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# Fundamentals of Asset Management

*Step 5. Set Target Level of Service*

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*A Hands-On Approach*

# Tom's bad day...

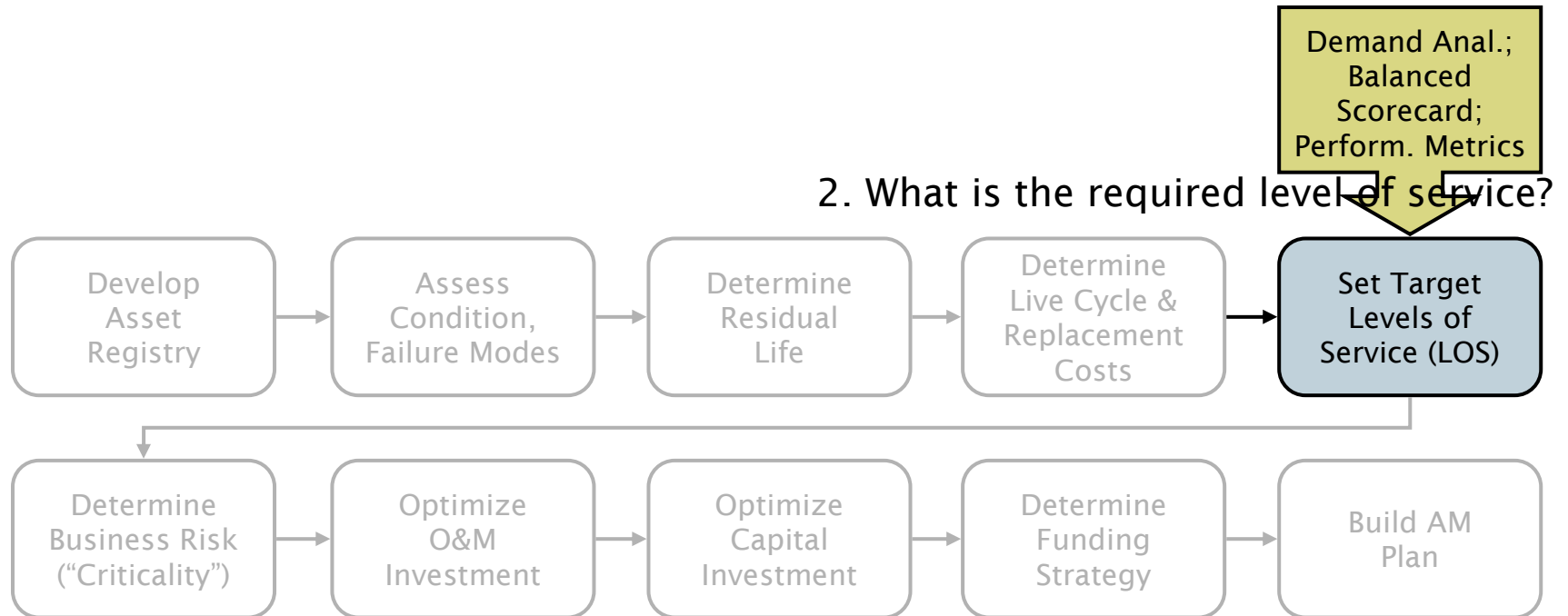


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## Second of 5 core questions

2. What is the required level of service (LOS)?
  - What is the *demand for my services* by my stakeholders?
  - What do *regulators require*?
  - What is my *actual performance*?

# AM plan 10-step process



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# Level of service

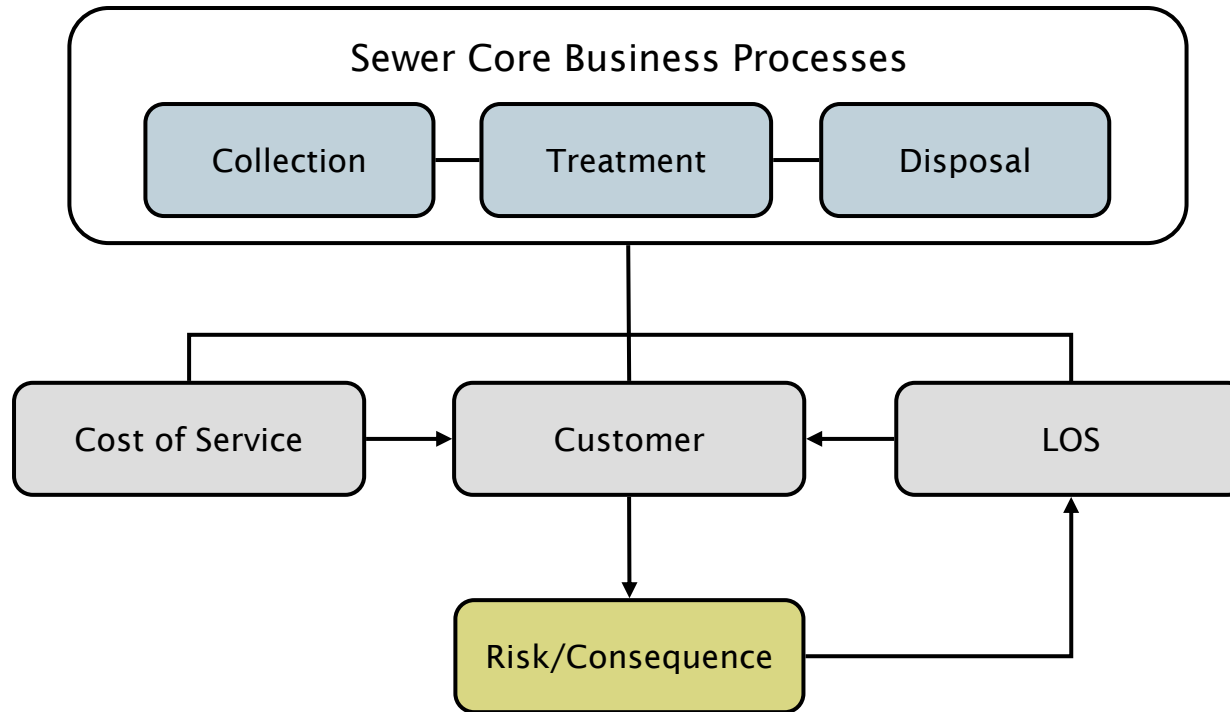
- Good, output-oriented management is driven by a defined standard or level of service
- Where that LOS is
  - Driven by *customer-user* demand
  - As determined by the appropriate legislative body in a political arena
  - Tied at the *strategic* organizational level to the *tactical* asset level
- LOS can be defined as
  - Characteristics or attributes of a service that describe its required level of performance
  - These characteristics typically describe *how much, of what nature, and how frequently* about the service

# Why LOS?

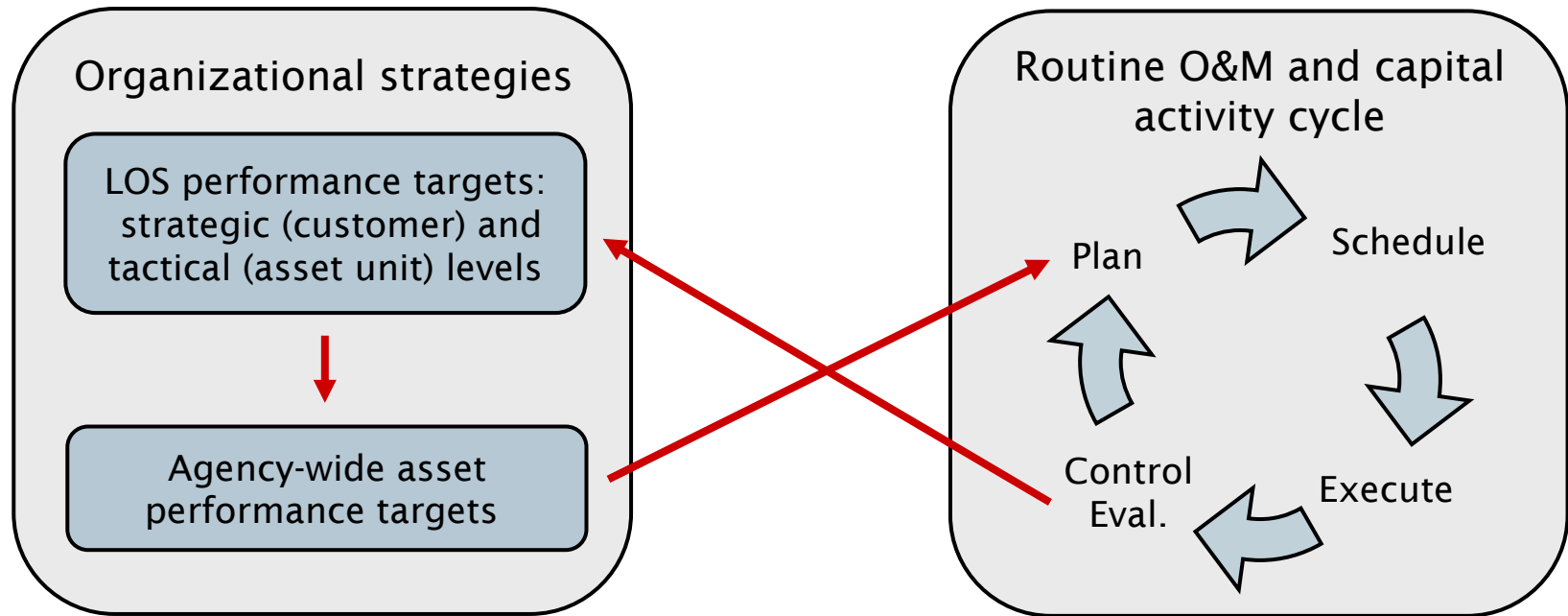
It helps us...

- *Concentrate* (focus) efforts and resources
  - On agreed on service levels
  - Less *service-level-defined by notion*
- *Communicate* service expectations and choices
  - Increased services equal increased costs
  - Discussion of trade-offs and risks
- *Negotiate* (regulators and council/commission/board)
  - Service levels
  - Costs and budgets
  - Rate impacts
  - Reinvestments for renewal
  - Level of risk

# LOS's strategic position



# Alignment of routine O&M and capital activities with organizational strategies





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# Nature of LOS

- LOS occurs at multiple levels
  - Agency-wide
  - Groups or systems of assets (collection system, treatment plants)
  - Assets (individual pump stations, digesters, clarifiers)
  - Key asset components (pumps, motors, vfd's)
- LOS targets are established to *roll up* to meet higher level targets

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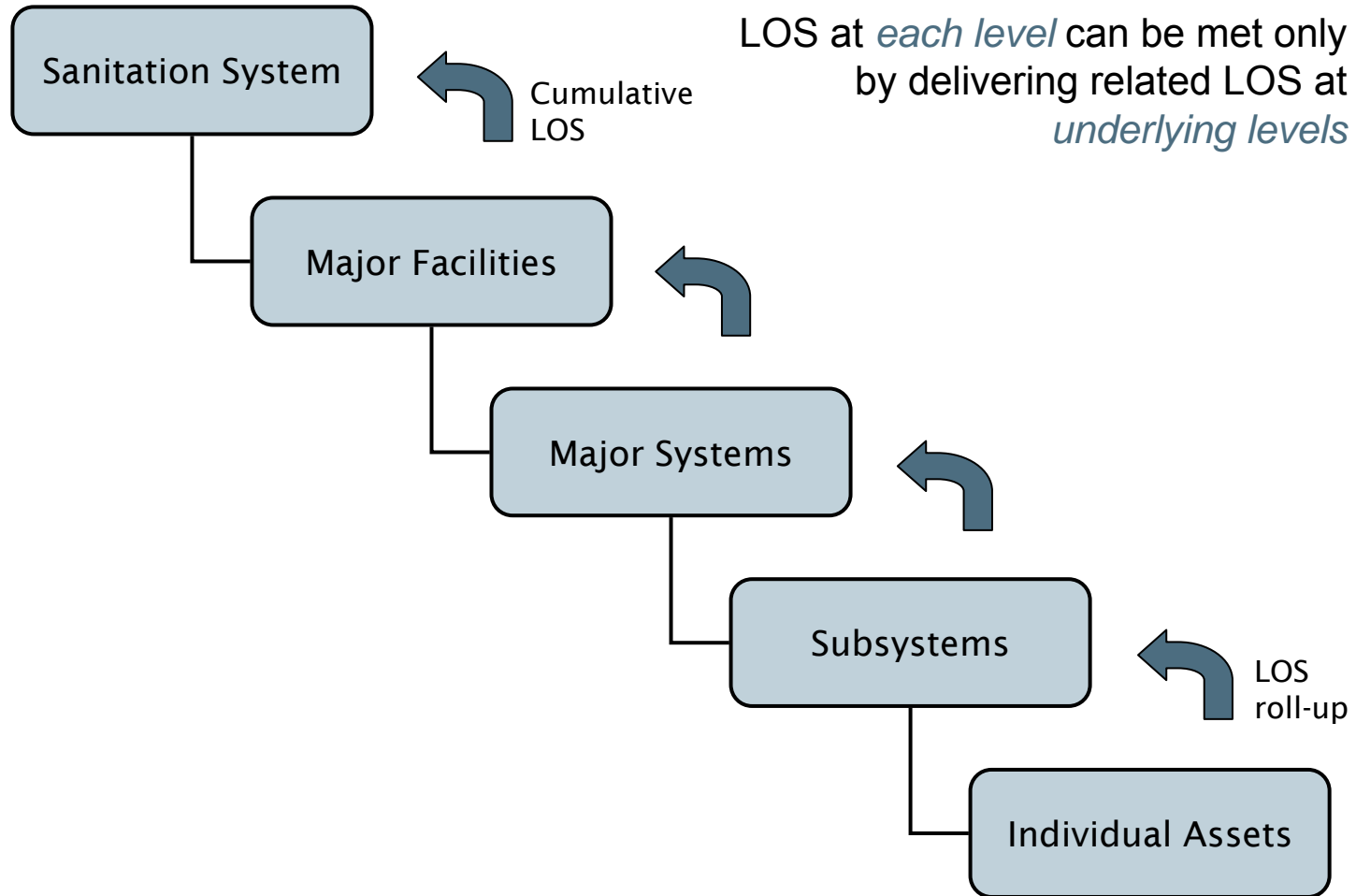
# Nature of LOS, continued

There are internal and external LOS targets

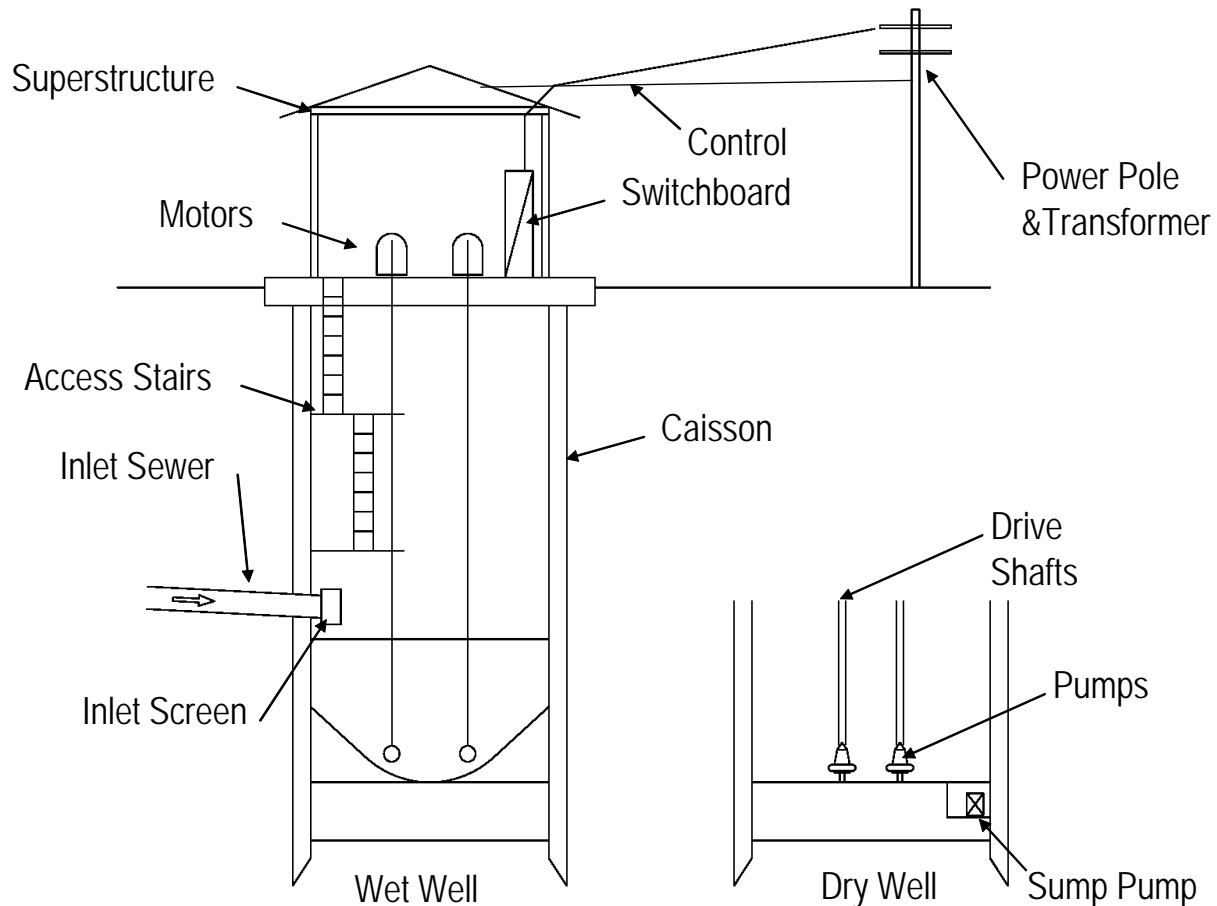
- External LOS targets typically are strategic or KPI outcomes
  - Driven by customer-user demand
  - Confirmed or determined by the appropriate legislative body in a political arena
- Internal LOS targets typically are tactical and geared toward focusing activities

LOS is level of service, KPI is key performance indicator

# Roll up of LOS



# Jones Street pump station cross-section view



# Example of LOS statement

ENVIRONMENTAL	
Key Performance Indicators	
<b>1. OCSD will comply with effluent quality standards.</b>	
a. Compliance with all Ocean Discharge Permit Limits, %	
b. Concentration of Emerging Chemical Constituents of C Plant No. 1 Secondary Effluent	
c. Effluent total coliform bacteria after initial dilution, mpn	
d. Source Control permittee compliance with permit condition percent	
<b>2. OCSD will manage flows reliably.</b>	
a. Frequency of use of emergency spill outfall	
b. Sanitary sewer spills per 100 miles	
c. Contain sanitary sewer spills within 5 hours	
<b>3. OCSD's effluent will be recycled.</b>	
a. Treated effluent reclaimed, % (flow)	
<b>4. OCSD will implement a sustainable biosolids management program.</b>	
a. National Biosolids Program Certification for Environmental Management System	
b. Percent of biosolids beneficial reuse Class "B" Class "A/EQ"	
<b>5. OCSD will improve the regional watershed.</b>	
a. Dry weather urban runoff collected and treated	
b. Rainfall induced inflow and infiltration, wet weather peak	
c. Stormwater management, % of treatment process area treated on site	
d. Per capita wastewater flow rate, gallons per person per day	
<b>6. OCSD will protect the air environment.</b>	
a. Odor complaints: Reclamation Plant No. 1 Treatment Plant No. 2 Collection System	
b. Air emissions health risk to: Community, cancer risk per 1 million Employees	
c. Air mass emissions permit compliance, %	

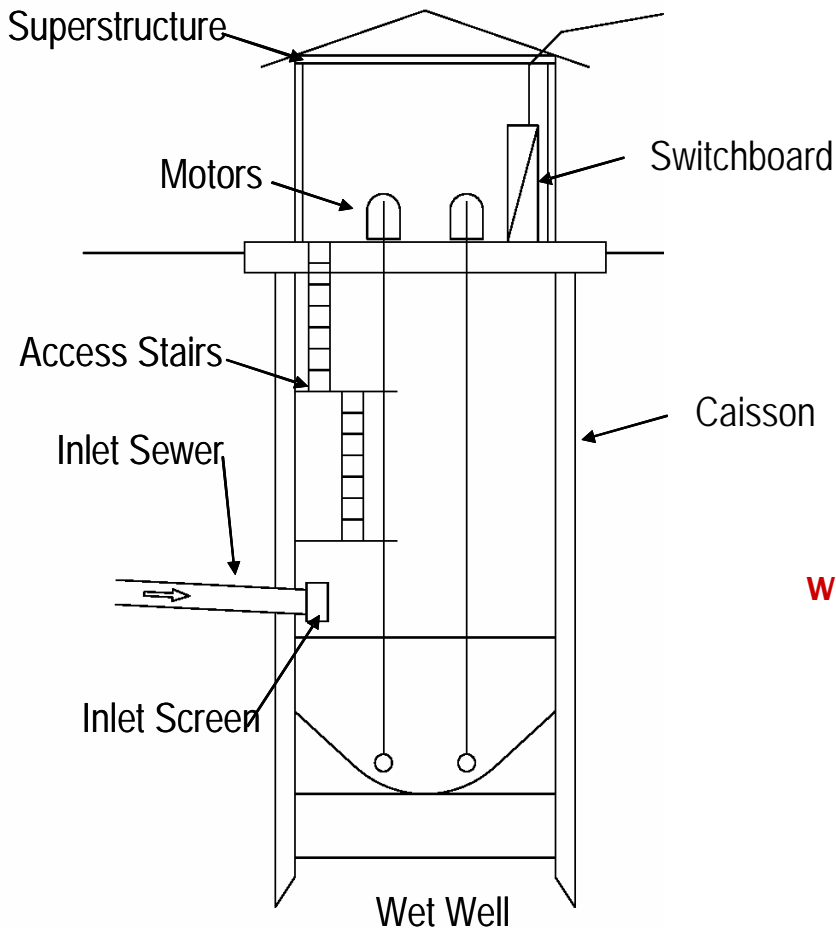
  

SOCIAL		
Key Performance Indicators		2005 Target Level of Service
<b>1. OCSD will be a good neighbor and will be responsive to its customers.</b>		
a. Off site Biosolids nuisance complaints		0
b. Odor complaint response		
Treatment Plants within 1 hour		100%
Collection System within 1 working day		100%
c. Restore collection service to customer within 8 hours		100%
d. Respond to public complaints or inquiries regarding construction projects within 1 working day		>90%
e. Respond to collection system spills within 1 hour		100%
f. New connection permits processed within one working day		>90%
g. Dig Alert response within 48 hours		100%
<b>2. OCSD will provide public access to OCSD information.</b>		
a. Public Records Act requests within 10 working days		100%
b. Post Board/Committee Agenda Packages 72 hours prior to meeting		100%
c. Post studies and reports on OCSD website within 1 week of receive/file.		100%
<b>3. OCSD will take care of its people.</b>		
a. Training hours per employee		45
b. Employee Injury Incident Rate		<3.75

ECONOMIC		
Key Performance Indicators		2005 Target Level of Service
<b>1. OCSD will exercise sound financial management.</b>		
a. New borrowing		Not more than annual Capital Improvement Program requirements
b. COP coverage ratio		Between 1.25 and 2.0
c. COP service Principal and Interest		< than O&M expenses
d. Annual SFR user fee increase		not more than 15%
e. Annual user fees		Sufficient to cover all O&M requirements
f. Annual increase in collection, treatment, and disposal costs per million gallons		< 10%
g. Annual variance from adopted reserve policy		<5%

# Pump station LOS requirements



*Which assets relate directly to achieving target levels of service?*

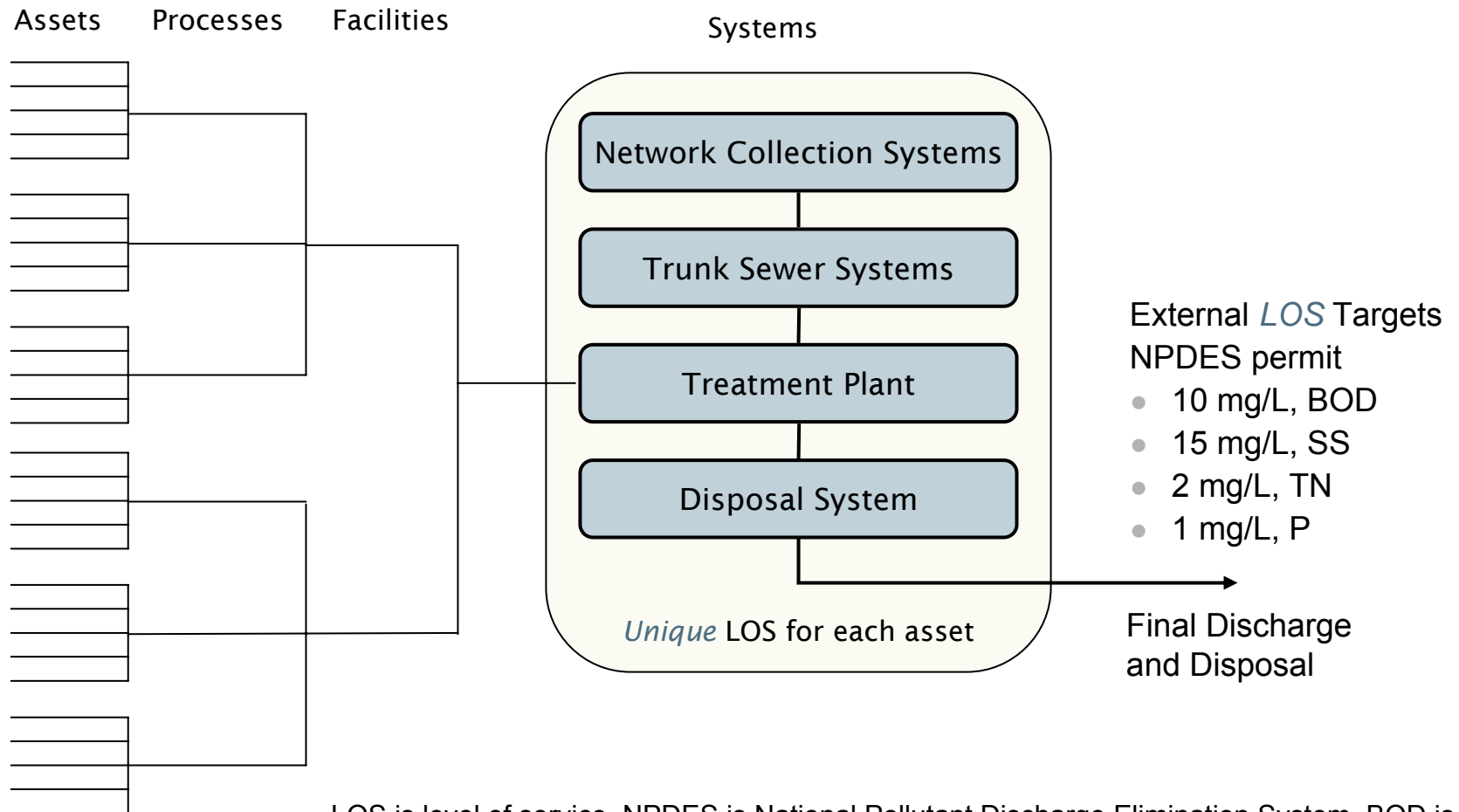
External *LOS for Pump Station*

- No preventable SSOs
- 3 odor complaints/year, max.
- 35 dB at boundary, max.
- OSHA compliance
- NPDES & CMOM compliance

**Where in the lift station is noise generated?**

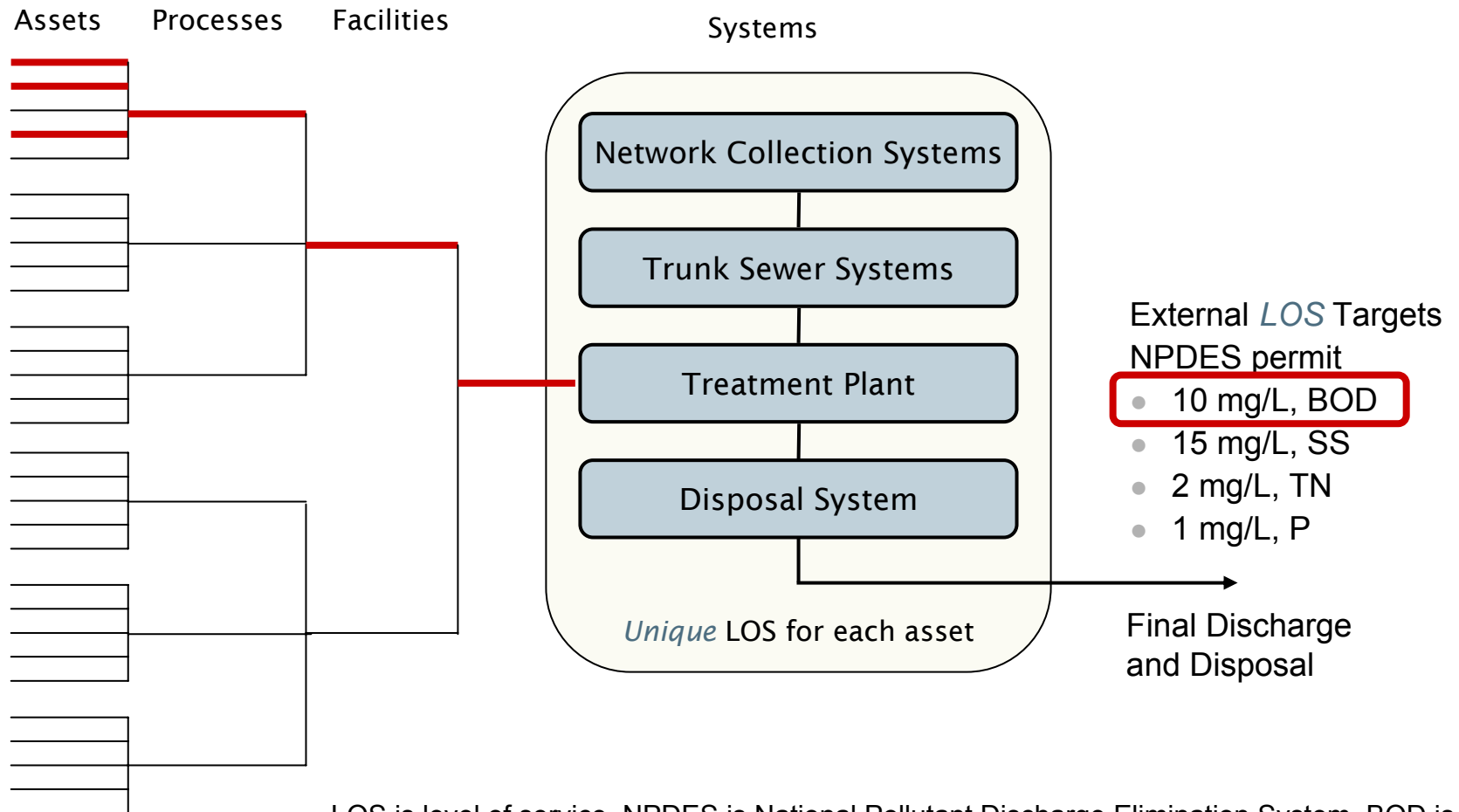
LOS is level of service, SSOs are storm sewer overflows, dB is decibel, OSHA is Occupational Safety and Health Administration, NPDES is National Pollutant Discharge Elimination System, CMOM is capacity, management, operation, and maintenance

# System performance requirements



LOS is level of service, NPDES is National Pollutant Discharge Elimination System, BOD is biochemical oxygen demand, SS is suspended solids, TN is total nitrogen, P is phosphorus

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# Four major *failure modes*

<i>Failure Mode</i>	<i>Definition</i>	<i>Tactical Aspects</i>	<i>Management Strategy</i>
<b>Capacity</b>	Volume of demand exceeds design capacity	Growth, system expansion	Redesign
<b>LOS</b>	Functional requirements exceed design capacity	Codes & permits: NPDES, CSOs, OSHA, noise, odor, life safety; service, etc.	O&M optimization, renewal
<b>Mortality</b>	Consumption of asset reduces performance below acceptable level	Physical deterioration due to age, usage (including operator error), acts of nature	O&M optimization, renewal
<b>Efficiency</b>	Operations costs exceed that of feasible alternatives	Pay-back period	Replace

NPDES is National Pollutant Discharge Elimination System, CSOs are combined sewer overflows, and OSHA is Occupational Safety and Health Administration

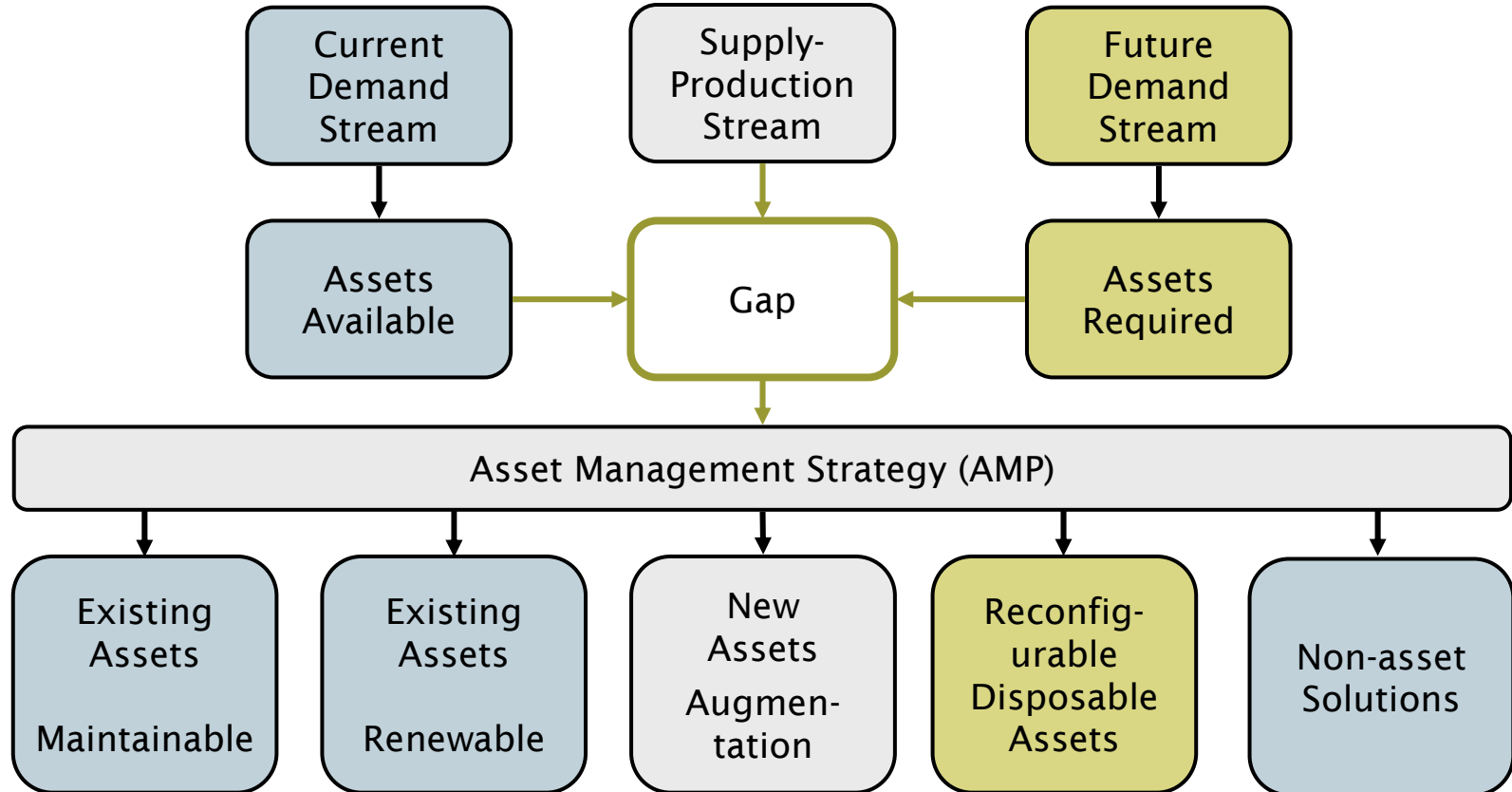
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# Forces driving LOS

LOS is constantly subjected to forces of change:

- Growth/retrenchment
- Regulatory requirements
- Demands of customers
- Physical deterioration
- Operational costs/efficiencies

# Balancing future demand with current capabilities



# Example: Pump station LOS

<i>Standard</i>	<i>Measure</i>	<i>Current</i>	<i>Target</i>
<i>Performance</i>			
Odor	Complaints/year	0.5	1
	Number/year	2	0
Spills	Gallons/spill	56,000	2,000
Pumping	Percent influent	99.68%	100%
<i>Reliability</i>			
SCADA	Outages/year	7	2
	Duration, hours	72+	8
Power	Outages/year	1	1
	Duration, hours	7	2.5

# Example: Pump station LOS

<i>Standard</i>	<i>Measure</i>	<i>Current</i>	<i>Target</i>
<i>Reliability, cont.</i>			
Pumps	% reserve capacity, peak Q	30%	30%
	% redundancy at peak Q	0	50%
Power	2nd source, hours	7	2.5
<i>Regulatory</i>			
Spill reporting	Verbal, hours	NA	24
	Report, days	21	10
	Impact notice, hours	NA	8
	Training, hours/yr	0	8

# Key points from this session

## *What is my required sustainable level of service?*

### Key Points:

- LOS is the “collection of measurable attributes or characteristics of a product or service delivered” to a customer
- LOS is most useful in a long term perspective - “sustainable LOS”
- LOS is ultimately defined by customers and regulators through the agency’s Policy Board.
- System performance and customer satisfaction (“serviceability”) are related but separate concepts.
- LOS is directly related to the cost of service and the level of acceptable business risk.
- LOS is best measured across a range of balanced measures.
- Staff and Board should be involved in determining LOS, but it is not necessary that the Board be involved if they refuse.

### Associated Techniques:

- Customer demand analysis
- Regulatory requirements analysis
- Level of service statements; LOS “roll-up” hierarchy
- Balanced scorecard”
- Asset functionality statements
- AM Charter

# Tom's spreadsheet

Microsoft Excel - EPA Seminar Master.xls

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Asset Register and Hierarchy					What is the State of My Assets?			Required LOS?		Which Are Most "Critical"?		
Installed Date	Asset Class	Original Cost	Estimated Effective Life	Condition Rating	Annual Dep	Accum Dep	Current LOS?	Minimum Condition	Backup Reduction (Redundancy)	Probability of Failure	Consequence of Failure	
Year		\$	Years	1 to 10	\$	\$			%	Rating	1 to 10	
Act or Est	Tab A	Act or Est	Calculated	Tab A	Calculated	Calculated		Tab A	Tab D	Calculated	Tab C	
10	Sanitation System											
11	Disposal System											
12	Treatment Plants											
13	Collection Systems											
14	Sewer Mains											
15	Pump Station											
16	Incoming Sewer											
17	Pipes	1963	3	\$ 1,725	100	6	\$ 17	\$ 742				
18	Manhole	1963	3	\$ 340	100	5	\$ 3	\$ 146				
19	Influent Gate Valve	1986	5	\$ 442	30	8	\$ 15	\$ 235				
20	Incoming Power											
21	Pole & Transformer	2006	4	\$ -	40	1	\$ -	\$ -				
22	Connection	2006	7	\$ -	35	1	\$ -	\$ -				
23	Control system											
24	Incoming Telephone	1985	8	\$ 85	25	7	\$ 3	\$ 71				
25	PLC	1983	8	\$ 8,600	25	8	\$ 344	\$ 7,912				
26	Manual controls	1978	8	\$ 425	25	7	\$ 17	\$ 476				
27	Land & Improvements											
28	Land	1950	10	\$ 630	300	1	\$ 2	\$ 118				
29	Access Road	1963	1	\$ 12,500	75	5	\$ 167	\$ 7,167				
30	Landscaping	2000	1	\$ 595	75	6	\$ 8	\$ 48				
31	Security fence	1963	1	\$ 1,360	75	7	\$ 18	\$ 780				
32	Sub Structure											
33	Cassion Outer	1963	1	\$ 30,600	75	6	\$ 408	\$ 17,544				
34	Upper Floor	1963	1	\$ 4,250	75	6	\$ 57	\$ 2,437				
35	Dry well	1963	1	\$ 6,800	75	6	\$ 91	\$ 3,899				
36	Landings and Stairs	1963	9	\$ 4,250	60	7	\$ 71	\$ 3,046				
37	Wet Well	1963	1	\$ 5,100	75	6	\$ 68	\$ 2,924				
38	Shaped floor	1963	1	\$ 850	75	6	\$ 11	\$ 487				
39	Sump pump	1963	4	\$ 895	40	6	\$ 15	\$ 640				
40	Pumps											
41	Drive shafts	2006	6	\$ 12,560	35	1	\$ 359	\$ -				
42	Pumps	2006	4	\$ 29,750	40	1	\$ 744	\$ -				

Ready

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10:43 AM Tuesday 4/10/2007