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## Water Resources Protection and Management Regulation

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بِسْمِ اللّٰهِ الرَّحْمٰنِ الرَّحِیْمِ



Ministry of Environment  
Male'  
Republic of Maldives

## Water resources protection and management regulation

Introduction	1.	This is a Regulation formulated pursuant Section 58 (a) of the Law No: 8/2020 (Water and Sanitation Act), with reference to Section 17, 18, 19, 20 and 23 of the Law No: 8/2020 (Water and Sewerage Act) and Section 20 of Law No: 26/2020 (Utility Regulatory Authority Act).	
Title	2.	The title of this Regulation shall be “ <b>Water resources protection and management regulation</b> ”.	
Objective	3.	The objective of this Regulation is to establish and implement a mechanism and to establish regulatory framework for the sustainable usage of the available water resources by preservation, protection and development of the resources in order to achieve its benefits to the fullest.	
Enforcement Authority	4.	This Regulation will be enforced by the Utility Regulatory Authority.	
Authorization	5.	All authorizations to be granted for the enforcement of this Regulation shall be given in writing, by the Authority or by personnel designated by the Authority.	
Protection and maintenance of the ground water lens	6.	(a)	Any action that may endanger the groundwater lens is prohibited, as it is a protected resource under Section 18 (a) of Act No: 8/2020 (Water and Sewerage Act)
		(b)	To ensure sustainable management of all water resources within the jurisdiction of each island, the “Water resource conservation and management plan” of the island shall be formulated by the council of the island, in consultation with the Ministry and the Environmental Protection Agency, passed by the Authority and published in the gazette within 12 (twelve) months of the commencement of this Regulation.

		(c)	The plan formulated according to sub-section (b) of this Section shall be implemented by the council of that island.
		(d)	The Authority shall ensure the implementation of the plan formulated according to sub-section (b) of this Section.
		(e)	In situations wherein dewatering of ground water is required for construction and industrial purposes, it shall be done according to the regulation on dewatering of ground water for construction and industrial works.
		(f)	For various industrial and commercial purposes, it is prohibited to extract, sell, or use water from the ground water lens or wetlands or from naturally formed waters.
		(g)	Notwithstanding subsection (a) of this section, the regulation does not prevent the extraction and use of ground water by digging or collection and use of rainwater or extraction and use of seawater for personal use.
		(h)	In any situation requiring extraction of water from the ground water lens, water shall be extracted in a way that it does not damage the natural water layer of that island.
Use of water from water resources during a disaster	7.	(a)	The Authority at its discretion may permit the use of water from protected water resources for a prescribed time period during a disaster, in the following situations.
		(1)	The need to use water in the event of a dangerous incident
		(2)	During a water crisis
		(3)	The possibility that an event that is beyond the control of the water provider will damage the water system and run out of water reserves.
		(b)	The procedure and method for use of protected water resource during the situations stated in sub-section (a) of this section, shall be stated in the plan formulated according to Section 6 (b) of this Regulation.
		(c)	If any circumstances stated in subsection (a) necessitates the usage of a protected water resource in islands or land allotted for agriculture and other industrial activities or tourism, and for that purpose, the owner of the place must ensure that water is extracted according to Annex 1 of this regulation in a manner that it does not damage the water lens.
		(d)	If any circumstances stated in subsection (a) necessitates the usage of protected water resources, cause of the

			situation and the time period of usage or proposed time period of use must be informed to the authority within 48 (forty-eight) hours of the occurrence via letter or email.
		(e)	If any circumstances stated in subsection (a) necessitates the usage of protected water resources, the changes to the protected water resources shall be checked and monitored by the user according to the instructions given by the Authority. This information shall be submitted to the Authority or person designated by the Authority.
		(f)	Based on the information received by the authority under sub-section (e) of this Regulation, if irrecoverable change is being caused to protected water resource in use, the Authority at its discretion may issue an order to halt extraction of water from the current resource or order to use another similar resource.
		(g)	The persons using water from a protected water resource in circumstance stated in subsection (a) of this Regulation, shall inform the Authority the details of the plan to return to the previous situation of water usage and shall make effort to return to that previous situation as soon as possible.
Renewal of the water layer	8.	(a)	All buildings shall be constructed, in a manner that water from the roof of the buildings or the terrace and overflow water from rainwater tanks, fall into a well or drain to the ground through a well or drainage system. Some designs that could be used for constructing such water drainage system has been provided in Annex 2 of this Regulation as a sample.
		(b)	If any existing building has been constructed in contravention of subsection (a) of this section, it shall be compliant in accordance with subsection (a) of this regulation within five years from the date of commencement of this regulation
		(c)	It is prohibited to connect water from the roof or terrace of any building and overflow water from water tanks to the sewerage system or to discharge or drain it through the sewerage system.
		(d)	Notwithstanding subsection (a) of this section, without exception to subsection (b) of this section, if a building does not have designated drainage well, pit or area it is

			not restricted by this Regulation to release on to the road, if excess water from water overflows from the well or the drainage area.
		(e)	Notwithstanding subsection (c) of this section, the regulation does not prohibit the release of water from the roof or terrace into the sewerage system with the permission of the utility service provider if there is no drainage system in place on that island and if the Government declares a flood disaster due to heavy rain.
Infiltration of water collected in the island into the ground due to heavy rain	9.	(a)	The water drainage systems in the islands shall be built in a way that the water accumulated on the roads of the island drains into the ground. The system should be designed as per the design criteria set by Ministry.
		(b)	The road gutters must be built in a way that the water accumulated in the gutter drain into the ground through a connection to the water drainage system. And the materials used to construct the roads shall be conducive to water drainage.
		(c)	Land reclamation projects shall be conducted, in a manner that ensures that flooding does not arise due to the reclamation water drains to the ground in the island. And if that island, has been facing problems of water drainage even prior to land reclamation, land reclamation shall be carried out in a way that does not further exacerbate the issue of flooding.
		(d)	In public infrastructures with open areas such as playgrounds, recreational areas and parks, water drainage systems should be built underground.
Contamination of water lens	10.		Any work done in any island of the Maldives by any person shall be conducted in accordance to Section 20 of the Law No: 8/2020 (Water and Sewerage Act) while ensuring no contamination of the water layer.
Prevention of contamination of water lens due to sewage and wastewater	11.	(a)	In an island, after 1 (one) year of official provision of service after completion of the establishment of the sewerage system, all houses and building on the road wherein the sewerage system pipelines are laid shall be connected to the sewerage system for the purpose of disposal of sewage and wastewater. After the aforementioned period, the drainage of sewage or wastewater to the ground without connecting to the sewerage system by any of those houses or buildings is prohibited.

		(b)	Within 1 (one) year, after the establishment of the sewerage system, the septic tanks and such things used in the island should be safely de-sludged, treated and covered with soil by the utility service provider of sewerage of the island. A price set by the Authority may be charged by the service provider for the provision of this service, from the customer.
		(c)	In the islands where a sewerage system has been established, it is the responsibility of the licensee to ensure that there is no leakage of sewage or wastewater from the system into the ground at any area of the island.
		(d)	In the islands where there is a sewerage system and treatment facility, if treated sewage and wastewater were to be drained into the ground, it shall be done so in accordance with the standards set out in Annex 3 of this regulation and with the written permission of the authority.
		(e)	If water is being drained to ground as stated on subsection (d) of this Section, the party conducting the draining shall formulate a groundwater lens monitoring plan and submit it to authority for approval. This monitoring report shall be submitted to the authority as per the procedure set by the authority.
		(f)	Draining of sewerage water to the ground in contravention of subsection (e) of this section is prohibited.
		(g)	In the islands wherein the sewerage system has not been established, septic tanks shall be constructed according to the guideline in the Annex 4 of this Regulation.
Prevention of contamination of water lens due to oil and chemical used in industrial, economical and public service works	12.	(a)	It is prohibited for any person or party to spill oil or chemicals and similar agent to the ground or water lens. intentionally or by negligence.
		(b)	Tanks constructed to store oil products shall be in accordance with Regulation No: 2015/R-160 (Regulation on the handling, usage and storage of oil products).
		(c)	Oils or any chemical product shall be stored in an area that is adequately sheltered, properly secured with a bund wall and designed in reference to the quantity of oil and chemical stored in that area, in case of a leak, it

			will not drain into the ground, but can be collected and restored.
		(d)	Spillage of oil or any chemical products to the ground resulting in the contamination of ground water, due to transportation by land from one location to another, in contravention of Law No: 8/2020 (Water and Sewerage Act) and this regulation is prohibited.
		(e)	Oil and chemical refill points shall be established in an area, appropriately sheltered, properly secured with a bund wall, and designed with reference to the maximum quantity of oil and chemical refilling that can be done at the area, hence, in case of a leak of that quantity, it will not drain into the ground, but can be collected and restored.
		(f)	Transportation of oil or any chemical products on land shall be done in containers in a way that it does not cause any spillage to the ground. These containers must be attached to the vehicle properly.
		(g)	Oil and any chemical products, shall be carried on any vehicle in accordance with Regulation No: 2015/R-160 (Regulation on the handling, usage and storage of oil products).
		(h)	If a pipeline is buried underground for the transport of oil or any chemical products, the construction of the pipes shall be carried out after an environmental impact report has been prepared and clearance from Environmental Protection Agency has been obtained.
		(i)	Oil and any chemical products shall be disposed, at a place approved by the Authority, in manner that does not contaminate the ground water layer or any other water resource. Any other manner of disposal it is prohibited.
		(j)	It shall be the responsibility of oil and any chemical product owners to safely handle oil and chemicals required for disposal in a manner that does not pollute water resources.
		(k)	Special sampling points for ground water testing shall be maintained in areas where oil or chemical is stored, refilled, transferred, by persons conducting those works.
		(l)	After establishing sampling points, persons handling oil and any chemical products, shall submit to the Authority or person authorized by the Authority, before the 10 <sup>th</sup> day of the first month of each quarter, after testing the below stated perimeters. This testing shall be done by a

			laboratory authorized by a relevant government authority or by such a certified foreign laboratory.
		1	pH level of water (pH)
		2	Oil and Hydrocarbon (mg/1 or PPM)
Prevention of contamination of ground water lens due to industrial activities	13		It is prohibited to dump oil or water with chemical residue onto land or sea after cleaning or washing engines and similar items by garage, factory, boatyard and other areas where industrial work is done.
Prevention of contamination of ground water lens due to agriculture	14	(a)	The ground water lens shall be used for agriculture, according Section 19 of Law No: 8/2020 (Water and Sewerage Act). The use of ground water lens for agricultural purpose in any other manner is prohibited.
		(b)	The usage of, fertilizers, pesticides or other similar substances by farmers in a manner that it may contaminate the water lens is prohibited.
		(c)	Notwithstanding sub-section (b) of this Section, in the circumstances stated in Section 20 (b) of Law No: 8/2020 (Water and Sewerage Act), this Regulation will not be applicable.
		(d)	To minimize or prevent contamination of the ground water lens due to agriculture, pesticides and similar products used by farmers shall be used according to Section 18 of Law No: 21/2019 (Act on Control of Pesticide used in Agriculture) and Regulation No: 2021/R-12 (Regulation on the Control of Pesticide used in Agriculture)
		(e)	Fertilizer and pesticide shall be stored, in a place or area designed in such manner that, in case of a leak, it can be collected and stored without spillage to the ground.
		(f)	When agriculture is carried out in uninhabited islands and areas of land of 10,000 (ten thousand) square meters or more within the jurisdiction of the inhabited islands, the Authority has the right to order water testing to determine the effects of it, on the ground or ground water layer.
		(g)	After establishing sampling points as per subsection (f) of this Section, every 6 months in minimum, the following parameters shall be analyzed and submitted to the Authority or person designated by the Authority. This testing must be performed by a laboratory authorized by a relevant government authority or by such a certified foreign laboratory
		(1)	PH level of water (pH)

		(2)	Level of electric conductivity (Electric Conductivity $\mu\text{S}/\text{cm}$ ) (EC)
		(3)	Nitrate ( $\text{NO}_3$ , mg/1)
		(4)	Phosphate ( $\text{PO}_4$ , mg/1)
		(5)	Ammonium ( $\text{NH}_4$ , mg/1)
		(6)	Sulphate ( $\text{SO}_4$ , mg/1)
		(7)	Pesticides (ppm)
		(8)	Level of faecal effect in water (Faecal Coliform CFU/100)
	(h)		In case where cultivation takes place on agricultural lands less than 10,000 (ten thousand) acres within the jurisdiction of inhabited islands, the Authority shall have the power to designate and direct the island council to establish sampling points for groundwater testing with reference to the size of the agricultural land and the type of agriculture carried out on the land
	(i)		The council of the island shall provide the Authority with the information required to establish the sampling points stated in sub-section (h) of this Section.
	(j)		The sampling points established as referred to in (a) of this section shall test the following parameters and submit the test report to the Authority or a person designated by the Authority before the end of March of each calendar year. These tests must be performed by a laboratory authorized by a competent governmental authority or by such foreign certified laboratory.
		(1)	PH level of water (pH)
		(2)	Level of electric conductivity (Electric Conductivity $\mu\text{S}/\text{cm}$ ) (EC)
		(3)	Nitrate ( $\text{NO}_3$ , mg/1)
		(4)	Phosphate ( $\text{PO}_4$ , mg/1)
		(5)	Ammonium ( $\text{NH}_4$ , mg/1)
		(6)	Sulphate ( $\text{SO}_4$ , mg/1)
		(7)	Pesticides (ppm)
		(8)	Level of faecal effect in water (Faecal Coliform CFU/100)
	(k)		It shall be the responsibility of the Council to manage the expenses required to conduct the tests stated in sub-section (j) of this Section, either by inclusion in the budget or from the income of the Council.
	(l)		In the application of sub-section (h) of this Section, planting of trees in land granted for living is excluded.
	(m)		Notwithstanding sub-section (l) of this section, the usage of fertilizer beyond the levels stated in section 20 (b) of

			Law No:8/2020 (Water and Sewerage Act) and the usage of pesticides beyond the levels set by the Government Authorities, as planting of trees in land granted for living may contaminate the water layer, parties planting trees in land granted for living shall act in manner that will not contaminate the ground water lens.
Prevention of contamination of ground water lens by waste management centers	15.	(a)	Waste management centers shall be established, in such a manner that water lens will not be contaminated due to leakage into the ground or due to blending with the ground of leachate from the waste collected at the place or by any adverse matter that may be created from the waste.
		(b)	Waste shall be transported, by vehicles, packed in containers especially made for this purpose or in sealed containers. And it shall be, fixed properly to the carrier and designed such that there is no spillage at all of any extent to the ground.
Prevention of water lens contamination due to hazardous medical waste	16.	(a)	Hazardous waste and similar matter from hospitals, clinics and centers providing medical service, shall be stored in an area specified for that purpose in a manner that it does not spill to ground.
		(b)	Hazardous waste and similar matter from hospitals, clinics and centers providing medical service, shall be transported for disposal, by vehicles, packed in containers especially made for this purpose or in sealed containers ensuring there is no spillage of any extent to the ground.
		(c)	Waste carried under subsection (b) of this Section shall be disposed, ensuring there is no affect to the ground water lens of the waste disposal area.
Rectification in case of contamination of ground water lens	17.	(a)	In the transport of oil or any chemical products from one place to another, if spilled onto the ground which may contaminate the ground water, it shall be the responsibility of the person carrying it to clean or take the necessary steps to rectify the situation if the ground or water was contaminated due to spillage onto the ground.
		(b)	In the storage of any matter that may contaminate the ground water due to spillage onto the ground, and if ground water is contaminated due to spillage, the responsibility shall be borne by the owner of it.
		(c)	In the occurrence of the situation stated in sub-section (a) and (b) of this Section, it shall be reported to the

			Authority within not more than 24 (twenty-four) hours of occurrence.
		(d)	In the situation stated in sub-section (a) and (b) of this Section, cleaning of the ground and ground water shall be done according to the instructions given by the Authority.
		(e)	In the occurrence of a situation stated in sub-section (a) and (b) of this Section, if the person involved in that situation or the person negligent in it, has not taken the responsibility of cleaning the ground and ground water within a reasonable period of time or if the Authority deems the person is unable to take the responsibility, the Authority has the right to clean the ground and ground water by assigning it to a third party. In such a situation, all costs associated with the work shall be borne by the person involved or was negligent in the situation.
		(f)	In assigning the cleaning of ground and ground water, in the event of a situation stated in sub-section (e) of this Section, if it is believed that due to delay spread of the matter spilled onto the ground water lens may increase causing irrecoverable damage, the Authority has the right to act according to Section 10.25 (d) (2) of Regulation No: 2017/R-20 (Public Finance Regulation)
Economical use of well water in public usage	18.	(a)	Usage of groundwater, water wiring and a framework for labelling, rating, incentivization of the items used in construction of toilet must be formulated and published in the government gazette by the Ministry within 6 (six) months from the date this regulation was gazetted, as per Annex 5 of this Regulation.
		(b)	In order to determine the impact of ground water extraction on the groundwater lens, the following information should be maintained by its council in each island. This information shall be submitted to the authority by the end of every calendar year.
		(1)	Number of wells
		(2)	Number of water wells where water is extracted through pump
		(3)	Capacity of the pump installed in the well
		(4)	If borewell (ground-filled) water is taken, the amount of water collected and the number of borewells
		(5)	Water quality reports generated from the water extraction, if groundwater testing and monitoring devices have been installed in the islands

Economical use of well water in Agricultural Usage	19.	(a)	Whilst using well water for farming, farmers shall pay attention for the economical use of water and to avoid wastage.
		(b)	In inhabited agricultural islands, if water required for agricultural lands less than 10,000 (ten thousand) square meters, is being extracted from the ground water lens, water extraction system shall be established in manner it will not endanger the ground water lens. An example of such water extraction is included in Annex 1 of this Regulation.
		(c)	The systems being used to irrigate the plants in the farmlands must ensure avoidance of wastage of water.
Use of well water in other industrial and economical activities	20.		Under section 19 of Act No. 8/2020 (Water and Sewerage Act), the use of groundwater for any economic and industrial purpose is prohibited except for public purposes and irrigation of less than 10,000 (ten thousand) acres of land in inhabited islands.
Extraction and sale of ground water	21.		As ground water layer is a protected resource according to Section 18 (a) of Act No: 8/2020 (Water and Sewerage Act), extraction of any amount of a protected water for any purpose and sale of that water, is prohibited under this regulation.
Referral for protection of ground water lens in the formulation of land use plan	22.	(a)	“Protection of water resources from any loss that may be caused due to climate change and potential damage from industrial and economic development efforts” shall be one of the objectives and vision of the land use plan of each island.
		(b)	In the formulation of the land use plan, the National Master plan on Water and Sewerage in force at the time, the Strategic Action plan of the field of Water and Sewerage and Water resource conservation and management plan of the island shall be considered.
		(c)	In the formulation of the land use plan, it shall be persuaded to establish vast lands with open spaces of public infrastructures like playgrounds, recreational areas and parks in the center of the island. And these areas shall be designated as the water layer enhancing zones.
		(d)	In the formulation of the land use plan, land for economic and industrial purposes shall be located in one side of the island away from residential areas so that the impact on islands groundwater lens is minimized.
Responsibility of the Authority	23.		In addition to the responsibilities of the Authority stated in Section 11 of the Law No: 8/2020 (Water and Sewerage Act), the following are responsibilities of the Authority.

		(a)	Provide technical assistance to the Ministry in carrying out works related to protected water resources;
		(b)	Raising public awareness and familiarization to this Regulation and policies formulated under this Regulation
		(c)	Take action against those who contravene this Act; and
		(d)	Provide the ministry with information and statistics relating to protected water resources collected under this regulation within the time limit requested by the ministry
Responsibility of the Council	24		In addition to the responsibilities stated in Section 9 of Law No: 8/2020 (Water and Sewerage Act), the following are also responsibilities of the Councils.
		(a)	Implementation of regulations and polices formulated relating to protected water resources under Law No: 8/2020 (Water and Sewerage Act) at island level and provision of co-operation to the Ministry and Authority to achieve that;
		(b)	To operate and maintain the facilities or instruments established in the island for the detection of changes in the groundwater lens, according to the instructions given by the Ministry, and to provide the information collected by these facilities to the Ministry;
		(c)	Plan and implement resident awareness programs on water resources at the island level; and
		(d)	Ensure that the natural water lens of the island is not being adversely altered by the public service systems established in the island, and by any social, economic and industrial activities carried out in the island.
Reporting of issues and resolving them	25.	(a)	If any damage to the water table is caused by any act or omission of any person, that person or any person who became aware of it shall report it to the Authority within a maximum of 24 (twenty-four) hours. The Authority shall formulate a policy for reporting such cases within 90 (ninety) days of the commencement of this regulation and publish them in the Government Gazette through the Ministry as Annex 6 to this regulation.
		(b)	In the event of an incident referred to in (a) of this section, or upon receipt of such a report, the Authority or its designated person shall investigate the incident and take appropriate action within not more than 24 (twenty-four) hours.
Penalties	26.		Persons who commit the actions stated below under Section 54 of Law No: 8/2020 (Water and Sewerage Act), shall be punished as stated below.

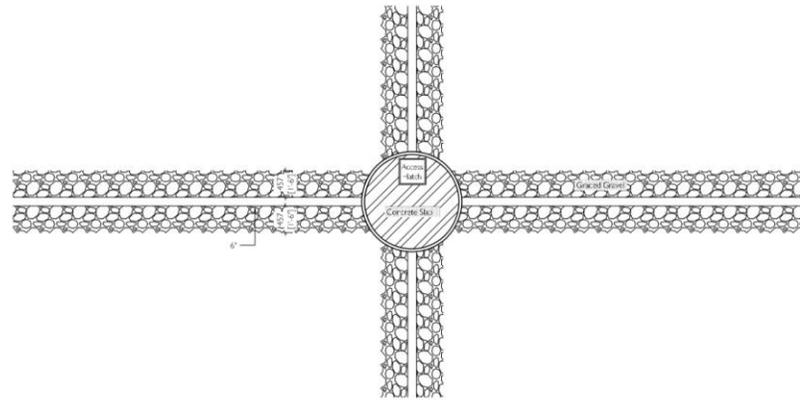
	(a)	A person who in the provision of information to the Authority or to the Ministry or to a person designated by the Ministry and Authority, intentionally to deceive, provide false information shall be punishable with a fine of not more than 50,000/- (fifty thousand) Maldivian Rufiya.
	(b)	A person who prevents, restricts the work of an enforcement officer, intentionally or negligently causes physical harm, abuse or any other conduct to disturb an enforcement officer whilst dispensing the obligations and responsibilities, under Law No: 8/2020 (Water and Sewerage Act) or this Regulation, shall be punishable with a fine between 5,000/- (five thousand) Maldivian Rufiya and 25,000/- (twenty-five thousand) Maldivian Rufiya. And if the act includes a criminal offence, it shall be submitted to the relevant authorities for investigation.
	(c)	A service provider who does not take the correctional measures within the prescribed time shall be punishable with a fine of not more than 100,000/- (hundred thousand) Maldivian Rufiya.
	(d)	A person who uses unauthorized water and sewerage services, shall be punishable with a fine of not more than 1000,000/- (one million) Maldivian Rufiya.
	(e)	A person from whom the Ministry has requested information from, and without reasonable cause fails to provide the requested information within the time frame given by the Ministry, shall be punishable with a fine of not more than 5000/- (five thousand) Maldivian Rufiya
	(f)	A person who opens, shuts or make changes to a valve, stopper or manhole installed by the sewerage service provider for the provision of sewerage service, shall be punishable with a fine between 1000/- (one thousand) Maldivian Rufiya and 25,000/- (twenty-five thousand) Maldivian Rufiya.
	(g)	A person who for the production of water, uses water from the freshwater layer of the island or natural wetland or lake, shall be punishable with a fine between 500,000/- (five hundred thousand) Maldivian Rufiya and 1000,000/- (one million) Maldivian Rufiya
	(h)	A person who, intentionally or by negligence, puts in the water system anything or lets anything to reach into the system that may cause any change in the quality of the water provided by the service provider, shall be

			punishable with a fine between 50,000/- (fifty thousand) Maldivian Rufiya and 100,000/- (one hundred thousand) Maldivian Rufiya
Commencement of the Regulation	27.	This regulation shall commence upon publication in the Government Gazette.	
Definition	28.	Unless the use of a phrase or a word in this Act does give rise to another meaning, the following phrases and words shall have the following meaning attributed below to those phrases and words.	
		(a)	“Ministry” means, the ministry assigned at the time to implement the water and sewerage policies.
		(b)	“Certified laboratory” means a laboratory licensed by or approved by the government.
		(c)	“Borewell” means, a hole drilled into the ground water layer for the extraction of water from ground.
		(d)	“Sewerage treatment plant” means, a system for cleaning sewage and wastewater released from the sewerage system into a place, to a level that it does not endanger the environment or living things in that area.
		(e)	“Sewerage system” means, sewerage network established for the movement of sewage and wastewater released from household toilets, for collection at one point, with the inclusion of all parts of that network.
		(f)	“Sewage and wastewater” mean, water released from toilets, kitchens, basins and washing machines.
		(g)	“Authority” means, the authority established under Law No:26/2020 (Utility Regulatory Authority Act)
		(h)	“Council” or “council of that island” means, the island councils or city councils established under Law No:7/2010 (Decentralization Act)
		(i)	“Building” means, resident buildings, buildings leased for residence, offices, schools, shopping centers, places providing health service, food service, sports and recreational services and mosques, which includes all places where generally people occupy.
		(j)	“Places of industrial works” means, places like islands wherein industrial works are carried out or used for tourism purpose, agricultural works, factories where fish is prepared and boatbuilding sheds.
		(k)	“Water layer” means, natural water formed under the ground of the island. Beginning from the place of water seeping from under the ground to the quantity of salt in the sea water or to the level reaching electrical

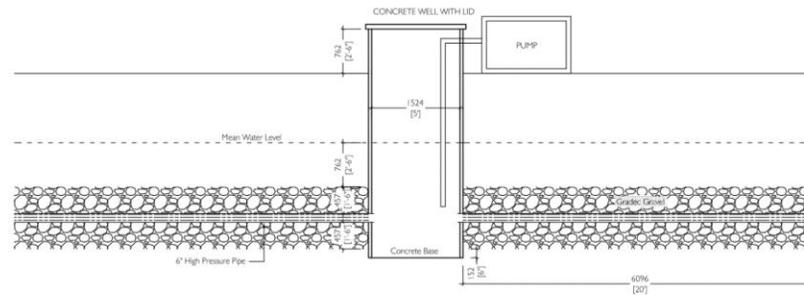
			conductivity, shall be considered as the area of the ground water layer.
		(l)	“Infiltration gallery” means, a system established enabling extraction of water from the top most layer/sac of the water layer, without damaging the water layer.
		(m)	“For personal use” means, use of water for household necessities.
		(n)	“Leachate” means, contaminated liquid generated from the spoiled/ solid waste at waste collection areas.
		(o)	“Environmental impact Report” means, environmental impact report formulated under Regulation No:2012-R-27 (Regulation on the preparation of environmental impact report, 2012)
		(p)	“Septic tank” means, a tank of square shape, made of concrete or plastic or fiberglass, concealed underground, that is used to drain household wastewater to the ground.

### Annex 1: Design for establishing infiltration gallery

#### Infiltration Gallery Design Template



INFILTRATION GALLERY (TOP VIEW)  
NTS



INFILTRATION GALLERY (REAR VIEW)  
NTS

NOTE: THE DEVELOPER WILL BE RESPONSIBLE TO PRODUCE SITE SPECIFIC DETAIL DESIGNS OF THE GALLERY SYSTEM AND ESTABLISH THE SYSTEMS

Annex 2: Excess rainwater recharge design

## Excess Rainwater Recharge Design Templates

### Components suitable for unsaturated & partially saturated land plots

**1. Soakways**  
Square or circular excavations filled with void-forming materials such as gravel that allows temporary storage of water before it soaks into the ground.

**2. Infiltration Trenches**  
Shallow, linear excavations filled with permeable granular material that allows exfiltration of water into the surrounding soils from the bottom and sides of the trench (fundamentally linear or trench soakaways).

**3. Filter Drains**  
A linear trench filled with granular material overlaying a perforated pipe provided near the base of the filter drain to collect and convey water downstream, such as a French drain.

**4. Filter Strips**  
Gently sloping areas of grass or vegetation that drains water evenly off from the edge of impermeable surfaces usually to another drainage component.

**5. Infiltration Basins**  
A dry flat-bottomed, shallow vegetated landscape depressions that stores runoff that infiltrates water gradually into the ground.

**6. Infiltration Blankets**  
Large shallow systems that are typically constructed using permeable aggregate or geo-cellular units that act as extensive soakaway systems.

### Components suitable for fully built-up land plots

#### 1. Underground Recharge Wells

Underground dug-wells made of concrete or HDPE tanks can be buried below ground and used for groundwater recharge.

**NOTE: THE DEVELOPER WILL BE RESPONSIBLE TO PRODUCE SITE SPECIFIC DETAIL DESIGNS OF THE GALLERY SYSTEM AND ESTABLISH THE SYSTEMS**

## Annex 3: Standards to be followed if sewage or wastewater is drained into the ground

Parameters	Units	Permissible Limits
Faecal coliforms	CFU/100ml	0
E. coli	Org/100ml	0
Suspended solids	mg/l	15
Residual chlorine	mg/l	0.8
Temperature	°C	Not more than 3 °C above the receiving water
pH	-	6-9
Nitrates as N	mg/l	6
Free ammonia as NH <sub>3</sub>	mg/l	5
Ortho-phosphate as P	mg/l	1
Surfactants	mg/l	10
Electrical Conductivity	µS/cm	Equal or less than receiving groundwater
Oils and grease (food related)	mg/l	5
Oils, grease and waxes (mineral origin)	mg/l	1
Hydrocarbons (fuel origins)	mg/l	0
Chemical Oxygen Demand (5 days)	mg/l	5
Biological Oxygen Demand (5 days)	mg/l	5
Dissolved Oxygen	-	75% air saturation
Phenolic compounds as Phenol	mg/l	1
Arsenic as As	mg/l	0.05
Calcium as Ca	mg/l	80
Cyanides as Cn	mg/l	0.5
Chloride as Cl	mg/l	200
Sulphides as S	mg/l	0.05
Sulphates as SO <sub>4</sub>	mg/l	250
Fluoride as F	mg/l	1
Sodium as Na	mg/l	200
Zinc as Zn	mg/l	5
Cadmium as Cd	mg/l	0.005
Mercury as Hg	mg/l	0.02
Selenium A Se	mg/l	0.05
Nickel as Ni	mg/l	1
Boron as B	mg/l	0.5
Hexavalent Chromium as Cr	mg/l	0.05
Total Chromium as Cr	mg/l	0.5

Copper as Cu	mg/l	1
Lead as Pb	mg/l	0.1
Iron as Fe	mg/l	1
Manganese as Mn	mg/l	0.1
Magnesium as Mg	mg/l	100
Aluminum as Al	mg/l	0.3
Sum of metals	mg/l	1
Acute Toxicity	-	Zero

## Annex 4

**Guideline on preparing cesspit, septic tank and drainage pit.****1. Cesspit****(a) Determining a place**

Cesspit and drainage pit shall be kept as far as possible from the water well. It should be ensured that at least 15 meters are maintained between the water well and cesspit and between the water well and drainage pit. And if there are two drainage pits, it should be ensured that at least 10 meters is maintained between them.

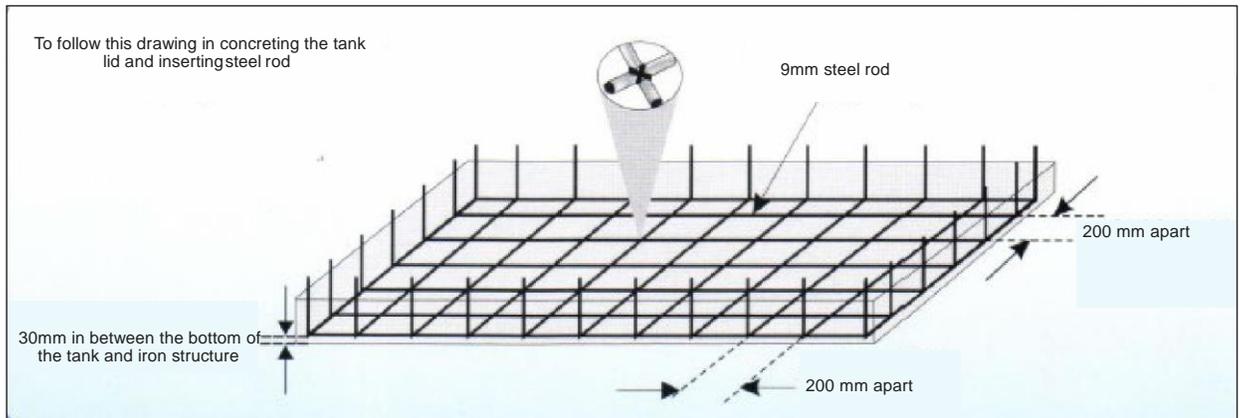
**(b) Avoidance of sewage seepage**

It is very important to keep the cesspit closed to ensure that there is no leakage. That is if sewage from tank seeps or leaks into the ground, the sewage will contaminate the groundwater. For this reason, a waterproofing agent (compound) should be added to the bottom (base) and top (top cover) of the tank if available, when preparing the required concrete. Once the tank is completed, it should be filled with water before use and tested for any leaks from any part of the well.

**(c) Building a strong cesspit**

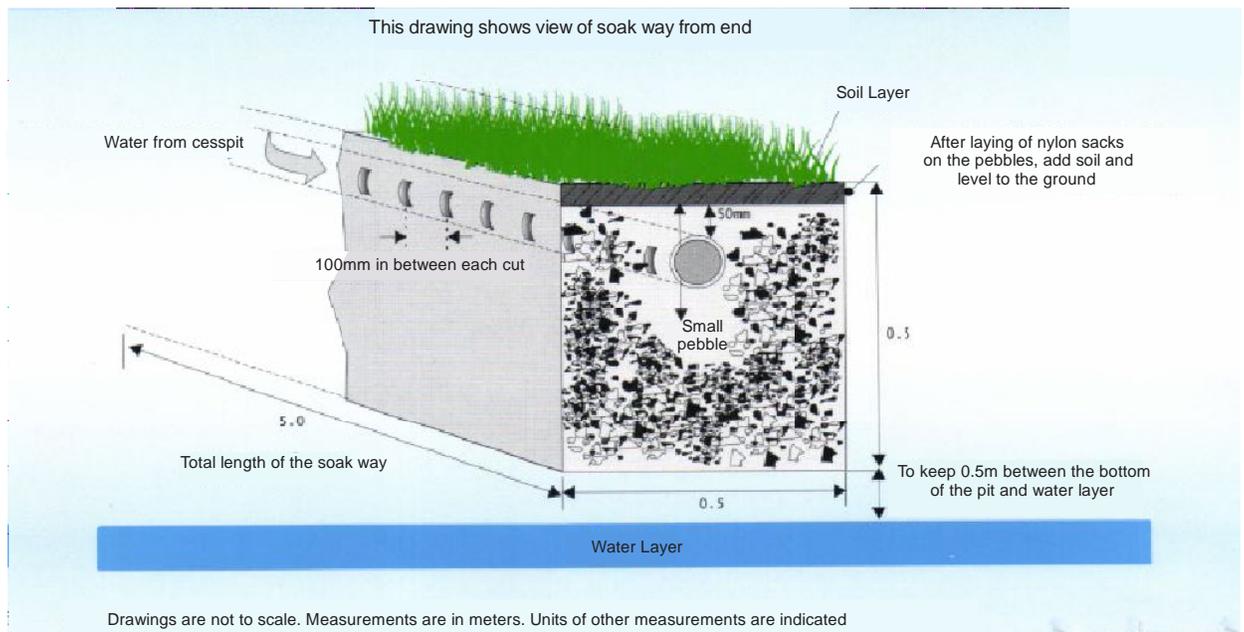
Cesspit shall be strong enough to hold the weight of the sewage and wastewater discharged into it. The weight of 1 liter of water is 1 kilogram. Therefore, a 2000 liter tank that is half full will weigh 1 ton. The base of the pit shall be made of concrete and steel, through the insertion of a steel rod. Inserting 9mm steel rod from each 200mm will be favorable. The tank's base must be constructed on the ground using formwork. After leveling the bottom of the excavated pit, the concrete base will be poured on it. The figure below depicts how the bottom of the pit should be.

## Drawing: 1

**(d) Preparing the cesspit in the correct measurements and completing its parts**

Cesspit shall be prepared, according to the measurements shown in the drawing. This is a good a measurement to fit in a squat toilet, in a household of 8 people. This cesspit shall be emptied in every 5 (five) years. If it is used by more than 8 people or if flushing toilet (sitting toilet with tank) is used, the cesspit shall be emptied in every 3 (three) years. It should be in rectangular shape with two compartments. The first compartment shall be twice the size of the second compartment. The drawing shows how to prepare a proper cesspit with all the necessary parts.

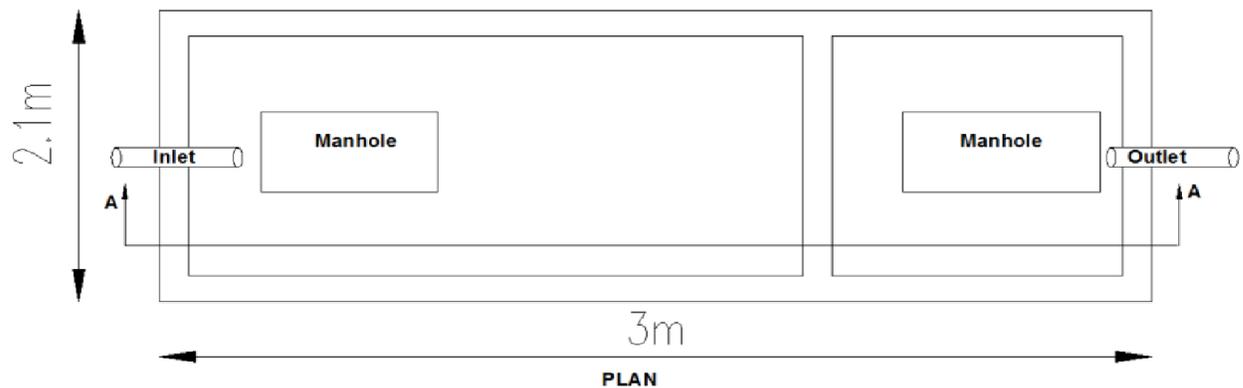


**Drawing: 3****2. Septic tank****(a) Preparation of septic tank**

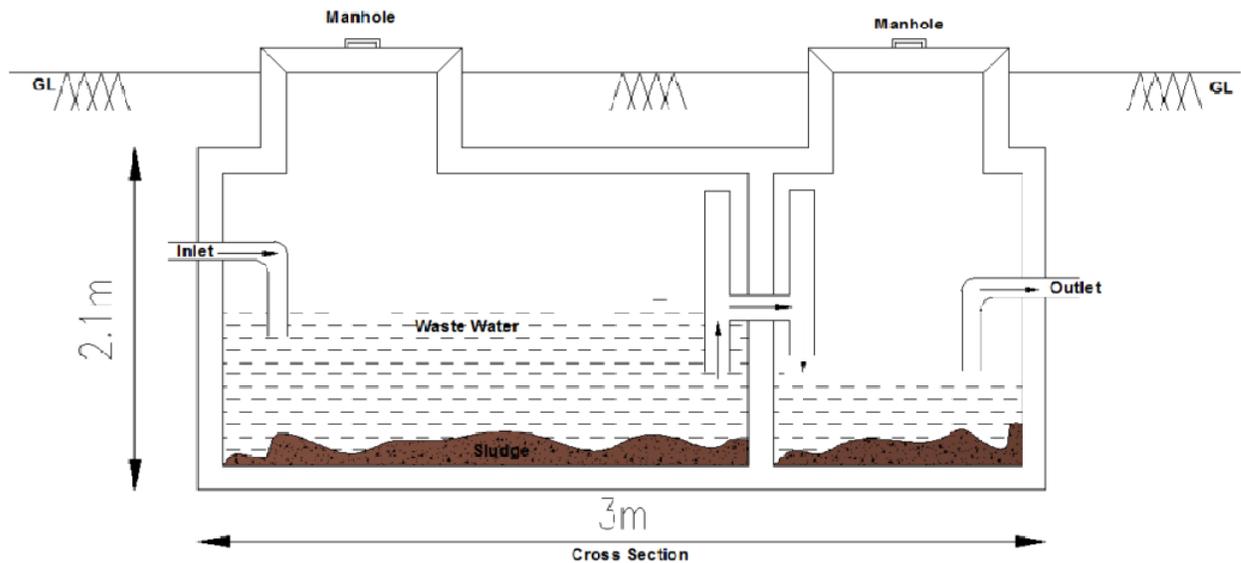
- (1) The septic tank should be installed, as far as possible from the water well. Between the nearest water and the septic tank, there shall at least be 15 meters.
- (2) Dig a pit large enough to hold a tank shown in drawing 4, level and harden the soil at the bottom of the pit.
- (3) Concrete the bottom of the tank by placing plywood formwork near the pit. While concreting insert steel rod (crisscross) from each by 200 mn
- (4) When the concrete bottom is dry, insert into the pit and level it. Afterwards, the walls of the tank can be prepared with concrete or built with stone. While preparing the walls, pipes going in and out should be inserted. Before inserting these pipes, apply glue to the outside of the pipe, to the level to be inserted into the wall, and coat with sand. The purpose of this is to connect the pipe and wall properly and seal it.
- (5) The cross wall between the two compartments of the tank can also be concreted. Or if preferred it could be built. There shall be two holes of 100 mm in this wall in order for the wastewater to pass from the first compartment into the second compartment.
- (6) Prepare a "T" or "elbow" from 100 mm PVC pipe and attach to the tank. To attach properly apply PVC glue and coat with sand.
- (7) It is important to attach a "baffle" to prevent particles floating in the water from going inside the pipe. And the use of a "T" here will make it easier to clean the pipe through insertion.

- (8) Inside of the tank (on the walls), shall be covered with cement of 20 mm thickness. For this purpose, "sulphate resistant" shall be used. And if available, "bituminous paint" can be applied to make it waterproof.
- (9) The lid of the tank should also be prepared on the ground using formwork. While preparing the tank lid, there shall be 2 holes of 600 mm diameter on the tank lid. And small lids to be placed on these holes shall also be prepared.
- (10) Inside of the tank lid shall be covered with sulphate resistant. And it should be cemented and painted with bituminous paint.
- (11) In the pipe connecting the toilet and the septic tank, a septic vent pipe shall be installed as near as possible to the toilet. The septic vent pipe shall be of the height 4 (four) meters and shall be attached to a wall.

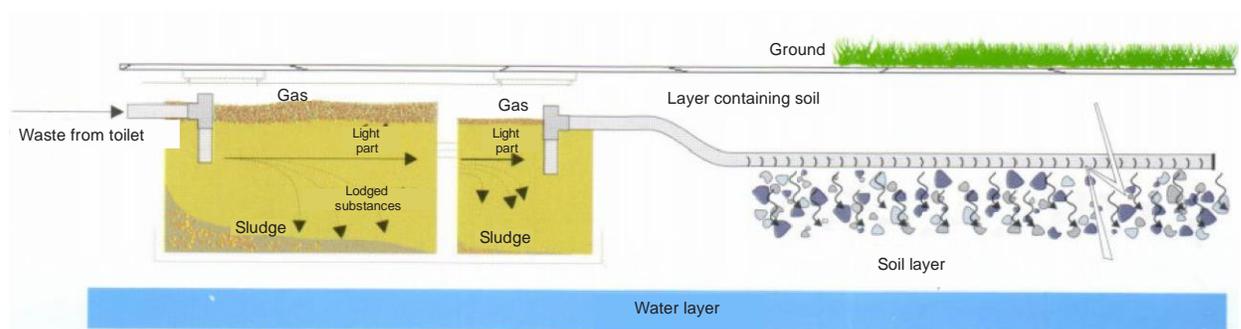
Drawing: 4 (a) - Top view



Drawing: 4 (b) – Side elevation



Drawing: 4 (c)

**(b) Testing the septic tank**

- (1) To test the tank for leaks, pour water into the tank and leave it. Check after 6 hours and if the water has lessened, it means there is a leak. If that happens, find the leak, seal the area with cement and apply bituminous paint.
- (2) To check if the septic vent pipe works, put a lighted paper inside the tank. When done so, if the vent works, the smoke shall travel through the pipe connected to the tank and come out of the septic vent pipe.

**(c) The drainage pit connected to the septic tank**

- (1) The drainage pit shall be as far as possible from the water wells. It should be at least 15 meters away from the nearest well. And it should be 10 meters away from the other drainage pits.
- (2) Cut a PVC pipe of 100 mm to the width of two hack saw blades. Between each cutting a length of 100 mm shall be maintained.
- (3) Dig a pit, half meter deep, from the water outlet pipe of the septic tank. The width of this pit must be half meter and 5 meter of length shall be maintained. Small pebbles must be kept inside the pit and this shall be done to the level of the water outlet pipe of the septic tank.
- (4) Connect the PVC pipe cut to the width of two hack saw blades, to water outlet pipe of the septic tank and place it in the pebbled, leveled. After that, again place pebbles on the pipe to the thickness of 50 mm.
- (5) Place, such as nylon sacks on the pebbles. This is to avoid soil from entering into the pit. Transfer the soil which was removed while digging the pit, into the sacks and level it to the ground.

**(d) Proper maintenance of the septic tank**

After the preparation of the cesspit and drainage pit, attention shall be given to regular maintenance during usage.

**(e) Desludging the cesspit connected to the septic tank**

If a tank prepared, according to the measurements shown in the drawing 4, is used by a household of 8 people, it shall be emptied in about every 5 (five) years. The level of sludge in the tank shall be checked intermittently. This can be done by lifting the removable lid and by the insertion of a stick. The tank is full when the increase in sludging reaches the bottom of the T attached to the pipe for carrying in sewage into the septic tank. If the sludge reaches above this, it may block the pipe for carrying in sewage and water into the tank, causing flooding of toilets. When removing the lid of the tank, a thin layer of sludge may be observed which is a common occurrence. This thin sludge layer will enable disposal of sewage and it shall not be destroyed unless during the event of emptying the tank.

**(f) Disposal of sludge in the septic tank safely**

Mud (sludge) removed from septic tanks, may have an adverse effect on health. As such, it should be disposed of in a correct and safe manner. The transfer of the sludge from septic tank to the disposal area shall be done cautiously and in a container like empty oil barrel, that can be properly sealed.

**(g) Emptying sludge from the cesspit**

Since, gases formed in the cesspit are dangerous to health and contain life-threatening hazardous substances, a person should not climb into it unless otherwise required. Even in such a situation, after opening the lid of the tank, it shall be left open for at least 1 (one) hour, before entering. And the person shall not stay inside the tank for more than 10 minutes. If working inside the tank, another person must stay close by for assistance to help climb out of the tank, in case of headache or dizziness due to gas. The best way to empty sludge from a cesspit is by using a pump.

Below stated is the procedure for emptying sludge from the cesspit.

1. Find a container or similar item in which sludge or sewage can be sealed properly and carried easily.
2. Remove both the lids of tank.
3. If there is water in the first compartment, remove the water with an item such as a ladle, and pour it into the second compartment and close the lid of the second compartment afterwards.
4. Next, remove the sludge from the first compartment and put it into the designated container. Continue to do this until the greater portion of the sludge is removed.
5. Fully emptying the tank of sludge is not appropriate. Hence, sludge must be kept at the bottom of the tank to a thickness of 100mm. If the tank is emptied of sludge, it may destroy the germs responsible for disposal of sewage.
6. It is not proper to wash the tank using chemicals like chlorine as it may kill the germs.
7. During the time in which the tank is open, if there is oil or such fat present near the sewage in and out pipes, it should be removed.
8. After the cleaning process, place the first lid and seal it properly. Afterwards, if there is any spillage of sludge outside the tank, clean properly and wash with chlorine water.