

3 – Determining levels of service for assets



MISSISSIPPI
Water and Pollution Control
Operators Association

Objectives

- Understand the concept and importance of level of service for an asset
- Understand the importance of the asset inventory in determining levels of service
- Understand multiple methods in determining a level of service score

The concept of “level of service”

- The overall thrust of the level of service concept is **how well do the assets provide the quality of water and levels of service that the system’s customers should have a right to expect**
- As the system operator – or member of a governing board – you have the knowledge to utilize the combination of the assets to provide this level of service
- “A chain is only as strong as its weakest link” – the water system is as weak as the lowest performing assets
- Each asset or asset group must be examined to determine how the asset or group can contribute to the level of service concept

Problems

- A great deal of lip service is devoted to level of service, but there are few guides
- Level of service means different things to operators, boards, customers
- Doubtful that anyone in this room could agree on an exact formula for level of service – but everyone has their own opinion

Defining level of service

- Most professionals agree that different water utilities provide different levels of service
- The absolute minimum level of service is strict adherence to regulations with no additional service being provided.
 - Regulations set only minimum standards of operation
 - Regulations can't address all areas of operation
- The maximum level of service would be the maximum capability of the assets
 - This level of service is likely not feasible
- The ideal level of service **for your utility** is someplace in this range

Beginning the process

- Asset Management Planning and Reporting Options (AMPRO – a part of the AWWA Research Foundation) identified three options for beginning a level of service definition
 - **Basic** – traditional concepts of valuation and service life are used to approximate conditions, estimate replacement and renewal (R&R) expenditures,
 - **High-end** – Utilize key performance indicators such as service outages and regulatory compliance.
 - **Strategic** – combining features of the other two methods, but including the financial effects and system effects of the R&R process. This is likely the most common choice in some form.

Incorporating customers into level of service ratings

- Other methods formally include customer perceptions into the level of service identification process
- Operators may be primarily concerned with the technical side of service – the provision of safe drinking water
- Board members have some interest in the technical aspects of providing water, but tend to lean more toward the financial side
- Customers may have very different ideas regarding what constitutes an **appropriate** level of service than do the operator and/or the board

Level of service questions

1. What is the level of service goals for health, safety, and security?
2. How often is the system out of regulatory compliance?
3. Are the system's operators properly certified?
4. How does the system stay aware of and prepare for new regs?
5. Does the system share its level of service goals with customers?
6. How are customer needs/complaints tracked and responded to?
7. How can our current processes be improved?
8. How quickly does management respond to customer issues?

Level of service questions

10. How much will the improvements cost and how will they be funded?
11. Are assets being properly maintained?
12. What areas within the system are most important to insure the best level of service possible?
13. Are asset ages, life cycles, conditions, costs, funding availability, etc., being considered in the level of service considerations?
14. How often will the level of service goals be reviewed and modified?

Technical quality versus functional quality

- When looking at the level of service, it may be easier to examine this as two different pieces – technical quality versus functional quality
- Technical quality – physical attributes perceived by the customer that can be measured, but in which the customer has little interaction
 - Water pressure
 - Water purity (clarity??)
 - Consistency of service
- Functional quality – supplementary services that directly affect customers
 - Accuracy of billing
 - Providing information

Technical quality versus functional quality

- The International Standards Organization provides detailed guidance for level of service metrics that can be divided into these groups
- Technical quality
 - Provision of the service – repairs, price of service, quantity of services, water quality, level of service, coverage of service (w.r.t. certificated area)
 - Protection of the environment – sustainable use of resources, environmental impact, wastewater treatment
- Functional quality
 - Billing – content of the service agreement, clarity of billing, accuracy of billing, response to billing complaints, methods of payment, payment management
 - Customer relationships – contact, professional responses (especially to unusual circumstances), information dissemination (i.e., social media), billing issues (fairness to all customers versus empathy to one)

Looking at assets from a level of service lens

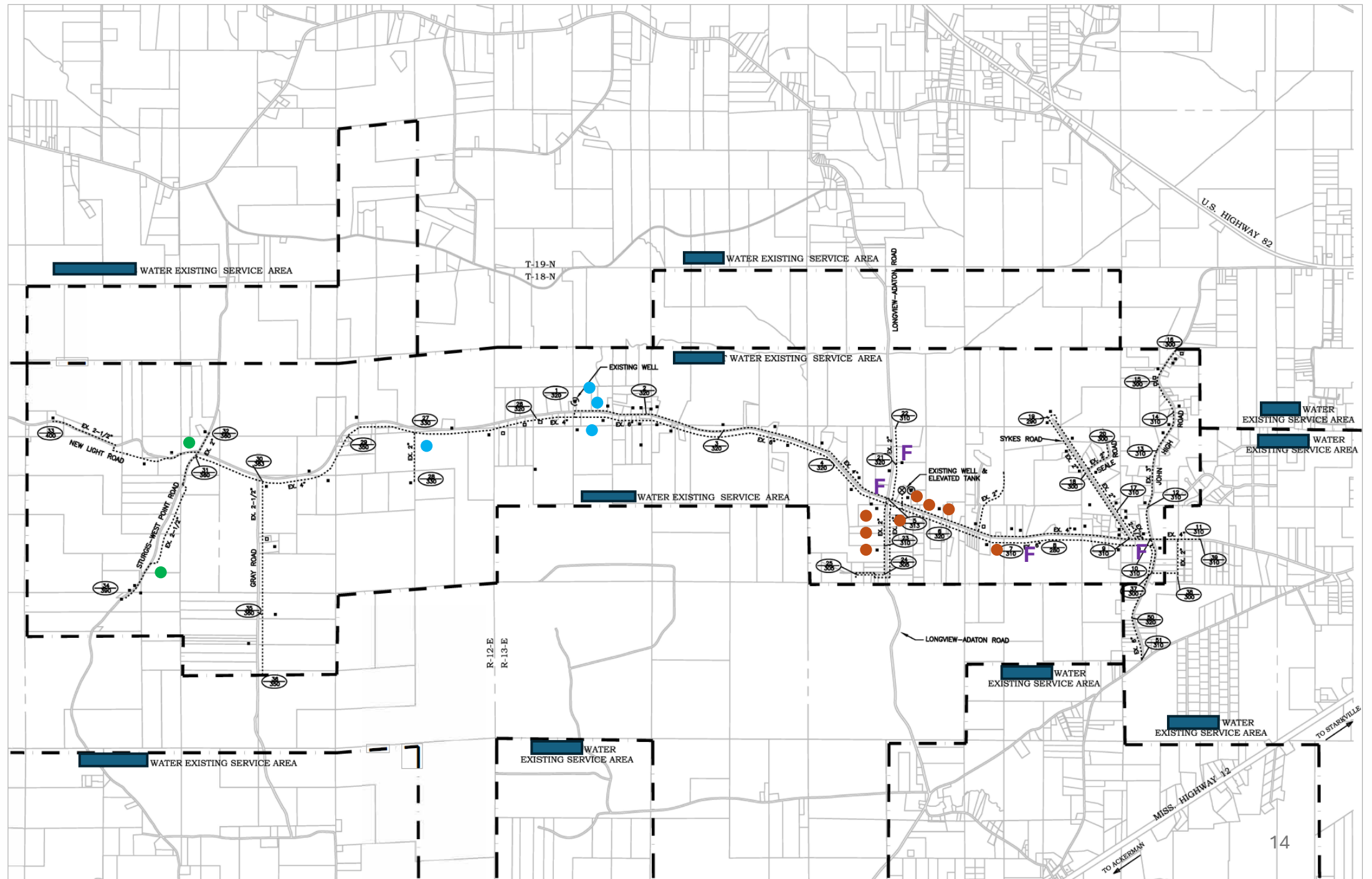
- Each system will have hundreds, if not thousands, of individual assets that should be considered in the asset management plan
- Some assets may need to be examined individually
 - Wells
 - Pumps
 - Tanks
 - Chemical feeders
 - Clarifiers
 - Filters
 - Valves

Looking at assets from a level of service lens

- It may make sense to examine other assets in “groups”
- Consider the following as-built map
 - There are four fire hydrants on the system that were installed at the same time.
 - It may make sense to “group” these assets and consider them together. They are likely to deteriorate at the same rate and will need refurbishment/ replacement at approximately the same time.
- There are other assets that can be grouped. Why consider each individual piece (length) of pipe? Consider the as-built map and the hydrology study
 - The consulting engineer has grouped individual pieces of pipe into line segments that likely were installed at the same time under the same conditions

- 2" valve
- 4" valve
- 6" valve
- F Fire hydrant

Example 1 – Water Association (valves/fire hydrants added)



Asset Mgt Concepts

- Flow rate number (+ or -) indicate flow direction
- Diameter and length of pipe in each segment
- Elevation – look at minimum and maximum, particularly for future growth
- Static pressure and head loss indicate adequate pressure to customer

Pipe No.	Node #1	Node #2	Service Conns.	Flow Rate (GPM)	Pipe Length (FT)	Pipe Dia. (INCH)	Head Loss (FT)	Velocity (FPS)	Node 1			Node 2			Road Name
									Static (PSI)	Dynam (PSI)	Elev. (FT)	Static (PSI)	Dynam (PSI)	Elev. (FT)	
P-1	J-16	J-15	26	-47.82	1208.19	3.00	-10.90	-0.46	78.87	20.34	300	78.87	25.06	300	
P-10	J-19	J-18	10	-4.41	2202.40	2.00	-1.73	0.77	83.20	64.04	290	78.87	60.45	300	
P-11	J-10	J-64	0	-79.97	219.31	6.00	-0.18	-0.27	74.53	69.13	310	74.53	69.21	310	
P-12	J-31	J-34	10	30.01	5719.90	2.50	52.89	0.17	52.87	31.82	360	39.87	-4.10	390	
P-13	J-29	J-30	9	55.03	4257.53	4.00	12.27	-0.48	57.20	43.32	350	51.57	32.37	363	
P-14	J-55	J-7	9	103.65	3885.01	6.00	5.02	-0.39	72.37	71.26	315	74.53	71.25	310	
P-15	J-57	J-56	10	-30.01	1589.82	4.00	-1.49	0.00	76.70	73.48	305	76.70	74.12	305	
P-16	J-20	J-61	8	-27.12	1231.89	2.00	-28.00	0.39	78.87	48.00	300	78.87	60.13	300	
P-17	J-59	J-58	7	-25.56	2394.84	2.00	-48.78	-0.14	74.10	46.15	311	73.67	66.86	312	
P-18	T-2	J-55	0	184.25	680.15	6.00	2.55	0.14	69.77	69.77	321	72.37	71.26	315	
P-19	J-38	J-65	0	0.00	470.76	2.00	0.00	0.00	78.87	68.37	300	78.87	68.37	300	
P-2	J-39	J-11	1	-12.26	795.07	4.00	-0.14	0.00	74.53	63.46	310	74.53	63.52	310	
P-20	J-63	J-50	1	12.26	2621.81	6.00	0.07	0.20	74.10	68.81	311	70.20	64.88	320	
P-21	J-26	J-27	4	69.32	4129.61	4.00	18.25	-0.32	70.20	66.87	320	65.87	54.62	330	
P-22	J-68	J-31	0	-30.01	159.86	2.00	-4.38	0.24	52.87	29.92	360	52.87	31.82	360	
P-23	J-30	J-31	0	41.86	2453.32	4.00	4.26	0.18	51.57	32.37	363	52.87	31.82	360	
P-24	J-27	J-29	6	60.03	1801.07	4.00	6.10	2.26	65.87	54.62	330	57.20	43.32	350	
P-25	J-1	J-26	3	71.52	1345.79	4.00	6.30	0.60	70.20	69.60	320	70.20	66.87	320	
P-26	J-66	J-4	5	-23.06	2668.49	6.00	-0.21	0.50	73.23	71.96	313	70.20	69.02	320	
P-27	J-67	J-66	0	61.10	218.40	6.00	0.11	0.78	73.23	72.01	313	73.23	71.96	313	
P-28	J-53	J-5	0	-73.84	200.88	4.00	-1.00	1.53	73.23	71.19	313	73.23	71.62	313	
P-29	J-55	J-67	0	76.10	374.56	6.00	0.27	-0.30	72.37	71.26	315	73.23	72.01	313	
P-3	J-35	J-30	5	-22.13	6594.12	2.50	-34.69	-0.29	52.87	18.63	360	51.57	32.37	363	
P-30	J-58	J-53	9	-61.35	3118.87	4.00	-10.99	0.54	73.67	66.86	312	73.23	71.19	313	
P-31	J-19	J-60	0	0.00	201.28	2.00	0.00	0.38	83.20	64.04	290	83.20	64.04	290	
P-32	J-61	J-19	5	3.09	2431.57	2.00	0.99	0.37	78.87	60.13	300	83.20	64.04	290	
P-33	J-9	J-58	13	-43.35	5190.02	4.00	-9.61	0.87	74.53	63.56	310	73.67	66.86	312	
P-34	J-62	J-9	0	-19.44	205.50	4.00	-0.09	1.21	74.53	63.52	310	74.53	63.56	310	
P-35	J-11	J-62	0	1.15	1407.75	4.00	0.00	2.44	74.53	63.52	310	74.53	63.52	310	
P-36	J-64	J-37	0	15.15	1020.51	2.00	7.89	1.36	74.53	69.21	310	78.87	70.12	300	
P-37	J-63	J-64	0	82.15	98.31	6.00	0.08	1.12	74.10	68.81	311	74.53	69.21	310	
P-38	J-65	J-11	6	5.15	1133.49	2.00	1.19	2.92	78.87	68.37	300	74.53	63.52	310	
P-39	J-2	J-100	9	-22.68	2575.57	4.00	-1.44	0.52	70.20	69.08	320	70.20	69.70	320	
P-4	J-32	J-68	3	-18.02	770.65	2.00	-8.21	0.52	52.87	26.36	360	52.87	29.92	360	
P-40	J-3	J-2	6	-15.18	2737.33	4.00	-0.73	0.31	70.20	68.76	320	70.20	69.08	320	
P-41	J-4	J-1	14	-32.56	8751.49	6.00	-1.32	0.56	70.20	69.02	320	70.20	69.60	320	
P-42	J-21	J-53	0	-27.12	870.48	2.00	-19.78	0.84	74.53	63.91	310	73.23	71.19	313	
P-43	J-23	J-66	0	-30.01	1481.11	2.00	-40.60	0.38	74.53	55.67	310	73.23	71.96	313	
P-44	J-24	J-23	5	-30.01	926.54	2.00	-25.40	2.26	76.70	46.83	305	74.53	55.67	310	
P-45	J-5	J-3	10	-7.18	6179.55	4.00	-0.41	0.78	73.23	71.62	313	70.20	68.76	320	
P-46	J-66	J-5	0	71.67	168.76	4.00	0.79	0.34	73.23	71.96	313	73.23	71.62	313	
P-47	J-18	J-9	8	-13.41	2782.73	2.00	-17.17	0.21	78.87	60.45	300	74.53	63.56	310	
P-48	J-17	J-62	4	-18.59	1129.20	2.50	-4.30	0.00	74.53	61.66	310	74.53	63.52	310	
P-49	J-15	J-14	15	-60.84	1443.02	3.00	-20.33	-0.29	78.87	25.06	300	74.53	29.54	310	
P-5	J-33	J-68	7	-25.56	5531.81	2.50	-38.01	0.55	35.53	-3.88	400	52.87	29.92	360	
P-50	J-14	J-13	12	-70.06	1643.53	3.00	-30.07	-0.62	74.53	29.54	310	74.53	42.57	310	
P-51	J-13	J-12	10	-77.21	1701.53	3.00	-37.27	0.46	74.53	42.57	310	74.53	58.72	310	
P-52	J-12	J-10	4	-79.97	1028.41	3.00	-24.04	0.12	74.53	58.72	310	74.53	69.13	310	
P-53	J-37	J-65	7	11.65	851.11	2.00	4.05	0.20	78.87	70.12	300	78.87	68.37	300	
P-54	J-50	J-51	0	0.00	1455.88	6.00	0.00	-0.01	70.20	64.88	320	74.53	69.22	310	

Technical Quality

Looking at assets from a level of service lens

- Maintain leak repair records
- Maintain customer complaint records regarding pressure deficiencies
- Routinely test meters for accuracy
- Have well pump tests performed regularly
- Monitor maintenance of equipment

Functional Quality

Looking at level of service from a customer standpoint

- How do your customers view your utility's performance?
- What is your system doing to understand your customers' views of your performance?
- There are some things that your system can/should do to monitor functional quality
 - Maintain records of customer complaints for leaks, low pressure, etc.
 - Maintain records of the system's actions for these complaints, including time required to resolve the complaint
 - Maintain records of work performed on customer property, outcomes, lawn/landscape issues, etc. and actions taken to correct issues
 - Maintain records of Maintain records of inaccurate billings and the actions/time to resolve

Functional Quality

Looking at level of service from a customer standpoint

- **How does this translate into a level of service “rating”?**
- Establish a baseline of occurrences of issues that affect the functional quality of the system
- Set an acceptable level of service for these issues
- Realize that the issues aren't going to solve themselves; it's going to take work to solve them
 - It's likely that the entire asset management team will need to be involved in this effort
 - If your system is going to address these issues, you have to have a competent team and a governing board that is eager to improve service
- Another lens may be a regular customer satisfaction survey

Functional Quality

Looking at level of service from a customer standpoint

- There are three sample customer satisfaction surveys on the course website
- There are several ways in which a customer satisfaction survey can be administered
 - Mailing
 - Email
 - Post on platform such as Survey Monkey – likely the easiest and will provide some analysis for you
- Establish desired levels of service for each survey section/question
- Realize that if the system asks customers about issues, the system, board and operator has to **listen** to what the customers say and act on their suggestions/perceptions

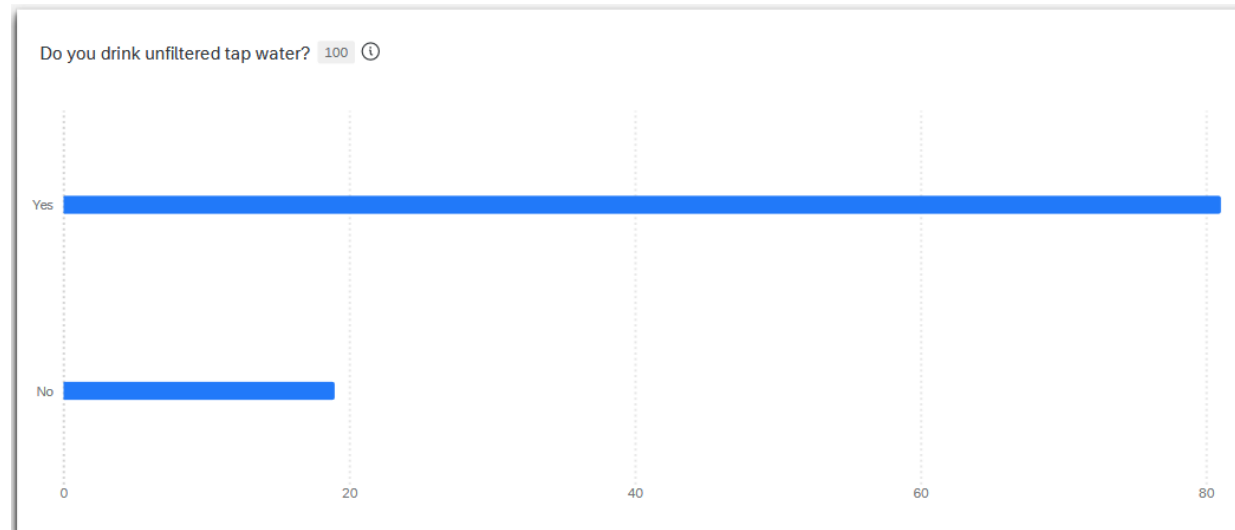
Functional Quality

Looking at level of service from a customer standpoint

- Surveys can be administered in a variety of ways for your customers
- The easiest is to use a platform like SurveyMonkey (surveymonkey.com). It is free and you can collect ongoing data
- One hundred sample responses have been entered into survey example 1 for analysis
- The following slides are from pages of an automatically generated survey platform report (this report is on the class website)

Functional Quality

Looking at level of service from a customer standpoint



Do you drink unfiltered tap water? 100 ⓘ

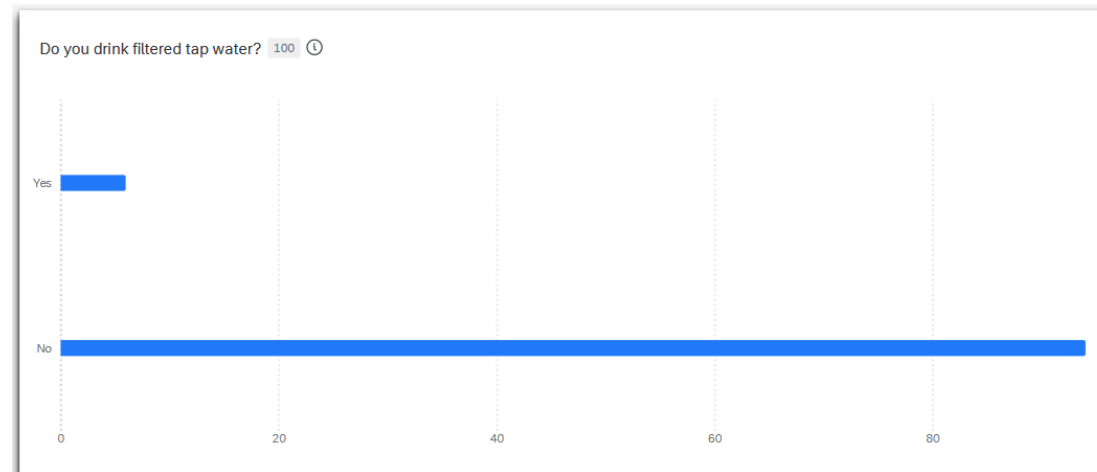
Q1 - Do you drink unfiltered tap water?	Percentage	Count
Yes	81%	81
No	19%	19

Do you drink unfiltered tap water? 100 ⓘ

Do you drink unfiltered tap water?	Average	Minimum	Maximum	Count
Yes	1.00	1.00	1.00	81
No	2.00	2.00	2.00	19

Functional Quality

Looking at level of service from a customer standpoint



Do you drink filtered tap water? 100 ⓘ

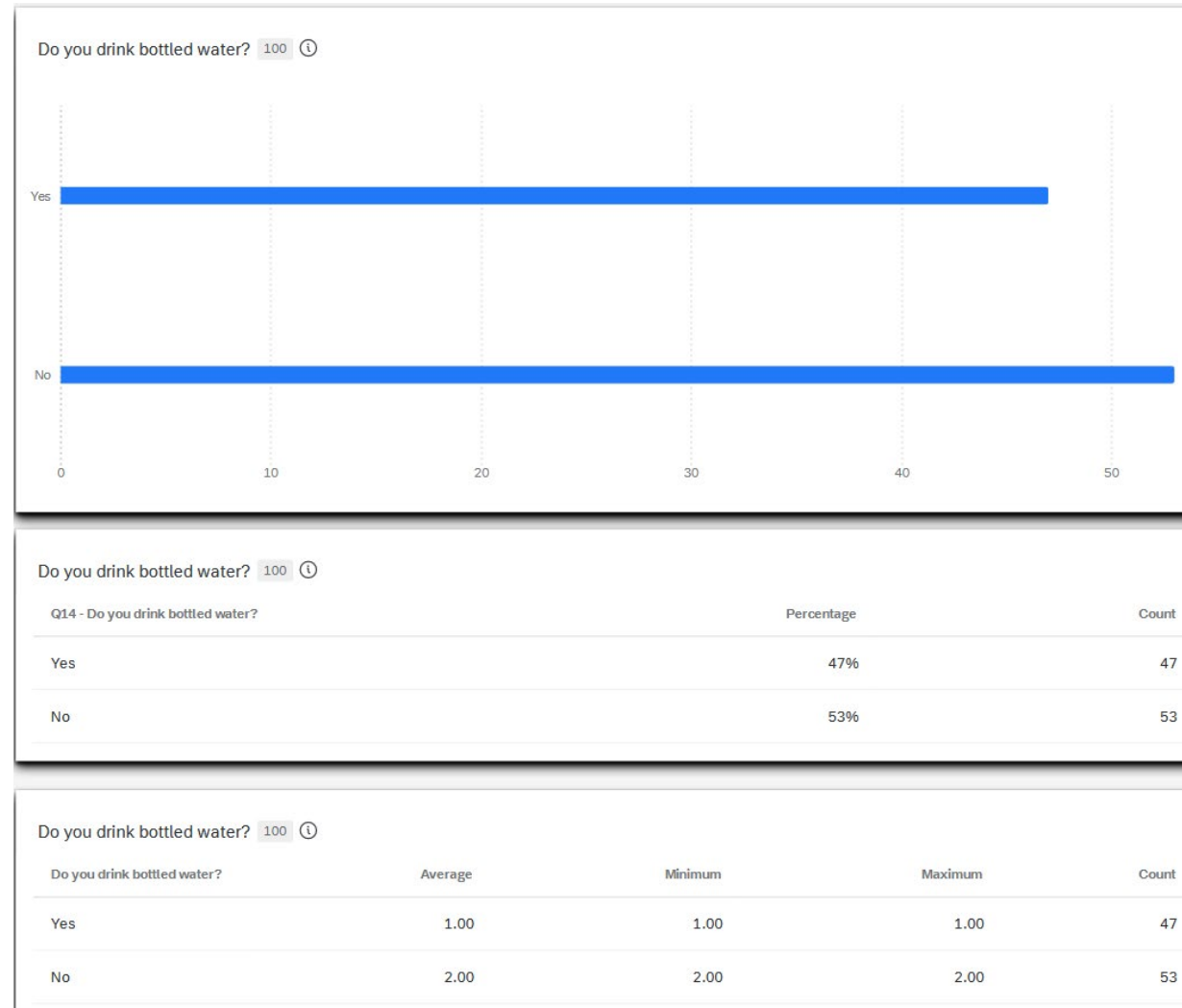
Q13 - Do you drink filtered tap water?	Percentage	Count
Yes	6%	6
No	94%	94

Do you drink filtered tap water? 100 ⓘ

Do you drink filtered tap water?	Average	Minimum	Maximum	Count
Yes	1.00	1.00	1.00	6
No	2.00	2.00	2.00	94

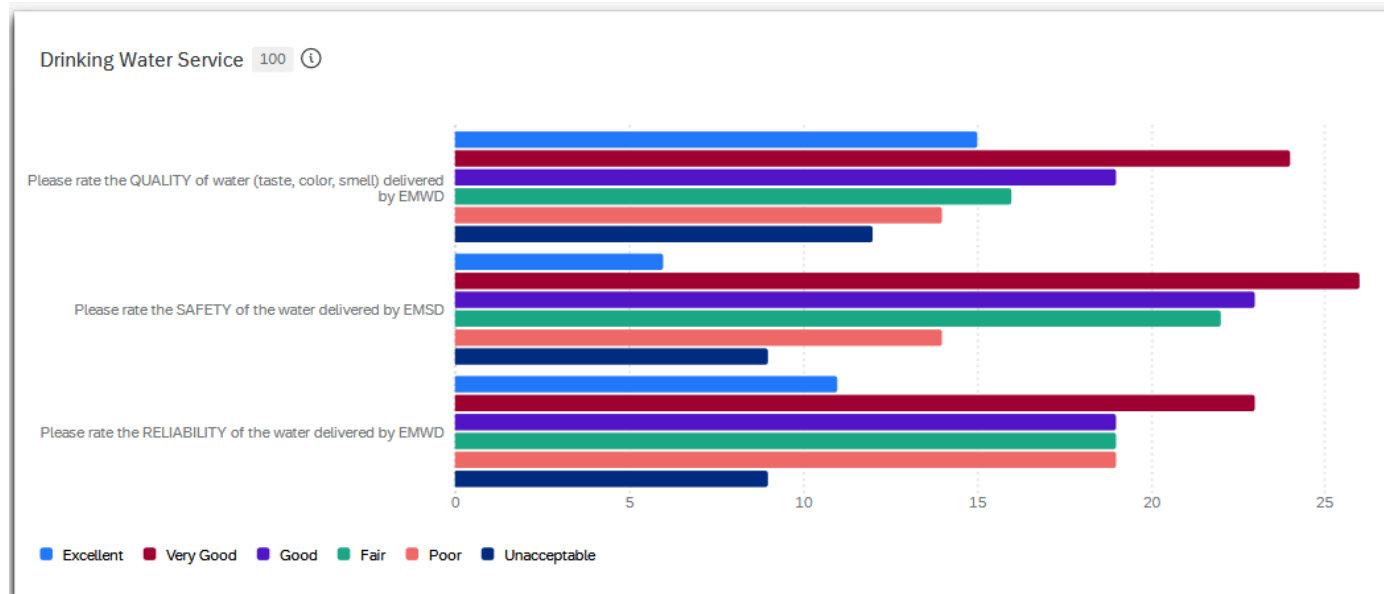
Functional Quality

Looking at level of service from a customer standpoint



Functional Quality

Looking at level of service from a customer standpoint

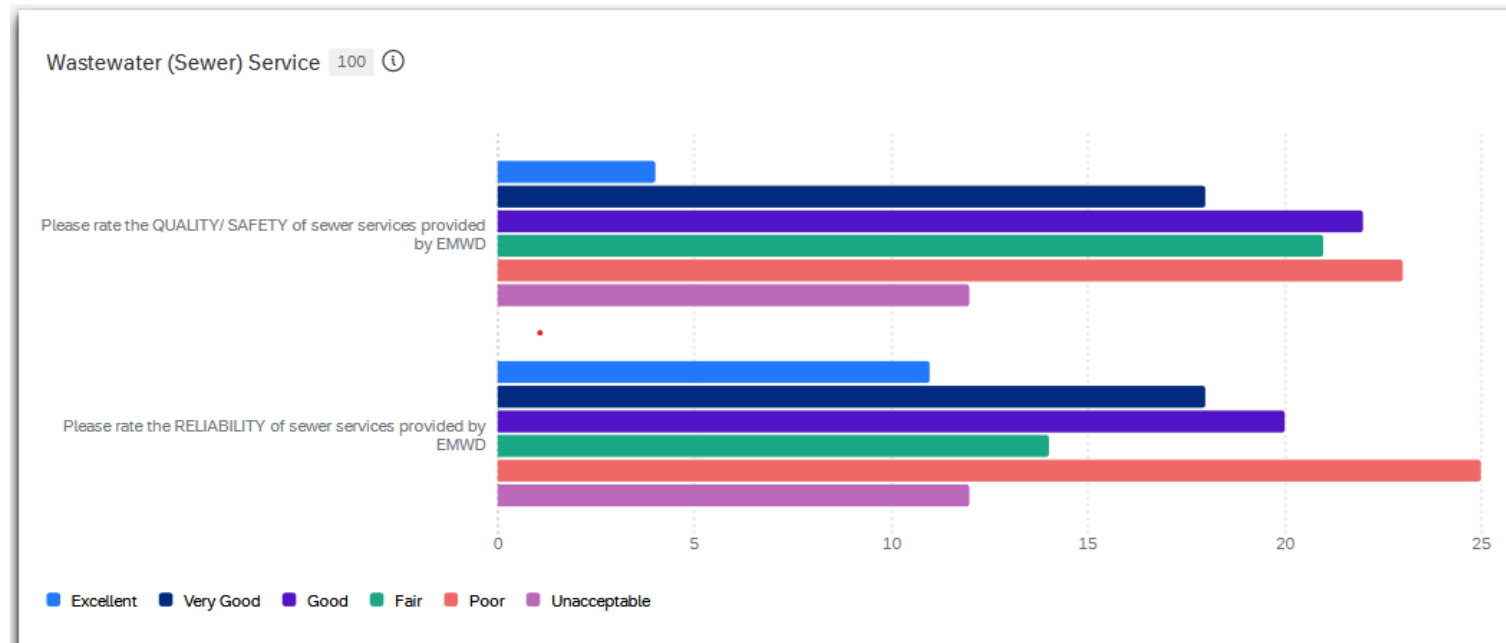


Drinking Water Service 100 ⓘ

Drinking Water Service	Excellent	Very Good	Good	Fair	Poor	Unacceptable
Please rate the QUALITY of water (taste, color, smell) delivered by EMWD	15	24	19	16	14	12
Please rate the SAFETY of the water delivered by EMSD	6	26	23	22	14	9
Please rate the RELIABILITY of the water delivered by EMWD	11	23	19	19	19	9

Functional Quality

Looking at level of service from a customer standpoint



Wastewater (Sewer) Service 100 ⓘ

Wastewater (Sewer) Service	Excellent	Very Good	Good	Fair	Poor	Unacceptable
Please rate the QUALITY/ SAFETY of sewer services provided by EMWD	4	18	22	21	23	12
Please rate the RELIABILITY of sewer services provided by EMWD	11	18	20	14	25	12

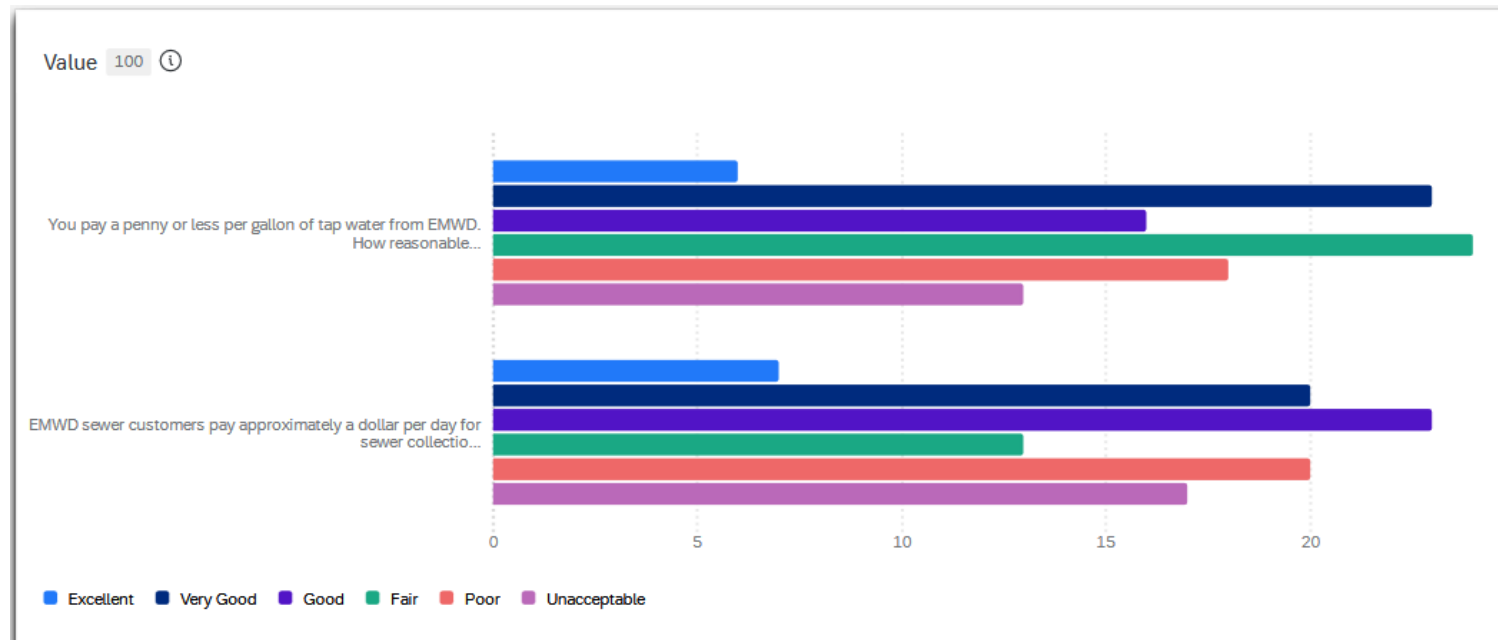
Functional Quality

Looking at level of service from a customer standpoint



Functional Quality

Looking at level of service from a customer standpoint



Value 100 ⓘ

Value	Excellent	Very Good	Good	Fair	Poor	Unacceptable
You pay a penny or less per gallon of tap water from EMWD. How reasonable...	6	23	16	24	18	13
EMWD sewer customers pay approximately a dollar per day for sewer collectio...	7	20	23	13	20	17

Functional Quality

Looking at level of service from a customer standpoint

- Why would you want to use a customer satisfaction survey?
 - Feedback from customers can highlight problem areas on the system, particularly if customer names or road names are requested on the survey
 - Effective asset management will require customer support for funding; providing customers with a way to provide feedback on the utility's operations, particularly customer service operations, can generate this support
- You must realize that if you ask for customer feedback, you have to acknowledge and address that feedback
- This could mean improving customer service, addressing lower pressure areas, etc.
- There are risks to this strategy, but returns can be relatively large

Assigning a level of service score

- RULE: Low score means the asset isn't performing well; high score means that it is. Perhaps use a scale from 1-5
- There should be two components for the level of service score
 - How well is the asset performing from the system standpoint?
 - How well is the system (and therefore the assets in the system) performing from the customers' standpoint?
- The issue is how to meld these two scores together into one score
- Example:
 - If the customers along a particular span of distribution line perceive that they have low pressure, the customer perception might be assigned a score of 2.
 - But if there are no leaks, the system's perspective might be a score of 5.
 - You can add the two together or multiply them for the final service level score