# SUSTAINABLE RISK MANAGEMENT STRATEGIES ASSOCIATED WITH REUSE AND REDEVELOPMENT OF UNCONTROLLED LANDFILL SITES **Cheryl A. Kehres-Dietrich, CGWP and Jeffrey R. Lanier, PE**

## WHAT IS AN UNCONTROLLED LANDFILL SITE?

- Various types of nonhazardous landfills and dumps
- Frequently forgotten or not known about
- Sites with no or little engineering design
- Often the site of public facilities, e.g. parks, DPW yards

## HAT ARE THE TECHNICAL CHALLENGES AND RISKS?

- **Direct Contact** cover for recreational fields and O&M program to address long-term ingestion and dermal contact with contaminated soil
- Storm Water & Infrastructure retaining storm water on site and venting
- Methane characterization; venting systems and ventilation trenches; etc.
- Structural Support remove waste vs. leave in place; geotechnical design, etc.

## OR LEAGUE BASEBALL FIELD - KEY ASPECT

- Unregulated landfill created in 1950s along river
- Landfilled waste uncapped and exposed
- Design challenges included methane mitigation and structural support

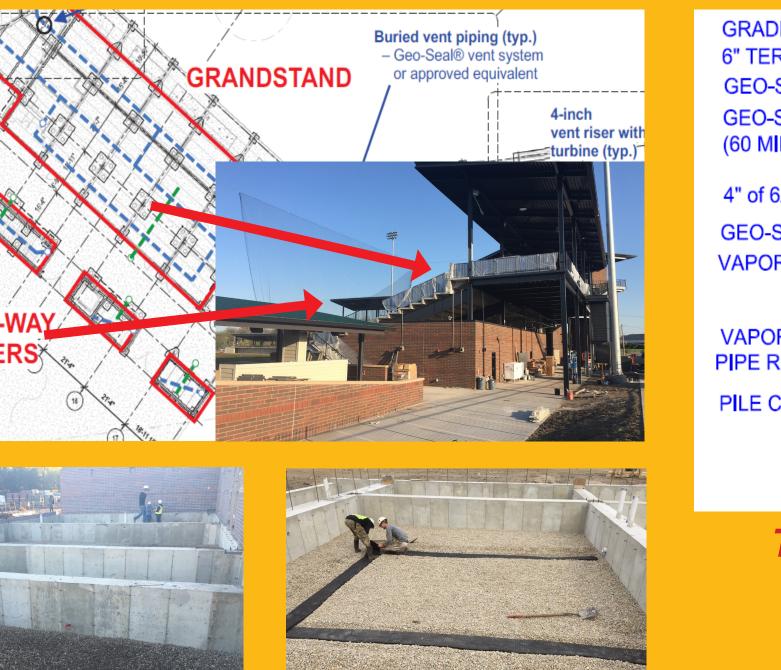
## **PPROACH FOR METHANE**

1 Prepare gravel bed

3 Place HDPE sheets

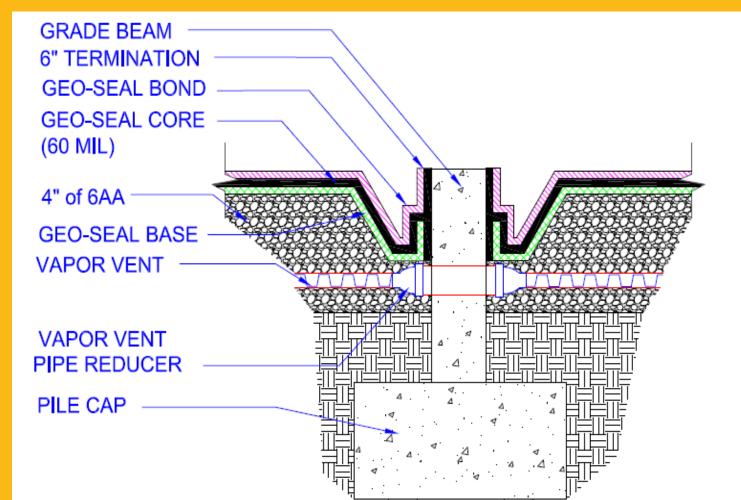
5 Smoke test of barrier

Install sub-slab vapor barrier and passive ventilation systems under grandstand and entry-way towers



2 Install low-profile vents

4 Spray sheet w/ barrier produc



Typical grade beam penetration

- Cost prohibitive for removal and replacement of 120,000 cyds of landfill material (\$4.5M)
- Evaluated targeted waste removal areas for building footprints, but still not feasible
- Mechanically Stabilized Earth (MSE) walls and pipe pile foundations most cost-effective solution



**Collaboration + Common Goal = Viable Project** Project team obtained total of \$3 million in funding at city, county, state and federal levels



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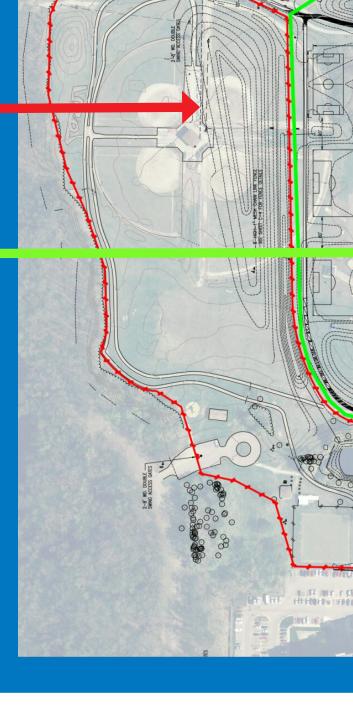
MUNICIPAL PARK - KEY ASPECTS

- Site undeveloped until mid-1940s; sand mining from mid-1940s to early 1970s
- Disposal of storm sewer catch basin sediments and street sweepings during same time period
- Landfilling of municipal solid waste in the 1950s and 1960s
- Leased by City and developed as public park in 1978; situation rose to the forefront in 2006

### **APPROACH FOR DIRECT CONTACT:**

barrier in recreation area

- Address human direct contact with lead-contaminated soil
- Undeveloped Area (restricted access area) fencing and maintain vegetative cover in this restricted area not for public use
- Park Area (recreation area on eastern portion of site) install engineered exposure barrier in unpaved areas; rely on \_\_\_\_\_ impervious surfaces elsewhere such as asphalt or concrete walkways and parking areas



## **APPROACH FOR STRUCTURAL SUPPORT:**

Multiple options considered for foundations

## **PUBLIC SAFETY TRAINING COMPLEX - KEY ASPECTS**

- 15-acre driving course and storm water pond Specialty pavement design for landfill Methane and storm water management issues Managing the "unexpected" during construction

### **APPROACH FOR METHANE:**

Clean Fill

• Liner vents to address methane pockets that formed after construction



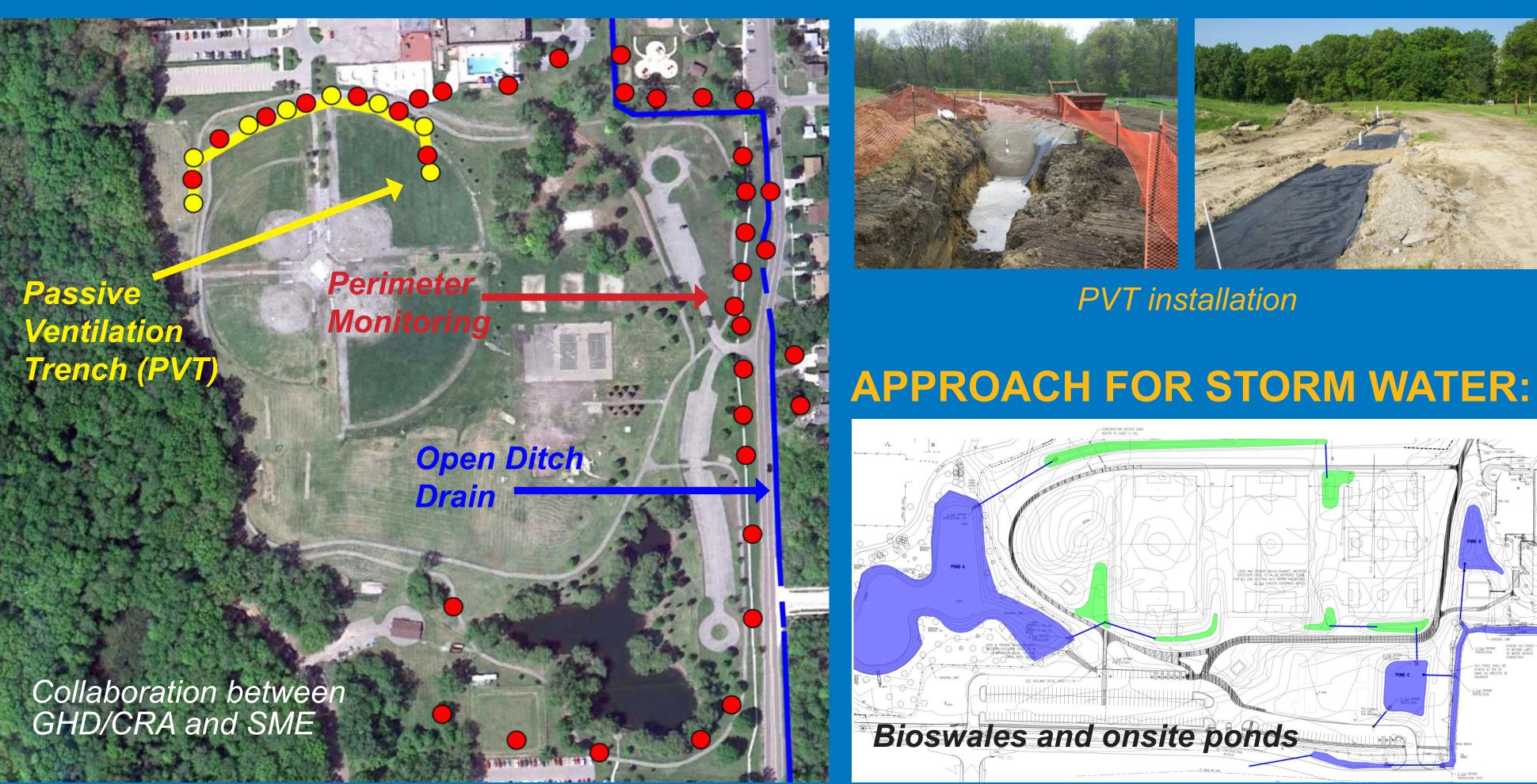






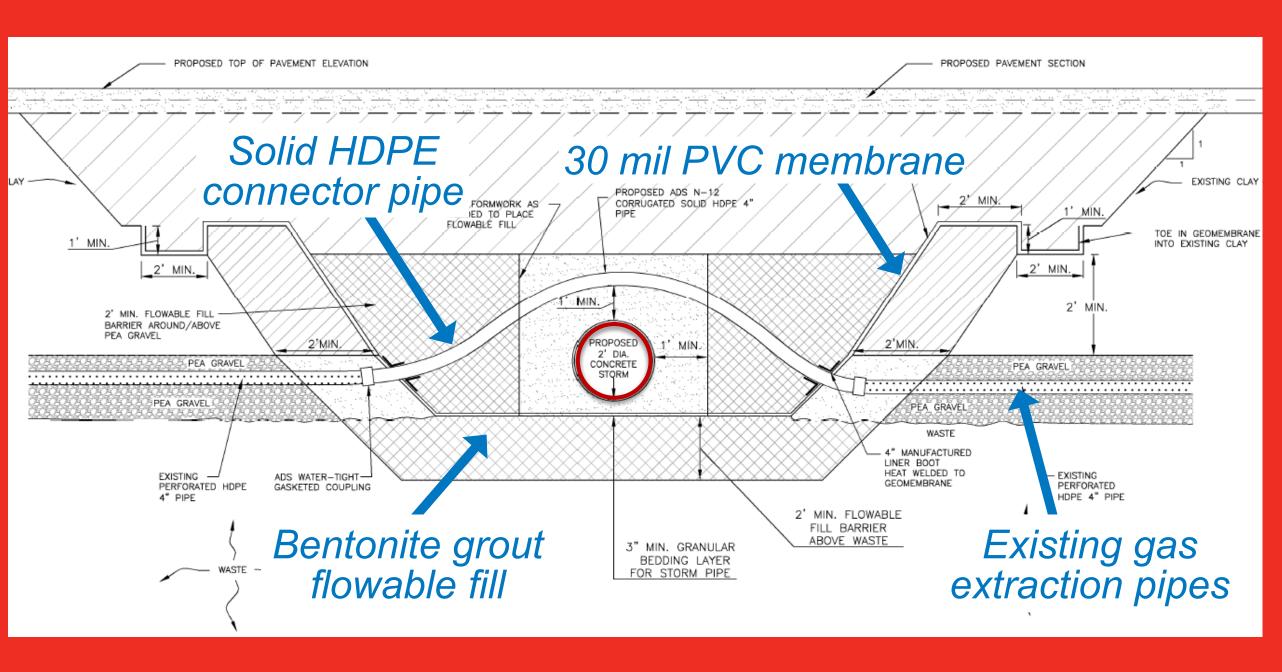


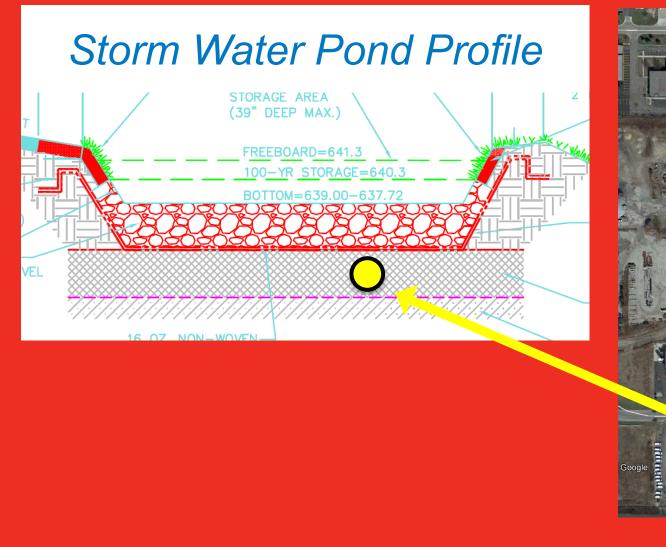
Perimeter Passive Ventilation Trench (PVT) and monitoring Sub-slab vapor barrier and passive ventilation system installed under buildings

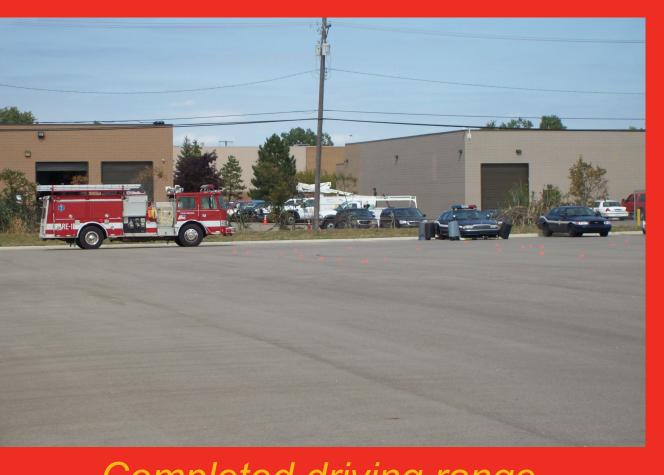


- **APPROACH FOR PAVEMENT:**
- Proposed loading/use (for emergency vehicles)
- Durability
- Future maintenance
- waste)

### **APPROACH FOR STORM WATER:** Special design for multiple utility crossings



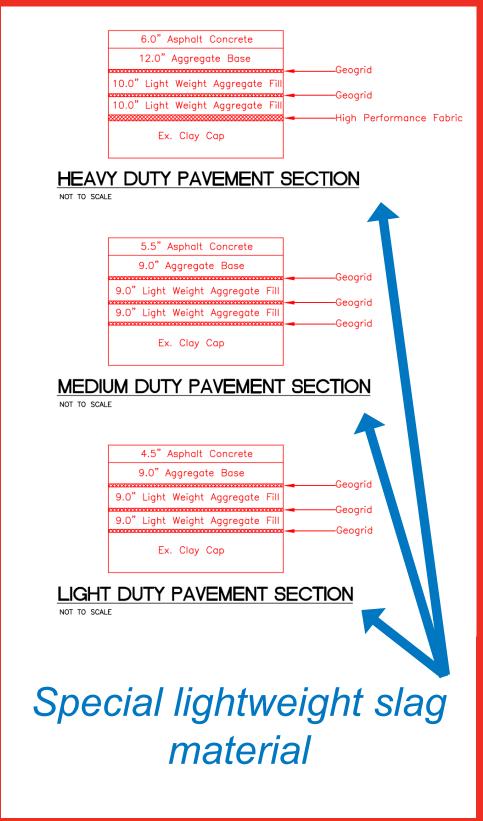




Completed driving range

- Overall weight (impact to landfilled)







### **STRONG COLLABORATION AMONG PROJECT TEAM MEMBERS:**

- Local City
- Local County
- Department of Environmental Quality
- OHM Advisors
- GHD/CRA
- SME





## **CONCLUSIONS:**

- Post-construction Operation & Maintenance (O&M) plans are a must and should include:
  - a. Monitoring of sub-slab depressurization systems
  - b. Methane monitoring at property perimeters
  - c. Methane alarms in buildings
  - d. Regular monitoring and maintenance of soil covers and other surfaces
  - e. High intensity use, such as soccer fields, will require extra considerations and maintenance
- Uncontrolled landfills can be redeveloped for the benefit of communities
- There are alternatives to waste removal
- Sufficient characterization is needed for Conceptual Site Models (CSMs)
- Technical challenges and risks include:
- a. Direct Contact
- b. Storm Water and Infrastructure
- c. Methane
- d. Structural Support
- Issues may arise during construction, but practical solutions are possible
- Positive collaboration between stakeholders provide the framework for success