# MITIGATION: *INFLOW & INFILTRATION (I/I)*

Water Management Advisory Committee
May 21, 2025

# MITIGATION

- Activities that offset the impacts of ground or surface water withdrawals by improving streamflow or aquatic habitat.

# MITIGATION AMOUNT

- Mitigation Amount = Permitted Volume greater than Baseline.
- Mitigation "currencies":
  - *Direct Mitigation:* **Gallons** = calculated credits for Volume of returned* water.
  - *Indirect Mitigation:* **Credits** = prescribed Volume of water for each type of activity.

# BASELINE

- In part, the volume of water used to determine the Mitigation Amount.
- Permittee's Baseline volume is based on water use from 2003 to 2005 + 5%.
- Cannot be less than the permittee's registered volume.
- Cannot be greater than the permittee's authorized volume for 2005.

* recharged to groundwater within same major basin

# TWO TYPES OF MITIGATION

## 1. Direct Mitigation

- Directly enhances streamflow
- Amenable to volumetric calculation
- Mitigation is based on total volume returned
- No Maximum # of Credits

## 2. Indirect Mitigation

- Generally not amenable to volumetric calculation
- Maximum # of Credits for each Activity
- Number of Credits is based on mitigation activity
- Credit value is based on Permit Tier type:
  - Tier 2 permits: 1 credit / 10,000 gallons
  - Tier 3 permits: 1 credit / 5,000 gallons

# MITIGATION HIERARCHY

**1. DIRECT MITIGATION - HIGHEST PRIORITY**

a) surface water releases;

b) stormwater recharge;

c) infiltration and inflow (I/I) removal;

d) decommissioning cranberry bog withdrawals.

**2. INDIRECT MITIGATION - LOWER PRIORITY**

a) Habitat Improvement

b) Land Acquisition

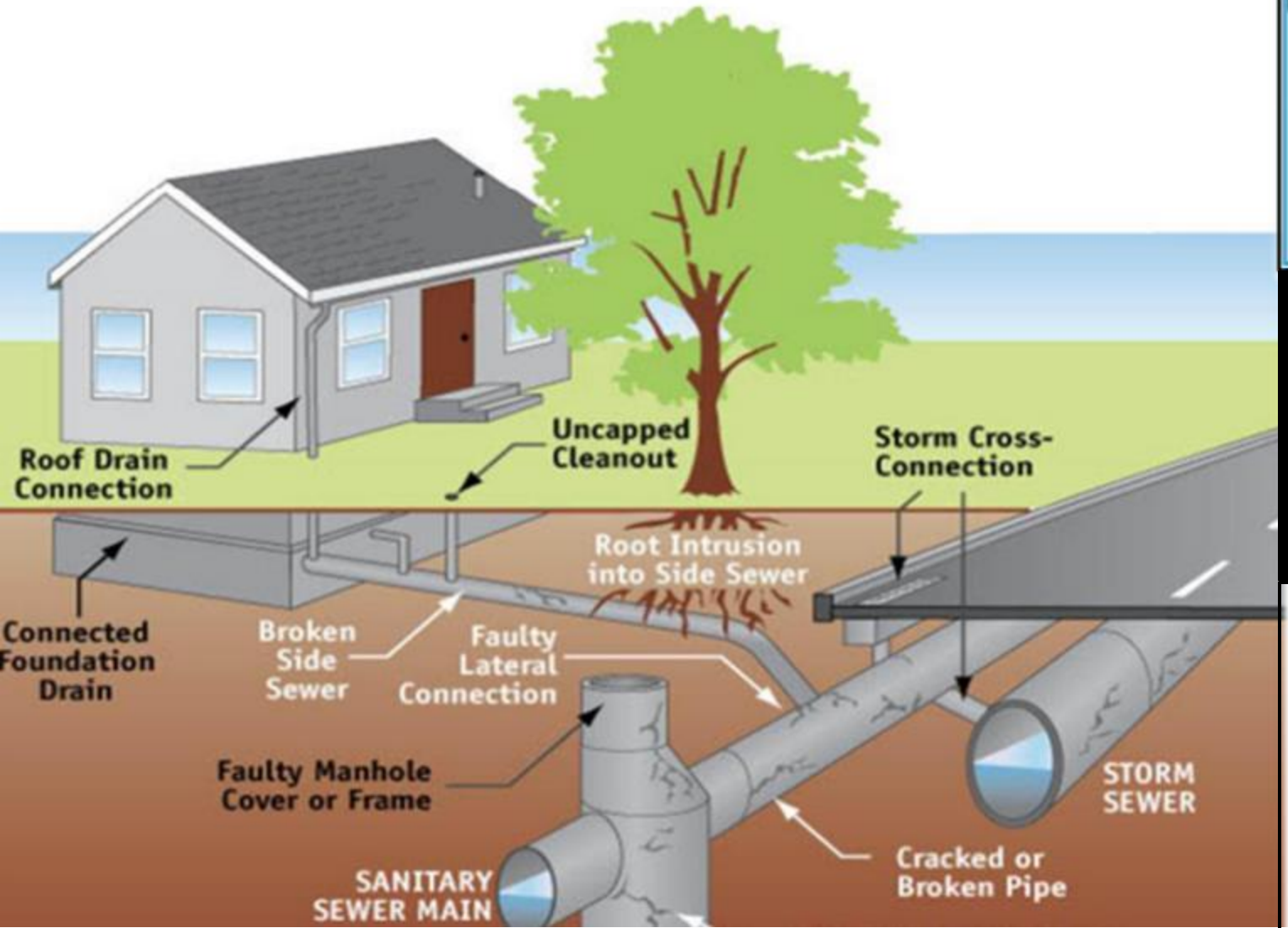
c) Wastewater

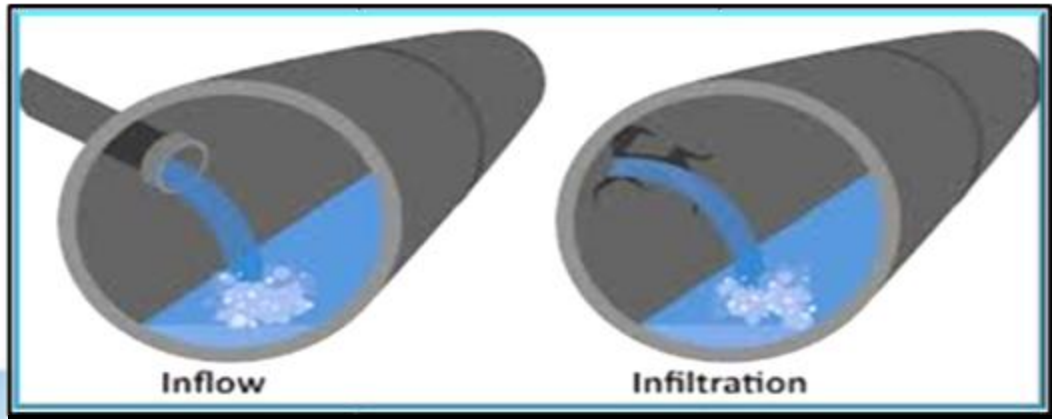
d) Stormwater

e) Bylaws (non-stormwater)

f) Water Quality Improvements

# INFILTRATION / INFLOW (I/I)




**Infiltration**

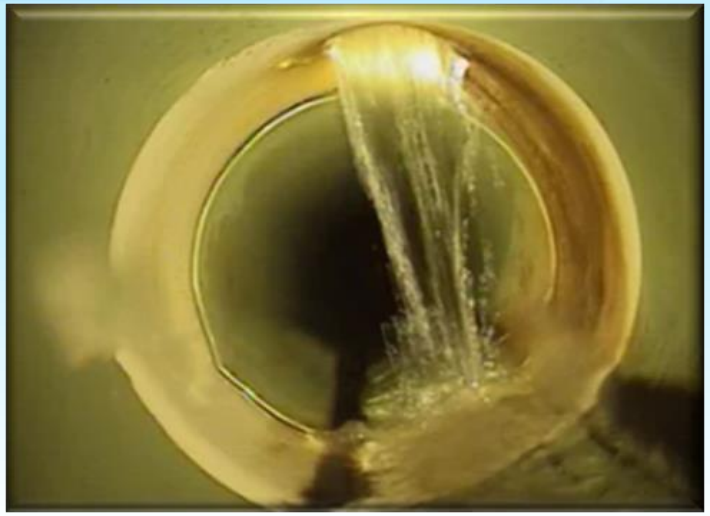
Water seepage that enters wastewater collection systems through **undefined paths** like defective pipes, pipe joints, and manhole walls.

**Inflow**

Water that enters the wastewater collection system through **defined paths** such as catch basins, manhole covers, cross connections with storm drains, sump pumps, foundation drains, and downspouts.

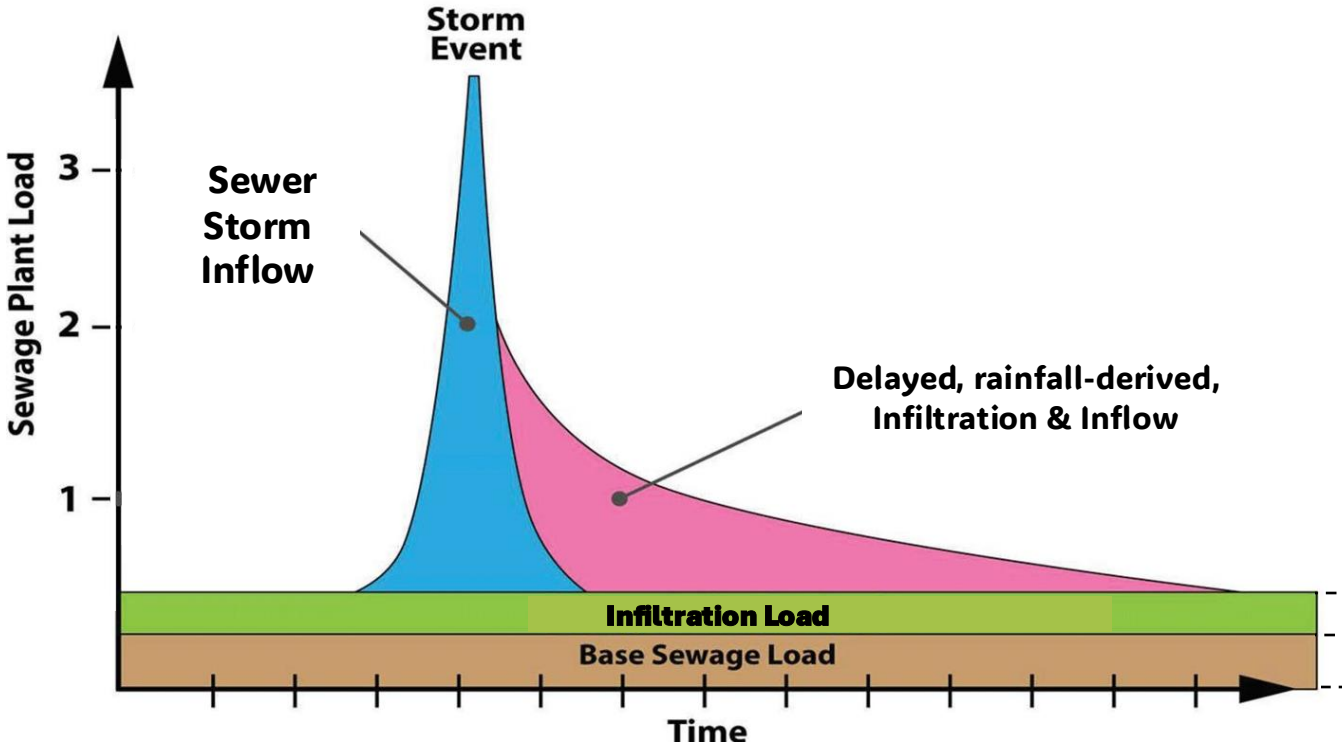
# INFILTRATION: SEEPAGE

# INFLOW

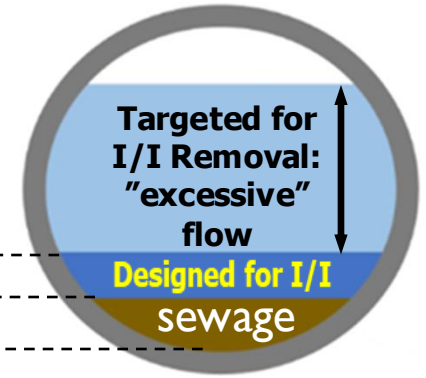



# Effects and Design of Infiltration/Inflow (I/I)

**Sanitary Sewer Stormflow Hydrograph**




**Cross-section of Sanitary Sewer**



# I/I REMOVAL PROGRAM*

**Potentially creates Mitigation, both Direct and Indirect, for municipal wastewater & stormwater systems**

1) **Indirect** mitigation credit earned for accepted plans and studies

2) **Direct** mitigation volumes earned from completed sewer rehab work and follow-up analyses

* Permittee will work directly with MassDEP to guide advancement through the I/I Removal Program.

# I/I REMOVAL PROGRAM

## Program Credit Review Criteria

1) Complies with **Operation, Maintenance and Pretreatment Standards for Wastewater Treatment Works (WWTW)** (314 CMR 12.00)

2) Follows: **MassDEP's 2017 Guidelines for Performing I/I Analyses and Sewer System Evaluation Surveys** (**SSESs**)

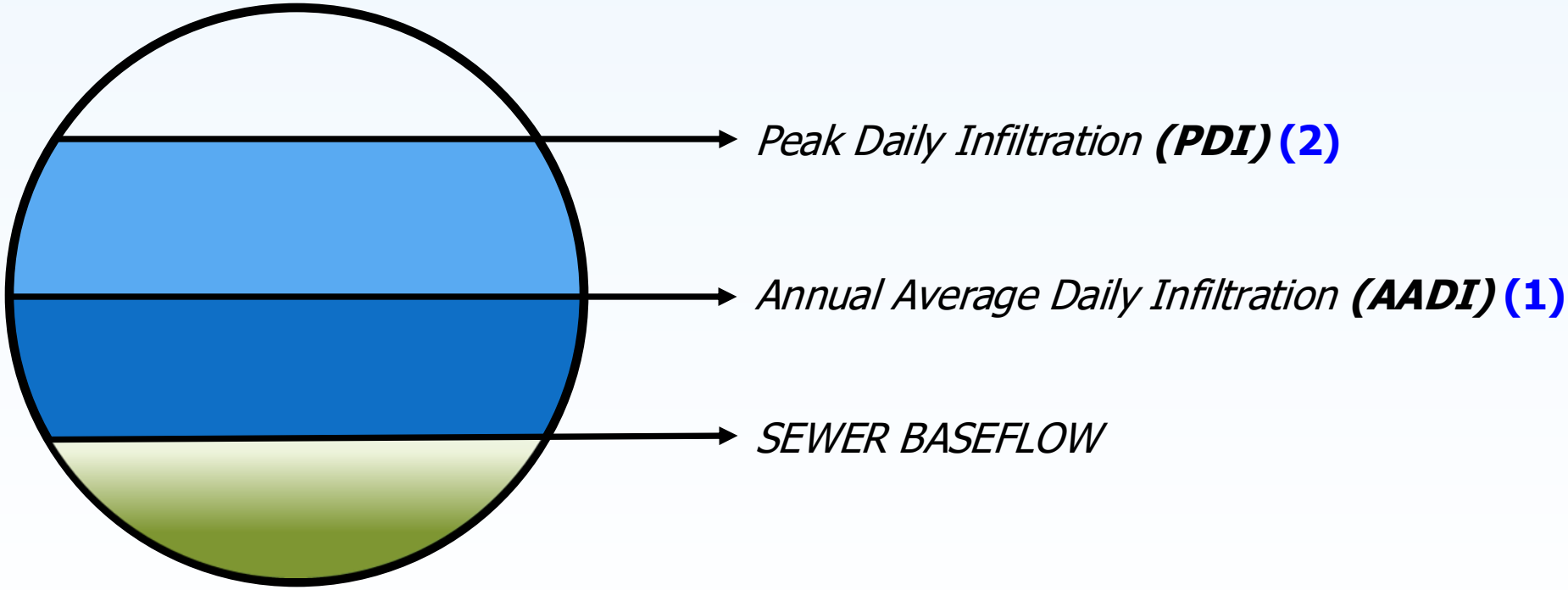
**Elements of I/I analyses:**

1. **INDIRECT CREDIT:** (Initial) Infiltration and Inflow Analysis:…… **Assessment**
2. **INDIRECT CREDIT:** Sewer System Evaluation Survey (SSES):…. **Assessment**
3. **DIRECT CREDIT:** Sewer System Rehabilitation (O&M program)… **Construction**
4. **DIRECT CREDIT:** Follow-up Analysis (>5 years after Rehab):…… **Quality Assurance**

***** Process: Assess, Fix and Verify Work Quality *****

# I/I REMOVAL PROGRAM
# DIRECT MITIGATION CRITICAL METRICS

***SEWER PIPE CROSS-SECTION***




| | |
|---|---|
| **(1) AADI:** Direct Credit for infiltration estimate:..... | **AADI x 50% *** |
| **(2) PDI:** Direct Credit for infiltration estimate (when AADI unknown)..... | **PDI x 25%**** |

* Maximum of 25% of PDI and 50% of AADI volumes are eligible for credit **PRIOR** to an SSES "***Follow-up Analysis***"

** **= 50% x (PDI x 50%)** at each rehab subarea, based on MWRA Annual Infiltration/Inflow Reduction Reports.

# I/I REMOVAL SUMMARY TABLE & CALCULATIONS

| Major Basin | Year completed | Data Source(s)[1] | Activity Type (infiltration or inflow) | Activity[2] | Method[3] | Flow Estimate (mgd) | Measured or Removable I/I?[4] | Peak or Average Annual Flow?[5] | Notes |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

[1]SSES reports and/or post-rehab monitoring data should be the primary data sources for completing this table. Please consult with DEP if using an alternate data source.

[2]Example I/I removal activities include main line repairs, service connection repairs, manhole repairs, and sump pump disconections.

[3]Example I/I removal methods include CIPP lining for pipe repairs and frame & cover replacements for manhole repairs.

[4]Please indicate whether the value provided in the SSES report is the estimated volume or the estimated *removable* volume.

[5]Please indicate whether the value provided in the SSES report reflects peak flow (i.e. based on springtime mesurements) or annual average flow conditions.

- **I/I activities must have occurred since 2005 & w/in 10 years of SSES**

**WMA Direct Mitigation for Inflow estimates:**

- 100% of the estimated Inflow volume is eligible for direct credit by following I/I Program Credit Review Criteria
- Permittees must complete the I/I Removal Summary Table or provide documentation of a follow-up analysis that includes pre-rehab and post-rehab flow monitoring

**General:**

- Construction and flow-measurement methods will require MassDEP approval.
- Pre- and post-construction volumes must be comparably and adequately measured
- The annual average volume should apply to the entire system rather than the improved sub-area(s).

# Crediting I/I Removal in WMA Permitting*

| Activity | Max Credits | Criteria | Submitted |
|---|---|---|---|
| **INDIRECT MITIGATION – I/I Removal Program- maximum of 5 credits** | | | |
| O&M | 1 | Detailed plan of O & M methods, locations, duration, and frequency | ☑ |
| | | Demonstrated funding availability | |
| I/I Analysis | ½ | I/I Analysis plan developed | ☑ |
| | ½ | I/I Analysis study completed with report | |
| SSES | ½ | SSES plan developed | ☑ |
| | ½ | SSES study completed with report | |
| Sewer System Rehab | 1 | Sewer system rehab plan developed | ☑ |
| | 1 | Funding secured, and construction dates set | |
| **DIRECT MITIGATION – based on gallons of I/I removed** | | | |
| Sewer System Rehab | estimated Gallons removed | Sewer system rehab construction completed with documentation and DEP approval | ☑ |
| Follow-Up Analysis | Gallons removed | Analysis of pre- and post-rehab I/I required | ☑ |
| | | Post-rehab flow monitoring must be documented annually | |
| | | Must be submitted at least 5 years after construction to adequately measure long-term removal | |
| **Applicant WMA Certification for Infiltration & Inflow (I/I) Removal Mitigation Credits** | | | ☑ |

* Indirect & Direct credit eligibility requests may be submitted at different times. All must submit *Applicant Certification Form.*
For inquiries, contact Duane.LeVangie@mass.gov

- **Environmental Impacts** – Accelerated Basin depletion, Sewer overflows
- 8 Gallons/Minute = 4,204,800 Gallons/Year
- Revenues Offset By Treatment Costs
- Rate Increases To Offset Treatment Costs
- Delayed Capital Improvement Projects

# THE END