Engineering has reviewed the plans for the Woodlands at Echo Farms Tract 2 project submitted January 11, 2018 and have the following comments:

Stormwater Management Permit Application Form

1. IV. Project Information; Line Item #14: The impervious allocations list Offsite impervious draining to the ponds, but the drainage area for each SCM in the plan set appears to be on-site only. Please verify. If impervious within the Independence Boulevard, Echo Farms Boulevard and Appleton Way truly drains to the ponds then the drainage areas need to reflect that.

H.D.R.S. Deed Restrictions & Protective Covenances

2. Please use the City of Wilmington High Density Residential Subdivisions Deed Restrictions & Protective Covenances form in lieu of the State form that was submitted. It was discovered that the High Density Residential link on the city website directs you to the State Deed Restriction form instead of the City form. That has been corrected.

Stormwater-Erosion Control Design Narrative

Design Narrative (pg. 3)

3. Verify the 44.4% impervious coverage.
4. Pre vs. Post Runoff Summary (pg. 4): Pond #2 & #3 10-yr post is greater than the 10-yr pre. Please make every effort to keep the post-development peak flows less than or equal to pre-development peak flows, which is a city code requirement.

Calculations

5. The curve number calculations only have two pre-development drainage areas, but the plans show three. Please revise so calculations and plans match.
6. For consistency, revise land use from Wooded-Fair to Wooded-Good. The curve numbers used are for woods-good and the technical standards mandate that the city considers pre-development to be woods in good condition for the purposes of determining runoff coefficients.
7. Remove the footnote that refers to a natural barrier island.
8. The breakdown of the post-development basins do not appear to match the information in the application. There are discrepancies in both the Area (Ac.), % Basin. The offsite impervious listed in the table under line item #14 of the application is not included in the calculations. Recheck the weighted CNs.

Woodlands Tract 2 Wet Detention Basin #1

9. The offsite impervious listed in the table under line item #14 of the application is not included in the wet detention basin design calculations. Determine if the offsite impervious actually drains to the pond.
10. The Elevation of Wet Detention Pond Bottom appears to be incorrect.
11. Required SA/DA Ratio appears to need revising based on the corrected average depth. Be sure to use the old SA/DA ratio tables since pond design is based on old rules.
12. Required PP Surface Area will need adjusting based on revised SA/DA ratio.
13. Runoff coefficient and required 1.5” runoff volume may need revising if the offsite component of the impervious breakdown is altered.
14. Based on the stage-storage table and the plan view of forebay #2, it would appear that there isn’t any real volume provided for sediment storage.
15. Contour Elevations appear to be incorrect for Forebay #2.
16. Average Depth Calculation: The area of the bottom of the shelf must include both the main pool and the forebays. Correct the average depth and check the SA/DA ratio and required surface area.
17. Were the two forebays individually sized based on the percentage of the drainage area draining to each one?

18. Provide the pond routing analysis of the 50-year with the principal structure clogged or not operating properly. The results were provided in the Pre-Post Summary, but the analysis is needed.

Woodlands Tract 2 Wet Detention Basin #2

19. Comments #9 - #13 and #16 are valid for Basin #2
20. Depth of Permanent Pool appears to be incorrect.
21. The Elevation of Wet Detention Pond Bottom appears to be incorrect.
22. Volume Below Permanent Pool appears to be incorrect. This volume is taken from the PP to the sediment storage elevation, not the bottom of the shelf.

Woodlands Tract 2 Wet Detention Basin #3

23. See comments for Basin #1 and #2 and apply to Basin #3.
24. The forebay is too small based on the old rules to which the ponds are being designed. The acceptable range is 18-22%. Please resize the forebay.
25. The drawdown times appear to be incorrect as the elevations do not match the plan sheet outlet structure design elevations for Basin #3.
26. Average Depth Calculation: All areas appear to be from a different pond design.

Grassed Swale Calculations

27. Per the technical standards (Chart E-6, pg. 5-16), the rainfall intensity is 7.23 in/hr. Calculations appear to use 7.10 in/hr which is too low.
28. Provide the weighted C-value calculations. The values seem low if the swales are to convey runoff from any impervious surfaces constructed on lots 52-54. Provide swale drainage areas in the plan set that correspond to the calculations.

Pond Routing

29. Please justify the 10 minute time of concentration used for Subcatchment 5S: Post Development and Subcatchment 8S: Post Development. Wet Basin #1 has a larger drainage area and has a 5 minute TOC.
30. Subcatchment 14S: RA#2 area is 1.08 acres. RA#2 is 0.17 acres and RA #3 is 1.08 acres in the plan set. The 0.17 acres is not included in the routing analysis for the pre/post determination.
31. Pond 9P: Wet Basin #3: The vertical orifice is 1.7", the pond design calculations have it at 1.75". Can the routing software carry decimal places to the hundredths?
32. Pond 9P: Wet Basin #3: Device #3 elevation (7.00') does not match the outlet structure secondary spillway elevation (6.50').
33. Pond 9P: Wet Basin #3: Device #3 weir length (20') does not match the weir length for the outlet structure in the plan set (16').
34. Pond 9P: Wet Basin #3: Please help me understand the need for the secondary device #5? Is that truly needed since it was already modeled as the primary inflow to the main pool of the basin? The model appears to show the equalizer pipes having an outflow other than from the outlet structure. Please clarify.

10YR HGL Calculations

35. The minimum cover over a storm drainage pipe shall be 2.0 feet. Cover shall be measured from the top of the pipe to the bottom of the base course in roadways (Technical Standard Ch. V.D.1.f). It would appear that adequate cover has not been provided over some of the piped systems. Please explain where the rim elevation listed in the table is taken from. Is it the top back of curb, edge of pavement, etc.?
36. The pipe system that enters forebay #2 of pond #1 appears to come in deeper than the bottom elevation of the forebay will allow. Please verify.

37. 5.00’ appears to be the tailwater condition assigned for all of the pipe systems, which is the elevation of the permanent pool for each wet pond. 5.00’ is not an appropriate tailwater condition for stormwater analysis.
38. The HGL of FES-19 is below the PP elevation and cannot be considered an appropriate tailwater condition. Please revise.

50YR HGL Calculations

39. After the appropriate tailwater is addressed, recheck the 50YR HGL Calculations for any flooding that could impede emergency access.

MISC.

40. FES-14 does not have an energy dissipater.
41. The outfall pipes from the all three outlet structures do not have energy dissipaters.

Supplements

42. Since the wet ponds were designed using the old rules, please use the City Wet Detention Basin Supplement located at: https://www.wilmingtonnc.gov/departments/engineering/plan-review-section/stormwater-permits for each basin. Make sure the supplements agree with the calculations and the plan set.

Operation & Maintenance Agreements

43. The O&M for Pond #1 needs to address the elevations of two forebays.
44. The O&M for Pond #3 doesn’t match the forebay elevations on C-5.2 or the pond stage-storage calculations.

Plans

45. Add the Stormwater Approval Stamp to all sheets in the plan set.
46. C-1.0:
    a. Note #14 under Site Notes addresses parking lot dimensions. Not relevant to this project.
    b. Add note to erosion control notes that any wet basins used as sediment basins during construction shall be cleaned out and returned to its original design state before it can be used as a stormwater facility.
47. C-2.0:
    a. See Section 18-372 regarding permanent monumentation for proposed public streets. Coordinate with Peter Brennan, the City Surveyor.
    b. Provide the permit for the wetland impact at the intersection of Road R and Echo Farms Blvd.
    c. Sidewalk will be required along the portion of the property that fronts Echo Farms Boulevard and Appleton Way. Appleton Way may need curb and gutter if an adequate clear recovery zone cannot be provided.
    d. Street trees shall be provided by developers in the plazas of public rights-of-way.
    e. A non-municipal utility easement of 10’ in width shall be provided on both sides of all public streets for installation of electric, gas, telephone and cable TV lines.
48. C-2.1:
    a. Provide a graphic scale.
    b. Radius at roadway edge at corners – 35 feet. Radius at roadway edge at corners of Road ‘R’ at Echo Farms Boulevard shows 34 feet.
    c. What surface material is being proposed for the trail to the kayak launch? Provide a detail. Realign the trail to avoid the Pond #1 embankment.
    d. 24” Modified Valley Curb & Gutter detail was not provided on detail sheet.
    e. Is the hatching across Road ‘R’ at the intersection with Echo Farms Blvd for wetland impacts?

f. The entrance to the open space parking must be a city standard concrete driveway.

49. C-2.2:
    a. Provide road cross section for Road 'U'.
    b. Provide a graphic scale for each viewport.
    c. Radius at roadway edge at corners – 35 feet. Radius at roadway edge at corners of Road 'U' at Independence Boulevard shows 34 feet.
    d. The private access easement is currently shown as a right-of way where the property lines end at the r/w line. For an access easement, the property lines must extend thru the access easement.
50. C-3.0:
    a. Stormwater Note #2 refers to an infiltration basin instead of a wet basin. Check plan set for other locations this note shows up.
    b. General Note #4 refers to a parking lot. Please revise. Check plan set for other locations this note shows up.
    c. General Note #7 specifies the use of N-12 HDPE pipe within the public right-of-way. This is incorrect. RCP and ADS HP Storm pipe is allowed within public rights-of-way. Check plan set for other locations this note shows up.
51. C-3.2:
    a. Piped systems to be dedicated public shall be located within the public right-of-way. Where this is not possible, a dedicated drainage easement will be required with a width determined by the equation found on page 5-3 in the technical standards. The easement shall be labeled as a 'public drainage easement'.
    b. Move MH-4 out of the sidewalk and MH-8 out of the driveway entrance.
    c. Headwalls or flared end sections shall be required at the inlet and outlet of all pipe systems.
    d. The proposed lot grading (particularly the lots on the southern side of Road 'R') appears to change the natural drainage pattern of the former golf course. Verify that the proposed grading will not create areas of standing water or flooding conditions that would negatively impact adjoining properties.
    e. Provide Pond #1 outfall pipe information. Add energy dissipater and make sure the ED can be constructed without impacting the wetlands.
    f. How can you ensure that runoff will not be directed toward the rear of the lots and not be collected and treated in the ponds?
    g. Add the 10' maintenance access and 5' landscape zone per the technical standards around the perimeter of the pond.
    h. Show emergency spillway appropriately designed stabilization material from the top of the spillway down to natural grade.
52. C-3.3:
    a. Add a label that provides the swale construction information.
    b. Add equalizer pipe information to the plan view.
    c. Provide Pond #2 & #3 outfall pipe information. Add energy dissipaters and make sure the EDs can be constructed without impacting the wetlands.
    d. How can you ensure that runoff will not be directed toward the front of the lots along Appleton Way and toward the rear of the lots along Road 'U' and not be collected and treated in the ponds?
    e. Add the 10' maintenance access and 5' landscape zone per the technical standards around the perimeter of the ponds.
    f. Show emergency spillway appropriately designed stabilization material from the top of the spillway down to natural grade.

53. C-3.6: Individual drainage areas are not shown for the inlets and swales.
54. C-4.0: Add a match line along Road 'R' (station 25+40) in the plan view where it corresponds with the end of the profile on the same sheet.
55. C-4.1:
    a. Remove the hatching at the Road 'R'/Echo Farms Blvd intersection.
    b. The SS labels in plan view for Road 'U' do not match the SS labels in the profile.
56. C-4.3: Move the FM alignment out of the pond embankment. Maintenance on the FM would compromise the pond.
57. C-5.0: Add City standard detail SD 3-05.
58. C-5.2:
    a. Add the pipe length to the outlet pipe labels.
    b. The invert down for Pond #1 outlet pipe (4.0') does not match routing.
    c. Add elevation information for both forebays for Pond #1.
    d. Pond #1 emergency spillway elevation must be 6 inches higher than the top of the outlet structure.
    e. Pond #2 secondary spillway elevation (6.25') doesn't match calculations and routing.
    f. Pond #2 outlet structure size does not agree with the routing. A 5'x5' top grate opening would provide a 20' weir length as listed in the routing.
    g. Pond #3 secondary spillway elevation (6.50') doesn't match calculations and routing.
    h. Pond #3 outlet structure size does not agree with the routing. A 5'x5' top grate opening would provide a 20' weir length as listed in the routing. Detail lists a 16' weir.
59. CFPUA detail sheets can be omitted from the plan set.

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