Radnor Township
Stormwater Management Advisory Committee (SWMAC)
Agenda
7:00pm, Thursday, August 18, 2016

1. Call to Order.

2. Pledge of Allegiance.

3. Review / approve meeting minutes of July 14, 2016 SWMAC Meeting.
   (5 minutes)

4. Public comment.
   (25 minutes)

5. Township Wide Assessment update (CH2M).
   (20 minutes)

6. Discussion of draft budget for 2017-2021, including discussion of MS4 permit scope/fee proposal.
   (40 minutes)

7. Old/New Business – Update on current Repair Projects, Malin Road Culvert, Highview Drive proposal status, Storm Sewer Inspection/TV status, SWM Ordinance Revisions, Mill Dam legal research, N. Wayne Basin status, North Wayne Train Station/SEPTA.
   (30 minutes)

8. Set the date and time for the next meeting and adjourn.

RADNOR SWMAC MEETING SUMMARY

ATTENDEES:	SWMAC: Paige Maz, Charles Boschen, Joe Schanne, Tim Sass, Heather Gill CH2M: Daniel Wible
PREPARED BY:	CH2M
MEETING DATE:	July 14, 2016
SUBJECT:	July 2016 meeting

YouTube link:
https://www.youtube.com/watch?v=dHIAVtZRXrc&index=15&list=PLWSgQZEOk8cWuk_of0zq2i9J-kzoKsYZx

Review of Previous Meeting Minutes

- JUNE 9, 2016 SWMAC meeting minutes – approved

Public Comment

- Laura with the Delaware Valley Regional Planning Commission (DVRPC) introduced herself and discussed a project DVRPC is doing with the William Penn Foundation
  - DVRPC is looking at what various municipalities are doing to achieve their water quality goals, including additional program needs and potential incentives
  - Radnor Township is one of the case studies that DVRPC is considering and therefore Laura was in attendance to get a feel for what is happening in Radnor with respect to stormwater

Township Wide Assessment (TWA) Update

- Daniel provided an update on the progress of the TWA
  - CH2M is still working on Task 2 (Data Gap Analysis and Collection) of the TWA
    - In June, Daniel had reported that the focus of this task had turned to field survey rather than exhaustive research of record drawings
    - The field survey efforts in N. Wayne took longer and cost more than originally anticipated; N. Wayne is a challenging area to survey, as its infrastructure is old and not very well documented
    - Based on the lessons learned from N. Wayne, CH2M will scale back the amount of field survey to be used in the other study areas; CH2M will to spend more time and effort on researching the available record drawings and then fill in the remaining gaps with much more limited and focused field surveying
    - Daniel noted that according to the GIS, there are a total of 841 subdivisions (from the early 1950's through to 2009); of those, 420 intersect our study areas; of those, 188 are located near a stormwater feature (e.g. pipe, inlet, outfall); of those, we are trying to determine the most important ones for our analysis
- Daniel noted that CH2M still plans to complete the TWA in either October or November of this year, though the N. Wayne study area will be completed sooner
- Discussion of flooding questionnaire for property owners
  - Joe noted that at a previous meeting, the SWMAC discussed creating a questionnaire that the public could use to document flooding problems; Paul Burgmayer (not present at this SWMAC meeting) developed a draft questionnaire
  - Joe stated that his only comment to Paul was that the flood depth options should be reduced

- Two different versions of the questionnaire were briefly discussed (a preliminary version and an updated version); only two changes should be made: 1) "I don't know" should be added as an option for the question about the cause of the flooding and 2) the "Location of Flooding" question from a previous version of the questionnaire should be added back in
- General SWMAC consensus that the questionnaire should be made available to all Radnor residents on the Township website and that those living within the TWA study areas could be "targeted" or "encouraged" to complete it
- Heather noted that the questionnaire could be discussed in the next Township newsletter; the deadline for the September newsletter is 8/5
- Maya van Rossum (Delaware Riverkeeper and Township resident) suggested that, in addition to street flooding, the questionnaire should also include inputs for house/property flooding
- Daniel noted that from a modeling perspective, the more information about existing flooding conditions in the Township, the better; Daniel noted and Joe agreed that asking for information about private residence/property flooding may lead to unrealistic expectations about flood mitigation
- Completed questionnaires would be sent to CH2M, which would compile the results and highlight new information to the SWMAC

- Discussion of draft prioritization criteria for potential flood mitigation projects
  - Daniel briefly discussed the various criteria and noted that CH2M tried to include criteria that was measurable and to keep the number of criteria at a manageable size
  - The list of criteria included: flood volume reduction, runoff volume reduction, ownership, water quality, cost sharing and partnership opportunities, operations and maintenance needs, public amenity/community asset/public safety, constructability, and cost/benefit
  - Daniel noted that a potential scoring scheme of 0-10 was considered; some of the scoring will have to be further defined / refined
  - The various criteria will also have to be weighted, as not all criteria may be considered equally important
  - Daniel discussed a prioritization example in which a theoretical vegetated infiltration basin at an unspecified Township-owned park was compared to a theoretical pipe upsizing project in an unspecified State route; in this example, the vegetated infiltration basin scored much higher than the pipe upsizing project
  - Joe stated that cost / benefit should not be included in the prioritization criteria list; Daniel agreed and stated that cost / benefit is a separate consideration that should be looked at after projects have been prioritized
  - Discussion of having a public workshop to further discuss project prioritization
    - Paige noted that it could take a while to settle on the weightings of the various criteria
    - The SWMAC will further review the prioritization criteria and think about potential weightings prior to the August SWMAC meeting
  - Daniel noted that preliminary results of the N. Wayne flooding analysis would be presented at the August SWMAC meeting and that a presentation to the Board of Commissioners (BOC) could happen in either late August or early September
    - The plan is to model how the existing basin currently functions, as well as how it was originally intended to function
    - Maya suggested that the model of the proposed basin should happen at a later date, after written clarity from the BOC is sought with respect to the best course of action; according to Maya, the feedback from the BOC to date has been "piecemeal"
  - Maya offered some thoughts on the draft prioritization criteria:
    - Community amenity / assets should be separated from public safety

- Erosion should be considered
- Constructability should be further defined
- Type of flooding should be further considered (basement vs. first floor vs. street, etc.); need a better approach to capture the "quality" of flooding that occurs
- The number of residents that benefit from a project should be considered
- MS4 permit obligations, especially the pollutant reduction plans
- Negative impacts should be considered
- Cost / benefit should be separated out from the prioritization criteria and further defined
- Public input is important

Discussion of Repair Project Prioritization / Stormwater Budget

- Steve estimated the construction cost of the Highview Drive project to be $300,000; Daniel noted that this cost should be considered conservative (i.e. high)
  - Daniel also noted that at their June meeting, the BOC determined that CH2M was selected to be the Township's Stormwater Program Administrator, not to perform design services and therefore a design proposal from another consultant will be needed (Note: Steve later requested a proposal for this work from Gannett Fleming)
  - General SWMAC consensus that the construction cost estimate of $300k for the Highview Drive project seems excessively high
  - General discussion over the best course of action for soliciting a proposal from other engineering firms (Note: Steve later requested a proposal for this work from Gannett Fleming)
- Discussion of annual allocation for repair projects; the SWMAC's goal is to limit annual spending on repairs to 20%, though Steve's prioritization results in much higher percentages being spent over the next several years
- Daniel noted that in the July tracking sheet, there are placeholders for future unspecified flood mitigation projects
- Joe noted that, based on Steve's prioritization of repairs, the first culvert to be repaired (Eagle Road) will not occur until 2018
- SWMAC asked about the deadline for the stormwater budget update; consensus is that serious budget discussions should start in September and be completed by the end of the year
- General SWMAC consensus is that, like the budget developed at the end of 2015, percentages should be assigned to the different budget categories (e.g. repairs)

Old/New Business

- N. Wayne Train Station (SEPTA): Gannett Fleming continues to work with SEPTA and Amtrak to address their comments regarding the Right-Of-Entry Application
- Mill Dam: the Township Solicitor (John Rice) is reviewing the legal question about the responsible party for the repairs
- Banbury Way flood mitigation project: Daniel noted that T&M's selection as the design engineer for this project was formally approved by the BOC; a kickoff meeting will be held between T&M and the Township (including CH2M) on 7/15
  - Maya asked if the final approved proposal from T&M could be made public
- Radnor Middle School connector pipe: based on Gannett Fleming's report, the BOC decided to terminate this project; the assumed cost of $250k was removed from the budget
  - Gannett Fleming's investigation yielded multiple potential utility conflicts (including a fiber optic duct bank) that would likely be very expensive to overcome; in addition, there is still unknown utility information (size, depth, etc.) that would require additional costs to investigate further

  - Daniel stated that the outlet control structure for the Radnor Middle School stormwater system will still be modified (i.e. a weir will be installed per the original design); Daniel and Steve are exploring different options; it may make sense to wait until the TWA is completed before modifying the outlet structure
  - Tim asked if the potential utility conflicts could be avoided by implementing horizontal drilling; this option is likely cost-prohibitive
  - Daniel discussed a potential alternative pipe alignment that would use one of the existing pipes; this alternative would entail connecting a larger pipe to a smaller pipe, but could potentially reduce the level of conflict with other utilities
  - Another option could be to install one or more new inlets on the east side of S. Wayne Ave; these inlets would connect to one of the pipes feeding the Radnor Middle School stormwater system, reducing localized flooding in the process
  - The TWA modeling effort could further explore one or more of the above alternatives to the original connector pipe; general SWMAC consensus is that this project should be revisited at a future date
  - Tim and Joe would have liked to have seen actual costs associated with overcoming the utility challenges for this project
- MS4 update: CH2M is developing a proposal to address the new MS4 requirements for the Township; the goal is to have the proposal completed by the August SWMAC meeting
- Mill Road Culvert: bids came in cheaper than the estimate; the low bid was $79k and construction will begin soon; Joe would like to know the construction schedule as soon as it is updated, as it is imperative that construction be completed prior to the start of school
- Cleaning, Televising, and Mapping: bids came in and there was a large range (low bid was $109k, while the approved budget for this was $100k)
  - The mapping component of this effort was bid as a separate item
  - For the low bid, the mapping component entails an additional 20% of the cost
  - Daniel sees no value in adding mapping to the cleaning and televising effort for N. Wayne, as that was part of the field survey effort in the TWA
  - Heather asked if new storm sewer observations from the field could be captured by the company doing the cleaning and televising (Note: Steve said that this was possible under the scope of work)
  - SWMAC voted to approve the low bid cost of $109k and to not include the mapping component
- Stormwater Management Ordinance update: Gannett Fleming reported (via Daniel) that the EAC verbally expressed "overwhelmingly opposition" to the proposed ordinance update
  - Maya reminded the SWMAC that the Delaware Riverkeeper Network had submitted detailed comments on the ordinance update back in August of 2015
  - Maya stated that the ordinance update falls short in that it does not adequately address runoff volume or water quality (both important for the new MS4 requirements)
- Daniel also provided updates on various other stormwater projects in the Township (see attached July 2016 Stormwater Tracking Table for detailed information)

Next SWMAC meeting: 8/11/16 (Radnorshire room) – later changed to 8/18/16

Action Items

- **SWMAC** to further review the draft prioritization criteria and consider potential weightings prior to the August SWMAC meeting
- **CH2M** to update Steve on SWMAC's approval of cleaning and televising effort
- **CH2M** to send slides on the Radnor Middle School alternative pipe alignment to the SWMAC

Township Assessment Schedule Update

- Task 1 – ID Flood Locations (complete)
- Task 2 – Data Collection
  - May-July: File review at Township; Survey for North Wayne
  - July-Aug: Create a GIS-based stormwater network; annotate with critical information pulled from record plans, and cross-check with Township review
  - Sep: Supplement with survey as needed in spot/critical locations
- Task 3 – Enhanced Modeling Existing Conditions
  - July-Aug: North Wayne modeling baseline
  - Sep-Oct: Remaining 6 priority Problem Areas
- Task 4 – Develop and Model Conceptual Solutions
  - Aug-Sept: Prepare Projects and costs
  - Sep-Oct: Model conceptual Solutions
- Task 5 – Prioritization of Projects
  - Aug-Sept: Develop Criteria with input from Public

? October Workshop to share first round of potential projects and get public input on priorities?

  - Nov-Dec: Present Prioritized list of projects

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Task 5 Project Prioritization

- SWMAC and community to develop **priority criteria** which become the metrics by which we score each project.
  - Each Criteria has to have a performance measure – High/Medium/Low or Yes/No
- **Criteria is weighted** by relative importance
  - EX: Long-term O&M needs may be more important (higher weight) than cost sharing or partnership potential (lower weight)
- **Projects are ranked** – can be grouped by problem area or township-wide

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Criteria Name	Potential Scoring Schema (0-10)	Description	Weight
Flood Volume Reduction	Volume of flooding reduced; could have different ranges (0-10)	Numeric ranges by X,000 CF flooding volume reduced (based on results from detailed stormwater modeling)	TBD
Runoff Volume Reduction	Volume of stormwater runoff reduced via infiltration or rainwater harvesting projects; could have different ranges (0-10)	Numeric ranges by X,000 CF runoff volume reduced (based on calculation)	TBD
Ownership	Different scores based on ownership, whether Radnor Township (10), School District (8), PennDOT (7), Private Commercial (6), Private Residential (4), Other Township (e.g. Tredyffrin) (2)	Will require some additional consideration; could potentially downgrade an otherwise higher scoring flood reduction project if it is on private property	TBD
Water Quality	Low (0), medium (5), or high water (10) quality improvement potential	This would link to the new MS4 permit requirements, specifically the Pollutant Reduction Plan requirements	TBD
Cost Sharing and Partnership Opportunities	Low (0), medium (5), or high (10)	This could help private projects score higher if they allow projects on their land.	TBD
Operations and Maintenance Needs	Low (10), medium (5), or high (0)	Would be based on combination of engineering judgment and planning level O&M requirements / costs	TBD
Public Amenity / Community Asset / Public Safety	Low (0), medium (5), or high (10)	Includes recreational value, aesthetics, safety, enhancing community assets; For example, pipe upsizing would be scored lower than vegetated curb extensions	TBD
Constructability	Low (0), medium (5), or high (10)	Takes into account traffic concerns, space constraints, utilities, etc; For example, a project in a park would score likely higher than a project along Rt 30	TBD
Cost / Benefit	Low (10), medium (5), or high (0)	Would relate each project to the costs per benefit score; range can be calculated; *this is an overlay after the fact, not part of prioritization criteria*	TBD

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Additional Priorities voiced from public

- Community amenity / assets should be separated from public safety
- Erosion should be considered
- "Constructability" should be further defined
- Type of flooding should be further considered (basement vs. first floor vs. street, etc.); need a better approach to capture the "quality" of flooding that occurs
- The number of residents that benefit from a project should be considered
- MS4 permit obligations, especially the pollutant reduction plans
- Negative impacts should be considered
- Cost / benefit should be separated out from the prioritization criteria and further defined
- Public input is important

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Next Steps:

- September SWMAC Meeting – final list of criteria to be approved
- October Public Meeting – Criteria are weighted (usually 0-100)
  - Criteria weights are used to define tradeoffs between goals and to build a defensible foundation for ranking projects based on their anticipated benefits.
- October/November – CH2M to score each project based on the definitions provided and tabulate the results
- November SWMAC Meeting – CH2M to present the list of prioritized projects, ranked in order from highest to lowest

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- SLIDES FROM JUNE 2016 SWMAC MEETING FOLLOW

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Step 1. Develop the Project list and cost estimates

Project Number	Project Name (Please limit project name to the following width)	Category/Fund Type	Capital Cost	Cumulative Project Cost
1	YL01 N 12th St Green Street Option A	YL 01	$147,000	$147,000
2	YL01 N 12th St Green Street Option B	YL 01	$148,000	$295,000
3	YL01 N 12th St Green Street Option C	YL 01	$133,000	$428,000
4	YL04 Yorktown CuldeSac Typology Option A West	YL 04	$241,000	$669,000
5	YL04 Yorktown CuldeSac Typology Option B West	YL 04	$182,000	$851,000
6	YL04 Yorktown CuldeSac Typology Option C West	YL 04	$192,000	$1,043,000
7	YL09 Vacant Lot at Hutchinson St Option A	YL 09	$169,000	$1,212,000
8	YL09 Vacant Lot at Hutchinson St Option B	YL 09	$164,000	$1,376,000
9	YL09 Vacant Lot at Hutchinson St Option C	YL 09	$179,000	$1,555,000
10	YL14 Oxford St Green Street Option A	YL 14	$188,000	$1,743,000
11	YL14 Oxford St Green Street Option B	YL 14	$218,000	$1,961,000
12	YL14 Oxford St Green Street Option C	YL 14	$170,000	$2,131,000
13	YL16 Cruz Recreation Center Option A	YL 16	$160,000	$2,291,000
14	YL16 Cruz Recreation Center Option B	YL 16	$177,000	$2,468,000
15	YL16 Cruz Recreation Center Option C	YL 16	$137,000	$2,605,000
16	YL04 Yorktown CuldeSac Typology Option A East	YL 04	$209,000	$2,814,000
17	YL04 Yorktown CuldeSac Typology Option B East	YL 04	$199,000	$3,013,000
18	YL04 Yorktown CuldeSac Typology Option C East	YL 04	$169,000	$3,181,000

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Step 2. Develop the Evaluation Criteria & Performance Measure;
Step 3. Weight the Criteria 0-100

Criteria No.	Evaluation Criteria Name	Weight (0 - 100 Scale)	Criteria Performance Measure Description
1	Greened Acres (Impervious DA Captured	100	Score applied based on the area of capture calculated for each project option. Higher scores indicate higher drainage area capture and are preferred
2	Tree Canopy	33	Score based on number of trees and the equivalent canopy increase associated with each project option; high canopy potential is preferred
3	Cost per Greened Acre	67	Score based on the cost (as calculated using CH2M HILL methodology) per Greened Acre); lower costs are preferred
4	Cost sharing and Partnership opportunities	33	Rated based on potential for all or portion of the project to be paid for by entity other than PWD (i.e. Parks, Streets, Private); This criteria may be updated after stakeholder outreach has occurred. High potential for cost sharing is preferred
5	Operations & Maintenance needs per project	67	Low maintenance needs are preferred
6	Public amenity/ community asset	33	Scored based on meeting a number of the following criteria: 1) is highly visible, 2) provides potential for creation of public amenity or community assets through site improvements, 3) engages in complimentary programming, 4) increase in usage and 5) positive impact on public safety; Higher scores are preferred.

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Example Criteria and Performance Measures

Criteria	Rank/Score		Application of Criteria
Greened Acres opportunity / Potential drainage area	Low/Med/High (0/5/10)	0 = Low impervious area capture potential consisting of immediately adjacent streets/other impervious (1-2 streets).	Score applied based on the ability of project to manage adjacent streets and other impervious areas. Higher score when project able to capture street and adjacent private/public impervious outside of ROW. In some cases reasonable and minor infrastructure improvements were assumed to increase drainage areas (conveyance).
		5 = Moderate impervious area capture potential consisting of adjacent areas and additional areas draining towards project (3-4 streets).	
		10 = High impervious area capture potential consisting of onsite and offsite areas that may be captured with or without the use of conveyance structures (>4 streets).	
Potential for cost sharing and partnering opportunities and/or potential for GSI Adoption	Low/Med/High (0/5/10)	0 = No potential for cost sharing and/or GSI adoption.	Rated based on potential for all or portion of the project to be paid for by entity other than PWD (i.e. Parks, Streets, Private) and/or potential to shift maintenance/ownership of GSI to entity other than PWD (e.g. Parks & Rec, neighborhood organization).
		5 = Moderate potential for cost sharing and/or GSI adoption (at least one partner).	
		10 = High potential for cost sharing and/or GSI adoption (more than one partner).	
Presence of significant structural issues and constructability	Low/Med/High (10/5/0)	0 = Many major structures or constructability issues	Score based on amount of existing structures or infrastructure on project site (e.g. pavements, curbs, walls, infrastructure conflicts) with larger score assigned when less structure present on site or when minimal demolition and regrading required.
		5 = Moderate amount of major structures or constructability issues	
		10 = No major structures or constructability issues	
Potential for creation of public amenity/community assets through site improvements, complimentary programming, increase in usage and positive impact on public safety	Yes/No (10/0)	0 = No potential for creation of public amenity/community asset	Positive score indicates that project is high visibility, provides potential for creation of public amenity/community assets through site improvements, complimentary programming, increase in usage and positive impact on public safety
		10 = Potential for creation of public amenity/community asset.	

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Step 4. Score and rank by Total Benefit Score

Project Number	Project Description	Category/Fund Type	Capital Cost	Cumulative Capital Cost	Total Benefit Score
15	YL16 Cruz Recreation Center Option C	YL-16	$137 C00	[illegible]	89.00
3	YL01 N 12th St Green Street Option C	YL-01	$133 C00	[illegible]	73.00
8	YL09 Vacant Lot at Hutchinson St Option B	YL 09	$164 C00	[illegible]	69.50
14	YL16 Cruz Recreation Center Option B	YL 16	$177 C00	[illegible]	66.00
12	YL14 Oxford St Green Street Option C	YL-14	$170 C00	[illegible]	61.50
13	YL16 Cruz Recreation Center Option A	YL 16	$160 C00	[illegible]	61.50
9	YL09 Vacant Lot at Hutchinson St Option C	YL 09	$179 C00	[illegible]	59.00
2	YL01 N 12th St Green Street Option B	YL-01	$168 C00	[illegible]	58.50
10	YL14 Oxford St Green Street Option A	YL 14	$188 C00	[illegible]	50.50
1	YL01 N 12th St Green Street Option A	YL-01	$167 C00	[illegible]	49.00
7	YL09 Vacant Lot at Hutchinson St Option A	YL-09	$169 C00	[illegible]	49.00
11	YL14 Oxford St Green Street Option B	YL 14	$218 C00	[illegible]	47.50
18	YL04 Yorktown CuldeSac Typology Option C - East	YL 04	$169 C00	[illegible]	37.50

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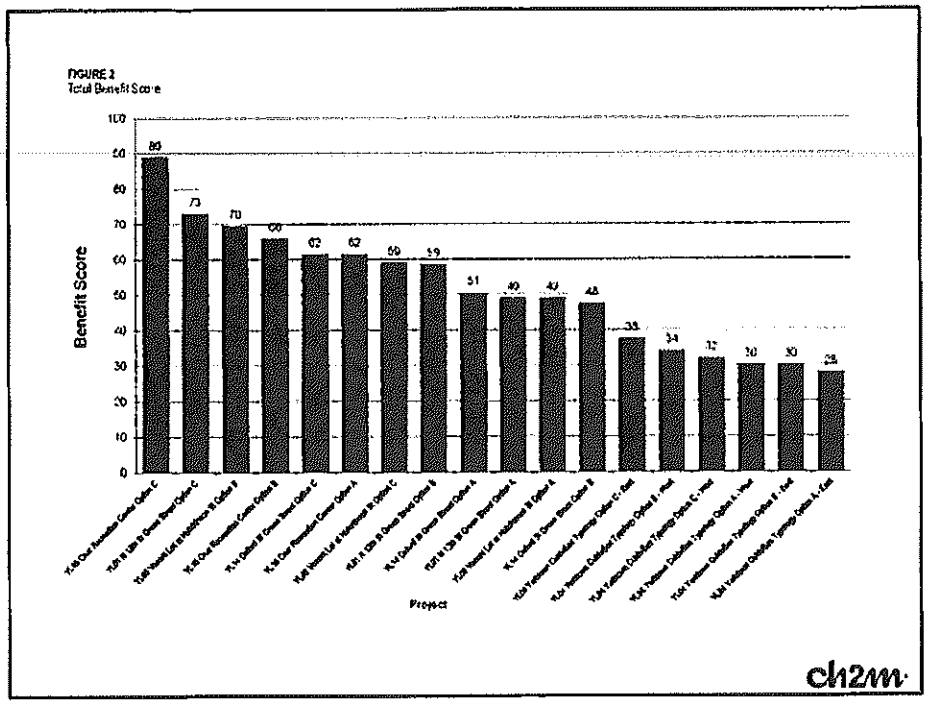
FIGURE 2
Total Benefit Score
Benefit Score
Project
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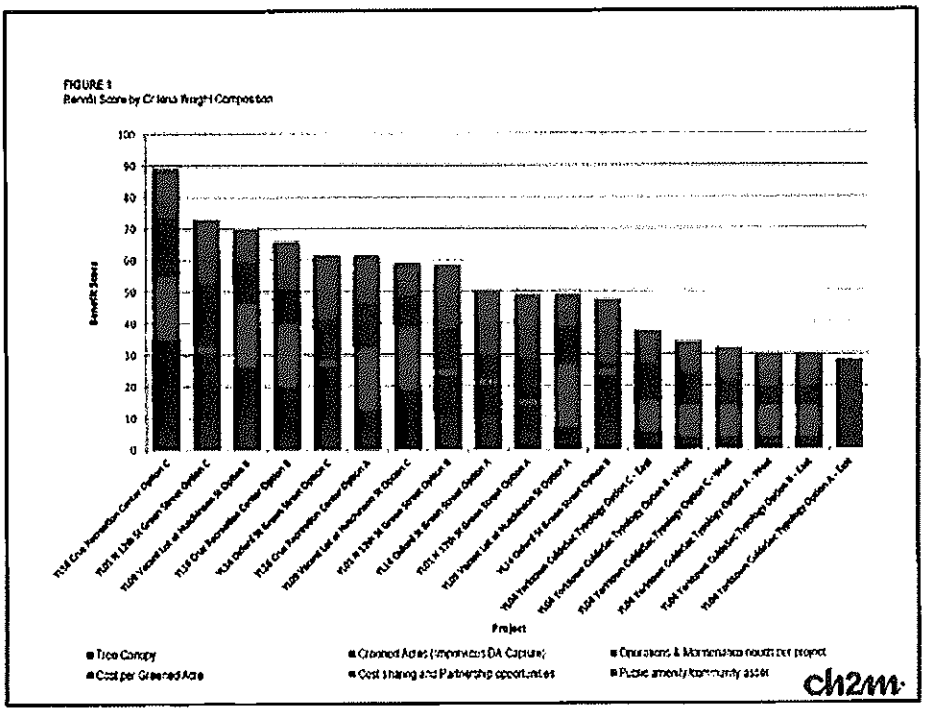
FIGURE 3
Benefit Score by Criteria Weight Composition
Benefit Score
Project
Tree Canopy
Cost per Greened Acre
Greened Acres (Improves DA Capture)
Cost sharing and Partnership opportunities
Operations & Maintenance needs per project
Public amenity/community asset
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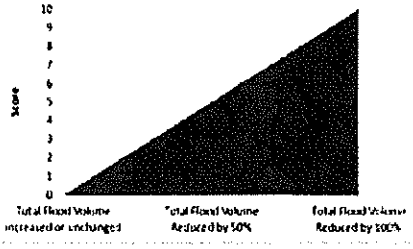
Solution Evaluation Criteria

- Eight evaluation criteria were selected with city staff input
- Weights and a scoring method were developed and documented for each criterion

Solution Evaluation Criteria	Weight
Urban Drainage/Flooding	95
Environmental Compliance	93
EcoCity Goals/Sustainability	50
Social Benefits	40
Integrated Asset Management	73
City-wide Maintenance Implications	90
Constructability	60
Public Acceptability	53

Urban Drainage/Flooding Scoring Method



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DRAFT Stormwater Project Prioritization Criteria for Radnor Township

Prepared by: CH2M

Date: 6/15/16

	Criteria Name	Potential Scoring Scheme (0-10)	Description	Weight
	Flood Volume Reduction	Volume of flooding reduced; could have different ranges (0-10)	Numeric ranges by X,000 CF flooding volume reduced (based on results from detailed stormwater modeling)	TBD
	Runoff Volume Reduction	Volume of stormwater runoff reduced via infiltration or rainwater harvesting projects; could have different ranges (0-10)	Numeric ranges by X,000 CF runoff volume reduced (based on calculation)	TBD
	Ownership	Different scores based on ownership, whether Radnor Township (10), School District (8), PennDOT (7), Private Commercial (6), Private Residential (4), Other Township (e.g. Tredyffrin) (2)	Will require some additional consideration; could potentially downgrade an otherwise higher scoring flood reduction project if it is on private property	TBD
	Water Quality	Low (0), medium (5), or high water (10) quality improvement potential	This would link to the new MS4 permit requirements, specifically the Pollutant Reduction Plan requirements	TBD
	Cost Sharing and Partnership Opportunities	Low (0), medium (5), or high (10)	This could help private projects score higher if they allow projects on their land.	TBD
	Operations and Maintenance Needs	Low (10), medium (5), or high (0)	Would be based on combination of engineering judgment and planning level O&M requirements / costs	TBD
	Public Amenity / Community Asset / Public Safety	Low (0), medium (5), or high (10)	Includes recreational value, aesthetics, safety, enhancing community assets; For example, pipe upsizing would be scored lower than vegetated curb extensions	TBD
	Constructability	Low (0), medium (5), or high (10)	Takes into account traffic concerns, space constraints, utilities, etc; For example, a project in a park would score likely higher than a project along Rt 30	TBD
	Cost / Benefit	Low (10), medium (5), or high (0)	Would relate each project to the costs per benefit score; range can be calculated; this is an overlay after the fact, not part of prioritization criteria	TBD

Projected Radnor Township Stormwater Budget 2017-2021 **Prepared by: PRB** **Date: 7/31/16**

YEAR (actual $ and %)	2016$	2016%	2017$	2017%	2018$	2018%	2019$	2019%	2020$	2020%	2021$	2021%
PLANNED REVENUES												
Stormwater Fee Revenue	$1,010,500		$1,110,500		$1,010,500		$1,010,500		$1,010,500		$1,010,500	
Previous Year Balance	2,267,442		1,842,038		123,835		35,695		(234,545)		(393,885)	
PLANNED EXPENDITURES												
Repair/Maintenance/MS4	$940,256	93.0%	$937,863	84%	$507,800	50%	$689,900	68%	$579,000	57%	$195,000	19%
Earles Lane Culvert							$83,900		$124,000			
Eagle Road Culvert			$98,300		$168,000							
South Devon Avenue Culvert					$84,300		$116,000					
Maplewood/Odorisio Park Outfall							$47,000		$300,000			
Malin Road Culvert	$102,000		$259,563									
Highview Road Outfall	$46,000		$300,000									
Maplewood Ave/Mill Dam Embankment												
Chamounix Road Culvert					$100,500		$233,000					
Sawmill Road Culvert							$55,000					
Evaluation of Five Culverts in the Township	$18,258										$40,000	
Barley Cone Lane Storm Sewer	$12,029											
Belrose Lane												
Gulph Creek at Cricket Stream Bank/Outfall Repair												
Strathmore Dr. storm sewer replacement												
Marlbridge Way Culvert - Permitting, design, Bid, GF	$19,108											
Marlbridge Way Culvert Replacement	$260,675											
Marlbridge Way Culvert: Pipep Purchase	$14,627											
Mill Road Culvert: design and construction	$93,522											
Cleaning, Televising, & Mapping	$109,000		$100,000		$50,000		$50,000		$50,000		$50,000	
Repair SW sewer lines/inlets			$100,000		$100,000		$100,000		$100,000		$100,000	
North Wayne Basin - Inspect/Repair Existing system	$185,000											
MS4 revisions - DW estimate $100-125k 2016-2017	$75,000		$75,000									
MS4 progress report	$5,037		$5,000		$5,000		$5,000		$5,000		$5,000	
Capital Improvements	$404,808	40.1%	$1,800,000	162%	$500,000	49%	$500,000	49%	$500,000	49%	$500,000	49%
Ithan Creek Watershed Assessment	$13,905											
Septa Train Station - Design services - GF	$ 30,000		$ 100,000									
Banbury Way - design & construction	$ 95,236		$ 1,200,000									
RMS Connector - DPB Documents	$7,560											
Future Flood Mitigation Projects TBD			$ 500,000		$ 500,000		$ 500,000		$ 500,000		$ 500,000	
Township-wide SW Eng. Assessment	$258,107											
Admin/ General SW Engineering	$88,840	8.8%	$85,840	7.7%	$85,840	8.5%	$85,840	8.5%	$85,840	8.5%	$85,840	8.5%
CH2M	$80,840		$80,840		$80,840		$80,840		$80,840		$80,840	
Stormwater ordinance update	$3,000											
Credit card fees	$5,000		$5,000		$5,000		$5,000		$5,000		$5,000	
Rebate/Credit/Grants	$2,000	0.2%	$5,000	0.5%	$5,000	0.5%	$5,000	0.5%	$5,000	0.5%	$5,000	0.5%
%/$ of current year fees	**$1,435,904**	**142.1%**	**$2,828,703**	**254.7%**	**$1,098,640**	**108.7%**	**$1,280,740**	**126.7%**	**$1,169,840**	**115.8%**	**$785,840**	**77.8%**
Year -End Balance	$1,842,038		$123,835		$35,695		($234,545)		($393,885)		($169,225)	

Projected Radnor Township Stormwater Budget 2017-2021			Prepared by: PRB		Date: 8/9/16					
YEAR (actual $ and %)	2016$	2016%	2017$	2017%	2018$	2018%	2019$	2019%	2020$	2020%
PLANNED REVENUE										
Stormwater Fee Revenue	$1,010,500		$1,110,500		$1,010,500		$1,010,500		$1,010,500	
Previous Year Balance	$2,267,442		$2,158,560		$353,220		$167,880		$2,540	
PLANNED EXPENDITURE										
Repair/Maintenance/MS4	$623,734	61.7%	$225,000	20%	$205,000	20%	$205,000	20%	$205,000	20%
Evaluation of Five Culverts in the Township	$18,258									
Barley Cone Lane Storm Sewe	$12,029									
Marlbridge Way Culvert - PDB, GF	$19,108									
Marlbridge Way Culvert Replacemer	$260,675									
Marlbridge Way Culvert: Pipep Purchase	$14,627									
Cleaning, Televising, & Mappi	$109,000		$100,000		$50,000		$50,000		$50,000	
North Wayne Basin - Inspect/Repair Existing systen	$185,000									
MS4 progress report	$5,037		$5,000		$5,000		$5,000		$5,000	
Remaining repair design and construction $	$0		$120,000		$150,000		$150,000		$150,000	
Capital Improvements	$404,808	40.1%	$2,600,000	234%	$900,000	89%	$880,000	87%	$710,000	70%
Ithan Creek Watershed Assessmen	$13,905									
Septa Train Station	$ 30,000		$ 100,000							
Banbury Way	$ 95,236		$1,200,000							
RMS Connector	$7,560									
Township-wide SW Eng. Assessment	$258,107									
Future Flood Mitigation Projects Design			$ 100,000		$ 100,000		$ 80,000		$ 60,000	
Future Flood Mitigation Projects Construction	$0		$1,200,000		$ 800,000		$ 800,000		$ 650,000	
Admin/ General SW Engineerin	$88,840	8.8%	$85,840	7.7%	$85,840	8.5%	$85,840	8.5%	$85,840	8.5%
CH2M	$80,840		$80,840		$80,840		$80,840		$80,840	
Stormwater ordinance update	$3,000									
Credit card fees	$5,000		$5,000		$5,000		$5,000		$5,000	
Rebate/Credit/Grants	$2,000	0.2%	$5,000	0.5%	$5,000	0.5%	$5,000	0.5%	$5,000	0.5%
%/$ of current year fees	$1,119,382	110.8%	$2,915,840	262.6%	$1,195,840	118.3%	$1,175,840	116.4%	$1,005,840	99.5%
Year -End Balance	$2,158,560		$353,220		$167,880		$2,540		$7,200	

List of repair projects (per Dan and Steve tracking sh	*Estimated cost*	*Comments*
Total current known repairs and maintenanc	*$ 2,627,850*	
Earles Lane Culver	$ 207,900	
Eagle Road Culver	$ 266,300	
South Devon Avenue Culver	$ 200,300	
Maplewood/Odorisio Park Outf	$ 347,000	
Malin Road Culve	$ 361,563	
Highview Road Outfal	$ 346,000	
~~Maplewood Ave/Mill Dam Embankmer~~	$ -	Pending legal review of ownership, SWMAC voted non
Chamounix Road Culver	$ 333,500	
Sawmill Road Culver	$ 55,000	
Evaluation of Five Culverts in the Townsl	$ 58,258	
Barley Cone Lane Storm Sewe	$ 12,029	
Belrose Lane	$ -	No cost estimate
Gulph Creek at Cricket Stream Bank/Outfall Repa	$ -	No cost estimate
Strathmore Dr. storm sewer replacemen	$ -	No cost estimate
Cleaning, Televising, & Mappir	$ 100,000	
Repair SW sewer lines/inle	$ -	No cost estimate
North Wayne Basin - Inspect/Repair Existing syste	$ 185,000	
MS4 revision	$ 150,000	Dan Wible estimate, 2016-2017 only
MS4 progress repor	$ 5,000	Yearly through 2020

Radnor Township - Stormwater Tracking Table
August 18, 2016

Project Description	Status	Type	Watershed	Estimated Expenditure FY 2016	YTD (Actual) Expenditure FY 2016	Estimated Expenditure FY 2017	Estimated Expenditure FY 2018	Estimated Expenditure FY 2019	Estimated Expenditure FY 2020	August 2016 Update
Arthur Road Inlet and Piping	Problem Identified	Repair/Maintenance	Meadowbrook Run							Per Steve Norcini, there is a low section in the cul-de-sac that does not drain properly (not flood mitigation, infrastructure); Steve will provide an estimate for piping and inlets
Radnor Street and Willow Inlets and Piping	Problem Identified	Repair/Maintenance	Gulph Creek							Per Steve Norcini, piping and inlets needed to address low volume, high frequency storms (not flood mitigation, infrastructure); Steve will provide an estimate for piping and inlets
Earles Lane Culvert	Report completed	Repair/Maintenance	Darby Creek					$ 83,900	$ 124,000	---
Eagle Road Culvert	Report completed	Repair/Maintenance	Gulph Creek			$ 98,300	$ 168,000			---
South Devon Avenue Culvert	Report completed	Repair/Maintenance	Darby Creek				$ 84,300	$ 116,000		---
Maplewood/Odorisio Park Outfall	Problem Identified	Repair/Maintenance	Darby Creek					$ 47,000	$ 300,000	---
Malin Road Culvert	Report completed	Repair/Maintenance	Darby Creek	$ 102,000		$ 259,563				Steve Norcini requests that SWMAC recommend moving forward with design in 2016
Highview Road Outfall	Problem Identified	Repair/Maintenance	Gulph Creek	$ 42,177		$ 300,000				BOC approved selection of Gannett Fleming ($42,177) on 8/15/16; Per Steve Norcini, as far as the cost for construction, (the estimate) is conservatively high... as previously noted, there are items that will increase the cost over a "normal" project: permanent easements, temporary easements, most likely a new drive way, along with the volume reduction planned for in the street
Maplewood Ave/Mill Dam Embankment	Report completed	Repair/Maintenance	Darby Creek							The Township Solicitor is still reviewing the question of legal responsibility for making repairs to the abandoned pipe through the dam
Annual Mill Dam O&M - Annual service to the sluice gate at the Mill Dam/Maplewood Road.	On-going	Repair/Maintenance	Darby Creek	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500	Added expenditure of $1500 to Chalmers Kubeck in July 2016: annual service to the sluice gate at the Mill Dam/Maplewood Road
Chamounix Road Culvert	Report completed	Repair/Maintenance	Ithan Creek				$ 100,500	$ 233,000		---
Sawmill Road Culvert	Report completed	Repair/Maintenance	Darby Creek					$ 55,000		---
Castlefinn Lane Culvert - Emergency Repair	Completed	Repair/Maintenance	Meadowbrook Run	$ 18,936						Per Steve Norcini, a portion of the culvert on Castlefinn Lane collapsed and needed to be repaired; the cost of the repair was $18,936
Septa Train Station - Authorizing Gannett Fleming to provide design services for stormwater management at the N. Wayne Train Station (north side)	Design	Capital Improvement	Gulph Creek	$ 30,000	$ 1,208	$ 100,000				---
Banbury Way Flood Mitigation Project: design	Design	Capital Improvement	Ithan Creek	$ 95,236		$ 1,200,000				Kickoff meeting between T&M, Township, and CH2M held on 7/15/16; site visit between all 3 parties held on 8/3/16; T&M's schedule is as follows: survey/geotech by 9/30/16, conceptual design update by 11/4/16, final design by 1/27/17; Per Steve Norcini, once design is 50% complete, the Township can mail the affected residents as a heads up to what is forthcoming, and any impacts it may have on their property, as well as access egress... communication will have to be more specific, and face to face, if we need temporary or permanent easements
Township-wide SW Eng. Assessment: Authorization for CH2M RFP & Approval for Professional Services for an Assessment of the Gulph Creek, Meadowbrook Run, and Darby Creek Watersheds	On-going	Eng & Admin	Various	$258,107	$34,379					CH2M progress: completed field survey of N. Wayne, continued file review of record plans at Township building, created GIS-based stormwater network (annotated with critical information pulled from record plans and cross-checked with Township review), developed detailed hydrologic/hydraulic model for N. Wayne; The Township Solicitor recommended that the resident flooding survey be put on hold for now; it is not yet clear for how long.
Stormwater Administrator: Authorization to Contract for Program Billing, GIS, and Professional Eng. Services	On-going	Eng & Admin	Various	$80,840	$53,162	$ 80,000	$ 80,840	$ 80,840	$ 80,840	---
MS4 Progress Report - Preparation of MS4 Progress Report for 3/2014 - 3/2016 due to PA DEP 5/13/16	On-going	Eng & Admin	Various	$ 5,037	$7,725.33					CH2M developed a proposal to plan for and implement new MS4 permit requirements, which are much more rigorous than in the past; cost proposal / schedule under review by Steve and will be shared with SWMAC soon
Homeowner (SFR) Stormwater Facility Rebate Program	On-going	Rebate/Credits/Grants	Various	$ 2,000		$ 5,000	$ 5,000	$ 5,000	$ 5,000	---
Mill Road Culvert: construction	Awarded	Repair/Maintenance	Meadowbrook Run	$79,059						Per Steve Norcini, construction to start soon; ten day duration for pipe installation (street closing), 10-15 feet off the street
Cleaning, Televising, and Mapping of Storm Sewer in Radnor Township	Bids Received	Repair/Maintenance	Various	$ 109,000		$ 100,000	$ 50,000	$ 50,000	$ 50,000	BOC approved selection of TLC Drain and Sewer Incorporated ($109k) on 8/15/16

Radnor Township - Stormwater Tracking Table
August 18, 2016

Project Description	Status	Type	Watershed	Estimated Expenditure FY 2016	YTD (Actual) Expenditure FY 2016	Estimated Expenditure FY 2017	Estimated Expenditure FY 2018	Estimated Expenditure FY 2019	Estimated Expenditure FY 2020	August 2016 Update
North Wayne Basin - Inspect/Repair Existing SW System based on Township-wide Study results. Pending BOC approval	Problem identified	Repair/Maintenance	Gulph Creek	$185,000						CH2M will share preliminary results of the N. Wayne modeling at the 8/18/16 SWMAC meeting
Stormwater Management Ordinance Update	On-going	Eng & Admin	n/a		$4,805					No update
Repair Stormwater Inlets and Pipes	As Needed	Repair/Maintenance	Various			$ 100,000	$ 50,000	$ 50,000	$ 50,000	Added item for consistency with SWMAC stormwater budget
Flood Mitigation Projects TBD	Planning	Capital Improvement	Various			$ 500,000	$ 500,000	$ 500,000	$ 400,000	
Total costs in a year				$ 1,345,156	$ 457,176	$ 2,789,363	$ 1,045,140	$ 1,227,240	$ 1,016,340	
Repair costs				$ 868,936	$ 328,410	$ 799,363	$ 404,300	$ 586,400	$ 475,500	
Repair % of total				65%	72%	29%	39%	48%	47%	
Yearly revenue from Stormwater Fee				$ 1,010,500	$ 1,092,439	$ 1,010,500	$ 1,010,500	$ 1,010,500	$ 1,010,500	
Other Revenue						$ 100,000				
Previous balance				$ 2,267,442	$ 2,267,442	$ 1,932,786	$ 253,923	$ 219,283	$ 2,543	
End of year balance				$ 1,932,786	$ 2,902,705	$ 253,923	$ 219,283	$ 2,543	$ (3,297)	

Summary of Major Updates to the PAG-13 NPDES MS4 Permit

- Enhanced Stormwater Mapping Requirements (due Sep 2017)
- Pollution Control Measures (due 2019, 2020, 2022)
- Pollutant Reduction Plan (due Sep 2017)

1

MS4 U

Updates

Enhanced Mapping and I

- Stormwater system map requirements have increased
- Newly required features:
  - Private BMPs (location, type, year installed, etc.) from 2003 - 2016
    - Existing tracking system via Township's Grading Permit inventory to be converted to GIS
  - Drainage areas to private BMPs
  - Drainage areas to the stormwater outfalls
    - Approximately 140 outfalls to impaired streams
- Updated Stormwater Map to be posted in lobby and on website

2

ch2m:

Pollution Control Measures

- PCMs are activities to identify and control pollutant loading to impaired waters
- PCMs are BMPs and other strategies
- Based on MS4 Requirements Table (next slide), PCMs need to be prepared to mitigate Priority Organic Compounds (PCBs, pesticides, or other organic compounds)
- Township has to develop a map of the subbasins (2019), an inventory of suspected and known sources (2020) and an investigation of each known source (by 2022).

3

ch2m.

	CAUSE(S) OF IMPAIRMENT			Pollution Control Measures (due by 2019)		Pollutant Reduction Plans (due by September 2017)	
Impaired Downstream Waters	Other Habitat Alterations, Water / Flow Variability	Water/Flow Variability	Cause Unknown	Appendix B Pathogens	Appendix C PCB	Appendix E Siltation	Appendix E Nutrients, Siltation
Abrahams Run		X	X		X		
Browns Run	X		X		X	X	
Camp Run		X	X		X		
Cobbs Creek	X		X	X	X	X	
Darby Creek	X		X		X	X	
Doom Run	X		X		X	X	
Finn Run	X		X		X	X	
Foxes Run	X		X		X	X	
Gulph Creek		X				X	
Hardings Run	X		X		X	X	
Ithan Creek	X		X		X	X	
Julip Run		X	X		X		
Kirks Run	X		X		X	X	
Little Darby Creek		X	X		X		
Meadowbrook Run	X		X		X	X	
Miles Run		X	X		X		
Mill Creek		X					X
Saw Mill Run		X	X		X		
Schuylkill River					X		
Valley Run	X		X		X	X	

Pollutant Reduction Plan

- To be submitted in September 2017 along with the Notice of Intent to renew the stormwater permit application
- Goal is to reduce pollution x% over 5 years
  - 10% for Sediment, 5% for TN and 3% for TP
  - Causes of Impairment: Other Habitat Alterations, Water / Flow Variability, Cause Unknown
- Specific projects are to be developed which will mitigate the water quality issues in the watershed
- Calculate the pollution loading reduction of each project
- MS4 Requirements Table guides the effort (next slide)

5

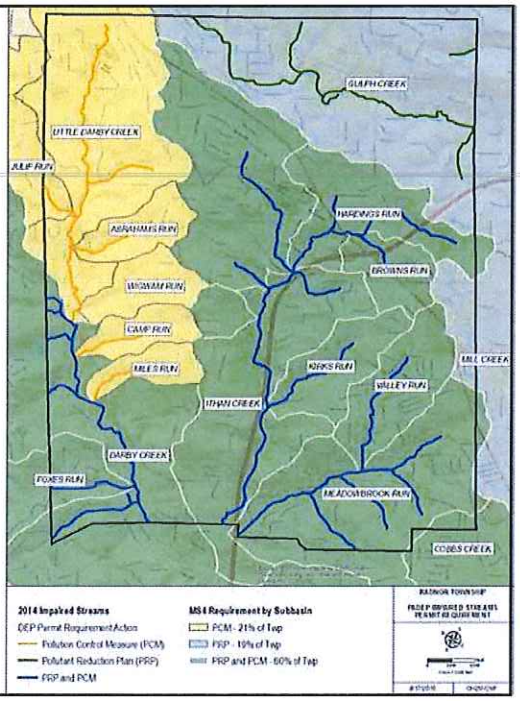
ch2m.

	CAUSE(S) OF IMPAIRMENT			Pollution Control Measures (due by 2019)		Pollutant Reduction Plans (due by September 2017)	
Impaired Downstream Waters	Other Habitat Alterations, Water / Flow Variability	Water/Flow Variability	Cause Unknown	Appendix B Pathogens	Appendix C PCB	Appendix E Siltation	Appendix E Nutrients, Siltation
Abrahams Run		X	X		X		
Browns Run	X		X		X	X	
Camp Run		X	X		X		
Cobbs Creek	X		X	X	X	X	
Darby Creek	X		X		X	X	
Doom Run	X		X		X	X	
Finn Run	X		X		X	X	
Foxes Run	X		X		X	X	
Gulph Creek		X				X	
Hardings Run	X		X		X	X	
Ithan Creek	X		X		X	X	
Julip Run		X	X		X		
Kirks Run	X		X		X	X	
Little Darby Creek		X	X		X		
Meadowbrook Run	X		X		X	X	
Miles Run		X	X		X		
Mill Creek		X					X
Saw Mill Run		X	X		X		
Schuylkill River					X		
Valley Run	X		X		X	X	

Map of requirements

79% of the Township is required to have a PRP (7,000 AC)

21% is required to have just the PCM (1,850 AC)



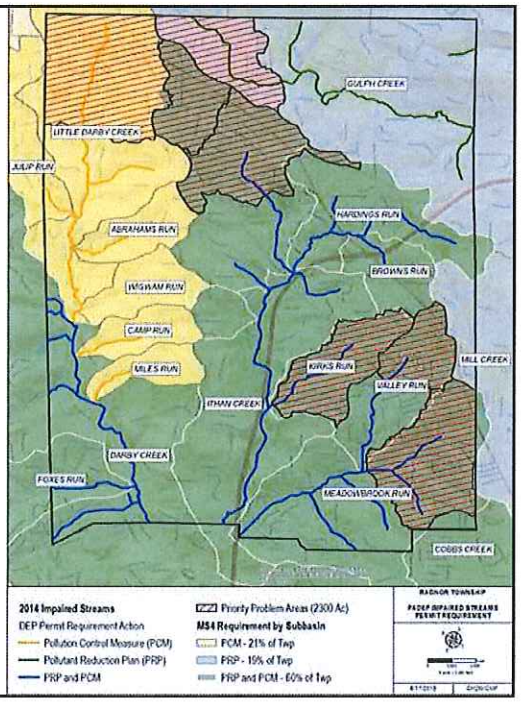
Map of requirements with Modeling PPAs

The Modeling is looking at 2,200 Acres (~25%) of the Township

All but 1 PPA is required to have a Pollutant Reduction Plan

An overlap of 1750 AC, or 20% of the Township

So, of the ~ 7,000 AC (80%) of the Township that is required to have a PRP, approximately 1,750 (20%) AC will be already covered by the Modeling study



PRP and NOI: due to PADEP September 16, 2017

SubTask	2017								
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Notice of Intent (NOI) to Renew									
Pollutant Reduction Plan						DRAFT			FINAL
Public Participation (2 Meetings)					Mtg #1		Mtg #2		

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ch2m

Radnor Township Wide Study

August 18, 2016

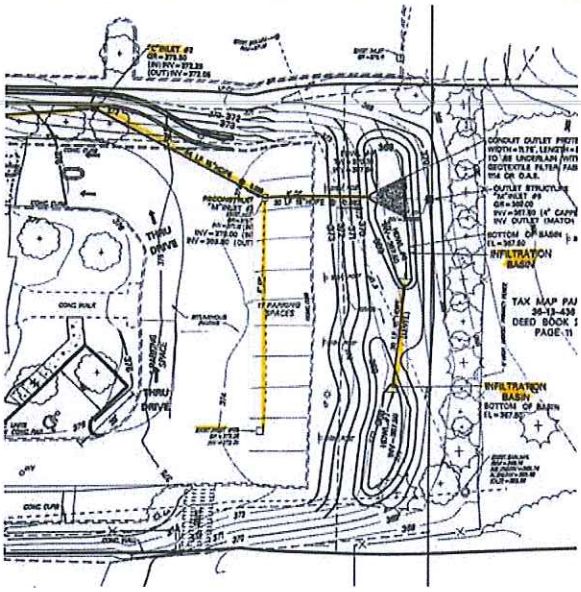
ch2m:

GIS Data Creation:
Subdivision Plan Processing in GIS

2

ch2m:

Subdivision Plan Data Processing in GIS



- Review subdivision plans
  - Plans from 1954 – 2006
  - 100+ plans reviewed
- Identify stormwater features
  - Pipes
  - Inlets
  - Manholes
  - BMPs

ch2m

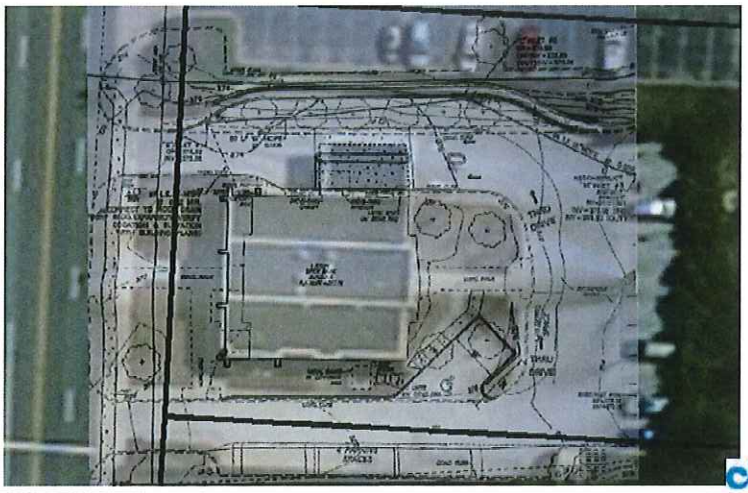
Subdivision Plan Data Processing in GIS

Step 1. Locate parcel in GIS with aerial imagery

ch2m

Subdivision Plan Data Processing in GIS

Step 2. Overlay and georeference the historic plan into GIS



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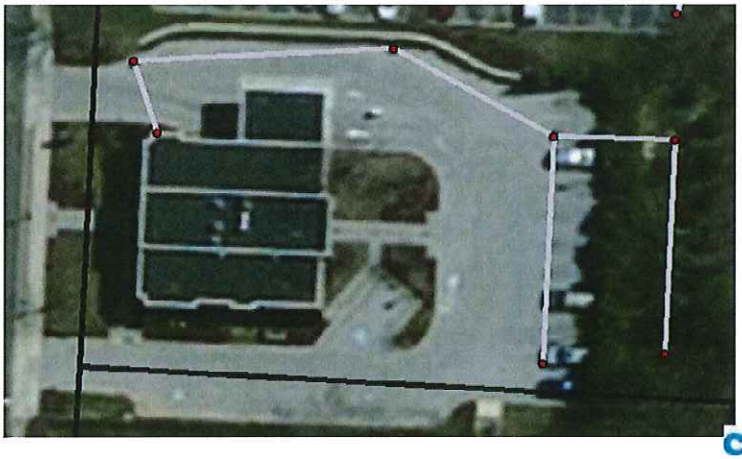
ch2m.

Subdivision Plan Data Processing in GIS

Step 3. Create new stormwater features or add to existing features in GIS



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ch2m.

Subdivision Plan Data Processing in GIS

Step 4. Record attributes of stormwater features that are critical for modeling, including

- invert elevations
- pipe sizes
- pipe slopes

ProblemArea	RIM_ELEV	RIM_SOURCE	INVERT_ELEV	INVERT_SOURCE	TYPE	PlanDrawing
B	370.35	Plan drawing	367.5	Plan drawing	BMP	05-D-12.pdf
B	369.41	Plan drawing	<Null>	<Null>	Inlet	05-D-12.pdf
B	358.36	Plan drawing	356.1	Plan drawing	Inlet	05-D-12.pdf
B	<Null>	<Null>	373.19	Plan drawing	Pipe IO	05-D-12.pdf
B	375.65	Plan drawing	372.65	Plan drawing	Inlet	05-D-12.pdf
B	375.5	Plan drawing	372.05	Plan drawing	Inlet	05-D-12.pdf
B	373.17	Plan drawing	369.8	Plan drawing	Inlet	05-D-12.pdf
B	370.11	Plan drawing	<Null>		Inlet	05-D-12.pdf

7

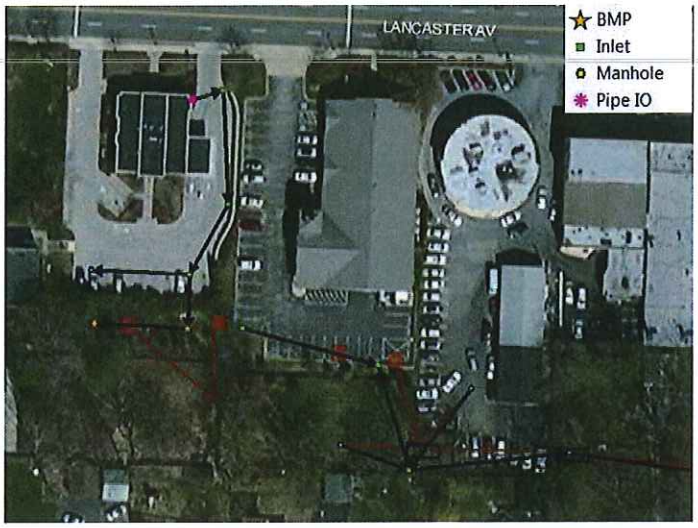
ch2m.

Comparison of original vs improved GIS data

8

ch2m.

Comparison of original vs improved GIS data



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ch2m

Comparison of original vs improved GIS data

10

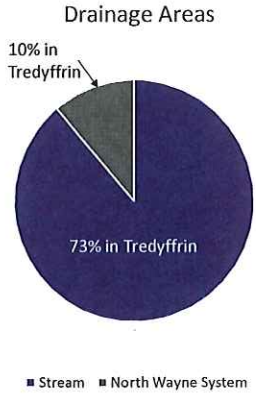
ch2m

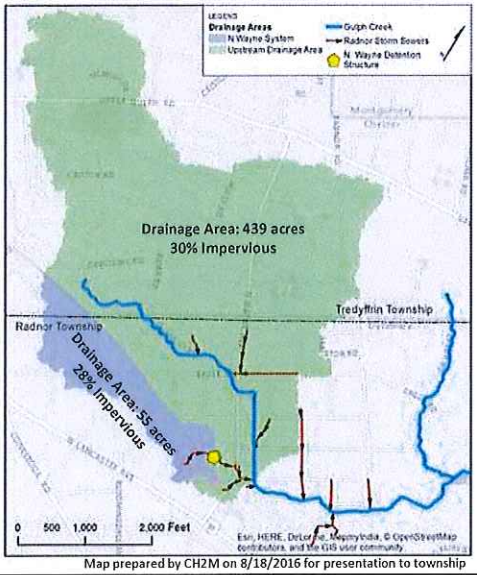
North Wayne Basin – Preliminary Modeling & Results

11

ch2m.

N. Wayne detention system is 11% of drainage area to stream at N. Wayne & Poplar Ave





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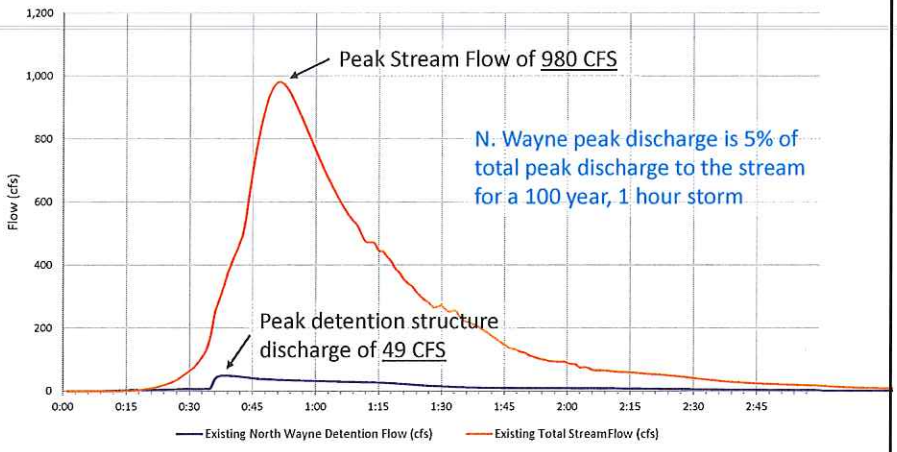
ch2m.

Map prepared by CH2M on 8/18/2016 for presentation to township

Existing Conditions Model Results: 100 year, 1 hour Design Storm



13

ch2m:

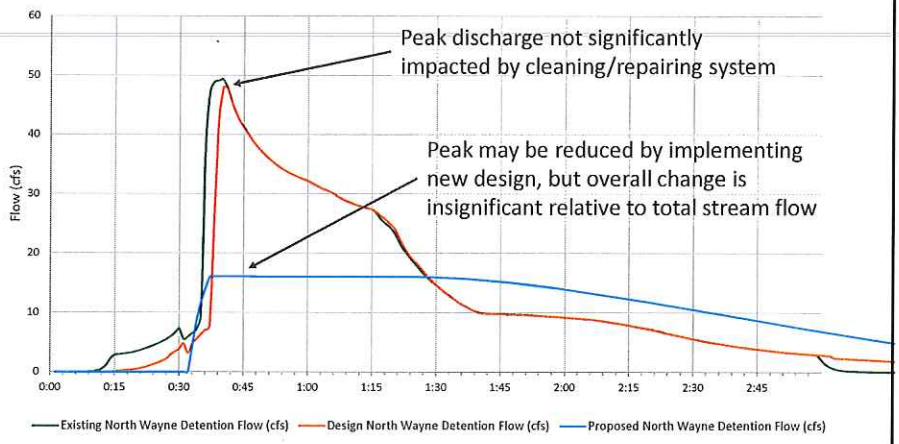
Preliminary model of original design, existing conditions, and proposed improvements

- Original Design
  - Approx. 49,000 ft^3 of storage
  - Unobstructed inlet
- Existing Conditions
  - 12-18 inches of sedimentation
  - Obstructed inlet
- Proposed Improvements
  - Approx. 147,000 ft^3 of storage
  - Reconfigured outlet structure

14

ch2m:

North Wayne Detention Structure model results 100 year, 1 hour Design Storm



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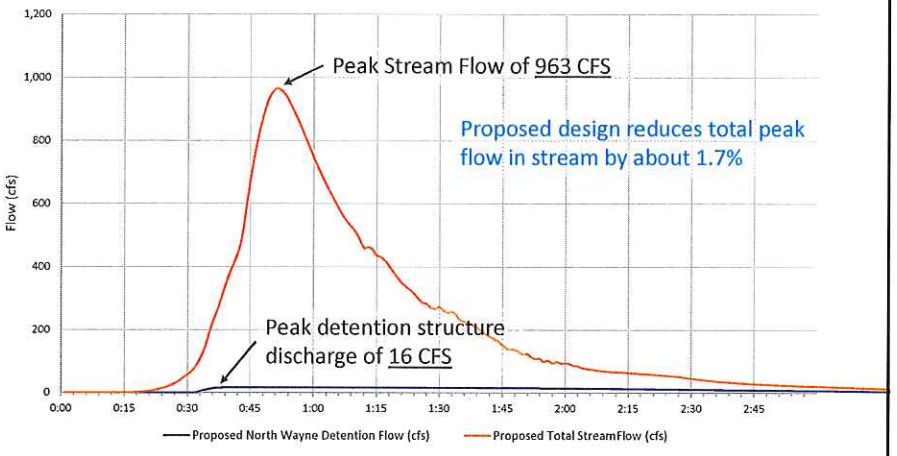
ch2m

Proposed Conditions Model Results: 100 year, 1 hour Design Storm



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ch2m

Thank You

Radnor Township Public Works & Engineering Departments

Memorandum

To: Stormwater Management Advisory Committee

From: Stephen F. Norcini, PE

cc: Robert A. Zienkowski, Township Manager
William M. White, Finance Director

Date: 8/18/2016

Re: Request to Endorse Funding the CH2M MS4 Proposal form the Stormwater Fund

---

As the Stormwater Management Advisory Committee (SWMAC) is aware, the breadth, depth, and scope of the MS4 regulations have increased exponentially from what was required in past permit years. To that end, I requested that CH2M, Incorporated, the Township's appointed Stormwater Administrator, provide a cost proposal. Please note that MS4 preparation was noted in the RFP for Stormwater Administrator.

The cost proposal is detailed in describing the tasks and the deliverables. I am asking the SWMAC to endorse this project, as noted below:

Request for endorsement from the SWMAC:

CH2M NPDES MS4 - 4th quarter of 2016	**$50,003**
CH2M NPDES MS4 – 2017	**$117,362**
TOTAL PROJECT COST	**$167,365**

I respectfully request the SWMAC endorse the above referenced project for 2016 (and endorse the 2017 cost in the upcoming budget). I request that the determination from the SWMAC be made no later than the September 8th, 2016 meeting. If endorsed by the SWMAC, I will request authorization of the 2016 portion of the project at the September 26th Board of Commissioners meeting.

Water Business Group
CH2M Philadelphia
Three Logan Square
1717 Arch Street
Suite 4400
Philadelphia, PA 19103
O +1 215 563 4220
F +1 215 563 3828
www.ch2m.com

August 9, 2016

Mr. Steve Norcini
Director Public Works
Radnor Township
301 Iven Avenue
Wayne, PA 19087
Delivered via email: snorcini@radnor.org

Subject: Proposal for PADEP PAG-13 Stormwater Permit Support

Dear Steve,

Attached please find the proposal for services to support the DEP National Pollutant Discharge Elimination System (NPDES) municipal separate stormwater system (MS4) permit. Under this scope, CH2M and subconsultant Cedarville Engineering Group, will prepare updates for the required documentation for the Minimum Control Measures (MCMs); will update the GIS mapping needs requested by PADEP, will prepare the Notice of Intent to renew the permit application, and will prepare the Pollutant Reduction Plans for a subset of select watersheds in the Township. Should you find our proposal acceptable, please sign the attached agreement and return to my attention.

We appreciate the Township's consideration in providing us this opportunity for us to offer our professional services to support the Township's stormwater program.

Sincerely,

Courtney Finneran
Project Manager

Jed Campbell
Vice President

Radnor Township
Proposal for NPDES MS4 Support

Submitted August 9, 2016

Prepared by:

Proposal for Radnor Township NPDES MS4 Support

PREPARED FOR:	Steve Norcini, Director Public Works
CLIENT NAME/ADDRESS	Radnor Township, 301 Iven Avenue, Wayne, PA 19087
COPY TO:	Daniel Wible, CH2M
PREPARED BY:	Courtney Finneran, CH2M
DATE:	August 9, 2016

Background

On June 3, 2016, Pennsylvania Department of Environmental Protection (DEP) released an updated General Permit for Stormwater Discharge (PAG-13) for municipalities with regulated small municipal separate storm sewer systems (MS4s) under the National Pollutant Discharge Elimination System (NPDES) program. Radnor Township currently has an existing NPDES MS4 Permit and is required to obtain coverage under the new permit which will become effective on March 16, 2018.

The MS4 Permit authorizes Radnor Township to discharge stormwater to surface waters, all of which are listed as "impaired" according to DEP's latest Integrated Water Quality Monitoring and Assessment Report. PADEP has prepared a MS4 Requirements Table which shows the specific regulatory requirements for Radnor Township to undertake relating to the remediation of impaired waters (Table 1). Under separate Task Order, CH2M is preparing a map to visually show the impairment status and associated permit requirements of DEP (Figure 1).

Table 1.
MS4 Requirements Table (July 29, 2016) listing out the causes of stream impairment and permit required planning activity under PAG-13

				NPDES MS4 REQUIREMENT			
	CAUSE(S) OF IMPAIRMENT			Pollution Control Measures (due to PADEP by 2019)		Pollutant Reduction Plans (due to PADEP by September 2017)	
Impaired Downstream Waters	Other Habitat Alterations, Water / Flow Variability	Water/Flow Variability	Cause Unknown	Appendix B Pathogens	Appendix C PCB	Appendix E Siltation	Appendix E Nutrients, Siltation
Abrahams Run		X	X		X		
Browns Run	X		X		X	X	
Camp Run		X	X		X		
Cobbs Creek	X		X	X	X	X	
Darby Creek	X		X		X	X	
Doom Run	X		X		X	X	

Finn Run	X		X		X	X	
Foxes Run	X		X		X	X	
Gulph Creek		X				X	
Hardings Run	X		X		X	X	
Ithan Creek	X		X		X	X	
Julip Run		X	X		X		
Kirks Run	X		X		X	X	
Little Darby Creek		X	X		X		
Meadowbrook Run	X		X		X	X	
Miles Run		X	X		X		
Mill Creek		X					X
Saw Mill Run		X	X		X		
Schuylkill River					X		
Valley Run	X		X		X	X	

Scope

CH2M will provide the following services to Radnor Township:

Task 1. Prepare required documentation under the Six Minimum Control Measures (MCMs)

Attachment 1 (3800-PM-BPNPSM0100h "PAG-13 Appendix A Stormwater Management Program) is the PADEP detailed requirement directions for municipal compliance with the Six MCMs. CH2M, working in conjunction with Cedarville Engineering Group as subconsultants to CH2M, will provide professional services on the following MCMs as described below.

MCM #1: Public Education and Outreach Program

Building off of the 2005 Public Education and Outreach Program (PEOP), CH2M will work with the Township to develop and prepare an updated PEOP to develop and distribute educational materials to the community or conduct equivalent outreach activities about the impacts of stormwater discharges on water bodies. The PEOP will include example materials that will help the Township educate the public on steps they can take to reduce pollutants in stormwater runoff. The PEOP will be designed to achieve measurable improvements in the target audience's understanding of the causes and impacts of stormwater pollution and the steps they can take to prevent it. CH2M will work with the SWMAC to develop reasonable outreach programs that can reach the intended audiences. The PEOP will be written with specific examples for outreach format, the Township roles, (the Stormwater Management Advisory Committee (SWMAC) and the Engineering Department will be key), and a schedule for outreach methods will be clearly identified. CH2M will post the final PEOP to the township website.

Deliverable: Public Education and Outreach Program, draft and final;

One meeting with the SWMAC to present the draft PEOP and to solicit comments from the public

MCM #2: Public Involvement and Participation Program

CH2M will collaborate with the SWMAC and Township to prepare a written Public Involvement and Participation Program (PIPP) plan that describes various types of possible participation activities and describes methods of encouraging the public's involvement and of soliciting the public's input. The PIPP will seek to build off the existing efforts undertaken by the SWMAC as well as the 2005 version previously submitted to DEP. CH2M will post the final PIPP to the township website.

Deliverable: Public Involvement and Participation Program Plan, draft and final

One meeting with the SWMAC to present the draft PIPP and to solicit comments from the public

MCM #3: Illicit Discharge Detection and Elimination Plan

A written Illicit Discharge Detection and Elimination (IDD&E) Plan will be prepared by CH2M. The IDD&E program focuses on priority areas, defined by DEP as "areas with a higher likelihood of illicit discharges, illicit connections or illegal dumping. Priority areas may include areas with older infrastructure, a concentration of high-risk activities, or past history of water pollution problems." The IDD&E program will include procedures for identifying priority areas; screening outfalls in priority areas; identifying the source of an illicit discharge when a contaminated flow is detected at a regulated small MS4 outfall; and assessing the potential for illicit discharges caused by the interaction of sewage disposal systems with storm drain systems. The IDD&E program will also include mechanisms for gaining access to private property to inspect outfalls, procedures for program documentation, evaluation and assessment, as well as for addressing information of complaints received from the public. After the IDD&E Plan has been prepared and presented to the Township, CH2M will develop a map showing the potential priority areas, based on available GIS data provided by the Township as well as interviews with Township staff (Steve Amarant and Paul). This map will be a poster size drawing that CH2M will print out for the Township Department of Public Works, and CH2M will provide the GIS data and MXD to the Township database. 20 hours has been allotted for this data creating and mapping activity.

Deliverable: Illicit Discharge Detection and Elimination Plan, draft and final

Potential Priority Area map (poster size); all GIS data and MXD

MCM #5 Post Construction Stormwater Management Tracking

Under this MCM, the Township is required to develop a tracking system to track the inspections conducted and the results of the inspections for all Post Construction Stormwater Management (PCSMs) (privately owned and publicly owned). The Township currently uses a grading permit application process which is entered into an internal database that serves as the foundation for the PCSM tracking database. Township staff currently conduct the stormwater construction inspections, and record keeping is a separate documented activity.

Under this task, CH2M will review the current database management system, generate a list of recommended customizations, and implement a combined permit approval and construction inspection workflow within the Township's grading permit tracking database. A key component to this upgrade will allow for site location information (addresses) to be converted into a GIS compatible format in order to output annual BMP location map updates. CH2M has allotted 80 hours to support this database upgrade task. This task assumes the current database management system, which is built off of Microsoft Access, will be utilized. If the township upgrades to a new program, the budget associated with this task will be reviewed to determine adequacy as well as compatibility with any new Township software. CH2M will convert all approved grading permits, from 2003 to 2016, into GIS location feature for mapping under a separate task (Task 2).

Deliverable: Upgraded grading permit database that includes construction inspection information, with the option to export results annually to a GIS based format for future mapping.

MCM #6: Operations & Maintenance Program Manual

CH2M will develop a Manual for Municipal Operations, Facilities, and Activities as required by the NPDES MS4 Permit. The program will include management practices, policies, and procedures to reduce or prevent the discharge of pollutants to the MS4; maintenance activities, maintenance schedules, and inspection procedures to reduce the potential for pollutants to reach the MS4; controls for reducing or eliminating the discharge of pollutants from municipal facilities; and procedures for the proper disposal of waste. The O&M Manual previously submitted to DEP will be reviewed, and the Engineering Department will be surveyed and interviewed.

Deliverable: Operations & Maintenance Program and Manual, draft and final

MCM #3 and #6: Employee Training

Under this subtask, CH2M will develop a written program for Employee Training as required by the NPDES MS4 Permit. The program will address topics to further the goal of preventing or reducing the discharge of pollutants from operations to the MS4. Additionally, CH2M will provide interactive training via PowerPoint session, to Township staff to cover two topics:

1) outfall field screening procedures and sampling of dry weather discharges for selected chemical and biological parameters, and

2) pollution prevention and good housekeeping practices.

Deliverables: Written Employee O&M Training Program, draft and final

Interactive Training session including PowerPoint

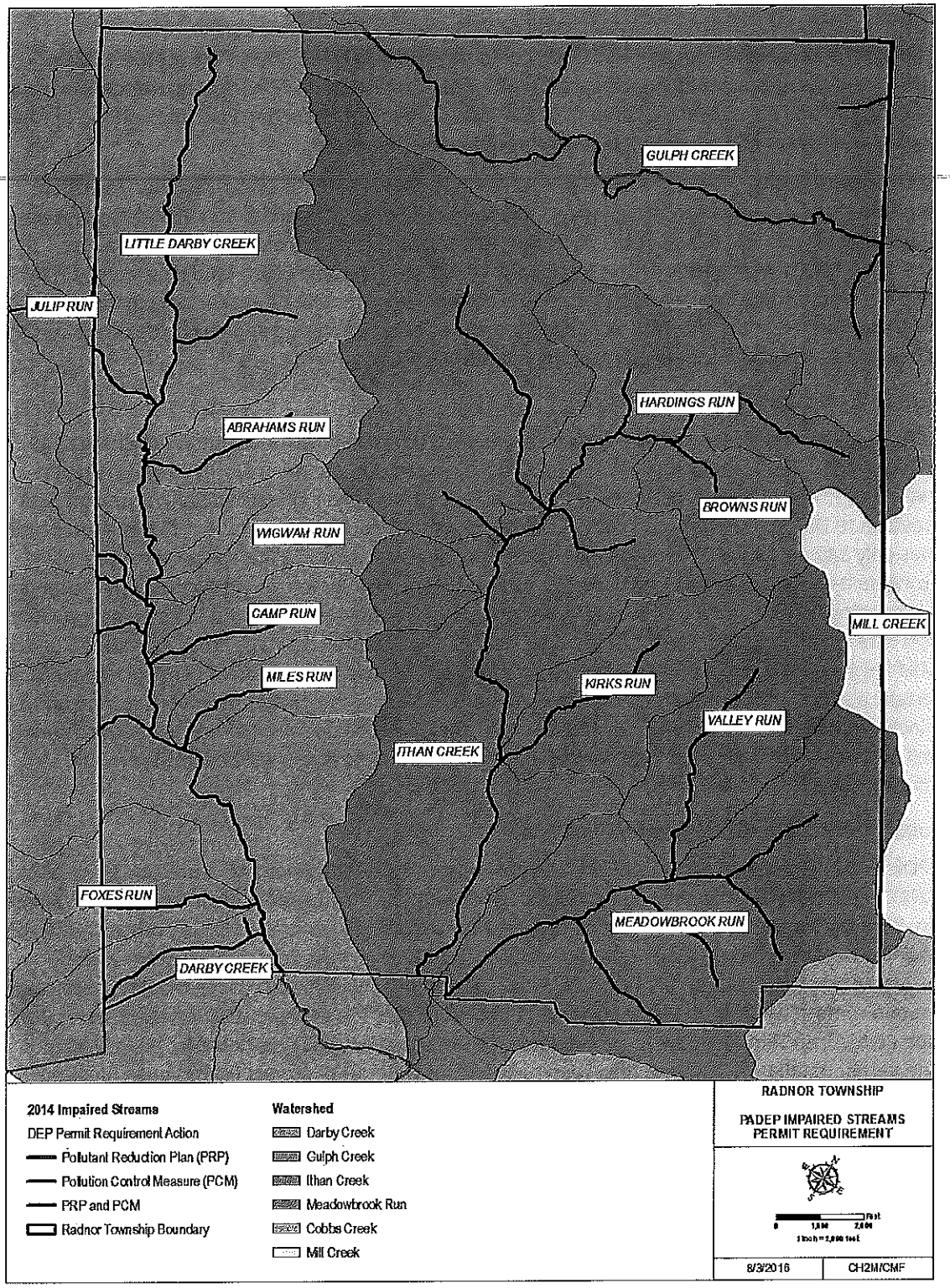

Figure 1

Radnor Township stream impairment status and associated permit requirements of DEP based on July 2016 MS4 Requirements Table

Task 2. Prepare Stormwater System Map

Both the MCM and the Pollutant Reduction Plan (PRP) components of the NPDES MS4 Permit have a large amount of new mapping requirements. Attachment 1 (3800-PM-BPNPSM0100h "PAG-13 Appendix A Stormwater Management Program) and Attachment 2 (3800-PM-BCW0100k "Pollutant Reduction Plan Instructions") provide the instructions to the township on the mapping needs required by the permit.

Under the Stormwater Program Administrator (SPA) contract, CH2M was hired to convert Radnor Township MapInfo files of the stormwater system into a modern GIS format (ESRI 10.3.1 geodatabase), and this task has successfully been completed. On behalf of the Township, CH2M prepared a Stormwater System Map for inclusion in the 2016 Annual MS4 Status Report (Figure 2). Under the Township Flood Modeling study, CH2M has upgraded the GIS to support the local modeling effort, which generated more accurate GIS data in the Modeling study area. Work performed under this Task will build off the previously converted and newly prepared GIS data and develop new layers as needed for various elements of the NPDES MS4 Permit.

MCM #3: Outfall Sewershed Delineation

Under the NPDES MS4 permit, DEP requires the storm sewershed be delineated for all outfalls discharging to impaired surface waters. Radnor has approximately 250 documented outfalls, the majority of which are not geospatially accurate (they are usually between 100-1,000+ feet off from their actual location). Based on data previously provided to DEP, 140 outfalls currently discharge to impaired surface waters. For this budget estimate, CH2M assumes only 140 outfalls will be incorporated into this subtask activity. CH2M will perform geospatial analyses utilizing built-in ESRI extensions including the ArcHydro toolset, in order to update the outfall locations (for example, Snapping feature and the Flow Accumulation tool). An outcome of this step will be higher quality outfall location data which can support a more accurate delineation of outfall drainage areas as required under the NPDES MS4 Permit. CH2M will not digitize outfall locations off any built subdivision or construction plans, and will not undertake a survey of the outfalls, as both activities are outside of the budget of this effort. An output of this task will include an updated Stormwater Outfall GIS layer for just those outfalls draining to impaired surface waters, as well as a newly created sewershed polygon data layer. Both data layers will be included in the Stormwater System Map.

MCM #3: Public and Private BMP Inventory and Map

Under the NPDES MS4 permit, DEP requires public and private stormwater facilities (structural and non-structural BMPs, from 2003 to 2016) to be mapped and included in an inventory. The inventory must include: BMP Name, BMP Location, BMP Drainage Area; and BMP Construction Date. CH2M will generate a list of constructed BMPs (and the associated inventory elements) as an outcome of Task 1 MCM #5 Post Construction Stormwater Management Tracking activity. Under this Task, CH2M will work with Township staff (Doug Meder, specifically) to review the list and confirm whether they have been constructed or not. The final constructed stormwater BMP list will then be edited back into the grading permit database (meaning, any changes noted by Doug will be changed in the permit database). Once the final constructed stormwater BMP project list has been finalized, CH2M will geocode the project locations based on addresses and create a Private BMP location point layer in GIS. CH2M will then delineate the drainage area to each BMP using ESRI tools and extensions including the ArcHydro toolset. An output of this task will be an updated constructed stormwater project location layer (points) and drainage areas to each BMP (polygon).

Assumptions and caveats: CH2M will not use design-based drainage area information that may be provided in the subdivision plans or construction plans. CH2M will not perform any field survey to verify drainage areas delineated under this subtask. CH2M has reviewed the existing grading permit applications in the database and determined there are approximately 900 approved permits from 2003 – June 2016 with stormwater management required. For the purposes of budgeting, CH2M is estimating that 95% of these have been constructed and

therefore, we anticipate generating 850 stormwater BMP locations (points) from this effort. The centerpoint of each parcel will represent the BMP location, and the Drainage Area will be delineated to that location. For those parcels with multiple permits/BMPs (i.e. Villanova) CH2M will work with Township staff and Township Engineering firm to determine the specific location of the stormwater feature. The budget will need to be updated if DEP requires more detailed mapping of specific private BMP locations, which will be determined at a DEP meeting to be held after submittal of this proposal.

MCM #3: Stormwater System Map

An example stormwater system map required by PADEP is provided in Attachment 3. DEP clarification on this requirement is as follows:

> "To clarify, the term "entire storm sewer collection system" means the entire system that the MS4 permittee owns or operates to collect and convey stormwater from publicly-owned property in the urbanized area to surface waters. The system therefore includes both publicly-owned components (e.g., publicly-owned streets, ditches, swales, inlets and piping systems) and, where applicable, privately-owned components (e.g., conveyances or best management practices on private property that are connected to upstream publicly-owned components, within the permittee's jurisdiction).

Under this task, CH2M will update missing stormwater data, including locations of swales, channels, and basins; ownership information for the existing pipe and inlet system; urbanized areas, sewershed/outfall drainage areas, BMPs (Public and Private), contours and others. CH2M recently prepared the Stormwater System Map for the NPDES Annual Report submitted to PADEP in May 2016 and will update as needed.

Deliverables: The following deliverables will be provided to the Township in electronic PDF format and CH2M will post the appropriate files to the Radnor Township Stormwater Program MS4 webpage. CH2M will also plot out 1 large format poster version of the Stormwater System Map for display in the Township Building lobby.

1. Stormwater System Map (poster size) in PDF for website
2. Stormwater System Map (poster size) mounted for display on an easel in the township building

MCM #6: Municipal Property and Operations Inventory Map

CH2M will identify and document all facilities and activities that are owned or operated by the Township and have the potential for generating stormwater runoff to the regulated small MS4. A site visit and meeting with the Township Public Works department will be necessary to collect this information.

- **Deliverable:** Municipal Property and Operations Inventory Map

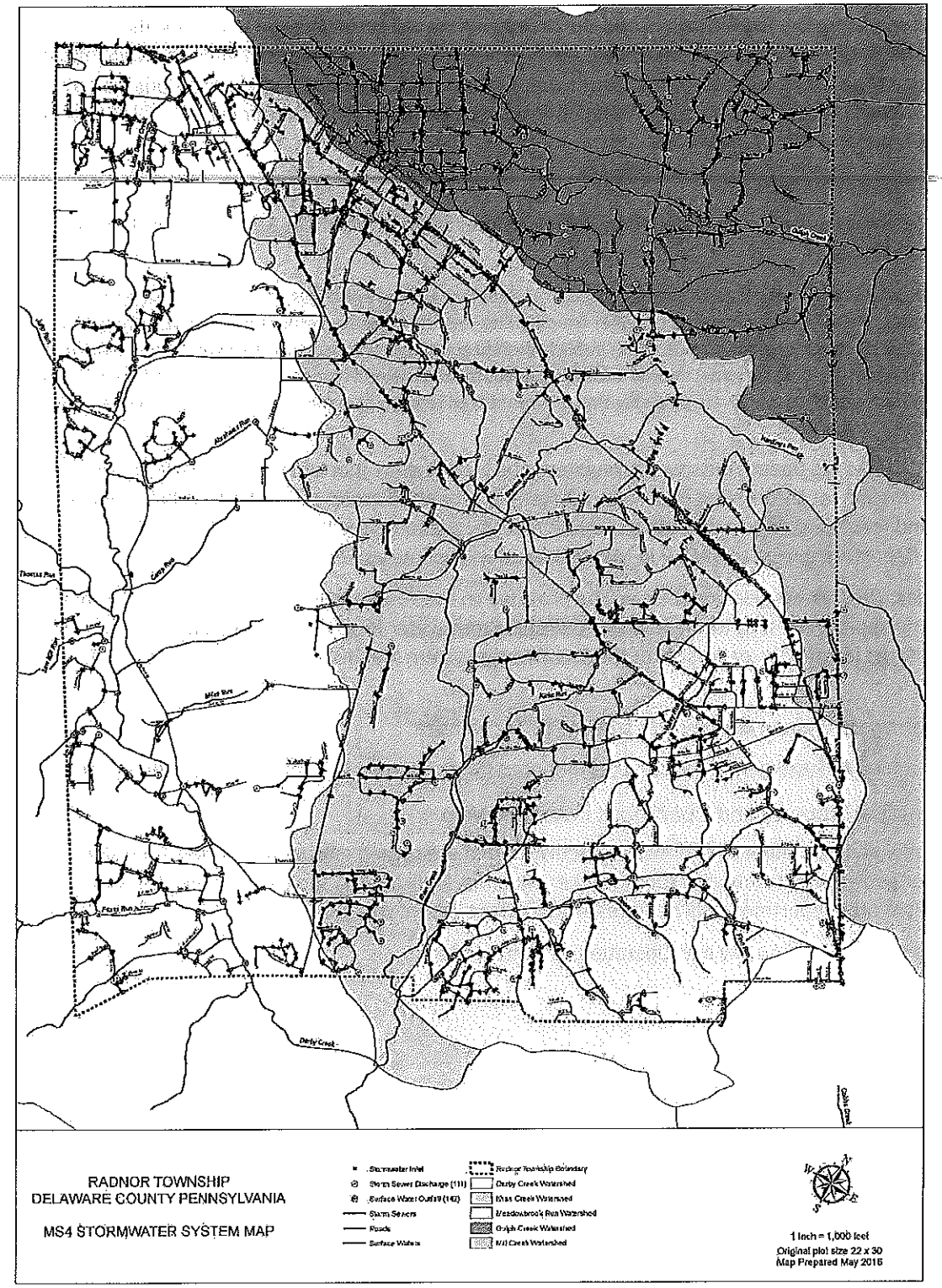

Figure 2
Stormwater System Map included with May 2016 Annual Report to DEP

Task 3. Prepare of the Notice of Intent (NOI) to renew and the Pollutant Reduction Plan (PRP)

Notice of Intent

CH2M will prepare the Notice of Intent (NOI) Checklist (1-page) and the NOI application (7-pages) on behalf of Radnor Township. Both files are provided in Attachment 4 ("3800-PM-BCW0100b – Notice of Intent").

Pollutant Reduction Plan

Radnor Township discharges stormwater to impaired surface waters and, therefore, under the new PAG-13 permit, is obligated to develop Pollutant Reduction Plans (PRPs) for those streams impaired due to siltation. A PRP is a planning document which guides the selection and implementation of specific BMPs to reduce pollutant loading to surface waters. As noted in Table 1, Radnor Township is required to develop a PRP to plan for and document the reduction of siltation in 13 waterways, and siltation and nutrients in one waterway. Attachment 2 (3800-PM-BCW0100k "Pollutant Reduction Plan Instructions") provides the detailed directions from DEP for preparing the PRP. CH2M will work with the Township and SWMAC to prepare the PRP including the following required components of the PRP:

A. Public Participation

CH2M will work with the SWMAC to host two public meetings to elicit comments on the plan. CH2M will provide a PowerPoint presentation and any poster/visual aids/handouts needed for the meeting. CH2M will summarize the public participation effort in a compiled PDF suitable for delivery to DEP.

B. Map Book

CH2M will prepare up to 14 sub-basin zoom maps (one map per impaired waterway) to show the identified BMP projects to be implemented over the 5-year permit timeframe. Maps will show the BMP locations and will also include the drainage area to each BMP in order to calculate the pollutant reduction associated with the project. Since the locations and magnitude of the need for BMP siting and development is unknown at the time of proposal development, for the purposes of budgeting this task, CH2M has assumed a maximum of 25 project concept schematics will be developed throughout the impaired watersheds in order to meet the NPDES MS4 requirements. The NPDES MS4 permit very clearly states that the final project list/map must be projects that the Township is committed to constructing, or includes projects the Township is aware will be constructed by others. Therefore, this task will include meeting with the Township and SWMAC to clarify project selection. Additionally, any projects developed under separate Task Orders (for example the Township Flood Modeling study) will be included in the Pollutant Reduction Planning effort.

C. Pollutants of Concern

The main pollutant of concern in Radnor Township is siltation/sedimentation for all but one Subbasin (which includes nutrients as well as siltation). CH2M will use existing GIS data (land use, impervious area) as well as interviews with Township officials to describe and define the potential source locations of sedimentation. CH2M will not undertake a survey or detailed pollution location or siting analysis. A summary memo will be prepared to document the information obtained in subtasks C, D and E of Task 3.

D. Determine Existing Loadings for Pollutants of Concern

CH2M will use the DEP simplified method to calculate the existing loading, in lbs per year, for the pollutant(s) of concern in all storm sewersheds. Critical to this effort will be claiming credit for structural BMPs implemented prior to development of the PRP to reduce existing loading estimates. These previously constructed BMPs (which will be mapped under Task 2) will be included in the pollution calculation methodology as well as the maps

prepared under Task 3.B. A summary memo will be prepared to document the information obtained in subtasks C, D and E of Task 3.

E. Select BMPs to Achieve the Minimum Required Reductions in Pollutant Loading

Under this subtask, CH2M will work with the Township and SWMAC to identify specific locations of BMPs that will achieve the minimum required reduction in pollutant loading. DEP requires that these BMPs must be implemented within 5 years of DEP's approval of coverage under the PAG-13 General Permit, and must be located within the storm sewersheds of the applicable impaired waters, on either public or private property. DEP does allow for including BMPs that will be implemented by others within the storm sewershed that will result in net pollutant loading reductions. A summary memo will be prepared to document the information obtained in subtasks C, D and E of Task 3.

F. Identify Funding Mechanism

The BMP projects identified in subtask E will be reviewed in coordination with the SWMAC's annual budget setting process. CH2M will prepare conceptual-level cost estimates at the Class 4 level and will summarize the funding mechanism in a brief memo. The memo will contain a list of projects and the costs, as well as pollutant reduction benefits, associated with each project.

G. Identify Responsible Parties for Operation and Maintenance (O&M) of BMPs.

Under this subtask, CH2M will prepare an O&M Plan for the BMPs that will include the responsible parties, the specific recommended O&M activities and the frequency at which O&M activities will occur. CH2M will include standard operating procedures that are organized by BMP type.

Task 3 Deliverables

1. Notice of Intent Checklist
2. Notice of Intent Application
3. Pollutant Reduction Plan, including
    a. Public participation summary Appendix
    b. Map book with up to 14 sheets depicting the selected BMPs
    c. Summary memo describing the pollutants of concern, the existing loading calculations, and the potential reduction achieved over 5-years with implementation of selected BMPS
    d. Funding mechanism summary memo
    e. Operations and Maintenance Plan
4. All GIS data developed and MXD maps associated with this task will be provided to the Township an uploaded into their GIS database.

Assumptions

CH2M will reasonably rely upon the accuracy, timeliness, and completeness of any data provided by Radnor Township or other third parties.

Project Schedule

The schedule shown below shows the proposed activities concluding by September 2017 in order to align with the PADEP deadline for submittal of the NOI and PRP and all supporting documentation. This assumes approval of the proposal will be provided at the September 2016 SWMAC and Board of Commissioners meeting.

	SubTask	2016				2017								
		SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
TASK 1	Public Education and Outreach Program (MCM #1)													
	Public Involvement and Participation Program (MCM #2)													
	Illicit Discharge Detection and Elimination Plan (MCM #3)													
	Post Construction Stormwater Management Tracking (MCM #5)													
	Operations & Maintenance Program Manual (MCM #6)													
	Employee Training Program (MCM #6 and #3)													
TASK 2	Outfall Sewershed Delineation (MCM #3)													
	Public and Private BMP Inventory (Tracking System) and Map (MCM #3)													
	Stormwater System Map (MCM #3)													
	Municipal Property and Operations Inventory (MCM #6)													
TASK 3	Notice of Intent (NOI) to Renew to DEP Sept 16, 2017													
	Pollutant Reduction Plan due to DEP Sept 16, 2017										DRAFT			FINAL
	Public Participation (2 Meetings)									Mtg #1		Mtg #2		

Compensation

Table 2 provides the proposed budget for this proposal separating the cost by fiscal year for budgeting purposes. Work performed for all CH2M employees, with the exception of Daniel Wible, is at a 2.9 multiplier. Daniel Wible is billed at a 2.7 multiplier. Reimbursement for CH2M activity will be on a time and material basis, with the fee not to exceed what is shown in Table 2. Cedarville will serve as a subconsultant to CH2M and will be reimbursed on lump sum basis with no mark-ups provided.

Table 2.

Proposed Budget for PAG-13 NPDES MS4 Support

Proposed 2016 Budget				
Task Number	**Task Description**	**CH2M**	**Cedarville**	**Total Task Cost**
Task 1	Prepare required documentation under the Six Minimum Control Measures (MCMs)	$21,008	$15,612	$36,620
Task 2	Prepare Stormwater System Map	$10,867	$2,116	$12,983
Task 3	Prepare Notice of Intent (NOI) to renew permit and Pollutant Reduction Plan (PRP)	-	-	$0
EX	Expenses	$400		$400
	TOTAL 2016 BUDGET	$32,275	$17,728	$50,003
Proposed 2017 Budget				
Task Number	**Task Description**	**CH2M**	**Cedarville**	**Total Task Cost**
Task 1	Prepare required documentation under the Six Minimum Control Measures (MCMs)	$7,088	$0	$7,088
Task 2	Prepare Stormwater System Map	$41,383	$0	$41,383
Task 3	Prepare Notice of Intent (NOI) to renew permit and Pollutant Reduction Plan (PRP)	$68,491	$0	$68,491
EX	Expenses	$400		$400
	TOTAL 2017 BUDGET	$117,362	$0	$117,362
	TOTAL REQUESTED BUDGET	**$149,637**	**$17,728**	**$167,365**

CH2MHILL

STANDARD AGREEMENT FOR PROFESSIONAL SERVICES

CH2M HILL'S OFFICE ADDRESS: 1717 Arch Street, Suite 4400, Philadelphia PA 19103

PROJECT NAME: PAG-13 MS4 Permit Support

CLIENT & ADDRESS: Radnor Township
301 Iven Avenue, Wayne PA 19087

CLIENT requests and authorizes CH2M HILL Engineers, Inc.. (hereinafter "CH2M HILL") to perform

Scope of Services

CH2M will provide the services described in the proposed scope of work prepared by CH2M dated August 9, 2016, which is hereby incorporated into the Agreement.

Compensation

CH2M shall be compensated as outlined in CH2M's proposal dated August 9, 2016.

Other Terms

The following document(s) are incorporated by reference: CH2M proposal dated August 9, 2016.

Services covered by this AGREEMENT will be performed in accordance with the Provisions and any attachments or schedules. This AGREEMENT supersedes all prior agreements and understandings and may only be changed by written amendment executed by both parties.

CLIENT: Radnor Township		**CH2M HILL ENGINEERS, INC.**	
Signature	_____	Signature	_____
Name	_____	Name	_____
Title	_____	Title	_____
Date	_____	Date	_____

PROVISIONS

1. **Authorization to Proceed**

   Execution of this AGREEMENT by CLIENT will be authorization for CH2M HILL to proceed with the Services, unless otherwise provided for in this AGREEMENT.

2. **Compensation**

   Compensation shall be as specified with the Compensation section on Page 1.

3. **Subcontracts and Direct Expenses**

   A markup of __0__ percent will be applied to subcontracts and outside services and a markup of __0__ percent will be applied to Direct Expenses. For purposes of this AGREEMENT, Direct Expenses are defined to include those necessary costs and charges incurred for the Project including, but not limited to: (1) the direct costs of transportation, meals, lodging, shipping, equipment and supplies; (2) CH2M HILL's current standard rate charges for direct use of CH2M HILL's vehicles, laboratory test and analysis, and certain field equipment; and (3) CH2M HILL's standard project charges for comprehensive health and safety requirements of OSHA.

   All sales, use, value added, business transfer, gross receipts, or other similar taxes will be added to CH2M HILL's compensation when invoicing CLIENT. In the event that any such taxes are imposed after the signing of this AGREEMENT, Engineer's compensation will be adjusted by the amount of such new taxes.

4. **Cost Opinions**

   Any cost opinions or Project economic evaluations provided by CH2M HILL will be on a basis of experience and judgment, but, since CH2M HILL has no control over market conditions or bidding procedures, CH2M HILL cannot warrant that bids, ultimate construction cost, or Project economics will not vary from these opinions.

5. **Standard of Care**

   The standard of care applicable to CH2M HILL's services will be the degree of skill and diligence normally employed by professional engineers or consultants performing the same or similar services at the time CH2M HILL's services are performed. CH2M HILL will re-perform any services not meeting this standard without additional compensation from CLIENT provided, however, that CLIENT notifies CH2M HILL in writing of such non-conformance within a period of one year from completion of such Services hereunder.

   CH2M HILL shall not be responsible for the cost of any construction rework or replacement. NO OTHER REPRESENTATION, GUARANTEE, OR WARRANTY, EXPRESSED OR IMPLIED, IS INTENDED IN OR BY THIS AGREEMENT.

6. **Termination**

   This AGREEMENT may be terminated for convenience on 30 days written notice or if either party fails substantially to perform through no fault of the other and does not commence correction of such nonperformance within 5 days of written notice and diligently complete the correction thereafter. On termination, CH2M HILL will be paid for all authorized work performed up to the termination date plus termination expenses, such as, but not limited to, reassignment of personnel, subcontract termination costs, and related closeout costs.

7. **Payment to CH2M HILL**

   Monthly invoices will be issued by CH2M HILL for all Services performed under this AGREEMENT. CLIENT shall pay each invoice within 30 days. Interest at a rate of 1-1/2 percent per month will be charged on all past-due amounts.

   In the event of a disputed billing, only that disputed portion will be withheld from payment, and the undisputed portion will be paid. CLIENT will exercise reasonableness in disputing any bill or portion thereof. No interest will accrue on any disputed portion of the billing until mutually resolved.

8. **Limitation of Liability**

   CH2M HILL's liability for Client's damages will, in the aggregate, not exceed the authorized fee under the AGREEMENT. This Provision takes precedence over any conflicting Provision of this AGREEMENT or any document incorporated into it or referenced by it. In no event shall CH2M HILL, its affiliated corporations, officers, employees, or any of its subcontractors be liable for any incidental, indirect, special, punitive, economic or consequential damages, including but not limited to loss of revenue or profits, suffered or incurred by CLIENT or any of its agents, including other contractors engaged at the project site, as a result of this Agreement or CH2M HILL's performance or non-performance of services pursuant to this Agreement.

   This limitation of liability will apply whether CH2M HILL's liability arises under breach of contract or warranty; tort, including negligence; strict liability; statutory liability; or any other cause of action, and shall include CH2M HILL's officers, affiliated corporations, employees, and subcontractors.

9. **Severability and Survival**

   If any of the provisions contained in this AGREEMENT are held illegal, invalid or unenforceable, the other provisions shall remain in full effect. Limitations of liability shall survive termination of this AGREEMENT for any cause.

10. **No Third Party Beneficiaries**

    This AGREEMENT gives no rights or benefits to anyone other than CLIENT and CH2M HILL and has no third party beneficiaries except as provided in Provision 10.

11. **Materials and Samples**

Any items, substances, materials, or samples removed from the Project site for testing, analysis, or other evaluation will be returned to the Project site unless agreed to otherwise. CLIENT recognizes and agrees that CH2M HILL is acting as a bailee and at no time assumes title to said items, substances, materials, or samples. CLIENT recognizes that CH2M HILL assumes no risk and/or liability for a waste or hazardous waste site originated by other than CH2M HILL.

12. Assignments

Except to direct subsidiaries, neither party shall have the power to or will assign any of the duties or rights or any claim arising out of or related to this AGREEMENT, whether arising in tort, contract or otherwise, without the written consent of the other party. Any unauthorized assignment is void and unenforceable.

13. Integration

This AGREEMENT incorporates all previous communications and negotiations and constitutes the entire agreement of the parties. If CLIENT issues a Purchase Order in conjunction with performance of the Services, general or standard terms and conditions on the Purchase Order do not apply to this AGREEMENT.

14. Force Majeure

If performance of the Services is affected by causes beyond CH2M HILL's reasonable control, project schedule and compensation shall be equitably adjusted.

15. Dispute Resolution

The parties will use their best efforts to resolve amicably any dispute, including use of alternative dispute resolution options.

16. Changes

CLIENT may make or approve changes within the general Scope of Services in this AGREEMENT. If such changes affect CH2M HILL's cost of or time required for performance of the services, an equitable adjustment will be made through an amendment to this AGREEMENT.

17. Indemnification

CH2M HILL agrees to indemnify CLIENT from any claims, loss, cost, or expense claimed by third parties for property damage and bodily injury, including death, to the proportionate extent caused by the negligence or willful misconduct of CH2M HILL, its employees, affiliated corporations, officers, and subcontractors in connection with the PROJECT.

CLIENT agrees to indemnify CH2M HILL from any loss, cost, or expense claimed by third parties for property damage and bodily injury, including death, to the proportionate extent caused by the negligence or willful misconduct of CLIENT, its employees, or agents in connection with the PROJECT.

18. Reuse of PROJECT Documents

All reports, drawings, specifications, documents, and other deliverables of CH2M HILL, whether in hard copy or in electronic form, are instruments of service for this PROJECT, whether the PROJECT is completed or not. CLIENT agrees to indemnify CH2M HILL and its officers, employees, subcontractors and affiliated corporations from all claims, damages, losses, and costs, including, but not limited to, litigation expenses and attorney's fees arising out of or related to the unauthorized reuse, change or alteration of these PROJECT documents.

19. Access to Facilities and Property

CLIENT will make its facilities accessible to CH2M HILL as required for CH2M HILL's performance of its services and will provide labor and safety equipment as required by CH2M HILL for such access. CLIENT will perform, at no cost to CH2M HILL, such tests of equipment, machinery, pipelines, and other components of CLIENT's facilities as may be required in connection with CH2M HILL's services.

20. Client-Furnished Data

CLIENT will provide to CH2M HILL all data in CLIENT's possession relating to CH2M HILL's services on the PROJECT. CH2M HILL will reasonably rely upon the accuracy, timeliness, and completeness of the information provided by CLIENT.

21. Ownership of Work Product and Inventions

All of the work product of CH2M HILL in executing the Services shall remain the property of CH2M HILL. CLIENT shall receive a perpetual, royalty-free, non-transferable, non-exclusive license to use the deliverables for the purpose for which they were intended. Any inventions, patents, copyrights, computer software, or other intellectual property developed during the course of, or as a result of, the Services shall remain the property of CH2M HILL.

22. Restrictions

The terms of this Agreement shall not be valid for remedial activities or construction services. Additional provisions may be negotiated as required for those services.

Radnor Township Public Works & Engineering Departments

Memorandum

To: Stormwater Management Advisory Committee (SWMAC)

From: Stephen F. Norcini, PE

Cc: Robert A. Zienkowski, Township Manager
William M. White, Finance Director

Date: 8/17/2016

Re: Requests for Projects to be Funded from the Stormwater Fund

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As a follow up to my earlier email, I respectfully request the Stormwater Management Advisory Committee (SWMAC) endorse three projects for funding. The projects are as follows:

1. **Malin Road Culvert Replacement**

In 2014, Gannett Fleming performed an evaluation of the Malin Road Culvert (since that time the road above the culvert has subsided even further). The evaluation of the culvert was prompted by the current condition of the culvert. One of the tasks included in their work was to determine the cost of repair versus replacement, including life cycle costs. As you can see, the 100-year life cycle costs for rehabilitation of the culvert are $$1,114,076.60, versus a 100-year life cycle cost of $361,653.90 for replacement.

In the spreadsheet previously sent to the SWMAC regarding culvert repair/replacement, I had noted the Malin Road Culvert for design in 2016, and construction in 2017. I feel this culvert should be moved on in short order, specifically for replacement.

(Please see attached April 2014 Gannett Fleming Memorandum, Rehabilitation 100-year Project Costs and Replacement 100 Year Project Costs)

Request for endorsement from the SWMAC:

Malin Road Culvert Design - 4th quarter of 2016	**$102,000**
Malin Road Culvert Construction – 2017 (cost includes Construction Observation)	**$300,000**
TOTAL PROJECT COST	**$402,000**

2. Arthur Road – Construction of Storm Sewer Extension

Arthur Road is a cul-de-sac off of County Line Road, in Bryn Mawr, near the border of Lower Merion Township. This cul-de-sac has a low area in the western portion of the cul-de-sac. The sizeable ponding that occurs in this area causes an icy patch in the winter, and provides a mosquito breeding ground in the spring and summer. We are unable to eliminate the ponding through paving (as we sometimes can); the solution would be to install additional storm sewer piping and inlets to address this situation. The attached map shows the area that ponds, the existing infrastructure, and the project limits. Please note that the following estimate is preliminary, and is an adequate budget number to proceed with, but as always, the more accurate estimate will come with the design, and the ultimate price is determined by the sealed bidding process.

(Please see attached map titled "Arthur Road SWMAC)

Request for endorsement from the SWMAC:

Survey & Design – 2017	**$10,500**
Construction – 2017	**$49,500**
TOTAL PROJECT COST	**$60,000**

3. Willow Avenue & Radnor Street Road Storm Sewer Extension

The intersection of Willow Avenue and Radnor Street Road can get severely flooded during large storms; the project being put forth is not a flood mitigation project in regards to Gulph Creek and the North Wayne area. What this project is intended to do is provide additional inlets and piping to address run off in the more frequent storms, that cause ponding in the intersection as well as run off issues at the property on the south east corner. The project will entail the addition of inlets and piping on Radnor Street and Willow, to convey runoff that sole inlet cannot handle. The attached map shows the area that ponds, the existing infrastructure, and the project limits. Please note that the following estimate is preliminary, and is an adequate budget number to proceed with, but as always, the more accurate estimate will come with the design, and the ultimate price is determined by the sealed bidding process.

(Please see attached map titled "Willow & Radnor Street SWMAC)

Request for endorsement from the SWMAC:

Survey & Design – 2017	**$14,000**
Construction – 2017	**$61,000**
TOTAL PROJECT COST	**$75,000**

I respectfully request the SWMAC review the three aforementioned projects, and at the September meeting endorse them to move forward as noted, and placed in the budget.

GANNETT FLEMING MEMORANDUM

Date: April 9, 2014

To: Radnor Township

From: Gannett Fleming

Re: Malin Rd. Culvert Field View

A field view was performed the morning of March, 26, 2014 on the above referenced culvert which carries Malin Road, just north of its intersection with Bryn Mawr Avenue, over Foxes Run in Radnor Township, Montgomery County. The field view was performed to determine the structural condition of the structure's east headwall as requested by the township on March 25, 2014. The field view was limited to visually accessible elements; elements below water or groundline were not assessed.

Structure Description

The structure is a culvert approximately 33'-8" long consisting of two original 72 inch diameter by 17 feet steel riveted pipes placed side-by-side that was later extended to provide a wider roadway above. The extended portion consists of two steel-encased I-beams placed approximately three feet from either end of the steel pipes at a spacing of approximately 3'-5", with 4' headwalls placed above the fascia beams to retain the fill for the roadway surface. The clear span of the widened portion is approximately 12 feet, roughly the combined width of both barrels. The beams sit atop stone masonry abutments that end in flared wingwalls at all corners (also stone masonry) and extend to the tops of the headwalls.

Except for the northwest wingwall, all ends of the headwalls terminate one foot or more beyond the clear span of the culvert and behind the wingwalls. This creates a buttressed effect on the headwalls such that they provide lateral support to the headwall.

Foxes Run in the vicinity of the culvert flows generally west to east. Its alignment entering the culvert is generally straight with a gradual transition from the streambed into the pipes. Water at the outlet end of the pipe has a waterfall effect because the pipe outlet was approximately 1' above the water line at the time of the field visit. No cut-off walls are present at either end of the barrels.

Structure Findings

The condition of the headwall was viewed as well as the culvert to determine if there are other deficiencies that could be compromising the structural integrity of this structure. Findings on the headwall and the remaining structure are summarized as follows:

Headwalls

The east headwall, although spalled at the bottom with exposed corroded reinforcement and encased I-beams, does not exhibit distress such as bulging, cracking or excessive rotation that would indicate the wall is in danger of collapse. The presence of the masonry wingwalls

at either end of the headwall provides further support against overturning of the wall. The portions of the wingwalls buttressing the headwall are relatively plumb with all stones intact and only minor scaling of the parging layer and mortar.

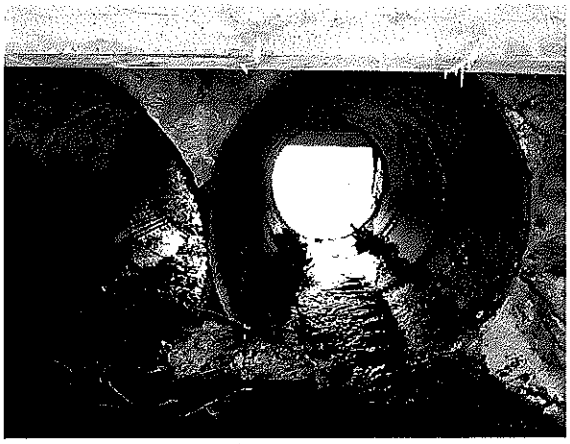
Southeast Wingwall

Northeast Wingwall

Remaining Structure

Both steel pipe culverts are heavily corroded with rust laminations throughout. Of the two pipes (north and south) the south pipe is more heavily corroded with holes throughout, mainly along the waterline. The pipes do not appear to be bulging or misshapen due to loss of section.

The holes in the pipe act to both trap debris and allow water to pass behind and between the pipes. This is evidenced by extensive undermining at the culvert outlet: Approximately 3 feet of undermining are present at the southeast culvert outlet along the south abutment and wingwall, as well as below and behind the outlet end of the south pipe. The north abutment and wingwall also exhibit undermining, though not as severe.



Culvert Inlet ~ 6" deep

Culvert Outlet ~ 4' deep

Conclusions

Despite the deficiencies noted during the field view, all structure components appear to be intact and free from excessive deformation, bulging or settlement. However, exposure of steel at the bottom of the headwalls will result in further corrosion and subsequent spalling of the headwall and encased I-beam concrete.

The holes in the pipes allow water to flow behind them and will continue to erode the fill behind them. In addition, the stream behavior through the culvert and the cascade effect at the outlet likely also contributes to streambed scour and undermining found below the east end of the abutments and the north and south wingwalls.

The roadway surface does have some depressions in the wheel paths on the northbound side of Malin Road, which could indicate shifting of material below the roadway as fill is removed behind the pipes due to stream flow.

Recommendations

The following recommendations are made in order to extend the serviceability of this structure:

- Repair spalled areas of concrete at locations of exposed steel – both reinforcement and concrete encased beams. Blast clean exposed steel prior to patching with concrete.

- To stabilize streambed material, install cutoff walls (e.g., concrete, riprap or gabions choked with grout or stone) at the culvert inlet and outlet.

- Place concrete and/or flowable fill at undermined portions of abutments, wingwalls and pipe outlets to fill these voids.

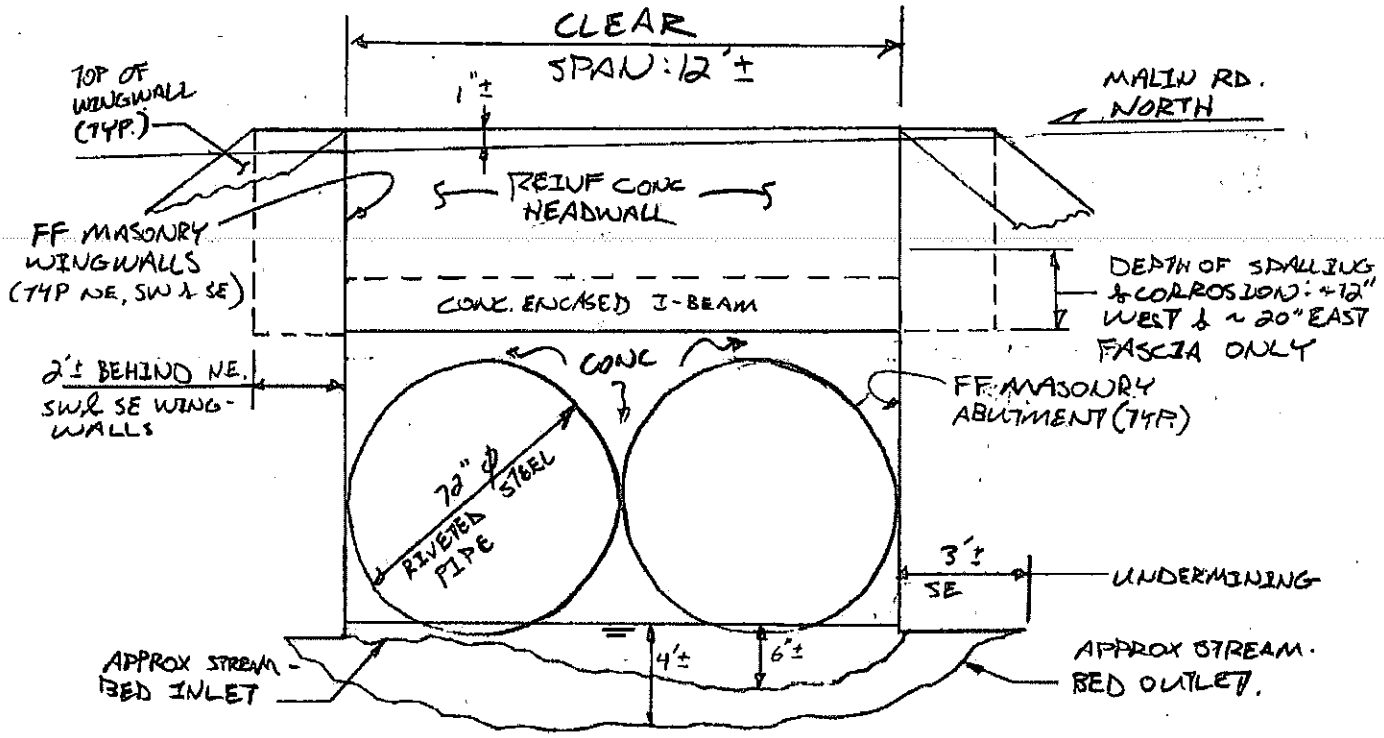
- Inject grout behind and between the steel barrels from the corrosion holes to fill in all open gaps behind the barrels.

- Consider lining the pipes to mitigate further corrosion and section loss to the pipe walls.

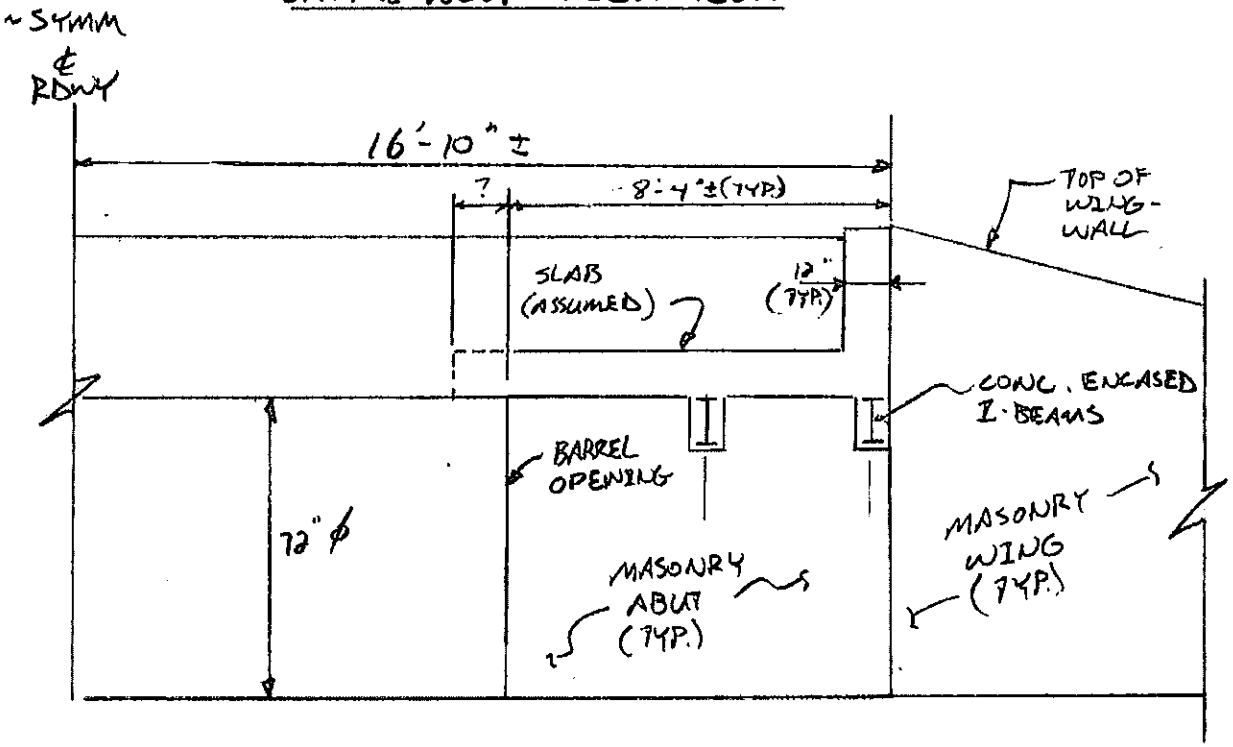
Gannett Fleming

SUBJECT MALIN RD CULVERT - RADNOR TWP. FIELD SKETCH | SHEET NO. OF | JOB NO.

BY CM DATE 3/14 CHKD. BY DATE



EAST & WEST ELEVATION



½ SECTION THROUGH CULVERT

Malin Road Culvert Rehabilitation Preliminary Construction Cost Estimate

	Construction Effort Estimate:	Days	Equip			Mat'l
1	Channel water through one pipe at a time for pipe rehabilitation					
a	Place fabric and rip-rap to channel water through one pipe (~1/2 day per pipe, 3 people, backhoe, 3 yds rip-rap).	1	$ 2,150.00	/mo	$	135.00
b	Place temporary lining into pipe to prevent water intrusion during grouting (~1/2 day per pipe, 3 people).	1				
c	Remove rip-rap after completion of project (~1 day, 3 people, backhoe).	1				
2	Place concrete and flowable grout at undermined portions of abutments, wingwalls and pipe outlets to fill these voids.					
a	Remove debris and loose base material in undermined areas – do not over-excavate in these areas (~1 day, 3 people).	1	*			
b	From streambed depth, excavate 1ft wide by 3'-6" deep trench at front face of wingwalls and abutments for placement of cutoff wall below streambed (~2 days, 3 people, 1 backhoe).	2	*			
c	Place concrete into void areas behind abutments, wingwalls, below pipe outlets and formed cutoff wall (~4 days, 3 people, cement mixer, 2 yds concrete).	4	$ 350.00	/wk	$	600.00
3	Inject grout behind and between the steel barrels from the corrosion holes to fill in all open gaps behind the barrels.					
a	Fill in voided areas behind, between and below culvert pipes (~3 days, 3 people, grout pump, 10 cf grout).	3	$ 530.00	/wk	$	42.50
b	Trowel finish exposed areas (~1/2 day, 3 people).	0.5				
4	Install cutoff walls (e.g., concrete, riprap or gabions choked with grout or stone) at the culvert inlet and outlet.					
a	Excavate to 3'-6" by 5' length below inlet and outlet (~2 days, 3 people, backhoe)	2	*			
b	Install concrete or R-6 rip-rap cut-off wall – BD-632M Sht 6 w/o apron (~4 days, 3 people, 24 CY rip-rap)	4	*		$	1,080.00
c	Replace streambed material – BD-632M (~1 day, 3 people)	1	*			
5	Repair spalled areas of concrete at locations of exposed steel – both reinforcement and concrete encased beams. Blast clean exposed steel, coat with epoxy paint and apply epoxy bonding compound prior to patching with concrete.					
a	Remove delaminated concrete (~1 day, 3 people)	1				
b	Clean exposed steel surfaces and coat with epoxy paint (~2 days, 3 people, compr, blast equip & matls)	2	$ 291.00	/wk	$	100.00
c	Apply epoxy bonding compound to repair surfaces, trowel concrete to patch spalled areas (~3 days, 3 people, 500SF epoxy paint, 500SF epoxy bonding compd)	3			$	247.50
6	Lining the pipes to strengthen and mitigate further corrosion and section loss to the pipe walls					
a	Clean steel surfaces and remove rust laminations (~3 days, 3 people, compr, blast equip & matls)	3	*			
b	Utilize Milliken spray applied tunnel lining, 50-year life (1.5" thick - Structural) ($62,100 unit cost including design and mob.)	-				
c	Finish ends into cutoff wall to mitigate potential for water penetration.	-				
	Total Production Estimate:	29.5	$ 3,321.00		$	2,205.00
	Engineering Costs:				$	72,400.00

Total Labor:	$ 42,480.00
Total Equipment:	$ 3,321.00
Total Materials:	$ 2,205.00
Milliken Lining (50 yr life):	**$ 62,100.00**
Traffic Control:	$ 2,000.00
5% Mobilization:	$ 5,605.30
15% Contingency:	$ 16,815.90
Construction Subtotal:	**$ 134,527.20**
Engineering Fee:	**$ 72,400.00**
TOTAL 50 YEAR PROJECT COST:	**$ 206,927.20**
Assume structure rehab cost in 50 yrs (3% per year at 50 years)	$ 907,149.40
TOTAL 100 YEAR PROJECT COST	**$ 1,114,076.60**

* Rental cost already included

Notes:

- Construction costs are based on anticipated methods/process used by the contractor and will likley vary in the final bid based on the contractor's means and methods of construction. Quantities are approximate based on the field view performed on March 26, 2014 and do not reflect actual surveyed field data.
- 1 person @ $60/hr average * 8Hr Day * Crew of 3 - $1440/day
- Labor rates, material & rentals include O & P

Malin Road Culvert Replacement Preliminary Cost Estimate

		Qty	Unit $	Item Cost
Construction Item Estimate:				
1	Bypass Pumping (assume similar to rehab costs) - LS	1	$ 7,000.00	$ 7,000.00
2	Excavation - Roadway open cut to 3.5 below streambed (includes additional 33% for excavation behind wingwalls) - CY	818	$ 25.00	$ 20,448.75
3	Backfill - Roadway open cut to 3.5 below streambed (includes additional 33% for excavation behind wingwalls) - CY	818	$ 55.00	$ 44,987.25
4	R-6 Streambed Lining at inlet and outlet (includes 100% for embankment lining) - CY	50	$ 80.00	$ 4,000.00
5	Class A Concrete (Footings, wingwalls & aprons) - CY	66	$ 600.00	$ 39,600.00
6	Class AA Concrete (Relief Slab, Sleeper Slab, Barrier & Toe Wall) - CY	79	$ 650.00	$ 51,350.00
7	Steel Reinforcement - (assume 200lb/cy of concrete)	29000	$ 1.40	$ 40,600.00
8	Pipe Culvert (Single pipe arch assumed, 117 X 79, 100 year life) - LF	34	$ 200.00	$ 6,800.00
9	Formliner (Say similar to Chamonix @ $9000)	1	$ 9,000.00	$ 9,000.00
10	Traffic Control - LS	1	$ 2,000.00	$ 2,000.00
Engineering Fee				$102,000.00

Note: Construction costs are based on recent unit prices of District 6-0 projects. Quantities are approximate based on the field view performed on March 26, 2014 and do not reflect actual surveyed field data.

Total Item Cost	$ 225,786.00
5% Mobilization:	$ 11,289.30
10% Contingency:	$ 22,578.60
Construction Subtotal:	**$ 259,653.90**
Engineering Fee:	**$102,000.00**
TOTAL PROJECT COST (100 year life):	**$ 361,653.90**