



May 3, 2022

Mr. Stuart B. Popper, AICP
Director of Planning & Development
Town of Cromwell
41 West Street
Cromwell, CT 06416-0189

Re: Cromwell Inland Wetlands and Watercourses Agency Peer Review
IWWA Application #21-06
Scannell Properties #576, LLC
210 Shunpike Road, Cromwell, CT

Dear Mr. Popper,

On behalf of Scannell Properties #576, LLC, All-Points Technology Corporation, P.C. ("APT") is pleased to provide responses to comments provided in a January 14, 2022 LandTech letter from a review of the previously filed and later withdrawn IWWA Application #21-06. Scannell Properties #576, LLC voluntarily withdrew the application to allow for additional field surveys to be performed and associated analysis to be conducted in order to inform many of the responses provided herein.

Specifically, comments provided on pages 5 through 7 of LandTech's letter from their review of APT's *Wetland Assessment Report Project Highlands 210 Shunpike Road Cromwell, Connecticut*, dated October 2021, are addressed below. The LandTech comments are noted below as they appeared in their January 14, 2022 letter with responses provided in ***bold italics***.

Please note that additional information relating to the comments below are depicted in project site plans prepared by Langan and incorporated into APT's updated May 2022 Wetland Assessment Report. These materials have been submitted with the recently filed Town of Cromwell Inland Wetlands and Watercourses Agency Application to Conduct Regulated Activity.

Wetlands and Vernal Pools

WVP-1) Breeding data from the vernal pools were collected during one breeding season and potential vernal pools 8 and 9 were not evaluated at all as portions of the property had not yet been acquired when the breeding season occurred. There is a lot of variability in vernal pool breeding success from year to year due to a number of factors including rainfall and normal variability in local populations. Therefore, it is typically better to get more than one year of biological data to confirm if a pool meets the biological component of the definition or not and to identify potential impacts from proposed structures.

Response: A second vernal pool survey has been performed in 2022 with inspections conducted in March and April. The results of the 2022 vernal pool survey are provided in APT's May 2022 Wetland Assessment Report provided under separate cover. This vernal pool survey confirmed that breeding activity by vernal pool indicator species is supported by Vernal Pool 9. However, potential Vernal Pool 8 was found to contain insufficient hydrology and no breeding activity by indicator species was observed; therefore, potential Vernal Pool 8 is not considered to provide vernal pool habitat.

WVP-2) An approximate 275-foot-long road is proposed to be constructed through wooded areas and near sensitive wetlands. The proposed road will separate the highly functioning Vernal Pool 4 from the high functioning Vernal Pool 2, and Potential Vernal Pools 8 & 9. The path of this road goes through upland habitat critical for amphibian species during the non-breeding season. The expected truck traffic is not appropriate for Geer Street therefore, if this facility is to be constructed, Shunpike Road is the only option. The applicant has proposed best management practices and environmental protections to minimize impacts to vernal pool species. However, there is still a risk of mortal impacts to migrating herpetofauna during both the spring breeding season and during the summer as subadults emerge from the vernal pools.

Response: Shunpike Road is the only reasonable option for access to the proposed warehouse. With Wetland 4 running parallel to Shunpike Road for the entire Site's frontage, crossing of Wetland 4 is necessary and unavoidable. Using the former farm road crossing of Wetland 4 and its associated perennial stream is the most prudent and feasible option that minimizes wetland impacts to the greatest degree possible. This crossing point drives the western end of the proposed access design and as the access moves eastward there is greater flexibility in changes to the orientation of the road.

As discussed in further detail below in the response to comment WMP-3, the access road alignment has been adjusted to maximize buffers to Vernal Pools 1, 2, and 9 to the north and Vernal Pool 4 to the south. This adjustment of the access road now places it in the outer limits of the associated vernal pool terrestrial habitat zone where amphibian densities are expected to be lower than areas closer to the pool. By adjusting the road in this fashion, it reduces the impact to vernal pool indicator species.

In addition, the following structural mitigation measures have been incorporated into the access road design to facilitate movement of amphibians across the road and minimize impact and chances for incidental mortality:

- ***Road width has been minimized to the maximum extent possible.***
- ***Full cutoff Dark Sky Compliant lighting with minimal light intensity fixtures will avoid light spillage beyond the limits of the access road.***
- ***The access road will use low profile Cape Cod style curbing to minimize impediments to migrating herpetofauna.***
- ***The access road's stormwater management will rely on 'soft' green infrastructure elements with sheet flow into stormwater quality swales and bioinfiltration basins and will avoid use of catch basins that could entrap migrating herpetofauna.***
- ***Bioinfiltration basins will be fitted with permanent isolation barriers to avoid creation of decoy pools.***
- ***Tree clearing along the road shoulders are minimize to the greatest extent possible.***

- *Access road shoulders are designed with gentle grades made of earthen fill (as opposed to stone) to avoid impediments to migrating herpetofauna.*
- *Erosion control fabric made with plastic netting for stabilization will be avoided to prevent wildlife entanglement.*
- *Traffic volumes are anticipated to be lower after dark when most amphibian overland movement would occur, further lessening incidental adult mortality to vernal pool indicator species.*

WMP-3) The road appears to be laid out to skirt the southern boundaries of the 200-foot vernal pool buffers. Data from last year's breeding season show Vernal Pools 2 and 4 to be highly productive.

Unless there is geographic or ecological habitat area that is being preserved, the applicant should consider moving the proposed road to the south more to allow for a larger southern buffer for VP 2.

Response: The access road has been realigned based on a more thorough assessment of the quality of terrestrial habitat that surrounds Vernal Pools 1, 2, 4, and 9; please refer to the response provided to comment WVP-10 for a more thorough discussion on this topic. The access road has been shifted further south in proximity to both Vernal Pools 1, 2 and 9 and no activities are now proposed within the 200-foot vernal pool upland review areas with the new alignment.

An assessment of the quality of surrounding terrestrial habitat helped inform this new access road alignment to avoid impacting the highest value optimal forested terrestrial habitat. This assessment also identified suboptimal terrestrial habitat resulting in incorporation of terrestrial habitat enhancements in proximity to the proposed access road as part of the Project's overall mitigation strategy.

WVP-4) The Wetland Assessment Report states (Pg A-16) that potential vernal pools 8 & 9 are assumed to support breeding by vernal pool species. We assume from this statement that the pools met the physical definition of vernal pools however this was not stated. The applicant should confirm. No physical components were provided for any of the vernal pools or potential vernal pools.

Response: Potential Vernal Pools 8 and 9 contain the physical characteristics to possibly support vernal pool breeding. A vernal pool survey conducted in March and April 2022 confirmed that Vernal Pool 9 contained sufficient hydrology and evidence of breeding activity (wood frog and spotted salamander egg masses were observed). However, insufficient hydrology and lack of any breeding activity by vernal pool indicator species was observed in potential vernal pool 8 and as a result this wetland feature was determined not to be classified as a vernal pool habitat. Physical characteristics of all the vernal pools inspected in 2021 and 2022 are contained in the separately attached May 2022 Wetland Assessment Report.

WVP-5) The applicant states that PVP 5 did not show evidence of amphibian breeding last season so they did not consider it a vernal pool. The question we have is does the depression meet the physical components of the vernal pool definition? If so and the pool supports breeding in other years, it may meet the "most years" guideline and may be considered a vernal pool. More information on depth and hydroperiod is needed as this PVP is on the western edge of the proposed development.

Response: Potential Vernal Pool 5 consists of potential cryptic type vernal pool habitat imbedded within the interior of Wetland 3. During inspections performed in 2021 and 2022, the depths of inundation measured were found to be too shallow (e.g., 2 inches minus at its greatest depth) to support sufficient hydrology and hydroperiod for vernal pool breeding and no evidence of breeding activity (e.g., egg masses, adults, etc.) was observed at any time during either the 2021 or 2022 vernal pool surveys. Therefore, this area was not found to contain the request characteristics to be classified as a vernal pool.

WVP-6) Please confirm the spotted salamander egg mass number recorded for VP7, it seems high based on the fact that the vernal pool is surrounded by 300 to 860 feet of agricultural fields which provides little to no escape cover from predators or solar cover in the spring putting salamanders at risk for desiccation.

Response: The 51 spotted salamander egg masses identified during the 2021 vernal pool survey of Vernal Pool 7 are confirmed. It was surprising to see that level of productivity in this man-made former irrigation pond feature particularly given its location and the surrounding suboptimal terrestrial habitat associated with the adjacent cultivated agricultural fields. The 2022 vernal pool survey found a reduction in productivity with 29 spotted salamander egg masses observed. That reduction in productivity, or the surprising productivity observed in 2021, could be associated with cyclical breeding activity changes as well as field conditions during the different survey dates (i.e., deeper levels of inundation have occurred in 2022 as compared to 2021, which may contribute to some but not all of the drop in observed egg masses). What this does reveal is the opportunistic survival skills of vernal pool amphibians taking advantage of these types of anthropogenic features that were intended for other purposes, in this case an irrigation pond, that have unintentionally created relatively productive breeding habitat. These types of unintentional man-made vernal pools are somewhat common throughout Connecticut's highly suburbanized and urbanized landscape and such examples have been observed by APT on other sites.

WVP-7) We agree with the description of Vernal Pool 7 presented on page A-6 except for the statement that "it is entirely isolated hydraulically from any surrounding wetland or watercourse". We expect there to be a hydrological groundwater connection.

Response: APT acknowledges this statement and agrees that Vernal Pool 7/Wetland 1 is likely connected via groundwater to nearby Wetland 7/3/8 via the western groundwater flow direction.

WVP-8) The top of page A-11 states that "Classic" vernal pools are natural depressions in a wooded upland with no hydrologic connection to other wetland systems. Classic vernal pools are not limited to natural depressions, productive vernal pools can also form in manmade basins.

Response: APT acknowledges this statement and agrees that some man-made basins can unintentionally result in creation of productive vernal pools. Vernal Pool 7 is an example of this phenomena having been intentionally dug in upland soils to create an irrigation pond and due to relatively recent lack of maintenance it has unintentionally created a vernal pool habitat.

WVP-9) The applicant should provide the response letter of the NDDB request when it is received so that the town can evaluate any special requirements needed by protected or high interest species.

Response: The Applicant is still in consultation with NDDB. Based on experience with similar species on other development projects, the proposed wetland and vernal pool protection program that consist of several components, including: education of all contractors and sub-contractors prior to initiation of work on the Site; installation of protective isolation measures (i.e., temporary silt fence and permanent isolation barriers); periodic inspection of the construction project by a third-party environmental monitor; reporting, and almost 100 acres of wetland, vernal pool , terrestrial habitat, and mitigation areas being placed in conservation easement, will be found to adequately protect any State-listed rare species.

WVP-10) Has a dispersal study been conducted to determine where the breeding herptiles are migrating from and to at each pool? Certain upland habitats are more suitable for amphibians and turtles than others. If the migratory routes are known, one can have a better understanding of potential impacts to migrating animals from structures such as roads. If a study has not been done, an evaluation of suitable surrounding habitat can provide useful information.

Response: A dispersal study has not been conducted and as discussed with Thomas Ryder of LandTech during a telephone conversation on January 28, 2022, which also included Stuart Popper, Cromwell Director of Planning & Development, Mr. Ryder indicated that a dispersal study was not required provided additional information regarding the quality of the surrounding terrestrial habitat is provided.

A vernal pool survey was conducted in March and April 2022 to supplement vernal pool survey results from 2021 and to collected information regarding the relative quality of terrestrial habitat that surrounds the various vernal pools present on the site. The results of this analysis informed adjustment to the access road alignment to minimize impact to optimal terrestrial habitat and maximize buffers to productive vernal pools to both the north and south. Details of that analysis are provided in the separately attached May 2022 Wetland Assessment Report.

Wetland Impact Mitigation Measures

WIMM -1) How will migrating amphibians and reptiles be kept from entering the stormwater management feature located southwest of the warehouse and the smaller wet and dry basins northwest and west of the building? Basins like these often act like decoy breeding pools. Fencing or other barriers that meet the ground should be installed around these basins to prevent wildlife access.

Response: The stormwater management feature located southwest of the warehouse has been relocated to the north and is now surrounded by the drive isle and parking area west of the warehouse. The Applicant recognizes that stormwater management features, particularly those located in proximity to vernal pools, can at times create decoy breeding pools and have an impact on populations of breeding vernal pool herpetofauna. To address this concern, all stormwater management features will be surrounded by a permanent restrictive barrier to prevent access by vernal pool indicator species (as well as other wildlife). Animex® wildlife isolation fencing AMX 40 will be used in these areas. Please refer to the project site plans for specific areas where the Animex® fencing will be installed along with a detail of AMX 40. Project site plans have been submitted under

separate cover in the recently filed Town of Cromwell Inland Wetlands and Watercourses Agency Application to Conduct Regulated Activity.

WIMM-2) Similarly, what exclusion devices are proposed to keep migrating amphibians and reptiles from entering onto the parking lot from Wetland 2/Vernal Pool 6 and the Wetland 12/proposed wetland & vernal pool creation complex?

Response: The proposed warehouse's parking areas, drive isles, and a portion of the access road immediately adjacent to the warehouse will be surrounded by a permanent restrictive barrier to prevent access by vernal pool herpetofauna (as well as other wildlife). Animex® wildlife isolation fencing AMX 40 will be used in these areas similar to the stormwater management features. Please refer to the project site plans for specific areas where the Animex® fencing will be installed along with a detail of AMX 40. Project site plans have been submitted under separate cover in the recently filed Town of Cromwell Inland Wetlands and Watercourses Agency Application to Conduct Regulated Activity.

WIMM-3) The applicant has provided a Wetland and Vernal Pool Protection Program as part of the Wetland Assessment Report. This program discusses how erosion and sedimentation controls will be installed in sensitive herpetofaunal areas. However, it appears to be focused toward migrating animals and not sedentary ones.

It is likely that some of the breeding activity found in Vernal Pool 7 is from mature individuals who live year-round in the wetland buffer and do not migrate over the 300-to-860-foot distance of agricultural field which likely contains little to no vegetation during March and April. This was not discussed in the application. If so, this resident population needs to be protected. What time of year will Wetland 1/Vernal Pool 7 be filled in? Care should be taken to not only avoid disturbance during the breeding and metamorphosis period, but to also protect any vernal pool species utilizing the narrow upland buffer. Protecting/removing salamanders, frogs etc. living in the narrow buffer around Wetland 1/Vernal Pool 7 will take some detailed work. The applicant should provide some additional procedures for this area.

Response: A significant resident population of vernal pool indicator species within the narrow wooded buffer surrounding Vernal Pool 7 is not anticipated. The habitat quality of the Vernal Pool Envelope ("VPE"; the area 0-100' around the vernal pool edge) was evaluated for its suitability as terrestrial habitat for indicator vernal pool species as discussed in further detail below.

The average width of the VPE that contains tree and shrub cover was estimated at 50 feet. This VPE vegetation consists of closed canopy tree cover with tree species including small to large sawtimber hardwoods ranging in size generally from 14 inches to 30 inches d.b.h. The dominant tree species are cottonwood (Populus deltoides), red oak (Quercus rubra), black oak (Quercus velutina), hickories (Carya sp.) and red maple (Acer rubrum). There is a broad (sun-leaning) dripline on the outer trees bordering the adjacent cornfield. The shrub and midstory vegetation within the dripline is dominated by a dense growth of non-native invasive shrubs including autumn olive (Elaeagnus umbellata), multiflora rose (Rosa multiflora) and bush honeysuckle (Lonicera morrowii).

The terrestrial habitat quality of the VPE for mole salamanders and wood frog is considered low because the microhabitat conditions lack sufficient/sustained moisture

content necessary to support long-term inhabitation by vernal pool amphibians. This is the result of several factors: (1) the narrow width of the vegetated buffer (avg. 50 feet) which results in increased high sun exposure; (2) the topsoil layer is thin and has low organic matter content; (3) there is little to no duff layer present; (4) fine root masses interspersed with organic material is lacking within the O and A soil horizons; and, (5) abundant cover objects are lacking, including and most importantly, cover objects embedded within both the topsoil and duff layer. All of these factors result in a conclusion that the population of adults and dispersing juvenile vernal pool herpetofauna utilizing Vernal Pool 7 are unlikely to use this low quality and narrow VPE and most likely use the relative high quality forested terrestrial habitat nearby to the west.

Based on the low quality habitat present within the VPE, it is anticipated that if any resident population is using this limited habitat it would consist of a very limited number of individuals. The bulk of the resident population using Vernal Pool 7, which is responsible for the sustained breeding amphibian population supporting this pool, likely relies on the terrestrial forest habitat 400 feet to the southwest. The directional location of this forested area coincides with the location of most of the spotted salamander egg masses observed in the pool: 25 of 29 spotted salamander egg masses were located along the west-southwest shore, suggesting this western shoreline was the point of entry for breeding females. While deposition location is not always directly correlated with the point of entry, in this case, with the presence of homogenous habitat with uniform bathymetry (and corresponding water depths), egg mass location likely indicates the point of entry.

Provided various agency authorizations are secured, it is anticipated that construction would begin in fall 2022. This would avoid disturbance to Vernal Pool 7 during the breeding and metamorphosis periods. This construction schedule would limit impact to the amphibian population, since any resident population residing in the VPE would make up a small percent of the population which primarily resides in the forested habitat to the southwest. Should start of construction of the project be delayed until early spring 2023, an isolation barrier would be installed around the perimeter of Vernal Pool 7 as well as around the project's limits of disturbance to prevent vernal pool species from entering into the proposed work zone and Vernal Pool 7. Should a small resident population be found to still breed within Vernal Pool 7, egg masses (following completion of the egg mass deposition period) along with any adults found would be translocated into nearby Vernal Pool 4.

WIMM-4) A wetland and vernal pool complex is proposed to be created north of the building to compensate for the direct wetland impacts of Wetland 1/Vernal Pool 7 and Wetland 4. The Wetland Assessment Report states that the direct impacts to Wetland 1/ Vernal Pool 7 is 18,007± sf and the impact associated with the road crossing through Wetland 4 is 3,047± sf. The applicant has proposed to create a 25,187± sf wetland of which 12,250± sf will be a created vernal pool. The applicant reports a 1.4:1 ratio.

The wetland creation area appears to be suitable as it adjacent to a large wetland system and is in the vicinity of Vernal Pool 6 however we saw no ground water data for this area. During a phone conversation with Dean Gustafson, Senior Wetland Scientist for the applicant on January 13, 2022, Dean stated that the groundwater in this area is being monitored to determine if it is suitable for the wetland and vernal pool creation that is proposed. The applicant should provide details of this

monitoring program and present the results to the commission for discussion. The results may require altering the design of the wetland and vernal pool creation.

Current science tells us vernal pool creation should be several times larger than the area it is intended to replace (Klemens et al 2021). The applicant should consider creating a larger vernal pool or multiple smaller systems in close proximity to provide appropriate compensation.

Response: The wetland mitigation plan has been significantly revised and in particular the areas of the proposed wetland and vernal pool creation have been increased. The Project now proposes to create a new wetland area, expanding the previous creation area further to the north/northeast parallel to the large forested swamp to the north (Wetland 12), that is now ±71,014 SF in size. The vernal pool creation area has also been significantly increased to ±50,485 SF.

Direct wetland impacts have been slightly reduced: permanent direct impacts to Wetland 1/ Vernal Pool 7 is ±18,007± SF (unchanged) and the impact associated with the road crossing through Wetland 4 has been reduced to ±1,387 SF (temporary impacts of ±891 SF will be restored). As a result, the Project's total permanent direct wetland impacts are ±19,394 SF, of which ±18,007 SF are associated with vernal pool habitat. In addition to the wetland and vernal pool creation areas noted above, ±6,514 SF of the flood compensatory storage area associated with the Wetland 4 crossing will also consist of creation of a forested floodplain wetland. The total area of wetland creation for the Project is ±77,528 SF, resulting in a 4:1 mitigation to impact ratio. The vernal pool creation/impact ratio is 2.8:1, without taking into account mitigation provided by a nearly 100 acre conservation easement that protects five (5) existing vernal pools, including the Site's highest productivity pool in Vernal Pool 4.

The Army Corps New England District Compensatory Mitigation Standard Operating Procedures (December 29, 2002) document provides guidance on compensatory mitigation ratios including recommended compensatory mitigation ratios for direct permanent impacts to vernal pools¹. The ratio for vernal pool loss is based on a rating system of low, moderate, and high that evaluates the existing land use in the surrounding terrestrial habitat, ranking forested habitat the highest value and open and developed area the lowest values. Using this weighted rating system, low rated vernal pools are those with a score of 19 or less. Calculating the rating of Vernal Pool 7, this vernal pool has a score of only 11.4 due to the existing open cultivated agricultural fields that dominate the surrounding terrestrial habitat. As a result, the mitigation ratio in accordance with this regulatory document requires preservation of one (1) pool and its surrounding terrestrial habitat. In addition to creating a new vernal pool that will be 2.8 times larger than that being impacted, the large conservation easement will preserve five (5) vernal pools and nearly 100 acres that include significant areas of terrestrial habitat. The compilation of these mitigation measures significantly exceeds the mitigation ratio recommended by the Corps.

A thorough geotechnical investigation of the Site has been performed, including areas within and proximate to the proposed wetland/vernal pool creation area. This investigation included direct observations of groundwater at testing locations and the

¹ Refer to Appendix C1 – Recommended Compensatory Mitigation Ratios for Direct Permanent Impacts to Wetlands, Army Corps New England District Compensatory Mitigation Standard Operating Procedures (December 29, 2002)

installation and monitoring of groundwater wells. That data is provided in the Stormwater Management Report prepared by Langan and submitted under separate cover as part of the wetland permit application filing. The wetland/vernal pool creation proposed grading reflects results from this groundwater data collection effort and will result in creation of hydrologic conditions suitable for creation of new wetland and vernal pool habitats with appropriate hydrologic regimes. Please refer to project site plans for additional details of this mitigation plan which have been submitted with the recently filed Town of Cromwell Inland Wetlands and Watercourses Agency Application to Conduct Regulated Activity.

WIMM-5) The area southeast of Wetland 7 is currently cleared agricultural fields. This area will remain undeveloped and as part of the planting plan should be replanted up to the western edge of the development in order to accelerate the establishment of suitable wetland and vernal pool buffer for Wetland 7/Vernal Pool 4.

Response: This is a good suggestion and the triangular-shaped agricultural field located southeast of Wetland 7/Vernal Pool 4 (the Site's highest productivity vernal pool) has been incorporated into the project's overall mitigation plan. This area will be planted with a variety of native trees, shrubs and herbaceous species to provide significant enhancement to this upland area by providing a high quality forested terrestrial habitat. This area will develop through natural forest succession processes optimal forested terrestrial habitat for vernal pool species that are utilizing Vernal Pool 4. Please refer to the project site plans for additional details of this mitigation plan that have been submitted with the recently filed Town of Cromwell Inland Wetlands and Watercourses Agency Application to Conduct Regulated Activity.

On behalf of Scannell Properties #576, LLC, thank you for your consideration of our responses. If you have any questions regarding the above-referenced information, please feel free to contact me by telephone at (860) 552-2033 or at dgustafson@allpointstech.com.

Sincerely,
All-Points Technology Corporation, P.C.



Dean Gustafson
Senior Wetland Scientist
Professional Soil Scientist

cc: Daniel Madrigal, Scannell Properties #576, LLC
Thomas P. Cody, Robinson & Cole LLP

Langan CT, Inc.

555 Long Wharf Drive New Haven, CT 06511 T: 203.562.5771 F: 203.789.6142

To: Thomas Ryder, Landtech
Robert Pryor, P.E., L.S., Landtech

From: Timothy Onderko, Langan CT

Date: May 3, 2022

Re: Cromwell Inland Wetlands and Watercourses Agency Review
Scannell Properties #576, LLC
210 Shunpike Road, Cromwell, CT
Langan Project No.: 140225401

Enclosed please find our responses to your letter dated January 14, 2022. Below please find each comment followed by our response in **bold**.

Stormwater Report

Culvert Analysis

- CA 1) The design flows used for the culvert design appear to be taken from StreamStats. Per the ConnDOT drainage manual, these flows may need to be adjusted upward to account for the urbanization of the watershed (See ConnDOT Drainage Manual Section 6.13). The applicant should perform this analysis to verify that they are using the correct design flows for analysis.

COMMENT RESPONSE: In accordance with Section 6.13 of the ConnDOT Drainage Manual, design flow rates obtained via the StreamStats website have been adjusted upward to account for urbanization of the watershed. Refer to Appendix E of the Stormwater Management Report for calculations.

- CA-2) Although not indicated on the topographic survey, there is an existing culvert downstream of the proposed crossing that crosses Shunpike Road. It is unclear whether an analysis of this culvert was performed to determine what affect that its performance and condition might have with regard to tailwater elevations on the proposed culvert. The FEMA mapping shows much of the area downstream of the proposed culvert within Flood Zone A, meaning that the area likely exhibits some flooding in the 100-year event.

COMMENT RESPONSE: An analysis of the existing downstream culvert was performed using the Hydraflow Express computer program in order to establish the appropriate tailwater elevations to be used in the capacity and headwater calculations of the proposed culvert. Refer to Appendix E of the Stormwater Management Report for calculations.

MEMO

Cromwell Inland Wetlands and Watercourses Agency Review
210 Shunpike Road, Cromwell, CT
Langan Project No.: 140225401
May 3, 2022- Page 2 of 9

- CA-3) With regard to the construction of the culvert and the associated retaining walls, the applicant should consider eliminating the roadway shoulders and guiderails and design the retaining walls to extend above the roadway to act as guiderail protection. This would shorten the culvert length by approximately 8', thereby reducing the area of wetland filling.

COMMENT RESPONSE: We have revised the proposed wetland crossing area to reduce the culvert length from approximately 72' to 60'. This reduces the wetland impact from ±3,047 SF to ±1,387 SF.

- CA-4) There is no inlet or outlet protection proposed for the proposed road crossing culvert. The stormwater management report reports velocities of 8+ fps at the inlet and 10+ fps at the outlet. Based on the improved hydraulic characteristics of the culvert, these velocities are likely higher than what the natural stream channel currently experiences, and may result in increased erosion/scour at the inlet and outlet of the proposed culvert. The applicant should justify their decision to omit any stream bed protection in this area.

COMMENT RESPONSE: According to Appendix G of the Army Corps CT General Permit Application, the existing streambed material is to be maintained through the proposed culvert crossing. In order to protect the culvert footing from scour and erosion at the headwall and through the culvert, we are proposing an area of intermediate riprap on the east and west sides of the culvert both through the barrel and at the entrance and exit points. Proposed velocities through the culvert are calculated as 3.69 cfs and 4.36 cfs for the 50 and 100-year storm events respectively. Refer to the CG plan series for locations and details of the proposed riprap at the culvert entrance and exit.

- CA-5) The natural channel bottom is depicted as having a low-flow channel, but no dimensions of this channel are provided. The applicant should provide base flow calculations showing how average daily flows will be contained in the low flow channel, allowing for wildlife passage under the culvert under non-storm conditions. The low flow channel should also be designed to limit flow velocities to allow aquatic wildlife to traverse the culvert in an upstream direction.

COMMENT RESPONSE: The inverts of the proposed culvert have been designed based of the hydraulics of the existing downstream 60 inch diameter culvert entrance. In addition, a low flow channel is proposed through the crossing to allow for the passage of the base flow and the passage of wildlife along the low flow channel banks. Refer to the CG500 plan series details for additional information. Field measurements of the base flow rate were performed in early 2022. These measurement indicate a base flow rate of approximately 0.5 cubic feet per second. The capacity of the proposed low flow channel at full depth is calculated as 8.71 cfs.

MEMO

Cromwell Inland Wetlands and Watercourses Agency Review
210 Shunpike Road, Cromwell, CT
Langan Project No.: 140225401
May 3, 2022- Page 3 of 9

Stormwater Analysis & Design

- SA -1) The Cromwell zoning regulations appear to require analysis of the 50-year storm event. The applicant may wish to consider adding the 50-year event to their analysis.

COMMENT RESPONSE: *The existing and proposed conditions drainage model has been updated to include the 50-year storm event. Results can be found in Appendices A and B of the included Stormwater Management Report. A summary of results can also be found in Table 2.*

- SA-2) The Stormwater Management Report we received provided a summary table of discharges for the 2, 10, 25, and 100-year storm events, but only the detailed HydroCAD output for the 25-year storm was included. Please provide the detailed HydroCAD output for all storm events so that we can complete our review.

COMMENT RESPONSE: *Model results and hydrographs for the existing and proposed 2, 10, 25, 50 and 100 year storm events have been added to Appendices A and B of the attached Stormwater Management Report. A summary of results can also be found included in Table 2.*

- SA-3) The drainage system for the entry drive consists of rip rap leak-offs with roadside swales. In general, we support this methodology. We would like the applicant to provide the following information to more fully document their design:

- Gutter flow analysis of the roadway to verify the capacity and spacing of the leak-offs.

COMMENT RESPONSE: *Calculations for gutter flow rates, depths, associated lane spread, and bypass has been added to the attached Stormwater Management Report under Appendix F. Gutters and inlets have been designed to allow for a maximum spread of 10 feet along the proposed roadway, during a 10-year storm event, which is equal to the width of the 2 foot shoulder plus half of the 16ft wide lane.*

- Hydraulic analysis of the roadside swales to verify capacity for the design storm.

COMMENT RESPONSE: *Capacity calculations for the proposed roadside swale have been included in Appendix F of the attached Stormwater Management Report. As proposed, the roadside swale has the capacity to pass 8.71 CFS while allowing for 1 foot of freeboard.*

- SA-4) The applicant may also want to consider incorporating rip rap infiltration trenches at the bottom of the roadside swales to further promote infiltration and distribute the groundwater recharge more uniformly along the roadway length.

MEMO

Cromwell Inland Wetlands and Watercourses Agency Review
210 Shunpike Road, Cromwell, CT
Langan Project No.: 140225401
May 3, 2022- Page 4 of 9

COMMENT RESPONSE: Details for the proposed roadside swale along the northern side of the proposed access roadway have been modified to include riprap infiltration trenches along the bottom width of the swale at all locations.

SA-5) We would consider the proposed infiltration basins (D2, F2, F3, F4, G2) to meet the definition of an "Infiltrative Practice" as defined in the 2004 Connecticut Stormwater Quality Manual (CSQM). The applicant also defines them in this way in their SWM Report. As such, we believe that the guidance provided in the CSQM applies to these elements. Our review indicates the following with regards to compliance with the CSQM:

- a) Section 11-P3-3 of the CSQM requires a minimum of three field tests and test pits/borings within the footprint of each proposed infiltrative practice. In this case, the applicant has provided a maximum of two tests in the vicinity of proposed basin D-2, and no testing for any of the other proposed Infiltration Basins. We recommend that the applicant perform an additional two soil tests/field infiltration tests within the footprints of the proposed infiltrative practices. In addition, we recommend that the soil tests be performed as test pits, as opposed to borings, so that the soil indicators (redox) of seasonal high ground water can be identified and proper vertical separation distances can be ensured.

COMMENT RESPONSE: The project geotechnical engineer, GEI Consulting, Inc., has performed additional on-site testing in order to provide for a minimum of three field tests per infiltrative practice as outlined in the 2004 Connecticut Stormwater Quality Manual. Refer to Appendix I of the attached Stormwater Management Report for the results of all soil tests performed on site. The locations of testing can be found in the CG100 Plan series. In addition, refer to Table 4 of the Stormwater Management Report for a summary of proposed infiltrative practices, the bottom elevation of said practices, and the elevation of any restrictive soil layer.

- b) Section 11-P3-3 of the CSQM specifies that the field-measured infiltration rates in the areas proposed for infiltrative practices should be between 0.3 in./hour and 5.0 in./hour. The infiltration tests provided in the submission materials specify infiltration rates between 8.0 inches/hour and 60.0 inches/hour which are clearly outside of the CTDEEP recommended range. CTDEEP recommends against locating infiltrative practices in these types of soils due to the lack of treatment/renovation and the potential for groundwater impacts. This is especially true when there is a limited vertical separation between the bottom of the basins and the groundwater table. The applicant should justify why the recommendations of the CSQM should not be applied in this case.

MEMO

Cromwell Inland Wetlands and Watercourses Agency Review
210 Shunpike Road, Cromwell, CT
Langan Project No.: 140225401
May 3, 2022- Page 5 of 9

COMMENT RESPONSE: *We have added an amended soil layer (18 inches deep) below the infiltrative practices that have high infiltration rates. This amended soil layer will consist of an engineered material specifically designed to limit infiltration to a maximum of 5 inches per hour. Refer to the grading & drainage detail sheets (CG500 series).*

- SA-6) The large underground detention systems proposed to handle the runoff from the roof of the proposed building are detailed as open bottom structures. The detail calls for these systems to be wrapped with a geotextile fabric/membrane. Based on the outlet structures proposed, it appears that these structures will depend on infiltration to completely drain out after storm events. The same comments that apply to the proposed infiltration basins, as described above, also apply to these underground structures.

COMMENT RESPONSE: *The above responses to comments SA-5.a and SA-5.b also apply to the two proposed underground detention systems. Refer to Appendix I for soil testing results, the CG100 Plan series for soil testing locations, and Table 4 of the Stormwater Management Report for bottom of system elevations and associated groundwater elevations.*

- SA-7) Please provide drawdown calculations for all stormwater management basins/systems.

COMMENT RESPONSE: *Drawdown calculations for all proposed stormwater BMPs have been added to the attached Stormwater Management Report in Table 4. Drawdown calculations for the proposed basins correspond to the time it takes for the full storage capacity of the system to infiltrate using an infiltration rate of 1 inch per hour. Drawdown times do not correlate to any particular storm event.*

- SA-8) Please provide computations that demonstrates how the proposed stormwater management facilities meet the CSQM relative to Groundwater Recharge Volume (GRV).

COMMENT RESPONSE: *Calculations for Groundwater Recharge Volume have been added to the Stormwater Management Report in Appendix C. Also, refer to Table 3 of the report for BMP sizing requirements and associated storage capacities.*

- SA-9) Please provide documentation that demonstrates how the proposed stormwater management facilities meet the recommendations of the CSQM relative to Peak Flow Control, more specifically, the recommendations relative to:

- a) Stream Channel Protection

COMMENT RESPONSE: *Due to the majority of soils throughout the site being classified as HSG-A, and the limited topographic relief across the site, the existing*

MEMO

Cromwell Inland Wetlands and Watercourses Agency Review
210 Shunpike Road, Cromwell, CT
Langan Project No.: 140225401
May 3, 2022- Page 6 of 9

2-year 24-hour storm events result in low peak flow rates. In order to reduce the proposed 2-yr event to less than 50% of the existing 2-year event, all pond outlet control structures (orifices/weirs) would be reduced to a size too small to effectively operate. Section 7.61 of the Connecticut Stormwater Quality Manual identified this as a potential practical limitation of meeting the stream channel protection criteria. Our calculations do not take credit for the ability of the various stormwater management features to provide infiltration that would reduce proposed condition peak flow rates and bring the development into conformance with this standard.

b) Conveyance Protection

COMMENT RESPONSE: All closed pipe networks proposed on site have been designed to convey, at a minimum, the runoff associated with the 10-year storm event. In addition, all pipe networks to be located downstream of proposed stormwater BMPs have been designed to safely pass peak flow rates associated with the 100-year storm event.

c) Peak Runoff Attenuation (Complete)

COMMENT RESPONSE: Nine stormwater BMPs are proposed for the site in order to maintain existing peak runoff rates at all downstream design points. Refer to Table 2 in the attached Stormwater Management Report for additional information.

d) Emergency Outlet Sizing

COMMENT RESPONSE: As mentioned in the response to comment SA-9.b, all pipe networks to be located downstream of proposed Stormwater BMPs, have been designed to safely pass peak flow rates associated with the 100-year storm event.

SA-10) The proposed project includes significant areas of roof and pavement. Runoff from these impervious surfaces is often at a much higher temperature than that from lawn/landscaped areas. The applicant should evaluate and discuss how these potential "thermal effects" are mitigated by the proposed stormwater design.

COMMENT RESPONSE: We believe that the following measures taken, as listed below, successfully mitigate the "thermal effects" of runoff from the site's proposed impervious surfaces:

- Use of concrete paving for all employee parking areas as well as the entirety of the truck parking court. The use of concrete verses black asphalt reduces the surface temperature of the pavement by approximately 20 degrees.***
- Implementation of two underground detention/retention systems that collect runoff from the entire building and eastern truck court, and at a minimum, retain the Water Quality Volume of runoff for their respective watersheds.***

MEMO

Cromwell Inland Wetlands and Watercourses Agency Review
210 Shunpike Road, Cromwell, CT
Langan Project No.: 140225401
May 3, 2022- Page 7 of 9

- ***Inclusion of infiltration basins to delay the timing of the peak runoff rates, allowing for thermal cooling of the runoff.***
- ***No direct discharge of runoff from on-site impervious areas to any downstream watercourse or wetland.***

SA-11) It appears that the large wet basin (B-5) is designed so that the bottom will remain below the water table, based on a single observation of groundwater/mottling at 5.8ft/5.5ft. below the surface (Approximate Elevation 130.5). The maximum static surface water elevation (non-storm event) will be maintained at an elevation of 132.00 by a low-flow orifice in the outlet structure. We have the following comments regarding this basin:

- a) The groundwater levels that are being relied on for this design are based on a single, instantaneous observation of the groundwater. We believe that additional testing, as well as groundwater monitoring wells, should be installed and monitored over an extended period of time to more accurately determine the groundwater behavior and variability of the groundwater elevations over time. At a minimum, these observations should extend through the spring "wet" season until late spring.

COMMENT RESPONSE: Wet pond B-5, as previously proposed, has been removed from the plan and replaced with Extended Detention Basin B-5 in an alternate location. However, the project geotechnical engineer, GEI Consulting, Inc., has performed additional testing in the vicinity of former Wet Pond B-5 since the initial submission. This includes 3 monitoring wells, (SB-2/MW-1, SB-3/MW-2, and SB-4/MW-3), installed on 12/20/2021–12/21/2021 and monitored through 01/05/2022. GEI has also performed additional field tests in the area. We now have observed groundwater elevations from three test pits (TP-7, TP-10, and TP-11) and two borings (B-1, B-47) within the basin footprint, with multiple other tests in the area surrounding the wet pond.

- b) Based on the testing, the seasonal high groundwater elevation is approximately 130.5 (based on observed mottling), and the aquatic bench elevation is set at 131.0. If the pond elevation remains at or below the observed GW elevation for extended periods of time, will the viability of the aquatic bench be affected?

COMMENT RESPONSE: As mentioned in the response to comment SA-11.a, West Pond B-5 has been removed from the plan and replaced with proposed Extended Detention Basin B-5.

- c) The basin does not appear to be equipped with an emergency overflow weir. Clogging of the small outlet orifice and catch basin grate could result in the basin filling to the top of the berm at elevation 137.5, causing the

MEMO

Cromwell Inland Wetlands and Watercourses Agency Review
210 Shunpike Road, Cromwell, CT
Langan Project No.: 140225401
May 3, 2022- Page 8 of 9

breaching of the earthen berm. We suggest that the applicant consider adding an emergency overflow weir to the basin or demonstrate why it is not advisable to include it.

COMMENT RESPONSE: We have added an emergency spillway to Extended Detention Basin B-4, located at the southwest corner of the proposed building. The spillway's crest elevation has been designed to engage for any storm that exceeds the 100-year event.

- d) The wet basin will collect runoff from a 67.7-acre area and convey that runoff into a basin with a footprint of approximately 10 acres. The stormwater modelling does not consider the effects of infiltration, which is conservative with respect to runoff rates and volumes. We do feel, however, that the stormwater stored in the basin will infiltrate into the surrounding soils and groundwater, and based on the types of soils in the area, could potentially cause some groundwater mounding in the vicinity of the pond. We suggest that the applicant evaluate this potential groundwater mounding to verify that the effects will not extend past the property limits.

COMMENT RESPONSE: This basin has been eliminated and relocated to the center of the site.

General Site Design

GSD-1) All proposed grading steeper than 3H:1V should be installed with soil erosion control matting. This shall include both cut and fill slopes.

COMMENT RESPONSE: We have added this note to the soil erosion-sediment control notes on sheet CE501. See note #26.

Soil Erosion & Sediment Control Plans

ESC-1) The soil erosion and sediment control plans appear to be well thought out and designed: we offer the following observations:

- a) The construction sequence lacks sufficient detail for a project of this scope. Additional detail is required, including the approximate duration of each phase, as well as overall project duration.

COMMENT RESPONSE: We have added a more detailed construction sequence, including approximate durations, to sheet CE501.

- b) An estimate of earthwork quantities should be included, and should specify the approximate quantities of the various materials (topsoil export, structural fill import,

MEMO

Cromwell Inland Wetlands and Watercourses Agency Review
210 Shunpike Road, Cromwell, CT
Langan Project No.: 140225401
May 3, 2022- Page 9 of 9

etc.).

COMMENT RESPONSE: *Based on our current design, we have estimated that the project would require a net import of approximately 30,000 cubic yards. All existing topsoil would remain onsite for future use.*

- c) Due to the large areas being disturbed, the applicant may wish to include additional rows of silt fence/sediment barrier within the project site to limit the transport of sediment across the site and to further limit sedimentation of areas outside of the project area in the event of a failure of the perimeter sediment barrier.

COMMENT RESPONSE: *We have added additional rows of compost filter tube and silt fence to the Phase I & II Soil Erosion & Sediment Control plans to slow water flowing downhill and help limit the transport of sediment across the site.*

- d) We strongly suggest that the applicant construct, stabilize, and provide a temporary or permanent bituminous concrete binder course on the construction access road prior to commencing the main site construction. We believe that the length of the access road, proximity to wetlands, and amount of trucks required for the import/export activities warrant this approach.

COMMENT RESPONSE: *We have added notes to the Phase I & II Soil Erosion & Sediment Control plans that the contractor shall construct, stabilize, and provide a bituminous concrete binder course on the construction access road prior to commencing the main site construction.*

- ESC-2) If approved, we recommend that the town bond all erosion and sediment control measures and retain an independent third party to provide inspections and reporting by a qualified erosion and sediment control professional on a weekly basis and after each measurable precipitation event of 0.25 inches or greater until the site is permanently stabilized.

COMMENT RESPONSE: *Noted.*

\\angan.com\data\NHV\data4\140225401\Project Data\Correspondence\Comment Response\2022-05-04 WL App - Landtech Peer Review\2022-05-04 Ryder-Pryor Comment Response Memo.docx

LANGAN