SUSTAINABLE REDEVELOPMENT OF FORMER AND ABANDONED LANDFILLS
LESSONS FROM PRACTICE

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Sustainability Benefits of Landfill Redevelopment

- **Environmental**
  - Improved Environmental Protection, Ecological Enhancement, Remediation of Impacts

- **Economic**
  - Revenue/Resources for Post-Closure Care, Profit for the Developer, Indirect Economic Benefits for the Community

- **Social**
  - Preservation of Virgin Sites, Community Amenities, Jobs, Aesthetic Enhancement
Risks Associated With Landfill Redevelopment

- **Environmental**
  - Risk of Adverse Impacts to Human Health or the Environment (Engineering Risks)

- **Financial**
  - Excessive Transaction Costs, Poor Financial Return, Litigation (Over Real and Perceived Impacts)

- **Social**
  - Loss of Credibility, Abandoned or Stalled Projects
Types of Redevelopment Sites

- **Self-Developing**
  - Economically Advantageous to Develop
- **Cooperative**
  - Incentives or Public-Private Partnerships Required to Realize Redevelopment
- **Reserve**
  - No tangible economic benefit, or risks outweigh benefits
  - Redevelopment driven by environmental and social benefits
Engineering for Landfill Redevelopment

Governing Axiom of Engineering

An engineering solution can be developed for (almost) any (landfill redevelopment) problem

- with enough time and money
Key Questions Driving Redevelopment Decisions

What ENGINEERING SOLUTIONS are required to achieve ACCEPTABLE RISK?

- Regulatory Acceptance
- Community Acceptance
- Developer Acceptance
  - Mitigate Perceived Risks (Litigation Risk)

What acceptable ENGINEERING SOLUTION has the lowest LIFECYCLE COST?

What INCENTIVES are required to drive a socially beneficial redevelopment scheme
FACTORS INFLUENCING THE DECISION

Hierarchy of Engineering Solutions

Institutional Controls
Barriers (Containment)
Treatment
Removal

Increasing Reliability
Increasing Cost

Decreasing Long Term Risk
Increasing Short Term Risk

Note: Redevelopment can Exacerbate Environmental Risks
## Lessons From Practice

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<td>Only available site for desired amenity</td>
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<td>Nature trails, adjacent sports park</td>
<td>Redevelopment “bundled” with adjacent property</td>
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<td>“Big Box” retail stores</td>
<td>Improved access facilitated redevelopment</td>
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<td>Nature preserve, golf course</td>
<td>Community dictated end use; End user provides maintenance</td>
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<td>ASCON</td>
<td>Commercial or open space</td>
<td>Too risky for residential development</td>
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Gaffey Street Landfill Location
Gaffey Street Landfill Redevelopment

- Only available site for park
- Communication program to ease concerns
- Low levels of methane in soil
- Capillary break cover with active gas extraction contingency
Gaffey Street Capillary Barrier

- 0.3 m Vegetative Layer
- 0.9 m Engineered Cover Soil
- 0.15 m Clean Gravel (Capillary Break)
- Asphalt Grindings (As Needed)
- Existing Cover Soil

Filter Geotextile

100-mm Gas Venting Pipe

Gas Venting Pipe Enables Contingent Active Gas Collection

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Fresno Landfill Park Master Plan (Dunn, 2005)

Landfill “bundled” with adjacent property to facilitate redevelopment
Fresno Landfill Sports Park
OII Landfill North Parcel Redevelopment

- Only developable parcel left in city
- “Big Box” retail store provides jobs, service to residents, $1 million per year in sales tax revenue
- City agreed to provide freeway access, property tax relief

Note: South parcel not considered suitable for redevelopment
McColl Site

- Eleven unlined pits w/ pH = 9 waste
- Community rejected clean closure, waste stabilization
- Constructed nature preserve, restored golf course
  - Golf course owner provides maintenance
McColl Golf Course Cap

Geotextiles

HDPE Geomembrane

Geosynthetic Clay Liner

HDPE Geomembrane Backing

HDPE Gas Extraction Pipes

Reinforcing HDPE Geogrid

Vegetated Layer

Intrusion Barrier / Drainage Layer

Barrier Layer

Gas Collection/ Foundation Sublayer

Reinforced Foundation Sublayer

Unreinforced Foundation Sublayer

Existing Ground

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McColl Site Today

- Vertical Barrier (Slurry Wall)
- Restricted Access
- Nature Preserve
- Reinforced Earth Wall

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McColl Site Post-Remediation
ASCON Hazardous Waste Site

- Site Approved for 500 homes at $1 million each
- Oil companies responsible for cleanup did not own site
- Waste included drilling mud, styrene pits, other chemical wastes

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ASCON Oil Waste Lagoon
Allegations of Cancer Cluster

Orange County Weekly, Thursday, 25 March 2004

BITTER HARVEST

Four Huntington Beach kids have died of a rare disease. ... They’ve found at least two connections between the four cases. One is ... the Ascon Hazardous Waste Site.
Community Opposition to Clean Closure

Removing the waste:

- **might endanger nearby residents**
- take at least three years
- Generate enough crud to fill 12,500 toxic-waste-disposal trucks
- convoy would stretch more than 70 miles
ASCON Site Current Status

- Oil companies purchased site from developer
  - No residential development
- Current redevelopment options include:
  - Waste stabilization and consolidation with capping and commercial development
  - Waste stabilization with capping and golf course
Conclusions

- Redevelopment of Former and Abandoned Landfills is a Sustainable Engineering Practice
- Environmental Risks Associated with Landfill Redevelopment can Generally be Mitigated by Sound Engineering
- Redevelopment Costs may Require Incentives, P-P-P for Realization of Project
- Perceived Risks may Deter Certain Types of Redevelopment
Acknowledgement

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www.sufalnet.net