

Provost & Rovero, Inc.

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February 6, 2023

Maureen Fitzgerald, Environmental Planner
Town of Waterford
15 Rope Ferry Road
Waterford, CT 06385

**RE: Kingstown Properties, LLC – Affordable Housing Development – Clark Lane
P&R Job No. 213009**

Dear Ms. Fitzgerald:

Attached, please find revised plans and supplementary storm drainage calculations which address January 26, 2023 comments prepared by SLR International Corporation (SLR) and items discussed during the January 26, 2023 public hearing. The following information is offered for your consideration with responses corresponding to numbered review comments where applicable:

SLR Engineering Review Comments

1. The sediment basin has been revised and now includes a dewatering drain. Revised sediment basin design calculations are included in the supplementary drainage report.
2. The 100' upland review area line has been shown and labeled on site plan sheets.
3. Concrete sidewalks connecting each house to the paved parking areas have been added to the plans. There are no plans at this time to install a sidewalk system along the private roadway. Note that all impervious house footprints have been shown as 28'x48'. The actual houses to be constructed by the applicant will be 26'-8"x48'. The minimal increase in impervious area due to the sidewalk connections is accounted for with the small reduction in house footprints. Also note that the bioretention and detention basin system has been revised to further enhance stormwater quality treatment. As shown in the supplementary calculations, the system will have excess capacity for both water quality treatment and peak flow control to accommodate minor increases in impervious coverage in the event that such increases become necessary in the future.
4. Item #2 in the Construction Sequence on sheet 15 has been revised to include temporary construction fencing along the northerly, southerly and westerly project limits to provide a protective barrier.
5. Additional yard drains have been included to the rear of units 27 through 47 to prevent localized ponding. Proposed DMH 114 has also been changed to a catch basin inlet.

6. A reinforced turf access path has been provided to the bioretention basin for maintenance. The path is shown on sheet 5. A cross section detail for the reinforced turf has been added to sheet 16.
7. Item #17 in the Construction Sequence on sheet 15 has been added for diversion of groundwater from the major cut areas on the westerly side of the project. This will address the primary concern for dewatering during major site work.
8. The bioretention basin has been reconfigured to include an internal storage reservoir (ISR) which functions as a subsurface gravel wetland. This updated design takes advantage of the shallow groundwater condition in the basin footprint as the ISR requires anaerobic conditions from continuous inundation for enhanced nitrogen renovation. An upgradient underdrain will be utilized to control groundwater levels to provide for initial surface storage of the water quality volume (WQV) while still allowing for anaerobic conditions in the ISR bed. The bioretention soil mixture requirements have also been revised to further enhance phosphorus renovation. The revised design of the bioretention basin is based on 2020 recommendations and requirements developed by the University of New Hampshire Stormwater Center which are much more up to date than the 2004 Connecticut Water Quality Manual. The updated design is shown on sheet 17. A summary detail prepared by the University of New Hampshire Stormwater Center is shown for reference in the supplemental calculations.
9. As noted in #8 above, the revised bioretention basin with the ISR system actually requires anaerobic conditions which are provided by the combination of controlled groundwater and an impermeable base below the ISR.
10. The outlet inverts for DMH 114 (now CB 114) and CB 109 have been dropped as suggested.
11. There have been no changes to the slope at the rear of units 1 through 16.
12. Item #18 in the Construction Sequence on sheet 15 addresses the requirement to install catch basin inlet protection devices while the site is being permanently stabilized.
13. The proposed slab elevations for each home have been added to the plans.
14. The applicant is intending to utilize curb side pickup for trash and recycling within the development.
15. Based on our review of the as-built sanitary sewer plans for Clark Lane from 1985-1986, all of the houses adjacent to the project are connected to the sanitary sewer system and are not served by septic systems.
16. Proposed spot grades have been added at high and low points in the roadway.
17. The attached supplementary drainage calculations utilize curve numbers for a good hydrologic condition based on further review of the on site ground cover conditions. In general, this change indicates a more conservative design for the stormwater management system.
18. All roof areas will be connected to the storm drainage system except for units 14, 15 and 16. These connections have been shown on sheets 7-9. Units 14, 15 and 16 will discharge roof runoff at the approximate location where the current Clark Lane drainage system eventually flows. The intention is to provide additional clean runoff at this location to maintain existing hydrologic conditions for the downgradient wetland system.

19. The pipe capacities have been added to the storm sewer design summary report included in the supplementary calculations. Note that the "Maximum Flow" reported is based on a simple application of Manning's equation and does not account for either headwater or tailwater affects. The storm sewer pipes have actually been designed based on the hydraulic grade line at each structure in the network and preventing overtopping at each location. We believe this energy based network approach is preferable to a simple application of Manning's equation.
20. The detention basin outlet pipe has been changed to a 30" pipe.
21. Calculations are included in the supplement showing a flow velocity from the level spreader of 1.70 ft/second based on the revised stormwater basin design.
22. The watershed labelling has been corrected in the drainage routing diagram.
23. The label for the detention basin outlet has been corrected to match between the calculations and plans.

Wetland Science Review Comments

Additional responses to Wetland Science Review Comments are provide separately by Joseph Theroux, certified soil scientist. Responses below are provided to supplement information provided by Joseph Theroux.

1. Offsite wetlands were delineated to the extent necessary to define potential upland review areas on the subject property.
2. Perimeter silt fence has been revised to provide a continuous barrier along the northerly, easterly and southerly limits of work. If any additional measures are warranted to protect specific species, we anticipate that they will be stipulated by CT DEEP in conjunction with the construction stormwater discharge permit registration and associated SWPPP development.
3. Please see Joseph Theroux response. We note that both the bioretention basin and detention basin have been designed to dewater soon after the end of a rain event and neither basin will include a permanent pool to act as decoy habitat for potential vernal pool obligate species.
4. A planting plan has been provide on sheet 17 for the stormwater basins. The detention basin will be planted on the base with "New England Wetmix" which includes a number of native wetland species. We anticipate that these species will thrive in the expected hydric soil regime at the bottom of the detention basin.
5. As noted above, we anticipate a hydric soil regime in the bottom of the detention basin. The intent is to take advantage of the additional stormwater treatment provided by this created wetland system.
6. The level spreader structure has been pulled back approximately 10' from the wetland boundary as suggested. Minor adjustments have been made to the detention basin elevations to accommodate this change.
7. We take no exception to permanent markers to protect the wetlands adjacent to the project. Our suggestion would be to provide signage at the limits of disturbance rather than at the wetland edge. We anticipate discussing the preferred placement or method of signage with the Commission.
8. Upland review areas have been added to the site plan sheets.

9. The revised sediment basin design includes measures to manage groundwater. The revised permanent stormwater basins also provide for detailed control of groundwater to facilitate proper functioning of the bioretention basin.
10. In general, snow will be plowed and if stockpiling is necessary, it will be stockpiled at the terminus of the roadway adjacent to the detention basin. In general, road sand will be utilized within the development and salt or other deicing products will only be used when absolutely necessary.
11. All units within the project are intended to be owned by the applicant and managed by their company.
12. The conservation easement is intended to be granted to both Waterford and New London on each municipality's respective portion of the property. This may change based on the desires or requirements of either municipality. Based on discussion at the January 26 public hearing, we are not proposing any particular measures for management or removal of invasive species but the applicant is amenable to reasonable measures which the Commission may desire.
13. There are no current plans for extension of a walking trail through wetlands.

Public Hearing Discussion Items

1. An existing stone wall has been added to the plans downgradient of the proposed detention basin outlet. There was discussion during the public hearing about the potential for down gradient erosion and channelized flow. The existing stone wall will act in part as a secondary level spreader and filter. During our February 3, 2023 site inspection with Sigrun Gadwa, we noted that surface water flows in this downgradient area are spread out over a very wide area. In addition to fairly dense vegetation, the gently sloping area between the level spreader and the channel of Fenger Brook includes many large surface boulders, both of which provide a very stable flow path for this water which would not be subject to erosion.
2. There was concern voiced by Sigrun Gadwa regarding the proposal to connect the existing Clark Lane storm drain discharge to the proposed system based on potential hydrologic impacts to wetlands as well as concerns that this could actually reduce the quality of this stormwater when it ultimately reaches Fenger Brook. We note that the downgradient wetlands are not receiving any significant portion of their supporting hydrology as a result of this discharge. The net hydrologic impact of collecting this storm water in our system is that this minor water input to the larger Fenger Brook hydrologic system is moved slightly to the south. As noted by Joseph Theroux, this will have no detrimental impact to the overall wetland system.

The Clark Lane system has a watershed of 2.66 acres, most of which is impervious surface. The total watershed to the bioretention basin is 13.74 acres and the total impervious surface draining to the bioretention basin is 5.29 acres. Although the watershed area from Clark Lane is relatively small, it contributes approximately 40% of the impervious surface runoff to the system and because this is nearly all impervious, it has the highest concentrations of pollutants of concern. The UNHSC data for the bioretention basin system indicates that phosphorus and nitrogen removal rates will range between 87% and 85% respectively. The net effect of constructing the proposed project and treating the Clark Lane runoff is an overall reduction of stormwater pollution released to the environment.

Connecting the Clark Lane discharge and treating this stormwater is in keeping with the goals and requirements of the Jordan Brook Watershed Management Plan which has been an important guiding document for the stormwater system design. We also note that when this issue was discussed

verbally with Town staff, it was the consensus opinion of staff that this water should be collected and treated with the proposed system.

If you have any questions or need additional information, please do not hesitate to contact us at your convenience.

Sincerely,

A handwritten signature in blue ink, appearing to read "D. J. Held".

David J. Held, P.E., L.S.
Provost & Rovero, Inc.