# Middle River Complex Sediment Remedy

# Updates on Middle River and Martin State Airport Projects

February 28, 2013

LOCKHEED MARTIN

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- Middle River Complex
  - Sediment Feasibility Study proposed remedy
  - Short updates on:
    - Proposed Consent Agreement
    - Groundwater remedy underway
    - Surface water sampling results in Dark Head Cove
    - Soil remedy planning

#### Sediment Feasibility Study -Tonight's Meeting



- Initial public engagement:
  - Citizens Guide Dec. 2011
  - Public Information Session January 18, 2012
- Citizens' Working Group process (February, March, April 2012)
- Remedy development & selection; Feasibility Study in review
- Recommended remedy for sediments
- Public and Regulators comment on the recommended remedy
- Next Steps projected schedule

#### Public Comment Period: Feb. 28 – March 28, 2013

# **Citizens Working Group**



#### The Working Group and Public Involvement in the Feasibility Study Process



#### Middle River Complex (MRC) Setting



# Values/Concerns and Working Group Feedback

- <u>H</u> for High level of concern
- M for Medium level of concern
- L for Low level of concern

<u>High</u>	<u>Medium</u>	Low	lssue
7	8	1	Traffic congestion
4	9	2	Noise, dust
15	1	0	Air or water quality issues
9	4	3	Job retention/creation
12	3	0	Commercial development
11	5	0	Residential development

#### **Hydraulic & Sedimentation Analysis**



# **Surface Water & Sediment Quality**

- Surface Water No chemicals detected above water quality standards
- PCBs (Polychlorinated Biphenyls)
  - Are located in shallow sediments near the bulkhead
  - Represent human health and ecological risks
  - Are bioaccumulative (will build up in the food chain)
- PAHs (Polycyclic Aromatic Hydrocarbons)
  - Are located near the bulkhead and Martin State Airport
  - Are less of a risk driver than PCBs
- Metals (e.g., cadmium, copper, chromium)
  - Are present in Cow Pen Creek and Dark Head Cove
  - Are potentially toxic to benthic macroinvertebrates (i.e., worms)
  - Are more elevated in deep sediments

## **Areas of Potential Concern at the Sediment Surface**



#### Human Health

- No acute risks identified or anticipated
- Some risks posed by fish consumption
- Site fish tissue concentrations are similar to local area-wide conditions
- Ecological
  - No predicted impacts to fish, birds or mammals
  - Potential impacts to benthic macroinvertebrates (e.g., worms)

State fish consumption advisories listing specific species and waterways are in place now and are not expected to change as a result of this cleanup, as this is a regional issue.

- Reduce, to the extent practicable\*:
  - RAO 1: human health risks associated with the consumption of resident fish by reducing bioavailable sediment concentrations of contaminants of concern (COCs).
  - RAO 2: human health risks associated with exposure to COCs through direct contact with sediments and incidental sediment ingestion by reducing sediment concentrations of COCs.
  - RAO 3: risks to benthic invertebrates by reducing bioavailable sediment concentrations of COCs.

# **Site-Specific Considerations**

#### Cow Pen Creek

- Subject to erosion
- Tidal and non-tidal wetlands
- Capping and in situ technologies are not practicable

#### Dark Head Cove

- Generally quiet, stable sediment environment
- A federally designated channel
- Water depth currently at minimum required by federal channel
- Placement of material for capping and enhanced natural recovery may not be permitted by Army Corps
- In situ technologies and MNR still considered viable

# **Remedial Alternatives**



## **Cleanup Alternatives Comparison**



# **Removal by Excavation**



#### **Excavation of sediment from shore**

## **Removal by Excavation**



#### **Excavation of sediment in dry**

# **Mechanical Dredging**



# **Hydraulic Dredging**









# **Natural Recovery**

NATURAL	Monitored Natural Recovery	Biodegradation Sedimentation Recovery Modeling Long-Term Monitoring		
RECOVERY	Enhanced Natural Recovery	Thin-Layer Placement Thin-Layer Placement with Carbon Amendments		



#### In Situ Treatment



Norwegian Research Council, 2011

Application of activated carbon to reduce bioavailability of contaminants such as PCBs and PAHs.

# In situ Treatment Applications









# **Evaluation Criteria**



#### Based on EPA's Feasibility Study guidance

- Threshold Criteria
  - Protection of Human Health and the Environment
  - Compliance with Regulations
- Balancing Criteria
  - Long Term Effectiveness
  - Short Term Effectiveness (impacts)
  - Reduction in toxicity, mobility, volume through treatment
  - Implementability
  - Cost
- Modifying Criteria
  - Community Acceptance
  - Regulatory Acceptance



# **Qualitative Comparison**

					Reme	dial Alternatives	_		
Evaluation Criteria		1 No Action	3A Removal at CPC, DHC, Dark Head Creek	3B Removal at CPC, DHC	4F Partial Removal, Reactive ENR	4G Partial Removal, <i>In situ</i> Treatment, MNR	4H Partial Removal, MNR	4I Partial+ Removal, MNR	4J Partial+ Removal, <i>In situ</i> Treatment, MNR
	Achieve RAOs	All remedial alter and environment	matives achieve R until it meets the l	AOs at varying RAOs in a timef	performance. No A frame of about 100	ction is considered n years.	iot achieving RAOs	due to unacceptable 1	isks to human healt
Overall Protection of Human	Time to Achieve Human Health RAOs (RAO 1 and	No Action achiev RAO 1 in one ye	To Action achieves RAO 1 in 30 years. Alternatives 3A, 3B, 4F, 4I, and 4J achieve RAO 1 at the end of construction. Alternatives 4G and 4H achieve RAO 1 in one year and 10 years respectively. All alternatives except No Action achieve RAO 2 at the end of construction.						lG and 4H achieve
Health and Environment	RAO 2)	*	****	*****	****	****	***	*****	****
	Time to Achieve Benthic	No Action achiev years; Alternativ	ves RAO 3 in 100 e 4H up to 26 year	years. Alternativ s; Alternative 41	ves 3A, 3B, 4F achi I up to 12 years, Alt	eve RAO 3 at the en ternative 4J up to 3 y	d of construction. A rears.	lternatives 4G achieve	es RAO 3 up to 13
	RAOs (RAO 3)	*	****	****	****	***	**	***	****
Compliance with ARARs		Not expected to comply			All p	emedial alternatives com	ply with ARARs		
		*	****	****	****	****	****	****	****
Long-term Effectiveness		Long-term effectiveness is considered higher for removal-focus and larger removal alternatives than the alternatives relying on effectiveness of <i>n situ</i> treatment and MNR.							
		*	****	****	****	***	***	****	****
Reduction of Toxicity, Mobility, or Volume through Treatment		Alternatives 4F,	4G, and 4J has trea	atment compone	ents. In situ treatmer	nt is not incorporated	1 in other alternative	s.	
		*	*	*	*****	****	*	*	****
		Short-term impac	cts are higher for r	emoval-focus al	ternatives and incre	ase with increased re	emoval volume.		
Short-term Effectiveness		****	*	**	****	****	****	***	***
mplementability		Implementability schedule delays i River.	of removal-focus increase with the d	alternatives is le redge volume. A	ess than the combin Alternative 4F has lo	ed action alternative ow administrative in	s. Potential for techn plementability due t	nical and administration of a state of a sta	ve difficulties, status of Middle
		****	*	**	**	****	****	***	***
Cost		****	*	**	***	***	****	***	***
Modifying Criteria (Regulatory and Public Acceptance)		Regulatory accep	otance is not ranke	d at this time. Pı	ublic acceptance is	ranked based on the	input received from	the community.	I
		*	**	***	****	****	***	****	****
Overall Su	nmary =	**	**	***	****	****	****	****	****
			**						
Ranking Index =		*	Leve Madiser	and an an	****	*********	l		

## **Quantitative Scoring of Alternatives**

Alternatives	Value	Decision Scores
4G. Removal,Insitu,MNR	0.634	
4J. Removal+,Insitu,MNR	0.631	
4F. Removal, R.ENR	0.613	
4I. Removal+, MNR	0.597	
4H. Removal, MNR	0.563	
3B. Removal atCPC,DHC	0.523	
1. No Action	0.518	
3A. Complete Removal	0.465	

# **Remedial Alternatives**

Remedial Alternatives		Description/Highlights	FS – Level Cost
No Action	1	CERCLA baseline alternative used for comparison to other alternatives	None
Complete Removal	3A	<ul> <li>Removal of impacted sediments over the AOPC in CPC, DHC and Dark Head Creek</li> <li>143,200 cy removal</li> <li>Remedial Action Objectives (RAOs) achieved at end of construction</li> </ul>	\$\$\$\$
	3В	<ul> <li>Removal of impacted sediments over the AOPC in CPC and DHC</li> <li>99,600 cy removal</li> <li>RAOs achieved at end of construction</li> </ul>	\$\$\$
Combined Action	4F Partial Removal, Reactive ENR	<ul> <li>Removal in CPC, DHC bulkhead and outfalls.</li> <li>48,800 cy removal over 12.5 acres; 8.5 acre reactive ENR (13,800 cy); 8.5 acre long-term OM&amp;M</li> <li>RAOs achieved at end of construction</li> </ul>	\$\$
	4G Partial Removal, <i>In situ</i> Treatment, MNR	<ul> <li>Removal in CPC, DHC bulkhead and outfalls.</li> <li>48,800 cy removal over 12.5 acres; 8.5 acre in situ treatment; 3.7 acre MNR; 8.5 acre long-term OM&amp;M</li> <li>Human health RAOs achieved at end of construction</li> <li>Benthic RAO is achieved at 93% of the AOPC; average 6 years of MNR to reach benthic RAO in remaining 7% of the AOPC</li> </ul>	\$\$+
	4H Partial Removal at DHC, CPC, and MNR	<ul> <li>Removal in CPC, DHC bulkhead and outfalls.</li> <li>48,800 cy removal over 12.5 acres; 8.5 acre of MNR</li> <li>Progress towards human health RAOs is 82%</li> <li>Benthic RAO is achieved at 82% of the AOPC; average 15 years of MNR to reach benthic RAO in remaining 18% of the AOPC</li> </ul>	\$\$
	4I Partial Removal at DHC, CPC, and MNR	<ul> <li>Removal in CPC, DHC bulkhead and outfalls, additional removal in DHC and in front of the Wilson Point Park over 3.5 acre</li> <li>62,900 cy removal over 16 acres; 5 acre MNR</li> <li>Human health RAOs achieved at the end of construction</li> <li>Benthic RAO is achieved at 90% of the AOPC; average 7 years of MNR to reach benthic RAO in remaining 10% of the AOPC</li> </ul>	\$\$+
	4J Partial Removal at DHC, CPC, <i>In situ</i> Treatment, MNR	<ul> <li>Removal in CPC, DHC bulkhead and outfalls, additional removal in DHC and in front of the Wilson Point Park over 3.5 acre</li> <li>62,900 cy removal over 16 acres; 2 acres in situ treatment; 3 acres MNR</li> <li>Human health RAOs achieved at end of construction</li> <li>Benthic RAO is achieved at 93% of the AOPC; average 2 years of MNR to reach benthic RAO in remaining 7% of the AOPC</li> </ul>	\$\$++

# Areas of Potential Concern at the Sediment Surface



## Recommended Remedial Alternative – 4G Removal with *in Situ* Treatment & MNR



#### Dredging, Backfilling and In Situ Treatment







# **Next Steps**



- Feasibility Study Document
  - Submitted to Maryland Department of the Environment and U.S. Environmental Protection Agency
  - Available at Essex Public Library and Lockheed Martin Website
- Public Information Session TONIGHT!!
  - Wilson Point Fire Hall February 28<sup>th</sup>
- Public Comment Period
  - February 28 March 28, 2013
- Tentative Schedule of Remedial Action (pending remedy approval)
  - Design and permitting (2013 2014)
    - Additional sampling for the design (2013)
  - Implementation of remedy (2015 2017)

#### Sediment Remediation – Tentative List of Permits Required

Agency	Permit Description	Public Comment Period
U.S. Army Corps of Engineers (USACE) and Environmental Protection Agency (EPA)	Section 404 Clean Water Act Joint Permit: Dredge and Fill of Waters of the U.S. Including Wetlands	Yes
USACE and EPA	Section 10 Rivers and Harbors Act Joint Permit: Work in Navigable Waters of the U.S.	Yes
USACE and EPA	Anticipated: National Environment Policy Act (NEPA) Review - Evaluates environmental impacts to the creek	Yes
National Oceanic and Atmospheric Administration (NOAA) Fisheries	Essential Fish Habitat (EFH) Consultation and Review: Potential impacts on EFH	No
U.S. Fish and Wildlife Service	Section 7 Endangered Species Act Consultation and Review: Potential impacts to listed species and/or critical habitat	No
Maryland Department of the Environment (MDE)/Board of Public Works	MDE Tidal Wetlands Protection Act License Joint Permit: Impacts to Tidal Wetlands and Waters of the State	Yes
MDE Wetlands/Waterways Division	MDE Non-Tidal Wetlands Protection Permit: Impacts to Non- tidal Wetlands and Waters of the State	Yes
MD Department of Natural Resources (DNR)	Section 307 Federal Coastal Zone Management, Coastal Zone Consistency: Federal actions must be consistent with state's coastal management program	Yes
MDE	Section 401 Water Quality Certification: State certifies that Section 404 permit meets state water quality standards	Yes
MDE	Section 402 Clean Water Act, Construction General Permit for Construction Stormwater: Discharges to waters of the U.S. and state	Yes
MDE National Pollutant Discharge Elimination System (NPDES) Program	Section 402 Clean Water Act NPDES Discharge Permit: discharges to waters of the US	Yes
Maryland Historic Trust	Section 106 of the National Historic Preservation Act Historic/Cultural Resource Review: Potential impacts to any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register	No
MD DNR	Nongame and Endangered Species Conservation Act, Listed Species and Habitat Review: Potential impacts to state listed species and habitat	No
Baltimore County Department of Environmental Protection and Resource Management (DEPS) Stormwater Engineering	Stormwater Management Plan Approval: Stormwater management and sedimentation impacts to waters of the state and impacts in Baltimore County	No
Baltimore County DEPS Environmental Review	Baltimore County Code, Critical Area Plan/Permit Approval: Potential impacts to critical area resources	No
Baltimore County DEPS Stormwater Engineering and Baltimore County Soil Conservation District	Section 1.04 of the Code of the Baltimore County Regulations, Approvals of Grading Plan and Erosion and Sediment Control Plan (E&S) from Baltimore County Soil Conservation District: Changes to site grades	No



## **Questions?**

## **Comments?**

# **Agenda - Continued**

- Middle River Complex
  - Short updates on:
    - Proposed Consent Agreement
    - Groundwater remedy underway
    - Surface water sampling results in Dark Head Cove
    - Soil remedy planning

#### **Proposed Consent Agreement**

#### • Reasons:

- Sediment cleanup program is not eligible for the Voluntary Cleanup Program (VCP)
  - VCP only applies to land you own
  - Creek and cove are Waters of the State not owned by Lockheed Martin
- Proposing change to Industrial Cleanup goals for soil
  - Consistent with past and anticipated future land use
  - Cleanup goals reflect PAH distribution widely dispersed in soil
- MDE suggested that Lockheed Martin consider putting all contaminated media under the same regulatory program
  - Soil, groundwater and sediment

#### Middle River Complex – Groundwater Remedy Underway



## **Groundwater Remedy Design**

- Now underway and coming soon:
  - Additional design details and specifications
  - Soil removal in Blocks E and G
    - Goal is to remove contaminated soil in the area of the groundwater remedy
  - Swale relocation in Block G
  - Permitting



#### Numerous permits are underway

Permit	Status
US Army Corps of Engineers (USACE) & Maryland Department of the Environment (MDE) State Programmatic General Permit - Impacts to Waters of the US/State	Approval granted January 24, 2013
Maryland Historic Trust and Maryland Department of Natural Resources Project Review	Review completed – Activities will have no effect on regulated resources
Baltimore County Soil Conservation District (SCD) Erosion and Sediment Control (E&S) Plan Approval	SCD in final review stage – Expect approval by late Feb or early March 2013
Baltimore County Grading Plan Approval	County Soil Conservation District review in progress. Expect Approval in late Feb or Early March 2013
Baltimore County Stormwater Variance	Variance granted on January 7, 2013
MDE Notice of Intent (NOI) for coverage under the Construction Stormwater General Permit	Will be granted after Soil Conservation District Grading Plan approval and Inspection by County of installed Erosion and Sediment Control systems.

### **Groundwater Remedy Project Schedule**

- Permitting 2013
- Complete Design early 2013
- Construction site preparation begins in Spring 2013
  - Swale Relocation
  - Pre-remediation of soil
  - Groundwater system construction
- Tracer Injection Testing Early 2014
- First Substrate Injection Mid 2014



**These Activities** 

# Surface Water Sampling - 2012



Map Document: (K\GProject\middle\_river\Maps\2012 Surface Water Samples\_TCE revised 091412 m 10/15/2012 - 12:16:24 PM

#### **Surface Water Sampling**

- 2012 Results: trace TCE concentrations detected in 10 of 11 samples in Dark Head Cove
  - Maximum TCE of 0.82 µg/L (estimated)
  - Results well below screening levels for ecological, human consumption of fish and swimming

#### • Future sampling:

- Collect another round of surface water samples in June 2013 during swimming season at same locations
- Once *in situ* groundwater remedy injection begins, monitor more frequently in Dark Head Cove near Outfalls 6 and 8 and where western plume intercepts Cow Pen Creek

## **Proposed Soil Remedial Approach**

- Industrial cleanup goal
  - Consistent with past and anticipated future land use
- Excavate impacted soils within top 2'
  - Remove impacted soils to reduce site-wide risk
    - Excavate, transport, and dispose impacted soil off-site
    - Backfill with imported clean fill
    - Restore surface to grade with in-kind material

# Soil Remedy – Estimated Removal Comparison

Cleanup Goal, Risk-Based (mg/kg)	Residential	Recreational	Commercial	Industrial
PAHs (BaPEq)	0.14	0.20	0.37	2.9
PCB (mg/kg)	1			10

PAH = polycyclic aromatic hydrocarbon

- BaPEq = benzo(a)pyrene equivalent
- PCB = polychlorinated biphenyl

Estimated Soil Transport	Residential	Industrial
Excavated soil (tons)	110,000	48,700
Number truck trips* **	24,000	11,000

\*Assumes 18 tons per truckload

\*\*Assumes round trips for removal and backfill

# **Soil Remedy Schedule**

Task	Blocks D, F, G, H	Block E
Revise Response Action Plans	2013	2013
Design	2014	2014 - 2015
Remediation	2014 - 2015	2015 - 2016
Reporting and Approval	2016	2017

#### Thank you for your participation!

#### Please contact us with any questions

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