

Engineering has reviewed the plans for the Woodlands at EF Tract 5 project submitted December 11, 2018 and have the following comments:

**Stormwater Management Permit Application Form**

1. Note only: I. General Information; #3: The project is better located if your description states that it is on the southwest side of Carolina Beach Road.
2. IV. Project Information; #6, #7, #8: The site has existing asphalt cart paths. Are parts of the paths to remain, parts to be removed? Please update page 3 accordingly.
3. IV. Project Information; #14: the Percent Impervious Area for Pond 5-3 appears to be incorrect.
4. IV. Project Information; #15: This line item should be completed if there is offsite impervious area within the drainage area of the SCMs. In this case there isn't, so this should be left blank.

**Stormwater and EC Narrative**

5. Provide any wetland determination or impact permits.
6. Project Narrative: The TR-55 document assigns Wrightsboro soils a HSG rating of 'C', the Web Soil Survey has it as a 'B'. The City acknowledges the TR-55 as the official document. Please revise design and calculations accordingly.
7. There are soils that are not listed in the narrative that are listed within the AOI on the Web Soil Survey printout that was provided. Some of the soils encompass a larger percentage of the project area than the two soils that are in the narrative. Please include all relevant soil types. Check all HSGs with Table H-1 in the TSSM (page 5-52).
8. Proposed SW Control Measures: Storm Network 10-yr HGL information appears to be incomplete (...except one which is...?).
9. Wet Pond [Tract 5-Pond #1]:
  - a. Elevation of Wet Detention Pond Bottom should exclude the sediment storage elevation. Should be 7.0'.
  - b. Depth of Permanent Pool should also exclude the sediment storage elevation. Depth should be 5 feet.
  - c. Average Depth appears to be incorrect due to incorrect PP contour area in the main pool. Update SA/DA Ratio and Required PP surface area accordingly.
  - d. Provided PP Surface Area should be the surface area of the main pool only (6,627sf).
  - e. Storage Elevation (12.90') does not match the elevation on C-5.2 (13.00').
  - f. Storage Volume Provided should be the volume at elevation 13.00' (9,795cf).
  - g. Rework the forebay volume requirements based on the main pond PP volume.
  - h. Update the Stage/Storage Main Pond Contour Area at elevation 12.0'. Contour area listed is for entire pond (forebay & main pool), needs to be main pool only (8,644-2,017=6,627).
10. Wet Pond [Tract 5-Pond #2]:
  - a. Elevation of Wet Detention Pond Bottom should exclude the sediment storage elevation. Should be 6.0'.
  - b. Depth of Permanent Pool should also exclude the sediment storage elevation. Depth should be 5 feet.
  - c. Average Depth appears to be incorrect due to incorrect PP contour area in the main pool. Update SA/DA Ratio and Required PP surface area accordingly.
  - d. Provided PP Surface Area should be the surface area of the main pool only (5,464sf).
  - e. Rework the forebay volume requirements based on the main pond PP volume.
  - f. Update the Stage/Storage Main Pond Contour Area at elevation 11.0'. Contour area listed is for entire pond (forebay & main pool), needs to be main pool only (7,137-778-895=5,464).

11. Wet Pond [Tract 5-Pond #3]:

- a. Impervious Drainage Area and Impervious Cover are not consistent with the SW application.
- b. Update SA/DA Ratio and Required PP Surface Area based on the corrected Impervious Cover.
- c. Update the Provided PP Surface Area based on the main pool contour area (2,943sf).

12. Hold

**Supplement-EZ Form**

**Pond 5-1**

13. Design Volume of SCM is incorrect.

14. General MDC from 02H .1050:

- a. #5: Answer yes for bypass for flows.
- b. #10: Leave blank.

15. Wet Pond MDC from 02H .1053:

- a. #1: Both surface area and volume of the main permanent pool are incorrect.
- b. #2: Average depth of the main pool is incorrect.
- c. #2: Elevation of the bottom of the PP should be 7.0'.
- d. #2: Elevation of the top of the temporary pool is incorrect.
- e. #5: Volume of the forebay is incorrect.
- f. #5: See MDC 5: Forebay in the Wet Pond chapter of the design manual for information on the entrance and exit depths (Figure 5).
- g. #6: Change slope of vegetated shelf (H:V) from 1:6 to 6:1.
- h. #10: A trash rack is being provided. Answer yes.
- i. #11 List the species of turf that will be used on the dam and embankment. Not the same as the vegetation for the vegetated shelf.

**Pond 5-2**

16. General MDC from 02H .1050:

- a. #5: Answer yes for bypass for flows.
- b. #10: Leave blank.

17. Wet Pond MDC from 02H .1053:

- a. #1: Both surface area and volume of the main permanent pool are incorrect.
- b. #2: Elevation of the bottom of the PP should be 6.0'.
- c. #2: Elevation of the top of the temporary pool is incorrect.
- d. Volume of the forebay is incorrect.
- e. #5: See MDC 5: Forebay in the Wet Pond chapter of the design manual for information on the entrance and exit depths (Figure 5).
- f. #6: Change slope of vegetated shelf (H:V) from 1:6 to 6:1.
- g. #10: A trash rack is being provided. Answer yes.
- h. #11 List the species of turf that will be used on the dam and embankment. Not the same as the vegetation for the vegetated shelf.

**Pond 5-3**

18. Minimum Volume required is incorrect.

19. General MDC from 02H .1050:

- a. #5: Answer yes for bypass for flows.
- b. #10: Leave blank.

20. Wet Pond MDC from 02H .1053:

- a. #2: Elevation of the bottom of the PP should be 3.0'.
- b. #2: Elevation of the top of the temporary pool is incorrect.

- c. #5: See MDC 5: Forebay in the Wet Pond chapter of the design manual for information on the entrance and exit depths (Figure 5).
  - d. #6: Change slope of vegetated shelf (H:V) from 1:6 to 6:1.
  - e. #7: Diameter of drawdown orifice is incorrect.
  - f. #10: A trash rack is being provided. Answer yes.
  - g. #11 List the species of turf that will be used on the dam and embankment. Not the same as the vegetation for the vegetated shelf.
21. Deed Restrictions should only restrict the four single-family lots. Please complete the second #6 and leave the first #6 blank. We will also need to review the declarations to see if the townhome owners will have the ability to add impervious surface area to their units.

#### **Pond Routing Calculations**

22. Recheck pre/post curve numbers for all ponds based on earlier comment regarding the HSG issue. Weighted curve numbers are necessary. Provide weighted curve number calculations.
23. Summary for Subcatchment 8S: Post Dev Area #5-3:
- a. Impervious / pervious breakdown does not agree with the application or the pond calculations.
  - b. Please provide an explanation for the increase in time of concentration from pre (8.5 min) to post (13.7 min). Provide Tc calculations to support this.
24. Pond #5-1: A tailwater elevation of 10.50' was assigned at the outlet structure for this pond for the pipe system that the outlet pipe ties into. How was 10.50' determined?
25. Pond #5-2: The emergency spillway elevation must conform to Ch. V.D.4.e.1: Minimum of six (6) inches higher than the top of the outlet structure but in no case lower than the water surface elevation that restricts the discharge to the 25-year pre-development flow rate. The spillway elevation does not restrict the flow to meet this requirement.

#### **Storm Drain Design Computations**

26. Calculations do not provide the tailwater elevation assigned at each forebay pipe inlet for each pond. Please provide. The tailwater elevation cannot be the PP elevation. Ideally it should be the water surface elevation in the pond for the intended storm event (10-yr or 50-yr).
27. How was a discharge flow of 12.00 cfs determined for the existing pipe coming out from under Carolina Beach Road? What size pipe is it?
28. Please provide gutter spread calculations for the inlets within the public right-of-way.

#### **Plans**

29. DA-Map:
- a. Minor revision: There appear to be some inlet drainage areas outside of the overall pond drainage areas.  
Minor revision: Portions of units 29 and 33 appear to be outside of their respective inlet drainage areas.
30. Cover Sheet:
- a. Please provide road profiles for review since the roads are to be dedicated as public.
  - b. Provide the utility plan and profile sheets.
31. C-2.0:
- a. See Section 18-372, Permanent Monuments, in the LDC. Coordinate with the City Surveyor Peter Brennan.
  - b. Per the technical standards, plazas and sidewalk cross-slopes must be between 1 and 2%. Please revise typical cross-sections. Make sure that the slopes are noted on each cross-section.
32. C-2.1:

- a. Vehicles parked in driveways will not be allowed to overhang into the public r/w. Driveways for Units #4, #25 and #36 appear to be short enough that parked vehicles could overhang. The buildings could be shifted into the landscape zone in an effort to lengthen the driveways.
  - b. There appears to be some erroneous hatching in the Concklin Court r/w. Please remove.
  - c. All storm drain pipes that convey public water need to be located in public drainage easements and labeled accordingly. Some pipes have them but the easements need to encompass even the pipe that enters the forebays. The ponds are in maintenance easements, but those are not public easements. The pipe system carrying water from CBR needs to be a public drainage easement as well. Easements shall be sized per the TSSM (min. 20 ft wide).
  - d. Storm pipes need to be a minimum of 10 feet away from the footprints of the buildings.
  - e. Turn off the Autoturn vehicle path.
33. C-2.2: Sewer MHs cannot be in the public sidewalk. If proposed sewer, relocate MHs. If existing sewer, relocate sidewalk to avoid MHs.
34. C-2.3: What is the existing pipe size under CBR? Please label.
35. C-3.2:
- a. Turn off the Autoturn.
  - b. Better grading is needed at the intersection of McCarley Blvd. and Levon Way to demonstrate constructability. The southern side of McCarley needs to show how the sidewalk will be installed in the same area as the 42" dia. pipe and ditch. The 42" pipe needs a headwall or FES and an energy dissipater. A handrail may be required as well depending on the height of the drop-off.
  - c. Delete the erroneous label at the top of the sheet.
  - d. Will the area behind units 1, 2 and 3 become a low area that collects water? If so, provide some means to move the water out and away from the area or regrade to remove the low area altogether.
  - e. Pipes ends that are submerged in the forebays do not require energy dissipaters.
  - f. Spot grades are needed along the proposed CBR sidewalk to demonstrate constructability and ADA compliance.
  - g. Remove the existing 18" CMP located within the CBR r/w and regrade for an open ditch.
  - h. It is not clear how the proposed pipe will connect to the existing pipe that comes under CBR. Provide a detail if necessary.
  - i. Provide spot grades that clearly demonstrate that water exiting the ES in Pond #1 will actually flow to the waters of the U.S. to the southeast. It does not appear that a path has been provided. MH 12 and the grading around it appear to obstruct any flow path there might be. Look at relocating MH 12. May need to add a structure to realign that pipe run out of the flow path. Lower end of the proposed 36" pipe may have very little cover if any.
  - j. Provide retaining wall elevations showing how Pond #2 outlet pipe will exit through the retaining wall. Also, provide retaining wall elevations to show how the wall will be built in conjunction with the emergency spillway. Is there a significant drop in elevation from the ES to the bottom of the retaining wall? Please demonstrate how you intend to handle that.
  - k. Verify that sufficient vertical separation is provided for the CBR sidewalk or that the sidewalk has been placed outside the necessary clear zone distance.

- l. Verify that the public drainage easement required for pipe run FES25-CI-28 will not be in conflict with the proposed pump station. Verify with CFPUA.
  - m. Pond outlet pipes must have a flared end section or headwall.
36. C-3.3:
- a. The swale at the rear of the SF lots will need to be placed in a private drainage easement so that the swale cannot be altered by the property owners.
  - b. Address how runoff from Lot #4 will be conveyed to the swale. Will roof runoff be pipe to the swale? Please clarify on plans.
  - c. Will the outlet pipe downstream of the pond embankment have any cover? Or will it be exposed?
37. C-5.2:
- a. Label the Temporary (Water Quality) Pool for ponds 5-1 and 5-2 the same way you did for pond 5-3. The temporary pool elevation needs to match the elevation of the next highest weir above the orifice (5-1: 13'; 5-2: 12.30'; 5-3: 9.80').
  - b. Add a note that shelf plantings shall not be planted within 10 feet of the outlet structure. This helps to prevent clogging of the orifice by vegetation debris.
38. C-5.3:
- a. Pipe trench details need to City standard details or NCDOT standard details.
  - b. Provide all stormwater management details (curb inlets, SDMH, drop inlets). The City prefers NCDOT standard details in lieu of City standard details for public SD infrastructure.
39. Provide the landscape plans.

Please submit one complete set of plans, the stormwater narrative, application, calculations and any other supporting documentation to Engineering for additional review. Please call or email if there are any questions. Thank you.