Guidance Notes for Rainwater Harvesting Systems

Revision 1: October 2024
Revision 2: February 2025

Contents

1 Objectives

This document provides guidelines to Owners, Developers, Qualified Persons and Licensed Plumbers on the Conditions and Requirements for rainwater harvesting (RWH) systems. The document also serves to inform Owners, Developers, Qualified Persons and Licensed Plumbers of the charges on the usage of harvested rainwater and the implementation approach to facilitate this for both existing and proposed RWH systems.

2 Background

The construction of RWH systems is regulated under Section 31 of the Sewerage and Drainage Act 1999, which prohibits the construction of any works for taking or intercepting water from any place or sea within the territorial limits of Singapore without PUB's approval. The Owner, Developer and Qualified Person shall comply with the Conditions and Requirements stipulated herein.

3 General Conditions

(a) The harvested rainwater is only allowed for non-potable use. The Owner shall ensure that the harvested rainwater is used for the approved purposes only.

(b) Any transaction or sale of the harvested rainwater within water catchments, by the Owner to other parties for use at other premises, is not allowed.

(c) In the event of excessive drought, which is to be assessed and determined by PUB, the Owner shall, for the purposes of conservation of water resources, upon receiving such direction from PUB, forthwith cease using the rainwater collected by the RWH system.

(d) The Owner shall ensure that the RWH system is designed with a bypass system to allow the rainwater to be channelled directly into any drain or watercourse, upon any direction issued pursuant to paragraph 3(c) above.

(e) Prior to the installation of the RWH system, the Owner or Developer shall appoint an appropriate Qualified Person to prepare the submission and supervise the installation of the RWH system.

(f) The harvested rainwater may be collected and discharged by gravity or through pumping. As such, an appropriate Qualified Person shall endorse and submit the Application according to the mode of collection of and/or discharge from the RWH tank or collection system (e.g. pond) for the intended usage. When the mode of collection and discharge is by gravity, a Professional Engineer (Civil) shall endorse and submit the Application. When the mode of collection and/or discharge is by pumping, a Professional Engineer (Mechanical) shall endorse and submit the Application. If relevant and

applicable, the submitting Qualified Person shall include plan(s) endorsed by other Qualified Persons for their Application.

(g) The Owner shall notify PUB in writing if there is any alteration or deviation to the approved RWH system during its operation. Under such circumstances, PUB may require the Owner to lodge a new Application for the RWH system. PUB may impose additional conditions and requirements as it deems fit on the new Application.

(h) The Owner shall ensure that the RWH system is maintained during its operation according to the Operations and Maintenance Plan set forth in the Standard Operating Procedure (SOP) submitted.

(i) In granting any approval for the construction of RWH systems, PUB may, at its discretion, impose any other Conditions as it deems fit.

(j) When there is a change in Ownership of the RWH system, the Owner shall ensure that the new Owner is informed of all the Conditions that have been previously imposed, unless otherwise specified by PUB.

4 Imposition of Waterborne Tax (WBT)

(a) WBT will be imposed on the volume of rainwater used from 1 April 2025. The charges[1] shall apply to Owners of existing and proposed RWH systems of sizes above 350 m^3.

(b) PUB will install meters to quantify the volume of rainwater used. The Licensed Plumber shall ensure that the water services designed and constructed for RWH systems of sizes above 350 m^3 are suitable for PUB to install the meter(s) at the incoming mains[2] (if applicable) and outgoing mains, which are indicated by the positions of Meter B and Meter C respectively (illustrated in Figures 1 and 2)[3].

(c) If potable water, NEWater or raw water is used as a back-up supply to the RWH system, WBT will only be charged on the volume of water used (measured by Meter C), excluding the contribution from the back-up supply (measured by meters for the respective supplies, e.g. Meter B). The potable water, NEWater or raw water drawn from the incoming mains (measured by meters for the respective supplies, e.g. Meter A) will be charged as per normal.

[1] For more information on the WBT rates, refer to https://www.pub.gov.sg/Public/WaterLoop/Water-Conservation/Resources-on-Water-Efficiency-Measures/Alternate-Sources-of-Water
[2] Where potable water, NEWater or raw water are being used to top up the RWH system
[3] Figures are for illustration purposes only. Actual site configurations may differ

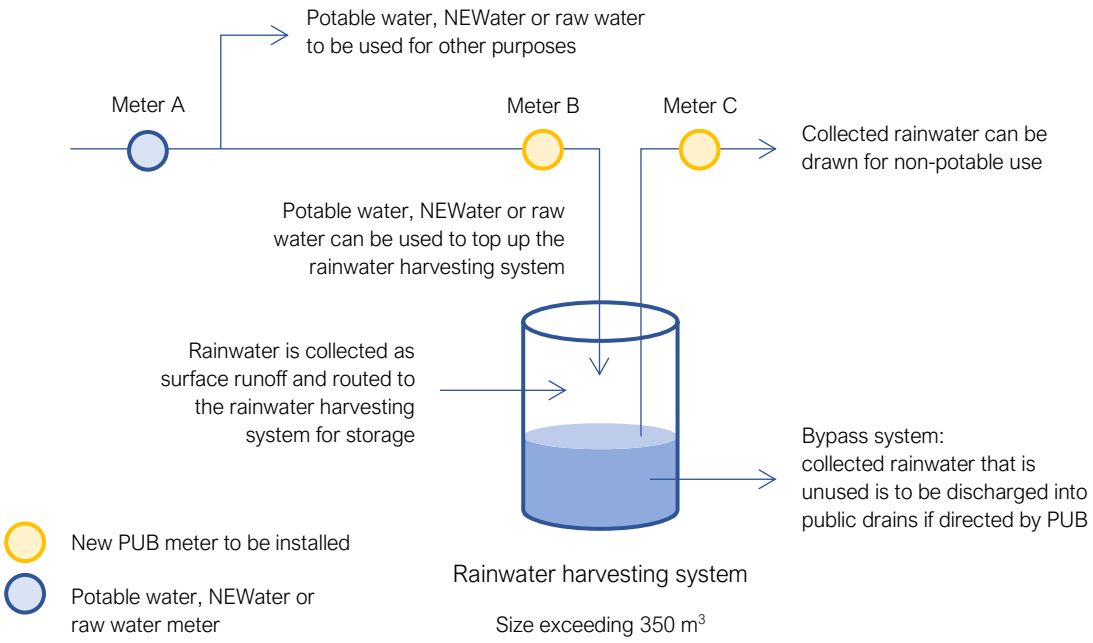


Figure 1 Computing the volume of used rainwater to be imposed with WBT (with back-up supply)

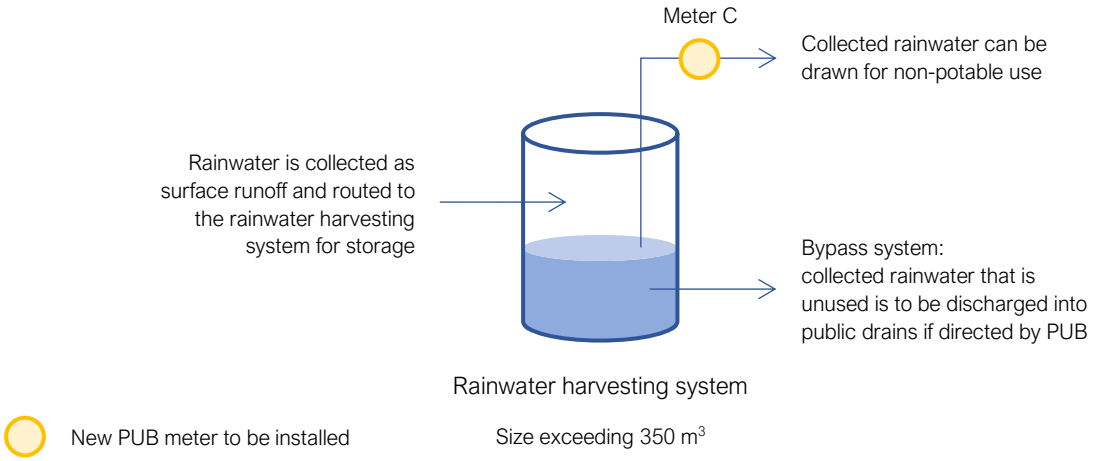


Figure 2 Computing the volume of used rainwater to be imposed with WBT (without back-up supply)

(d) Where harvesters have multiple tanks or collection systems (e.g. ponds), the volumes of the tanks or collection systems shall be aggregated if they fulfil any one of the following criteria:

i. They share the same catchment area;

ii. They have inter-connecting pipes to transfer rainwater to one another; or

iii. They discharge through the same reticulation system or eventually supply to the same area

(e) Should any other tax, charge or fee be levied in the future in relation to such use, collection or discharge of rainwater, the Owner shall pay such tax, charge or fee upon reasonable notice being given to the Owner by PUB.

5 Technical Requirements

5.1 Water Services Requirements

(a) Where there is a need to connect back-up supply to the RWH system, there shall be no inter-connection or cross-connection between the potable water/NEWater and non-potable water pipes.

(b) A vertical physical air gap of at least 150 mm shall be provided between the potable water/NEWater discharge point and the top of the tank to ensure no risk of contamination to the potable water/NEWater supply. Double check valves shall be provided immediately at the tee-off of the potable water/NEWater pipe serving the RWH system.

(c) The pipes and fittings which are served by the non-potable water system shall be clearly differentiated from the potable water/NEWater system by means of colour coding. The pipes shall be marked clearly at suitable intervals with the wording: “Non-potable water” and “Not for drinking”.

(d) For RWH systems of sizes above 350 m^3, provision shall be provided for meters to be installed, in accordance with Section 4.

(e) All Water Service Installation (WSI) works shall be carried out in accordance with the Public Utilities Act and its subsidiary legislations, and Singapore Standard 636:2018 Code of Practice for Water Services.

(f) All water fittings used shall comply with the standards and requirements stipulated by PUB, and their use in WSI works shall conform to the Public Utilities Act and its subsidiary legislations, and Singapore Standard 636:2018 Code of Practice for Water Services. The standards and requirements stipulated by PUB for water fittings can be found at the website https://www.pub.gov.sg/Professionals/Requirements/Water-Supply-Services/Water-Fittings#. In the event that the standards and requirements for a water fitting are not available, the Owner, Developer, Qualified Person or Licensed Plumber shall approach PUB to stipulate the necessary standards and requirements for compliance.

5.2 Pollution Control and Environmental Health Requirements

(a) The harvested rainwater shall be used strictly for non-potable purposes, and shall be limited to general washing (not including washing of hands or face, showering, bathing, and brushing of teeth, as these activities may lead to the accidental ingestion of the non-potable water), toilet flushing and landscape irrigation only. To prevent the unwitting use of the harvested rainwater for potable purposes, signages at points of usage shall be displayed clearly with the wording: “Non-potable water” and “Not for drinking”.

(b) The owner or operator of the RWH system shall implement the necessary management control and water quality monitoring measures to ensure that only clean and uncontaminated water will be collected by the system.

(c) Wastewater generated from the use of the harvested rainwater in general washing shall be collected and discharged into the public sewer in accordance with the allowable limits stipulated in the Sewerage and Drainage Act and Sewerage and Drainage (Trade Effluent) Regulations. Such wastewater shall not be discharged into any public drain or onto any land to prevent potential water pollution or land contamination issues.

(d) Rainwater from roofs or open spaces, and any unused or uncontaminated rainwater from the RWH system shall not be discharged into the public sewer. Instead, it shall be discharged in accordance with the allowable limits directly into a public drain, watercourse, or other collection medium in accordance with Singapore Standard 593:2013 Code of Practice for Pollution Control.

(e) The RWH system shall be mosquito-proofed in accordance with "Guidelines on Mosquito Prevention in Domestic Rainwater Collection System for Non-Potable Uses" which can be found at the website https://www.nea.gov.sg/docs/default-source/resource/guidelines-on-mosquito-prevention-in-domestic-rainwater-collection-system-for-non-potable-uses.pdf.

6 Requirements for Combined Detention-Rainwater Harvesting Systems

(a) Owners or Developers shall implement stormwater detention tank systems to manage peak runoff discharged from the development as required under Clause 7.1.5 of the Code of Practice on Surface Water Drainage. A RWH system can be co-located with the detention tank system within the same development. Notwithstanding that the purposes of a stormwater detention tank system and a RWH system are different, the QP can adopt a combined detention-rainwater harvesting system, subject to the following requirements (illustrated in Figure 3):

i. The required detention volume is independent of the rainwater harvesting volume i.e. the required detention volume shall always be available; and

ii. The required detention volume shall be restored within 4 hours after a storm event.

(b) Provided that the requirements in paragraph 6(a) are fulfilled, some possible configurations of a combined detention-rainwater harvesting system include (illustrated in Figure 4):

i. Pumping the water from the detention tank and storing in a separate secondary tank; or

ii. Designing a larger tank to cater for both detention and rainwater harvesting purposes, provided that the required volume for each purpose is catered for separately.

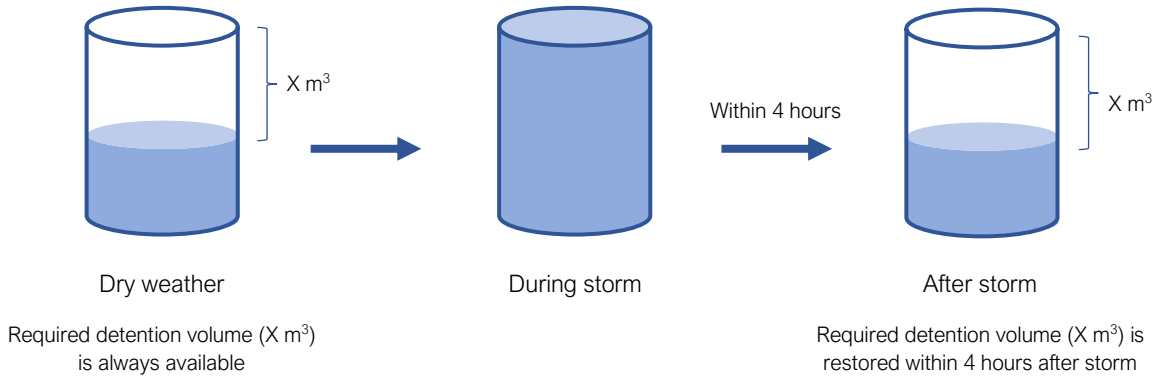


Figure 3 Design requirements for combined detention-rainwater harvesting systems

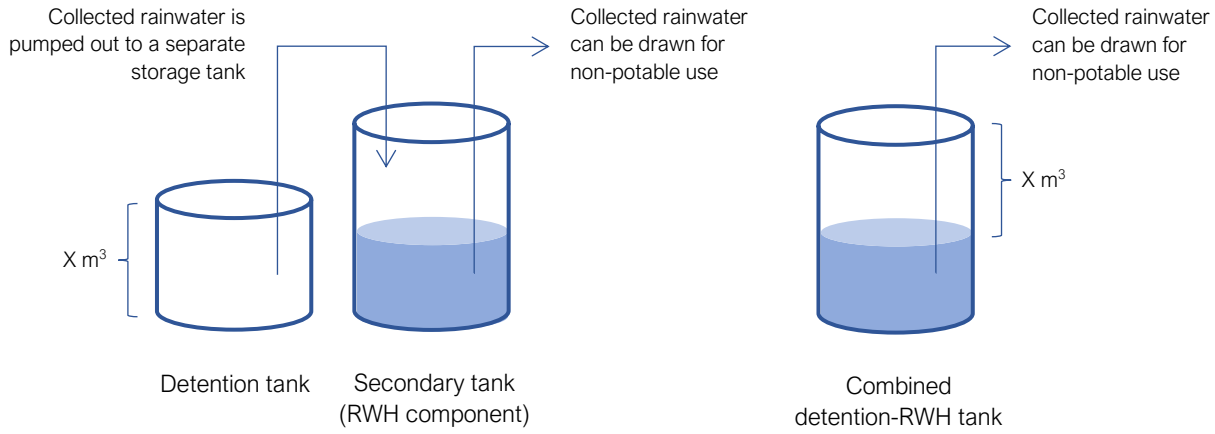


Figure 4 Possible configurations of combined detention-rainwater harvesting systems

7 Application Process for RWH Systems

(a) For enquiries and pre-submission consultations related to RWH systems, and submission of the RWH system Application, the Qualified Person may email the relevant documents in PDF format to Ms Ivy Poon at Ivy_Poon@pub.gov.sg and Mr Gan Chiat Kwang at Gan_Chiat_Kwang@pub.gov.sg.

(b) The processing time is 14 working days upon receipt of a complete Qualified Person's submission of all required documents. Please refer to Annex A for the submission requirements and application process for RWH systems.

(c) For RWH systems of sizes above 350 m^3, the Qualified Person shall include provision for meters to be installed in the submitted plans.

(d) The Notice of Approval will be granted once all relevant Conditions and Requirements have been complied with.

8 Water Service Installation (WSI) Requirements for Metering RWH Systems

(a) For RWH systems of sizes above 350 m^3, the Owner or Developer shall appoint a Licensed Plumber to prepare the existing or proposed RWH systems for PUB to install meters at the positions of Meter B (if applicable) and Meter C (illustrated in Figures 1 and 2) and make the necessary WSI submissions to PUB before commencement of work.

(b) The Licensed Plumber shall ensure that works are done in accordance with the Public Utilities Act and its subsidiary legislations, Singapore Standard 636:2018 Code of Practice for Water Services and all other relevant statutory requirements.

(c) The meter position shall be provided in accordance with the requirements stipulated in Singapore Standard 636:2018 Code of Practice for Water Services, inclusive of but not limited to the following:

i. Meter should be easily accessible for meter installation, meter reading and maintenance work, and shall not be obstructive;

ii. Meter shall not be located at roof level;

iii. Meter shall be housed in a suitable chamber or service duct whenever possible and proper drainage should be provided; and

iv. Meter measuring the RWH system outlet shall be installed after the booster pump, if any, and a filter shall be installed before the meter.

(d) The Licensed Plumber shall submit to PUB a Notification of WSI Works before the commencement of such works, and to submit a Certificate of Satisfactory Completion of WSI Works after the completion of such works via FormSG. PUB shall arrange to install the meters once the above submissions are in order. Please refer to Annex B for the submission requirements and application process for metering RWH systems.

Annex A

Submission Requirements and Application Process for RWH Systems

(a) Submission Requirements

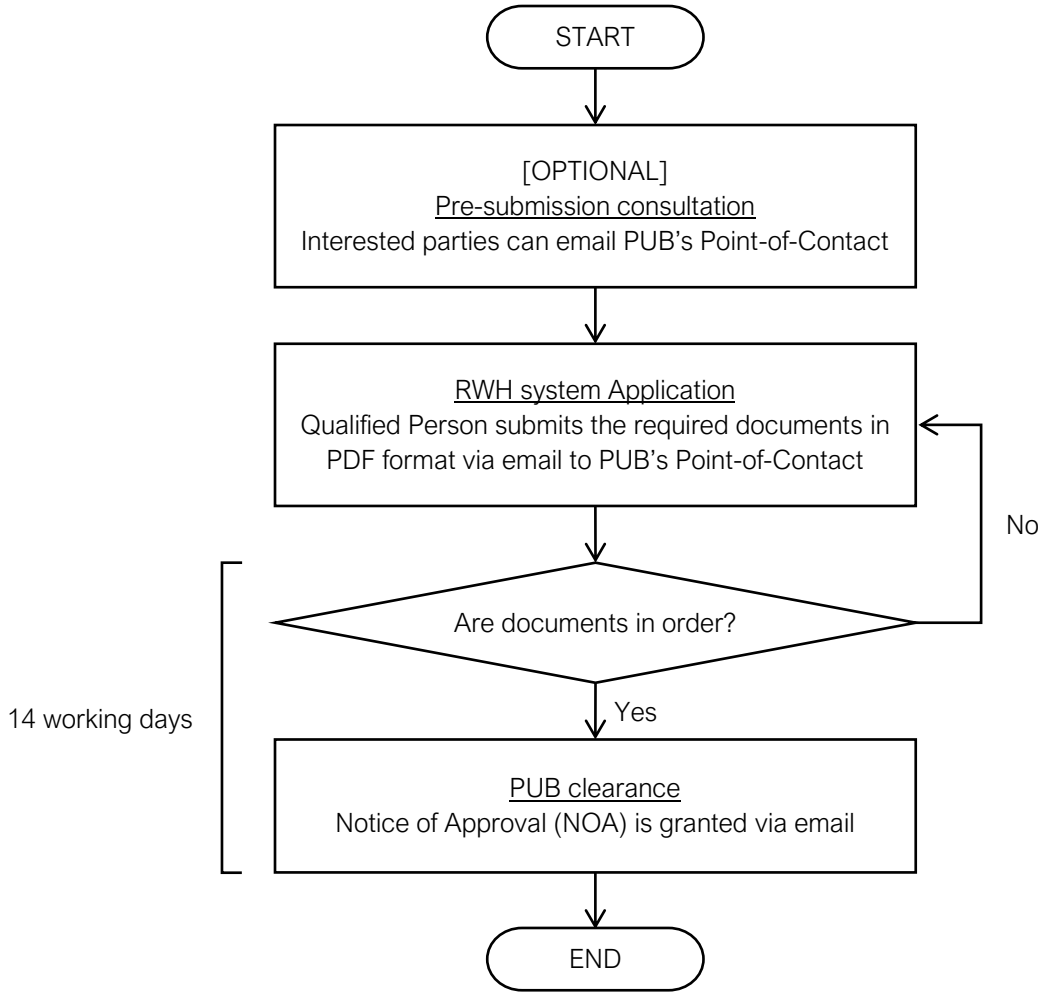
Item	Details
Cover letter*	BCA project reference number (if applicable)
	Project title
	Owner's/Developer's name, email and postal address
	Standard endorsement by QP: "I, _____, the QP, hereby confirm that the design, operation and maintenance of the rainwater harvesting system submitted under this Application complies with Sections 3 and 5 of the prevailing Guidance Notes for Rainwater Harvesting Systems."
Technical write-up*	Catchment area for rainwater harvesting
	Purpose/usage of harvested rainwater
	Calculations on estimated daily usage (m^3/day)
	Calculations on RWH tank sizing
	Design provisions for the RWH system: - Bypass system (including location of bypass valves) - Plans for 7-day unused water inside RWH tank - Overflow design - Pre-treatment measures - Anti-mosquito measures - Usage of back-up supply to top up water - Used water conveyance
	Standard Operating Procedure (SOP) to operate and maintain the RWH system: - Operation during (1) normal storm event, and (2) bypass mode - Maintenance (washing of tank, inspection of tank and accessories, etc.)
Drawings*	Drawing bundle shall consist of: - Location plan - Site plan - Catchment plan - Floor plan (showing location of RWH system, inlet drains serving the RWH system and detention tank, if any) - RWH system layout (showing plan and sections only)^ - Schematic diagram (showing source of collection to point of usage)#

* To be endorsed by the Qualified Person making the RWH system Application.

^ For a pumped RWH system, a Professional Engineer (Civil) may be required to design the structural details of the tank. Such details need not be submitted under the Application.

To include provision for meters for RWH systems of sizes above 350 m^3

(b) Overview of Submission Process for RWH System Applications



Annex B

Submission Requirements and Application Process for Metering RWH Systems

(a) Submission Requirements for Notification of WSI Works

Item	Details
Documents	RWH system Application NOA letter
	No Objection letter from Owner/Management
	Master meter serial number (if applicable)
Drawings	Drawing bundle shall consist of: - Layout plan of water pipe routing - Schematic diagram of water reticulation, meter arrangement and RWH system

(b) Submission Requirements for CSC of WSI Works

Item	Details
Drawings	As-built drawing bundle shall consist of: - Layout plan of water pipe routing - Schematic diagram of water reticulation, meter arrangement and RWH system

(c) Overview of WSI Works and Metering Process for RWH Systems