



GOVE ENVIRONMENTAL SERVICES, INC.

Date: November 9, 2020

To: Randall Brownrigg, Chairman Hudson Conservation Commission

Cc: John Grace, Hillwood
John Smolak, Smolak & Vaughan
Justin Pasay, Donahue, Tucker & Ciandella
Nathan Kirschner, Langan

From: Brendan Quigley, Gove Environmental Services. Inc.

Re: Hudson Logistics Center
Responses to Conservation Commission Member Comments

We are pleased to provide the following responses to Conservation Member comments on the proposed Hudson Logistics Center. These comments were compiled on June 6, 2020 and provided to us by the Town Engineer Elvis Dhima. They have been grouped by member.

Brett Gagnon (Member)

1. Would the applicant be open to creating new wetlands at Rangers Town Forest to mitigate the impacts they are having on their project? Note: Designating the left over wetland as conservation does not seem like actionable mitigation.

RESPONSE: Wetland preservation and restoration have been chosen to provide local mitigation over wetland creation for several reasons. Wetland creation presents planning, construction, and management challenges that often lead to failure of such areas or result in poor quality wetlands that do not compensate for lost function and value. While it may not directly replace lost wetland, preservation efforts will permanently protect wetlands, buffers, and other uplands beyond the designated Wetlands Conservation Overlay District in Hudson (the “District”). Hillwood’s proposed

preservation efforts therefore, will permanently protect wetland function and value by preserving both the wetlands and a larger supporting area. This is particularly relevant at this site with nearly a mile of shoreline frontage along the Merrimack River and large areas of upland along

Limit Brook. Importantly, these uplands were utilized by previous proposals for development and they continue to hold development potential. As noted below, and as we will discuss with the Conservation Commission in person, rather than attempt to utilize these uplands, Hillwood proposes permanent protection of same via conservation easements conveyed to the Town of Hudson.

Restoration of the riparian areas along the Merrimack and Limit Brook provide additional valuable mitigation given the altered maintained landscape that currently exists in these areas.

Both Preservation and Restoration are recognized as viable forms of mitigation by the Army Corps of Engineers New England District Compensatory Mitigation Guidance that is referenced in the ordinance. The proposed 116+/- acres of preservation alone exceeds the mitigation that would be required by the applicable ratio given in this guidance document by over 20 acres. Considering the additional restoration along the Merrimack and Limit Brook, the proposed mitigation greatly exceeds what would be required per this ACOE guidance.

2. What is the estimated results of a 100 year flood after the wetland impacts have been made with this project?

RESPONSE: None of the proposed wetland impacts are within the 100-year floodplain of either Limit Brook or the Merrimack River so there will be no loss of flood storage below the 100 year flood elevation. Small losses in flood storage outside the flood plain that may result from the loss of wetlands that have been identified with that function, will be compensated for by the stormwater management system which is specifically designed for this purpose.

3. Will the existing Steele Rd and bridge be removed from the property and allow the brook and associated wetlands to revegetate?

RESPONSE: Steele Road will remain unchanged along its length from Lowell road up to the proposed development and the end of the public limit of same. Hillwood is proposing to relocate the tail end of the public portion of Steele Road to the south to accommodate access to the Merrimack River via an easement conveyed to the Town. The two crossings over Limit Brook will not be removed. The existing turf areas adjacent to Limit Brook in the vicinity of Steele Road will be restored using native plantings and allowed to naturalize. Permanent protection by formal preservation is also proposed for these areas.

4. Is the main entrance roadway all fill, or will there be some bridges to span the wetland areas?

RESPONSE: No bridges are proposed to span wetland impacts along proposed Green Meadow Drive. Spanning the wetlands along the access road is not feasible from a design perspective since the wetland lies close to the same elevation as the proposed road. The road would have to be raised significantly to install bridges that span the wetlands and avoid impacts. The resulting grades would be unrealistic. Additionally, most of the impact is to the edge of the forested wetland that currently lies directly adjacent to the existing driveway for Mercury Systems. A span would therefore offer no additional connectivity as no wetland is being segmented. The impacts have been minimized by routing the road through uplands as much as possible and by



utilizing a large box culvert at the hydrologic connection between wetland north and south of the access road. See response #5.

5. Will there be any pipes or similar for both water and animals to cross under the main roadway?

RESPONSE: A culvert has been included at Impact Area F which lies between wetlands to the north and south of the access roadway and is the only impact area along the proposed main access with connectivity potential. The originally proposed 24” culvert for this crossing has been replaced with a 22-foot wide by 3-foot high open bottom structure and the length of the crossing will be reduced to 80 feet using wing walls. This will provide better connectivity for amphibians, reptiles, and small mammals, as outlined in Hillwood’s Wildlife Habitat Evaluation.

6. Why cant the round-about be moved into the upland? What is the need and legal allowance to put it in the wetlands? Note: I dont see the reason to impact wetlands with the round-about if the only benefit is to make the buildings larger.

RESPONSE: The location and configuration of the originally proposed traffic circle was based on the need to provide frontage to all three proposed lots, public roadway design and traffic circulation criteria, as well as the consideration of available room for the development program. Several important changes have been made, however, which allowed greater design flexibility in this area. Pursuant to the original subdivision model, Green Meadow Drive was to be a public road and the traffic circle was designed to provide frontage to the three proposed lots. Hillwood is no longer proposing that subdivision. Rather, Hillwood proposes to consolidate a portion of Tax Map 234, Lot 34 with Tax Maps 234, Lot 5 and 239, Lot 1 to create one condominium parcel with frontage along Lowell Road. As a result, Green Meadow Drive will not be a public road, will not be required to provide frontage, and the traffic circle will be reduced in size.

The legal allowance for the remaining impacts associated with the access road impacts can be found in § 334-36(C.)(2) of Article IX of the Zoning Ordinance which regulates the Wetlands Conservation Overlay District. This section provides for a conditional use for the “construction of streets, bridges, and utilities if essential to the productive use of land beyond the Wetland Conservation Overlay District”. The orientation of wetlands extending along the entire eastern side of the property, and the well-established unsuitability of Steele Road, mean that wetlands impacts are necessary at some point to access several hundred acres of buildable land on the site.

7. If the round-about cannot be moved, and the impact to the wetland in that area must remain, I would ask that the secondary entrance by Sams club be removed, Note: The wetlands should not be impacted because the applicant wants a very large building which requires many vehicles and thus forcing additional roadways.

RESPONSE: As described in the previous response impacts caused by the main access road have been reduced. The second access has been retained in order to distribute traffic between the two intersections, improve internal traffic patterns and to facilitate emergency vehicle access. Considering the very large area of developable upland on the site that lies beyond the Wetland Conservation Overlay District, a second access to this property is essential and reasonable and



would be expected on any development proposal. The two access points were in fact identified long before the current proposal and incorporated into the Planning Board's site plan review of adjacent properties.

8. Will there be a deed restriction on the 81 acres proposed to be protected? Note: Having a deed restriction on this area will guarantee protection in perpetuity.

RESPONSE: A conservation easement, with the Town of Hudson acting as the easement holder, is proposed for formal protection of the preservation areas. This is considered more robust than a deed restriction and will ensure protection and oversight in perpetuity. Further, it will facilitate the Conservation Commission's oversight of the same. The total combined conservation easement area proposal is 116 acres which is inclusive of a 90 +/- acre area on the eastern side of the Property, and a 26-acre area on the western side of the Property along the Merrimack River.

9. Will an endangered species review take place on the site, or is a digital review all that is required?

RESPONSE: The process to address rare, threatened, and endangered species begins with a review of existing records by the NH Natural Heritage Bureau (NHB) which maintains a database of rare, threatened, and endangered plant and animal species statewide. The process continues with an onsite review of the habitat on the property and surrounding area to assess the suitability for the animal species identified in the report as well as other potential rare species. This is closely coordinated with NH Fish & Game. Surveys for the rare plants identified in the report are also completed with guidance from the NHB. These two agencies provide comments to the Wetland Bureau which ensures that all concerns have been addressed prior to issuing a wetland permit.

Additionally, a Wildlife Habitat Evaluation was prepared for this project which both considered wildlife and habitat broadly and focused on the presence or evidence of rare species on the Property. This study has been provided under separate cover and will be presented at the upcoming Conservation Commission Meeting. That Wildlife Habitat Evaluation concluded that the Property does not contain any specified habitats of any rare, threatened, or endangered species of wildlife and that the development of the Property will not cause significant impacts to wildlife or wildlife habitat, including unique or rare wildlife habitats.

10. Is the applicant open to agreeing to have the wetland water tested for contaminants for 10 years and reporting said results back to the town for review? Note: This will help ease concerns of pollution that the town would have to spend money to mitigate in the future once the applicant is no longer in charge of the location.

RESPONSE: The peer reviewed studies concerning air pollution and management of stormwater indicate that there will be no increased risk of pollution as a result of this project. Furthermore, with no baseline data on the current water quality within the wetlands and significant runoff from off-site developments and public roadways, the testing would be of



limited value and potentially erroneous and unreliable. For these reasons, testing of this type is not proposed.

11. Can we get more information about the "sludge tank" the residents spoke about?

RESPONSE: As part of the due diligence investigation for this site the development team completed both a Phase 1 Environmental Site Assessment and Phase II Environmental Investigation. No evidence of a "sludge tank" was discovered through either investigation. Should any tanks containing "sludge", or any environmentally sensitive materials be identified at any point during construction the Hillwood Team will ensure it is removed in accordance with all applicable local, state, and federal guidelines.

12. I would like an explanation of how the water retention system can hold/handle 200 million gallons of runoff each year? Note: 47" of rain / 56" of snow average in Hudson per year

RESPONSE: The stormwater management system adheres to strict design criteria outlined in the NH Alteration of Terrain (AOT) rules and the Town of Hudson Stormwater Regulations. These require that the stormwater management system be designed to manage and treat stormwater runoff for all design storms identified in the rules and regulations of both the town and state. The conveyance system, treatment measures, storage, and infiltration components of the system are all designed with the needed capacity to handle the calculated storm volumes. The design of this system has been reviewed and approved by both the Town of Hudson and the town's peer review consultant and is currently being reviewed by NHDES staff for compliance with the AoT rules.

13. Has there been any test pits or samples showing soil content? Is there evidence to show no environmental concerns under the proposed site? (i.e. Needing to blast, aquifers to disrupt, underground flow etc.)

RESPONSE: Yes. As part of the due diligence investigation an extensive geotechnical investigation was conducted at the site consisting of soil borings and test pits. This investigation was completed to obtain groundwater and soil data necessary for designing stormwater management system as well as the building foundations. In total 273 borings and 115 test pits were completed throughout the site. Pursuant to that analysis no blasting is anticipated at this time, though the applicant reserves the right to modify this response if it is determined that any blasting is necessary, and then, any such blasting will be limited to the extent it is possible and will be conducted in accordance with all applicable local, State, and Federal regulations. No concerns related to disruption of aquifers or underground flow were identified.

14. What emergency Response is available in Hudson for large hazmat spills in a wetland? (i.e a truck spilling in the driveway area)

RESPONSE: Large quantities of hazardous materials will not be handled at the site so there is no potential for a large spill such as from a tanker truck. Hazardous materials will be limited to



the motor fluids in the trucks themselves. Given the slow speed at which the trucks will operate in the driveways, the risk of an accident that results in a spill extremely low but is likely to be small if it did occur. Such incidents would be handled in a routine way by first responders, similar to any accident on the road. Additionally, drainage structures along the road are fitted with oil and grease separators that would intercept any petroleum products released during an accident such that they could be cleaned out before being flushed into wetland areas.

Jennifer Parkhurst (Former Alternate Member)

15. How will particulates from air, that cycle back into water be quantified and mitigated for in this plan?

RESPONSE: A comprehensive air modeling report has been conducted which accounts for all the cars and trucks associated with the facility. The study demonstrates the emissions, including particulates, will be dispersed to concentrations that, when combined with background, are well below State and Federal standards. Therefore, there will be no excessive deposit of particulates on land or in waterways resulting from this project. These standards are protective of humans and wildlife.

16. What happens to the wetlands, if applicant abandons project during build stage?

RESPONSE: The proposed project is not speculative development and would not be abandoned during construction. The permitting, design, and purchase of the property represent a very significant investment, that has been carried out largely for a tenant that has committed for two out of three of three proposed condominium units. Additionally, the compensatory mitigation, totaling over \$700,000 and the proposed preservation will have been finalized prior to any of the impacts. Even ignoring these disincentives, the wetland impacts, which are almost entirely associated with access, will be carried out very early during the course of the project and would therefore be constructed and stabilized prior to any halt to construction as required by NHDES under the Wetland and AOT permits.

17. What experience does the applicant have with projects comparable to this one? That involve this scale of wetland impact and scale of run off mitigation? Please provide an example and references.

RESPONSE: Hillwood has significant experience developing projects of comparable and larger scale than the Hudson Logistics Project within the context development space and wetland impact.

18. Has the applicants wetland scientist physically inspected wetlands? Report mentions likelihood from modelling.

RESPONSE: Yes. Brendan Quigley, NHCWS #249 re-flagged all wetlands within the project area and completed functional assessments in advance of the proposal, primarily in 2019 and 2020. Additional field work was also conducted to assess vernal pool breeding activity and to



survey for state listed plant species as required by the Natural Heritage Bureau report. There were no models or predictive elements employed in this work.

19. Why hasn't the scale of this project been considered in the alternative solutioning? I do note alternative which are an expectation of the wetland exception application, however nothing has been mentioned to scale that might reduce the impact to the wetlands.

RESPONSE: The wetland impact within the Wetlands Conservation Overlay District is largely associated with access to the site along the two alignments which have long been identified as the access to this property. The impacts associated with these access roads will not significantly change, even if large changes were made to the scale of the development. That said, effort has been taken to further reduce the impacts caused by the access roads. Additionally, the impacts within the Wetlands Conservation Overlay District related to development are limited to four small areas (impact areas #2 & #3) totaling 2,611 square feet and buffer impacts totaling 56,281 square feet. These impacts are almost entirely within maintained areas of the golf course which have minimal wetland function and value currently, and not within natural areas. Adjustments to the site design have also been made to completely avoid impacts to the southernmost pond, a manmade feature that is not part of the Wetlands Conservation Overlay District.

20. What studies have been done to take inventory on wildlife? Other than the consultation of a database? Many residents have expressed concern and listed numerous species. How will the applicant respond to these concerns and mitigate? Especially with regards dependent on the wetlands. Examples I recorded: Rabbits, turkeys, deer, amphibians, blue spotted salamanders, bald eagles, sand pipers, owls, warblers, lady slipper orchids, etc.

RESPONSE: A Wildlife Habitat Evaluation has been prepared for purposes of assessing and demonstrating compliance with the wildlife-related criteria described under the Town of Hudson Wetlands Conservation Overlay District Ordinance. The evaluation examined the wildlife habitat and vegetative communities for the entire project Site for purposes of assessing the degree of potential impact and overall effect the proposed development project may have on wildlife and related habitat, and demonstrating compliance with the wildlife-related criteria described under the Town of Hudson Wetlands Conservation Overlay District Ordinance. The report also includes an overview of existing habitat and potential impacts to wildlife use and function, with a particular emphasis on areas subject to jurisdiction under the Wetlands Ordinance which are included within the boundaries of the Wetland Conservation Overlay District.

The Wildlife Habitat Evaluation concludes that there will be no significant impacts to important wildlife habitat. Concerns related to habitat connectivity, sound, lighting and specific wildlife species have been addressed and fully mitigated. The portions of the Wetlands Conservation Overlay District that occur within the maintained golf course do not significantly contribute to wildlife habitat function within the Study Area. Elsewhere, the proposed project will generally impact forested uplands and wetlands that are common throughout the Site and region. These impacts are largely unavoidable as safe and effective access to the site is required and there are no impacts to unique or rare wildlife habitat types. Impacts will be mitigated by establishing a Conservation Easement (CE) areas on the eastern portion of the Property surrounding Limit



Brook and the Shoreland Protection Zone associated with the Merrimac River in the western portion of the Property, which will preserve the most ecologically significant resources on the Site. Excluding the access roads these conservation easements are proposed to permanently protect 116 +/- acres of land to include 90 acres along the eastern portion of the Site and 26 acres along the Merrimac River. The extent of the proposed easement will encompass the nearly the entirety of the Limit Brook wetland corridor.

21. How will the applicant manage wetland impact during and after build? Compliance? How will tenants be held accountable for environmental concerns?

RESPONSE: Construction within the wetland impact areas will begin with the establishment of erosion control as specified on the Soil, Erosion, & Sediment Control Plans prior to any clearing of vegetation or grading. Construction will proceed per the sequence shown on these plans with the wetland impacts occurring early in the process with the installation of the access roads and rough grading of the site. The erosion control and other construction best management practices will be monitored and maintained across the site throughout the construction period by qualified personnel operating under a Construction Stormwater Pollution Prevention Plan (SWPPP) in compliance with the National Pollutant Discharge Elimination System. Following construction, compliance will primarily be through an operation and maintenance plan for maintaining the stormwater system, storing, and removing snow, and general housekeeping. After construction, tenants will be subject to all applicable local, State, and Federal laws and regulations regarding environmental concerns as any other business in Hudson.

22. Why has made this project fall outside the scope of Section 404 of the Clean Water Act? This is mentioned in report but not explained in detail.

RESPONSE: The project is subject to Section 404 of the Clean Water Act and must receive approval from the Army Corps of Engineers for wetland impacts to Waters of the United States which includes vegetated wetland areas. The project does not, however, require an Individual Permit, because it falls under the General Permit for New Hampshire which is available for projects with wetland impacts under 3 acres. The review for General Permit projects is primarily overseen by the State of New Hampshire with input, if necessary, from the federal agencies. A letter of concurrence is issued by the ACOE following the state approval, provided all requirements have been met.

23. Will the peer reviewer also be reviewing wetland and environmental impact mitigation? If not, what wetland expert will be retained to review these plans?

RESPONSE: Wetlands are not specifically covered in the peer review that as part of the Hudson Site Plan approval process. Compliance with standards for avoidance and minimization of impacts are reviewed at the State level and the Town of Hudson Ordinance mimics these concepts in almost all ways. Also, many of the concerns that have been expressed relative to wetlands are closely related to other aspects of the project that have received rigorous peer review such as stormwater management and air quality.

24. Did the applicant's wetland scientist modify or reflag any existing wetlands?



RESPONSE: All the wetlands in the project area were flagged between 2017 and 2020, with the majority having been flagged in the Fall of 2019. This was required since the previous wetland delineation was more than 5 years old. The location and extent of wetland on the site did not significantly change, except for the wetland identified in the grass areas by the proposed cul-de-sac. This area was not identified as wetland previously.

25. How will current groundwater mitigation plans handle unusual storm water? For example, Mothers Day Flood of 2008. What is the plan and what happens when it fails?

RESPONSE: We assume this question is oriented towards the issue of infiltration. The stormwater management system makes extensive use of infiltration which will mimic the natural condition by limiting stormwater runoff from post construction impervious surfaces. The infiltration basins have been designed to retain a 50-year design storm with a minimum of one foot of freeboard in all basins. During even more significant rainfall events the infiltration basins have been designed with spillways that will discharge in a controlled way without causing failure of the basin or causing erosion to adjacent areas

Ken Dickinson (Member)

26. What dictates the need for a 40' roadway width? Can this be reduced to a standard width?

RESPONSE: The proposed Green Meadow Drive is currently designed at 36 feet in width and includes a shoulder and a 5-foot pedestrian sidewalk. Currently the access drive from Walmart BLVD is designed with a total width of 40 feet. While this drive is not intended for pedestrian access, to ensure the safety of any cyclists or pedestrians that may utilize this drive a wider shoulder is being proposed.

27. Please amend plans to clearly indicate wetland buffer impacts and label area calculations on both the entry drive plans and site development plans (provide in a similar manner as was depicted for direct wetland impacts).

RESPONSE: The revised wetland and buffer impacts are summarized on the Wetland Impact Plan (Blue and Magenta color) and detailed on the development and roadway plans as requested.

28. Is the client proposing to remove existing driveway pavement in the area where the proposed access road is proximity to the existing driveway? If Yes, than it should be clearly noted for restoration and plan set should be amended to reflect details regarding this restoration, i.e. off-site erosion control.

RESPONSE: A portion of the existing driveway will be removed to accommodate grading for the proposed roadway. This area will be loamed and seeded with NE Roadside matrix seed mix providing a mix of native grasses, wildflowers, and shrub seed.

29. Can the existing alignment be utilized for a longer distance downhill prior to turning into the project site?



RESPONSE: The easement established for access to the Green Meadow property in 1983, and updated in 2006, leaves the existing driveway shortly after the intersection for several reasons. A primary consideration is minimizing interference with the private driveway and parking areas for Mercury Systems. Additionally, if the proposed access utilized more of the existing driveway a sharper curve would be needed to align with the preferred narrowest wetland crossing before entering the golf course. The proposed alignment is also able to provide future access to Lot 234-34.

30. Buffer impacts could be dramatic reduced by increasing the 4:1 proposed grading to 2:1 or 3:1 to avoid these impacts. Basins could have 3:1 slopes to minimize impact and achieve a more efficient footprint.

RESPONSE: The revised design utilizes slope adjustments, a larger crossing structure with wing walls, and a smaller cul-de-sac which has been shifted west of its original location. These changes have allowed for an impact reductions.

31. Pond impact area 6 could be completely avoided. I understand that the pond was man-made, however it's currently supporting substantial wildlife. It resembles a natural pond and is the closest pond to adjacent residences. It did not appear that the proposed slope was sufficiently detailed. The 2:1 slope is substantial and directly leading into the pond, therefore additional erosion control devices would be needed in this area (Per sheet CE303 a composed filter tube berm will not sufficiently protect the pond from potential slope failure during and after construction). It obviously would be better to shift the road away from the pond.

RESPONSE: Impact to this pond has been eliminated in the revised design.

32. This access road appears to be very windy and difficult to negotiate and the slope appears to be very steep at the end. I would be in favor of creating a public ramp with better access versus constructing the one that is proposed.

RESPONSE: The boat ramp is no longer proposed at this site though Hillwood remains committed to working with the Town to facilitate the construction of a boat ramp in another location that is more suitable.

33. Process: What is the process for permitting the on-site amenities, such as a boat ramp or recreational path? Will this be an amendment to the current application?

RESPONSE: As described above the boat ramp is no longer proposed at this site. Hillwood continues to work with the Town on the concept of a recreational trail along the river, though details and connectivity remain unresolved. The permitting and construction of the trail will, therefore, be separate from the current application. The proposed mitigation includes a 26-acre proposed conservation easement that will run alongside the Merrimack River to be held by the Town of Hudson. The easement language will be written with specific allowance for a trail to be constructed at a future date.



34. Request on-site wetland restoration efforts such as treatment for purple loosestrife (release beetles)

RESPONSE: Galerucella beetle has now been so widely used for the control of purple loosestrife that it is increasingly found in wetlands where no specific program has been implemented. This is especially in southern New Hampshire where there have been a number of programs, including an early study by NHDOT. Purple Loosestrife along Limit Brook and adjacent to the ponds on the site was inspected in early July and found to exhibit the characteristic damage caused by the beetle. Galerucella beetle is therefore already active on the site and appears to be exerting some control as very little of the Purple Loosestrife observed was in flower when in normally would be at that time of year. In my experience, the NH Department of Agriculture, Markets and Food, which must approve release of the beetle, is unlikely to do so if the species is already present.

Bill Collins (Member—Vice Chair)

35. Dredge and Fill wetland impact vs. Conditional Use Permit Application. The town's Conditional Use Permit Application has the following listed Permanent Wetland Impact Area equaling 69,449 sqft. Permanent Wetland Buffer Impact Area equaling 225,713 sqft. The DES Dredge and Fill Permit filed totals 114,449 sqft. Noted, Why the difference?

RESPONSE: The difference is related to the ponds being “manmade facilities” which are not included in the Town's Wetland Conservation Overlay District pursuant to Section 334-35(C) of the Zoning Ordinance. Note that the impact to the manmade pond in the southeast corner of the site has now been avoided.

36. A 5 foot Culvert Pipe is proposed for the stream crossing noted as EA1. Would a more robust culvert type be applicable? Wildlife maybe using this corridor to get safely down to the river and a simple pipe opening could be blocked forcing migration across a potentially very busy roadway.

RESPONSE: Though connectivity through this stream corridor to the Merrimack River is currently limited by the much longer 60” pipe under the highway just 150 feet to the north, the crossing has been revised to improve connectivity to the south. The originally proposed 60” diameter pipe has been replaced with a 12-foot-wide by 5.5-foot-high open bottom structure that will be 75 feet long. This larger, open bottom structure will span the stream channel and a significant area of wetland to either side proving for both terrestrial and aquatic organism passage. The “openness” of the crossing (a ratio of the cross-sectional area of the opening to the length) meets well established guidelines for design of wildlife friendly stream crossings.

37. In your experience, would you prefer a more robust crossing structure like a precast arch or a bottomless box culvert?

RESPONSE: As described in the previous response, the crossing has been revised to include a larger open bottom structure.



38. There are also culvert designs that provide an internal ledge at grade to allow for smaller animals like raccoons, rabbits and other animal species to cross under the roadways.

RESPONSE: The revised crossing spans the channel and provides for terrestrial crossing.

39. 3) Roadway Storm Water. Looking at the Plan and Profile, sheets 3 through 6, of the Subdivision Plan Set I do not see any Storm Water Detention areas along the roadway that will pretreat storm water prior to discharge into the surrounding wetland areas. How or will roadway storm water be collected and pre-treated prior to release into the surrounding wetlands?

RESPONSE: The stormwater from the roadway will be captured in a closed pipe system and transmitted to basins located on the site for attenuation and treatment. All stormwater from the road will be treated in accordance with Town of Hudson and state of New Hampshire Alteration of Terrain program standards. Also note that there is a series drain pipes adjacent to and under the proposed road that do discharge to the adjacent wetlands but do not collect stormwater runoff from the roadway or paved areas. Rather, this piping system collects run-off from adjacent vegetated areas and maintains natural flow path between upland and wetland areas.

40. Wetland Fragmentation. The proposed roadway path will take it through Riparian wetland sections and fragmentation won't be avoided or easily mitigated. Will there be culverts placed at Wetland Impact Area "F" and "G"? I believe the Gove report showed standing water in those areas and maintaining connectivity along those watercourses should be essential to the health of the surrounding wetlands.

RESPONSE: The proposed Green Meadow Drive involves edge impacts only until Wetland Impact Area F. This area is an excavated ditch-like feature connecting forested wetlands to the north and the ponds associated with Limit Brook to the south. This crossing has been revised to promote maximum wildlife connectivity between these areas. The originally proposed 24" concrete pipe has been replaced with a 22-foot-wide by 3-foot-high open bottom structure and the length of the crossing has been reduced to 80 feet using wing walls. The height of this crossing is constrained by utilities and drainage piping, but the very wide structure will provide an openness ratio that meets design standards for wildlife passage, as indicated in Hillwood's Wildlife Habitat Evaluation. Impact Area G is a "lawn area wetland" which was viewed and discussed during the site walk. This area has no wildlife or hydrologic connectivity to preserve so no culvert is proposed in this area.

41. As a follow up to question 4 above. Stream and water crossings do not have to be simple pipes. Would a robust stream crossing design as noted in question .2 be applicable here also? The goal again is to keep wild life out of the streets especially with the projected traffic.

RESPONSE: As described above, the crossing has been redesigned with a much larger open-bottom structure for this purpose.

42. Lighting along the proposed Green Meadow Drive. 18 Lighting Units will be placed along the roadway leading up to the terminus of the cul-de-sac. The proposal will produce an



appreciable amount of light trespass into the periphery of the Sam's Club and Limit Brook wetland complex. Do you see any issues that could affect nocturnal species that reside in the wetlands? Frogs, turtles, fish or birds. Could spacing be adjusted to reduce the number of lighting units required by a third? I believe that limiting ambient lighting along this corridor would be beneficial to nocturnal animal species living in the area.

RESPONSE: A site specific study of incident light conditions at night has been performed and by shielding the light fixtures, particularly at the location of the wetland crossings, the increase in incident light levels from the lights will be at or very close to zero within the protected areas of the site along the Merrimack River and on the east side of the site. As a result, nocturnal wildlife will be able to forage and move throughout the protected areas in similar nighttime conditions as they do currently.

43. In your experience as a field scientist how does nearby pollution affect the overall health of an ECO system like this? Can you compare this to a current infrastructure project such as a highway that is adjacent to pond or bog area?

RESPONSE: When resource areas are affected by runoff from adjacent development, I believe it is most often related to erosion and poorly designed drainage. These are more often a problem on older developments and infrastructure that were constructed when less (or no) attention was paid to these issues. This is particularly true of stormwater management which has advanced considerably since many of the state's major highways were constructed. The widening of I-93 provides an excellent example. Extensive stormwater management systems are visible in sections of the newly widened highway but very few such facilities are present in older sections of the highway. These older systems provide less treatment, a problem that is compounded by lack of maintenance. Stormwater management systems designed to current standards and maintained in accordance with operation and maintenance plans, as will be developed for this site, do not typically have noticeable impact on adjacent wetland resources.

44. The wetland complex constructed to handle highway and parking lot run off by the Sagamore Bridge seems to have developed into a somewhat natural environment. This area has matured over the last 5 to 10 years into what appears to be a successful wetland. Have you or your company ever evaluated this type of road side construction feature to see how effective it is in regards nutrient trapping, sediment control and other environmental pollutants that are common along heavily trafficked roadways?

RESPONSE: I am not familiar with that stormwater feature, but extensive research and testing has been conducted on of these types of treatment systems by the UNH Stormwater Center and their performance is well documented. However, they are not suitable for all sites considering runoff volume, space limitations, infiltration requirements, and other considerations that factor into the design of stormwater management systems.

On this site, various pre-treatment measures have been incorporated upstream of the infiltration basins which, together with the basins, will meet all applicable treatment and infiltration standards while also mitigating the volume of runoff leaving the site.



45. Lastly, and I feel that this is important. Do storm water detention features indirectly create suitable habitat for wild life to flourish?

RESPONSE: Stormwater detention features can serve as wildlife habitat but are not often specifically designed for that purpose nor is it often desirable to do so. If careful consideration is not paid to designing safe piping systems and outlet structures, stormwater basins can pose a significant entrapment hazard. This can be caused by drainage structures with outlets at higher elevations than their interior base, or no outlets at all, which creates a “sump” from which turtles, snakes, and amphibian species cannot escape. An important element of our coordination with NH Fish & Game involves this issue, ensuring the drainage system is as safe as possible for wildlife while also balancing the need for effective stormwater treatment.

The basins on this site have not been designed as permanent ponds (see following response) but will be vegetated with native species suitable for intermittently flooded wetlands and wet meadows. These areas should provide habitat for a variety of species that would normally use such areas.

46. (a) Will these newly created ponds contain water year round?

RESPONSE: No. The basins proposed on this site are designed as infiltration basins. They can be expected detain water for a short periods of time following rain events, and saturated for a longer period of time but they are not designed to be wet ponds.

47. (b) What type plants would be optimum for handling pollution from run off?

RESPONSE: The most effective and practical vegetation consists of dense herbaceous cover by a variety of gramimoid species adapted to saturated and intermittently flooded conditions. Dense herbaceous growth stabilizes soil, slows runoff velocity allowing better filtering of suspended solids and infiltration, provides quick growth, and utilizes nutrients that would constitute pollutants in nearby surface waters. Herbaceous vegetation is also easily maintained by annual mowing. The seed mix specified for the proposed infiltrations basins is “detention area mix” designed for this purpose.

48. (c) If water levels are maintainable within the proposed storm water treatment areas how long do you think it would take for frogs, snakes and other local species to repopulate these areas?

RESPONSE: The proposed stormwater basins are designed as infiltration basins that will not be permanently flooded. They will not, therefore, provide permanent habitat such as a pond would. Turtles and amphibians may utilize the areas intermittently especially when wet. Snakes and songbirds can be expected to utilize the tall grass in these which should support an abundance of insects. I would expect this usage to happen more or less immediately after vegetation is established.

Paula Hubbert (Member—Alternate)

49. Explain Run off.



RESPONSE: See responses #12, #25 & #39.

50. Explain Flood Zone.

RESPONSE: There are three FEMA Flood Zones on the property: Zone X (unshaded), Zone X (Shaded) and Zone AE. The site has been designed to minimize disturbance within the Zone X shaded zone and avoid any work within Zone AE. In addition, there will be no impacts within the 100-year floodplain of the Merrimack River or Limit Brook.

51. Explain how chemicals possible getting into the water will be mitigated?

RESPONSE: The stormwater management system includes catch basins that are fitted with oil and grease separators which will intercept these pollutants prior to entering the downstream portions of the stormwater treatment system or surface waters. These structures will be periodically cleaned as part of the operation and maintenance plans for the site.

