

Hamilton Run Watershed Characterization and Action Plan



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Ecosystem Planning and Restoration



Project Background

- Collaboration between FSA & EPR



- Watershed Characterization and Action Plan
 - Document existing stream conditions
 - Recommend stream restoration and BMP projects
 - Develop conceptual plans
 - Recommend future land use and land management practices
 - Assist the City of Hagerstown to meet MS4 permit requirements
- The Greens at Hamilton Run Stream Restoration Project



Characterization Methodology

- Three assessments conducted
 - Existing Stream Conditions - Rapid function-based stream assessment (USFWS - Starr 2015)
 - Bank Erosion - Bank Assessment for Non-point source Consequences of Sediment (BANCS) (Rosgen 2006)
 - Project Recommendations – Stream Restoration and BMP Feasibility Assessment (USFWS - Starr 2009)



Rapid Function-Based Stream Assessment

- Seven Evaluation Parameters:
 - Runoff
 - Floodplain Connectivity
 - Riparian Vegetation
 - Lateral Stability
 - Bedform Diversity
 - Water Quality and Nutrients
 - Biology
- Scoring - 1 (least functioning) through and 10 (highly functioning)
- Evaluated - Existing, restoration potential, and proposed conditions

EXISTING and PROPOSED REACH LEVEL STREAM FUNCTION-BASED RAPID ASSESSMENT FIELD DATA SHEET				
Proposed Stream	Name		Date	
Reach Length	Latitude		Longitude	
Reach ID				
Function-based Rapid Reach Level Stream Assessment				
Assessment Parameter	Measurement Method	Category		
		Functioning	Functioning at Risk	Not Functioning
Stream Function Pyramid Level 1 Hydrology				
1 Concentrated Flow		No potential for concentrated flow/regime from adjacent and pool	Some potential for concentrated flow/regime to reach restoration site however, measures are in place to protect resources	Potential for concentrated flow/regime to reach restoration site and no treatments are in place
	Existing Condition	10	8	7
	Restoration Potential	10	9	7
	Proposed Condition	10	8	7
2 Fastness		Non-facily flow regime as a result of channel pattern, geology, and soils, impervious cover less than 6%	Non-facily flow regime as a result of channel pattern, geology, and soils, impervious cover 7 - 10%	Facily flow regime as a result of channel pattern, geology, and soils, impervious cover greater than 10%
	Existing Condition	10	9	8
	Restoration Potential	10	9	8
	Proposed Condition	10	9	8



BANCS Erosion Assessment

- Predict the rate and amount of streambank erosion
- Two Measurement Parameters
 - Bank Erodibility Hazard Index (BEHI)
 - Near Bank Stress (NBS) indices



Restoration Feasibility Assessment

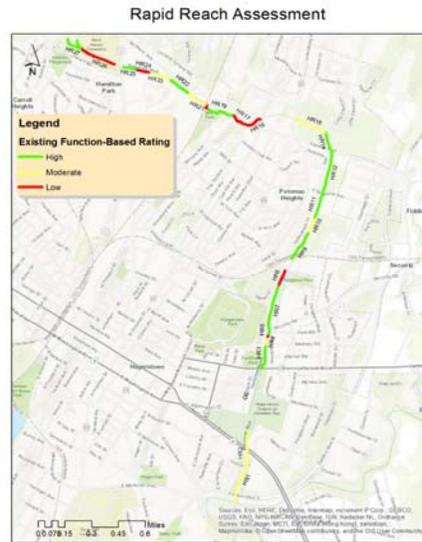
- Nine Assessment Parameters
 1. Potential Restoration Solution
 2. Potential Restoration Solution Uplift
 3. TMDL Restoration Potential for Nutrient and Phosphorus Reduction
 4. Stream Length
 5. Construction Access
 6. Construction Constraints
 7. Potential for Project Success / rRsk
 8. BMP Restoration Potential
 9. Land Ownership

STREAM RESTORATION FEASIBILITY ASSESSMENT FIELD DATA SHEET				
Watershed	Watershed Name		Rating	RIS
Reach ID	Reach ID		Date	
STREAM RESTORATION POTENTIAL SOLUTION, COST, and FEASIBILITY				
Parameter	Category			
	Optimal	Suboptimal	Marginal	Poor
1. Potential Restoration Solution Approach	Downgrading and/or minor bank grading. Less than 50% reach requires localized restoration.	Downgrading and/or minor bank grading and some localized placement of stream structures. Greater than 50% of reach requires localized restoration.	Channel adjustments, bankbank structures, and revegetation throughout entire project area.	Channel adjustments, bankbank structures, and revegetation throughout entire project area.
SCORE	10 9 8	7 6 5	4 3	2 1
2. Potential Restoration Solution Uplift	Existing Condition - All parameters on Potential Levels 2 and 3 are not functioning or functioning at less than 50%.	Existing Condition - All of both Functioning and Potential Levels 2 through 6. Potential Condition - Functioning scores for Levels 1-5.	Existing Condition - All of both Functioning and Potential Levels 2 through 6. Potential Condition - Functioning scores for Levels 2 through 6. Potential Condition - Functioning scores for Levels 1-5.	Existing Condition - All of both Functioning and Potential Levels 2 through 6. Potential Condition - Functioning scores for Levels 2 through 6. Potential Condition - Functioning scores for Levels 1-5.
3. TMDL Restoration Potential for Nutrient and Phosphorus Reduction	Existing Condition - All parameters on Potential Levels 2 and 3 are not functioning or functioning at less than 50%.	Existing Condition - All parameters on Potential Levels 2 and 3 are not functioning or functioning at less than 50%.	Existing Condition - All parameters on Potential Levels 2 and 3 are not functioning or functioning at less than 50%.	Existing Condition - All parameters on Potential Levels 2 and 3 are not functioning or functioning at less than 50%.
4. Stream Length	Existing Condition - All parameters on Potential Levels 2 and 3 are not functioning or functioning at less than 50%.	Existing Condition - All parameters on Potential Levels 2 and 3 are not functioning or functioning at less than 50%.	Existing Condition - All parameters on Potential Levels 2 and 3 are not functioning or functioning at less than 50%.	Existing Condition - All parameters on Potential Levels 2 and 3 are not functioning or functioning at less than 50%.
5. Construction Access	Existing Condition - All parameters on Potential Levels 2 and 3 are not functioning or functioning at less than 50%.	Existing Condition - All parameters on Potential Levels 2 and 3 are not functioning or functioning at less than 50%.	Existing Condition - All parameters on Potential Levels 2 and 3 are not functioning or functioning at less than 50%.	Existing Condition - All parameters on Potential Levels 2 and 3 are not functioning or functioning at less than 50%.
6. Construction Constraints	Existing Condition - All parameters on Potential Levels 2 and 3 are not functioning or functioning at less than 50%.	Existing Condition - All parameters on Potential Levels 2 and 3 are not functioning or functioning at less than 50%.	Existing Condition - All parameters on Potential Levels 2 and 3 are not functioning or functioning at less than 50%.	Existing Condition - All parameters on Potential Levels 2 and 3 are not functioning or functioning at less than 50%.
7. Potential for Project Success / rRsk	Existing Condition - All parameters on Potential Levels 2 and 3 are not functioning or functioning at less than 50%.	Existing Condition - All parameters on Potential Levels 2 and 3 are not functioning or functioning at less than 50%.	Existing Condition - All parameters on Potential Levels 2 and 3 are not functioning or functioning at less than 50%.	Existing Condition - All parameters on Potential Levels 2 and 3 are not functioning or functioning at less than 50%.
8. BMP Restoration Potential	Existing Condition - All parameters on Potential Levels 2 and 3 are not functioning or functioning at less than 50%.	Existing Condition - All parameters on Potential Levels 2 and 3 are not functioning or functioning at less than 50%.	Existing Condition - All parameters on Potential Levels 2 and 3 are not functioning or functioning at less than 50%.	Existing Condition - All parameters on Potential Levels 2 and 3 are not functioning or functioning at less than 50%.
9. Land Ownership	Existing Condition - All parameters on Potential Levels 2 and 3 are not functioning or functioning at less than 50%.	Existing Condition - All parameters on Potential Levels 2 and 3 are not functioning or functioning at less than 50%.	Existing Condition - All parameters on Potential Levels 2 and 3 are not functioning or functioning at less than 50%.	Existing Condition - All parameters on Potential Levels 2 and 3 are not functioning or functioning at less than 50%.



Results – Rapid Function-based Assessment

- Ratings relative based
- 49% High, 32% Moderate & 19% Low
- Primary impacts include:
 - Bank erosion
 - Poor bedform diversity
 - Lack of riparian vegetation
 - Poor floodplain connectivity
 - Untreated storm water runoff
 - Floodplain encroachment



Results – Rapid Function-based Assessment

High



Moderate

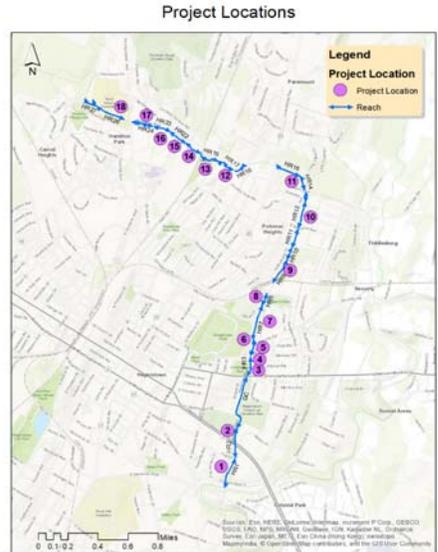


Low



Results – Feasibility Assessment

- Restoration Recommendations and Prioritization
- Natural Channel Design (NCD) stream restoration approach
- Storm water treatment and wetland BMPs
- 18 Proposed Project Areas



Results – Feasibility Assessment

Design Goals	Assessment Reaches
1. Reconnect floodplain	1 – 7, 9 – 27
2. Improve lateral stability	1 – 27
3. Enhance stream riparian buffer	1 - 27
4. Reduce Nutrient Levels	1 – 7, 9 – 22, 24 – 27

Level and Category	Parameters	Design Objectives
Level 2 Hydraulics	1. Floodplain Connectivity	1. Create floodplain connection by decreasing bank-height ratio to 1.0 to 1.2 and increasing entrenchment ratio to greater than 2.2.
Level 3 – Geomorphology	2. Lateral Stability	2. Reduce stream bank erosion rates to match reference erosion rates (bank migration / lateral stability)
	3. Riparian Buffer	3. Create a minimum 25 ft wide native riparian buffer
Level 4 Physicochemical	4. Nutrient Levels	4. Reduce nutrient levels compared to existing conditions



Results – Feasibility Assessment (1 – 10)

Proposed Project Area	Assessment Reach	Project Reach Length (ft)	Proposed Stream Restoration Recommendation	Proposed BMP Recommendation
1	1	1125	NCD Priority 1 if raising streambed does not impact bridge, Priority 2 if it does impact the bridge	None
2	2	1100	NCD Priority 3	Install BMP to treat stormwater drainage from commercial parking lot
3	3	700	Localized bank stabilization	Replace concrete swale with grass swale BMP to better manage concentrated flow from alleyways
4	4	270	NCD Priority 3	None
5	5	70	NCD Priority 3 if landowners are willing to give up land	None
6	6	250	NCD Priority 3	None
7	7	1300	NCD Priority 1, Valley Restoration	Create large wetland BMP in floodplain that is frequently inundated from flood flows
8	8	470	Localized bank stabilization and some riparian plantings	None
9	9	2060	NCD Priority 1, Valley Restoration	Create large wetland BMP in floodplain that is frequently inundated from flood flows
	10			
	11			
10	12	1330	NCD Priority 3	None
	13			

Results – Feasibility Assessment (11 – 18)

Proposed Project Area	Assessment Reach	Project Reach Length (ft)	Proposed Stream Restoration Recommendation	Proposed BMP Recommendation
11	14	1480	NCD Priority 3 for Assessment Reach 15	Create large wetland BMP in floodplain that is frequently inundated from flood flows
	15			
12	16	960	NCD Priority 3	None
	17			
13	18	800	NCD Priority 1, Valley Restoration	Create small wetland BMP in floodplain that is frequently inundated from flood flows
	19			
14	20	760	NCD Priority 3	BMP to treat stormwater runoff from the County maintenance yard parking lot and reduce concentrated flow
	21			
15	22	660	NCD Priority 1, Valley Restoration	Create small wetland BMP in floodplain that is frequently inundated from flood flows
16	23	630	NCD Priority 2	None
17	24	760	NCD Priority 1, Valley Restoration	Create small wetland BMP in floodplain that is frequently inundated from flood flows
	25			
18	26	1440	NCD Priority 3 for Assessment Reach 26 and NCD Priority 2 for Assessment Reach 27	Potential to turn current ponds into wetland BMPs
	27			



Project Ranking Methodology

- Projects were scored from a variety of criteria and weighted to create a project prioritization score

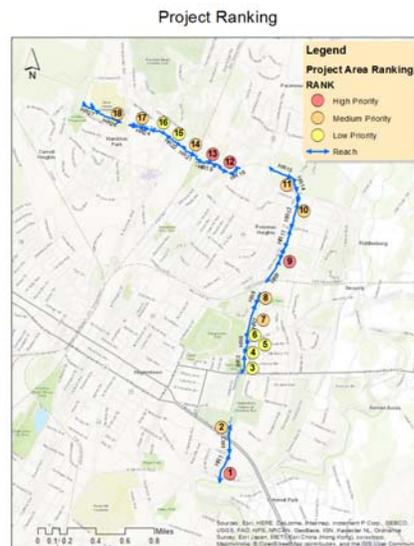
Prioritization Criteria	Weighted contribution to prioritization score
Property Ownership	25%
Potential sediment reduction through bank restoration	25%
Proposed restoration costs per linear foot	25%
Potential Restoration Solution Approach	3%
Potential Restoration Solution Uplift	3%
TMDL Restoration Potential for Sediment, Nutrient and Phosphorous Reduction	3%
Construction Access	3%
Constraints	3%
Potential Success/Risk	3%
BMP Restoration Potential	3%
Stream Length	3%

- Best professional judgement was then used to evaluate rankings to create a final priority list



Project Ranking Results

Proposed Project Area	Assessment Reach	Priority Ranking	Stream Restoration Potential for TMDL Credits
1	1	High	High
2	2	Medium	Medium
3	3	Low	Medium
4	4	Low	Low
5	5	Low	Low
6	6	Low	Low
7	7	Medium	Low
8	8	Medium	Medium
9	9	High	High
	10		
	11		
10	12	Medium	High
	13		
	14		
11	15	Medium	Medium
	16		
12	17	High	High
	18		
13	19	High	Medium
	20		
14	21	Medium	High
	22		
15	23	Low	Low
	24		
16	25	Medium	Medium
	26		
17	27	Medium	High
	28		



Priority Project Concept Plans

1. **Project 7** (downstream from the Pangborn Park lake)
2. **Project 9** (north/upstream from the RR embankment near Pangborn)
3. **Project 10** (just downstream from Eastern Blvd.)



Priority Project Concept Plans – Project Area 7

- Stream fairly healthy
- Large open space on the left bank
- Create a wetland BMPs with stream channel to maintain moving water
- Filter Pangborn Pond water discharge
- Water quality and biological benefits
- Trail
- Need landowner permission





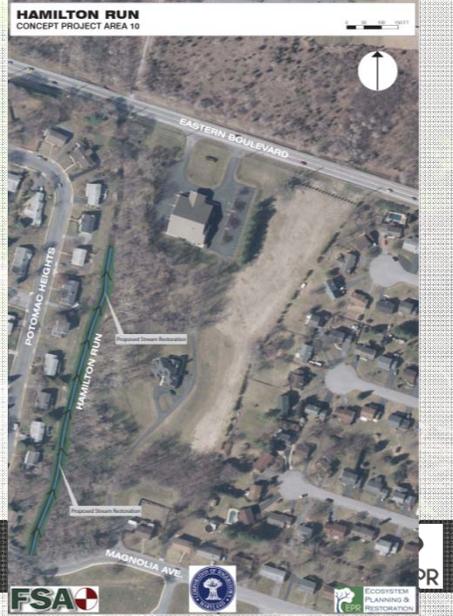
Priority Project Concept Plans – Project Area 9

- Large open space on the left bank (owned by school district)
- Create a wetland BMPs with stream channel to maintain moving water
- Highly eroding streambanks
- Need several landowners permission for stream restoration



Priority Project Concept Plans – Project Area 10

- Highly eroding stream banks
- Priority 3 Stream Restoration
- Mostly water quality benefits with some biological benefits
- Need several landowners permission for stream restoration



Priority Project Concept Plans – Project Area 10



Land Management Recommendations

- Public land management
 - Develop a Riparian Area Management Plan
 - Requiring maintenance of existing forested riparian buffers along perennial and intermittent tributaries
 - Utilizing a natural turf management strategy
 - Develop further plans for existing stormwater BMP retrofits and new facilities (URS Stormwater Retrofit Study 2013)
 - Using permeable pavement



Land Management Recommendations

- Private land management:
 - Regulating the maintenance of stream buffer widths along Hamilton Run (RAMP)
 - Increase public education of stream-friendly lawn care and installation of rain gardens or similar bioretention facilities
 - Incentive programs that reward lower impact development and provide rebates to property owners who install facilities that treat stormwater on-site



Future Land Use Recommendations

- City of Hagerstown primarily built out
- High Density Development
- Redevelopment BMPs
- RAMP
- Two undeveloped areas
 - Project Area 11
 - Watershed headwater
- Pangborn Industrial Site



Future Land Use Recommendations – Project Area 11

Project Area 11

- Currently mixed zoning (high density residential development, professional office-mixed)
- Existing set aside for forest conservation easement
- Remaining land is in the Hamilton Run floodplain.
- Recommend large wetland BMP, with landowner support



Future Land Use Recommendations

Watershed Headwaters

- Currently zoned high density
- Work with landowner
 - Preserve forest *or*
 - Limit impervious cover

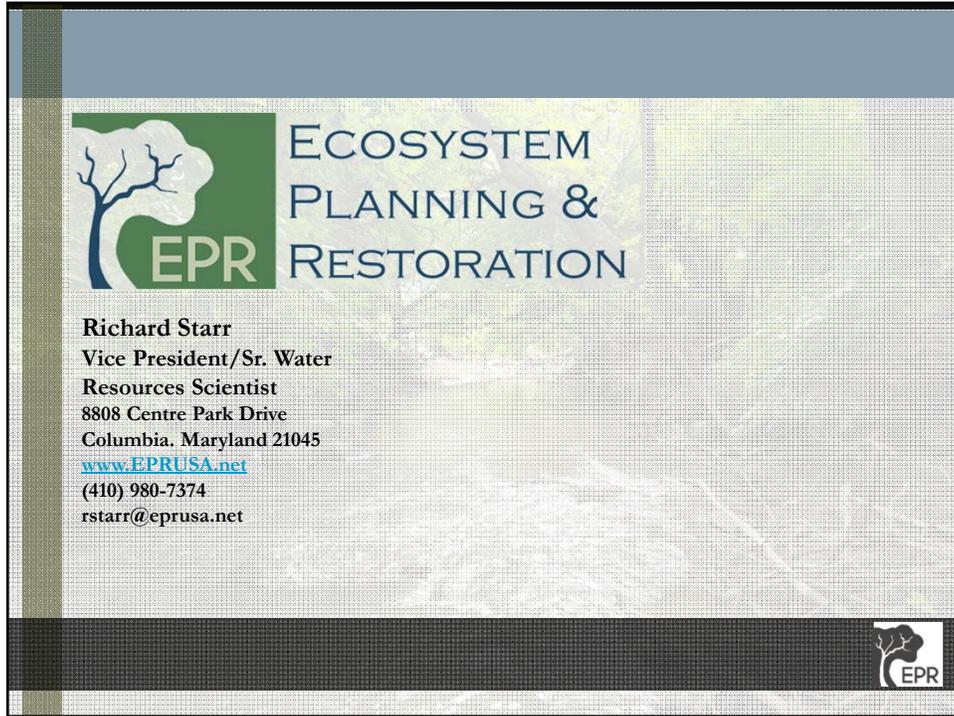
An aerial photograph showing a watershed headwater area. A red circle highlights a large, dense forested area. To the north and east of the forest are several large, light-colored industrial or commercial buildings. The surrounding area includes residential neighborhoods with houses and streets, and a road that runs along the edge of the forest.

Future Land Use Recommendations

Pangborn Industrial Site

- Work with landowner
 - Remove concrete areas
 - Reforest floodplain
 - Daylight Hamilton Run

An aerial photograph of the Pangborn Industrial Site. A red circle highlights a specific area within the site, which appears to be a mix of industrial buildings and open land. The site is surrounded by residential areas with houses and streets. A road runs along the top edge of the site, and a stream or floodplain is visible to the left.



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