

3.4 Harvest and Use BMPs

Type of BMP	LID – Harvest and Use
Treatment Mechanisms	Volume Reduction
Minimum Tributary Drainage Area	This BMP is generally limited by the cistern / detention storage size.
Other Names	Cistern, Above-Ground Cistern, Underground Detention

Description

Harvest and use BMPs include both above-ground and underground cisterns / vaults. Such BMPs collect and temporarily store runoff for later non-potable uses including the following:

- Irrigation
- Toilet flushing
- Other non-potable uses, such as industrial processes

Above-ground cisterns collect and temporarily store runoff from rooftops or other above-ground impervious surfaces. Underground cisterns include subsurface tanks, vaults and oversized pipes that temporarily store runoff for later use. These systems can include pipes that divert runoff to the cistern, an overflow system for when the cistern is full, a pump, and a distribution system to supply the intended uses.

Siting Considerations

- The primary feasibility consideration for harvest and use BMPs is the presence of a consistent and reliable demand that is sufficient to drain the BMPs between storms. When designing harvest and use systems for stormwater management, a reliable method of quickly regenerating storage capacity (through the use of the captured stormwater) must exist to ensure that there will be adequate storage capacity for subsequent storms in the wet season.
- Other feasibility considerations include potential conflicts with health and plumbing codes. Applicable health codes focus mainly on the potential impacts of long-term standing water in the BMP facility.
- For above-ground cisterns, the facilities should be installed on a level surface, either on consolidated and stable native soil, or on a concrete pad. A geotechnical analysis is required to ensure stability.
- For underground detention facilities, **pretreatment** must be provided where necessary or as directed by the Engineering Authority, to prevent accumulation of sediments within the BMP. These facilities should be installed on consolidated and stable native soil. A geotechnical analysis is required to ensure stability.

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Key Design Elements

- All cisterns must:
 - Have provisions for mosquito prevention and abatement.
 - Have mechanisms to keep debris and animals from entering the cistern, and have a mechanism to easily clean any/all screens.
 - Have provisions for safe overflow of runoff when the cistern is full. Overflow shall be directed to an appropriate area as approved by the Engineering Authority. Dispersion within vegetated areas is preferred.
 - Have adequate access to maintain and/or replace the cistern and all associated equipment such as pumps. For underground cisterns / vaults, this includes access adequate to remove any/all accumulated sediment.
 - Be designed in a manner that allows for supplemental potable water to be used when there is insufficient harvested water to fully meet required demands.
 - Include measures acceptable to the local water supplier to prevent harvested storm water from being introduced into the potable water supply.

See the following figures for *examples* of common elements of above-ground and underground cisterns. The proposed design elements and configurations must be approved by the Engineering Authority.

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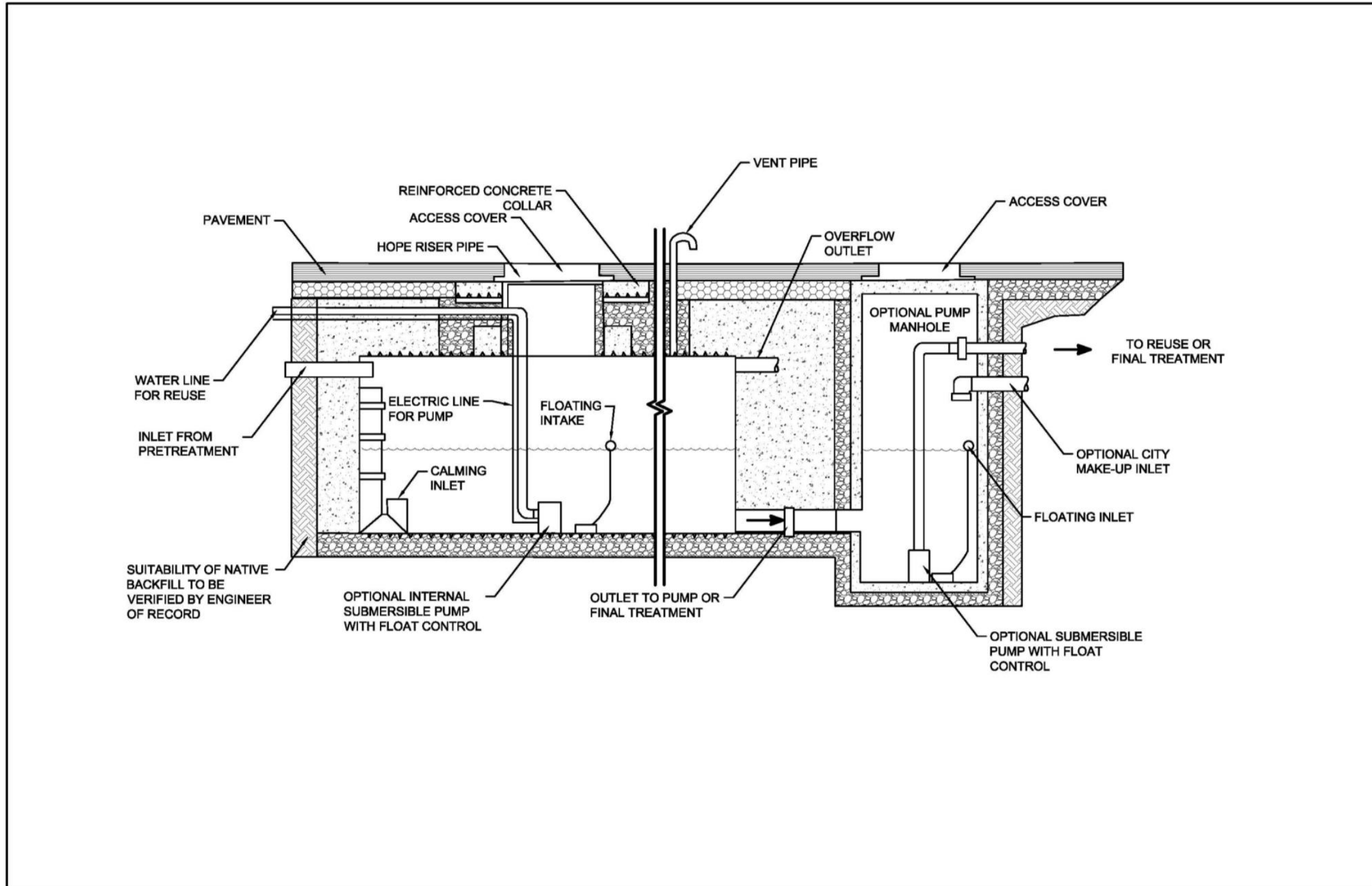


Figure 1 – Common Design Elements of Underground Cistern

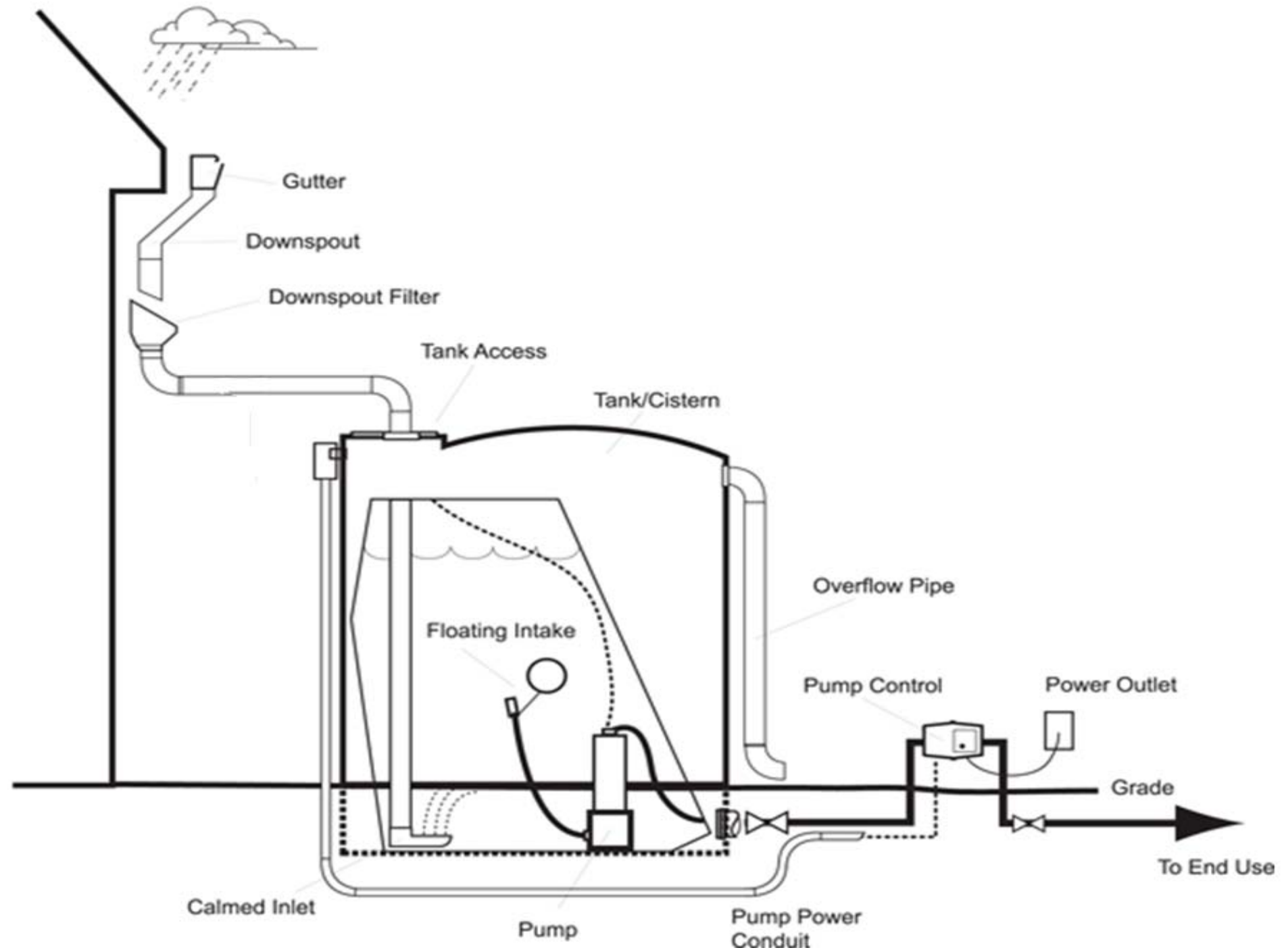


Figure 2 – Common Design Elements of Above-ground Cistern
Graphic courtesy of BRAE

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Design and Sizing Criteria

1. Assess whether there is sufficient and reliable (year-round) demand for non-potable use of the runoff from the area tributary to the BMP. Consider seasonal variations in demand for harvested water, such as irrigation needs during the wet season, periodic facility closures (such as for schools), etc. Verify with the Engineering Authority (EA) and the applicable WQMP for applicability requirements / restrictions for this BMP. The following potential on-site uses for harvested rainwater are typically assessed:
 - a. Irrigation use
 - b. Toilet use
 - c. Other non-potable uses (i.e. industrial use)
2. If there is a sufficient on-site demand for harvested rainwater acceptable to the Engineering Authority, determine the Design Capture Volume, V_{BMP} , determined from Section 2.1 of this Handbook.
3. Size the cistern to hold and allow for the use of the Design Capture Volume, in accordance with any manufacturer specifications.

Inspection and Maintenance Schedule

Schedule	Activity
Annually before the wet season	<ul style="list-style-type: none">• Check for debris and sediment on screens and overflow facilities and remove where observed.• Verify proper operation of all pumps.• Check integrity of downspout connections to harvest and use BMPs• Check locking mechanisms on facility entry covers• Check integrity of mosquito screens
After storm events	<ul style="list-style-type: none">• Check for long-term standing water in the facility. If standing water is observed more than 72 hours after the last storm event, monitor water levels, and verify that the water is being drawn down through the intended use of the water. If water is not properly being drawn down ensure that all pumps distribution systems are functioning correctly. Under no circumstances shall water retained within a cistern be pumped or otherwise drained in a manner that could allow a discharge to a street or storm drain.• Remove debris and sediment from screens and overflow facilities