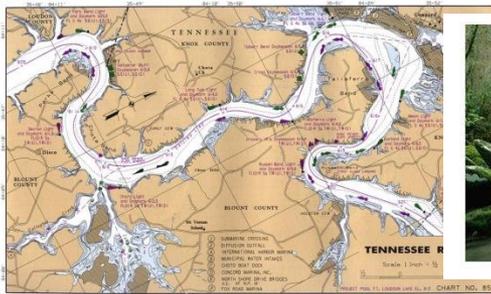


# Counties and the Environment



- Solid Waste**
- Land Use and Planning**
- Air Quality**
- Water Quality**
- Public Health and Safety**
- Economic Development**
- Tourism**
- Parks and Green spaces**
- Sustainability**
- Energy Conservation**



# Counties are Integral to Environmental Planning and Compliance

- 39,000 local governments around the country make daily decisions that impact Environmental Quality
  - Examples: Siting and Types of Private Development
  - Public Infrastructure Planning and Funding
  - Decisions about Land Use
    - Implementation of Land Use Plans—with eye toward population changes, housing needs, transportation needs, workforce and education needs, water and sewer needs.

# Class Objectives

- Outline Major Environmental Legislation Impacting TN Counties in broad areas of
  - Air, Water, Land
- Identify Natural Resource Assets
- Understand how a federal environmental framework is implemented at the state and local level.
- Examples/Case Studies:
  - How Planning Departments, Solid Waste Departments, Highway Departments, Public Works Departments, Stormwater Departments, Transportation Organizations, and the State of TN Implement Environmental Legislation

# What Does Your Community Need?

- Affordable Places to Live
- Strong Economy
  - Workforce and Employment Training
  - Good Jobs
  - Financial Well-Being
- Cost Effective Government
- Affordable Public Works Services
- Stronger Communities
  - Great Neighborhoods
  - Great Places
  - Healthy lifestyles
  - Healthy environment
  - Quality of Life
- “Pollution Mitigation”
- Cleanup and Development of Brownfields
- Less Sprawl
- Development and Reuse
- Environmental Justice
- Resiliency
- Clean Air and Water
- Public Spaces for Walking and Biking
- Protection of Farming and Forestry

How to balance needs and costs-- both current and future.

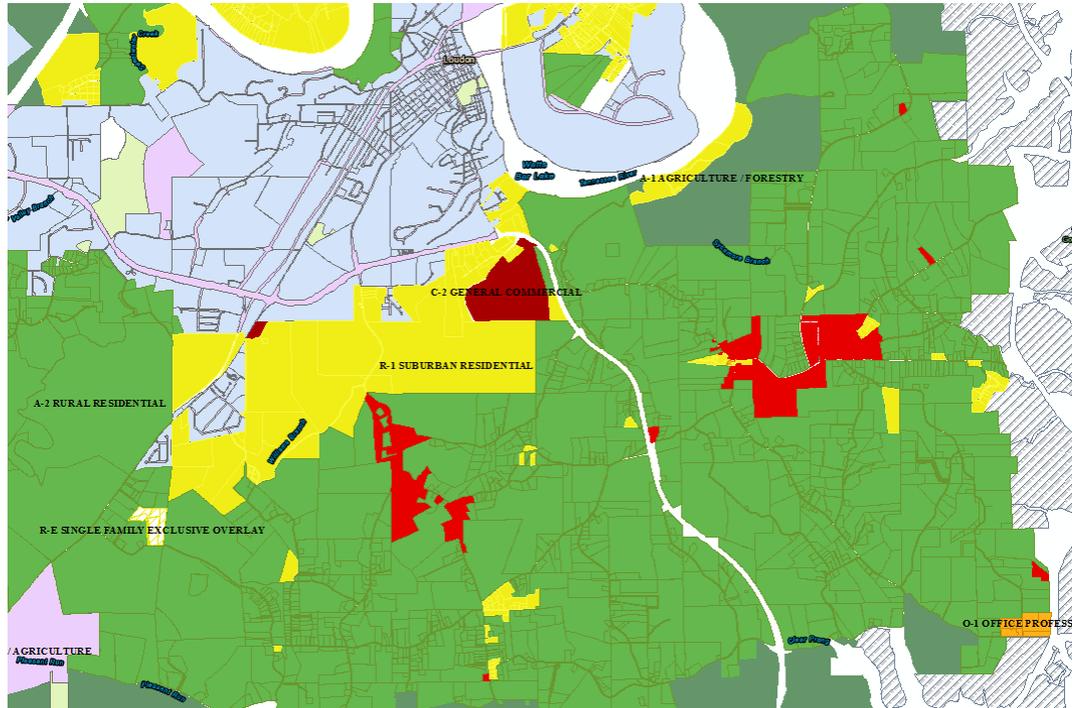
# ZONING

The Most Widely  
Used Land Use  
Control in the US

Traditional Zoning has  
two parts:

1) The Text describing  
the ruling (Residential,  
R-1, Commercial C-1,  
etc.)

2) A Map showing the  
locations and  
boundaries of the  
zoning districts.



# Zoning in Perspective

## Praises

- Separates Conflicting Land Use (e.g. disallows placement of factory in residential neighborhood)
- Overlay Zones—Double Zones where standards of both serve to protect public health, safety, and welfare (e.g. Floodplain Zone over R-1)

## Criticisms

- Separates Commercial and Residential perhaps requiring people to travel by car from work to shop to home.
- Creates “cookie cutter” housing developments
- Often Variances defeat the objectives of the land use plan
- Emphasizes expanding the tax base--may result in downplaying of topography, hydrology, soils, infrastructure needs

# Subdivision and Land-Development Regulations

- Establish Rules for the design and layouts of lots, roads and sidewalks, sewage disposal, drinking water supplies, stormwater drainage, and open spaces.
- Planning Commissions review and approve a development proposal—sketch plans, preliminary plats, and the final plat.
- In the preliminary stage—negotiations occur.
  - Once the preliminary plat is approved there is little the public can do to change the proposed development.



# Capital Improvement Plans

- Anticipate and Fund Public Infrastructure
- Plans address what a community will need to Build, Repair and Replace
  - Determine where these services are or will be located
  - When the construction will happen
  - How they will be funded
  - Typically, CIP's look 5-10 years into the future, but can vary

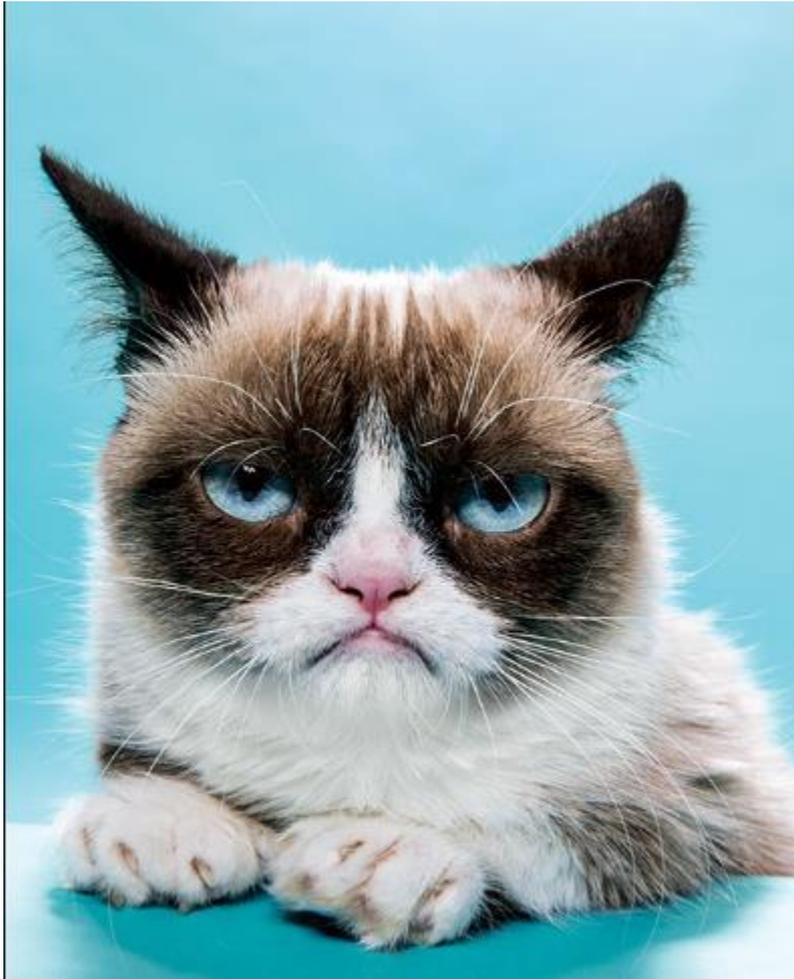
# Development Checklist

## Is the Proposed Development...

- Consistent with a comprehensive land-use plan?
- Consistent with the zoning ordinance?
- Consistent with subdivision and land-development regulations?

## Are there Environmental Costs?

- Is there impact on water quality?
- Could the development change stormwater drainage patterns or increase off-site runoff?
- Could the development produce significant soil erosion and sedimentation?
- How will sewage be disposed of?



**Why do I  
have to do  
that?**

# ENVIRONMENTAL LAW AND COUNTIES

## A. CONSTITUTIONAL LAW

- Three amendments are especially important to the establishment of county environmental programs.
- **The fifth amendment...**'nor shall private property be taken for public use without just compensation."
- Government regulation goes to far and results in a 'taking' of property if it restricts the use of the property to a point that no reasonable economic use of the property remains.

# 5<sup>th</sup> Amendment Cont'd

- But owners do not have absolute rights
  - Governments may impose regulations in public interest to protect public health, safety, and welfare.
  - There are limitations to building in floodplains, wetlands, steep slopes.
  - Governments may have a legitimate case for acquiring land easements, but the acquisition must be “proportional” to the potential impacts of the proposed use or development.

# Case Dolan v. City of Tigard, 512 US 374 (1994)

- City required donation of land (for bike trail) in exchange for permission to expand their hardware business.
- Supreme Court ruled there was no connection (rational nexus) between what the Dolan's were proposing and what the city was requiring.
- Additionally, the ask was not "proportional" thus resulted in "taking of private property".
- Court affirmed developers may still be required to dedicate land for roads as part of the land-development process, but local governments need to have clear standards and not ask for dedications that are unrelated to the proposed development.

# Reaffirmed..Compensation

- Though a government cannot take without compensation, a government is also under no obligation to guarantee a private landowner's return on land investment.
- Land is an investment—may increase or decrease in value with addition or improvement of infrastructure.

# The Tenth Amendment

- Allows state government to use their police power to protect the public health, safety, welfare, and morals.
- States delegate some of this authority to local governments.
- Local governments are exercising police power when they adopt zoning and subdivision regulations over the use of private land.

# Conflict..

- There is a tension between the fifth and tenth amendments over land use.
- Landowners see property as a financial asset. But development of property has implications for public service costs, environmental quality, and overall quality of life.
- Government is often in the middle between development interests and interests of the public.

# The Fourteenth Amendment

- In part, no state shall...deprive any person of life, liberty, or property, without due process of law, nor deny to any person within its jurisdiction the equal protection of the laws.
  - Due Process: Fair and speed trial or decision
  - Equal Protection: Governments cannot enact laws or regulations that discriminate
  - Same rights to clean and healthy environment
  - Protection against “spot zoning”, “arbitrary and capricious” decisions

## B. LEGISLATIVE LAW

- Compiled as statutory law in federal and state law books and also referring to local law—ordinances, resolutions, etc.
- Federal Environmental Law: Came about in response to broad public concern about threats to public health and natural habitats.

# 1970 National Environmental Policy Act (NEPA)

- Established process for the review of federal projects, policies, and investments that could affect environmental quality and result in the irreversible use of natural resources.
- The heart of NEPA-- the environmental impact statement (EIS) process, which screens all proposed federal projects, funding, permits, policies, and actions for potential environmental effects.
-

# NEPA Cont'd

- On review, EPA can issue a 'finding of no significant impact "FONSI"



- Or may decide that an EIS is necessary.
- If necessary, required to published in the Federal Register and circulated for comment.
- After which, have to produce "program impact statement"

US Transportation writes the most EIS reports.

US Army Corp of Engineers is another leader.

# C. Administrative and Judicial Law

## ADMINISTRATIVE LAW

- Government agencies need to adopt rules and regulations to implement the statutes.
  - For example, Chapter 40 of the Code of Federal Regulations describes the regulations that the EPA follows and enforces to implement environmental statutes.

## JUDICIAL LAW (CASE LAW)

- Judges asked to interpret how the US Constitution and existing laws and regulations apply to a particular situation.
  - Has been important in interpreting the Fifth, Tenth, and Fourteenth Amendments

# D. QUASI JUDICIAL RULINGS

- Interpret the law based on facts, but the ruling is made by a publicly appointed board or elected officials, not a judge.
  - Government boards, elected officials make quasi-judicial rulings based on record of facts.
- Usually making decisions based on one land owner or developer.
  - Important to observe due process by giving proper notice of a public hearing and making written findings of fact to support decisions.

# EPA US Environmental Protection Agency

Created through executive order by President Nixon in December 1970.

Agency has broad regulator powers that affect nearly every industry and local government in the nations.

- Has authority to implement and enforce environmental laws including
  - Clean Water Act
  - Safe Drinking Water Act
  - Clean Air Act
  - Toxic Substances Control Act
  - Federal Insecticide, Fungicide, and Rodenticide Act
  - Resource Conservation and Recovery Act
  - Comprehensive Environmental Response, Compensation, and Liability Act (Superfund)

# EPA has authority to ..

- Present testimony on EIS's through NEPA
- Block large development projects that would do irreversible damage or violate environmental laws
- Bring enforcement action against state and local government agencies that are not carrying out environmental laws and regulations
- Levy fines on violators
- Undertake legal action against polluters
- Initiate cleanup of hazardous waste sites
- Ban the production hazardous substances such as DDT and PCB's
- Require states to link land use planning and the management of air quality
- Withhold federal highways funds from states and metropolitan area not meeting the Nation Ambient Air Quality Standards
- Conduct research on toxic substances and set safety standards for air and water quality based on science.

# EPA

- Agency serves as the primary guardian of America's public health and environment, but it is a politically charged agency that changes tenor with each administration.
- Their authority is often battled and challenged.

# HAVE ENVIRONMENTAL REGULATIONS PRODUCED GREATER BENEFITS THAN COSTS?

- EPA estimates the 1970 Clean Air Act and Amendments created \$23 trillion worth of health and ecological benefits from 1970-1990.
- Compared this to \$523 billion in costs.
- What price is the public willing to pay for environmental amenities?
- Economists use term “contingent valuation”... how much are citizens willing to pay for an environmental benefit.

# Local Governments Routinely Make These Same Determinations

- FISCAL IMPACT STUDIES: Estimate the likely costs associated with a proposed development plan.
  - E.G. A new residential subdivision may create need for elementary school and other infrastructure and transportation build-out.
- A Fiscal Impact Analysis looks at how growth impacts infrastructure as compared to property taxes and sales taxes generated.
- A fiscal impact study can show whether a project is desirable and whether there is “contingent valuation” the public is willing to pay for.

# ENVIRONMENT AND PUBLIC HEALTH

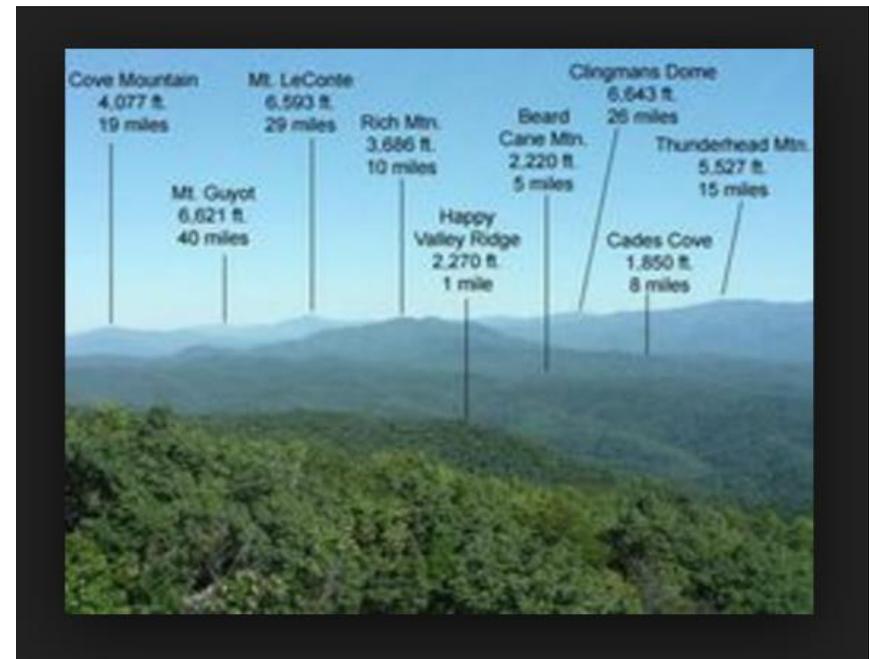
- According to EPA, Air Pollution in the US accounts for more than 100,000 premature deaths/yr.
- Also increases frequency of asthma, chronic bronchitis, emphysema, lung cancer, and circulatory problems.
- Main sources of air pollution:
  - Mobile sources, stationary direct sources, stationary indirect sources.

# Major Air Pollution Sources

- Mobile: Motor vehicles cause about 1/3-1/2 of the Air Pollution in US.
  - Add also ships, planes, mowers, etc.
- Stationary: Factories, Municipal and Private Incinerators
  - Add also burning stoves, electric generating plants, fire places, gas stations, dry cleaners, sewage treatment plants, landfills.

# Concentration of Pollutants related to

- Amount/rate released by stationary/mobile sources
- The form of the pollutant
- Prevailing wind direction and speed
- Climate Warm/humid air holds pollution more than cold, dry air
- Topography (Thermal inversions)
- Vegetative Cover



# Air Pollution

- Nitrogen oxide (Mainly exhaust from cars, trucks, buses, smokestacks, power plants)
- Sulphur Dioxide (From coal fired plants, paper and metal factories, burning of gasoline)
- Lead (less common)
- Carbon monoxide (Bi product of gasoline and diesel fuel)

# Cont'd

- Particulates (PM-2.5 and PM 10) Microscopic dust, soot, smoke combined with water droplets.
  - 2.5 is size of the micron in diameter. A human hair has diameter of about 70 microns.
  - Particulates are the leading air pollution health threat in America.
- Ozone a poisonous form of oxygen created by sunlight, warm temps, and interactions with VOC's hydrocarbon compounds (from car/truck tailpipes, factories, paints, solvents, fireplaces)

# EPA's Reach..

- In all, EPA regulates almost 200 toxic pollutants.
- In 2007 the US Supreme Court ruled that carbon dioxide and other greenhouse gases were air pollutants.
- A “Cap and Trade” system for Greenhouse gases may have been more effective and desirable to business.

# AIR POLLUTION LEGISLATION

- Federal regulation of air quality began in 1970 with the passage of the Clean Air Act.
- Established six “Criteria” pollutants and enforcement through lawsuits and fines for violators.
- Initially an “end of pipe” effort, requiring industries to install scrubbers, electrostatic precipitators.

# Two standards--

- 1) **Ambient Air Quality Standards** – maximum allowed level of pollutants in the air that will still protect human health, property, and the natural environment
- 2) **Emissions Standards**--Amount of certain pollutants that an emission source (Factory, car, truck) is allowed to release into the environment.

# Status

- **Nonattainment:** means the region does not meet the national primary or secondary ambient air-quality standard for the pollutant
- **Attainment:** the region meets the national primary or secondary ambient air quality standard for the pollutant.

# 6 CRITERIA POLLUTANTS

- Carbon Monoxide
- Lead
- Nitrogen dioxide
- Ozone
- Particle Pollution
  - PM2.5
  - PM-10
- Sulfur Dioxide

# How this Impacts Counties.. Air Pollution is a Component of Transportation Planning

- Each MPO must adopt a transportation plan that will maintain the region's air quality or move the region towards attainment. The plan has 3 elements:
  - A 20-yr regional transportation plan (RTP). Must be consistent with the state's long-term plan and the SIP (State Implementation Plan).
  - A 3-6 year Transportation Improvement Program (TIP). This must show that any increase in vehicle miles traveled will not jeopardize the improvement of air quality.
  - Individual transportation projects, such as new roads, bus, or rail, must be consistent with the state's long-term transportation plan.
- MPO's don't spend transportation dollars, but allocate them to cities, counties, and transportation authorities.

# IMPLEMENTATION

- SANCTIONS

- Offset requirements for new pollution sources
- Withholding of federal funds for new highway and industrial construction in regions with air quality below the federal standard.

- REGULATORY

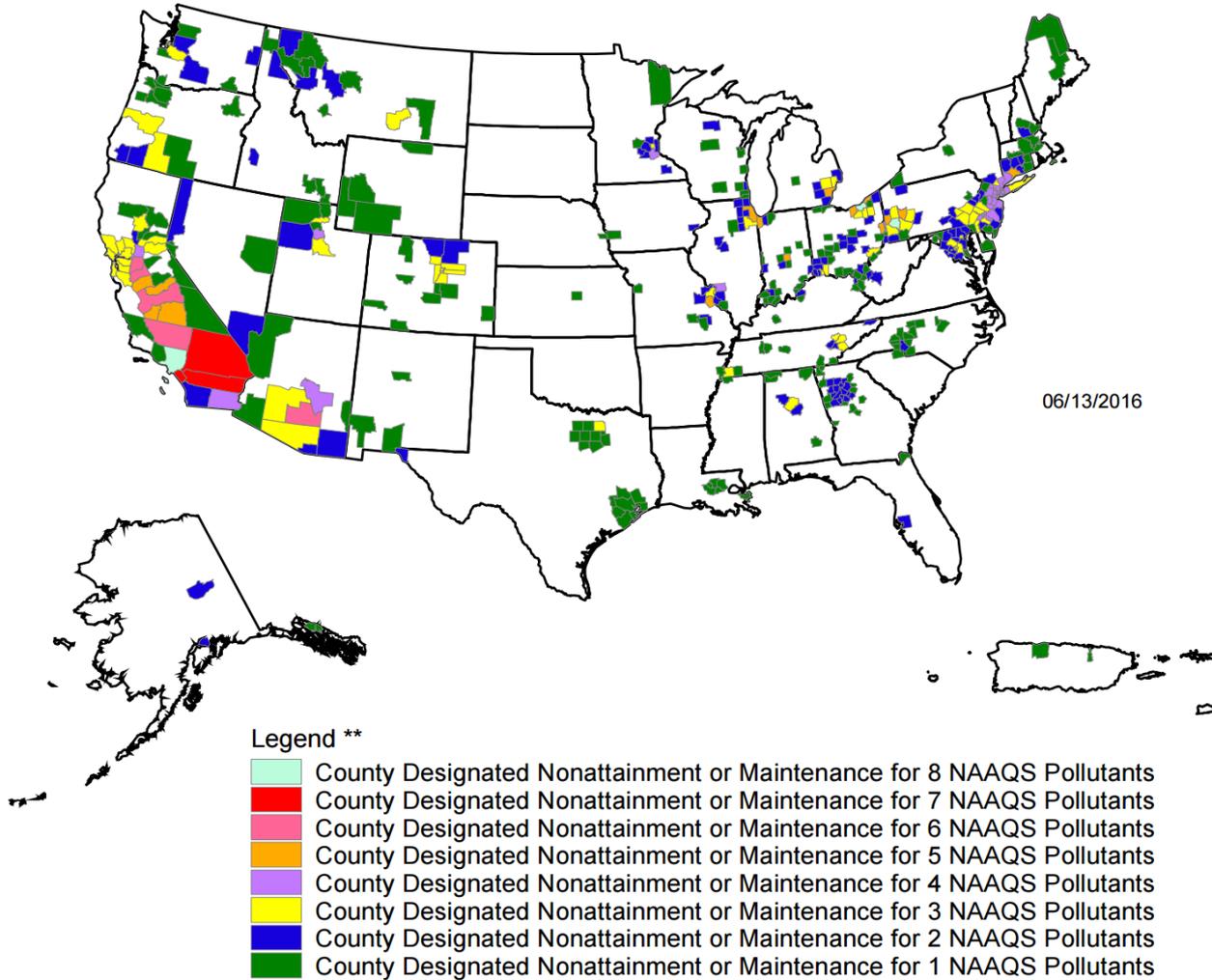
- Motor Vehicle Emission Controls
- 1990 Catalytic Converter
- 1990 Diesel Engine Particulate emission reduction
- Diesel has less sulfur content now.

# AIR POLLUTION CONTROL TECHNOLOGIES

- New Source Review Program
  - In **attainment**, owners of new or modified air pollution sources are required to install Best Available Control Technologies (**BACT**) to ensure outside air quality will not be degraded
  - In **nonattainment**, New Source Review requires companies to obtain a permit for major new stationary sources of air pollution that would emit 100 or more tons per year of any of the six criteria pollutants and for major modifications to existing stationary sources.
    - Must use (**LAER**) **Lowest Achievable Emission Rate** technologies. No net increase in air pollutant levels.

# Counties Designated "Nonattainment" or "Maintenance"

for Clean Air Act's National Ambient Air Quality Standards (NAAQS) \*



# ROLE OF THE STATES IN AIR QUALITY

- EPA requires each state to submit a SIP (State Implementation Plan).
- States and MPO's must show that regional transportation plans are consistent with the SIP.
- The plan must include land-use and transportation controls if necessary to meet air quality standards.
- Otherwise, states cannot spend federal funds on highway or transit projects that would make a region out of compliance.

# SIPS include

- A review of proposed major new stationary sources of air pollution.
- A review process for large, new indirect pollution sources that would attract mobile sources of pollution (shopping centers, airports, highways, sports stadiums)
- The designation of air-quality maintenance areas and air-quality improvement areas.
- Air Quality maintenance plans –must explain how the state will maintain air quality and prevent “significant deterioration”
- Plans to improve air quality in “nonattainment areas” that do not meet standards
- Rules for the six criteria pollutants and emission standards for hazardous air pollution
- Land uses and transportation connections
- Motor vehicle emission and fuel standards
- Conformance policy

# Challenges

- Population growth and economic growth are challenges for areas that are in nonattainment.
- EPA has been quick to levy fines for stationary polluters, but more reluctant to require states to curtail or limit development.



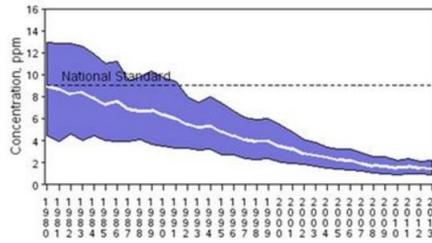
# Local Air Quality Implementation Strategies

- Through zoning ordinances that limit where industrial facilities go
- By encouraging in-fill/mix used
- Passing Ordinances that reduce sprawl
- Subdivision Regulations--Can require large number of trees (filters, shade) and open space requirements
- Passing Requirements for “Concurrency”
  - Policies where developments can’t occur until adequate public facilities (Schools, sewers, water, roads, police, fire) are in place.

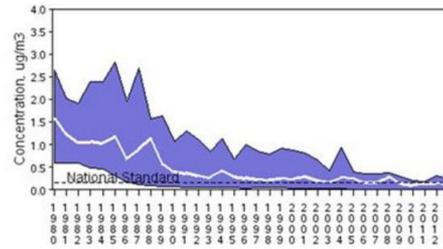
# GREENHOUSE GAS

- Buildup of certain gases—Carbon Dioxide, Nitrous Oxide, Sulfur hexafluoride, hydrofluorocarbons, methane that increase the ability of the atmosphere to trap sun's rays.
- Causing “greenhouse effect”
- Measured in metric tons , CO<sub>2</sub> is most common in US, accounting for more than 4/5's of the nation's total emission.
- But other gases such as methane are influential
  - Methane has a warming potential 20 times that of Co<sub>2</sub>.
  - Nitrous oxide has a global warming potential 300 times more than Co<sub>2</sub>.
  - Fluorinated gases are 1000 times more potent.

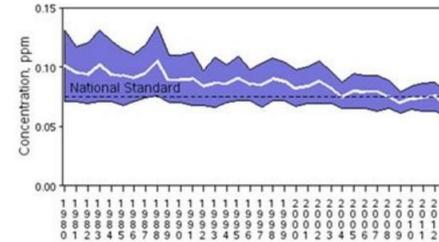
**CO Air Quality, 1980 - 2013**  
 (Annual 2nd Maximum 8-hour Average)  
 National Trend based on 82 Sites



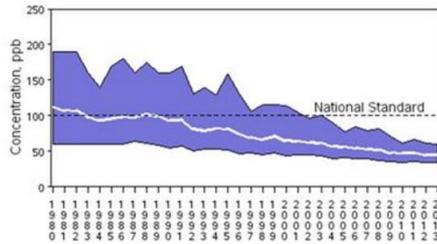
**Lead Air Quality, 1980 - 2013**  
 (Annual Maximum 3-Month Average)  
 National Trend based on 12 Sites



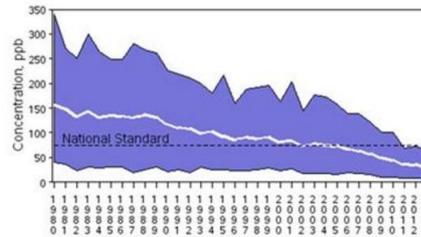
**Ozone Air Quality, 1980 - 2013**  
 (Annual 4th Maximum of Daily Max 8-Hour Average)  
 National Trend based on 222 Sites



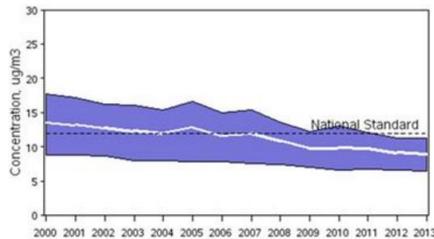
**NO2 Air Quality, 1980 - 2013**  
 (Annual 98th Percentile of Daily Max 1-Hour Average)  
 National Trend based on 29 Sites



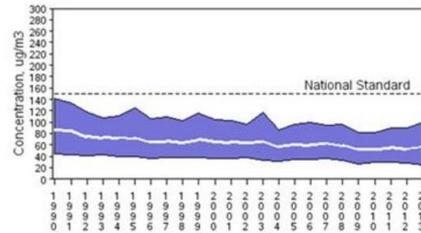
**SO2 Air Quality, 1980 - 2013**  
 (Annual 99th Percentile of Daily Max 1-Hour Average)  
 National Trend based on 47 Sites



**PM2.5 Air Quality, 2000 - 2013**  
 (Seasonally-Weighted Annual Average)  
 National Trend based on 537 Sites



**PM10 Air Quality, 1990 - 2013**  
 (Annual 2nd Maximum 24-Hour Average)  
 National Trend based on 207 Sites



From 1980 to 2012  
 Emissions of the six  
 criteria pollutants fell  
 by 67 percent.  
 Still, and estimated  
 127 million Americans  
 in 2008 were living in  
 counties that did not  
 meet the NAAQs for at  
 least one of the six  
 criteria pollutants.

All Graph Data Source: <http://www.epa.gov/>

# PROGRESS



## Water

# WATER SUPPLY PLANNING

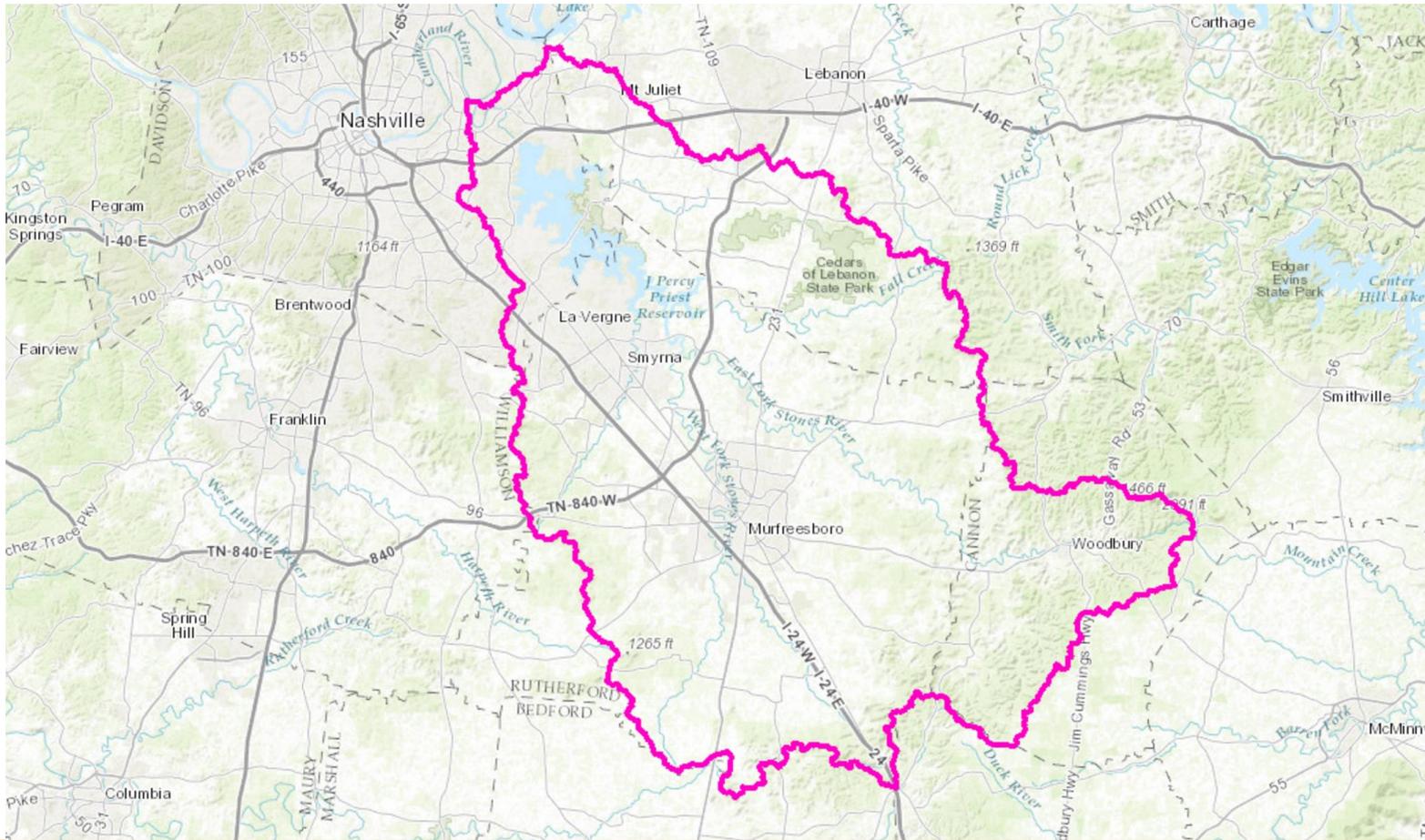
- US has 8 percent of the world's fresh water.
- We use 400 Billion gallons of water every day.
- Electric power plants/manufacturing account for a little more than half of use.
- Competing uses: Farms, Cities, Wildlife
- Water rights-- "Them's Fighting Words" in parts of the US western states.
- In Eastern US water supplies are more plentiful.

# Watersheds

- Water supplies belong to a specific watershed or river basin.
- Watershed: the land area that drains into a particular lake or river system, including its tributaries.
- The Mississippi River--the nation's largest watershed or "river basin".
- Watersheds rarely reflect political boundaries.
- Comprised of Surface Water and Ground Water

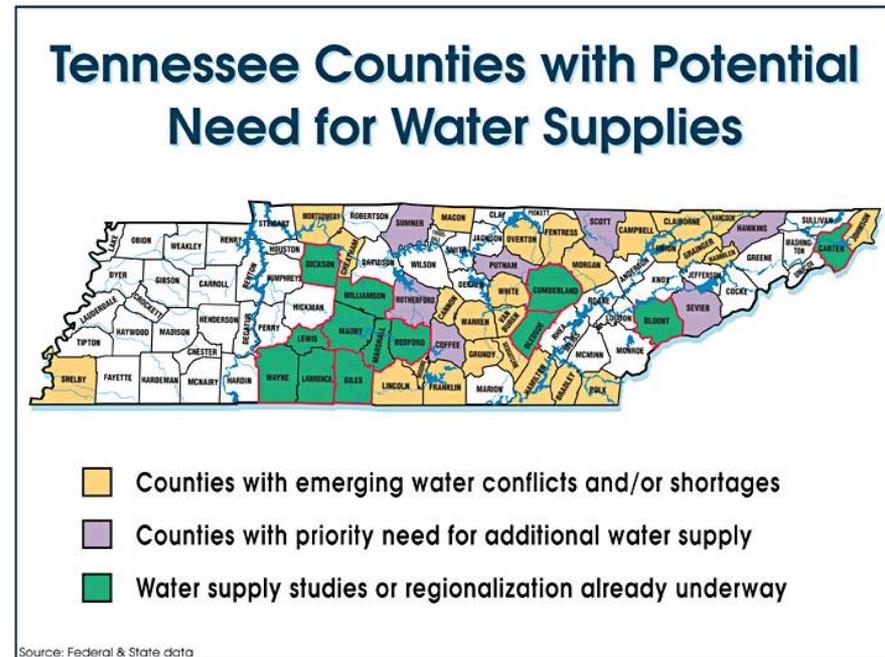


# Stones River Watershed



# Water Issues

- Water Quantity
- Water Quality
- Source Water Protection



# WATER SUPPLY FACTS

- About ½ of US drinking water is from surface water, about ½ from Groundwater.
- However, in rural America ground water accounts for about 90 percent of the overall water supply.
- Atlanta: Demand for water will increase 50% between 2000-2020.
- Leaking pipes result in the loss of an estimated 17% of America's annual potable water use.

# Water Conservation Efforts

- Recent Improvements: National standards for toilets, showerheads, faucets.
- Block rate pricing: Costs more per usage unit not less.
- Ordinances: Restrictions on watering, time of use
- Public use campaigns

# THE SAFE DRINKING WATER ACT

- Congress passed SDWA in 1974 with amendments in '86, '88, '96 to reduce contaminants in public drinking water supplies.
  - Set national drinking water-quality standards,
  - Requires water quality monitoring, water treatment, and public reporting
  - Funds source water protection programs
  - Bans the underground injection of hazardous waste

# Public Water Systems

- There are some 170,000 public water systems, of which 53,000 are community water systems serving at least 15 connections or 25 year round residents.
- Public water systems also include some 21,4000 non-community water systems serving at least 25 people daily for 6 months or more.
- The EPA does not regulate private water systems serving less than 25 people.

# Safe Drinking Water Act

- SWDA Established maximum contaminate levels
- Set secondary standards on heavy metals, color corrosiveness, turbidity
- Addresses wellhead protection and source water assessment and protection. Each state has a program to protect wellhead areas of community water supplies. (SWAP) Source Water Assessment and Protection Programs
- Large water suppliers are required to inform customers about where their water comes from, any contaminants in the water, and how their water compares to state health department standards, including violations from prior years.

# SWDA Cont'd

- Public water systems must demonstrate adequate financial, technical, and management capacity to deliver safe drinking water.
- SWDA has a Drinking Water State Revolving Fund—makes loans to public water suppliers for building and upgrading water treatment plants and transmission systems.
- EPA estimates that community water systems will need to invest almost **400 billion** in the next two decades for installing and upgrading water systems.

# STATE WATER LAW

- Water law defines the rights of individuals, communities, and the state to use freshwater and to allocate water among competing usages.

# SURFACE WATER LAW

## Eastern States--Riparian doctrine:

- Allows a landowner adjacent to a river or stream to withdraw and use the water.
- Also allows riparian land owner to transport water to property that is not contiguous.
- If the riparian landowner sells the land, the water rights pass with the property.
- Works when there is abundant water.

## Western States--Appropriation doctrine:

- Water rights are determined by historical use. “First in time, first in right” and “use it or lose it”.
- If a user ceases to draw water the user may lose future rights to use the water.
- Counterproductive to water conservation.

# Local Water Inventory

## Water Supply Planning Checklist

- Number of surface water and ground water sources
- Safe yield, seasonal flow variations for each source
- Location, capacity, age of treatment plants
- Average annual and peak water use
- Storage capacity
- Contaminations Levels allowed
- Information on Distribution systems
- Metering, rate structure, billing period
- Annual Revenues, expenses, fixed assets, long-term debts, contingency funds
- Emergency response plans

# Water Supply Planning and Protection

## Checklist Planning

- Know when upgrades or new Public Systems will be needed
- Have Interconnections for drought, emergency.
- Keep check on Interconnections—they have potential to encourage sprawling development patterns

## Checklist Protection

- Have wellhead protection zones in place—minimize contamination from
  - septic systems and yard chemicals
  - commercial uses
  - transportation runoff
  - and industrial use
  - feedlots
  - landfills
  - golf courses
  - sewage treatment plants

# WATER QUALITY

- About 40 percent of America's waterways are not fit for swimming or fishing.
- Bacteria and sediment are the most common pollutants in rivers and streams.
- Water Pollution comes from Point sources: Stationary and easily identified. *"End of pipe"*
- And Nonpoint Sources: Dispersed and not in a fixed location. Harder to identify, measure, control.

# Water Pollution

## Point Source Pollutants

... are identifiable sources of pollution such as a pipe or ditch from a municipal or industrial wastewater treatment facility.



# Stormwater Runoff

- Between 70-80 percent of water pollution comes from nonpoint sources.
- Stormwater runoff comes from agricultural sources, forestry practices, road building and construction, runoff from impervious services, onsite septic systems, lawns and golf courses, motor vehicles, mines.

# CLEAN WATER ACT 1972

- Administered by EPA, but day-to-day regulation mainly carried out by states
- EPA Sets water-quality ratings, a waterbody rated less than Class B is considered “Impaired”
- EPA also establishes water quality standards, such as swimmable and fishable (Class A and B)
- Requires states to list the designated uses of a water body

# DESIGNATED USES

- Frequent Designated Uses:
  - Drinking water
  - Industrial
  - Agricultural
  - Human Contact
  - Swimming
  - Fish for eating
- Most often designated as ‘fishable and swimmable’
- Most sensitive use takes precedence.
- Economic and social effects of designating the water body maybe considered.

# CWA Requirements for States

*The Commissioner shall have the power, duty, and responsibility to...post or cause to be posted such signs as required to give notice to the public of the potential or actual dangers of specific uses of such waters.*

Tennessee Water Quality Control Act

- Have a plan to maintain water quality
- Protect against the degradation of high-quality waters and water bodies that already meet the fishable/swimmable standards
- Clean up polluted or impaired waterways
- EPA allows states to set standards for use other than drinking. *Unlike Clean Air Act*

# Cont'd

- Section 404 regulates draining and filling of wetlands. Act has provisions for establishing pretreatment of sewage sludge and upgrade of treatment plants.
- In 1972 ,most water pollution was from point sources. *Like Clean Air Act*
- Required Improvement to sewage treatment plants and issuing of “pollution permits” or NPDES permits (National Pollutant Discharge Elimination System)

# CWA Sections

- **SECTION 201** Grants for Construction of public sewage treatment plants
- **SECTION 208** Standards and management plans addressing non degradation of swimmable and drinkable waters and waters of “exceptional recreational or ecological significance”, and the ID and use of **best management practices** for the control of point and nonpoint pollution sources.
- **SECTION 303(d)** State Total Maximum Daily Load (**TMDL**) process for prioritizing and implementing cleanup
- **SECTION 305(b)** Biennial EPA report to Congress on the nation’s water quality
- **SECTION 319** Grants for control of nonpoint source pollution
- **SECTION 402** NPDES permit system, including **stormwater permits**, CAFO’s. Monitoring of urban stormwater discharges
- **SECTION 403** Pretreatment of industrial sewage before discharge
- **SECTION 404** Wetlands permitting system for the draining and filling of wetlands
- **SECTION 503** Sewage sludge **land application** and disposal regulations
- **SECTION 604(b)** State water-quality planning and assessment grants.

# WASTE WATER INFRASTRUCTURE

- There are over 21,600 public sewage treatment plants in the US.
- There's also a huge backlog of improvement projects needed.
- In 2013, The American Society of Civil Engineers rated the nation's wastewater infrastructure a D+.
- Major new investments will be necessary to maintain wastewater treatment plants and sewer lines.



# Waste Water Treatment

## Primary, Secondary, Tertiary Treatments

- 1) Primary: Removes Solids and some Nutrients
- 2) Chemical and Biological treatments: Break down organic matter and remove chemicals such as nitrogen, phosphorus, iron, metals
- 3) Tertiary: Advanced (and more expensive) –remove pathogens, suspended solids, dissolved solids.
  - Examples: Membrane systems, Activated charcoal systems.

# NPDES (Section 402)

- More than 400,000 issued permits in US
- In 2003 CAFO's required to permit (Feedlots, farms with more than 1000 animal units)
  - About 8000 CAFOs have permits
- The NPDES permit is a negotiation between the discharger and the state (or EPA)

# SEWER OVERFLOWS AND COMBINED SEWER OVERFLOWS

- US has two main types of public sewer systems: Combined sewer systems and sanitary sewer systems.
- A combined sewer system collects waste water from homes and businesses as well as stormwater and snowmelt through street grates and sends those waters through a single pipe to a sewage treatment plant. Found mainly in older cities.
- When excess rainfall occurs, these systems overflow and bypass the treatment processes, releasing raw sewage back to surface waters.
- US still has almost 1000 CSO's.

# NPDES Storm Water Discharges, Phase I& II

- Phase I of this federal program was implemented in 1990.
- Phase I used a permit system to regulate storm water discharges from larger cities and construction projects.
- In 2000, TDEC expanded Phase I by requiring counties, cities, and additional other parties to implement programs and practices to control stormwater runoff (Phase II).
- This primarily applies to the 20 larger counties and cities within. **If you are named, you need a Permit and Plan**

# Separate Systems

- Modern systems are Separate, meaning Sewage is collected separate from Stormwater.
- Areas covered by SSS's often have a municipal separate storm sewer system (MS4) to collect and convey runoff from rainfall.
- The stormwater is typically untreated and directed back to waterways. Nationwide, almost 16,000 systems. MS4 operators must obtain a NPDES permit.
- CSO's and SSO's are permitted as point sources of water pollution.

# Water Quality Monitoring

Under 305(b) States must submit state-level report every two years. Report assesses water as either

- Good/fully supporting: Meeting water quality criteria and fulfilling the designated use
- Good/threatened: Meeting water quality criteria at present but in danger of degradation in the near future
- Fair/partially supporting: Meeting water q standards most of the time
- Poor/not supporting. Not meeting water quality standards
- Not attainable: One or more of the designated water uses cannot be met.

# DESIGNATION OF WATER QUALITY

- Designated Use. States must designate water bodies that do not meet the drinkable, swimmable, and fishable standards as IMPAIRED WATERS.
- Criteria: Maximum threshold levels must be established. Standards meant to protect the designated uses.
- Antidegradation Policy. Must not allow waters that meet the Class A or B standards to deteriorate in quality.

# CLEANING UP IMPAIRED WATERWAYS: TOTAL MAXIMUM DAILY LOADS

- SECTION 303(D) Requires states to identify impaired waterways and create a priority list and Implement a Total Maximum Daily Load plan.
- Within 8-13 years after a waterbody is listed as impaired, TMDL's should be established by states and approved by the EPA.
- TMDL's are "Pollution Budgets" that define the Wasteload or load allocation that is acceptable for release.

## Pollution Sources in TN:

Urban Runoff and Point Sources Evenly Distributed in TN

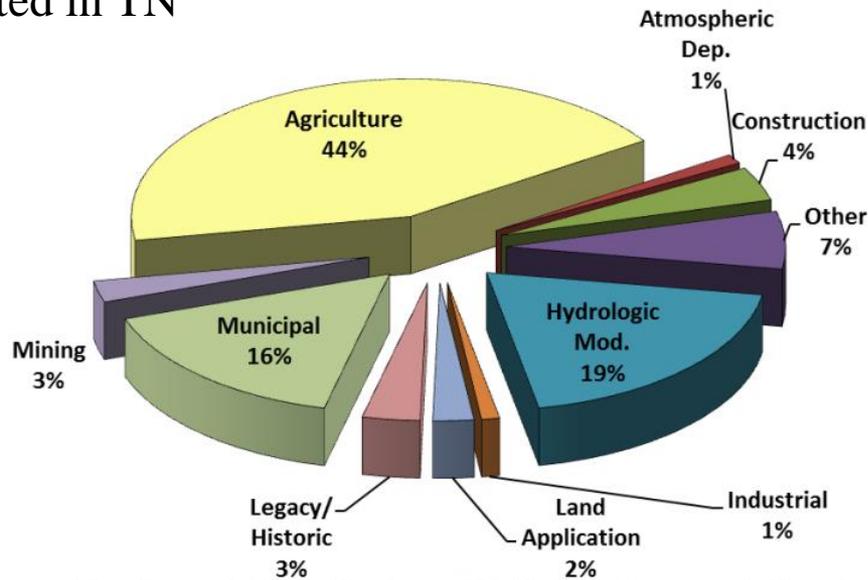


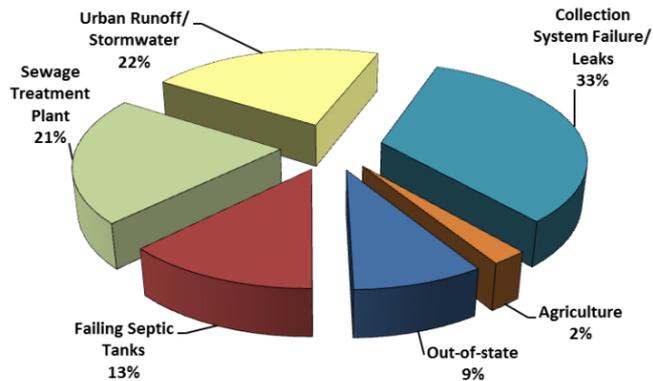
Figure 12: Percent Contribution of Pollution Sources in Impaired Rivers and Streams

Channelization and Crop production in West TN

Dairy farming in the Ridge and Valley Region of East TN

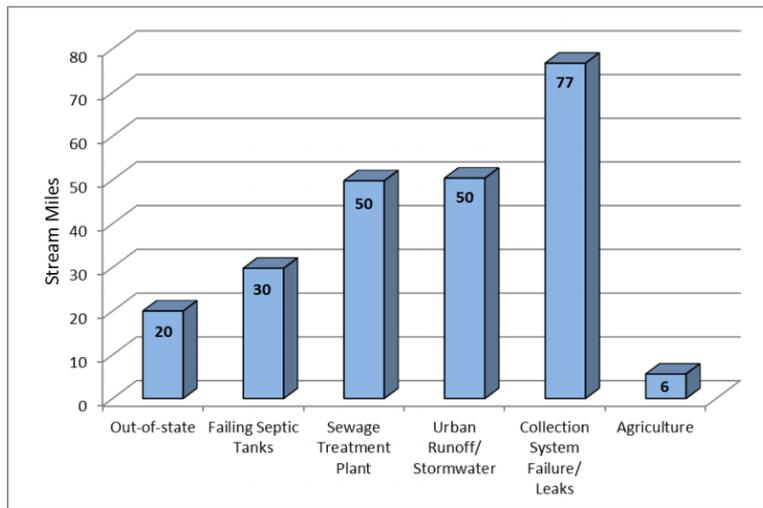
Middle TN: Rapid commercial and residential development

62



**Figure 17: Relative Contribution of Stream Miles Posted for Pathogen Contamination**

# Pathogen Sources in Tennessee



**Figure 18: Stream Miles Contaminated by Various Pathogen Sources.** (The same waterbody may be impaired by more than one source of pollution. Totals are not additive.)

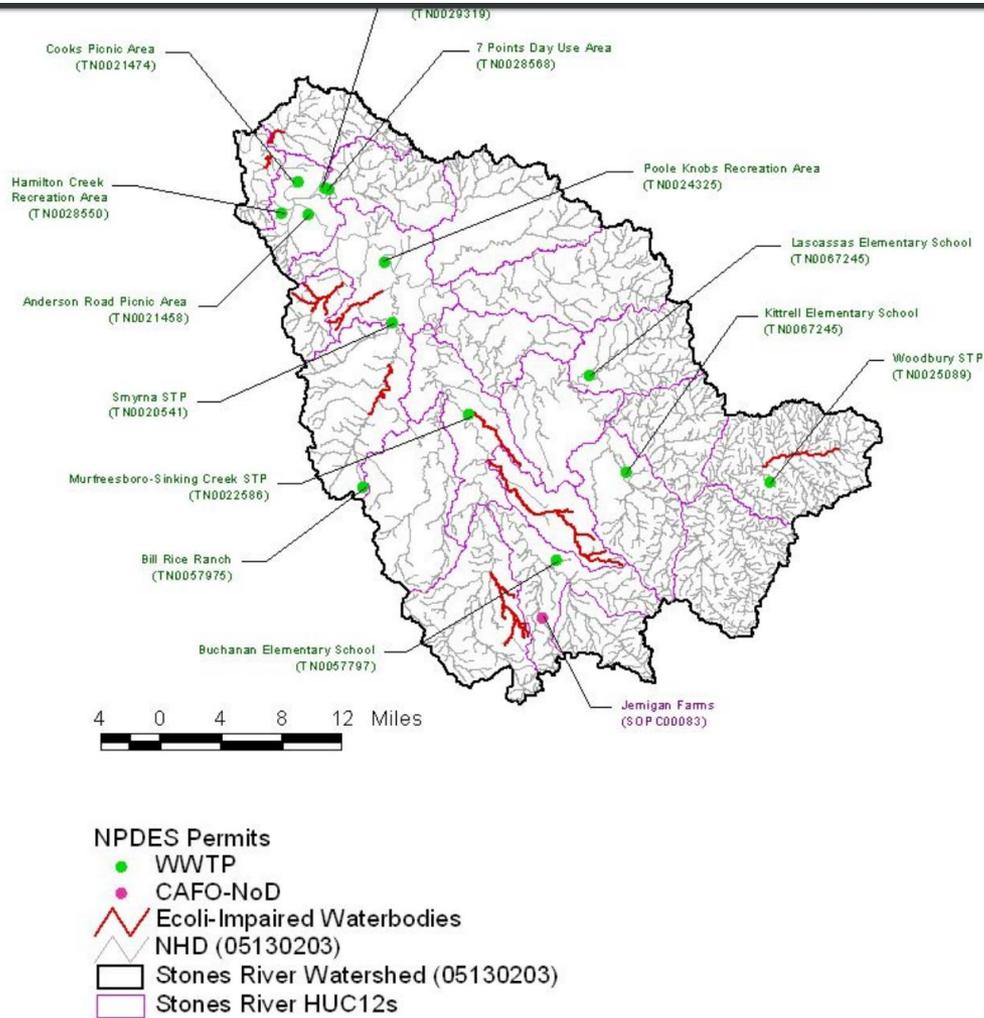
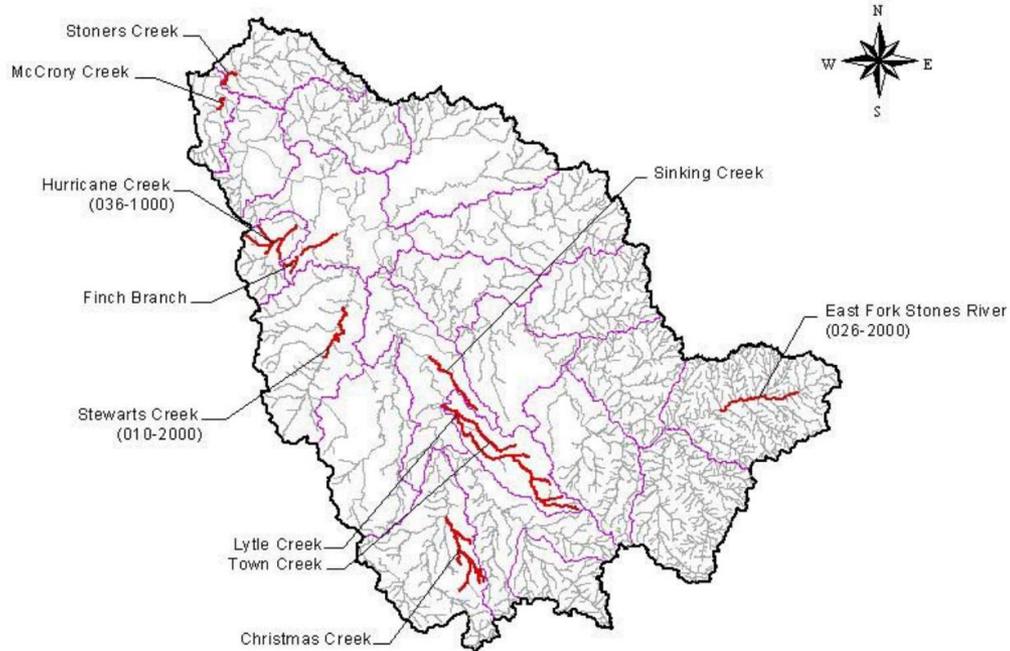


Figure 6. NPDES Regulated Point Sources in and near Impaired Subwatersheds and Drainage Areas of the Stones River Watershed.



-  E. coli-Impaired Waterbodies
-  NHD (05130203)
-  Stones River Watershed (05130203)
-  Stones River HUC12s

# TMDL Requirement for Stones River

Summary of TMDLs, WLAs, & LAs expressed as daily loads for Impaired Waterbodies in the Stones River Watershed (HUC 05130203)

HUC-12 Subwatershed (05130203_) or Drainage Area (DA)	Impaired Waterbody Name	Impaired Waterbody ID	TMDL	MOS	WLAs			LAs <sup>c</sup>
					WWTFs <sup>a</sup>	Collection Systems	MS4s <sup>b,c</sup>	
			[CFU/day]	[CFU/day]	[CFU/day]	[CFU/day]	[CFU/d/ac]	[CFU/d/ac]
East Fork Stones River DA	East Fork Stones River	TN05130203026 – 2000	$1.20 \times 10^{10} \times Q$	$1.20 \times 10^9 \times Q$	$1.106 \times 10^{10}$	0	NA	$(3.838 \times 10^5 \times Q) - (3.930 \times 10^5)$
0203	Lytle Creek	TN05130203022 – 1000	$2.30 \times 10^{10} \times Q$	$2.30 \times 10^9 \times Q$	NA	0	$1.237 \times 10^6 \times Q$	$1.237 \times 10^6 \times Q$
	Lytle Creek	TN05130203022 – 2000						
	Town Creek	TN05130203022 – 0100						
Christmas Creek DA	Christmas Creek	TN05130203018 – 0210	$2.30 \times 10^{10} \times Q$	$2.30 \times 10^9 \times Q$	NA	NA	$4.501 \times 10^6 \times Q$	$4.501 \times 10^6 \times Q$
Sinking Creek DA	Sinking Creek	TN05130203018 – 0210	$1.20 \times 10^{10} \times Q$	$1.20 \times 10^9 \times Q$	NA	0	$3.096 \times 10^6 \times Q$	$3.096 \times 10^6 \times Q$
Stewarts Creek DA	Stewarts Creek	TN05130203010 – 2000	$2.30 \times 10^{10} \times Q$	$2.30 \times 10^9 \times Q$	$3.562 \times 10^9$	0	$(7.566 \times 10^5 \times Q) - (1.302 \times 10^5)$	$(7.566 \times 10^5 \times Q) - (1.302 \times 10^5)$
0304	Hurricane Creek	TN05130203036 – 1000	$1.20 \times 10^{10} \times Q$	$1.20 \times 10^9 \times Q$	NA	NA	$9.841 \times 10^5 \times Q$	$9.841 \times 10^5 \times Q$
Finch Branch DA	Finch Branch	TN05130203003T – 0100	$2.30 \times 10^{10} \times Q$	$2.30 \times 10^9 \times Q$	NA	0	$6.404 \times 10^6 \times Q$	$6.404 \times 10^6 \times Q$
0308	Stoners Creek	TN05130203035 – 1000	$2.30 \times 10^{10} \times Q$	$2.30 \times 10^9 \times Q$	NA	NA	$1.081 \times 10^6 \times Q$	$1.081 \times 10^6 \times Q$
McCrory Creek DA	McCrory Creek	TN05130203001 – 0100	$2.30 \times 10^{10} \times Q$	$2.30 \times 10^9 \times Q$	NA	NA	$3.595 \times 10^6 \times Q$	$3.595 \times 10^6 \times Q$

Notes: NA = Not Applicable.

Q = Mean Daily In-stream Flow (cfs).

- WLAs for WWTFs are expressed as E. coli loads (CFU/day). All current and future WWTFs must meet water quality standards as specified in their NPDES permit.
- Applies to any MS4 discharge loading in the subwatershed. Future MS4s will be assigned waste load allocations (WLAs) consistent with load allocations (LAs) assigned to precipitation induced nonpoint sources.
- WLAs and LAs expressed as a "per acre" load are calculated based on the drainage area at the pour point of the HUC-12 or drainage area.

**Table 10. Example Urban Area Management Practice/Hydrologic Flow Zone Considerations.**

Management Practice	Duration Curve Zone (Flow Zone)				
	High	Moist	Mid-Range	Dry	Low
<b>Bacteria source reduction</b>					
Remove illicit discharges			L	M	H
Address pet & wildlife waste		H	M	M	L
<b>Combined sewer overflow management</b>					
Combined sewer separation		H	M	L	
CSO prevention practices		H	M	L	
<b>Sanitary sewer system</b>					
Infiltration/Inflow mitigation	H	M	L	L	
Inspection, maintenance, and repair		L	M	H	H
SSO repair/abatement	H	M	L		
Illegal cross-connections					
<b>Septic system management</b>					
Managing private systems		L	M	H	M
Replacing failed systems		L	M	H	M
Installing public sewers		L	M	H	M
<b>Storm water infiltration/retention</b>					
Infiltration basin		L	M	H	
Infiltration trench		L	M	H	
Infiltration/Biofilter swale		L	M	H	
<b>Storm Water detention</b>					
Created wetland		H	M	L	

**Table 10 (cont'd). Example Urban Area Management Practice/Hydrologic Flow Zone Considerations.**

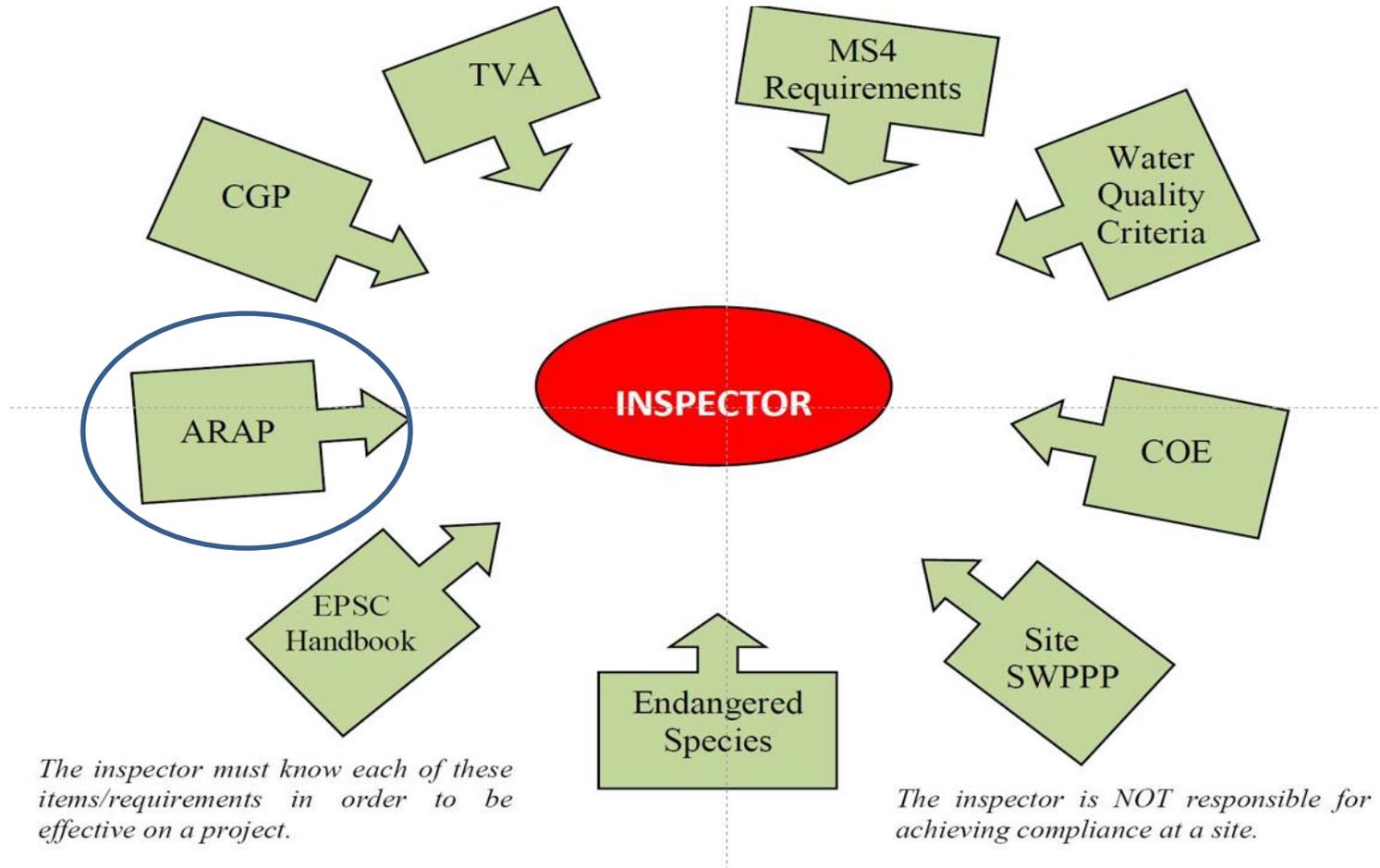
Management Practice	Duration Curve Zone (Flow Zone)				
	High	Moist	Mid-Range	Dry	Low
<b>Low impact development</b>					
Disconnecting impervious areas		L	M	H	
Bioretention	L	M	H	H	
Pervious pavement		L	M	H	
Green Roof		L	M	H	
Buffers		H	H	H	
<b>New/existing on-site wastewater treatment systems</b>					
Permitting & installation programs		L	M	H	M
Operation & maintenance programs		L	M	H	M
<b>Other</b>					
Point source controls		L	M	H	H
Landfill control		L	M	H	
Riparian buffers		H	H	H	
Pet waste education & ordinances		M	H	H	L
Wildlife management		M	H	H	L
Inspection & maintenance of BMPs	L	M	H	H	L
<b>Note:</b> Potential relative importance of management practice effectiveness under given hydrologic condition (H: High, M: Medium, L: Low)					

# Problem: Over 40,000 impaired waters in the US

- Do states have the necessary scientific information to identify, assess, and reduce pollutant loads?
- 75% of these are nonpoint sources.



# Watershed Approach



# Surface Runoff is Regulated by TDEC

- Bare soils and “impervious surfaces”
  - contribute to runoff
  - increase likelihood of flooding
  - lead to “impaired stream” designation
  - result in permit violations



# Applies to All Counties in Tennessee

- Must notify the Division of Water Pollution Control to receive a permit for grubbing, clearing, grading or excavation of 1 or more acres of land
- Certain County Facilities may need a Stormwater Pollution Prevention Plan (SWPPP)

# National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP)

- NPDES permits are required by the U.S. Environmental Protection Agency, but are administered within this state by TDEC, or by a **Quality Local Program (QLP)**.
- A construction permit is necessary for all construction activity that involves the grubbing, clearing, grading or excavation of **1 acre or more**.
- Even if the construction activity is less than 1 acre, a NPDES construction permit is still required if the overall project development site includes over 1 acre.
- The applicant must fill out a **Notice of Intent (NOI) form and also submit a Stormwater Pollution Prevention Plan (SWPPP)**. Application fees typically range from \$250 up to \$7500, depending on the amount of acreage developed.
- Two options for obtaining authorization to discharge or “permit coverage”: general permits and individual permits. The vast majority of discharges associated with construction activity are covered under NPDES general permits.

# NPDES Coverage—County Public Works Programs

- Typically, to obtain authorization to discharge under a construction general permit, a discharger (any owners and operators of the construction site; typically, a developer, builder, and/or contractor) submits to the permitting authority a Notice of Intent (NOI) to be covered under the general permit.
- An NOI is not a permit or a permit application, but by submitting the NOI, the discharger acknowledges that it is eligible for coverage under the general permit and that it agrees to the conditions in the published general permit.
- Discharges associated with the construction activity are authorized consistent with the terms and conditions established in the general permit.

# Aquatic Resource Alteration Permit (ARAP)

- This permit is necessary for any **alteration, modification or impact within or adjacent to waters of the state**, which also includes wetlands and sinkholes. Waters of the state are **normally defined** as any blue-line stream shown on a USGS quadrangle map, or any point adjacent or downstream from the start of a blue-line stream shown on a USGS quadrangle map.
- State of Tennessee requires that an ARAP must be submitted and approved prior to any activity which could potentially damage or degrade waters of the state.

# Notice of Determination ARAP General Permits

## Under The Tennessee Water Quality Act of 1977--

- Commissioner may use a general permit to authorize alterations to waters for specific categories of activities that are substantially similar in nature and that result in no more than an *insignificant or de-minimis degradation of water quality*.
- NOTICE OF COVERAGE
- Each general permit establishes notification procedures required for approval of a specific qualifying activity. Notice of Coverage by the Division of activities that qualify under general permits may also serve as a § 401 water quality certification pursuant to *The Clean Water Act*.
- The valid duration of a permit under the *Tennessee Water Quality Act of 1977* is five years. **The Department must therefore re-issue or deny the general permits every five years.**

# Water Permit (ARAP) for the Alteration of Wet Weather Conveyances

- Conveyances: “Man-made or natural watercourses, including natural watercourses that have been modified by channelization, that **flow only in direct response to precipitation runoff in their immediate locality**, whose channels are above the groundwater table, and in which hydrological and biological analysis indicate that, **under normal weather conditions, due to naturally occurring ephemeral or low flow there is not sufficient water to support fish, or multiple populations of lotic aquatic organisms** whose life cycle includes an aquatic phase of at least two months.”



TDEC-WPC Hydrological Determination Guidance

# General Conditions

- Alterations to wet weather conveyances do not require submittal of an application or written authorization prior to commencement of work **provided the alteration is performed in accordance with the terms and conditions:**
  - 1) No discharge of waste
  - 2) Placement of materials will not impair surface water
  - 3) **Sediment** shall be prevented from entering waters of the state
  - 4) ) Erosion and sediment **control measures** shall be designed according to the size and slope of the disturbed drainage area
  - 5) Erosion and sediment control measures shall be **in place** and functional before operations begin
  - 6) Check dams utilized where runoff is concentrated
  - 7) Appropriate steps taken to ensure **petroleum products** or other chemicals are prevented from entering waters of the state.
  - 8) Work shall not commence until the permittee has obtained all necessary authorizations



# ARAP –Wet Weather Conveyance Cont'd

- 9) Permit does not authorize impacts to cultural, historic or archeologic features or sites.
- 10) Permit does not authorize access to private property.
- 11) Permit does not authorize adverse impact to formally listed state or federal threatened endangered species or their critical habitat.
- 12) The permittee is responsible for obtaining coverage under NPDES General Permit for Storm Water Discharges from Construction Activities where clearing, grading or excavation results in an area of disturbance **of one or more acres**, or activities that result in the disturbance of less than one acre if it is part of a larger common plan of development or sale.

# Water Permit (ARAP) for Construction or Removal of Minor Road Crossings

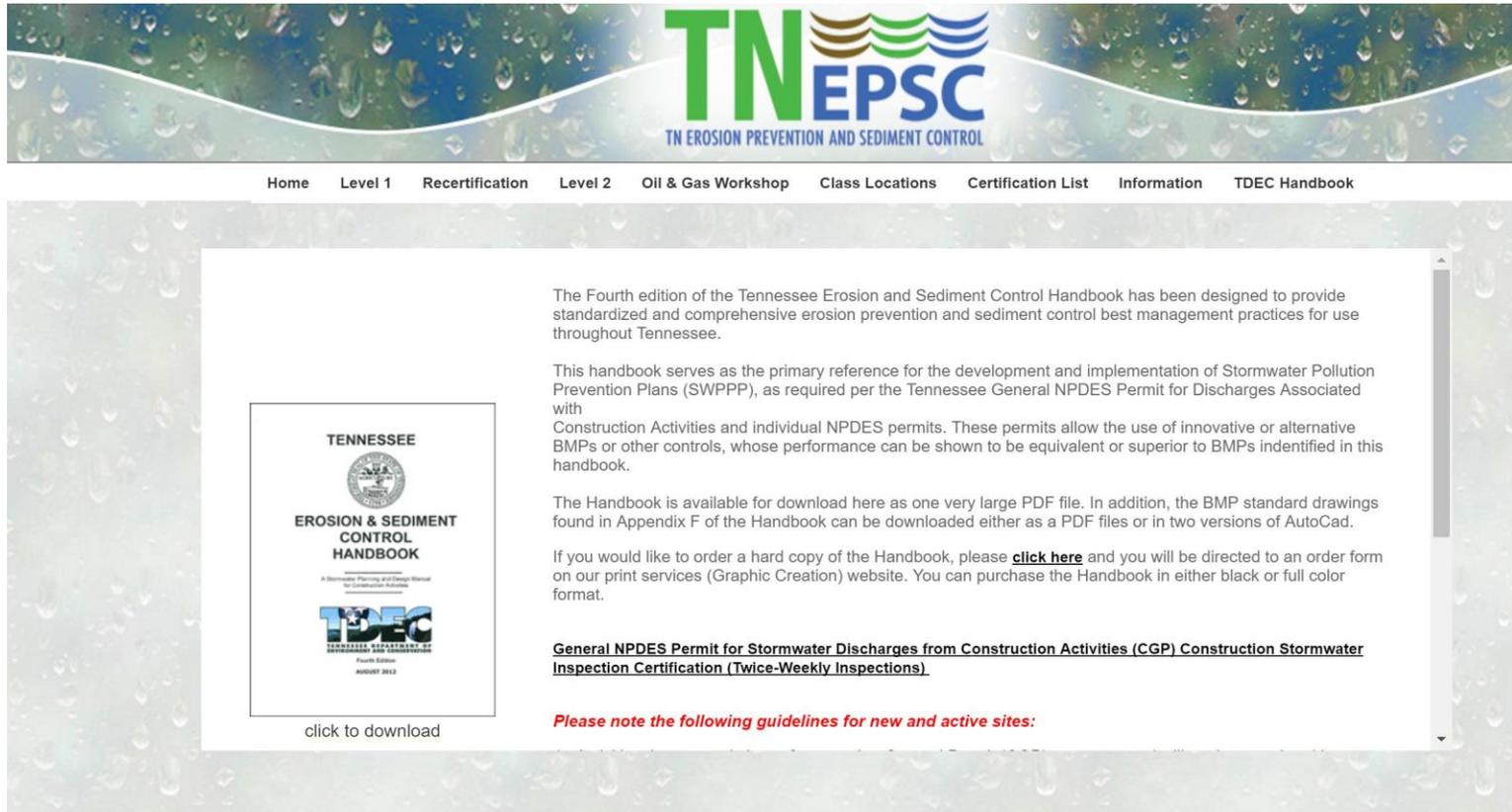
- Coverage: This general permit authorizes the **construction and/or removal of minor road crossings of streams, via bridge, culvert, pipe, or fords.**
- This permit also authorizes other similar transportation crossings such as railroads and linear crossings of greenway trails.



# “Special Conditions”

- 1) Road crossings, including transition channels, endwalls, aprons, or rip rap, that either individually or **cumulatively exceed a total length of 200 feet of impact in the same water body are not covered.**
- 2) **Non-linear crossings** such as vehicle maintenance or storage building, parking lots, cul-de-sacs and turn arounds are not covered.
- 3) **Riprap areas must mimic the existing/proposed contours** of the stream channel
- 4) Road crossing that may significantly alter the hydraulics of the stream (under-sizing or over widening) not covered.
- 5) Bottom of culverts shall be constructed below the stream bed elevation.
- 6) The crossing shall be culverted, bridged or otherwise designed to **prevent the impoundment of normal or base flows** on the upstream side, and not result in a disruption or barrier to the movement of fish or other aquatic life.
- 7) The Width of **the fill** shall **be limited to the minimum necessary** for the crossing.
- 8) Where a crossing is removed, **natural channel characteristics shall be replicated** and stabilized using clean rock, riprap anchored trees or other non-erodible materials.

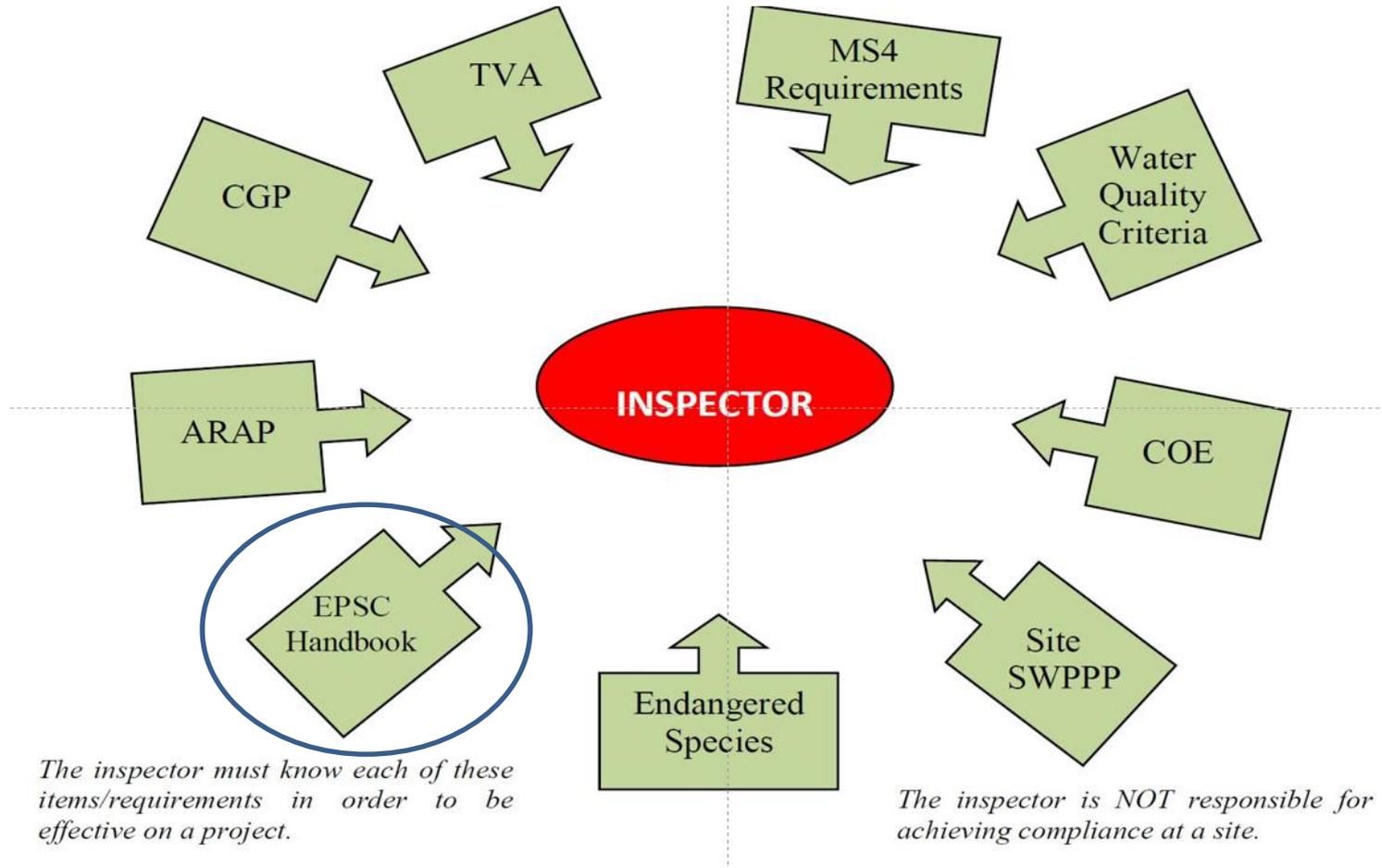
# TN Erosion Prevention and Sediment Control



The screenshot shows the TN EPSC website with a navigation menu at the top: Home, Level 1, Recertification, Level 2, Oil & Gas Workshop, Class Locations, Certification List, Information, and TDEC Handbook. The main content area features a white box with a scroll bar. On the left of this box is a thumbnail of the 'TENNESSEE EROSION & SEDIMENT CONTROL HANDBOOK' cover, which includes the TDEC logo and the text 'Fourth Edition AUGUST 2013'. Below the thumbnail is a 'click to download' link. To the right of the thumbnail, the text reads: 'The Fourth edition of the Tennessee Erosion and Sediment Control Handbook has been designed to provide standardized and comprehensive erosion prevention and sediment control best management practices for use throughout Tennessee.' This is followed by a paragraph explaining the handbook's role as a primary reference for SWPPP development and implementation. A third paragraph states that the handbook is available for download as a large PDF file or as AutoCad files. A fourth paragraph offers to order a hard copy, with a 'click here' link. At the bottom of the text area, there is a link for the 'General NPDES Permit for Stormwater Discharges from Construction Activities (CGP) Construction Stormwater Inspection Certification (Twice-Weekly Inspections)'. Below the text is a red note: 'Please note the following guidelines for new and active sites:'.



# Watershed Approach



# Erosion Processes

## Geologic vs. Accelerated Erosion

Geologic	Accelerated
Natural Process	Caused by Humans - Agriculture, mining, forestry and development (land disturbance)
30%	70%
	

# Soil Erosion



Wind Erosion



Sheet & Rill Erosion



Stream Bank Erosion



Gully Erosion

## Impacts of Erosion and Sedimentation



**Sediment transport**



**Pollutant runoff**



**Slope failure**



**Flooding**



## Principles of Erosion & Sediment Control

Erosion Control - first line of defense. "If there is no erosion, there can be no sediment."

- Prevents damages associated with both erosion and sediment control
- The only practical approach in some instances (e.g., very fine sediments)



## Principles of Erosion & Sediment Control

Sediment Control - subordinate to erosion control practices; second line of defense.

Coordination of erosion control, sediment control, & management of stormwater leaving the site is necessary for a well-integrated program!



# Principles of Erosion & Sediment Control



Erosion Control

Sediment Control

Inexpensive

Easy to install

Vegetative

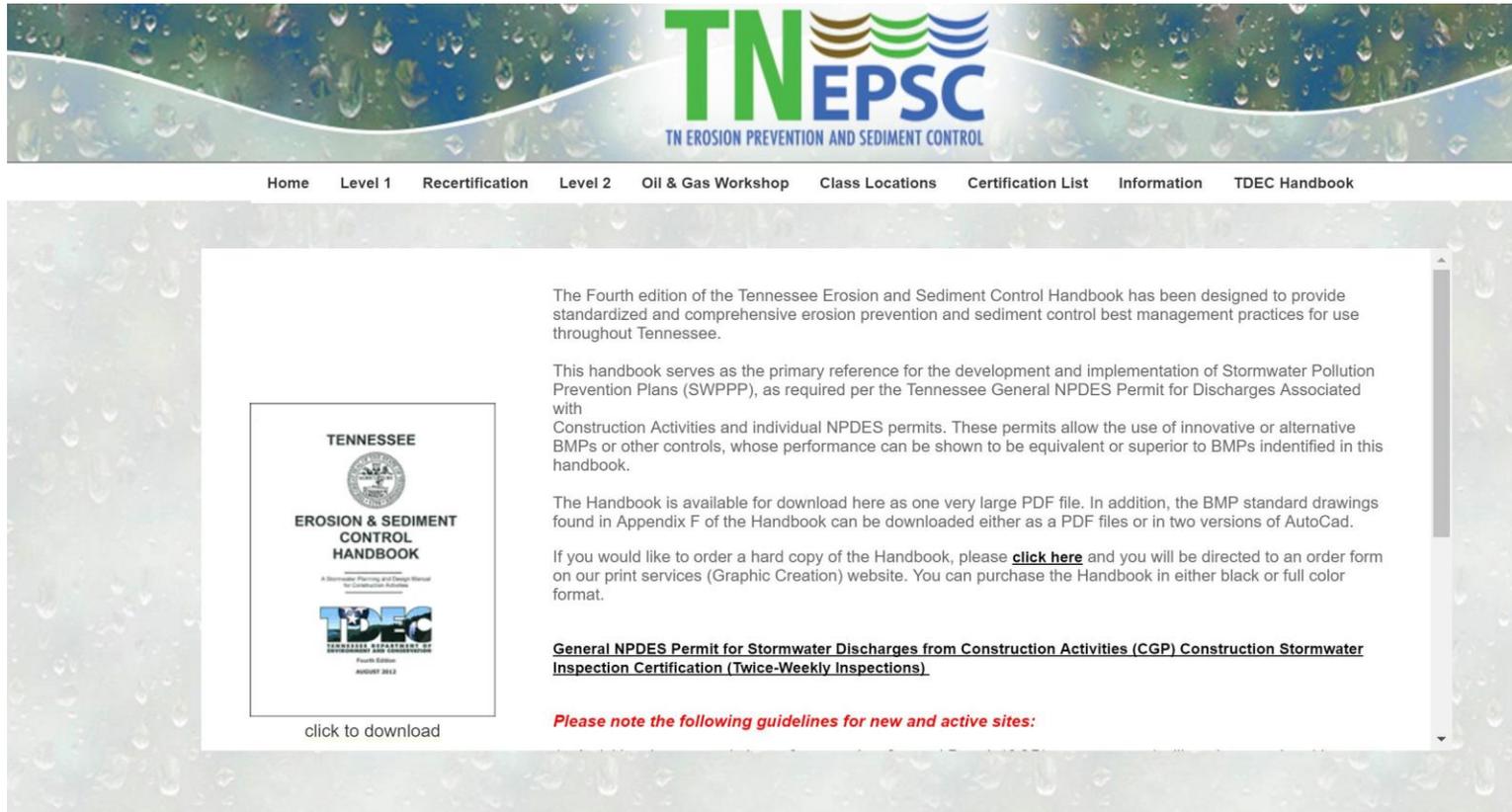
Surface Cover

Expensive

Structural

Perimeter Controls

# TN Erosion Prevention and Sediment Control



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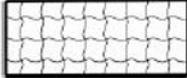
# Surface Runoff is Regulated by TDEC

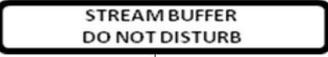
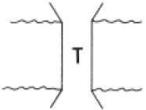
- Bare soils and “impervious surfaces”
  - contribute to runoff
  - increase likelihood of flooding
  - lead to “impaired stream” designation
  - result in permit violations



<b>STABILIZATION PRACTICES</b>	
<b>MU</b>	7.6 Disturbed Area Stabilization with straw mulch
<b>MO</b>	7.7 Disturbed area stabilization with other mulches
<b>PS</b>	7.8 Disturbed Area Stabilization with Permanent Vegetation

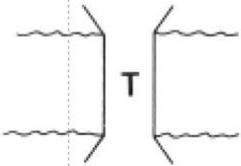
# BMP's-Best Management Practices

<b>SO</b>	7.9 Disturbed Area Stabilization with Sod
<b>TS</b>	7.10 Disturbed Area Stabilization with Temporary Vegetation
	7.11 Rolled Erosion Control Products
<b>HYD</b>	7.12 Hydro Applications
	7.13 Soil binders and tackifiers
<b>PLAS</b>	7.14 Emergency stabilization with plastic
<b>SE</b>	7.15 Soil Enhancement

STREAM PROTECTION PRACTICES		POLLUTION PREVENTION PRACTICES	
 7.41 Stream Buffers		 7.16 Concrete washout	
 Stream Diversion Channel		 7.17 Vehicle maintenance	
 7.43 Temporary Stream Crossing		 7.18 Chemical storage	
 7.44 Bioengineered Stream Bank Stabilization		 7.19 Trash and debris	

STREAM PROTECTION PRACTICES

7.43 TEMPORARY STREAM CROSSING



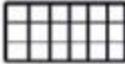
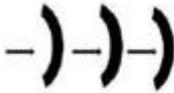
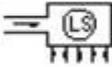
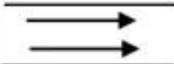
**Definition** A temporary stream crossing is a temporary structure installed across a flowing stream or watercourse for use by construction equipment.

## Rock Check Dams



Rock Check Dams prevent gully erosion caused by concentrated flow.

## RUNOFF CONTROL PRACTICES

	7.20 Check Dam
	7.21 Dewatering Treatment Practice
	7.23 Outlet Protection
	7.24 Slope Drain
	7.25 Tubes and Wattles
	7.26 Level Spreader
	7.27 Channels

## SEDIMENT CONTROL PRACTICES

	7.28 Construction Exit
	7.29 Tire washing facility
	7.30 Filter Ring
	7.31 Sediment Basin
	7.32 Sediment Trap
	7.33 Baffles
	7.34 Silt Fence
	7.35 Inlet Protection

### 7.35 INLET PROTECTION



EXCAVATED INLET PROTECTION



HARDWARE CLOTH AND GRAVEL INLET PROTECTION



ROCK RING INLET PROTECTION



BLOCK AND GRAVEL INLET PROTECTION

Definition

Purpose

Conditions  
Where Practice  
Applies

## Silt Fences



Silt Fences temporarily impound runoff and retain sediment on-site, often as perimeter control.

## SEDIMENT CONTROL PRACTICES

### 7.34 SILT FENCE



SILT FENCE

**Definition** A temporary sediment control measure, composed of woven geotextile fabric supported by steel or wood posts, used to intercept sediment transported from areas where runoff occurs as sheet flow.

**Purpose** To prevent sediment carried by sheet flow from leaving the site and entering natural drainage ways or storm drainage systems by slowing storm water runoff, causing ponding and the deposition of sediment at the structure. Silt fence does not filter sediment.

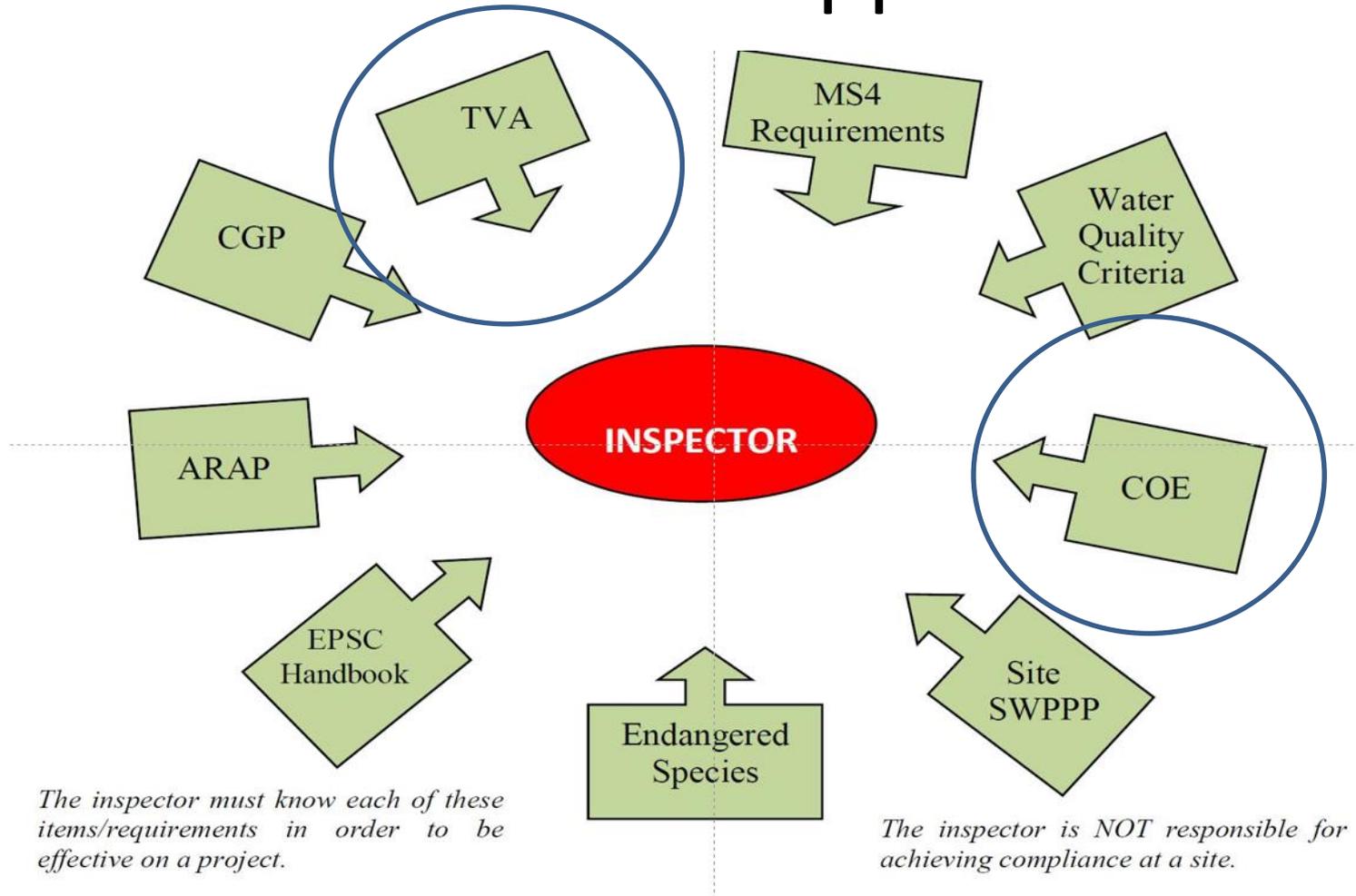
**Conditions Where Practice Applies** Silt fence may be used in a variety of locations including:

- at the toe of, or on, an exposed slope
- around the perimeter of an exposed construction site
- along the banks of ditches or swales
- around the perimeter of a soil stockpile
- around buffer areas

**Silt fence shall not be installed across streams, ditches, waterways, or other concentrated flow areas.**

SEDIMENT CONTROL PRACTICES	
	7.28 Construction Exit
	7.29 Tire washing facility
	7.30 Filter Ring
	7.31 Sediment Basin
	7.32 Sediment Trap
	7.33 Baffles
	7.34 Silt Fence
	7.35 Inlet Protection

# Watershed Approach



*The inspector must know each of these items/requirements in order to be effective on a project.*

*The inspector is NOT responsible for achieving compliance at a site.*

# Federal Permits

- The United States government may also require permits prior to site development and actual project construction. The two most common types of federal permits are concerned with potential impacts or alterations to creeks, streams, lakes, wetlands and other waters of the state.
  - A. Section 26A Permit for TVA creeks and tributaries (Tennessee Valley Authority)
  - B. Section 404 Permit for USACE blue-line streams (U.S. Army Corps of Engineers)
- The USACE has special emphasis on navigable waters. A **blue-line stream is defined as any stream or channel on a USGS quadrangle map**, which is downstream from any point where the blue-line map legend is used. This definition may also include lakes, ponds, wetlands or other depressions that are adjacent to a blue-line stream.

# WETLANDS

- SECTION 404 Fed Wetlands Permits. Administered by both the EPA and the Corps of Engineers.
- Referred to dredging and filling in the waters of the United States. Unclear if this meant only navigable water or all waters.
- In 2006 Rapanos v. US. Supreme Court reaffirmed that the corps did not have jurisdiction over the filling of a wetland that was not part of or connected to navigable waters.
- Developer had filled 22 acres for a shopping mall and it was several miles away from the nearest navigable water.

# HOW LOCAL GOVERNMENTS IMPLEMENT WATER QUALITY STANDARDS

- Through MS4's and Stormwater Ordinances
- Through Rural County Conservation Districts and Natural Resources Conservation Service (NRCS)—BMP's for Agriculture
- Zoning--Can require development to locate away from high-quality water bodies, impaired waterways, wellhead protection areas.
- Zoning Overlays-Can require Steep slope restrictions, Setbacks for buildings and structures, Septic Drain locations, Storage tank locations, Landfill and Industrial siting.
- Subdivision regulations—During and Post Construction Developers are required to have Stormwater management and Erosion and Sediment Controls.

# In Review Process

- Will a proposed project use a private septic or a public sewer system?
- Of private septic, where will it be located?
- If public sewer, how much sewage will be generated? What is the capacity of existing system?
- Will project use on-site wells or public water facilities?
- What is the slope of the site?
- Do Erosion and Sediment control standards apply?
- How much vegetation is being removed?
- How much impervious pavement is being created?
- What are the drainage and stormwater implications?
- Will there be discharge into streams?
- Is an NPDES permit needed?
- Is any state-level review required?

# Floods and Floodplains

- FEMA administers the National Flood Insurance Program (NFIP)
  - Flood Hazard Mapping
  - Floodplain management regulations
  - Flood Insurance

<http://tn.gov/environment/section/nfip-national-flood-insurance-program>

# Federal and State Roles

- Feds: Risk Identification, development/building standards, insurance coverage, enforcement, disaster response and recovery
- State: Guide and assist communities in development, implementation, and maintenance of local floodplain management regulations

# NFIP: Local Responsibilities

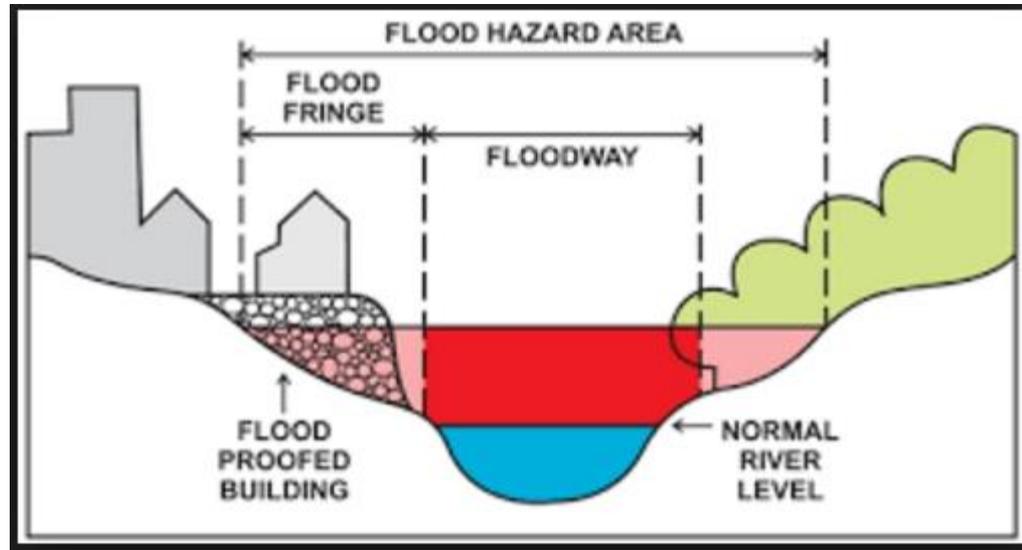
- Review Permit applications and coordinate permit reviews
- Issue and deny permits
- Determine Compliance
- Conduct Inspections
- Take Enforcement Actions
- Investigate Complaints
- Maintain maps and data
- Keep Records

# Tennessee Statistics

- 401 Participating Communities
- 11 Non-Participating Communities
- 28,810 Policies
- Paid Since 1978 **\$338,654,487**

# Base Flood Elevation

- The Base Flood Elevation is the **computed elevation** to which floodwater is anticipated to rise during the base flood, or the **1-Percent-Annual-Chance-Flood**.
- The BFE is the regulatory requirement for the elevation of flood proofing of structures and determines the insurance premium.

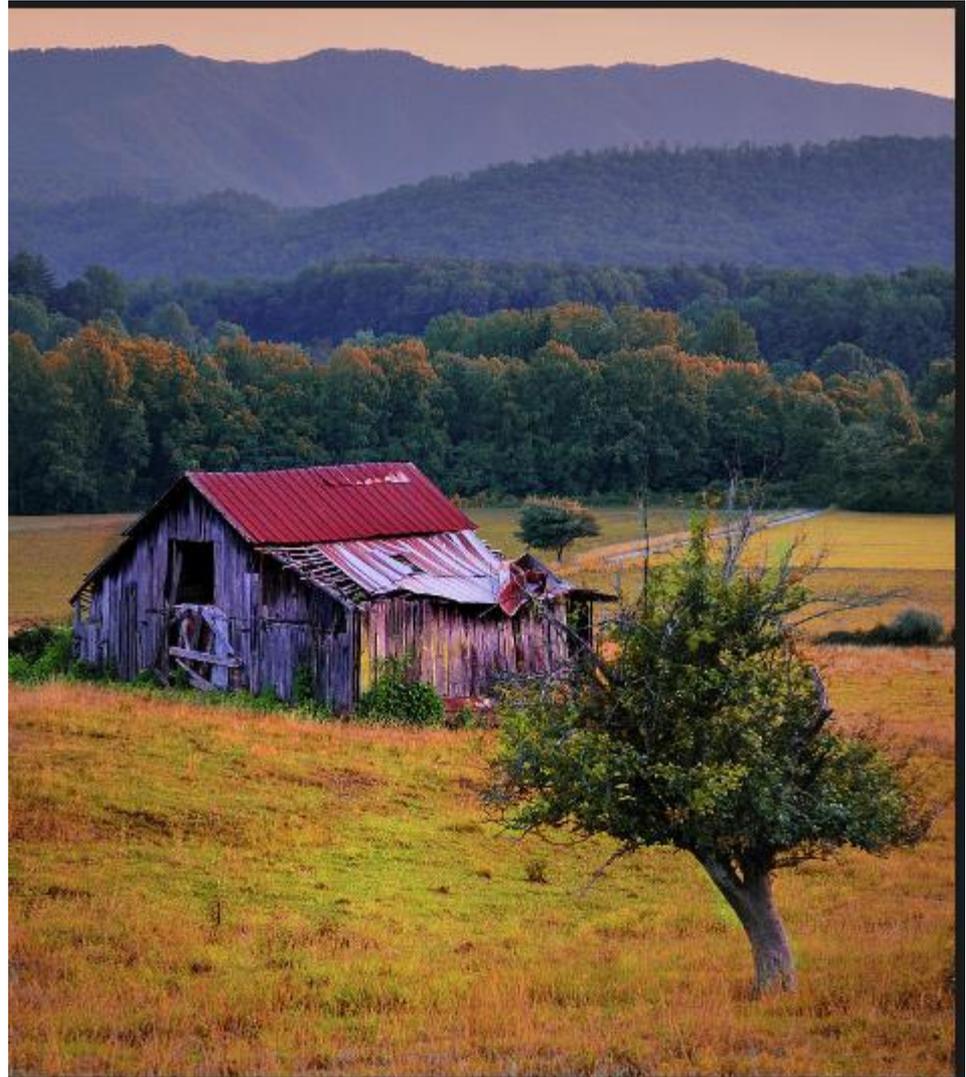




In early May 2010, the most catastrophic and deadly flood of the year hit the Nashville, Tennessee area killing 26 in Tennessee and Kentucky, and causing \$2.3 billion in damages. **This was categorized as a 1000 year flood.**

Two-day rain totals in some areas were greater than 19 inches (480 mm). The [Cumberland River](#) crested at 51.86 feet in [Nashville](#), a level not seen since 1937, before the [U.S. Army Corps of Engineers](#) flood control measures were in place.

# LAND USE / LAND PROTECTION



# OPEN SPACE

- Tennessee is a beautiful state. Many want to see the rural characteristics preserved.
- Community leaders recognize importance of large, intact areas of native vegetation.
- There is a balance between public use, recreation and need for wild habitat.
- Important to minimize human impact.
- Capitalize on tourism and recreation businesses.

# Wild Space Preservation: Land Trusts, Habitat Incentives, Greenways

- Wildlife Habitat Incentives Program (Now part of Environmental Quality Incentive Program)
- Voluntary program under 1996 Farm Bill to provide cost-share money to landowners who improve wildlife habitat.
- 75 percent cost-share payments to landowners for up to 10 years to undertake habitat improvement activities.
- Public Greenways in Floodplains and un-buildable areas

# CONSERVATION TOOLS

- Agricultural zoning, adequate public facilities ordinance, growth boundaries, tree regulations, developer agreements, ridge and steep slope ordinance, intergovernmental agreements, mitigation agreements, preferential property tax assessment, transfer of development rights, purchase of development rights, Fee simple acquisition, land trades, conservation easement donations.

# PROTECTING FARMS

- Farmland Loss
  - Prime farmland has high productive soils, slopes of 8 percent or less, adequate rainfall or access to water.
- 48 states offer preferential assessment on farmland by assessing the land for tax purposes as its use-value.
- Rollback provisions common.

# RIGHT TO FARM LAW-In 48 States

- Farmer cannot be found to create a nuisance if the farmer is following standard farming practices.



# MUNICIPAL SOLID WASTE

- Consists of household garbage, industrial waste, hazardous waste, and construction waste.
- If not handled properly can become breeding ground for pests and generate polluted runoff.
- Disposing of waste is not cheap, and the cost of disposing of solid waste continues to increase.
- Managing household waste is typically the third-largest component of a local government budget—after education and public safety.

# Municipal Solid Waste Generation

Figure 5. Total MSW Generation (by material), 2012  
251 Million Tons (before recycling)

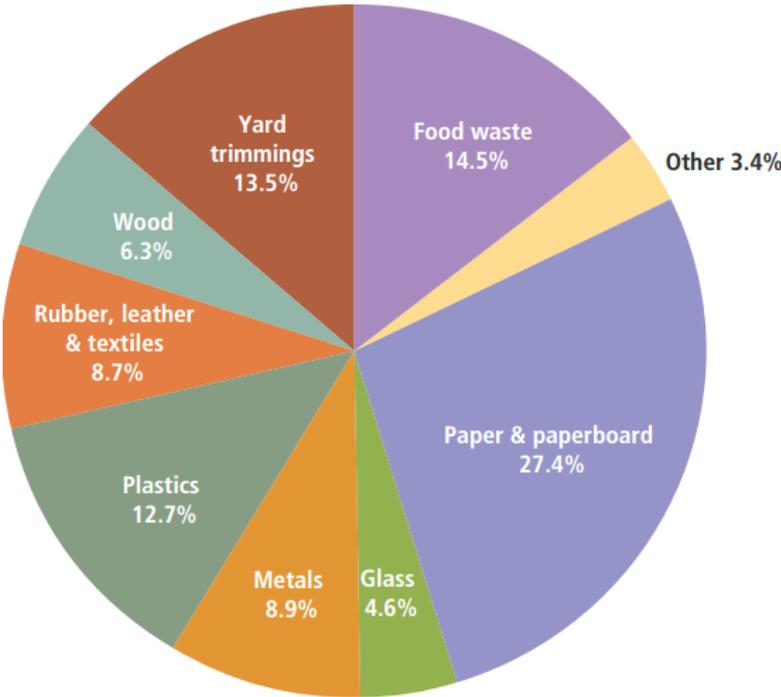
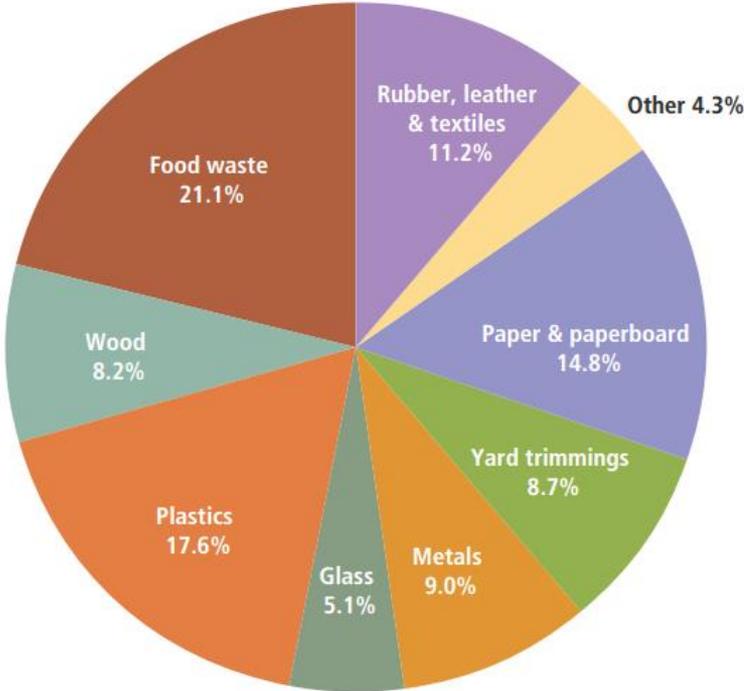


Figure 7. Total MSW Discards (by material), 2012  
164 Million Tons (after recycling and composting)



# Costs of Solid Waste Management

- EPA estimates in 2010, managing MSW cost Americans \$53 million dollars
- Americans generate about 4.43 pounds of waste/day
- This is more than any other country in the world and about 50% more than most Europeans
- Americans pay about \$44 per ton to bury garbage compared to \$200-400.tons in Germany/Japan

# DISPOSAL OF MUNICIPAL SOLID WASTE

- The Resource Conservation and Recovery Act (RCRA) 1976—set standards for the construction, operation, closure, and postclosure maintenance of landfills.
- As a result, the number of landfills has decreased dramatically from almost 8000 in 1988 to less than 2000 in 2010.
- The siting of new landfills will be an important land-use issue in the future.

# REDUCTION, REUSE, RECYCLING, UPCYCLING, AND RECOVERY

- REDUCTION: GO to the source. Reduce the creation of waste. e.g. Packaging.
- REUSE: Donations to Goodwill, churches...
- RECYCLING: Process that converts goods to new products.
  - Aluminum cans use about 95 percent less energy if made from recycled cans. Reduction of greenhouse gases, saves landfill space.
  - Economics Dependent on participation and markets.
  - Economics for recycling work better from some materials. Subsidies for wood and paper keep this material low cost already.

# Cont'd

- **UPCYCLING**
  - Making more valuable products out of recycled products.
- **RECOVERY**
  - MRFs Materials Recovery Facility
- **ORGANICS**
  - Accounts for about one-fifth of the nation's total municipal solid waste. Recovery rate only 3%.
  - Some materials controversial—
    - Sludge or biosolids can be land applied as fertilizer. But need to be well regulated.

# FEDERAL LAW

- Subtitle D of the RCRA empowered EPA to set minimum national standards for states to follow in issuing permits for new, existing, or expansions of public or private owned and operated solid waste landfills.
- These landfills may accept nonhazardous waste, household waste, septic tank waste, nonhazardous sludge, and commercial and industrial solid waste.

# RESOURCE CONSERVATION AND RECOVERY ACT—Minimum Standards

- Location of landfills. Restrictions on slopes, wetlands, airports, natural hazards, floodplains.
- Operating Procedures. Require Daily compacting and cover. Access restricted. Stormwater runoff and air emissions must be controlled. No 55-gal drums accepted.
- Design of liners. Liners required to minimize the leaching of pollutants into groundwater. Leachate collection systems of pipes pumps
- Groundwater monitoring systems.
- Corrective Action for Environmental Issues that Arise.

# Cont'd

- Defines CLOSURE of a landfill and postclosure monitoring and maintenance. Final cover and at least two feet of clay/topsoil and vegetation cover.
- FOR 30 YEARS AFTER, THE OWNER/OPERATOR must maintain cover, monitor groundwater and landfill gas and perform maintenance.
- Financial Assurance. The operator must demonstrate the financial capacity to undertake corrective action, if needed, and to pay for the cost of closure and postclosure monitoring and maintenance. 40 CFR Chapter 1 Part 258.

# Solid Waste Management Act of 1991

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- **County Responsibilities:**
  - Proper management of solid waste collection, transfer, transport, processing, and disposal
    - Includes recycling, diversion, waste tire management and problem waste collection.
- **Solid Waste Region Responsibilities**
  - Must have Solid Waste Plan
  - Must meet 25% Waste Reduction Goal
  - Must provide for community education
- **New Solid Waste and Materials Management Plan Underway for 2015-25**

# TDEC Requires a 10 Year Solid Waste Plan

- **Waste Reduction & Recycling**
- **Financing**
- **Infrastructure Needs (for Competitive Grants)**
- **Collection, Disposal and Transportation**
- **Household Hazardous Waste**
- **Waste Tires**
- **Used Oil**
- **Education, Information and Reporting**

# Collection, Transportation and Disposal

**Each county must assure that a collection system is available to all residents.**



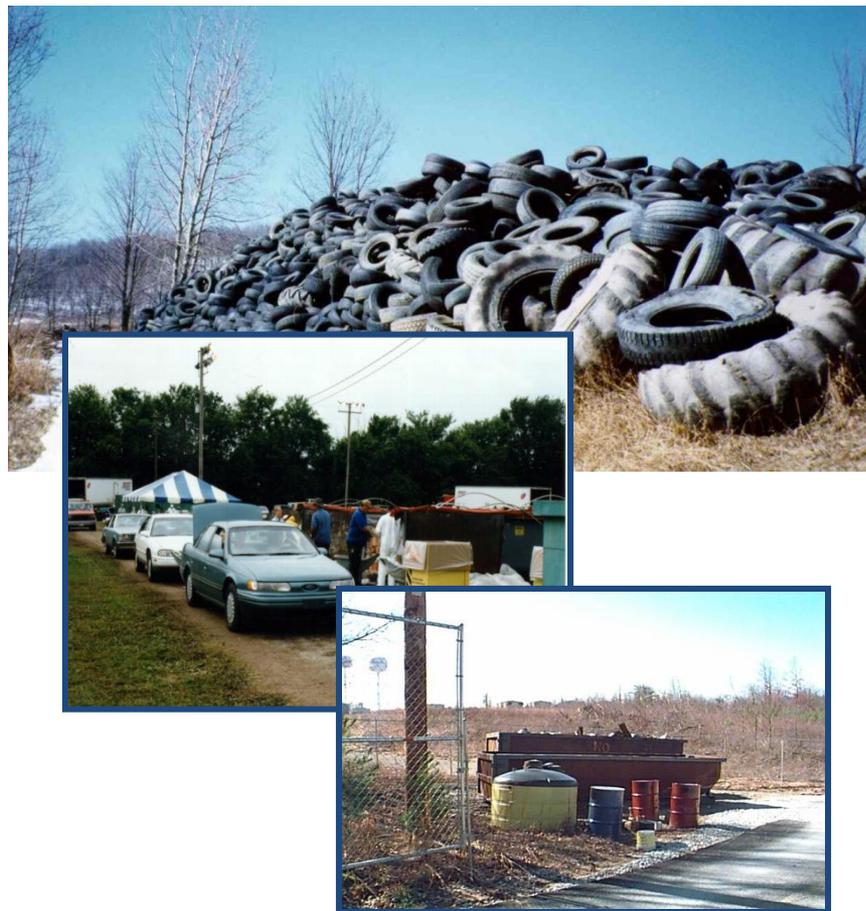
# Waste Reduction/Recycling

- **Counties must divert 25% of Waste (T.C.A. 68-211-821)**
- **Methods for calculating waste reduction (T.C.A. 68-211-835)**



# Restrictive Wastes

- **Whole tires are banned from Tennessee landfills**
- **Other problem wastes include oil, batteries, and “E-wastes”**
- **Household Hazardous Waste collection events are funded by TDEC and can serve as participatory community events**



# 2025 Plan



Department of  
**Environment & Conservation**

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Program Areas ▾ Permitting ▾ About ▾ Public Participation Contact ▾

## Solid Waste

Solid Waste Management ▾

Hazardous Waste Management ▾

Materials Management Program ▾

Toxic Substances ▾

Regulations ▾

## 2015-2025 Solid Waste and Materials Management Plan

### Final Document

The document linked below is the final version of the 2015-2025 Solid Waste and Materials Management Plan (the 2025 Plan). The 2025 Plan incorporates public comment recommendations and feedback.

- [2015-2025 Solid Waste and Materials Management Plan and Appendices](https://tn.gov/environment/topic/sw-2015-2025-solid-waste-and-materials-management-plan)

[Website](https://tn.gov/environment/topic/sw-2015-2025-solid-waste-and-materials-management-plan)

<https://tn.gov/environment/topic/sw-2015-2025-solid-waste-and-materials-management-plan>



# Middle Point Landfill

- \$2 Million in recent upgrades
- 800 Acre footprint
- Pre treat leachate, with remnants going to sewage Treatment plant--90,000 gallons a week
- WASTE: 3,400 tons a day, or a ~million tons/year
- At least 27 counties use the landfill
- Will be full in 8-10 yrs or sooner if growth is faster than anticipated

# Hosting Agreement

- According to Republic
  - More than \$2 Million in 2015
  - Beginning in 1995--Free disposal for county and city
  - Cost Savings: 7.5 million in 2015

# Landfill Siting and Jackson Law

- Jackson Law/Public Chapter 199 An optional law that if adopted by a county provides that no construction may be initiated for a new landfill unless such proposed construction receives the approval of the county legislative body. T.C.A. 68-211-701 *et seq.*
- In determining whether to approve the new landfill, the county legislative body must consider eight specific statutory criteria: (1) Type of waste to be disposed in landfill; (2) Method of disposal; (3) Noise and odor created; (4) Impact on property values; (5) Adequacy of existing roads and bridges to proposed landfill; (6) economic impact on county; (7) compatibility with existing development or zoning plans; and (8) Public health, safety and welfare.

# Solid Waste and Zoning

- Zoning separates conflicting land uses to protect public health and safety.
- Landfills are one of the classic locally unwanted land uses.
- Helpful to co-locate Industrial and MSW Facilities
- Subdivision Regulations—Can also offer incentives for builders to separate/recycle certain recyclable building waste streams.

# Questions for Solid Waste Planning

- How much waste will a new or proposed development will generate?
- How will their waste be hauled or collected?
- Where will waste be disposed of or recycled?
- How will a development affect the capacity of local landfills?
- Is a proposed landfill located in a safe distance from population concentrations?
- Is the site appropriate?
- What permits are necessary?

# FULL COST ACCOUNTING

- Encouraged, but not widely adopted
- Costs are monitored: Front-end costs to create, operate, and backend costs are added
- Accounts for acquisition of equipment and materials
- Siting and construction of facilities
- Collection, processing, and marketing of recycling
- Transportation
- Operation and maintenance of facilities
- Cleanup of illegal dumps
- Landfill closure/post closure monitoring
- Program promotion and Administration

# Industrial Facilities and Emergency Planning: Community Right-to-Know Act 1986

- Passed in response to the accidental toxic release in Bhopal, India in 1984. Designed to help local communities protect public health and safety and the environment from chemical hazards.
- Act requires companies that manufacture, use, or store hazardous materials to keep records on the location, quantity, use, and any release of those materials to the air, land, or water.
- The Emergency Planning and Community Right to Know Act also set up planning procedures for state and local governments to follow in response to hazardous material spills.
- State working with locals to appoint a local committee with appropriate persons with training in First Responses, industrial health, government officials, hospitals...media

# BROWNFIELDS REMEDIATION

- EPA: “Real property, the expansion, redevelopment, or reuse of which maybe complicated by the presence of potential presence of hazardous substance, pollutant, or contaminant”.
- Range from abandoned gas stations to defunct factory complexes.
- Often have good access to transportation networks, sewers, water facilities, population concentrations. Technology parks, new manufacturing/warehousing.
- For every acre of brownfield brought back, an average of 1.7 acres of suburban greenfields will not be developed.

# BROWNFIELD REDEVELOPMENT

- New owners were held liable for old contaminations. This kept sites from being developed/reclaimed.
- Redevelopment depends on a reliable assessment of the contamination, risk-based cleanup standards, limits to future cleanup liability, and financial incentives.

# RELIABLE ASSESSMENT

- Lending agencies require “due diligence”.
- Environmental assessments are essential.
- Should be performed by a qualified professional.
- A Phase I ESA is an investigation in to the current and previous ownership and uses of the property.
- If there is evidence of hazardous materials on the site the site will require a Phase II Site Assessment.
  - Includes soil and water samples.
  - Spill detection.

# Cont'd

- RISK-BASED CLEANUP STANDARDS
  - Let the “use” guide the cleanup standard.
- LIMITS TO FUTURE CLEANUP LIABILITY
- FINANCIAL INCENTIVES FOR REDEVELOPMENT
  - Grants to assess and inventory brownfield sites.
  - Established a revolving loan fund.
- Since program began over 20,000 sites assessed, 90,000 jobs leveraged.
  - Over 40,000 acres made ready for reuse.
  - 20.3 Billion dollars leveraged.
- Start with inventory.



## **Tennessee Brownfields Redevelopment Toolbox**



<http://www.tennessee.gov/environment/article/rem-brownfields-redevelopment>

# End with the Inventory!

## CONCLUSION

- Recognize and map your environmental assets
- Understand how a federal environmental framework is implemented at the state and local level
- Plan for Growth and for Infrastructure Improvements

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