# WASTEWATER 101

## Part 1
## What is wastewater?

Water Environment Federation
the water quality people®

**nwbe.org**

**nwbe@wef.org**

# DISCLAIMER

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# WASTEWATER

" … the water supply of the community after it has been used in a variety of applications and which now contains constituents that render it unsuitable for most uses without treatment. "

Metcalf & Eddy | AECOM. 2014. Wastewater Engineering

# ALIASES

Used water

*and*

Sewage*

*But not really

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# ASPIRATIONS

*To be:*

- A source of energy, information & nutrients
- Reclaimed and reused as clean water

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Domestic or "sanitary" sewage

Stormwater (& snowmelt)

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## CONSTITUENTS IN COMBINED SYSTEMS

Industrial discharges

Infiltration & inflow (I/I)

Domestic or "sanitary" sewage

Stormwater (& snowmelt)

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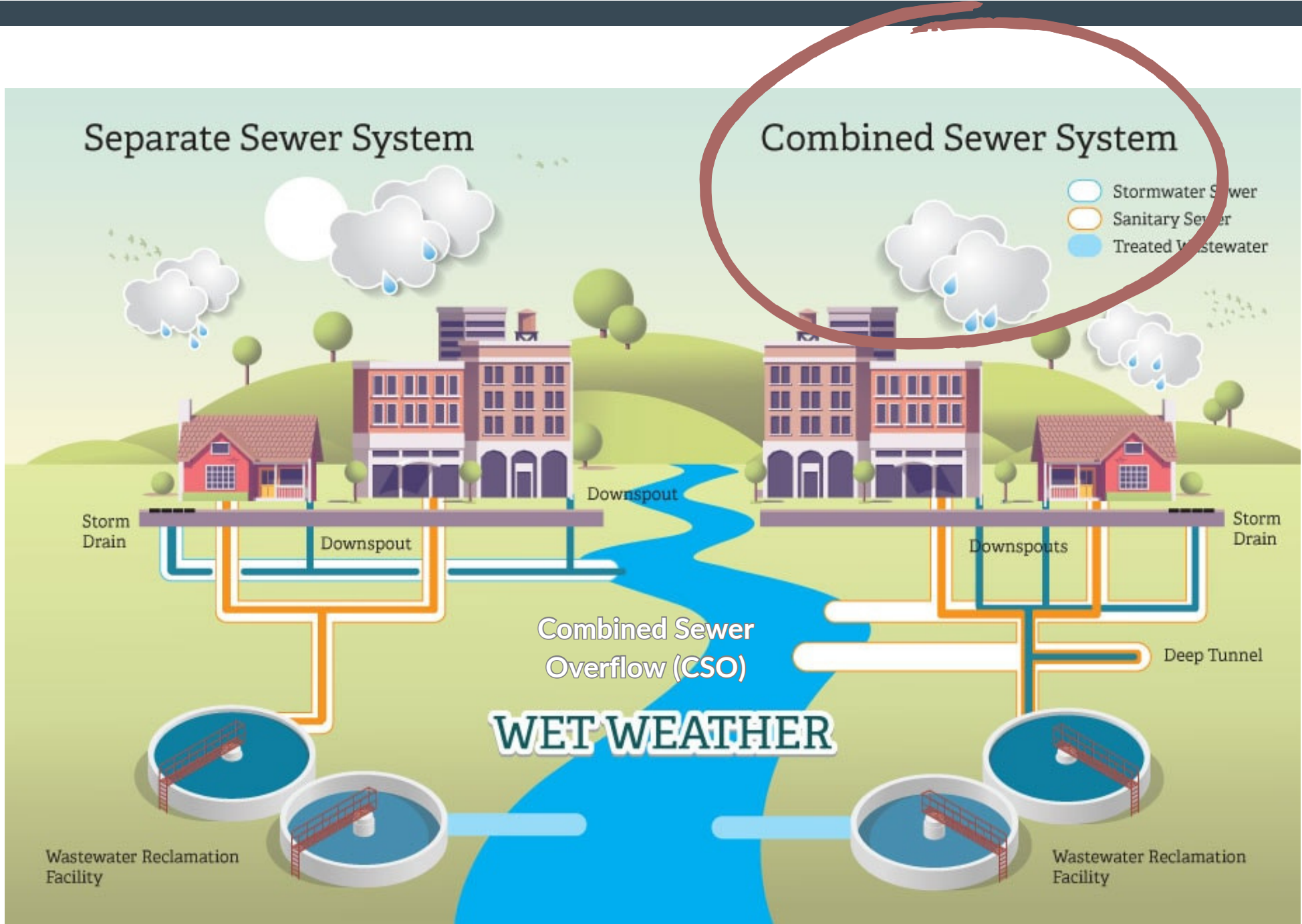See **Part 5** in this series for more information on the typical characteristics of each constituent in wastewater

# CONSTITUENTS IN COMBINED SYSTEMS

Industrial discharges

Infiltration & inflow (I/I)
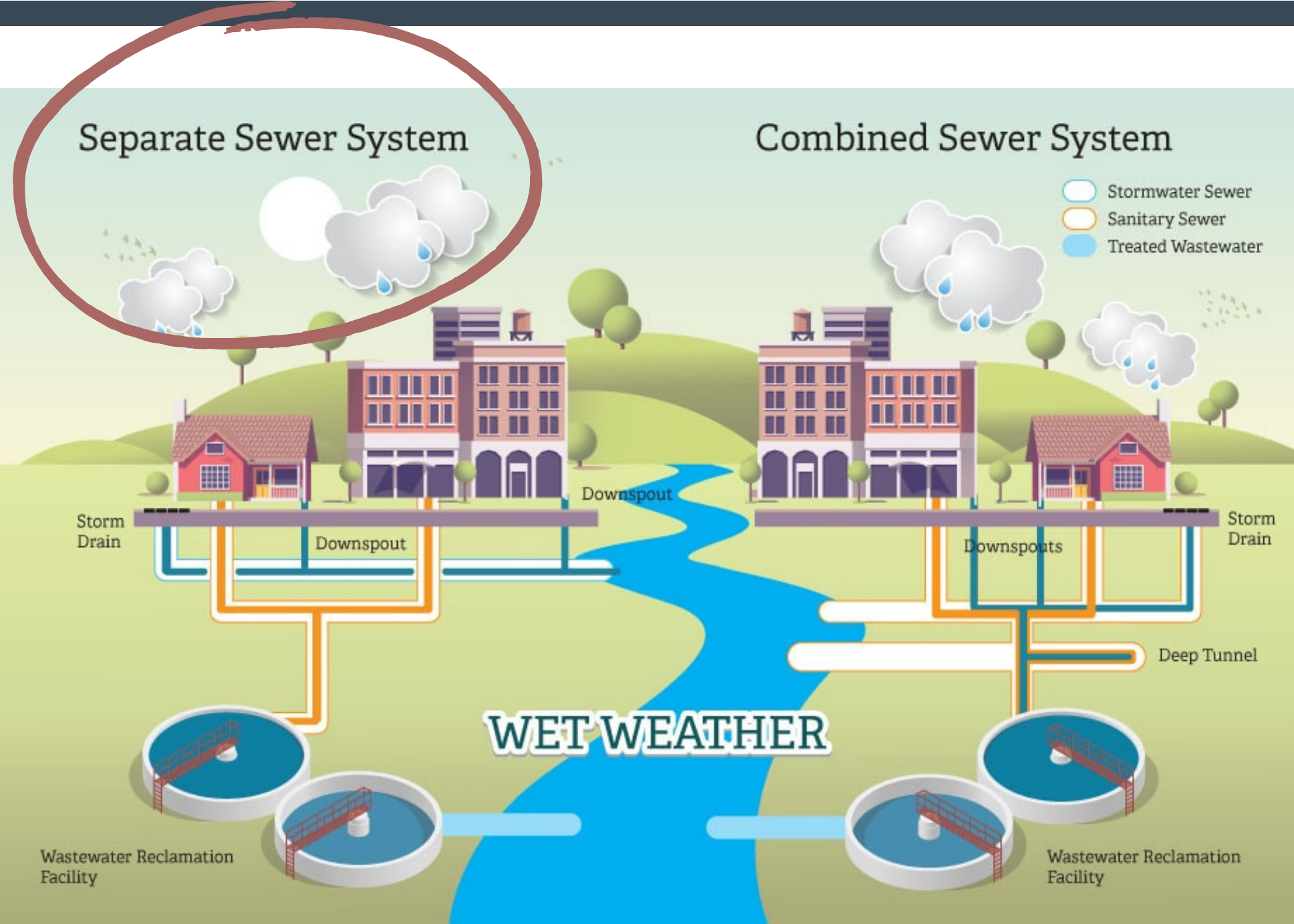
# COMBINED WHAT?

# SEPARATE SEWERS



https://www.mmsd.com/what-we-do/wastewater-treatment/sewers

Domestic or "sanitary" sewage

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CONSTITUENTS IN SEPARATE SYSTEMS

Industrial discharges

Infiltration & inflow (I/I)

# SEPARATE SEWERS

# FLOW VARIABILITY

- Data shown are from a plant with ~6 MGD* ADF**
- Larger plants have a flatter diurnal flow pattern
- Weekday flow patterns are different than weekend flow patterns
- Industrial flows can be unpredictable

*MGD = million gallons per day
**ADF = average daily flow
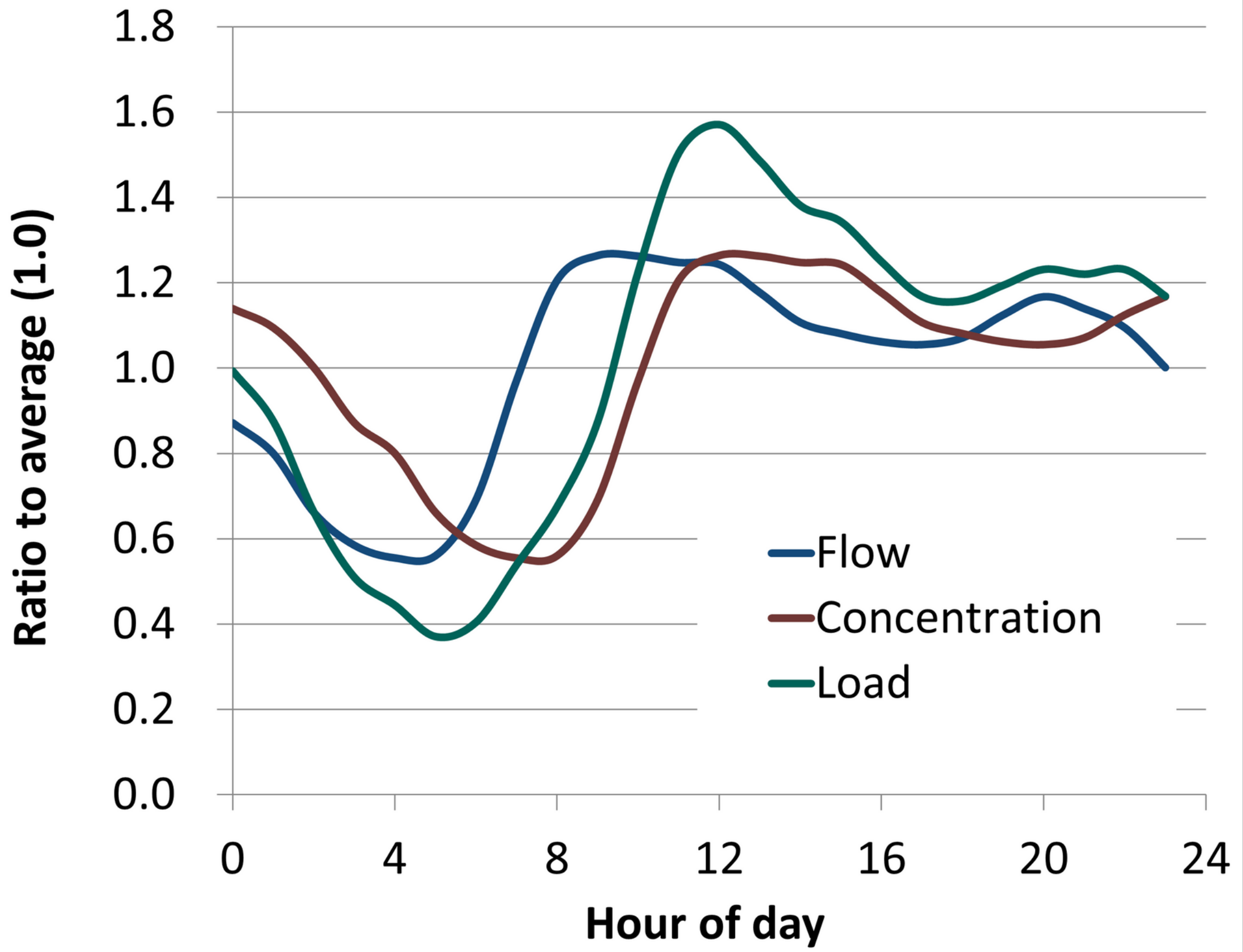
*See **Part 4** in this series for more information on wastewater treatment plant flow terminology and **Part 5** for more information on typical concentrations and loads*

# FLOW VARIABILITY

- Peak wet weather flows are higher in combined systems than in separate systems
- All systems have steady infiltration
- All systems exhibit peaks in inflow during and after wet weather events
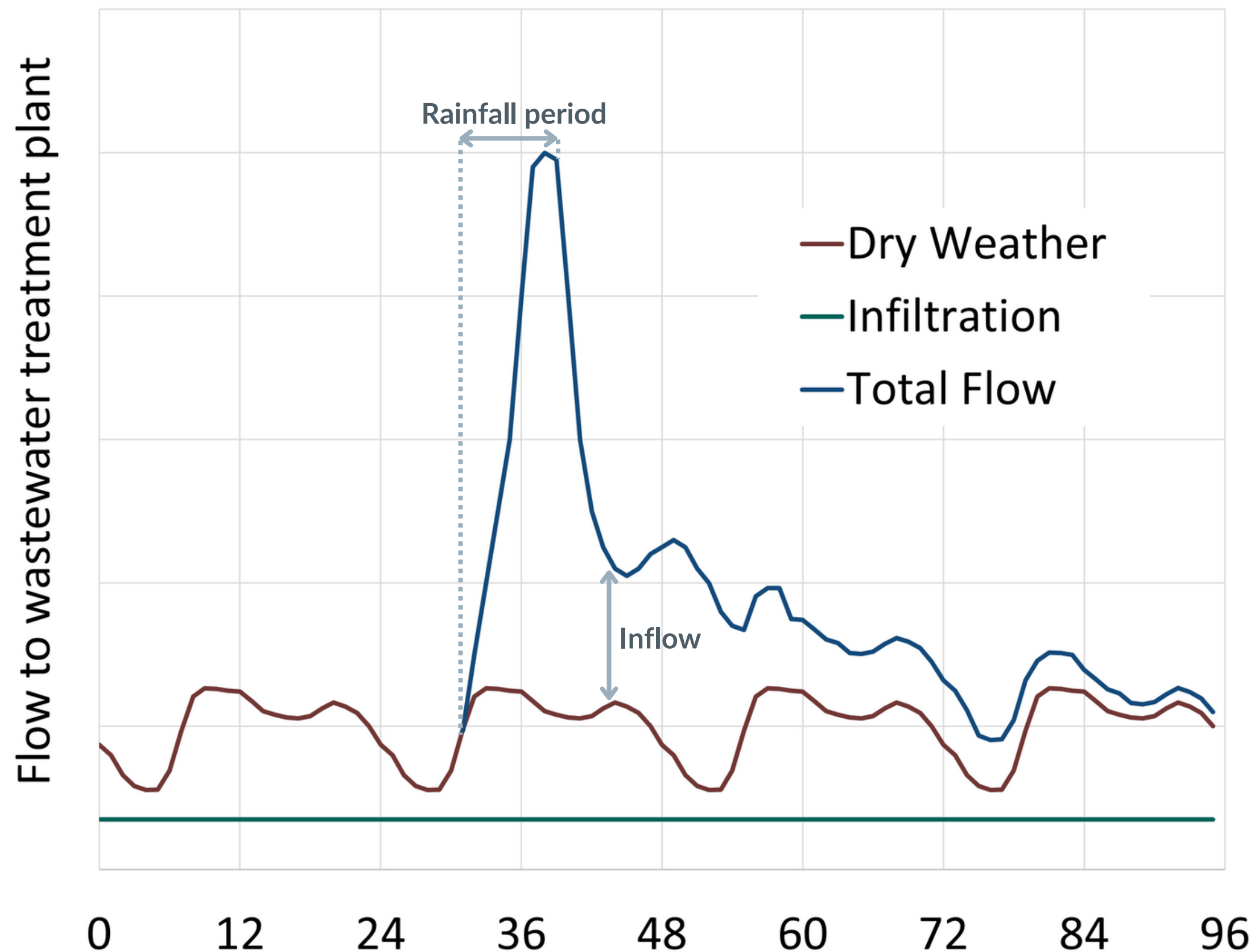- I/I has substantial impacts on the wastewater characteristics

*See **Part 4** in this series for more information on wastewater treatment plant flow terminology and **Part 5** for more information on typical concentrations and loads*

# SEPTAGE

Contents of domestic septic ("onsite") systems that are pumped out by a truck and conveyed to a local wastewater treatment plant

Added to beginning of the treatment process, but exact point in process varies by treatment plant

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**Domestic or "sanitary" sewage**

# CONSTITUENTS IN SEPTAGE

# TERMINOLOGY

## WASTEWATER

"... the water supply of the community after it has been used in a variety of applications and which now contains constituents that render it **unsuitable for most uses without treatment**."*

## SEWAGE

Used water from sinks, toilets, clothes washing, and dishwashers in residential and institutional settings; also known as **sanitary sewage** or **domestic sewage**

## INDUSTRIAL WASTEWATER

Wastewater discharged from industrial facilities, the composition of which will **depend on the type of industry**

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# TERMINOLOGY

## INFILTRATION

**Groundwater** that enters sewers through "defective pipes, pipe joints, connections, or access port (manhole) walls and joints"*; the first "I" in I/I ("I-n-I")

## INFLOW

**Stormwater** that enters the sewers through roof leaders, yard drains, access port (manhole) covers, and (in the case of combined systems), storm drains; the second "I" in I/I

## WET WEATHER

Flow condition in sewer during or immediately after **precipitation** (rain or snow) or **snowmelt** events

*Metcalf & Eddy | AECOM. 2014. Wastewater Engineering

# TERMINOLOGY

## SEPARATE SEWER

Sewer system in which storm drain flows are routed to a **different** pipe network than the one that conveys sewage, industrial discharges, and I/I

## COMBINED SEWER

Sewer system in which storm drain flows are routed to the **same** pipe network as the one that conveys sewage, industrial discharges, and I/I

## SEPTAGE

Contents of septic systems that are pumped out and hauled by specialized trucks and dumped at many wastewater treatment plants

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# TERMINOLOGY

## MGD

**Million gallons per day**: the typical units for wastewater flowrate; the largest treatment plant in the US has a capacity of >1,000 MGD

## ADF

**Average daily flow**: the typical metric used to characterize how "big" a wastewater treatment plant is; calculated as the average of all 24-hour flows during a year

## DIURNAL

Used to refer to the typical **daily pattern** of flow collected for treatment, with peak flow occurring around the middle of the day

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# WHAT TO ASK YOUR UTILITY PARTNERS

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- Do you receive wastewater from a combined or a separate collection system?
- Are there major industries that discharge to your collection system? If so, how many and what types?
- Are there major institutions (universities, hospitals) that discharge into your collection system? If so, how many and what types?
- How extensive is I/I in your system?
- Does your facility accept septage? If so, where does the septage enter your treatment process?
- Is there anything else that would be helpful to know about the type of wastewater you receive?

# This was Part 1 of WASTEWATER 101: What is wastewater?

*Other parts in the series include:*
Part 2: How is wastewater collected?
Part 3: How is wastewater treated?
Part 4: Where does treated water go?
Part 5: How is water quality monitored?
Part 6: Who works in the wastewater sector?

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Thank you!

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