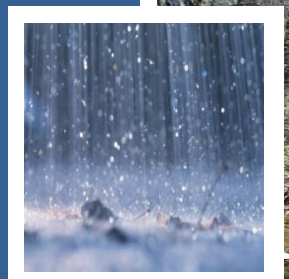
Lower Mill Creek Partial Remedy

City Council
Livable
Communities
Committee

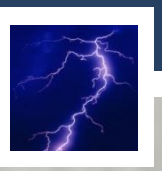
June 26, 2012

Previously Presented to BOCC April 2012



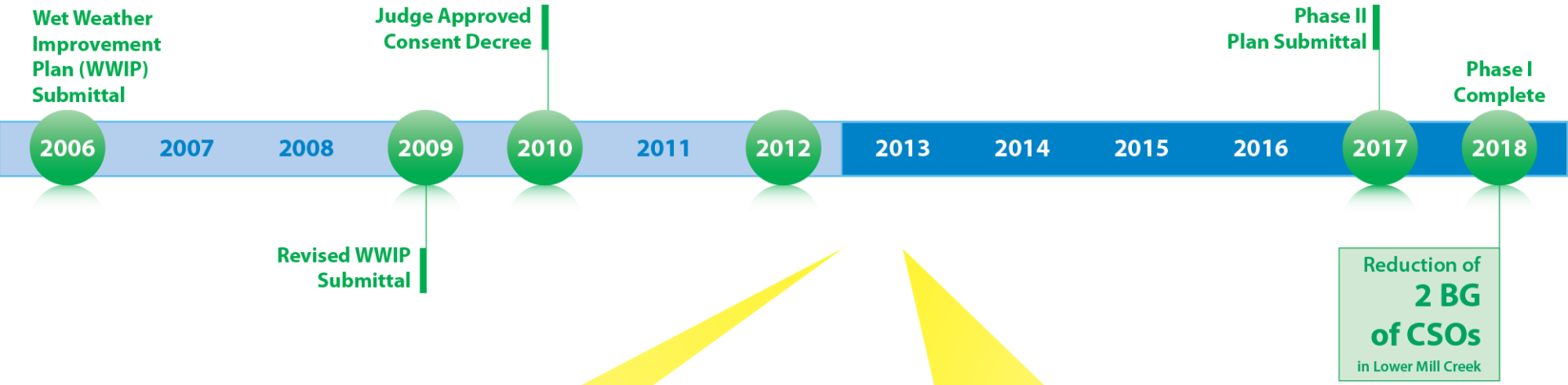
METROPOLITAN SEWER DISTRICT of greater CINCINNATI

Today's Agenda



- Lower Mill Creek Partial Remedy (LMCPR) Study Scope of Work
- Alternatives Evaluated
  - Technical, economic, and feasibility analysis of the options under consideration for the LMCPR, including findings related to:
    - Alternative Analysis
    - Costing
    - Water Quantity
    - Water Quality
- Next Steps

CSO Control Mandates: Lower Mill Creek



DEFAULT SOLUTION

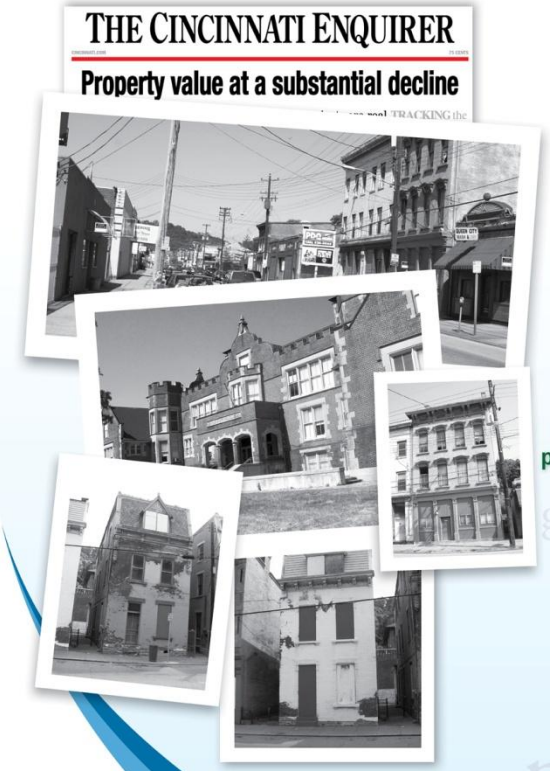
ALTERNATIVE SOLUTION

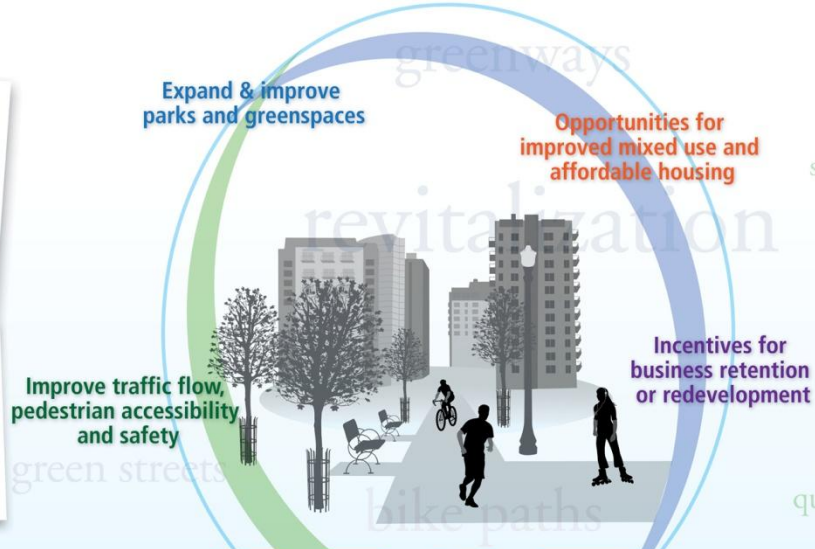
March 2012
Submit preliminary findings to the Hamilton County Board of County Commissioners

LOWER MILL CREEK PARTIAL REMEDY

December 2012
Submit preferred plan for reduction of 2 billion gallons of CSOs in the Lower Mill Creek by 2018

Current Conditions in the Community → Leverage MSD's Investment → Community's Vision for the Future





MSD

Metropolitan Sewer District

Investment to reduce sewer overflows and meet federal mandates

economics infill sustainability jobs smart growth bike trails safety recreational opportunities better community gardens education quality place community assets greenways revitalization green streets bike paths parks active recreation areas

METROPOLITAN SEWER DISTRICT of greater CINCINNATI

Wet weather problems

Guerley Road & Sunset Avenue

Lick Run Watershed

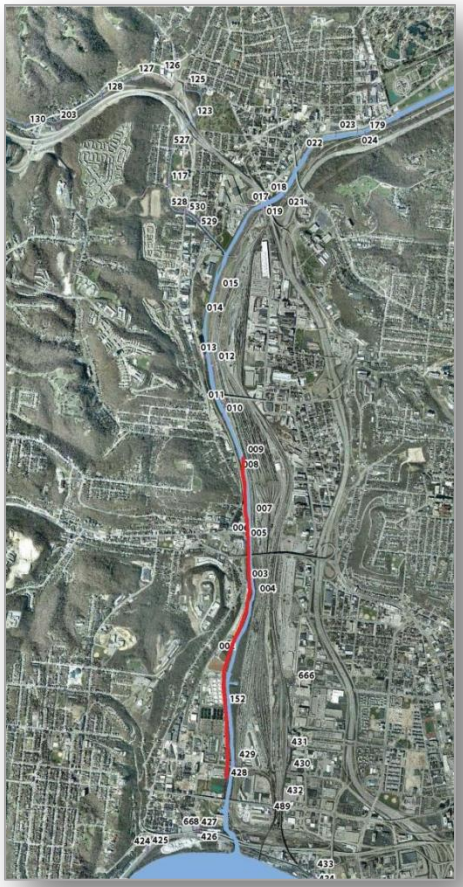
CSO#5 Lick Run

Kings Run – CSO 483

June 26, 2012

LMC Partial Remedy Study

WWIP Requirements

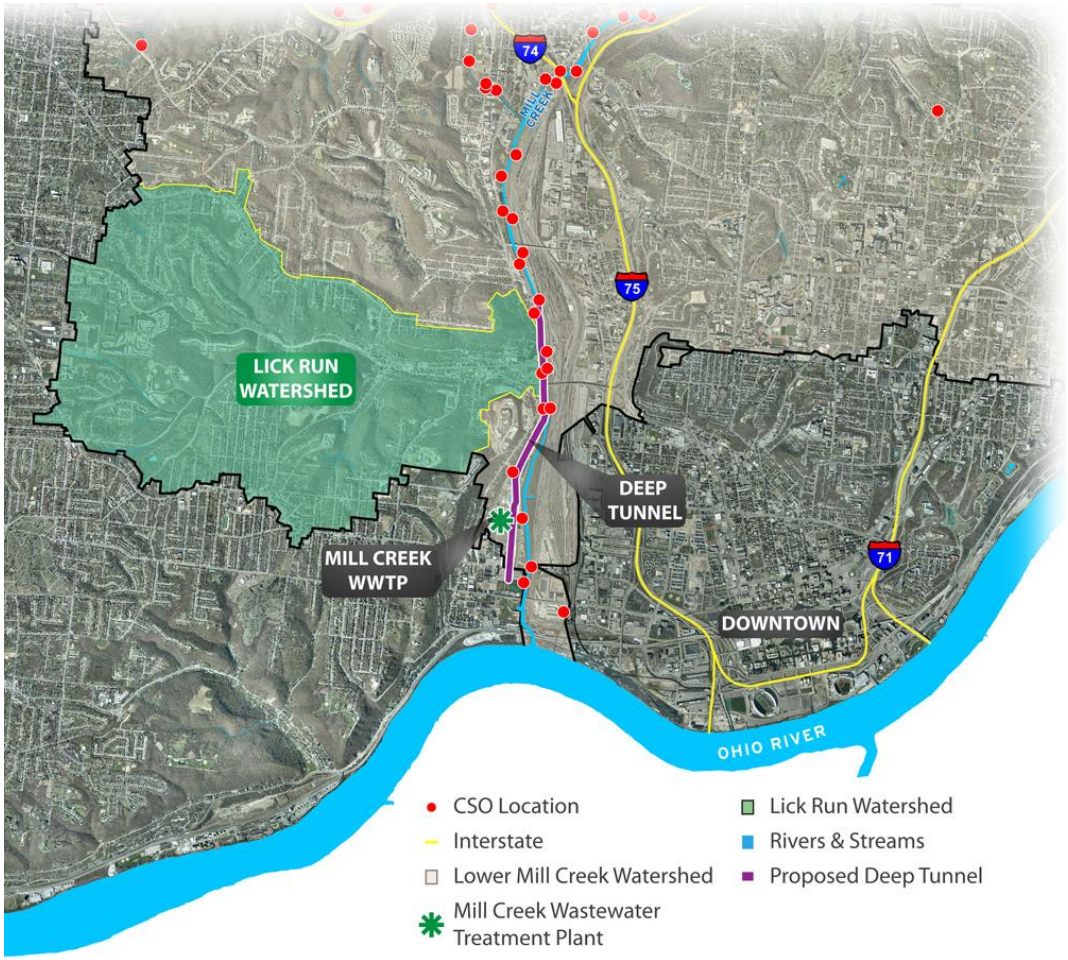


- Phase 1 will include a 3-year study/detailed design period to examine green measures and other measures to refine the Original LMCPR approach and cost estimates.
- Defendants may submit to the Regulators proposed changes to, or improvements on, the Original LMCPR remedy as a result of this study, provided the proposed revised remedy provides equal or greater control of CSO annual volume as the Original LMCPR and is completed by the Phase 1 end date.
- Defendants shall submit to the Regulators a LMCPR Study Report and any proposal for a Revised Original LMCPR by December 31, 2012.

PROJECT GROUNDWORK
your pipeline to clean water

LMCPR Default Refinement

Project Component	Original Project Estimate
Tunnel	$ 104,783,000
Consolidation Sewers	$ 12,128,000
Pump Station	$ 15,688,000
Enhanced High Rate Treatment	$ 13,712,000
Contingencies	$ 36,579,000
Soft Costs	$ 61,452,000
Total	**$ 244,342,000**



Costs are presented in 2006 dollars

Default Remedy Challenges

Constraints of Default LMCPR	Revisions Required
4 key CSOs could not be connected to the tunnel	*Accessibility details to extend consolidation sewers for key CSOs*
Project could **not be constructed** within Phase 1 timeline	*Changes in facility locations to facilitate overlapping construction schedules*
Safety and serviceability concerns	*Alternative pump station design for hydraulic and safety issues*
Provisions not included for **future extensions**	*Slight increase in tunnel length to facilitate construction of future extension*
CSX may not issue permit	*Construction of a microtunnel beneath railyard to minimize impact to operations*

In addition to development and refinement of a grey alternative, MSD has vetted a source control sustainable alternative, as well as a hybrid of the two.

Phase 1- Grey Alternative

Phase 1 Highlights

- 25-ft deep tunnel from WWTP to CSO 14 (I-74 & I-75 Exchange)
- Tunnel Pump Station & EHRT
- Consolidation Sewers

PHASE 1	GREY
Tunnel (ft)	15,300
Vertical Length of Drop Shafts (ft)	1,500
Consolidation Sewers (ft)	10,400
Tunnel Pump Station & EHRT (mgd)	84
Real Time Control Facilities (CSOs)	5 ,125, 482, 485/487
West Fork Channel Grate Modifications	YES

Phase 1: Sustainable/Hybrid Alternative

The Sustainable and Hybrid LMCPR have the same projects in Phase 1

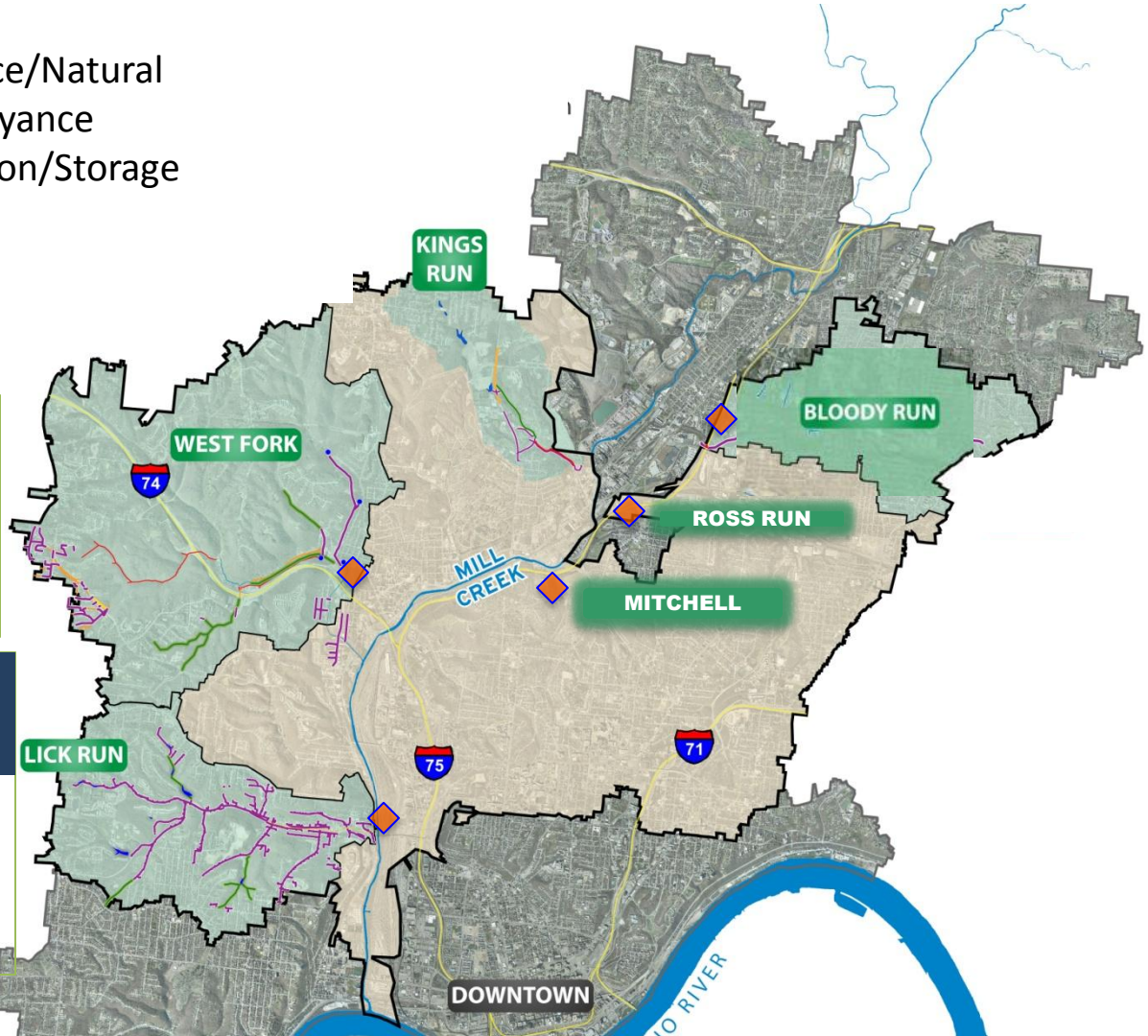
PHASE 1	Sustainable/Hybrid
Real Time Control Facilities (CSOs)	5 ,125, 181, 482, 485/487
West Fork Channel Grate Modifications	YES
New Storm Sewers (ft)	104,400
Relocated Combined Sewers (ft)	21,500
Naturalized Channels (ft)	5,500
Valley Conveyance System (ft)	8,100
Natural Conveyance/Stream Separation (ft)	20,000
Non-Tunnel Storage Capacity (mg)	5
Additional EHRT Capacity (mgd)	20
Stormwater Detention Basins (acre - ft)	80

Phase 1 Highlights

- Kings Run Source Control & Storage
- Bloody Run, Mitchell, Ross Run RTC
- Storage at CSO 488
- West Fork Source Control, Storage & RTC
- Lick Run Source Control & RTC

Phase 1: Sustainable/Hybrid Alternative

- Real Time Control (Mitchell, Bagley, Lick, Bloody& Ross Runs)
- Proposed Strom Sewer
- Proposed Natural Conveyance/Natural Conveyance
- Proposed Detention/Retention/Storage
- Relocated Combined Sewer
- Proposed Sanitary Sewer



West Fork Neighborhoods

- College Hill
- East Westwood
- S.Cummingsville
- Westwood
- Northside
- Fay Apartments
- Mt. Airy
- Green Township

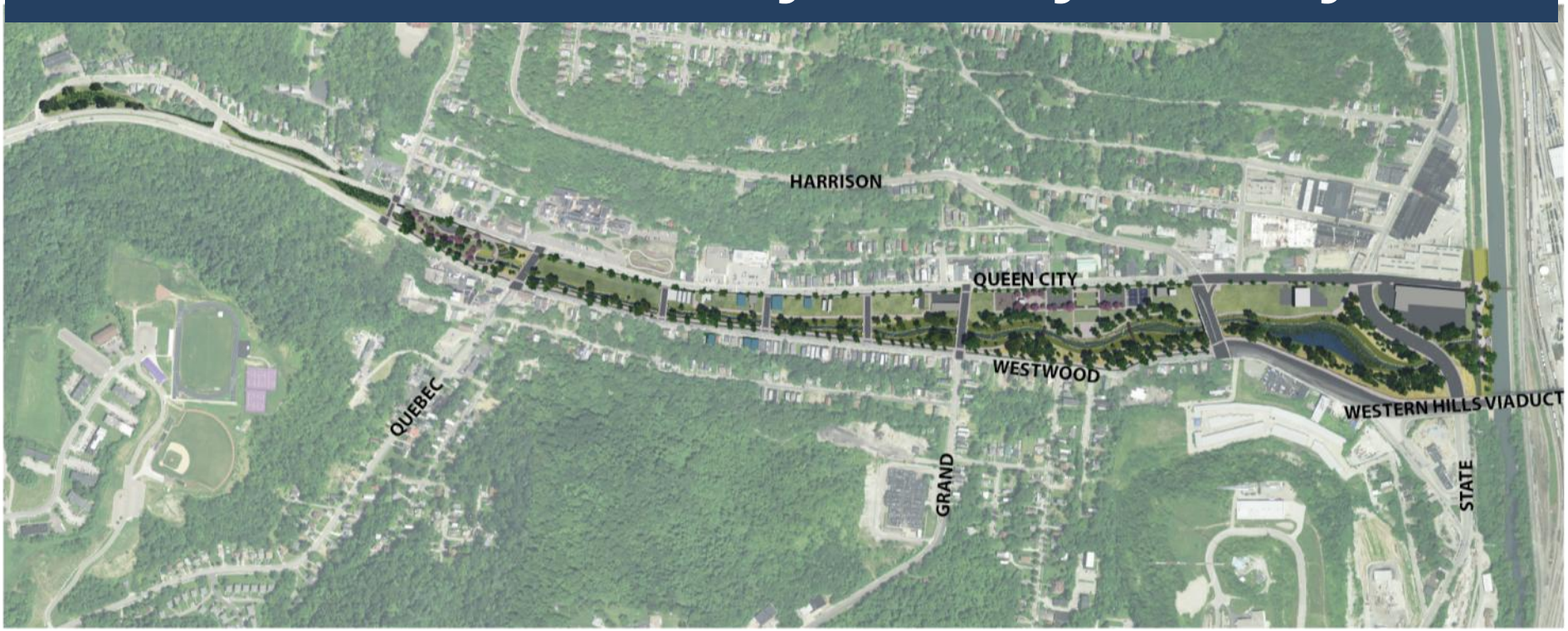
King Run Neighborhoods

- College Hill
- Spring Grove Village
- Winton Hills
- Northside

Lick Run Neighborhoods

- Westwood
- S.Fairmount
- Lower Price Hill
- East Price Hill

Phase 1: Lick Run **Valley Conveyance System**



The Base Project

Concept Planning
Agency Coordination
Community Engagement

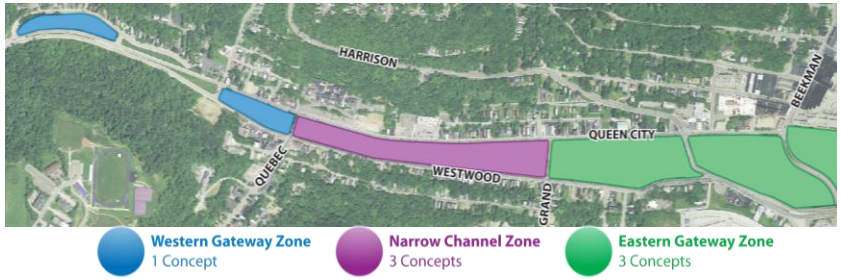
DESIGN

CONSTRUCTION

2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018

June 26, 2012

Leveraging Benefits of Innovative Water Solutions



Narrow Channel Zone

Looking south towards Westwood Avenue

Western Gateway Zone

Looking north towards Queen City

Civic Recreation Hub

Looking south towards Westwood

Phase 1 – Performance Metric Comparison

Performance Metrics	Original WWIP Model	Updated Baseline Model 3.2	Phase 1 Grey Alternative	Phase 1 Sustainable/ Hybrid Alternative
Combined System Inflow (MG)	13,602	10,148	8,698	7,710
Stormwater Separated (MG)	0	0	1,450	2,978
Overflow Mitigated (MG)	0	0	2,205	2,024
Flows Treated at EHRT (MG)	0	0	0	17
Flows Treated at WWTP (MG)	5,349	5,071	5,825	4,080
Remaining Overflow (MG)	8,253	5,077	2,872	3,145
Watershed % Control	39%	50%	72%	71%
Number of CSOs Eliminated	0	4	5	8
Number of CSOs > 85% Control	37	28	42	43
Number of CSOs < 85% Control	62	69	43	54
No. of CSOs >100 MG overflow	28	11	8	9

Phase 1 – Benefits Comparison

Phase 1 Benefit	Grey Alternative	Sustainable/Hybrid Alternative
Phase 1 achieves > 2 billion gallons CSO reduction	✓	✓
Fewer assumptions in modeled results	✓	
Higher volume flow treated at WWTP or EHRT	✓	
More operational flexibility for interceptor maintenance	✓	
Accommodates multiple solutions for Carthage & SSO 700	✓	✓
Surface improvements and increased public acceptance		✓
Opportunity to leverage private/public funding		✓
Construction jobs available for local workforce & SBEs		✓
Less purchased energy		✓
Flexibiilty for future long-term decision making		✓
Water quality improvements	✓	✓
Brownfield remediation		✓
Repurposing of land		✓
Reduction in wet weather volume to WWTP		✓
Right-size Phase 2 infrastructure		✓

Phase 1 – Risk Comparison

Phase 1 Risk	Grey Alternative	Sustainable/ Hybrid Alternative
Long-term solution not adaptable	X	
Complex construction methods	X	
Limited local construction participation	X	
Higher energy demand & cost	X	
Larger carbon footprint	X	
Additional assumptions for modeling		X
Potential future stormwater regulations	X	X
Future NPDES regulations	X	X
Potential large variance with cost for tunnel construction	X	

Phase 1 – Cost Summary

PHASE 1	Grey Alternative	Sustainable/Hybrid Alternative
Lick Run Watershed	$ -	$ 195,449,000
West Fork Watershed	$ -	$ 73,503,000
Bloody Run Watershed	$ -	$ 3,421,000
Kings Run Watershed	$ -	$ 34,423,000
CSO 488 Storage	$ -	$ 10,651,000
Tunnel	$ 312,671,000	$ -
Consolidation Sewers	$ 88,927,000	$ -
Tunnel Pump Station & EHRT	$ 135,811,000	$ -
Total	**$ 537,409,000**	**$ 317,447,000**

USEPA's Guidance

"The primary means of determining if green control measures are equivalent to a planned grey infrastructure control measure will be model runs."

- ✓ **Hydrology & hydraulic model** used to simulate effects of source control measures
- ✓ Model also **simulates grey components** of the alternative
- ✓ Specific information on **volume of overflows** in a typical year
- ✓ Good understanding of **assumptions** used in model
- ✓ **Adjustments** made to hydrology inputs

Source: "Guidance Pertaining to Consideration of Any Proposed Revised Original Lower Mill Creek Partial Remedy Defendants May Choose to Submit in Accordance with Paragraph A.2 of the Wet Weather Improvement Program", USEPA, October 11, 2011.

USEPA's Guidance

The final USEPA alternative review step involves verifying the work and that its implementation is consistent with the approved WWIP.

- **Detailed description** of technologies and intended mode of operation
- List of tasks required for implementation with **cost and schedule**
- Source control/green infrastructure **maintenance activities**
- **Legal authority** to retain permanent access and sufficient public control over the land
- Stakeholder **outreach and public participation**
- **Identify areas** of low household incomes, poor educational attainment, or concentrated minority population
- **Tracking** of implementation, operation, maintenance, and reporting activities
- **Unique issues** anticipated for Post-Construction Monitoring Study

Lower Mill Creek Final Remedy Alternative/Options (LMCFR/Phase 2)

If Grey Alternative is pursued in Phase 1 → Phase 2 = Extended Tunnel Option

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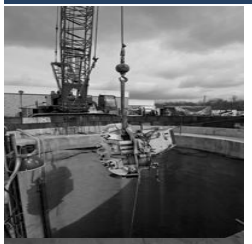
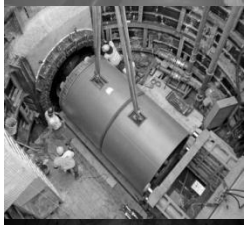
If Sustainable Hybrid Alternative is pursued in Phase 1 → Phase 2 = Source Control Option

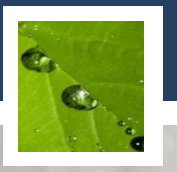
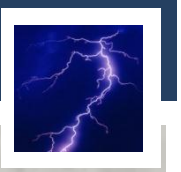
OR

→ Phase 2 = Tunnel Option

Phase 2 Grey Alternative





Phase 2 Highlights

- Tunnel from CSO 14 to Mitchell Avenue (CSO 482)
- 20 MG combined storage in Bloody Run
- 67 MGD EHRT for Wooden Shoe (CSO 217)
- Upper watershed storage and partial separations

PHASE 2 CONCEPT (2019 - TBD)	GREY
Tunnel (ft)	13,200
Vertical length of drop shafts (ft)	750
Consolidation Sewers (ft)	16,000
Real time control facilities	CSO 181
EHRT at Carthage (mgd)	65
Regulator Improvements	18 CSOs
New storm sewers (feet)	65,000
Non-tunnel storage capacity (mg)	31
Additional EHRT capacity (mgd)	67

Phase 2 Sustainable & Hybrid Options

PHASE 2 (2019 – TBD)	HYBRID	SUSTAINABLE
Tunnel (ft)	**28,300**	**0**
Vertical Length of Drop Shafts (ft)	**2,000**	**0**
Consolidation Sewers (ft)	**19,600**	**0**
Tunnel Pump Station & EHRT	**84**	**0**
Regulator Improvements	**18**	**18**
Carthage EHRT Facility (mg)	**65**	**65**
Relocated Combined Sewers (ft)	**0**	**10,900**
Natural Conveyance/Stream Separation (ft)	**0**	**17,100**
New Storm Sewers (ft)	**39,400**	**129,000**
Sanitary Sewers (ft)	**19,600**	**300**
Non-Tunnel Storage Capacity (MG)	**23**	**3**
Stormwater Detention Basins (acre-ft)	**0**	**181**

Phase 2 - Hybrid

- Construct ≈20 ft tunnel from WWTP to CSO 482 (Mitchell) w/PS & EHRT
- Upper Watershed Storage & Separations

Phase 2 - Sustainable

- Balance of Bloody Run Watershed
- Denham & Ludlow Watersheds
- Upper Watershed Storage & Separations
- Enabled Impact Projects (40 MG TD)

LMCFR - Volumetric Control

Performance Metrics	Original WWIP Model	Updated Baseline Model 3.2	LMCFR Grey Alternative	Phase 2 Sustainable Alternative	Phase 2 Hybrid Alternative
Combined System Inflow (MG)	13,602	10,148	8,158	6,200	7,019
Stormwater Separated (MG)	0	0	1,990	3,948	3,129
Overflow Mitigated (MG)	0	0	3,902	3,005	4,051
Flows Treated at EHRT (MG)	0	0	268	231	263
Flows Treated at WWTP (MG)	5,349	5,071	7,063	4,129	5,993
Remaining Overflow (MG)	8,253	5,077	1,175	2,072	1,026
Watershed % Control	39%	50%	88%	80%	90%
Number of CSOs Eliminated	0	4	6	9	9
Number of CSOs > 85% Control	37	28	97	75	97
Number of CSOs < 85% Control	62	69	0	22	0
No. of CSOs >100 MG overflow	28	11	2	6	2

**Options to be determined as part of Phase 2 scheduling*

LMCFR Cost Summary

2006 $

PHASE 1	Grey	Sustainable/Hybrid
Sub-Total $	534,677,000	$ 317,447,000

PHASE 2	Grey Alternative	Sustainable Option	Hybrid Option
Denham Watershed	$ -	$ 58,181,000	$ -
Ludlow Run Watershed	$ -	$ 33,727,000	$ -
Bloody Run Watershed	$ -	$ 83,526,000	$ 58,305,000
Upper Watersheds Part Seps	$ 74,768,000	$ 29,345,000	$ 45,104,000
EHRT & Storage Facilities	$ 186,568,000	$ 25,813,000	$ 25,813,000
Carthage EHRT	$ 65,979,000	$ 65,979,000	$ 65,979,000
Regulator Improvements	$ 15,918,000	$ 15,918,000	$ 15,918,000
Tunnel Pump Station & EHRT	$ -	$ -	$ 135,811,000
Tunnel	$ 218,130,000	$ -	$ 414,584,000
Consolidation Sewers	$ 83,123,000	$ -	$ 165,718,000
Total	$ 644,486,000	$ 312,489,000	$ 927,232,000
TOTAL LMCFR	$ 1,181,895,000	$ 629,936,000	$ 1,244,679,000

Summary of Alternatives

Fiscal Summary (2006$)

PHASE 1	Grey	Sustainable/Hybrid Alternative
Capital	$ 537,409,000	$ 317,447,000
Life Cycle	$ 431,349,000	$ 248,851,000
Cost/gallon removed	$ 0.24	$ 0.16

PHASE 2	Grey	Sustainable Option	Hybrid Option
Capital	$ 644,486,000	$ 312,489,000	$ 927,232,000
Life Cycle	$ 529,676,000	$ 250,735,000	$ 752,946,000
Cost/gallon removed	$ 0.38	$ 0.32	$ 0.46
TOTAL PROJECT			
Capital	$ 1,181,895,000	$ 629,936,000	$ 1,244,679,000
Life Cycle	$ 961,025,000	$ 499,586,000	$ 1,001,797,000
Cost/gallon removed	$ 0.30	$ 0.21	$ 0.31
CHANGE in TREATMENT LIFE CYCLE COST (Included in Life Cycle cost totals)			
Operating Differential	$ 7,547,000	$ (3,569,000)	$ 3,493,000

Overall Comparison

Grey Alternative

- Highest Phase 1 cost
- Lowest cost to achieve 85% at every CSO*
- Least adaptive
- Least deviation from existing approved WWIP
- Provides more alternatives for Carthage and SSO 700 solutions

Sustainable Option

- Lowest Phase 1 Cost
- Lowest Total Capital Cost
- Lowest WWTP O&M Cost
- Community Based
- Lowest overall CSO control

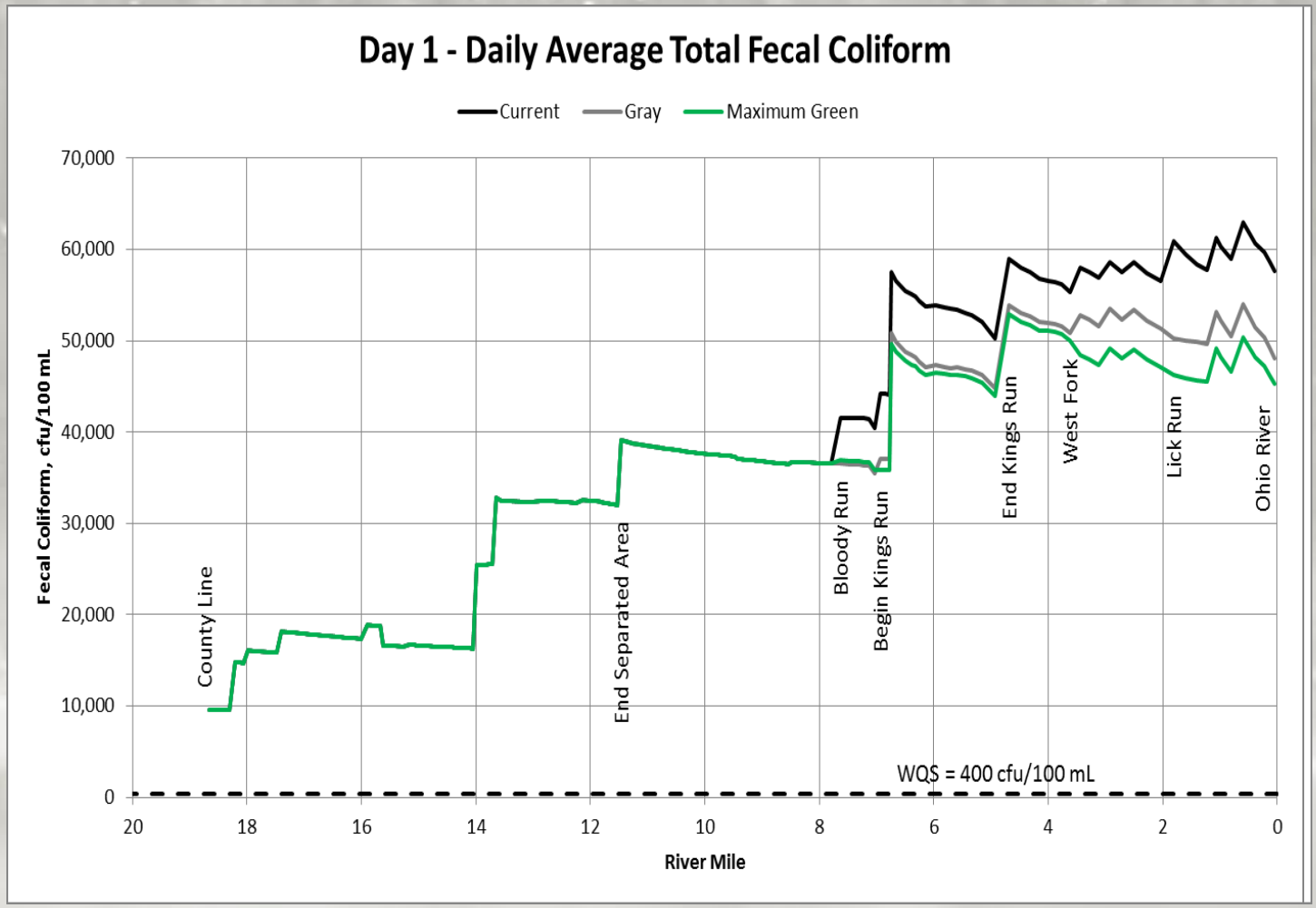
Hybrid Option

- Lowest Phase 1 Cost
- Highest Overall Capital Cost
- Provides more alternatives for the Carthage and SSO 700 Solutions
- Achieves 85% control at every CSO

Water Quality

Limnotech Modeling

Any approach the Co-Defendants pursue will NOT achieve the fecal coliform standard. However, a source control approach offers a better end result.



Lower Mill Creek Open Houses

Over 300 people attended 4 open house

West Fork Neighborhoods

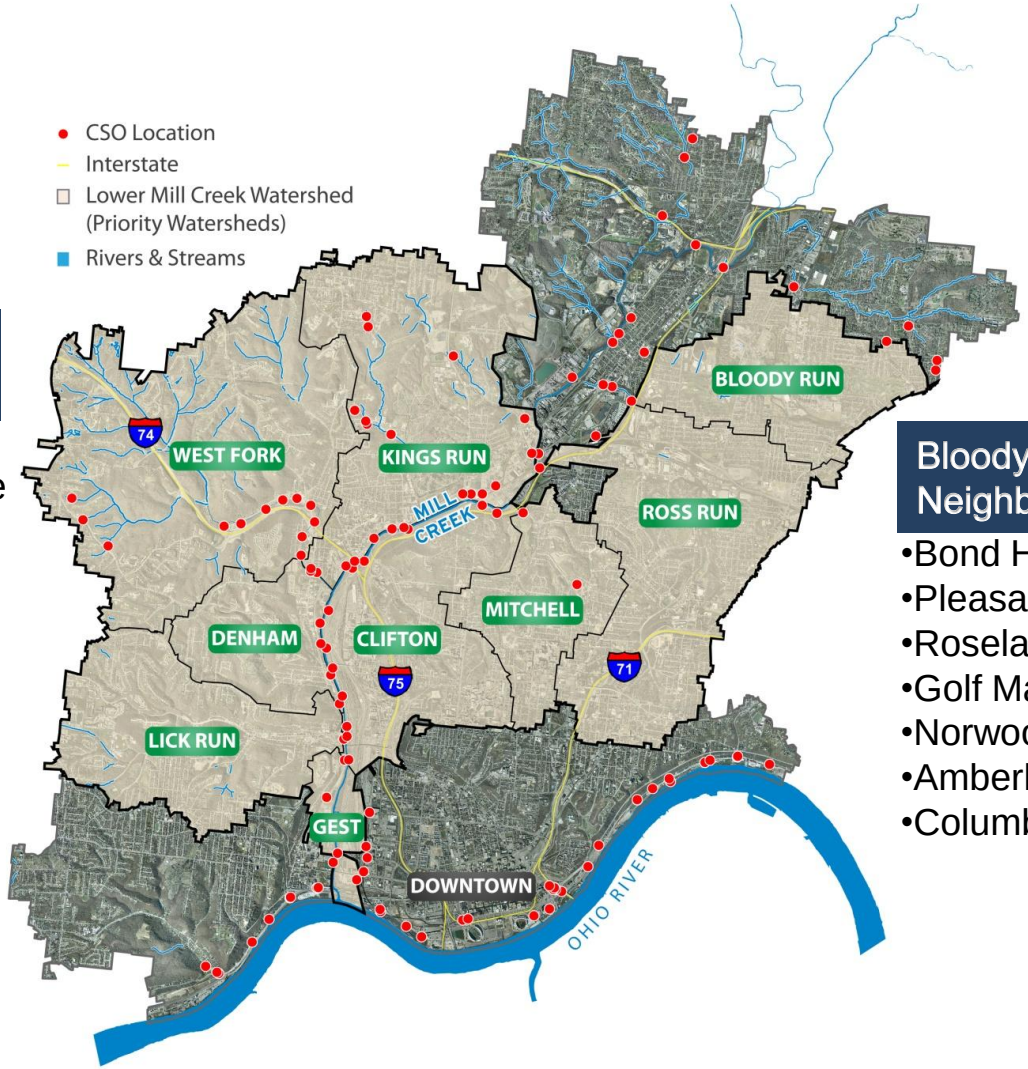
- College Hill
- East Westwood
- Fay Apartments
- Mt. Airy
- Northside
- S.Cummingsville
- Westwood
- Green Township

Kings Run Neighborhoods

- College Hill
- Spring Grove Village
- Winton Hills
- Northside

Lick Run Neighborhoods

- Westwood
- S.Fairmount
- Lower Price Hill
- East Price Hill



Bloody Run Neighborhoods

- Bond Hill
- Pleasant Ridge
- Roselawn
- Golf Manor
- Norwood
- Amberley Village
- Columbia Twp

June 26, 2012

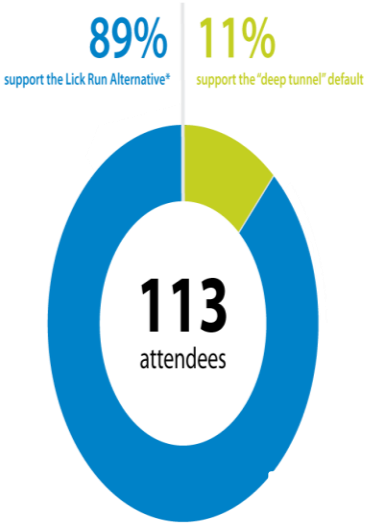
Lower Mill Creek Feedback

Public Outreach

✓ **More than 60 Meetings**

MSD has engaged residents, property owners, and stakeholders to gain input on the deep tunnel and proposed sustainable infrastructure projects.

Community Design Workshop #1

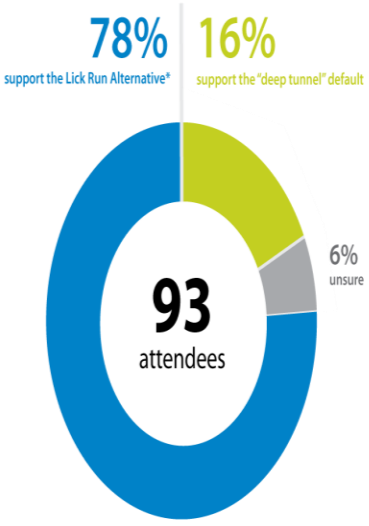


Workshop Content:

Visual Preferences

Open Space Corridor
Community Core
Historic Fabric
Hillside & Ridgetop Neighborhoods

Community Design Workshop #2

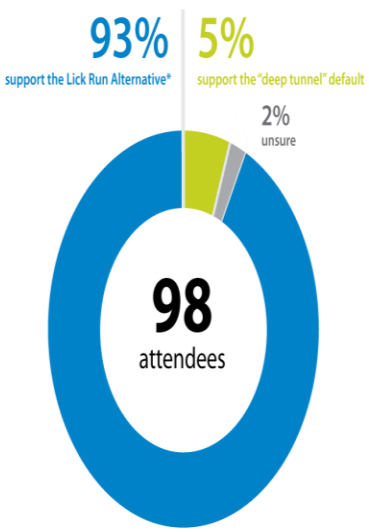


Workshop Content:

Concept Development

Western Gateway Zone
Narrow Channel Zone
Eastern Gateway Zone
Transportation & Trails Network
Green Planning Principles

Community Design Workshop #3



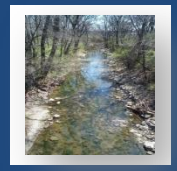
Workshop Content:

Preliminary Master Plan

"Base Plan"
Waterway Character
CSO Reduction Solutions
Vision Plan
Transportation Network & Trails

Next Steps: Broader Public Outreach

- Lick Run Master Plan – completed and on web May 2012
- Presenting findings of Lower Mill Creek Alternatives Evaluation in public settings
  - Actively soliciting written comments via the www.projectgroundwork.org or email MSDcommunications@cincinnati-oh.org
- Numerous presentations across the community in July and August
  - Reach out to jurisdictions across Hamilton County
- Complete public outreach by September 3, 2012



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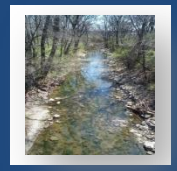
Next Steps

- USEPA & Ohio EPA Continuation of Technical Review/Discussions
- Continue Flow Monitoring & Model Refinements
- Potential Joint Session with City/County in late August to receive public comment
- City Council Action following public comment period on Recommendation for USEPA submittal
- County Commission Action following public comment period on Recommendation for USEPA submittal
- MSD to prepare submittal to USEPA
  - Complete submittal due to USEPA by December 31, 2012



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Questions