



guidelines for onsite wastewater treatment

Wastewater Treatment Requirements for Developments Outside the West Bay Beach Sewerage System (WBBSS) Service Area

Note

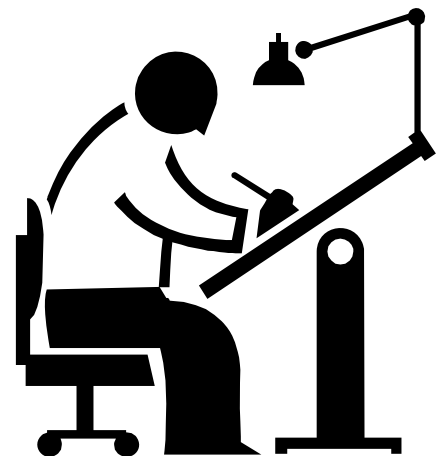
The following information is provided for general reference only. Specific requirements are set out by Development Control after reviewing plans submitted via the Planning Department. Requirements set out by the Water Authority then become conditions of Planning Permission.

All developments outside the West Bay Beach Sewerage System collection area are required to provide on-site wastewater treatment. No person shall construct, install, or modify any onsite sewage treatment system without first obtaining written approval from the Authority.

LOCATION AND INSTALLATION

All systems shall be located and installed so that with proper operation and maintenance the systems function in a manner that does not create sanitary nuisances or health hazards and does not endanger the safety of any domestic water supply, groundwater or surface water. Sewage waste and effluent from onsite sewage treatment and disposal systems shall not be discharged onto the ground surface or into ditches, drainage structures, surface waters, or aquifers. To prevent such discharge or health hazards:

1. Adequate area shall be reserved for the treatment plant. On-site systems shall be located at least 75 feet from a potable well and at least 100 feet from the mean high waterline of any water body (sea, lakes, canals, etc.) . The location shall comply with the minimum setback requirements of Planning.
2. All treated effluent shall be discharged into a disposal well. The disposal well shall be constructed in strict accordance with the Authority's standards.
3. Special consideration shall be given to the elevation of the treatment system:
 - Surface water should drain away from a treatment system.
 - The elevation of the treatment system shall allow gravity-flow of the treated effluent into the disposal well.
 - The discharge pipe from the treatment system shall enter the disposal well at a height of at least two feet above the water table level in the well.
4. If a lift (pump) station is necessary to allow gravity-flow from the effluent discharge pipe to the disposal well, the lift station shall be installed upstream of the treatment plant. Full details of any proposed lift station (i.e., size of wet well and pump specifications) shall be submitted to the Water Authority for approval.
5. All systems shall be located and installed to allow access for operation, maintenance, inspection and sampling. The systems should be installed in a secure manner to prevent tampering or accidents.



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- If more than one system is used to achieve the required capacity, they shall be of equal size and shall be installed in parallel. The split to the systems shall be gravity flow; i.e., not pressurized. The mechanism to split the flow shall be approved by the WA.

DESIGN FLOWS

Requirements for wastewater treatment systems are based on the **total estimated wastewater flow generated on a given parcel**. The total estimated daily wastewater flow on a single parcel of land is calculated for all development on a parcel (proposed and existing), using factors found in Appendix I.

For any given parcel where wastewater flows are estimated to be <1,800 gallons per day (gpd), a septic system may be utilized for wastewater treatment. Refer to Appendix II to determine the capacity of septic tank that will be required for the estimated flows.

If wastewater flows are estimated to be $\geq 1,800$ gpd, Aerobic Treatment Unit(s) (ATU(s)) are required for the treatment of all wastewater generated on the given parcel. The minimum treatment capacity of ATU required is equivalent to the estimated gpd calculated. ATUs are available in various capacity sizes.



SEPTIC TANKS

Septic tanks provide primary treatment; i.e., removal of solids that sink or float and are retained in the tank while effluent from the midlayer discharges to the disposal well. Requirements for septic tanks are based on the design and sizing criteria found in Appendix III.

AEROBIC TREATMENT UNITS (ATUs)

ATUs, often referred to as “package plants”, provide secondary treatment by mechanically introducing oxygen and mixing into the wastewater, which reduces pollutants contained in primary treatment effluent.

ATU REQUIREMENTS

ATUs must have third-party certification from a recognized institution, such as the National Sanitation Foundation (NSF), that the system is capable of producing an effluent of $\leq 30\text{mg/l}$ BOD5 and 30mg/l Suspended Solids.

The developer is required to submit detailed plans for the proposed ATU to the WAC for approval. Various approved makes and models of ATUs are currently available from vendors on the Island. Contact Development Control for an updated listing. Proposals for other ATU makes and models will be considered upon receipt of product literature that includes design specifications and third-party certification.

Custom ATU designs will only be considered for applications where, due to strength or volume of wastewater generated, flows cannot be accommodated by readily available certified ATUs. Custom designs must be by a professional engineer. Complete proposals

must be submitted at least 45 days prior to the date upon which a decision by the Authority is desired.

A professional engineer shall prepare the proposal documents submitted for review. The documents shall include an engineer’s report, plans and specifications.

- The engineer’s report shall include at a minimum, a description of the project, information regarding the volume and strength of wastewater that will be generated, the system’s design loading rates (hydraulic and organic), calculations including assumptions made and factors used in the functional design of the system and each of the component units.
- Plans shall include scaled drawings that clearly show the nature of the design, dimensions, elevations, and details of all facilities and appurtenances, a schematic flow diagram showing the flow through various plant units, piping and hydraulic profiles.
- Manufacturer’s specification sheets shall be included for all components; e.g. blowers, pumps, diffusers.

Proposals for custom systems will be reviewed in conformance with established design criteria.

By review of plans and specifications, the Water Authority assumes no responsibility for the successful operation of the facility so reviewed. It is the primary responsibility of the professional engineer designing such facilities as well as the owner/operator of such facilities to ensure that they will operate satisfactorily.

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Water Authority—Cayman

APPENDIX I: FACTORS FOR ESTIMATING WASTEWATER FLOWS

FACILITY	USE	gpd/unit
RESIDENTIAL SOURCES		
Single or multi-family dwellings. If ancillary rooms (e.g., den, study, media, etc) increase SF beyond range specified, use factor based on SF.	1 bedroom 750 SF or less	150
	2 bedroom 751 – 1200 SF	225
	3 bedroom 1201 – 2000 SF	300
	each add'l bdr or each add'l 750 SF	75
COMMERCIAL SOURCES		
Bars (separate establishment, minimal food service)	floor area SF	1.0
Barber & Beauty Shop	service chair	75.0
Grocery Store, with food preparation (e.g., deli, bakery or meat cutting) add for water closet	floor area SF	0.2
	each	200
Doctor and Dentist	practitioner	250
Hotel w/o kitchen	room	100
Laundry (self-service)	machine	200
Industrial building (may include: warehouse / showroom / office / service facility) requirements are min: no high water use; e.g. food prep, laundry, etc.	gross SF	0.1
	and water closet	100
Office	net SF	0.15
Retail Center (not including food service, bar, or other high-water usage)	net SF	0.15
Restaurant	dining area (in and outdoor) SF	1.8
Restaurant: carry out only (i.e., single service articles)	floor area SF	1.0
Service station w/ dry goods only convenience store add, for convenience store w/ food svc	water closet	250
	floor area SF	0.2
INSTITUTIONAL & PUBLIC FACILITIES		
Day Care	occupant	20
Hospital	bed	200
Nursing home	bed	100
Prison	inmate	120
Schools	classroom area SF (for pre& nursery schools, use indoor "play, nursery, etc." SF	No cafeteria or gym 0.75
		With cafeteria and/or gym 1.0
Hospital – Cat & Dog	gross SF	0.3
Kennel – Cat and/or Dog (require hair interceptor for kennel drains)	gross SF	0.1
Church * If classrooms comprise an academic school (i.e., 5 day/week; 6 hrs/day), calculate as under Schools	SF (Sanctuary + assembly hall + office + classrooms*) and	0.15
	SF (kitchen area)	1.0
Parks, Recreation Centers, Tourist Facilities: estimate peak hours (e.g., 4 for gyms, 8 for public parks & facilities near major tourist traffic, 4 for outlying parks,...) multiply peak hrs X # fixtures X gal / hour factor	water closet (3.5 g/use x 8.4 use/hr)	30 g/hr
	urinal	30 g/hr
	wash basin (1.4 g/use x 10 use/hr)	15 g/hr
	shower (17.2 g/use x 1.7 use/hr)	30 g/hr

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APPENDIX II: SEPTIC TANKS

SIZING CRITERIA

The table below shall be used to determine the minimum effective septic tank capacity required.

AVERAGE WASTEWATER FLOW (U.S. gallons / day)	MINIMUM EFFECTIVE CAPACITY (U.S. gallons)
0-375	750
376 – 550	1,000
551 – 725	1,250
726 – 900	1,500
901 – 1,100	1,750
1,101 – 1,300	2,000
1,301 – 1,550	2,250
1,551 – 1,800	2,500

DESIGN CRITERIA

1. The design of the septic tank shall be such as to assure uniform horizontal flow throughout its entire length, permitting adequate retention and access for cleaning.
2. Septic tanks shall be watertight and constructed of sound and durable materials not subject to excessive corrosion, decay or to cracking or buckling due to settlement or backfilling. Septic tanks shall be constructed in a workmanlike manner and designed to support the superimposed load without failure.
3. Septic tanks shall have two (2) or more compartments to achieve the required liquid capacity. The first chamber shall have a minimum effective liquid capacity of at least two-thirds of the total required liquid capacity. Additional chambers shall have a minimum effective capacity equal to or greater than one-half of the liquid capacity of the first chamber.
4. The total length of the septic tank shall not be less than two times the width. The minimum inside width of a septic tank shall not be less than 42 inches.
5. The total inside depth of the septic tank shall not be less than sixty (60) inches. The liquid depth of compartments shall be at least forty-eight (48) inches. Liquid depths greater than seventy-two (72) inches shall not be considered in determining the effective liquid capacity.
6. A minimum freeboard or airspace of twelve (12) inches between the liquid level and the underside of the cover slab shall be provided.
7. The normal dimensions for the required septic tank capacities shall be as stated in the table shown on Drawing I. Variation of these dimensions will be allowed

provided that the requirements as detailed in the sub-clauses 2 through 5 are still satisfied.

8. Each compartment shall have access provided by a twenty-four (24) inch wide square opening manhole or a twenty-four (24) inch diameter circular opening manhole. The manholes shall be located so as to allow access to the inlet and outlet devices. The manholes shall extend to finished grade.

9. The inlet invert shall enter the tank (2) to three (3) inches above the liquid level of the tank. A vented inlet tee shall be provided to divert the incoming sewage. The inlet tee shall have a minimum diameter of three (4) inches and shall extend at least sixteen (16) inches below the liquid surface, but not more than one-third of the liquid depth.

10. A minimum three (3) inch diameter vented outlet tee shall extend at least eighteen (18) inches below the liquid level of the tank, but not more than forty (40) percent of the liquid depth, and shall extend at least six (6) inches above the liquid level. The outlet tee shall be two (2) to three (3) inches below the invert of the inlet tee.

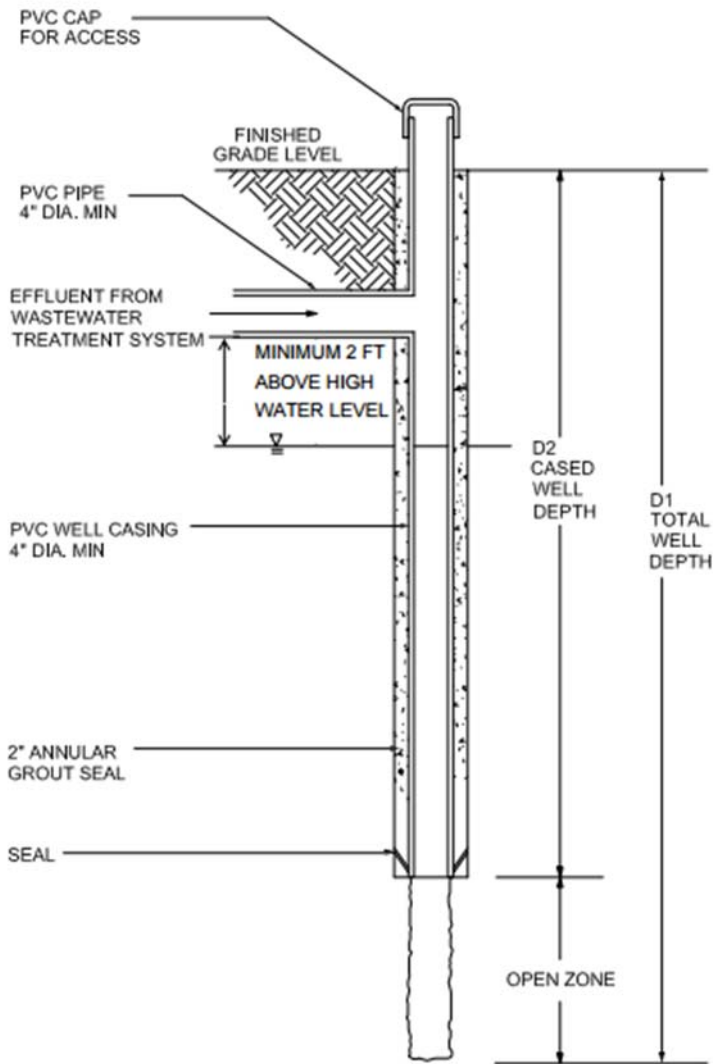
11. The inlet and outlet tees shall be located at opposite ends of the tank so as to be separated by the maximum distance possible and shall be attached in a watertight manner.

12. The first and second chamber shall be interconnected utilizing a tee with a minimum diameter of four (4) inches. The intake of the outlet tee shall extend at least twelve (12) inches below the liquid surface, but not more than one-third of the liquid depth, and shall extend at least six (6) inches above the liquid level.



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APPENDIX III: DOMESTIC EFFLUENT DISPOSAL WELL



NOTES

D1 AND D2

D1 is the minimum total depth of the borehole.
D2 is the minimum cased depth of the grouted casing.
D1 and D2 are site specific values determined by elevation and proximity to water features: fresh water lenses, excavations, and coastal zone.
The minimum depth of grouted casing is 40ft below the water table.
Contact the Water Authority at drillerinfo@waterauthority.ky for site specific requirements for D1 and D2.

OPEN ZONE (UNCASED PORTION FOR DISCHARGE)

The depth of the uncased portion of the borehole shall be minimum 10' and is dependent on the permeability of the formation.

GROUTED CASING (ANNULAR SEAL)

The annulus shall be sealed with cement slurry, mixed as 1 bag cement with 6 Gallons of potable water and placed by pumping through a tremie pipe. Alternatively bentonite pellets shall be placed in the annular space. Cavities may be bridged with 3/8" clean gravel or well cuttings.

DRAWING IS NOT TO SCALE

