informative bulletins that are posted on all notice boards with in the asset and its contractors.

Newsletters cover specific safety, security, health and environmental concerns. Aside from general information, extraordinary bulletins are prepared if a particular SSHE issue of interest requires coverage and publication.

6.3.3.3 EXTERNAL COMMUNICATION OF SSHE ISSUES

External communication can be a planned program (e.g. community engagement for new projects, public consultation for new EIA/IEE/EMP study, etc.) or unplanned event (external complaint). For external complaint or customer complaint, prompt investigation and response action are required to ensure that the case is seriously attended. The communication is also included;

- Weekly and monthly reports to Myanma Oil and Gas Enterprise (MOGE) which contain updates to the Myanmar Asset SSHE plan and SSHE activity highlights.
- Weekly and monthly reports to Corporate SSHE on SSHE performance/ statistics and incidents via Notification of Incident (NOI) and Incident Management System IMS.
- External communication of SSHE issues in PTTEP website e.g. Myanmar Asset SSHE Policy, disclosure of EIA/IEE/EMP study.

6.3.4 DOCUMENTATION MANAGEMENT

The Myanmar Asset operates within the PTTEP SSHE standards, procedures and guidelines. The PTTEP SSHE standards, procedures and guidelines have been used to develop the Myanmar Asset's own SSHE document. The PTTEP SSHE Corporate documentation is integrated within Myanmar Asset's SSHE MS, either directly or by way of incorporation in Asset's own standards and procedures. Where PTTEP Standards and Procedures cannot be applied, the reasons for deviation are documented and all other available measures, temporary or otherwise, to reduce risk exposure are considered and evaluated. A full list of PTTEP Corporate SSHE Documentation is given in link [Corporate SSHE Document](#).

The Corporate SSHE Department is responsible for maintaining an up to date SSHE reference Library of all applicable SSHE standards (National, International, PTTEP and Asset)

The Asset takes these requirements into account when setting SSHE objectives and when defining Asset SSHE Standards.

The line will be notified by Email when changes to Standards are made. It is the lines responsibility to assess what the changes mean to the Asset and its operations to ensure compliance or derogation.

The SSHE department is responsible for developing and reviewing SSHE standards and procedures, in conjunction with line personnel. It is the lines responsibility to write detailed procedures to manage the activities safely. Changes in, or additions to, SSHE legislation, industry and Group standards/guidelines are reviewed within the SSHE department and incorporated into SSHE standards and procedures as appropriate. All changes to standards reflecting the need for a more basic change in the Asset SSHE MS structure are notified by the appropriate Line Manager to the SSHE Management Committee for review and authorization. These changes are then documented and communicated to end users.

The Asset makes applicable SSHE documents available to Contractors.

All Controlled documents within the Asset are controlled via the Document Management System described in the PTTEP Corporate SSHE Standards and Production Asset Group Procedures.

- [SSHE Document Management Standard, 11038-STD-SSHE-304](#)
- [SSHE Document Control, 10012-PDR-SSHE-330-002](#)

A series of Standard document templates for Myanmar Asset generated document are available on the web.

The objective of the Myanmar Assets document control system is to ensure:

- Mandatory requirements are clearly communicated to all relevant personnel.
- Documents can be identified with appropriate company, function or activity.
- Documents are periodically reviewed, revised as necessary and approved for adequacy by authorised personnel prior to re-issue.
- Document change and modification procedures are defined and understood.
- Current versions of documents are available at those locations where they are needed.
- When obsolete, documents are promptly removed from all points of issue and point of use.

Documentation is maintained in an orderly and legible manner. It is dated (with dates of revision), readily identifiable and retained for a specific period. Controlled documents are registered on the web as following link [Myanmar Asset SSHE Document](#).

SSHE Documentation

The hierarchy of documentation as pictured in figure 2.

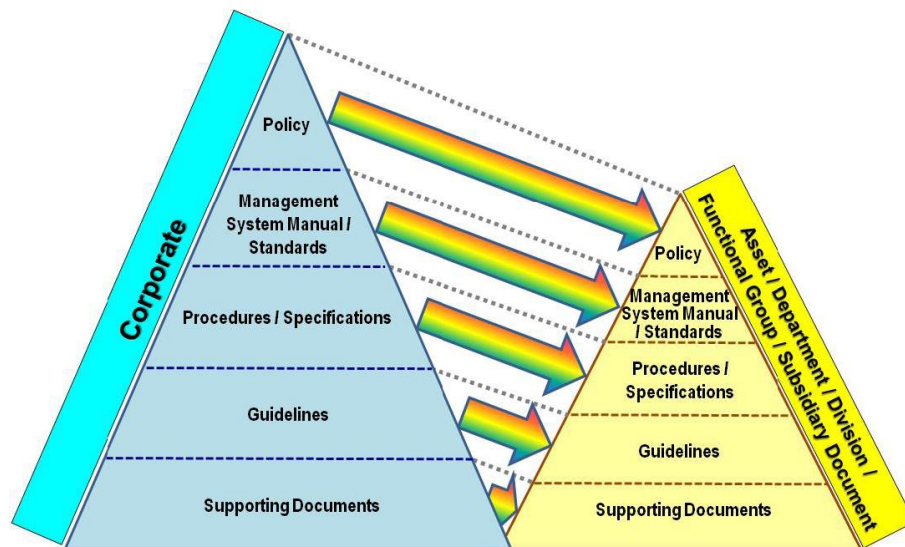


Figure 2: SSHE Documentation Hierarchy

SSHE MS documentation can be viewed as a series of explanations or statements of how the SSHE management system requirements are applied by the Myanmar Asset. **Figure 2** shows the levels of management system documentation.

- The SSHE Policy statement officially states the Myanmar Asset's position on SSHE matters.
- The SSHE MS (this document) provides the description of the management system itself. The Safety Cases demonstrate the SSHE MS is working effectively at selected facilities and operations.
- The standards, plans, procedures, Site Standing Instructions (SSIs), work instructions, guidelines, reports and reviews describe how components of the management system are carried out.

6.3.5 TRAINING AND COMPETENCE

It is important that the competence of employee and contractor is regularly evaluated and necessary training programs are made available to them to ensure that all personnel are competent to perform their tasks and control the associated risks effectively.

All sections under the Myanmar Asset are responsible to implement the competence assurance system established by PTTEP Corporate Human Resources (HR) Department.

SSHE Training requirements follow [SSHE Training and Competency Standard, SSHE-106-STD-340](#) and [SSHE Training and Competency Procedure, 11027-PDR-SSHE-340-003](#).

All Training records are available in the training database of HR (e-HR) and maintained for each employee whilst remaining within the company employment.

At the site level some specific training needs or training courses for key personnel related to safety critical activity defined in the each site training and competence procedure.

6.3.6 REGULATORY COMPLIANCE AND STANDARD

Compliance to related SSHE legislations and other requirements is one of the key expectations of the SSHE Policy follows [SSHE Regulatory Compliance Standard, Myanmar-13253-STD-014](#).

It is essential to establish a channel to access to and identify the related legislations and other requirements for effective implementation. Compliance to the related legislations and other requirements need to be regularly checked/audited. Any nonconformity needs to be raised whereas the corrective and preventive actions are to be seriously taken. Results of the compliance audit need to be presented to the management of Myanmar Asset for followed up and close-out.

6.4 EVALUATION AND RISK MANAGEMENT

The Hazards and Effects Management process (HEMP) is applied to current and new activities as a means of assessing SSHE risks to the Myanmar Asset.

The purpose of this process is to identify, evaluate and determine effective controls for the Safety, Security, Health and Environmental **hazards, aspects** and **effects** associated with The Myanmar Asset activities, where:

- A **hazard** is defined as anything that has the potential to cause harm, including ill health and injury to people (Myanmar Asset staff, contractor personnel & third parties), damage to assets/property, products or the environment, production losses or increased liability, and the potential for social/cultural disruption.
- An environmental **aspect** is defined as any element of an organization's activities, products or services that interacts with the environment.
- An **effect** is usually an adverse impact on people, the environment, property, or company reputation. Effect also includes adverse or beneficial impacts to environmental, social, or cultural systems, either directly or indirectly.

The process is applicable to all business processes in the life cycle of an operation from conception to abandonment. The tools and techniques available are applied in a logical and rigorous way, setting acceptance criteria and screening against them as the process proceeds. The arrangements identified as necessary to manage assessed threats and potential consequences and effects are then incorporated in the design phase, for existing operations it is necessary to verify that what is in place is suitable and sufficient. If not, remedial actions are taken and all necessary procedures are incorporated into the SSHE MS.

The principles of **identify, assess, control and recover** are the bases of HEMP, with the individual stages summarised in the following steps:

- Identify hazards, aspects and potential effects
- Assess risks
- Establish risk reduction measures to prevent or **control** incidents and/or to mitigate effects, **recovery** preparedness.
- Compare with objectives and performance criteria to demonstrate that risks are reduced to As Low As Reasonably Practicable (ALARP).
- Record Hazards and Effects

The HEMP studies to be applied to facilities design, construction, modification and abandonment is included in the [SSHE Risk Management Standard, SSHE-106-STD-400](#).

The Myanmar Asset uses Annex D of ISO 17776: 2000(E) *“Petroleum and natural gas industries-Offshore production installations - Guidelines on tool and techniques for hazard identification and risk assessment”* as guidance to identify hazards associated with the activity.

6.4.1 IDENTIFICATION OF HAZARDS AND ASPECTS

In the context of this manual, the following terms are synonymous; “environmental aspect” and “environmental hazard”; “significant environmental aspect” and “major environmental hazard”.

The identification of major SSHE hazards is based on the operational experience of the Companies Staff and their advisors and contractors, in conjunction with available and risk-based studies.

Line management is responsible for involving staff in the hazard identification and assessment process. Identified hazards are analysed in detail in the Safety Cases and registered in the hazard register database named Risk and Environmental Aspect Assessment (REA) on PDT SSHE webpage: http://doa-sshe/SSHE_SS/Index follows PDT SSHE instruction;

- [Hazard Analysis and Risk Assessment Instruction, SSHE-300-WI-400](#)

The Hazard Register is reviewed following:

- Revision / update of a Safety Case
- Any major change in the Myanmar Asset operations
- Any significant findings from incident investigation, reviews, audits, inspections, job safety analyses, etc.

The hazard register is updated to include any new/revised hazards. The following techniques are applied to ensure the early identification, review and documentation of hazards and their effects in the Myanmar Asset operations:

| Technique | Description | Reference |
|-----------|--|--|
| HAZID | Performed during development / initiation phase of all major projects to provide early identification and assessment of HSE hazards related to the project. HAZIDs are the responsibility of Project Managers & Asset Holders. | HAZID Study Guideline SSHE-106-GDL-411 |
| HAZOP | Performed during the definition phase of all major projects, once drawings of an adequate quality are available for review. It is the responsibility of the Project Manager & Asset Holder to determine whether a project requires a HAZOP and the level | HAZOP Study Guideline SSHE-106-GDL-412 |

| Technique | Description | Reference |
|------------|---|--|
| | of detail of the HAZOP. The reasons for deciding not to perform a HAZOP for a major project must be documented. | |
| QRA | Performed whenever there is a requirement to quantitatively demonstrate risk reduction to ALARP. QRA may be performed in conjunction with cost benefit analysis. The decision to perform QRA lies with the Asset Holder. | QRA Guideline SSHE-106-GDL-404 |
| PTR | Project Technical Safety reviews are done prior to the end of every Project Engineering phase for all major projects. (PTR 1,2,3 and 4) | PTR Guideline SSHE-106-GDL-703 |
| OTR | Operations Technical Review Performed during operations and is mandatory to be done very 3 years | OTR Guideline SSHE-106-GDL-705 |
| HRA | Health Risk Assessments are performed in accordance with Corporate guidelines and are the responsibility of line management with support from the Occupational Health Advisor. | Health Risk Assessments Guideline SSHE-106-GDL-403 |
| EIA | Environmental Impact Assessments are performed according to established corporate guidelines and national law requirements. These studies are conducted with the support from the Corporate Environment Management Department | Environmental Aspect Identification and Evaluation Guideline SSHE-106-GDL-401 |
| SRA | Security Risk and Threat analysis and Assessment are performed in accordance with Corporate guidelines and are the responsibility of line management with support from the Security Advisors from the Corporate Safety Department | Security Risk and Threat analysis and Assessment Guideline SSHE-106-GDL-402 |

6.4.2 RISK ASSESSMENT AND SCENEING CRITERIA

Qualitative Risk Evaluation

Once hazards, aspects and effects have been identified, they are assessed for their overall risk level and in the case of environmental aspects, for their significance.

Risk is defined as the product of the likelihood and consequence of an event. The Myanmar Asset uses the PTTEP Risk Assessment Matrix (RAM) for risk assessment. The matrix can be used for risk assessment of relatively simple activities or where the exposure of the workforce, public, environment or the asset is relatively straightforward to assess. Within the matrix, risks are identified as high risk (RED Area), Medium risk (Yellow Area) and Low risk (Green Area).

Risk assessments are used to rank hazardous scenarios and prioritise development of controls and are made on the basis of the information available from:

- Audits and reviews
- Analysis of incidents to date for Company
- Analysis of PTTEP statistics
- Analysis of occupational exposure standards and environmental standards
- Legal and PTTEP requirements

The Myanmar Asset operations are high risk. It is imperative that controls are fully implemented and that every effort is made to reduce risk.

Quantitative Risk Evaluation

For quantitative risk evaluation, area risk, Individual Risk (of fatality) Per Annum (IRPA) is calculated and is compared against the criteria in Table 1.

Table 1 Risk Acceptance Criteria – Individual Risk, per year

| Risk Regions | Employees / Contractors | Public |
|---|---|---|
| High Risk | $> 1 \times 10^{-3}$ | $> 1 \times 10^{-4}$ |
| Medium Risk *Goal for old facilities: 5×10^{-4} ** Goal for new facilities 10^{-5} | $1 \times 10^{-6} < \text{Risk} < 1 \times 10^{-3}$ | $1 \times 10^{-6} < \text{Risk} < 1 \times 10^{-4}$ |
| Low Risk | $< 1 \times 10^{-6}$ | $< 1 \times 10^{-6}$ |

Demonstration of ALARP

To reduce risk to a level which is as low as reasonably practicable (ALARP) involves balancing reduction in risk to a level, objectively assessed, where the trouble, difficulty and cost of further reduction measured become unreasonably disproportionate to the additional risk reduction obtained, as illustrated in Figure 3

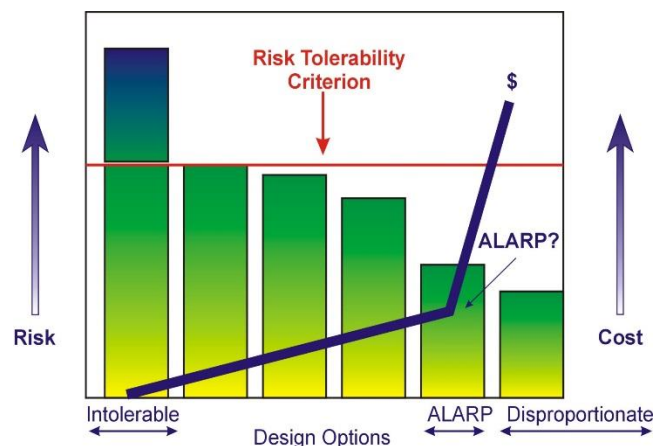


Figure 3: Demonstration of ALARP

The risks are managed in the Asset primarily by flowing means:

The Individual risk Criteria are set for risk tolerability to demonstrate ALARP and acceptance using Table 1.

The risk Matrix is used to define areas of tolerable risk within the Myanmar Asset. Three key levels of risk are indicated on the matrix

- Low(Green) - Manage for continuous improvement
- Medium (Yellow) - Incorporate risk reduction measures
- High (Red) - Intolerable

In the first instance the HEMP process is used to provide a qualitative demonstration of ALARP. A series of hazardous scenarios are envisaged for which a preliminary risk assessment is performed (the "uncontrolled" scenario assessment).

Depending on the risk assessment level and following the consideration of assurance options, controls are established to prevent the scenario from being realised.

These controls are primarily derived from standards, procedures and judgement based on experience.

Rather than specify a pre-defined number of controls for a given risk level, the Myanmar Asset prefers to judge each scenario on a case by case basis. Two controls may be sufficient for one scenario, but a different scenario with the same risk assessment may require several controls to be in place before management is satisfied that ALARP has been demonstrated. The first criteria that the Myanmar Asset specifies is that the controls put in place have the effect of bringing the risk level out of the intolerable region. For this reason a second risk assessment is performed on each scenario following the establishment of controls (the “controlled” scenario assessment). The difference in distribution of risk assessments for “uncontrolled” and “controlled” hazardous scenarios provides a clear visualisation of risk reduction and allows management to identify those risks which require more rigorous analysis (e.g. QRA, cost benefit analysis).

Any operation with a “controlled” risk assessment that lies in the intolerable region of the risk assessment matrix cannot be carried out; in these cases alternative methods for carrying out the operation will be investigated, if no alternative ways of operating are permissible, then management decides whether to proceed or not. In such cases, this decision must be documented.

6.4.3 SAFETY CASES

Safety Cases are an important part of the SSHE MS. The corporate standard for [Safety Cases Standard, 11038-STD-SSHE-420-008](#) has been used with the preparation of the site and activity specific safety cases to demonstrate:

- A systematic and implemented SSHE MS is in place to ensure compliance with PTTEP policies, relevant legislation and commitment and continuous improvement,
- Hazards and Effects Management Process (HEMP) aspects identified as significant are suitably controlled with recovery and preparedness measures in place and that the risks are managed to ALARP.
 - All Major Accident Events have been identified and have mitigation measures in place to reduce the risk.
 - All Safety Critical Elements have been identified and have a Performance Standards in place which can be monitored and maintained.

The Hazard and Effects Management Process (HEMP) is applied to support demonstration of risk control.

The Myanmar Asset has the following Safety Cases

- Zawtika Offshore Operational Safety Case
- Zawtika Onshore Operational Safety Case

The remedial action plan is included in the Safety Cases where shortfalls were identified when producing and reviewing the Safety Case.

All Drilling Rigs Contracted shall have a Safety Case.

The barriers safeguarding against Major Accident Events (MAE) are monitored through the MAE Prevention Tool.

6.4.4 ASSET INTEGRITY MANAGEMENT

The Myanmar Asset is developed and designed to provide technical integrity and is maintained to preserve technical integrity and operational performance as out lined in the assets safety case.

Technical integrity of Myanmar Asset is achieved when under specific operating conditions:

- The is no foreseeable risk of failure to endanger the safety of personnel, the environment or asset value
- SSHE hazards/risk associated with the asset are reduced to ALARP

In practise this is achieved by the application of effective HEMP controls that include technical standards, procedures and work instructions.

6.4.4.1 TECHNICAL DESIGN INTEGRITY

All equipment and installations are designed according to Myanmar legislation, PTTEP and other industry standards for use within a specified operational envelope. System boundaries are defined along with the system function and operating parameters. Design specifications and operating parameters together form the basis for operational and maintenance tasks.

The Myanmar Asset technical design standards are defined in:

- PTTEP Engineering General Specifications
- Installations Basis of Design
- Assets Safety Concept Document

The roles and responsibilities and authorities of designated Technical Authorities, Discipline Engineers and the technical Operations forum in approving a facility design, construction or modification activity is described in [PTTEP DAS chapter IX Technical Authority](#) and [Technical Authorities Recommended Practice, CMS-12060-RPR-407](#).

6.4.4.2 MAINTAINING TECHNICAL INTEGRITY & OPERATIONAL PERFORMANCE

For technical Integrity safeguarding systems, Failure Modes & Effects Analysis / Reliability Centred Maintenance determines the applicable maintenance tasks and are managed through the [Asset Reliability and Integrity Management Standard, ARIM-0842-STD-001](#).

Figure 4 below is a simplified overview of the Asset Integrity process.

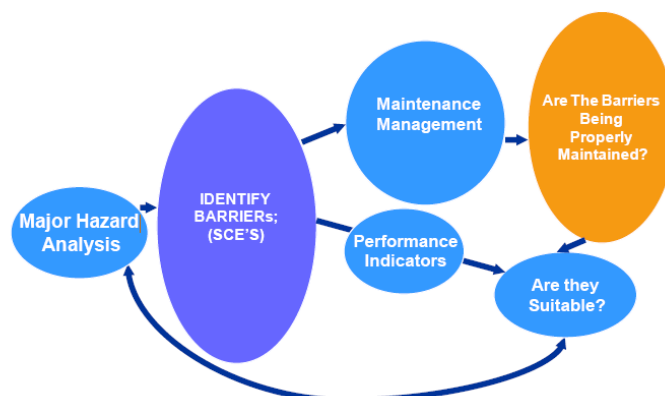


Figure 4: Simplified Asset Integrity Process

The Myanmar Asset is responsible to ensure the compliance with the technical integrity performance standard set out in the ARIMS and the [Process Safety Management Standard SSHE-106-STD-440-007](#)

The ARIMS Dash Board is used to demonstrate the technical integrity of all facilities at any given time.

6.4.5 PROCESS SAFETY

The corporate [Process Safety Management Standard, 11038-STD-SSHE-440-007](#) highlights all the Process Safety Elements which are applicable to the Myanmar Asset in table *Table 1: Guidance of Application of Process Safety through Asset Lifecycle*. Process Safety Event Indicators are captured and are monitored.

The Engineering Corporate Management System describes how Process Safety aspects are incorporated into the designs and how Asset integrity is managed through the ARIMS is followed.

The [Major Accident Event Prevention Tool Guideline SSHE-106-GDL-432](#) has been used to develop a line of sight for the monitoring the health of Main Accident Event barriers.

These barriers have been identified in the bow ties of the safety cases.

6.4.6 RISK TO REPUTATION

Reputation risk issues depend to a large degree on societal issues and perceptions. Myanmar Asset relies on firmly established communication channels and External Relations management to ensure that potential risks to reputation are identified as early as possible in order to avoid problems. The establishment of effective communications systems is an integral part of reputation risk management.

6.5 PLANNING AND OPERATION CONTROL

6.5.1 MYANMAR ASSET SSHE PLAN

The Myanmar Asset develops an annual SSHE and Audit Plan (derived from the annual Business Plan and the Corporate SSHE Plan) that integrates actions in support of strategic objectives and implementation / monitoring / continuous improvement of the SSHE MS, including the Safety Cases. The Myanmar Asset SSHE Manager manages the preparation of the Myanmar Assets SSHE plan, in conjunction with the management of Myanmar Asset.

Objectives and targets from previous year are reviewed in the light of the previous year's performance; significant environmental aspects; legal, financial, commercial operational requirements; technological options and view from interested parties. Results from monitoring programs and internal audits are used to measure performance against targets established in the SSHE Plan. The Myanmar Asset Senior Vice President (the General Manager), endorses the Myanmar Asset SSHE Plan.

See detailed requirements in [Corporate SSHE Plan Standard, 11003-STD-SSHE-550-003](#)

FUNCTION SSHE PLAN

Each site/operation produces a SSHE Plan cascaded down from the Myanmar Asset SSHE Plan, which is included in the annual Asset Operations Plan. Site/Operation Managers are responsible for the preparation of SSHE Plans and for ensuring timely closeout of action Items. Progress of action items is reported to the Myanmar Asset Manager on a regular basis to ensure that stated objectives are achieved.

Targets for Key performance indicators are set at the beginning of each year after evaluation of KPI statistics for the previous year.

The requirements for ISO 14001 and other ISO standards the asset maintains are integrated in the SSHE Plan.

6.5.2 OPERATIONAL CONTROL

6.5.2.1 PROCEDURES AND WORK INSTRUCTIONS

The developed specific standards, procedures, guidelines and work instructions for SSHE critical operations or activities have been developed to ensure adequate controls are in place and to support the implementation of the SSHE MS in the workplace.

Those which are important for the control of critical activities fall under the controlled documents classification and in consequence are registered in the document management system and issued in each function website.

PDT SSHE : <http://doa-sshe/Documentation/>
Myanmar Asset : <http://rgn-imasshe/documentation/Index>
ZPQ : <http://zpq-sshe/Home/>
ZOC : <http://zoc-sshe/Home/>

The SSHE critical activities and operations are included in the Safety Cases.

To facilitate the access to SSHE procedures and guidelines to contractors and facilities with no access to the asset intranet, the SSHE documentation has been provided to all major contractors via contract holders.

All workers are responsible for immediately advising their supervisor of any SSHE concerns. These concerns should be reported to the appropriate Line Manager if sufficiently serious.

This SSHE MS and the Myanmar Asset Standards Procedures and Work Instructions follow the requirements as described in the Corporate [Operational Safety Management Standard, SSHE-106-STD-540](#).

6.5.2.2 EMERGENCY AND CRISIS MANAGEMENT

The Line organization primarily deals with emergency scenarios in conjunction with the Emergency Co-ordinator, the Emergency Response Team and the Duty Manager. Myanmar Asset [Emergency Management Plan, 11027-PDR-SSHE-340-005](#) and [Crisis Management Plan, 11027-PDR-SSHE-340-006](#) are addressed on Myanmar Asset SSHE Document Database.

The Myanmar Assets management team is responsible for conducting scheduled reviews to ensure that the emergency procedures and associated information remain valid and comply with the current operating conditions.

Desktop emergency and crisis drills are performed periodically, including mobilization of the Emergency Control room, to test readiness and crisis management response.

Emergency and Crisis Response Team members who may have to communicate with external parties have been trained to do this.

The Field Manager and Drilling Supervisors co-ordinate and maintain records of weekly facility emergency exercises.

The Myanmar Asset Emergency and Crisis Management Plan are in compliance with the corporate [Emergency and Crisis Management Standard, SSHE-106-STD-500](#).

6.5.2.3 PERMIT TO WORK

The Myanmar Asset use PTTEP Corporate [Permit to Work Standard, SSHE-106-STD-510](#) and [Permit to Work Procedure, 10011-PDR-SSHE-510-010](#) to operate permit to work system throughout its operations. The above standard and procedure describe the authorisation, restrictions, procedures for approval and detailed definitions of permit types. No work may be carried out with or without a permit unless it forms part of an approved work plan and has been authorised to commence.

6.5.2.4 MANAGEMENT OF CHANGE

To ensure that an auditable process is in place to:

- Report and record all non-compliances with established Country statutory requirements, PTTEP policies, standards and procedures
- Report, review evaluate and record all variances from Country statutory requirements, PTTEP policies, standards and procedures
- Report, review evaluate and record all changes to projects and to the Process Safety elements of functional assets.

All planned variances / change requests are evaluated by a multidisciplinary team consisting of technical authorities to verify that all required standards are adhered to and achieved. Approved variance /change requests are incorporated into project Initiation notes and work packs as appropriate.

The Corporate [Management of Change Standard, 11038-STD-SSHE-570-012](#) is the mother document for the management of change.

When a change (Modification or Deviation) in an Operating Asset affects Safety Critical Systems, approval for the change shall be obtained from Management of the Asset for continued operations follows

- [PTTEP DAS chapter IX Technical Authority](#)
- [Accountability and Ownership of Management of Change CMS-12060-STD-407](#)
- [Management of Engineering Modifications for Operating Assets CMS-12060-RPR-404](#)
- [Change Management – Projects \(Engineering and Construction\) CMS-12060-RPR-405](#)
- [Management of Deviations for Operating Assets, CMS-12060-RPR-406](#)
- [Technical Authorities Recommended Practice, CMS-12060-RPR-407](#)

6.5.2.5 PERSONAL PROTECTIVE EQUIPMENT (PPE)

The Myanmar Asset has purchased and issued PPE as per the requirements of section 6.5 of the corporate [Operation Safety Management Standard, SSHE-106-STD-540](#).

The PPE standard requirements are a standard requirement in the Contractor Requirement Form for managing contractors.

6.5.2.6 CHEMICAL MANAGEMENT

The chemical used in the Myanmar Asset is controlled by “Chemical Owners” in consultation with SSHE Department and/or Site SSHE. Corporate [Chemical Management Standard, 11003-STD-SSHE-590-005](#) is used for the Management of Chemicals (Purchase, storage, transportation and disposal).

PTTEP uses the Chemwatch “Chemgold III” program for tracking chemicals and their Material Data Sheets and emergency response requirements.

6.5.3 SECURITY MANAGEMENT

The primary objectives for security management are to:

- Identify and evaluate the threats to Company personnel and Assets and implement appropriate measures;
- Evaluate the Companies vulnerabilities by a process of continuous assessment of security measures;
- Ensure that Threat Response measures are appropriate and ready for implementation;
- Develop practical, cost-effective and feasible mitigation measures;
- Determine the risks based upon available intelligence and security expertise; and
- Communicate awareness and appreciation of security related issues through education.

Myanmar Asset shall develop, maintain and implement [Myanmar Asset Security Management Procedure, 11027-PDR-SSHE-340-004](#). Key functional Staffs have been briefed on the Security Plan and key aspects of the security requirements have been embedded in the asset and functions SSHE Plans.

The Security focal point for the asset is the SSHE Manager.

Security is managed in line with the requirements of the Corporate [Security Management Standard, SSHE-106-STD-530](#)

6.5.4 OCCUPATIONAL HEALTH MANAGEMENT

The purpose of Occupational health management is to:

- Protect, promote and maintain the health, safety and welfare of people at work
- Advise on the provision of safe and healthy conditions by informed assessment of the physical and psychological aspects of the working environment
- Identify and advise management on the causes of occupational disease and injury and the means of their prevention
- Advise on the rehabilitation and placement in suitable work of those temporarily or permanently incapacitated by illness or injury and
- Assist in the planning and preparedness of emergency response plans.

Based on the corporate [Occupational Health Management Standard, SSHE-106-STD-560](#), PDT has developed [Hearing Conservation Program \(HCP\) Procedure, SSHE-300-PDR-560](#), applies to the Myanmar Asset.

PTTEP Corporate has developed the procedure and guidelines which applicable to the Myanmar Asset covering the following:

- [Medical Emergency Management Guideline, 11003-GDL-SSHE-501-003](#)
- [Fitness to Work Guideline, 11003-GDL-SSHE-561-005](#)
- [Work Related Injury/Illness Case Management Procedure, 11038-PDR-SSHE-562-006](#)
- [Site Medical and Health Care Services Guideline, 11038-GDL-SSHE-563-020](#)
- [Drugs and Alcohol Guideline, SSHE-106-GDL-564](#)
- [HIV/AIDS Management Guideline, SSHE-106-GDL-565](#)
- [Industrial Hygiene Monitoring Guideline, SSHE-106-GDL-566](#)

- [Medical Surveillance Management Guideline, SSHE-106-GDL-569](#)

The Myanmar Asset does not have its own Occupational Health Specialist but has the required support through the Service Level Agreement with Corporate SSHE division. The Occupational Health management is subject to yearly audits from the Corporate Occupational Health Specialist.

6.5.5 ENVIRONMENT MANAGEMENT

The purpose of Environment Management is to reduce and mitigate the environmental impacts of identified environment aspects as well as achieving the high environmental performances.

The environment management covers Air Emission, Flaring and Venting, Waste and Wastewater discharges, Produced Water Discharges, Energy Efficiency and Biodiversity.

The Myanmar Asset follows the requirements as documented in the corporate [Environment Management Standard, 11038-STD-SSHE-520-009](#).

The Myanmar Asset has implemented the following requirements;

- The environment management requirements as stipulated in the SSHE Policy
- Complies with the Regulatory environment laws
- The assets facilities are ISO 14001 certified
- The assets facilities have been subjected to an Environment Impact Assessment study
- The asset has incorporated the management of environmental aspects in its SSHE Plan
- Has Environmental Management Audits scheduled in its SSHE Plan

The Myanmar Asset develops Waste Management Procedure which complies with Myanmar regulations and PTTEP Corporate guideline. The Myanmar Asset Waste Management Procedure is presented in [Waste Management Procedure, Myanmar-SSHE-11027-PDR-510](#).

PTTEP Corporate has developed the procedures and guidelines which applicable to the Myanmar Asset covering the following:

- [Waste Management Procedure, SSHE-106-PDR-521](#)
- [Biodiversity and Ecosystem Services Management Guideline, 12002-GDL-SSHE-522-008](#)
- [Water Management Guideline, SSHE-106-GDL-523](#)
- [Energy Efficiency Guideline, SSHE-106-GDL-524](#)
- [Gas Flaring and Venting Reduction Guideline, SSHE-106-GDL-527](#)
- [Net Environmental Benefit Analysis Guideline, SSHE-106-GDL-526](#)
- [Environmental Baseline Survey and Monitoring Procedure, SSHE-106-PDR-611](#)

The Corporate and the asset environment strategic goals and plans have been embedded in the Myanmar Asset SSHE plan.

6.6 IMPLEMENTATION AND MONITORING

6.6.1 INCIDENT MANAGEMENT

To learn and prevent similar incidents from re-occurrence and to find the root causes, all SSHE incidents are reported according to the [Incident Management Standard, 11038-STD-SSHE-600-011](#).

Details of the all incidents and high potential near misses are electronically input into the [PTTEP Incident Management System \(IMS\)](#) by nominated departmental focal points. The incidents are reported to the

line and authorities in accordance with the reporting requirements mentioned in the standard. Those locations which do not have access to the Intranet use the paper Incident Reporting forms and are scanned and copied to the SSHE department within the required reporting time. The Site SSHE personnel are responsible for the maintenance of records within the IMS. Corporate SSHE is responsible to maintain and develop the IMS.

The Myanmar Asset SSHE department is responsible for ensuring that the appropriate records are kept for;

- Follow-up actions related to incidents / high potential near misses
- Environmental incidents including chemical spills
- Vehicle incidents

In additions the Myanmar Asset SSHE department is responsible for ensuring that the entire Company is provided with adequate feedback regarding incidents, together with corresponding measures to prevent future recurrence. SSHE Newsletters, produced by the Myanmar Asset SSHE department, are used to publish details of incidents that have a high learning value. Copies of news letters are also distributed to contractors.

6.6.1.1 INCIDENT INVESTIGATION

Incidents and near misses with a significant actual or potential severity risk accordingly to the SSHE Risk Assessment Matrix, are investigated following the documents:

- [Occupational Illness Cases Identification Guideline,SSHE-106-GDL-601](#)
- [Incident Investigation guideline,12148-GDL-SSHE-602-024](#)
- [SSHE Incident Reporting Perimeter Guideline \(SSHE-106-GDL-603\)](#)

Incidents are reviewed on a monthly basis in order to establish root causes and identify actions to reduce the chance of re-occurrence. In addition an RAM assessment is made to determine the risk potential.

It should be noted that in some cases incident investigations conducted by PTTEP may be run in parallel to external investigations by the authorities or insurance companies.

In case of incidents involving contractors an investigation could be made in parallel with the contractor's investigation.

The results of incident investigations are presented to the SSHE Committee and lessons learnt are disseminated to PTTEP and contractor's personnel. In the event of a fatality, a report must be submitted to PTTEP CSH and a review of the effectiveness of remedial actions is carried out 12 months after submission of the investigation report. The results of this review are sent to PTTEP CSH.

Incident investigation reports are approved and signed by the appropriate level of management as specified in the documents mentioned above.

6.6.1.2 COMMUNICATION OF LESSONS LEARNT

Lessons learnt from incidents will be communicated by the corporate PTTEP SSHE division to ensure that the corrective actions from the lesson learnt have been incorporated into the continuous improvement process of relevant functions to prevent similar incident from reoccurrence.

PTTEP SSHE website provides access to all [Lessons Learnt](#) publications.

6.6.2 KEY PERFORMANCE INDICATOR AND PERFORMANCE MANAGEMENT

SSHE performance against plans and targets is monitored at various levels within the Myanmar Asset follows the [SSHE KPI and Performance Management Standard, SSHE-106-STD-610](#).

A review of the relevant KPIs performance against the Corporate Plan targets is carried out during the monthly SSHE management Committee meetings (see 6.3.3.2 Hierarchy of SSHE meetings). Each Operation/Site is responsible for initiating the activities required to achieve its target SSHE performance. If targets are not met, appropriate corrective actions are initiated.

Additional pro-active monitoring involves an assessment of the Myanmar Asset's and Contractor's commitment to SSHE by monitoring amongst others the following issues:

- The number of reported incidents and near misses, including High potential near misses and asset defects / Technical Integrity issues, general failure, causes, etc.
- The number of reported Safety Observation Cards.
- Adherence to medical checks and health surveillance (Refer to Fitness to Work Guideline)
- Frequency of management inspections and site visits

Contractor SSHE performance is reviewed in the formal contractors meeting and the yearly and final Contractor SSHE Evaluation report as per the SSHE Contractor Management Procedure.

The Procurement department maintains a database of all contractor SSHE assessments.

6.6.2.1 PERFORMANCE INDICATORS (PROACTIVE AND REACTIVE)

Key performance indicators are an essential part of an effective management system. Tracking of KPIs generates historical performance records from which SSHE performance trends can be derived. Within the Myanmar Asset both active and reactive KPIs are selected such that if one or a number of indicators show adverse trends, corrective action will be initiated. The Myanmar Asset follows PTTEP Corporate SSHE Department's requirements and in setting SSHE targets using the same format of the 7 elements.

Key performance indicators are set annually in the SSHE plans and performance on the most significant KPIs is monitored monthly and documented in the SSHE monthly report and also reported to the Myanmar Asset SSHE Department and Corporate SSHE Department.

See [PDT SSHE](#) web site for up to date KPI's and Performances.

6.6.2.2 TASK AND TARGETS

As stated above, SSHE targets for each KPI are defined annually and are specified in the Corporate SSHE plan. Corporate SSHE targets are cascaded down into specific departmental plans.

Achieving the Myanmar Asset performance objectives and targets depends on:

- Maintaining a high level of SSHE awareness in the Myanmar Asset staff and contractors
- Effective Contractor Management
- Performing strategic reviews following changes to the scope of operations & revising plans accordingly.

6.6.2.3 SSHE RECORDS

A record is defined as any type of form that is routinely used to summarize a distinct set or information. Records are established within controlled documents.

The Myanmar Asset maintains SSHE records in hard copy or electronic format in order to demonstrate conformance to SSHE requirements, to meet regulatory requirements and ISO14001 requirements.

| No. | Record | Responsible Party | Type |
|-----|--|--|---|
| 1 | Training and Competence | HR Department & Asset SSHE Department | Web Database |
| 2 | Control Document | Asset Document Controller & Asset SSHE Department | Web Database |
| 3 | Performance Measurement and Monitoring | Asset SSHE Department | Web Database (PDT SSHE Page) |
| 4 | Calibration and Maintenance activities and results | Asset Maintenance Department & Asset SSHE Department | Web Database (SAP) SSHE Department Filing |
| 5 | Applicable legal and Other requirements compliance evaluations results | Asset SSHE Department | Web Database (PDT SSHE Legislation) (Myanmar Asset SSHE Legislation) |
| 6 | Incident Investigation | Asset SSHE Department | Web Database (IMS) |
| 7 | Corrective/Preventive Actions | Asset SSHE Department | Web Database (ATS) |
| 8 | Internal Audit | Asset SSHE Department | SSHE Department Filing |
| 9 | Management Review | Asset SSHE Department | SSHE Department Filing |

6.6.2.4 DATA COLLECTION

The data related to the KPIs is provided by the line and collected and reviewed by the SSHE department. The SSHE department is responsible for collating all SSHE data and compiling performance statistics, including monthly summaries. Environmental data is collected and performance calculated as stated in [Environmental Performance Reporting procedure, 12002-PDR-SSHE-612-003](#). Performance statistics are used to identify current trends and take corrective actions as required.

6.6.3 BEHAVIOURAL BASED SAFETY (BBS)

The SSHE policy sets out the Company's goals and to achieve the goals one will need a good Safety Culture. Behaviour Based Safety tools and questionnaires are used to improve and monitor the development of the companies Safety Culture. The Behaviour Based Safety is mentioned in Corporate [SSHE Culture Management Standard, 11003-STD-SSHE-620-006](#). It is the task of all leaders within the Myanmar Asset to promote improvements to the Safety Culture by implementing the BBS process.

BBS guidelines under PDT SSHE are:

- [Stop Work Authority, 10012-GDL-SSHE-620-001](#)
- [SSHE Award and Recognition, SSHE-300-GDL-311](#)

6.6.4 NON COMPLIANCE AND CORRECTIVE AND PREVENTIVE ACTION

Typically non compliances are identified via incidents reporting and investigation, managerial SSHE inspections, ad hoc SSHE audits and reviews, SSHE MS self-assessment and internal and external SSHE MS audits and reviews. Identified non compliances or observations that could arise in non-compliance are included in the review/audit/inspection reports, corrective/preventive actions are identified and prioritised, an action plan is defined including assigned action parties and completion dates. Actions

are agreed with the activity/process responsible and are included in the [Action Tracking System \(ATS\)](#) tool for follow up and tracking to final closeout.

Management regularly review the status of corrective actions and ensures they are implemented.

6.7 AUDIT AND REVIEW

The Myanmar Asset follows and requirements as stipulated in the [Audit and Review Standard, SSHE-106-STD-700](#) supplemented with local audit and review requirements documented in [Audit and Review Procedure, 10012-PDR-SSHE-700-004](#).

6.7.1 AUDIT PLANNING

The annual SSHE audits and reviews and inspection plan is scheduled in the annual Audit Plan which is aligned with PTTEP Corporate Audit Plan to plan for the independent audits and reviews lead by Myanmar Asset SSHE staff.

The plan usually includes:

- ISO 14001 internal/external audit
- SSHE Compliance Audit
- Occupational Health and Hygiene internal Audit
- EIA Compliance Audit
- Security internal Audit
- Operational Technical Review (Once every 3 years, led by CSH staff)
- Managerial SSHE inspections to facilities and main contractors
- Legal Compliance Audit

The audit plan is a rolling five year plan that is updated on a yearly basis based on risk assessment results. The assurance plan defines the relative criticality, exposure and ranking of audits and reviews. Internal and external resource requirements in terms of man-days are planned over the entire five-year period, together with the timing of audits / reviews.

The Myanmar Asset SSHE Committee is responsible for establishing, reviewing and updating the Audit Plan and for monitoring follow-up against recommendations by means of the follow up action system database.

Each audit is conducted according to specific schedule that is included in the audit terms of reference. Audit schedules are jointly prepared by the lead Auditor and the Auditee.

Contractors are audited by the relevant Contract Holder with the support with of the SSHE Department if required.

Initial entry and continued eligibility of a contractor to work for the Myanmar Asset is dependent upon demonstration of sound SSHE management. The frequency of contractor audits depends on contract duration and scope and is captured in the Contract Monitoring Plan.

6.7.2 MANAGEMENT REVIEW PLANNING AND PROCEDURES

6.7.2.1 SSHE MS MANAGEMENT REVIEW

Results from the SSHE MS and legal compliance self-assessment exercise, incident investigation, audits, inspections, reviews participation and consultation, external interest and complaint, the annual SSHE performance and legal update are used by the management SSHE Committee to conduct a review of the

SSHE MS to address the need for changes to policy, objectives and targets, SSHE management programmes and other elements of the SSHE MS as appropriate.

The annual SSHE MS review is documented as part of the SSHE Committee Meeting minutes.

Review findings and recommendations are incorporated into updated versions of the Myanmar Asset SSHE MS and are cascaded down into the Safety Cases as appropriate.

6.7.2.2 MANAGEMENT SSHE INSPECTIONS

A schedule of cross-functional site SSHE inspections is established and carried out by members of the Myanmar Asset management team. This schedule is established in the annual Myanmar Asset SSHE Plan.

Each Manager assigned to a site inspection is responsible for assembling his own team and for producing a report on the site visit for presentation to the SSHE Committee at the following meeting.

Managers are expected to make use of relevant checklists during site visits to ensure that hazard controls specified are in place and functional.

6.7.2.3 SSHE MS SELF-ASSESSMENT

As stated above an annual SSHE MS Self-Assessment process is conducted to verify the health of the SSHE MS and identify any weakness or concern area. Results from this assessment are used as an input both to the Management review and to the next year SSHE Plan definition.

Annex B

ZPQ Sewage Treatment Unit Information



CHAPTER 18:

SEWAGE TREATMENT SYSTEM



CHAPTER 18: TABULATION OF REVISED PAGES

| SHEET | REVISIONS | | | | | | | SHEET | REVISIONS | | | | | | |
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| 2 | X | X | | | | | | 51 | | | | | | | |
| 3 | X | X | | | | | | 52 | | | | | | | |
| 4 | X | | X | | | | | 53 | | | | | | | |
| 5 | X | | X | | | | | 54 | | | | | | | |
| 6 | X | X | X | | | | | 55 | | | | | | | |
| 7 | X | X | X | | | | | 56 | | | | | | | |
| 8 | X | | X | | | | | 57 | | | | | | | |
| 9 | X | | X | | | | | 58 | | | | | | | |
| 10 | X | X | X | | | | | 59 | | | | | | | |
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**18.0 Acronyms**

| | |
|-----|-------------------------------|
| CRO | Control Room Operator |
| F&G | Fire & Gas System |
| LC | Lock Close |
| LO | Lock Open |
| PCS | Process Control System |
| PLC | Programmable Logic Controller |
| SIS | Safety Instrumented System |
| STP | Sewage Treatment Package |



18.1 PROCESS AND EQUIPMENT DESCRIPTION

18.1.1 Process Description

Raw sewage is collected from black water and grey water and is introduced into the Surge Tank (T-7320) sewage is then sent to macerator (P-7330). It further mixes with incoming seawater and goes through the bookcell (SW-7340) and to Effluent Tank (T-7360) for subsequent discharge to overboard.

Some quantity of sewage is recycled through the orifice plate to Surge Tank (T-7320). When the unit is not operating, seawater flows into Surge Tank (T-7320).

During backflush, seawater enters at the top of the bookcell (SW-7340) to flush seawater scale deposits from the cell plates. The macerator (P-7330) pumps liquid from the bookcell (SW-7340) to Surge Tank (T-7320).

During slowdown mode untreated solids in Effluent Tank (T-7360) are recycled back to Surge Tank (T-7320) for treatment in the manual blowdown operation, the macerator pump takes suction from the bottom of Effluent Tank (T-7360) back to and discharges through the return orifice to Surge Tank (T-7320).

Sewage treatment package is equipped with an automatic blowdown option, the macerator pump circulates liquid through and eductor (venturi) to draw untreated solids from Effluent Tank (T-7360) and return flow to Surge Tank (T-7320) for retreatment.

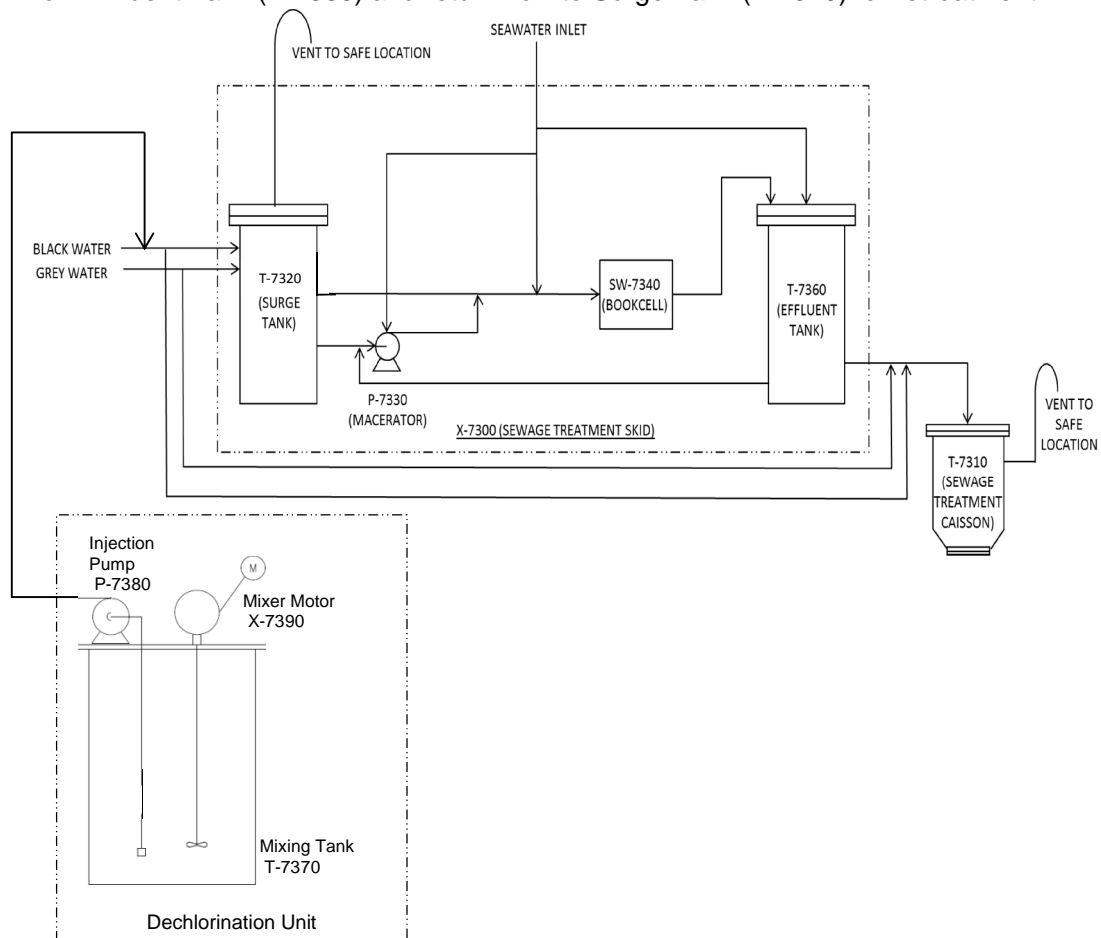


Figure 18.1 Sewage Treatment System Diagram



18.1.2 Equipment Description

The complete skid mounted system consists of pre-assembled Schedule 80 CPVC piping and valves, two tanks (T-7320 & T-7360), control power panel (LCP-CPP-7300), power transformer (TR-7300), Bookcell, and macerator grinder (P-7330). The process piping on the Sewage Treatment Package (STP) is divided into replaceable sections via unions or union type ball valves. The piping and valves included in this STP meet ASTM D-1784 industry standards.

The Surge Tank incorporates an ultrasonic level transmitter (LT-7300) that measures the level of sewage. This transmitter reading is used to initiate the start and stop sequences of the STP when in the "AUTO" mode. When the T-7320 tank level reaches 35% the system will begin processing the sewage. This involves starting the macerator (P-7330) which causes the sewage to flow through the bookcell and into the T-7360 tank. When the T-7320 tank level reaches 0% the automatic process stops and the flow direction valves for the bookcell (XV-7307A and XV-7307B) change state. This allows the sewage to flow through the bookcell in the opposite direction the next time the unit starts thus causing a cleaning action within the bookcell. The raw sewage contained in the Surge Tank is finely ground through a specially designed Macerator Grinder (P-7330). From the Macerator discharge, approximately 5 gpm (1.2m³/hr) of the macerated sewage is returned to the Surge Tank through a calibrated orifice plate (RO-1). This "recycled" sewage keeps the sewage stirred up and keeps it being ground into fine particles. This helps prevent any blockage and settling out of particulate matter.

The remainder of the macerated sewage is mixed with a controlled amount of seawater as it is pumped to the Ompure Bookcell. The STP oxidizes and disinfects raw sewage by means of electrochemical reaction. The mixture of finely ground sewage and seawater passes between electrically charged plates within the operating Bookcell. The chloride salts of the seawater are decomposed by electrolysis to form hypochlorite, which kills harmful coliform bacteria and oxidizes the organic compounds in the sewage stream. A single pass between the plates kills nearly 100% of resident bacteria and oxidizes between 90 and 95% of organic compounds.

The treated sewage water is then discharged overboard via sewage caisson.

18.1.2.1 Influent / Effluent Tank T-7320 / T-7360

T-7320 is the influent (surge) tank for raw sewage prior to processing. T-7360 is the effluent (discharge) tank for treated sewage.

18.1.2.2 Macerator Grinder P-7330

The Macerator is not a typical centrifugal pump. The addition of specialized internal shredders and cutter components at the wetted suction of the unit eliminates the flow characteristics normally found in a centrifugal design. The grinder is mechanically coupled to an electric driver, via flexible coupling. The Macerator is used to effectively grind the collected wastewater to allow for proper treatment through the Ompure system. The primary purpose of this unit is to grind sewage wastes, and discharge the stream from the casing at a suitable flow required for the Ompure system.



18.1.2.3 Dechlorination Unit

Injection Pump P-7380

Diaphragm injection pump with adjustable stroke and rate settings. This pump provides Dechlorination solution injection to the Omnipure unit's Effluent discharge stream. Provides effective neutralization of the sodium hypochlorite in the effluent stream.

Mixing Tank T-7370 & Mixer Motor X-7390

An on-skid mixing tank equipped with a motor is used to facilitate the neutralisation of chlorine in the overboard discharge stream after treatment. The effluent is neutralised with sodium sulphite.

18.1.2.4 Sewage Caisson

The treated sewage from effluent tank is led to the Sewage Treatment Caisson T-7310.

Sewage caisson is designed to keep maximum possible distance from intake of seawater and discharge treated sewage.

Cover plate flange with hinge shall be provided for opening purpose.

18.1.3 Equipment Data

18.1.3.1 Influent/Effluent Tank T-7320/T-7360

| OPERATING CONDITIONS | |
|------------------------------|--|
| Volume | m ³ [Gal] |
| T-7320 | 3.03 [800] |
| T-7360 | 2.25 [595] |
| Pressure (Operating) | Atmospheric |
| Temp. Range °C [°F] | 0-40 [32-104] |
| CONSTRUCTION | |
| Material of Construction | 1/4" A36 CS |
| Coating (external) | Marine Grade Polyurethane/epoxy |
| | Per STDN TS-25E |
| (internal) | Epoxy per STDN TS-25INT |
| Mounting Provisions | 3/8"A36 CS Plate (Formed/Welded) |
| OTHER CHARACTERISTICS | |
| Volume Indications | None |
| Mounting | Anchor tabs (x 6 per Tank) |
| | Removable Tank Tops |
| Dimensions | Mm [in] |
| T-7320 | 1778 X 1270 X 1371 [70 X 50 X 54] |
| T-7360 | 1524 X 1067 X 1422 [60 X 42 X 56] |
| Item Weight | Kg [lbs] |
| T-7320 | 898 [1979] |
| T-7360 | 741 [1633] |
| MANUFACTURER DATA | |
| Manufacturer/Vendor: | Drager's Industries Inc. |
| Model No: | Custom – OD025701-S-01 |
| | See D025701-S-01 for skid detail drawings. |



18.1.3.2 Macerator Grinder P-7330

| Process Liquid | | Raw Sewage, Seawater | | |
|--|--|---|--------|--------|
| Pumping Temperature Norm/Max C [F] | | 24/65 [75/150] | | |
| Spec. Gravity @ Pumping Temp. | | 1.03 | | |
| Capacity @ Pumping Temp. Min/Max LPM [GPM] | | 0.94 / 75 [0.25 / 20] Set by factory via inline orifice plates | | |
| Grinder Flowrate | | Set by factory via inline orifice plates | | |
| Discharge Pressure Min/Max kg/cm ² [PSIG] | | 0.0 / 0.42 [0.0 / 6] | | |
| PERFORMANCE @ RATED CONDITIONS | | | | |
| Rated RPM | | 2850@50Hz | | |
| Brake HP Kw [HP] | | 1.49[2] | | |
| GRINDER CONSTRUCTION | | | | |
| Casing Hydro Pressure Max.kg/cm ² [PSIG] | | 3.16 [45] | | |
| Suction Conn. | | Flat Faced(FF), 150# Flange | | |
| Discharge Conn. | | 1 ¼" Female NPT | | |
| Internal Cutters/Grinder Rings | | Hardened 17-4 PH Stainless Steel | | |
| Rotational Arrow | | Yes | | |
| Breather | | Yes | | |
| Mechanical Seal | | Silicon Carbide/ Silicon Carbide | | |
| Oil Level Site Glass Port | | Yes | | |
| Mounting/Fixing hardware | | 316L | | |
| Drive Shaft | | Solid, 316L SS | | |
| Nozzles | | Size | Rating | Facing |
| Suction | | 3" | 150# | FF |
| Discharge | | 1-1/4" | 150# | FNPT |
| Seal Flushing Port | | 1/8" | 150# | Comp |
| Pump Coupling | | Flexible Rubber | | |
| Internal O-Rings | | Viton | | |
| Material of Construction | | 875 Silicone Bronze, Cast | | |
| Mounting | | Foot | | |
| LUBRICATION | | | | |
| Recommended | | Synthetic, Non detergent, ISO 32 | | |
| Factory Filled | | Yes; Royal Purple; Synfilm 32 | | |
| OTHER CHARACTERISTICS | | | | |
| Replaceable Mechanical Seal | | Yes – Consult Factory for Kit | | |
| Adjustable Cutters | | Yes | | |
| Mech. Seal/Bushing Tool Avail. | | Yes – Consult Factory | | |
| Adjustable Base Plate | | n/a | | |
| Nameplate | | 316SS, Dual Rated 50/60 Hz | | |
| Grinder(only) Weight kg[lb] | | 29 [65] | | |

18.1.3.3 Sewage Treatment Caisson

| DESCRIPTION | DETAIL |
|--------------------|--|
| Location | Partially submerged. Part of structure below Sea Deck. |
| Manufacturer | N/A |
| Type | Vertical |
| Size | 273 mm (OD) x 20250mm (L) |
| Design pressure | Atmospheric |
| Design temperature | 70°C / 0°C |
| Operating pressure | Atmospheric |



| DESCRIPTION | DETAIL |
|-----------------------|--|
| Operating temperature | Ambient |
| Material | CS, Internal and external surfaces to be coated with modified epoxy or glass flake epoxy |
| Corrosion allowance | 6 mm (3 mm internal, 3 mm external) + anode |

18.1.3.4 Injection Pump P-7380

| OPERATING CONDITIONS | |
|--|-------------------------|
| Process Liquid | Sodium Bisulfite |
| Pumping Temp Min/Max °C[°F] | 0/45[32/113] |
| Spec. Gravity @ Pumping Temp. | 1.01 |
| Capacity @ Pumping Temp. Max m ³ /hr [gpm] | 0.002 [0.009] |
| Discharge Pressure Max kg/cm ² [psi] | 12.24 [174] |
| Tank Capacity m ³ [Gal] | 0.2 [50] |
| PERFORMANCE @ RATED CONDITIONS | |
| Operating Power (Internally derived) | 50 watts @ 120VAC |
| Operating Frequency | 50 Hz |
| MATERIAL OF CONSTRUCTION | |
| Head and Fittings | PVC |
| Balls | Ceramic |
| Diaphragm | PTFE |
| Seal Ring | Viton-B |
| Diaphragm | PTFE |
| Seal Ring | Viton-B |
| LUBRICATION | |
| None Required | |
| OTHER CHARACTERISTICS | |
| Area Classification | ATEX EEx d IIC T6 |
| Motor Data | Internal Solenoid drive |
| Protection | IP65 |
| Pump Type | Diaphragm w/piston |
| MANUFACTURER DATA | |
| Manufacturer/Vendor | ProMinent |
| Model No.: | EXBbG1201PS30B001 |

18.1.3.5 Mixing Tank T-7370

| Operating Temperature | 22 – 33 °C |
|-----------------------|-----------------------|
| Operating Pressure | ATM |
| Design Pressure | 0.12 barg |
| Total volume | 0.21 m ³ |
| Dimensions, L x W x H | 813mm x 305mm x 900mm |
| Weight | 125 kg |
| MATERIALS | |
| Structural Steel | A36, CS |
| Structural Shapes | ASTM |
| Gaskets | Neoprene |
| Top Cover | A36, CS |



18.1.3.6 Mixer Motor X-7390

| | |
|-------------------|-------------------------------|
| Product Code/Type | 3GKP 082 310-BSH/M3KP 80 MA 4 |
| Rated output | 0.55 kW |
| Rated speed | 1421 rpm |
| Rated voltage | 400 VY |
| Rated frequency | 50 Hz |
| Rated current | 1.41 A |

18.2 CONTROL AND MONITORING DESCRIPTION

The electrical power required to operate the Bookcell is derived from the STP internal D.C. rectifier. The preset amount of rectified D.C. current applied to the Bookcell determines the degree of oxidation needed for proper operation. If any abnormal conditions occur which cause the bookcell to overheat then the two thermal switches (TSH-7300A and TSH-7300B), which are integral parts of the bookcell, will indicate this over-temperature situation. The PLC will then take the appropriate action of shutting down the STP and activating the Common Alarm.

In case of high level in surge tank T-7320 , sewage treatment package bypass valve ,XV-73012, will be opened and inlet valve ,XV-73011, will be closed from PCS to let Sewage flow to overboard straightly.

The bookcell has two valves, XV-7307A and XV-7307B, which are controlled by the PLC and which determine the direction of flow through the bookcell. Each time the STP stops (typically due the all the sewage having been processed) these valves will reverse and change the flow direction through the bookcell. This reversal process helps prevent blockage and lengthens the time required between bookcell cleanings. This is because this reversal causes particles that catch in small crevasses to dislodge when the flow direction is reversed.

18.3 ALARMS, SHUTDOWNS AND SYSTEM PROTECTIONS

The Effluent Tank (T-7360) is sized to provide a minimum retention time of 30 minutes between the entry of treated sewage (effluent) at the bottom of the Effluent Tank (T-7360) and subsequent discharge from the top of Effluent Tank (T-7360) to the sea. This overflow connection allows the fluid to overflow out of the tank via gravity. Additionally there is a 1" Blowdown line from this tank. Once every 24 hours the PLC will cause the STP to temporarily stop processing sewage and begin a blowdown, or cleaning, cycle. This is done by changing the state of valve XV- 7306. This causes the output from the macerator to flow to an ejector. As this fluid stream passes through the ejector on its way back to the T-7320 tank it pulls in fluid from the 1" Blowdown line. The remaining solids from the T-7360 tank are part of this fluid stream and are thus removed from this tank and sent back to the T-7320 tank. This allows these solids to be ground finer until they are small enough to leave the system as effluent. This process takes about five minutes after which the valve XV-7306 will return to its original state and the STP will again be ready to process the sewage.

The on skid PLC is operated from a touch controlled HMI (Human Machine Interface). This HMI will display the system status (including any Alarm and Warning conditions) and indicate the state on all automated valves and the level in the T-7320 Surge Tank. There is a Common Alarm output from the PLC that can be used by the



platform DCS to monitor the status of the STP.

| EQUIPMENT NAME | FUNCTION |
|----------------------------------|--|
| Power Control Panel LCP-CPP-7300 | NEMA 4X enclosure that contains all control logic elements of the system including the power rectification circuits (D.C. power supply). All skid mounted components are pre-wired to the panel. |
| Power Transformer TR-7300 | Uses customer AC Power to run all controls in the control panel and converts the AC power to DC for the Bookcell. |
| Surge Tank T-7320 | Collection tank to accommodate normal raw sewage flow into the STP. Tank size allows the STP to operate at the correct treatment rate without regard to incoming flow rate. |
| Level Transmitter LT-7300 | Used to monitor sewage level of the Surge Tank (T-7320). The preset levels will either start the macerator (P-7330) when the high level (35% volume [785mm]) is reached, or stop (idle mode) the macerator (P-7330) when the Surge Tank (T-7320) is at 0% [483mm]. When a high-high level (75% volume [1130]) is reached, the unit will alarm without shutdown, open the Grey Water bypass valve (XV-73011), close the Grey Water inlet valve (XV-73012), and continue to process sewage until the Surge Tank (T-7320) is at 0% level [483mm]. |
| Macerator P-7330 | Designed to empty the Surge Tank (T-7320) by grinding down waste, mixing the slurry with seawater and then moving through to the Bookcell. |
| Bookcell | The Bookcell oxidizes and disinfects raw sewage by means of Electrolysis (moderate voltage, high amperage direct current induces a complex chain of reactions that cause water and salt molecules to separate and recombine into sodium hypochlorite). The non-conductive PVC Bookcell housing and conduit fittings provide electrical protection. |
| Effluent Tank T-7360 | Provides the required retention time to assure that any remaining bacteria will be exposed to the produced hypochlorite and killed. Operated in the flooded] state so overflow discharge is continuously removed while the STP is in operation. A vent system is required to extract gases from the STP and send to the atmosphere (safe location). |
| Spray Head Assembly | Mounted to the downcomer flange. The Spray Head aids in preventing foam, generated by electrolytic process, from migrating up the positive vent pipe. |



18.4 REFERENCES

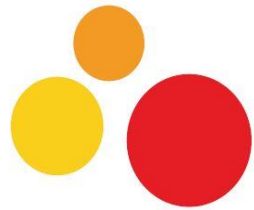
| DOCUMENT NUMBER | DESCRIPTION |
|--|---|
| PHILOSOPHY | |
| MM-ZTK-1A-ZPQ-M026-PHI-0001 | Control & Shutdown Philosophy - Sewage Treatment System |
| OPERATING PROCEDURE | |
| MM-ZTK-1A-ZPQ-M026-MAN-0001 | Operating Manual for Sewage Treatment System |
| P&ID | |
| MM-ZTK-1A-ZPQ-PRO-PID-0325 | Sewage LQ Treatment |
| MM-ZTK-1A-ZPQ-M026-PID-0001 | Flow Diagram |
| CAUSE & EFFECT CHARTS | |
| MM-STK-1A-ZPQ-PRO-ESD-0001 | SIS Cause & Effect Chart |
| UTILITY FLOW DIAGRAMS | |
| MM-ZTK-1A-ZPQ-PRO-UFD-0312 | Sewage Treatment System |
| MANUALS, DATA SHEETS AND SPECIFICATIONS | |
| MM-ZTK-1A-ZPQ-M026-DTS-0002 | Equipment Datasheets |
| MM-ZTK-1A-ZPQ-M026-DTA-0001 | Instrument Datasheets |

Annex C

Golden DOWA Eco-system Myanmar Co., LTD. (GEM) Information

DOWA

Our mission is to discover, nurture and bring to life
the ideals of people and companies who share our planet.



motivate our planet

About Us

Name : GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
Establishment : 17 December 2014
Operations Start : October 2015
Location : Lot No. E1 Thilawa SEZ Zone A, Yangon region Myanmar
Type of Business : Waste Management Services, Collection, Treatment, Landfill, Recycle

Contact US

Tel. 01-2309051
Email: tintinei@golden-desm.com
Person-in-Charge Tin Tin Ei (Myanmar)
Kei Nagata (Japan)
URL <http://www.dowa-eco.co.jp/en/>



motivate our planet

1. Company profile and facility capacity
2. License/Certification of Company
 - Registration procedure of Thilawa SEZ
 - Authorized business
 - Environmental approval
3. Types of waste that can be disposed
 - Limited waste
 - Procedure for decision of waste acceptance
4. Disposal of waste required by PTTEP

1. Company profile

Company Name :

GOLDEN DOWA ECO-SYSTEM MYANMAR CO.,LTD.(GEM)

Capital : 36 Million USD

Share Holder : DOWA ECO-SYSTEM (JAPAN) 100%

Board of Directors : 2 Persons (DOWA)

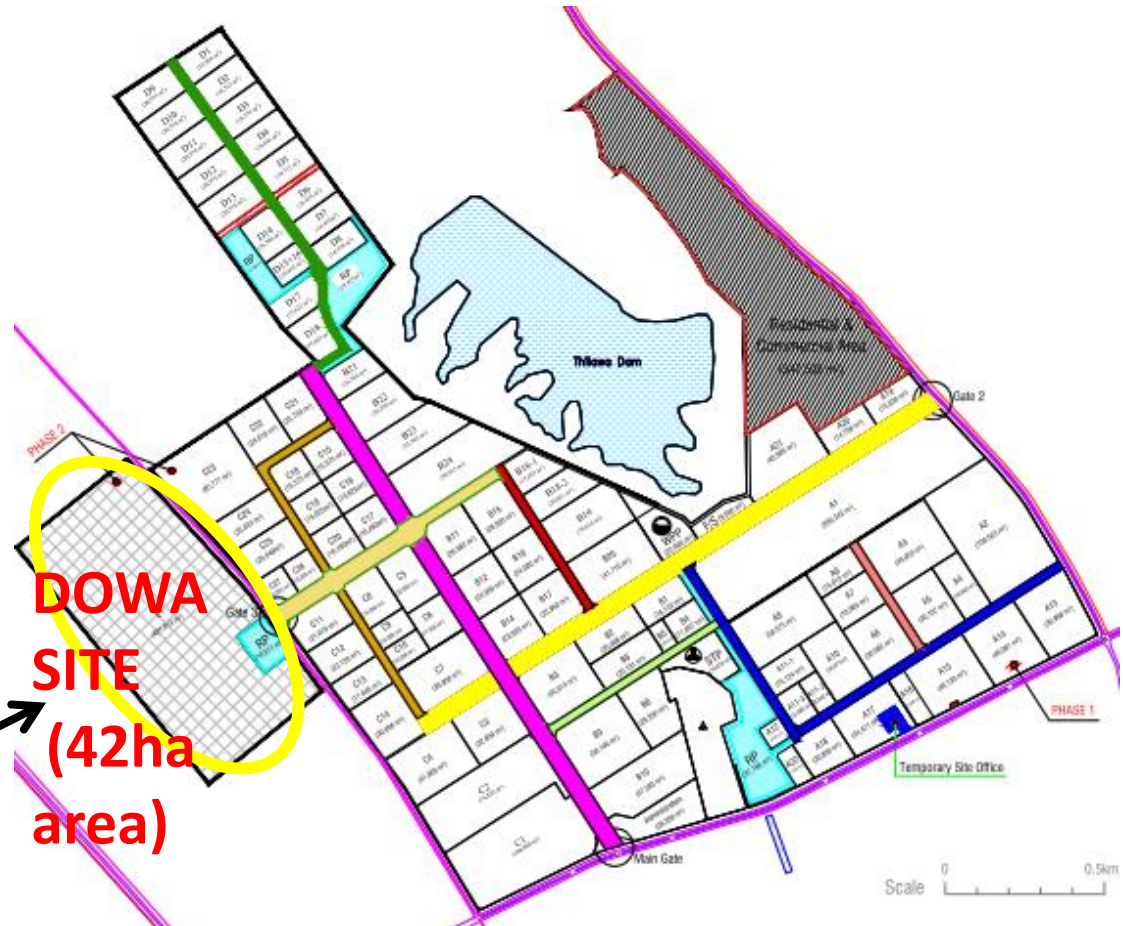
Employee : About 40 persons

Established : 17 December, 2014 (310 FC of 2014-2015 TSEZ)

Approval of Waste Management Business

SEZ Management committee approved us to do waste management business.

EIA : Under the Environmental Impact Assessment procedures of Myanmar, We had done EIA of our business already. We got approval letter from Thilawa SEZ Management Committee on 30 June, 2015.



Contents of the Facilities

1. Controlled Secured Landfill (Phase -1)

- Landfill Area 80mX80m X 2 Sites (**Haz and Non-Haz**)
- Capacity 44,000m³(Non-Haz) 43,000m³(Haz)

(After closure of phase 1 site, we'll continually develop new area beside phase 1.)

- Total capacity is around 400,000m³ during operation.

2. Sorting/Stabilization Facilities

- Size 24.5m X 44m X 10m

3. Waste water and Leachate water treatment Facility

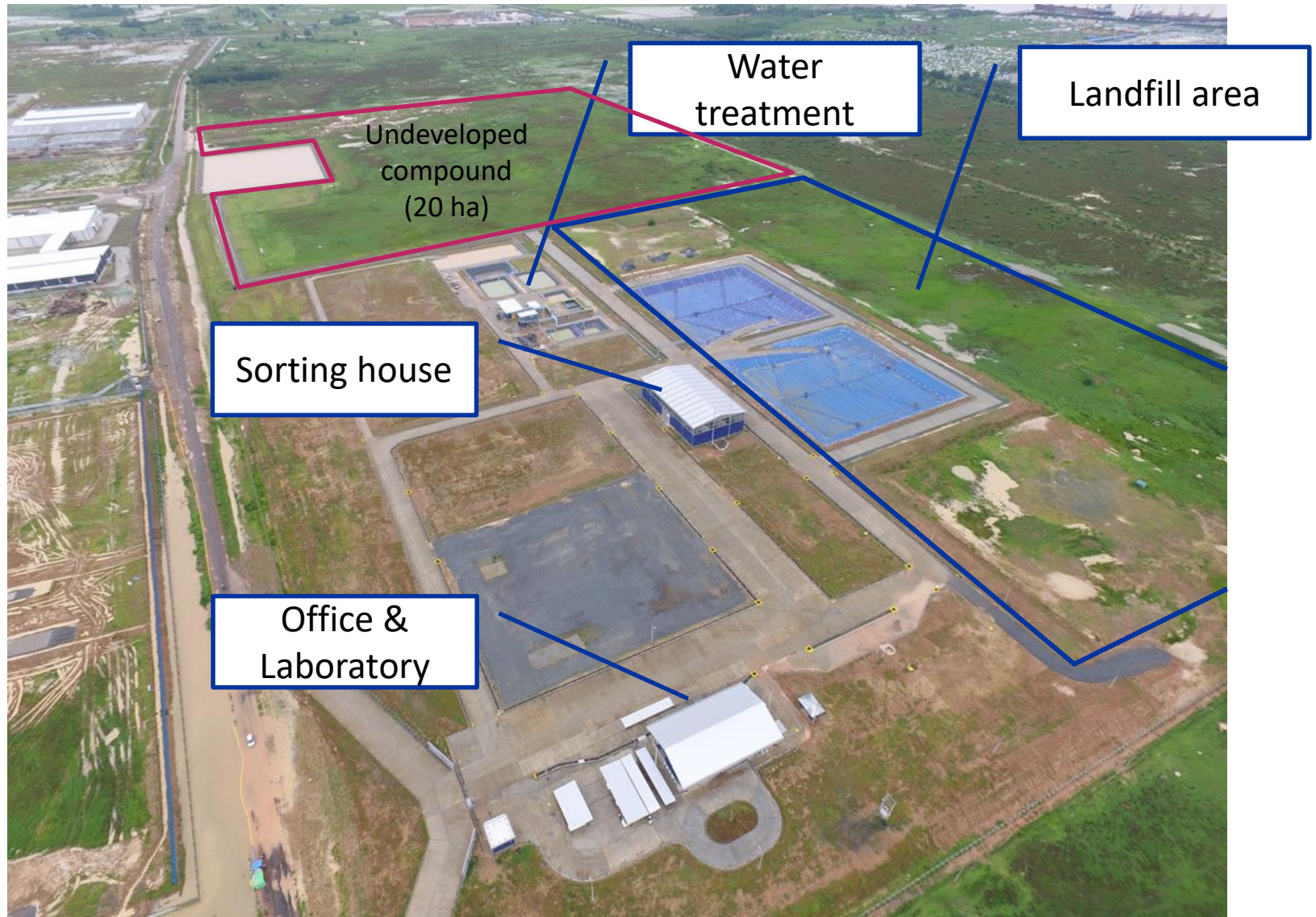
- Ability 35m³/Day
- Treatment Method Biological Treatment +Flocculation
- Pond Capacity 300m³ × 3

4. Office(with Lab.)

- Size 16mX28mX3m

5. Incinerator (will invest 2 year after = tentative)







Landfill



Water treatment

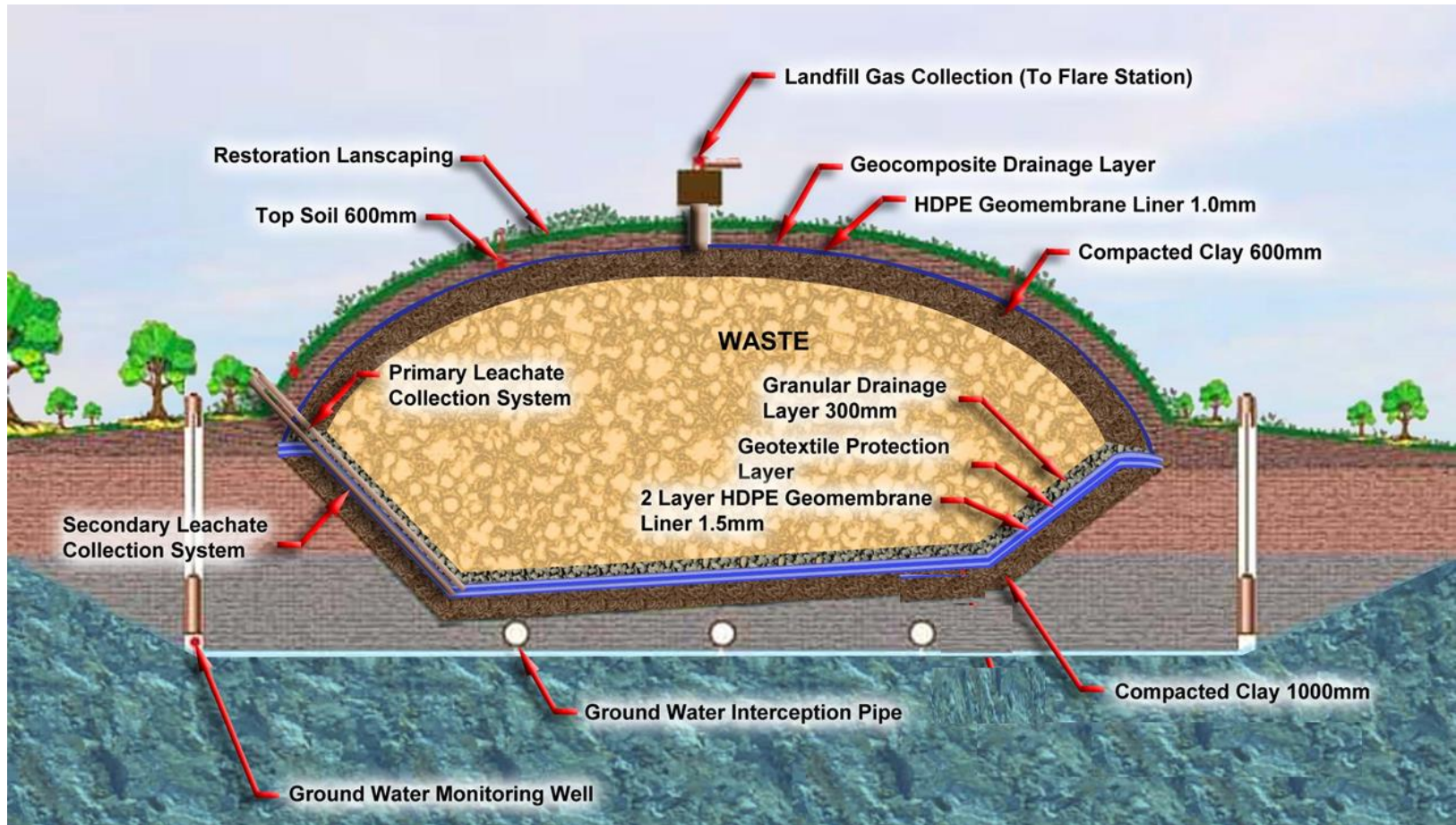


Laboratory



Sorting house

Landfill structure

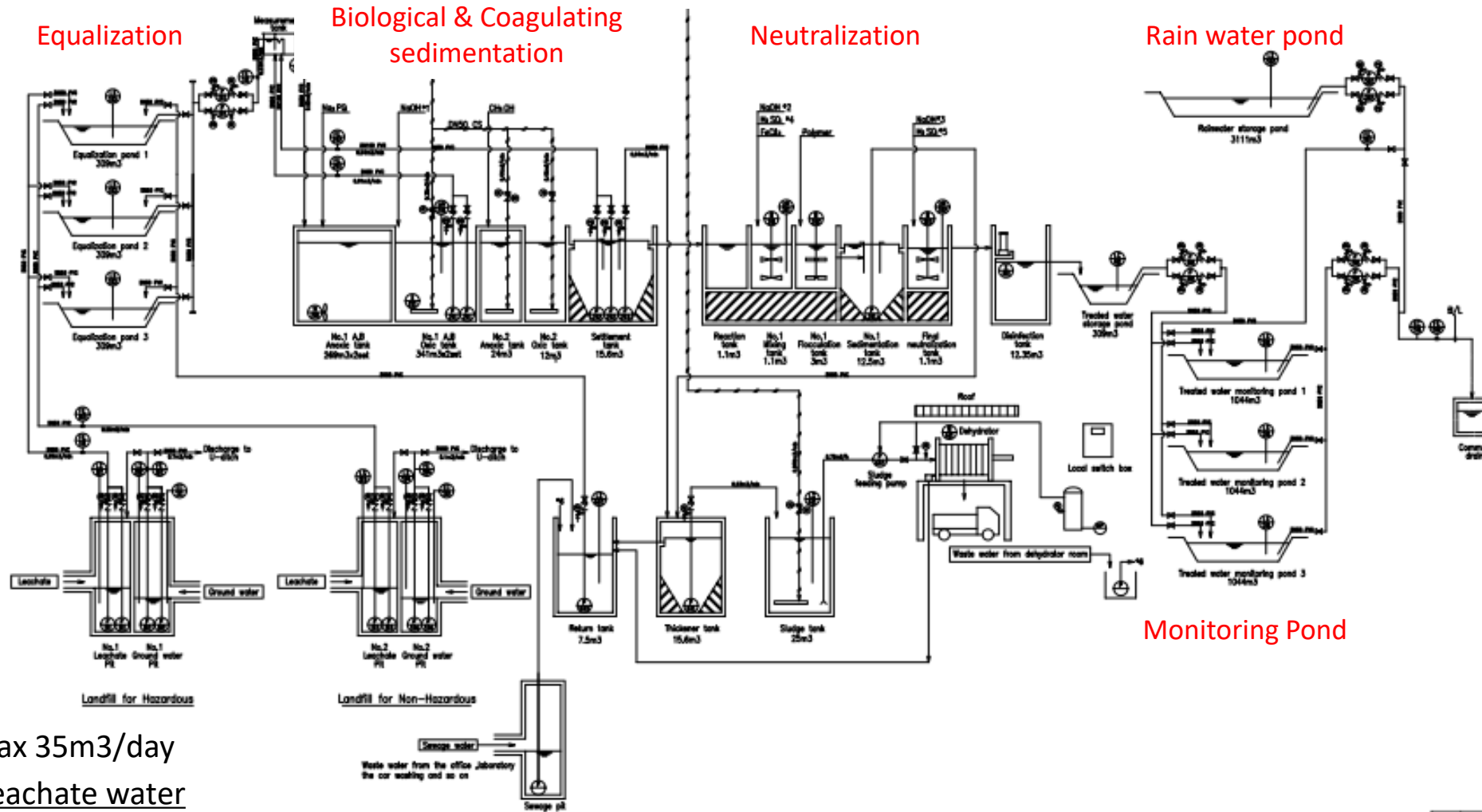


The structure that has high ability to prevent from leak and entry is based on **USEPA(US Environmental Protection Agency) regulation**

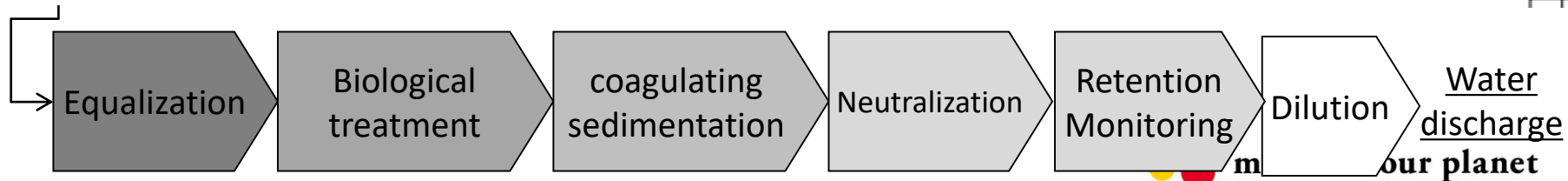
USEPA regulation is actual standards of the world., our plan in Thilawa also apply to this standards. (Hazardous waste)

In our understanding, there are no facilities of this type in Myanmar.  **motivate our planet**

Process of Water Treatment



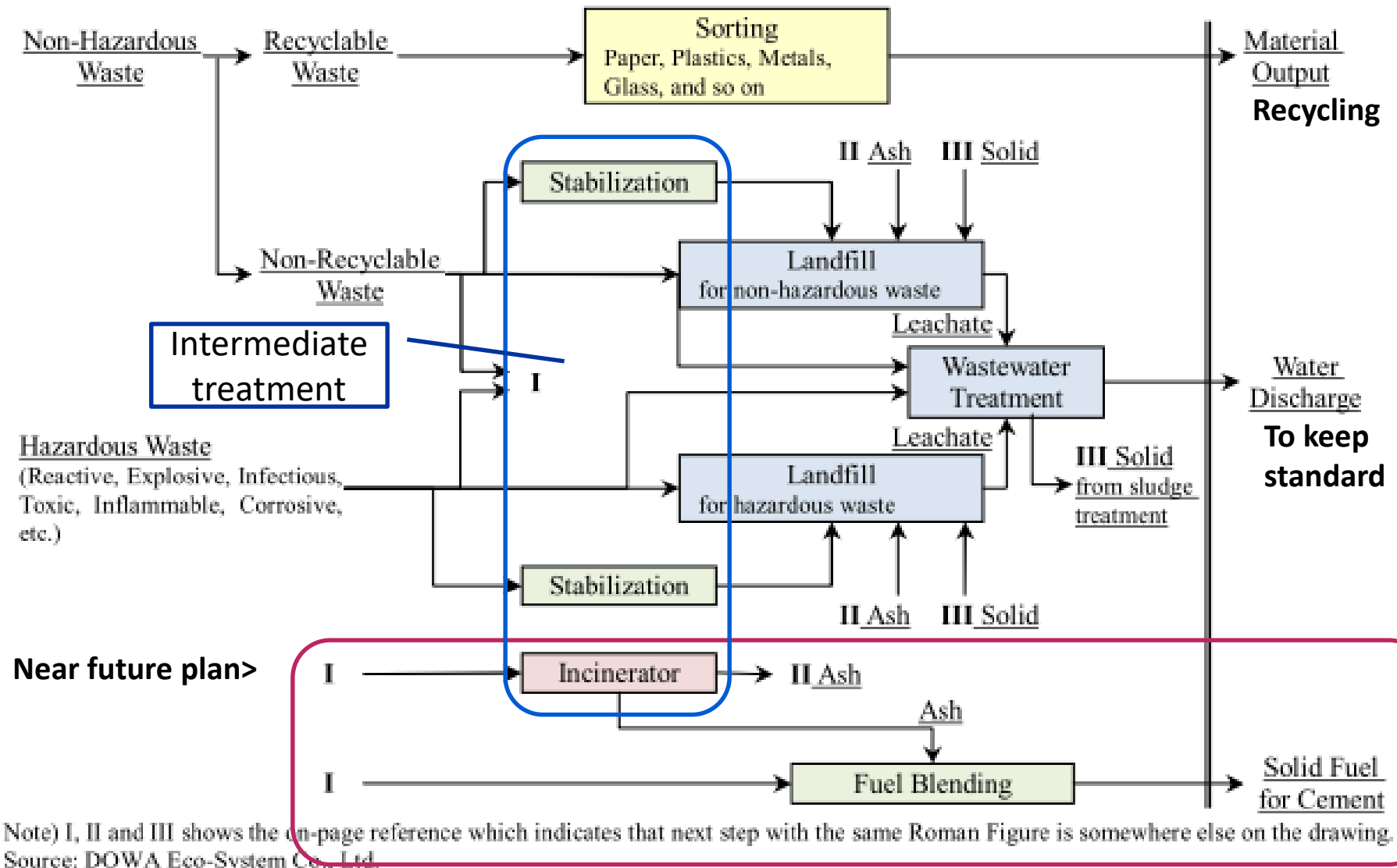
Max 35m³/day
Leachate water



Effluent water quality standard

| No. | Parameter | | Unit |
|-----|---------------------------|-----------|-----------|
| 1 | BOD (5days at 20·°C) | max 20 | ppm |
| 2 | Suspended Solids (SS) | max 30 | ppm |
| 3 | Total Dissolved solids | max 2,000 | ppm |
| 4 | pH Value | 6.5-8.5 | - |
| 5 | COD Mn Permanganate value | max 35 | ppm |
| 6 | COD Cr Dichromate value | max 60 | ppm |
| 7 | Sulphide (HS) | max 1 | ppm |
| 8 | Cyanide (as HCN) | max 0.2 | ppm |
| 9 | Oil and grease | max 5 | ppm |
| 10 | Total coliform bacteria | max 400 | MPN/100ml |
| 11 | Tar | none | - |
| 12 | Formaldehyde | max 1 | ppm |
| 13 | Phenols and cresols | max 1 | ppm |
| 14 | Free chlorine | max 1 | ppm |

| No. | Parameter | | Unit |
|-----|-----------------------|-----------|---------|
| 16 | Chromium | max 0.5 | ppm |
| 17 | Arsenic | max 0.25 | ppm |
| 18 | Copper | max 1.0 | ppm |
| 19 | Mercury | max 0.005 | ppm |
| 20 | Cadmium | max 0.03 | ppm |
| 21 | Barium | max 1 | ppm |
| 22 | Selenium | max 0.02 | ppm |
| 23 | Lead | max 0.2 | ppm |
| 24 | Nickel | max 0.2 | ppm |
| 25 | Insecticides | none | - |
| 26 | Radioactive Materials | none | - |
| 27 | Temperature | max 35 | °C |
| 28 | Color and Odor | 150 | [Co-Pt] |
| 29 | T-N | 5 | ppm |



Establishment procedure of Special Economic Zone

Thilawa SEZ Management Committee(TSMC) provide these approval and certification to locators of SEZ under Special Economic Zone Law

- Company establishment
- Investment permission(Type of business)
- Approval for Environmental conservation
ECPP(Regulated by SEZ law) and EIA(With ECD)
- Building permission, etc.

Locaters obtain these approval and certification from TSMC

- Certification Of Incorporation(Company registration)
- Approval for Investor (Approval of business)
- Approval for Environmental Conservation
- Building permission, Tax exemption etc.



Start a business authorized by law and regulation





Issued: 17 Dec, 2014

Registration of company in Myanmar



The Republic of the Union of Myanmar
Thilawa Special Economic Zone Management Committee

FORM-2

Issued: 22 Dec, 2014

Golden Dowa Eco-System Myanmar is approved as “Waste management service”
→ Authorized business by government of Myanmar.

LETTER OF APPROVAL FOR INVESTOR

Our Ref: TSEZ-IP-007
Dated: 22 December 2014
Subject: Investment Approval of the Thilawa Special Economic Zone Management Committee to the application for setting up a Business in the Thilawa Special Economic Zone

Reference: Registered investment application of ECO-SYSTEM CO., LTD. on 5 Dec 2014

Attention: DOWA ECO-SYSTEM CO., LTD.

With reference to the above mentioned application, Management Committee hereby approves to set up **GOLDEN DOWA ECO-SYSTEM MYANMAR** facilities and entitlements admissible to a Business subject to the provisions of the Myanmar Special Economic Zones Law enacted on 23rd January 2014 (hereinafter referred to as Myanmar Special Economic Zone Law) and the Rules and orders made thereunder and for the establishment of a Business in the Thilawa Special Economic Zone for undertaking Authorized Operations, namely service, as under:—

I. Provided Status: A Business in Promotion Zone

II. Authorized Operations: Service/Waste Management Services

III. Investment Incentives:

Upon the issuance of this Approval, Thilawa Special Economic Zone Management

I. Provided Status: A Business in Promotion Zone

II. Authorized Operations: Service/Waste Management Services

III. Investment Incentives:

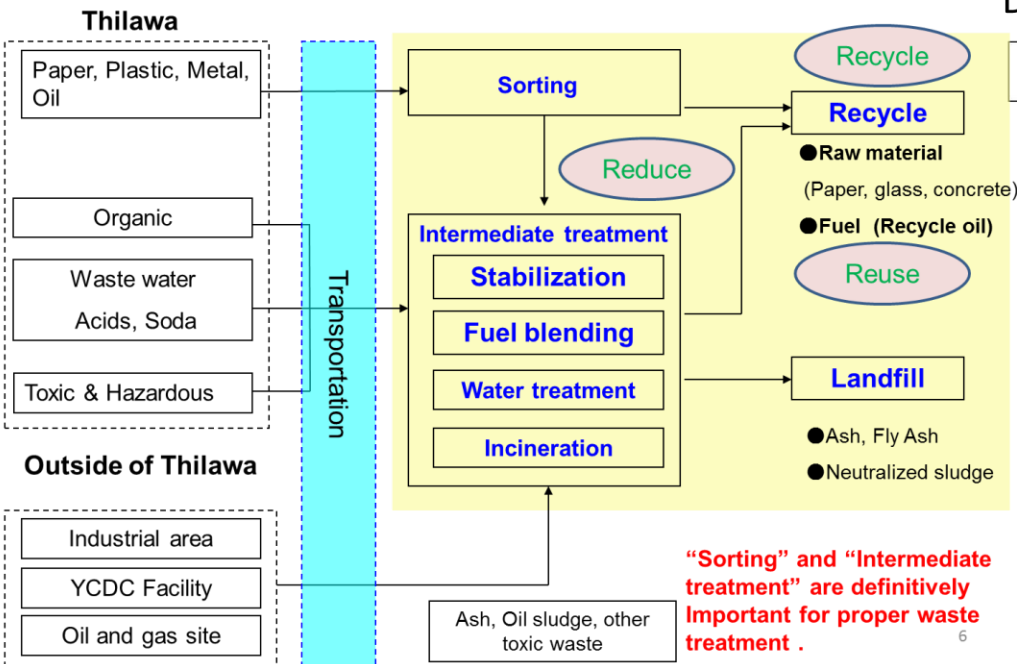
Upon the issuance of this Approval, Thilawa Special Economic Zone Management

DOWA What “Waste management service” is approved?

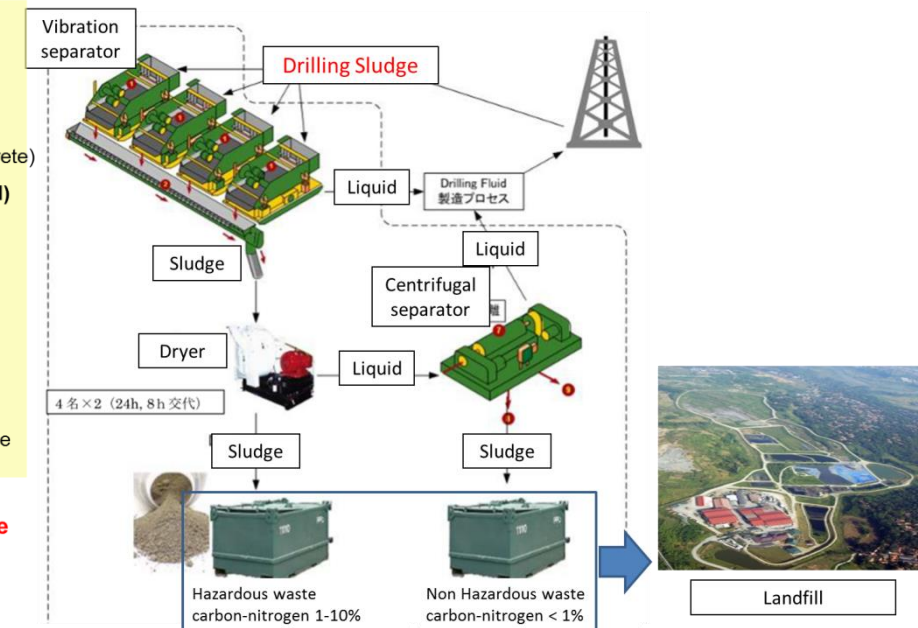
Our application of company registration and approval for investment in Thilawa SEZ mentioned about our business “Waste management service” as follows,

3) Type of business

We want to establish “Integrated Waste Treatment Facilities “ ,not simply Landfill.



Drilling Waste Management(DWM) Process



Not only Thilawa but also another area, we can collect waste.

Waste management for Drilling is also mentioned in our business.

Other law, rules and regulations that provide waste management business certification are not available in Myanmar.

Environmental Impact Assessment

Regulated by “EIA procedure”

- For all of area in Myanmar
- For limited business depend on their

Types of business

Capacity of business

Environmental Conservation and Prevention Plan

Regulated by “SEZ law, Rules and Regulations”

- For all of business in Special Economic Zone
- Necessary for certification of starting construction



Republic of the Union of Myanmar
Thilawa Special Economic Zone Management Committee

APPROVAL OF ENVIRONMENTAL IMPACT ASSESSMENT

Our Ref: TSEZ-EIA-001
Date: 30 June 2015
To: GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
Let No.E-1, Zone A, Thilawa Special Economic Zone
Subject: Approval of the Environmental Impact Assessment (EIA) in the Thilawa Special Economic Zone
Reference: Your application No. GEM-APP-2015-033 dated on 19 June 2015 for approval of the Final EIA Report

With reference to the above mentioned Final EIA Report, the Thilawa Special Economic Zone Management Committee hereby approves, under the conditions described herein, the Environmental Impact Assessment (EIA) for setting up a Business under the name of GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD. in Thilawa Special Economic Zone.

1. General Terms and Conditions for Approval:

- This approval letter is valid only for the location for which you prepared the Final EIA Report. In case you change the location, add/modify machinery and/or facilities which may cause environmental, social, and/or health impacts, or expand buildings beyond the descriptions of Final EIA Report, you shall submit again a new/revised EIA report to Thilawa Special Economic Zone Management Committee.
- You shall submit monitoring report, which summarizes performance of mitigation measures on environmental, social and/or health impacts as well as emergency risks in accordance with Final EIA Report, to the Thilawa Special Economic Zone Management Committee as stated below.

Under EIA procedure

Long-term Expectation
Of Environmental impact
↓
Set “※ EMP”
Measurement
Mitigation
Monitoring

Under SEZ Law

Set a ECPP
Measurement
Mitigation
Monitoring

Sometime more detail is
Required than EMP by
TSMC.



The Republic of the Union of Myanmar
Thilawa Special Economic Zone Management Committee

APPROVAL OF ENVIRONMENTAL CONSERVATION AND PREVENTION PLAN

Our Ref: TSEZ-EP-003
Date: 23 December 2014
To: GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
Let No.E-1, Zone A, Thilawa Special Economic Zone
Subject: Environmental Approval of the application for Environmental Conservation and Prevention Plan (ECPP) in the Thilawa Special Economic Zone
Reference: Registered ECPP application No.003 dated on 5 December 2014

With reference to the above mentioned application, the Thilawa Special Economic Zone Management Committee hereby approves, under the conditions described herein, the Environmental Conservation and Prevention Plan (ECPP) for setting up a Business under the name of GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD. in Thilawa Special Economic Zone.

1. General Terms and Conditions for Approval:

- This approval letter is valid only for the location for which you obtain the Building Permit. In case you change the location, add/modify machinery which may cause environmental, social, and/or health impacts, or expand buildings beyond the Building Permit, you shall submit again a new ECPP to Thilawa Special Economic Zone.
- You shall submit monitoring report, which summarizes performance of mitigation measures on environmental, social and/or health impacts as well as emergency risks in accordance with the ECPP, to the Thilawa Special Economic Zone Management Committee as stated below.

※Environmental Management Plan

DOWA follow both of Environmental conservation regulation as Waste management business and SEZ company



motivate our planet



APPROVAL OF ENVIRONMENTAL IMPACT ASSESSMENT

Our Ref: TSEZ-EIA-001
Date: 30 June 2015

To: GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
Lot No.E-1, Zone A, Thilawa Special Economic Zone

Subject: Approval of the Environmental Impact Assessment (EIA) in the Thilawa Special Economic Zone

Reference: Your application No. GEM-APP-2015-033 dated on 19 June 2015 for approval of the Final EIA Report

With reference to the above mentioned Final EIA Report, the Thilawa Special Economic Zone Management Committee hereby approves, under the conditions described herein, the Environmental Impact Assessment (EIA) for setting up a Business under the name of GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD. in Thilawa Special Economic Zone.

I. General Terms and Conditions for Approval:

- This approval letter is valid only for the location for which you prepared the Final EIA Report. In case you change the location, add/modify machinery and/or facilities which may cause environmental, social, and/or health impacts, or expand buildings beyond the descriptions of Final EIA Report, you shall submit again a new/revised EIA report to Thilawa Special Economic Zone Management Committee.
- You shall submit monitoring report, which summarizes performance of mitigation measures on environmental, social and/or health impacts as well as emergency risks in accordance with Final EIA Report, to the Thilawa Special Economic Zone Management Committee as stated below.



APPROVAL OF ENVIRONMENTAL CONSERVATION AND PREVENTION PLAN

Our Ref: TSEZ-EP-003
Date: 23 December 2014

To: GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
Lot No.E-1, Zone A, Thilawa Special Economic Zone

Subject: Environmental Approval of the application for Environmental Conservation and Prevention Plan (ECCP) in the Thilawa Special Economic Zone

Reference: Registered ECCP application No.003 dated on 5 December 2014

With reference to the above mentioned application, the Thilawa Special Economic Zone Management Committee hereby approves, under the conditions described herein, the Environmental Conservation and Prevention Plan (ECCP) for setting up a Business under the name of GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD. in Thilawa Special Economic Zone.

I. General Terms and Conditions for Approval:

- This approval letter is valid only for the location for which you obtain the Building Permit. In case you change the location, add/modify machinery which may cause environmental, social, and/or health impacts, or expand buildings beyond the Building Permit, you shall submit again a new ECCP to Thilawa Special Economic Zone.
- You shall submit monitoring report, which summarizes performance of mitigation measures on environmental, social and/or health impacts as well as emergency risks in accordance with the ECCP, to the Thilawa Special Economic Zone Management Committee as stated below.

Approval process of EIA and ECPP

| Date | EIA | ECPP |
|---------------|---|---|
| May, 2014 | Starting study | |
| June, 2014 | Kick off with ECD-MOECAF | |
| Aug-Oct, 2014 | Stake holder meeting and public announcement | |
| Oct, 2014 | <u>Submission of Draft EIA Report to MONREC via TSMC</u> | |
| Nov, 2014 | | <u>Submission of ECPP (Environmental Conservation and Protection Plan) to TSMC</u> |
| Dec, 2014 | | <u>Received Approval Letter of ECPP from TSMC</u> |
| May, 2015 | <u>Receiving a comment letter on Draft EIA Report from ECD-MOECAF via TSMC</u> | |
| June, 2015 | Public Announcement and Public Disclosure of Final EIA Report (draft). | |
| June, 2015 | <u>Received Approval Letter of EIA from TSMC</u> | |
| Dec, 2015 | EIA procedure was issued by government. | |



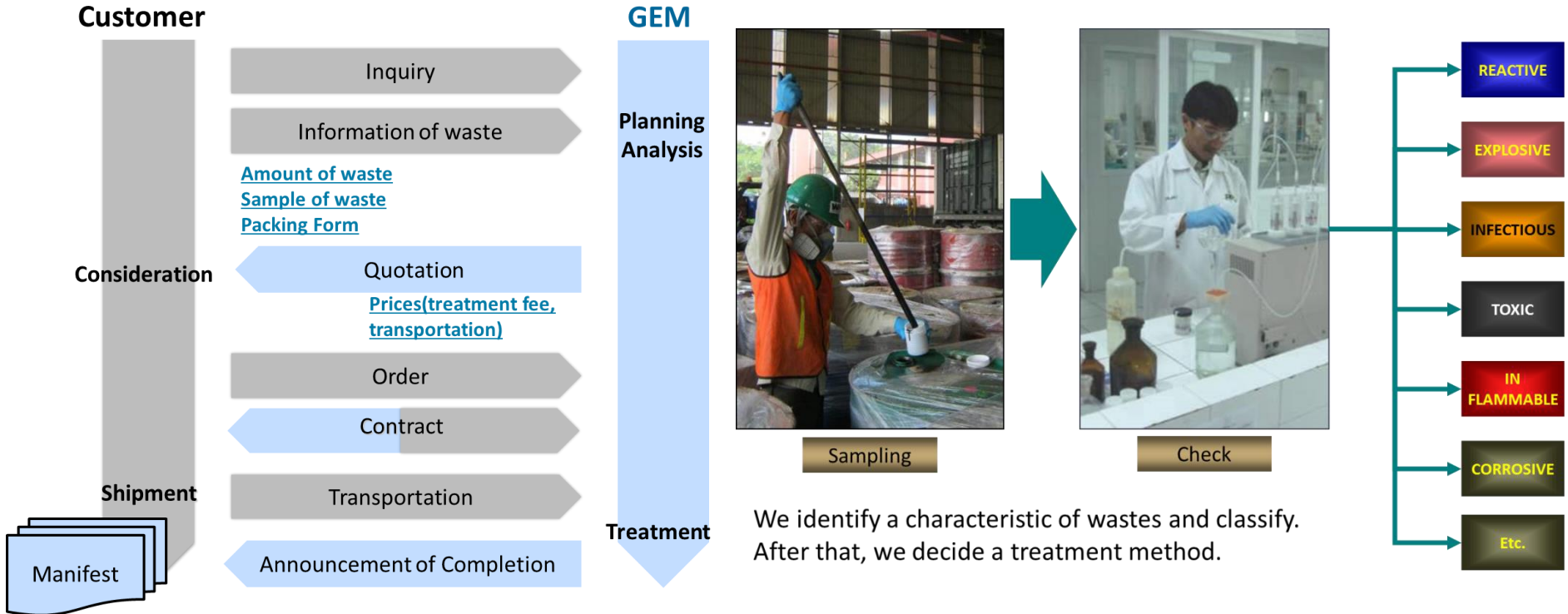
We decide to accept waste which we can ensure as follows.

- To keep our effluent standard(Water, Emission gas, others)
- To keep safe it during transportation, handling of waste and disposal.
- If any law, regulation or direction to limit about waste disposal will be enforced in future, we will follow that.

Limited waste at our site

| Limited | | Reason | Waste type (Sample) |
|---|-----------------|--|--|
| Import of waste | by law | This type of business is inhibited by Thilawa SEZ law. | Any material recognized “waste” |
| Radio active | By our decision | There are no regulation of radio active material in Myanmar. | Mining sludge Drilling waste, etc. |
| Asbestos | By our decision | Difficult to ensure our healths of employees | Old construction waste |
| High risk material (High explosive, toxic, strong odor, etc) | By our decision | When we decide to difficult to dispose at our site by legal risk or technical risk and cost. | Nitroglycerin(High explosive) Toxic gas, Virus, weapon, etc. |

DOWA Procedure for decision of waste acceptance



Hazardous waste treatment



Hazardous waste

Solid waste

Sludge
Ash, Dust
Light bulb, E-waste
Oil contaminated

Liquid waste

Waste Water
Waste Oil
High moisture mud, etc



Stabilization



Dismantling, Segregation



Water treatment

Recycling
Oil, Fuel

Recycling
Scrap, metal

Landfilling

Leachate water

Effluent water

For safety transportation of hazardous waste on the way

Prevention for leakage of waste to common road, area

- Use a properly packaging (Drum, Container)
- Fix a packaged waste in cargo and car.

Prevention for car accident

- Appoint properly logistic service(Insurance, Experience, car condition)
- Limit a speed, long time driving and night driving.



Annex D

**A letter of correspondence between MOGE and PSC
companies operating in Myanmar**



PTTEP International Limited (Yangon Branch)

PTTEPI.L.GM (IMA/S) 065/11-02/13

Myanmar Assets
Tel. (951) 661814

February 11, 2013

U TINT SWE

Project Director
Tanintharyi Nature Reserve Project
The Republic of the Union of Myanmar
Ministry of Environmental Conservation and Forestry
Forest Department

Subject: Annually USD 150,000 Financial Support to TNRP projects

Attachment: MOGE letter No: D(O/S) 3/4/2 (3018) 2012, 26th December 2012.

Dear U Tint Swe,

Regarding to above subject, this is an official confirmation that PTTEPI will make annually USD 150,000 financial support to TNRP project.

In this connection, PTTEPI would like to request TNRP and Forest Department to add PTTEPI as the member of TNRP according to the Forest Department Regulation.

Your kind support and confirmation on this matter is highly appreciated.

Sincerely Yours,

Kanok Intharawijitr
General Manager
PTTEP International Limited (Yangon Branch)

| | | |
|-----|------------------------|-------------------|
| Cc: | Director General | Forest Department |
| | Director (Offshore) | MOGE |
| | Managing Director | MOGE |
| | Director (Engineering) | MOGE |



PTTEP International Limited (Yangon Branch)

Attachment -1

FROM : NPT-OFFSHORE- F

FAX NO. : 067411330

27 Dec. 2012 9:25AM P1

ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်အစိုးရ
စွမ်းအင်ဝန်ကြီးဌာန
မြန်မာ့ရေနံနှင့်သဘာဝဓါတ်ငွေ့လုပ်ငန်း
MYANMA OIL AND GAS ENTERPRISE

582

FAX : 067-411329
TEL : 413063, 411066



PO BOX 1049
BUILDING NO. 14
NAY PYI TAW, THE REPUBLIC OF THE UNION OF MYANMAR

Letter No: D(O/S) 3/4/2 (3018) 2012

Date: 25. December, 2012

✓ Mr. Kanok Intharawijitr

General Manager

PTTEP International Limited (Yangon Branch)



Subject: Approval of Contribution for TNRP

Reference: MOE Letter No - Nyama/Myanmayenan/Sa (284) dated on 20th December, 2012

Dear Mr. Kanok,

Regarding the above subject, MOE has already approved on this issue as per above reference letter.

Therefore, MOGE give an approval to provide contribution USD 150,000 per year for TNRP project. PTTEPI need to negotiate with TNRP and Forest Department to participate as the member of TNRP according to the Forest Department Regulation.

Your understanding and cooperation on this matter will be highly appreciated.

Yours Sincerely,

For Managing Director,
(Myo Myint Oo, Director-Offshore)

Myanma Oil & Gas Enterprise

Cc : Director General
Managing Director
Director (Engineering)
Director (TNRP)

To - IMA/R
- Ratchara
- IMA/s
For your info and action.

Ka
27/12/12

- Forest Department
- MOGE
- MOGE
- Forest Department

PTTEP/IL/001/12/PTI/Approval for TNRP Contribution (24-12-2012)



PTTEP International Limited (Yangon Branch)

PTTEPI.L.GM (IMA/S)049/07-03/13

March 7, 2013

*Myanmar Assets
Tel. (951) 661814*

U TINT SWE

Project Director
Tanintharyi Nature Reserve Project
The Republic of the Union of Myanmar
Ministry of Environmental Conservation and Forestry
Forest Department

Subject: PTTEPI's Financial Contribution to TNRP

Dear U Tint Swe,

Referring to letter dispatch no. TNRP/L/174-180/2013 on date 14 February 2013, this is a confirmation that the period of PTTEPI's financial contribution to TNRP is for 30 years since the 1st payment or until the end of pipeline operational life span whichever occur first.

Sincerely Yours,

for

Kanok Intharawijitr
General Manager
PTTEP International Limited (Yangon Branch)

| | | |
|-----|------------------------|-------------------|
| Cc: | Director General | Forest Department |
| | Director (Offshore) | MOGE |
| | Managing Director | MOGE |
| | Director (Engineering) | MOGE |
| | IMD, EMP | |

Annex E

CSR program for the Zawtika Project

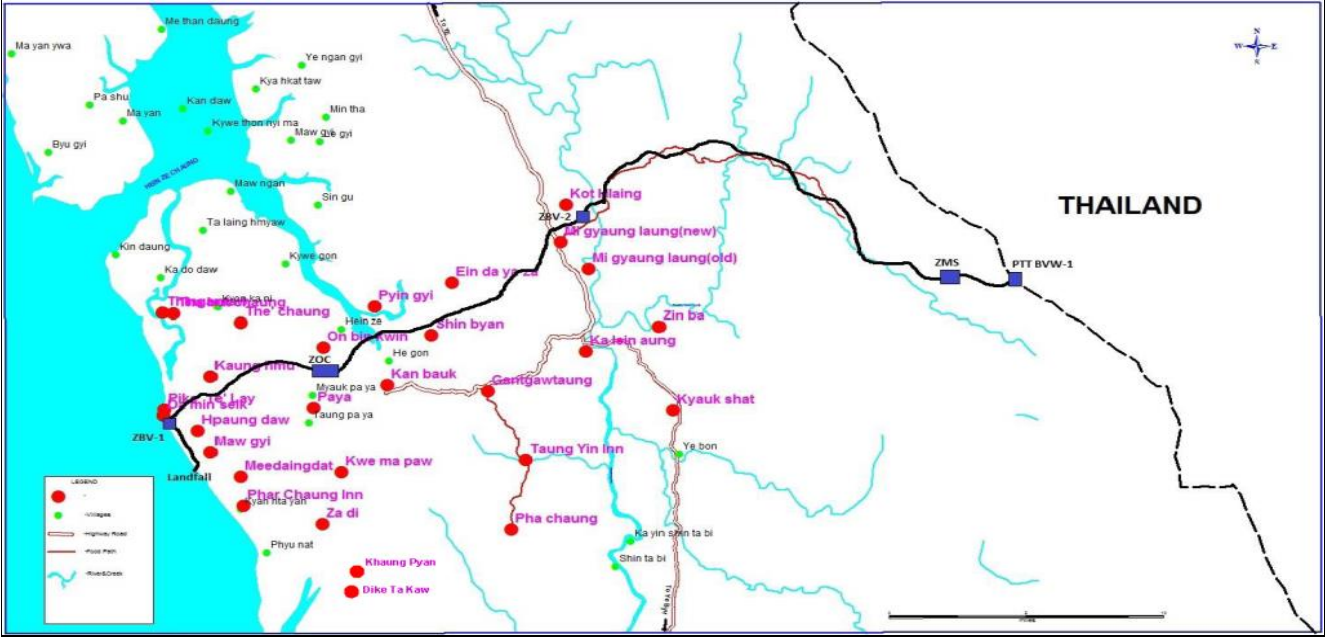
Corporate Social Responsibility – Zawtika (M9)

- **Objective**
To uplift quality of life and gain favorable relation from all stakeholders in operating area. It consists of 3 mainly Sectors in CSR program: **“Health, Education and Community Development Sector”**

- **Objective**
To uplift quality of life and gain favorable relation from all stakeholders in operating area. It consists of 3 mainly Sectors in CSR program: **“Health, Education and Community Development Sector”**

| Health Sector | Education Sector | Community Development Sector |
|---|---|---|
| <p>Title: “Parasite Free School”</p> <p><u>Objective</u></p> <ul style="list-style-type: none"> • To improve the health condition in schoolchildren • To promote better hygienic system • To create a health awareness <p><u>Support Activities</u></p> <ul style="list-style-type: none"> • Social Engagement • Data Collection • Medical Checkup • Diagnosis • Treatment • Training | <p>Title: “Scholarship (Higher Education Assistance for Development”</p> <p><u>Objective</u></p> <ul style="list-style-type: none"> • To provide higher education opportunity for students in remote area • To assist parent from educational expense burden <p><u>Support Activities</u></p> <ul style="list-style-type: none"> • Medical • Education • Technology • Nursing • Midwife | <p>Title: “Support Community”</p> <p><u>Objective</u></p> <ul style="list-style-type: none"> • To develop and uplift quality of life of local community by relief of existing problem in the villages <p><u>Support Activities</u></p> <ul style="list-style-type: none"> • Infrastructure improvement (school building, teacher house, toilet, drinking water, hospital, road, bridge, etc.) • Utility Supply (electricity and water supply) • Religious support • Road safety • Community supports • Emergency relief |

| | |
|---|--|
| <u>CSR Project Villages in Operating Area (Total - 29 villages)</u> | |
|---|--|



Achievements (2009 – 2016)

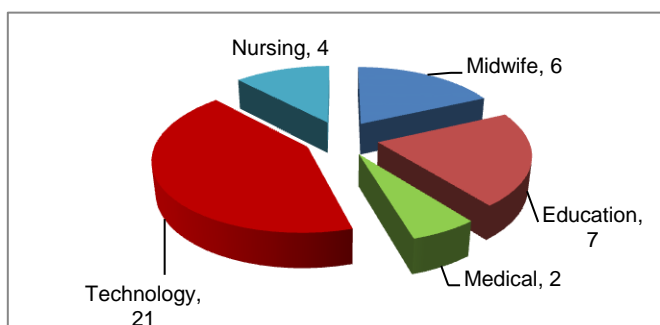
Health Sector

- Since the beginning of the parasite free school program in 2010, the number of schools covered by the program was gradually increased from 4 to 15, 29 and 35 respectively. The project covered 35 schools in all project villages in 2013 and continued to 2014.
- Then, proceeding 3 years follow up program in 10 schools starting from 2015 to 2017.
- Over 6,000 students beneficial from the program.



Parasite Free School Activity

Education Sector



- 2009 – 2015, total 40 students were awarded for scholarship. Among them, 11 students were graduated and 3 students were failed in exam.
- Currently, 26 students have been receiving the scholarship.



Scholarship Activity






**Community
Development Sector**

| Infrastructure Improvement | Total Supports (2009 – 2016) |
|------------------------------------|------------------------------|
| School Building | 12 |
| School Teacher House | 1 |
| Hygienic School Toilet | 9 |
| School Drinking Water | 18 |
| Hospital Renovation/ Health Center | 4 |
| Village Electricity Supply | 15 |
| Village Water Supply | 3 |
| Bridge | 4 |
| Road Improvement | 6 |
| Monastery Support | 7 |



Infrastructure Improvement Activity



| | |
|------------------------------|--|
| |     <p>Community Support Activity</p> |
| |  <p>Emergency Relief Activity</p> |
| Future CSR Plan | |
| Health Sector | <ul style="list-style-type: none"> ○ Parasite Free School Follow up Program in 10 local schools |
| Education Sector | <ul style="list-style-type: none"> ○ Scholarship (HEAD) Program |
| Community Development Sector | <ul style="list-style-type: none"> ○ Infrastructure Improvement ○ Utility Supply ○ Religious Support ○ Community Support ○ Emergency Relief |

***Note - All CSR activity program and location have to be performed as per the below **MOGE_CSR Implementation Guidline:-**



MOGE_CSR
Implementation Guidl

Annex F

MOGE's Guidelines for Implementation of CSR Programs

Nº 0107771

ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်အစိုးရ

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မြန်မာ့ရေနံနှင့်သဘာဝဓာတ်ငွေ့လုပ်ငန်း

MYANMA OIL AND GAS ENTERPRISE



M.O.G.E.

FAX 067-411125
TELE 067-411055, 411056

P.O BOX. 1049
BUILDING NO. 44

NAY PYI TAW, THE REPUBLIC OF THE UNION OF MYANMAR

Letter No. MD.3/6(0685) 2014

Dated: 26th February 2014

All Companies

Subject; Guidelines of implementation of CSR programmes

Regarding the above mentioned subject, MOGE would like to inform that; all Production Sharing Contract Companies must be implemented CSR programmes base on the guidelines as follows,

- (a) Firstly, meet with Village Tract Development Committee and discuss CSR programmes to meet and fulfill the needs of respective region of Project Area.
- (b) Then, inform the results of the discussion to local authorities and Regional Governments for their comments and suggestion on the results.
- (c) All CSR programmes need to get agreement from relevant ministries.
- (d) MOGE have to monitor all the CSR programmes and budgets of each operator in timely manner.

Your understanding and cooperation in this matter is highly appreciated.

Yours Sincerely,

For Managing Director

(Wai Oo, Director- Admin)

Myanma Oil and Gas Enterprise

CC: Dir (Planning)/(O/S)/All GM

19/2

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ERM Siam Co.,Ltd.

179 Bangkok City Tower
24th Floor, South Sathorn Road
Thungmahamek, Sathorn
Bangkok 10120
Thailand

T: +66 2 679 5200

F: +66 2 679 5209

www.erm.com