

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

FOR

**THE GARDEN YANKIN PPP
REDEVELOPMENT PROJECT**



**PREPARED BY:
ENVIRONMENTAL CONSERVATION
CONSULTING ENGINEERS ASSOCIATION
(YANGON)**

**PREPARED FOR:
KAJIMA YANKIN PPP COMPANY LIMITED
No. (303 B), MOC, Yan Aung Street (1) & (2), Ward (2)
Yankin Township, Yangon, Myanmar**

March, 2020

LETTER OF ENDORSEMENT BY THE PROJECT PROPONENT

This Environmental Impact Assessment Report for “The Garden” Yankin PPP Redevelopment Project was prepared by Environmental Conservation Consulting Engineers Association (Yangon) on behalf of Kajima Yankin PPP Company Limited. I hereby issue my letter of endorsement to confirm:

- (a) the accuracy and completeness of the EIA;
- (b) that the EIA has been prepared in strict compliance with applicable laws including the EIA Procedure and with the ToR for the EIA; and
- (c) that the Project will at all times comply fully with the commitments, mitigation measures, and plans in the EIA Report.

Signed

Name :
Position :
Organization :

COMMITMENT OF THIRD PARTY

This Environmental Impact Assessment Report has been done with reasonable skills, care and diligence in accordance with the stipulations of Environmental Conservation Law 2012, Environmental Conservation Rules (2014) and EIA Procedures (2015). We hereby signed this report on behalf of the Environmental Conservation Consulting Engineers Association of Myanmar Engineering Society (MES) to certify that all the information in it are true and convincing to the best of our knowledge.

Name	ECCEA Responsibility	Sector	
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U Soe Myint	Secretary	Team Leader & Legal and Policies Review	
U Khin Maung Maung	Vice-President	Urban Planning & Cultural Heritage	
Dr. Maung Hlaing	E.C.Member	Impact Assessment	
U Khin Maung Htay	E.C.Member	Water & Sanitation System Assessment	
U Hla Baw	Auditor	Water Resources & Utilization Assessment	
Dr. Aung Lay Tin	E.C.Member	Air & Noise Assessment	
Daw Htay Htay Win	Treasurer	Assesment on Soil Impact	
U Kyaw Zin Latt	Member	Environmental Geology Assessment	
Daw Mu Mu Aye	Joint Secretaries	Biodiversity Assessment	
Dr. Lae Lae Win	Member		
Dr. Yin Min Pike	Member	Operations Analysis	
U Yan Naing Aung	Public Relation Officer	Social Impact Assessment, CSR Formaulation, EMP, Scoping Report,	
U Myint Maung Maung Than	Member	Executive Summary & Final Report	
U Linn Thura Aung	Member	Compilation	

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LIST OF ABBREVIATION

BOD	Biological Oxygen Demand
COD	Chemical Oxygen Demand
CSH	Community Safety and Health
CSR	Cooperate Social Responsibility
DS	Down Stream
ECC	Environmental Compliance Certificate
ECL	Environmental Conservation Law
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EME	Earth Moving Equipment
EMP	Environmental Management Plan
ESIA	Environmental and Social Impact Assessment
FDP	Farmers Development Programme
IEE	Initial Environmental Examination
IFC	International Finance Corporation
INGOs	International Non-Government Organizations
MONREC	Ministry of Natural Resources and Environmental Conservation
MEMs	Mitigation and Enhancement Measures
NEQG	National Environmental Quality Guidelines
OSH	Occupational Safety and Health
UNEP	United Nations Environment Programme
WHO	World Health Organization
ToR	Term of References
TW	Tubewell
US	Upper Stream

အနှစ်ချုပ်အစီအရင်ခံစာ

၁။ နိဒါန်း

Kajima Yankin PPP ကုမ္ပဏီလီမိတက်သည် “The Garden (Yankin PPP) Redevelopment Project” အမည်ရှိဆောက်လုပ်ရေးစီမံကိန်းကို အကောင်အထည်ဖော်ဆောင်ရွက်လျက် ရှိပါသည်။ စီမံကိန်းတွင် ဟိုတယ် (၁) ခု၊ Retail (၁) ခု၊ ကာလရှည်တည်းခိုနိုင်သော ဟိုတယ် (၁) ခု၊ ရုံးခန်း အဆောက်အဦး (၁) ခု ပါဝင်မည် ဖြစ်ပါသည်။

Kajima Yankin PPP ကုမ္ပဏီလီမိတက်သည် မြန်မာကုမ္ပဏီများ ဥပဒေနှင့် အညီ ဖွဲ့စည်းထားသော ပုဂ္ဂလိက ကုမ္ပဏီလီမိတက်တစ်ခု ဖြစ်ပြီး ကုမ္ပဏီရုံးချုပ်သည် အမှတ် (၃၀၃ ခ) ၊ MOC၊ ရန်အောင် (၁) လမ်းနှင့် (၂) လမ်း၊ (၂) ရပ်ကွက်၊ ရန်ကင်းမြို့နယ်၊ ရန်ကုန်တိုင်းဒေသကြီးတွင် တည်ရှိပါသည်။

“The Garden (Yankin PPP) Redevelopment Project” စီမံကိန်းတည်နေရာသည် ဆောက်လုပ်ရေး ဝန်ကြီးဌာနပိုင် သိုလှောင်ရုံအဟောင်းများ တည်ရှိရာနေရာဖြစ်ပြီး ရန်ကုန်တိုင်းဒေသကြီး၊ ရန်ကင်းမြို့နယ် ဆရာစံ လမ်းမကြီးနှင့် ရန်ကင်းလမ်းဆုံတွင် တည်ရှိပြီး စုစုပေါင်း မြေဧရိယာအကျယ် (၆.၇၀၈) ဧကတွင် ဆောက်လုပ် သွားမည် ဖြစ်ပါသည်။

စီမံကိန်းဧရိယာ၏ အရှေ့ဘက်တွင် ရဲဝန်ထမ်းအိမ်ရာ၊ အနောက်ဘက်တွင် ရန်ကင်း(၂) ရပ်ကွက်၊ မြောက်ဘက်တွင်ရန်ကင်း (၁) ရပ်ကွက် နှင့် “The Golden City” အိမ်ရာ၊ တောင်ဘက်တွင် ဆရာစံ မြောက်၊ အရှေ့ ရပ်ကွက်တို့ တည်ရှိပါသည်။ စီမံကိန်းဧရိယာ၏ မြောက်ဘက်အစပ်တွင် ခုနစ်ပင်လိမ်ချောင်း၊ အနောက်ဘက်အစပ်တွင် ရန်ကင်းလမ်းမကြီး၊ တောင်ဘက်တွင် ဆရာစံလမ်းတို့ ထိစပ်တည်ရှိ နေပါသည်။ စီမံကိန်း ဧရိယာသည် ရန်ကုန် အပြည်ပြည်ဆိုင်ရာလေဆိပ်မှ (၁၀) ကီလိုမီတာအဝေးခန့်အကွာအဝေးတွင် တည်ရှိပြီးကားနှင့် သွားလာပါက ၂၇မိနစ်ခန့် ကြာမြင့်မည် ဖြစ်ပါသည်။ အနီးနားရှိ ရန်ကင်းစင်တာနှင့် ၀.၃ ကီလိုမီတာခန့် အကွာအဝေးတွင် တည်ရှိပြီး လမ်းလျှောက်လျှင် ၅မိနစ်ခန့်သာ ကြာမြင့်မည်ဖြစ်ပါသည်။

စီမံကိန်းတစ်ခုလုံးကို တစ်ဆင့်တည်းအပြီး တည်ဆောက်မည်ဖြစ်ပြီး ကနဦး ရင်းနှီးမြုပ်နှံမှုအဖြစ် အမေရိကန်ဒေါ်လာ (၄၀၈.၃) သန်းကျခံသုံးစွဲမည် ဖြစ်ပါသည်။

အနှစ်ချုပ်အစီရင်ခံစာ၏ ရည်ရွယ်ချက်မှာစီမံကိန်းအကောင်အထည်ဖော် ဆောင်ရွက်ပါက စီမံကိန်း ပတ်ဝန်းကျင်ရှိ မြေထု၊ ရေထု၊ လေထု၊ သက်ရှိသက်မဲ့ စသည့် သဘာဝပတ်ဝန်းကျင် ဆိုင်ရာများနှင့် လူမှုရေး၊ စီးပွားရေး၊ ပညာရေး၊ ကျန်းမာရေးအစရှိသည့် လူမှုပတ်ဝန်းကျင် ဆိုင်ရာ အကြောင်းအရာများ အပေါ် ကောင်းကျိုးနှင့် ဆိုးကျိုးသက်ရောက်မှု များကိုစနစ်တကျ ဖော်ထုတ်၊ တိုင်းတာ၊ အကဲဖြတ်ပြီးဆုံးကျိုး သက်ရောက်မှုများကို လျော့ချ၊ ကုစားရန် နှင့် ကောင်းကျိုး သက်ရောက်မှုများကို မြှင့်တင်ရန် နည်းလမ်းများကို လေ့လာဖော်ထုတ်ရန် ဖြစ်ပါသည်။

ဤစီမံကိန်းအတွက် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း (EIA) လုပ်ငန်းများကို မြန်မာနိုင်ငံ အင်ဂျင်နီယာအသင်း လက်အောက်ရှိ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး အတိုင်ပင်ခံအင်ဂျင်နီယာအသင်း (ရန်ကုန်) မှ ၂၀၁၈ ခုနှစ် ဧပြီလဆန်းမှ စတင်ဆောင်ရွက်ခဲ့ပြီး လုပ်ငန်းများကို ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးဥပဒေ ၂၀၁၂၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး နည်းဥပဒေ ၂၀၁၄ နှင့် ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း လုပ်ထုံးလုပ်နည်း ၂၀၁၅ ပါ ပြဋ္ဌာန်းချက်များ အတိုင်း လိုက်နာဆောင်ရွက်ခဲ့ပါသည်။

၂။ ရည်ရွယ်ချက်

စီမံကိန်းလုပ်ငန်းစဉ်များ၏ ဥပဒေနှင့် ညီညွတ်မှု ရှိမရှိ အား အကဲဖြတ်ရန်၊ စီမံကိန်း တည်ရှိရာ ဒေသ၏ နောက်ခံလူမှုစီးပွားရေးအခြေအနေ၊ ပတ်ဝန်းကျင်ဆိုင်ရာများကိုလေ့လာသုံးသပ်ရန်၊ စီမံကိန်းဆိုင်ရာ အချက်အလက်များကိုအများပြည်သူသို့ ထုတ်ဖော်ကာ ဆွေးနွေးညှိနှိုင်းခြင်း၊ အကြံပြုချက်များရယူခြင်းများ ဆောင်ရွက်ရန်၊ စီမံကိန်းကြောင့် ဖြစ်ပေါ်လာနိုင်သည့် ပတ်ဝန်းကျင်နှင့် လူမှုစီးပွားသက်ရောက်မှုများကို လေ့လာတွက်ဆရန်နှင့် ဆိုးကျိုးသက်ရောက်မှုများကို လျော့ချကုစားရန် နည်းလမ်းများ၊ ကောင်းကျိုး သက်ရောက်မှုများကို ဆွေးမြေ့တင်ရန် နည်းလမ်းများ ရှာဖွေဖော်ထုတ်ရန်ဟူသည့် ရည်ရွယ်ချက်များဖြင့် “The Garden (Yankin PPP) Redevelopment Project” စီမံကိန်းတည်ဆောက်ရေးလုပ်ငန်းအတွက် ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း (EIA) ဆောင်ရွက်ခဲ့ပါသည်။

၃။ ဥပဒေရေးရာသုံးသပ်ချက်

ပတ်ဝန်းကျင် ထိခိုက်မှု ဆန်းစစ်ခြင်းလုပ်ငန်း နှင့် ဆက်စပ်သည့် လုပ်ငန်းများ ဆောင်ရွက်ရာတွင် အောက်ဖော်ပြပါ ပြဋ္ဌာန်းချက်များ၊ လမ်းညွှန်ချက်များနှင့် အပြည်ပြည်ဆိုင်ရာ လမ်းညွှန်ချက်များအား လေ့လာသုံးသပ်မှုများ ပြုလုပ်မည် ဖြစ်ပါသည်။

- (၁) ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဥပဒေ
- (၂) ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး နည်းဥပဒေ
- (၃) ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်းများ
- (၄) အမျိုးသားပတ်ဝန်းကျင်အရည်အသွေး (ထုတ်လွှတ်မှု) ဆိုင်ရာ လမ်းညွှန်ချက်များ
- (၅) ပတ်ဝန်းကျင်၊ ကျန်းမာရေးနှင့် ဘေးအန္တရာယ် ကင်းရှင်းရေးဆိုင်ရာ အထွေထွေ လမ်းညွှန်ချက်များ (IFC)
- (၆) မြေနှင့် အခွန်တော် အက်ဥပဒေ
- (၇) ရပ်ကွက်နှင့် ကျေးရွာအုပ်စု အုပ်ချုပ်ရေး ဥပဒေ
- (၈) ရန်ကုန်မြို့တော် စည်ပင်သာယာရေး ဥပဒေ
- (၉) ရှေ့ဟောင်းအဆောက်အအုံများ ကာကွယ်ထိန်းသိမ်းရေး ဥပဒေ
- (၁၀) မြန်မာနိုင်ငံ ရင်းနှီးမြုပ်နှံမှု ဥပဒေ
- (၁၁) နိုင်ငံခြား ရင်းနှီးမြုပ်နှံမှု ဥပဒေ
- (၁၂) အနည်းဆုံး အခကြေးငွေ ဥပဒေ
- (၁၃) အခြားဆက်စပ်လျက်ရှိသောဥပဒေများ

၄။ လေ့လာရေးလုပ်ငန်းများ

ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းလုပ်ငန်းကိုစီမံကိန်းတည်ရှိရာ ရန်ကင်းမြို့နယ်၊ ဆရာစံမြောက်/ အရှေ့ရပ်ကွက်၊ ရန်ကင်း (၁) ရပ်ကွက် နှင့် (၂) ရပ်ကွက်တို့ကို အခြေပြု၍ ဆောင်ရွက်ခဲ့ပါသည်။ လေ့လာရေးလုပ်ငန်းစဉ်တွင်ပါဝင်သည့် လုပ်ငန်းရပ်များမှာ ကနဦးလေ့လာမှု၊ နယ်ပယ်အတိုင်းအတာ သတ်မှတ်ခြင်း၊ လူထုပါဝင်ဆောင်ရွက်ရေးလုပ်ငန်းများ၊ အသေးစိတ်အချက်အလက်များတိုင်းတာ

ကောက်ယူခြင်း၊ သက်ရောက်မှုဖော်ထုတ်ခြင်းနှင့်အကဲဖြတ်ခြင်း၊ အစီရင်ခံစာမူကြမ်းပြုစုခြင်း၊ တွေ့ရှိချက်များကို အများပြည်သူအားထုတ်ဖော်ခြင်းနှင့် အပြီးသတ်အစီရင်ခံစာပြုစုခြင်းတို့ဖြစ်ကြပါသည်။

အသေးစိတ်အချက်အလက်များကောက်ယူရာတွင် တိုက်ရိုက်လေ့လာခြင်း၊ တစ်ဦးတစ်ယောက်ခြင်းဖြစ်စေ၊ အဖွဲ့လိုက်ဖြစ်စေ တွေ့ဆုံမေးမြန်းခြင်း၊ ရုပ်ဝတ္ထုဆိုင်ရာ အရင်းအမြစ်များကို လေ့လာရာတွင် ရာသီဥတုအခြေအနေများလေ့လာခြင်း၊ စီမံကိန်းအတွင်းနှင့် စီမံကိန်းပြင်ပရှိ ရေအရည်အသွေး တိုင်းတာစစ်ဆေးခြင်းများပါဝင်ပါသည်။ သက်ရှိအရင်းအမြစ်များကို လေ့လာရာတွင် စီမံကိန်းတည်ရှိရာနေရာတွင် ပေါက်ရောက်သည့် သစ်ပင်များကိုစာရင်းပြုစုခြင်း၊ ကျေးငှက်တိရစ္ဆာန်များနှင့် ရေနေသတ္တဝါများကို လေ့လာခြင်းများပါဝင်ပါသည်။ လူမှုစီးပွားရေးနှင့် ဆိုင်သောအချက်အလက်များကောက်ယူရာတွင် စီမံကိန်းပတ်ဝန်းကျင်တွင် အခြေချနေထိုင်သော လူဦးရေအခြေအနေ၊ စီးပွားရေးအခြေအနေ၊ အလုပ်အကိုင်၊ လူထု၏ ပညာရေးအခြေအနေလေ့လာမှုများပါဝင်ပါသည်။

၅။ လူထုတွေ့ဆုံပွဲ

ပထမအကြိမ် တွေ့ဆုံပွဲကို ၂၀၁၈ ခုနှစ်၊ ဧပြီလ၅ ရက်နေ့တွင် ရန်ကင်းမြို့နယ်၊ မိုးကောင်းဘုရားလမ်း၊ မိုးကောင်းဘုရားအနီးရှိ သာသနာ့ဗိမာန်တော်ကြီး၌ ကျင်းပပြုလုပ်ခဲ့ပါသည်။ လူထုတွေ့ဆုံပွဲသို့ ရန်ကင်းအမှတ်(၁) ရပ်ကွက်၊ အမှတ်(၂)ရပ်ကွက်၊ ဗဟန်းမြို့နယ်ဆရာစံမြောက်/အရှေ့ရပ်ကွက် များတွင်နေထိုင်သော ဒေသခံရပ်မိရပ်ဖများ၊ Kajima Yankin PPP ကုမ္ပဏီလီမိတက်မှ တာဝန်ရှိသူများ၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးအတိုင်ပင်ခံအင်ဂျင်နီယာအသင်း (ရန်ကုန်) မှ တာဝန်ရှိသူများ၊ ရန်ကင်းမြို့နယ်၏ သက်ဆိုင်ရာ ဌာနများမှ တာဝန်ရှိသူများအပါအဝင် စုစုပေါင်း (၅၈) ဦးခန့် တက်ရောက်ခဲ့ပါသည်။

ပထမအကြိမ် လူထုတွေ့ဆုံပွဲတက်ရောက်သူများ၏ ဆွေးနွေးချက်များမှာ အောက်ပါအတိုင်းဖြစ်ပါသည်။

ဦးသိန်းဇော် (ရန်ကုန်တိုင်းဒေသကြီးလွှတ်တော်ကိုယ်စားလှယ်)

- ပွင့်ပွင့်လင်းလင်းချပြခြင်းကိုမိမိအနေဖြင့်ပထမဦးဆုံးကြိမ်ဖြင့်ဖြစ်ပါကြောင်း
- တက်ရောက်လာသည့် ပြည်သူများကလည်း မေးစရာရှိသည်များကို ပွင့်ပွင့်လင်းလင်း မေးမြန်းစေလိုပါကြောင်း

- ယခင်ကြိုတွေ့ခဲ့ရသောဆောက်လုပ်ရေးလုပ်ငန်းများသည် ပတ်ဝန်းကျင်ထိခိုက်မှုများရှိခဲ့ပါကြောင်း၊ ဥပမာ လမ်းမများပေါ်သို့ မြေသယ်ကားများမှ မြေသားလျှံကျမှုများ၊ စွန့်ပစ်ရေဆိုးများ လမ်းမပေါ်သို့ စီးကျလာခြင်းများ ကြိုတွေ့ခဲ့ရသည်များရှိပါကြောင်း
- ရပ်ကွက်နေပြည်သူများအတွက် အလုပ်အကိုင် အခွင့်အလမ်း ရရှိနိုင်မှု အခြေအနေကို သိရှိလိုပါကြောင်း
- မြန်မာနိုင်ငံအင်ဂျင်နီယာအသင်းမှ ထိခိုက်မှုများကိုဆန်းစစ်လေ့လာပြီးပါက ပြည်သူများကိုပွင့်ပွင့်လင်းလင်း ပြန်လည်ချပြစေလိုကြောင်း
- ရန်ကင်းမြို့နယ်ဖွံ့ဖြိုးရေးလုပ်ငန်းများ၊ ရပ်ကွက်ဖွံ့ဖြိုးရေးလုပ်ငန်းများကိုလည်း ဆောင်ရွက်ပေးစေလိုပါကြောင်း

ဦးနိုင်ဝင်း (ရပ်ကွက်အုပ်ချုပ်ရေးမှူး၊ ရန်ကင်း (၁) ရပ်ကွက်)

- စီမံကိန်းဧရိယာတွင် ပိုင်ရှိက်ခြင်းများဆောင်ရွက်သည့်အခါတွင် တုန်ခါမှုများ ဖြစ်ပေါ်လာပြီး အနီးပတ်ဝန်းကျင်ရှိ နှစ် ၃၀၊၄၀ သက်တမ်းရှိ အဆောက်အဦများအား ထိခိုက်မှု ဖြစ်ပေါ်လာနိုင်သည်ကို မည်သို့ကာကွယ်မှုများ ပြုလုပ်ပေးမည်ကို ထည့်သွင်း စဉ်းစားပေးစေ လိုပါကြောင်း
- စီမံကိန်းမှမြေသယ်ယာဉ်များ မည်သည့်နေရာတွင် ရပ်နားမည်ကိုသိရှိလိုပါကြောင်း
- မြေသယ်ယာဉ်များနှင့် ပတ်သတ်သောပြဿနာများကို မပေါ်ပေါက်စေရန် မည်သို့ ဆောင်ရွက်ပေးမည်ကို သိရှိလိုပါကြောင်း

ဦးကျော်စွာဝင်း (ဗိသုကာပညာရှင်)

- ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ချက် လုပ်ငန်းစဉ်များကို မည်သည့်နေရာတွင်ရရှိနိုင်သည်ကိုသိလိုပါကြောင်း

- စီမံကိန်းတည်ဆောက်သူများမှ လေ့လာဆန်းစစ်အကြံပြုချက်များကို လိုက်နာ ဆောင်ရွက်ခြင်း ရှိမရှိ ကို မည်သို့ စစ်ဆေးခြင်းများပြုလုပ်သည်ကို သိရှိလိုပါကြောင်း၊ မည်သို့ အရေးယူ ဆောင်ရွက်မည်ကို သိရှိလိုပါကြောင်း

ဦးမျိုးမြင့် (မြို့နယ်မီးသတ်တပ်ဖွဲ့)

- စီမံကိန်း တည်ဆောက်နေဆဲကာလတွင် မီးလောင်မှုဖြစ်ပွားပါက မည်သို့ ဖြေရှင်းရမည်ကို ကြိုတင် စဉ်းစား ထားစေလိုပါကြောင်း

ဦးအောင်စိုး (မြို့နယ်တွဲဖက်ပညာရေးမှူး)

- ရန်ကင်း အ.လ.က (၆) ကျောင်းသည် စီမံကိန်းဧရိယာနှင့်ကပ်လျက်တည်ရှိသဖြင့် လုပ်ငန်းခွင်မှ ထွက်ပေါ်လာသော တုန်ခါမှုများကြောင့် ကျောင်းအဆောက်အဦ ကိုထိခိုက်မည်ကိုစိုးရိမ်ပါကြောင်း၊ ဆူညံသံများကြောင့် ကျောင်းသား၊ ကျောင်းသူများ စာသင်ကြားမှုကို ထိခိုက်မည်ကိုစိုးရိမ်ပါကြောင်း၊ ထိခိုက်မှုများရှိခဲ့လျှင် မည်သို့တာဝန်ယူပေးမည်ကို သိလိုပါကြောင်း

ဦးမြင့်အောင် (ရပ်ကွက်အုပ်ချုပ်ရေးမှူး၊ ရန်ကင်း (၂) ရပ်ကွက်)

- စီမံကိန်းနှင့်အနီးဆုံးဖြစ်သော ရန်အောင် (၄) လမ်းရှိ ကပ်လျက်တိုက်တန်းများအား ဆူညံသံ၊ အနံ့အသက်၊ ဖုန်မှုန့်များ၏ သက်ရောက်မှုများကို ထည့်သွင်းစဉ်းစားပေးစေလိုပါကြောင်း

ဦးမောင်မောင် (MICEG)

- စီမံကိန်း ပြီးစီးသွားပါက ရပ်ကွက်အတွင်းရှိ ပြည်သူများနှင့်စီမံကိန်းဧရိယာအတွင်းရှိသူများ လူနေမှု အဆင့်အတန်းမြင့်မားလာမည်ဖြစ်ရာ ဒေသခံပြည်သူများအတွက်ထည့်သွင်း စဉ်းစားပေးစေ လိုပါကြောင်း

စီမံကိန်းမှ ဦးဝင်းမြင့်သိန်း (KAJIMA YANKIN PPP Co., Ltd) မှပြန်လည်ရှင်းလင်းဆွေးနွေးရာတွင်

- စီမံကိန်းတည်ဆောက်ရေးကာလသည် (၆) နှစ် ကြာမြင့်မည်ဖြစ်ကြောင်း

- တည်ဆောက်ရေးကာလတွင် အလုပ်အကိုင်၂၅၀၀ နှင့် စီမံကိန်းစတင်လည်ပတ်သည့်ကာလတွင် ၆၀၀ မှ ၈၀၀ ကြား အထိရရှိနိုင်မည်ဖြစ်ကြောင်း၊ အများစုမှာမြန်မာနိုင်ငံသားများဖြစ်ရမည်ဖြစ်ကြောင်း
- မြေသယ်ကားများကို ရေဆေးသန့်စင်မှုများပြုလုပ်ပြီးမှ အသုံးပြုမည်ဖြစ်ကြောင်း၊ စွန့်ပစ်ရေများကို ပြန်လည်သန့်စင်ပြီးမှ စွန့်ပစ်မည်ဖြစ်ကြောင်း၊ လမ်းမပေါ်တွင်ညစ်ညမ်းမှုများဖြစ်ပေါ်လာပါက စီမံကိန်းမှ တာဝန်ယူမည်ဖြစ်ကြောင်း
- တုန်ခါမှုနှင့်ပတ်သတ်၍ ပတ်ဝန်းကျင် အဆောက်အဦများ၏ အခြေအနေကိုလေ့လာပြီး ထိခိုက်မှု အနည်းဆုံးလျှော့ချပေးနိုင်သည့် ပိုင်အမျိုးအစားကို ရွေးချယ်အသုံးပြုမည်ဖြစ်ပါကြောင်း၊ စီမံကိန်းကြောင့် ထိခိုက်မှုများဖြစ်ပေါ်လာပါက စီမံကိန်းမှ တာဝန်ယူမည်ဖြစ်ပါကြောင်း
- ယခုစီမံကိန်းသည် ရှေ့ပြေးစီမံကိန်းဖြစ်ပြီး နောင်တွင် သူ့နေရာနှင့်သူ စီမံကိန်းများပေါ်ပေါက်လာပါက ဗုံပြ စီမံကိန်းအဖြစ်အကောင်းဆုံးဖြစ်အောင်စဉ်းစားစီစဉ်ထားပါကြောင်း
- မီးသတ်ဦးစီးဌာနနှင့်သွားရောက်ဆွေးနွေးကာတိုင်ပင်ညှိနှိုင်းဆောင်ရွက်မည်ဖြစ်ပါကြောင်း၊ လုပ်ငန်းသုံး ပစ္စည်းများအားလုံးကို စီမံကိန်းဧရိယာထဲတွင်မသိုလှောင်ထားပဲ လိုအပ်သည့်ပစ္စည်းများကိုသာ သီလဝါ စီမံကိန်းဧရိယာထဲမှ သယ်ယူမည်ဖြစ်ပါကြောင်း
- ရန်ကုန်မြို့တော်စည်ပင်သာယာရေးကော်မတီ၏ စည်မျဉ်းစည်းကမ်းများအတိုင်းမြေသယ်ယာဉ်များကို လိုက်နာဆောင်ရွက်မည်ဖြစ်ပါကြောင်း၊ ယာဉ်ကြောပိတ်ဆို့မှုများကို အချက်အလက် ကောက်ယူနေပြီ ဖြစ်ပါကြောင်း နှင့် လမ်းမပိတ်စေရန် အကောင်းဆုံးစဉ်းစားဆောင်ရွက်သွားမည်ဖြစ်ပါကြောင်း

ဒုတိယအကြိမ် လူထုတွေ့ဆုံပွဲကို ၂၀၁၉ ခုနှစ်၊ ဖေဖော်ဝါရီလ ၂၇ ရက်နေ့တွင် ရန်ကင်းမြို့နယ်၊ မိုးကောင်းဘုရားလမ်း၊ မိုးကောင်းဘုရားအနီးရှိ သာသနာ့ဗိမာန်တော်ကြီး၌ပင် ကျင်းပပြုလုပ်ခဲ့ပါသည်။ လူထုတွေ့ဆုံပွဲသို့ ရန်ကုန်တိုင်းဒေသကြီးလွှတ်တော်ကိုယ်စားလှယ်၊ (၁) ရပ်ကွက်၊ (၂) ရပ်ကွက် နှင့် ဗဟန်းမြို့နယ် ဆရာစံမြောက်အရှေ့ရပ်ကွက်မှ ဒေသခံများ၊ မြို့မိမြို့ဖများ၊ ရန်ကင်းမြို့နယ်မှ ဌာနဆိုင်ရာ ကိုယ်စားလှယ်များ၊ KAJIMA YANKIN PPP Co., Ltd မှ တာဝန်ရှိသူများ၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး

အတိုင်ပင်ခံအင်ဂျင်နီယာအသင်း (ရန်ကုန်)မှ တာဝန်ရှိသူများ အပါအဝင် စုစုပေါင်း (၇၅) ဦးခန့် တက်ရောက်ခဲ့ပါသည်။

ဒုတိယအကြိမ်လူထုတွေ့ဆုံပွဲတက်ရောက်သူများ၏ ဆွေးနွေးချက်များမှာ အောက်ပါအတိုင်းဖြစ်ပါသည်။

ဦးမျိုးမြင့် (မြို့နယ်မီးသတ်တပ်ဖွဲ့)

- မြန်မာပလာဇာ ဆောက်လုပ်ရေးလုပ်ငန်းလုပ်စဉ် မီးလောင်ခဲ့ဖူးကြောင်း၊ ထိုသို့မီးလောင်စဉ် မြေစာများပုံထားသောကြောင့် မီးသတ်ကားများ အလွယ်တကူ ဝင်၍မရပါကြောင်း၊ ဝန်ထမ်းများတွင်လည်း မီးသတ်ခြင်းနှင့် ပတ်သက်၍ အသိပညာနည်းပါးကြောင်း၊ ထို့ကြောင့် ယခုစီမံကိန်းတွင် ဝင်လမ်းထွက်လမ်းများ ကောင်းမွန်စွာ ထားပေးစေလိုကြောင်း၊ မီးသတ်ပစ္စည်းကိရိယာများနှင့် အသက်ကယ်ပစ္စည်းများ ကို siteထဲတွင် လုံလောက်စွာ ထားပေးပါရန်၊ ဝန်ထမ်းများအား မီးသတ်ခြင်းဆိုင်ရာအသိပညာများ ပေးထားရန်၊ အထပ်မြင့်များတွင် မီးဘေးအန္တရာယ်ဖြစ်လျှင် အန္တရာယ်များသောကြောင့် အရေးပေါ်လှေကားများ လုံလောက်စွာ စီစဉ်ထားရှိရန် လိုအပ်ပါကြောင်း။

ဦးမျိုးသက်စိုး (KAJIMA YANKIN PPP Co., Ltd.)

- siteထဲတွင်ဂါလံ (၂၀၀၀) ဆွဲ water tank နှင့် (၂) လက်မရေပိုက် ထားရှိထားပါကြောင်း၊ခြံစည်းရိုးတွင် ၂လက်မ ရေပိုက် ထားရှိထားပါကြောင်း၊ ဝန်းထမ်းများကိုလည်း training ပေးပြီး ပြန်လည်စစ်ဆေးမှုများ ပြုလုပ်ပါကြောင်း၊ လက်ရှိတွင်ထွက်ပေါက် (၂) ခု ထားပေးထားကြောင်း။

ဦးမောင်မောင်ညွန့် (ရပ်ကွက်အုပ်ချုပ်ရေးမှူး၊ ရန်ကင်း (၃) ရပ်ကွက်)

- ပထမအကြိမ် လူထုတွေ့ဆုံပွဲ ပြုလုပ်သည်ကို မသိလိုက်ရပါကြောင်း၊ လူထုတွေ့ဆုံပွဲဟု ခေါင်းစဉ်တပ် ထားသော်လည်း လူသိနည်း၍တက်ရောက်သူနည်းကြောင်း
- social media မှတစ်ဆင့် လူအများသိအောင် ကြေငြာစေလိုကြောင်း၊ ပြည်သူ့အတွက် မည်သို့အကျိုးကျေးဇူး ရှိနိုင်သည်ကို သိရှိအောင်ပြုလုပ်ပေးစေလိုပါကြောင်း

- Third party မှ မည်သည့်အကျိုးကျေးဇူးရှိသောကြောင့် ESIA လုပ်သည်ကို သိရှိလိုပါကြောင်း
- မြေသယ်ကားများကို လုပ်ငန်းခွင်ပြင်ပတွင် စည်းကမ်းနှင့်အညီ မောင်းနှင်စေလိုကြောင်း၊ လက်တွေ့ လုပ်ငန်းခွင်တွင် ESIA Report ထဲ၌ရေးသားထားသည့် အတိုင်း ကြပ်မတ်ဆောင်ရွက်စေလိုကြောင်း

ဦးစိုးမြင့် (ECCEA)

- Third party အဖွဲ့အစည်းများသည် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနတွင် လိုင်စင်ယူရကြောင်း
- ESIA လုပ်ငန်းအား အခမဲ့လုပ်ဆောင်ခြင်းမဟုတ်ပဲ အခကြေးငွေယူ၍ လုပ်ဆောင်ခြင်း ဖြစ်ကြောင်း
- သို့သော် ပွင့်လင်းမြင်သာမှုရှိရှိ မျှမျှတတ လုပ်ဆောင်ရပါကြောင်း
- CSR မည်သို့သုံးစွဲမည်ကို လုပ်ငန်းရှင်မှ monitoring team နှင့် တိုင်ပင်မည်ဖြစ်ပါကြောင်း

ဦးဝင်းမြင့်သိန်း (KAJIMA YANKIN PPP Co., Ltd.)

- စီမံကိန်းတွင် ဒေသခံများလွတ်လပ်စွာ ကိုယ်လက်လှေ့ကျင့်ခန်းလုပ်ဆောင်နိုင်ရန် (၂၄) နာရီ အသုံးပြု နိုင်မည့် ပန်းခြံပါရှိကြောင်း
- ကလေးသူငယ်များ ဖွံ့ဖြိုးတိုးတက်စေရန် ရည်ရွယ်၍ စာကြည့်တိုက်ထားရှိမည်ဖြစ်ကြောင်း
- Hotel ရုံးခန်းများအတွက် သဘာဝဘေးအန္တရာယ် ကာကွယ်ရေးအစီအစဉ်များ ပြုလုပ်ထား ပါကြောင်း

ဒေါက်တာသီသီလတ် (ပြည်သူ့ကျန်းမာရေးဦးစီးဌာန)

- စီမံကိန်းကို ကြိုဆိုပါကြောင်းနှင့် ပြည်သူ့လူထုအတွက် စဉ်းစားပေးထားပါသောကြောင့် ကျေးဇူးတင် ပါကြောင်း
- Golden City တွင် သွေးလွန်တုပ်ကွေး outbreak ဖြစ်စဉ်က security ကြောင့် အလွယ်တကူ ဝင်ခွင့်မရခဲ့ပါကြောင်း၊ ဝင်စစ်ခွင့်ရသောအခါ နေထိုင်ပုံမှာ ကျန်းမာရေးနှင့် မညီညွတ်သည်ကို တွေ့ရှိရကြောင်း၊ ထို့ကြောင့်စီမံကိန်းတွင် ဝန်ထမ်းတန်းလျားများ ဆောက်လုပ်ပြီးပါက ဝင်ရောက်ကြည့်ရှုခွင့် ရလိုပါကြောင်း၊

- လုပ်ငန်းခွင်အတွင်း ညအိပ်နေထိုင်သော ဝန်ထမ်းများအတွက် ရန်ကင်း (၁၂) လုံးတန်းရှိ ဒေသန္တရ ဆေးခန်းတွင် office hour အတွင်း ကျန်းမာရေးစောင့်ရှောက်မှု ရယူနိုင်ပါကြောင်း
- အိမ်ထောင်သည်များ၏ မှီခိုမှုများဖြစ်သော အမျိုးသမီးများနှင့် ကလေးသူငယ်များအတွက် ကျန်းမာရေး စောင့်ရှောက်မှု ပေးပါကြောင်း
- စီမံချက်အရ အဖွဲ့အစည်းနှင့် site ထဲသို့ ဝင်ရန်လိုအပ်ကြောင်း။ တိုင်းဒေသကြီးအနေနှင့် ပြုလုပ်သော စီမံကိန်းများအတွက် construction site ထဲက လုပ်သားဦးရေစာရင်းနှင့် မှီခိုစာရင်းအား အသက်အပိုင်းအခြား အလိုက် ပြုစုထားစေလိုပါကြောင်း
- ရေဝပ်လျှင် ခြင်ပေါက်ပွားနိုင်ကြောင်းနှင့် ခြင်ဆေးဖြန်းလိုလျှင် ကျန်းမာရေးဌာနနှင့် တိုင်ပင်ညှိနှိုင်း စေလိုကြောင်း (၀၉၅၁၂၄၇၃၉ သို့ဆက်သွယ်နိုင်ပါကြောင်း)
- စီမံကိန်းမှာ ၂၀၂၄ ခုနှစ်အထိ ကြာရှည် မည်ဖြစ်၍ အလုပ်သမား အရေအတွက်များလျှင် ကျန်းမာရေး တာဝန်ခံ နှင့် ဆေးခန်းထားပေးစေလိုပါကြောင်း
- surprise inspection ပြုလုပ်ရန်မရှိကြောင်း
- launch နှင့် dinner ကျွေးလျှင် food poison မဖြစ်စေရန်ဂရုစိုက်စေလိုကြောင်း၊ ရေအိမ်များအား စနစ်တကျ ထားစေလိုကြောင်း၊ kitchen တွင် ရေသန့်ရှင်းမှုနှင့် အစားအစာသန့်ရှင်းမှုရှိမရှိကို ကြည့်ရှုအကြံပြုလိုပါကြောင်း

ဦးမျိုးသက်စိုး (KAJIMA YANKIN PPP Co., Ltd)

- ရေမဝပ်စေရန်အတွက် ခြံများကို ပုံမှန်ရှင်းပါကြောင်း၊ မှောင်ရိပ်မခိုစေရန်အတွက် မီးထွန်းထားပါကြောင်း
- site visit အားလိုအပ်သလိုပြုလုပ်နိုင်ပါကြောင်း
- safety officer များထားရှိပေးထားပါကြောင်း၊ first aid သင်တန်းများကိုလည်း ပေးထားပါကြောင်း
- site inspection ကို ပုံမှန်ပြုလုပ်နိုင်ကြောင်း၊ surprise inspection ဆိုပါကလည်း security နှင့် ချိတ်ဆက်၍ စစ်ဆေးမှုများ ပြုလုပ်နိုင်ပါကြောင်း

- site ထဲတွင် ညအိပ်အလုပ်သမားများ မထားကြောင်း
- မတော်တဆ မီးလောင်မှုမဖြစ်စေရန် site ထဲတွင် kitchen မထားပါကြောင်း
- စားသောက်ထားသည့်အမှိုက်များကိုလည်း အမှိုက်ပုံးနှင့် စနစ်တကျ စွန့်ပစ်ပါကြောင်း

ဦးကျော်လေးမြင့် (ရန်ကင်း (၂) ရပ်ကွက်)

- ဆရာစံလမ်းနှင့် ရန်ကင်းလမ်းထောင့်တွင် traffic jam ရှိ၍ Kajima Site မှ free lane စီစဉ်ပေးနိုင်မှု ရှိ/မရှိ သိရှိလိုပါကြောင်း
- လက်ရှိsite ၏ ထောင့်လေးဘက်ကို အနည်းငယ်ရှင်းပေး၍ free lane ယာယီလုပ်ပေးစေလိုပါကြောင်း

ဦးဝင်းမြင့်သိန်း (KAJIMA YANKIN PPP Co., Ltd.)

- မီးသတ်ပတ်လမ်းကို သီးသန့်ထားရှိသောကြောင့် free lane စီစဉ်ပေးရန် အဆင်မပြေပါကြောင်း
- လူသွားလမ်းနှင့် ကားလမ်းကို သီးသန့်ခွဲထားပါကြောင်း
- Bypass ပေးရန် စဉ်းစားနေသော်လည်း ယခုထက်ထိ ချပြု၍မရသေးပါကြောင်း
- အဆိုပါထောင့်ချိုးနေရာတွင် မြေအောက်သုံးထပ်တည်ဆောက်မည်ဖြစ်သောကြောင့် free lane စီစဉ်ပေး၍ မရနိုင်ကြောင်း
- ဆက်လက်လုပ်ဆောင်မည့် traffic လုပ်ငန်းရပ်များတွင် ယခုအကြံပြုချက်ကို ထည့်သွင်းစဉ်းစား၍ အကောင်းဆုံးဖြစ်အောင် ဆောင်ရွက်ပေးမည်ဖြစ်ပါကြောင်း

၆။ တွေ့ဆုံဆွေးနွေးမှုများမှ ဆွေးနွေးချက်များ

- မြန်မာပလာဇာ တည်ဆောက်စဉ်ကာလအတွင်း ဘိလပ်မြေဖျော်စပ်သည်ကို စီမံကိန်းဧရိယာထဲတွင် ပြုလုပ်သည့်အတွက် လေတိုက်လျှင် ဘိလပ်မြေမှုန့်များ လွင့်လာကြောင်း၊ ယခုစီမံကိန်းတွင် ဘိလပ်မြေဖျော်သည့်အလုပ်ကို စီမံကိန်းဧရိယာထဲတွင်ပြုလုပ်မည် (သို့မဟုတ်) မြို့ပြင်တွင်ပြုလုပ်မည်ကို သိရှိလိုပါကြောင်း။
- ကားပါကင်ထားမည်ဆိုလျှင်အဆင်ပြေပါကြောင်း။
- မြေသယ်ယာဉ်များကိုစည်းကမ်းတကျ ခွင့်ပြုရန်နှင့် လိုင်စင်မရှိသူများမောင်းနှင်မှုမပြုစေရန်။

- စီမံကိန်းဧရိယာထဲရှိ အလုပ်သမားများအား ပတ်ဝန်းကျင်နှင့် အဆင်ပြေအောင် စည်းကမ်းကြပ်မတ်ရန်။
- မြေသယ်ယာဉ်များကို ဆူညံမှုမရှိစေရန်နှင့် မြေသယ်စဉ် လမ်းမပေါ်၌ မြေကြီးခဲများ မကျစေရန်။
- ပိုင်ရှိက်စဉ် ဆူညံမှုမရှိစေရန်။
- ယခုစီမံကိန်းသည် စီးပွားရေး ဖွံ့ဖြိုးတိုးတက်မှုအတွက် အထောက်အကူပြုနိုင်ကြောင်း။
- ကားသမားများကိုစည်းကမ်းကြပ်မတ်ရန်။
- ဖြစ်ပေါ်လာသည့် ပြဿနာဖြေရှင်းရန်တာဝန်ခံ အတည်တကျသတ်မှတ်ပေးရန်။
- စီမံကိန်းဧရိယာထဲတွင်နေထိုင်မည့် လူဦးရေကို ရပ်ကွက်ကိုစာရင်းအတိအကျပေးရန်။
- ယခင် Golden City စီမံကိန်းတွင် သွေးလွန်တုပ်ကွေးရောဂါ လူ (၄၀) ကျော် ဖြစ်ပွားခဲ့ဖူး၍ ကျန်းမာရေး ပြဿနာကို ပူးပေါင်းဖြေရှင်းရန်
- အလုပ်သမားများ၏ လုပ်ငန်းခွင်အန္တရာယ်ကင်းရှင်းရေးကိုကြပ်မတ်ရန်။
- ဓါတုအညစ်အကြေးများစနစ်တကျစွန့်ပစ်ပါရန်

၇။ သက်ရောက်မှုဖော်ထုတ်ခြင်း နှင့်ကုစားရန်နည်းလမ်းများ

ဖြစ်ပေါ်လာနိုင်သည့် လူမှုစီးပွား သက်ရောက်မှုများကိုဖော်ထုတ်ရန် စီမံကိန်းလုပ်ငန်းစဉ် များကို သက်ရောက်ခံပတ်ဝန်းကျင်နှင့် ချိတ်ဆက်ကာ ဆက်စပ်ဖော်ထုတ်ခဲ့ပါသည်။ စီမံကိန်းကြောင့် ၎င်း၏ ပတ်ဝန်းကျင်တွင်ဖြစ်ပေါ်သည့် ပတ်ဝန်းကျင်နှင့် လူမှုစီးပွားသက်ရောက်မှုများအနက်မှ (၈) ခုကို အောက်တွင် ရှင်းလင်းဆွေးနွေးထားပါသည်။

(၁) မြေထုပတ်ဝန်းကျင်အပေါ်သက်ရောက်မှု

တည်ဆောက်ရေးလုပ်ငန်း ဆောင်ရွက်မှုကြောင့် စီမံကိန်းဧရိယာအတွင်း မြေဆီလွှာ ပြောင်းလဲ ထိခိုက်မှုအချို့ ရှိမည်ဖြစ်ပါသည်။ တည်ဆောက်ရေးလုပ်ငန်းများအတွက် မြေဆီလွှာများ ဖယ်ထုတ်ခံရခြင်း၊ စီမံကိန်းဧရိယာတစ်ခုလုံးကို သတ်မှတ်အမြင့် ရောက်သည်အထိ မြေဖို့ခြင်း တို့ကြောင့် မြေဆီလွှာသိပ်သည်းမှု နှင့် အခြားဂုဏ်သတ္တိများ ပြောင်းလဲနိုင်ခြင်း၊ ဘိုလပ်မြေနှင့် လောင်စာဆီများ ယိုဖိတ်ခြင်း တို့ကြောင့် မြေဆီလွှာ ညစ်ညမ်းခြင်း၊ မြေသားလုပ်ငန်းများ ဆောင်ရွက်နေစဉ် လေနှင့် ရေတိုက်စားမှုများကြောင့်

မြေဆီလွှာ ပြုန်းတီးခြင်းများ အထိုက်အလျောက် ဖြစ်ပေါ်မည် ဖြစ်ပါသည်။ သို့သော် သက်ရောက်မှုအများစုမှာ စီမံကိန်းလုပ်ငန်းခွင် ဧရိယာအတွင်း၌သာဖြစ်ပေါ်မည် ဖြစ်ပါသည်။

သက်ရောက်မှုလျော့ချ/ကုစားရန်

- (၁) မြေဖို့ခြင်းနှင့် မြေတူးလုပ်ငန်းများကို မိုးရွာသွန်းမှုနည်းပါးချိန်တွင်ဆောင်ရွက်ရန်၊
- (၂) မြေဖို့ခြင်းနှင့် မြေတူးလုပ်ငန်းများ ဆောင်ရွက်ပြီးချိန်တွင် တည်ဆောက်ရေး လုပ်ငန်းများကို ဆောလျင်စွာ ဆောင်ရွက်ခြင်းဖြင့် မလိုအပ်သော မြေဆီလွှာပြုန်းတီးမှု များ မဖြစ်ပေါ်အောင် ဆောင်ရွက်ရန်၊
- (၃) မြေသားလုပ်ငန်း ဆောင်ရွက်ထားသည့်နေရာများတွင် ရေစီးကြောင်းများ ဖြတ်သန်း စီးဆင်းမှု မရှိအောင်ဆောင်ရွက်ရန်၊
- (၄) တည်ဆောက်ရေးလုပ်ငန်းများပြီးစီးပါက သင့်လျော်သည့် အပေါ်ယံမြေဆီလွှာများ ပြန်လည် ဖြည့်တင်းပြီး မြေဆီလွှာထိန်းသိမ်းနိုင်သည့် သစ်ပင်ပန်းမန်များ ပြန်လည် စိုက်ပျိုးရန်၊

(၂) လေထုပတ်ဝန်းကျင်အပေါ်သက်ရောက်မှု

စီမံကိန်းတည်ဆောက်ရေးလုပ်ငန်းများ ဆောင်ရွက်ရာတွင် မြေဖို့ခြင်း၊ မြေညိုခြင်း၊ မြေတူးခြင်း၊ စသည့် မြေသားလုပ်ငန်းများ ဆောင်ရွက်မှုကြောင့် အမှုန်အမွှားနှင့် ဖုန်မှုန့်များလွင့်ပျံ့မှု အထိုက်အလျောက် ရှိမည် ဖြစ်ပါသည်။ မြေသားလုပ်ငန်းများမှ ထွက်ရှိလာမည့် မြေစာများကို သယ်ယူပို့ဆောင်ခြင်းလုပ်ငန်းမှ ဖုန်မှုန့်များ ထုတ်လွှတ်မည် ဖြစ်ပါသည်။ မြေစာများကိုသယ်ယူပို့ဆောင်သည့် ကားများတွင် သင့်လျော်သည့် အဖုံး၊ အကာများ မရှိပါက သယ်ယူပို့ဆောင်ရာ လမ်းကြောင်းတလျှောက် အမှုန်အမွှားများ ထုတ်လွှတ်မည် ဖြစ်ပါသည်။ ခြောက်သွေ့ပြီး လေထန်သည့် ရာသီဥတုမျိုးတွင် လုပ်ဆောင်ရမည့် ဆောက်လုပ်ရေး လုပ်ငန်းများတွင် အမှုန်အမွှားထုတ်လွှတ်ခြင်းမှာ သိသာနိုင်ပါသည်။

တည်ဆောက်ရေးကာလတွင် ဒီဇယ်အင်ဂျင်များ၊ စက်ယန္တရားကြီးများအသုံးပြုခြင်း၊ လမ်းခင်းခြင်း၊ ဆေးသုတ်ခြင်း၊ စသည့်လုပ်ငန်းများမှ အခိုးအငွေ့နှင့် အနံ့အသက်များ ထွက်ရှိမည် ဖြစ်ပါသည်။ သို့သော် အဆိုပါအနံ့အသက်များမှာ ယာယီမျှသာ ထွက်ရှိခြင်း၊ ထွက်ရှိချိန်တိုတောင်းခြင်း ရံဖန်ရံခါမျှသာထွက်ရှိခြင်း စသည်တို့ကြောင့် အနံ့အသက်ကြောင့်ဖြစ်ပေါ်သည့်သက်ရောက်မှုမှာ ကြီးမား ပြင်းထန်မှု မရှိကြောင်း တွေ့ရှိရ

ပါသည်။ စီမံကိန်းပတ်ဝန်းကျင်၏ လေထုအရည်အသွေးကို တိုင်းတာပြီးလေ့လာဆန်းစစ်မှုများပြုလုပ်ခဲ့ရာ အောက်ပါရလဒ်များကိုတွေ့ရှိရပါသည်။

No	Parameters	Day 1		Day 2		Standards
		Lowest	Highest	Lowest	Highest	WHO, NAAQS
၁	CO ₂ , ppm ကာဗွန်ဒိုင် အောက်ဆိုဒ်	315	530	376	512	600 ppm
၂	CO, ppm ကာဗွန်မို နောက်ဆိုဒ်	26	33	22	32	5 ppm
၃	SO ₂ , ppb ဆာလဖာ ဒိုင်အောက်ဆိုဒ်	0	1	0	1	5 ppb
၄	NO ₂ , ppb နိုက်ထရိုဂျင် ဒိုင်အောက်ဆိုဒ်	14	78	17	64	100 ppb
၅	PMA µg/m ³ 2.5 မိုက်ခရုဂ်အမုန်	15	31	16	37	150 µg/m ³
၆	PMB µg/m ³ 10 မိုက်ခရုဂ်အမုန်	38	109	28	63	35 µg/m ³

သက်ရောက်မှုလျှော့ချကုစားရန်

- (၁) မြေသားလုပ်ငန်းဆောင်ရွက်ရာတွင် ဖုန်မှုန့်နှင့် အမှုန်အမွှားများ လွှင့်ပျံ့နိုင်သည့် နေရာများကို အနည်းဆုံး တစ်နေ့လျှင် နှစ်ကြိမ်ရေဖျန်းရန်၊
- (၂) လုပ်ငန်းခွင်ဧရိယာအတွင်း မောင်းနှင်သည့် မော်တော်ယာဉ်များကို တစ်နာရီလျှင် (၁၅) မိုင်နှုန်း ထက် ကျော်လွန်မောင်းနှင်ခြင်း မပြုစေရေး ကြပ်မတ်ထိန်းသိမ်းရန်၊
- (၃) မြေစာသယ်မည့် ကားများကို လိုအပ်သည့် အဖုံးအကာများ ဖုံးအုပ်ရေး ကြပ်မတ်ပေးရန်၊
- (၄) မြေသယ်ကားကြီးများ၏ ဘီးများကို စီမံကိန်းဧရိယာမှအထွက်တွင် ရေဆေးပေးရန်၊

(၃) ရေထုတ်ဝန်းကျင်အပေါ်သက်ရောက်မှု

စီမံကိန်းမှ ရေဂါလံ (၇၂၆၀၀) ဆုံ ရေကန်တည်ဆောက်ပြီး စီမံကိန်းဧရိယာအတွင်း (၆) လက်မ ရေတွင်း(၅)တွင်း တူး၍ မြေအောက်ရေကို ထုတ်ယူသုံးစွဲမည် ဖြစ်သည်။ စီမံကိန်းဧရိယာ၏ မြောက်ဘက်အစပ်တွင်ခုနှစ်ပင်လိမ်ချောင်း တည်ရှိပြီး စီမံကိန်းမှ မြေဖို့ခြင်းလုပ်ငန်းများ ဆောင်ရွက်ချိန်တွင် ချောင်းအတွင်းသို့ မြေစာများကျရောက်ပြီး ချောင်းကို ပိတ်ဆို့နိုင်ပါသည်။

ဆောက်လုပ်ရေးလုပ်ငန်းများမှ စွန့်ပစ်ရေများ ထွက်ရှိမည် ဖြစ်ပါသည်။ ပိုင်လုပ်ငန်းမှ ရွှံ့ရေများ၊ ဘိလပ်မြေ ဖျော်စက်မှ စွန့်ပစ်ရေများနှင့် အခြားသော ဆောက်လုပ်ရေး လုပ်ငန်းသုံးနှင့် လူသုံးစွန့်ပစ်ရေများ ထွက်ရှိမည် ဖြစ်ပါသည်။

စီမံကိန်းတည်ဆောက်ပြီးစီး၍ စတင်လည်ပတ်ချိန်တွင် ဟိုတယ်၊ Retail၊ ကာလရှည်ဟိုတယ် နှင့် ရုံးခန်းအဆောက်အဦ တို့မှ နေ့စဉ်အိမ်သုံး စွန့်ပစ်ရေများ ထွက်ရှိမည် ဖြစ်ပါသည်။ အဆောက်အဦများမှ ထွက်ရှိလာမည့် စွန့်ပစ်ရေများကို ရေဆိုးသန့်စင် စနစ်များဖြင့် သတ်မှတ် အရည်အသွေးရအောင် သန့်စင်ပြီးမှသာ လမ်းဘေးရေနှုတ်မြောင်းများ အတွင်းသို့ စွန့်ပစ်ရမည် ဖြစ်ပါသည်။ စီမံကိန်းပတ်ဝန်းကျင်၏ ရေထုအရည်အသွေးကိုတိုင်းတာပြီး လေ့လာဆန်းစစ်မှုများပြုလုပ်ခဲ့ရာ အောက်ပါရလဒ်များကို တွေ့ရှိရပါသည်။

Test	Unit	Water Samples			
		NEQG	TW	US	DS

PH	S.U. ^a	6-9	6.37	7.06	7.10
Suspended solids	mg/l	-	6.00	24.00	42.00
Biochemical Oxygen Demand (BOD)	ppm	50	0.57	19.40	18.20
Chemical Oxygen Demand (COD)	ppm	250	5.2	70	54.0
Total Coliform	MPN/100ml	400	<1.8	>160000	>160000
Total Nitrogen	mg/l	10	0.1	7.2	7.2
Total Phosphorous	mg/l	2	<0.050	0.794	0.857
Oil and Grease	mg/l	10	<3.1	3.30	<3.1

သက်ရောက်မှုလျှော့ချ/ကုစားရန် -

- (၁) စီမံကိန်း တည်ဆောက်ရေး လုပ်ငန်းများလုပ်ဆောင်နေချိန် ဘိလပ်မြေနှင့် လောင်စာဆီများ ယိုဖိတ်ခြင်း မရှိအောင် အထူးသတိပြုဆောင်ရွက်ရန်၊
- (၂) စီမံကိန်းမှထွက်ရှိလာသော စွန့်ပစ်အမှိုက်များကို သတ်မှတ်ထားသောနေရာတွင် စနစ်တကျ စွန့်ပစ်ရန်၊
- (၃) တည်ဆောက်ရေးကာလတွင်ထွက်ရှိသည့် စွန့်ပစ်ရေများကို အနည်ထိုင်ကန်များတွင် စုစည်းအနည် ထိုင်စေပြီး ကြည်လင်သောရေကိုသာ စွန့်ပစ်ရန်၊
- (၄) ပိုင်လုပ်ငန်းမှ ထွက်ရှိလာသော ရွှံ့နှစ်ရေများကို မြောင်းအတွင်းသို့ တိုက်ရိုက် စွန့်ပစ်ခြင်း၊ စီးထွက်ခြင်းများ မဖြစ်ပေါ်အောင်ထိန်းသိမ်းရန်၊
- (၅) စီမံကိန်းမှထွက်ရှိလာသော စွန့်ပစ်ရေဆိုးများကို သတ်မှတ်ထားသော အရည်အသွေး ရရှိသည် အထိ ရေဆိုးသန့်စင်စနစ်များဖြင့် စနစ်တကျသန့်စင်ပြီးမှ စွန့်ပစ်ရန်၊
- (၆) ရေအရင်းအမြစ်များကို စနစ်တကျ ထိန်းသိမ်းသုံးစွဲရေးဆိုင်ရာ အသိပညာဖြန့်ဝေမှုများ ပြုလုပ်ပေးရန်၊
- (၇) အနာဂတ်တွင် မိုးရေကို သိုလှောင်အသုံးချနိုင်မည့် စနစ်များစီမံထားရှိရန်၊
- (၈) ရန်ကုန်မြို့တော် စည်ပင်သာယာရေးကော်မတီ၏ ခွင့်ပြုချက်ဖြင့် စီမံကိန်းဧရိယာ အတွင်း လုံလောက်သော အရွယ်အစားရှိသည့် ရေနှုတ်မြောင်းများ တည်ဆောက်ရန်။

- (၉) ရေသုံးစွဲမှုလျှော့ချနိုင်မည့် အိမ်သာနှင့် သန့်စင်ခန်းသုံးပစ္စည်းများ အသုံးပြုခြင်း၊ ရေသုံးစွဲမှု ချွေတာနိုင်မည့် အစီအစဉ်များ စီမံထားရှိခြင်းများ ပြုလုပ်ရန်။
- (၁၀) မြေဖို့ခြင်းလုပ်ငန်းများ ဆောင်ရွက်ချိန်တွင် ခုနှစ်ပင်လိမ်ချောင်း အတွင်းသို့ မြေသားကျရောက်ပိတ်ဆို့မှု မဖြစ်စေရန် အလေးထားဆောင်ရွက်ရန်။
- (၁၁) စီမံကိန်းဧရိယာ အတွင်း ရေစီးရေလာ ကောင်းမွန်အောင်ဆောင်ရွက်ရန်။

(၅) ဇီဝမျိုးစုံမျိုးကွဲအပေါ်သက်ရောက်မှု

စီမံကိန်းအတွက် ဇီဝမျိုးစုံမျိုးကွဲဆိုင်ရာ လေ့လာမှု လုပ်ငန်းရပ်များကို ဆောင်ရွက်ခဲ့ပါသည်။ လေ့လာတွေ့ရှိချက်များအရ စီမံကိန်းဧရိယာတွင် မျိုးစိတ်နည်းပါးသည်ကိုတွေ့ရှိရပြီး လေ့လာ တွေ့ရှိသောမျိုးစိတ်များတွင် အန္တရာယ်ရှိသည့် အပင်နှင့်သတ္တဝါမျိုးစိတ်များ မပါဝင်သည်ကို တွေ့ရှိရပါသည်။ Kajima Yankin PPP စီမံကိန်းဧရိယာအတွင်းတွင် ဥယျာဉ် (၅) ခု တည်ဆောက်မည် ဖြစ်သဖြင့် ထိုဥယျာဉ်များမှာ ဇီဝမျိုးစုံမျိုးကွဲများအတွက်ပိုမိုကောင်းမွန်သည့် အနေအထားကိုဖန်တီးပေးနိုင် မည်ဟု ယူဆရပါသည်။

သက်ရောက်မှုလျှော့ချကုစားရန် -

- (၁) ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်ပါ မြေထု၊ ရေထု၊ လေထု ညစ်ညမ်းမှု လျှော့ချ/ကာကွယ်ရေးဆိုင်ရာ အစီအမံများကို အပြည့်အဝ အကောင်အထည်ဖော် ဆောင်ရွက်ရန်။

(၆) ဆူညံသံ နှင့် တုန်ခါမှုဖြစ်ပေါ်နိုင်ခြင်း

ဆောက်လုပ်ရေးလုပ်ငန်းစဉ်များက ဆူညံသံနှင့် တုန်ခါမှုများကို ဖြစ်ပေါ်စေနိုင်ပါသည်။ ပိုင်ရှိက်ခြင်း နှင့် စက်ယန္တရားကြီးများ မောင်းနှင်ခြင်းတို့မှ ဆူညံသံများ ထွက်ရှိမည်ဖြစ်ပါသည်။ မီးပျက်ချိန် မီးစက်ကြီးများမောင်းနှင်ခြင်းကလည်း ဆူညံသံများထွက်ပေါ်စေမည်ဖြစ်ပါသည်။ စီမံကိန်း ဧရိယာသည် ရန်ကင်း (၁) နှင့် (၂) ရပ်ကွက် နှင့် ဆရာစံ(မြောက်/အရှေ့)ရပ်ကွက် စသည့် လူနေရပ်ကွက်များနှင့် ကပ်လျက်တည်ရှိနေသောကြောင့် ဆူညံသံများနှင့် တုန်ခါမှု များကြောင့် ထိခိုက်မှု မရှိစေရေး သတိပြုဆောင်ရွက်ရမည် ဖြစ်ပါသည်။

No	Parameters	Location 1		Location 2		Location 3		Standard WHO, NAAQS
		Lowest	Highest	Lowest	Highest	Lowest	Highest	
၁	Noise dB အသံ	68	88	69	81	74	84	60dB

သက်ရောက်မှုလျော့ချ/ကုစားရန် -

- (၁) ပိုင်ရှိက်ရာတွင် ဆူညံသံနှင့် တုန်ခါမှုနည်းပါးသည့် နည်းစနစ်များအသုံးပြုရန်၊
- (၂) စက်ယန္တရားများကို စနစ်တကျ ပြုပြင်ထိန်းသိမ်းခြင်းဖြင့် မလိုအပ်သော ဆူညံသံများ မဖြစ်ပေါ်အောင် ထိန်းသိမ်းရန်၊
- (၃) ဆူညံသံထွက်ပေါ်မှုမြင့်မားသည့် တည်ဆောက်ရေးလုပ်ငန်းများကို ညဘက် လူခြေတိတ်ချိန် တွင် ဆောင်ရွက်ခြင်း မပြုရန်၊
- (၄) မီးစက်များ အင်ဂျင်များတွင် အသံထိန်းစနစ် (Silencer/Muffler) များတပ်ဆင် အသုံးပြုရန်၊
- (၅) အသံဆူညံမှုနှင့် ပတ်သက်၍ ဆက်သွယ်ဆောင်ရွက်နိုင်မည့် တာဝန်ခံတစ်ဦးထားရှိပြီး ဆက်သွယ်ရန် အမည်နှင့်ဖုန်းနံပါတ်များပါဝင်သည့် ကြေညာစာများကို စီမံကိန်း ပတ်ဝန်းကျင် ဒေသများတွင် ဖြန့်ဝေထားရှိရန်။

(၇) လုပ်သားကျန်းမာရေးနှင့် လုပ်ငန်းခွင်အန္တရာယ်ကျရောက်နိုင်မှု

စီမံကိန်းတည်ဆောက်ရေးလုပ်ငန်းများမှာ ပမာဏအားဖြင့် အထိုက်အလျောက် ကြီးမားပြီး လုပ်သား အများအပြား အသုံးပြုရမည် ဖြစ်ပါသည်။ ပြင်ပမှ လာရောက် အလုပ်လုပ်ကြသည့် အလုပ်သမားများအတွက် ယာယီအလုပ်သမား တန်းလျားများကို စနစ်တကျတည်ဆောက်ပေးခြင်း မပြုပါက အလုပ်သမားတို့၏ ကျန်းမာရေး ထိခိုက်မှုများ ဖြစ်ပေါ်မည်ဖြစ်သည်။ ဆောက်လုပ်ရေး လုပ်ငန်းများနှင့် စီမံကိန်းလည်ပတ်စဉ်တွင် ကြိုတွေ့ရမည့် အမြင့်မှပြုတ်ကျခြင်း၊ အရာဝတ္ထုများ ပြုတ်ကျမှုကြောင့် ထိခိုက်ခြင်း၊ ချွန်ထက်သော အရာဝတ္ထုများကြောင့် ထိခိုက်ဒဏ်ရာ ရရှိခြင်း၊ ဓာတ်လိုက်ခြင်း၊ ချော်လဲခြင်း အစရှိသည့် လုပ်ငန်းခွင်ဆိုင်ရာ အန္တရာယ်ကျရောက်နိုင်မှုများလည်း ရှိနေမည်ဖြစ်ပါသည်။

သက်ရောက်မှု လျှော့ချ/ကုစားရန်

- (၁) ကျန်းမာရေးနှင့်ညီညွတ်ပြီး လုံခြုံမှုအပြည့်အဝပေးနိုင်သည့် အလုပ်သမား တန်းလျားများ ထားရှိရန်၊
- (၂) လုပ်ငန်းခွင်သုံး တစ်ကိုယ်ရေကာကွယ်ရေးပစ္စည်း (PPE) များ လုံလောက်စွာထားရှိပြီး စနစ်တကျ ကိုင်တွယ် အသုံးပြုရေး ကြပ်မတ်ကွပ်ကဲရန်၊
- (၃) လုပ်ငန်းခွင် အန္တရာယ်ကင်းရှင်းရေးဆိုင်ရာများကို လုပ်သားများအား ပညာပေးပြီး စနစ်တကျ လိုက်နာ ကျင့်သုံးစေရေး ကြပ်မတ်ကွပ်ကဲရန်၊
- (၄) လုပ်ငန်းခွင် အန္တရာယ်ကင်းရှင်းရေး အရာရှိ (Safety Officer) တစ်ဦးထားရှိပြီး လုပ်ငန်းခွင် အန္တရာယ် ကင်းရှင်းရေးလုပ်ငန်းများ စနစ်တကျ ဆောင်ရွက်ရန်။

(၈) အများပြည်သူဘေးအန္တရာယ်ကင်းရှင်းရေးနှင့်ကျန်းမာရေး

စီမံကိန်းတည်ဆောက်ရေး လုပ်ငန်းများ ဆောင်ရွက်ချိန်တွင် အနီးပတ်ဝန်းကျင်၌ ဖုန်များ၊ စွန့်ပစ် ပစ္စည်းများ၊ အသံများ ထွက်ရှိနိုင်ပါသည်။ သို့သော် စီမံကိန်း တည်ဆောက်ချိန်တွင်သာ ဖြစ်ပေါ်သောကြောင့် ပြင်းထန်သော သက်ရောက်မှု မရှိနိုင်ကြောင်း တွေ့ရပါသည်။ စီမံကိန်း တည်ဆောက်ရေး ကာလတွင် တည်ဆောက်ရေးအတွက် လိုအပ်သည့် ကြီးမားသော စက်ယန္တရားများနှင့် အခြားလိုအပ်သော ပစ္စည်းများကို သယ်ယူရမည် ဖြစ်သဖြင့် လုပ်သားများနှင့် ဒေသခံများအတွက် မတော်တဆ ထိခိုက်မှုများနှင့် ယာဉ်အန္တရာယ် ကျရောက်နိုင်မှုများ အထိုက်အလျောက် ဖြစ်ပေါ်လာနိုင်ပါသည်။

ထို့ပြင် စီမံကိန်းဧရိယာသည် ဗဟန်းမြို့နယ် ဆရာစံလမ်းမကြီးနှင့် ရန်ကင်း လမ်းဆုံတွင် တည်ရှိပြီး စီမံကိန်းမှ အသုံးပြုသည့် အဝင်အထွက်လမ်းနှင့် လမ်းမကြီး ဆုံသည့်နေရာများတွင် မတော်တဆ ထိခိုက်မှုများ နှင့် ယာဉ်အန္တရာယ် ကျရောက်နိုင်မှုများ ဖြစ်ပေါ်လာနိုင်ပါသည်။ စီမံကိန်းလုပ်ငန်းတွင် အသုံးပြုသည့် စက်ယန္တရားကြီးများ၊ မြေသယ်ကားများကို လူနေရပ်ကွက်များအတွင်း ဖြစ်သန်း မောင်းနှင်မှုကြောင့် ယာဉ်မတော်တဆမှုများ ဖြစ်ပေါ်မည်ကို ဒေသခံများက စိုးရိမ်ကြောင်း ဆွေးနွေးကြပါသည်။

သက်ရောက်မှု လျှော့ချ/ကုစားရန်

- (၁) တည်ဆောက်ရေးကာလတွင် ယာဉ်အန္တရာယ် ဖြစ်နိုင်ခြေများသည် လမ်းများ၊ အချိန်များကို ရှောင်ရှားခြင်း၊ ယာဉ်မောင်းသူများအား အရှိန်ထိန်းမောင်းနှင်စေခြင်းဖြင့် ယာဉ်မတော်တဆမှု လျော့ချရန်
- (၂) စီမံကိန်းနှင့် သက်ဆိုင်သည့် ကိစ္စရပ်များအတွက် ဒေသခံများက စီမံကိန်းထံ အချိန်မရွေး ဆက်သွယ် ဆောင်ရွက်နိုင်မည့် အစီအမံတစ်ခု ချမှတ်ထားခြင်း
- (၃) ယာဉ်မောင်းသူများနှင့် စီမံကိန်းဧရိယာအတွင်းတွင် နေထိုင်သူများကို ယာဉ်စည်းကမ်း၊ လမ်း စည်းကမ်းများ အသိပညာပေးရန်
- (၄) စီမံကိန်းဝင်းအတွင်းတွင် စီမံကိန်းတစ်ခုလုံးကို လွှမ်းခြုံသော လုံခြုံရေးစနစ်နှင့် မီးဘေးကာကွယ်ရေး စနစ်များ ထည့်သွင်းတည်ဆောက်ရန်
- (၅) လူမှုစီးပွားတာဝန်သိ အစီအစဉ်ဖြင့် စီမံကိန်းပတ်ဝန်းကျင်ဒေသ၏ ကျန်းမာရေးကဏ္ဍအတွက် ကူညီ ထောက်ပံ့မှုများ ပြုလုပ်ရန်

(၉) အလုပ်အကိုင်အခွင့်အလမ်းရရှိနိုင်မှု

စီမံကိန်းတည်ဆောက်ရေးလုပ်ငန်းများ လုပ်ဆောင်ချိန်တွင် အလုပ်အကိုင် အခွင့်အလမ်းများ ပေါ်ပေါက်လာမည် ဖြစ်ပါသည်။ စီမံကိန်းတွင် ဟိုတယ်၊ Retail၊ ကာလရှည်ဟိုတယ် နှင့် ရုံးခန်းများ ပါဝင်မည် ဖြစ်သဖြင့် တည်ဆောက်ရေးလုပ်ငန်းများပြီးစီး၍ စီမံကိန်းစတင်လည်ပတ်ချိန်တွင် အလုပ်အကိုင်အခွင့် အလမ်းများ အများအပြား ပေါ်ပေါက်လာမည် ဖြစ်ပါသည်။

သက်ရောက်မှု မြှင့်တင်ရန်နည်းလမ်းများ

- (၁) အလုပ်ခန့်ထားရန် လိုအပ်ပါက ဒေသခံများ သိရှိနိုင်ရေးအတွက် ရပ်ကွက်အုပ်ချုပ်ရေးမှူးရုံး အပါအဝင် ကြော်ငြာများ ဖြန့်ဝေရန်၊
- (၂) အလုပ်အကိုင်ခန့်ထားရာတွင် ဒေသခံများကို ဦးစားပေးရန်၊
- (၃) အလုပ်အကိုင်ခန့်ထားရာတွင် တည်ဆဲလုပ်အကိုင်နှင့် အလုပ်သမားရေးရာ ဥပဒေများနှင့်အညီ လိုက်နာ ဆောင်ရွက်ရန်။

၈။ လူမှုစီးပွားတာဝန်သိအစီအစဉ် (CSR)

စီမံကိန်းများက နှစ်စဉ် အသားတင် အမြတ်၏ (၂) ရာခိုင်နှုန်းခန့်ကို လူမှုစီးပွား တာဝန်သိ အစီအစဉ်အတွက် အသုံးပြုမည် ဖြစ်ပါသည်။ လူမှုစီးပွား တာဝန်သိ အစီအစဉ်အတွက် မိမိ၏ဝန်ထမ်းများနှင့်တကွ သက်ရောက်မှု ဧရိယာအတွင်း ကျရောက်နေသည့် ဗဟန်းမြို့နယ် ဆရာစံ မြောက် အရှေ့ ရပ်ကွက်၊ ရန်ကင်း (၁) ရပ်ကွက် နှင့် (၂) ရပ်ကွက် တို့၏ ပညာရေးကဏ္ဍ၊ ကျန်းမာရေးကဏ္ဍ၊ လူမှုရေးကဏ္ဍ၊ စီးပွားရေးကဏ္ဍ၊ အခြေခံအဆောက်အအုံကဏ္ဍ၊ သဘာဝဘေးအန္တရာယ် ကူညီထောက်ပံ့ရေးကဏ္ဍများတွင် ဒေသခံများ၊ ဒေသဆိုင်ရာအုပ်ချုပ်ရေး အဖွဲ့အစည်းများနှင့် တိုင်ပင်ညှိနှိုင်းကာ လူမှုစီးပွားတာဝန်သိ အစီအစဉ်များကို စဉ်ဆက်မပြတ် ပါဝင်ဆောင်ရွက်သွားရန် ဖြစ်ပါသည်။ စီမံကိန်းမှ မိမိတို့ဝန်ထမ်းများသက်သာချောင်ချိရေး၊ ကျန်းမာရေးစောင့်ရှောက်မှု၊ ပညာရေးဆိုင်ရာကူညီပံ့ပိုးမှု၊ အရည်အသွေးဖွံ့ဖြိုးတိုးတက်ရေးဆိုင်ရာ သင်တန်းများပေးခြင်း စသည်တို့ကိုလည်း လူမှုစီးပွား တာဝန်သိအစီအစဉ်တွင် ထည့်သွင်းဆောင်ရွက်ရမည်ဖြစ်ပါသည်။

၉။ ပတ်ဝန်းကျင်ရေးရာစောင့်ကြည့်အဖွဲ့

The Garden (Yankin PPP) Redevelopment Project စီမံကိန်း တည်ဆောက်ရေး လုပ်ငန်းရပ်များအတွက် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ် (Environmental Management Plan) ကို အောင်မြင်စွာ အကောင်အထည်ဖော် ဆောင်ရွက်နိုင်ရန်အတွက် ဤပတ်ဝန်းကျင်ရေးရာ စောင့်ကြည့်အဖွဲ့ကို ဖွဲ့စည်းရမည် ဖြစ်ပါသည်။ စောင့်ကြည့်အဖွဲ့တွင် ဌာနဆိုင်ရာကိုယ်စားလှယ်များ၊ ဒေသခံကိုယ်စားလှယ်များနှင့် စီမံကိန်းလုပ်ငန်းရှင် ကိုယ်စားလှယ်များ ပါဝင်ရပါမည်။

ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်ကို အကောင်အထည်ဖော် ဆောင်ရွက်ရန် လုပ်ငန်းရှင်တွင် တာဝန်ရှိပါသည်။ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်၏ အစိတ်အပိုင်းတစ်ရပ်ဖြစ်သော ပတ်ဝန်းကျင်ဆိုင်ရာ စောင့်ကြည့်တိုင်းတာရေး အစီအစဉ် (Environmental Monitoring Programme) ကို လုပ်ငန်းရှင်က အကောင်အထည်ဖော်ကာ တိုင်းတာတွေ့ရှိချက် အစီရင်ခံစာများကို ပတ်ဝန်းကျင်စောင့်ကြည့်အဖွဲ့ဝင် ကိုယ်စားလှယ်များထံ မိတ္တူပေးပို့ရမည် ဖြစ်ပါသည်။ လူမှုစီးပွားတာဝန်သိ အစီအစဉ် (Corporate Social Responsibility) အနေဖြင့် စီမံကိန်းက ဒေသခံများအတွက် ပေးအပ်သော ကူညီထောက်ပံ့မှုများကို စောင့်ကြည့်အဖွဲ့မှ ဒေသခံကိုယ်စားလှယ်များထံမှ တစ်ဆင့်

ဒေသခံများထံသို့ ပေးအပ်ရမည်ဖြစ်ပါသည်။ ပတ်ဝန်းကျင်ရေးရာနှင့် စပ်ဆိုင်သော အကြောင်းတစ်စုံတစ်ရာ ပေါ်ပေါက်ပါက ဒေသခံများအနေဖြင့် စောင့်ကြည့်အဖွဲ့မှ အဖွဲ့ဝင် ဒေသခံကိုယ်စားလှယ်များမှတစ်ဆင့် စီမံကိန်းနှင့် ဆက်သွယ်ဆောင်ရွက်နိုင်မည် ဖြစ်ပါသည်။ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်ကို အတိအကျလိုက်နာဆောင်ရွက်ကာ ပတ်ဝန်းကျင်စောင့်ကြည့်တိုင်းတာရေးအစီအစဉ် (Environmental Monitoring Programme) ပါ စောင့်ကြည့်တိုင်းတာသည့် လုပ်ငန်းရပ်များအားလုံးကို လုပ်ငန်းပိုင်ရှင်မှ ကိုယ်တိုင်လုပ်ကိုင်ဆောင်ရွက်ရန်ဖြစ်ပြီး ရလဒ်များကိုဒေသခံများ စဉ်ဆက်မပြတ် သိရှိနိုင်ရေးကို စောင့်ကြည့်အဖွဲ့နှင့် ပူးပေါင်းဆောင်ရွက်ရန်ဖြစ်ပါသည်။

(၁) ရည်ရွယ်ချက်

- (က) စီမံကိန်း၏ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်အား လိုက်နာဆောင်ရွက်မှု အခြေအနေများကို ဒေသခံများ စဉ်ဆက်မပြတ် သိရှိနိုင်ရန်
- (ခ) ပတ်ဝန်းကျင်ဆိုင်ရာ စောင့်ကြည့် တိုင်းတာရေး အစီအစဉ်မှ တိုင်းတာတွေ့ရှိချက် အစီရင်ခံစာ များကို ဒေသခံများ သိရှိနိုင်ရန်
- (ဂ) ပတ်ဝန်းကျင်ရေးရာနှင့် စပ်ဆိုင်သော အကြောင်းကိစ္စများအတွက် ဆက်သွယ်ဆောင်ရွက်နိုင်ရန်
- (ဃ) လူမှုစီးပွား တာဝန်သိ အစီအစဉ်အရ ပေးအပ်သည့် ကူညီထောက်ပံ့မှုများကို စနစ်တကျ စီမံခန့်ခွဲမှုများကို စနစ်တကျ စောင့်ကြည့်ထိန်းကြောင်းနိုင်ရန်

(၂) တာဝန်များ

- (က) စီမံကိန်းနှင့် ဒေသခံများအကြား ပတ်ဝန်းကျင်ရေးရာ ကိစ္စများ ဆက်သွယ်ဆောင်ရွက်နိုင်ရန် ဒေသခံကိုယ်စားလှယ်များက ကြားခံဆောင်ရွက်ပေးရန်
- (ခ) စီမံကိန်းမှ လူမှုစီးပွားတာဝန်သိ အစီအစဉ်အရ ကတိကဝတ်အတိုင်း ပေးအပ်သည့် ကူညီ ထောက်ပံ့မှုများကို ရပ်ကွက်အသီးသီးရှိ ဒေသခံကိုယ်စားလှယ်များမှတစ်ဆင့် ပေးအပ်ရန်

(ဂ) စီမံကိန်း၏ ပတ်ဝန်းကျင်ဆိုင်ရာ စောင့်ကြည့်တိုင်းတာရေး အစီအစဉ်မှ တိုင်းတာတွေ့ရှိချက် အစီရင်ခံစာများကို အစိုးရဌာနများမှ ကိုယ်စားလှယ်များနှင့် ဒေသခံကိုယ်စားလှယ်များ အားလုံးထံ ဖြန့်ဝေကာ ဒေသခံများ သိရှိနိုင်အောင် ဆောင်ရွက်ရန်

(ဃ) စီမံကိန်းမှ အလုပ်သမားခန့်ထားရေးဆိုင်ရာ ကိစ္စရပ်များအတွက် ဒေသခံကိုယ်စားလှယ်များ၏ အကူအညီဖြင့် ဒေသခံများအားလုံး သိရှိနိုင်အောင် ဆောင်ရွက်ရန်

(င) ဒေသခံများ၏ လူမှုရေး၊ ဘာသာရေးနှင့် ယဉ်ကျေးမှုဆိုင်ရာ အစီအစဉ်များတွင် စီမံကိန်းက ပါဝင် ဆောင်ရွက်နိုင်ရေးအတွက် ဒေသခံကိုယ်စားလှယ်များမှ စီမံကိန်းတာဝန်ရှိသူများနှင့် ပူးပေါင်းဆောင်ရွက်ရန်

(စ) ပတ်ဝန်းကျင်ရေးရာ စောင့်ကြည့်အဖွဲ့ကို စီမံကိန်းတည်ဆောက်ရေး လုပ်ငန်းများ မစတင်မီ စီမံကိန်းမှ တာဝန်ရှိသူများက တာဝန်ယူကာ ဖွဲ့စည်းရန်

(ဆ) စောင့်ကြည့်အဖွဲ့၏ စုံညီအစည်းအဝေးကို အနည်းဆုံး (၆) လလျှင်တစ်ကြိမ် ကျင်းပကာ စောင့်ကြည့် အဖွဲ့၏ ရည်ရွယ်ချက်များနှင့် တာဝန်များကို ဆွေးနွေးညှိနှိုင်းပြီး ပိုမိုကောင်းမွန်သော မူဝါဒများ ချမှတ်ရန်

၁၀။ တွေ့ရှိချက်များအား ထုတ်ဖော်ခြင်း

ယခုအစီရင်ခံစာ အကျဉ်းချုပ်ပါ အချက်အလက်များသည် ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းလုပ်ငန်းမှ တွေ့ရှိချက်များကို အနှစ်ချုပ် ဖော်ပြထားခြင်း ဖြစ်ပါသည်။ ဤအစီရင်ခံစာပါ အချက်အလက်များကို ရပ်မိရပ်ဖများ အနေဖြင့် သေချာစွာ ဖတ်ရှုလေ့လာခဲ့ပြီး ဆွေးနွေးလိုသည်များ၊ အကြံပြုလိုသည်များကို ဒုတိယအကြိမ် လူထုတွေ့ဆုံပွဲတွင် ရင်းနှီးပွင့်လင်းစွာ ဆွေးနွေးအကြံပြုခဲ့ကြပြီး ဖြစ်ပါသည်။

၁၁။ နိဂုံး

“The Garden (Yankin PPP) Redevelopment Project”

တည်ဆောက်ရေးစီမံကိန်းလုပ်ငန်းအတွက် ပတ်ဝန်းကျင်နှင့်လူမှုရေးဆိုင်ရာထိခိုက်မှုဆန်းစစ်ခြင်းလုပ်ငန်း

(ESIA) ကို ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး အတိုင်ပင်ခံအင်ဂျင်နီယာအသင်းမှ ၂၀၁၈ ခုနှစ် ဧပြီလ အစောပိုင်းမှစတင်လုပ်ဆောင်ခဲ့ပါသည်။ စီမံကိန်းဆိုင်ရာအချက်အလက်များကို ရပ်မိရပ်ဖများအားတင်ပြကာ ဒေသခံရပ်မိရပ်ဖများ၏ ဆွေးနွေး အကြံပြုချက်များကို ၂၀၁၈ ခုနှစ် ဧပြီ (၅) ရက်နေ့တွင်ပြုလုပ်သော ပထမအကြိမ် လူထုတွေ့ဆုံပွဲတွင်လည်းကောင်း၊ ၂၀၁၉ ခုနှစ် ဖေဖော်ဝါရီ ၂၇ ရက်နေ့တွင်ပြုလုပ်သော ဒုတိယအကြိမ် လူထုတွေ့ဆုံပွဲတွင်လည်းကောင်း၊ ဗဟန်းမြို့နယ် ဆရာစံ အရှေ့မြောက်ရပ်ကွက်၊ ရန်ကင်း(၁) ရပ်ကွက်၊ ရန်ကင်း (၂) ရပ်ကွက် နှင့် ရန်ကင်း (၁၆) ရပ်ကွက်တို့တွင် လူမှုစီးပွားစစ်တမ်းများ ကောက်ယူခြင်းအားဖြင့်လည်းကောင်း ရယူခဲ့ပါသည်။ စီမံကိန်းလုပ်ငန်းစဉ်များနှင့် သက်ရောက်ခံ ပတ်ဝန်းကျင်၏ အချိတ်အဆက်၊ ရပ်မိရပ်ဖများ၏ သဘောထားအမြင်များ၊ ဆွေးနွေးအကြံပြုချက်များအပေါ် မူတည်ကာ အဓိကကျသည့် ပတ်ဝန်းကျင်ဆိုင်ရာနှင့် လူမှုစီးပွားသက်ရောက်မှုများကို ဖော်ထုတ်ထားပြီး ၎င်းတို့အနက်မှ ၉ ခုကို ဤအနှစ်ချုပ်အစီရင်ခံစာတွင် ရှင်းလင်းတင်ပြထားပါသည်။ ဆိုးကျိုး သက်ရောက်မှုများကို လျော့ချကုစားရန် နည်းလမ်းများ၊ ကောင်းကျိုးသက်ရောက်မှုများကို ဆပွားမြှင့်တင်ရန် နည်းလမ်းများကိုလည်း အကျဉ်းရှုံးတင်ပြထားပါသည်။

EXECUTIVE SUMMARY

1. Context of the Project

Kajima Yankin PPP Company Limited is planning a project called “The Garden” Yankin PPP Redevelopment Project. The proponent is also planning to construct the hotel, long-stay hotel, office buildings and retail together with infrastructures.

Kajima Yankin PPP Company Limited is a Private Company Limited incorporated under the Myanmar Companies Act. The company head quarter is located at No. (303 B), MOC, Yan Aung Street (1) & (2), Ward (2), Yankin Township, Yangon, Myanmar. Environmental Conservation Consulting Engineers Association (Yangon) will be served as third party for ESIA study and reporting for The Garden Yankin PPP Redevelopment Project.

The aim of Environmental and Social Impact Assessment (ESIA) for Kajima Yankin PPP Company Limited, The Garden Yankin PPP Redevelopment Project is to enable the approving authority and the developer to properly consider the potential environmental and social consequences of the project and to delineate an environmental management plan for the project.

2. Policy, Legal and Institutional Framework

Stipulations from the following laws, rules regulation and international guidelines are reviewed as part of the EIA study.

- (a) Environmental Conservation Law
- (b) Environmental Conservation Rules
- (c) Environmental Impact Assessment Procedure
- (d) National Environmental Quality (Emissions) Guidelines
- (e) General EHS Guidelines (IFC)
- (f) Yangon City Development Committee Law
- (g) The Land Acquisition Act (1894)
- (h) Ward or Village Tract Administration Law
- (i) Myanmar Investment Law
- (j) The Occupational Safety and Health Law
- (k) The Electricity Law
- (l) The Shops and Establishment Act (1951)

- (m) Minimum Wages Law
- (n) The Labour Dispute Settlement Law (2012)
- (o) The Worker's Compensation Act (1923)
- (p) The Labour Organization Law (2011)

3. Project Description and Alternatives

3.1 Project Description

The project is called "The Garden" Yankin PPP Redevelopment Project to become new image for Yangon City. The project will be established by the Kajima Yankin PPP Co., Ltd. The project's particulars are as follows:

Table A. Project Information

Sr.	Particular	Information
1	Type of Project	Construction
2	Location of Project	the corner of Yankin Road and Sayasan Road in Yankin Township, Yangon.
3	Total Area	approximately (6.708) acres (2.71 ha)
6	Capital Investment	US\$ (408.3) Millions
7	Fuel requirement	40,000 liters per day
8	Electricity requirement	7600 kW
9	Water requirement	102580 gallons per day

3.2 Project Location

The location of the project is at the corner of Yankin Road and Sayasan Road in Yankin Township, Yangon. It is situated on the plot of (6.708) acres. Around the project area, accommodations for police is in the eastern, No. (2) Yankin Ward is in the western, No. (1) Yankin ward and The Golden City Housings are in the Northern and, Sayasan -North ward is in the southern. In the northern of the project, Khun-Hna-Pin-Lein Creek is located as a border of the area. In the western of the project, Yankin Road is closed to the project area and in the southern; Sayasan Road is closed to the project. The site location is about 10 km distance far away from Yangon International Airport

(Mingalardon) and takes 27 minutes for driving by car. And then 0.3 km distance far away from Yankin Center and takes 5 minutes by walking.

3.3 Project Area

The total area of the project is approximately 6.708 acres (292200.48 sq-ft) (2.71 ha). The project is single-phase construction.

3.4 Investment

The expected initial investment cost of the overall project is US\$ (408.3) million.

3.5 Project Schedule

Scheduling is the fitting of the final work plan to a time scale. It shows the duration and order of various construction activities. The expected starting date of the project is at the May, 2019 and implementation of the project will be (2024). The expected duration of the project is about (50+10+10) years. Construction schedule must be arranged and prepared for the steps of all works and the possible problems in construction.

3.6 Alternative Methods

3.6.1 No Project Option

If the project is not implemented, both the positive impacts and negative impacts of the project will be vanished. But, by the outcomes of ESIA studies, ESIA team believes that the project will be environmentally and socially sustainable if it is implemented in compliance with the delineated EMP.

3.6.2 Location Alternatives

Current project location is on a plot of land of (6.708) acres which was the former storage site of Ministry of Construction (MOC). Location of the project is at the corner of Yankin Road and Sayarsan Road in Yankin Township, Yangon, near Yankin Center. In the eastern of the project area, accommodations for police, in the northern, Khun-Hna-Pin-Lein Creek is located as a border of the area. Yankin Township is one of the most populated area in Yangon. Yankin is the biggest social housing area in Yangon. The site location is in advance redevelopment for the existing social housings.

ESIA team found out that current project location exerts no significant adverse impact on the structure of the Yangon City or nearby community but only benefits the City by adding new buildings with infrastructure.

3.6.3 Technology Alternative

Every step takes place in construction works and every choice makes in materials and methods will be based on best available technology considering environmental conservation and sustainable development of the community as a whole.

4. Description of The Environment

The project is called "The Garden" Yankin PPP Redevelopment Project to become new image for Yangon City. The project will be established by the Kajima Yankin PPP Co., Ltd.

4.1 Stakeholder Analysis

Stakeholders are categorized in four groups such as local people, government organizations, project proponent and other interested groups such as NGOs according to UNEP EIA MANUAL Guideline. Analysis was based on primary impact factors such as involvement in land acquisition, vicinity to the project, common use of utilities such as water and infrastructures. Paragraph 49 (g) of the EIA procedures stipulates that the scoping shall identify potentially affected communities and other stakeholders with an interest in the Project. The following table shows level of interest by stakeholders on the project.

Table B. Stakeholders of "The Garden" Yankin PPP Redevelopment Project

Sr.	Stakeholder Group	Stakeholder	Interest Level		Interest
			Level	Reason	
1	Local people	No.(1)Yankin Ward	High	Close Vicinity	-Pollution -CSR (Road)
		No.(2)Yankin Ward	High	Close Vicinity Existing the plantation near the project	-CSR (electricity) -CSR (Water)

		No. (16) Yankin Ward	High	Close Vicinity Existing the plantation near the project	
		SayaSan(north) Ward	High	Existing the plantation near the project	
2	Government Organization	General Administration Office Department	High	-Water Resources	-Administration -Pollution -CSR -Coordination
		Township Educational Office	Low	Only Relevant CSR	
		Township Health Department	Low	Only Relevant CSR	
		Township Environmental Conservation Department	Low		
		Township Fire Brigade	Low		
		Department of Mine	Low		
		Township Police Force	Medium	- Accountability	
3	Proponent	Project management Project construction contractor	High	-Project Owner	-Operation and Management -Construction -EMP

4	Other Interested Party	None	-	-	-
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4.2 Project Affected Area

Project affected area is demarcated based on the results of stakeholder analysis. Affected human settlements, noise environment, biological environment, hydrological regime and land environment are shown in the following table.

Table C. Project Affected Area

Sr.	Category	Location	Factor
1	Human Settlements	Accommodations for Police	- Close location
		Sayar San- North Ward	- Access road
		No. (2) Yankin Ward	
		No. (1) Yankin Ward	
2	Land Environment	Kyaik Ka San Stadium	- Waste
		Yankin Park	- Access road
3	Biological Environment	Project area	-
4	Air and Noise Environment	Within Project area and nearby community	- Noise levels
5	Water Environment	Within Project area	- Water usages
		Khun-Hna-Pin-Lein Creek	- Water quality - Waste water

4.3 Biological Components

Biodiversity, or the variety of life and its process, is a basis property of nature that provides enormous ecological, economic, and aesthetic benefits. Its loss is recognized as a major national as well as global concern, with potentially profound ecological and economic consequences.

This is assessment of the EIA fauna survey. A total of 59 species representing butterfly (10 species), dragonfly and damselfly (10 species), frog and toad (3 species), lizard snake, and skink (5 species), insects (15 species), mammal (3 species) and birds (13 species) are recorded. There is not included the any endangered and endemic species under IUCN Red list category. The significance of biodiversity in an ecosystem and complex interrelations with other components determines the structure and productivity of ecosystems, as well as contributing to their functionality.

At present, there are 14 tree species, 32 small tree species, 38 shrubs, 54 herbs, 31 climbers, 10 grass, 2 ferns and 10 aquatics within the study area. The entire site was visually assessed, with all vascular plants recorded, any significant records mapped and the overall condition of vegetation noted. Remnant vegetation in the local area was also reviewed to assist in determining the original vegetation within the study area. There is no forest area within or near the project.

4.4 Socio-Economic Components

Socio-economic factors are lifestyle components and measurements of both financial viability and social standing. They directly influence social privilege and levels of financial independence. Factors such as health status, income, environment and education are studied by sociologists in terms of how they each affect human behaviors and circumstances.

The project area is located at the corner of Saya San road and Yankin road, Yankin Township, Eastern District of Yangon Region. The nearby study area includes Yankin (1), Yankin (2), Saya San North-East and Yankin (16) wards. As Yankin is one of the most populated township in Yangon Region, the population and number of households in the conducted survey is quite large. The total number of populations in the study area goes beyond 20,000 with the 4519 of total households. The largest ward is Yankin (16) with total households of 1447 and the smallest ward is Yankin (1) with 423 households.

5. Impact and Risk Assessment and Mitigation Measures

To identify the potential environmental and social impacts of the project, project activities were correlated with environmental and social receptors and their interactions were identified for potential environmental and social impacts. EIA team finds out twenty two key environmental and social impacts of the project on its environment.

5.1 Impact Identification

5.1.1 Preconstruction

There are three distinct impacts in the pre-construction phase of the project which are:

1. Air Quality Impact by site clearing dust and particulate
2. Solid Waste from site clearing
3. Possibility of Drainage Blockage

5.1.2 Construction

There are eight distinct impacts in the construction phase of the project which are:

1. Impact on Air Quality by Dust and Particulates
2. Impact from Noise and Vibration
3. Impact on Land by solid waste
4. Waste water generation
5. Drainage Blocking
6. Occupational Safety and Health (OSH)
7. Community Safety and Health (CSH)
8. Job opportunity in construction works (and supply chain)

5.1.3 Operation

There are distinct impacts in the operation phase of the project which are:

1. Waste water generation
2. Impact from solid waste
3. Increased Traffic Loading
4. Increased residential amenity
5. Job opportunity

5.1.4 Decommissioning

In the decommission phase, there are four distinct impacts from decommission works as project impact.

1. Impact on air quality by dust and particulate

2. Noise and vibration
3. Solid waste generation
4. Occupational Safety and Health (OSH)

5.1.5 Closure and Post-closure

There are two distinct impacts in the closure and post-closure phase of the project which are:

1. Dust from refilling works
2. Landform changes by refilling

5.2 Impact Assessment

Assessment of the identified impacts are carried out with rating matrix method the detail of which are shown in the previous part of this chapter. The assessment results are shown in the following table.

Table D. Impact Ratings without MEMs

PRE-CONSTRUCTION								
Sr.	Impact	Severity	Duration	Spatial Scope	Frequency	Probability	Total Rating	Significance Level
1	Air Quality Impact by Site Clearing Dust and Particulate	2	1	3	5	4	54	Low-Medium
2	Solid Waste from Site Clearing	3	1	3	4	4	56	Low-Medium
3	Possibility of Drainage Blockage	3	1	3	4	4	56	Low-Medium
CONSTRUCTION								
1	Impact on Air Quality by Dust and Particulates	3	2	2	4	4	56	Low-Medium
2	Impact from Noise and Vibration	3	2	2	4	4	56	Low-Medium
3	Impact on Land by Solid Waste	3	2	2	4	4	56	Low-Medium
4	Waste Water Generation	2	2	3	4	4	56	Low-Medium

5	Drainage Blockage	3	2	3	1	4	40	Low
6	Impact on Occupational Safety and Health (OSH)	2	2	2	4	4	48	Low
7	Impact on Community Safety and Health (CSH)	2	2	3	4	4	56	Low-Medium
8	Job Opportunity	2	4	3	1	4	45	Low
OPERATION								
1	Waste Water Generation	2	4	3	5	4	81	Medium-High
2	Impact from Solid Waste	3	4	2	5	4	81	Medium-High
3	Increased Traffic Loading	3	4	3	5	4	90	Medium-High
4	Increased Residential Amenity	3	4	3	5	4	90	Medium-High
5	Job Opportunity	2	4	3	1	4	45	Low
DECOMMISSION								
1	Impact on Air Quality by Dust and Particulate	2	1	2	4	4	40	Low
2	Noise and Vibration from Demolitions	2	1	2	4	4	40	Low
3	Solid Waste Generation	3	1	3	4	4	56	Low-Medium
4	Impact on Occupational Safety and Health (OSH)	3	1	2	4	4	48	Low
CLOSURE AND POST-CLOSURE								
1	Dust from refilling works	4	2	1	4	4	56	Low-Medium
2	Landform change by refilling	3	4	2	5	4	81	Medium-High

5.3 Impact Mitigations

Following mitigation measures are formulated to prevent, reduce, or compensate the effect of the impacts caused by the project activities. Detail plan for management actions, implementation and follow-up of the impact mitigations are delineated in EMP chapter.

Table E. Summary of MEMs

Sr.	Impact	Mitigation
Pre-Construction		

1	Air Quality Impact by Site Clearing Dust and Particulate	1. Water spraying if necessary
2	Soild Waste from Site Clearing	1.Dispose the solid waste systematically at designated waste disposal site provided by YCDC.
3	Possibility of Drainage Blockage	1.Maintaining the existing drainage within the project compound and Khun-Hna-Pin-Lein creek beside the project. 2.Providing an alternative drainage when the area for drainage is needed for future development.
Construction		
1	Impact on Air Quality by Dust and Particulates	1.Places of dust emission during earth works must be sprayed with water if necessary. 2.A speed limit of 15 mph must be set for vehicles travelling within the project site. 3. Provide covering for dump trucks as necessary 4. Wheels of dump trucks must be washed with water jet in every outbound travel from the project site.
2	Impact from Noise and Vibration	1.Carry out maintenance work so that unnecessary mechanical noise could be prevented. 2.Incorporating silencer/ Muffler with engines and generator sets. 3.Delivering information of a contact person with contact number at site and in local community so that issues from noise disturbance could be communicated and informed with the project. 4.Piling system with less noise and vibration must be used instead of a noisy and vibrating one. 5.High noise construction work must be avoided in night time. 6.Carrying out noise level according to NEQG 7. Providing necessary PPE for workers at high noise area
3	Impact on Land by Solid Waste	1.Construction activities should be done in restricted areas and activities kept to a minimum as far as possible.

		<p>2.Excavation process should be monitored to prevent over-excavation.</p> <p>3.In order to mitigate soil erosion, the basic principle of construction erosion control measures should be followed where necessary.</p> <p>4.Schedule excavation during low-rainfall periods, when possible.</p> <p>5.Excavate immediately before construction instead of leaving soils exposed for months or years.</p> <p>6.Where wind erosion is a concern, plan and install windbreaks.</p> <p>7.Divert water from disturbed areas.</p> <p>8.Avoid soil compaction by restricting the use of trucks and heavy equipment to limited area.</p> <p>9.Control concentrated flow and runoff to reduce the volume and velocity of water from work sites to prevent formation of drainages</p> <p>10.The wetting of soil and the discharge of construction grey water across natural soil should be controlled.</p> <p>11.The handling of natural construction materials, such as filling soil and gravels will require dust management.</p>
4	Waste Water Generation	<p>1.Construction waste water must be settled in settling ponds and only clear water must be allowed to disposed to creek.</p> <p>2.Mud water from bore pile work must be prevented from direct run off or direct discharge into roadside drainage.</p>
5	Drainage Blockage	<p>1.Maintaining the existing drainage within the project compound and Khun-Hna-Pin-Lein creek beside the project.</p>
6	Impact on Occupational Safety and Health (OSH)	<p>1.Appointing a safety officer.</p> <p>2.Provide safe, secure and health camps for workers adequately.</p> <p>3.Construction activities should be done in restricted areas and kept to a minimum as far as possible.</p>

		4. Providing necessary PPE adequately and supervise their proper use in work place.
7	Impact on Community Safety and Health (CSH)	<ol style="list-style-type: none"> 1. To avoid high hazard routes and crowded periods so that traffic hazard could be minimized. 2. Provide security system and fire safety system adequately. 3. Provide support for health sector in CSR programme.
8	Job Opportunity	1. Signing employment contract in accordance with employment and skill development law.
Operation		
1	Waste Water Generation	<ol style="list-style-type: none"> 1. Domestic waste water from the project must be treated to NEQG's waste water quality guidelines before discharging to drainage. 2. To consider proper process for reduction of water use so that domestic water consumption could be minimized. 3. Fixtures that can minimized water consumption must be used. 4. To conduct awareness program for effective utilization of water. 5. To consider other source of water apart from groundwater for future expansion of project.
2	Impact from Solid Waste	<ol style="list-style-type: none"> 1. Provide adequate containers 2. Provide a systematic solid waste management system. 3. Dispose the solid waste systematically at designated waste disposal site provided by YCDC.

3	Increased Traffic Loading	<ol style="list-style-type: none"> 1. Provide adequate parking area for the project. 2. Recruit adequate employee for parking services. 3. Provide systematic layout for the vehicles and walkways in project compound. 4. To implement remedial measure in TIA report.
4	Increased Residential Amenity	<ol style="list-style-type: none"> 1. Sufficient security personnel and systematic security system must be provided. 2. Adequate lighting for night time security must be installed in readily accessible area. 3. Project area must be landscaped systematically when construction works are finished. 4. Provide security system and fire safety system adequately.
5	Job Opportunity	<ol style="list-style-type: none"> 1. Signing employment contract in accordance with employment and skill development law.
Decommissioning		
1	Impact on Air Quality by Dust and Particulate	<ol style="list-style-type: none"> 1. Earth works must be sprayed after decommissioning if necessary.
2	Noise and Vibration from Demolitions	<ol style="list-style-type: none"> 1. High noise decommission work must be avoided during the night time. 2. Carrying out noise management according to NEQG guidelines. 3. Providing necessary PPE for workers at high noise area.
3	Solid Waste Generation	<ol style="list-style-type: none"> 1. Disposing the decommissioning solid waste systematically at waste disposal site provided by YCDC. 2. Disposing the decommissioning solid waste must be separated into reuseable materials and non-reuseable materials.
4	Impact on Occupational Safety and Health (OSH)	<ol style="list-style-type: none"> 1. Providing necessary PPE adequately during the decommissioning. 2. Planning work site layout to minimize the need for manual transfer of heavy loads.
Closure and Post-closure		
1	Dust from refilling works	<ol style="list-style-type: none"> 1. Water spraying the area where it is carrying out filling and grading operations. 2. Water sprays the unpaved haulage roads as dust suppression measure.

2	Landform changes by refilling	<ol style="list-style-type: none">1. Refill all the excavated place in the project.2. Top soil must be refilled back at the surface.3. Re-vegetate the entire site.
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6. Environmental Management Plan

Table F. Environmental Monitoring Programme

Sr.	Management Action	Frequency	Start	End/Duration	Cost	Responsibility
1	Checking the condition of the project site daily for water spraying	Daily	Starting from pre-construction phase	Pre-Construction phase	-	ED
2	Negotiation of waste disposal with township development	Once	Starting from pre-construction phase	Pre-Construction phase	-	AD
3	Checking the condition of the channel weekly	Weekly	Starting from pre-construction phase	Pre-Construction phase	-	AD
4	Carrying out necessary action if the channel is disturbed to maintain it to its normal flowing condition	Weekly	Starting from pre-construction phase	Pre-Construction phase	-	ED
5	Checking the condition of the project site daily for water spraying	Daily	Starting from construction phase	Construction phase	-	ED
6	Providing source of water	Once	Starting from construction phase	Construction phase	16,000,000	ED
7	Spraying necessary places with water	If necessary	Starting from construction phase	Construction phase	800/m ³	ED
8	Checking workplace daily for vehicles travelling within the project site	Daily	Starting from construction phase	Construction phase	-	ED
9	Providing speed limit sign boards	Once/3 years	Starting from construction phase	Construction phase	150,000/3 years	SO
10	Monitoring and control of vehicles for speed limit	Continuously	Starting from construction phase	Construction phase	-	SO
11	Checking workplace daily for covering dump trucks	Daily	Starting from construction phase	Construction phase	-	AD
12	Checking workplace daily for washing wheels of dump trucks	Daily	Starting from construction phase	Construction phase	-	AD
13	Carrying out overall maintenance works if necessary	If necessary	Starting from construction phase	Construction phase	2,500,000/ maintenance	ED

14	Checking workplace Daily for noise	Daily	Starting from construction phase	Construction phase	-	ED
15	Checking workplace for physical conditions of silencers if necessary	If necessary	Starting from construction phase	Construction phase	-	ED
16	Appointing person with contact phone number for noise issue	Once	Starting from construction phase	Construction phase	-	ED
17	Distributing contact person name and phone number to nearby quarters	Once	Starting from construction phase	Construction phase	-	ED
18	Piling system with less noise and vibration must be used instead of a noisy and vibrating one	Daily	Starting from construction phase	Construction phase	-	ED
19	Checking workplace daily for noise in night time	Daily	Starting from construction phase	Construction phase	-	ED
20	Monitoring and control of noise level	Annually	Starting from construction phase	Construction phase	2,000,000/year	SO
21	Providing necessary PPE for workers at high noise area	Daily	Starting from construction phase	Construction phase	-	ED
22	Construction activities should be done in restricted areas and activities kept to a minimum as far as possible	Daily	Starting from construction phase	Construction phase	-	ED
23	Checking workplace Daily to prevent over excavation	Daily	Starting from construction phase	Construction phase	-	ED
24	Checking workplace daily to mitigate soil erosion	Daily	Starting from construction phase	Construction phase	-	ED
25	Checking workplace daily during excavation	Daily	Starting from construction phase	Construction phase	-	ED
26	Excavate immediately before construction instead of leaving soils exposed for months or years	-	Starting from construction phase	Construction phase	-	ED
27	Where wind erosion is a concern plan and install windbreaks	Once	Starting from construction phase	Construction phase	-	ED
28	Checking workplace daily to divert water from disturbed areas	Daily	Starting from construction phase	Construction phase	-	ED
29	Avoid soil compaction by restricting the use of trucks and heavy equipment to limited area	Daily	Starting from construction phase	Construction phase	-	ED
30	Checking workplace daily to control flow and runoff to reduce the volume and velocity of water	Daily	Starting from construction phase	Construction phase	-	ED
31	Checking workplace daily to control grey water	Daily	Starting from construction phase	Construction phase	-	ED

32	Checking workplace daily for dust management	Daily	Starting from construction phase	Construction phase	-	ED
33	To construct the settling pond	Once	Starting from construction phase	Construction phase	10,000,000	ED
34	After constructing the settling pond, must be allowed to disposed to creek	Daily	Starting from construction phase	Construction phase	-	ED
35	Mud water from bore pile work must be prevented from direct run off or direct discharge to roadside drainage.	Daily	Starting from construction phase	Construction phase	-	ED
36	Checking the condition of the channel weekly	Weekly	Starting from construction phase	Construction phase	-	ED
37	Appointing a safety officer	Once	Starting from construction phase	Construction phase	-	HR
38	Provide safe, secure and health camps for workers adequately	Once	Starting from construction phase	Construction phase	-	ED
39	Providing the restricted area sign boards at project area	Once	Starting from construction phase	Construction phase	15,000	SO
40	Providing suites of PPE annually	Once	Starting from construction phase	Construction phase	-	SO
41	Check workplace daily for systematic usage of PPE	Daily	Starting from construction phase	Construction phase	-	SO
42	Checking workplace daily for traffic hazard	Daily	Starting from construction phase	Construction phase	-	SP/SO
43	Provide security system and fire safety system adequately	Once	Starting from construction phase	Construction phase	-	SO
44	Provide support for health sector in CSR program	Occasional	Starting from construction phase	Construction phase	-	AD
45	Preparing employment contract according to employment and skill development law chapter (3) paragraph (5)	Once	Starting from construction phase	Construction phase	-	HR
46	Signing employment contract for every employment	Once	Starting from construction phase	Construction phase	-	HR
47	To construct waste water treatment plant	Once	Starting from operation phase	Operation phase	950,000,000	ED
48	Monitoring waste water quality before discharging	Twice per year	Starting from operation phase	Operation phase	800,000/year	ED
49	Recycling treated domestic waste water will reuse	Daily	Starting from operation phase	Operation phase	-	ED

50	Installing recycling system for cooling tower water with treated waste water	Once	Starting from operation phase	Operation phase	70,000,000	ED
51	Install fixtures that can minimize water consumption	Once	Starting from operation phase	Operation phase	-	ED
52	To conduct awareness program for effective utilization of water	Once	Starting from operation phase	Operation phase	-	AD
53	To consider other source of water apart from ground water for future expansion of project	Once	Starting from operation phase	Operation phase	-	AD
54	Providing adequate capacity of garbage storage	Once/3 years	Starting from operation phase	Operation phase	104,400,000/3years	AD
55	Provide a systematic solid waste management system	Daily	Starting from operation phase	Operation phase	-	AD
56	Weekly disposal of solid waste to designated site	Weekly	Starting from operation phase	Operation phase	-	AD
57	Provide adequate parking area for the project	Daily	Starting from operation phase	Operation phase	-	SP
58	Recruit adequate employee for parking services	Daily	Starting from operation phase	Operation phase	-	SP
59	Provide systematic layout for the vehicles and walkways in project compound	Once	Starting from operation phase	Operation phase	-	ED
60	To implement remedial measure in TIA report	Once	Starting from operation phase	Operation phase	-	PM
61	Providing the security personnel and systematic security system	Once	Starting from operation phase	Operation phase	-	HR
62	Adequate lighting for night time security must be installed in readily accessible area	Annually	Starting from operation phase	Operation phase	-	ED
63	Project area must be landscaped systematically when construction works are finished	Once	Starting from operation phase	Operation phase	-	ED
64	Provide the fire management system	Once	Starting from operation phase	Operation phase	-	ED
65	Preparing employment contract according to employment and skill development law chapter (3) paragraph (5)	Once	Starting from operation phase	Operation phase	-	HR
66	Signing employment contract for every employment	Once	Starting from operation phase	Operation phase	-	HR
67	Checking workplace daily for earth works	Daily	Starting from decommissioning phase	Decommissioning phase	-	ED

68	Checking workplace daily for high noise	Daily	Starting from decommissioning phase	Decommissioning phase	-	ED
69	Carrying out noise management according to NEQG guidelines	Daily	Starting from decommissioning phase	Decommissioning phase	-	ED
70	Checking workplace daily for systematic usage of PPE	Daily	Starting from decommissioning phase	Decommissioning phase	-	SO
71	Negotiation of waste disposal site with township development committee	Once	Starting from decommissioning phase	Decommissioning phase	-	AD
72	Disposal of decommissioning solid waste to designated site	Daily	Starting from decommissioning phase	Decommissioning phase	-	AD
73	Disposing the decommissioning solid waste must be separated reuse materials and non-reuse materials	Daily	Starting from decommissioning phase	Decommissioning phase	-	AD
74	Providing necessary PPE adequately while the decommissioning	Once	Starting from decommissioning phase	Decommissioning phase	-	AD
75	Planning work site layout to minimize the need for manual transfer of heavy loads	Daily	Starting from decommissioning phase	Decommissioning phase	-	ED
76	Assigning watering truck	Once	Starting from Closure and Pose-Closure	Closure and Post-Closure	-	ED
77	Carrying out watering with watering truck	Once	Starting from Closure and Pose-Closure	Closure and Post-Closure	-	ED
78	Supervising watering and dust emission daily	Daily	Starting from Closure and Pose-Closure	Closure and Post-Closure	-	ED
79	Refilling all the excavated place	Once	Starting from Closure and Pose-Closure	Closure and Post-Closure	-	ED
80	Refilling top soil at the refilled surface	Once	Starting from Closure and Pose-Closure	Closure and Post-Closure	-	ED
81	Re-vegetating at the refilled surface	Once	Starting from Closure and Pose-Closure	Closure and Post-Closure	-	ED

Table G. Projected budget for implementation of the EMP

Sr.	Management Actions	Budget
1	Providing source of water	16,000,000
2	Providing speed limit sign boards within project areas	150,000/3 yr.
3	Carrying out overall maintenance work	2,500,000/yr.
4	Monitoring Noise level	2,000,000/yr
5	To construct the settling pond	10,000,000
6	Providing the restricted area sign boards at project area	15,000
7	To construct waste water treatment plant	950,000,000
8.	Monitoring waste water quality before discharging	800,000/yr
9	Installing landscape watering system for cooling tower water with treated waste water	70,000,000
10	Providing adequate capacity of garbage storage	104,400,000/3yr
Total One Time Cost		1,155,865,000
Total Recurring Cost		109,850,000/yr

7. Public Consultation and Disclosure

In order to acquire public opinion on the implementation of the Garden Redevelopment Project, public consultation works were done firstly by disclosing relevant project information in local community following by first public meeting for scoping report. Then consultation works continued with a systematic household data survey. Final public consultation works is carried out in second public meeting where the results of all the study works are delineated to general public in the form of a translated executive summary report.

1. INTRODUCTION

Kajima Yankin PPP Company Limited is planning a project called “**The Garden**” Yankin PPP Redevelopment Project. The proponent is also planning to construct the hotel, retail (underground), long-stay hotel, office buildings together with infrastructures.

Yankin Township is the most populated area. Yankin is the biggest social housing area in Yangon and its location is between the half way of central town and international airport.

Environmental Impact Assessment (EIA) study for the project was carried out by **Environmental Conservation Consulting Engineers Association (Yangon)**, also called as **ECCEA**, from March 2018 to September 2019. The study was performed in accordance with the Environmental Conservation Law 2012, Environmental Conservation Rules (2014) and EIA Procedures (2015).

1.1 SCOPE OF THE EIA STUDY

The EIA study focusing the project area and its vicinity includes Kyeik Ka San police avenue, No. (1) Yankin ward, No. (2) Yankin ward, Sayasan -North ward and the Golden City Housings. General study for scope of EIA team includes:

- **Preliminary study** – collecting and analyzing preliminary information such as project information, project location, maps and technical background;
- **Scoping** – carrying out field trip identification of potential environmental impacts, and determination of what has to be covered in the EIA to which extent;
- **Public participation** – acquiring public comments, suggestions and input for the project by means of public meetings and consultation works;
- **Household survey** – carrying out a systematic socioeconomic data survey;
- **Baseline environmental data survey** – collecting baseline data relating to existing physical and biological environment of the project;
- **Impact identification and assessment** – identification of anticipated impacts and assessing them biological environment of the project;



- **EMP** – delineation of MEMs for the anticipated negative and positive impacts;
- **Reproting drafting** – preparation of a draft report and a translated non-technical executive summary;
- **Disclosure of draft report** – delivering the translated non-technical summary report to stakeholders; and
- **Finalizing the report** – finalization of the report putting together all the information obtained.

1.2 PRESENTATION OF THE PROJECT PROPONENT

Kajima Yankin PPP Company Limited is a Private Company Limited incorporated under the Myanmar Companies Act. The company head quarter is located at No. (303 B), MOC, Yan Aung Street (1) & (2), Ward (2), Yankin Township, Yangon, Myanmar. The list of the project proponent is shown in following organization chart.

Figure 1. Information of Kajima Yankin PPP Company Limited

Sr.	Particular	Name/Address
1	Company Name	Kajima Yankin PPP Company Limited
2	Projects Location	Block No.34A+35C, LOT No. (2A+1C+1B ² +1A+36C ³), Corner of Yankin Road and Sayar San Road, Yankin Township, Yangon.
3	Company Address	No. (20), Marlar Myaing street, 16 Ward, Yankin Township, Yangon, Myanmar
4	Project Owner	Kajima Yankin PPP Co., Ltd.
5	Managing Director	Mr. Atsushi Yasuhara (Passport No. JPN-PR- 5877305)

1.3 ENVIRONMENTAL AND SOCIAL EXPERTS

Environmental Conservation Consulting Engineers Association (Yangon) will be the third party for ESIA study and reporting for “The Garden” Yankin PPP Redevelopment Project. Environmental Conservation Consulting Engineers



Association (Yangon) will perform all ESIA and reporting works by collaborating with subject matter expert teams.

Table 1. Sectorwise Participant of ECCEA for The Garden ESIA Project

Name	ECCEA Responsibility	Sector
U Lin	President	Management
U Soe Myint	Secretary	Team Leader & Legal and Policies Review
U Khin Maung Maung	Vice-President	Urban Planning & Cultural Heritage Impact Assesment
Dr. Maung Hlaing	E.C. Member	
U Khin Maung Htay	E.C. Member	Water & Sanitation System Assesment
U Hla Baw	Auditor	Water Resources & Utilization Assesment
Dr. Aung Lay Tin	E.C. Member	Air & Noice Assessment
Daw Htay Htay Win	Treasurer	Assesment on Soil Impact
U Kyaw Zin Latt	Member	Environmental Geology Assessment
Daw Mu Mu Aye	Joint Secretaries	Biodiversity Assessment
Dr. Lae Lae Win	Member	
Dr. Yin Min Pike	Member	Operations Analysis
U Yan Naing Aung	Public Relations Officer	Social Impact Assessment, CSR Formulation, EMP, Scoping Report, Executive Summary & Final Report Compilation
U Myint Maung Maung Than	Member	
U Linn Thura Aung	Member	
U Thura Kyaw	Workgroup Member	
U Aung Thiha Soe	Workgroup Member	
Daw Phyto Phyto San	Workgroup Member	
U Phyto Hein Kyaw	Workgroup Member	



2. POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

2.1 ENVIRONMENTAL POLICIES

Kajima Yankin PPP Company Limited is committed to carrying out “The Garden” Yankin PPP Redevelopment Project in an environmentally responsible manner. The company will fulfill its environmental commitment by:

- Ensuring compliance with applicable environmental legislations
- Adopting appropriate mitigation measures for adverse environment impacts caused by company’s activities
- Continually improving processes and ways of production which reduce levels of environment impact through energy, water and natural resources conservation
- Raising staff consciousness and their competence in environmental protection

2.2 POLICY AND LEGAL FRAMEWORK

2.2.1 Myanmar Environmental Policy

The Constitution of the Republic of the Union of Myanmar stipulates the Government to protect and conserve the natural environment and implies every citizen of Myanmar to assist the Government in environment conservation.

National Environment Policy (1994) is the basis for the integration of environmental consideration into development in Myanmar which proclaims the Government’s commitment to sustainable development. It highlights the integration of environmental considerations with development process for a better quality of life of all citizens. The state has the responsibility and that environmental protection should always be the primary objective in seeking development.

The Myanmar Agenda 21 was developed in (1997) for all natural resource management and environmental conservation work in pursuit of activities relating to biodiversity conservation.

National Sustainable Development Strategy (NSDS) prepared in 2009 includes three goals: (1) sustainable social development. One of the Government’s main priorities is to mainstream sustainable environmental considerations into the national development planning and to develop an effective safeguards system to prevent the social and environmental impacts associated with rapid economic growth.



2.2.2 Laws and Rules

Stipulations from the following laws, rules regulation and international guidelines are reviewed as part of the EIA study.

- (a) Environmental Conservation Law
- (b) Environmental Conservation Rules
- (c) Environmental Impact Assessment Procedure
- (d) National Environmental Quality (Emissions) Guidelines
- (e) General EHS Guidelines (IFC)
- (f) Yangon City Development Committee Law
- (g) The Land Acquisition Act (1894)
- (h) Ward or Village Tract Administration Law
- (i) Myanmar Investment Law
- (j) The Occupational Safety and Health Law
- (k) The Electricity Law
- (l) The Shops and Establishment Act (1951)
- (m) Minimum Wages Law
- (n) The Labour Dispute Settlement Law (2012)
- (o) The Worker's Compensation Act (1923)
- (p) The Labour Organization Law (2011)

2.2.2.1 Environmental Conservation Law

Myanmar enacted the Environmental Conservation Law on 30th March, 2012 as PyidaungsuHluttaw Law No. (9/2012). There are eight objectives of the law which stress on (i) implementation of Myanmar National Environmental Policy, (ii) integration of environmental conservation in sustainable development, (iii) emerging healthy and clean environment and conserving natural and cultural resources, (iv) reclaiming ecosystems, (v) sustainable and beneficial use of natural resources, (vi) promoting public awareness and cooperation, (vii) promoting international cooperation, and (viii) cooperation with government departments, INGOs, NGOs and individuals for the matters of environmental conservation.

There are (42) paragraphs in (14) sections of the law. Paragraph (14) of the law stipulates that *“a person causing a point source of pollution shall treat, emit, discharge and deposit the substances which cause pollution in the environment in accord with stipulated environmental quality standards”*.



Moreover, paragraph (15) of the law says that “the owner or occupier of any business, material or place which causes a point source of pollution shall install or use an on-site facility or controlling equipment in order to monitor, control, manage, reduce or eliminate environmental pollution. If it is impracticable, it shall be arranged to dispose the waste in accord with environmentally sound methods”.

According to paragraph (39(b)) of the law, if any terms and conditions of environmental conservation contained in the prior permission for a business is not complied with, the power to cancel the issued license, permit or register or suspend it for a limited period is granted for relevant government department, or government organization.

2.2.2.2 Environmental Conservation Rules

Environmental Conservation Rules were officially announced on 5th June 2014. Some of the highlights of the Environmental Conservation Rules are:

- (i) proposal for incentive mechanisms, terms and conditions for green initiatives for sustainable development to mainstream into the development sectors;
- (ii) establishment of the Integrated Environmental Monitoring System;
- (iii) conduct of Environmental Impact Assessment;
- (iv) development of Environmental Quality Standards
- (v) carrying out sustainable management and utilization of natural resources;
- (vi) waste management; and
- (vii) setting up of the Environmental Management Fund.

2.2.2.3 EIA Regulations

Former MOECAF developed the Environmental Impact Assessment Procedures which were approved in December 2015. MOECAF is already applying the main principles of EIA Procedures before their approval. Under the Foreign Investments Rules, the environmental impact assessment and social impact assessment reports are needed to be attached together with the investment proposal. Capital intensive investment projects and designated businesses need to be assessed by the MOECAF in terms of environmental impacts and compliance. Under the EIA procedures, all projects undertaken in Myanmar that can cause significant adverse



impacts are required to undertake an IEE or EIA and to obtain an Environmental Compliance Certificate (ECC).

EIA team for this current “The Garden” Yankin PPP Redevelopment Project carried out thorough reviews on a number of laws, rules, procedures and notifications to justify the compliance of the project and its activities with relevant Myanmar laws.

2.2.2.4 Yangon City Development Committee Law

At the 1st, Waning of First Waso, 1380 M.E. (28, June, 2018), and the Yangon Region Hluttaw hereby enacts Yangon City Development Law. The objectives of this law are as follows -

- (a) the capital with the leadership of the City Development Committee stages of sustainable development and improve the living standards of urban communities.
- (b) Municipal broad tax within the borders of the capital to ensure full and existing laws, rules, rules to be used properly in accordance with on municipal development,
- (c) As a large international capital, the urban community in order to upgrade to become beautiful, clean, quiet, lovely city.
- (d) to become the revelation of the people-centered management system about municipal activities and accountability, accountability, open and transparent,
- (e) to perform organized work groups and departments in charge of municipal operations more dynamic effective

2.2.2.5 The Land Acquisition Act (1894)

The Land Acquisition Act (1894) serves as the fundamental law for land acquisition in Myanmar that sets out the procedure of land acquisition and compensation. The act further outlines relevant procedures, including notice periods, procedures for objections to acquisition (Article 5), method of valuation of land, process for taking possession of land (Article 16 and 17), court processes and appeals (Article 18 and 24), procedures for the temporary occupation of land (Article 35), and the acquisition of land for companies (Article 38). The act requires that compensation 'at market value' is provided to those from whom the land is acquired (Article 23).



2.2.2.6 Ward or Village Tract Administration Law

The law is enacted in order to appoint and assign duty of Ward and Village Tract Administration in accord with law to any person who is respected by the society and has to implement and carry out the works relating to the Ward or Village Tract Administration as it is provided in section 289 of the constitution of the Republic of the Union of Myanmar. It stipulates the formation of wards or village tracts, basic principles of function of the ward or village tract administrator and their functions and duties, duties of the person residing in the ward or village tract together with their rights.

There are four wards within the project areas. The project has to establish a dynamic relationship with all the wards. In due course of the project implementation, the area will encounter general development including expansion of businesses and wards as well as its dwelling population.

2.2.2.7 Myanmar Investment Law (2016)

At the 2nd, Waning of Thadingyut, 1378 M.E. (18, October, 2016), and the Pyidaungsu Hluttaw hereby enacts Myanmar Investment Law. This Law shall apply to all existing or new investments within the Union on the date of entry into force of this Law. The objectives of this Law are as follows:

- i. to develop responsible investment businesses which do not cause harm to the natural environment and the social environment for the interest of the Union and its citizens;
- ii. to protect the investors and their investment businesses in accordance with the law;
- iii. to create job opportunities for the people;
- iv. to develop human resources;
- v. to develop high functioning production, service, and trading sectors;
- vi. to develop technology, agriculture, livestock and industrial sectors;
- vii. to develop various professional fields including infrastructure around the Union;
- viii. to enable the citizens to be able to work alongside with the international community;
- ix. to develop businesses and investment businesses that meet international standards

In Chapter XVI, **Responsibilities of Investors** are as follows:



The Investor:

- (a) shall respect and comply with the customs, traditions and traditional culture of the ethnic groups in the Union;
- (b) shall establish and register a company or sole proprietorship or legal entities or branches of such entities under the laws in order to invest;
- (c) shall abide by the terms and conditions, stipulations of special licenses, permits, and business operation certificates issued to them, including the rules, notifications, orders, and directives and procedures issued by this Law and the applicable laws, terms and conditions of contract and tax obligations;
- (d) shall carry out in accordance with the stipulations of the relevant department if it is, by the nature of business or by other need, required to obtain any license or permit from the relevant Union Ministries, government departments and governmental organizations, or to carry out registration;
- (e) shall immediately inform the Commission if it is found that natural mineral resources or antique objects and treasure trove not related to the investment permitted above and under the land on which the investor is entitled to lease or use and not included in the original contracts. If the Commission allows, the investor shall continue to carry out the investment in such land, and if not allowed, the investor shall transfer and carry out, by obtaining the permission, at the substituted place which is selected and submitted by him;
- (f) shall not make any significant alteration of topography or elevation of the land on which he is entitled to lease or to use, without the approval of the Commission;
- (g) shall abide by the applicable laws, rules, procedures and best standards practiced internationally for this investment so as not to cause damage, pollution, and loss to the natural and social environment and not to cause damage to cultural heritage;
- (h) shall list and keep proper records in books of accounting and annual financial statements, and necessary financial matters relating to the investments performed by a Permit or an Endorsement in accordance with internationally and locally recognized accounting standards;
- (i) shall close and discontinue the investment only after payment of compensation to employees in accordance with applicable laws for any breach of employment contracts, closure of investment, sale and transfer of investment, discontinuation of investment, or reduction of workforce;



- (j) shall pay wages and salaries to employees in accordance with applicable laws, rules, procedures, directives and so forth during the period of suspension of investment for a credible reason;
- (k) shall pay compensation and indemnification in accordance with applicable laws to the relevant employee or his successor for injury, disability, disease and death due to the work;
- (l) shall supervise foreign experts, supervisors and their families, who employ in its investment, to abide by the applicable laws, rules, orders and directives, and the culture and traditions of Myanmar;
- (m) shall respect and comply with the labor laws;
- (n) shall have the right to sue and to be sued in accordance with the laws;
- (o) shall pay effective compensation for loss incurred to the victim, if there is damage to the natural environment and socioeconomic losses caused by logging or extraction of natural resources which are not related to the scope of the permissible investment, except from carrying out the activities required to conduct investment in a Permit or an Endorsement.
- (p) shall allow the Commission to inspect in any places, when the Commission informs the prior notice to inspect the investment;
- (q) shall take in advance a Permit or an Endorsement of the Commission for the investments which need to obtain prior approval under the Environmental Conservation Law and the procedures of environmental impact assessment, before undertaking the assessment. Such investments shall be submitted the situation of environmental and social impact assessment to the Commission during the permitted investment period.

2.2.2.8 The Occupational Safety and Health Law

On 15th March 2019, the Occupational Safety and Health Law was passed and entered into force. The intent of the law is to implement safety and health regulations for industries and business in Myanmar. A primary goal is to reduce and mitigate the occurrences of diseases and accidents arising in various industries and business activities in Myanmar, and in so doing, to improve the productivity and health of workers. This Law lists out 18 types of industries/businesses to which it will apply. The scope is broad and includes factories, workshops, manufacturing, construction and communications, and these can be owned by government departments or organizations, cooperatives, national citizens or foreigners in private or joint venture.



It is mandatory for a business which falls under the above-mentioned list of industries/businesses to apply to or notify the Factories and General Labour Laws Inspection Department if such business wishes to:

- (a) operate a building, extend or demolish a factory or building;
- (b) place, install, extend or change the use of applicable machines; and/or
- (c) close or terminate or relocate or change the nature of its business.

It is required under the Law that the manufacturer, importer, seller and/or person who operates, installs or dismantles the hazardous machines that are used in the workplace or site obtains a certificate issued by the authorized examiner or relevant authority under the Law. The manufacturer, importer and/or seller are required to provide the information relating to use of the machinery in a safe manner and to conduct testing of the machinery for safety and health purposes.

Under this Law, some key responsibilities of an employer are:

Oversight

- (a) to appoint a person in-charge for occupational safety and health to closely supervise safety and health of workers;
- (b) if the number of workers in the business exceeds the number determined by the Ministry of Labour, Immigration and Population (the number has not yet been published), to form an occupational safety and health committee;

Safety Measures

- (c) to assess the risks of workplace, process and machines and materials used and the likelihood of the occurrence of hazards at the workplace and to the environment;
- (d) to display instructions, danger signs, notices, posters and signage for directions in accordance with requirements under the Law;
- (e) if the workplace is classified as a hazardous workplace, to put in place additional safety measures;

Medical

- (f) to arrange a medical check-up for the workers by a medical professional duly certified under the Law when they suffer from any occupational disease;
- (g) not to demote or dismiss a worker during or before any period when a medical certificate is issued for occupational disease;
- (h) not to demote or dismiss a worker because the worker has made a complaint to the authorities about workplace conditions which are hazardous or detrimental to health;

Reporting



- (i) to inform the Factories and General Labour Laws Inspection Department in the case of an occupational accident and/or hazardous event; and
- (j) to inform the Factories and General Labour Laws Inspection Department if a worker is contaminated or likely to be contaminated with the occupational disease due to the work.

An employer who is found to have contravened this Law may be liable to a fine and/or imprisonment. Depending on the contravention, the fines range from MMK 1 million to MMK 10 million. There are also certain violations which may result in imprisonment, such as failure to appoint a person-in-charge of safety and health matters and a failure to report an occupational accident and/or hazardous event.

2.2.2.9 The Electricity Law (2014)

In 2014, the Electricity Law of 1984 was replaced by the new Electricity Law, a comprehensive piece of legislation covering licensing, a new regulatory commission, standards, inspection, tariff, and restrictions. The Electricity Law divides projects into “small” (up to 10 MW), “medium” (between 10 MW to 30 MW) and large (upwards of 30 MW); the states and regions can issue permits for small and medium power plants. In case these plants are not connected to the national grid, the Union Government Ministry is not the primary authority involved. The authorities have a legal right to use land for the purpose of power plants under the Electricity Law, and have the right to expand and maintain their facilities. The law also provides that the authorities can build transmission lines in accordance with existing laws

2.2.2.10 The Shops and Establishment Act (1951)

It stipulates the payment of wage, work hours, holidays at shops and commercial establishment. The Leave and Holidays Act (1951, partially revised in 2014) This act has been used as the basic framework for leaves and holidays for workers with minor amendment in 2006 and 2014. This defines the public holidays that every employees shall be granted with full payment. It also defines the rules of leaves for workers including medical leave, earned leave and maternity leave.

2.2.2.11 Minimum Wages Law

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 the competitiveness, the PyidaungsuHlutaw hereby enacts this law as the PyidaungsuHluttaw Law No. 7/2013 at 22nd March, 2013.

2.2.2.12 The Labour Dispute Settlement Law (2012)

This law was enacted for safeguarding the right of workers or having good relationship between employer and workers and making peaceful workplace or obtaining the rights fairly, rightfully and quickly by settling the dispute of employer and worker justly. It stipulates that employer in which more than 30 workers are employed shall form the workplace coordinating committee consisting of the representatives of workers and the representatives of employer.

2.2.2.13 The Worker's Compensation Act (1923)

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

2.2.2.14 The Labour Organization Law (2011)

The Labour Organization Law replaced the Trade Union Act enacted in 1927 for protecting the rights of the workers, having good relations among the workers or between the employer and the worker, and for forming and carrying out the labour organizations systematically and independently. Under the law, the labour organization has the right to carry out freely in drawing up their constitution and rules. It has the right to negotiate and settle with the employer if the workers are unable to obtain the right of the workers contained in the labor laws. On the other hand, the employer shall recognize the labour organizations and assist as much as possible if the labour organizations request for help for the interest of his workers.

2.3 NATIONAL STANDARDS AND GUIDELINES

National Environmental Quality (Emission) Guidelines (NEQG) for waste water and noise levels are referenced in this EIA report. Followings are the environmental standards and guidelines adopted by EIA team.



Table 2. Environmental Standards for Wastewater Discharge (NEQG)

Sr.	Parameter	Unit	Guideline Value
1	5-day Biochemical oxygen demand	mg/l	50
2	Chemical oxygen demand	mg/l	250
3	Oil and grease	mg/l	10
4	pH	S.U. ^a	6-9
5	Total coliform bacteria	100ml	400
6	Total nitrogen	mg/l	10
7	Total phosphorus	mg/l	2
8	Total suspended solids	mg/l	50

^a Standard Unit

Table 3. Noise Level Standard (NEQG)

Receptor	One Hour LAeq (dBA)	
	Daytime (7:00 - 22:00) (10:00 – 22:00 for public holidays)	Nighttime (22:00-7:00) (22:00-10:00 for public holidays)
Residential, institutional, educational	55	45
Industrial, commercial	70	70

Table 4. Air Quality Standard (NEQG)

Sr	Parameter	Averaging Period	Guideline Value (µg/m ³)
1	Nitrogen dioxide	1-year	40
		1-hour	200
2	Ozone	8-hour daily Maximum	100
3	PM ₁₀	1-year	20
		24-hour	50
4	PM _{2.5}	1-year	10
		14-hour	25
5	Sulfur dioxide	24-hour	20
		10-minute	500



2.4 INTERNATIONAL STANDARDS AND GUIDELINES

The general Environmental, Health, and Safety (EHS) Guidelines of IFC is technical reference document with general examples of Good International Industry Practice (GIIP). The EHS Guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs. The applicability of the EHS Guidelines is tailored for The Garden Redevelopment Project by taking accounts the results of the environmental assessment.

Internationally accepted environmental standards and guidelines for ambient air, waste water, noise levels and environmental monitoring parameters are referenced in this EIA report. Following is the environmental standards and guidelines adopted by EIA team.

Table 5. Environmental Standards and Guidelines Referenced in this Report

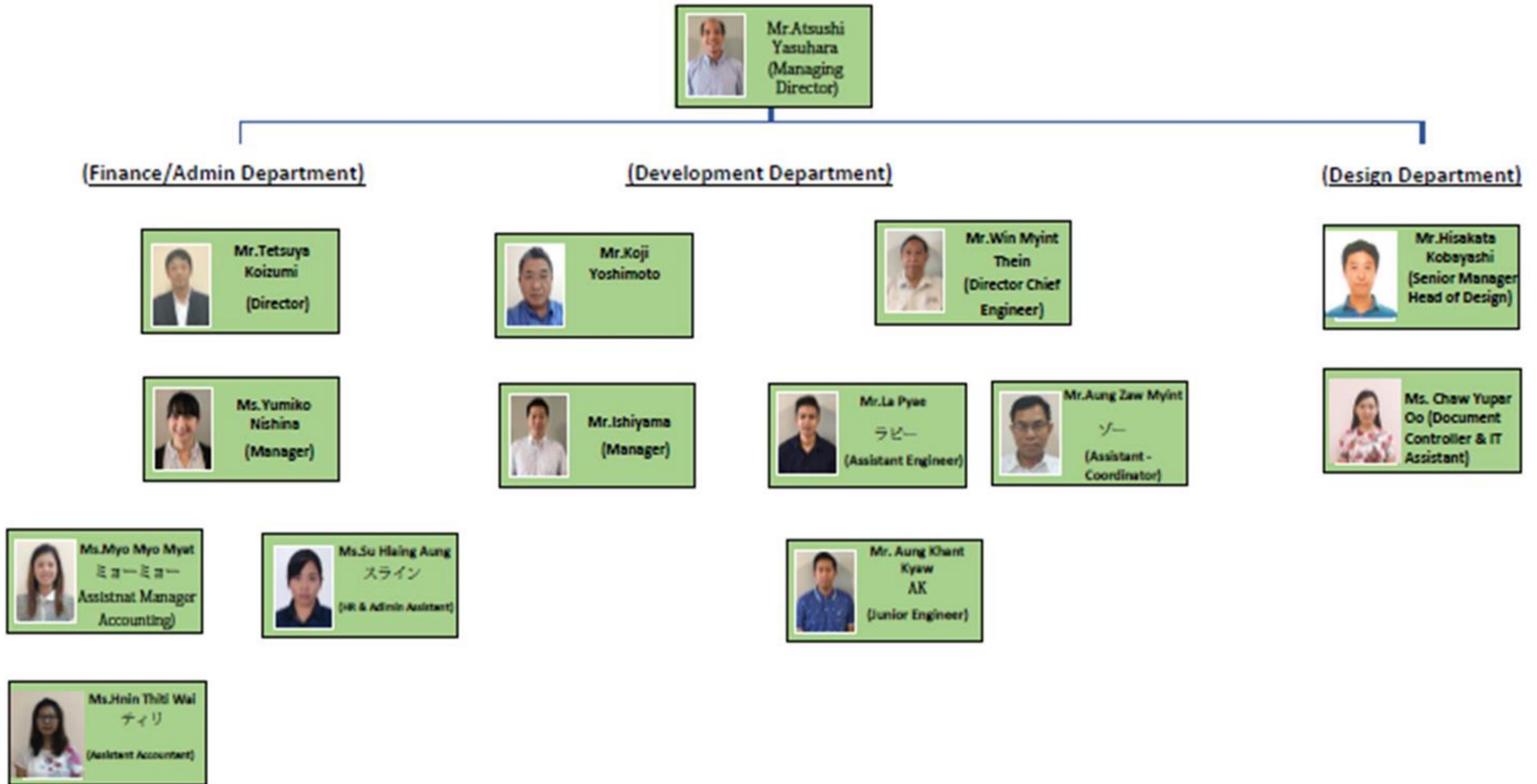
Sr.	Standards	References
1	Environmental monitoring programme	IFC
2	Occupational safety and health	IFC

2.5 Project Proponent

Kajima Yankin PPP Company Limited is a Private Company Limited incorporated under the Myanmar Companies Act. The company head quarter is located at No. (20), Marlar Myaing street and (16) Ward, Yankin Township, Yangon, Myanmar. The list of the project proponent is shown in following organization chart.



Figure 2. Organization Chart of Kajima Yankin PPP Company Limited



2.7 PROJECT'S ENVIRONMENTAL AND SOCIAL STANDARDS

Internationally accepted environmental standards and guidelines for ambient air, waste water, noise levels and environmental monitoring parameters are referenced in this ESIA report. Following is the environmental standards and guidelines adopted by ESIA team.

Table 6. Environmental Standards and Guidelines Referenced in this Report

Sr.	Standards	Reference
1	Ambient air quality	WHO
2	Waste water quality	IFC
3	Drinking water quality	WHO
4	Noise Levels	IFC
5	Environmental monitoring programme	IFC

2.8 Third Party Organization

Environmental Conservation Consulting Engineers Association (Yangon), also called as **ECCEA**, will be the third party for ESIA study and reporting for “The Garden” Yankin PPP Redevelopment Project. Environmental Conservation Consulting Engineers Association (Yangon) will perform all ESIA and reporting works by collaborating with subject matter expert teams.

Table 7. Sectorwise Participants of ECCEA

Name	ECCEA Responsibility	Sector
U Lin	President	Management
U Soe Myint	Secretary	Team Leader & Legal and Policies Review



U Khin Maung Maung	Vice-President	Urban Planning & Cultural Heritage Impact Assesment
Dr. Maung Hlaing	E.C. Member	
U Khin Maung Htay	E.C. Member	Water & Sanitation System Assesment
U Hla Baw	Auditor	Water Resources & Utilization Assesment
Dr. Aung Lay Tin	E.C. Member	Air & Noice Assessment
Daw Htay Htay Win	Treasurer	Assesment on Soil Impact
U Kyaw Zin Latt	Member	Environmental Geology Assessment
Daw Mu Mu Aye	Joint Secretaries	Biodiversity Assessment
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Dr. Yin Min Pike	Member	Operations Analysis
U Yan Naing Aung	Public Relations Officer	Social Impact Assessment, CSR Formaulation, EMP, Scoping Report, Executive Summary & Final Report Compilation
U Myint Maung Maung Than	Member	
U Linn Thura Aung	Member	
U Thura Kyaw	Workgroup Member	
U Aung Thiha Soe	Workgroup Member	
Daw Phyto Phyto San	Workgroup Member	
U Phyto Hein Kyaw	Workgroup Member	

2.9 Objectives of ESIA Study

The aim of Environmental and Social Impact Assessment (ESIA) for “The Garden” Yankin PPP Redevelopment Project is to enable the approving authority and



the developer to properly consider the potential environmental and social consequences of the project and to delineate an environmental management plan for the project.

Primary objective of the report is to provide sufficient, clear and objective information for the approving authority to make a decision on whether to approve the project and if so, under what conditions.

ESIA study for “The Garden” Yankin PPP Redevelopment Project is performed by **ECCEA** with the following specific objectives:

- (a) to investigate the legality of the project;
- (b) to study the background environmental and socioeconomic profile of the area;
- (c) to release project information for the general public;
- (d) to study the environmental, social and socioeconomic issues likely to occur; and
- (e) to devise mitigation and enhancement measures for key environmental and social impacts.

2.10 Built Operate and Transfer Contract

Built Operate and Transfer contract between The Department of Urban and Housing Development of the Ministry of Construction and Kajima Yankin PPP Co., Limited. To construct a high-quality mixed-use building with office, hotel, Long- stay hotel, retail and other commercial space and to operate and finally transfer the same. The Built Operate and Transfer Contract is describing in Appendix (J).



3. DESCRIPTION OF THE SURROUNDING ENVIRONMENT

3.1 SETTING THE STUDY LIMITS

The ESIA study focusing the project area and its vicinity includes Sayar San-North Ward, No. (1) and No. (2) Yankin Wards from Yankin and Bahan Townships.

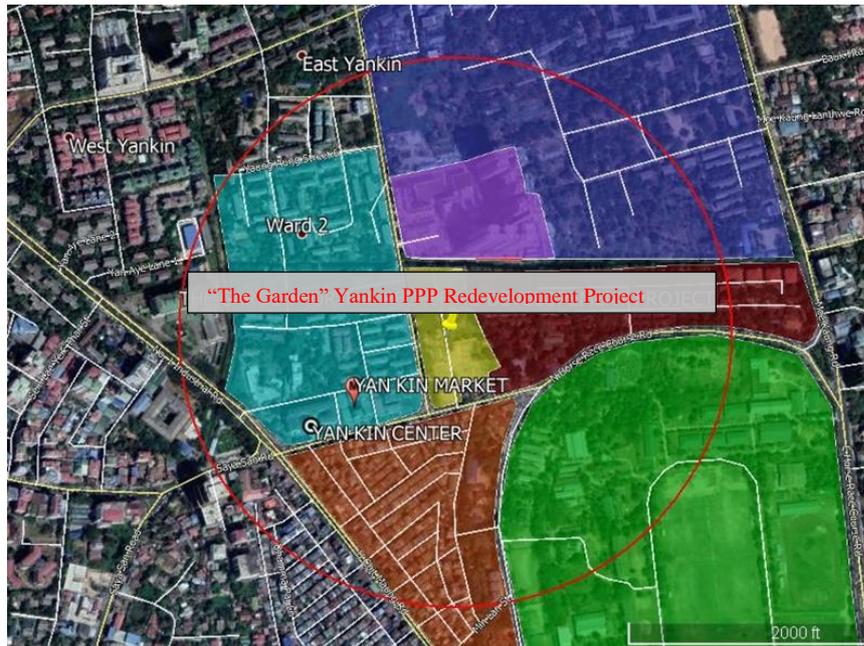


Figure 3: EIA Study for The Garden Redevelopment Project



Figure 4. High Rise Building Surrounding of Proposed Site



3.2 METHODOLOGY AND OBJECTIVES

The EIA study for the project includes analysis on baseline data from local, government organization, MIC proposal of the Kajima Yankin PPP Co., Ltd, and the master plan and other documents obtained from the project proponent.

Primary data collections include direct observation, interview, individual/target group consultation, public meeting, sampling and laboratory analysis on physicochemical parameters of water from the project area, listing biological resources such as flora and fauna, secondary data collection on demography, socioeconomics, occupation and education.

EIA study for “The Garden” Yankin PPP Redevelopment Project is performed by ECCEA with the following specific objectives as to investigate the legality of the project; to study the background environmental and socioeconomic profile of the area; to release project information for the general public; to study the environmental, social and socioeconomic issues likely to occur; and to devise mitigation and enhancement measures for key environmental and social impacts.

3.3 STAKEHOLDER ANALYSIS

Stakeholders are categorized in four groups such as local people, government organizations, project proponent and other interested groups such as NGOs according to UNEP EIA MANUAL Guideline. Analysis was based on primary impact factors such as involvement in land acquisition, vicinity to the project, common use of utilities such as water and infrastructures. Paragraph 49 (g) of the EIA procedures stipulates that the scoping shall identify potentially affected communities and other stakeholders with an interest in the Project. The following table shows level of interest by stakeholders on the project.

Table 8. Stakeholders of “The Garden” Yankin PPP Redevelopment Project

Sr.	Stakeholder Group	Stakeholder	Interest Level		Interest
			Level	Reason	
1	Local People	Sayar San- North Ward	High	Close Vicinity	- Pollution - Noise



		Golden City Resident	High	Close Vicinity	- Traffic - Job opportunity
		Accommodations for Police	High	Close Vicinity	- CSR
		No. (1) Yankin Ward	High	Close Vicinity	
		No. (2) Yankin Ward	High	Close Vicinity	
2	Government Organization	General Administration Office Department	Medium	- For administrative relation	- Administration - Coordination - CSR
		YCDC	Medium	-City Development	
		Department of planning	High	- Storm water issue	
		Township Educational Office	Low	- Only relevant for CSR	
		Land Records Department	Low	- No land related issue	
		Township Health Department	Low	- Only relevant for CSR	
		Township Environmental Conservation Department	Not yet estd:	-	
		Township Fire-brigade	Low	-	
3	Proponent	Project management Project construction contractor	High	- Project Owner	- Operation and Management - Construction - EMP



3.4 Project Affected Area

Project affected area is demarcated based on the results of stakeholder analysis. Affected human settlements, noise environment, biological environment and land environment are shown in the following table.

Table 9. Project Affected Area

Sr.	Category	Location	Factor
1	Human Settlements	Accommodations for Police	- Close location
		Sayar San- North Ward	- Access road
		No. (2)Yankin Ward	
		No. (1)Yankin Ward	
2	Land Environment	Kyaik Ka San Stadium	- Waste
		Yankin Park	- Access road
3	Biological Environment	Project area	-
4	Air and Noise Environment	Within Project area and nearby community	- Noise levels
5	Water Environment	Within Project area	- Water usages
		Khun-Hna-Pin-Lein Creek	- Water quality - Waste water



3.5 PHYSICAL COMPONENTS

3.5.1 Topography

The study area is located in built-up area of Yankin Township in Yangon. Therefore, the topography is quite flat, with no major differences in altitude.

3.5.2 Water Resources

The required amount of water for daily operations will be obtained from five Nos of the 6" Ø tube well. According to the well developing result, this tube well can yield the maximum quantity of 11.37 cubic meters per hour. However, it can be recommended that pumping water volume of 8.18 cubic meters per hour is optimum productivity to apply daily operation for sustainable well life. This quantity can be considered to sufficiently cover the daily water demand of the future operations. In analyzing aquifer characteristics through the step drawdown and continuous pumping test, T value and K value of the aquifer of this tube well could be obtained 22.08 square meters per day and 2.13×10^{-3} centimeter per second, respectively. It can be said that these values are indicating that the aquifer is sufficiently capable of yielding water for the household used.



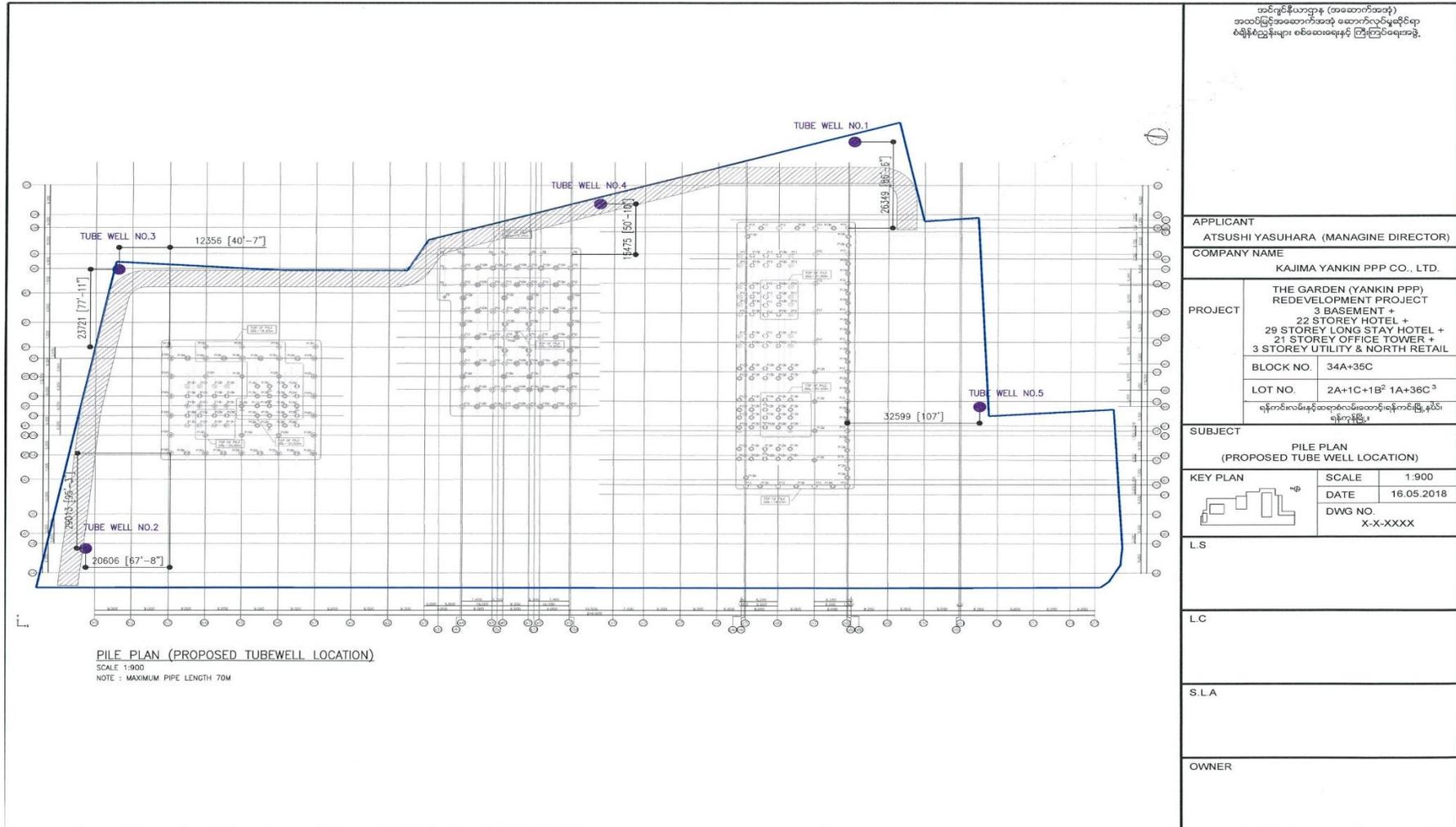


Figure 5. Location of Tube Well in project area



3.5.3 Geology and soils

The study area is included in the Greater Yangon Area, is lying in the Delta of Ayeyarwaddy and at the southern spur of the Bago Yoma. Yangon area is located in N-S trending sedimentary basin containing a thick Tertiary and Quaternary deposits.

3.5.3.1 Limitations

Information provided in the specialist report has been based on information provided by the developer, published scientific literature and maps. The study area was visited to investigate the physical aspects related to topography, geomorphology and geology of the study area. There is no detailed geotechnical investigation (trial pits, soil testing) or verification of the existing geological mapping was conducted. This report is discussed the potential environmental impacts on geological environment in study area. The information provided in this report is deemed adequate for Environmental Impact Assessment Report under Geology Section.

3.5.3.2 Location

The study area is situated at corner of Yankin Road and Sayar San Road, Yankin Township, Yangon Region, Myanmar. The proposed project and surrounding area are also defined as built-up area of Yangon.

3.5.3.3 Topography and climate

The study area is currently occupied by built-up area. Therefore, the topography is no major differences in altitude. The climate of project area is located in tropical wet and dry climate.

3.5.3.4 Geology and soil type

The study area is included in the Greater Yangon Area, is lying in the Delta of Ayeyarwaddy and at the southern spur of the Bago Yoma. Yangon area is located in N-S trending sedimentary basin containing a thick Tertiary and Quaternary deposits. The regional geology consists of Miocene consolidated sediments overlain by the Quaternary sands, silts and clay [17]. According to the geological map of Yangon area, the study area lies in Danyingon clays, Pliocene age. Danyingon clays is mainly composed of clay with interbedded sand rock, unknown thickness [18]. According to



the soil laboratory test result of a project, the subsurface major soil zones can be divided into two main types as bluish grey colored Clayey SILT with underlying yellowish-brown colored SANDY soil layer.

There are no major geological faults in proposed area based on the map of 1:1,000,000 scales on tectonic map of Myanmar and its surrounding region [19]. However, Yangon Region is tectonically bounded by the Indian-Burma plates subduction in the west, Sagaing fault in the east, West Bago Yoma fault in the north, Kyaykkyan fault in the north-east, and the Andaman rift zone in the south. Yangon area can be affected mainly from the strike-slip movement of west segments of Sagaing Fault, a large linear seismic source [20]. The eastern part of Yangon is 20 miles to 25 miles far away from Sagaing Fault. Besides, two fractures and one inactive fault mapped on the 1: 1,000,000 scales are occurred around the study area. The anticipated seismic intensity of the proposed area is located in moderate zone or strong zone of Seismic Zone Map of Myanmar. The equivalent modified Mercalli Scale Classes are VII or VIII. The peak ground accelerations (PAG) are 0.1-0.15 g (VII) or 0.2 to 0.3 g (VIII) [21].

3.5.3.5 Geological Assessment

The geological study has discussed geological features such as local geology, geological structure, soil types, and geosites. Besides, the potential impacts on geologic environment of proposed area has identified that degradation of the natural soil is the main geological impact associated with the proposed activity. The possible mitigation of impacts has discussed for Environmental Management and Planning. According to an overview of the discussed geological characteristics of the site, the main potential impacts that have been identified are considered to be low impacts to geologic environment if the possible mitigation of impacts will be carried out successfully.

3.5.3.6 Geosites

There are no known geo-sites within the study area based on the regional geology and local geology.



3.5.3.7 *Rock degradation*

The bed rock is not exposed in study area because of the thickness of alluvium deposit. There would not be potential impact on rock degradation during construction activity.

3.5.3.8 *Soil degradation*

Soil degradation is the removal, alteration or damage to soil and soil-forming processes which can be due to natural processes, such as erosion, or human influence during construction activity. The preservation of the natural soil is important to maintain environmental status.

Potential negative impacts relating to soil degradation are anticipated for the proposed activity. Such impacts include excavation, displacement or importation of soil, stockpiling, mixing, wetting, compaction and pollution of soil, soil erosion and sedimentation.

Soil erosion is the process of the lowering of the natural ground level by wind or water and may occur as a result of, inter alia, chemical process and/or physical transport on the land surface [22]. Soil erodibility potential is the erosion when soils are exposed to water (and/or wind) during or as a result of land-disturbing activities. Erosion potential is determined by the erodibility of the soil (type and structure), vegetative cover, topography, climate (rainfall and wind), and the nature of land-clearing [23].

Generally, soils with faster infiltration rates, higher levels of organic matter and improved soil structure have a greater resistance to erosion. Sand, sandy loam and loam textured soils tend to be less erodible than silt, very fine sand, and certain clay textured soils [24]. Besides, erodibility potential is generally increased where low-plasticity, fine-grained, unconsolidated soils occur, such as Quaternary and Recent sediments. The soil type covered the study area is two main types as bluish grey colored Clayey SILT with underlying yellowish-brown colored SANDY soil layer.

Water erosion potential is generally higher in areas of high relief and at the base of steep slopes where hydraulic energy is higher. The topography of study area is quite flat.



3.5.3.9 Assessment of potential impacts

The proposed activity will conduct earthworks for foundations for structures and access road. The most important issues are the direct impacts of soil degradation which includes soil removal, soil alteration and soil pollution. Soil erosion can be occurred because of the nature of top soil texture. The climate of the proposed area is still need to be considered for surface soil erosion of stockpile from excavation although topography of proposed area is quite flat.

However, the proposed project is a fairly small-scale so that the proposed activity is considered to be minor contributor in the cumulative impact on natural soil in the area. The potential impacts that have been identified are likely to be low over most of study area.

The main direct potential impacts are shown in following Table.

Table 10. Main Potential Impacts Related to Geological Environment

Potential Impact	Nature	Extent
Soil Removal (During Construction Phase)	Removal of soil due to excavations for foundations and assess internal roads	Local only
Soil alteration (During Construction Phase)	Alteration of soil texture, density, structure and chemistry due to soil mixing, wetting, stockpiling and compaction	Local Only
Soil Pollution (During Construction Phase)	Pollution of in situ soil due to spillage of hazardous substances such as fuel, oil and cement	Local Only
Soil Erosion and Sedimentation (During Construction Phase)	1.Loss of soil by water or wind erosion 2.Deposition as a sediment in the stream of soil washed from land development sites	Local to Regional

As mentioned above, construction activity will have potential impacts on the natural soil in proposed area. However, the potential impacts can be mitigated successfully. The following mitigation measures should be considered for the framework for the Environmental Management Plan (EMP). The Environmental Management Plan is discussed in the following table.



Table 11. The Environmental Management Plan

No.	Potential Impact	Mitigation of Impact
1.	Soil Removal	<ul style="list-style-type: none"> • Construction activity should be done in restricted areas and activities should be kept to a minimum as far as possible (limit unnecessary earthworks etc.) • Excavation process should be monitored to prevent over-excavation
2.	Soil alteration	<ul style="list-style-type: none"> • Ensure those construction vehicles are restricted to existing roads to avoid unnecessary soil compaction within and around the project site • The wetting of soil and the discharge of construction grey water across natural soil should be controlled • The handling of natural construction materials, such as filling soil and gravels will require dust management, particularly near sensitive areas
3.	Soil Pollution	<ul style="list-style-type: none"> • Correct use of hazardous substances should be controlled in order to prevent soil pollution • Storage of waste disposal must be considered seriously not to pollute the groundwater.
4.	Soil Erosion	<ul style="list-style-type: none"> • Keep land clearance to a minimum • Avoid wherever possible clearing areas of highly erodible soils and steep slopes which are prone to water and wind erosion. However, there are no steep slopes within proposed area • Schedule excavation during low-rainfall periods, when possible (November to April is low-rainfall periods) • Excavate immediately before construction instead of leaving soils exposed for months or years • Re-vegetate and mulch progressively as each section of works is completed. The interval between clearing and re-vegetation should be kept to an absolute minimum. • Designed the slope of a cut to minimize the angle of incline • Divert water from disturbed areas • Keep vehicles to well-defined haul roads • Control concentrated flow and runoff to reduce the volume and velocity of water from work sites to prevent formation of rills and gullies • Rehabilitate cleared areas promptly • Rehabilitation will involve the replacement of suitable and adequate topsoil and the encouragement of indigenous local vegetation to stabilize the soil



3.5.4 Environmental Quality

3.5.4.1 Water Quality

The baseline water quality status in the region established by analyzing samples at three locations consisting of tube well water sample from the project area, and two surface water samples from upper stream and downstream of the KhunhnitPinlain creek. The criteria for the selection of sites was determined on the project location, topographical upstream and downstream of the project, potential areas of polluted water and the location of the drainage and its discharge system. All water samples were analyzed for their physiochemical properties in DOWA laboratory and the results are as shown in following table (13).

Table 12. Results of Water Quality Analysis from DOWA Laboratory

Test	Unit	Water Samples			
		NEQG	TW	US	DS
PH	S.U. ^a	6-9	6.37	7.06	7.10
Iron	mg/l	3.5			
Suspended solids	mg/l		6.00	24.00	42.00
Arsenic (As)	mg/l	0.1			
Biochemical Oxygen Demand (BOD)	ppm	50	0.57	19.40	18.20
Chemical Oxygen Demand (COD)	ppm	250	5.2	70	54.0
Total Coliform	MPN/100ml		<1.8	>160000	>160000
Total Nitrogen	mg/l		0.1	7.2	7.2
Total Phosphorous	mg/l		<0.050	0.794	0.857
Oil and Grease	mg/l		<3.1	3.30	<3.1

Every physiochemical property analyzed are compared with NEQG guidelines value as shown in the above table. It could clearly be seen that property of analyzed samples are well within the limit of NEQG guideline values.





Figure 6. Water Sampling Photos



Figure 7. Water Sampling Point of the Project

3.5.4.1 Analysis on Water Quality Results

3.5.4.1.1 pH

pH value of water samples from the upper stream and downstream of KhunhitPinlain creek were 7.06 and 7.10, respectively. NEQG guideline for pH value of wastewater is 6-9 and the laboratory results were well within the range of guideline



value. For tube well water from the project area, 6.37 pH value of the tested water sample also is within the limit. So, the project should be aware that discharging high pH water to nearby surface drain will contribute to background pH level.

3.5.4.1.2 Biochemical Oxygen Demand (B.O.D)

The maximum value of Biochemical Oxygen Demand was 19.40 ppm for Waste Water from project area. BOD content of wastewater from project area (19.40 ppm) is well within the NEQG standard guideline value of 50 ppm.

As of the “Yankin PPP Redevelopment Project”, the project will generate domestic wastewater which will be discharged into the drainages nearby the project area. It is the responsibility of the project that the quality of the wastewater discharged must be in compliance with the set national guideline values.

3.5.4.1.3 Chemical Oxygen Demand (C.O.D)

For Chemical Oxygen Demand, the maximum value was 70 ppm for wastewater from project area. COD content of wastewater from project area is well within the NEQG standard guideline value of 250 ppm. The project has its responsibility to prevent adding up extra COD loading by treating its wastewater in compliance with the set guideline value.

3.5.5 Air Quality

Emission of air pollutants and noise occur from the moving vehicles since the sampling points are located at the corner of Yankin Road and Sayar San Road, and the site is at the pre-construction stage.

3.5.5.1 Air Quality Survey Item

The parameters for air quality survey were SO₂, NO₂, CO₂, CO, H₂S, PM_{2.5}, PM₁₀, Temperature, Relative Humidity, Wind Speed and Wind Direction.

3.5.5.2 Air Quality Survey Location

To survey the air quality, there are ten air sampling points. There is No Construction works near the air station during air quality monitoring period, the possible emission source is mostly from smoke and particulate matter from vehicular



movements or bypassing motorcars through the air station (EPAS). The survey point is located inside The Garden Redevelopment Project site. The detail of the location of air quality survey point is presented in figure and table below.

Table 13. The location of Air Sample Point of the Project

Sr.	Sample Name	location	Coordinates	
			Latitude (N)	Longitude (E)
1	Air Sample	Inside the Boundary of The Garden Redevelopment Project Site at the corner of Yankin Road and Sayar San Road, adjacent to Golden City Condominium.	16°49'31.35" N	96°9'54.17" E

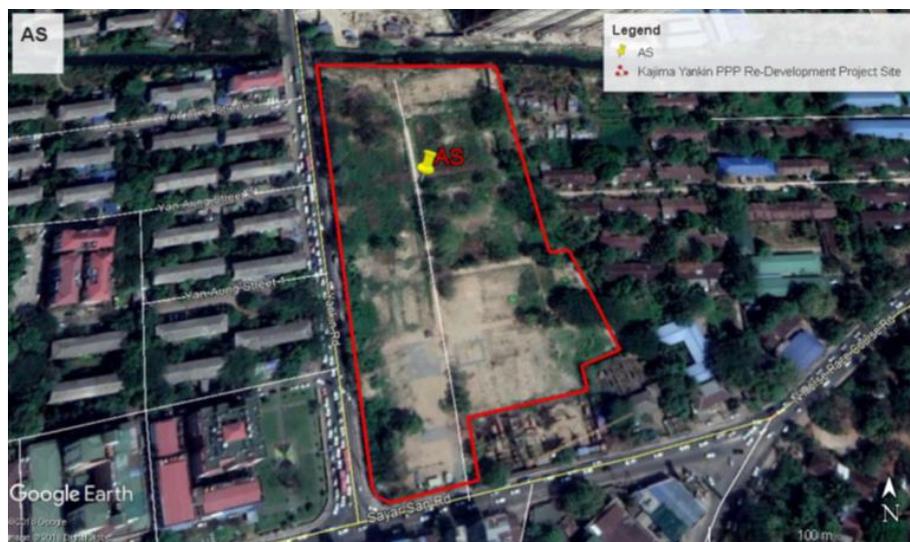


Figure 8 Air Quality Survey Location

Sampling and analysis of ambient air quality were collected at one point for 5 days, and 8 hours duration for each day. Air quality is measured at 4.6.2018 (Monday), 5.6.2018(Tuesday), 6.6.2018 (Wednesday), 8.6.2018 (Friday) and 9.6.2018 (Saturday) in order to take data for weekdays and weekends.

Table 14. Air Quality Sampling Time

Date	Sampling point	Duration
4.6.2018 (Monday)	AS	11: 00 am to 19: 00 pm
5.6.2018 (Tuesday)	AS	11: 00 am to 19: 00 pm
6.6.2018 (Wednesday)	AS	11: 00 am to 19: 00 pm
8.6.2018 (Friday)	AS	11: 00 am to 19: 00 pm
9.6.2018 (Saturday)	AS	11: 00 am to 19: 00 pm





Figure 9. Air Quality Monitoring inside the site boundary

3.5.5.3 Survey Methodology

Sampling and analysis of ambient air quality were conducted by referring to the recommendation of the United States Environmental Protection Agency (U.S. EPA). The Haz-Scanner Environmental Perimeter Air Station (EPAS) was used to collect ambient air survey data. Sampling rate or air quality data were measured automatically every one minute and directly read and recorded onsite for measured parameters (SO₂, NO₂, CO₂, CO, H₂S, O₃, CH₄, PM₁₀, PM_{2.5}), as shown in Table. Sampling pump was operated at 2 L/min. Different analysis methods are integrated in the instrument, such as Particulates 90° Infrared Light Scattering for particulate matters (PM₁₀, PM_{2.5}), electrochemical sensors for toxic gases (SO₂, NO₂, CO, H₂S), NDIR (optional sensor) for (CO₂, CH₄) and Gas Sensing Semiconductor- GSS technology (optional sensor) for O₃.

Table 15. Sampling and Analysis Method for Air Quality

No.	Parameter	Analysis Method
1.	Sulfur Dioxide (SO ₂)	On site reading
2.	Nitrogen Dioxide (NO ₂)	On site reading
3.	Carbon Dioxide (CO ₂)	On site reading
4.	Carbon Monoxide (CO)	On site reading
5.	Hydrogen Sulfide (H ₂ S)	On site reading
6.	Particulate Matter 10 (PM ₁₀)	On site reading
7.	Particulate Matter 2.5 (PM _{2.5})	On site reading



8.	Wind Direction	On site reading
9.	Wind Speed	On site reading
10.	Temperature	On site reading
11.	Relative Humidity	On site reading

3.5.5.4 Identification of Air Pollutants and Its Impacts

The proposed The Garden Redevelopment Project is in the preconstruction stage and the air station is set on to collect data of the current air quality impacted by moving vehicles running on Yankin Road and Sayar San Road. Therefore, the site has to measure the surrounding air quality to know whether SO₂, NO₂, CO₂, CO, H₂S, PM_{2.5} and PM₁₀ are exceeding the limiting amount of National Environmental Quality Emission Guideline or not. The impacts of pollutants are defined below.

Carbon Monoxide (CO) is a toxic gas that cannot be seen or smelled. All people are at risk for CO poisoning. Unborn babies, infants, the elderly, and people with chronic heart disease, anemia, or respiratory problems are generally more at risk than others. Breathing CO can cause headache, dizziness and vomiting nausea. If CO levels are high enough, unconscious or death may be become. Exposure to moderate and high levels of CO over long periods of time has also been linked with increased risk of heart disease.

Carbon Dioxide (CO₂) is the primary greenhouse gas pollutant, accounting for nearly three-quarters of global greenhouse gas emissions. Carbon pollution leads to long lasting changes in our climate, such as rising global temperatures, rising sea level, changes in weather and precipitation patterns and changes in ecosystems, habitats and species diversity. Children, older adults, people living in poverty may be at risk from the health impacts of climate change.

Nitrogen Dioxide (NO₂) is a nasty-smelling gas. The main effect of breathing in raised levels of nitrogen dioxide is the increased likelihood of respiratory problems. Nitrogen dioxide inflames the lining of the lungs, and it can reduce immunity to lung infections. This can cause problems such as wheezing, coughing, colds, flu and bronchitis. Increased levels of nitrogen dioxide can have significant impacts on people with asthma because it can cause more frequent and more intense attacks. Children with asthma and older people with heart disease are most at risk.



Sulfur Dioxide (SO₂) is an invisible gas and has a nasty, sharp smell. It reacts easily with other substances to form harmful compounds, such as sulfuric acid, sulfurous acid and sulfate particles. Sulfur dioxide affects human health when it is breathed in. It irritates the nose, throat and airways to cause coughing, wheezing, shortness of breath, or a tight feeling around the chest. The effects of sulfur dioxide are felt very quickly and most people would feel the worst symptoms in 10 or 15 minutes after breathing in. Those most at risk of developing problems if they are exposed to sulfur dioxide are people with asthma or similar conditions.

Ozone (O₃) has a strong odor. Breathing ozone can trigger a variety of health problems including chest pain, coughing, throat irritation, and congestion. It can worsen bronchitis, emphysema, and asthma. It can also reduce lung function and inflame the linings of the lungs. Repeated exposure may permanently scar lung tissue.

Particulate matter (PM) consists of microscopically small solid particles or liquid droplets suspended in the air. The smaller the particles, the deeper they can penetrate in to the respiratory system and the more hazardous they are to breathe. Long-term exposure to current ambient PM concentrations may lead to a marked reduction in life expectancy. The reduction in life expectancy is primarily due to increase cardio-pulmonary and lung cancer mortality. Increases are likely in lower respiratory symptoms and reduced lung function in children, and chronic obstructive pulmonary disease and reduced lung function in adults.

3.5.5.5 Survey Result

The average concentrations of pollutants at the sampling point for 5 days, each day for 8 hours duration is shown in the table below.

Table 16. Average Concentrations of Pollutants at the Sample Point for 5days

Date	Time	Average Value Parameters						
		CO ₂ (ppm)	CO (ppb)	SO ₂ (ppb)	NO ₂ (ppb)	O ₃ (ppb)	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)
4.6.2018 (Monday)	11:00AM	515	17	1	14	100	4	1
	12:00PM	502	21	4	12	100	2	1
	13:00PM	499	12	1	64	110	2	1
	14:00PM	503	24	1	40	100	2	1
	15:00PM	507	19	1	2	100	3	5
	16:00PM	492	12	1	2	100	13	12
	17:00PM	501	17	1	2	100	12	7



	18:00PM	512	23	1	18	100	15	14
	19:00PM	517	24	1	33	100	14	7
5.6.2018 (Tuesday)	11:00AM	504	17	1	11	100	9	3
	12:00PM	502	18	1	49	100	14	4
	13:00PM	496	18	1	38	100	4	3
	14:00PM	497	14	1	12	100	16	12
	15:00PM	501	14	1	2	100	6	2
	16:00PM	500	21	1	2	100	25	2
	17:00PM	510	25	1	31	100	10	31
	18:00PM	513	14	1	55	100	25	4
	19:00PM	505	14	1	2	100	9	6
	6.6.2018 (Wednesday)	11:00AM	499	24	1	64	100	6
12:00PM		505	17	1	50	100	12	5
13:00PM		513	25	1	11	100	10	7
14:00PM		500	23	1	12	100	20	7
15:00PM		510	19	1	15	100	25	13
16:00PM		517	14	1	36	100	17	10
17:00PM		512	18	1	2	100	10	12
18:00PM		507	19	1	18	100	21	21
19:00PM		515	21	1	27	100	16	6
8.6.2018 (Friday)	11:00AM	512	21	1	24	100	9	5
	12:00PM	496	16	1	34	110	24	11
	13:00PM	509	19	1	12	100	12	9
	14:00PM	488	22	1	8	100	20	6
	15:00PM	521	16	7	45	100	9	10
	16:00PM	517	19	1	76	100	25	9
	17:00PM	449	13	1	32	100	18	16
	18:00PM	421	21	3	19	100	12	6
9.6.2018 (Saturday)	11:00AM	523	15	1	9	100	2	5
	12:00PM	496	8	1	11	100	15	2
	13:00PM	527	14	7	38	100	9	2
	14:00PM	501	25	5	27	112	21	8
	15:00PM	511	21	1	19	100	15	12
	16:00PM	428	18	1	21	100	27	20
	17:00PM	532	16	3	28	100	31	13
	18:00PM	551	21	1	31	100	9	9
	19:00PM	496	9	1	42	100	11	17

According to the above table, the surrounding air quality result can be noted as below:

The concentration of Carbon Dioxide measured in all the sampling times for 5 days was below the World Health Organization (WHO) Guidelines, which specifies 600 ppm for the limitation of CO₂ concentration. CO₂ concentration of 551 ppm was the highest and 421 ppm was the lowest at the proposed area. Since the project is not a



polluting project which emits carbon dioxide into the atmosphere, there could be no impact from the project on the background carbon dioxide level of local community.

The concentrations of Carbon Monoxide measured in all the sampling times for 5 days were below the National Ambient Air Quality Standards (NAAQS) which specifies 35 ppb for the limitation of CO concentration. CO concentration of 25 ppb was the highest and 8 ppb was the lowest at the proposed area.

The concentration of Sulfur Dioxide measured in all the sampling times was below the National Ambient Air Quality Standards (NAAQS), which specifies 75 ppb for the limitation of SO₂ concentration. SO₂ concentration of 7 ppb was the highest and 1 ppb was the lowest at the proposed area.

The concentration of Nitrogen Dioxide measured in all the sampling times was below the Myanmar National Environmental Quality Emission Guideline (NEQEG), which specifies 200 ppb for the limitation of NO₂ concentration. NO₂ concentration of 76 ppb was the highest and 2 ppb was the lowest at the proposed area.

The concentration of Ozone measured in all the sampling times was below the National Ambient Air Quality Standards (NAAQS), which specifies 120 ppb for the limitation of O₃ concentration. O₃ concentration of 112 ppb was the highest and 10 ppb was the lowest at the proposed area.

The concentration of Particulate Matter measured in all the sampling times was below the National Ambient Air Quality Standards (NAAQS), which specifies 150 µg/m³ for the limitation of PM₁₀ concentration. PM₁₀ concentration of 31 µg/m³ was the highest and 2 µg/m³ was the lowest at the proposed area.

The concentration of Fine Particulate Matter measured in all the sampling times was below the National Ambient Air Quality Standards (NAAQS), which specifies 35 µg/m³ for the limitation of PM_{2.5} concentration. PM_{2.5} concentration of 31 µg/m³ was the highest and 2 µg/m³ was the lowest at the proposed area.

The charts below show that the concentration of Carbon Dioxide (CO₂) measured in all sampling times for 5 days was between the ranges of 421 ppm – 551 ppm. The survey results of carbon dioxide concentrations are shown in the following charts:



Carbon Dioxide (CO₂) Emission (ppm)

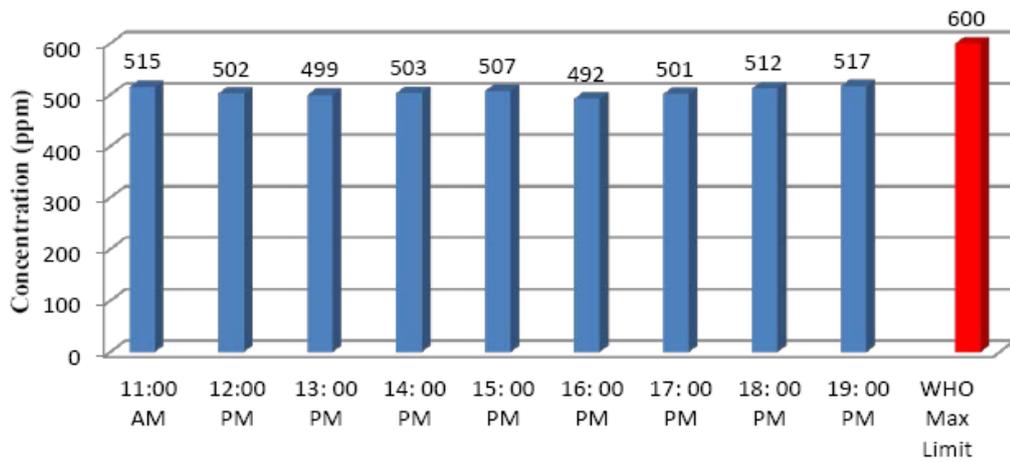


Figure 10. Carbon Dioxide Concentration on 4.6.2018 (Monday)

Carbon Dioxide (CO₂) Emission (ppm)

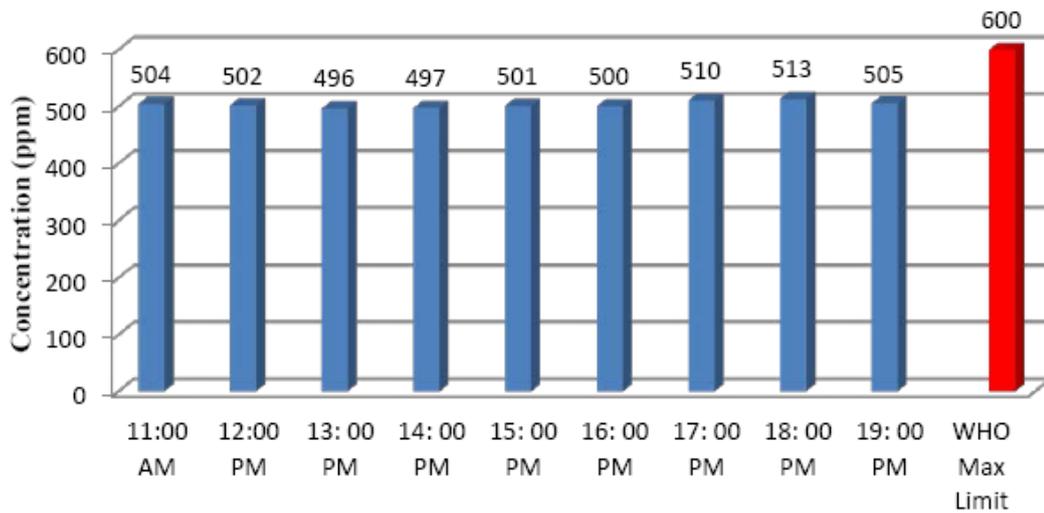


Figure 11. Carbon Dioxide Concentration on 5.6.2018 (Tuesday)

Carbon Dioxide (CO₂) Emission (ppm)

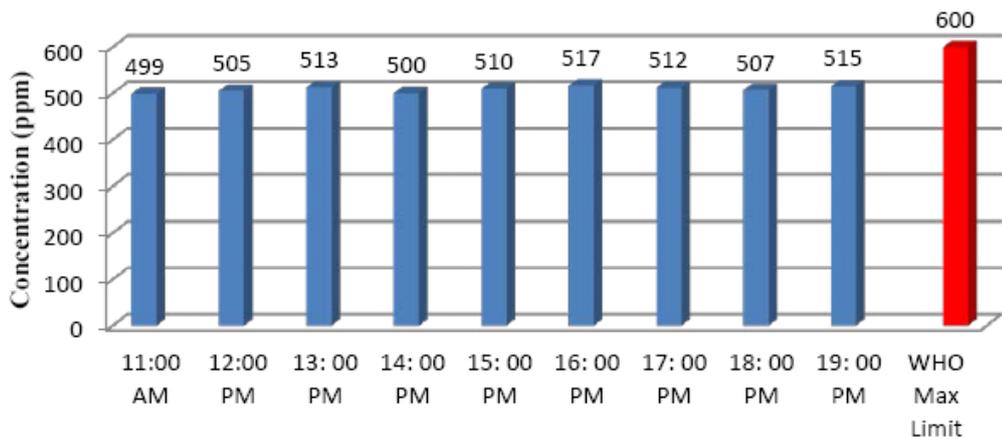


Figure 12. Carbon Dioxide Concentration on 6.6.2018 (Wednesday)



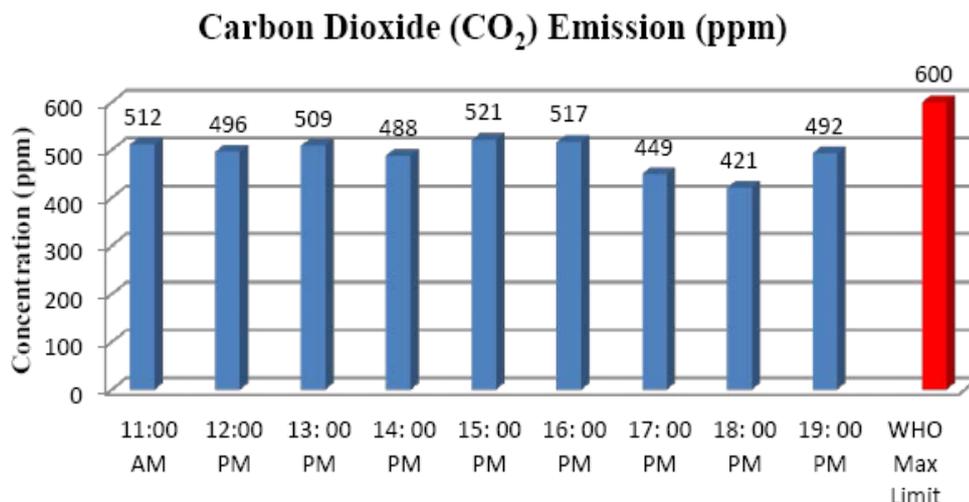


Figure 13. Carbon Dioxide Concentration on 8.6.2018 (Friday)

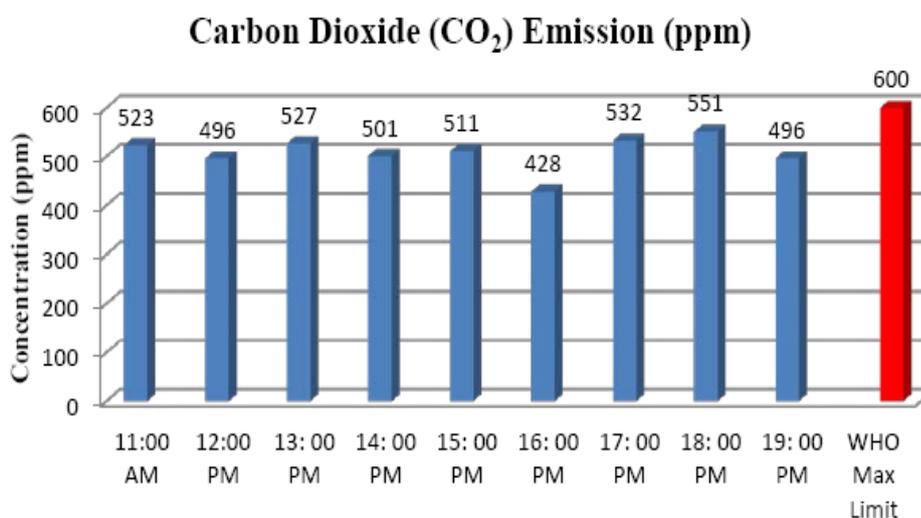


Figure 14. Carbon Dioxide Concentration on 9.6.2018 (Saturday)

3.5.5.6 Humidity and Temperature

Relative humidity and temperature of the proposed project were also measured by using the Haz-Scanner Environmental Perimeter Air Station (EPAS). The results are as following table.

Table 17. Relative Humidity and Temperature of the Project

Date	RH% (Avg.)	RH% (Max)	RH% (Min)	Temp °C (Avg.)	Temp °C (Max)	Temp °C (Min)
4.6.2018 (Monday)	72	100	52	22	23	19
5.6.2018 (Tuesday)	69	95	52	24	28	20



6.6.2018 (Wednesday)	72	86	58	24	28	20
8.6.2018 (Friday)	70	87	61	23	26	20
9.6.2018 (Saturday)	68	80	64	24	28	20

3.5.5.7 Noise Level

The noise levels for the proposed project were measured by **TES-52A** Advanced Sound Level Meter. Data of noise level were collected at three points for 5 days, and 8 hours duration for each day. Noise level is measured at 4.6.2018 (Monday), 5.6.2018(Tuesday), 6.6.2018 (Wednesday), 8.6.2018 (Friday) and 9.6.2018 (Saturday) in order to take data for weekdays and weekends.

Table 18. The Locations of Noise Sample Points

No.	Sample Point	Coordinates		Location
		Latitude (N)	Longitude (E)	
1.	NS 1	16°49'25.65"N	96° 9'53.61"E	At the corner of YankinRoad and Sayar San Road.
2.	NS 2	16°49'25.85"N	96° 9'54.97"E	Beside Sayar San Road.
3.	NS 3	16°49'32.78"N	96° 9'52.19"E	Beside Yankin Road

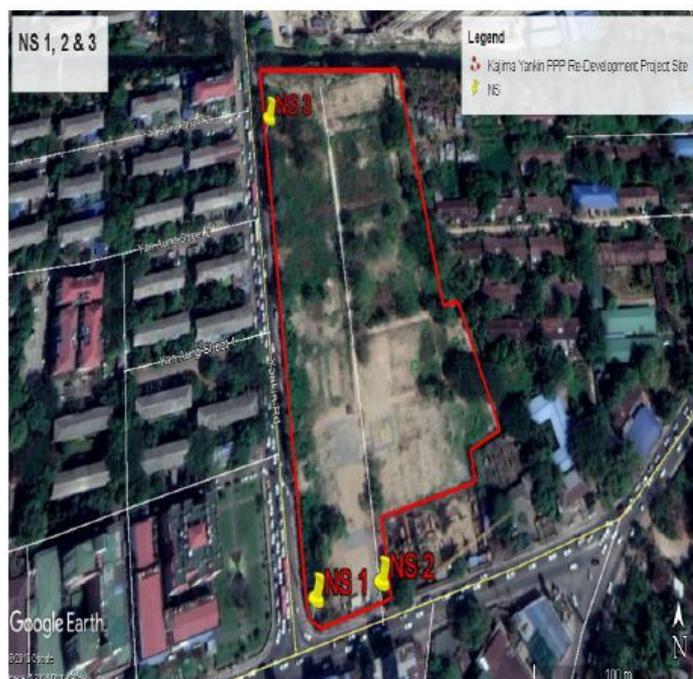


Figure 15. The Locations of Noise Sample Points



Figure 16. Noise Level Measuring at NS Point 1 and 2



Figure 17. Noise Level Measuring at NS Point 3

Date	Time	Noise Sample Points		
		NS 1	NS 2	NS 3
4.6.2018 (Monday)	11: 00 AM	75.1	70.2	72.1
	12: 00 PM	75.0	79.3	78.9
	13: 00 PM	74.6	80.1	74.1
	14: 00 PM	77.6	78.5	82.7
	15: 00 PM	76.0	77.9	79.0
	16: 00 PM	80.1	77.6	74.4
	17: 00 PM	75.3	75.7	73.9
	18: 00 PM	78.4	76.4	73.5
	19: 00 PM	75.1	79.4	73.7
5.6.2018 (Tuesday)	11: 00 AM	76.1	78.2	73.0
	12: 00 PM	75.7	77.6	73.2
	13: 00 PM	80.0	73.1	74.3
	14: 00 PM	82.5	78.1	69.8
	15: 00 PM	77.8	78.6	74.4
	16: 00 PM	79.6	78.5	74.7
	17: 00 PM	76.0	75.4	67.9
	18: 00 PM	76.9	76.1	70.0
	19: 00 PM	73.8	80.4	71.6
6.6.2018 (Wednesday)	11: 00 AM	75.0	91.6	70.9
	12: 00 PM	76.8	82.4	72.3
	13: 00 PM	75.8	79.2	79.1
	14: 00 PM	76.6	76.0	81.5
	15: 00 PM	72.4	76.8	72.9
	16: 00 PM	76.8	78.0	75.6
	17: 00 PM	78.1	79.9	76.3
	18: 00 PM	75.7	80.1	73.2
	19: 00 PM	76.2	72.9	73.1
8.6.2018 (Friday)	11: 00 AM	86.1	76.5	75.7
	12: 00 PM	86.7	79.3	75.3
	13: 00 PM	80.4	77.9	73.4
	14: 00 PM	79.7	76.9	80.9



	15: 00 PM	82.9	76.9	73.9
	16: 00 PM	77.7	77.9	76.9
	17: 00 PM	73.7	80.2	76.7
	18: 00 PM	78.5	81.1	69.5
	19: 00 PM	81.0	79.2	74.2
9.6.2018 (Saturday)	11: 00 AM	76.6	76.9	72.9
	12: 00 PM	79.3	77.0	74.8
	13: 00 PM	78.7	78.9	76.6
	14: 00 PM	87.1	82.6	83.6
	15: 00 PM	76.7	80.1	74.7
	16: 00 PM	77.9	79.7	81.8
	17: 00 PM	81.2	78.9	80.6
	18: 00 PM	80.5	76.6	72.8
	19: 00 PM	78.3	81.4	74.4

Table 19. Wind Speed and Air Direction

Time	Wind Speed (km/h)	Wind Direction (Degree)	Wind Direction (Cardinal Point)
11: 00 AM	1.1	267°	W
12: 00 PM	2.9	195°	SSW
13: 00 PM	5.6	248°	WSW
14: 00 PM	0.9	237°	WSW
15: 00 PM	3.6	234°	SW
16: 00 PM	6.8	228°	SW
17: 00 PM	6.1	187°	S
18: 00 PM	2.1	203°	SSW
19: 00 PM	2.4	298°	WNW

Table 20. Assessment of Ambient Air Quality in the Project

Sr.	Location	Air Temp	WBT	Dew Point	Humidity	CO ₂ (ppm)	Wind Speed
1	AS1	Medium	Low	Low	High	Medium	Low-Medium



3.5.6 Climate

3.5.6.1 Average Weather

Here are some annual weather facts we collected from our historical climate data: During the months of June, July, August and September you are most likely to experience good weather with pleasant average temperatures. On average, the temperatures are always high. A lot of rain (rainy season) falls in the months of: May, June, July, August, September and October. Yangon has dry periods in January, February, March, April and December. On average, the warmest month is April. On average, the coolest month is January. August is the wettest month. This month should be avoided if you don't like too much rain. February is the driest month.

3.5.6.2 Temperature

In Yangon, the months, June, July, August and September, have a nice average temperature. On average, the temperatures are always high. On average, the warmest month is April. On average, the coolest month is July. The average annual maximum temperature is: 32.0° Celsius (89.6° Fahrenheit) The average annual minimum temperature is: 22.0° Celsius (71.6° Fahrenheit)

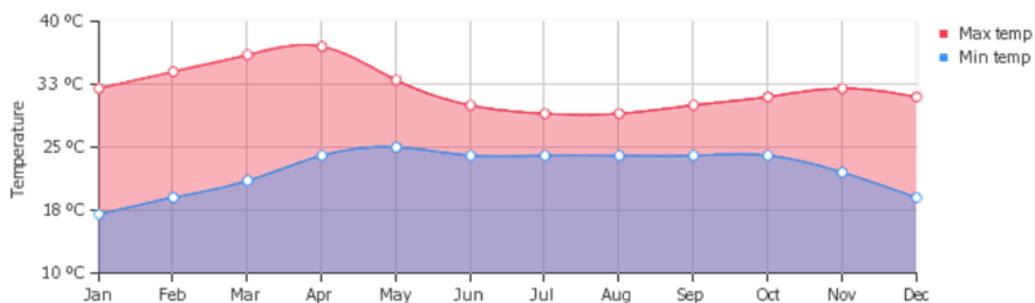


Figure 18. Temperature Graph of Yangon

3.5.6.3 Precipitation

A lot of rain (rainy season) falls in the months: May, June, July, August, September and October. Yangon has dry periods in January, February, March, April and December. On average, August is the wettest month. On average, February is the driest month. The average amount of annual precipitation is: 999.9 mm (39.37 in).



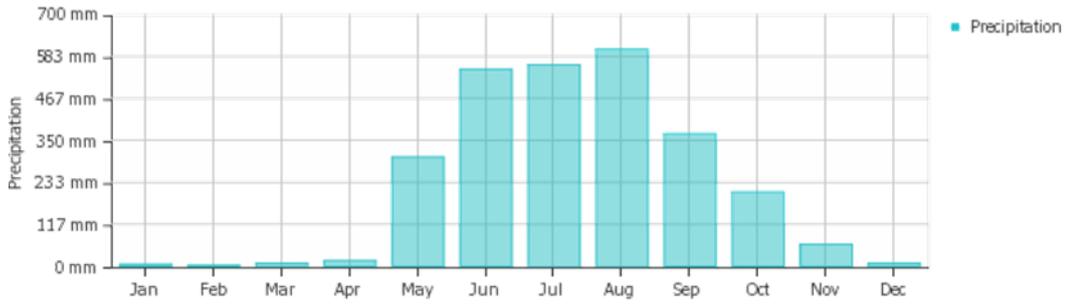


Figure 19. Precipitation Graph of Yangon

3.5.6.4 Rainfall

Most rainy days are in June, July, August and September. Yangon has dry periods in January, February, March, April and December. On average, August is the rainiest. On average, December has the least rainy days. The average annual amount of rainy days is: 125days with morethan 0.1mm (0.004 in) of rainfall(precipitation) or 10.4 days with a quality of rain, sleet, snow, etc. per month.

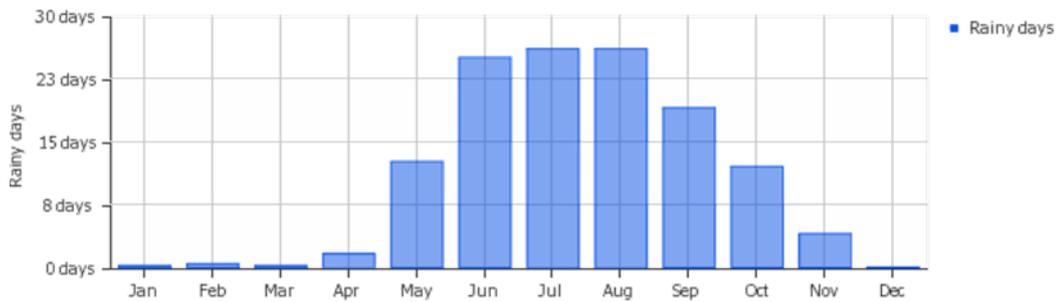


Figure 20. Rainfall Graph of Yangon

3.5.6.5 Relative Humidity

On average, July is the most humid. On average, January is the least humid month. The average annual percentage of humidity is: 76.0%



Figure 21. Relative Humidity Graph of Yangon



3.5.7 Vegetation Cover

The project area is located near the Khunhnit Pinlain Creek and Golden City High-rise Building at Yankin Township, Yangon Region. All most vegetations in the area were cleaned up in the past. There are some trees which were cultivated for shade on road side and fruits trees. The majority of the western half of the study area is considered to be native vegetation from three *Nyaung*, *Kokko* and *Bamboo*. No national or state significant flora species or ecological communities were recorded during the current assessment.

At present, there are 14 tree species, 32 small tree species, 38 shrubs, 54 herbs, 31 climbers, 10 grass, 2 ferns and 10 aquatics within the study area. The entire site was visually assessed, with all vascular plants recorded, any significant records mapped and the overall condition of vegetation noted. Remnant vegetation in the local area was also reviewed to assist in determining the original vegetation within the study area. There is no forest area within or near the project.

3.5.8 Natural hazards

The proposed project and its surrounding are bounded by the Indian-Burma plates subduction in the west, Sagaing fault in the east, West BagoYoma fault in the north, Kyaykkyan fault in the north-east, and the Andaman rift zone in the south. The following hazards have the potential impacts on the project area:

- Cyclones;
- Earthquake;
- Flooding; and
- Fire;

Cyclones originating in the Bay of Bengal normally start by moving west towards India, then change direction to move northeast towards Bangladesh and Myanmar. The main cyclone seasons are April to May and October to November and involve storm surges of water, heavy rain and strong winds. While it is rare for cyclones to reach the Myanmar coast, in May 2008 Cyclone Nargis caused devastation across the Ayeyarwady Region - Yangon Region also suffered Dala, Twantay, Htantabin and Hlegu townships being the worst affected.

The proposed project and its surrounding are 20 miles to 25 miles far away from Sagaing Fault. So, it can be affected mainly from the strike-slip movement of west



segments of Sagaing Fault, a large linear seismic source. Besides, two fractures and one inactive fault mapped on the 1: 1,000,000 scales are occurred around the study area. The anticipated seismic intensity of the proposed area is located in moderate zone or strong zone of Seismic Zone Map of Myanmar. The equivalent modified Mercalli Scale Classes are VII or VIII. The peak ground accelerations (PAG) are 0.1-0.15 g (VII) or 0.2 to 0.3 g (VIII).

Table 21. Recent Earthquakes near Yangon, Myanmar in 2018-2019

Sr.	Location	Magnitude	Date	Depth (km)
1	Pyu, Bago	4.5	28-1-2019	32
2	Thongwa, Yangon	4.3	16-8-2018	10
3	Syriam, Yangon	4.3	16-8-2018	67
4	Pyu, Bago	4.6	17-6-2018	24
5	Pyu, Bago	5.0	17-6-2018	10
6	Pyu, Bago	5.1	24-4-2018	10
7	Pyu, Bago	4.9	22-4-2018	10
8	Pyu, Bago	4.7	21-4-2018	10
9	Pyu, Bago	5.0	20-4-2018	17
10	Pyu, Bago	4.8	20-4-2018	29
11	Twante, Yangon	4.2	18-4-2018	10
12	Pyapon, Ayeyarwady	4.1	14-4-2018	10
13	Pyu, Bago	5.1	17-3-2018	19
14	Pyu, Bago	4.9	4-3-2018	13
15	Pyu, Bago	4.1	7-2-2018	10
16	Pyu, Bago	4.6	5-2-2018	10
17	Thongwa, Yangon	4.1	4-2-2018	10
18	Pyu, Bago	4.7	22-1-2018	10
19	Pyu, Bago	4.7	14-1-2018	10
20	Pyu, Bago	4.6	13-1-2018	10

Yankin township is located 80 feet above the sea level. During the rainy season, it is common for parts of the city to suffer floods due to any combination of clogged drains, high tide or heavy rain.



The limited Yangon Fire Service, outdated electricity transmission network and poor construction and safety standards means fires are all too common in the city – an estimated 300 fire outbreaks occur every year across the Region. In 2005 more than 9,000 people were affected by a fire in Hlaing which caused extensive loss of property.

3.6 BIOLOGICAL COMPONENTS

Biodiversity, or the variety of life and its process, is a basis property of nature that provides enormous ecological, economic, and aesthetic benefits. Its loss is recognized as a major national as well as global concern, with potentially profound ecological and economic consequences.

Factors contributing to the decline of biodiversity include physical alterations to the geography due to resource exploitation and changing land usages; pollution; overharvesting; introduction of exotic (non-native) species and elimination of native species through predation, competition, genetic modification, and disease transmission; disruption of natural process; and global climate change.

Impact identification methods such as interaction matrices, networks, or simple and descriptive checklists can provide a systematic basis for qualitatively delineating potential impacts of concerns. This description of existing Flora and Fauna primarily focuses on community types (habitat types) which include identifying certain selected species for each community types.

In this study, EIA team has focused “Biological Baseline Study and Impact Assessment of “The Garden” Yankin PPP Redevelopment Project. It will be considered to identify the biological impacts, existing biological condition, the biological impacts, and mitigation measure for environmental protection management.

3.6.1 Objective Study

- To evaluate the ecosystem that affects the flora and fauna those inhabited in the project area and nearby of the project
- To study and record the diversity of flora and fauna of this area
- To identify the recorded flora and fauna with their population assessment
- To assess and reveal the ecological and commercial values of different species of flora recorded from the sites and environs
- To identify the potential negative impacts of mine those may affect and threaten to the richness of biodiversity of the project area and nearby



- To recommend the mitigation measures and management plans for safety of flora and fauna diversity of the sites and environs

3.6.2 Fauna

3.6.2.1 *Methods of Fauna Survey*

Biodiversity is a good indicator of wider levels of the sustainability of our development. In areas where we consume more than we renew, biodiversity suffers and declines. Conversely, in areas where we are more sensible and careful in our resource use, biodiversity flourishes. Thus, we should conserve biodiversity, not only because of the things it gives us but also because by doing so we will become more sustainable as a society and thus more able to maintain and leave a viable planet for future generations to enjoy.

3.6.2.2 *Results and Findings of Fauna*

3.6.2.2.1 fauna

Animals constitute an important component of the natural ecosystem of the study area. The animal communities are important because of their uses as sources of biodiversity conservation and research studies, recreation. Ecologically, the animal population plays an important role in the transfer of food energy and cycling of essential elements in the ecosystem. The study area is endowed with a moderate variety of animal species. They vary from small arthropods like mites and ticks to very large mammals. The Phylum Arthropoda dominated the invertebrate community and is represented by insects, spiders, millipedes, etc.

Various groups of vertebrates were encountered and they included amphibians, reptiles, birds and mammals. The amphibians are organisms that spend part of the developmental stage in their life cycle in water and the adult stage on land. Toads were represented by the genus *Bufo* while the frogs were mainly *Rana* spp.

This is assessment of the EIA fauna survey. A total of 59 species representing butterfly (10 species), dragonfly and damselfly (10 species), frog and toad (3 species), lizard snake, and skink (5 species), insects (15 species), mammal (3 species) and birds (13 species) are recorded. There is not included the any endangered and endemic species under IUCN Red list category. The significance of biodiversity in an ecosystem



and complex interrelations with other components determines the structure and productivity of ecosystems, as well as contributing to their functionality.

Table 22. List of Fauna from Project Area

	Order	Family	Species
Butterfly	1	5	10
Dragonfly and Damselfly	1	2	10
Frog and Toad	1	3	3
Lizard and skink	1	3	4
Snake	-	1	1
Soil fauna	-	3	15
Bird	3	10	13
Mammal	1	2	3
	8	29	59

Flora, mammal and bird surveys were conducted at the development site. No designated habitats of international or national value were recorded on or adjacent to the site. All the habitats recorded on site are widespread within the landscape and of moderate to low species-richness. There are very limited areas of scrub or other habitat types. No active endanger species recorded in site. A few places looked like a small jungle in indirect impact zone. And also, road lie beside the project area. Most of the Study Area, particularly the area to be directly affected by the proposed Project is highly urbanised and degraded by existing and on-going development, including housing, roads and drainage channels.

A total of 59 species of vertebrate fauna, belonging to 29 families were recorded from Kajima project. Species diversity of five groups, Insects (butterfly, dragonfly and damselfly), Amphibians (toads and frog), Reptiles (snake and lizard), Birds, soil fauna and mammals (squirrel, and rats) are examined. A total of 59 species of fauna are recorded.



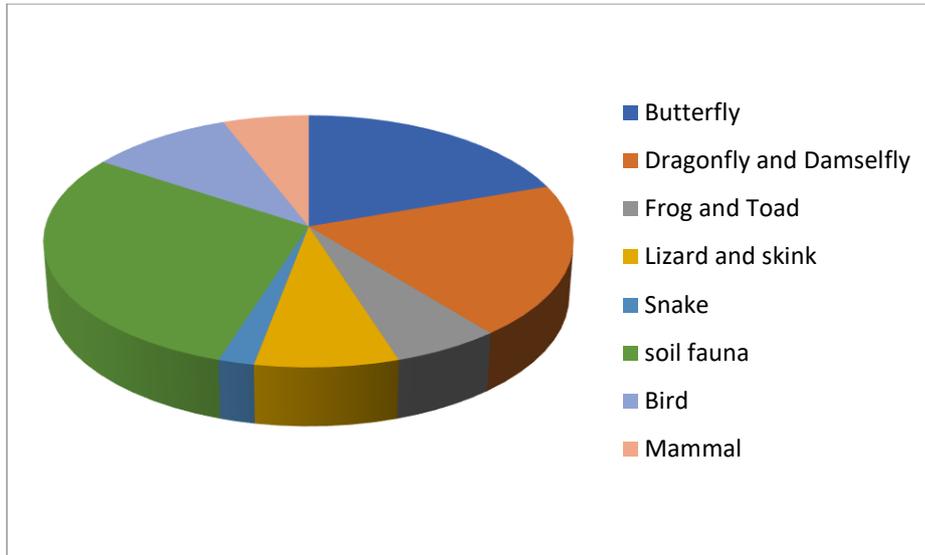


Figure 22. Species Richness of Fauna in Study Area of the Project

3.6.2.2.2 Invertebrate Fauna

Only two invertebrate groups - the butterflies (Lepidoptera) and the dragonflies (Odonata) were studied in detail, as these two groups are well documented in project area. The butterflies are recorded consisted of 10 species (in 5 families) and the odonates (dragonflies and damselflies) consists of 10 species (in 2 families). Since the collected numbers of each species are not many, population size is relatively small and some species are common and some are rear species, hence they are vulnerable and easy to disappear. No endemic or endangered species is recorded (see Table.22).

Table 23. Butterfly Species (Order Lepidoptera) from Survey Area

No.	Family Name	Scientific Name
1	Hesperiidae	<i>Tagiades japetus</i>
2	Pieridae	<i>Eurema brigitta</i> <i>Appias libythea</i>
3	Lycaenidae	<i>Tagiades japetus</i>
4	Nymphalidae	<i>Idea agamarschana cadelli</i> <i>Neptis hylas kamarupa</i> <i>Danaus chrysippus</i> <i>Caligo teucer</i>
5	Papilionidae	<i>Papilio polytes</i> <i>Pachliopta aristolochiae</i>





Figure 23. Some Butterfly Species from Survey Area

Table 24. Dragonfly & Damselfly of Odonata from Survey Area

Order/ Suborder	Family	Scientific Name
Order-Odonata	Coenagrionidae	<i>Ceriagrion</i>
Sub-order Zygoptera		<i>coromandelinum</i>
		<i>Ischnura heterosticta</i>
		<i>Agriocnemis pygmaea</i>

<p>Sub- order Anisoptera</p>	<p>Libellulidae</p>	<p><i>Orthetrum Sabina</i> <i>Acisoma panorpoides</i> <i>Diplacodestrivalis</i> <i>Neurothemis tullia</i> <i>Rhodothemis rufa</i></p>
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Ceriagrioncoromandelinum



Agriocnemispygmaea



Ischnuraheterosticta



Orthetrum Sabina



Acisomapanorpoides



Rhyothemisrufa



Neurothemistulia



Diplacodestrivalis

Figure 24. Some Damselfly and Dragonfly of Odontaspecies from Survey Area

3.6.2.2.3 Herpeto fauna

A total of 8 species of 8 families of Class Amphibia (4 families & 8 species) and Reptilia (7 families & 8 species) of Herpetofauna are recorded from this survey area. All species are very few numbers of collected specimens (Table.24). It could be assumed that species number and population size is locally disappeared due to discharge of waste from factory and human impacts. No endemic or endangered species is recorded.

Table 25. Systematic Position of Recorded Herpetofauna from Survey Area

Family	Scientific Name	Common Name	Local Name	Habit
Bufonidae	<i>Bufo macrotis</i>	Large ear toad	Hpar pyok thay	On the ground
Microhylidae	<i>Kaloula pulchra</i>	Common bull frog	Phar- kyaung	On the ground
Ranidae	<i>Ocidozyga sp.</i>	Swamp floating frog	Phar-han-lat	Mud/pond mud
Rhacophoridae	<i>Polypedates leucomystax</i>	Common tree frog	Phar-pyan	Crevice of roof
Geckkonidae	<i>Hemidactylus frenatus</i>	Common house gecko	Eing- myaung	House
Agamidae	<i>Agama agama</i> <i>Calotes mystaceus</i>	rainbow lizard Blue crested lizard	Poat-thin- nyo Poat-thin- nyo	On the trunk On the trunk
Scincidae	<i>Mabuya multifasciata</i>	Common sun skink	Kyal-pyar- kin-late- shaw	Storage house
Colubridae	<i>Xenochrophis piscstor</i>	Chequered keel back	Yal-mway	In the water



*Bufo macrotis**Ocidozyga sp.**Kaloulapulchra**Polypedatesleucomystax**Hemidactylus frenatus**Calotes mystaceus**Mabuya multifasciata**Xenochrophis sp.*

Figure 25. Some Herpeto Fauna from Project Area

3.6.2.2.4 Bird fauna

Most birds are conspicuous and easy to observe. The avian population was preponderant in terms of numbers and types. Total of 13 species under 10 families 3 orders were collected in study area. According to their nature and behavior of birds, the survey area is not their original roosting and nesting sites, they come from another place for foraging to here. In bird activity pattern, flying pattern is the most common than the others. There are not many tall trees for the bird's nesting in that area that means no good habitat is present (Table 25). No endemic or endangered species was recorded.

Table 26. Systemic Position of recorded Avifauna from Survey Area

Order/Family	Scientific Name	Common Name	Vernacular Name
I.Columbiformes 1.Columbidae	<i>Columba livia</i>	Rock pigeon	Kho
II.Ciconiiformes 2.Ardeidae	<i>Ardeola grayii</i>	Indian pond heron	Byine-ouk
III.Passeriformes 3.Corvidae 4.Muscicapidae 5.Sturnidae 6.Hirundinidae 7.Sylviidae 8.Passeridae 9. Ploceinae 10.Estrildinae	<i>Corvus splendens</i> <i>Copsychus saularis</i> <i>Acridotheres tristis</i> <i>Acridotheres fuscus</i> <i>Hirundo striolata</i> <i>Orthotomus sutorius</i> <i>Passer domesticus</i> <i>Passer montanus</i> <i>Ploceus philippinus</i> <i>Lonchura striata</i> <i>Lonchura punctulata</i>	House crow Oriental magpie robin Common myna Jungle myna Red-rumped swallow Common tailor bird House sparrow Eurasian tree sparrow Baya weaver White-rumped-munia Scaly-breasted munia	Kyi-kan Tha-paik-lwe Myo-za-yet Taw-za-yet Pyan-hlwar Hnan-pyi-soak Eain-sar Thit-pin-sar Sar-wa-tee Sar-pa-tee Sar-pa-tee

*Corvus splendens**Hirundo striolata*



Copsychus saularis



Columba livia



Acridotheres tristis



Lonchura striata



Acridotheres fuscus



Passer montanus



Passer domesticus

Figure 26. Some Avi Fauna Species from Project Area

3.6.2.2.5 Soil fauna

Life in the soil is diverse ranging from microscopic single celled organisms to large burrowing animals. Hence there are well-defined food chain/energy flows within the soil ecosystem. The soil macro-fauna encountered within the study area include various arthropods (insects, millipedes, mites), molluscs (snails), annelids (earthworms) and nematodes (Table .26). These organisms are primary consumers; decomposers, mixers and utilizers of energy stored in plants and plant residues, and contribute to the re-cycling of nutrients. Others were secondary consumers such as centipedes, scorpions and spiders. These animals consume smaller sized animals and they may also serve as food for organisms occupying higher levels of the food chain.



The soil fauna of special interest within the savanna ecosystem under study were termites and earthworms. The importance of earthworms to soil includes aeration, improvement of texture, mixing (materials from the surface taken to lower depths and *vice versa*) and nutrient re-cycling.

Table 27 Soil Fauna Encountered in Soils of the Project

Phylum/ Order	Genera	Common Name	Trophic Level
Arthropod Termitidae	Trinervitermes	Termite	Primary Consumers
	Ancistrotermes	Termites	Primary Consumers
	Amitermes	Termites	Decomposers
	Macrotermes	Termites	Decomposers
	Odontotermes	Termites	Decomposers
	Cubitermes	Termites	Decomposers
	Collembola	Ground Beetle	Decomposers
	Carabidae	Oryetes	Dung beetle
Myriapoda Geophilomorpha	Lithobius	Soil Centipedes	Secondary Consumers
	Spirotreplus	Milipedes	Primary Consumers
Arachnid	Gastrocantha	Spiders	Secondary Consumers
	Pandinus	Scorpion	Secondary Consumers
Annelids (Phylum)	Edudrilus	Earthworm	Decomposers
	Hyperidrilus	Earthworm	Decomposers
Molluscs (Phylum)	Limicolaria	Garden snail	Primary Consumers





Figure 27. The Soil Macro-Fauna within the Project Site

3.6.2.2.6 Mammal Fauna

Three species of rat, and squirrel under 2 families and 1 order were collected in study area.

Table 28. Systematic Position of Class Mammalia Fauna from Indirect Impact Zone

Order/Family	Scientific Name	Common Name	Vernacular Name
Rodentia	<i>Funambulus palmarum</i>	squirrel	Palm squirrel
Sciuridae	<i>Mus musculus</i>	rat	Lesser bandicoot rat
Muridae	<i>Rattus rattus</i>	rat	

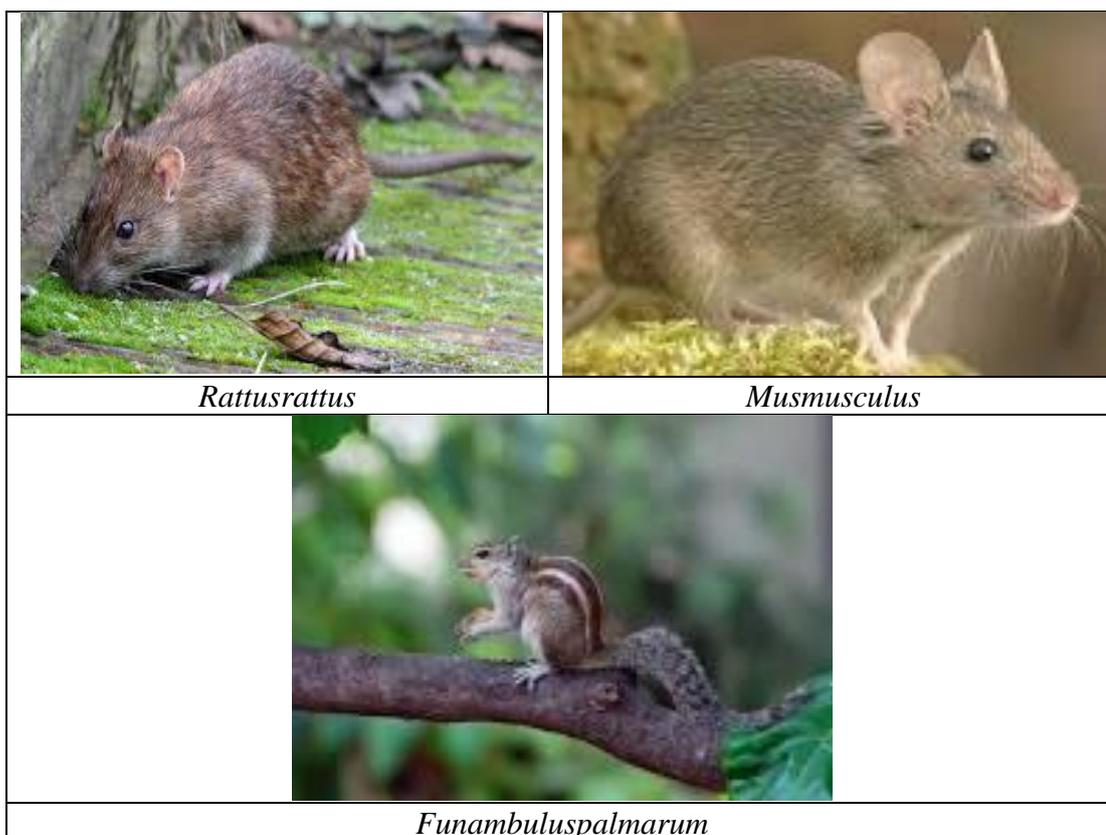


Figure 28. Some Mammals from Indirect Impact Zone from Project.

3.6.2.3 Impacts on Fauna diversity

- There are bushes of insects' habitats at raining season. Insect fauna co-existing with bushes in the direct zone will be locally cleaned up while those in the indirect zone will be affected by the changing of ecosystem.
- There is relatively affect on the bird species due to their mobility behavior. They have to change a small part if their foraging ground. At present condition, there are some tall trees in indirect zone, in it for the roosting for nesting for the birds.
- Terrestrial fauna would be impacted directly and indirectly by various phases of the project on both short-term and long-term bases.
- Burrowing insects (soil fauna) would be disappeared from habitats by clearing vegetation and from areas adjacent to construction sites due to increased noise and human presence.
- Construction can damage or destroy these ecosystems, making it more difficult for many native species to survive. Those species able to survive in urban settings may thrive, but the rest are forced to find new territory to survive.

- Negative impacts include disturbance to the landscape, dust and noise and disruption to local biodiversity.

3.6.2.4 Mitigation of impacts on Fauna

- Reduce dust and air pollution as far as possible.
- Identify potential environmental impacts associated with construction and operation of the proposed project.
- Contribute to the removal of organic matters from polluted water.
- Noise pollution of project construction should be minimized.
- Planting in road rights-of-way and adjacent areas can help to support local flora and fauna. Planting may provide additional habitats and migration routes for local animals.
- Reduction of the speed limit may reduce the rate of collisions between vehicles and animals.
- Environmental specifications for contractors should cover management of work forces (control of poaching and firewood collection), machinery (speed, noise, and traffic), and prevention of erosion and contamination during construction.

3.6.2.5 Monitoring

- Minimizing the removal off-site of any soils containing invasive species.
- Understanding the ecological constraints of the project
- Compliance with the ecological requirements of the project and any other legal requirements with regard to waste management, environmental pollution, discharge to waters etc.
- Replacement of lost habitat throughout the site or in other areas, where possible.

3.6.2.6 Discussion and conclusions for Fauna

Biodiversity and construction are both important to social and economic wellbeing. It is accepted that construction is necessary for continued economic growth, and that a balance be struck between protection of biodiversity and continued development. Construction can have many adverse impacts on this biodiversity through habitat destruction or fragmentation and disturbance of animals / birds and their breeding grounds. Currently, planning and EIA requirements should consider



biodiversity during the construction process through ensuring that key factors are addressed as part of the planning process. This approach ensures that habitats and species receive the appropriate level of protection as set out in our legislation. It is vital that we all work with this system to maintain the means of continuing development in a way that protects our natural environment. Construction work cause impact to reptile or amphibian in the Study Area. Construction work in the Study Area only affected grassland and roadside plantations, which are not important reptile or amphibian habitat. It is believed that the construction work did not cause much impact on the reptile or amphibian fauna in the Study Area.

All the habitats recorded on site are widespread within the landscape and low species-richness. There are very limited areas of scrub or other habitat types. No active endanger species of flora and fauna recorded in site. A few places looked like a small jungle in indirect impact zone. And also, road lied beside the project area. Most of the Study Area, particularly the area to be directly affected by the proposed Project is highly urbanised and degraded by existing and on-going development, including buildings, roads and drainage channels. However, in Kajima project plan, five gardens can help to support local flora and fauna. Planting may provide additional habitats and migration routes for local animals like a protective area.

The proposed construction works would be conducted in the developed area which is considered of very low ecological value. No direct or indirect impacts on terrestrial habitats and the inhabiting wildlife would be resulted from the operation of the Project.

3.6.3 Flora

3.6.3.1 *Methods for flora survey*

The floristic data and ecological data collection were conducted by the following methods in the study Area.

3.6.3.1.1 Sample Plotting

The Global Positioning System was used to navigate and mark the coordinates of the sample plots. In order to obtain essential data for predicting of tree species composition in the mangrove forest, 30x30 meter quadrants were set up and tree species in the plot were collected and population of each species were also counted. The species



identification was carried out by using key to families of flowering plants and appropriate literature and confirmed by matching with herbarium specimens of Department of Botany, University of Yangon.

3.6.3.1.2 Mapping

Location maps are set by the method based on the Google map and mark the GPS position of vegetation survey.

3.6.3.1.3 Materials

Materials used for recording are strings for sample plotting and transecting, digital camera for recording, GPS, maps, heavy duty plastic bags, newspapers, alcohol, spray jug (for fixing specimens), 10x lens, permanent marker, field note books, field press, drying press and dryers.

3.6.3.2 *Result and findings for flora*

The project area is located near the Khunhnit Pinlain Creek and Golden City High-rise Building at Yankin Township, Yangon Region. All most vegetations in the area was cleaned up in the past. There are some trees which were cultivated for shade on road side and fruits trees. The majority of the western half of the study area is considered to be native vegetation from three Nyaung, Kokko, and Bamboo. No national or state significant flora species or ecological communities were recorded during the current assessment.

At present, there are 14 tree species, 32 small tree species, 38 shrubs, 54 herbs, 31 climbers, 10 grass, 2 ferns and 10 aquatics within the study area. The entire site was visually assessed, with all vascular plants recorded, any significant records mapped and the overall condition of vegetation noted. Remnant vegetation in the local area was also reviewed to assist in determining the original vegetation within the study area. There is no forest area within or near the project.



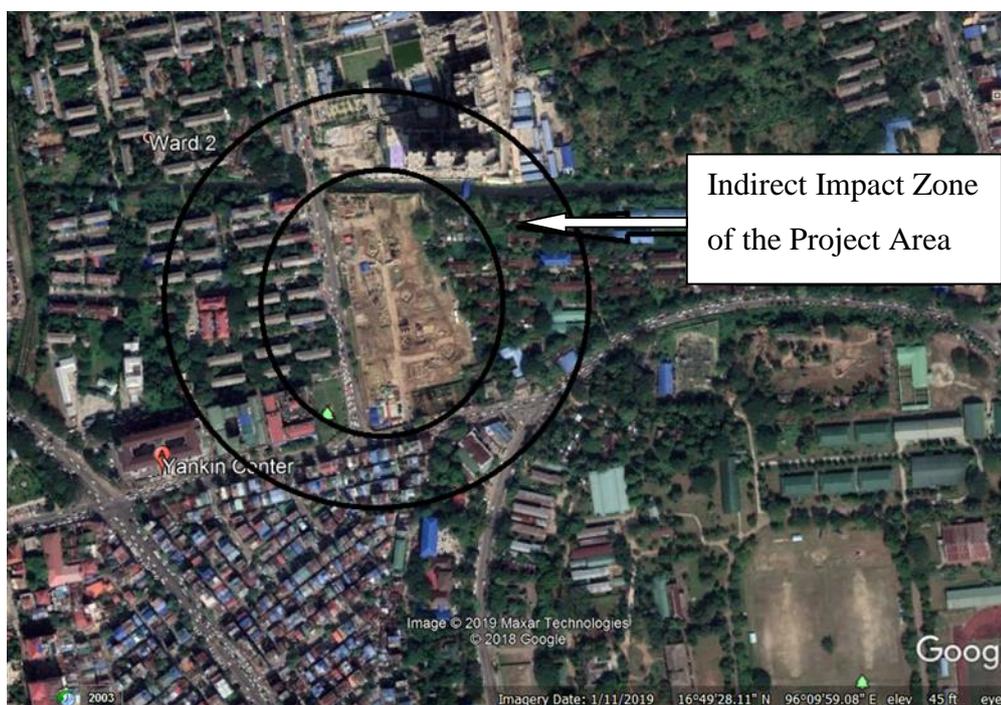
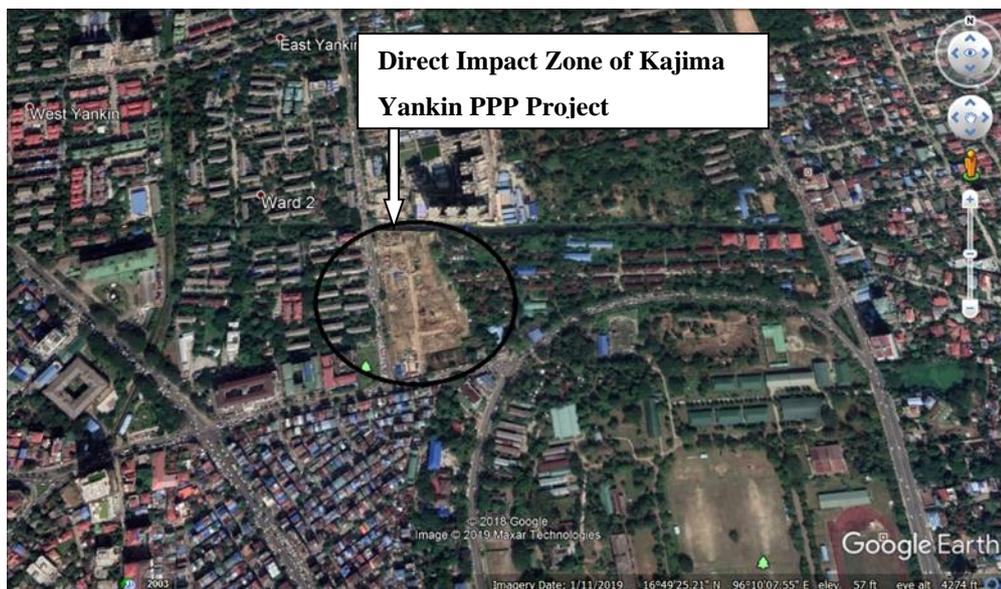


Figure 29. Direct and Indirect Impact Zone of the Garden Redevelopment Project

Table 29. Species List in Direct Impact Zone

No.	Common Name	Scientific Name	Family Name	Habitat
1.	Baw-za-gaing	Leucaena leucocephala (Lam.)	Mimosaceae	T
2.	Dan-kywe	Cassia bicapsularisL.	Caesalpiniaceae	S
3.	Hmo-chin-gyi	Oxalis latifoliaH.B.K.	Oxalidaceae	H



4.	Hti-ka-yon	Mimosa pudica L.	Mimosaceae	H
5.	Kat-cho	Smilax griffithiiA. DC.	Smilacaceae	Cl
6.	Khwele-ya	Mucuna pruriens(L.)	Fabaceae	Cl
7.	Kinmun gyin	Acacia concinna DC.	Mimosaceae	Cl
8.	Kyan	Saccharum officinarumL.	Poaceae	G
9.	Kyeik-hman	Edipta-alba (L.)	Asteraceae	ST
10.	Ma-haw-gany	Swetenia macrophylla King	Meliaceae	T
11.	Maw-kauk-pa	Wendlandia ligustrinaWall.	Rubiaceae	ST
12.	Mawk-mu-le	Jasminum grandiflorumL.	Oleaceae	CL
13.	Mawk-hnangsi	Rosa giganteaCollett ex Crepin.	Rosaceae	CL
14.	Nalin-gyaw	Litsea lancifolia (Roxb. ex Nees)	Lauraceae	T
15.	Nay-kyar	Tithonia diversifoliaA. Gray	Asteraceae	S
16.	Palaw	Diospyros wallichii King&Gamble.	Ebenaceae	T
17.	Paukpan-byu	Sesbania grandiflora(L.)	Fabaceae	ST
18.	Phet-aung	Ficus obscuraBlume.	Moraceae	S
19.	Pyaung	Sorghum bicolor(L.)	Poaceae	G
20.	Sabalin	Cymbopogon citratus(DC.)	Poaceae	G
21.	Sa-nwin	Curcuma longaL.	Zingiberaceae	H
22.	Sat-thapoo	Pandanus odoratissimusL. f.	Pandanaceae	ST
23.	Sipwa-gamon	Aglaonema nitidumvar. helferi	Araceae Mangrove	H
24.	Ta-byet-si- ywet.gyi	Sida mysorensis Wight&Arn.	Malvaceae	H
25.	Than-man-naing- kyauk-ma-naing	Alysicarpus vaginalis(L.) Dc.	Fabaceae	S



26.	Thapan	Ficus glomerataRoxb.	Moraceae	T
27.	Thayin	Gomphostemma strobilinumvar.	Lamiaceae	H
28.	Thin-baw-ma-nyo-pan	Catharanthus roseus(L.)	Apocynaceae	S
29.	Wheatgrass	Thinopyrum intermedium (Host)	Poaceae	G

Aquatic, CL=Climber, Fern, Grass, H=Herbs, S=Shrubs, ST=Small Tree, T=Tree

Table 30. Cultivated Species in Indirect Impact Zone

No.	Common Name	Scientific Name	Family Name	Habitat
1.	Akyaw	Plumeria obtusaL.	Apocynaceae	S
2.	Gen-kaw	Premna bracteataWall.	Verbenaceae	T
3.	Htin-yu-pan	Prunus cerasoidesD. Don	Rosaceae	T
4.	Khar-daw-hmi	Grevillea robustaA. Cunn.	Proteaceae	T
5.	Khayay	Manilkara hexandra (Roxb.)	Sapotaceae	S
6.	Ko-kko	Samanea saman (Jacq.) Merr.	Mimosaceae	T
7.	Kyun	Tectona grandisL. f.	Verbenaceae	G
8.	Ma-ho-gany	Swetenia macrophylla King.	Meliaceae	T
9.	Mezali	Senna siamea (Lam.)	Caesalpinaceae	S
10.	Nyaung-ok	Ficus retusaL.	Moraceae	T
11.	Nyaung-thabye	Ficus tinctoriaG. Forst.	Moraceae	T
12.	Padok	Pterocarpus macrocarpusKurz.	Fabaceae	T
13.	Peinne	Artocarpus heterophyllusLam.	Moraceae	T
13.	Pon-nyet	Calophyllum inophyllumL.	Hypericaceae	T
14.	Saga-phyu	Michelia laceiW.W. Sm.	Magnoliaceae	T



15.	Seingpan-ni	Delonix regia (Bojer ex Hook.)	Caesalpiniaceae	T
16.	Tama	Azadirachta indicaA. Juss.	Meliaceae	T
17.	Taung-mayo	Alstonia scholaris (L.) R. Br	Apocynaceae	T
18.	Tha-bye	Syzygium grande(wight)Walp.	Myrtaceae	T
19.	Yuzana	Murraya paniculata (L.) Jack	Rutaceae	T

Aquatic, CL=Climber, Fern, Grass, H=Herbs, S=Shrubs, ST=Small Tree, T=Tree

Table 31. Species List in Direct Impact Zone

No.	Common Name	Scientific Name	Family Name	Habitat
1.	Baw-za-gaing	Leucaena leucocephala (Lam.)	Mimosaceae	T
2.	Dan-kywe	Cassia bicapsularisL.	Caesalpiniaceae	S
3.	Hmo-chin-gyi	Oxalis latifoliaH.B.K.	Oxalidaceae	H
4.	Hti-ka-yon	Mimosa pudica L.	Mimosaceae	H
5.	Kat-cho	Smilax griffithiiA. DC.	Smilacaceae	Cl
6.	Khwele-ya	Mucuna pruriens(L.)	Fabaceae	Cl
7.	Kinmun gyin	Acacia concinna DC.	Mimosaceae	Cl
8.	Kyan	Saccharum officinarumL.	Poaceae	G
9.	Kyeik-hman	Edipta-alba (L.)	Asteraceae	ST
10.	Ma-haw-gany	Swetenia macrophylla King	Meliaceae	T
11.	Maw-kauk-pa	Wendlandia ligustrinaWall.	Rubiaceae	ST
12.	Mawk-mu-le	Jasminum grandiflorumL.	Oleaceae	CL
13.	Mawk-hnangsi	Rosa giganteaCollett ex Crepin.	Rosaceae	CL
14.	Nalin-gyaw	Litsea lancifolia (Roxb. ex Nees)	Lauraceae)	T
15.	Nay-kyar	Tithonia diversifoliaA. Gray	Asteraceae	S



16.	Palaw	Diospyros wallichii King&Gamble.	Ebenaceae	T
17.	Paukpan-byu	Sesbania grandiflora (L.)	Fabaceae	ST
18.	Phet-aung	Ficus obscuraBlume.	Moraceae	S
19.	Pyaung	Sorghum bicolor (L.)	Poaceae	G
20.	Sabalin	Cymbopogon citratus(DC.)	Poaceae	G
21.	Sa-nwin	Curcuma longaL.	Zingiberaceae	H
22.	Sat-thapoo	Pandanus odoratissimusL. f.	Pandanaceae	ST
23.	Sipwa-gamon	Aglaonema nitidumvar.helferi	Araceae Mangrove	H
24.	Ta-byet-si- ywet.gyi	Sida mysorensis Wight&Arn.	Malvaceae	H
25.	Than-man- naing-kyauk- ma-naing	Alysicarpus vaginalis(L.) Dc.	Fabaceae	S
26.	Thapan	Ficus glomerataRoxb.	Moraceae	T
27.	Thayin	Gomphostemma strobilinumvar.	Lamiaceae	H
28.	Thin-baw-ma- nyo-pan	Catharanthus roseus(L.)	Apocynaceae	S
29.	Wa-u	Tacca leontopetaloides(L.)	Taccaceae	H
30.	Wheatgrass	Thinopyrum intermedium (Host)	Poaceae	G

Aquatic, CL=Climber, Fern, Grass, H=Herbs, S=Shrubs, ST=Small Tree, T=Tree

According to the investigation in the list of the International Union for Conservation of Nature (IUCN), there were no endanger and endemic species in the direct impact zone. The IUCN is an international organization dedicated to finding “pragmatic solutions to our most pressing environment and development challenges”. The organization publishes the **IUCN Red List of Threatened Species**, which assesses the conservation status of species.





Figure 30. Some Flora Species in Project Area

Table 32. Cultivated Species in Indirect Impact Zone

No.	Common Name	Scientific Name	Family Name	Habitat
1.	Akyaw	Plumeria obtusaL.	Apocynaceae	S
2.	Gen-kaw	Premna bracteataWall.	Verbenaceae	T
3.	Htin-yu-pan	Prunus cerasoidesD. Don	Rosaceae	T
4.	Khar-daw-hmi	Grevillea robustaA. Cunn.	Proteaceae	T
5.	Khayay	Manilkara hexandra(Roxb.)	Sapotaceae	S

6.	Ko-kko	Samanea saman (Jacq.) Merr.	Mimosaceae	T
7.	Kyun	Tectona grandisL. f.	Verbenaceae	G
8.	Ma-ho-gany	Swetenia macrophylla King.	Meliaceae	T
9.	Mezali	Senna siamea(Lam.)	Caesalpinaceae	S
10.	Nyaung-ok	Ficus retusaL.	Moraceae	T
11.	Nyaung-thabye	Ficus tinctoriaG. Forst.	Moraceae	T
12.	Padok	Pterocarpus macrocarpusKurz.	Fabaceae	T
13.	Peinne	Artocarpus heterophyllusLam.	Moraceae	T
13.	Pon-nyet	Calophyllum inophyllumL.	Hypericaceae	T
14.	Saga-phyu	Michelia laceiW.W. Sm.	Magnoliaceae	T
15.	Seingpan-ni	Delonix regia(Bojer ex Hook.)	Caesalpinaceae	T
16.	Tama	Azadirachta indicaA. Juss.	Meliaceae	T
17.	Taung-mayo	Alstonia scholaris(L.) R. Br	Apocynaceae	T
18.	Tha-bye	Syzygium grande(wight)Walp.	Myrtaceae	T
19.	Yuzana	Murraya paniculata(L.) Jack	Rutaceae	T

Aquatic, CL=Climber, Fern, Grass, H=Herbs, S=Shrubs, ST=Small Tree,T=Tree

According to the investigation in the list of the International Union for Conservation of Nature (IUCN), there were no endanger and endemic species in the direct impact zone. The IUCN is an international organization dedicated to finding “pragmatic solutions to our most pressing environment and development challenges”. The organization publishes the **IUCN Red List of Threatened Species**, which assesses the conservation status of species.



Table 33. Cultivated Species in Direct Impact Zone

No.	Scientific Name	Common Name	Family Name	Habit
1	<i>Acalypha indica</i> L.	Kyaung-say-pin	Euphorbiaceae	S
2	<i>Acanthus ilicifolius</i> L.	Kha-yar	Acanthaceae	S
3	<i>Achyranthesaspera</i> L.	Kyet-mauk-sue-pyan	Amaranthaceae	H
4	<i>Achyranthesbidentata</i> Bl.	Kyet-mauk-sue-pyan	Amaranthaceae	H
5	<i>Acmella calva</i> (DC.) R.K. Jansen	Pe-le-nyin	Asteraceae	H
6	<i>Acroceohalus axillaris</i> Benth.	Sein-na-gyet	Lamiaceae	H
7	<i>Adiantum trapeziforme</i>	Not known	Adiantaceae	Fern
8	<i>Aeschynomene indica</i> L.	Not known	Fabaceae	S
9	<i>Ageratum conyzoides</i> L.	Khwe-thay-pan	Asteraceae	H
10	<i>Albizia lebbek</i> (L.) Benth.	Bama-kokko	Mimosaceae	T
11	<i>Alocasia macrorrhizos</i> (L.)G.Don	Pein	Araceae	H
12	<i>Alpinia conchigera</i> Griff.	Pa-de-gaw-gyi	Zingiberaceae	H
13	<i>Alternanthera nodiflora</i> R.Br.	Ka-na-phaw-yaing	Amaranthaceae	H
14	<i>Alternanthera sessilis</i> (L.) R.Br.	Pa-zun-sar-yaing	Amaranthaceae	H
15	<i>Alysicarpus ovalifolius</i> (Schum.) J. Leonard	Not known	Fabaceae	S
16	<i>Alysicarpus vaginalis</i> (L.) Dc.	Than-ma-naing-kyauk-ma-naing	Fabaceae	S
17	<i>Ampelocissus barbata</i> Planch.	Sa-byit-yaing	Vitaceae	CL
18	<i>Angelonia cornigera</i> Hook.	Ye-hmwe-pan	Scrophulariaceae	H
19	<i>Anisomeles ovata</i> R.Br.	Kyet-gaung-chake	Lamiaceae	H
20	<i>Annona squamosa</i> L.	Aw-za	Annonaceae	ST
21	<i>Artocarpus heterophyllus</i> Lam.	Pein-ne	Moraceae	T
22	<i>Atylosia crassa</i> Prain	Taw-pe-di-sein	Fabaceae	CL
23	<i>Azadirachta indica</i> A.Juss.	Ta-ma	Meliaceae	ST



24	<i>Bauhinia acuminata</i> L.	Swe-daw	Caesalpiniaceae	ST
25	<i>Bombax ceiba</i> L.	Let-pan	Bombacaceae	ST
26	<i>Caladium bicolor</i> (L.)Vent.	Pein-kyar	Araceae	H
27	<i>Caladium humboldtii</i>	Pein-kyar	Araceae	H
28	<i>Calophyllum inophyllum</i> L.	Pon-nyet	Hypericaceae	ST
29	<i>Canavalia cathartica</i>	Khwe-lae-ya	Fabaceae	CL
30	<i>Cassia fistula</i> L.	Ngu	Caesalpiniaceae	ST
31	<i>Cassia occidentalis</i> L.	Ka-zaw-poke	Caesalpiniaceae	S
32	<i>Cassytha filiformis</i> L.	Shwe-nwee	Lauraceae	CL
33	<i>Cayratia trifolia</i> (L.) Domin	Not known	Vitaceae	CL
34	<i>Ceiba pentandra</i> Gaertn.	Le-hmoe	Bombacaceae	ST
35	<i>Chloris barbata</i> Sw.	Lay-gya-myet	Poaceae	Grass
36	<i>Chromolaena odorata</i> (L.) R.M. King & H Robinson	Bi-zet	Asteraceae	S
37	<i>Chrysopogon acicularis</i> (Retz.) Trin	Nauk-poe-myet	Poaceae	Grass
38	<i>Citharexylum suberratum</i> Sw.	Gaw-tha-zin	Verbenaceae	T
39	<i>Cleome burmanii</i> Wight & Arn.	Taw-hin-galar	Capparaceae	H
40	<i>Clerodendrum inerme</i> Gaertn.	Taw-kyaung-pan	Verbenaceae	S
41	<i>Coccinia grandis</i> (L.) J. Voigh.	Kin-pon	Cucurbitaceae	CL
42	<i>Cocos nucifera</i> L.	Ohn	Arecaceae	T
43	<i>Codiaeum variegatum</i> (L.)Blume	Ywet-hla-pan	Euphorbiaceae	S
44	<i>Colocasia antiquorum</i> Schott.	Pein	Araceae	H
45	<i>Colocasia esculnta</i> (L.)Schott	Pein	Araceae	H
46	<i>Commelina bengalensis</i> L.	Wet-kyut	Commelinaceae	H
47	<i>Commelina nudiflora</i> L.	Myet-kyut	Commelinaceae	H
48	<i>Corchorus oleriorius</i> L.	Pilaw-yaing	Tiliaceae	S
49	<i>Cordia myxa</i> L.	Tha-nat	Boraginaceae	ST
50	<i>Costus speciosus</i> Sm.	Pha-lan-taung- hmwe	Costaceae	H
51	<i>Crateva adansonii</i> DC.	Ka-det	Capparaceae	ST



52	<i>Crinum</i> sp.	Not known	Amaryllidaceae	H
53	<i>Crotalaria mucronata</i> L.	Taw-paik-san	Fabaceae	S
54	<i>Curcuma</i> sp.	Ma-lar	Zingiberaceae	H
55	<i>Cyanthillium cinereum</i> (L.) H. Robinson	Ka-du-byan	Asteraceae	H
56	<i>Cyperus exaltatus</i> Retz	Not known	Cyperaceae	H
57	<i>Dactyloctenium aegyptium</i>	Not known	Poaceae	Grass
58	<i>Derris trifoliata</i> Lour.	Mi-chaung-pan	Fabaceae	CL
59	<i>Desmodium triflorum</i> DC.	Not known	Fabaceae	CL
60	<i>Dioscorea sativa</i> L.	Myauk-u	Dioscoreaceae	CL
61	<i>Dolichandrone spathacea</i> (L. f.) K. Schum.	Tha-khut	Bignoniaceae	ST
62	<i>Dolichos tetragonolobus</i> L.	Pe-zaung-yar	Fabaceae	CL
63	<i>Drynaria fortunei</i> (Kunze)J.Sm.	Not known	Polypodiaceae	Fern
64	<i>Eclipta alba</i> (L.) Hassk.	Kyeik-hman	Asteraceae	H
65	<i>Eichhornia crassipes</i> (Mart.) Solms	Be-da	Pontederiaceae	Aquat ic
66	<i>Elephantopus scaber</i> L.	Taw-monla	Asteraceae	H
67	<i>Eleusine indica</i> Gaertn.	Sin-ngo-myet	Poaceae	Grass
68	<i>Eragrostis papposa</i> Duf.	Not known	Poaceae	Grass
69	<i>Eragrostis tremula</i> Hochst. ex. Steud.	Not known	Poaceae	Grass
70	<i>Erythrina</i> sp.	Ka-thit	Fabaceae	ST
71	<i>Euphorbia hypericifolia</i> L.	Seik-noe-ma-htwet	Euphorbiaceae	H
72	<i>Euphorbia thymifolia</i> L.	Mye-na-ga	Euphorbiaceae	H
73	<i>Evolvulus nummularius</i> L.	Kyauk-kwe	Convolvulaceae	H
74	<i>Excoecaria agallocha</i> L.	Tha-yaw	Euphorbiaceae	ST
75	<i>Ficus hispida</i> L.	Kha-aung	Moraceae	ST
76	<i>Ficus racemosa</i> L.	Kon-tha-phan	Moraceae	ST
77	<i>Ficus religiosa</i> L.	Baw-di-nyaung	Moraceae	ST
78	<i>Fimbristylis ferruginea</i> Vahl.	Not known	Cyperaceae	H
79	<i>Flagellaria indica</i> L.	Myauk-kyein	Flagellariaceae	CL



80	<i>Flueggea leucopyrus</i> Willd	Chin-ya	Euphorbiaceae	S
81	<i>Gardenia lucida</i> Roxb.	Zi-za-war	Rubiaceae	S
82	<i>Glochidion</i> sp.	Hta-ma-soke	Euphorbiaceae	S
83	<i>Gymnopetalum conchinchinense</i> Kurz	Sar-tha-kwar	Cucurbitaceae	CL
84	<i>Hedyotis diffusa</i> Willd.	Not known	Rubiaceae	H
85	<i>Heliotropium indicum</i> L.	Sin-hna-maung	Boraginaceae	H
86	<i>Hibiscus esculentus</i> L.	Yon-padi	Malvaceae	S
87	<i>Hibiscus sabdariffa</i> L.	Chin-paung-ni	Malvaceae	S
88	<i>Hibiscus similis</i> Blum.	Tha-man	Malvaceae	ST
89	<i>Hibiscus surratensis</i> L.	Chin-paung-phyu	Malvaceae	S
90	<i>Hygrophila phlomoides</i> Nees	Mi-chaung-kun- phet	Acanthaceae	S
91	<i>Hyptis suaveolens</i> (L.) Poit.	Pin-sein-yaing	Lamiaceae	H
92	<i>Indigofera miniata</i> L.	Not known	Fabaceae	CL
93	<i>Ipomoea aquatica</i> Forssk.	Ye-ka-zun	Convolvulaceae	Aquat ic
94	<i>Ipomoea batatas</i> Lam.	Ka-zun-gyi	Convolvulaceae	CL
95	<i>Ipomoea fistulosa</i> Mart.ex Choisy	La-tha-ka-zun	Convolvulaceae	CL
96	<i>Ipomoea pilosa</i> Sweet	Ka-zun-nwee	Convolvulaceae	CL
97	<i>Ipomoea sagittata</i> Poir.	Kon-ka-zun	Convolvulaceae	H
98	<i>Ipomoea violacea</i> L.	Kyet-thon-pin	Convolvulaceae	CL
99	<i>Jasminum</i> sp.	Sa-be	Oleaceae	S
100	<i>Jatropha curcas</i> L.	Chan-si-yoe-kyet- su	Euphorbiaceae	S
101	<i>Jussiaea suffruticosa</i> L.	Taw-lay-nyin	Onagraceae	H
102	<i>Justica oreophila</i> Clarke.	Nat-pan-nyo	Acanthaceae	S
103	<i>Kyllinga melanosperma</i> Nees.	Thone-daunt-myet	Cyperaceae	H
104	<i>Lagerstroemia macrocarpa</i> Kurz	Pin-ma-ywet-gyi	Lythraceae	T
105	<i>Lagerstroemia speciosa</i> (L.) Pers.	Pyin-ma-ywet-thay	Lythraceae	T



106	<i>Lawsonia inermis</i> L.	Dan-gyi	Lythraceae	S
107	<i>Lemna minor</i> L.	Duck week	Lemnaceae	Aquat ic
108	<i>Leucaena leucocephala</i> (Lam.) De.Wit	Baw-za-gaing	Mimosaceae	ST
109	<i>Lindernia antipoda</i> (L.) Alston	Not known	Scrophulariaceae	H
110	<i>Lindernia ciliata</i> Colsm.) Pennell	Not known	Scrophulariaceae	H
111	<i>Lindernia crustacea</i> (L.) F.Muell.	Not known	Scrophulariaceae	H
112	<i>Livistona</i> sp.	Taung-htan	Arecaceae	ST
113	<i>Luffa aegyptiaca</i> Mill.	Tha-but-kha	Cucurbitaceae	CL
114	<i>Lycopersicon esculentum</i> Mill.	Kha-yan-chin	Solanaceae	CL
115	<i>Malachra capitata</i> L.	Sin-ma-hmwe- soke	Malvaceae	S
116	<i>Mangifera indica</i> L.	Tha-yet	Anacardiaceae	T
117	<i>Melanthera biflora</i> (L.) Wild	Not known	Asteraceae	CL
118	<i>Mikania micrantha</i> H.B.K.	Bi-zet-new	Asteraceae	CL
119	<i>Millettia</i> sp.	win-u	Fabaceae	CL
120	<i>Mimosa diplotricha</i> C.	Japan-hti-ka-yon	Mimosaceae	H
121	<i>Mimosa pudica</i> L.	Hti-ka-yon	Mimosaceae	H
122	<i>Mimusops elengi</i> L.	Kha-yae	Sapotaceae	ST
123	<i>Momordica charantia</i> L.	Kyet-hin-kha	Cucurbitaceae	CL
124	<i>Monochoria hastaefolia</i> Presl	Le-pa-dauk	Pontederiaceae	Aquat ic
125	<i>Monochoria vaginalis</i> (Presl) Kunth	Ka-dauk-set	Pontederiaceae	Aquat ic
126	<i>Morinda angustifolia</i> Roxb.	Ye-yo	Rubiaceae	ST
127	<i>Moringa pterygosperma</i> Gaertn.	Dan-tha-lun	Moringaceae	ST
128	<i>Muntingia calabura</i> L.	Japan-zi	Tiliaceae	ST
129	<i>Musa malaccensis</i> Ridl.	Phi-gyan-nget- pyaw	Musaceae	H



130	<i>Musa sapientum</i> L.	Yakhaing-nget-pyaw	Musaceae	H
131	<i>Mussaenda erythrophylla</i> Schum.&Thonn.	Pwint-tu-ywet-tu	Rubiaceae	ST
132	<i>Nymphaea nouchali</i> Byrn. f.	Kyar-phyu	Nymphaeaceae	Aquatic
133	<i>Nymphaea pubescens</i> Willd.	Kyar-ni	Nymphaeaceae	Aquatic
134	<i>Nypa fruticans</i> Wurm	Da-ni	Arecaceae	ST
135	<i>Oldenlandia corymbosa</i> L.	Su-la-na-pha	Rubiaceae	H
136	<i>Operculina turpethum</i> (L.) Silva Mansa	Kyar-hin-nwee	Convolvulaceae	CL
137	<i>Oroxylum indicum</i> (L.) Kurz.	Kyaung-sha	Bignoniaceae	ST
138	<i>Paspalidium flavidum</i> Retz.	Not known	Poaceae	Grass
139	<i>Passiflora foetida</i> L.	Taw-su-ka	Passifloraceae	CL
140	<i>Peltophorum pterocarpum</i> (DC.) Back.ex K.	English-me-za-li	Caesalpiniaceae	T
141	<i>Peperomia pellucida</i> (L.) H.B.K.	Thit-yay-gyi	Piperaceae	H
142	<i>Phaseolus calcaratus</i> Roxb.	Pe-yin	Fabaceae	CL
143	<i>Phyllanthus maderaspatensis</i> L.	Myay-zi-phyu	Euphorbiaceae	H
144	<i>Phyllanthus niruri</i> L.	Kyet-tha-hin	Euphorbiaceae	S
145	<i>Phyllanthus urinaria</i> L.	Myay-zi-phyu	Euphorbiaceae	H
146	<i>Physalis minima</i> L.	Bauk-thi-pin	Solanaceae	H
147	<i>Pistia stratiotes</i> L.	Ye-za-lat	Araceae	Aquatic
148	<i>Pithecellobium dulce</i> (Roxb.)Benth.	Kala-ma-gyi	Mimosaceae	ST
149	<i>Pluchea indica</i> (L.)Less.	Kha-ru	Asteraceae	S
150	<i>Pontederia</i> sp.	Not known	Pontederiaceae	H
151	<i>Portulaca grandiflora</i> Hook.	Taing-lon-chantha	Portulacaceae	H
152	<i>Portulaca oleracea</i> L.	Myay-byit	Portulacaceae	H
153	<i>Psidium guajava</i> L.	Ma-la-kar	Myrtaceae	ST
154	<i>Saccharum officinarum</i> L.	Kyan	Poaceae	Grass



155	<i>Saccharum spontaneum</i> L.	Kaing	Poaceae	Grass
156	<i>Samanea saman</i> (Jacq.) Merr.	Ko-kko	Mimosaceae	T
157	<i>Scoparia dulcis</i> L.	Dan-na-thu-kha	Scrophulariaceae	H
158	<i>Senna alata</i> L.	Pwe-say-mezali	Caesalpiniaceae	S
159	<i>Senna siamea</i> (Lam.) Irwin & Barneby	Me-za-li	Caesalpiniaceae	T
160	<i>Senna tora</i> (L.) Roxb	Dan-gywe	Caesalpiniaceae	S
161	<i>Sesbania grandiflora</i> (L.)Poir.	Pauk-pan-phyu	Fabaceae	ST
162	<i>Sesbania paludosa</i> Roxb.	Nyan	Fabaceae	S
163	<i>Sida acuta</i> Burm f	Ta-byet-si-ywet-shae	Malvaceae	S
164	<i>Sida mysorensis</i> Wight & Arn.	Ta-byet-si-ywet-gyi	Malvaceae	S
165	<i>Sida rhombifolia</i> L.	Ta-byet-si-ywet-wine	Malvaceae	S
166	<i>Smithia sensitiva</i> Ait.	Nwa-hta-min	Fabaceae	S
167	<i>Solanum torvum</i> Swartz	Kha-yan-ka-zawt	Solanaceae	S
168	<i>Sonneratia apetala</i> Buch.-Ham	Kat-ma-lar	Sonneratiaceae	T
169	<i>Sonneratia caseolaris</i> (L.)Engl.	La-mu	Sonneratiaceae	T
170	<i>Sphenoclea zeylanica</i> Gaertn.	Le-pa-du	Sphenocleaceae	Aquat ic
171	<i>Streblus asper</i> Lour.	Ohn-hne	Moraceae	S
172	<i>Swetenia macrophylla</i> King	Ma-ho-gany	Meliaceae	ST
173	<i>Synedrella nodiflora</i> (L.) Gaertn.	Bi-zet-pho	Asteraceae	S
174	<i>Syngonium podophyllum</i> Schott	Mai-daw-gyi-gamon	Araceae	CL
175	<i>Syzygium grande</i> (Wight) Walp	Tha-bye	Myrtaceae	ST
176	<i>Tamarindus indica</i> L.	Ma-gyi	Caesalpiniaceae	T
177	<i>Terminalia catappa</i> L.	Ban-da	Combretaceae	T
178	<i>Trema orientalis</i> (L.) Blume	Khwe-sha	Urticaceae	ST
179	<i>Trichosanthes cordata</i> Roxb.	Kyi-ah	Cucurbitaceae	CL



180	<i>Triumfetta bartramia</i> L.	Ket-si-nae-thay	Tiliaceae	S
181	<i>Tylophora flexuosa</i> R.Br.	Not known	Asclepiadaceae	CL
182	<i>Urea lobata</i> L.	Ket-si-nae-gyi	Malvaceae	S
183	<i>Urtica dioca</i> L.	Phet-yar-lay	Urticaceae	H
184	<i>Urtica nivea</i> L.	Phet-ya-gyi	Urticaceae	H
185	<i>Utricularia</i> sp.	Not known	Lentibulariaceae	Aquatic
186	<i>Vignapeduncularis</i> (Kunth)Fawc. &Rendle	Taing-taung-pe	Fabaceae	CL
187	<i>Vitex trifolia</i> L.	Kyaung-pan	Verbenaceae	S
188	<i>Vitis japonica</i> Thunb.	Yin-hnaung	Vitaceae	CL
189	<i>Wattakaka volubilis</i> (L. f.) Stapf.	Gwe-dauk	Asclepiadaceae	CL
190	<i>Zea mays</i> L.	Pyaung-phu-pin	Poaceae	Grass
191	<i>Zizyphus jujuba</i> Lam.	Zi	Rhamnaceae	ST

Aquatic, CL=Climber, Fern, Grass, H=Herbs, S=Shrubs, ST=Small Tree, T=Tree

According to the above table, there are 14 tree species, 32 small tree species, 38 shrubs, 54 herbs, 31 climbers, 10 grass, 2 ferns and 10 aquatics within the study area. According to the investigation in the list of the International Union for Conservation of Nature (IUCN), there were no endanger and endemic species in the direct impact zone



Leucaena leucocephala



Cymbopogon citratus



Samanea saman



Bauhinia acuminata



Codiaeum variegatum



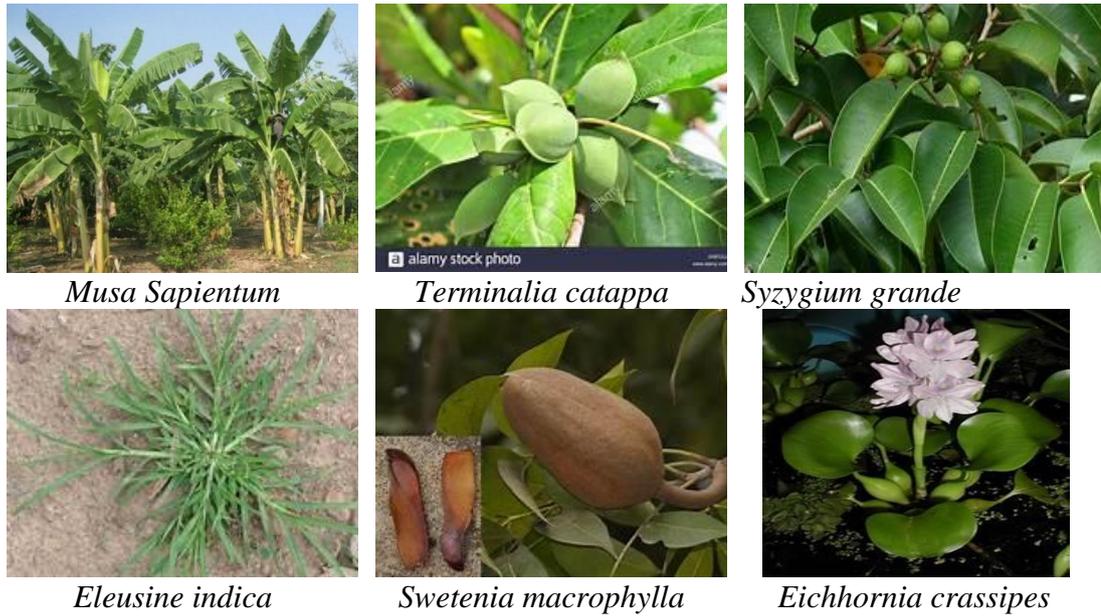


Figure 31. Some Flora Species in Project Area



Figure 32. Some Flora Species in the Garden Redevelopment Project

3.6.3.3 Impacts on Flora

There is no or little impact in the project area since the area lies within already cleaned up compound. However, the aquatic vegetation along the river

bank in the indirect impact zone should be conserved since it is the key habitat for the aquatic animals including fishes. Since aquatic animals are ecologically sensitive species, periodic salt water intrusion is essential in aquatic vegetation growing area.

3.6.3.4 Mitigation of impacts on flora

1. To establish a plan to restore and replant for green belt.
2. To establish a plan to aid the socio-economic and livelihood of local people.

3.6.3.5 Monitoring

1. Seasonal investigation of water parameters must be tested.
2. Reproductive performance of birds' fauna in the project must be investigated.

3.6.3.6 Discussion and Conclusion for Flora

The project area lies within the site compound which had been already cleaned up. For this reason, there is no natural vegetation in the direct impact zone. Only the cultivated species were collected in this zone. No endangered species were identified in the area.

However, in the indirect zone, there is an area of ecologically sensitive aquatic species and its associates. Aquatic plants habitat is a key to the aquatic animals. The maintenance of aquatic area is the key issue for this area.

All the habitats recorded on site are widespread within the landscape and low species-richness. There are very limited areas of scrub or other habitat types. No active endanger species of flora and fauna recorded in site.

A few places looked like a small jungle in indirect impact zone. And also, road lied beside the project area. Most of the Study Area, particularly the area to be directly affected by the proposed Project is highly urbanised and degraded by existing and on-going development, including buildings, roads and drainage channels.



However, in Kajima project plan, five gardens can help to support local flora and fauna. Planting may provide additional habitats and migration routes for local animals like a protective area.

The proposed construction works would be conducted in the developed area which is considered of very low ecological value. No direct or indirect impacts on terrestrial habitats and the inhabiting wildlife would be resulted from the operation of the Project.

3.7 SOCIO-ECONOMIC COMPONENTS

Socio-economic factors are lifestyle components and measurements of both financial viability and social standing. They directly influence social privilege and levels of financial independence. Factors such as health status, income, environment and education are studied by sociologists in terms of how they each affect human behaviors and circumstances.

3.7.1 Living conditions

3.7.1.1 Population, Households and Average Household Size

The project area is located at the corner of Sa Yar San road and Yankin road, Yankin Township, Eastern District of Yangon Region. The nearby study area includes Yankin (1), Yankin (2), Saya San North-East and Yankin (16) wards. As Yankin is one of the most populated township in Yangon Region, the population and number of households in the conducted survey is quite large. The total number of populations in the study area goes beyond 20,000 with the 4519 of total households. The largest ward is Yankin (16) with total households of 1447 and the smallest ward is Yankin (1) with 423 households. The following table and figure show the population, households and average household size in the study area compared to that of Union, Bahan township and Yankin township.

Table 34. Household Numbers in the Study Area

Sr	Ward	Population	Households	Avg House hold size
1	Ward 1	2141	423	5.06
2	Ward 16	7082	1447	4.89



3	Ward 2	4642	1228	3.78
4	Sa Yar San (North/East)(W)	6474	1421	4.56
Total		20339	4519	

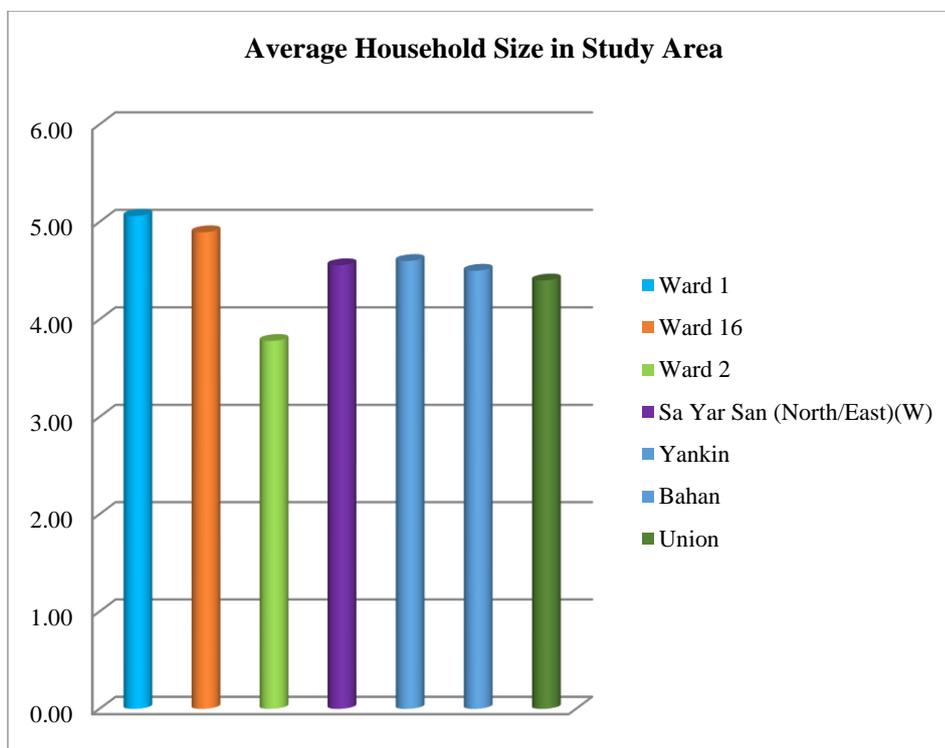


Figure 33. Household Numbers in the Study Area

The average household size in the study area is shown in the above table and figure. All the wards have nearly the same of population per household compared to that of Yankin Township (4.4). For the whole study area, average household size is about 4.6 people per household which is remarkably higher than the household sizes of Myanmar (4.4). Yankin (2) ward has the smallest household size with 3.78 while Yankin (1) ward has the largest household size with 5.06 while the other two wards have average household of 4.89 and 4.56.



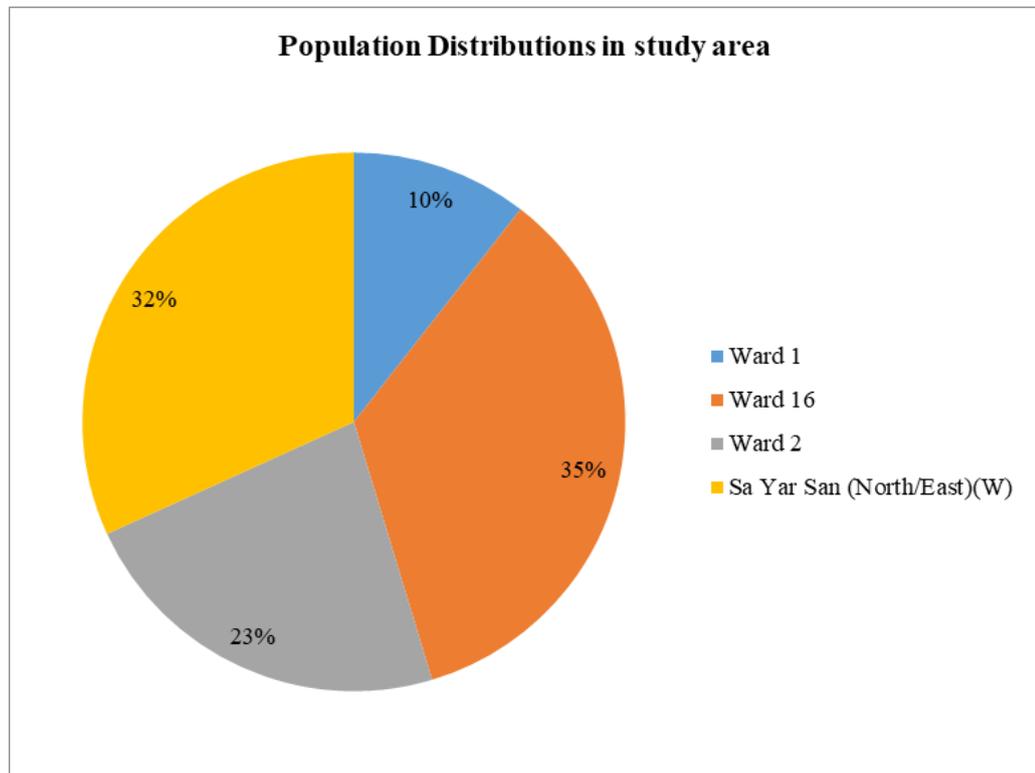


Figure 34. Population Distributions in the Study Area

3.7.1.2 Gender Distributions

The gender distributions in the study area is depicted in the Table 35 and figure 35. The referenced data are collected from the Yankin township report, the 2014 Myanmar population and housing census published by Depart of population in October 2017.

Table 35. Total Population and Gender Distributions in the Study Area

Ward	Total	Males	Females
Ward 1	2141	988	1153
Ward 16	7082	3261	3821
Ward 2	4642	1893	2749
Sa Yar San (North/East)(W)	6474	2790	3684



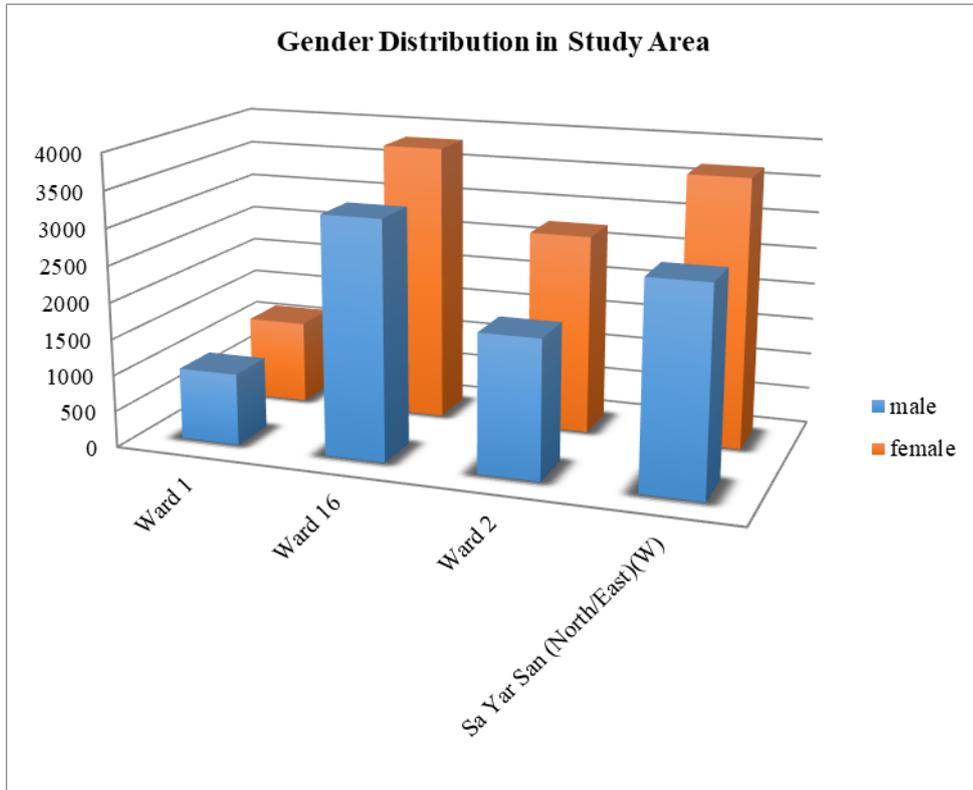


Figure 35. The Gender Distributions in the Study Area

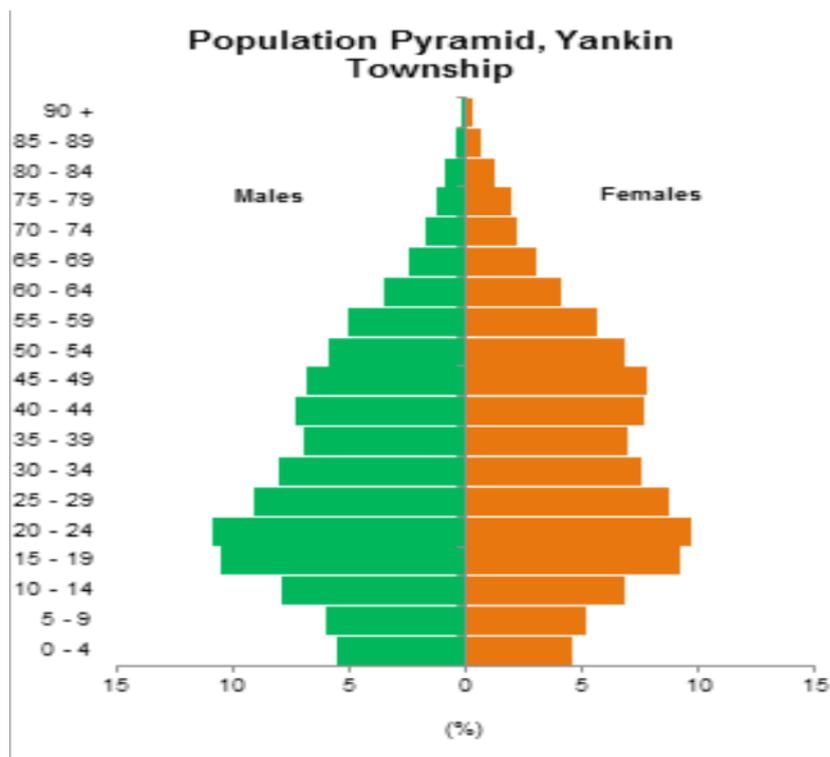


Figure 36. Population Pyramid of Yankin Twonship



Total number of populations in the study area is depicted in Population Matrix. The matrix shows the distribution of both sexes (male and female) counted by their age (0 to 100). According to the matrix, the highest number of populations in both sexes is young and reproductive age, 20-24 and the older population, age 65 and above, is the lowest.

3.7.2 Employment

3.7.2.1 Dependency Ratio and Occupation Distribution

Income is money that an individual or business receives in exchange for providing the goods or service or through investing capital. Income is consumed to fuel day-to-day expenditures. Most people age 65 and under receive the majority of their income from a salary or wages earned from a job.

The total dependency ratio tells the proportion of the population not in the work-force who are 'dependent' on those of working-age, it's a calculation which groups those aged under 15 with those over 65 years as the 'dependents' and classifying those aged 15-64 years as the working-age population. Dependency ratio is a measure of the portion of a population which is composed of dependents (people who are too young or too old to work). The dependency ratio is equal to the number of individuals aged below 15 or above 64 divided by the number of individuals aged 15 to 64, expressed as a percentage. The following pie chart shows age distribution of study area.

Table 36. Age Group Distribution in the Study Area

Age Group	Population
Schooling Age 0-14	12,687
Working Age 15-64	52,469
Depending Age 65+	5,790

According to Myanmar Census 2014 report of Yankin and Bahan Townships, total population is grouped into three major age groups, schooling age, working age and depending Age. Table 36 shows the population of these three age groups and Figure 37 is the distributions of age groups by percentages basic.



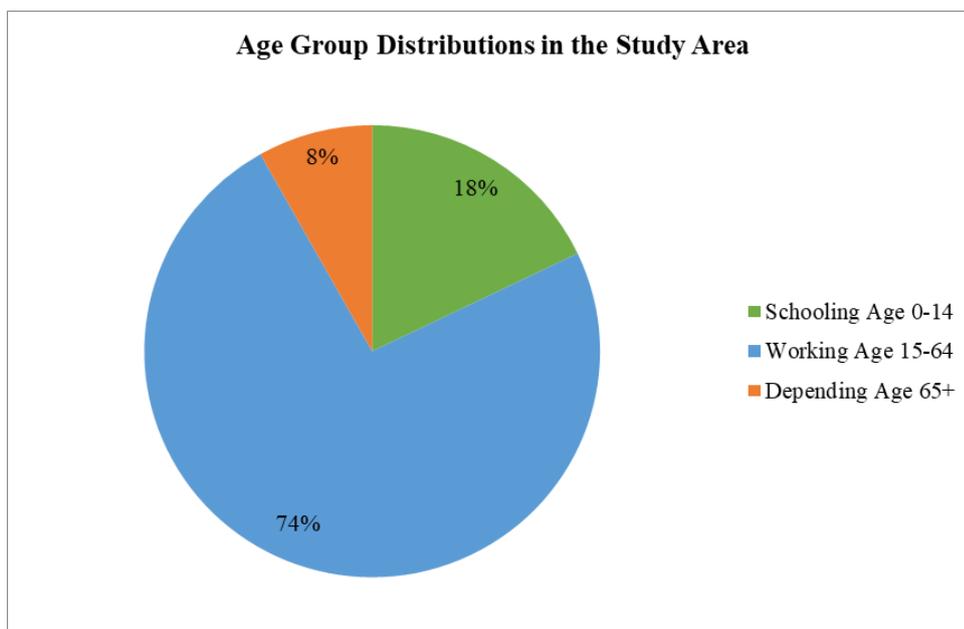


Figure 37. Age Group distributions in the Study Area

The percentage of children (age under 15 years)	= 18 %
The older population (aged 65+)	= 8 %
The working-age population (age 15-64 years)	= 74 %
Dependency ratio	= $((18+8))/74 \times 100$ =35.135135

So, in theory, roughly 74 percents of the population is working-age and supporting the other 26 percents of the population, who are either children or retired. The higher the dependency ratio, the more people who are not of working age and the fewer the labor force is.

Table 37 is the descriptive table of occupation of entire population in the study area including dependent people, schooling children and ill-health baseline data of employment and occupation distributions of the two study area according to Myanmar 2014 census reports the Yankin and Bahan township. According to Figure 38 and Figure 39, the pie charts of targeted study area, the most employed section is private employee with around 25% in Yankin Township and nearly 29% in Bahan Township.

The household workers take the second largest portion with approximately 18.6% in Yankin and 15% in Bahan Township. Own account workers such as private taxi drivers, house shops and pedestrian workers get the percentages of 12 in both Yankin and Bahan Townships.



Table 37. Occupation Distributions in the Study Area

Types of Occupations	Yankin Township	Bahan Township
Employee (government)	5027	5683
Employee (private)	15967	25565
Employer	1221	2641
Own account worker	7582	10672
Unpaid family worker	1072	2365
Sought work	1703	1980
Did not seek work	334	313
Full time student	8957	11021
Household worker	11802	13195
Pensioner, retired, elderly	6077	7112
Ill, disabled	436	492
Other	3268	7427
Total	63446	88466

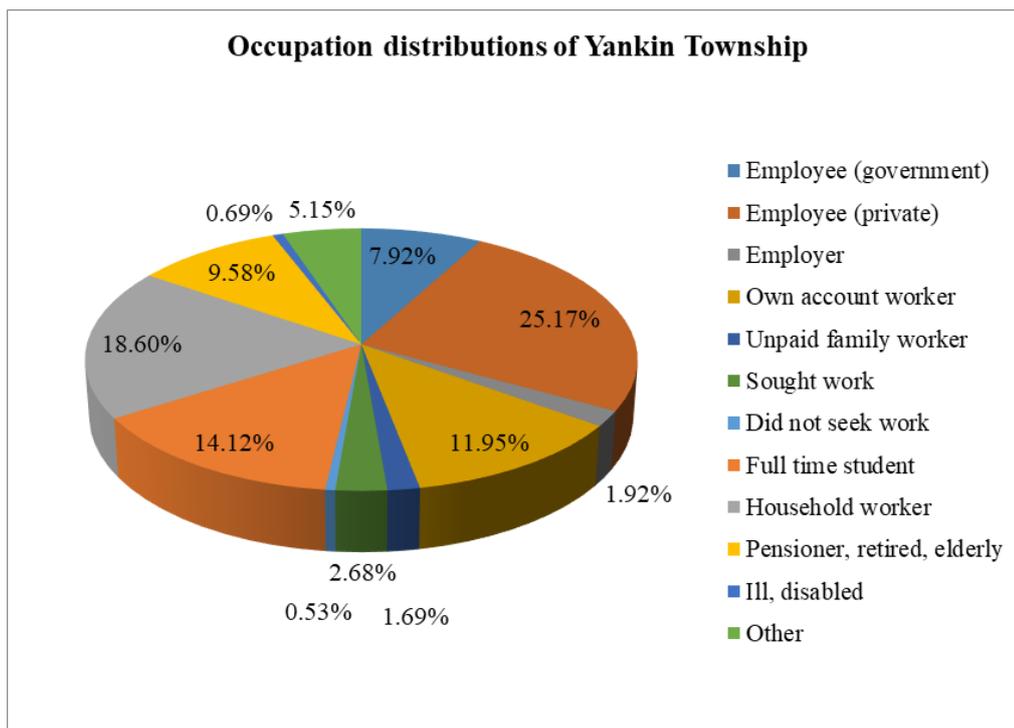


Figure 38. Occupation Distributions in the Study Area (Yankin Township)



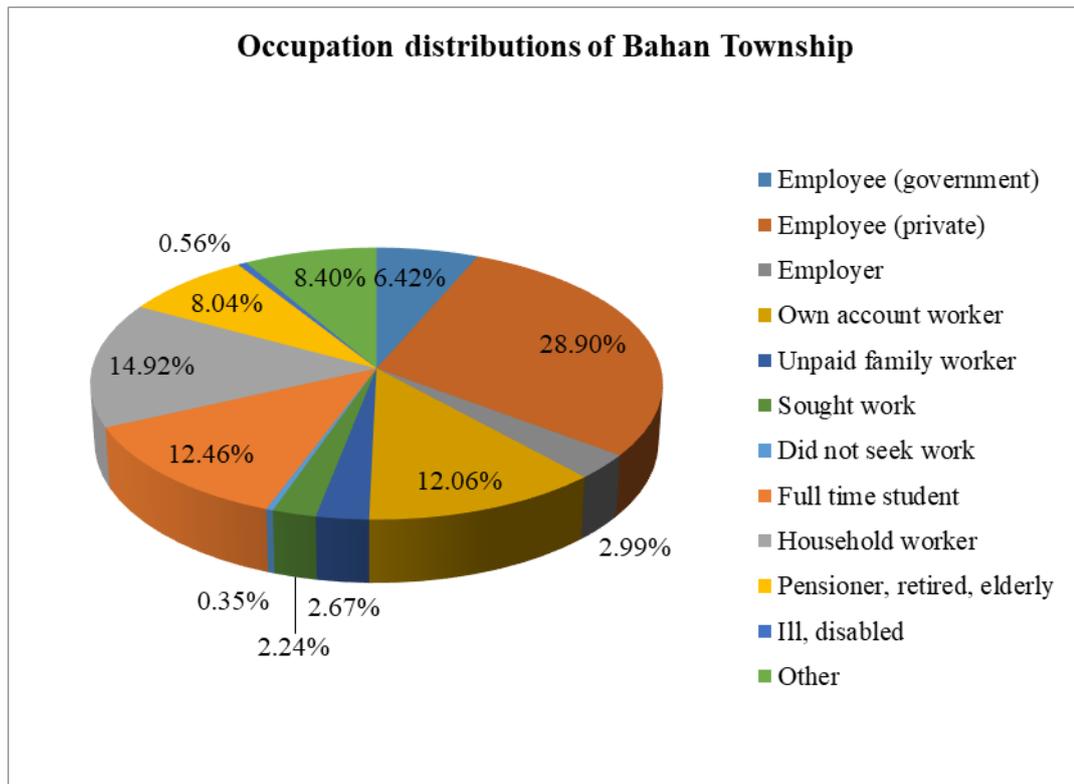


Figure 39. Occupation Distributions in the Study Area (Bahan Township)

According to the pie charts, the full-time students and elderly percentages in both townships take nearly 26% of total population. Together these two age groups which are solely dependent on other age groups sum up more than thirteen percentage of total population in the area. More than 23% of the people living in the study area fall under the age group of 16 years to 64 years. This group is mainly consisting of workforces of local community.

3.7.2.2 Employment

Private employee is the most conspicuous living with about 25 to 29 percents of the people in two townships. Second most dominant type is household workers with about 15% in Bahan and 19 percents in Yankin Township. Approximately 22% of the people in the two resident areas are working in family business, running private business and pedestrian workers.

Table 38 is the labor force participation rate and unemployment rate by sex and age group according to Myanmar census 2014 report. Labor force participation rate for the population aged 15-64 in Yankin Township is 60.4%. The labor force participation rate of females is 47.5% and is much lower than that of their male counterparts which is 75.6%. In Yankin Township, labour force participation rate for the population aged



10-14 is 6.2%. The unemployment rate for those aged 15-64 in Yankin Township is 5.3%. There is not much difference between the unemployment rate for males (5.6%) and for females (4.8%). The unemployment rate for young females aged 15-24 is 10.7%.

Table 38. Labor Force Participation and Unemployment Rate by Sex and Age Group

Age Group	Labor Force Participation Rate			Unemployment Rate		
	Total	Males	Females	Total	Males	Females
10 14	6.2	5.7	6.8	9.9	13.6	6.8
15 - 19	36	39	33	9.3	11.4	7
20 - 24	67.4	71.4	63.5	12.6	12.7	12.6
25-29	74.5	86	64.2	7.6	8.6	6.4
30-34	70.5	89.8	53	5	5.8	3.9
35-39	69.2	90.2	51.2	3.1	3.5	2.5
40-44	68.4	90.5	50	1.9	2.4	1.1
45-49	63.5	87.4	45.5	1.6	2.3	0.7
50-54	58.9	82.2	41.7	0.8	1.2	0.2
55-59	51.3	74.1	33.7	0.8	1	0.4
60-64	29.6	46.5	17.3	0.2	0.2	0.4
65-69	16.8	30.2	7.7	-5.6	0	0
70-74	8.5	15.4	4	0.8	0	2.9
75+	4.07	7.4	2.2	2	1.5	2.9
15-24	52	55.4	48.6	11.5	12	10.7
15-64	60.4	75.6	47.5	5.3	5.6	4.8

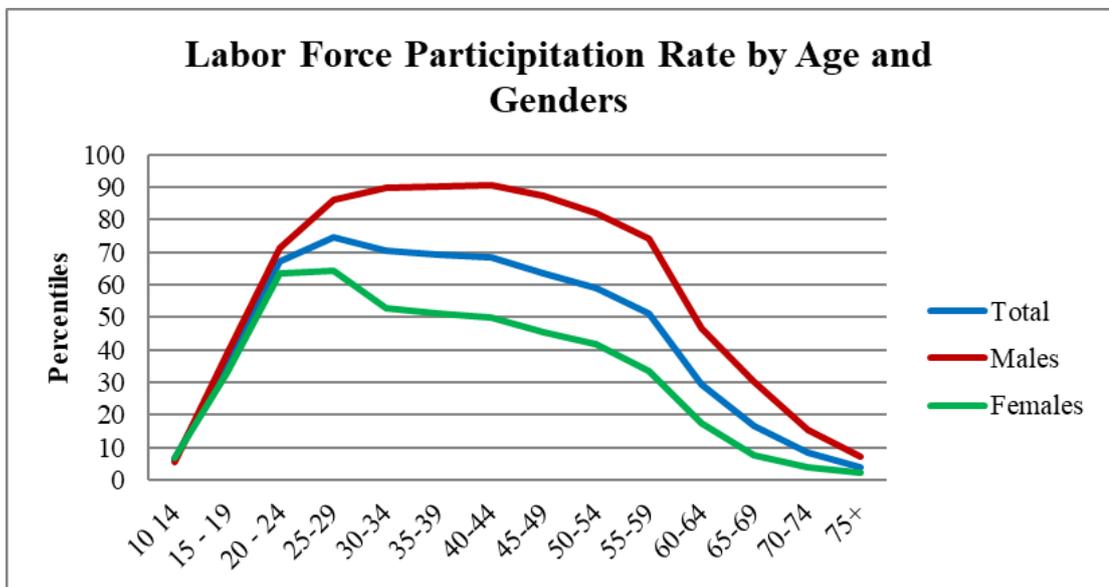


Figure 40. Labor Force Participation Rate by Age and Genders in Study Area



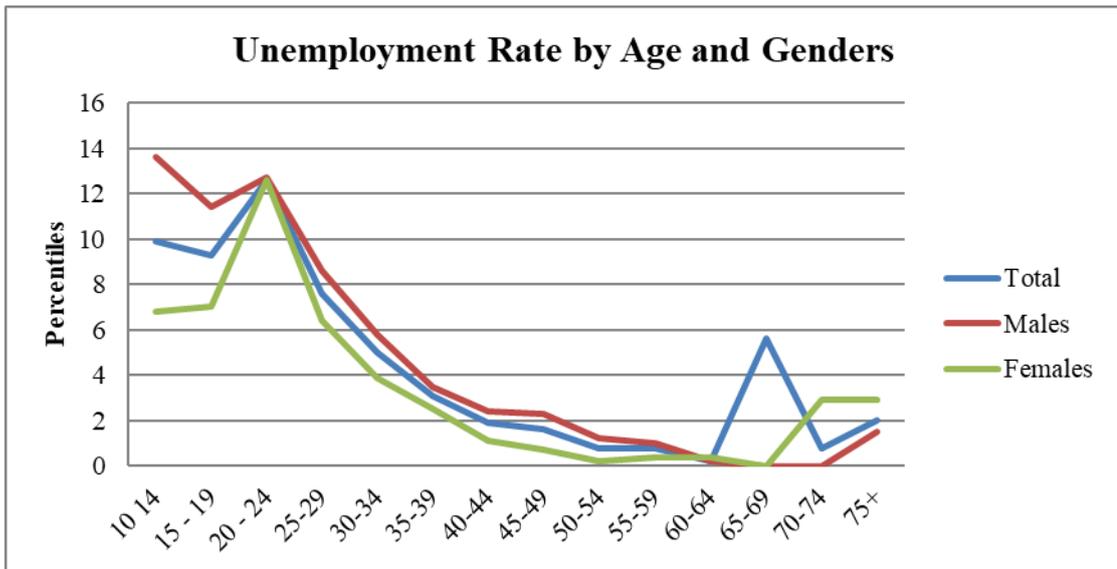


Figure 41. Unemployment Rate by Age and Genders in Study Area

3.7.3 Religion Distribution

The most dominant religion in the Yangon Region is Buddhism with approximately 91 percent of total population. The other religion shares the remaining two percentages with 3.2% of Christian, 4.7% of Islam and 1 % of Hindu respectively. Figure 42 is the Religion distribution chart of Yangon region Compare to that of Union with percentage and Cumulative percentages values.

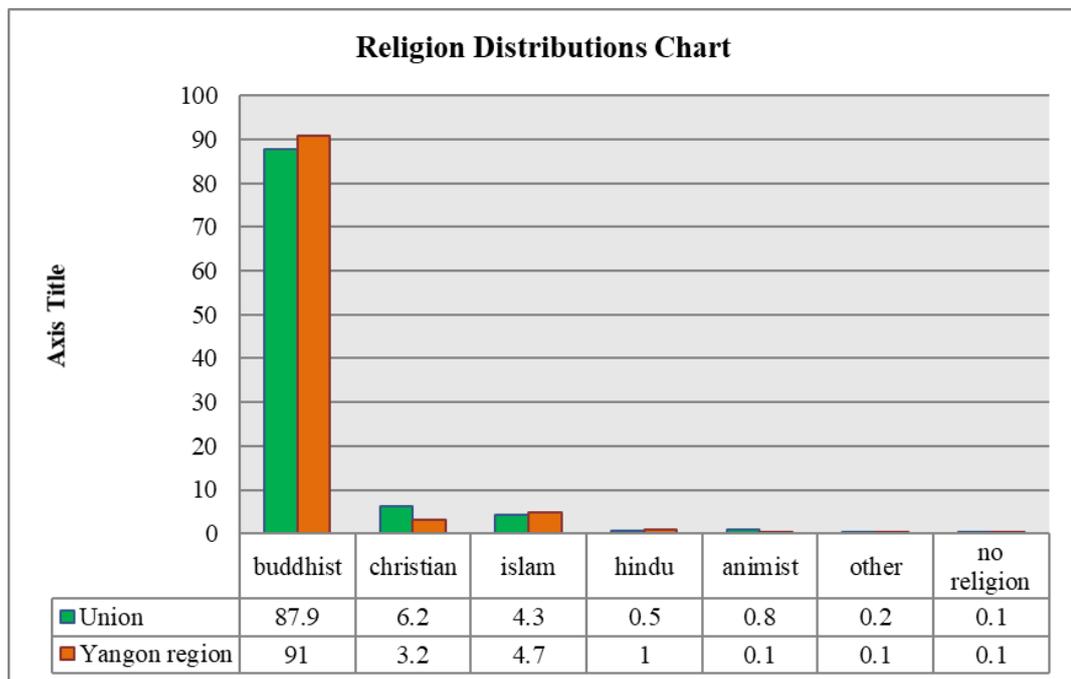


Figure 42. Religion Distributions in the Study Area



3.7.4 Educational Attainment

Around 15% and 13% of the people in both study areas attained primary level education. Around 19% reached to middle school and around 25% went to high school in both Yankin and Bahan Township. The most significant figure is that 35 to 36 percent of total schooling population in both townships are occupied by University/ College students. Approximately only 2 to 3 percents of population is illiterate. Current educational attainment levels show the local community’s past education condition. Hospitality and tourism business need a fair to high level of educational attainment. Background educational attainment of local community shows that the project needs to concentrate capacity building of local community so that they could participate in the development process. Figure (43 and 44) shows the educational attainments of local community.

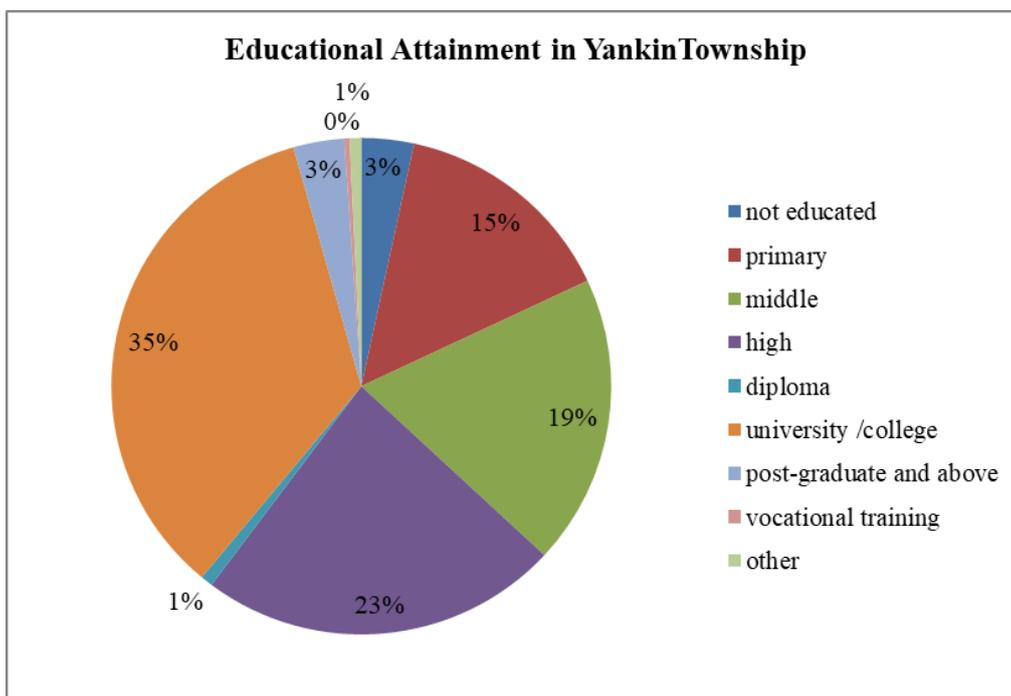


Figure 43. Educational Attainment in Yankin Township

Education level of both sexes in local community is described in Table 39 with individual frequencies, total count. According to Figure 43 and 44, the most obvious education level is primary, secondary and high school levels which mean almost all of school-age children are learning at basic education schools. University and bachelor degree holders stand around 36% of total educational attainments in the local community. Both male and female education attainment are almost in the same count.



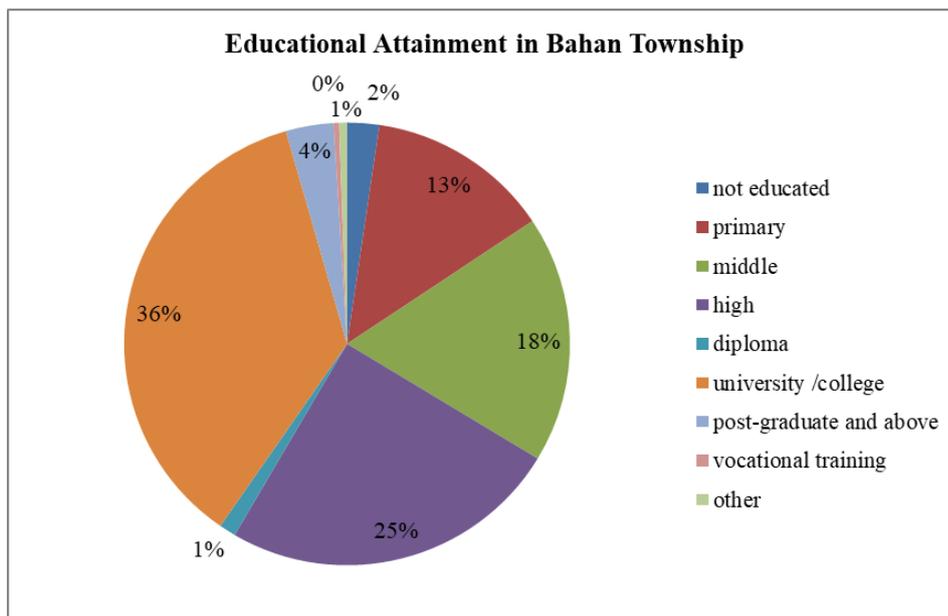


Figure 44. Educational Attainments of Bahan Township

Table 39. Educational Attainment by Gender in Study Area

Education Level	Yankin Township			Bahan Township		
	Total	Male	Female	Total	Male	Female
Not Educated	1495	373	1,122	1398	392	1006
Primary School	6441	2150	4291	7999	2567	5432
Middle School	8324	3914	4,410	10838	5116	5722
High School	10269	5134	5,135	14872	7718	7154
Diploma	346	266	80	729	457	272
University/College	15238	6694	8,544	21606	9645	11961
Post-graduate and above	1450	532	918	2076	877	1199
Vocational Training	151	117	34	237	182	55
Others	331	210	121	345	203	142

3.8 VISUAL COMPONENTS

The project is located at the corner of Yankin Road and Sayasan Road in Yankin Township, Yangon. In the eastern of the project area, accommodations for police, in the western, No. (2) Yankin Ward, in the Northern, No. (1) Yankin ward and The Golden City Housings and in the southern, Sayasan -North ward are located. In the northern of the project, Khun-Hna-Pin-Lein Creek is located as a border of the area. In the western of the project, Yankin Road is closed to the project area and in the southern; Sayasan



Road is closed to the project. There are no cultural, recreational sites around the project. But there are Yankin Center and newly construed Golden City Housing near the project. The area of the project will be created visual amenity because of modernized and systematic landscaping.

3.9 Cultural Components

The location of the project is at the corner of Yankin Road and Sayasan Road in Yankin Township, Yangon. It is situated on the plot of 6.708 acres. In the eastern of the project area, accommodations for police, in the western, No. (2) Yankin Ward, in the Northern, No. (1) Yankin ward and The Golden City Housings and in the southern, Sayasan -North ward are located. In the northern of the project, Khun-Hna-Pin-Lein Creek is located as a border of the area. In the western of the project, Yankin Road is closed to the project area and in the southern; Sayasan Road is closed to the project. There are no sensitive areas near the project. However, Moe Kaung Pagoda is situated distance 1.18km from the project site.

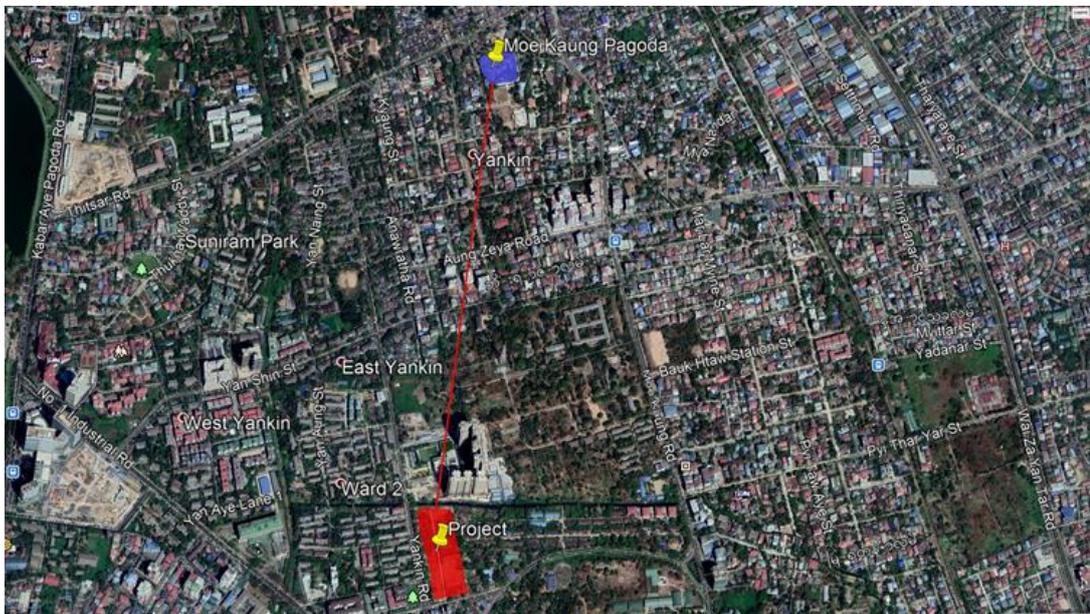


Figure 45. Distance from Heritage Building

4. PROJECT DESCRIPTION AND ALTERNATIVE SELECTION

4.1 INTRODUCTION

This chapter provides a description of the project.

4.1.1 Project Name

The project is called "**The Garden**" Yankin PPP Redevelopment Project to become new image for Yangon City. The project including the hotel, retail (underground), long-stay hotel, offices buildings together with infrastructures will be established by Kajima Yankin PPP Co., Ltd.

4.1.2 Site Condition

The land owner of the site area is Department of Urban and Housing Development, the Ministry of Construction, the Government of the Republic of the Union of Myanmar. Former used of the site was Yankin construction material storage compound. Average mean sea level of the site is 8.75M (28' 8.5"). The shape of the site is irregular shape and long in north-south direction and short in east-west direction. There is some concrete road, pavement area, grass and bushes, some small and big tree are growing in the existing condition. 60% of site area is covered with green area and 40% of site is covered with concrete plinth area of demolishing old storage building. Site orientation is facing to the west direction and Yankin Main Road.



Figure 46. Site Shape and Site Condition Google Map



must be arranged and prepared for the steps of all works and the possible problems in construction.

4.2 Project Development and Implementation

4.2.1 Master Plan of The Garden

The shape of the site is irregular shape plan and facing to the west direction (Yankin Road). The total site area of “The Garden” Yankin PPP Redevelopment Project is 27146.31 SqM (6.708 acres). 22 storey hotel, 29 storey long stay hotel, 22 storey office tower, 3 storey utilities and 1 storey utility building are proposed in this project area. 1 storey north utility building is placed closed at the corner of Khunhnit Pinlain Creek and Yankin Road and its orientation face to the south. 3 storey utilities building is placed at the corner of Sayasan road and Yankin road. The shape of utilities building is L-shape due to the shape of site at southern end portion. The function of this building is mainly used for utilities and services for the whole project.

The 22 storey hotel building is layout the northern part of the site and its orientation is faced to the west. The hotel garden and pool are placed at the back of the hotel. 29 storey long stay hotel is located at the center of the site and orientation face to the west. Its pool and long stay hotel garden are placed at the northern part of the hotel. Sunken garden, public garden and canopy are planned at the west part of the hotel. The 22 storey office tower building is proposed at the southern part of the long stay hotel and its orientation face to the west.

The public garden, sunken garden and glass roof of the office tower are planned at the northern part of the building. 1 storey utility building is located at the northern part of the site and face to the west. The shape of utility building is L shape as the alignment of the site fencing. Sunken garden is placed at the corner of the utility building and the plaza is placed at the west. Three main entrance gates and exit gates are allocated 2 numbers to Yankin Road and 1 to Sayarsan Road to get good access of the proposed project. Main transportation square and drop off area are located the west of the office tower and long stay hotel building.

The spacing of hotel and long stay hotel is 90’ 6.5” and the spacing of long stay hotel and office tower is 104’ 2” respectively. And then the spacing of office tower and utilities building is 36’ 7”.



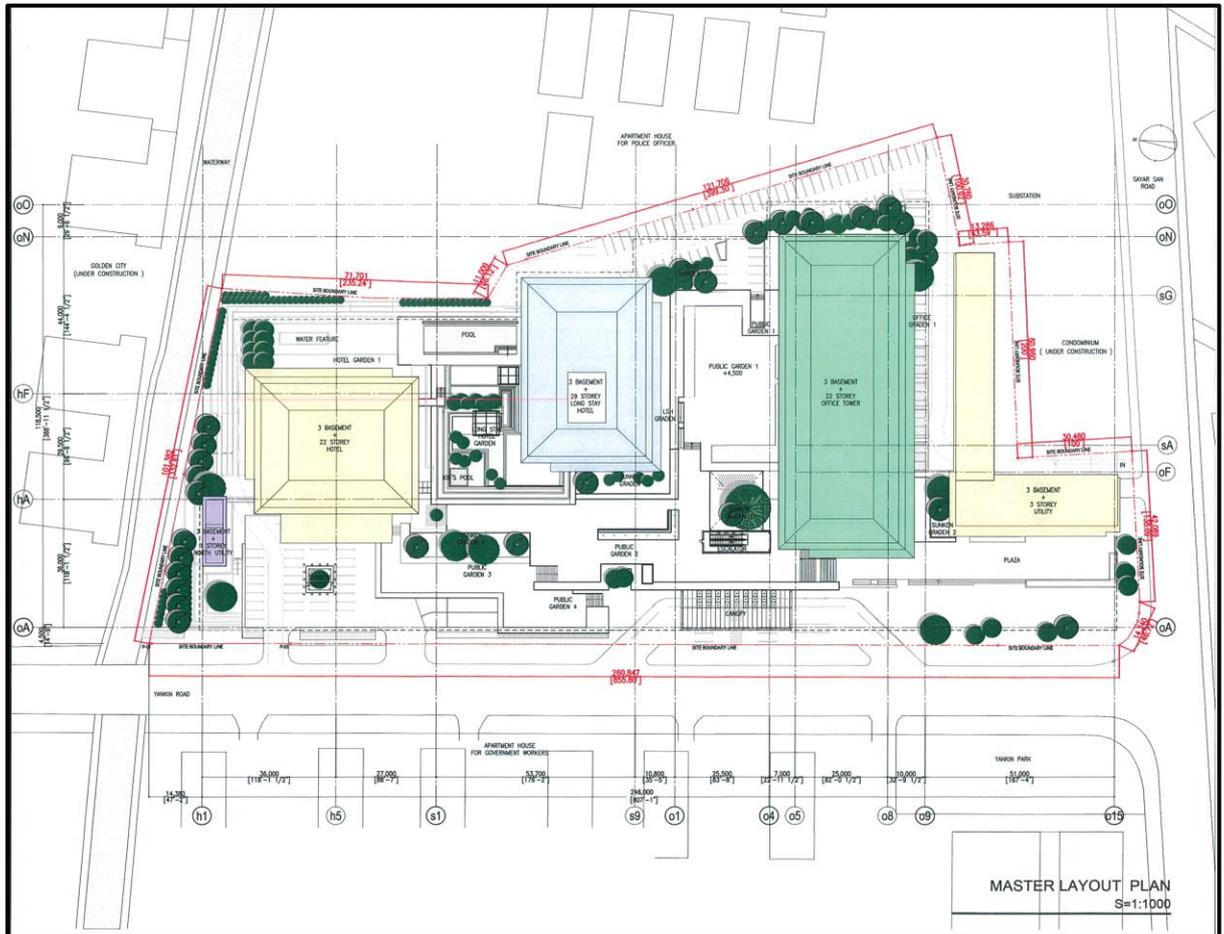


Figure 48. Master Plan of the Project

4.2.2 Basement of The Garden Project

Slope ramp to the basement level is 1:7.2 for the access of car parking. Minimum distance of basement set back is 8'8.5" and maximum distance of basement setback is 13'8". There are 3 basement levels design for the project. Basement level 3 and 2 are only used for car parking and basement level 1 is used for retail, restaurants, 850 capacity ball room and M&E room. The floor area of basement level 1 is 22663.88 SqM², level 2 is 22663.49 SqM² and level 3 is 19298.14 SqM².

4.2.3 Environs of the Garden Project

The proposed site of the project is located at the corner of Yankin Road and Sayer San Road. The Golden city condominium is located at the northern part of the proposed site. The Kyaik Ka San police housing is located at the eastern part of the proposed site. Sub-station, condominium and Sayer San Street are located at the



southern part of the proposed project. Yankin Road, Yankin garden, apartment for government workers housings and Department of Urban and Housing Development (Yankin Township) are located at the western part of the proposed site. Khunhnit Pinlain Creek is using as a border line with the Golden City Condominium project area.



Figure 49. Environs of the Project

4.2.4 Floor Area Ratio and Building Coverage Ratio of the Project

According to the Yangon Zoning Guidelines in the following figure, the project site of the "The Garden" Yankin PPP Redevelopment Project is located in the zone no. (4) called mix-used zone. The allowable floor area ratio of the project location is 8 and building coverage ratio is 0.6. The floor area ratio of the project is 4.93 and the building coverage ratio is 59.85 %. So that FAR and BCR of the project is covered according to the Yangon Zoning guidelines.



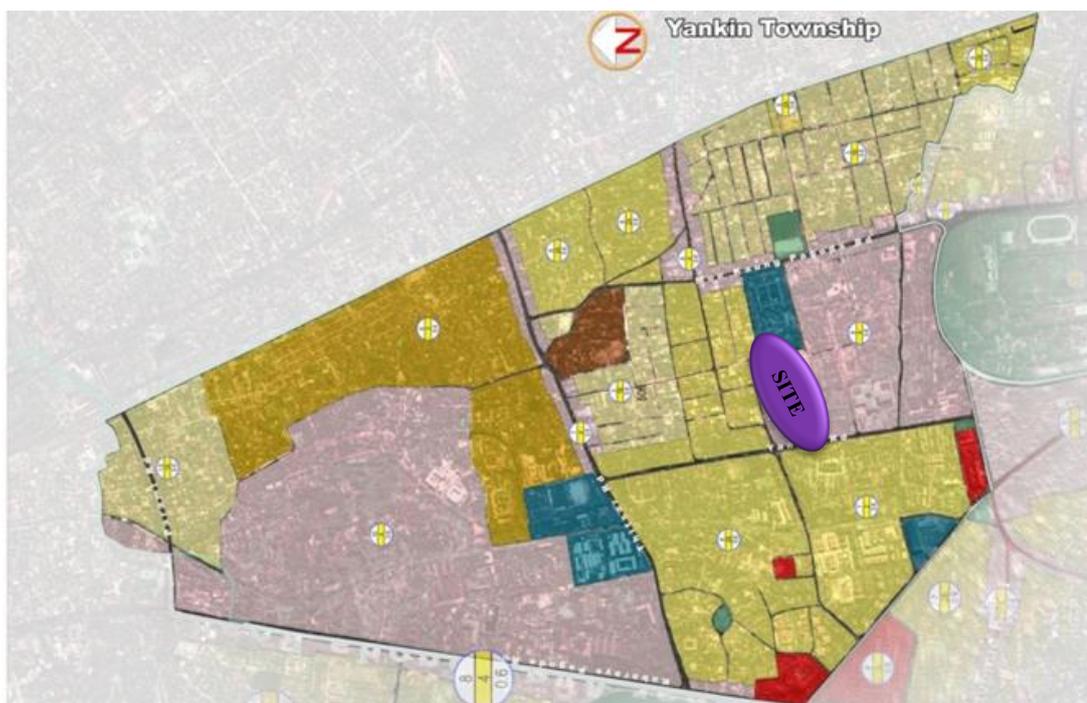


Figure 50. Project Site Location in Yankin Township

4.2.5 Structural System of the Project

The substructures such as foundation and basement structure of the project are pile foundation and mat slab at tower area. The maximum size of bored piles is 1500 mm diameter. Reinforced concrete included prestress structures are mainly used in the superstructure of the project. The quantity of bored piles is 657 pcs, earth retaining wall is 23,360 SqM and excavation volume is 359,000 Cubic Meter respectively. Cement concrete volume is 165000 Cubic Meter and total weight of rebar is 25500 ton for reinforced concrete structure of the project.

4.2.6 Land Use and Floor Area of Project

Road and parking area at the ground level of the Garden Project is 5422.51 SqM and Road area ratio is 19.97% of Plot area. Public garden area 5 % to 10% of plantation between the hotel and office are 461 SqM. 50% of plantation green area in front of the tower building is 322 SqM. The hotel, long stay hotel, office and utilities building footprint area are 9903.25 SqM.

Floor area of office tower is 55610 SqM, podium (under ground level) is 11710 SqM, long stay hotel tower is 37430 SqM, hotel tower is 28450 SqM and parking area is 34000 SqM respectively.



Table 40. Landuse Area of the Project

Sr.	Land Use	Area (SqM)	Percentage %
1	Road and Parking Area	5422.51	20.0
2	Public Garden	461	1.7
3	Green, Plaza and Canopy	11359.54	41.8
4	Building Footprint Area	9903.25	36.5
Total		27146.3	100

4.2.7 Road Network Plan

Fire engine access way can approach to the site from Sayasan Road close to the under construction of Condominium and drive as the alignment way of site boundary and exit the end of site beside the Khunhnit Pinlain Creek. Fire access way is separated into 3 main locations. The location (1) is between Utilities and long stay hotel, the location (2) is at the back of office tower and the location (3) is at corner of hotel and north utility building. Yankin Road is main vehicular access for entrance and exit way of hotel, office and long stay hotel. Vehicular access for Utilities and North Utility Buildings are from Sayasan Road and Yankin Road close to the Khunhnit Pinlain Creek.

4.2.8 Car Parking Area

Car parking for hotel, long stay hotel, office tower and retail buildings are designed in the basement level 2 and level 3. Car parking quantity for basement level 2 is 339 and for basement level 3 is 326 respectively. Car parking quantity in the ground level is 148 numbers and total car parking numbers in the whole campus may be 838 numbers. The requirement of car parking according to the YCDC rules and regulation is 834 numbers. So, the parking facilities are enough for the user of The Garden.

4.2.9 Drainage Plan

The summit point of the main drainage line is designed at the highest level of the site which is located at the corner of Yankin Road and Saya San Road (south-west corner of the site). The two main drainage line apart from this point and discharge to the Khunhnit Pinlain Creek at the north-east corner of the site. The storm water and surface water around the site flow to this main drainage line.



4.2.10 Water Supply and Sanitation

YCDC water supply system and 5 nos of tube well in the 5 corners of the site will be installed for the water supply of the project. Water from two main sources will be collected to the ground tank and pumping to the overhead tank of the respective building for 1 ½ days storage capacity. Water from the overhead tank will be distributed to the units and shopping area by pressure control system.

Waste treatment plant will be built in the basement level-2 for the sewage waste from the respective building. The treated water will get the quality according to the guidelines of YCDC by using MBR technology. This treated water will be pumped and through to the YCDC drainage line (Khunhnit Pinlain Creek) with submersible type sewage pump systematically.

4.2.11 Waste Disposal System

Refuse collection management system and management team for waste discharging will be organized in the community. Central refuse room will be planned at the basement and collected waste to the YCDC rubbish collector truck by on call system.

4.2.12 The 3 Basements + 22 Storey Hotel Building

Car parking of hotel building are placed at the basement-3 and basement-2 level. Ball room is placed at the basement-1 and restaurant area is designed at the ground floor area. Gym room is layout at the 1st floor level. Common WCs are planned at the ground floor to second floor, 19th floor and 21st floor for the public. Circulation area, Mechanical & electrical area are also allocated at ground floor level to 21st floor level. Services area of the hotel also used basement-3 to basement-1 and ground floor to 21st floor. There are 8 types of hotel room in the hotel and place at the 4th floor to the 19th floor. There are standard room-1, standard room-2, D standard-1, D standard-2, standard connecting, junior suite-1, junior suite-2 and suite. The total room numbers of hotel are 250 rooms.

Table 41. Room Types and Room Quantity of Hotel Building

Sr.	Room Types	Quantity	Remarks
1	Standard-1	78	



2	Standard-2	18	
3	D Standard-1	18	
4	D Standard-2	28	
5	Standard Connecting-1	82	
6	Standard Connecting-1	20	
7	Junior Suite-1	13	
8	Junior Suite-2	11	
9	Suite	2	
Total Room Numbers		250	

4.2.13 The 3 Basements + 29 Storey Long Stay Hotel Building

Table 42. Room Types and Room Quantity of Long Stay Hotel Building

Sr.	Room Types	Quantity	Remarks
1.	Studio-1	30	
2.	Studio-2	40	
3.	Studio-3	4	
4.	Studio-Connecting	2	
5.	1 Bed Room	70	
6.	1 Bed Room TC	8	
7.	2 Bed Room-1	20	
8.	2 Bed Room-2	32	
9.	3 Bed Room	20	
10.	4 Bed Room	4	
11.	Penthouse	1	
Total Room Numbers		221	

4.2.14 The 3 Basements + 22 Storey Office Tower

The main functions of the three-basement floor are parking, store, mechanical & electrical supply area, garbage, lift & stairs, retails, restaurant, chiller room and food court. Office lobby, office entrance, VIP lobby, lift & stair area, retail area, toilet and parking area are planned at the ground floor level of the project.



4.2.15 The 3 Basements + 3 Storey Utilities

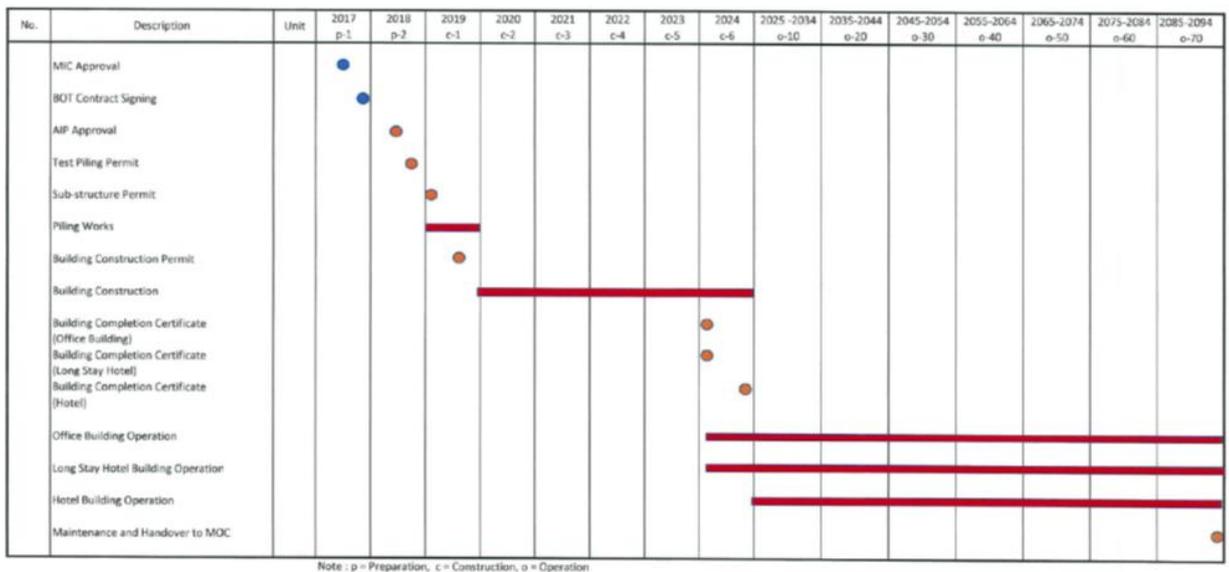
Parking areas are planned at basement level-3 and level-2. Security office, fuel oil tank room, retail area, management office, fire pump room, fire water tank and stair case are also designed at basement level-2. AHU, restaurant, sunken garden, retail (library), rental (BOH), stair case and WC room are layout in the basement level-1. Indoor control room, fire common center, gas cylinder and stair case are designed at the ground floor plan. Generator set substation room and LVDP in first floor plan and MVMDP (cooling tower units) in second floor plan/ podium roof are placed respectively.

4.2.16 The 1-Storey North Utility

AHU, storage, retention tank, driver room are designed in the north utility building.

4.2.17 Schedules of the Project

Table 43. Schedules of the Project



Documentation of the projects, drawings, approval, permit, contract signing documents and other process will be finished in the beginning of 2019. Piling work of foundation process will do and finish in the 2020. Building construction permit will get in the mid of 2020 and will start the building construction in the end of 2020. The whole construction project has to take approximately 5 year until to the end of 2024.



Building completion certificates of office building and long stay hotel will receive in the beginning of 2024 respectively from the authority. Building completion certificate of hotel building will get in the end of 2024. The operation period of office building and long stay hotel building will take 70 years start from the beginning of 2024 to finish in the 2094. The operation period of hotel building will also take 70 years from the end of 2024 to finish in the 2094. According to the BOT contract signing agreement, the project will be handover to the Ministry of Construction. Before handover to the Ministry of Construction, the project team should maintenance the whole project in good condition. The overall duration of the project will take approximately 77 years from 2017 to until 2094.

4.3 LOCATION, OVERVIEW MAP AND SITE LAYOUT MAPS

The location of the project is at the corner of Yankin Road and Sayasan Road in Yankin Township, Yangon. It is situated on the plot of (6.708) acres. Around the project area, accommodations for police is in the eastern, No. (2) Yankin Ward is in the western, No. (1) Yankin ward and The Golden City Housings are in the Northern and, Sayasan -North ward is in the southern. In the northern of the project, Khun-Hna-Pin-Lein Creek is located as a border of the area. In the western of the project, Yankin Road is closed to the project area and in the southern; Saya San Road is closed to the project. The site location is about 10 km distance far away from Yangon International Airport (Mingalardon) and take 27 minutes for driving by car. And then 0.3 km distance far away from Yankin Center and take 5 minutes for walking.





Figure 51. Location Map of the Garden Redevelopment Project

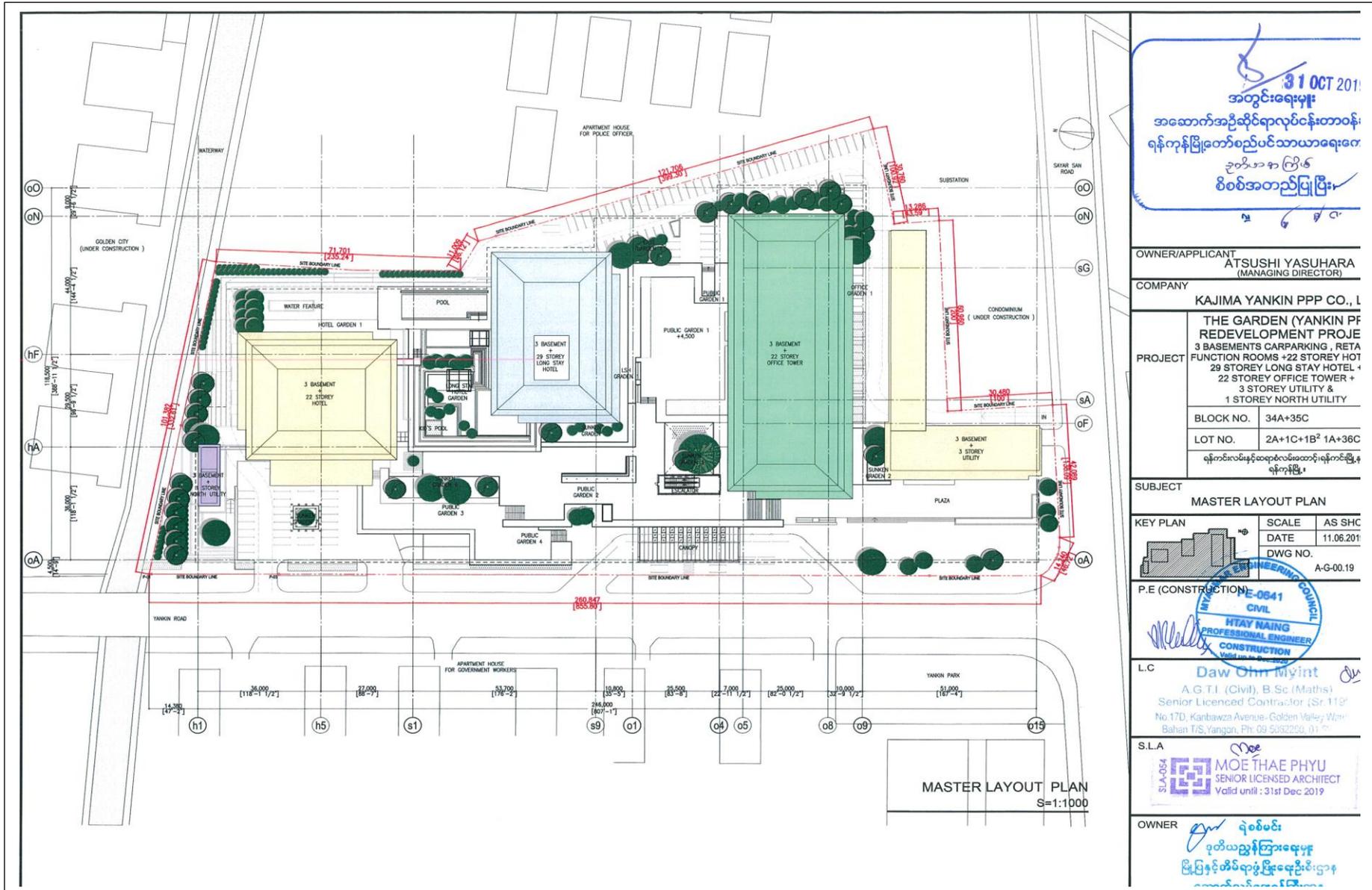


Figure 52. Site Layout Map of the Project



Table 44. Project Information

Sr.	Particular	Information
1	Type of Project	Construction
2	Location of Project	the corner of Yankin Road and Sayasan Road in Yankin Township, Yangon.
3	Total Area	approximately (6.708) acres (2.71 ha)
6	Capital Investment	US\$ (408.3) Millions
7	Fuel requirement	40,000 liters per day
8	Electricity requirement	7,600 kW
9	Water requirement	102580 gallons per day

4.4 DESCRIPTION OF THE PROJECT

Project Size: The project covers an area of approximately 6.708 acres (292200.48 sq-ft) (2.71 ha) which constitutes the hotel, Retail (underground), long-stay hotel, offices buildings together with infrastructures.

4.4.1 Site Investigation

The basic objective of the form of site investigation is to collect systematically and record all the necessary data which will be needed or will help in the design and construction processes of The Garden (Yankin PPP) project. Anything on adjacent sites which may affect the proposed works or conversely anything appertaining to the proposed works which may affect an adjacent site should also be recorded. This is an all-embracing term covering every aspect of the site under investigation.

Soil investigation are specifically related to the subsoil beneath the site under investigation and could be part of or separate from the site investigation. Purposes of soil investigation are

1. Determine the suitability of the site for the proposed project.
2. Determine an adequate and economic foundation design.
3. Determine the difficulties which may arise during the construction process and period.
4. Determine the occurrence and/or cause of all changes in subsoil conditions.



Before determining the actual method of obtaining the required subsoil samples the depth to which the soil investigation should be carried out must be established. This is usually based on the following factors

1. Proposed foundation type.
2. Pressure bulb of proposed foundation.
3. Relationship of proposed foundation to other foundations.

4.4.2 Pre-construction

Size	6.708 acres (292200.48 sq-ft) (2.71 ha)
Installations	N/A
Technology	N/A
Infrastructure	N/A
Production processes	Site clearing
Use of materials and resources	Human(workers), Heavy Machinery
Generation of waste, emissions and disturbances	Dust, Solid waste, Noise and Vibration

4.4.2.1 Site Layout Consideration

Any specific considerations and decisions can be made regarding site layout a general appreciation should be obtained by conducting a through site investigation at the pre-tender stage and examining in detail the drawings, specification and bill of quantities to formulate proposals of how the contract will be carried out. This will involve a preliminary assessment of plant, materials and manpower requirements plotted against the proposed time scale in the form of a bar chart. Access considerations must be considered for both on-and off-site access. Routes to and from the site must be checked as to the suitability for transporting all the requirements for the proposed works. Access on site for deliveries and general circulation must also be carefully considered.

Amount and types of material to be stored, security and weather protection requirements, allocation of adequate areas for storing materials and allocating adequate working space around storage areas as required, siting of storage areas to reduce double



handling to a minimum without impeding the general site circulation and/or works in progress.

Number and type of site staff anticipated, calculate size and select units of accommodation and check to ensure compliance with the minimum requirements of the construction regulations, select siting for offices to give easy and quick access for visitors but at the same time giving a reasonable view of the site, select siting for mess room and toilets to reduce walking time to a minimum without impeding the general site circulation and/or works in progress.

Temporary services considerations must be required in the site layout. Possibility of having permanent services installed at an early stage and making temporary connections for site use during the construction period, coordination with the various service undertakings is essential.

Type of plant, the aged of plant and species of plants also consider. The static or mobile plants have to study before the pre-construction work. If static selects the most appropriate position and provide any necessary hard standing, if mobile check on circulation routes for optimum efficiency and suitability, provision of space and hard standing for on-site plant maintenance if required.

Local vandalism record, types of fence and/or hoarding required, possibility of using fencing which is part of the contract by erecting this at an early stage in the contract.

4.4.2.2 Site Security

The primary objectives of site security are security against theft, security from vandals and protection from innocent trespassers. The need for and type of security required will vary from site to site according to the neighbourhood, local vandalism record and the value of goods stored on site. Perimeter fencing, internal site protection and night security may all be necessary.

4.4.2.3 Site Lighting

This can be used effectively to enable work to continue during periods of inadequate daylight. It can also be used as a deterrent to would-be trespassers. Site lighting can be employed externally to illuminate the storage and circulation areas and internally for general movement and for specific work tasks. The types of lamp are available range from simple tungsten filament lamps to tungsten halogen and discharge lamps. The



arrangement of site lighting can be static where the lamps are fixed to support poles or mounted on items of fixed plant such as scaffolding and tower cranes. Alternatively the lamps can be sited locally where the work is in progress by being mounted on a movable support or hand held with a trailing lead.

4.4.2.4 Electrical Supply to Building Sites

A supply of electricity is usually required at an early stage in the contract to provide light and power to the units of accommodation. As the work progresses power could also be required for site lighting, hand held power tools and large items of plant. The supply of electricity to a building site is the subject of a contract between the contractor and the Yangon Electrical Supply Corporation who will want to know the date when supply is required; site address together with a block plan of the site; final load demand of proposed building and an estimate of the maximum load demand in kilowatts for the construction period. The latter can be estimated by allowing 10W/m² of the total floor area of the proposed building plus an allowance for high load equipment such as cranes. The installation should be undertaken by a competent electrical contractor to ensure that it complies with all the statutory rules and regulations for the supply of electricity to building sites.

4.4.2.5 Site Office Accommodation

The arrangements for office accommodation to be provided on site are a matter of choice for each individual contractor. Generally separate offices would be provided for site agent, clerk of works, administrative staff, site surveyors and sales staff. Portable cabin with four adjustable steel legs with attachments for stacking can be used as site office. Paneling of galvanized steel sheet and rigid insulation core and plasterboard inner lining to walls and ceiling are possible for site office. Pyro-shield windows with steel shutters and a high security steel door.

4.4.2.6 Site Storage

Materials store on site prior to being used or fixed may require protection for security reasons or against the adverse effects which can be caused by exposure to the elements. Small and valuable items should be kept in a secure and lockable store. Similar items should be stored together in a rack or bin system and only issued against an authorized requisition. Large or bulk storage items for security protection these items



can be stored within a lockable fenced compound. The form of fencing chosen may give visual security by being of an open nature but these are generally easier to climb than the close boarded type of fence which lacks the visual security property.

4.4.2.7 Material Storage

Storage of materials can be defined as the provision of adequate space, protection and control for building materials and components held on site during the construction process. The location and size of space to be allocated for any particular material should be planned by calculating the area required and by taking into account all the relevant factors before selecting the most appropriate position on site in terms of handling, storage and convenience. Failure to carry out this simple planning exercise can result in chaos on site or having on site more materials than there is storage space available.

Each site will present its own problems since a certain amount of site space must be allocated to the units of accommodation, car parking, circulation and working areas, therefore the amount of space available for materials storage may be limited. The size of the materials or component being ordered must be known together with the proposed method of storage and this may vary between different sites of similar building activities. There are therefore no standard solutions for allocating site storage space and each site must be considered separately to suit its own requirements.

4.4.2.8 Protection Orders for Trees and Structures

Trees are part of our national heritage and are also the source of timber to maintain this source a control over tree felling. Trees on building sites which are covered by a tree preservation order should be protected by a suitable fence. Trees, shrubs, bushes and tree roots which are to be removed from site can usually be grubbed out using hand held tools such as saws, picks and spades. Where whole trees are to be removed for relocation special labour and equipment is required to ensure that the roots, root earth ball and bark are not damaged.

4.4.2.9 Locating Public Utility Services

Services which may be encountered on construction sites and the authority responsible are water, electricity (transmission and distribution), telephone, internet cable and drainage. Once located, position and type of service can be plotted on a map



or plan, marked with special paint on hard surfaces and marked with wood pegs with identification data on earth surfaces.

4.4.2.9 Setting Out the Building Outline

This task is usually undertaken once the site has been cleared of any debris or obstructions and any reduced level excavation work is finished. It is usually the responsibility of the contractor to set out the buildings using the information provided by the designer or architect. Accurate setting out is of paramount importance and should therefore only be carried out by competent persons and all their work thoroughly checked, preferably by different personnel and by a different method. The first task in setting out the building is to establish a base line to which all the setting out can be related. The base line very often coincides with the building line which is a line, whose position on site is given by the local authority in front of which no development is permitted.

4.4.2.10 Road Construction

Road construction within the context of building operations roadworks usually consist of the construction of small estate roads, access roads and driveways together with temporary roads laid to define site circulation routes and/or provide a suitable surface for plant movements. The construction of roads can be considered under three headings are setting out, earthworks and paving construction. Setting out roads activity is usually carried out after the topsoil has been removed using the dimensions given on the layout drawing(s). The layout could include straight lengths junctions, hammer heads, turning bays and intersecting curves. Straight road lengths are usually set out from centre lines which have been established by traditional means.

Paving construction has been prepared and any drainage or other buried services installed the construction of the paving can be undertaken. Paved surfaces can be either flexible or rigid in format. Flexible or bound surfaces are formed of materials applied in layers directly over the subgrade whereas rigid pavings consist of a concrete slab resting on a granular base.

4.4.2.11 Site Preparation

The first step in site construction work will involve the pre engineering work of the site. Site clearing including cutting trees, bushes and dressing, earth filling, sand



filling, watering and ramming, compaction are very importance for the site preparation. Site Analysis is prior to purchasing a building site it is essential to conduct a thorough survey to ascertain whether the site characteristics suit the development concept.

4.4.3 Construction

Size	6.708 acres (292200.48 sq-ft) (2.71 ha)
Installations	Access Roads, Residential Buildings
Technology	Standard Practice
Infrastructure	Office, Storage,
Production processes	As Per Project Process Design
Use of materials and resources	Human(workers), Heavy Machinery
Generation of waste, emissions and disturbances	Dust, Solid waste, Waste water

The heavy equipment operators are moving dirt, the concrete finishers are pumping concrete, and the steel erectors are setting beams and girders. There are cranes hoisting equipment and trucks delivering materials and worker making noise and stirring up dust everywhere. To the innocent bystander, this scene may appear quite chaotic, but to the knowledgeable observer, this is what construction is all about. This is where it all happens. All of this apparent chaos is actually a well-orchestrated effort directed by one of the most valuable players on the construction management team the superintendent often with support from an assistant superintendent and at least one field engineer.

The on-site project team must be very familiar with all elements of construction. Lots of questions and requests for information are going to arise regarding the intent of the plans and specifications, and it is the project team's job to obtain the answers and clarify confusing aspects of the work to keep things moving forward. The team works together to sequence all activities and coordinate all efforts by the various building trades, material suppliers, building inspectors and safety officials, adjusting the schedule as they go.



The following table highlights some of the typical work items associated with various building elements. Keep in mind that each work item may require the coordination of several building trades and numerous materials. For example, a standard foundation can include excavation, formwork, filling, reinforcing, concrete, masonry, anchors, and embeds. Every project requires the management and coordination of hundreds of materials and activities on the job site daily, not to mention all the people and personalities involved.

Table 45. Details of Work Items in Building Elements

Sr.	Building Elements	Details of Work Items
1	Site work	Clearing, grading, utilities, layout, landscaping, irrigation, paving, exterior concrete
2	Foundations	Bored Pile foundations, Excavation, special foundations, slabs on grade, diaphragm wall
3	Basement construction	Basement excavation, basement walls, basement floors, waterproofing, perimeter drains, backfill
4	Superstructure	Floor, wall, column, beam, stair, door, window, fanlight, glass wall, curtain wall, partition, roof construction
5	Exterior closure	Exterior walls, exterior windows, exterior doors
6	Roofing	Truss, rafter, purlin, roofing sheet, roof covering, flashings, roof openings
7	Interior construction	Partitions, interior doors, specialties
8	Staircases	Stair construction, stair well, lift well, stair finishes
9	Conveying systems	Elevators, escalators, moving walkers, material handling systems
10	Plumbing	Plumbing fixtures, domestic water distribution, sanitary waste, rainwater drainage, special plumbing systems
11	MVAC	Energy supply, heat-generating systems, cooling generating systems, control and instrumentation
12	Fire Protection	Fire protection and sprinkler systems, standpipe and hose systems, fire protection specialties
13	Electrical	Electrical services and distribution, lighting and branch wiring, communication and security systems
14	Equipment	Commercial equipment, institutional equipment, vehicular equipment, other equipment
15	Furnishings	Fixed furnishings, movable furnishings, etc.,
16	Special construction	Special structures, integrated construction, special construction systems, special facilities



4.4.3.1 Excavation for Foundation

Excavations for any purpose shall not remove lateral support from any footing or foundation without first underpinning or protecting the footing or foundation against settlement or lateral translation.

4.4.3.2 Placement of backfill

Excavations outside the foundation shall be backfilled with soil that is free of organic material, construction debris, cobbles and boulders or shall be backfilled with a controlled low-strength material. The backfill shall be placed in lifts and compacted in a manner that does not damage the foundation, the waterproofing or the damp-proofing material.

4.4.3.3 Site Grading

The ground immediately adjacent to the foundation shall be sloped away from the building at a slope of not less than one-unit vertical in 20 units horizontal (5 % slope) for a minimum distance of 10 feet measured perpendicular to the face of the wall. If physical obstruction or allotment boundaries prohibit 10 feet of horizontal distance, a 5 % slope shall be provided to an approved alternative method of diverting water away from the foundation. Swales used for this purpose shall be sloped a minimum of 2 percent where located within 10 feet of the building foundation. Impervious surfaces within 10 feet of the building foundation shall be sloped a minimum of 2 % away from the building.

4.4.3.4 Compacted Filling

Where footings bear onto compacted fill material, the compacted fill shall comply with the provisions of an approved report, which shall contain the following.

1. Specifications for the preparation of the site prior to placement of compacted fill material.
2. Specifications for material to be used as compacted fill.
3. Test methods to be used to determine the maximum dry density and optimum moisture content of the material to be used as compacted fill.
4. Maximum allowable thickness of each lift of compacted fill material.
5. Field test methods for determining the in-place dry density of the compacted fill.



6. The minimum acceptable in-place dry density expressed as a percentage of the maximum dry density determined.
7. The number and frequency of field tests required to determine compliance.

4.4.3.5 Piling

There are several alternative methods for piling such pile driving, grip piling, auger cast piling, and bored pile. This project will use bored pile method in its construction.

A typical bored pile process could be illustrated as follow:

1. Points for placing the piles will be set up on the base of the building according to pile design.
2. A steel shell is driven as a casing for the bored pile.
3. Earth will be drilled with an auger or bucket at the center of the steel shell.
4. Slime from drilling works will be removed by pumping bentonite clay which dissolved the slime.
5. The inner wall of the drilled holes will be checked such as by using sonic testing.
6. A rebar cage will be inserted into drilled hole prior to pouring of the concrete.
7. Segments of pipes will be inserted into the drilled hole at the center of the rebar cage progressively for concrete pouring.
8. Ready mixed concrete of high quality will be poured into the drill hole through pipe while removing the pipe segment by segment.
9. Bored piled work will be done when the steel casing is removed from the hole at last.

4.4.3.6 Formwork

Formwork should be capable of supporting safely all vertical and lateral loads that might be applied to it until such loads can be supported by the ground, the concrete structure, or other construction with adequate strength and stability. Dead loads on formwork consist of the weight of the forms and the weight of and pressures from freshly placed concrete. Live loads include weights of workers, equipment, materials to raise, and runways, and accelerating and braking forces from buggies and another placement equipment. Impact from concrete placement also should be considered in formwork design. Wood and bamboo were used in traditional formworks. Current alternative for such formwork is using reusable and dismantlable metal formwork. Alternatives will be choices between material for formworks and technique for



installation and dismantling of formworks. Environmentally friendly materials must be chosen. Moreover, installation and dismantling methods must be chosen on the basis of occupation safety point of view.

4.4.3.7 Reinforce Concrete Work

The term deformed steel bars for concrete reinforcement is commonly shortened to rebars. Standard rebars are produced in 11 sizes, designated on design drawings and in project specifications by a size number. Fabrication of rebars consists of cutting to length and required bending. Field placing drawings and bar lists are prepared, and the rebars are fabricated and set in place as required. Then, concrete will be placed. It will be conveyed from a mixer or from a truck to point of placement by any of a variety of methods and equipment, if properly transported to avoid segregation. In every step, choices must be made for environmentally friendly materials and sound occupational safety methods.

4.4.3.8 Masonry Work

Masonry comprises assemblages of nonmetallic, incombustible materials, such as stone, brick, structural clay tile, concrete block, glass block, gypsum block, or adobe brick. Unit masonry consists of pieces of such materials, usually between 4 and 24in in length and height and between 4 and 12 in thickness. The units are bonded together with mortar or other cementitious materials. Walls and partitions are classified as load-bearing and non-load-bearing. Different design criteria are applied to the two types. Like other structural materials, masonry may be designed by application of engineering principles. As an alternative, internationally accepted empirical rules and building codes may be used.

4.4.3.9 Carpentry work

Carpentry works will take place in doors, windows, and other frame works. Wood is the only renewable source for building materials. It comes from forests that can be continually being replanted as they are harvested. This practice ensures a plentiful supply of wood for construction and for a myriad of other uses. Compared to other building materials, wood has a very high ratio of strength to weight. This makes it very economical for use in all types of construction. Wood also has an aesthetic



quality and natural warmth unequalled by other building materials. An alternative for wood structure carpentry work is using structural metal such aluminum and steel.

4.4.3.10 Mechanical and Electrical Work

The plumbing system should be designed and adjusted to use the minimum quantity of water consistent with proper performance and cleansing of fixtures and appurtenances. Plumbing fixtures, devices, and appurtenances should be supplied with water in sufficient volume and at pressures adequate to enable them to function properly. The pipes conveying the water should be of sufficient size to provide the required water without undue pressure reduction and without undue noise under all normal conditions of use.

An electrical system conforming adequate safety standards must be correctly designed and incorporated with the building. The electrical load in a building will be included the sum of all the loads for lighting, motors, and appliances.

There will be numerous alternatives on the choice of materials for all installation. Choosing a specific one is left to the design contractors, consultants and proponent. The team recommends that every choice must be made for using environmentally friendly materials.

4.4.3.11 Finishing

Finishing operations include installation of the ceilings, tile, wallboard, wall paneling, air-conditioning equipment, cooling devices for rooms, escalators, floor coverings, window glass, movable partitions, finishing hardware, and other items called for in the drawings and specifications. Field offices, fences, bridges, and other temporary construction will be removed from the site. Utilities such as gas, electricity, and water are hooked up to the building. Finally, the building interior is painted and cleaned.

4.4.3.12 Landscaping

Landscaping in the context of building works this would involve reinstatement of the site as a preparation to the landscaping in the form of lawns, paths, pavings, flower and shrub beds and tree planting. The actual planning, lawn laying and planting activities are normally undertaken by a landscape subcontractor. The main contractor's work would involve clearing away all waste and unwanted materials, breaking up and



levelling surface areas, removing all unwanted vegetation, preparing the subsoil for and spreading topsoil to a depth of at least 150mm. The actual position and laying of services are the responsibility of the various service boards and undertakings. The best method is to use the common trench approach, avoid as far as practicable laying services under the highway.

4.4.3.13 Post Construction

When the Garden Redevelopment Project is sufficiently completed; the contractor will request the architect to conduct a substantial completion inspection to confirm that the work is complete in most respects. By doing so, the contractor implies that the work is complete enough for the owner to occupy the facility and start using it.

The contractor's request for substantial completion inspection by the architect may include a list of incomplete corrective portions of the work, referred to as the punch list. The punch list, which is prepared by the contractor, is used by the architect as a checklist to review all work, not merely the incomplete portions of the work. If the architect's inspection discloses incomplete items not included in the contractor's punch list, they are added to the list by the architect.

The substantial completion inspection is also conducted by the architect's consultants, either with the architect or separately. Incomplete items discovered by them are also added to the list. If the additional items are excessive, the architect may ask the contractor to complete the selected items before rescheduling substantial completion inspection.

The post construction stage is the cleanup stage. It is very important that this stage be handled with as much energy and enthusiasm as the project startup and operations, because a slipup here can have costly consequences down the road. And always need to remember that no matter how well the first 90 percent went, if make mistakes and drop the ball during the last 10 percent of the job, that's all the owner will remember. The team still has a number of tasks to manage before they can call it a wrap.

4.4.3.14 Substantial Completion: The Most Important Project Date

Before requesting a substantial completion inspection, the contractor must submit all required guaranties and warranties from the manufacturers of equipment and materials and the specialty subcontractors and installers used in the building. For instance, the manufacturers of roofing materials, windows, curtain walls, mechanical



equipment, and other materials, warrant their products for specified time periods. These warranties are in addition to the standard one-year warranty between the owner and the contractor.

The warranties are to be given to the architect at the time of substantial completion for review and transmission to the owner. Because the obligatory one-year warranty between the owner and the contractor, as well as other extended-time warranties, begin from the date of substantial completion of the project, the substantial completion date marks an important project closeout event. That is why the contractor is allowed a brief time interval to complete fully the work after the successful substantial completion inspection.

Before seeking a substantial completion inspection, the contractor is generally required to secure a certificate of occupancy from the authority having jurisdiction over the project usually the city where the project is permitted and built. The certificate of occupancy confirms that all appropriate inspections and approvals have taken place and that the site has been cleared of the contractor's temporary facilities so that the owner can occupy the building without obligations to any authority.

4.4.3.15 Certificate of Final Completion

After the contractor carries out all the corrective work identified during substantial completion inspection and so informs the architect, the architect (with the assistance of the consultants) carries out the final inspection of the project. If the final inspection passes, the certificate of final completion is issued by the architect, and the contractor is entitled to final payment.

Before the certificate of final completion is executed by the architect and, finally, the owner, the owner receives the record documents, keys and key schedule, equipment manuals, and other necessities. Additionally, the owner receives all legal documentation to indicate that the contractor will be responsible for claims made by any subcontractor, manufacturer, or other party with respect to the project. After the certificate of final completion, the contractor is no longer liable for the maintenance, utility costs, insurance, and security of the project. These responsibilities and liabilities transfer to the owner.



4.4.3.16 Record Documents

Changes of a minor nature are often made during the construction of a project. These changes must be recorded for the benefit of the owner, should the owner wish to alter or expand the building in the future. Therefore, after the building has been completed, the contractor is required to provide a set of record drawings (previously known as as-built drawings).

These drawings reflect the changes that were made during the course of construction by the contractor. In addition to record drawings, record specifications, as well as a set of approved shop drawings, are usually required to complete the record document package delivered to the owner.

4.4.3.17 The Project Closeout

The first step in the construction process is the project closeout. As previously stated, along with project startup, this step often becomes the most difficult to manage. This is the stage where all the loose ends get taken care of as the construction team readies the facility for occupancy by the end users. This is the time when the contractor turns the building over to the owner. However, before the owner actually takes possession of the facility, there are a number of sequential steps that must be performed by the contractor. The construction management team must complete the following list of final standard procedures before they can celebrate the completion of a job well done:

- Project punch out
- Substantial completion
- Final inspection
- Certificate of occupancy
- Commissioning
- Final documentation
- Final completion

Project closeout can often be a time of great stress and anxiety on the part of the construction management team and the owner's staff. The owner is anxious to move in, and the project team is usually anxious to move on to the next job. It becomes especially stressful if the owner schedules some major event such as a "grand opening" or with commercial building construction, the start of a new year. The dates for these events are established way in advance, and there is usually very little wiggle room if things aren't going well for the contractor as the job moves toward completion. This is when



the management of the project becomes a real challenge and creative strategies come into play in order to meet the critical deadlines.

4.4.3.18 Project Punch Out

At the end of every project there are always minor items of work that must be taken care of. They may include little items that have been overlooked, such as the installation of a robe hook or doorstop, or minor repairs or adjustments, such as replacing a cracked floor tile. Each of these items must be addressed before the project is acceptable to the owner. The project punches out activity is managed through a project punch list.

The punch list contains all of the work items remaining to be done to complete the project. The list is a compilation of observations noted by the owner, designer, and contractor as they conduct the formal project walk through. The challenge for the construction management team is to summon all of the various trades involved to return to the project to adjust, fix, or complete the multitude of small items that need attention. However, to the owner, attention to these small things makes all the difference in the world. And the completion of the punch list is of considerable importance to the general contractor because the completion of the list ultimately leads to the release of the final payment. Delay in this stage of the project is of no minor consequence.

4.4.3.19 Project Completion

Every project has a beginning and an end. The notice to proceed defined the start of the project. However, there are two steps to defining the end of the project. Substantial completion is the first step. Substantial completion occurs after the punch list work has been completed and is approved by the architect. At this point, the architect determines that the new facility can be utilized for its intended purpose and actually issues a formal certificate of substantial completion. This date is very important because it marks the official end of the project and establishes the beginning of the warranty period. Now all payments due to the contractor are released, with the exception of a small percentage called retainage. Final completion is accomplished after all remaining contract requirements have been met, such as the issuance of all final paperwork and documentation. This step is also certified by the architect and sets up the release of all remaining payments due to the contractor.



4.4.4 Operation

Size	6.708 acres (292200.48 sq-ft) (2.71 ha)
Installations	Water storage Other infrastructure facilities (road, work site boundary, pond, water intake, discharge and recirculation, earth bund)
Technology	method
Infrastructure	-
Production processes	-
Use of materials and resources	-
Generation of waste, emissions and disturbances	Dust, Noise and Vibration, Solid Waste, Waste water

4.4.4.1 Commissioning

There are many areas of operation throughout a new facility that need to be explained to the owners. This process is called commissioning and may be conducted by the general contractor, by subcontractors under the direction of the general contractor, or by the architects or engineers involved in the project. First commissioning is a process of testing systems and equipment to make sure that they are all working properly before turning the facility over to the owner. This process can be as simple as running the dishwasher, testing the air conditioner in a new building, or as complex as starting up huge turbines in a hydroelectric facility.

The second part of the commissioning task deals with training the owner's personnel in the operation and maintenance of the equipment and systems installed in the new facility. Because the contractor is accountable for the equipment and its operation at least during the warranty period, it is a very important part of project closeout and should not be shortchanged. It is in the contractor's best interest to make sure that all owner staff charged with operating the new systems are up to speed regarding their functional and receive the proper operation manuals.



4.4.4.2 Operation

Air-condition system, electronic and communication systems, water supply, electrical supply, septic tank, waste disposal, waste water treatment, vertical transportation system, coaxial cable, etc. operate and maintenance for the services of building. Down take pipe, roofing gutter, roof slab, drain and apron have to clean annually for the flow of rain water and waste water from the building. Other maintenance services will be done depend on the contract in the contract agreement between the client and contractor.

4.4.4.2.1 MVAC System

All air handling and fan coil units will be fully assembled from factory. The air conditioning units will be Air-cooled Variable Refrigerant Volume (VRV) system at office tower, LSH. Water cooled chiller (VSD turbo chiller) system will be used for Retail, LSH, Hotel and office tower. The refrigerant of chiller will be R134a or R123. Ducted fan coil unit, filters, weather proof screens, exhaust fans and AHU with VAV system will be provided for ventilation.

4.4.4.2.2 Electrical System

The main incoming power supply will be taken from YESC's substation. The 66kV XLPE cables will be routed underground from nearest YESC's main substation. There will be 2 lines of transformer (10MVA) oil type cast resin, 66kV/ 11kV, on load tap changer with 40% overload capacity.

Three sets of generators, 2500 kVA (located at level 2 utility building) and one set for future (space only) will be indoor type with acoustic protection system to ensure that the noise level of 85 dBA. Fuel day tanks will be provided with a 20,000L x2 and (future space x 1) of 24 hours' service.

For lighting, the minimum lux levels at all areas except walkway will be expected between 100lux to 500lux.

According to CQHP, the traditional Faraday Cage, Mesh type lighting protection system will be provided. All elevators have below functions;

- Earthquake emergency operation
- Fire emergency operation
- Automatic rescue device for power failure



- Monitoring and intercom system

According to fire safety department, the following requirements shall be satisfied;

- (1) Fire alarm control system
- (2) Fire detection and alarm devices
 - (a) Addressable smoke detector- photoelectric type
 - (b) Sounder base addressable smoke detector- photoelectric type
 - (c) Gas leakage sensor (M-work)
 - (d) Sprinkler and smoke exhaust system
 - (e) Two-way telephone handset/ Fireman intercom
 - (f) Manual pull station
 - (g) Fire stair
 - (h) Fire alarm

4.4.4.2.3 Sanitary System

In sanitary system, the following systems will be included;

- (a) Cold Water System
- (b) Hot Water System
- (c) Soil, Waste and Kitchen Waste Drainage
- (d) Wastewater Treatment Plant
- (e) storm water drainage system (for buildings)
- (f) irrigation system,
- (g) swimming pool recirculation system and
- (h) water garden recirculation system

Cold Water System

- Water storage 2 days consumption across whole site (Cold water and Raw water).
- Filtered Water Quality: CQHP guideline standards. (not for drinking)
- Flushing Water Quality; Raw water.
- Irrigation water Quality: Raw water.
- Cooling Tower Make up water Quality: Treated grey water quality standard by PUB in Singapore.



- For common area, cold water system will be up0 feed system using booster pumps. For hotel, LSH, and Office, cold water system will be down feed from the roof tanks except some top floors which will be supplied from variable speed booster pump to all sanitary equipment and point of usage.

Table 46. Expected Cold-water Usage

Building	Usage	Filtered	Treated Gray	Raw	Remark
Office	Basin, Pantry, Shower toilet	•			
	Water closet, Urinals	•			
	Drinking water is bottled water				
Retail	Basin	•			
	Water closet, Urinals	•			
	Kitchen (tenant)	•			Purifier by tenant
LSH/Hotel	Basin, Bath, Shower, Shower toilet	•			
	Water closet, Urinals	•			
	Kitchen at LSH room unit	•			Purifier
	Pool	•			
	Laundry	•			
	Boiler	•			Water Softener
Common	Irrigation			•	
	Water garden system	•			
	Cooling Tower		•		
	Faucet	•			

Hot Water System

Table 47. Expected Hot-water Usage

Usage	Original Unit	Hot water demand
LSH (Room)	100L/day. PE	-



Hotel (Guest room)	100L/day. PE	-
LSH (Restaurant)	25L/m ² . day	-
Hotel (Restaurant)	25L/m ² . day	-
Hotel (SPA)	100L/day. PE	100L/day
Hotel (Laundry)	-	

Soil, Waste and Kitchen Waste Drainage

- For office area, soil water and Waste water will be separated.
- For LSH/Hotel, soil water and Waste water will be separated. Restaurant kitchen waste water from main kitchen will be separate from waste water.
- All of waste water shall be connected to sewage treatment plant (STP). Treated waste water shall be finally discharged to the creek or gutter with proper water quality required by the CQHP guideline.
- Part of waste water, greywater, will be recycled as a treated greywater for cooling tower make-up water.
- Kitchen drain shall be connected to STP via grease trap installed near kitchen area. Grease trap for tenant's kitchen is done by tenant.
- Drain of car wash area at basement car parking will be gathered to underground pit tank via gasoline trap and conveyed to STP.

4.4.4.2.4 Wastewater Treatment Plant

Design criteria

- **Influent** (black water)
 - BOD from residential units ≤ 250 mg/L.
 - BOD from kitchens ≤ 700 mg/L.
- **Effluent**
 - BOD < 20 mg/L
 - SS < 30 mg/L.

Design Description

- All of waste water shall be connected to the STP. Treated waste water shall be finally discharged to the creek or gutter with proper water required by CQHP guideline.
- The STP system will be MBR (membrane bioreactor) system.
- Waste water will be treated into grey water by using activated carbon filter.



- Grease trap system will be provided for preliminary treatment of the kitchen waste water.
- STP plant will be located at B2F and STP tank will be located at B3f.

4.4.4.3 Auxiliary Services

In operation period, other services and system will be provided as follow;

- Repair and Maintenance
- Security System
- Transportation
- Parking Control System
- Emergency System
- Fire Protection System

4.4.5 Decommissioning

Decommissioning can include the complete or partial demolition or abandonment of old structures because the old structures have lost its utility, but such is not always the norm. The project would have a minimum lifespan of at least 70 years. Once the facility reaches the end of its lifespan, the structures could be closed and decommissioned. If decommissioned, all components would be removed and the site rehabilitated, returning to its current land use of potential grazing land. The decommissioning and reinstatement of the site will involve many activities that may have some environmental and socio-economic impacts.

It is anticipated that the impacts associated with decommissioning will be similar to those encountered during construction. The generation of waste through the decommissioning activity is anticipated to be high although the choice of the preferred supplier was made to mitigate this impact since the supplier has an existing programme which would maximize the reuse and recycling therefore significantly decreasing the waste generation during decommissioning.

The comprehensive decommissioning plan should be developed prior to the decommissioning of the facility to minimize potential negative impacts and enhance positive impacts associated with decommissioning.



In order not to leave adverse effects for the future generations decommissioning is vital in the life cycle of the project. If decommissioning and closure are not undertaken in a planned and effective manner, the site may continue to be hazardous and a source of pollution for many years to come in the project area and its environs. The overall objective is to prevent or minimize adverse long-term environmental impacts, and to create the agreed beneficial land use objectives.

1. Workforce Decommissioning

Total workforce requirement is 633. Workforce decommissioning will be started at project life 60 years. There is some possibility to extend the operations depending upon the contract. Work force will have to be entirely terminated in case there is no agreement of contract extension.

2. Structural Decommissioning

All above ground structure will be scraped down unless the authority and stakeholders would like to occupy the old structures in some way or the other. Normally the structures should be leveled down, filled, or removed in order to attain original situation.

4.4.5.1 Demolition

Demolition skilled and potentially dangerous work that should only be undertaken by experienced contractors. Types of demolition are partial or complete removal. Partial is less dynamic than complete removal, requiring temporary support to the remaining structure. This may involve window strutting, floor props and shoring. The execution of work is likely to be limited to manual handling with minimal use of powered equipment.

Preliminaries a detailed survey should include:

1. An assessment of condition of the structure and the impact of removing parts on the remainder.
2. The effect demolition will have on adjacent properties.
3. Photographic records, particularly of any noticeable defects on adjacent buildings.
4. Neighborhood impact, ie. disruption, disturbance, protection.
5. The need for hoardings potential for salvaging/recycling/re-use of materials.
6. Extent of basements and tunnels.
7. Services need to terminate and protect for future reconnections.



8. Means for selective removal of hazardous materials.

The general builders are unlikely to find demolition cover in their standard policies. All risks indemnity should be considered to cover claims from site personnel and others accessing the site. Additional third-party cover will be required for claims for loss or damage to other property, occupied areas, business, utilities, private and public roads. Salvaged materials and components can be valuable, bricks, tiles, slates, steel sections and timber are all marketable. Architectural features such as fireplaces and stairs will command a good price. Reclamation costs will be balanced against the financial gain. The banned material has been used in a variety of applications including pipe insulation, fire protection, sheet claddings, linings and roofing. Samples should be taken for laboratory analysis and if necessary, specialist contractors engaged to remove material before demolition commences.

4.4.5.2 Demolition Methods

Generally, the reverse order of construction should reduce gradually the height where space is not confined, overturning or explosives may be considered. Piecemeal use of hand held equipment such as pneumatic breakers, oxy-acetylene cutters, picks and hammers. Care should be taken when salvaging materials and other reusable components. Chutes should be used to direct debris to a suitable place of collection. Pusher arm usually attached to a long reach articulated boom fitted to a tracked chassis. Hydraulic movement is controlled from a robust cab structure mounted above the tracks. Wrecking ball largely confined to history, as even with safety features such as anti-spin devices, limited control over a heavy weight swinging and slewing from a crane jib will be considered unsafe in many situations.

Impact hammer otherwise known as a pecker. Basically, a large chisel operated by pneumatic power and fitted to the end of an articulated boom on a tracked chassis. Nibbler a hydraulically operated grip fitted as above that can be rotated to break brittle materials such as concrete.

Overturning steel wire ropes of at least 38 mm diameter attached at high level and to an anchored winch or heavy vehicle. May be considered where controlled collapse is encouraged by initial removal of key elements of structure, typical of steel framed buildings. Alternative methods should be given preference. Explosives demolition is specialized work and the use of explosives in demolition is a further



specialized practice limited to very few licensed operators. Charges are set to fire in a sequence that weakens the building to a controlled internal collapse.

4.4.6 Closure and Post-closure

Closure issues related to infrastructure include public health and safety, site stabilization aesthetic and restoration of disturbed lands. Site decommissioning will include the removal of all constructed infrastructure materials, with the exception of concrete foundation. Concrete foundations and other concrete structures will be broken down to ground level and buried in situ. This will be accomplished using internal resources and contractor demolition companies. It is expected that there will be salvage value for much of the materials, particular structural steel and other crushing, grinding and processing equipment from the project.

In all cases, equipment with marketable value will be removed first. The remaining facilities and equipment will be assessed for disposal through demolition and salvage contracts. It is not possible to accurately predict the residual values of the non-reclamation assets at the time of closure; values have instead been assumed based on current market conditions. Materials that are not economically salvageable will be buried in an onsite refuse landfill.

At the time of closure, the following infrastructure will remain in place to support post closure care and maintenance:

- Local access roads to the base camp and water treatment plant
- Reclamation equipment such as trucks, dozer, and snow mobile machine
- Water management systems
- Fuel storage facilities
- Small power generation facility
- Small maintenance workshop
- Limited accommodations
- Environmental laboratory and
- Communication system.

The above facilities will be decommissioned once they will no longer be required.



4.5 COMPARISON AND SELECTION OF THE PREFERRED ALTERNATIVES

This section presents an overview of the alternatives considered as part of the scoping study and report and incoming ESIA study. The main design criteria, construction technology and configuration were determined by project proponent according to the existing laws, rules and procedures.

Current project location is already fixed by the project proponent. In this case, third party could only give advice the alternative technology for the environmentally and socially sustainable development. The proposed project location is illustrated in Figure (53).

4.5.1 ALTERNATIVE METHODS

4.5.1.1 *No Project Option*

If the project is not implemented, both the positive impacts and negative impacts of the project will be vanished. But, by the outcomes of ESIA studies, ESIA team believes that the project will be environmentally and socially sustainable if it is implemented in compliance with the delineated EMP.

4.5.1.2 *Location Alternative*

Current project location is on a plot of land of (6.708) acres which was the storage site of Ministry of Construction (MOC). Location of the project is at the corner of Yankin Road and Sayarsan Road in Yankin Township, Yangon, near Yankin Center. In the eastern of the project area, accommodations for police, in the northern, Khun-Hna-Pin-Lein Creek is located as a border of the area. Yankin Township is the most populated area. Yankin is the biggest social housing area in Yangon. The site location is in advance redevelopment for the existing social housings. ESIA team found out that current project location exerts no significant adverse impact on the structure of the Yangon City or nearby community but only benefits the City by adding new housings with infrastructure.



4.5.1.3 Technology Alternative

Every step takes place in construction works and every choice makes in materials and methods will be based on best available technology considering environmental conservation and sustainable development of the community as a whole. Technical and safety point of view are selected and described Appendix (I).

4.5.1.4 Sensitive Area Surrounding the Project Area

The location of the project is at the corner of Yankin Road and Sayasan Road in Yankin Township, Yangon. It is situated on the plot of (6.708) acres. In the eastern of the project area, accommodations for police, in the western, No. (2) Yankin Ward, in the Northern, No. (1) Yankin ward and The Golden City Housings and in the southern, Saya San -North ward are located. In the northern of the project, Khun-Hna-Pin-Lein Creek is located as a border of the area. In the western of the project, Yankin Road is closed to the project area and in the southern; Saya San Road is closed to the project

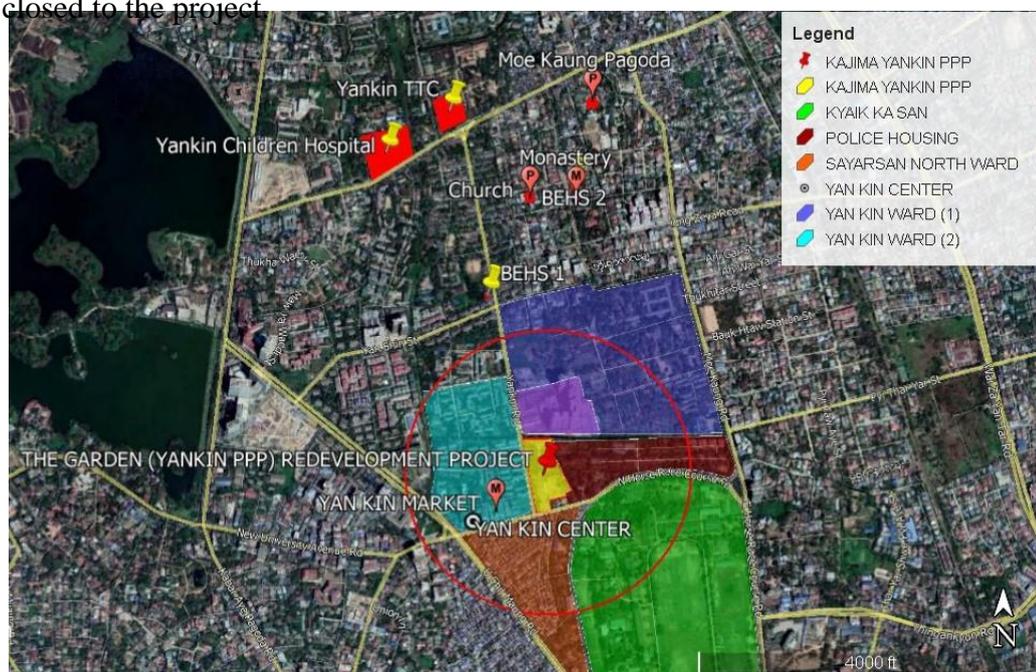


Figure 54. Frail Area Surrounding the Project Area

The project is situated 0.25km from BEHS (1) Yankin, 0.85 km from St. Jude Catholic Church, 0.89km from BEHS (2) Yankin, 1.07km from Yankin Children Hospital, 1.15km from Yankin (TTC), and 1.18km from Moe Kaung Pagoda respectively. The project is located anywhere exempted from the heritage restricted area.



5. IMPACT AND RISK ASSESSMENT AND MITIGATION MEASURES

To identify the potential environmental and social impacts of the project, project activities were correlated with environmental and social receptors and their interactions were identified for potential environmental and social impacts. EIA team finds out twenty-two key environmental and social impacts of the project on its environment. These impacts are described in this section of the report.

5.1 IMPACT AND RISK ASSESSMENT METHODOLOGY

Rating matrix method is used to assess the significance level of the identified environmental and social impacts of the The Garden Redevelopment Project on its environment. There are five parameters considered for the activities of the projects and the consequences resulted from the said activities. System of rating is described in detailed as follows.

Table 48. Severity of Consequence

Severity	Rating
Insignificant/ non-harmful	1
Small/ potential harmful	2
Significant/ slightly harmful	3
Great/ harmful	4
Disastrous/ deadly harmful	5

Table 49. Duration of the Consequence

Duration	Rating
Up to One Month	1
Up to One Year	2
Up to Ten Year	3
More than 10 year	4
Permanent	5



Table 50. Spatial Scope of the Consequence

Spatial Scope	Rating
Activity specific	1
Within right of way	2
Local area	3
National	4
Global	5

Table 51. Frequency of Activity

Frequency	Rating
Annual or less	1
Bi-annual	2
Monthly	3
Daily Intermittence	4
Daily Continuous	5

Table 52. Probability of Activity

Probability	Rating
Almost impossible	1
Highly unlikely	2
Unlikely	3
Possible	4
Definitely	5



Table 53. Significance Rating Matrix

		Consequence (Severity + Spatial Scope + Duration)														
Activity (Frequency + Probability)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	
	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105	
	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	
	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135	
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	

Table 54. Significance Levels

Sr.	Color Code	Value	Rating
1		1-25	Very Low
2		26-50	Low
3		51-75	Low-Medium
4		76-100	Medium-High
5		101-125	High
6		126-150	Very High

5.2 IMPACT AND RISK IDENTIFICATION, ASSESSMENT AND MITIGATION

In this section of the report, anticipated impacts of the “The Garden” Yankin PPP Redevelopment Project are identified by an activity/receptor matrix, assessed with rating matrix and mitigation measures for the identified impacts are delineated for each project phase; pre-construction, construction, operation, decommissioning, closure, and post-closure:



5.2.1 Pre-construction

5.2.1.1 Impact Identification

Table 55. Impact Identification Table

		PRE-CONSTRUCTION	
		Land Acquisition	FENCING AND SITE CLEARING
			Dust, Particulate, Noise
PHYSICAL	Air		Dust and Particulate
	Noise		
	Odour		
	Water		Drainage Blockage
	Geology		
	Soil		Solid Waste
BIOLOGICAL	Flora		
	Fauna		
SOCIAL	Social		
	Socioeconomic		
	Cultural Heritage		
HEALTH	OSH		
	CSH		
	Visual		
	Climate Change		

There are three distinct impacts in the pre-construction phase of the project which are:

1. Air Quality Impact by site clearing dust and particulate
2. Solid Waste from site clearing
3. Possibility of Drainage Blockage



5.2.1.2 Impact Characterization

Characteristics of the impacts are evaluated based on eight particular basis, five of which are used in the assessment of the significance level of the impacts.

Table 56. Impact Characterization Table

IMPACTS	CHARACTERISTICS							
	Nature	Impact Source	Impact Receptor	Severity	Duration	Spatial Scope	Frequency	Probability
1. Impact by Site Clearing Dust and Particulate	Negative	Site Clearing in project area by top soil removal	Workers and vicinity	Impact severity is small from pre-construction	Less than one month	Dust can spread on site and surrounding	Activity that cause the impact occurs daily continuous in pre-construction	Dust and particulate can emit the pre-construction from project area (Possible)
2. Soild Waste from Site Clearing	Negative	Top soil from levelling Shrub, Bush and debirts	Workers and vicinity	Impact severity is significant from processes	The process is about one month	Solid waste can affect can local area	Activity that cause the impact occurs daily intermittence	Solid waste may be generated the pre-construction



								from project area (Possible)
3. Possibility of Drainage Blockage	Negative	Site clearing and top soil removal in project area	Blocking the natural drainage around the project area	Impact severity is significant from processes	About one month in pre-construction	Impact can affect local area	Activity that cause the impact occurs daily intermittence	Drainage still exists around project area and Khun-Hna-Pin-Lein creek exists beside project (possible)



5.2.1.3 Impact Assessment

Assessment of the identified impacts are carried out with rating matrix method the detail of which are shown in the previous part of this chapter. The assessment results are shown in following table.

Table 57. Impact Assessment Table

Sr.	Impact	Severity	Duration	Spatial Scope	Frequency	Probability	Total Rating	Significance Level
1	Air Quality Impact by Site Clearing Dust and Particulate	2	1	3	5	4	54	Low-Medium
2	Solid Waste from Site Clearing	3	1	3	4	4	56	Low-Medium
3	Possibility of Drainage Blockage	3	1	3	4	4	56	Low-Medium

5.2.1.4 Impact Mitigations

Following mitigation measures are formulated to prevent, reduce, or compensate the effect of the impacts caused by the project activities. Detail plan for management actions, implementation and follow-up of the impact mitigations are delineated in EMP chapter.

Table 58. Impact Mitigations Table

Sr.	Impact	Mitigation/Enhancement Measures
1	Air Quality Impact by Site Clearing Dust and Particulate	1. Watering spraying if necessary
2	Solid Waste from Site Clearing	1. Dispose the solid waste systematically at designated waste disposal site provided by YCDC
3	Possibility of Drainage Blockage	1. Maintaining the existing drainage within the project compound and Khun-Hna-Pin-Lein creek beside the project 2. Providing an alternative drainage when the area for drainage is needed for future development



5.2.2 Construction

5.2.2.1 Impact Identifications

Table 59. Impact Identification Table

		CONSTRUCTION			
		EARTH WORK	PILE WORK	CIVIL WORKS	DECORATION
		Dust, Particulate, Noise, Blockage of Drainage			
PHYSICAL	AIR	Dust, Particulate		Dust, Particulate	Dust, Particulate
	NOISE		Noise and Vibration	Noise	
	ODOUR				Odour
	WATER	Drainage Blockage	Waste Water	Waste Water	
	GEOLOGY				
	SOIL	Soil Degradation, Solid Waste			
BIOLOGICAL	FLORA				
	FAUNA				
SOCIAL	SOCIAL				
	SOCIOECONOMICS	Job	Job	Job	Job
	CULTURAL HERITAGE				
HEALTH	OSH	Dust and Particulate	Physical	Physical, Dust and particulate	Dust, Particulate



	CSH	Transportation of materials		Transportation of materials	
	VISUAL				
	CLIMATE CHANGE				

There are eight distinct impacts in the construction phase of the project which are:

1. Impact on Air Quality by Dust and Particulates
2. Impact from Noise and Vibration
3. Impact on Land by solid waste
4. Waste water generation
5. Drainage Blocking
6. OSH
7. CSH
8. Job opportunity



5.2.2.2. Impact Characterization

Characteristics of the impacts are evaluated based on eight particular basis five of which are used in the assessment of the significance level of the impacts.

Table 60. Impact Characterization Table

IMPACTS	CHARACTERISTICS							
	Nature	Impact Source	Impact Receptor	Severity	Duration	Spatial Scope	Frequency	Probability
1. Impact on Air Quality by Dust and Particulate	Negative	Dust and particulate from construction	Workers	Impact severity is significant	Dust and particulate will emit during the project construction (up to six year)	Project area	Activity that cause the impact occurs daily intermittence in construction	Dust and particulate can emit the construction from project area (Possible)
2. Impact from Noise and Vibration	Negative	Noise from machinery used in construction	Workers	Impact severity is significant	While the project construction that will appear noise from machinery (up to six year)	Project area	Activity that cause the impact occurs daily intermittence in construction	Workers can undergo from noise (possible)



3. Impact on Land by Solid Waste	Negative	Soil waste and solid degradation	Soil	Impact severity is significant	Solid waste will appear the earthwork (up to one year)	Project area	Activity that cause the impact occurs daily intermittence	Solid waste emerges from earthwork (possible)
4. Waste Water Generation	Negative	Waste water from pile work and civil work	Drainage	Impact severity is small	During project construction waste water will emit from pile work and civil work (up to one year)	Local area	Activity that cause the impact occurs daily intermittence in project construction	Waste will be generating from pile work and civil work(possible)
5. Drainage Blockage	Negative	Block the drainage from earth work	Drainage	Impact severity is significant	In construction Period	Local area	In raining season (annual)	Possible
6. Impact on Occupational Safety and Health (OSH)	Negative	Physical hazards, dust & particulate from earth work, pile work, civil work and	Workers	Impact severity is small	In construction	Project area	Daily intermittence in project construction	Possible



		decoration from constructing						
7. Impact on Community Safety and Health (CSH)	Negative	Increased Traffic Loading	Local	Impact severity is small	In construction	Local area	Daily intermittence in project construction	Possible
8. Job Opportunity	Positive	Increased job opportunity from project operation	Local	Impact severity is small	Job opportunity will become in project life	Job opportunity	Activity that cause in project construction	Possible



5.2.2.3 Impact Assessment

Assessment of the identified impacts is carried out with rating matrix method the detail of which are shown in the previous part of this chapter. The assessment results are shown in following table.

Table 61. Impact Assessment Table

Sr.	Impact	Severity	Duration	Spatial	Frequency	Probability	Total Rating	Significance Level
1	Impact on Air Quality by Dust and Particulates	3	2	2	4	4	56	Low-Medium
2	Impact from Noise and Vibration	3	2	2	4	4	56	Low-Medium
3	Impact on Land by Solid Waste	3	2	2	4	4	56	Low-Medium
4	Waste Water Generation	2	2	3	4	4	56	Low-Medium
5	Drainage Blockage	3	2	3	1	4	40	Low
6	Impact on Occupational Safety and Health (OSH)	2	2	2	4	4	48	Low
7	Impact on Community Safety and Health (CSH)	2	2	3	4	4	56	Low-Medium
8	Job Opportunity	2	4	3	1	4	45	Low

5.2.2.4 Impact Mitigations

Following mitigation measures are formulated to prevent, reduce, or compensate the effect of the impacts caused by the project activities. Detail plan for management actions, implementation and follow-up of the impact mitigations are delineated in EMP chapter.



Table 62. Impact Mitigations Table

Sr.	Impact	Mitigation/Enhancement Measures
1	Impact on Air Quality by Dust and Particulates	<ol style="list-style-type: none"> 1. Places of dust emission during earth works must be sprayed with water if necessary 2. A speed limit of 15 mph must be set for vehicles travelling within the project site 3. Provide covering for dump trucks as necessary 4. Wheels of dump trucks must be washed with water jet in every outbound travel from the project site
2	Impact from Noise and Vibration	<ol style="list-style-type: none"> 1. Carry out maintenance work so that unnecessary mechanical noise could be prevented 2. Incorporating silencer/ Muffler with engines and generator sets 3. Delivering information of a contact person with contact number site and in local community so that issues from noise disturbance could be communicated and informed with the project 4. Piling system with less noise and vibration must be used instead of a noisy and vibrating one 5. High noise construction work must be avoided in night time 6. Carrying out noise level according to NEQG 7. Providing necessary PPE for workers at high noise area.
3	Impact on Land by Solid Waste	<ol style="list-style-type: none"> (1) Construction activities should be done in restricted areas and activities kept to a minimum as far as possible. (2) Excavation process should be monitored to prevent over-excavation.



		<p>(3) In order to mitigate soil erosion, the basic principle of construction erosion control measures should be followed where necessary.</p> <p>(4) Schedule excavation during low-rainfall periods, when possible.</p> <p>(5) Excavate immediately before construction instead of leaving soils exposed for months or years.</p> <p>(6) Where wind erosion is a concern, plan and install windbreaks</p> <p>(7) Divert water from disturbed areas.</p> <p>(8) Avoid soil compaction by restricting the use of trucks and heavy equipment to limited area.</p> <p>(9) Control concentrated flow and runoff to reduce the volume and velocity of water from work sites to prevent formation of drainages</p> <p>(10) The wetting of soil and the discharge of construction grey water across natural soil should be controlled.</p> <p>11. The handling of natural construction materials, such as filling soil and gravels will require dust management.</p>
4	Waste Water Generation	<p>1. Construction waste water must be settled in settling ponds and only clear water must be allowed to disposed to creek</p> <p>2. Mud water from bore pile work must be prevented from direct run off or direct discharge into roadside drainage</p>
5	Drainage Blockage	<p>1. Maintaining the existing drainage within the project compound and Khun-Hna-Pin-Lein creek beside the project</p>



6	<p style="text-align: center;">Impact on Occupational Safety and Health (OSH)</p>	<ol style="list-style-type: none"> 1. Appointing a safety officer 2. Provide safe, secure and health camps for workers adequately 3. Construction activity should be done in restricted areas and activities kept to minimum as far as possible 4. Providing necessary PPE adequately and supervise their proper use in work place.
7	<p style="text-align: center;">Impact on Community Safety and Health (CSH)</p>	<ol style="list-style-type: none"> (1) To avoid high hazard routes and crowded periods so that traffic hazard could be minimized (2) Provide security system and fire safety system adequately (3) Provide support for health sector in CSR programme
8	<p style="text-align: center;">Job Opportunity</p>	<ol style="list-style-type: none"> 1. Signing employment contract in accordance with employment and skill development law

5.2.3 Operation

5.2.3.1 Impact Identification

Table 63. Impact Identification Table

		OPERATION			
		HOTEL	RETAIL	LONG-STAY HOTEL	OFFICE BUILDING
		Traffic, Solid Waste, Waste Water			
PHYSICAL	AIR				
	NOISE				
	ODOUR				
	WATER	Waste Water (Domestic, Sanitary)	Waste Water (Domestic, Sanitary)	Waste Water (Domestic, Sanitary)	Waste Water (Domestic, Sanitary)
	GEOLOGY				
	SOIL	Solid Waste (Litter)	Solid Waste (Litter)	Solid Waste (Litter)	Solid Waste (Litter)
BIOLOGICAL	FLORA				
	FAUNA				
SOCIAL	SOCIAL				
	SOCIOECONOMICS	Job	Job	Job	Job
	CULTURAL HERITAGE				



HEALTH	OSH				
	CSH	Traffic	Traffic	Traffic	Traffic
	VISUAL	Increased Residential Amenity	Increased Residential Amenity	Increased Residential Amenity	Increased Residential Amenity
	CLIMATE CHANGE				

Majority of project impacts will occur upon the operation of the project. There are five distinct impacts in operation phase of project which are:

1. Waste water generation
2. Impact from solid waste
3. Increased Traffic Loading
4. Increased residential amenity
5. Job opportunity



5.2.3.2 Impact Characterization

Characteristics of the impacts are evaluated based on eight particular basis five of which are used in the assessment of the significance level of the impacts.

Table 64. Impact Characterization Table

IMPACTS	CHARACTERISTICS							
	Nature	Impact Source	Impact Receptor	Severity	Duration	Spatial Scope	Frequency	Probability
1. Waste Water Generation	Negative	Domestic and Sanitary waste water from the project operation	Drainage	Impact severity is small from project operation	Domestic and Sanitary waste water will emit in the project operation life	Domestic and Sanitary waste water will affect on local area	Activity that cause the impact occurs daily continuous	Possible
2. Impact from Solid Waste	Negative	Domestic soild waste(litters) from the project operation	Land	Impact severity is significant	Domestic solid waste will emit from the project operation life	Waste have effect on project area	Activity that cause the impact occurs daily continuous	Possible



3. Increased Traffic Loading	Negative	Increased traffic from the project operation	Local	Impact severity is significant from project operation	Project operation life	Traffic can affect in local area	Activity that cause the impact occurs daily continuous	Possible
4. Increased Residential Amenity	Positive	Increased Residential Amenity because of the project	Local	Impact severity is significant	Project operation life	Residential amenity will increase in local community	Activity that cause the impact occurs daily continuous	Residential amenity is increase possible
5. Job Opportunity	Positive	Increased job opportunity from project operation	Local	Impact severity is small	Job opportunity will become in project life	Job opportunity	Activity that cause the impact occurs daily continuous	Possible



5.2.3.3 Impact Assessment

Assessment of the identified impacts are carried out with rating matrix method the detail of which are shown in the previous part of this chapter. The assessment results are shown in following table.

Table 65. Impact Assessment Table

Sr.	Impact	Severity	Duration	Spatial Scope	Frequency	Probability	Total Rating	Significance Level
1	Waste Water Generation	2	4	3	5	4	81	Medium-High
2	Impact from Solid Waste	3	4	2	5	4	81	Medium-High
3	Increased Traffic Loading	3	4	3	5	4	90	Medium-High
4	Increased Residential Amenity	3	4	3	5	4	90	Medium-High
5	Job Opportunity	2	4	3	1	4	45	Low

5.2.3.4 Impact Mitigations

Following mitigation measures are formulated to prevent, reduce, or compensate the effect of the impacts caused by the project activities. Detail plan for management actions, implementation and follow-up of the impact mitigations are delineated in EMP chapter.

Table 66. Impact Mitigations Table

Sr.	Impact	Mitigation/Enhancement Measures
1	Waste Water Generation	<ol style="list-style-type: none"> 1. Domestic waste water from the project must be treated to NEQG waste water quality before discharging to drainage 2. To consider proper process for reduction of water use so that domestic water consumption could be minimized 3. Fixtures that can minimized water consumption must be used 4. To conduct awareness program for effective utilization of water 5. To consider other source of water apart from groundwater for future expansion of project



2	Impact from Solid Waste	<ol style="list-style-type: none"> 1. Provide adequate containers 2. Provide a systematic solid waste management system 3. Dispose the solid waste systematically at designated waste disposal site provided by YCDC
3	Increased Traffic Loading	<ol style="list-style-type: none"> 1. Provide adequate parking area for the project 2. Recruit adequate employee for parking services 3. Provide systematic layout for the vehicles and walkways in project compound 4. To implement remedial measure in TIA report
4	Increased Residential Amenity	<ol style="list-style-type: none"> 1. Sufficient security personnel and systematic security system must be provided 2. Adequate lighting for night time security must be installed in readily accessible area 3. Project area must be landscaped systematically when construction works are finished 4. Provide security system and fire safety system adequately
5	Job Opportunity	<ol style="list-style-type: none"> 1. Signing employment contract in accordance with employment and skill development law

5.2.4 Decommissioning

5.2.4.1 Impact Identifications

Table 67. Impact Identifications Table

		DECOMMISSIONING
		STRUCTURAL DECOMMISSIONING
		Solid waste, Dust and particulate, Noise and vibration
PHYSICAL	AIR	Dust and Particulate
	NOISE	Demolition Noise
	ODOUR	



	WATER	Close up of drainage
	GEOLOGY	
	SOIL	Solid Waste
BIOLOGICAL	FLORA	
	FAUNA	
SOCIAL	SOCIAL	
	SOCIOECONOMICS	
	CULTURAL HERITAGE	
HEALTH	OSH	Physical Hazzard
	CSH	
	VISUAL	
	CLIMATE CHANGE	

Majority of project impacts will occur upon the decommissioning

1. Impact on air quality by dust and particulate
2. Noise and vibration
3. Solid waste generation
4. OSH



5.2.4.2 Impact Characterization

Characteristics of the impacts are evaluated based on eight particular basis five of which are used in the assessment of the significance level of the impacts.

Table 68. Impact Characterization Table

IMPACTS	CHARACTERISTICS							
	Nature	Impact Source	Impact Receptor	Severity	Duration	Spatial Scope	Frequency	Probability
1. Impact on Air Quality by Dust and Particulate	Negative	Dust and particulate from structure decommissioning	Workers	Impact severity is small from decommissioning	More than one month	Project area	Activity that cause the impact occurs daily Intermittence	Possible
2. Noise and Vibration from Demolitions	Negative	Noise and vibration from structure decommissioning	Workers	Impact severity is small from decommissioning	More than one month	Project area	Activity that cause the impact occurs daily intermittence decommissioning	Possible
3. Solid Waste Generation	Negative	Solid Waste from structure decommissioning	Soil	Impact severity is significant from decommissioning	More than one month	Local area	Activity that cause the impact occurs daily intermittence	Solid waste may be generated in



								decommissioning
4. Impact on Occupational Safety and Health (OSH)	Negative	Physical hazard, dust and particulate may be decommissioning	Workers	Impact severity is significant	More than one month	In project area	Activity that cause the impact occurs daily intermittence in decommissioning	Workers can cause physical hazard in decommissioning(possible)



5.2.4.3 Impact Assessment

Assessment of the identified impacts are carried out with rating matrix method the detail of which are shown in the previous part of this chapter. The assessment results are shown in following table.

Table 69. Impact Assessment Table

Sr.	Impact	Severity	Duration	Spatial Scope	Frequency	Probability	Total Rating	Significance Level
1	Impact on Air Quality by Dust and Particulate	2	1	2	4	4	40	Low
2	Noise and Vibration from Demolitions	2	1	2	4	4	40	Low
3	Solid Waste Generation	3	1	3	4	4	56	Low-Medium
4	OSH	3	1	2	4	4	48	Low

5.2.4.4 Impact Mitigations

Following mitigation measures are formulated to prevent, reduce, or compensate the effect of the impacts caused by the project activities. Detail plan for management actions, implementation and follow-up of the impact mitigations are delineated in EMP chapter.

Table 70. Impact Mitigations Table

Sr.	Impact	Mitigation/Enhancement Measures
1	Impact on Air Quality by Dust and Particulate	1. Earth works must be sprayed after decommissioning if necessary.
2	Noise and Vibration from Demolitions	1. High noise decommission work must be avoided the night time 2. Carrying out noise management according to NEQG guidelines 3. Providing necessary PPE for workers at high noise area
3	Solid Waste Generation	1. Disposing the decommissioning solid waste systematically at waste disposal site provided by respective YCDC 2. Disposing the decommissioning solid waste



		must be separated reuse materials and non-reuse materials.
4	Impact on Occupational Safety and Health (OSH)	1. Providing necessary PPE adequately while the decommissioning 2.Planning work site layout to minimize the need for manual transfer of heavy loads

5.2.5 Closure and post-closure

5.2.5.1 Impact Identifications

Table 71. Impact Identifications Table

		CLOSURE AND POST CLOSURE	
		REFILLING	REPLANTATION
PHYSICAL	AIR	Noise, Dust, ...	
	WATER		
	LAND	Refilling	
BIOLOGICAL	FLORA		
	FAUNA		
SOCIAL			
SOCIOECONOMICS			
HEALTH			
CLIMATE CHANGE			

Majority of project impacts will occur upon the operation of the project. There are two distinct impacts in the closure and post-closure phase of the project which are:

1. Dust from refilling works
2. Landform change by refilling



5.2.5.2 Impact Characterization

Characteristics of the impacts are evaluated based on eight particular basis five of which are used in the assessment of the significance level of the impacts.

Table 72. Impact Characterization Table

IMPACTS	CHARACTERISTICS							
	Nature	Impact Source	Impact Receptor	Severity	Duration	Spatial Scope	Frequency	Probability
Dust from refilling works	Negative	Refilling Topsoil	Workers	Great	Up to one year	Activity specific	Daily Intermittence	Possible
Landform change by refilling	Negative	Refilling	Land	Significant	More than 10 Year	In the Project	Daily Continuous	Possible



5.2.5.3 Impact Assessment

Assessment of the identified impacts are carried out with rating matrix method the detail of which are shown in the previous part of this chapter. The assessment results are shown in following table.

Table 73. Impact Assessment Table

Sr.	Impact	Severity	Duration	Spatial Scope	Frequency	Probability	Total Rating	Significance Level
1	Dust from refilling works	4	2	1	4	4	56	Low-Medium
2	Landform change by refilling	3	4	2	5	4	81	Medium-High

5.2.5.4 Impact Mitigations

Following mitigation measures are formulated to prevent, reduce, or compensate the effect of the impacts caused by the project activities. Detail plan for management actions, implementation and follow-up of the impact mitigations are delineated in EMP chapter.

Table 74. Impact Mitigation Table

Sr.	Impact	Mitigation/Enhancement Measures
1	Dust from refilling works	(1) Water sprays area carrying out filling and grading operations (2) Water sprays unpaved roads as dust suppression measure
2	Landform change by refilling	(1) Refill all the excavated place in the project (2) Top soil must be refilled back at the surface (3) Re-vegetate the entire site



6. CUMULATIVE IMPACT ASSESSMENT

6.1 POTENTIAL CUMULATIVE IMPACTS

Only activities that could create cumulative nature of impacts is operation. Since the project is currently not starting operation, EIA study for the project has to be conducted and environmental management plan must be implemented as in current project. So, it could be reasonably expected that emissions and discharge of pollutants from that project is at least in compliance with NEQG guideline values.

For “The Garden” Yankin PPP Redevelopment Project, following assessment for project related impacts in light of cumulative impact is conducted.

6.1.1 Cumulative Impact on Air Quality

Factors that can impact air quality are dust emission and noise during construction. Effect of dust emission on environment is dust fall out on nearby residents. Given that dust emission activities occur only in construction phase and mitigation measures are to be implemented for dust suppression, impact of dust on surrounding environment is expected to be not in cumulative nature. No special mitigation measure except from those delineated in EMP is expected to be needed. Effect of noise will mainly impact nearby residences if they are uncontrolled. But noise impact mitigation measures and redress mechanism are included in EMP. So, no accumulation could occur by noise.

6.1.2 Cumulative Impact on Water Quality

Factors that can impact water quality are generation of domestic waste water. But according to project plans, waste water treatment plant will be constructed in the project and only discharged treated water. Given that the project area is located near by Khun-Hna-Pin-Lein Creek in the north and discharge domestic waste water which is treated accordingly as delineated in EMP is expected to be no threat to water environment. No special mitigation measure except from those delineated in EMP is expected to be needed for cumulated water quality impact.

6.1.3 Cumulative Impact on Traffic

Factors that can impact on traffic are future traffic generation and future traffic distribution. For the assessment of the future traffic generation, there is no reference



rate rather than ITE's rate. ITE trip rate for Long Stay Hotel is 0.48 trips per dwelling unit in morning peak while trip rate for evening peak hour is 0.54. Again, 90% of trips produced by Long Stay Hotel and Hotel are vehicular trips. That means about 10% of those are assumed to use public transit services. The trips for office are taken 60% of total trips as vehicular trips. The proposed site is favorably located with regard to high frequency bus.

The proposed project can be accessed by roads from Western and Southern sides. In terms of road network, the proposed project can be accessed by Sayar San Road directly for the people who come for the office. For the guests who come for hotel and other purposes can access directly to the project site by Yankin Road. Trips production and attractions to and from the proposed site can be assumed as follows.

- 20% of total trips are estimated to and from northern side of the project. It includes Mayangone, Yankin, and South Oakkalar townships.
- Another 30% of total trips are also estimated to and from Western side of the project, it includes Thingangyun, Bahan and Tarmwe townships.
- Another 50% of total trips are estimated to and from eastern side of the project through Sayar San road. That eastern side consists of Kamaryut, Hlaing and Kyeemyindaing townships.

As the project is scheduled to be completed 100% at year 2024, the traffic situation at the time is to be focused as traffic impact assessment report. It is assumed that the traffic growth rate of 5% per annum for Yangon city. The project will be completely finished 8 years from now. Therefore, traffic growth within eight years can be forecasted for 40% more in a design year of 2024. Remedial measures such as modification of traffic signal at the junction of Sayarsan Road and Yankin Road, modification of ingress and egress, modification of bus bay are delineated in TIA report. It is assuming that cumulative impact on traffic congestion could be reasonably under control if those remediation measures are implemented.



7. ENVIRONMENTAL MANAGEMENT PLAN

1.1 Brief Project Description

In the corner of the Yankin Road and Sayar San Road, the Ministry of Construction previously used as construction material storage yard. At the 2nd Construction Vice-Ministerial Meeting on 20 January 2015, H.E. Dr. Win Myint, Vice Union Minister of Ministry of Construction (MOC) gave a request to H.E. Mr. Hideo Tokuyama, Vice Minister of Ministry of Land, Infrastructure, Transport and Tourism, Japan (MLTI) to make a proposal to redevelop the site as “Japanese PPP” model. On 22 September 2016, Cabinet Meeting of Yangon Region (YR) agreed to give a non-objection letter to MOC for them to request Economic Committee under Cabinet Meeting under Union Government of Myanmar (EC) to give an approval to enter into a discussion with Kajima to exchange a BOT contract for Project.

Kajima Yankin PPP Company Limited is implementing “The Garden” Yankin PPP Redevelopment Project. Project is 6.708 acres of land located at the corner of Yankin Road and Sayasan Road in Yankin Township, Yangon Region, Myanmar. The Project may include the hotel, retail, long-stay hotel and office building together with infrastructures.

The site location is about 10 km distance far away from Yangon International Airport (Mingalardon) and take 27 minutes for driving by car. And then 0.3 km distance far away from Yankin Center and take 5 minutes for walking.

The expected commitment date of the project is at the last months of (2018) and completion of the project will be by (2024). The expected operation period of the project is about (50+10+10) years.

1.2 SUMMARY OF IMPACTS AND MITIGATION MEASURES

7.2.1 Summary of Impacts

There are total of twenty-two significant impacts by the project. Significance level of the impacts are shown in the following tables.



Table 75. Impact Ratings without MEMs

PRE-CONSTRUCTION								
Sr.	Impact	Severity	Duration	Spatial Scope	Frequency	Probability	Total Rating	Significance Level
1	Air Quality Impact by Site Clearing Dust and Particulate	2	1	3	5	4	54	Low-Medium
2	Solid Waste from Site Clearing	3	1	3	4	4	56	Low-Medium
3	Possibility of Drainage Blockage	3	1	3	4	4	56	Low-Medium
CONSTRUCTION								
1	Impact on Air Quality by Dust and Particulates	3	2	2	4	4	56	Low-Medium
2	Impact from Noise and Vibration	3	2	2	4	4	56	Low-Medium
3	Impact on Land by Solid Waste	3	2	2	4	4	56	Low-Medium
4	Waste Water Generation	2	2	3	4	4	56	Low-Medium
5	Drainage Blockage	3	2	3	1	4	40	Low
6	Impact on Occupational Safety and Health (OSH)	2	2	2	4	4	48	Low
7	Impact on Community Safety and Health (CSH)	2	2	3	4	4	56	Low-Medium
8	Job Opportunity	2	4	3	1	4	45	Low
OPERATION								
1	Waste Water Generation	2	4	3	5	4	81	Medium-High
2	Impact from Solid Waste	3	4	2	5	4	81	Medium-High
3	Increased Traffic Loading	3	4	3	5	4	90	Medium-High
4	Increased Residential Amenity	3	4	3	5	4	90	Medium-High
5	Job Opportunity	2	4	3	1	4	45	Low
DECOMMISSION								
1	Impact on Air Quality by Dust and Particulate	2	1	2	4	4	40	Low
2	Noise and Vibration from Demolitions	2	1	2	4	4	40	Low



3	Solid Waste Generation	3	1	3	4	4	56	Low-Medium
4	Impact on Occupational Safety and Health (OSH)	3	1	2	4	4	48	Low
CLOSURE AND POST-CLOSURE								
1	Dust from refilling works	4	2	1	4	4	56	Low-Medium
2	Landform change by refilling	3	4	2	5	4	81	Medium-High

Table 76. Impact Ratings with MEMs

PRE-CONSTRUCTION								
Sr.	Impact	Severity	Duration	Spatial Scope	Frequency	Probability	Total Rating	Significance Level
1	Air Quality Impact by Site Clearing Dust and Particulate	2	1	2	4	4	40	Low
2	Solid Waste from Site Clearing	2	1	3	4	4	48	Low
3	Possibility of Drainage Blockage	2	1	3	4	4	48	Low
CONSTRUCTION								
1	Impact on Air Quality by Dust and Particulates	3	2	2	4	3	49	Low
2	Impact from Noise and Vibration	2	2	2	4	4	48	Low
3	Impact on Land by Solid Waste	3	2	2	4	3	49	Low
4	Waste Water Generation	2	2	3	3	4	49	Low
5	Drainage Blockage	2	2	2	1	3	24	Very-Low
6	Impact on Occupational Safety and Health (OSH)	1	1	2	3	3	24	Very-Low
7	Impact on Community Safety and Health (CSH)	2	2	3	3	4	49	Low
8	Job Opportunity	2	4	3	2	4	54	Low-Medium
OPERATION								
1	Waste Water Generation	2	3	3	4	4	64	Low-Medium
2	Impact from Solid Waste	3	3	2	4	4	64	Low-Medium



3	Increased Traffic Loading	3	3	3	4	4	72	Low-Medium
4	Increased Residential	4	5	4	4	4	104	High
5	Job Opportunity	2	4	3	2	4	54	Low-Medium
DECOMMISSION								
1	Impact on Air Quality by Dust and Particulate	1	1	2	3	3	24	Very-Low
2	Noise and Vibration from Demolitions	1	1	2	3	3	24	Very-Low
3	Solid Waste Generation	2	1	3	4	4	48	Low
4	Impact on Occupational Safety and Health (OSH)	2	1	2	3	2	25	Very-Low
CLOSURE AND POST-CLOSURE								
1	Dust from refilling works	3	2	1	4	4	48	Low
2	Landform change by refilling	2	4	2	5	4	72	Low-Medium

All the significance levels of anticipated impacts with and without MEMs could be summarized as in the following table.

Table 77. Summary of Impact Significance With/Without MEMs

Sr.	Impact	Without Mitigation		With Mitigation	
		Rating	Significance	Rating	Significance
Pre-Construction					
1	Air quality impact by Site Clearing Dust and Particulate	54	Low-Medium	40	Low
2	Solid waste from Site Clearing	56	Low-Medium	48	Low
3	Possibility of Drainage Blockage	56	Low-Medium	48	Low
Construction					
1	Impact on Air Quality by Dust and Particulates	56	Low-Medium	49	Low



2	Impact from Noise and Vibration	56	Low-Medium	48	Low
3	Impact on Land by Solid Waste	56	Low-Medium	49	Low
4	Waste Water Generation	56	Low-Medium	49	Low
5	Drainage Blockage	40	Low	24	Very-Low
6	Impact on Occupational Safety and Health (OSH)	48	Low	24	Very-Low
7	Impact on Community Safety and Health (CSH)	56	Low-Medium	49	Low
8	Job Opportunity	45	Low	54	Low-Medium
Operation					
1	Waste Water Generation	81	Medium-High	64	Low-Medium
2	Impact from Solid Waste	81	Medium-High	64	Low-Medium
3	Increased Traffic Loading	90	Medium-High	72	Low-Medium
4	Increased Residential Amenity	90	Medium-High	104	High
5	Job Opportunity	45	Low	54	Low-Medium
Decommissioning					
1	Impact on Air Quality by Dust and Particulate	40	Low	24	Very-Low
2	Noise and Vibration from Demolitions	40	Low	24	Very-Low
3	Solid Waste Generation	56	Low-Medium	48	Low
4	Impact on Occupational Safety and Health (OSH)	48	Low	25	Very-Low
Closure and Post-closure					
1	Dust from refilling works	56	Low-Medium	48	Low
2	Landform change by refilling	81	Medium-High	72	Low-Medium



7.2.2 Summary of Mitigation Measures

Table 78. Summary of MEMs

Sr.	Impact	Mitigation
Pre-Construction		
1	Air Quality Impact by Site Clearing Dust and Particulate	1. Water spraying if necessary
2	Solid Waste from Site Clearing	1. Dispose the solid waste systematically at designated waste disposal site provided by YCDC
3	Possibility of Drainage Blockage	1. Maintaining the existing drainage within the project compound and Khun-Hna-Pin-Lein creek beside the project 2. Providing an alternative drainage when the area for drainage is needed for future development
Construction		
1	Impact on Air Quality by Dust and Particulates	1. Places of dust emission during earth works must be sprayed with water if necessary. 2. A speed limit of 15 mph must be set for vehicles travelling within the project site 3. Provide covering for dump trucks as necessary 4. Wheels of dump trucks must be washed with water jet in every outbound travel from the project site
2	Impact from Noise and Vibration	1. Carrying out maintenance work so that unnecessary mechanical noises could be prevented 2. Incorporating silencer/ Muffler with engines and generator sets 3. Delivering information of a contact person with contact number site and in local community so that issues from noise disturbance could be communicated and informed with the project



		<p>4. Piling system with less noise and vibration must be used instead of a noisy and vibrating one</p> <p>5. High noise construction work must be avoided in night time</p> <p>6. Carrying out noise level according to NEQG</p> <p>7. Providing necessary PPE for workers at high noise area</p>
3	Impact on Land by Solid Waste	<p>(1) Construction activities should be done in restricted areas and activities kept to a minimum as far as possible.</p> <p>(2) Excavation processes should be monitored to prevent over-excavation.</p> <p>(3) In order to mitigate soil erosion, the basic principle of construction erosion control measures should be followed where necessary.</p> <p>(4) Schedule excavation during low-rainfall periods, when possible.</p> <p>(5) Excavate immediately before construction instead of leaving soils exposed for months or years.</p> <p>(6) Where wind erosion is a concern, plan and install windbreaks.</p> <p>(7) Divert water from disturbed areas.</p> <p>(8) Avoid soil compaction by restricting the use of trucks and heavy equipment to limited area.</p> <p>(9) Control concentrated flow and runoff to reduce the volume and velocity of water from work sites to prevent formation of drainages</p> <p>(10) The wetting of soil and the discharge of construction grey water across natural soil should be controlled.</p> <p>(11) The handling of natural construction materials, such as filling soil and gravels will require dust management.</p>
4	Waste Water Generation	<p>1. Construction waste water must be settled in settling ponds and only clear water must be allowed to disposed to creek</p>



		2. Mud water from bore pile work must be prevented from direct run off or direct discharge into roadside drainage
5	Drainage Blockage	1. Maintaining the existing drainage within the project compound and Khun-Hna-Pin-Lein creek beside the project
6	Impact on Occupational Safety and Health (OSH)	<ol style="list-style-type: none"> 1. Appointing a safety officer 2. Provide safe, secure and health camps for workers adequately 3. Construction activity should be done in restricted areas and activities kept to a minimum as far as possible. 4. Providing necessary PPE adequately and supervise their proper use in work place
7	Impact on Community Safety and Health (CSH)	<ol style="list-style-type: none"> (1) To avoid high hazard routes and crowded periods so that traffic hazard could be minimized (2) Provide security system and fire safety system adequately (3) Provide support for health sector in CSR Program.
8	Job Opportunity	1. Signing employment contract in accordance with employment and skill development law
Operation		



1	Waste Water Generation	<ol style="list-style-type: none"> 1. Domestic waste water from the project must be treated according to NEQG's waste water quality guidelines before discharging to drainage 2. To consider proper process for reduction of water use so that domestic water consumption could be minimized 3. Fixtures that can minimized water consumption must be used 4. To conduct awareness program for effective utilization of water 5. To consider other source of water apart from groundwater for future expansion of project
2	Impact from Solid Waste	<ol style="list-style-type: none"> 1. Providing adequate capacity of garbage storage. 2. Provide a systematic solid waste management system. 3. Dispose the solid waste systematically at designated waste disposal site provided by YCDC
3	Increased Traffic Loading	<ol style="list-style-type: none"> 1. Provide adequate parking area for the project 2. Recruit adequate employee for parking services 3. Provide systematic layout for the vehicles and walkways in project compound 4. To implement remedial measure in TIA report
4	Increased Residential Amenity	<ol style="list-style-type: none"> 1. Sufficient security personnel and systematic security system must be provided 2. Adequate lighting for night time security must be installed in readily accessible area 3. Project area must be landscaped systematically when construction works are finished 4. Provide security system and fire safety system adequately



5	Job Opportunity	1. Signing employment contract in accordance with employment and skill development law
Decommissioning		
1	Impact on Air Quality by Dust and Particulate	1. Earth works must be sprayed after decommissioning if necessary
2	Noise and Vibration from Demolitions	1. High noise decommission work must be avoided the night time 2. Carrying out noise management according to NEQG guidelines 3. Providing necessary PPE for workers at high noise area
3	Solid Waste Generation	1. Disposing the decommissioning solid waste systematically at waste disposal site provided by YCDC 2. Disposing the decommissioning solid waste must be separated reuse materials and non-reuse materials
4	Impact on Occupational Safety and Health (OSH)	1. Providing necessary PPE adequately while the Decommissioning 2. Planning work site layout to minimize the need for manual transfer of heavy loads
Closure and Post-closure		
1	Dust from refilling works	(1) Water spraying the area where it is carrying out filling and grading operations (2) Water spraying the unpaved haulage roads as dust suppression measure
2	Landform change by refilling	(1) Refill all the excavated place in the project (2) Top soil must be refilled back at the surface (3) Re-vegetate the entire site



1.3 MANAGEMENT AND MONITORING SUB-PLANS BY PROJECT PHASE

7.3.1 Management Actions

Table 79. Management Actions for Impact Mitigation

Sr.	IMPACT	MITIGATIONS	Management Actions
PRE-CONSTRUCTION			
1	Air Quality Impact by Site Clearing Dust and Particulate	1. Water spraying if necessary	1. Checking the condition of the project site daily for water spraying
2	Solid Waste from Site Clearing	1. Dispose the solid waste systematically at designated waste disposal site provided by YCDC	1. Negotiation of waste disposal site with township development committee
3	Possibility of Drainage Blockage	1. Maintaining the existing drainage within the project compound and Khun-Hna-Pin-Lein creek beside the project	1. Checking the condition of the channel weekly
		2. Providing an alternative drainage when the area for drainage is needed for future development	1. Carrying out necessary action if the channel is disturbed to maintain it to its normal flowing condition
CONSTRUCTION			
1	Impact on Air Quality by Dust and Particulates	1. Places of dust emission during earth works must be sprayed with water if necessary	1. Checking the condition of the project site daily for water spraying 2. Providing a source of water 3. Spraying necessary places with water



		2. A speed limit of 15 mph must be set for vehicles travelling within the project site	<ul style="list-style-type: none"> 1. Checking workplace daily 2. Providing speed limit sign boards within project areas 3. Monitoring and control of vehicles for speed limit
		3. Provide covering for dump trucks as necessary	1. Checking workplace daily for covering dump trucks
		4. Wheels of dump trucks must be washed with water jet in every outbound travel from the project site	1. Checking workplace daily for washing wheels of dump trucks
2	Impact from Noise and Vibration	1. Carry out maintenance work so that unnecessary mechanical noises could be prevented	<ul style="list-style-type: none"> 1. Carrying out overall maintenance works if necessary 2. Checking workplace daily for noise
		2. Incorporating silencer/ Muffler with engines and generator sets	1. Checking workplace for physical conditions of silencers if necessary
		3. Delivering information of a contact person with contact number at site and in local community so that issues from	1. Appointing person with contact phone number for noise issue



		disturbance could be communicated and informed with the project	2. Distributing contact person name and phone number to nearby quarters
		4. Piling system with less noise and vibration must be used instead of a noisy and vibrating one	1. Piling system with less noise and vibration must be used instead of a noisy and vibrating one
		5. High noise construction work must be avoided in night time	1. Checking workplace daily for noise in night time
		6. Carrying out noise level according to NEQG	1. Monitoring and control of noise level
		7. Providing necessary PPE for workers at high noise area	1. Providing necessary PPE for workers at high noise area
3	Impact on Land by Solid Wastes	1. Construction activity should be done in restricted areas and activities kept to a minimum as far as possible	1. Construction activities should be done in restricted areas and activities kept to a minimum as far as possible.
		2. Excavation process should be monitored to prevent over-excavation.	1. Checking workplace daily to prevent over-excavation
		3. In order to mitigate soil erosion, the basic principle of construction erosion control measures should be followed where necessary.	1. Checking workplace daily to mitigate soil erosion
		4. Schedule excavation during low-rainfall periods, when possible.	1. Checking workplace daily during excavation



		5. Excavate immediately before construction instead of leaving soils exposed for months or years.	1. Excavate immediately before construction instead of leaving soils exposed for months or years.
		6. Where wind erosion is a concern, plan and install windbreaks	1. Where wind erosion is a concern, plan and install windbreaks
		7. Divert water from disturbed areas.	1. Checking workplace daily to divert water from disturbed areas
		8. Avoid soil compaction by restricting the use of trucks and heavy equipment to limited area	1. Avoid soil compaction by restricting the use of trucks and heavy equipment to limited area
		9. Control concentrated flow and runoff to reduce the volume and velocity of water from work sites to prevent formation of drainages	1. Checking workplace daily to control flow and runoff to reduce the volume and velocity of water
		10. The wetting of soil and the discharge of construction grey water across natural soil should be controlled.	1. Checking workplace daily to control grey water
		11. The handling of natural construction materials, such as filling soil and gravels will require dust management.	1. Checking workplace daily for dust management
4	Waste Water Generation	1. Construction waste water must be settled in settling ponds and only clear water must be allowed to disposed to roadside drain	1. To construct the settling pond
			2. After constructing the settling pond, must be allowed to disposed to creek



		2. Mud water from bore pile work must be prevented from direct run off or direct discharge to roadside drainage	1. Mud water from bore pile work must be prevented from direct run off or direct discharge to roadside drainage
5	Drainage Blockage	1. Maintaining the existing drainage within the project compound and Khun-Hna-Pin-Lein creek beside the project	1. Checking the condition of the channel weekly
6	Impact on Occupational Safety and Health (OSH)	1. Appointing a safety officer	1. Appointing a safety officer
		2. Provide safe, secure and health camps for workers adequately	1. Provide safe, secure and health camps for workers adequately
		3. Construction activity should be done in restricted areas and activities kept to a minimum as far as possible.	1. Providing the restricted area sign boards at project area
		4. Providing necessary PPE adequately and supervise their proper use in work place	1. Providing suites of PPE annually 2. Checking workplace daily for systematic usage of PPE
7	Impact on Community Safety and Health (CSH)	1. To avoid high hazard routes and crowded periods so that traffic hazard could be minimized	1. Checking workplace daily for traffic hazard



		2. Provide security system and fire safety system adequately	1. Provide security system and fire safety system adequately
		3. Provide support for health sector in CSR program	1. Provide support for health sector in CSR program
8	Job Opportunity	1. Signing employment contract in employment with employment and skill development law	1. Preparing employment contract according to employment and skill development law chapter (3) paragraph (5) 2. Signing employment contract for every employment



OPERATION			
1	Waste Water Generation	1. Domestic waste water from the project must be treated according to NEQG's waste water quality guidelines before discharging to drainage	1. To construct waste water treatment plant 2. Monitoring waste water quality before discharging
		2. To consider proper process for reducing of water use so that domestic water consumption could be minimized	1. Recycling treated domestic waste water will reuse 2. Installing landscape watering system with treated waste water
		3. Fixtures that can minimized water consumption must be used	1. Install Fixtures that can minimized water consumption
		4. To conduct awareness program for effective utilization of water	1. To conduct awareness program for effective utilization of water
		5. To consider other source of water apart from groundwater for future expansion of project	1. To consider other source of water apart from groundwater for future expansion of project
2		1. Provide adequate capacity of garbage storage	1. Providing adequate containers



	Impact from Solid Waste	2. Provide a systematic solid waste management system	1. Provide a systematic solid waste management system
		3. Dispose the solid waste systematically at designated waste disposal site provided by YCDC	1. Weekly disposal of solid waste to designated site
3	Increased Traffic Loading	1. Provide adequate parking area for the project	1. Provide adequate parking area for the project
		2. Recruit adequate employee for parking services	1. Recruit adequate employee for parking services
		3. Provide systematic layout for the vehicles and walkways in project compound	1. Provide systematic layout for the vehicles and walkways in project compound
		4. To implement remedial measure in TIA report	1. To implement remedial measure in TIA report
4	Increased Residential Amenity	1. Sufficient security personnel and systematic security system must be provided	1. Providing the security personnel and systematic security system
		2. Adequate lighting for night time security must be installed in readily accessible area	1. Adequate lighting for night time security must be installed in readily accessible area



		3. Project area must be landscaped systematically when construction works are finished	1. Project area must be landscaped systematically when construction works are finished
		4. Provide security system and fire safety system adequately	1. Provide the fire management system
5	Job Opportunity	1. Signing employment contract in accordance with employment and skill development law	<p>1 . Preparing employment contract according to employment and skill development law chapter (3) paragraph (5)</p> <p>2. Signing employment contract for every employment</p>



DECOMMISSIONING			
1	Impact on Air Quality by Dust and Particulates	1. Earth works must be sprayed after decommissioning if necessary	1. Checking workplace daily for earth works
2	Noise and Vibration from Demolitions	1. High noise decommission work must be avoided the night time	1. Checking workplace daily for high noise
		2. Carrying out noise management according to NEQG guidelines	1. Carrying out noise management according to NEQG guidelines
		3. Providing necessary PPE for workers at high noise area	1. Checking workplace daily for systematic usage of PPE
3	Soild Waste Generation	1. Disposing the decommissioning solid waste systematically at waste disposal site provided by YCDC	1. Negotiation of a waste disposal site with township development committee 2. Disposal of decommissioning solid waste to designated site
		2. Disposing the decommissioning solid waste must be separated reuse materials and non-reuse materials.	1. Disposing the decommissioning solid waste must be separated reuse materials and non-reuse materials.
4	Impact on Occupational Safety and Health (OSH)	1. Providing necessary PPE adequately while the decommissioning	1. Providing necessary PPE adequately while the decommissioning
		2. Planning work site layout to minimize the need for manual transfer of heavy loads	1. Planning work site layout to minimize the need for manual transfer of heavy loads



Closure and Post-closure			
1	Dust from refilling works	(1) Water spraying the area where it is carrying out filling and grading operations	1. Assigning watering truck
		(2) Water spraying the unpaved haulage roads as dust suppression measure	1. Carrying out watering with watering truck 2. Supervising watering and dust emission daily
2	Landform change by refilling	(1) Refill all the excavated place in the project	1. Refilling all the excavated place
		(2) Top soil must be refilled back at the surface	1. Refilling top soil at the refilled surface
		(3) Re-vegetate the entire site	1. Re-vegetating at the refilled surface



Table 80. Implementation Plan for EMP

Sr.	Management Action	Frequency	Start	End/ Duration	Cost (Ks)	Respon- sibility
PRE-CONSTRUCTION						
1	Checking the condition of the project site daily for water spraying	Daily	Starting from pre-construction phase	Pre-construction phase	-	ED
2	Negotiation of waste disposal site with township development committee	Once	Starting from pre-construction phase	Pre-construction phase	-	AD
3	Checking the condition of the channel weekly	Weekly	Starting from pre-construction phase	Pre-construction phase	-	AD
4	Carrying out necessary action if the channel is disturbed to maintain it to its normal flowing condition	Weekly	Starting from pre-construction phase	Pre-construction phase	-	ED
CONSTRUCTION						
1	Checking the condition of the project site daily for water spraying	Daily	Starting from construction phase	Construction phase	-	ED
2	Providing source of water	Once	Starting from construction phase	Construction phase	16,000,000	ED
3	Spraying necessary places with water	If necessary	Starting from construction phase	Construction phase	800/m ³	ED



4	Checking workplace daily for vehicles travelling within the project site	Daily	Starting from construction phase	Construction phase	-	ED
5	Providing speed limit sign boards within project areas	Once/3 yrs	Starting from construction phase	Construction phase	150,000/3 yr	SO
6	Monitoring and control of vehicles for speed limit	Continuously	Starting from construction phase	Construction phase	-	SO
7	Checking workplace daily covering for dump trucks	Daily	Starting from construction phase	Construction phase	-	AD
8	Checking workplace daily for washing wheels of dump trucks	Daily	Starting from construction phase	Construction phase	-	AD
9	Carrying out overall maintenance work if necessary	If necessary	Starting from construction phase	Construction phase	2,500,000/maintenance	ED
10	Checking workplace daily for noise	Daily	Starting from construction phase	Construction phase	-	ED
11	Checking workplace for physical conditions of silencers if necessary	If necessary	Starting from construction phase	Construction phase	-	ED



12	Appointing person with contact phone number for noise issue	Once	Starting from construction phase	Construction phase	-	ED
13	Distributing contact person name and phone number to nearby quarters	Once	Starting from construction phase	Construction phase	-	ED
14	Piling system with less noise and vibration must be used instead of a noisy and vibrating one	Daily	Starting from construction phase	Construction phase	-	ED
15	Checking workplace daily for noise in night time	Daily	Starting from construction phase	Construction phase	-	ED
16	Monitoring and control of noise level	Annually	Starting from construction phase	Construction phase	2,000,000/ yr	SO
17	Providing necessary PPE for workers at high noise area	Daily	Starting from construction phase	Construction phase	-	SO
18	Construction activities should be done in restricted areas and activities kept to a minimum as far as possible.	Daily	Starting from construction phase	Construction phase	-	ED
19	Checking workplace daily to prevent over-excavation.	Daily	Starting from construction phase	Construction phase	-	ED
20	Checking workplace daily to mitigate soil erosion	Daily	Starting from construction phase	Construction phase	-	ED



21	Checking workplace daily during excavation	Daily	Starting from construction phase	Construction phase	-	ED
22	Excavate immediately before construction instead of leaving soils exposed for months or years.	-	Starting from construction phase	Construction phase	-	ED
23	Where wind erosion is a concern, plan and install windbreaks	Once	Starting from construction phase	Construction phase	-	ED
24	Checking workplace daily to divert water from disturbed areas	Daily	Starting from construction phase	Construction phase	-	ED
25	Avoid soil compaction by restricting the use of trucks and heavy equipment to limited area	Daily	Starting from construction phase	Construction phase	-	ED
26	Checking workplace daily to control flow and runoff to reduce the volume and velocity of water	Daily	Starting from construction phase	Construction phase	-	ED
27	Checking workplace daily to control grey water	Daily	Starting from construction phase	Construction phase	-	ED
28	Checking workplace daily for dust management	Daily	Starting from construction phase	Construction phase	-	ED
29	To construct the settling pond	Once	Starting from construction phase	Construction phase	10,000,000	ED



30	After constructing the settling pond, must be allowed to disposed to creek	Daily	Starting from construction phase	Constructi-on phase	-	ED
31	Mud water from bore pile work must be prevent from direct run off or direct discharge to roadside drainage	Daily	Starting from construction phase	Constructi-on phase	-	ED
32	Checking the condition of the channel weekly	Weekly	Starting from construction phase	Constructi-on phase	-	ED
33	Appointing a safety officer	Once	Starting from construction phase	Constructi-on phase	-	HR
34	Provide safe, secure and health camps for workers adequately	Once	Starting from construction phase	Constructi-on phase	-	ED
35	Providing the restricted area sign boards at project area	Once	Starting from construction phase	Constructi-on phase	15,000	SO
36	Providing suites of PPE annually	Once	Starting from construction phase	Constructi-on phase	-	SO
37	Checking workplace daily for systematic usage of PPE	Daily	Starting from construction phase	Constructi-on phase	-	SO



38	Checking workplace daily for traffic hazard	Daily	Starting from Construction phase	Constructi-on phase	-	SP/ SO
39	Provide security system and fire safety system adequately	Once	Starting from construction phase	Constructi-on phase	-	SO
40	Provide support for health sector in CSR program	Occasional	Starting from construction phase	Constructi-on phase	-	AD



41	Preparing employment contract according to employment and skill development law chapter (3) paragraph (5)	Once	Starting from construction phase	Construction phase	-	HR
42	Signing employment contract for every employment	Once	Starting from construction phase	Construction phase	-	HR
OPERATION						
1	To construct waste water treatment plant	Once	Starting from operation phase	Operation phase	950,000,000	ED
2	Monitoring waste water quality at the discharging	Twice per year	Starting from operation phase	Operation phase	800,000/yr	ED
3	Recycling treated domestic waste water will reuse	Daily	Starting from operation phase	Operation phase	-	ED
4	Installing recycling system for cooling tower water with treated waste water	Once	Starting from operation phase	Operation phase	70,000,000	ED
5	Install Fixtures that can minimized water consumption	Once	Starting from operation phase	Operation phase	-	ED
6	To conduct awareness program for effective utilization of water	Once	Starting from operation phase	Operation phase	-	AD



7	To consider other source of water apart from groundwater for future expansion of project	Once	Starting from operation phase	Operation phase	-	AD
8	Providing adequate capacity of garbage storage	Once/3 yrs	Starting from operation phase	Operation phase	104,400,000/3yr	AD
9	Provide a systematic solid waste management system	Daily	Starting from operation phase	Operation phase	-	AD
10	Weekly disposal of solid waste to designated site	Weekly	Starting from operation phase	Operation phase	-	AD
11	Provide adequate parking area for the project	Daily	Starting from operation phase	Operation phase	-	SP
12	Recruit adequate employee for parking services	Daily	Starting from operation phase	Operation phase	-	SP



13	Provide systematic arranging layout for the vehicles and walkways in project compound	Once	Starting from operation phase	Operation phase	-	ED
14	To implement remedial measure in TIA report	Once	Starting from operation phase	Operation phase	-	PM
15	Providing the security personnel and systematic security system	Once	Starting from operation phase	Operation phase	-	HR
16	Adequate lighting for night time security must be installed in readily accessible area	Annually	Starting from operation phase	Operation phase	-	ED
17	Project area must be landscaped systematically when construction works are finished	Once	Starting from operation phase	Operation Phase	-	ED
18	Provide the fire management system	Once	Starting from operation phase	Operation phase	-	ED



19	Preparing employment contract according to employment and skill development law chapter (3) paragraph (5)	Once	Starting from operation phase	Operation phase	-	HR
20	Signing employment contract for every employment	Once	Starting from operation phase	Operation phase	-	HR
DECOMMISSIONING						
1	Checking workplace daily for earth work	Daily	Starting from Decommissioning phase	Decommissioning phase	-	ED
2	Checking workplace daily for high noise	Daily	Starting from Decommissioning phase	Decommissioning phase	-	ED



3	Carrying out noise management according to NEQG guidelines	Daily	Starting from Decommissioning phase	Decommissioning phase	-	ED
4	Checking workplace daily for systematic usage of PPE	Daily	Starting from Decommissioning phase	Decommissioning phase	-	SO
5	Negotiation of a waste disposal site with township development committee	Once	Starting from Decommissioning phase	Decommissioning phase	-	AD
6	Disposal of decommissioning solid waste to designated site	Daily	Starting from Decommissioning phase	Decommissioning phase	-	AD
7	Disposing the decommissioning solid waste must be separated reuse materials and non-reuse materials.	Daily	Starting from Decommissioning phase	Decommissioning phase	-	AD
8	Providing necessary PPE adequately while the decommissioning	Once	Starting from Decommissioning	Decommissioning phase	-	AD
9	Planning work site layout to minimize the need for manual transfer of heavy loads	Daily	Starting from Decommissioning phase	Decommissioning phase	-	ED



Closure and Post-closure						
1	Assigning watering truck	Once	Starting from Closure and Post-closure	Closure and Post-closure	-	ED
2	Carrying out watering with watering truck	Once	Starting from Closure and Post-closure	Closure and Post-closure	-	ED
3	Supervising watering and dust emission daily	Daily	Starting from Closure and Post-closure	Closure and Post-closure	-	ED
4	Refilling all the excavated place	Once	Starting from Closure and Post-closure	Closure and Post-closure	-	ED
5	Refilling top soil at the refilled surface	Once	Starting from Closure and Post-closure	Closure and Post-closure	-	ED
6	Re-vegetating at the refilled surface	Once	Starting from Closure and Post-closure	Closure and Post-closure	-	ED

ED = Engineer Department (KMM)

PM = Project Manager (KYP)

SP = Security Personal (Security Staff)

HR = Human Resources Department (KMDM)

SO = Safety Officer

AD = Administration Department (KMDM)



7.3.2 Monitoring Plans

Environmental monitoring programs for this project will be implemented to address all activities that have been identified to have potentially significant impacts on the environment, during normal operations and upset conditions. Environmental monitoring activities will be based on direct or indirect indicators of emissions, effluents, and resource use applicable to the project. Monitoring frequency are set to be sufficient to provide representative data for the parameter being monitored. Monitoring will be conducted by trained individuals following monitoring and record-keeping procedures and using properly calibrated and maintained equipment. Monitoring data will be analyzed and reviewed at regular intervals and compared with the operating standards so that any necessary corrective actions can be taken.

Summerized EMP is provided in **APPENDIX -K** with example checklist.



Table 81. Environmental Monitoring Program

Sr.	Management Actions	Monitoring	Parameter	Location	Frequency	Method	Responsibility
PRE-CONSTRUCTION							
1	1. Checking the condition of the project site daily	Water spraying if necessary	Dust emission	Project area	Daily	Visual Inspection	ED
2	3. Checking the condition of the channel weekly	Drainages	-Yes/No -Condition	- All drainages	Weekly	Visual Inspection	AD
3	4. Carrying out necessary action if the channel is disturbed to maintain it to its normal flowing condition	Drainages	-Flowing condition	- All drainages	Weekly	Necessary action	ED
CONSTRUCTION							
4	1. Checking the condition of the project site daily for water spraying	Water spraying if necessary	Dust emission	Project area	Daily	Visual Inspection	ED
5	4. Checking workplace daily for vehicles travelling within the project site	Water spraying if necessary	Dust emission	Project area	Daily	Visual Inspection	ED
6	6. Monitoring and control of vehicles for speed limit	Inspection record	-Yes/No -Condition	Project area	Daily	Inspection	SO



7	7. Checking workplace daily covering for dump trucks	Inspection record	-Yes/No -Condition	Project area	Daily	Visual Inspection	AD
8	8. Checking workplace daily for washing wheels of dump trucks	Inspection record	-Yes/No -Condition	Project area	Daily	Visual Inspection	AD
9	9. Carrying out overall maintenance work if necessary	Maintenance record	- Yes/No	-	If necessary	Inspection	ED
10	11. Checking workplace for physical conditions of silencers if necessary	Inspection record	-Yes/No -Condition	Project area	If necessary	Inspection	ED
11	16. Monitoring and control of noise level	Inspection record	-Yes/No -Condition	Project area	Annually	Inspection	SO
12	5&35. Construction of sign boards	Sign boards	-Restricted area -Speed limit	Project area	Once	Inspection	SO
13	19. Checking workplace daily to prevent over-excavation.	Inspection record	-Yes/No -Condition	Project area	Daily	Visual Inspection	ED



14	20. Checking workplace daily to mitigate soil erosion	Inspection record	-Yes/No -Condition	Project area	Daily	Visual Inspection	ED
15	21. Checking workplace daily during excavation	Inspection record	-Yes/No -Condition	Project area	Daily	Visual Inspection	ED
16	26. Checking workplace daily to control flow and runoff to reduce the volume and velocity of water	Inspection record	-Yes/No -Condition	Project area	Daily	Visual Inspection	ED
17	27. Checking workplace daily to control grey water	Inspection record	-Yes/No -Condition	Project area	Daily	Visual Inspection	ED
18	28. Checking workplace daily for dust management	Inspection record	-Yes/No -Condition	Project area	Daily	Visual Inspection	ED
19	32. Checking the condition of the channel weekly	Drainages	-Yes/No -Condition	- All drainages	Weekly	Visual Inspection	ED
20	37. Checking workplace daily for systematic usage of PPE	Inspection record	-Yes/No -Condition	Project area	Daily	Inspection	SO



21	38. Checking workplace daily for traffic hazard	Inspection record	-Yes/No -Condition	Project area	Daily	Visual Inspection	SP/ SO
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OPERATION							
22	2. Monitoring waste water quality before discharging	Waste water quality	NEQG	Project area	Twice per year	Lab analysis	ED
23	6. To conduct awareness program for effective utilization of water	awareness training	-Yes/No -Records	Worker	Once	Inspection	AD
24	8. Providing adequate capacity of garbage storage	Garbage storage	-Numbers -Conditions	Project area	Once/3 years	Inspection	AD



DECOMMISSIONING							
25	1. Checking workplace daily for earth work	Inspection record	-Yes/No -Condition	Project area	Daily	Visual Inspection	ED
26	2. Checking workplace daily for high noise	Inspection record	-Yes/No -Condition	Project area	Daily	Measuring	ED
27	4. Checking workplace daily for systematic usage of PPE	Inspection record	-Yes/No -Condition	Project area	Daily	Inspection	SO
Closure and Post-closure							



28	1-3. Spraying necessary places with water for dust suppression	Water spraying	Dust emission	Project area	Daily	Necessary action	ED
29	4. Refilling all the excavated place	Refilling	-Yes/No -Area -Condition	Project area	Once	Inspection	ED
30	5. Refilling top soil at the refilled surface	Top soil	-Yes/No -Area -Condition	Refilled area	Once	Inspection	ED
31	6. Re-vegetating at the refilled surface	Re-vegetating	-Yes/No -Area -Condition	Refilled area	Once	Inspection	ED

ED = Engineer Department (KMM)

PM = Project Manager (KYP)

SP = Security Personal (Security Staff)

HR = Human Resources Department (KMDM)

SO = Safety Officer

AD = Administration Department (KMDM)



7.3.4 Environmental Monitoring Team

An Environmental Monitoring Team shall be established for successful implementation of the environmental management plan. The project proponent is responsible for complete implementation of the EMP. Proponent shall carry out environmental monitoring programme which is part of the EMP and the monitoring report will be distributed to the participants of the monitoring team. Implementation of CSR programme will also be facilitated with the participation of the monitoring team. Local community could communicate with the project for environmental affairs through the monitoring team. The objectives of the Environmental Monitoring Team are as follows:

- (a) To release information on the implementation of EMP for local community continuously
- (b) To distribute information on environmental monitoring to local community
- (c) To create a proper communication channel between the project and local community relating to environmental affairs
- (d) To insert a check and balance action for the management of fund and aids provided by the CSR programme

The team mainly consists of representatives from the project and local communities. The representatives from local communities must be elected by respective local communities by themselves.

Table 82. Environmental Monitoring Team

Sr.	Representative	Number
Project Management		
1	CEO	1
2	General Manager	1
3	Deputy General Manager 1	1
4	Deputy General Manager 2	1
Local Community		
1	Ward Administrator (No. (16) Yankin ward)	1
2	Elected Person (No. (16) Yankin ward)	2
3	Ward Administrator (No. (1) Yankin ward)	1
4	Elected Person (No. (1) Yankin ward)	2



5	Ward Administrator (No. (2) Yankin ward)	1
6	Elected Person (No. (2) Yankin ward)	2
7	Ward Administrator (Sayasan -North ward)	1
8	Elected Person (Sayasan -North ward)	2

7.3.4.1 Roles and Responsibilities

The team will act as a communication channel between the project and local community

- (b) Proponent will provide aids from CSR programme through the local representatives from the team
- (c) Proponent must disseminate monitoring report to local community through representatives from government departments and local communities
- (d) Proponent will distribute notification for recruitment in local community widely with the help of local representatives
- (e) The team will coordinate between local representatives and the project so that the project could participate in social, cultural and religious events of local community
- (f) Proponent must contact with the team within (7) days after summarization of annual net profit so that contribution could be made for CSR programme
- (g) General meeting of the team must be held at least once in (12) months to modify policy, roles and responsibilities of the Environmental Monitoring Team

7.4 CORPORATE SOCIAL RESPONSIBILITY (CSR)

The project will provide two percent of its production for carrying out CSR programs in local communities such as young education, library, shelter, transportation square and one stop services center programmes for Yankin Township and other nearby wards around the project will be included in CSR programmes. Generally, local communities which are directly related with project implementation must be included in CSR programme. CSR programme will be executed in coordination with the local community and administrative bodies. Programmes for employers such as social welfare, health care, educational aid, and professional development trainings must also be included in CSR programme.



7.5 PROJECTED BUDGETS

Table 83. Overall budget for implementation of the EMP

Sr.	Management Actions	Budget
CONSTRUCTION		
1	Providing source of water	16,000,000
2	Providing speed limit sign boards within project areas	150,000/3 yr
3	Carrying out overall maintenance work	2,500,000/yr
4	Monitoring Noise level	2,000,000/ yr
5	To construct the settling pond	10,000,000
6	Providing the restricted area sign boards at project area	15,000
OPERATION		
7	To construct waste water treatment plant	950,000,000
8	Monitoring waste water quality before discharging	800,000/yr
9	Installing landscape watering system for cooling tower water with treated waste water	70,000,000
10	Providing adequate capacity of garbage storage	104,400,000/3yr
Total One Time Cost		1,155,865,000
Total Recurring Cost		109,850,000/yr



7.6 TRAINING, AWARENESS AND COMPETENCE

This plan describes the provisions of training to ensure that any people working for or on behalf of the company involved in the activities covered by the scope of the EMP are properly trained to carry out their assigned duties in a manner that will not cause deviation from company environmental policy.

This procedure applies to EMP related training for staff and any persons working for or on behalf of "The Garden Redevelopment Project" involved in the activities covered by the scope of the EMP. "The Garden Redevelopment Project" will ensure that all people performing tasks for or on behalf of the organization, which includes temporary staff and remote workers, have had an appropriate assessment for their potential to cause a significant environmental impact and the associated competence required.

The Departmental Managers shall ensure that people working for or on behalf of the company within the scope of EMP are competent on the basis of appropriate education, training or experience. The Deputy General Managers (DGMs) shall identify training needs for people working for or on behalf of the company to ensure individual competence to implement the EMP effectively.

Table 84. Training Requirement

Sr.	Training Topics	Trainee	Duration
1	OSH Training	Supervisors, Operators, Workers and Security	40 hours
2	EMP Training	Managers, Assistant Managers, Engineer Department, Supervisors, Operators and Workers	40 hours
3	Emergency Response Training	All employee	16 hours
4	First Aid Training	All employee	20 hours
5	Health Training	All employee	40 hours

For each staff of "The Garden Redevelopment Project", the DGM shall establish, implement and maintain a Training Record of any type of EMP related



training received. Where a training course is undertaken internally, names of the attendants shall be recorded in the Training Attendance Record.

7.7 COMMUNICATION

This plan ensures a consistent and efficient approach to internal communication and external complaints relating to the environment. The procedure applies to all documents established under the EMP of "The Garden Redevelopment Project". The documents under the EMP include but are not limited to:

- EIA Report
- Mitigation Measures and Management Actions
- Environmental Monitoring Programme
- EMP Forms, Checklists and Guidelines
- Registers of Legal and Other Requirements
- External documents including legislation, professional guides and code of practices, etc.

7.7.1 Responsibility

- The General Manager (GM) is responsible for dealing with complaints.
- The DGM1 (Admin) is responsible for ensuring that all communications relating to the environment are processed correctly.
- All staffs are responsible for putting forward suggestions on environmental matters.

7.7.2 External Communications

Communications to be handled according to this procedure include correspondence, consultations and meeting with relevant interested parties. The person receiving the communication shall be noted the time and date, relevant address/telephone number and details of communication. Details shall be passed to the DGM1 (Admin) who will determine the response and whether the corrective action is required. If the communication is significant, the DGM1 (Admin) shall inform the GM as soon as possible. An initial response shall be provided within two weeks. The DGM1 (Admin) shall be responsible for maintaining records, responses and corrective action in a separate file designated for that purpose.



7.7.3 Internal Communications

The primary means of communication is through team briefings, supported as appropriate by use of notice boards and memos. Suggestions for environmental improvements are made through the company suggestion schemes.

7.8 DOCUMENT MANAGEMENT

This procedure describes the control system for preparing, approving, distributing, revising and updating documents that are required under the Environmental Management Plan (EMP).

This procedure applies to all documents established under the EMP of "The Garden Redevelopment Project". The documents under the EMP include but are not limited to:

- Impact Mitigation
- Management Actions
- Environmental Monitoring Programme
- EMP Forms, Checklists and Guidelines
- Registers of Legal and Other Requirements
- External documents including legislation, professional guides and code of practices, etc.

7.8.1 Responsibility

7.8.1.1 Managing Director

The GM shall approve and sign all EMP documents, include the Environmental Policy, EIA report, EMP and Other Requirements. In the absence of the GM, the DGM1 (Admin) shall approve and sign the EMP documents.

7.8.1.2 Administration Department (AD)

The AD is responsible for the EMP document control system. The AD shall ensure that only controlled and current copies of documents are used, and distribute the controlled EMP documents to relevant personnel. The AD shall also maintain and update the Master List of Documents.



7.8.1.3 Departmental Managers

Departmental Managers shall review relevant EMP documents and procedures, ensure that their subordinates are familiar with the EMP documents related to them, and report any proposed changes to the EMP documents and forms to the EMP Committee.

7.9 EMERGENCY PREPAREDNESS AND RESPONSE PLAN

This procedure describes the responses in case of emergency or fire hazard that suddenly occurs in the project compound.

7.9.1 Fire Hazard Preparedness

The design of the fire services installation will comply with local codes and authority requirements; in the absence of a fully developed local (national) fire code (currently under development) the design standards shall be based on applicable international standards in whole or part, at the discretion of the Authority. Currently, the preferred standard is Singapore Standards.

Hence in principle the FLS system shall be designed to SS standards (unless existing local code is more stringent) and shall be supplemented by international code for materials & workmanships standards.

7.9.1.1. Fire Protection Equipment

7.9.1.1. Explosion Suppression Systems

Explosion suppression systems shall be used in unusually hazardous areas such as elevator legs, boots and head, or in areas such as bins, distributors and tanks.

7.9.1.2 Portable Fire Extinguishers

All buildings within the project shall have fully charged and operable portable fire extinguishers. All employees shall be trained to use the equipment. Training must include the following:

- Correct type of extinguisher to use on different classes of fire
- Proper techniques for use of the equipment to extinguish a fire



7.9.1.3 Fire Hydrants

The project shall have adequate private fire hydrants on site. The fire hydrant shall have a water supply of 100,000 gallons stored tank.

7.9.1.4 Sprinkler System

-An automatic wet pipe sprinkler system in accordance with local code will be provide throughout the building with the exception of transformer & MDE room, High voltage substation, and communication room.

-Gas fire suppression system (NOVEC 1230) will be provided for HV & MV substation, transformer room, Server room, etc.

-Fire pumps will be electrical driven pumps installed at the main pump rooms in B2F. Additional fire diesel engine driven pumps will be provided for standby as per MFSD requirements.

-The jockey pumps will be provided to maintain the system pressure.

-The water storage tank will be provided for sprinkler system with duration of 60 minutes.

-A sprinkler system will also be provided to cover accessible ceiling spaces in public areas (including offices) where the space exceeds than 800mm in height and is equipped with combustible material/machines.

-Floor control valve will be provided at each floor for maintenance/testing purposes.

Sprinkler head type will be as follows:

-Pendent type, quick response for all area with false ceiling.

-Concealed sprinkler type, quick response for lobby and common areas.

-Upright sprinkler type, quick response for car park and BOH areas without false ceiling.

-Sprinkler will have 68°C temperature rating, except in kitchens which will be 94 °C.

7.9.1.5 Wet Rising Main (Landing valve)

-Rising main and landing valve will be located at SSL/FFL in stair cases.

-Duty electrical driven and standby diesel driven fire pumps will be provided and will be installed at the main pump rooms in B2F.



- The water storage tank for rising main will be provided for system with a duration of 60 minutes.
- The water storage tank supply to sprinkler, hydrants and rising main will be kept entirely independent of water supplies feeding other installation.

7.9.1.6 Fire Hose Reel (FHR)

- Fire hose reels will be provided throughout the building.
- The travel distance to any part of the building will be no more than 36 m.
- Each fire hose reel will have a nozzle, 6 mm. diameter; hose reel shall be at least 25 mm diameter.
- Duty and stand by electrical driven fire pumps will be provided and will be installed at roof.
- The water storage tank will be provided for system period of 60 minutes.

7.9.1.7 Fire Extinguisher (FE)

- Dry chemical fire extinguishers will be provided throughout the building within the maximum travel distance 15 m.
- CO2 fire extinguishers will be provided in all electrical rooms.

7.9.2 Basics of Firefighting

The first steps in fighting a fire are determining the contents or materials burning in the fire and the extent (size) of the fire. The following are basic considerations for firefighting:

- Equipment that is operating shall be shut down.
- Portable extinguishing equipment shall be available in areas where the potential for fire is high.
- Employees shall be trained in the use of any firefighting equipment that they are expected to use.
- If personnel cannot isolate the fire, they shall evacuate the area.
- Warm or burning materials shall be removed as soon as possible.
- Equipment shall be restarted only after the fire area has been inspected and cleared by qualified personnel.



7.9.3 Fire Risk Assessment

A fire risk assessment is an organized and methodical look at your premises, the activities carried on there and the likelihood that a fire could start and cause harm to those in and around the premises.

The aims of the fire risk assessment are:

- To identify the fire hazards.
- To reduce the risk of those hazards causing harm to as low as reasonably practicable.
- To decide what physical fire precautions and management arrangements are necessary to ensure the safety of people in your building if a fire does start.

The term ‘where necessary’ (see Glossary) is used in the Order therefore, when deciding what fire precautions and management arrangements are necessary, you will need to take account this definition.

The terms ‘hazard’ and ‘risk’ are used throughout this guide and it is important that you have a clear understanding of how these should be used.

- Hazard: anything that has the potential to cause harm.
- Risk: the chance of that harm occurring.

If your organization employs five or more people, or your premises are licensed or an alterations notice requiring it is in force, then the significant findings of the fire risk assessment, the actions to be taken as a result of the assessment and details of anyone especially at risk must be recorded. You will probably find it helpful to keep a record of the significant findings of your fire risk assessment even if you are not required to do so.

7.9.4. Identify Fire Hazards

For a fire to start, three things are needed:

- a source of ignition;
- fuel; and
- oxygen.

If any one of these is missing, a fire cannot start. Taking measures to avoid the three coming together will therefore reduce the chances of a fire occurring.

The remainder of this step will advise on how to identify potential ignition sources, the materials that might fuel a fire and the oxygen supplies that will help it burn.



7.9.4.1 Identify Sources of Ignition

You can identify the potential ignition sources in your premises by looking for possible sources of heat which could get hot enough to ignite material found in your premises. These sources could include:

- smoking materials, e.g. cigarettes, matches and lighters;
- naked flames, e.g. candles or gas or liquid-fuelled open-flame equipment;
- electrical, gas or oil-fired heaters (fixed or portable);
- cooking equipment;
- faulty or misused electrical equipment;
- lighting equipment;
- equipment owned or used by residents;
- hot surfaces and obstruction of equipment ventilation, e.g. photocopiers;
- hot processes, e.g. welding by contractors;
- arson, deliberate ignition, vandalism and so on.

Indications of ‘near-misses’, such as scorch marks on furniture or fittings, discolored charred electrical plugs and sockets, cigarette burns etc., can help you identify hazards which you may not otherwise notice.

7.9.4.2 Identify Sources of Fuel

Anything that burns is fuel for a fire. You need to look for the things that will burn reasonably easily and are in enough quantity to provide fuel for a fire or cause it to spread to another fuel source. Some of the most common ‘fuels’ found in premises providing residential care are:

- laundry supplies, such as bedding and towels, and medical supplies, such as disposable aprons;
- toiletries, aerosols;
- plastics and rubber (e.g. soft play or restraint areas), video tapes, polyurethane foam-filled furniture, foam-filled mats and polystyrene-based display materials;
- wood or wood-based furniture (permanent and temporary storage);
- textiles and soft furnishings, such as spare clothes and hanging curtains;
- private belongings, such as toys;
- seasonal and religious occasion decorations, such as Christmas decorations;
- items used in hobbies and crafts;



- flammable products, such as cleaning and decorating products, petrol, white spirit, methylated spirit, cooking oils, disposable cigarette lighters and photocopier chemicals;
- flammable gases such as liquefied petroleum gas (LPG), including aerosol canisters;
- paper products, packaging materials, stationery, advertising material, paper and books;
- waste products, particularly finely divided items such as shredded paper and wood shavings, off cuts, and dust; and
- waste storage, refuse containers and skips.

You should also consider the construction of your premises, and the materials used to line walls and ceilings, and how these might contribute to the spread of fire. You should check if the internal construction includes large areas of;

- hardboard, chipboard, block-board walls or ceilings;
- synthetic ceiling or wall coverings, such as polystyrene wall or ceiling tiles;
- flooring of polypropylene carpet or carpet tiles; or
- particular fixtures and fittings.

7.9.4.3 Identify Sources of Oxygen

The main source of oxygen for a fire is in the air around us. In an enclosed building this is provided by the ventilation system in use. This generally falls into one of two categories: natural airflow through doors, windows and other openings; or mechanical air conditioning systems and air handling systems. In many buildings there will be a combination of systems, which will be capable of introducing/ extracting air to and from the building.

Additional sources of oxygen can sometimes be found in materials used or stored at premises such as:

- some chemicals (oxidizing materials), which can provide a fire with additional oxygen and so help it burn. These chemicals should be identified on their container (and Control of Substances Hazardous to Health data sheet, see Figure 4) by the manufacturer or supplier who can advise as to their safe use and storage; or
- oxygen supplies from cylinder storage and piped systems, e.g. medical oxygen, oxygen used by contractors (e.g. in welding processes).



7.9.5 Fire Safety Training

You must provide adequate fire safety training for your staff. The type of training should be based on the particular features of your premises including any ancillary accommodation and should:

- take account of the findings of the fire risk assessment;
- explain your emergency procedures;
- take account of the work activity and explain the duties and responsibilities of staff;
- take place during their individual working hours and be repeated periodically where appropriate;
- be easily understandable by your staff and other people who may be present;
- be provided to new, agency and temporary staff prior to starting their duties;
- address the roles of staff and others (guests, residents); and
- be tested by fire drills.

In simple premises this may be no more than showing new staff the fire exits and giving basic training on what to do if there is a fire. In larger premises, with a high staff turnover and many shift patterns, the organisation of fire safety training will need to be planned.

Your training should include the following:

- the importance of keeping fire-doors closed (or closing them) to prevent the spread of fire, heat and smoke;
- what to do on discovering a fire;
- how to raise the alarm and what happens then;
- what to do upon hearing the fire alarm;
- when to adopt, and the procedures for, a ‘delayed evacuation’ response;
- the procedures for alerting other staff, residents and visitors including, where appropriate, directing them to exits;
- the arrangements for calling the fire and rescue service;
- the identification and use of protected areas for horizontal evacuation;
- the evacuation procedures for everyone in your premises to reach an assembly point at a place of total safety, in particular the role of residents;
- the evacuation procedures for residents who require assisted escape, to reach an assembly point at a safe place;
- the location and, when appropriate, the use of firefighting equipment;



- the location of escape routes, especially those not in regular use;
- how to open all emergency exit doors;
- where appropriate, how to stop machines, appliances and processes and isolate power supplies in the event of a fire;
- the reason for not using lifts (except those specifically installed or nominated, following a suitable fire risk assessment, for the evacuation of people with a disability);
- the safe use of and risks from storing or working with highly flammable and explosive substances and bottled or piped oxygen;
- the importance of general fire safety, which includes good housekeeping; and
- fire drills, with and without residents' involvement.

All the staff identified in your emergency plan that have a supervisory role if there is a fire (e.g. heads of department, fire marshals or wardens and, in larger premises providing residential care, fire parties or teams), should be given details of your fire risk assessment and receive additional training, and be aware of the importance of staff roles and staffing ratios.

7.9.6 Further Guidance on Fire Risks and Preventative Measures

This section provides further information on evaluating the risk of a fire and its prevention in your premises. You should spend time developing long-term workable and effective strategies to reduce hazards and the risk of a fire starting. At its simplest this means separating flammable materials from ignition sources.

You should consider:

- housekeeping;
- laundries;
- kitchen areas;
- storage;
- dangerous substances: storage and use;
- equipment and machinery;
- electrical safety;
- smoking;
- managing building work and alterations;
- existing layout and construction;
- particular hazards in corridors and stairways used as escape routes;



- insulated core panels;
- restricting the spread of fire and smoke;
- arson; and
- help for people with special needs.

7.9.6.1 Housekeeping

For all care homes, good housekeeping will lower the chances of a fire starting, so the accumulation of combustible materials in premises should be monitored carefully. Good housekeeping is essential to reduce the chances of escape routes and fire doors being blocked or obstructed.

Keep waste material in suitable containers before it is removed from the premises. If bins, particularly wheeled bins, are used outside, secure them in a compound to prevent them being moved to a position next to the building and set on fire. Never place skips against a building – they should normally be a minimum of 6m away from any part of the premises. Skips against a building – they should normally be a minimum of 6m away from any part of the premises. If you generate a considerable quantity of combustible waste material then you may need to develop a formal plan to manage this effectively. Other housekeeping issues include:

- the appropriate storage of aerosol sprays and medical gases;
- avoiding the use of flammable materials and liquids; and
- orderly stacking of linen, paper, medical consumables, packaging, furniture and furnishings.

In premises that provide care, the predictable nature of the day-to-day activities should allow systems to be developed for dealing with waste, laundry and other combustible materials.

Such waste should not be allowed to accumulate inside the building, particularly in the escape routes, whilst awaiting collection. Consideration of this issue should form part of the building fire risk assessment.

In higher risk areas you need to make sure arrangements are in place for safe close down, e.g. checking all appliances are turned off and combustible waste has been removed.



7.9.6.2 *Laundries*

Laundries, in both large and small care premises, remain a high-risk area. They are often located in the basement, which means that any fire can affect the escape routes above.

Washing and drying machines should not be loaded in excess of the manufacturer's recommendations, exhaust filters should be cleaned, and maintenance carried out regularly. Items such as cleaning cloths and mop heads placed in the dryers can spontaneously combust if there is any chemical residue left on them.

Ironing equipment should be correctly used and maintained. The laundry area should not be used for storing miscellaneous combustible material. The use of laundry chutes in larger premises provides a ready path for smoke from any fire to travel throughout the residential areas of the premises. Any smoke and fire dampers within the laundry chute should be automatically operated following activation of fire detection devices within the chute.

7.9.6.3 *Kitchens*

In larger premises with extensive catering facilities the cooking range should have some form of automatic fire suppression system. In smaller premises a suitable fire extinguisher and fire blanket should always be provided. All deep fat cooking equipment should have a thermostatic temperature control and should never be left unattended. Open cooking, such as frying, should not be left unattended. In some premises, such as a small children's home, the use of 'open top chip pans' should be discouraged or prohibited. There are approximately 8,000 chip pan fires every year.

Extractor ducting, grease traps and filters should be regularly cleaned and maintained. Isolation switches for gas and electricity supplies, and isolation switches for any extractor fans should be located near to an exit.

7.9.6.4 *Storage*

Many of the materials found in your premises will be combustible. If your premises have inadequate or poorly managed storage areas then the risk of fire is likely to be increased. The more combustible materials you store the greater the source of fuel to a fire. Poorly configured storage could prevent equipment such as sprinklers working effectively.



In premises used for residential care there can often be quite bulky (combustible) equipment, such as wheelchairs and bath chairs, which need to be stored away when not in use.

Combustible materials are not just those generally regarded as highly combustible, such as polystyrene, but all materials that will readily catch fire. However, by carefully considering the type of material, the quantities kept and the storage arrangements, the risks can be significantly reduced.

In your office (if you have one), the retention of large quantities of paper records, especially if not filed away in proprietary cabinets, can increase the fire hazard. Such readily available flammable material makes the potential effect of arson more serious.

7.9.7 Emergency Plan and Contingency Plan

The project need to have an emergency plan for dealing with any fire situation. The purpose of an emergency plan is to ensure that all the people in your premises know what to do if there is a fire and that the premises can be safely evacuated.

If the organisation employ five or more people, or your premises are licensed or an alterations notice requiring it is in force, then details of your emergency plan must be recorded. Even if it is not required, it is good practice to keep a record.

The emergency plan should be based on the outcome of your fire risk assessment and be available for your employees, their representatives (where appointed), residents (if they request it) and the enforcing authority.

In small premises providing residential care the emergency plan may be no more than a fire action notice. In most premises providing residential care, the emergency plan will need to be more detailed. Your emergency plan should be appropriate to your premises and could include:

- how people will be warned if there is a fire;
- what staff should do if they discover a fire;
- how the evacuation of the premises should be carried out;
- individual needs/risks relating to individual residents;
- identification and use of protected areas for horizontal evacuation;
- procedures for a 'delayed evacuation response';
- where people should assemble after they have left the premises and procedures

for



- checking whether the premises have been evacuated;
- identification of key escape routes, how people can gain access to them and escape from them to a place of total safety;
- arrangements for fighting fire;
- the duties and identity of staff who have specific responsibilities if there is a fire;
- arrangements for the safe evacuation of people identified as being especially at risk, such as residents and others with disabilities, children and people working alone;
- any machines/processes/appliances/power supplies that need to be stopped or isolated if there is a fire;
- specific arrangements, if necessary, for high-fire-risk areas;
- contingency plans, such as restrictions on the use of the building) for when life safety systems, such as evacuation lifts, fire detection and warning systems, sprinklers or smoke control systems are out of order; • how the fire and rescue service and any other necessary services will be called and who will be responsible for doing this; and
- procedures for meeting the fire and rescue service on their arrival and notifying them of the locations of any remaining residents and of any special risks, e.g. the location of highly flammable materials.

It can be helpful to keep an ‘emergency box’ containing up to date information on all the residents present, including their medication, special needs and next of kin. A member of staff should be charged with taking the box out of the premises when the fire warning actuates, and, where appropriate, making information from it available to the emergency services. As part of your emergency plan it is good practice to prepare post-incident plans for dealing with situations that might arise, such as those involving:

- people with personal belongings (especially valuables) still in the building;
- people in a state of undress;
- getting people away from the building (e.g. to transport);
- arranging alternative accommodation; and
- inclement weather.



You should also prepare contingency plans to determine specific actions and or the mobilisation of specialist resources. Guidance on developing health and safety management policy has been published by the HSE.31

7.10 MANAGEMENT REVIEW

This plan describes the review of EMP and monitoring results of "The Garden Yankin PPP Redevelopment Project"'s EMP to ensure that the Management Actions and Procedures are fully satisfied with the minimum side effects to the environment.

The General Manager shall work with the DGMs and Department Managers to define monitoring requirements and evaluation of compliance, and has the overall responsibility for ensuring that the requirements of this procedure are implemented.

The General Manager of "The Garden Yankin PPP Redevelopment Project" will be the responsible person of management review process. He shall be supported by the DGMs, departmental managers and various functional heads. The General Manager shall report the overall review of EMP to the CEO.



8. PUBLIC CONSULTATION AND DISCLOSURE

8.1 OBJECTIVE

In order to acquire public opinion on the implementation of the The Garden Redevelopment project at Yangon Region, public consultation works were done by firstly disclosing relevant project information in local community. Public consultation and information disclosure works for The Garden Redevelopment project were carried out with the following objectives:

- (a) To disseminate the project information, benefits and disadvantages of the project to general public so that they could understand the trade-offs;
- (b) To be able to gain meaningful contribution of informed public; and
- (c) To achieve greater trust of general public with the project proponent by disseminating relevant information.

8.2 PUBLIC CONSULTATION METHODOLOGY AND APPROACH

8.2.1 Personal Interviews

Personal interviews with local authorities from the four wards around project area were exercised to collect their opinion and suggestion. Then, interested persons from local community were consulted by firstly disseminating project information to them and then acquiring their comments and suggestions. Consultation work includes household data survey process where a questionnaire was used to collect socioeconomic data. Consultation was also done in household data survey by requesting comment and suggestion of the interviewee on the project.

8.2.2 Open Discussion

An agenda was provided for open discussion with local people and representatives from EIA team and project proponent in public meetings which were collectively held for The Garden Redevelopment project at the corner of Yankin Road and Sayasan Road in Yankin Township, Yangon. Results from the open discussion session of the public meeting are shown in later section.

8.2.3 Information Disclosure

- (a) Presentation



Representatives from project proponent and EIA teams gave presentations about their respective scope of works before general public in both public meetings.

(b) Translated Executive Summary

After the draft EIA report was compiled, executive summary of the report was translated into Myanmar and the translated documents were delivered to local people and local authorities for their review and comments. The translated summary delivered to local people is attached in Annex.

8.3 PUBLIC CONSULTATION MEETINGS

First public meeting was held at Yankin SaSaNaViMan on 5th April, 2018. There were (58) people from nearby wards such as No. (1) Yankin Ward, No. (2) Yankin Ward, Sayasan North/East Ward. Representatives from Kajima Yankin PPP Company Limited gave the project information and representative from Environmental Conservation Consulting Engineers Association (Yangon) explained ESIA processes and Biodiversity Study process to be conducted by Environmental Conservation Consulting Engineers Association (Yangon).

An open discussion session was included in the agenda to acquire public comments and suggestions for the project. There were (9) discussions made during the public meeting. Suggestion letters were distributed to local people in the Public Meeting and there were (19) written comments and suggestions in the suggestion letters.

Those comments (C), suggestions (S) and question (Q) were analyzed and categorized into (11) topics as in the following table and Appendix B.



Table 85. Description of Comments (C), Suggestions (S) and Question (Q) from the Suggestion Letters

Sr.	Acceptable	OSH, CSH	CSR\Public Welfare	Drainage System	Solid Waste	Traffic	Electrical power source	Water supply	Customer services	Environmental Impact	Job Opportunities \Employment
1.			2S						4S		
2.	2C								1S		
3.							2Q	1Q			
4.		2S			1S	1S				1S	3S
5.	3C										
6.					1S	1S					
7.			1C								
8.	2C	1S				1S					
9.			1C			1C				2C	
10.					1C						1C
11.				1S					1C		1C
12.						1C				1C	
13.										1C	
14.	3C										1S
15.	1C									1S	
16.		1C, 2S									
17.	2C										
18.					1S	1S					1S
19.										1C	
Total	13C	1C+ 5S	2C+ 2S	1S	1C+ 3S	2C+ 4S	2Q	1Q	1C + 5S	5C + 2S	2C + 5S



Second public meeting was held at Yankin SaSaNaViMan on 27th February, 2019. There were (75) people from nearby wards such as No. (1) Yankin Ward, No. (2) Yankin Ward, Sayasan North/East Ward. Representatives from Kajima Yankin PPP Company Limited gave the project information and representative from Environmental Conservation Consulting Engineers Association (Yangon) explained ESIA processes and Biodiversity Study process to be conducted by Environmental Conservation Consulting Engineers Association (Yangon).

An open discussion session was included in the agenda to acquire public comments and suggestions for the project. There were (12) discussions made during the public meeting.

8.4 SUMMARY OF CONSULTATIONS AND ACTIVITIES UNDERTAKEN

8.4.1 Initial Consultations

ESIA team held four consultation meetings for The Garden Redevelopment Project. The wards included were No. (1) Yankin Ward, No. (2) Yankin Ward, Sayasan North/East Ward. ESIA team explained the about of ESIA study and project information and achieved the wards' basic data. Project information and EIA process were explained to the wards' administrator. Achieved the basic data are as follows;

Ward	Total	Males	Females
Ward 1	2141	988	1153
Ward 16	7082	3261	3821
Ward 2	4642	1893	2749
Sa Yar San (North/East) (W)	6474	2790	3684

Table 86. Initial Consultation Data

Sr.	Particulate	Fact	
1.	ward Name	Yankin Township	Bahan Township
2.	No. of Household	7,551	8,341
3.	No. of Family	14,514	17,637
4.	Total Population	66,949	78,686
5.	Male total	30,263	34,326
6.	Female total	36,686	44,360



7.	Under 18 males	7,518	7,458
8.	Under 18 females	7,856	7,860
9.	Over 18 males	22,745	26,868
10.	Over 18 females	28,830	36,500
11.	School	26	30
12.	Amount of Teacher	501	418
13.	Total student	11,842	11,627
14.	Hospital	5	7
15.	Clinic	-	61
16.	No of Doctor	8	-
17.	No of nurse	4	-
18.	No of monasteries	45	7
19.	No of church	3	2
20.	No of mosque	1	3
21.	No of Hindu temple	6	-
22.	No of Chinese Temple	1	5
23.	NGO/ INGO	23	48
24.	Electricity	Yes	Yes
25.	Water	Gyo Phyu	Gyo Phyu
26.	Rare of water	No	No
27.	Flood	No	No
28.	Knowledge on Project Information	Yes	Yes

8.4.2 Results from Personal Interviews

Discussion of local people during personal interviews are as follows:

1. During rainy season, there will floods in nearby ward by Khun-nha-pin-lein creek
2. Suggested to build sluice walls in Khun-nha-pin-lein creek
3. Worried about interfering the teaching-learning process of B.E.M.S (6) in project vicinity by the construction noise and vibration
4. Worried about the traffic congestion on Yankin Road
5. Welcomed the project for job opportunities of local people
6. According to previous experiences, construction projects have adverse impact such as spillage of earth on roads by dump trucks, hitting and breaking the road lamp



- posts, accidents caused by speedy dump trucks, social problems between foreign workers and local people
7. Requested to take preventive measures for the impact of pile works vibration to nearby 40-50 years old buildings
 8. Requested not to throw waste and scrap into the creek
 9. To establish strict disciplines for dump truck drivers and to provide a contact person for grievance mechanism
 10. To provide population lists of employees reside in project area for ward administrator office
 11. Once there occurs a dengue outbreak in nearby Golden City Project, requested to cooperate with public health department as necessary
 12. Suggested to take care of employees' safety
 13. Suggested to discharge pollutants systematically
 14. Suggested to provide car parking
 15. Once cement dusts dispersion occurred from concrete mixing in a nearby project construction. Requested to know whether the concrete mixing process will be done on site or off site.
 16. Discussed that the current project supports the economic development



Figure 55. Consultation Meeting at SayarSan North East Ward in Bahan Township



Figure 56. Consultation Meeting at Ward (2) in Yankin Township



Figure 57. Consultation Meeting at Ward (16) in Yankin Township

8.4.3 Results of Consultations

Discussions of the local people in the **first public meeting** could be summarized as follows.

- (1) Discussed that this is the first time ever to be delivered project information transparently
- (2) Suggested to general public to ask questions openly.
- (3) According to previous experiences, construction projects have adverse impacts such as mud spilled on road from dumpers, and spillage of waste water on roads
- (4) Requested to know job opportunities for local people
- (5) Requested to delineate findings from impact study transparently
- (6) Requested to carry out development activities for Yankin township and nearby wards

- (7) Requested to take preventive measures for the impact of pile work vibration to nearby 30-40 years old buildings.
- (8) Requested to know the location of parking for dumpers
- (9) Requested to know preventive measures for dumper trucks related problems.
- (10) Suggested to prepare plans for fire incidents that could occur in project construction phase
- (11) As Yankin BEMS (6) is nearby the project area, worried that the school buildings could be damaged by vibrations. Worried that learning process of the children could be affected by construction noise.
- (12) Requested to consider impacts from noise and dust to the nearest buildings in No.4 street

Representative from Kajima Yankin PPP Co. Ltd. gave the following responses;

- (1) Project construction period will last for 6 years.
- (2) About 2500 job opportunities from construction and about 600-800 job opportunities from project operation are expected and most of the jobs are for Myanmar citizen
- (3) Dumpers will be washed, waste water will be discharged only after treatment, and the project will take full responsibility if pollution occurs by the project
- (4) Pile method with least vibration will be used and the project will take full responsibility if any damage occurs by the project
- (5) Discussions will be made with Firefighting department. Construction materials will be stored at Thilawar and only required materials will be transported to site
- (6) Rules from YCDC will be followed for dumpers. Data collection working are undertaking and considerations will be making for least traffic congestion.

Discussions in the **second public meeting** are:

- (1) Once, there was a fire incident at nearby Myanmar Plaza construction site. There happened firefighting trucks were unable to enter the site due to blockage of piles of soil. Moreover, workers at the site were found to be lack of knowledge in firefighting. So, current project is suggested to provide access roads in excellent conditions, firefighting equipment and safety equipment adequately, and to educate employees with firefighting.



- (2) Suggested to provide adequate emergency ladders as highrise building fire incidents are dangerous.
- (3) Would like to know more about benefits of the project and CSR activities to be implemented.
- (4) Requested to drive the dump trucks safely outside the project area.
- (5) Requested to implement the content of the report in the project construction.
- (6) Discussed that the project is warmly welcomed and expressed thanks as considerations are made for general public.
- (7) Once there occurred a dengue outbreak in nearby Golden City Project, access to the project compound was restricted by security personnel. When inspections were made, unhealthy conditions are found out in that project. Requested to the project to co-operate with Public Health Department so that necessary site inspection could be made occasionally.
- (8) There is a local clinic at Yankin Se-hnit-lone-dan where health service for employees including their spouses and children in office hours.
- (9) Suggested to prepare a list of employees and their families according to age groups so that information is available for relevant organizations in time of occasional health programmes.
- (10) Suggested to provide a health staff or a clinic for employees since the project construction will last till 2024
- (11) Suggested to provide clean toilets, and clean kitchen so that food poisoning could be prevented.
- (12) Requested to know whether a free lane could be provided or not at the junction of Sayar SanRoad and Yankin Road.

Representative from Kajima Yankin PPP Co. Ltd. gave the following responses;

- (1) Two numbers of 2000 gallon water tanks with 2-inch distribution pipe lines are provided in the project area.
- (2) Trainings and assessments were already provided for employees.
- (3) Two exits system is used in every building of the project.
- (4) A park with twenty-four-hour physical exercise area, children library, and a shelter are included as parts of the CSR program.



- (5) Replied that no workers will reside in project area, bushes were cleared regularly, adequate lighting are provided, and there will be no kitchen in the project so that fire hazard could be prevented
- (6) Health departments are always welcome to conduct site inspections.
- (7) Replied that the free lane could not be provided since there will be a three Storeyed underground structure at that junction area.
- (8) Consideration will be made for the best in ongoing traffic management programme formulation

Representative from ECCEA gave the following responses;

- (1) Details of the CSR programme will be continuously discussed with local communities through Environmental Monitoring Team.

8.5 DISCLOSURE

8.5.1 Presentation in Public Meeting

Following activities were performed to disseminate the information relating to the project and EIA works for general public in various stages of EIA works.



Figure 58. Representative from the Project Performed a Presentation



Figure 59. Representative from ECCEA gave a Presentation



Figure 60. Representative from ECCEA gave a Presentation





Figure 61. Discussion from Officer of Township Fire Service Department



Figure 62. Discussion of Local People



Figure 63 Discussion of Local People



Figure 64. Representatives from Kajima Yankin PPP Co. Ltd. gave the responses

8.5.2 Public Comments and Suggestion

- (a) Suggestion letters in which general public can put their comments and suggestions for the project were delivered in first public meeting
- (b) Open discussion and consultation works were exercised in both public meetings

8.5.3 Dissemination of Results from EIA Studies

- (a) Executive summary of draft EIA reports translated into Myanmar was delivered to general public meeting
- (b) Translated executive summary was also delivered to ward administration offices so that community could be freely accessible



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10. APPENDIX

APPENDIX (A)

APPENDIX (B)

APPENDIX (C)

APPENDIX (D)

APPENDIX (E)

APPENDIX (F)

APPENDIX (G)

APPENDIX (H)

APPENDIX (I)

APPENDIX (J)

APPENDIX (K)

APPENDIX (L)

