

Landfills 101

Part 1 – Siting Landfills

Outline

- Questions to Consider
- General Steps to Siting Process
- Challenges to Overcome
 - **Location Restrictions**
 - **Public and political opposition**
 - **Economics**

Key Questions to Consider

- 1. Is the site politically acceptable?**
- 2. Will the public accept a landfill in this area?**
- 3. Are there any fatal technical flaws?**
- 4. Is the site consistent with the area's Solid Waste Management Plan?**
- 5. How does a landfill fit into the surrounding land uses?**
- 6. Are there alternative sites which might serve us better?**

General Steps to Siting or Expanding a Landfill

- 1. Select an experienced and competent team**
- 2. Develop a business strategy**
- 3. Develop a technical strategy**
- 4. Develop a political strategy**
- 5. Develop a public relations strategy**
- 6. Establish siting criteria based on above strategies**
- 7. Implement the search process**
 - A. Eliminate as many unsuitable sites as soon as possible**
 - B. Compare and rank appropriate sites**
 - C. Select final site**
- 8. Conduct a fatal flaw analysis (repeat steps 1-7 if necessary)**
- 9. Begin the local government permitting/approval process**

Challenges of Siting Landfills

- **Location Restrictions**
- **Public and political opposition**
- **Economics**

Siting Location Restrictions – Federal/State

Purpose of Siting Restrictions:

To ensure that landfills are built in suitable geological areas away from faults, wetlands, flood plains, or other restricted areas.

Siting Location Restrictions – Federal

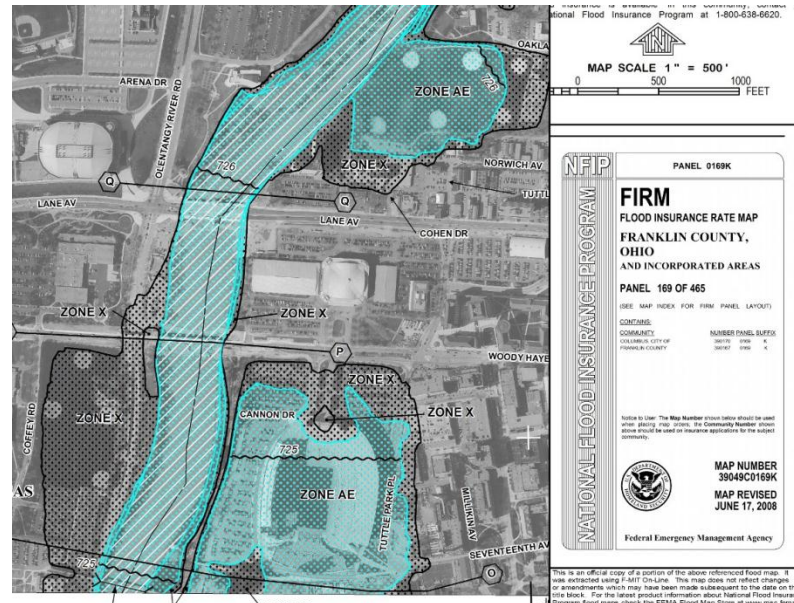
- **Subtitle D Location Restrictions include:**
 - **Airport Safety**
 - **Floodplains**
 - **Wetlands**
 - **Fault areas**
 - **Seismic impact zones**
 - **Unstable areas**

Airport safety / Bird Hazard

- **Existing LF**
 - **10,000 feet from runway – turbojet**
 - **5,000 feet from runway – piston type**
- **New LF**
 - **5 miles from any runway**

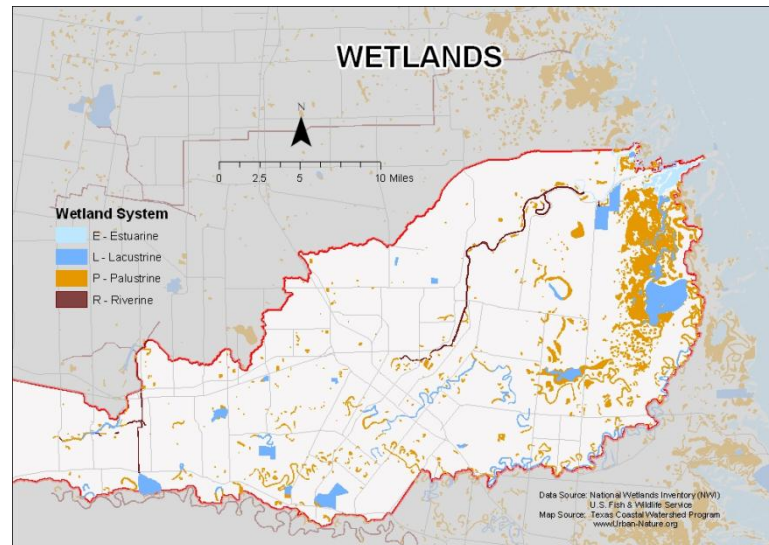
Floodplains

- Must stay out of 100 year flood plain or make demonstration
- Includes Leachate containment and waste



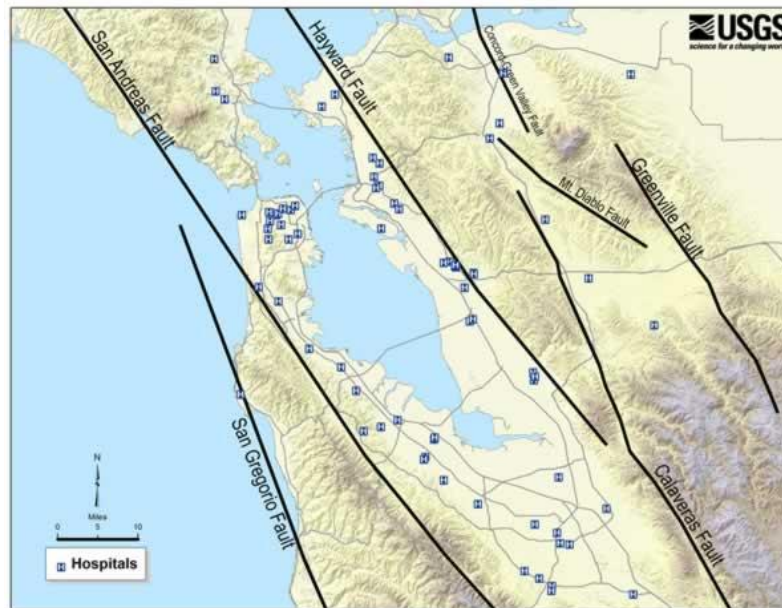
Wetlands

- **Cannot be located in wetlands unless make demonstration**
- **May need Army COE permit and mitigation of destroyed wetlands**



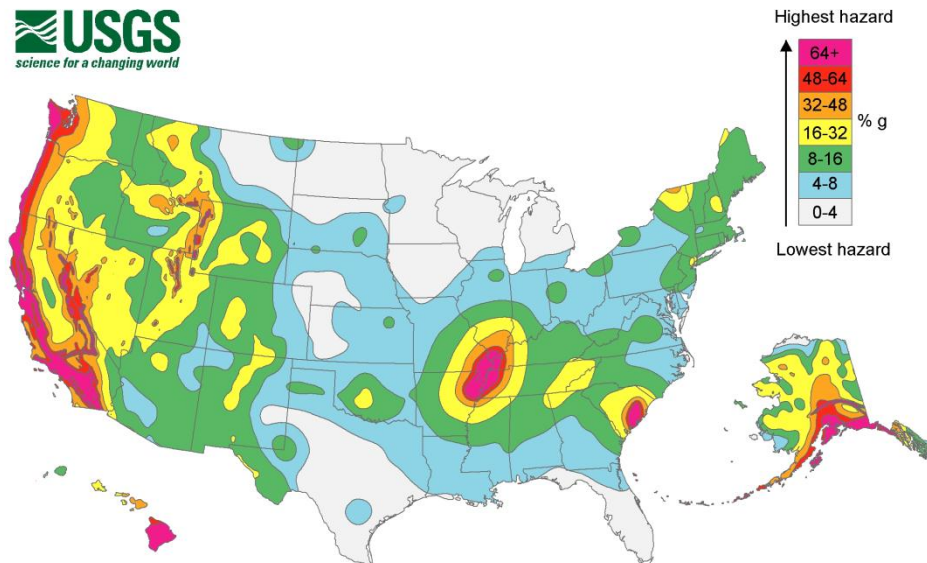
Fault areas

- LF shall not be located within 200 feet of a fault that has had displacement in Holocene time



Seismic Impact Zones

- LF shall not be located in seismic impact zones, unless demonstrate designed to resist the maximum horizontal acceleration in lithified earth material for the site



Unstable areas

- **Cannot site if existing**
 - **conditions that may result in significant differential settling;**
 - **On-site or local geologic or geomorphologic features (such as Karst Terrain); and**
 - **human-made features or events (both surface and subsurface), such as existing MSW.**

Location Restrictions – State/Local

- **Wildlife Hazard Assessment Plans**
 - May have additional requirement to perform a WHAP for aircraft safety.
- **Groundwater**
 - May have additional requirements for a minimum separation distance between bottom liner system and seasonal high groundwater table.
- **Proximity to Drinking Water Supplies**
 - May have additional restrictions on distance to public or private Drinking water supplies (wells, water plant, reservoirs, etc.).

Location Restrictions – State/Local Continued

- **Threatened/endangered species**
- **Historical and Archaeological sites**
- **State Level Horizontal and Vertical Buffers**
 - **Additional setbacks from schools, streams, roads, right of ways, residences, etc.**
- **Local Level Setbacks, Buffers, and Transitions**
 - **Additional setbacks from schools, streams, roads, right of ways, residences, etc.**
 - **May be required to provide beautification or landscaping plans.**

Environmental Impacts and Assessments

- **Many states require some form of Environmental Impact Statement or Assessment that addresses:**
 - **the known & potential environmental harms**
 - **a written mitigation plan which explains how the applicant plans to mitigate each known or potential environmental harm identified**
 - **describes any known and potential environmental harms not mitigated.**
 - **Harms vs. Benefits (PA)**
 - **Environmental Impact Statement (NY)**
 - **Environmental Assessment (NC)**

Institutional Restrictions/Prohibitions

- **States may require demonstrations that the facility is necessary or needed. Additionally, Host Fees, guarantees of disposal, or other agreements may need to be in place for approval.**
- **Examples:**
 - **Demonstration of Need (VA & SC)**
 - **Jackson Law (TN)**
 - **Franchise Agreement (NC)**

Other Considerations

- **Site Access**
- **Traffic**
- **Soil availability**
- **Topography**
- **Utilities**
- **Zoning & Adjacent land use**
- **Distance from waste source(s)**
- **Expansion potential**
- **Monitorability**
- **Site selection studies**
- **Fatal Flaw Analysis**
- **Political & Legal Considerations**

Challenges of Siting Landfills

- Location Restrictions
- **Public and political opposition**
- Economics



Involving the Public

- **Public participation is always valuable to the landfill siting process**
 - **Go to the public, don't wait for the public to come to you**
- **Owners/Managers are wise to include the public to avoid *some* of the opposition that usually occurs during landfill expansion or siting**
- **Timing and strategy are critical for success**

Involving the Public Continued

Accept and involve the public as a partner. Input from the community can help your facility make better decisions and improve your public image.

Consider the following communication vehicles:

- Establishing a hotline that provided information and recorded callers' messages.
- Producing fact sheets on "Municipal Waste Landfill Gases"
- Distributing biweekly press releases to provide residents with updated information.
- Publishing a newsletter
- Holding public meetings to provide citizens with the most up-to-date information
- Visiting a local school system to make presentations to elementary school and high school students.
- Create a local citizens "Advisory Committee" to act as a focus group
- Give adjacent property owners special tipping incentives

Challenges of Siting Landfills

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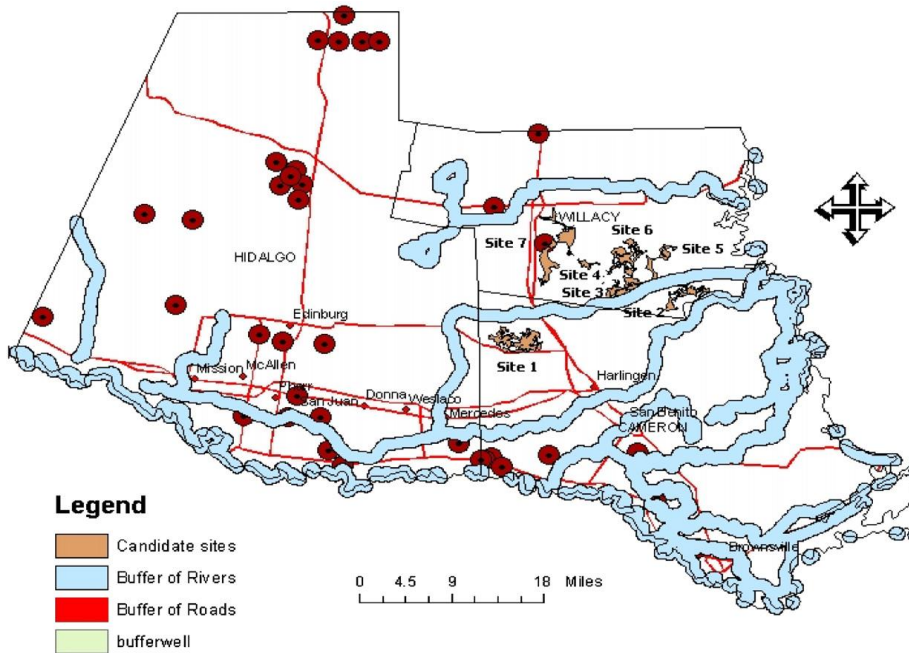
Key Economic Questions to Consider

- 1. What is the minimum tonnage required to make this site financially feasible?**
- 2. Where will the tonnage come from?**
- 3. Where are the competing facilities?**
- 4. What are their tipping fees?**
- 5. What is their remaining life/volume?**

Fatal Flaw Analysis

- **Topography**
- **Wetlands**
- **Soils (Type and Quantity)**
- **Airports**
- **Geology/Groundwater**
- **Threatened & Endangered Species**
- **Flood plains**
- **Historical & archaeological sites**
- **Transportation**
- **Visual and noise levels**
- **Regulatory setbacks and buffers**
- **Local land uses and zoning**
- **Site stability**
- **Infrastructure**
- **Existing uses**

Site Comparison



Source: Chang, N.-B., et al., Combining GIS with fuzzy multicriteria decision-making for landfill siting in a fast-growing urban region, *Journal of Environmental Management* (2007)

Criteria for Scoring	Site A	Site B	Site C
Ownership/Acquisition			
Zoning			
Road Access			
Topography			
Capacity			
Soils/Geology			
Groundwater Depth			
Proximity to Wells			
Surface Water			
Flood Hazard			
Airport Safety			
Holocene Fault			
Seismic Impact Zone			
Site Stability			
Landfill Gas Control/Use			
Land Use			
Habitat Value			
Visual Impacts			
Downwind Impacts			
Life Cycle Cost			
Ability to Permit			
Timeliness of Permitting			
Final Score			

Siting Tools and Resources

- City/County/State GIS Mapping
- State/Local DOT Traffic Studies & Planning Documents
- Local Health Department
- Google Earth & Google Earth Professional
earth.google.com
- USDA County Soils Maps
websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx
- NOAA Weather Service
dipper.nws.noaa.gov/hdsc/pfds/
- FEMA Flood Maps
www.msc.fema.gov
- National Wetlands Inventory
www.fws.gov/wetlands/data/Mapper.html
- Airport Locator
www.airnav.com/airports/search.html
- United States Geological Survey (USGS)
www.usgs.gov
earthquake.usgs.gov/hazards/apps/map

Ideal Site

- **Deep uniform and non-fractured geology away from faults and seismic impact zones**
- **One-directional groundwater flow across site and below minimum separation distance from landfill bottom**
- **Gently rolling topography oriented for use in natural screening and buffering**
- **Site location out of 100-year flood plan**
- **Moderate annual climate**

Ideal Site Continued

- **Enough land to buffer operations from:**
 - **Visual**
 - **Noise**
 - **Odor**
- **Direct access to major highway or interstate**
- **Deep soils with adequate quantities for:**
 - **Structural fill**
 - **Daily, intermediate, and final cover**
 - **Liner and cap construction**

Summary

- **Various factors that go into selecting or expanding a landfill site**
- **Siting or expanding a landfill has many challenges**
- **Avoid conflicts by involving the public**
- **Early communication can gain public approval**
- **A phased approach to siting is preferable**
- **Develop criteria for economic comparison**
- **Perform a Fatal Flaw Analysis**