

Environmental and Social Management Plan

Initial Environmental Examination

February 2021

MLD: Greater Malé Environmental Improvement and Waste Management Project

**Outer Island Waste Management Improvements:
Maafushi, South Male' Atoll**

CURRENCY EQUIVALENTS

(as of 1 February 2021)

Currency unit	–	Rufiyaa (Rf)
Rf1.00	=	\$0.06
\$1.00	=	Rf 15.4

ABBREVIATIONS

ADB	-	Asian Development Bank
AHs	-	affected households
BPEO	-	best practicable environmental option
CDW	-	construction and demolition waste
dB L _{eq}	-	continuous noise equivalent level, expressed in decibels
DMS	-	detailed measurement survey
EA	-	executing agency
EMP	-	Environmental Management Plan
EPA	-	Environmental Protection Agency
EPPA	-	Environmental Protection and Preservation Act of 1993
ES	-	environment specialist
GMEIWMP	-	Greater Malé Environmental Improvement and Waste Management Project
GOM	-	Government of the Republic of Maldives
GRC	-	grievance redress mechanism
HHs	-	households
IA	-	implementing agency
IEE	-	initial environmental examination
IMO	-	independent monitoring organization
IRC	-	Inter-Ministerial Resettlement Committee
IWMC	-	Island Waste Management Centre
ME	-	Ministry of Environment
MF	-	Ministry of Finance
MMS	-	Maldives Meteorological Service
MNPHI	-	Ministry of National Planning, Housing and Infrastructure
NBS	-	National Bureau of Statistic
MPW/100ml	-	most probable number (of bacteria) per 100 millilitres of water
NAPA	-	National Action Programme of Action (for climate change)
O&M	-	operation and maintenance
PMDSC	-	Project Management, Design and Supervision Consultants
PMU	-	project management unit
STELCO	-	State Electric Company
SWM	-	solid waste management
RWMF	-	regional waste management facility
WAMCO	-	Waste Management Corporation

NOTE

In this report, "\$" refers to US dollars

1 Declaration of the consultants

This EIA report has been prepared according to the EIA Regulations 2012, issued by the Ministry of Housing and Environment and all the amendments brought to the regulation including the amendment number 2016/R-66 Gazetted 11 August 2016.

The EIA was carried out by a multidisciplinary consulting team. In preparing this report, no data has been manipulated. Primary data has been collected to establish baseline, when such is not available.

I as the lead consultant certify that the statements in this Environmental Impact Assessment study are true, complete, and correct.

Name: Abdul Aleem (EIA P03/2019)

Signature:



Report reviewed by: Mohamed Asif, Ibrahim Faiz (EIA P05/2017)

2 Proponents Commitment and Declaration



PREVENT
DOMESTIC
VIOLENCE

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Ministry of Environment
Male', Republic of Maldives.

21st February 2021

438 - WMPC / 203 / 2021 / 28

Mr. Ibrahim Naeem
Director-General
Environmental Protection Agency
Male', Maldives

Dear Mr. Naeem,

Re: Declaration and Commitment to Undertake the Mitigation Measures and Monitoring Requirements of the ESMP of the Proposed Construction of an Island Waste Management Centers in V.Felidhoo, V.Keyodhoo, V.Rakeedhoo, V.Thinadhoo, K.Guraidhoo and K.Maafushi.

As the proponent we confirm that we have read the reports and to the best our knowledge, all non-technical information provided in the report are complete and accurate.

We would like to confirm our commitment to implement all mitigation and monitoring during construction stage as well as post construction mitigation and monitoring program as specified in the report.

Yours Sincerely

Ahmed Murthaza
Director General



Contents

1	Declaration of the consultants.....	3
2	Proponents Commitment and Declaration.....	4
1.	0	
2.	Non-Technical Summary	2
3	Introduction	4
4	Description of the Project.....	4
4.1	Project Proponent.....	4
4.2	Location and Study Area	4
4.3	Need and justification for the project	5
4.4	Proposed project	7
4.5	Components of the proposed project	8
4.6	Access Road.....	10
4.7	Temporary site setup location	11
4.8	Clean up of the existing waste pile	11
4.9	Utility.....	11
4.10	Project management	12
2.1	Project inputs and outputs	13
5	Policy Legal and Administrative Framework.....	16
5.1	Republic of Maldives Legislation for Environmental Management.....	16
5.2	ADB Environmental Safeguard Requirements	18
6	Description of the Environment.....	21
6.1	Physical Resources	21
2.2	General environment of the island	21
6.2	Ecological Resources	25
6.3	Socio-Economic Factors.....	27
6.4	Current waste management practices.....	27
2.3	Project site and access road condition	28
7	Anticipated Environmental Impacts and Mitigation Measures	30
7.1	Impact Identification.....	30
7.2	Method of Assessment.....	30
7.3	Impact Boundary	31
7.4	Environmental Impacts Related to Location	31
7.5	Environmental Impacts Related to Construction	32
7.6	Environmental Impacts Related to Operation.....	34
7.7	Global, Transboundary and Cumulative Impacts	35
8	Analysis of Alternatives.....	36
8.1	Alternatives for the IWMC.....	36
8.2	Alternatives within the Project Scope	36
8.3	The no project alternative	36
9	Information Disclosure, Consultation and Participation	37
9.1	Consultations and information disclosure during design	37
9.2	Further Information Disclosure and Public Consultation	37
10	Grievance Redress Mechanism.....	37
11	Environmental Management Plan.....	39
11.1	Objectives	39
11.2	Institutional Responsibilities	39
11.3	Impacts and Mitigation.....	40
11.4	Environmental Monitoring.....	43
12	Recommendation and Conclusion.....	44

13 References.....	45
Annex 1: EIA Screening Decision from EPA	46
Annex 2: Approved Location for IWMC	47
Annex 3: Site Location.....	48
Annex 4: Approved Concept Plan	49
Annex 5: Stakeholder Attendance	50
Annex 6: Quarantine Guidelines	51
Annex 7: Groundwater Test Results	52
Annex 8: Atoll and Island Council Submission	53
Annex 9: Criteria for Planning and Design for Subprojects.....	54
Annex 10: Rapid Environmental Assessment Checklist	55
Annex 11: Grievance Redress Mechanism Complaint Form	56
Annex 12: Template for Monitoring Report	57

Tables of Figures and Tables

Figure 1: Location of Maafushi in South Male' Atoll	5
Figure 2: Photos from Maafushi. (a) Drone photo of current waste dump site (b) open burning at waste dump site.....	6
Figure 3: Proposed location of ISWMC	7
Figure 4: Closeup of site boundary overlaid over a drone photo taken on 21 January 2021.	7
Figure 5: ISWMC concept of Maafushi Island	9
Figure 6: Cross section view of the ISWMC proposed in Maafushi.	10
Figure 7: Proposed road to be used to transport waste from ISWMC to harbour area	10
Figure 8: Empty area near the project site that can be used as a temporary material storage area	11
Figure 9: Septic tank proposed in the ISWMC	12
Figure 10: Sample sign board that can be used on the site.....	13
Figure 11: General environment of the island	21
Figure 12: Reclaimed land off southern end of the Maafushi island	22
Figure 13: Groundwater sample locations.....	24
Figure 14: Existing waste dumping area	28
Figure 15: Proposed location for ISWMC.....	28
Figure 16: Access road from harbour	29
Figure 19: IWMC planning process	39
Table 1: Tentative Schedule.....	12
Table 2: Matrix of major inputs of the project	13
Table 3: Matrix of major outputs of environmental significance during the project implementation.....	14
Table 4: Applicable WHO Ambient Air Quality Guidelines	20
Table 5: World Bank Group's Noise Level Guidelines	20
Table 6: Some key figures for Maafushi Island	22
Table 7: Average tide levels at Hulhulé	23
Table 8: Groundwater test results	24
Table 8: Protected areas in the vicinity of Greater Malé	26
Table 9: Scale used to assess impact criteria	30
Table 10: Impact assessment matrix of the construction phase	32
107 Table 11: Impact assessment matrix of the operation phase	34
Table 12: Environmental Management Plan	41
Table 13: Analysis of Environmental Monitoring Needs.....	43
Table 14: Environmental Monitoring Plan	44

1. סדר דעות

הנהגתו של הרמב"ם היא להצטרף לדעת רובא דתנאים וסבורים שיש להחיל את המשפט על כל המקרים. וכן נראה שהתוספות והראשונים חשבו שיש להחיל את המשפט על כל המקרים, וכן נראה שהתוספות והראשונים חשבו שיש להחיל את המשפט על כל המקרים. וכן נראה שהתוספות והראשונים חשבו שיש להחיל את המשפט על כל המקרים.

במהלך הדיון נקבעה דעה רובא דתנאים שיש להחיל את המשפט על כל המקרים. וכן נראה שהתוספות והראשונים חשבו שיש להחיל את המשפט על כל המקרים. וכן נראה שהתוספות והראשונים חשבו שיש להחיל את המשפט על כל המקרים.

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2. Non-Technical Summary

- 1 The report discusses the findings of an Environmental and Social Management Plan report undertaken by Water Solutions Pvt. Ltd. in order to fulfil obligatory requirements of the National Environment Protection and Preservation Act, Law No. 4/93 for the proposed development of Island Solid Waste Management Center (ISWMC) in K. Maafushi. The project will be implemented by Ministry of Environment. The aim of the project is to develop a modern island waste management center in Maafushi Island. This is under the project of Integrated Solid Waste Management Project for Zone III that includes Greater Male', North and South Male' Atoll, North and South Ari Atoll and Vaavu Atoll.
- 2 In Maafushi waste is managed by means of open burning. Household waste collection is undertaken by a private party under a contract from Island Council. Households that are registered pay a fee and door to door collection is undertaken. In addition to the door to door, there are collection points where bins are placed. Registered households can dump their waste into these bins, and they are regularly transferred to the dumpsite on the island. An open truck is used to transfer wastes from households and collection points to waste dumpsite. At the waste dumpsite, there are no fences or any other structures except old cement-locally built incinerator. This is not used currently as it has broken for a long time. The only way of managing the waste in the island is through open burning to which Island Council get lot of complaints from the residents of the island. Maafushi Island has lot of guesthouses and Island Council informed that when the waste is burnt, tourists complain about smoke and smell. The current waste management practices in the island are not appropriate. Therefore, Ministry of Environment proposes to build an ISWMC on the island to adopt more environment friendly and socially acceptable waste management practices on the island that would facilitate collection of waste from the households and business, manage the waste at the center and final transfer the residual waste to Thilafushi for final treatment and disposal.
- 3 The project involves constructing a new Island Solid Waste Management Center in Maafushi. The location proposed for the ISWMC is part of existing waste dump site on the southern side of the island near the football field. There is no fence or structures in the location except the community made incinerator built using sand cement. This is now not used since a fire accident damaged it few years back. The proposed ISWMC is 26m x 34m. It will provide provision for storing different types of waste such as plastic, glass and metal. A concrete flooring will be made to handle waste and the leachate collected on the floor will be collected by a trench, treated in an oil trap and disposed into a septic tank. Small office building and water tank will be also built as part of the project. As part of the project waste collection bins and equipment will be provided to the island to improve waste collection and transport to the ISWMC. An incinerator will be built to manage waste on the island at it's capacity until the project is operational.
- 4 The report outlines environmental impacts of the proposed project that have been examined through a number of processes. These include consultations with the project development team, field surveys, observations and assessment, and field experience gained from similar projects implemented throughout the country. Potential positive and negative impacts on the environment have been considered. The assessment indicates environmental impacts, both during the construction and operation stage. Most of the environmental impacts of the project have been identified as resulting mainly from vegetation removal and potential air and water pollution. During the operational stage, impacts may arise during the transport of the waste to regional facility. Also, if the waste is not regularly transferred the smell and visual impacts may be felt by the community. Most of the negative impacts can be minimized by adopting best practices outlined in the mitigation measures of this report. The positive impacts include introduction of proper waste management system in the island. Proposed ISWMC will bring new employment opportunities as well and will benefit indirectly to the local tourism by making the island environment cleaner.

-
- 5 An environmental monitoring plan has been developed including important elements that require regular checks, which mainly focus on components such as water quality. Success of the project can only be undertaken with proper monitoring; it is strongly encouraged to undertake the monitoring program outlined in this report. Overall, the project will benefit island of Maafushi in the long term and will bring significant amount of environmental and socio-economic benefits.

3 Introduction

- 6 The Greater Malé Environmental Improvement and Waste Management Project (GMEIWMP) will establish an integrated solid waste management system in Greater Malé and support Island Waste Management Centers (IWMCs) on 32 further inhabited islands in zone 3 which comprises the atolls of Alifu Alifu, Alifu Dhaalu, Kaafu, and Vaavu. Areas in which improvements will be introduced include collection, transfer, treatment using advanced waste-to-energy technology, disposal, recycling, dumpsite closure and remediation, and public awareness in reduce-reuse-recycle (3R); as well as institutional capacities for service delivery and environmental monitoring. The project will further improve climate change resilience and disaster risk management and contribute to reduced emissions into the environment.
- 7 The GMEIWMP will be implemented as two projects. Project 1 will comprise (i) improvements to the harbour and waste processing facilities on Thilafushi Island, including a construction and demolition waste (CDW) plant, recycling yard and end-of-life vehicle (ELV) dismantling workshop, (ii) an improved waste collection system (iii) improvements to transfer stations in Malé and Villingilli and Hulhumale, (iv) improvements to outer island waste management centres, (v) services for project management, design and supervision, (vi) services for awareness building and community outreach and (vii) a capacity building technical assistance (CDTA) for the environmental protection agency (EPA). Project 2 will comprise the construction of a new regional waste management facility (RWMF) including a waste to energy (WTE) plant and ash landfill, dumpsite rehabilitation and remediation, and project management and supervision support.
- 8 This Environmental and Social Management Plan (ESMP) is prepared for the proposed waste management improvement project on the island of Maafushi. This EMP is undertaken in order to fulfil obligatory requirements of the National Environment Protection and Preservation Act, Law No. 4/93 and the EIA Regulations (pursuant to the act) of 2007 for the proposed development of Island Solid Waste Management Center (ISWMC) in K. Maafushi. This report has also been prepared to meet the IEE requirements according to the ADB's Safeguard Policy Statement (2009). The ESMP is based on design undertaken by Water Solutions Ltd (Maldives) in association with Kocks Ingenieure (Germany), consultants to the Ministry of Environment and Energy (MEE). No works will commence until approval of this report by EPA and ADB.

4 Description of the Project

4.1 Project Proponent

- 9 This project is proposed by the Government of the Maldives where the Ministry of Environment (ME) is the implementing agency. Within the Ministry, the Waste Management Department will be overall managing the project. ADB is financing the development of this project.
- 10 The Maldivian Government remains committed in solving the issues of solid waste management that are inherent in the greater Male' region. The Environmental Protection Agency (EPA) will oversee the enforcement of strict environmental standards during the development and operational phase of the project components.

4.2 Location and Study Area

- 11 Maafushi is located on the eastern rim of South Male' Atoll at the coordinates of 3°56'25.37"N and 73°29'22.86"E. It is in close proximity to Male' the Capital of Maldives. Maafushi can be reached by speedboat in about 30 minute from Male'. Other than Maafushi, Guraidhoo and Gulhi are the only populated islands in South Male' Atoll. The following figures illustrate the location of Maafushi in South Male' Atoll

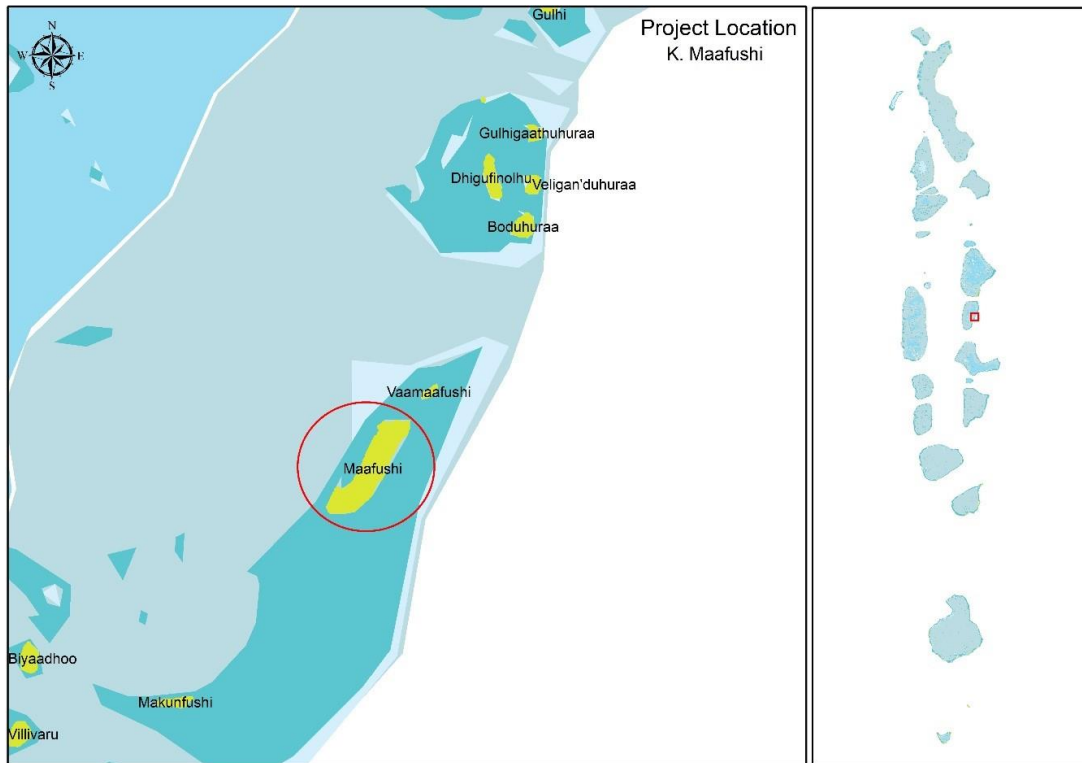


Figure 1: Location of Maafushi in South Male' Atoll

4.3 Need and justification for the project

- 12 Maldives has been facing serious issue of improper disposal of solid waste recent years due to, but not limited to, population increase, changing lifestyle, dependence on importation coupled with environmental challenges brought by the growing of economic industries such as tourism (Musthafa, 2019). The greater Male' area and its outer islands suffer from serious environmental pollution because of the inadequate collection and disposal of solid waste (ADB, 2018). Issue of improper waste management has deteriorated the livability in the islands of Maldives. Zone 3 (Figure 2), where the project focuses, encompasses 35 inhabited islands including capital Male', Kaafu atoll, Vaavu atoll, Alifu Alifu and Alifu Dhaalu atoll.
- 13 The island does not have island waste management centre (IWMC). Waste is managed by means of open burning at the waste dumpsite. Household waste collection is undertaken by Island Council. Households that are registered pay a fee and door to door collection is undertaken. In addition to the door to door, there are collection points where bins are placed. Registered households can dump their waste into these bins, and they are regularly transferred to the dumpsite on the island. Others bring waste directly to dumpsite. An open truck is used to transfer wastes from households and collection points to waste dumpsite. Island Council get a lot of complaints from the residents and tourist from the guesthouses on the island. At the waste dumpsite there is some fencing surrounding the site where open burning takes place, with no other structures in the area. In the case of food waste, some is disposed of via sea dumping. Maafushi has an estimated 1,733 kg/d of waste produced as of 2018¹. This figure has increased to an estimated 4500 kg/d in 2020².

¹ Water Solutions in association with Kocks Ingenieure (2018) Consultancy Services for Feasibility Study for an Integrated Solid Waste Management System for Zone III and Preparation of Engineering Design of the Regional Waste Management Facility at Thilafushi

² Water Solutions (2020) ENVIRONMENTAL IMPACT ASSESSMENT For the Installation of an Incinerator at Maafushi, Kaafu Atoll



Figure 2: Photos from Maafushi. (a) Drone photo of current waste dump site (b) open burning at waste dump site

4.4 Proposed project

- 14 The current waste management practices in the island are not appropriate. The council have identified a new site for a new IWMC on the eastern side of the island. The Ministry of Environment proposes to build an IWMC on the land proposed by the Island Council, to adopt more environment friendly and socially acceptable waste management practices on the island that would facilitate collection of waste from the households and business, manage the waste at the center and final transfer the residual waste to Thilafushi for final treatment and disposal. The proposed location is 25m x 32m. Figures below shows the location of the site. Until the regular transfer of waste to Thilafushi is operational the incinerator built in the IWMC will be used at its capacity to manage waste on the island.



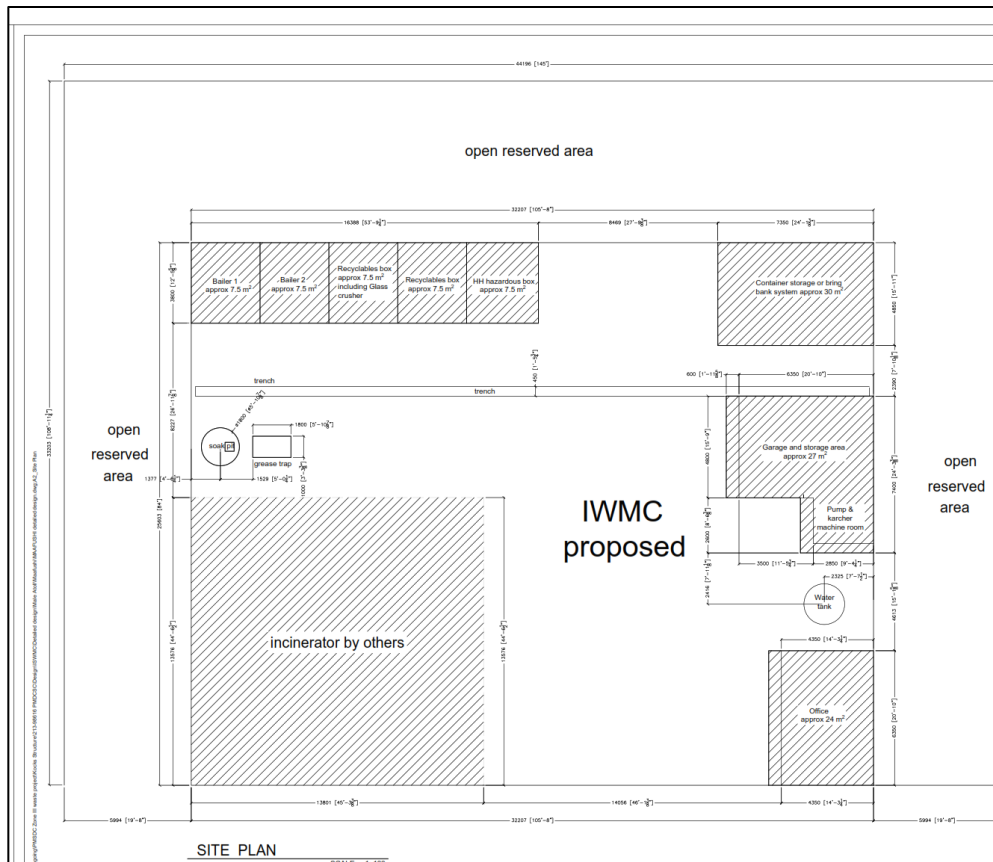
Figure 3: Proposed location of ISWMC



Figure 4: Closeup of site boundary overlaid over a drone photo taken on 21 January 2021.

4.5 Components of the proposed project

- 15 The project proposes to construct a new Integrated Solid Waste Management Centre (ISWMC) in Maafushi Island. This centre will be used to manage the waste produced in the island before it is being transferred to regional waste management centre at Thilafushi. According to the Feasibility Report of the project, ISWMC is planned in such a way to present an additional value to the community in terms of living condition, working opportunities, business opportunities and environmental improvement (Kasdari et al., 2018).
- 16 The ISWMC proposed for Maafushi will have the following components.
- Office for administration of the ISWMC
 - Shedd platform for handling waste
 - Dedicated areas for the conditioning of recyclables (plastics, cans, P&C): Baler facilities
 - Dedicated areas to keep glass crusher.
 - Dedicated area for temporary storage of residual waste and storage of bin
 - Dedicated area for household hazardous waste
 - Paved area for maneuvering vehicles
 - Garage and storage area
 - Container storage area
 - Machine room
 - Water tank for storage of rainwater/water from the island
 - Utility provision: water supply/storage/handwashing, sewerage (soak pit), electricity (light poles, electrical plugs)
- 17 Following figure shows the main components of the proposed ISWMC in Maafushi.



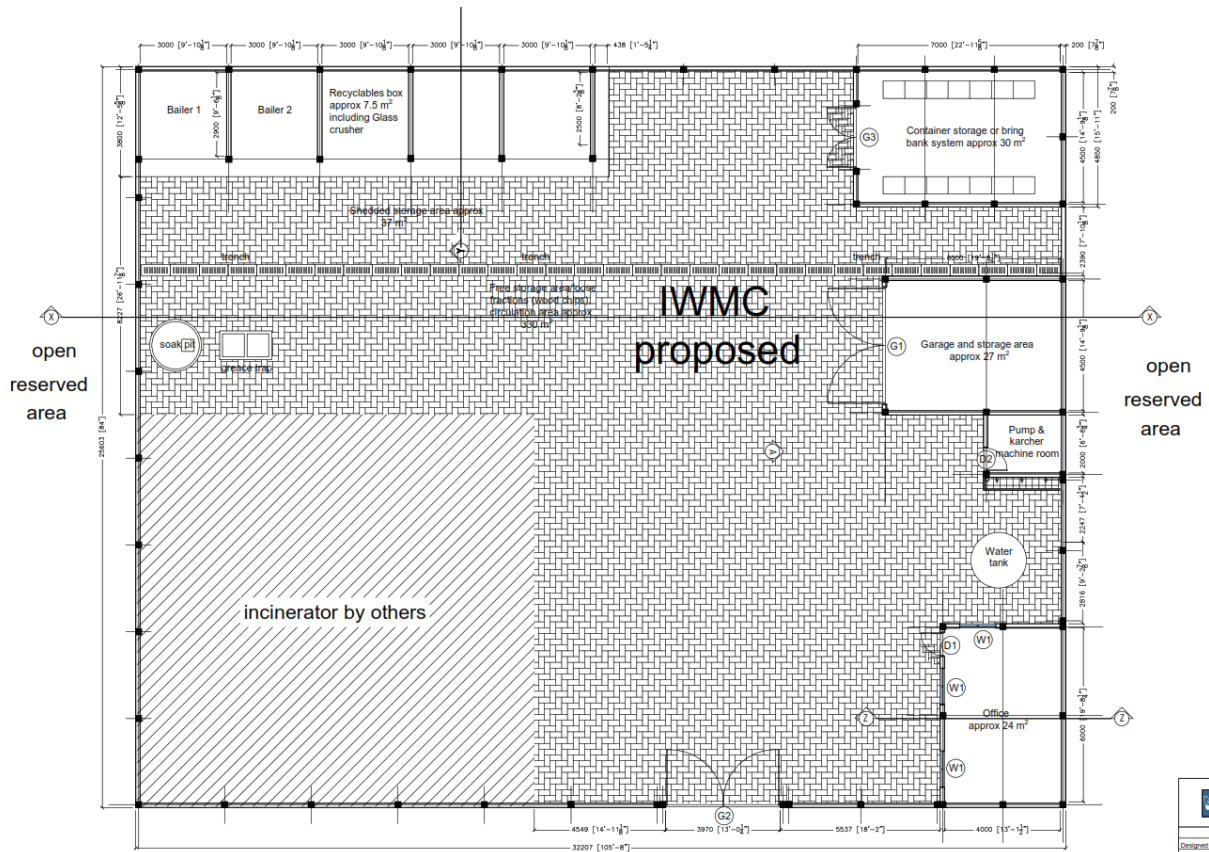


Figure 5: ISWMC concept of Maafushi Island

- 18 The proposed ISWMC has 2 main areas as described below.
- 19 **Pavement area:** This area will be paved using interlocking concrete blocks and mainly used for manoeuvring of vehicles and parking. This area can also be used as a free storage area. Total size of the area will be of 330m². Wet waste will not be handled or kept in the floor of this area as leachate can seep into ground in case of rain. Bins can be placed in this area for individual waste disposal services.
- 20 **Shedded Area:** In addition to the pavement area a shedded area with a concrete platform of the size of 37m² will be constructed. This area has a roof and is protected from rain. Major waste handling will be undertaken in this area. Waste will be segregated in this area and compacted/crushed using bailers and crushers. This area has separate provisions of 7.5m² each, for inorganic wastes. Waste such as plastic, metal and glass will be stored separately in the allocated area. Pavement is levelled so that water from the floor used for cleaning or other purposes will be collected in the trenches. This will mainly be of leachate. Leachate will be managed using a septic tank.
- 21 **Currently there is an Incinerator installed in Maafushi:** An Inciner8-700G incinerator of dimensions 6.04m x 1.91m x 5.75m. This incinerator has a capacity of 4 tons/d. A 148.6m². at the time of the site visit, incinerator was not operational. Island Council informed that they do not have the machinery required to feed the waste into the incinerator. Waste will be fed to the incinerator manually. Flue gas emission from the incinerator will be cleaned by a Venturi Scrubber. Bottom ash produced will be stored at site and transported to Thilafushi. Incinerator shed will be inside the proposed IWMC.
- 22 **Hazardous waste storage area:** Hazardous waste container of the size 7.5m².
- 23 **Office building:** For the staff small office of approximately 24m² will be constructed. This building will have 2 office rooms, a rest room and 2 toilets.

- 24 Design considers storage of waste for 1-2 weeks before being transferred to Regional Waste Management Facility (RWMF). Projects aims to have regular waste collection from outer islands at least once a week. In the case of Maafushi, island already has an incinerator installed. Once the operation of the incinerator starts, waste will be burned using the incinerator at its full capacity. Once the Zone III waste project is fully operational, waste will be transferred regularly Thilafushi. Incinerator then can be used to manage the waste that require daily disposal.
- 25 Maafushi is an island fast-developing island with lot of local guest houses and can be considered as the leading local tourism island in the Maldives. To accommodate the current and future waste management in the island, extension area is allocated on both side of the IWMC.

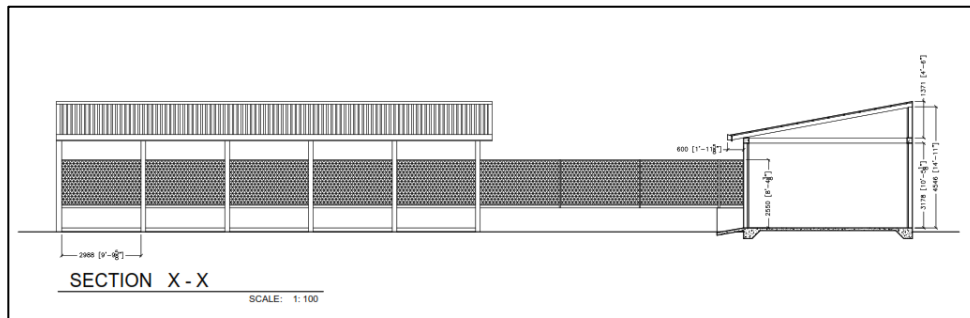


Figure 6: Cross section view of the ISWMC proposed in Maafushi.

4.6 Access Road

- 26 Regular transferring waste to the regional waste management center in Thilafushi is major part of this project. This part of the project will utilize heavy machineries and trucks to transfer waste from ISWMC to the harbour area of the island. Therefore, the main access road used for this purpose is identified in the diagram below.



Figure 7: Proposed road to be used to transport waste from ISWMC to harbour area

4.7 Temporary site setup location

- 27 The proposed project is a very small-scale construction project. Hence this project does not require an additional large area to set up the temporary site. Materials used for this project can be managed inside the proposed site. As for accommodation, workforce can be managed in rent houses in the island as the number of workforces is very minimum. In case of Maafushi, there are empty areas near the project site to store the construction materials and machineries.

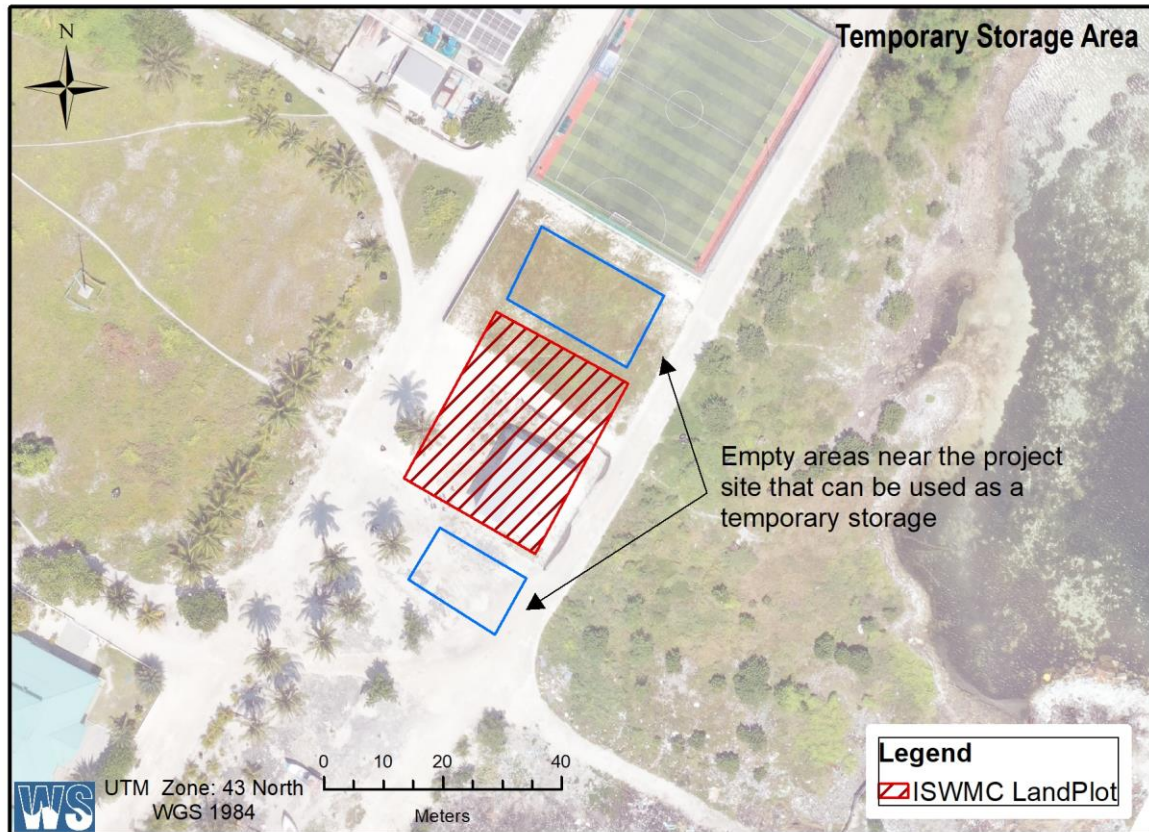


Figure 8: Empty area near the project site that can be used as a temporary material storage area

4.8 Clean up of the existing waste pile

- 28 The proposed site for the construction is an empty land. Therefore, site clearing will not be required.

4.9 Utility

- 29 Existing utility network of the island will be used for the ISWMC. Maafushi has an existing sewerage and water network in the island. The leachate collected from the concrete floor, where the waste will be handled, will be collected in a trench, and treated in a septic tank before its being diverted into the sewer network. Leachate will be treated by mean of settlement tank and anerobic filter as shown in the figure below.

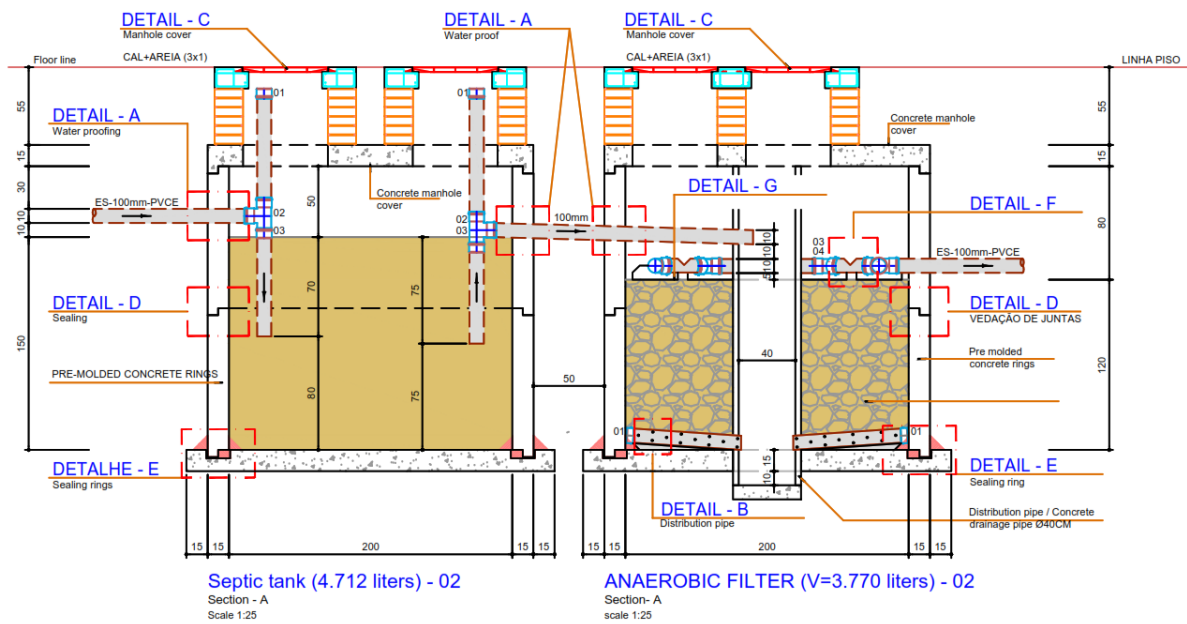


Figure 9: Septic tank proposed in the ISWMC

4.10 Project management

- 30 The project will be managed by Ministry of Environment by contracting the civil works to a contractor. The contractor will provide a daily work schedule for the project and will be responsible from hiring labourers, material, and civil works.

4.10.1 Project schedule

- 31 Total duration of the project is approximately 12 months. Construction of outer island waste management centers in the islands of Zone 3 will be carry out in parallel. Below is the construction schedule for the construction of ISWMC of Zone 3 islands. Master schedule for the whole project is attached as an Annex.

Table 1: Tentative Schedule

Tasks/Deliverables	2021												2022				
	January 14	February 15	March 16	April 17	May 18	June 19	July 20	August 21	September 22	October 23	November 24	December 25	January 26	February 27	March 28	April 29	May 30
Outer Island waste management centers																	

4.10.2 Emergency plan in case of spills (diesel, grease, and oil)

- 32 The project site will have contact numbers for the project manager to contact in case of any emergency. Everyone working on this project will have access to the project managers through mobile phones. To avoid any serious spillage, all fuelling activities should be undertaken on land. This would totally avoid any oil spillages to the marine environment. In case of a serious oil spill from a machinery due to a damage, all work will be immediately stopped, and everyone will be directed to focus their attention and effort to get the leaking stop, either through mechanically or by any temporary means. The focus will then be to move the machinery to land if it happens on the sea.

4.10.3 Fuel management

- 33 All fuel used in the site should be acquired locally to avoid long term storage of fuel on the site. Short term fuel storage on site should be done in an impervious flooring surface or in a leak proof container.

4.10.4 Site safety and safety equipment

- 34 General precautionary site safety methods will be applied. All workers will be given instructions about health and safety at site. Safety shoes and hats will be provided to all workers. Gloves and boiler suits will be provided for workers when necessary. Earmuffs will be provided to labourers working in noisy environment. Site Supervisors will give a brief on daily basis before the work starts to all workers and all proper health and safety precautions will be implemented on site. Construction safety sign boards must be erected on site.



Figure 10: Sample sign board that can be used on the site.

- 35 If workers are traveling from an island with a community outbreak of COVID-19, they should be quarantined for 10 days. After 10 days. They should be tested for COVID-19 and their samples will be sent for testing. If their tests were negative, they would be allowed to leave the premises. HPA guideline for “Travel related quarantine (furabandhu) guideline for groups of 10 or more people staying in shared accommodation” is attached as an annex.

4.10.5 Waste management

- 36 Waste generated during the construction stage will require adequate disposal, it is contractor’s responsibility for the disposal of wastes. However, with approval from the council, the waste can be managed in the island itself.

4.10.6 Communication

- 37 The project will be managed by Ministry of Environment. The contractor will submit weekly and monthly updates about construction work.

2.1 Project inputs and outputs

- 38 The project has inputs in terms of human resources, natural resources, and machinery. The main output of the project is ISWMC that would bring direct and indirect benefits to the local communities in terms of environmental, social, and economic development. The inputs and outputs are summarized in the following 1 tables.

Table 2: Matrix of major inputs of the project

	Input Resource(s)	Amount / Type	How to obtain resource(s)
Construction period	Sit supervisor / engineer	1	Site supervisor should ideally be local. He/she should be present at the construction site during the construction period. He/she should regularly communicate with island council. It is important that the

			supervisor has a good understanding of local context, social and cultural norms.
	Construction workers	10 Maldivians and foreign (locals will be given preference)	Open bidding by advertising in local papers/other sources. Since minimal number of workers is used for the project, accommodation can be provided in rent houses/rooms.
	Water supply	100L per day	From the existing water network system of the island. Well water is also available from the football field near the project site.
	Electricity/Energy	Diesel-based electricity from island mains	Existing island grid.
	Construction materials	Cement, sand, gravel, pipes, bars, paint, roofing, electrical equipment etc.	Incorporated in the contract document and contractor to obtain it from local sources. Some of these materials will be available from the island as well.
	Construction machinery	Pickups, small trucks, wheelbarrows, and other general construction machinery.	Responsibility of the contractor to obtain the required machinery.
	Telecommunications	Mobile Phones	Already this service is available in the island
	Transport (sea)	-	Materials to be transported in supply vessels. Contractor to arrange.
	Food (during construction period)	Obtained from the island	Local purchase by the contractor
	Fuel	Diesel, Petrol, Lubricants	Local purchase by the contractor
Operation period	Equipment	Glass crusher, woodchipper, metal can baler, waste collection vehicle, plastic shredder	Provided under this project.
	Water	Desalinated water	Island already has an established water network.
	Power	-	Diesel-based electricity from island mains.
	Staff	Approximately 5	Staff includes drivers, workers, and a supervisor.
	Waste	Approximately 960 kg per day	Waste will be collected from households and businesses and transferred to regional waste management center.

Major types and anticipated quantities of project outputs is presented below.

Table 3: Matrix of major outputs of environmental significance during the project implementation

	Products and waste materials	Anticipated quantities	Method of disposal
Construction period	Construction waste	Moderate amount of construction waste. Existing waste pile on the site.	Construction waste must be reused as much as possible; rest can be transferred to Thilafushi. Existing waste pile on the site could be transferred to Thilafushi as part of the site preparation process.
	Noise	Only localised to the project environment.	Unavoidable during the construction stage but will be minimal.
	Air pollution	Limited quantities of dust in the construction area.	Mainly arising as, a result of dust emission from the construction work

		Small quantities of air pollution from transportation of construction materials.	such as cement mixing, moving machinery and other processes. Only localised.
	Soil	Small quantity	Will be reused in the backfilling of the excavated areas.
	Waste oil	Small quantity	Barrelled and transferred to the regional waste management center at the end of the construction period.
Operational period	Inorganic waste	Crushed glasses, shredded plastic, compacted metal	Transferred to regional waste management centre (Thilafushi). Weekly transfer is planned to avoid open burning.
	Compost	Depending on the number of beds / or if council wish to start composting program	Used locally for agricultural purpose and can be sold to nearby resorts/islands
	Air pollution	From the incinerator. Depends on the usage.	Localised

5 Policy Legal and Administrative Framework

5.1 Republic of Maldives Legislation for Environmental Management

- 39 The law governing the protection of the environment is the Environmental Protection and Preservation Act (EPPA) of 1993 (Act No 4/93). The law is brief, and sets out the principles for sustaining and extending the benefits of the environment of the Maldives for the people and coming generations. The EPPA confers powers on the MEE to issue regulations and formulate policies for environmental protection and preservation. Such regulations include the EIA regulations of 2007, updated in 2012 (Regulation No. 2012/R-27).
- 40 Responsibilities and procedures for conducting environmental assessments, together with the requirements for environmental monitoring of projects, are set out in the EIA Regulations of 2012. All projects that may have an impact on the environment are referred to the Minister of Environment and Energy (EPPA 5(a)).
- 41 The EIA Regulations assign primary responsibility for undertaking environmental assessment of projects to the project proponent and set out procedures, rights and responsibilities for the preparation and approval of EIAs. The Ministry of Environment and Energy (MEE) undertakes review and approval of environmental assessment reports.
- 42 Project proponents are defined in the EIA regulations as a person, department or agency who is seeking to carry out or proposes to carry out a development proposal or is the owner or person having charge, management or control of a development proposal. EIA work must be carried out by registered consultants, and the procedures and requirements for registration are set out in Part V of the regulations.
- 43 The EIA regulations include a schedule (Schedule D) of investment project types that require an EIA. These include landfills, waste incinerators and large scale waste storage projects. For project types not included schedule D, a screening form is submitted in a specified format on the basis of which the ME decides whether an Environmental Management Plan is required or if further information is required, in which case an Initial Environmental Examination (IEE) will be carried out. The IEE is completed according to a specified format. If the IEE finds that the project may cause a significant environmental impact, a full EIA is required
- 44 For schedule D projects and those identified by the IEE as requiring an EIA, a scoping meeting is convened by the MEE to determine the specific Terms of Reference for the EIA. On completion of investigations and reporting, the EIA report is subject to review by MEE, which invites comments from other relevant ministries and the public following which an environmental decision is made.
- 45 On submission of the screening application to EPA, EPA screened this project to prepare an Environmental Management Plan. The Environmental and Social Management Plan for the proposed island waste management center at Maafushi has been prepared on a specified format and reviewed for compliance by EPA.
- 46 The table below shows the relevant polices and regulations to the proposed project. Small brief about the policy/regulation is also provided.

#	Relevant laws, regulations, policies, and guidelines	Description
1	Environmental Protection and Preservation Act	The project conforms to the requirements of the Environmental Protection and Preservation Act of the Maldives, Law no. 4/93. The EMP has been undertaken in accordance with the EIA Regulation 2012 of the Maldives by registered consultants. The construction and operation phase of the proposed project will fully abide to the Environmental Preservation and Protection Act.
2	Protected Areas and Sensitive Areas	Under Article 4 of the Environment Protection and Preservation Act, the Ministry of Environment is vested

		<p>with the responsibility of identifying and registering protected areas and natural reserves and drawing up of rules and regulations for their protection and preservation.</p> <p>The proposed project does not have any declared protected or sensitive area within the project boundary.</p>
3	Environmental Impact Assessment Regulation 2012	<p>The Ministry of Environment has issued EIA regulation on May 2012, which guides the process of undertaking the Environmental Impact Assessment in the Maldives – This guideline also provides a comprehensive outline of the EIA/EMP process, including the roles and responsibilities of the consultants and the proponents. Schedule D of the regulation underlines the projects/practices that require EIAs. Since the ISWMC does not fall within this list, a screening process was followed. Screening decision for this project is to prepare an EMP for this project. This EMP has been prepared in accordance with the guideline provided in the regulation.</p>
4	National Waste Management Policy 2015	<p>The key objective of the waste management policy would be the formulation and implementation of guidelines and means for solid waste management to maintain a healthy environment.</p> <p>The establishment of ISWMC is in line with this policy and is an important part of the Integrated Waste Management System.</p>
5	Waste Management Regulation	<p>WMR contains four main sections: (i) Waste management standards: Defines standards for waste collection, transfer, treatment, storage, waste site management, landfills and managing hazardous waste. (ii) Waste management Permits: Defines approval procedures for waste sites, (iii) Waste transfer: Standards and permits required for waste transport on land and sea, including transboundary movements, (iv) Reporting requirements: Defines reporting and monitoring requirements and procedures, (v) Enforcement: Defines procedures to implement WMR and penalties for non-compliance.</p> <p>The ISWMC proposed under this project was designed to conform the Waste Management Regulation.</p>
6	Land Use Planning	<p>The Land Use Planning Regulations and Guidelines (2005) include land use instruments such as inclusionary zoning and quotas. Land Use Plans (LUP) are prepared in consultation with the Ministry of National Planning, Housing, and Infrastructure, which does have allocations for residential areas as well as for different infrastructure and social needs.</p>
7	Health and Safety in Construction Industry	<p>Construction law was published in 2017 highlighting the rules regarding general construction industry in Maldives. This law includes the building code, permits, involvement of Maldivians in construction industry, inspecting quality of construction, quality of materials used in construction projects and payment regulations for workers. The proposed project should adhere to this law and should follow it throughout the construction stage.</p>
8	Immigration Act	<p>The Maldives Immigration Act (1/2007) establishes rules for the departure and entry of Maldivian nationals, and entry, departure, and deportation of foreign</p>

		nationals. The 15th article of the act establishes work visa permit, which allows for foreign nationals to remain in the Maldives for the purpose of working for a permitted period. Foreign labourers of this project should have valid working visa for the whole duration of the project.
9	Employment Act	Employment Act (2/2008) determines the fundamental principles relating to employment in the Maldives, the rights and obligations of employers and employees, establishes a Labour Relations Authority and an Employment Tribunal to protect such rights, and makes provision for all other matters related to employment. Below is the list of points applicable to the project. <ul style="list-style-type: none"> • Worker shall not be forced to work for more than 48 hours per week. • Workers shall not be made to work for more than 6 days a week consecutively without providing 24 hours for rest. • Workers shall not be made to work continuously for more than 5 hours without providing a break for at least 30 minutes. • Salary should be paid to all permanent contract workers once a month. • Minimum 03 meals shall be provided to construction staff per day or appropriate meal break time shall be provided.
10	Decentralization Act	The Decentralization Act establishes the local councils as highest authority in the locality and who shall have executive powers to be exercised in accordance with this Act. The Act establishes Atoll Councils, Island Councils and City Councils. This project will be monitored and overlooked by the Island Council. The project was also formulated together with the input from the Island Council.
11	Coral and Sand Mining	Coral mining from house reef and atoll rim has been banned through a directive from President's Office dated 26 September 1990. Sand should not be mined from any part of the existing Island, beach, or the newly reclaimed island beach.

5.2 ADB Environmental Safeguard Requirements

- 47 ADB requires the consideration of environmental issues in all aspects of ADB's operations, and the requirements for environmental assessment are described in ADB SPS, 2009. This states that ADB requires environmental assessment of all ADB investments.
- 48 **Screening and categorization.** The nature of the environmental assessment required for a project depends on the significance of its environmental impacts, which are related to the type and location of the project; the sensitivity, scale, nature, and magnitude of its potential impacts; and the availability of cost-effective mitigation measures. Projects are screened for their expected environmental impacts, and are assigned to one of the following four categories:
- (i) **Category A.** Projects could have significant adverse environmental impacts. An EIA is required to address significant impacts.
 - (ii) **Category B.** Projects could have some adverse environmental impacts, but of lesser degree or significance than those in category A. An IEE is required to determine whether significant environmental impacts warranting an EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental assessment report.
 - (iii) **Category C.** Projects are unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are reviewed.

-
- (iv) **Category FI.** Projects involve a credit line through a financial intermediary or an equity investment in a financial intermediary. The financial intermediary must apply an environmental management system, unless all projects will result in insignificant impacts.
- 49 **Environmental management plan.** The SPS further requires the development of an environmental management plan (EMP) specifying the required mitigation and monitoring and who is responsible for implementation.
- 50 **Public disclosure.** ADB will post the safeguard documents on its website as well as disclose relevant information in accessible manner in local communities:
- (i) for environmental category A projects, draft EIA report at least 120 days before Board consideration.
 - (ii) final or updated EIA and/or IEE upon receipt; and
 - (iii) environmental monitoring reports submitted by the Project Management Office (PMO) during project implementation upon receipt.
- 51 **Pollution Prevention and Control Technologies.** During the design, construction, and operation of the project the PMDCSC will apply pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environment, Health and Safety Guidelines. These standards contain performance levels and measures that are normally acceptable and applicable to projects.

Table 4: Applicable WHO Ambient Air Quality Guidelines

Table 1.1.1: WHO Ambient Air Quality Guidelines ^{7, 8}		
	Averaging Period	Guideline value in $\mu\text{g}/\text{m}^3$
Sulfur dioxide (SO ₂)	24-hour	125 (Interim target-1) 50 (Interim target-2) 20 (guideline)
	10 minute	500 (guideline)
Nitrogen dioxide (NO ₂)	1-year	40 (guideline)
	1-hour	200 (guideline)
Particulate Matter PM ₁₀	1-year	70 (Interim target-1) 50 (Interim target-2) 30 (Interim target-3) 20 (guideline)
	24-hour	150 (Interim target-1) 100 (Interim target-2) 75 (Interim target-3) 50 (guideline)
Particulate Matter PM _{2.5}	1-year	35 (Interim target-1) 25 (Interim target-2) 15 (Interim target-3) 10 (guideline)
	24-hour	75 (Interim target-1) 50 (Interim target-2) 37.5 (Interim target-3) 25 (guideline)
Ozone	8-hour daily maximum	160 (Interim target-1) 100 (guideline)

Table 5: World Bank Group's Noise Level Guidelines

Table 1.7.1- Noise Level Guidelines ⁵⁴		
Receptor	One Hour L _{Aeq} (dBA)	
	Daytime 07:00 - 22:00	Nighttime 22:00 - 07:00
Residential, institutional; educational ⁵⁵	55	45
Industrial, commercial	70	70

- 52 **Requirements for the Project.** All statutory clearances will be obtained prior to commencement of civil works. IEEs will be prepared for each package involving civil works and EMP to be attached in the bid and contract documents. IEE will be submitted to ADB for review and approval prior to issuance of bid documents. Monitoring of EMP implementation by the EA is reported to ADB.

6 Description of the Environment

6.1 Physical Resources

6.1.1 Geology, Topography and Soils

- 53 In common with all islands in the Maldives, Maafushi is a reef island that has formed mainly at the periphery of Kaafu Atoll by a process of deposition of shallow-water carbonates and successive coral deposits at the tidal level which gradually rose to reach the present-day level of the island. The underlying rock is variable in consistency, reflecting the growth patterns of the coral, which forms dense colonies (coral heads) and large voids between the heads. The unconsolidated sand and gravel on top of the rock layer is subject to seasonal conditions, particularly monsoons as well as wave action, and the beaches in their natural state are dynamic subject to continual erosion and accretion, making infrastructure around the island's coast vulnerable to erosion.
- 54 The island's soils are mainly sandy in texture, with a significant silt component formed as sand grains have ground against each other. Much of the inland part of the island has topsoil with an organic matter content, supporting thick vegetation in places as well as homes and gardens. The soils are free draining when uncompacted, have poor nutrient status and are alkaline. Surface relief is extremely low and below 2m above sea level.

2.2 General environment of the island

- 55 Maafushi is located in the east rim of South Male' Atoll. Cocoa island resort is located in the same lagoon as Maafushi. The nearest protected site is Guraidhoo kanduolhi located approximately 5km south of Maafushi.
- 56 The following is the summary of the general environment:
- A harbor is located on western side of the island,
 - Beaches are observed primarily of the northern side of the island. This is the main tourist beach that is protected using a groyne field.
 - The island has been fully compacted, there is no empty plots for future development,
 - A reclamation project of a small plot of land off the southern coast has been completed but is yet to be developed.



Figure 11: General environment of the island



Figure 12: Reclaimed land off southern end of the Maafushi island

Table 6: Some key figures for Maafushi Island

Name of the island	Maafushi
GPS Coordinates	73°29'22.86"E, 3°56'25.37"N
Area of islands/Hectares	41.8
Distance to atoll capital/Km	51.2
Distance to Male'/Km	24.83
Is it on its own reef	No
Is it sharing reef with other islands	Yes
If sharing how many islands	1
Nearest distance to reef edge/Km	0.06
Longest distance to reef edge/Km	3
Area of the reef (including lagoon)/Sqkm	7.69
Nearest inhabited island	Guraidhoo
Nearest Airport	Velana International Airport
Nearest Resort	Anantara Dhigu Maldives

6.1.2 Climate

- 57 The Climate is tropical maritime, featuring two monsoon seasons, originating over the Indian Ocean to the southwest between May and September (Hulhangu), and the Bay of Bengal to the drier northeast between December and February (Iruvai). The southwest monsoon is the stronger and monthly rainfall typically exceeds 200mm towards the end of the southwest monsoon period and is lowest in February. Cyclones can occur, with the higher risk period being between October and January. The island can also experience “edge effects” of larger more distant cyclones. The United Nations (2007)³ estimate that there is a 10% probability of a level one storm on the Saffir-Simpson scale occurring over Kaafu Atoll in a 10-year period. Storms in

³ United Nations Office for the Coordination of Humanitarian Affairs - Regional Office for Asia and the Pacific (OCHA ROAP) (2007) Maldives: Composite Hazard Map.

the level one category are described as being “very dangerous” with wind speeds likely in the range of 119 – 153 kph, and pressures below 100hPa, but not lower than 980 hPa.

58 Temperatures are relatively constant and range between 25oC and 30oC, with the hottest period occurring in March/April and the coolest, December/January. Monthly rainfall fluctuates between around 20mm in February to over 300mm in May and is over 200mm for most of the year.

59 The prevailing winds are predominantly westerly for much of the year, with easterly winds rare and south easterly winds almost non-existent. Winds are influenced by the monsoon patterns and west-south-westerly and westerly winds are the strongest over the year.

60 The tidal regime is semi-diurnal – two high and two low tides a day. The range for spring tides is approximately 1m and for neap tides, 0.3m while the extreme range between highest high water and lowest low water is 1.32m at the tidal gauge for the Malé area, on Hulhulé Island some 30 km north from Maafushi. Table 7 below gives the average tide levels at Hulhulé.

Table 7: Average tide levels at Hulhulé⁴

Tidal level	Water level from mean sea level (m)
Highest High Water (HHW)	0.62
Mean Highest High Water (MHHW)	0.34
Mean High Water (MHW)	0.33
Mean Low Water (MLW)	-0.36
Mean Lowest Low Water (MLLW)	-0.37
Lowest Low Water (LLW)	-0.72

61 Wave heights are also influenced by variations in atmospheric pressure and strong winds. Atmospheric pressure at sea level around Kaafu Atoll typically varies between 1011 and 1017 hPa, and an increase in air pressure of 1 hPa typically lowers the water level by 1cm. Lower pressures can occur in storm events, and may drop below 1000 hPa, entailing an increase of around 10cm or more, adding to effective storm wave heights.

62 Surface currents reflect tides and wind, and generally follow the monsoon pattern, with westward currents dominant from January to March, and the reverse between April and December.

6.1.3 Freshwater Resources

63 Natural freshwater sources on the island comprise rainwater collected from roofs and groundwater that accumulates through infiltration of rainwater into a freshwater lens that forms in underlying strata of the island, though the integrity of the lens and the quality of its water are threatened by the level of extraction and by pollution from human waste where proper sanitation facilities are not used. To get the baseline groundwater quality of the island, samples were taken from 3 locations: from the nearest well to the proposed IWMC site and from a control site.

⁴ Source: University of Hawaii Sea Level Center Database, quoted in the Second National Communication of the Maldives to the United Nations Framework Convention on Climate Change. Ministry of Environment and Energy, 2016.

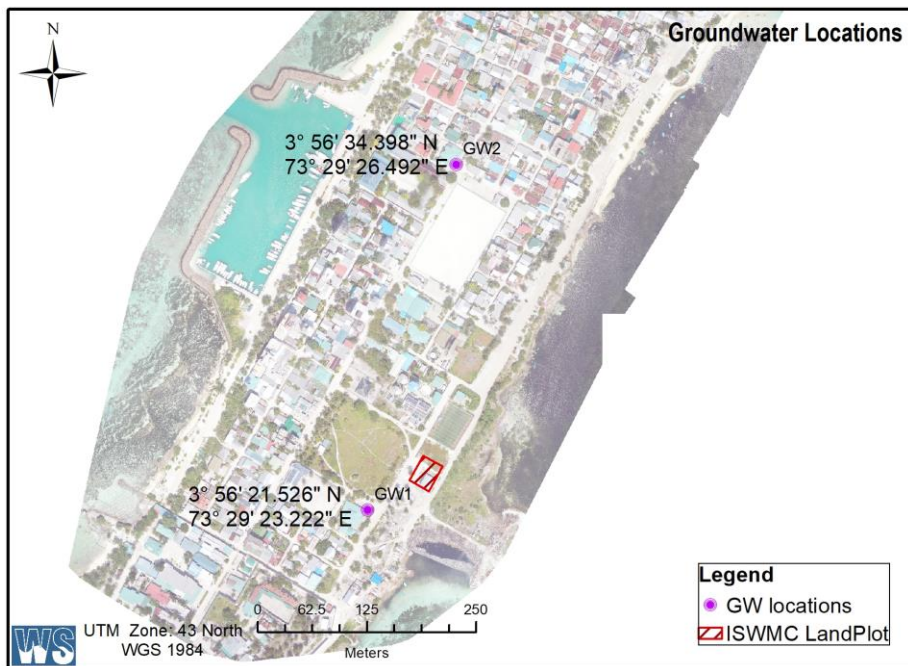


Figure 13: Groundwater sample locations

Table 8: Groundwater test results

	GW1	GW2	Unit
Conductivity	651	463	µS/cm
pH	7.75	7.82	-
Salinity	0.32	0.22	‰
Temperature	23.1	23.8	°C
Nitrogen Ammonia	0.10	<0.02	Mg/L
Total Petroleum Hydrocarbon	<0.036	0.040	Mg/L

6.1.4 Marine Resources

64 Significant fishing recreational diving and other water supports such as surfing take place in the water around Maafushi and the island is considered to be a surfing and diving destination for tourists. The water quality is influenced by sewerage discharge and illegal dumping of solid waste (including from neighbouring islands and passing vessels).

6.1.5 Marine Sediment

65 Pollutants from waste, particularly hazardous waste, can accumulate in the sediment on the lagoon or sea floor on a small scale. While more industry as well as waste management takes place on Thilafushi Island at the southern edge of the atoll, some 31km away.

6.1.6 Air Quality

66 Air pollution sources include vehicle emissions, emissions of other plant and machinery including diesel power generators, and construction activity, as well as industrial activity, all of which are limited on Guriadhoo. Levels of ambient air quality studied on the more populated islands of Greater Malé at the south of the atoll by AECOM in 2010 on Malé, Hulhulé and Hulmumale⁵ and compared with World Health Organization (WHO) standards for ambient air,

⁵ AECOM in association with Water Solutions (2011). Expansion and Modernization of Malé International Airport: Social and Environmental Impact Assessment, prepared for GMR Malé International Airport Private Limited.

finding that the pollutants of potential concern did not exceed WHO guideline levels in terms of the average 24hr mean.

6.1.7 Noise

- 67 Sources of noise pollution are similar to those for air quality, again very limited on Thulusdhoo, while wind and waves can contribute significantly to ambient noise levels.

6.2 Ecological Resources

6.2.1 Marine Ecosystems

- 68 Coral ecosystems have significant ecological significance and occur within lagoon waters and on the periphery of the islands. The corals are vulnerable to pollutants in the water, changes in radiation, changes in turbidity and in nutrient levels. Corals are adapted to low nutrient levels, and in areas where sewage, grey water and food waste is released, which usually have relatively high phosphate and nitrate levels, algal growth will often flourish and suppress coral growth. Coral health can be gauged by established survey methods, such as the reef check protocol supported by the international NGO Reef Check⁶ which provide standards to assess the coverage of coral and other substrates on the sea bed.
- 69 Pelagic fish form an important part of the local economy, both through commercial fishing activities and game fishing. Fishing activity focuses on areas known to be abundant and these occur throughout the Maldives waters, usually distant to the coast.

6.2.2 Avifauna

- 70 The Maldives has a diverse range of birds, including a significant seasonal population of migratory birds. The islands are important wintering grounds for a large number of migratory species that follow the Central Asian Flyway, a flyway covering a large continental area of Eurasia between the Arctic Ocean and the Indian Ocean, and comprising several important migration routes, extending from the northernmost breeding grounds in Siberia to the southernmost non-breeding wintering grounds in West and South Asia and the Indian Ocean Territory including the Maldives. Floating waste is a known hazard to birdlife on the atoll particularly when toxic waste is ingested or when articles such as plastic bags and string can cause birds to be debilitated or where they cause damage to the digestive system, or when it damages a natural habitat. These can travel considerable distances and therefore such waste released from more populated islands or from vessels can reach islands such as Maafushi and cause damage. The habitat of the white-breasted waterhen (*Amaurornis phoenicurus*) is known to be threatened by floating, uncollected solid waste⁷.

6.2.3 Terrestrial Ecosystems

- 71 The present-day vegetation cover on the islands is substantially influenced by human habitation and has little biodiversity conservation significance. Vegetation is dominated by pan-tropical species such as coconut (*Cocos nucifera*), Goats foot creeper (*Ipomea pes-caprae*), hibiscus (*Hibiscus tiliaceus*) and beach calophyllum (*Calophyllum inophyllum*).

6.2.4 Protected Areas

- 72 There are 42 protected areas in the Maldives designated under the EPPA and covering around 24,500ha, or 0.2% of national territory totalling more than 24,494 hectares (0.2% of the national territory) designated under the Environment Protection and Preservation Act 4/93 (EPPA 4/93) to prevent over exploitation, and improve conservation and preservation, including banning of export of important baitfish as aquarium fish, protection of threatened marine species such as sharks, sea turtles, giant clams and black coral and also to enhance and sustain dive tourism.

⁶ Hodgson, G., W. Kiene, J. Mihaly, J. Liebeler, C. Shuman, L. Maun and J. Hill (2006). Reef Check Instruction Manual: A Guide to Reef Check Coral Reef Monitoring Published by Reef Check, Institute of the Environment, University of California at Los Angeles.

⁷ Common Birds of the Maldives. Live & Learn Environmental Education. www.livelearn.org

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- 73 Two protected areas occur in the vicinity of Maafushi. The IUCN has not set a category for any of the sites.

Table 9: Protected areas in the vicinity of Greater Malé

Name	Type	Area	Notes	Location relative to Maafushi Island
Kandoomaa Thila (designated in 1999)	Reef	0.5 sq. km	Favoured as a dive site for sea life and rock features.	Approx 2.0 km to the north east (Atoll edge)
Guraidhoo Channel (designated in 1995)	Channel / reef	0.5 sq. km	Deep lagoon area	Approx 2.0 km to the South east (atoll edge)

6.3 Socio-Economic Factors

6.3.1 Population Levels

- 74 The population of Maafushi according to the 2014 census is 3,025. This is projected in the feasibility study for an Integrated Solid Waste Management System for Zone 3 to have reached around 4,026 at present day levels and to rise to 4,679 by 2035. The island has a number of guesthouses, serving a tourism market.

6.3.2 Economy

- 75 Maafushi's economic activity is dominated by the tourism guesthouse. The island has some tourism, primarily a collection of guesthouses and it is also the nearest inhabited island to some resorts in the area. Access to education, in keeping with the national average is good, with enrolment in primary education close to 100% and literacy rates at about 98%.

6.3.3 Public Health

- 76 Maafushi in general benefits both from relatively easier access to major health facilities in Malé and from the advances made in the sector over recent decades, which feature a rapid decline in maternal mortality rate, and eradication or heavy reduction of the incidence of a number of infectious diseases including leprosy, measles and lymphatic filariasis. However existing waste management practices, particularly regular burning of household waste including plastics, poses a mild risk to people living on the vicinity who regularly breathe air that contains smoke from the burning waste.

6.4 Current waste management practices

- 77 Maafushi Island does not have an island waste management center. Waste is managed by open burning, in the south-eastern side of the island. As per island council, wastes are collected from 368 households, 25 restaurants, 41 shops, health center and 55 guesthouses. However, other infrastructure like dive schools, schools and powerhouse also has some input.
- 78 Waste management in Maafushi is managed by island council by contracting the waste collection work to a private party. Waste is collected using two methods; Door to Door (D2D) and Collection Points (CP), however individuals can directly dump the waste into the dumpsite if they wish to do it. The inhabitants must pay for this service. Total of 90 households are registered and they pay 100MVR per month for collection service. For CP 120 and 240 L bins are being used. Wastes collected are not segregated. There is a fence installed in the lagoon of this area and waste is dumped inside the fence. But some of the waste was observed to be escaping the fence to the marine environment. Food waste area being dumped into the ocean.
- 79 According to island council managing waste management service is quite difficult due to limited number of machineries. The only way to manage is by open burning. The island consists of 55 guesthouses, island council receive a lot of complaints from them/guest and nearby resorts because of the open burning practice.



Figure 14: Existing waste dumping area

2.3 Project site and access road condition

- 80 ISWMC is located on eastern side of the island, behind the futsal pitch. The diagram below shows the proposed ISWMC area.

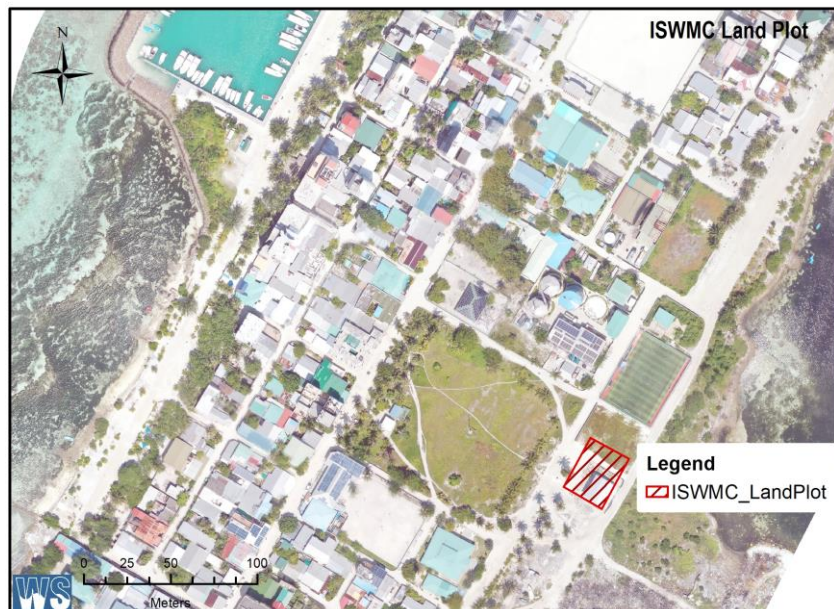


Figure 15: Proposed location for ISWMC

- 81 The project site can be accessed from northern side road. Northern side road is connected to the existing harbor. This road has already been cleared, so vegetation removal will not be required on the access road. The diagram below shows how the site can be accessed from harbor.



Figure 16: Access road from harbour

7 Anticipated Environmental Impacts and Mitigation Measures

7.1 Impact Identification

- 82 The potential impacts and mitigation measures have been identified through a site visit, interviews with stakeholders and review of designs for the IWMC and associated facilities.
- 83 In addition to the stakeholder consultation and primary and secondary data collected for this project, following reports has been reviewed to determine the possible impacts.
- EIA to the Installation of an Incinerator at Maafushi Island, Kaafu Atoll (Water Solutions, 2019)
 - ESMP for the Proposed Construction and Operation of an Island Waste Management Centre in Dhonfanu, Baa Atoll (CDE, 2019)
 - EMP for the Proposed Development of Island Waste Management Center in Th. Vandhoo (Zuhair, 2017)
 - EMP for the Proposed Island Waste Management Centre in Bodufulhadhoo, Alifu Alifu Atoll (Musthafa, 2019)
 - ESMP for the Upgrading of Island Waste Management Center in R. Maakurathu (Zuhair, 2019)
- 84 The proposed ISWMC construction project at Maafushi Island is expected to have limited impacts on the existing terrestrial environment of the island. These include the vegetation, soil, and the groundwater of the island. The project is also expected to impact the livelihood of the beneficiaries and impact the existing society in many ways. Impact identification has been focused on the environment and socio-economic aspects. Impacts have also been identified for short and long term as well. It is only through identifying the likely impacts; the mitigation measures can be identified and implemented.

7.2 Method of Assessment

- 85 For detail impact analysis, environmental impact identification was made by a combination of matrices along with expert opinions and experiences from similar projects in the past. The environmental impacts were examined using an adaptation of the Leopold matrix method. The Leopold matrix (Leopold, 1971) implements a two-dimensional checklist, where the columns of the matrix contains the project's activities while the rows list the environmental receptors under the three main categories – Physical components, Biological components, and Socio-economic and Cultural components. This interaction matrix helps to identify impacts on individual factors of the three main categories of the impact. Furthermore, the sum of the magnitude from each impact activity and/or a certain environmental factor could be identified.
- 86 This method analyses three aspects of each action which may have an impact on the environment – Magnitude, Duration, and Probability.
- Probability – Likelihood of an impact to be produced from a said activity.
 - Duration – Defines the duration of which the environmental impacts would persist.
 - Magnitude – Defines the severity of the impact, for both positive and negative. A score is given from a scale of +10 to -10. +10 being major positive and -10 being major negative.

Table 10: Scale used to assess impact criteria

Evaluation criteria	Magnitude Score	Category
Probability	O	Impact is possible (Probability < 50%)
	M	Impact is likely (Probability >50%)
	X	Impact is certain (Probability = 100%)
Duration	T	The effects of the activity would not be identifiable within a few months of its completion.

	S	The effects of the activity would not be identifiable within months to a year of its completion.
	L	The effects of the activity would not be identifiable within multiple years of its completion.
	P	The effects of the activity will persists endlessly causing irreversible impacts.
Magnitude	9 & 10	Major Positive
	7 & 8	Moderate Positive
	5 & 6	Minor Positive
	-4 to 4	Negligible
	-5 & -6	Minor Negative
	-7 & -8	Moderate Negative
	-9 & -10	Major negative
Cumulative		Impacts that are cumulative

87 There is also uncertainty with the smooth continuation of this project. Minor or even major changes to the project's concept plan could alter the series of impacts. Major changes would require an additional EMP to be made.

7.3 Impact Boundary

88 Proposed project has components that will impact the environment of the project site. The physical impacts (such as direct habitat loss) will usually be felt within the project footprint and close proximity to project area. However, some impacts such as noise and impact on groundwater can be felt on a large area without proper mitigation measures. The indirect impact of a project can be observed from a larger area as well. For example, operation of ISWMC will help to keep the whole island clean improving the living condition. Also, other positive social impacts of ISWMC can be felt by the whole island in the long term.

7.4 Environmental Impacts Related to Location

89 The siting of the IWMC has been the identified by the island council and is subject both to approval from the Ministry of National Planning, Housing and Infrastructure and the national EIA process. The proposed site is distant from residential areas, but close to the shore and therefore containing leachate from stored waste and composting is important.

90 **Effects on the surrounding seawater and marine ecosystems.** The IWMC is to be located close to the shoreline. The risk of loss of waste or leachate IWMC will be mitigated by (i) ensuring that waste enters and leaves the IWMC on the landward side of the facility (ii) collecting and containing leachate at IWMC and (iii) that site security and management is ensured by the island council. The measures must ensure no deterioration of water quality in the vicinity of the IWMC.

91 **Effects on vegetation.** The area was sparsely vegetated with shrubs and no mature trees. As there are no mature trees in the surrounding area, no removal of trees will be undertaken.

92 **Surrounding land use.** The surrounding land is not inhabited though likely to be developed for recreational use. While improved management of the IWMC will reduce odour and attraction to pests such as rodents, the effect on existing land use can be mitigated by (i) ensuring security, regular cleaning operations and maintenance takes place and (ii) planning of further developments such that receptors such as dwellings are not placed close to the facility, and preferably separated by a belt of trees or open space.

93 **Impedance of traffic.** Due to low levels of traffic on Maafushi, the transport of waste to and from the facility is not expected to impede traffic.

94 **Loss of land and effects on property.** No private property will be affected and land acquisition will be required and there is therefore no impact.

7.5 Environmental Impacts Related to Construction

95 Impact during the construction phase include impacts that arise from site preparation, mobilization, and from the construction activities. Waste generated during the construction is also a potential impact generating activity especially if not properly disposed. Positive sociocultural impacts will be felt during the construction by means of employment and negative impacts could arise from temporary traffic during mobilization. The table below shows the impact assessment matrix for the construction phase of the project.

Table 11: Impact assessment matrix of the construction phase

		Construction phase				
		Probability	Duration	Magnitude	Direct or indirect	Cumulative
Physical components	Air quality	O	T	-2	Direct	Cumulative from different project activities and other projects that fall within the same construction period.
	Noise	O	T	-2	Direct	Similar to air quality.
	Groundwater	M	S	-5	Direct	Cumulative from different project activities
Biological components	Terrestrial environment	NA	NA	NA	NA	NA
	Protected / sensitive areas	NA	NA	NA	NA	NA
Socio-economic and cultural component	Health and safety of workforce	O	T	-5	Direct	Cumulative from different project activities
	Health and safety of staff	NA	NA	NA	NA	NA
	Employment	X	S	8	Direct	Cumulative from different project activities
	Visual amenity	M	S	-3	Direct	NA
	Living standard	O	L	6	Indirect	Cumulative from different project activities
Total impact magnitude				-3		

96 **Site preparation:** Proposed land plot in Maafushi is located on the east side of the island near the football field. Excavations to form foundations for structures will involve making temporary stockpiles of material that will either be removed or re-used. To prevent the release of silt into sea contractors will be required to ensure that (i) excavated areas are rapidly refilled on completion of works, (ii) to place silt fences around temporary piles of excavated material and (iii) avoid excavation in wet weather to the extent practicable.

97 **Construction method.** The methods to be used for site preparation, and construction, as well as associated arrangements to ensure sound environmental management and safety at all times, are to be defined by the Contractor in a Contractor's Environmental Management Plan submitted to the PMDSC for approval.

98 **Transportation of construction machinery and materials:** Transportation of machinery and materials implies movement traffic that will lead to possible negative impacts to the surrounding area (dust, spillage, emissions, and noise) as well as disruption to the existing traffic flow of the

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- island. Construction vehicle movements are not expected to impede traffic, as levels of traffic on the island are very low.
- 99 Improper storage of construction materials, especially gravel, sand, and cement, on the construction site could lead to inadvertent dispersal of materials during heavy rains or high winds. This could have a negative impact on the surrounding environment. As the proposed project sites are close to sea, there is a chance of lose materials dispersing to marine environment.
- 100 **Water pollution.** The use of vehicles and plant can cause risks of water pollution, in the event of leaks and spills of fuel, lubricants, hydraulic fluid or other fluids used for vehicle operation. To reduce risks and limit impacts the contractor will be required to ensure that vehicles and plant are maintained in sound operable condition, free of leaks and that the condition of vehicles and equipment is regularly checked. The contractor will prepare and submit a plan for spill management, including provision of spill kits, training/briefing of workers on procedures on handling spills and allocation of responsibility within the contractor's team for ensuring that spill kits are available and that workers know how to use them.
- 101 **Waste management:** Construction waste will include packaging of equipment, fuels, lubricants, materials, equipment and food and some rubble where existing structures need to be demolished. Some specialist lubricants and paint for marking may be hazardous. Contractors will be responsible for removing waste to Thilafushi. Approval from the PMDSC must be obtained prior to importing materials rated as hazardous under the Globally Harmonized System of Classification and Labelling of Chemicals.
- 102 **Noise pollution and vibration.** Construction operations, particularly excavations and compaction will cause noise and vibration, which will be potentially be a temporary use to some residents. To mitigate the impacts the contractors will be required to (i) identify households that are likely to be affected by noise and vibration (if any), (ii) provide information to these households on scheduled work (iii) limit construction activities to normal daylight working hours (iv) adhere to the planned work schedule and (iv) ensure that all construction equipment and vehicles are kept in good working order with working exhaust mufflers.
- 103 **Air and dust pollution.** Potential sources of air pollution are exhaust fumes from vehicles and plant, dust from transport of construction and waste materials and areas around work sites where soil and debris is deposited. The effect will be limited due to the largely open environment where dust and fumes will be rapidly dispersed by wind. However emissions will be mitigated by ensuring that vehicles and equipment to be well maintained and tuned and fitted with exhaust baffles.
- 104 **Community health and safety risks.** The use of plant and machinery, use of compressed air lines and cables and excavations are potentially hazardous but most work sites are within the transfer station areas where public access is restricted. The contractor will ensure that restrictions to access are enforced and provide notices to the public identifying hazards and, where warranted, erect safety barriers/covers around areas of open excavation. Personal protective equipment to be provided to the workforce, appropriate to each site. Given the COVID-19 related current health crisis in the Maldives, social impact may arise due to the workers who are coming from other islands with a community spread. With proper measures such impacts are avoidable.
- 105 **Socio-economic impacts:** Socio economic impacts of the project involves the positive and negative impacts that arise during the construction stage. Negative socio-economic related impacts may include traffic flow and during the transportation of construction materials. If such materials are piled on the harbour area for long term, it will be a nuisance to the harbour users. In case of this project, construction material will be very minimal and will be transported to site for storage since the site has lot of empty land space. Since the island does not have many vehicles, impact of traffic will be temporary and minute. However, impact could be cumulative and significant if multiple projects are taking place in the island at the same time.

7.6 Environmental Impacts Related to Operation

106 General. The IWMCs and management of them are intended specifically to address existing poor practices of open burning of waste and to ensure safe and efficient handling, collection of recyclables and shipment of waste to the RWMF at Thilafushi. Existing impacts that are addressed including smoke nuisance and health risk, damage to the habitat in the existing dump area, and reduced pest issues. The table below shows the impact assessment matrix for the operation phase of the project.

107 Table 12: Impact assessment matrix of the operation phase

		Operation phase				
		Probability	Duration	Magnitude	Direct or indirect	Cumulative
Physical components	Air quality	O	T	-2	Direct	Cumulative from different project activities and other projects that fall within the same construction period.
	Noise	O	T	-2	Direct	Similar to air quality.
	Groundwater	M	S	-3	Direct	Cumulative from different project activities
Biological components	Terrestrial environment	NA	NA	NA	NA	NA
	Protected / sensitive areas	NA	NA	NA	NA	NA
Socio-economic and cultural component	Health and safety of workforce	NA	NA	NA	NA	NA
	Health and safety of staff	O	T	-3	Direct	Cumulative from different project activities
	Employment	X	S	8	Direct	Cumulative from different project activities and from other projects undertaken in the island
	Visual amenity	M	S	-2	Direct	NA
	Living standard	O	L	8	Indirect	Cumulative from other projects undertaken in the island
Total impact magnitude				6		

108 Most of the impacts that are envisaged to arise during the operational phase of the project are expected to be mostly positive if all the mitigation measures highlighted in the report are followed. However, there are few negative impacts that could arise during the operational stage mostly due to improper operational practice.

109 **Use of containers.** While containers provide a more efficient system of handling and loading waste, reducing potential losses into the sea, any breakages or mishandling of containers will result in significant discharge of waste into the sea. Operation and maintenance training must provide for instruction on maintenance of containers, loaders, cranes and vessels and sound operation including licensing of vehicle and plant operators and restrictions on operation during stormy weather.

110 **Waste management:** Construction of ISWMC will provide a sufficient solution for the current waste management issues of the island. Waste management center has dedicated areas to

store the waste and dedicated areas to handle certain types of waste. This will improve the waste handling and management process of the island. The waste collected in the center will be packed and stored according to the guidelines provided by the authorities and hence spillage during transfer will be minimum. The project also aims to transfer waste from ISWMC to the regional waste management center in Thilafushi. Waste will not be stored in the ISWMC not more than a week after the start of the full operation of the Zone 3 waste management project. This will be a positive impact to the island waste management.

- 111 **Pests.** Although improvements will reduce access to them, the transfer stations will still be subject to pests such as birds and rodents. Numbers of these can be kept down by improved operation regimes, including site hygiene and regular cleaning of surfaces.
- 112 **Occupational health and safety.** Potential hazards to workers arise from the handling of compost, when workers can breathe micro-organisms that cause respiratory and other disorders, and accidents associated with the operation of collection trucks and loading containers into the vessels that take the waste to the RWMF at Thilafushi. Risks are mitigated by training in handling of compost and of machinery, and sound supervision and management of operation of the facilities.

7.7 Global, Transboundary and Cumulative Impacts

- 113 IWMCs are to be established, where they do not exist or are not operational, on each inhabited island in zone 3 under the project and also elsewhere in the country. Operation of the IWMC and efficient removal of waste to the RWMF will reduce risks to the island and marine environment. Effective institution of sound management of the IWMCs and of waste collection and handling will provide a demonstration of good practice, of value to island councils and workers on other islands who need to develop capacities for improved waste management.
- 114 Capacity building for the island council will assist in the build-up of capabilities required to further improve and manage waste management facilities throughout the Maldives.

8 Analysis of Alternatives

8.1 Alternatives for the IWMC

- 115 As stated in section 0, there is an existing but a dumpsite on the island. The alternative of rehabilitating and extending this area and putting it back into operation has not been pursued, as the site requires the removal of the existing waste dump at the site which is not part of this project..

8.2 Alternatives within the Project Scope

- 116 Improvements to waste management on Maafushi envisages the use of containers, to receive waste from truck and transfer it to vessels. An alternative to this is an “open” system where trucks are offloaded mechanically, or they tip the waste to a central area or directly onto awaiting vessels. The use of containers however provides a much higher level of control, and greatly limits the risk of waste being lost to the sea during the offloading and loading processes.

8.3 The no project alternative

- 117 Under the “no project” scenario, the existing practice of open incineration of household waste will continue, even as volumes of waste generation grow with population and economic growth. It is unlikely that composting will be done on a community scale, foregoing the opportunity to reduce the volume of plant waste that can be composted and re-used. While the island council has made moves and/or expressed intention to raise public awareness on waste reduction and separation, the opportunity to support the council as well as schools and the wider community through the ICT component will also be foregone.

9 Information Disclosure, Consultation and Participation

9.1 Consultations and information disclosure during design

118 Consultations took place between the consultants, a representative of ME and representatives of the island council and stakeholders on the island during a visit on 5th December 2019 and 21st January 2021. These consultations enabled the consultants and ME to understand the intentions and existing actions of the island council to improve waste management on the island and to gauge capacity development needs.

119 Below is a summary of the points discussed in the meeting.

- Currently waste is burned in the dumping site. Dump site is located east side of the island. Therefore, during burning smoke comes into the island especially if wind is from east direction.
- Residents and tourists visiting the island complain about the smoke.
- There is an incinerator installed in the island. This is not yet operational because council has no proper machinery to feed waste into it. This has been informed to the Ministry.
- Council manages island waste by using 5 staffs. 3 of them works in collection and they collect from households and collection points and transfer them to the waste dump site. A monthly fee is taken. 2 of the staff looks after the dump site.
- Council hopes that the proposed IWMC will end the current waste burning practices. Also, they want to regularly transfer waste to Thilafushi to make sure the ISWMC is not filled with waste that they cannot dispose without burning.

9.2 Further Information Disclosure and Public Consultation

120 This report and a Dhivehi translation of the executive summary will be provided to commune officials for public disclosure. Stakeholders will be kept informed of construction activities that are likely to cause noise and dust nuisance and will be made aware of the grievance redress mechanism and consultations will take place regularly to gain feedback and ensure that impacts are being adequately managed.

10 Grievance Redress Mechanism

121 To ensure consultation, disclosure, and community engagement continues throughout project implementation, a grievance redress mechanism will be established based on existing mechanism. The grievance redress mechanism will allow for concerns and grievances about the waste management projects' social and environmental performance raised by individuals or groups and to facilitate resolution of those concerns and grievances. The Grievance Redress Mechanism includes 3 tiers. Every effort shall be given to find an amicable solution before higher tiers could be engaged. To facilitate such, following would be done by Ministry of Environment.

122 A register of grievances should be maintained at Island Council and Ministry of Environment.

First Tier (Island Council)

123 An individual or an interest group can contact Island Council for grievances.

- At the project location there will be an Information Board listing the names and contact telephones/emails.
- If the grievance cannot be resolved informally by contacting Island Council on (960) 6640073, or an aggrieved party must submit a complaint on the Tier I by sending an email to info@maafushi.gov.mv
- If the complaint is resolved within 15 days Island Council must communicate the decision to the aggrieved party in writing.
- If a complaint requires more time to address, this requirement must be communicated to the aggrieved party in writing and the aggrieved party must consent and sign-off the request for the extension to take effect. An extension can be made to an additional 15 days.
- A copy of the form should be provided to the aggrieved party as evidence of receipt. The complaint form should be available from the Island Council.

Second Tier (Ministry of Environment)

124 If the grievance cannot be resolved through Tier 1, an aggrieved party must submit a complaint on the Tier 2 to Ministry of Environment.

- An aggrieved party must contact Ministry of Environment on (960) 3018300 sending a mail to secretariat@environment.gov.mv.
- The complaint will be screened to determine if it is related to the project.
- If Ministry finds that the complaint is not related, the aggrieved party must be notified in writing with a way forwarded including the necessary government institutions to follow up with
- If the Ministry of Environment finds the complaint is related, Ministry to start the Second-Tier process.
- A written notification by Ministry of Environment will be provided to the aggrieved party if a solution is reached within working 15 days.
- An acknowledgment of the receipt of the decision of Ministry of Environment in acceptance or denial of the decision Ministry of Environment must be provided by the aggrieved party within 10 days. If no acknowledgement is submitted from the aggrieved party, then the decision will be considered as accepted.
- If a satisfactory solution was not reached through the Tier II process, the aggrieved party may notify Ministry of Environment, in writing of the intention to move to Tier III.

Third Tier (Judiciary)

- An individual or an interest group has the option of going to established judiciary system of the Maldives.
- The legal system is accessible to all aggrieved persons.
- Assistance from the Ministry of Environment would be available only for vulnerable person as per this grievance redress mechanism.
- In cases where vulnerable person(s) are unable to access the legal system, the Attorney General's office will provide legal support to the vulnerable person(s).
- The verdict of the Courts will be final.
- A vulnerable person(s) for the purpose of this project is a person who is poor, physically or mentally disabled/handicapped, destitute, and disadvantaged for ethnic or social reasons, an orphan, a widow, a person above sixty-five years of age, or a woman heading a household.

11 Environmental Management Plan

11.1 Objectives

- 125 This EMP sets out the needs for environmental management of transfer station improvements within the GMEIWMP in terms of institutional responsibilities to ensure mitigation and monitoring takes place during the pre-construction, construction and operation phases, meeting the requirements of the Government of the Maldives and the ADB's SPS.
- 126 A copy of the EMP must be kept on work sites at all times. This EMP will be included in the bid documents and will be further reviewed and updated during implementation. The EMP will be made binding on all contractors operating on the site and will be included in the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance.
- 127 For civil works, the contractor will be required to (i) establish an operational system for managing environmental impacts (ii) carry out all of the monitoring and mitigation measures set forth in the EMP; and (iii) implement any corrective or preventative actions set out in safeguards monitoring reports that the employer will prepare from time to time to monitor implementation of this IEE and EMP. The contractor shall allocate a budget for compliance with these EMP measures, requirements and actions.

11.2 Institutional Responsibilities

- 128 The planning, design and construction of IWMCs is set through a process that covers data collection, consultations, involvement of the island council, approvals, EIA preparation, design and tender. A flow diagram for this process is given in Figure 17. This IEE will be updated to reflect the findings of the EIA carried out as part of this process, and also detailed design.

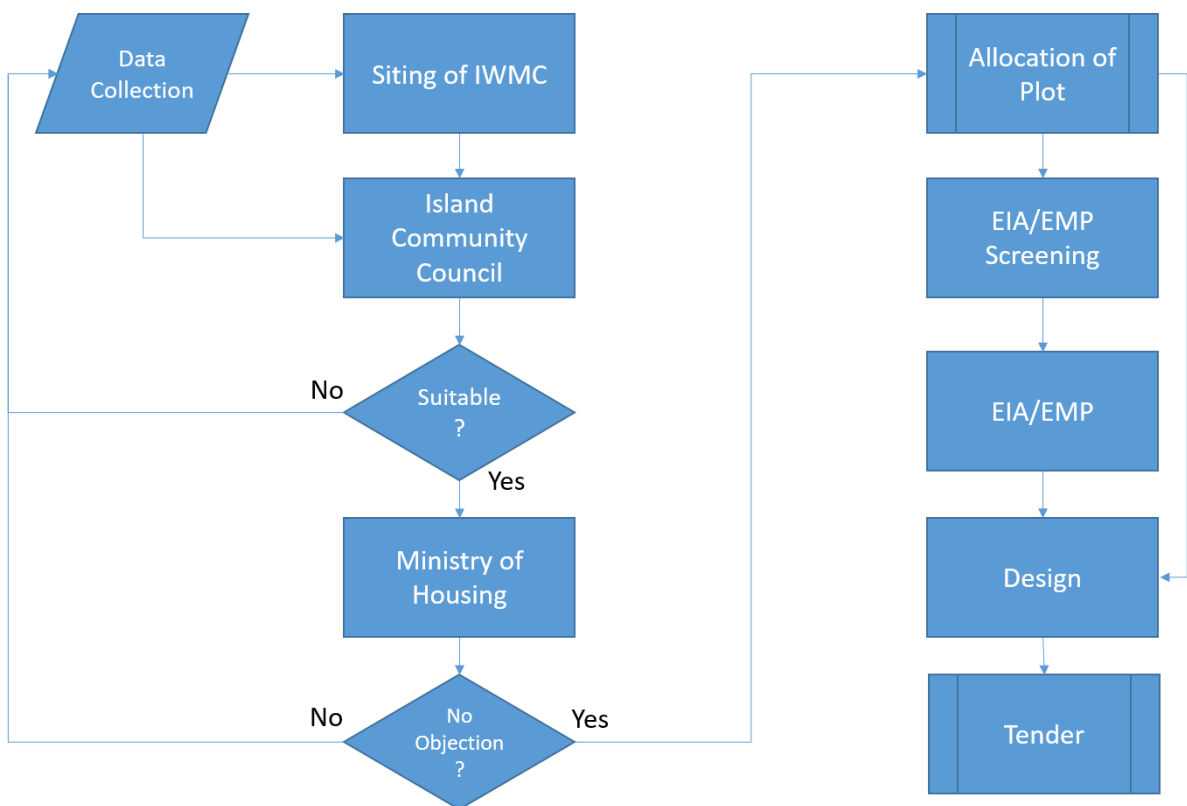


Figure 17: IWMC planning process

SOURCE: MEE

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- 129 The Executing Agency for the Greater Malé Environment Improvement and Waste Management Project (GMEIWMP) is the Ministry of Finance and Treasury (MOFT) and the implementing agency is the MEE. Project Management, Design and Supervision Consultants (PMDSC) will have responsibility for overseeing project management. EMP implementation will be the responsibility of the island council, with support from the PMDSC.

11.2.1 Capacities for Environmental Management

- 130 The regulatory body responsible for approving environmental impact assessments and issuing of permits is the responsibility of the Environmental Protection Agency (EPA), which has further responsibility for environmental research and conservation and development of facilities for waste, water supply and sanitation. This body is under the Ministry of Environment but funded and administered separately.
- 131 The EPA has few trained technical staff and the agency relies on external consultants for functions such as environmental monitoring for projects. The EPA clearly does not have resources for regular support to island councils and monitoring of their effectiveness in ensuring EMP implementation. The EPA will be reliant on the support of the PMDSC for overseeing EMP implementation.

11.3 Impacts and Mitigation

- 132 Table 13 summarizes the potential impacts and mitigation measures in relation to location, construction and operation identified in the report.

Table 13: Environmental Management Plan

Impacts	Location	Mitigation Measures	Source of Funds	Responsibility for Implementation	Responsibility for Supervision
Pre-Construction Stage					
Effects on surrounding seawater and marine ecosystems	Sea surrounding the IWMC	(i) ensuring that waste enters and leaves the IWMC on the landward side of the facility (ii) detailed design to include both a system for collecting and containing leachate from piled household waste awaiting collection and from composting and (iii) site security and management to be ensured by the island council. The measures must ensure no deterioration of water quality in the vicinity of the IWMC.	Project funds	Island council	ME
Odor and attraction to pests	Nearest residential area	(i) ensuring security, regular cleaning operations and maintenance takes place and (ii) planning of further developments of the reclaimed land such that receptors such as dwellings are not placed close to the facility, and preferably separated by a belt of trees or open space.	Island council	Island council	ME
Construction stage impacts					
Noise pollution and vibration	Nearest residential area	Identifying potentially affected households, providing information on operations, limiting construction activities to daylight hours, adhering to schedule, maintenance of construction equipment and vehicles in good operable order.	Construction Cost	Contractor	PMDSC
Construction waste	IWMC area	All solid waste must be disposed of at the RWEMF/Thilafushi. Importation of any materials rated as hazardous under the Globally Harmonized System of Classification and Labelling of Chemicals to be subject to approval by PMDSC, which will be conditional on stating adequate arrangements for disposal. Prohibit burning of construction and/or domestic waste. Conduct site clearance and restoration to original condition after the completion of construction works.	Construction Cost	Contractor	PMDSC
Release of silt	IWMC construction site	Excavated areas to be rapidly refilled on completion of works. Use of silt fences around temporary piles of excavated material. Avoid excavation in wet weather to the extent practicable.	Construction Cost	Contractor	PMDSC

Impacts	Location	Mitigation Measures	Source of Funds	Responsibility for Implementation	Responsibility for Supervision
Water pollution	IWMC construction site	Vehicles and plant are to be maintained in sound operable condition, free of leaks. The condition of vehicles and equipment will be periodically checked. Contractor to prepare and submit a plan for spill management, including provision of spill kits, training/briefing of workers on procedures on handling spills and allocation of responsibility within the contractor's team for ensuring that spill kits are available and that workers know how to use them.	Construction Cost	Contractor	PMDSC
Community health and safety hazards	IWMC construction site and immediate surrounds	Restriction of access to work site, warning notices to the public on hazards, barriers when warranted. If the workforce is sourced from an island with COVID-19 community spread, the workers must be tested negative for COVID-19 before the start of the construction work.	Construction Cost	Contractor	PMDSC
Occupational health and safety hazards	IWMC construction site	Contractor to focal point for health and safety at site and to ensure regular briefing of construction workforce on health and safety issues. Adequate personal protective equipment to be provided to the workforce.	Construction Cost	Contractor	PMDSC
Impacts During Operation					
Risks of loss of containers and contents	Dock area	O&M training to include instruction on maintenance of containers, loaders, cranes and vessels and sound operation including licensing of vehicle and plant operators and restrictions on operation during stormy weather	Training budget	Contractor	ME
Pests: Rodents and birds	IWMC area	Maintenance of site cleanliness, minimizing storage time for putrescible waste, provision of enclosures for putrescible waste.	Operation Cost	Island council	ME
Operator occupational health and safety	IWMC and dock area	Operators trained to recognize risks and hazards. Personal safety equipment issued and worn. Health and safety recognized as primary employer responsibility.	Operation Cost	Island council	ME

11.4 Environmental Monitoring

11.4.1 Monitoring Plan

- 133 The design of the environmental monitoring system is based on an analysis of the key environmental performance issues associated with each stage of the project, set out in Table 14 below.

Table 14: Analysis of Environmental Monitoring Needs

Phase	Key Environmental Performance Issues	Environmental Performance Indicator	Means of Monitoring
Design/Preconstruction	Inclusion of mitigation measures in design/build and/or detailed design documentation and construction activities	Compliance with EMP design measures	Compliance monitoring
Construction	Adherence to provisions in the EMP to mitigate construction impacts	Compliance with EMP	Compliance monitoring
	Direct effects on communities from impacts such as accidental damage, dust generation, noise generation and safety	Views and opinions of communities	Community feedback Grievance redress mechanism
Operation	Effectiveness of IWMC, collection system and removal to RWMF	Cessation of practice of burning of waste, regular removal to RWMF, limited odor, effective pest control	Site observations Community feedback

- 134 Two areas of environmental monitoring are identified: compliance monitoring and community feedback, which are in addition to monitoring measures in the Design and Monitoring Framework for the project. These provide a means of gauging whether the stations operate more efficiently and with less loss of waste into the sea.
- 135 Compliance monitoring is required during detailed design and construction of the IWMC, to ensure that mitigation specified in the EMP is carried out to an adequate standard. Compliance monitoring is a function of the PMDSC and its cost of this monitoring is part of the running cost of the PMDSC.
- 136 Community feedback provides for the monitoring of environmental indicators gauged by public perception. Appropriate indicators are:
- Reduced incidence of nuisance of smoke from burning waste
 - Clean area surrounding the IWMC
 - Effectiveness of waste handling (regular collection and removal to RWMF)
- 137 Costs of environmental assessment and monitoring during construction are project costs. Environmental monitoring during operation is carried out by the island council, and costs will be met from O&M budgets prepared and managed by the island council.

Table 15: Environmental Monitoring Plan

Impact to be Monitored	Means of Monitoring	Construction Phase			Operation Phase		
		Freq- uency	Responsible Agency	Indicative Annual Cost	Freq- uency	Respon- sible Agency	Indicative Annual Cost
General Construct- ion Impacts	Comm- unity Feed- back	To be estab- lished by PMDSC	PMDSC	Included in project management and consultancy cost	To be estab- lished by PMDSC	Island Council	Operat- ional Cost
Com- pliance with EMP	Inspections	As set up by super- vising engin- eers	PMDSC	Included in project management and consultancy cost	To be estab- lished by PMDSC	Island Council	Operat- ional Cost
Occurr- ence of floating waste	Comm- unity Feed- back	To be estab- lished by PMDSC	PMDSC	To be determined in design ICT component of Project 1	To be estab- lished by PMDSC	Island Council	Operat- ional Cost

11.4.2 Reporting

- 138 EMP compliance monitoring will be undertaken by the PMDSC. Effects will be monitored by means of community feedback and laboratory testing.
- 139 A detailed environmental monitoring report is required to be compiled and submitted to the EPA based on the data collected for the monitoring the parameters included in the monitoring plan given in the EMP. To facilitate monitoring and enable responses to emerging issues, quarterly reports will be prepared by the PMDSC.

12 Recommendation and Conclusion

- 140 Developing an island waste management center in Maafushi is essential to improve the current waste management practices in the island. Developing an ISWMC and adopting the practices highlighted in this report will help to alleviate the current waste related environmental pollution and public health issues of the island. Managing an ISMWC will also induce economic benefits as it will generate employment opportunities in the island.
- 141 This EMP is prepared in accordance with the EIA Regulations of 2012 from EPA. Since the proposed site for ISWMC in Maafushi is an area used by the island community to dump waste, and with no vegetation removal required, impact of it on the island terrestrial environment will be very minimal. Most of the negative impacts of the project can be avoided or minimized if the mitigation measures provided in the report are adhered.
- 142 The overall finding of the EMP is that the Project will result in significant environmental benefits, as it is conceived and designed to address environmental issues associated with existing practices of poor waste disposal including open burning of household and food waste. It will not have significant adverse environmental impacts and potential adverse impacts are manageable through the effective implementation of the EMP.
- 143 No further environmental assessment is therefore required, beyond the issues to be reviewed during detailed design however this EMP must be updated to reflect the EIA process to be undertaken as part of the ME supported IWMC Implementation.
- 144 It is recommended to include this EMP report in the contract of the construction and operation contractors. This will bind the contractor with an agreement to implement the mitigation measures provided in the report and to conduct the monitoring highlighted in the report.

13 References

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Annex 1: EIA Screening Decision from EPA



Screening Institution: **Environmental Protection Agency of Maldives**

Date of issue: **17th January 2021**
Date of Expiry: **17th January 2022**

Name: **Mr. Ibrahim Naeem**
Designation: **Director General**

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2021 ޖަނުއަރީ 17: ޖަނުއަރީ 2022
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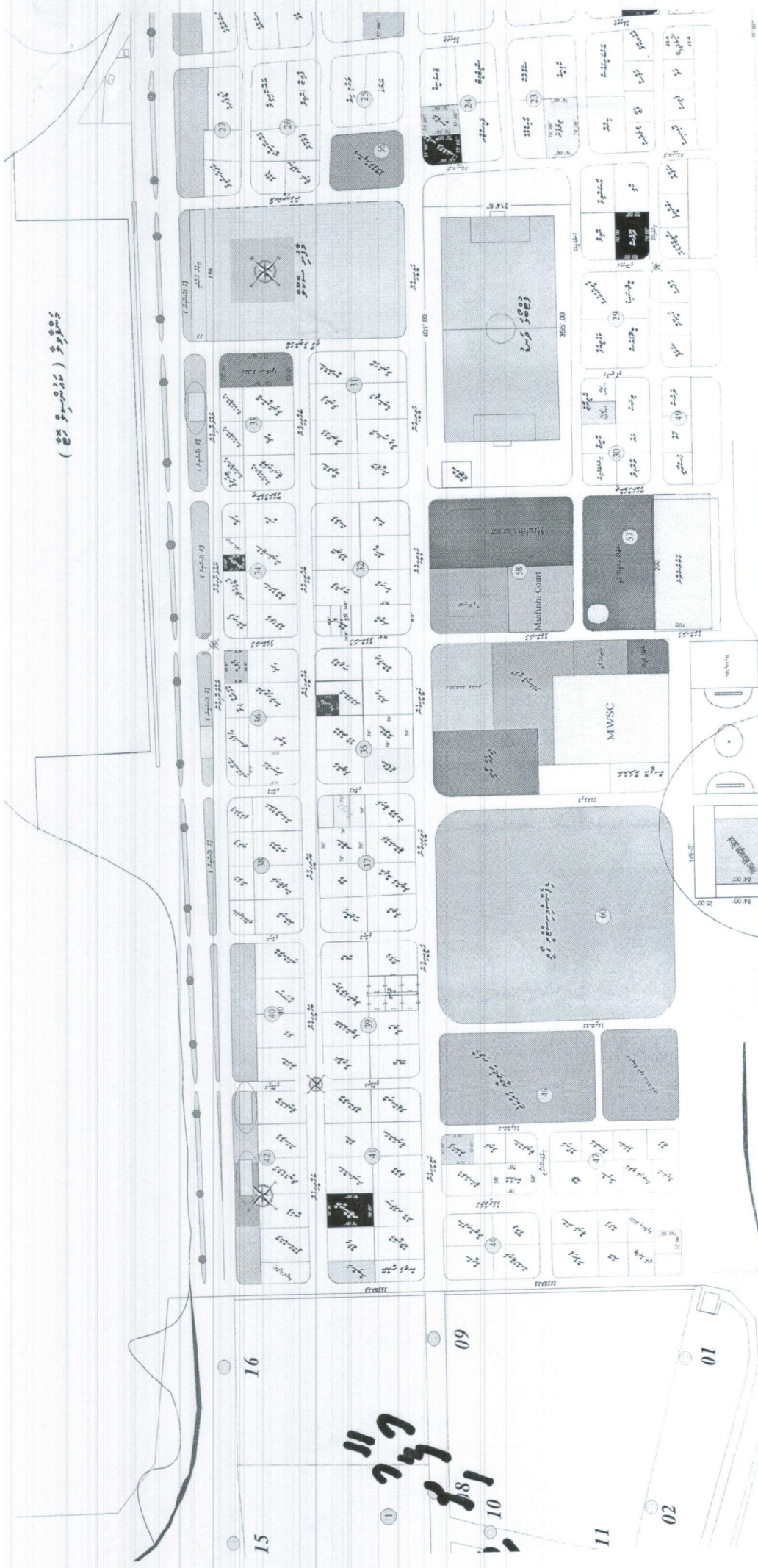
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Signature:

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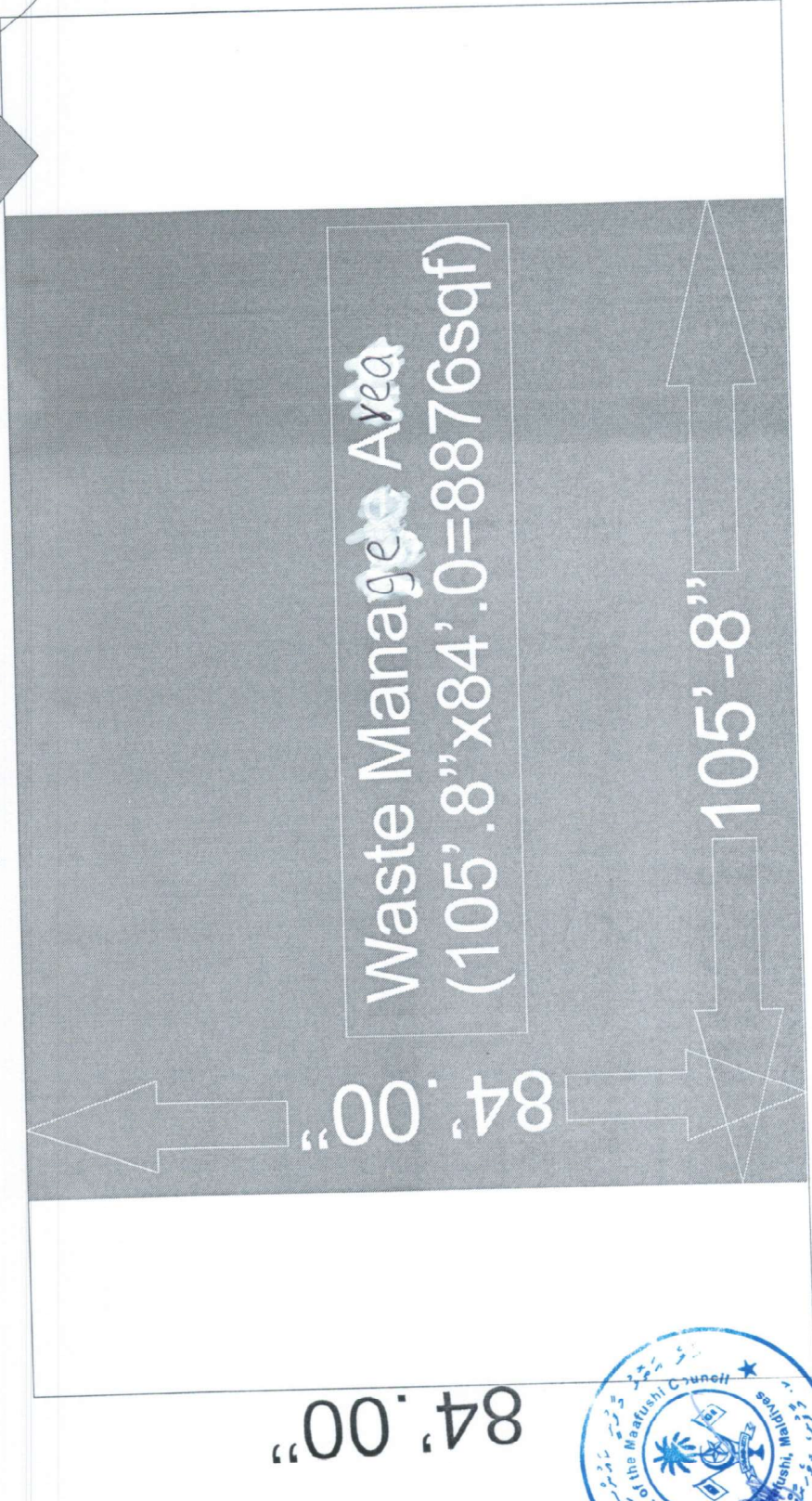
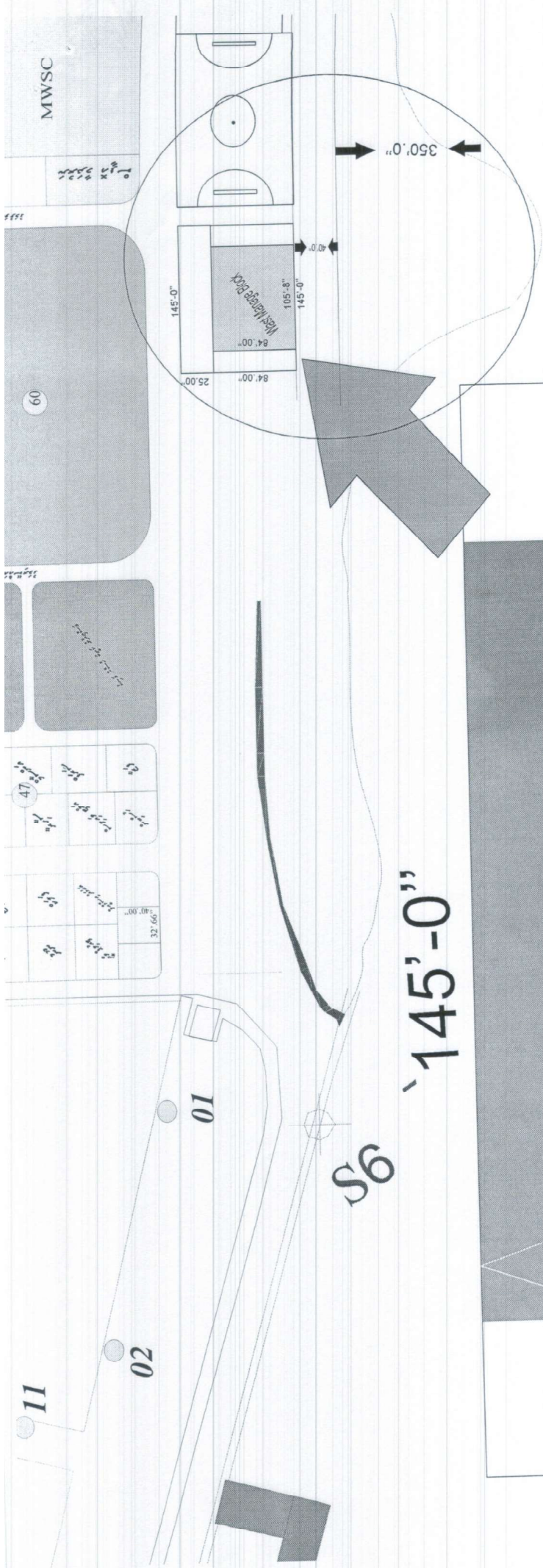
Annex 2: Approved Location for IWMC



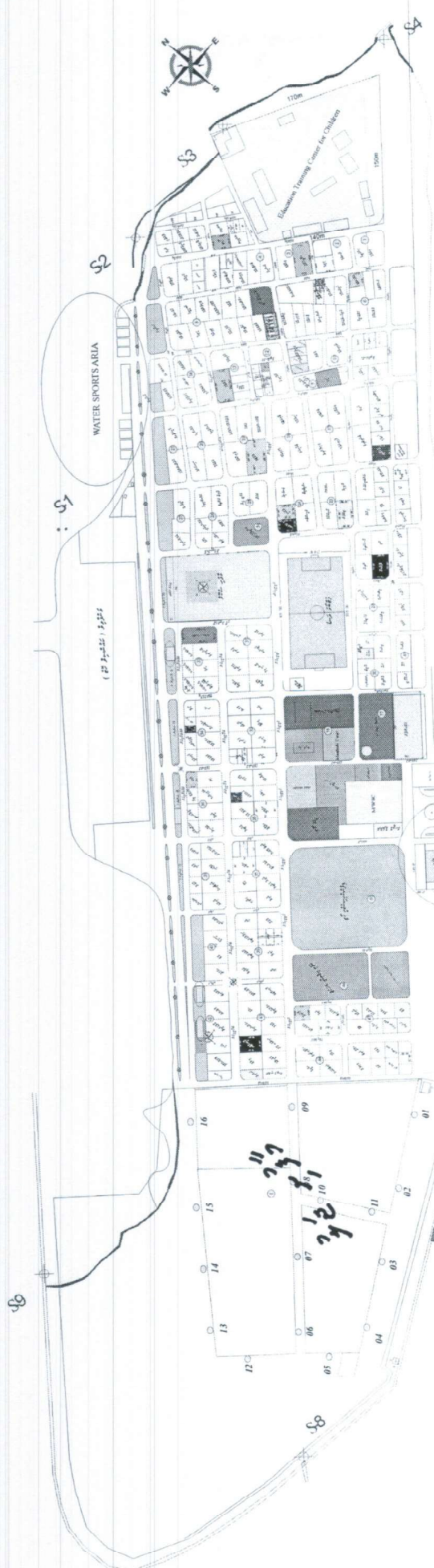
Male Atoll Maafushi (H12)

Handwritten notes: 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100





84'.00"



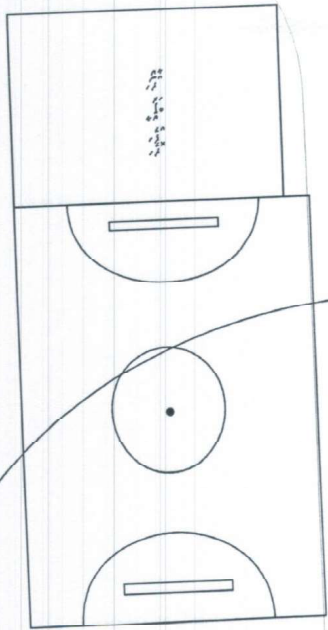
Male Atoll, Maafushi (HI 2)



N

100

MWSC



350'.0"

40'.0"

145'-0"

84'.00"

105'-8"

145'-0"

84'.00"

25.00"

60



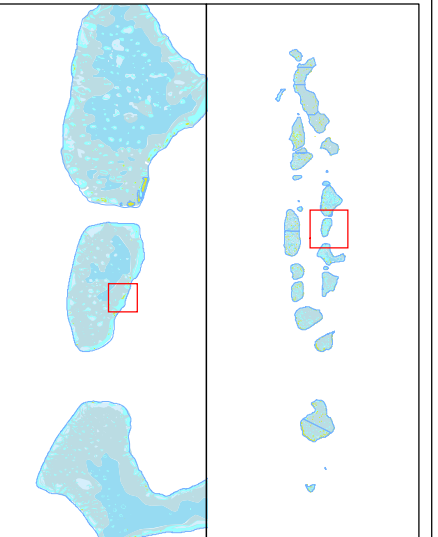
Annex 3: Site Location



K. Maafushi

Legend

 ISWMC LandPlot



Geodetic Parameters
 Coordinate Systems : UTM Zone: 43 North
 Projection : Transverse Mercator (TM)
 Datum : WGS 1984

Scale: 1:1,678

Map Title: **IWMC Location Map**

Project: PMSDC Zone III Waste Project

Client: ME

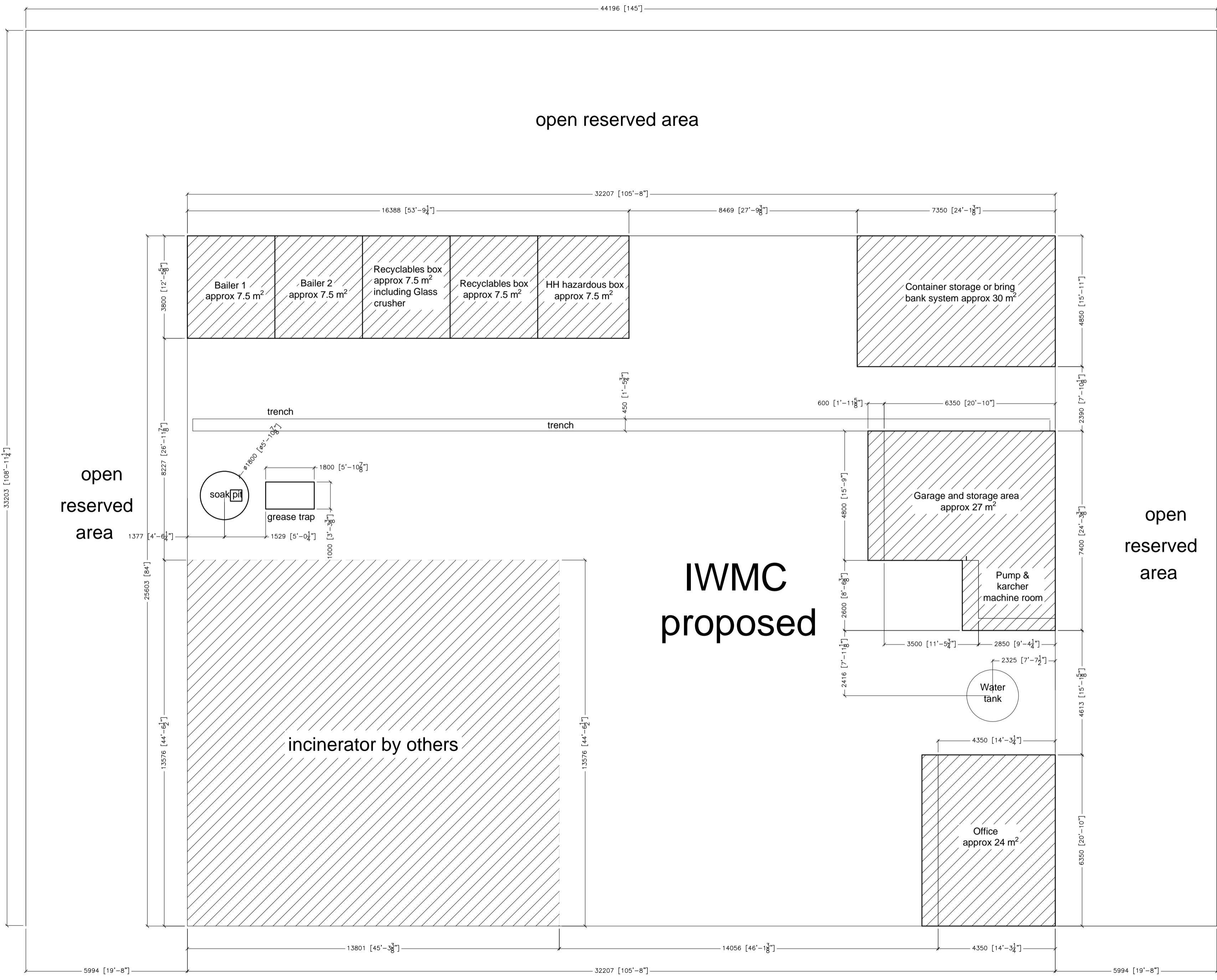
Consultant:
 **Water Solutions Pvt Ltd**
4th Floor, M. Niyadthurumaage, Alimas Magu, Male', Maldives
 Tel: +(960)3341643, Fax: +(960)331643
 www.water-solutions.biz

Map Number : -

Purpose : **EIA**



Annex 4: Approved Concept Plan

X:\Ongoing\PHSDC Zone III waste project\Kocks Structure\213-98616 PHSDC\Design\ISWMC\Detailed design\Male Atoll\Maafushi\MAAFUSHI detailed design.dwg_A2_Site Plan

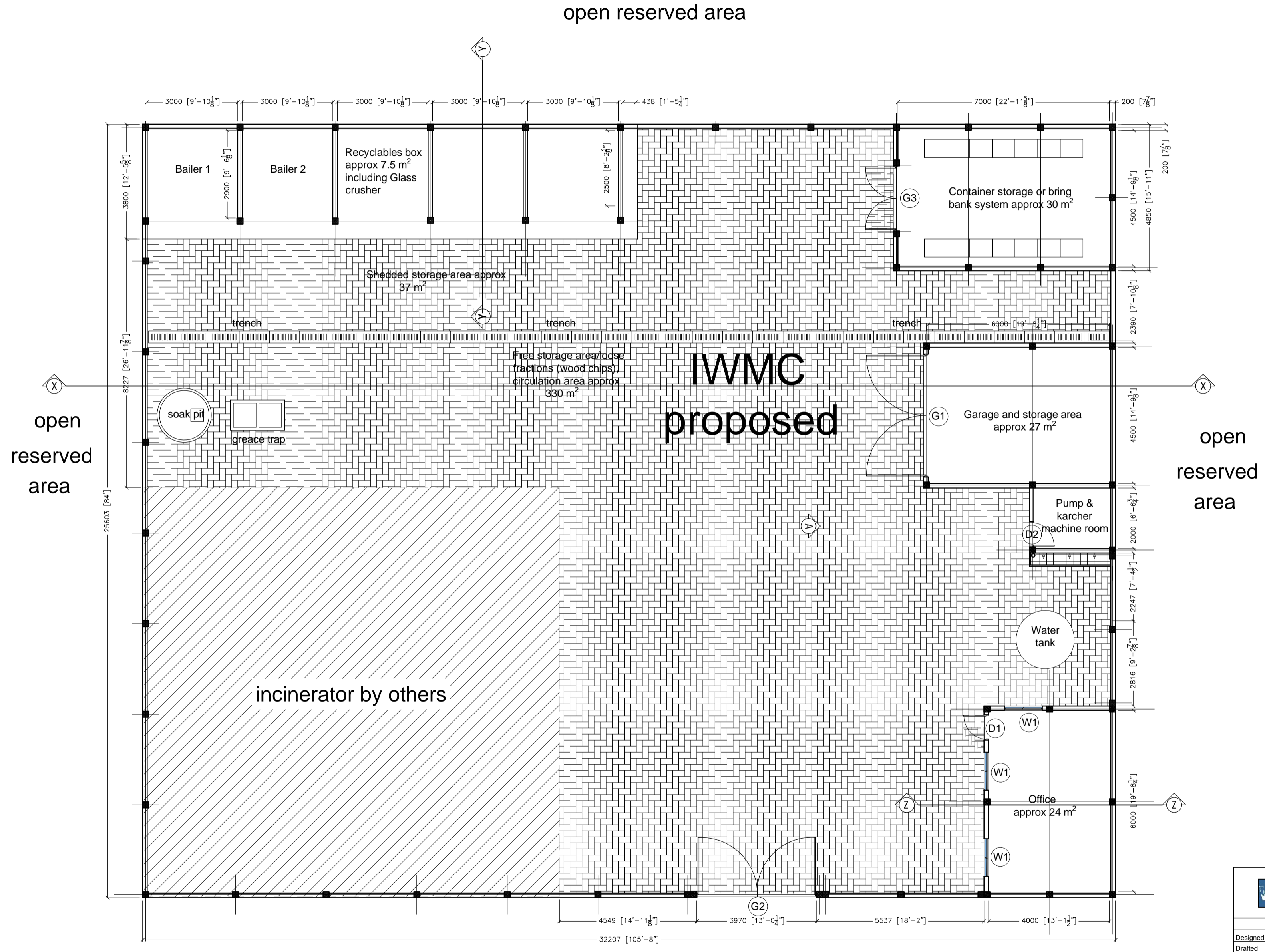


SITE PLAN




SCALE: 1: 100

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Name		Date		Name		Date	
Designed: Fayaz		Dec 2020		Name		Date	
Drafted: Nazim		Dec 2020		Name		Date	
Checked: Kasdarli		Dec 2020		Name		Date	
Project No. 213 - 68524				Name		Date	
Client Ministry of Environment and Energy							
Project Title Consultancy Services for Feasibility Study for an Integrated Solid Waste Management System for Zone III (including Greater Male') and Preparation of Engineering Design of the Regional Waste Management Facility at Thilafushi							
Design phase Detailed Design - Maafushi ISWMC							
Contents Site Plan							
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Drawing No. 1.1.1		Paper		A2			

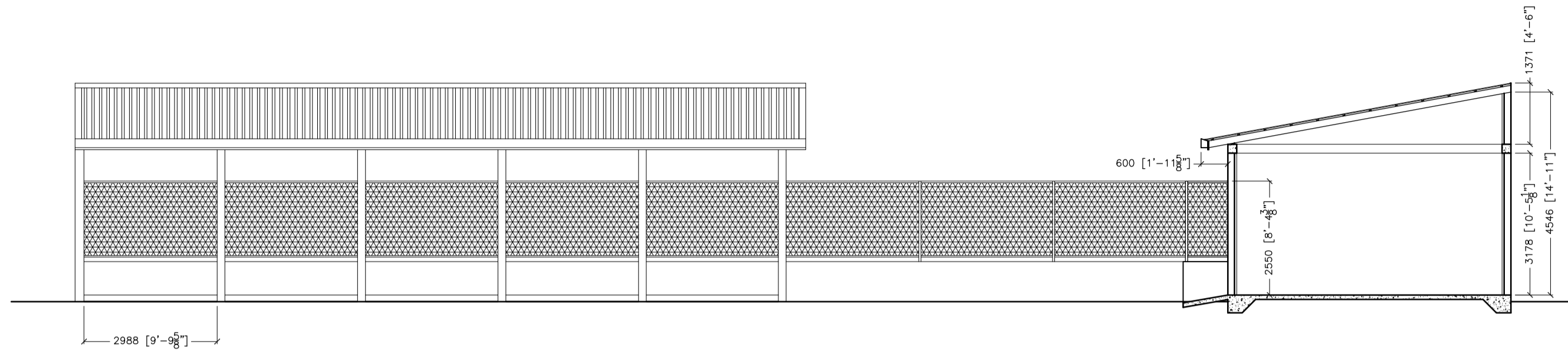
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GROUND FLOOR PLAN
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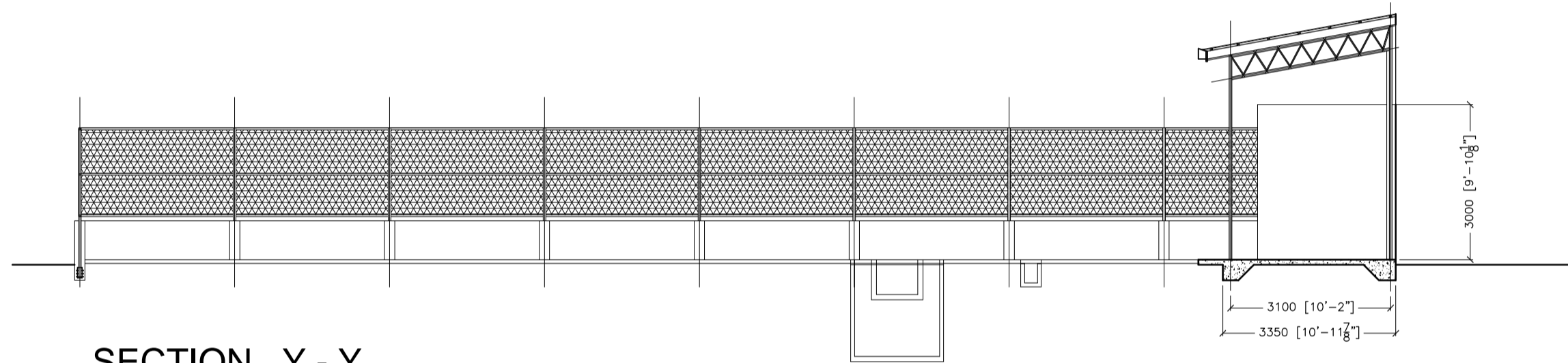
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Drafted: Nazim	Dec 2020										
Checked: Kasdarli	Dec 2020										
Project No. 213 - 68524											
Client: Ministry of Environment and Energy 											
Project Title: Consultancy Services for Feasibility Study for an Integrated Solid Waste Management System for Zone III (including Greater Male) and Preparation of Engineering Design of the Regional Waste Management Facility at Thilafushi											
Design phase: Detailed Design - Maafushi ISWMC											
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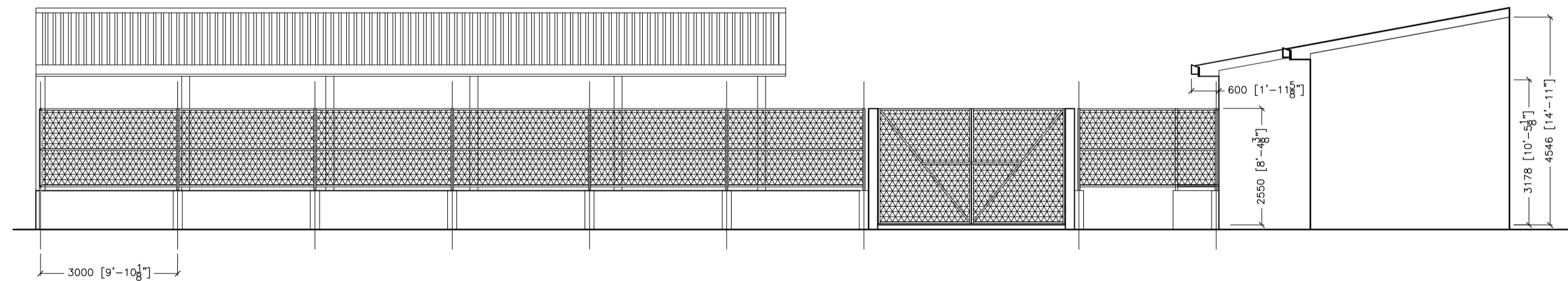
SECTION X - X

SCALE: 1: 100






SECTION Y - Y

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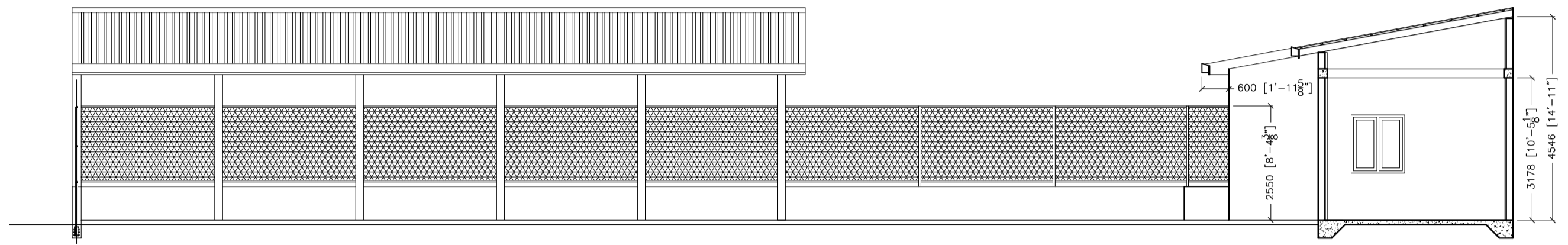


ELEVATION - B

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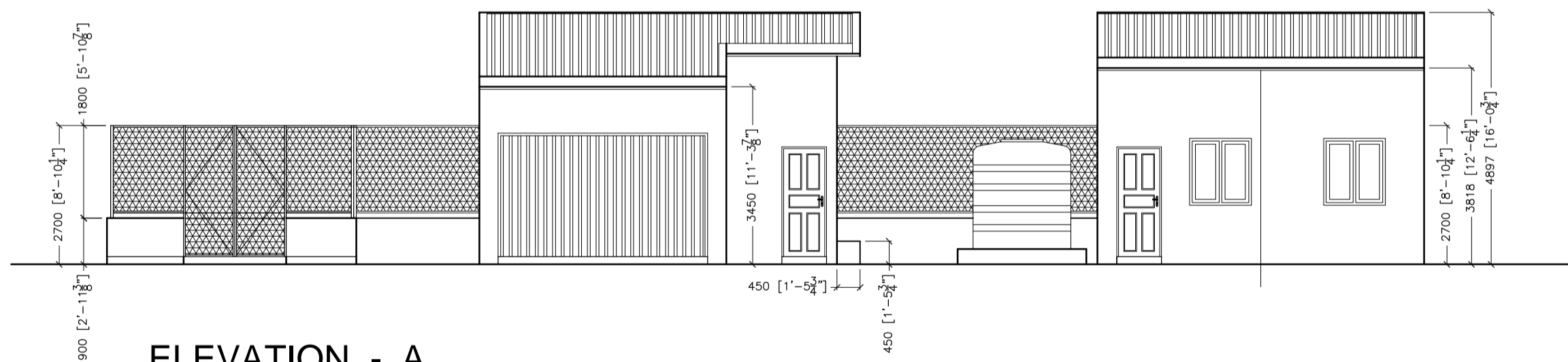
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SECTION Z - Z

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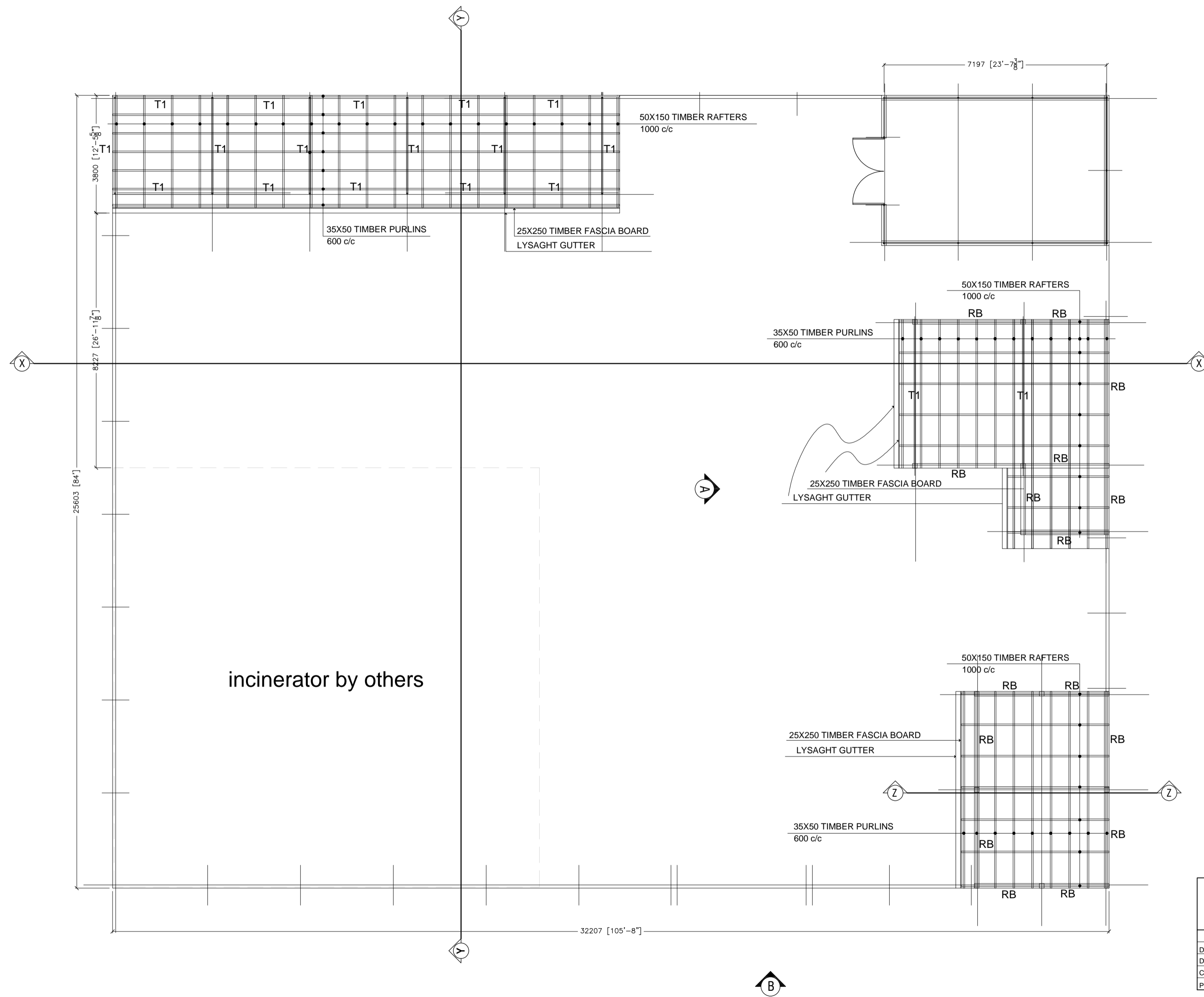


ELEVATION - A

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Drafted: Nazim	Dec 2020										
Checked: Kasdarli	Dec 2020										
Project No. 213 - 68524											
Client: Ministry of Environment and Energy 											
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Design phase	Detailed Design - Maafushi ISWMC										
Contents	Elevation and Section 2										
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Drawing No.	1.1.4	Paper	A2								


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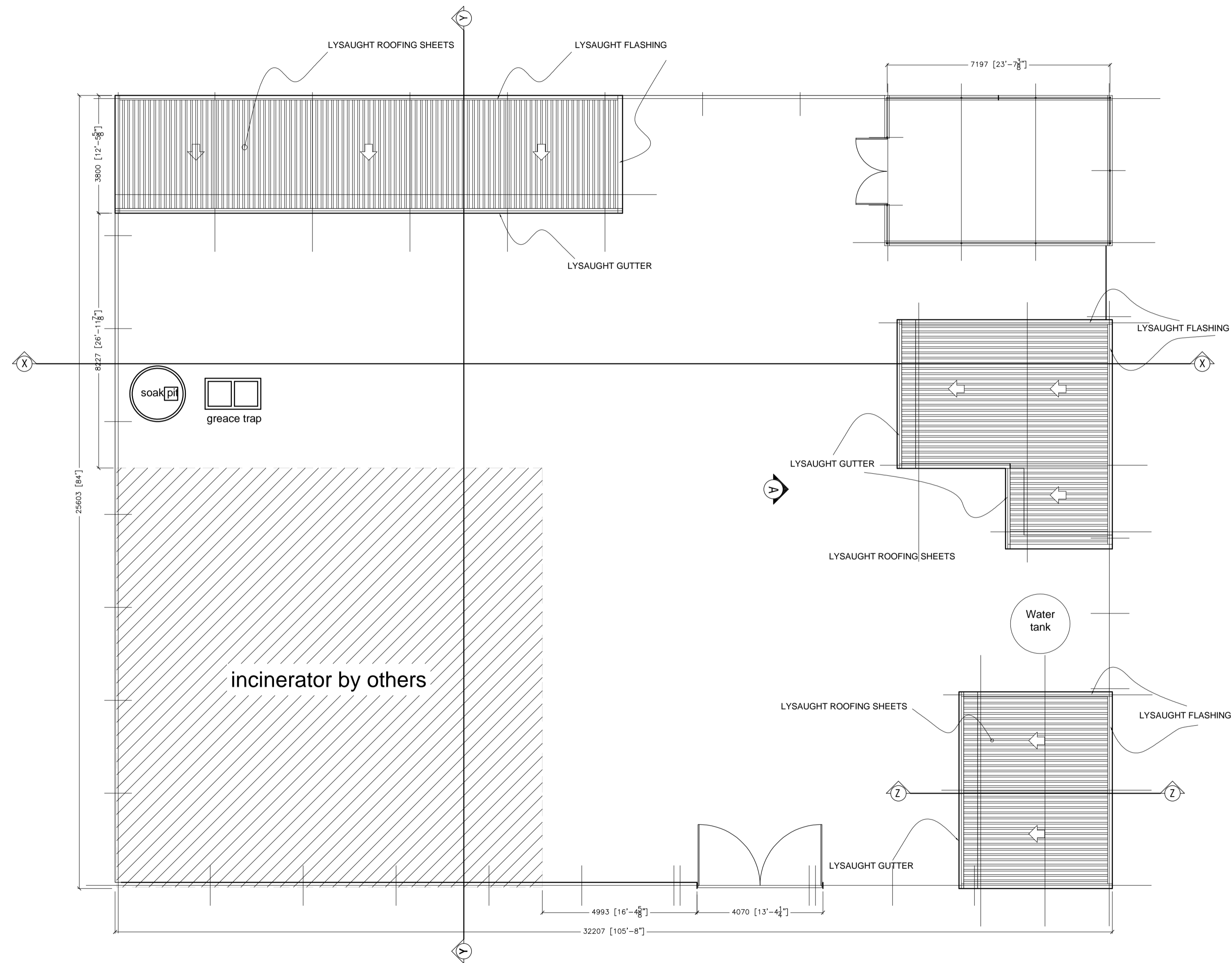
ROOF TRUSS & ROOF FRAMING PLAN

SCALE: 1: 100

	Water Solutions Pvt Ltd 1st Floor, Ma.Fay an, Amenee Magu, Male' 20205, Republic of Maldives Tel: +960 334 1643 / +960 330 1643 Fax: +960 333 1643 Email: info@water-solutions.biz		Kocks Consult GmbH Stegemannstr. 32 - 36 D-56058 Koblentz Tel: +49 261 1302-0 Fax: +49 261 1302-400 Email: info@kocks-ing.de
	Name Designed: Fayaz Drafted: Nazim Checked: Kasdarli Project No.: 213 - 68524		Date Dec 2020 Dec 2020 Dec 2020

Client	Ministry of Environment and Energy 		
Project Title	Consultancy Services for Feasibility Study for an Integrated Solid Waste Management System for Zone III (including Greater Male') and Preparation of Engineering Design of the Regional Waste Management Facility at Thilafushi		
Design phase	Detailed Design - Maafushi ISWMC		
Contents	Roof Structure Plan		
Scale	1 : 100		
Drawing No.	1.2.1	Paper	A2

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ROOF PLAN

SCALE: 1:100

	Water Solutions Pvt Ltd 1st Floor, Ma. Fay an, Ameenee Magu, Male' 20205, Republic of Maldives Tel: +960 334 1643 / +960 330 1643 Fax: +960 333 1643 Email: info@water-solutions.biz		Kocks Consult GmbH Stegenmannstr. 32 - 36 D-56058 Koblenz Tel: +49 261 1302-0 Fax: +49 261 1302-400 Email: info@kocks-ing.de								
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Design phase: Detailed Design - Maafushi ISWMC											
Contents: Roof Plan											
Scale: 1:100											
Drawing No. 1.2.2		Paper A2									

Annex 5: Stakeholder Attendance



Project: PMDCSC – Island Waste Management Center Survey – K. Maafushi

Date: 6th December 2019

Meeting Attendance Form

	Name	Designation	Office	Contact No.	Email	Signature
1	Usman Rasheed	President	Maafushi Island Council	9805088	k.maafushi@office@icmaail.com	
2	Nasheedha Adan	Vice President	Maafushi Island Council	6640073	k.maafushi@office@icmaail.com	
3	Ali Shamoon	member	Maafushi Island Council	6640073	k.maafushi@office@icmaail.com	
4	Chakir Kasderli	Team leader	KoCTS Engineer		kasderli@kocts.org.uk	
5	Ahmed Jameel	Deputy team lead	Water Solutions	7783379	aj@water-solutions.biz	
6	Abdul Neeem	Environment safeguard	Water Solutions	7783382	an@water-solutions.biz	
7	Abdulla Fayaz	Civil Engineer	Water Solutions UK	77823137	afayaz@water-solutions.biz	
8						
9						
10						
11						
12						
13						

Annex 6: Quarantine Guidelines



10. 10 වැනි පැයේ ඇති 19-19:00 පැය

දැනුණු 19-19:00 පැය

1. නැවත 19:00-19:00

19:00-19:00 පැයේ 10 වැනි පැයේ ඇති 19-19:00 පැය. 19-19:00 පැයේ 10 වැනි පැයේ ඇති 19-19:00 පැය. 19-19:00 පැයේ 10 වැනි පැයේ ඇති 19-19:00 පැය. 19-19:00 පැයේ 10 වැනි පැයේ ඇති 19-19:00 පැය. 19-19:00 පැයේ 10 වැනි පැයේ ඇති 19-19:00 පැය. 19-19:00 පැයේ 10 වැනි පැයේ ඇති 19-19:00 පැය. 19-19:00 පැයේ 10 වැනි පැයේ ඇති 19-19:00 පැය. 19-19:00 පැයේ 10 වැනි පැයේ ඇති 19-19:00 පැය.

2. 19:00-19:00

19:00-19:00 පැයේ 10 වැනි පැයේ ඇති 19-19:00 පැය.

3. 10:00-10:00 (10) 19:00-19:00

10:00-10:00 පැයේ 10 වැනි පැයේ ඇති 19-19:00 පැය. 10:00-10:00 පැයේ 10 වැනි පැයේ ඇති 19-19:00 පැය. 10:00-10:00 පැයේ 10 වැනි පැයේ ඇති 19-19:00 පැය. 10:00-10:00 පැයේ 10 වැනි පැයේ ඇති 19-19:00 පැය. 10:00-10:00 පැයේ 10 වැනි පැයේ ඇති 19-19:00 පැය. 10:00-10:00 පැයේ 10 වැනි පැයේ ඇති 19-19:00 පැය. 10:00-10:00 පැයේ 10 වැනි පැයේ ඇති 19-19:00 පැය. 10:00-10:00 පැයේ 10 වැනි පැයේ ඇති 19-19:00 පැය. 10:00-10:00 පැයේ 10 වැනි පැයේ ඇති 19-19:00 පැය. 10:00-10:00 පැයේ 10 වැනි පැයේ ඇති 19-19:00 පැය.

- **አጠቃላይ** ደንብ ለማውጣት ለሚያስፈልጉት ስራዎች (ለምሳሌ ስራዎች ለማውጣት) ማዘጋጀት ይገባል።

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- ለሰነድ ማውጣት ለሚያስፈልጉት ስራዎች (ለምሳሌ ስራዎች ለማውጣት) ማዘጋጀት ይገባል።

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3.5 አጠቃላይ ደንብ ለማውጣት ይገባል።

- ማዘጋጀት ይገባል።

ANNEX-1 Checklist for maintaining measures for group accommodation when going for “Furabandhu” quarantine

This form should be filled by the supervisor as a checklist if a group of 10 people or more who are sponsored by a company or an institution are going for “Furabandhu” quarantine.

1. Name of the company or institution who take guardianship of the quarantined people:

2. Name of responsible person from company or institution who will monitor and ensure that quarantine measures are followed by the group:

3. Purpose of travel of the group:

4. Number of people going for group quarantine: _____

5. Indicate the type of accommodation arranged for quarantine (tick where appropriate):

I. Accommodation in rooms

II. Dormitories (halls)

If accommodation is arranged in rooms:

6. Number of rooms where people are going to be quarantined: _____

7. Number of people who are going to be accommodated in a room: _____

8. Distance between beds: _____ feet.

9. Toilet/bathroom arrangements for occupants of each room:

I. Separate toilet/bathroom for each room

II. Toilets or bathrooms will be shared by rooms

If accommodation is arranged at a dormitories (halls):

10. Number of dormitories (halls): _____

11. Number of people accommodated in each dormitory (hall): _____

12. Distance between beds: _____ feet.

13. Number of toilets for each dormitory (hall): _____

14. Arrangement made to ensure separate dining of quarantined groups:

15. Arrangement for waste collection and disposal from the quarantine site:

16. Arrangement for providing access to communication for the quarantined people:

17. Are the following materials available or measures in place at the rooms or dormitories for quarantine:

S.no	Details	Yes	No
I.	Availability of medical masks for symptomatic persons and people who share a room with a symptomatic person		
II.	Availability of a separate room or area for isolation of a symptomatic person		
III.	Availability of hand washing facility OR hand sanitizer in the living area		

IV.	Availability of detergent and bleach for cleaning of living areas and toilet		
V.	Availability of lidded and lined dustbins:		
VI.	Availability of information materials on prevention of COVID-19 such as signage and posters		

18. Any further remarks:

Details of the supervisor:

Name: _____ Contact number: _____

Date: _____

Annex 7: Groundwater Test Results

Male' Water & Sewerage Company Pvt Ltd

Water Quality Assurance Laboratory

Quality Assurance Building, 1st Floor, Male' Hingun, Vilimale', Male' City, Maldives
Tel: +9603323209, Fax: +9603324306, Email: wqa@mwsc.com.mv



LB-TEST-090



WATER QUALITY TEST REPORT
Report No: 500186033

Customer Information:

Water Solutions Pvt Ltd
M.Niyadhurumaage
Alimas Magu
Male' 20063

Report date: **01/02/2021**
Test Requisition Form No: **900191099**
Sample(s) Received Date: **26/01/2021**
Date of Analysis: **26/01/2021 - 27/01/2021**

Sample Description ~	Guraidhoo Groundwater 1 (GGW1)	Guraidhoo Groundwater 2 (GGW2)	Maafushi Groundwater 1 (MGW1)	TEST METHOD	UNIT
Sample Type ~	Ground Water	Ground Water	Ground Water		
Sample No	83216209	83216210	83216211		
Sampled Date ~	25/01/2021 04:00	25/01/2021 04:00	25/01/2021 04:00		
PARAMETER	ANALYSIS RESULT				
Physical Appearance	Clear with particles	Clear with particles	Clear with particles		
Conductivity *	630	689	651	Method 2510 B. (adapted from Standard methods for the examination of water and waste water, 23rd edition)	µS/cm
pH *	7.11	7.48	7.75	Method 4500-H+ B. (adapted from Standard methods for the examination of water and waste water, 23rd edition)	-
Salinity	0.31	0.34	0.32	Method 2520 B. (adapted from Standard methods for the examination of water and waste water, 23rd edition)	‰
Temperature	23.8	23.5	23.1	Electrometry	°C
Nitrogen Ammonia	1.72	0.05	0.10	HACH Method 8038	mg/L
Total Petroleum Hydrocarbon (TPH)	0.073	0.120	<0.036 (LoQ 0.036 mg/L)	UV Fluorescence	mg/L

Keys: µS/cm : Micro Seimen per Centimeter, ‰ : Parts Per Thousand, °C : Degree Celcius, mg/L : Milligram Per Liter

Checked by

Aminath Sofa
Laboratory Executive

Approved by

Mohamed Eyman
Manager, Quality

Notes: Sampling Authority: Sampling was not done by MWSC Laboratory

This report shall not be reproduced except in full, without written approval of MWSC

This test report is ONLY FOR THE SAMPLES TESTED.

~ Information provided by the customer

*Parameters accredited by EIAC under ISO/IEC 17025:2017

Male' Water & Sewerage Company Pvt Ltd

Water Quality Assurance Laboratory

Quality Assurance Building, 1st Floor, Male' Hingun, Vilimale', Male' City, Maldives
Tel: +9603323209, Fax: +9603324306, Email: wqa@mwsc.com.mv



LB-TEST-090



WATER QUALITY TEST REPORT
Report No: 500186033

Customer Information:

Water Solutions Pvt Ltd
M.Niyadhurumaage
Alimas Magu
Male' 20063

Report date: **01/02/2021**
Test Requisition Form No: **900191099**
Sample(s) Recieved Date: **26/01/2021**
Date of Analysis: **26/01/2021 - 27/01/2021**

Sample Description ~	Maafushi Groundwater 2 (MGW2)	TEST METHOD	UNIT
Sample Type ~	Ground Water		
Sample No	83216212		
Sampled Date ~	25/01/2021 04:00		
PARAMETER	ANALYSIS RESULT		
Physical Appearance	Clear with particles		
Conductivity *	463	Method 2510 B. (adapted from Standard methods for the examination of water and waste water, 23rd edition)	µS/cm
pH *	7.82	Method 4500-H+ B. (adapted from Standard methods for the examination of water and waste water, 23rd edition)	-
Salinity	0.22	Method 2520 B. (adapted from Standard methods for the examination of water and waste water, 23rd edition)	‰
Temperature	23.8	Electrometry	°C
Nitrogen Ammonia	<0.02 (LoQ 0.02 mg/L)	HACH Method 8038	mg/L
Total Petroleum Hydrocarbon (TPH)	0.040	UV Fluorescence	mg/L

Keys: µS/cm : Micro Seimen per Centimeter, ‰ : Parts Per Thousand, °C : Degree Celcius, mg/L : Milligram Per Liter

Checked by

Aminath Sofa
Laboratory Executive

Approved by

Mohamed Eyman
Manager, Quality

Notes: Sampling Authority: Sampling was not done by MWSC Laboratory
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~ Information provided by the customer
*Parameters accredited by EIAC under ISO/IEC 17025:2017

***** END OF REPORT *****

Annex 8: Atoll and Island Council Submission



K. Maafushi: Waste Management Center EMP Report

2 messages

Yumin Naseem <yumin@water-solutions.biz>
To: info@maafushi.gov.mv
Cc: Ibrahim Faiz <faiz@water-solutions.biz>

Dear Sir/ Madam,

Please find the attached Environmental Management Plan and the receipt for the above mentioned project.

Best Regards,

--

Yumin Naseem

Junior Environmental Consultant

**Water Solutions Pvt Ltd.**

4th floor, M.Niyadhurumaage, Alimasmagu Male', 20205, Maldives

Mobile: (960) 7555722

Tel: (960) 3341643, (960) 3301643 , Ext : 1014

E-mail: yumin@water-solutions.bizWebsite: www.water-solutions.biz

Social Media: @wsmaldives

Disclaimer: This email (including all attachments) is confidential and intended only for the use of the individual or entity named above and may contain information that is privileged. If you are not the intended recipient, you are notified that an email in error, please notify us immediately by return email or telephone and destroy the original message. Thank you.

2 attachments **2021-02-21 Maafushi ISWMC EMP.pdf**
2861K **2021-02-21 WS-LTR-044 - K. Maafushi EMP Island Council Submission.pdf**
356K

Yumin Naseem <yumin@water-solutions.biz>
To: info@maafushi.gov.mv
Cc: Ibrahim Faiz <faiz@water-solutions.biz>

Sun, Feb 21, 2021 at 11:50 AM

Dear Sir/Madam,

Please disregard the previous report and find the attached updated report. Please sign the attached receipt and send it back to us as soon as possible. Apologies for any inconvenience.

Regards,

[Quoted text hidden]

2 attachments **2021-02-21 WS-LTR-044 - K. Maafushi EMP Island Council Submission.pdf**
356K **2021-02-21 Maafushi ISWMC EMP.pdf**
12705K



Ibrahim Faiz <faiz@water-solutions.biz>

Waste Management Center EMP Reports: K. Maafushi & K. Guraidhoo

1 message

Yumin Naseem <yumin@water-solutions.biz>
To: secretariat@kaaf.gov.mv
Cc: Ibrahim Faiz <faiz@water-solutions.biz>

Dear Sir/ Madam,

Please find the attached link for the Environmental Management Plans for K. Maafushi and K. Guraidhoo. Please sign the attached receipt and send it back to us as soon as possible.

<https://drive.google.com/drive/folders/1Y8QW14P3j7CrxfrzAmPhqHcPulkeec3N?usp=sharing>

Best Regards,

--

Yumin Naseem

Junior Environmental Consultant

**Water Solutions Pvt Ltd.**

4th floor, M.Niyadhurumaage, Alimasmagu Male', 20205, Maldives

Mobile: (960) 7555722

Tel: (960) 3341643, (960) 3301643 , Ext : 1014

E-mail: yumin@water-solutions.bizWebsite: www.water-solutions.biz

Social Media: @wsmaldives

Disclaimer: This email (including all attachments) is confidential and intended only for the use of the individual or entity named above and may contain information that is privileged. If you are not the intended recipient, you are notified that an email in error, please notify us immediately by return email or telephone and destroy the original message. Thank you.

2021-02-21 WS-LTR-046 - K. Atoll Council EMP Submission -.pdf
357K

Annex 9: Criteria for Planning and Design for Subprojects

Criteria for Planning and Design for Subprojects

Criteria	Remarks
<i>Pre-requisites</i>	
(i) No subproject scope will include features that appear on schedule D of the EIA regulations (2007, updated 2012) (List of Development Proposals Requiring an Environmental Impact Assessment Study)	Development proposals on Schedule D of the EIA regulations related to solid waste management are landfills, incinerators and large-scale waste storage and separation facilities.
(ii) A IEE and EMP must be prepared for each subproject, which must comply with EHS Guidelines on Waste Management Facilities	PMU to seek clearance from ADB on project siting if the criterion cannot be met due to space constraints.
(iii) Sites must not have any land acquisition or significant involuntary resettlement and social safeguard issues.	Verify land ownership records.
(iv) Any new facility must not be sited in an environmentally sensitive area, including all areas within 30m of the shoreline, or within 30m of areas such as thickly vegetated areas that are known to be habitats for bird species of conservation value	The 30m distance should be exceeded where possible. The restriction may be reviewed depending on site availability and stakeholder consultation, and provision of design measures to prevent release of leachate into the sea or onto the vegetated area in the event of the capacity of the leachate collection tank being exceeded.
(v) No new facility to be sited within 500m of areas of cultural significance, such as ancient religious artifacts	Verification, through consulting island councils and the Ministry of Education, that no physical cultural heritage sites are situated within 500m of the IWMC site. The restriction may be reviewed on the basis of site availability and consultation with stakeholders. PMU to seek clearance from ADB on project siting if the criterion cannot be met due to space constraints. Provide for use of “chance find” procedures in the EMP, such that any artifacts are preserved for future generations
(vi) Sites must have sufficient capacity to contain or handle volumes of waste projected to be generated over at least a 20 year planning horizon	To be assessed based on projections on growth in waste generation for each island
(vii) Sites must be at least 100m from residences, schools, clinics or mosques	The distance restriction may be reviewed depending on site availability and stakeholder consultation. PMU to seek clearance from ADB on project siting if the criterion cannot be met due to space constraints.
(viii) Sites must be least 100m from groundwater wells	The 100m limit is precautionary, however attention must be given in detailed design to

		ensure that the leachate collection tank is protected to exclude flood waters, including during storm situations, to ensure that leachate does not enter the groundwater lens. PMU to seek clearance from ADB on project siting if the criterion cannot be met due to space constraints.
(ix)	Sites must not intersect with power lines, water supply pipelines or sewer lines	Where these lie across proposed sites, they must be re-aligned to avoid the site
(x)	For initiatives that require the use of machinery such as shredders and presses, there must be established access to technical expertise for servicing and spare parts must be regularly available in-country	
(xi)	Consensus from island communities on proposed improvements.	Records of consultations, issues raised, and measures taken to address them to be summarized in IEEs.
(xii)	No other work, including road, pipeline, or power line improvements are planned at or near the proposed site	Island council to confirm. If such sites are planned, details must be taken account of in design to ensure adequate separation of the infrastructure
(xiii)	World Bank Group's Environmental, Health and Safety (EHS) Guidelines requires IWMCs to consider standard design of 110% volume and bunded for impermeable storage to avoid contaminated runoff entering the surface or groundwater.	Final detailed design to confirm capacity is 110% and bunded
<i>Preferable</i>		
(i)	Where IWMCs exist, any improvements should be to the existing infrastructure, rather than replacement on new sites.	New sites may be necessary if existing site has become unsuitable due to new developments around it or there is objection from communities to rehabilitate the existing IWMCs.
(ii)	Removal of trees to be avoided where possible.	When mature trees (of diameter at breast height of 40cm or greater) must be removed, new trees must be planted of a number and species agreed with the island community
(iii)	Where composting facilities are to be introduced or expanded, a high level of commitment from the community should be evident to ensure both cooperation in ensuring that waste to be composed is not contaminated and that compost will be purchased or used.	Evidence of commitment from the island community should be obtained.

Annex 10: Rapid Environmental Assessment Checklist

Rapid Environmental Assessment Checklist

Instructions:

- (i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to the Environment and Safeguards Division (RSES) for endorsement by the Director, RSES and for approval by the Chief Compliance Officer.
- (ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.
- (iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title: Outer Island Waste Management Improvements: Maafushi, kaafu Atoll

Sector Division:

Screening Questions	Yes	No	Remarks
A. Project Siting Is the project area...			
• Densely populated?		×	Maafushi has a resident population of 4026.
• Heavy with development activities?		×	Size of the island is 39.3 hectares. There is a land now reclaimed in the southeast side of the lagoon. This land will be connected to main island. Most of the island land has been used for development, mostly housing. There are 55 guest houses in the island. Most popular local tourism island in Maldives.
• Adjacent to or within any environmentally sensitive areas?		×	
• Cultural heritage site		×	
• Protected Area		×	
• Wetland		×	
• Mangrove		×	
• Estuarine		×	
• Buffer zone of protected area		×	
• Special area for protecting biodiversity		×	
• Bay		×	
B. Potential Environmental Impacts Will the Project cause...			

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> impacts associated with transport of wastes to the disposal site or treatment facility 	×		IWMC will consist of concrete platforms, shedded areas, segregated waste processing and storage areas, small office, and fencing. The Project will ensure island council will have the capacity to manage SWM by providing some machineries as well.
<ul style="list-style-type: none"> Impairment of historical/cultural monuments/areas and loss/damage to 		×	Not anticipated. No cultural or historical site near the project site.
<ul style="list-style-type: none"> Degradation of aesthetic and property value loss? 		×	The subproject will improve land aesthetics because of improved waste management infrastructure
<ul style="list-style-type: none"> Nuisance to neighboring areas due to foul odor and influx of insects, rodents, etc.? 	×		Likely. However, the EMP ensures good housekeeping and site management measures are included to mitigate the impacts at subproject site.
<ul style="list-style-type: none"> Dislocation or involuntary resettlement of people? 		×	Not anticipated.
<ul style="list-style-type: none"> Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable 		×	The project will benefit all sectors in the island.
<ul style="list-style-type: none"> Risks and vulnerabilities related occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation? 	×		OHS risks are inherent to construction activities. However, these risks can be reduced through implementation of good construction practices and adoption of internationally recognized OHS measures on OHS on construction activities and SWM operations. These are included in the EMP.
<ul style="list-style-type: none"> Public health hazards from odor, smoke from fire, and diseases transmitted by flies, insects, birds and rats? 	×		Project will not allow open burning of waste, therefore impacts from smoke is not anticipated. However, odor or pests could be a problem without proper housekeeping practices. EMP includes proper mitigation measures to reduce these impacts.
<ul style="list-style-type: none"> Deterioration of water quality as a result of contamination of receiving waters by leachate from land disposal system? 		×	Not applicable. The subproject will not include any land disposal system.

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> Contamination of ground and/or surface water by leachate from land disposal system? 		×	Not applicable. The subproject will not include any land disposal system.
<ul style="list-style-type: none"> Land use conflicts? 		×	Not anticipated.
<ul style="list-style-type: none"> Pollution of surface and ground water from leachate coming from sanitary landfill sites or methane gas produced from decomposition of solid wastes in the absence of air, which could enter the aquifer or escape through soil fissures at places far from the landfill site? 		×	Not applicable. The subproject will not include any landfill facility.
<ul style="list-style-type: none"> Inadequate buffer zone around landfill site to alleviate nuisances? 		×	Not applicable. The subproject will not include any landfill facility. There will be a boundary fence around IWMC.
<ul style="list-style-type: none"> Road blocking and/or increased traffic during construction of facilities? 		×	Not anticipated. Volume of traffic in the island is very low.
<ul style="list-style-type: none"> Noise and dust from construction activities? 	×		<p>Few receptors in vicinity, high ambient noise levels and winds. Impact of noise can be avoided by undertaking activities during daytime when background noise is high. Nighttime works is not expected. Noise suppression gadgets may also be used.</p> <p>Dust emission can be avoided with the implementation of dust control measures such as sprinkling of water on sites. No significant volumes of spoil will be generated.</p>
<ul style="list-style-type: none"> Temporary silt runoff due to construction? 	×		Run-off during construction will be more. However, impacts are temporary and short in duration. The EMP ensures measures are included to mitigate the impacts.
<ul style="list-style-type: none"> Hazards to public health due to inadequate management of landfill site caused by inadequate institutional and financial capabilities for the management of the landfill operation? 		×	Not applicable. The subproject will not include any landfill facilities.
<ul style="list-style-type: none"> Emission of potentially toxic volatile organics from land disposal site? 		×	Not applicable. The project will not include any landfill facilities. However, the IWMC design includes leachate collection and management.

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> Surface and ground water pollution from leachate and methane gas migration? 		×	Not applicable. The project will not include any landfill facilities. However, the IWMC design includes leachate collection and management.
<ul style="list-style-type: none"> Loss of deep-rooted vegetation (e.g. trees) from landfill gas? 	×		Only few trees need to be removed. EMP recommends to relocate to empty nearby site.
<ul style="list-style-type: none"> Explosion of toxic response from accumulated landfill gas in buildings? 		×	Not applicable. Landfill gas is not expected to be generated based on the quantity and type of waste.
<ul style="list-style-type: none"> Contamination of air quality from incineration? 	×		Not applicable to this project, but there is an incinerator installed in the island which is not operation yet. After start of operation it is anticipated to impact air quality.
<ul style="list-style-type: none"> Public health hazards from odor, smoke from fire, and diseases transmitted by flies, rodents, insects and birds, etc.? 	×		Limited public access; reduced exposure of pests to waste The operation of the IWMC will ensure community health hazards are avoided with the adoption of EHS guidelines on SWM as indicated in the EMP.
<ul style="list-style-type: none"> Health and safety hazards to workers from toxic gases and hazardous materials in the site? 	×		The EMP ensures occupational health and safety measures are included following relevant EHS guidelines. Fuels will be stored and handled properly as per EMP.
<ul style="list-style-type: none"> Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)? 		×	Due to small scale of the project, no significant increase in population of workers from overseas or off-island. Population influx due to project construction and operation is minimal.
<ul style="list-style-type: none"> Social conflicts if workers from other regions or countries are hired? 			Priority in employment will be given to local residents.
<ul style="list-style-type: none"> Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation? 	×		The EMP ensures community health and safety measures are included following relevant EHS guidelines on waste management. Fuels will be stored and handled properly following EHS guidelines as included in the EMP.

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> Community safety risks due to both accidental and natural hazards, especially where the structural elements or components (e.g., landfill or incinerator) of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning? 	X		During construction and operation of IWMC, community health and safety risks will be managed by adopting the EHS guidelines as indicated in the EMP.

A Checklist for Preliminary Climate Risk Screening

Country/Project Title:

Sector:

Subsector:

Division/Department:

Screening Questions		Score	Remarks ^a
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather-related events such as floods, droughts, storms, landslides?	1	Site very close to the shoreline.
	Would the project design (e.g., the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc)?	1	Design needs to consider sea level rise.
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g., prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?	1	
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s)?		
Performance of project outputs	Would weather/climate conditions, and related extreme events likely affect the performance (e.g., annual power production) of project output(s) (e.g. hydropower generation facilities) throughout their design lifetime?		

^a If possible, provide details on the sensitivity of project components to climate conditions, such as how climate parameters are considered in design standards for infrastructure components, how changes in key climate parameters and sea level might affect the siting/routing of project, the selection of construction material and/or scheduling, performances and/or the maintenance cost/scheduling of project outputs.

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

Responses when added that provide a score of 0 will be considered low risk project. If adding all responses will result to a score of 1-4 and that no score of 2 was given to any single response, the project will be assigned a medium risk category. A total score of 5 or more (which include providing a score of 1 in all responses) or a 2 in any single response, will be categorized as high-risk project.

Result of Initial Screening (Low, Medium, High): Low Risk

Other Comments: _____

Prepared by: Abdul Aleem

Annex 11: Grievance Redress Mechanism Complaint Form

Grievance Redress Mechanism Complaint Form

The Greater Malé Environmental Improvement and Waste Management Project welcomes complaints, suggestions, queries, and comments regarding project implementation. We encourage persons with grievance to provide their name and contact information to enable us to get in touch with you for clarification and feedback.

Should you choose to include your personal details but want that information to remain confidential, please inform us by writing/typing *(CONFIDENTIAL)* above your name. Thank you.

Date	Place of registration				
Contact Information/Personal Details					
Name		Gender	Male	Female	Age
Home Address					
Village / Town					
District					
Phone no.					
E-mail					
Complaint/Suggestion/Comment/Question Please provide the details (who, what, where and how) of your grievance below:					
If included as attachment/note/letter, please tick here:					
How do you want us to reach you for feedback or update on your comment/grievance?					

FOR OFFICIAL USE ONLY

Registered by: (Name of official registering grievance)	
If – then mode: <input type="checkbox"/> Note/Letter <input type="checkbox"/> E-mail <input type="checkbox"/> Verbal/Telephonic	
Reviewed by: (Names/Positions of Official(s) reviewing grievance)	
Action Taken:	
Whether Action Taken Disclosed:	<input type="checkbox"/> Yes <input type="checkbox"/> No
Means of Disclosure:	

GRIVENCES RECORD AND ACTION TAKEN

Sr. No.	Date	Name and Contact No. of Complainer	Type of Complain	Place	Status of Redress	Remarks

Annex 12: Template for Monitoring Report

Template for Semi-Annual Environmental Monitoring Report

Introduction

- Overall project description and objectives
- Environmental category as per ADB Safeguard Policy Statement, 2009
- Environmental category of each subproject as per national laws and regulations
- Project Safeguards Team

Name	Designation/Office	Email Address	Contact Number	Roles
1. PMU				
2. Consultant				

- Overall project and sub-project progress and status
- Description of subprojects (package-wise) and status of implementation (preliminary, detailed design, on-going construction, completed, and/or O&M stage)

Package Number	Components/List of Works	Contract Status (specify if under bidding or contract awarded)	Status of Implementation (Preliminary Design/Detailed Design/On-going Construction/Completed/O&M) ³¹	If On-going Construction	
				%Physical Progress	Expected Completion Date

³¹ If on-going construction, include %physical progress and expected date of completion

Compliance status with National/State/Local statutory environmental requirements³²

Package No.	Subproject Name	Statutory Environmental Requirements ³³	Status of Compliance ³⁴	Validity if obtained	Action Required	Specific Conditions that will require environmental monitoring as per Environment Clearance, Consent/Permit to Establish ³⁵

Compliance status with environmental loan covenants

No. (List schedule and paragraph number of Loan Agreement)	Covenant	Status of Compliance	Action Required

Compliance status with the Environmental Management Plan

- Confirm if IEE/s require contractors to submit site-specific EMP/construction EMPs. If not, describe the methodology of monitoring each package under implementation.

Package-wise IEE Documentation Status

Package Number	Final IEE based on Detailed Design				Site-specific EMP (or Construction EMP) approved by Project Director? (Yes/No)	Remarks
	Not yet due (detailed not yet completed)	Submitted to ADB (Provide Date of Submission)	Disclosed on project website (Provide Link)	Final IEE provided to design Contractor/s (Yes/No)		

³² All statutory clearance/s, no-objection certificates, permit/s, etc. should be obtained prior to award of contract/s. Attach as appendix all clearance obtained during the reporting period. If already reported, specify in the “remarks” column.

³³ Specify (environmental clearance? Permit/consent to establish? Forest clearance? Etc.)

³⁴ Specify if obtained, submitted and awaiting approval, application not yet submitted

³⁵ Example: Environmental Clearance requires ambient air quality monitoring, Forest Clearance/Tree-cutting Permit requires 2 trees for every tree, etc.

- For each package, provide name/s and contact details of contractor/s' nodal person/s for environmental safeguards.

Package-wise Contractor/s' Nodal Persons for Environmental Safeguards

Package Name	Contractor	Nodal Person	Email Address	Contact Number

- With reference to approved EMP/site-specific EMP/construction EMP, complete the table below

Summary of Environmental Monitoring Activities (for the Reporting Period)³⁶

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
Design Phase						
Pre-Construction Phase						
Construction Phase						
Operational Phase						

³⁶ Attach Laboratory Results and Sampling Map/Locations

Overall Compliance with EMP

No.	Sub-Project Name	EMP/ CEMP Part of Contract Documents (Y/N)	CEMP/ EMP Being Implemented (Y/N)	Status of Implementation (Excellent/ Satisfactory/ Partially Satisfactory/ Below Satisfactory)	Action Proposed and Additional Measures Required

Approach and methodology for environmental monitoring of the project

- Briefly describe the approach and methodology used for environmental monitoring of each sub-project.

Monitoring of environmental IMPACTS on PROJECT SURROUNDINGS (ambient air, water quality and noise levels)

- Discuss the general condition of surroundings at the project site, with consideration of the following, whichever are applicable:
 - o Confirm if any dust was noted to escape the site boundaries and identify dust suppression techniques followed for site/s.
 - o Identify if muddy water is escaping site boundaries or if muddy tracks are seen on adjacent roads.
 - o Identify type of erosion and sediment control measures installed on site/s, condition of erosion and sediment control measures including if these are intact following heavy rain;
 - o Identify designated areas for concrete works, chemical storage, construction materials, and refueling. Attach photographs of each area in the Appendix.
 - o Confirm spill kits on site and site procedure for handling emergencies.
 - o Identify any chemical stored on site and provide information on storage condition. Attach photograph.
 - o Describe management of stockpiles (construction materials, excavated soils, spoils, etc.). Provide photographs.
 - o Describe management of solid and liquid wastes on-site (quantity generated, transport, storage and disposal). Provide photographs.
 - o Provide information on barricades, signages, and on-site boards. Provide photographs in the Appendix.
 - o Indicate if there are any activities being under taken out of working hours and how that is being managed.
- Briefly discuss the basis for environmental parameters monitoring.
- Indicate type of environmental parameters to be monitored and identify the location.
- Indicate the method of monitoring and equipment used.

- Provide monitoring results and an analysis of results in relation to baseline data and statutory requirements.

As a minimum the results should be presented as per the tables below.

Air Quality Results

Site No.	Date of Testing	Site Location	Parameters (Government Standards)		
			PM10 µg/m3	SO2 µg/m3	NO2 µg/m3

Site No.	Date of Testing	Site Location	Parameters (Monitoring Results)		
			PM10 µg/m3	SO2 µg/m3	NO2 µg/m3

Water Quality Results

Site No.	Date of Sampling	Site Location	Parameters (Government Standards)				
			pH	Conductivity µS/cm	BOD mg/L	TSS mg/L	TN mg/L

Site No.	Date of Sampling	Site Location	Parameters (Monitoring Results)				
			pH	Conductivity µS/cm	BOD mg/L	TSS mg/L	TN mg/L

Noise Quality Results

Site No.	Date of Testing	Site Location	L _{Aeq} (dBA) (Government Standard)	
			Day Time	Night Time

Site No.	Date of Testing	Site Location	L _{Aeq} (dBA) (Monitoring Results)
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			Day Time	Night Time

Grievance Redress Mechanism

- Provide information on establishment of grievance redress mechanism and capacity of grievance redress committee to address project-related issues/complaints. Include as appendix Notification of the GRM (town-wise if applicable).

Complaints Received during the Reporting Period

- Provide information on number, nature, and resolution of complaints received during reporting period. Attach records as per GRM in the approved IEE. Identify safeguards team member/s involved in the GRM process. Attach minutes of meetings (ensure English translation is provided).

SUMMARY OF KEY ISSUES AND REMEDIAL ACTIONS

- Summary of follow up time-bound actions to be taken within a set timeframe.

APPENDIXES

- Photos
- Summary of consultations
- Copies of environmental clearances and permits
- Sample of environmental site inspection report
- all supporting documents including signed environmental site inspection reports prepared by consultants and/or contractors
- Others

SAMPLE ENVIRONMENTAL SITE INSPECTION REPORT

Project Name
Contract Number

NAME: _____ DATE: _____
TITLE: _____ DMA: _____
LOCATION: _____ GROUP: _____

WEATHER CONDITION:

INITIAL SITE CONDITION:

CONCLUDING SITE CONDITION:

Satisfactory ___ Unsatisfactory _____ Incident ___ Resolved ___ Unresolved _____

INCIDENT:
Nature of incident:

Intervention Steps:

Incident Issues

Resolution

Project Activity Stage	Survey	
	Design	
	Implementation	
	Pre-Commissioning	
	Guarantee Period	

Inspection

Emissions	Waste Minimization			
Air Quality	Reuse and Recycling			
Noise pollution	Dust and Litter Control			
Hazardous Substances	Trees and Vegetation			
Site Restored to Original Condition	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>

Signature

Sign off
