



Development Engineering

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January 6, 2016

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**Re: PAINTED HILLS FLOODPLAIN REVIEW – Comment Review Meeting Document
City Project No.: SUB-2015-0001
DETAILED Review Comments for Submittal #1**

We have looked over the submittal of the documents provided for the above-mentioned project. The goal of our review is, within our capacity, to make sure that the submittal to FEMA is complete and provides information enabling FEMA to review and see if the modifications “have been adequately designed” and “will be adequately maintained” (MT-2 submittal instructions). “The supporting data must include all the information FEMA needs to review and evaluate the request” (44 CFR 65.6(a)(1)).

In this review, there were a few items for which we request further clarification, provided below. Note: SS = Spokane Valley Street Standards, SRSM = Spokane Regional Stormwater Manual, ROW = right of way,

General

1. These comments are to be applied in conjunction with comments from Spokane County. If any conflict should occur between the two reviews please bring it to our attention for resolution.
2. Please apply for a Floodplain Development permit and a Land Disturbance permit for both Spokane Valley and Spokane County. Include permit numbers on the plans.
3. Contact Ecology regarding the need for a NPDES Construction Stormwater Permit.
4. If there is any concern with the acceptance of the design by FEMA, we recommend first having a preliminary discussion with Lynn Schmidt/Ecology prior to submittal to FEMA.
5. Prior to construction permit release, the following needs to be accomplished:

- a. Copy of CLOMR from FEMA
- b. Plan approval from Spokane Valley and Spokane County
6. Prior to construction acceptance, the following needs to be accomplished:
 - a. Copies of the Department of Ecology (DOE) drywell registrations for all new drywells (submitted with construction certification)
 - b. Record drawings showing as-built condition
 - c. Revisions to HEC-RAS model and reassessment of the freeboard if construction has altered the channels from that depicted in the model
 - d. Formation of HOA with CC&R's if it will be responsible for the project components
 - e. Letter from design engineers certifying project constructed according to approved plans and specifications
 - f. Levee certifications (44 CFR 65.10 (e))
 - g. Construction Certification Package

FEMA Forms and Submittal

7. MT-2 Form Instructions
 - a. Form 2,
 - i. D. Common Reg. Requirements – include proof of property owner notifications and evidence of regulatory floodway revision notification
 - b. Form 3,
 - i. C. Bridge/Culvert, 3. – finish filling out this section
 - ii. E. Levee/Floodwall – please use Geotech reports and revised plans to fill out this section. If additional information is needed please bring it to our attention.
 - c. Hydraulic calcs – include digital files for calcs supporting the Flood Control improvement design

Civil Plans

8. Prior to Civil Plans approval the following must be accomplished:
 - a. Recording numbers of the easements for the stormwater facilities (including the park area) and maintenance access roads outside right-of-way and border easements on the plans
 - b. Provide a single, complete Financial Plan and an Operations and Maintenance (O&M) Manual for the funding, operation, maintenance, repair, and replacement of the project components, including the stormwater systems, levees, impact mitigations, etc. as described on the Civil plans and in the reports (such as the Geotech reports and the Biological Evaluation by BSW). Include specific tasks, frequencies and costs. See SRSM chapter 11 for details. Include the person/entity responsible for the financing, operation and maintenance so that the project will be in compliance with SRSM chapter 11; 44 CFR §60.3(b)(7), §65.6(a)(12), and §65.10(d). For the levees, provide a brief description of what some of the repairs may involve. All discussions need to be in terms a non-

technical person can understand. If a Financial Plan and an O&M Manual is created for the onsite development then these two manuals need to be under a single cover prior to final acceptance of the onsite construction.

- c. O&M manual – 44 CFR 65.10 (d) states for levees “At a minimum, maintenance plans shall specify the maintenance activities to be performed, the frequency of their performance, and the person by name or title responsible for their performance. ” Please make sure these items are covered including the frequency and name of responsible party. Prior to construction acceptance the O&M items mentioned in SRSM chapter 11 (e.g. financial plan, etc.) need to also be included.

9. General

- a. The drainage plans shall provide enough detail for a third party to construct the proposed facilities per the engineer’s design (SRSM3.5.2)
- b. Confirm that the plans contain the applicable minimum plan elements per SRSM 3.5.2
- c. Identify/specify and locate all structures (pipes, manholes, drywells, grates, ponds, levees, berms, fences, access roads, etc.), including their alignments, in space and their boundaries (as applicable). Provide lengths and dimensions as needed. For all structures reference applicable standard plans; make sure references are for correct jurisdiction.
- d. Provide maintenance access to all stormwater and levee facilities (SRSM 11.1.6), provide approaches where accesses connect to a road
- e. Stormwater facilities (including the park area) and maintenance access roads outside right-of-way and border easements must be in a tract or easement (SRSM 11.1.6, 11.2). Show easements/tracts on the plans. Easements must be recorded at the County with a copy of what was recorded (with the recording number on it) returned to Development Engineering or Spokane County, as applicable. Recording numbers must be placed on these flood mitigation plans, the onsite civil plans (as applicable) and plat (as applicable) prior to final approvals. For drainage easements receiving water from Spokane Valley public facilities, please use the City’s form.
- f. At points along all project levees call out proposed top of levee elevation, BFE and max required freeboard (44 CFR 65.10 (b)(1)(i)). For levees that will also be used for access provide surfacing details.
- g. Please include our plans acceptance stamp on each sheet. Plans to be reviewed for acceptance once FEMA comments addressed.
- h. Include details for the proposed improvements to the existing levee between Thorpe and Dishman-Mica roads. Include, at least, existing and proposed elevations and slopes, elevations of the pedestrian bridges at the levee, cross-section showing existing and proposed geometry with surfacing, other items as mentioned above, items called out in sections 4.8.2, 5.2, 5.5, 6.6 of the Biological Evaluation by BSW and in section 3.4 of the Geotech report for this levee, etc. Evaluate the need for erosion protection at outlet of Thorpe culvert where the model shows velocities around 7 ft/s. Show how the ground will transition from the existing pedestrian bridge elevation to the raised levee elevation.

- i. Provide design details mentioned in the Biological Evaluation by BSW showing elk travel corridor improvements (sections 4.7, 5.6, 5.10, 6.1-6.7) and impact mitigations (sections 5.0, 5.2, 5.6, 5.8, 5.10, 6.1-6.7) that are pertinent to the improvements shown on these Civil plans.
 - j. Show riparian buffer limits
- 10. For the final submittal, the cover sheet shall be signed and dated by project proponent or agent
- 11. Sheet FC0.0 Cover sheet, include (SS 4.4.2) –
 - a. Provide the following information:
 - i. Spokane Valley
 - 1. SUB-2015-0001
 - 2. FPD-2015-???? (Floodplain Development permit number)
 - 3. EGR-????-???? (Land Disturbance permit number)
 - ii. Spokane County
 - 1. Floodplain Development permit number
 - 2. Grading permit number
 - b. Include the following drywell construction note on the cover sheet: Construction of every drywell, including fabric and drainrock, shall be observed by the on-site inspector to confirm that it meets the design details and specifications. Drywells not observed shall have their performance verified by a full-scale drywell test.
 - c. Easement recording numbers
- 12. Sheet FC0.1 General Notes
 - a. General Grading Note 6 – add that these elevations shall also be used for finished grade
- 13. Sheet FC4.0 South Grading and Drainage Plan
 - a. Show existing culverts and alignment of Detail 1 FC4.3
 - b. For the ponds, per SRSM, detail the maintenance access roads (11.1.6) and fencing (7.8.7). For the south pond show how water will get past the fencing and into the pond.
 - c. Show pavement cuts with dimensions
 - d. Show how the north edge of the park area will transition back to existing ground and call out slopes
 - e. A note in the HEC-RAS PCM model says that Thorpe is raised at the culverts. If this is true provide design including elements per SS 4.6, especially SS 4.6.3.
 - f. Identify the dashed lines in Thorpe and Madison Roads
 - g. Through the hydrograph, are the maximum velocities for flows down the slopes into the south pond and the distribution pond high enough to warrant erosion control measures on the slopes?
 - h. Construction notes –
 - i. Recommend calling out all pertinent detail sheets for the facilities
 - ii. Note 4 – compaction – reference the specific Geotech report
 - iii. Note 5 – include that pipe is to be rubber gasketed
 - iv. Note 9 - compaction – reference the specific Geotech report
 - i. Why does the gravel gallery extend all the way to Madison Road?

- j. Legend – show property lines, proposed concrete and limits of proposed stormwater ponds
- k. Title block – check road name
- 14. Sheet FC4.1 West Grading and Drainage Plan
 - a. Show proposed accesses from the site to Dishman-Mica Road that cross the levee. How will these accesses be constructed so as to not compromise the levee's function?
 - b. Dishman-Mica Road Section –
 - i. Check road cross-slopes
 - ii. Call out centerline
 - iii. Future development should include a 6 foot sidewalk
 - iv. Levee top should be shown higher than the road, provide range of distances between edge of future development and top of levee
 - v. Provide path surfacing details
- 15. Sheet FC4.2 Triangle Pond
 - a. Plan view –
 - i. provide lines to show alignment of levee and adjacent channel
 - ii. Show existing crossings to be removed as mentioned in the Geotech levee report section 3.1
 - iii. Show culvert at start of channel
 - b. Construction Note 2 – provide pond access road details.
 - c. For the pond and levee, per SRSM, detail the maintenance access road (11.1.6) and fencing (7.8.7)
 - d. Levee Detail –
 - i. Note – compaction – reference the specific Geotech report
 - ii. show location of alignment line
 - iii. specify width of slope between levee and channel and/or depth of channel
 - iv. specify some details for slope at right bank of channel
 - e. Title block – provide correct location
- 16. Sheet FC4.3 Grading and Drainage Details
 - a. Provide design calcs and details for the drywell rock
 - b. Forebay Ponds Section
 - i. Sidewalk is 5'
 - ii. Confirm that drywell rock at culvert outlet will not erode
 - iii. Show and callout drywell in the overflow/park area to identify rim elevation
 - iv. Show right-of-way and border easement
 - c. Gravel Gallery –
 - i. provide pipe details. Is pipe perforated?
 - ii. Specify geotextile
 - d. Title block – provide correct location
- 17. Sheet FC5.0 Madison Drainage Plan
 - a. Show road alignment with stationing, confirm future road widening width.
 - b. Construction Notes –

- i. Note 1 – have arrows point to portion of pipe to be removed
 - ii. Note 2 – include that minimum pavement section is 4/6
 - iii. Note 5 – confirm pipe type on WSDOT pipe cover tables
 - c. Title block – provide correct location
- 18. Sheet FC5.1 Pond Details
 - a. Confirm that –
 - i. The maintenance access roads (including alignment, cross-section, width, surfacing, slope, etc.) and fencing are detailed. Maintenance road must go within 15 feet of structures.
 - ii. All side slopes are called out
 - b. Forebay – show and dimension the drywell rock
 - c. Collection pond – provide erosion protection on side slopes as needed
 - d. Triangle Pond – confirm that maintenance road provides access to all structures
 - e. Construction Notes –
 - i. Note 3 – what is a CMD pipe?
 - ii. Notes 6 & 7 – provide cross-sections and rock details. Need geotextile?
 - f. Title block – provide correct location
- 19. Sheet FC9.0 – FC9.3 – Erosion Control
 - a. General notes –
 - i. include reference to Spokane Valley
 - ii. Please add a note to the ESC standard notes that “A site log shall be completed with the project per SS 5.4”
 - b. Show silt fence and stockpile locations
 - c. Check numbering on Appendix 9A notes
 - d. Title blocks – provide correct location

Flood Control Development Narrative (dated July 23, 2015)

- 20. SRSM 3.4 – provide
 - a. short discussion about floodplain background (e.g. see Biological Evaluation by BSW, sections 4.8.1, 4.8.2), Painted Hills and how this project fits in,
 - b. include discussion of Geotech Phase II study,
 - c. maps showing locations of -
 - i. all components discussed in report
 - ii. all Geotech evaluation sites (Phase I and II) with the proposed flood mitigation components
 - iii. contributing drainage basins
 - iv. off-site easements
 - d. calculations for all applicable structures such as –maximum velocities for flows down slopes into the south pond and the distribution pond, maximum velocities out of the 36-inch culverts, riprap sizing at culvert outlets, capacity ratings for beehive grates and gravel gallery pipe entrances, design calcs for v-ditch into triangle pond and riprap pad, etc.

21. Report Narrative

- a. Page 1, Concept Design and Process – since the stormwater is being directly injected into the ground, how will this water be treated?
 - b. Page 2 –
 - i. Both Ponds in Tandem –
 1. Confirm that pipe inverts are 1.55 feet above pond bottom
 2. How will the separation in elevation remove anything other than large suspended solids? Is the residence time long enough to enable fine sands and smaller particles to settle out? (note the forebay discussion mentions silt deposits)
 3. Silt is mentioned as accumulating in the forebay. O&M manual needs to discuss maintenance details to ensure that the silt is removed
 - ii. Broad Crested Weir –
 1. What is the 2.22 foot depth measured from?
 2. Provide information supporting that the floating filter will have 10 times the surface area
 - c. Page 3 –
 - i. Infiltration Rate – the gravel galleries are closer to P-5 (TP28) and the soils are more similar at P-5 (SM) than those at P-3. Use infiltration rate from P-5 for the gravel galleries.
 - ii. Hydraulic Analysis –
 1. Hydraflow is not on FEMA’s list of approved software programs. We recommend that before submitting the study you check with FEMA to see if they will accept this software.
 2. Discuss how the storm volumes compare between the HSPF model and the Hydraflow model
 - d. Page 4 –
 - i. Hydraulic Analysis, continued – Table 2 – for 100-year storm how can the water level in the upstream collection pond be lower than at the downstream weir? How does this compare with the PCM HEC-RAS output elevations?
 - e. Page 5, Table 4 – is heading “Elevation of inlet” supposed to be “Water Elevation at Inlet”?
 - f. Page 6, Secondary Flow Across Madison Road – at STA 20+44 and 24+41 the drywell outflow rates provided in the table appear to be derived from TP-19 where the soils are SP but the test pits closest to these drywells, TP-20, TP-24 and TP-25, show the soils to be either clay or clayey sand. Please use drywell outflow rates that would be expected from these latter soils.
 - g. Copies of referenced emails from West Consultants
 - h. Please include some discussion about what happens to stormwater generated between the Triangle pond and Madison Road
22. Report Calcs
- a. Include printouts of the input and of the culvert calcs for the 100-year run
 - b. 2-year storm run, Haase Pond –
 - i. Is this the South Collection Pond?

- ii. the orifice coefficient used for the culvert (pipe projecting) is 1.00. Please provide supporting documentation for this value.
 - c. 2-year storm run, Overflow Pond –
 - i. Is this the Forebay Pond?
 - ii. Why does the contour area decrease as the stage increases?
 - iii. Confirm crest length
 - iv. Provide supporting documentation for the exfiltration rate
 - d. 2-year storm run, Discharge Pond –
 - i. Is this the Distribution Pond?
 - ii. The outflow consists of 4 36-inch pipes at elevation 2001.44. What pipes are these? The gravel gallery consists of 18-inch pipes at elevation 1994.56 +/- . These pipes are shown with a 0.5% slope but the plans show the slope as flat, please explain.
 - iii. The outflow is also modeled using a 78' weir at elevation 2007.44. Please explain where this is.
 - e. Gravel Gallery Calc Sheet – provide an exhibit that relates the run (A, B, C, D, E) to the pipe on the plans.
- 23. Will the gravel gallery pipes, which have no slope, have the capacity to convey the peak flow without backing up the water too much?
- 24. West half of the gravel gallery system is represented by Geotechnical Evaluation Phase II (IPEC 2015) boring B-9. This boring shows that groundwater is very shallow, 11 feet below the ground surface, which puts the groundwater level near the top of the perforated drywell barrel sections and gravel galleries. These readings were taken in July 2015 in the summer of a declared statewide drought. {Per www.ncdc.noaa.gov, the monthly precipitation totals at Spokane Airport for 6 of the 7 months prior to July (March excluded) were near average to far below average with April and May at about 50% of normal, June at 6% of normal and July at 30% of normal.} We are concerned that if the groundwater is this high during a drought year then during a year that is wet enough to produce a 100-year storm the groundwater level will be significantly higher, high enough to make the drywell and gravel gallery infiltration ineffective. This concern is also applicable to the east portion of the infiltration system where the groundwater in July 2015 was 27 feet below existing ground (boring B-10). In a typical year this Chester Creek branch is flowing meaning that prior to the 100-year storm these flows could saturate the ground also resulting in very high groundwater levels. Please address.
- 25. Compare the 100-year water surface elevations between the HEC-RAS PCM run and the Hydraflow run.

CLOMR Application Report (dated Sept 10, 2015)

- 26. Page 3 title block – please check the project location figure at the bottom
- 27. Unnamed Tributary flow - Page 5 says that the total flow for the Unnamed Tributary is 20 cfs but page 10 says it is 16 cfs. Please check.
- 28. Infiltration facilities –
 - a. Page 9 says that the WCE report is 2014 but it should be 2015

- b. Page 10 near the top says that the pond is 215 ft wide by 215 ft long. Confirm that these dimensions are correct.
- 29. Interior Drainage – Page 13 last paragraph mentions 103 drywells, please confirm this number

HEC-RAS Model

- 30. Confirm that the cross-section spacing and the profile downstream of Thorpe matches the Civil plan

Preliminary Geotechnical Evaluation, Phase 1

- 31. Correct all incidences where P-5 is incorrectly called out as P-2

Preliminary Geotechnical Evaluation, Phase 2

- 32. Include this report in the FEMA submittal

Geotechnical Evaluation, Levee Evaluation and Certification (Existing Levee between Thorpe and Dishman-Mica roads)

- 33. Section 2.1 Logs – section mentions previous Geotechnical reports. Please include a description of them in Section 1.4.
- 34. Section 3.4 – discuss the needed erosion protection for the high velocities (7 ft/s) just downstream of Thorpe Road as shown in the table
- 35. O&M Manual
 - a. Section 3.10 Operation – for the financial plan, how much money should be put aside to prepare for fixing flood damage?
 - b. Section 3.20 Maintenance, for the financial plan -
 - i. estimate how many mowings per year and their annual cost. Can 2.3H:1V slopes be mowed?
 - ii. Estimate the frequency and annual cost for tree and objectionable material removal from the levee and creek channel.

Geotechnical Evaluation, Proposed Levee (Levee along east side of Dishman-Mica road)

- 36. Section 3.4 Closures – note that the proposed access appears to penetrate the levee
- 37. Section 3.9 and 3.10 –please include the operation and maintenance plan

Geotechnical Evaluation, Gustin Levee Evaluation (Levee near 40th Avenue)

- 38. Section 2.2 Site Conditions – mentions fairways, please check
- 39. Section 3.5 Embankment Protection – FEMA FIS Station appears to differ from the HEC-RAS cross-section station, please include the HEC-RAS stations.
- 40. Section 3.9 and 3.10 – please include the operation and maintenance plan

Biological Evaluation by BSW

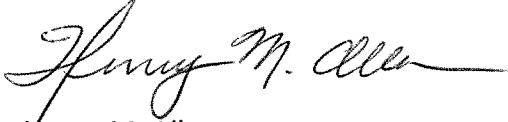
41. Section 5.4 mentions restoring the temporary trench area to its original contours but the civil plans show this area being regraded. Please check.

Please provide a written response to each comment above to ensure that we properly review any revisions or lack thereof.

All submittals must be submitted to the Permit Center.

If you have any questions, please email me at hallen@spokanevalley.org or call me at (509) 720-5319.

Sincerely,



Henry M. Allen
Development Engineer

Copies:

- Bryan Walker, C/O NAI Black, 107 S. Howard St., Spokane WA 99201
- Marianne Barrentine, Spokane County Public Works Building, 1026 W. Broadway Ave., Spokane, WA 99260
- Spokane Valley Planning Department – Deanna Horton
- Spokane Valley Development Engineering – Project File