Florida Department of Environmental Protection

Central District Drinking Water Permitting

Water Treatment Plant (WTP) Design Criteria

November 19, 2014



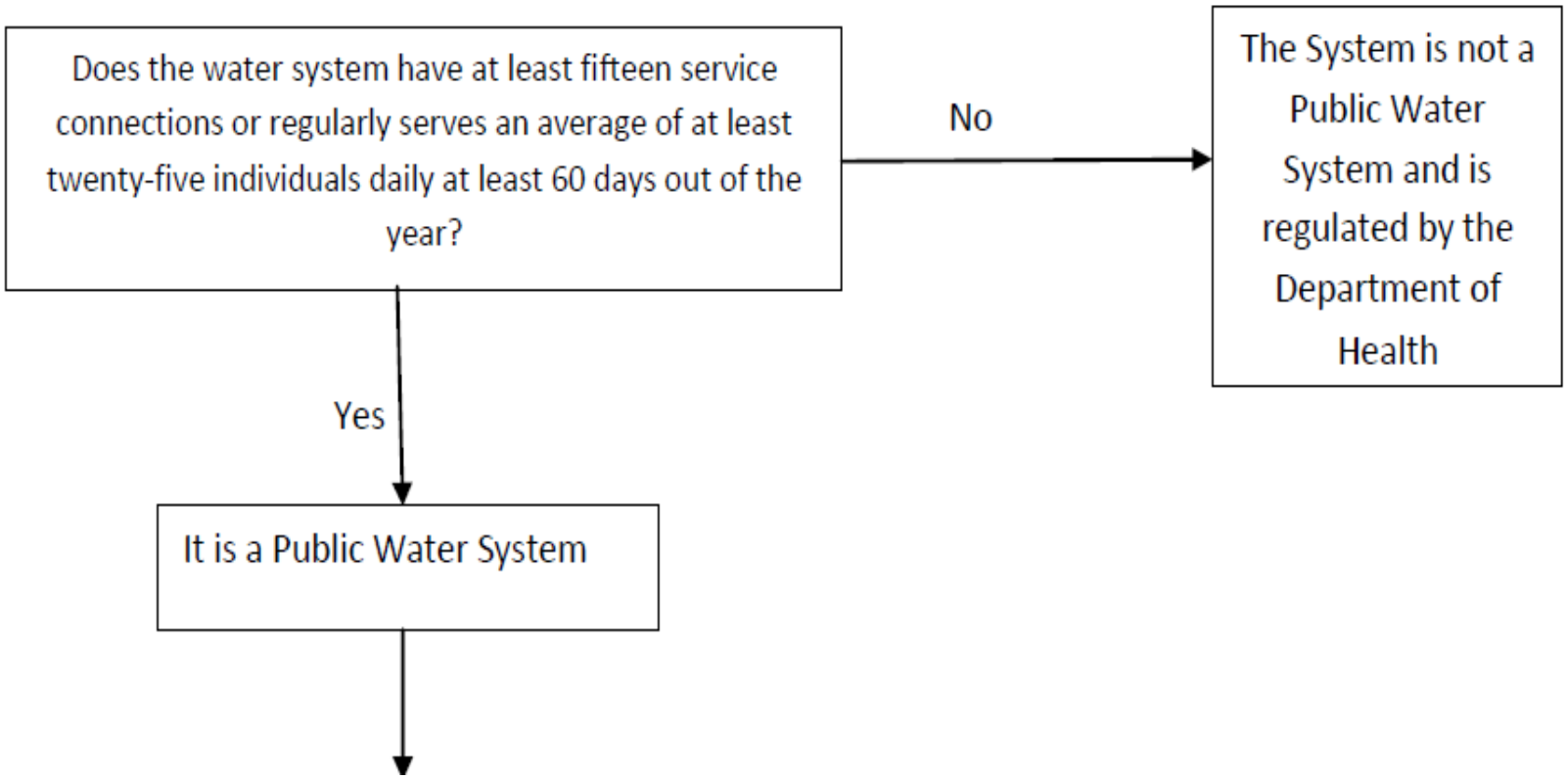


Presentation Summary

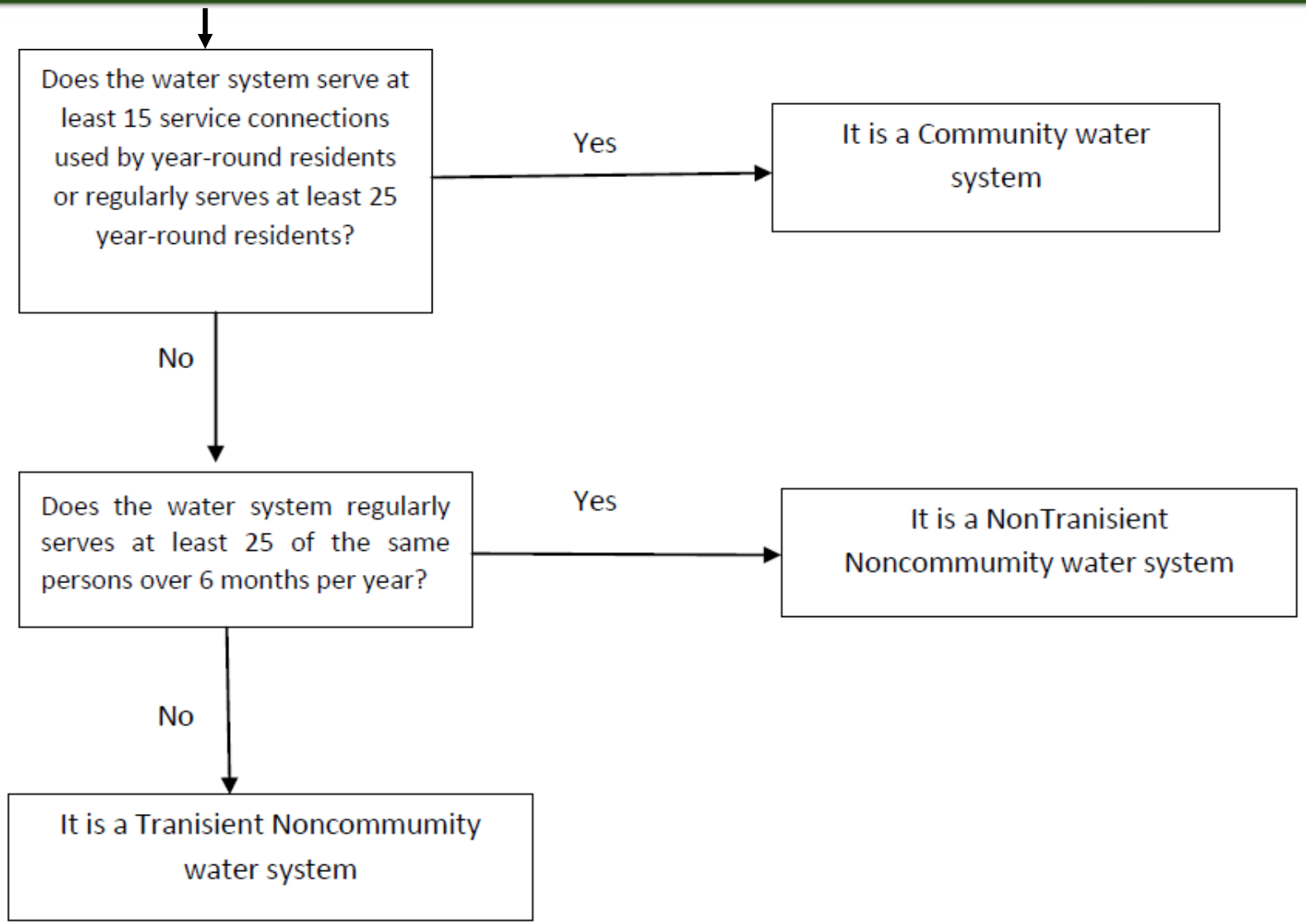
1. Water Treatment Plant Design
2. Water Treatment Plant Capacity
3. Well Permits vs. Consumptive Use Permits

Type of Water Systems

PUBLIC WATER SYSTEM



Type of Water Systems



Water Treatment Plant Design

- Use Recommended Standards for Water Works (Ten States Standards) since no checklist is available
- Not all items in TSS apply--discretion is recommended
- Use Chapter 62-555, F.A.C. as checklists for gas or liquid chlorine, required calculations, sampling, pumping, etc.
- Use other references as available per Chapter 62-555.335, F.A.C.

What is WTP Capacity?

- Optimum flow rate at which a water treatment plant is designed for
- Flows may exceed the capacity but it is not at the design or optimum flow
- You do not have to accept all of the capacity

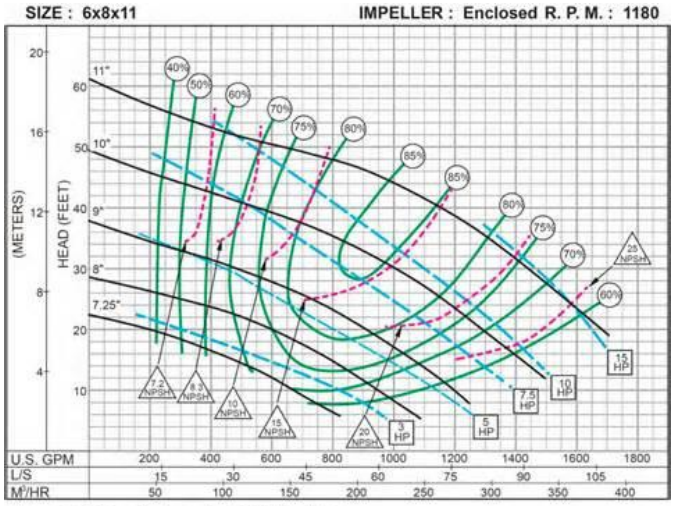


Figure 1: Manufacturer's Published Curve

Estimate Water Demand

Use Table 1 Estimated Sewage Flows in 64E-6.008, F.A.C.

TABLE I

For System Design

ESTIMATED SEWAGE FLOWS

TYPE OF ESTABLISHMENT	GALLONS PER DAY
COMMERCIAL:	
Airports, bus terminals, train stations, port & dock facilities, Bathroom waste only	
(a) Per passenger	4
(b) Add per employee per 8 hour shift	15
Barber & beauty shops per service chair	75
Bowling alley bathroom waste only per lane	50
Country club	
(a) Per resident	100
(b) Add per member or patron	25

Estimate Water Demand

- Add the flows up…this gives you the Average Daily Flow (ADF)
- Use ratios to calculate the Maximum Daily Flow (NDF) and Peak Hour Flow (PHF)
- DEP uses MDF/ADF = 2.25 and PHF/ADF = 4.5 unless there is historical data to use different ratios

A = Type of Service Connection	B = Number of Service Connections	C = Average Daily Water Demand Per Service Connection, gpd	D = Total Average Daily Water Demand[a], gpd (Columns BxC for Residential Service Connections)	E = Total Maximum-Day Water Demand[b], gpd
Single-Family Home			0	
Mobile Home			0	
Apartment			0	
Commercial, Institutional, or Industrial Facility[a]				
Total	0		0	

Use Monthly Operating Reports (MORs)

- Look at previous 12 months of MORs to determine the ADF and MDF. Compare with calculations

MONTHLY OPERATION REPORT FOR SUMMATION OF FINISHED-WATER PRODUCTION BY CWSs THAT HAVE MULTIPLE TREATMENT PLANTS

See page 2 for instructions.

Daily Finished-Water Production for the Month/Year of: September, 2014

Community Water System (CWS) Name: Silver Springs Shores

Public Water System (PWS) Identification Number: 3421197

	Plant 1 Name:	Plant 2 Name:	Plant 3 Name:	Plant 6 Name:	Plant 7 Name:	Plant 6 Name:	Plant 7 Name:	Plant 8 Name:	Name:	Name:	
	Silver Springs Shores WTP #1 B&C	Silver Springs Shores WTP #2 D	Silver Springs Shores WTP #3 G	Silver Springs Shores WTP #4 South Oak	Silver Springs Shores WTP #5 Deerpath						
	Permitted Maximum Day Operating Capacity of Each Plant, gallons per day										Total
Day of Month	2,880,000	720,000	1,500,000	720,000	915,000						6,735,000
	Net Quantity of Finished Water Produced by Each Plant, gallons										Total
1	455,000	0	580,000	0	0						1,035,000
2	990,000	0	803,000	0	0						1,793,000
3	952,000	0	920,000	0	0						1,872,000
4	825,000	2,000	908,000	0	2,000						1,737,000
5	945,000	39,000	760,000	1,000	1,000						1,746,000
6	732,000	0	803,000	0	0						1,535,000
7	733,000	3,000	804,000	0	0						1,540,000
8	1,037,000	0	669,000	0	0						1,706,000
9	843,000	0	749,000	0	0						1,592,000
10	843,000	0	740,000	0	0						1,583,000
11	1,029,000	1,000	724,000	0	0						1,754,000
12	961,000	0	684,000	0	0						1,645,000
13	777,000	0	789,000	0	0						1,566,000
14	777,000	0	790,000	0	0						1,567,000
15	1,035,000	0	709,000	1,000	0						1,745,000
16	883,000	0	849,000	0	0						1,732,000
17	838,000	0	702,000	0	1,000						1,541,000
18	802,000	0	706,000	0	0						1,508,000
19	882,000	1,000	706,000	0	0						1,589,000
20	815,000	0	738,000	0	0						1,553,000
21	816,000	1,000	738,000	0	0						1,555,000
22	857,000	0	742,000	0	0						1,599,000
23	895,000	1,000	676,000	1,000	0						1,573,000
24	431,000	1,000	1,010,000	0	1,000						1,443,000
25	782,000	0	752,000	0	1,000						1,535,000
26	798,000	0	722,000	0	1,000						1,521,000
27	858,000	0	931,000	1,000	0						1,790,000
28	764,000	0	682,000	0	0						1,446,000
29	764,000	1,000	682,000	0	0						1,447,000
30	787,000	0	651,000	0	0						1,438,000
											0
Total	24,906,000	50,000	22,719,000	4,000	7,000						47,686,000
Avg.	830,200	1,667	757,300	133	233						1,538,258
Max.	1,037,000	39,000	1,010,000	1,000	2,000						1,872,000

DEP Form 62-555.900(11)
Effective August 28, 2003

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Planning

Plan for the future; however, consider steps and milestones to progressively get there.

A WTP designed with too large of a capacity will find it hard to be in compliance. “More” is not necessarily better than “Less.”

WTP Capacity

- Capacity is based upon the Limiting Factor of the treatment process, i.e., well pumps, high service pumps, treatment capacity, storage capacity, etc.
- Capacity is based upon the MDF but there are other design criteria which must be met:
  - HS Pumps must meet peak hour flow (PHF)
  - Small hydropneumatic systems must meet Instantaneous Flow
- If no high service pumps (HSPs), well pumps act as HSPs for purposes of calculations

What is the Limiting Factor?

- Example 1*:
  - 2 well pumps@ 50 gpm:
    - 50 gpm x 2 pumps x 1440 min/day = 144,000 gpd
    - If no HSPs, then pumps must meet PHF
    - MDF = PHF/2: Q = 144,000 gpd/2 = 72,000 gpd
- Example 2*:
  - 2 well pumps@ 50 gpm: MDF = 144,000 gpd
  - 2 HSPs @ 75 gpm: 150 gpm x 1440 = 216,000 gpd
  - HSPs must meet PHF: PHF = 216,000/2 = 108,000 gpd
  - HSPs are the limiting factor so WTP is rated at 108,000 gpd

*(Assumes no FF or Elevated Storage)

What is the Limiting Factor?

- “Firm” capacities generally are not used for WTP capacities though the requirements have to be met
- Knowing the Limiting Factor can save $$$!

WTP Capacity vs. CAR

- **WTP capacity:**
  - In theory, may never be exceeded
  - Exceptions include readings during time differences, water main breaks, etc. which must be noted on the MORs

- **Capacity Analysis Reports (CAR):**
  - Based upon 75% of the water system's capacity
  - Required for future planning
  - Only for Community PWS with pops >3300
  - USE MORs for interconnected WTPs

WMD Well Permits vs. DEP Well Permits

- Well permitting was delegated from DER to the WMDs back in the 1970s & 1980s
- WMDs have delegated well permitting to some of the County Health Departments
- Well permitting thresholds vary from WMD to WMD
- DEP does NOT issue well or consumptive use permits
- DEP issues permits to **equip and connect** wells to water treatment facilities

DEP Equip & Connect to Wells

- Do not submit application until after the well has been constructed
- DEP only issues construction permits
- DEP only regulates Public Water Systems
- Contact DEP for the latest version of the well checklist