

## Chessia Consulting Services LLC



October 15, 2021

Daniel C. Hill, Esq.  
Hill Law  
Six Beacon Street, Suite 600  
Boston, MA 02108

RE: Professional Engineering Review  
Proposed Comprehensive Permit  
The Village at Cricket Lane,  
Byfield (Newbury), MA

Dear Mr. Hill:

Chessia Consulting Services, LLC has reviewed the above referenced project relative to a Notice of Intent Application to the Town of Newbury Conservation Commission. In particular, I have reviewed the project for compliance with Stormwater Regulations promulgated by the state Department of Environmental Protection (“DEP”). I note that the Town of Newbury Stormwater Management, Illicit Discharge and Erosion Control Rules and Regulations were waived by the Zoning Board of Appeals in their decision on the Comprehensive Permit. In addition, the design was reviewed for conformance to general engineering design standards.

For background, I have been a registered professional engineer in the Commonwealth of Massachusetts continuously since 1992. My practice specialty is general civil engineering in relation to real estate development projects, including stormwater and wastewater engineering. I have designed comprehensive permit projects, wastewater treatment plants and numerous other site development projects. I have assisted other engineering companies with stormwater designs and quality control reviews. I have performed hundreds of peer review assignments on behalf of municipal boards and commissions across the Commonwealth, including recent Chapter 40B project applications in Weston, Norwell and on Nantucket .

The data reviewed included the following:

**Plans Entitled:**

- “40B Comprehensive Permit The Villages at Cricket Lane Byfield, MA” dated August 17, 2020 last revised January 28, 2021 and re-issued to the Newbury Conservation Commission on March 8, 2021, consisting of 30 Sheets prepared by Ranger Engineering Group, Inc. (Site Plans);

## **Supporting Data:**

- Stormwater Management Report The Village at Cricket Lane 55 Pearson Drive, Byfield, Ma 01922 Assessor's Map 20 Lot 75 January 31, 2020 Revised June 30, 2020 prepared by Ranger Engineering Group, Inc. (Report)
- Notice of Intent Application The Village at Cricket Lane 55 Pearson Drive, Newbury, MA Assessor's Map R20 Lot 75 May 10, 2021 prepared by Ranger Engineering Group, Inc.
- Miscellaneous comment letters from the following:
  - LEC, the most recent dated January 21, 2021 (email correspondence)
  - Joseph J. Serwatka, P.E. the most recent dated September 22, 2020.
  - Patrick Garner the most recent dated October 14, 2021, with attachment.

## **I. Introduction – the Project Site**

The Project Site is located to the east of Pearson Drive between developed properties along Pearson Drive and Commonwealth of Massachusetts Division of Fish and Game property. The site would be accessed off of Pearson Drive through a 40-foot wide easement on #55 Pearson Drive. The parcel has no frontage on an existing road, based on the plans. The property is currently vacant and wooded. The total land area is listed as 656,984 square feet (15.08 acres) of which 4.82 acres would be deeded to the Commonwealth of Massachusetts Division of Fish and Game.

There are several wetland resources on and proximate to the property based on the plans and a review of MassGIS data. The site includes Bordering Vegetated Wetlands (BVW), Isolated Land Subject to Flooding (ILSF), Isolated Vegetated Wetlands, Intermittent Streams and a Certified Vernal Pool. The project also includes areas of historic wetland fill that reportedly was implemented without proper permits. The Applicant has proposed to fill wetlands to access the site through the proposed easement. It is unclear if the Applicant has documented that there is no other option to access the site. This should be provided to the Commission. The submittal does not indicate where runoff from the site would ultimately discharge, as the limit of the plans and study area for the hydrology model is the property line of the site. Based on MassGIS, the westerly wetlands and intermittent stream flow south to offsite ponds and streams. There are likely culverts and outlet structures in these receiving wetlands, as access drives cross over the wetlands between the ponds at two locations, and the ponds appear to be constructed ponds based on a review of historic USGS maps. It is less clear where the wetland to the east would ultimately discharge, as mapping is not at a sufficient scale to determine flow routes from MassGIS. The wetlands are discontinuous on the mapping available. It should be determined if there is an outlet from the easterly wetlands. In both of these areas there is proposed a significant increase in total volume of runoff, and the impact of flooding has not been assessed if there is a restricted outlet.

Topographically, there is generally a moderately steep slope from high points in the central portion of the proposed development to the east, west and south. The west side flows to the westerly wetlands, the east side to the easterly wetlands and the south central area flows to an isolated wetland and Isolated Land Subject to Flooding that is partially offsite.

Based on a review of data in the Site Engineering Report (“Report”), and in the Natural Resource Conservation Service (NRSC) website, the Site is identified as containing Canton series soils in uplands and Maybid in wetlands. Canton Soils have variable hydraulic conductivity and are classified as Hydrologic Soil Group (HSG) B. Maybid soils are found in wetlands and are of generally not suitable for development purposes. There are several on-site tests indicating variable soil conditions. No testing for individual roof infiltration systems as proposed has been indicated on the plans. There is testing for the septic system and tests are indicated in the stormwater detention and infiltration systems; however, logs for many of the tests were not included in the data provided. This is significant as the basis for the design would rely on these tests. Test data that has been provided indicates marginal soils for infiltration in the proposed large subsurface system.

*I recommend that the Applicant verify that there are no other options to access the site, without crossing a wetland.*

*I recommend that the Commission require that the Applicant provide complete soil testing data, including full soil evaluation reports, in the area of the proposed stormwater management systems.*

## **II. Introduction – the Proposed Project**

The Applicant proposes a condominium project consisting of 24 detached single family dwellings. Access would be off of Pearson Drive and would include an approximately 900- foot long cul de sac with two dead end branches of approximately 180 and 200 feet. The access would require filling of existing BVW to access the property. Houses would all have attached garages with parking also provided in front of the garage. There are additional on-street pull out spaces along the roadway and at the cul de sac. The plans should clarify if all houses, or only some of the houses, would have basements. The plans list a basement floor elevation for some (but not all) of the units, although all of them have foundation drains.

Stormwater runoff is proposed to be managed through three open and one subsurface basin. One open basin is proposed as a pocket wetland basin. The subsurface basin is also proposed to provide recharge of runoff. Two of the basins appear to be standard detention basins based on the Report. It is also proposed to collect and recharge roof runoff from houses. The Report is inconsistent relative to which roofs would have recharge systems. The Report states that the intent is to install 13 individual subsurface systems for roofs and route an additional 7 (Units 10-16 on the Site Plans) to the subsurface system under the cul de sac. There is a generic sizing calculation for a subsurface infiltration chamber system for an individual roof. The plans indicate only 9 locations for these systems, but no soil testing, piping design, etc. has been indicated on the plans. Other utilities, including water and sewer, cross through the infiltration systems in some locations. Runoff from constructed stormwater management systems would ultimately discharge to the easterly wetlands and the westerly wetlands.

*I recommend that the Commission require that the Applicant provide complete design data, including soil testing data for the roof systems. It is unclear that the roofs could be conveyed to these systems, as the roofs have multiple ridge lines with runoff to the rear in some cases, and it is unlikely to be practical to convey to the front. Complete design data is necessary, especially because the site has shallow depth to groundwater in many areas.*

The houses all have proposed foundation drains that do not have any information relative to the elevation, size, etc. The proposed system is quite extensive. It would appear that the foundation drains would lower the water table and reduce groundwater recharge, and in fact would increase flow into some of the proposed stormwater management systems. Two of the drains would connect to the subsurface system and would take up infiltration capacity when flowing. All of the open basins would also have flow from the proposed foundation drains. One is proposed to discharge to the State property at the property line and would require an easement from the state for this discharge.

*I recommend that the Commission require that the Applicant provide complete design data including elevations, inverts, seasonal high groundwater elevations for each house, etc., for the proposed foundation drains. In some cases it is likely that the proposed roof recharge system would just flow into the foundation drain and not function as proposed.*

Wastewater would be collected through sewer manholes and sewer mains to septic tanks and a pump chamber on the north side of the roadway across from Unit 4. There is a proposed leaching area north of the tanks and partially in the 100 foot buffer zone to wetlands. Water lines would come up the access drive and dead end in the cul de sac. No gas or electric/cable services are indicated on the plans.

*I recommend that all utility data be provided as applicable, because there is limited space for additional utilities, and construction would be in the filled wetlands and buffer zone in some locations.*

### **III. General Design Comments**

I have reviewed the plans for general design issues based on the data and information provided. In addition, I have reviewed the Project for conformance with the DEP Stormwater Handbook, including Volumes 1 for general data on the Stormwater Standards, Volume 2 for specific BMP design criteria, and Volume 3, "Documenting Compliance with the Massachusetts Stormwater Standards". I have used DEP's ten stormwater standards as the basis for review. The project will require an Order of Conditions as work is proposed both in the wetlands and the buffer zone.

### **IV. Grading**

1. The plan proposes several retaining walls and a typical detail for the walls is included in the Site Plans. The walls proposed would be modular block walls with wider blocks, up to 5 feet wide at the base and smaller blocks near the top. It is unclear that these could be constructed without impacting the abutter on the east side of the easement. It is also unclear that the proposed catch basin #3 could be constructed, if the base is 5 feet wide.

*I recommend that the Commission require more detail on the design of the retaining walls, including construction space and excavation requirements to install the walls.*

## **V. State Stormwater Management Regulations**

The DEP Stormwater Management Regulations consist of ten (10) broad stormwater standards. This section of the correspondence discusses each standard, and identifies whether the submittal complies, does not comply, or if additional information is required to demonstrate compliance.

*The Stormwater Checklist in the data provided to Chessia Consulting Services, LLC was not stamped by a Professional Engineer as required.*

### Standard 1 – Untreated Stormwater

To demonstrate compliance with this standard, runoff from impervious areas must be treated prior to discharge, and the Applicant must demonstrate that the proposed outlets will be stable and diffuse flow such that erosion does not occur at the outlet.

The Project's stormwater system includes three new point source discharges, based on the proposal. There are other issues as noted below, which would impact flows at some of the outlets. The submittal does not include the required computations for sizing outlet protection at discharge points. There is a detail, but the supporting calculations, although listed as provided in the Stormwater Checklist, were not in the Report or on the Site Plans.

*Outlet sizing computations are required to meet Stormwater Standard #1.*

### Standard 2 – Post Development Peak Discharge Rates

This Standard requires an Applicant to demonstrate that the Project does not result in an increase in the rate of runoff from the Site, and that the Project will not result in flooding on or offsite. Evaluation of runoff is prepared for specific control points where runoff would concentrate or reach a specific resource area (e.g., stream) or culvert.

1. *Existing Conditions*

In order to appropriately analyze the impact of the Project, the first step is to determine where existing runoff would flow and to identify capacity of existing drainage systems and locate concentrated discharge points.

Based on a review of MassGIS mapping and the plans, the westerly wetlands flow through an intermittent stream that flows offsite under an access drive and into a series of ponds before discharging into a tributary to the Parker River. A restrictive culvert would be the logical control point, if one exists, as is likely the case. It is also likely that the ponds have outlets that also control runoff. The analysis should determine where this runoff flows after it leaves the site to assess potential flooding impacts of the Project. The easterly wetlands appear to be confined within and off-site to the north, based on MassGIS wetlands mapping. Due to the scale of mapping it is quite possible that the wetlands have an outlet and could also ultimately flow to the Parker River. It is the Applicant's responsibility to assess if the project results in flooding, if any restrictions exist that could increase flood levels, if the wetlands are a closed system, and if the proposed increase in runoff volume would increase the flood height in the wetlands, potentially altering the wetlands.

The flow paths utilized by the Applicant to determine the time of concentration for EX 1, EX 2 and EX 3 do not appear to use the most *hydraulically remote* length. For small areas in this type of project, the flattest section for sheet flow would have the longest time hydraulic flow time. EX 1 is actually indicated as going up over a rise, which is physically impossible. The flow paths should also extend to the restriction downstream, as applicable. In the case of a confined area (if one exists) in the wetland associated with EX 3, the flood elevation should be determined to compare with post-development runoff. This would be true also for EX 2; however, it is proposed to reduce both the rate and volume to the ILSF, so it would have a lower flood height and further analysis would not be required for this area. Time of concentration calculations also use "short grass", which is a prairie condition not typical of lawn grass in New England which should be considered dense grass.

Most of the site is higher than the abutting properties, except that the property to the southeast of the access easement flows into the site. The tributary area from this property should be included in the existing conditions analysis, as the flow would be into the roadway in the proposed case and would impact flows to the constructed wetland basin.

*I recommend that flow paths for EX 1, EX 2 and EX 3 be modified to include the most hydraulically remote length.*

*Time of concentration calculations should use "dense grass" calculations.*

*Tributary areas from the abutter southeast of the access easement should be included in the existing conditions analysis.*

## 2. *Proposed Conditions*

The proposed conditions assume that the entire roof of each of the houses would discharge to one side or the other. A review of the Architectural Plans included with the Zoning

Board of Appeals Decision indicates that the houses have a central ridge line which pitches to either the front or back of the house. The rear of most of the houses is lower than the front near the street. It may be feasible to connect roof runoff from the front of the house to the lower rear side as there would be pitch for the pipes, but it is not likely that they could be sloped to the front.

*The Project plans should document elevations for all the pipes, gutter locations, etc. to demonstrate that the design is feasible or revise the model to account for where water would actually flow.*

The design also assumes that proposed catch basins would capture every drop of runoff from the 100 year storm and redirect it, counter to the roadway grades, and to the proposed stormwater management systems. Where catch basins are at a low point this may be the case, although the capacity of the grate and the available ponding area at the low point should be assessed. The low points are at the end of the cul de sac and at Station 0+48. The 100 year storm analysis indicates that CB 1, 2, 4, 7, 8 and 9 all have a peak flood elevation above the rim—in some cases over one foot above the rim—which would likely overflow the curb and shoulder at the low points (CB 1 & 2 at Station 0+48 and CB 9 at the end of the cul de sac). I note that a storm sewer analysis should be provided independent of the HydroCAD modeling analysis. HydroCAD is not suitable for sizing of hydraulic pipe networks as identified within the HydroCAD manual. Pipe slopes for the storm sewer network are also flatter than standard design practice in some cases. In one case it is listed as a 0% slope. The model actually lists a catch basin as the emergency overflow from the Constructed Wetland Basin. This is not consistent with the DEP Handbook as there should be a safe emergency spillway for storms in excess of the 100 year storm. Overflow from the catch basin would flow to the low point in the roadway and would not be a safe discharge location.

*The Commission should require a model that assesses realistic watershed areas, and includes correct depiction of bypasses and overflows from the system.*

The proposed design has a significant increase in overall runoff volume to design points DP 1 (westerly wetlands) and DP 3 (easterly wetlands). As noted, an increase in runoff volume to either a restriction (culvert or small channel) or to a confined wetland would increase flooding. It is not acceptable to increase flooding off-site which could alter wetlands characteristics and would at a minimum require an easement from the affected landowner.

The Site Plans indicate soil test locations at the proposed stormwater management basins and subsurface system. The test logs for soil evaluations were not found in the Report or on the Site Plans for most of the tests within the basins. For the subsurface system, which is assumed to infiltrate the volume stored below the system outlet, the materials present seem questionable for infiltration purposes. Eliminating the infiltration would also impact the overall HydroCAD model. The submittal lists the particle size analysis of HP 6 as 37.5% clay. This is the hand dug pit nearest to the infiltration system. The analysis of the other three tests 20-05, 20-06 and 20-07 all indicate very high percentage of fines with

79.2, 78.9 and 94.4 percent respectively passing the #200 sieve. The subsurface system proposed is similar in function to a subsurface infiltration trench. DEP Handbook Volume 2 Chapter 2 page 97 indicates that these systems should not be used at sites with 30% or greater clay content or 40% or greater silt clay content. Issues with recharge based on existing soil conditions would also be applicable under Standard 3.

According to the review performed by Joseph J. Serwatka, P.E. detention basin 1-2 is set at seasonal high groundwater and detention basin 3-2 is 2 to 3 feet into the seasonal high groundwater. It is not standard practice to place a detention basin into the groundwater and as listed in the DEP Handbook Volume 2 Chapter 2 page 110 for dry basins and page 51 for extended dry basins. The basins should be above the water table. Intercepting the water table results in slope stability issues and difficulty establishing vegetation. In general, the design does not provide sufficient documentation to demonstrate that it complies with the DEP Handbook for design of a detention basin. The plans have not identified if they are extended (or just dry) detention basins, but in either case the design would not meet Handbook requirements.

*Overall, the Applicant has not provided sufficient documentation to demonstrate compliance with Standard 2. The proposed submittal does not have provide sufficient documentation regarding soils, and collection and conveyance of runoff. I recommend that the Commission require that these issues be addressed in the plans, calculations and supporting documentation.*

### Standard 3 – Recharge to Groundwater

This standard requires recharge of runoff to compensate for the increase in impervious area.

The DEP Checklist included in the Report states that the Static Method has been used. In this case, not all impervious area is tributary to the system, and an adjustment has been provided that indicates that the proposed design slightly exceeds the DEP requirement that at least 65% of the impervious area is required to be captured and treated. This calculation is based on the assumption that it is feasible to convey the roofs to the infiltration systems, which as noted under Standard 2, has not been demonstrated and appears not to be feasible in some parts of the site. If the 65% is not met the project would not comply.

The soils, as also noted under Standard 2, are not suitable in the large subsurface system. It appears that soil evaluations may have been performed at the location of the larger system, but the data is not in the Report or on the Site Plans, so it is not feasible to determine if suitable groundwater separation has been provided. No testing to demonstrate that the roof systems have suitable soils, or groundwater separation, has been provided. This is a critical factor in the design and should be addressed. It has not been demonstrated that Standard 3 has been met.

A sheet for mounding calculations using the USGS Hantush spreadsheet has been included in the Report. I recommend that the Commission require that the input variables used are



supported by a descriptive sheet documenting the basis for the assumptions used. Based on the system cross section, it is proposed to have just over the minimum required separation of 2 feet.

*The Project does not demonstrate that Standard #3 has been met.*

#### Standard 4 – 80% TSS Removal

This standard requires that runoff be treated to 80% removal of total suspended solids (TSS) prior to discharge.

The submittal includes two TSS removal spreadsheets. One is for the subsurface detention/infiltration system and the other is for the Wet Basin. Other impervious area should also be treated including roofs, walkways, patios, etc.

A listing of the treatment BMP's proposed and their removal rating follows:

##### 1. Subsurface Detention/Infiltration System:

Deep sump catch basins: Deep sump catch basins are credited with 25% removal subject to proper design and sizing. To meet the standard, catch basins should collect no more than 10,890 square feet ( $\frac{1}{4}$  acre) of impervious area. Based on the data provided, several of the catch basins would have an overall tributary of more than  $\frac{1}{4}$  acre. No credit should be allowed if the impervious area (including any roofs) routed through the catch basin exceeds  $\frac{1}{4}$  acre.

Underground recharge chambers: The proposed system would be a subsurface infiltration system, according to DEP. The Applicant's submittal should include impervious roof area in the Water Quality Volume for treatment. Although roofs do not require pretreatment, they do require treatment. As noted, it is questionable that the soils are suitable for infiltration at the proposed location.

##### 2. Wet Basin System:

Deep sump catch basins: Deep sump catch basins are credited with 25% removal, subject to proper design and sizing. To meet the standard, catch basins should collect no more than 10,890 square feet ( $\frac{1}{4}$  acre) of impervious area. Based on the data provided, several of the catch basins would have an overall tributary of more than  $\frac{1}{4}$  acre. No credit should be allowed if the impervious area (including any roofs) routed through the catch basin exceed  $\frac{1}{4}$  acre.

Wet Basin: A wet basin can provide 80% TSS removal subject to proper design. I disagree that a catch basin is a suitable emergency overflow spillway. The Specifications in the DEP Handbook Volume 2 Chapter 2 require a separate safe emergency overflow. It will be complicated to provide this, given the location of the basin. I note that sizing data for

one forebay has been provided, but the Report is not specific to which forebay. There are two forebays discharging to the Wet Basin.

*Insufficient data has been provided to confirm compliance with Standard #4.*

#### Standard 5 – Higher Potential Pollutant Loads

The project would likely not be considered a Land Use with Higher Potential Pollution Loads (LUHPPL).

#### Standard 6 – Protection of Critical Areas

Based on a review of MassGIS data and information in the submittal and other supplied information, the Site would be in a critical area as it has a Certified Vernal Pool.

The plans do not propose a direct piped discharge to the Vernal Pool. In general, runoff is directed away from the Vernal Pool. As noted by Patrick Garner, a water budget should be prepared for the Project. In addition, the DEP Handbook Volume 1 Chapter 1 Page 18 in Table CA 2 specifies that Wet Basins should not be used near vernal pools. Wet Basin P1-1 is approximately 260 feet from the vernal pool and basin P1-2, which has some volume below the outlet based on the contours, is just over 100 feet from the vernal pool. These would likely need to be moved or the design modified to eliminate any retained water to comply with the DEP Handbook.

*The Commission should require a water budget analysis for the Project, and wet basins should be moved away from any vernal pool.*

#### Standard 7 – Redevelopment Projects

The Site is not a redevelopment project.

#### Standard 8 – Erosion/Sediment Control

This standard requires that an Erosion and Sedimentation Control plan be developed for the Site.

In this case a NPDES SWPPP will be required. The plans include an “Erosion and Sedimentation Control Plan” with limited information on erosion and sedimentation control features. There are also some details on the detail sheets for the tracking pad, sediment barriers, etc. The Report has a general description of construction phase erosion and sedimentation controls, primarily in the form of a sequence for construction. The data is not sufficient to describe methods to control erosion and sedimentation.

Projects of this type in soils with a high percentage of fines and limited work area can be difficult to construct without erosion and sedimentation issues.

*The Commission should require that a draft SWPPP be submitted for review and approval prior to the close of the hearings. The SWPPP should include detailed data on staging including parking, trailer locations storage areas, etc. in addition to stockpile locations, temporary basins for the westerly wetland and if required for the ILSF.*

#### Standard 9 – Operation and Maintenance Plan

This standard requires a plan for long term Operation and Maintenance (O&M) of stormwater BMP's.

A Long-Term Pollution Prevention Plan was included in the Report. This section should include more information on all BMP's including forebays, outlet protection, etc.

The following structural BMP's are proposed:

Catch basins – Catch basin O&M should specify quarterly inspections. The Report lists inspection of all drainage facilities (pipes and infiltration basins) every three months. This appears to be a qualifier, and if everything is to be inspected, there should not be a qualifier limiting the scope of inspections to pipes and infiltration basins. The O&M does specify that catch basins should be cleaned at least annually or if six inches of sediment has accumulated.

Forebays – Not specifically listed, the O&M should include maintenance requirements from the DEP Handbook.

Underground Chambers – These appear to be required to be inspected every three months, although this may not be considered a “basin”. It is also required to jet clean the galleys when 2” of sediment has accumulated. The plans and details should clarify the location of the filter fabric and if it is only installed in specific rows. As noted under other sections, pretreatment is not adequate based on the flow to some of the catch basins.

Wet Basin – The plans should identify where the 15 foot maintenance access is located, as required in the DEP Handbook. There is not a suitable overflow spillway, as well. Inspection requirements after the initial three years should be listed. It is proposed to have a 2” outlet at the surface of the water. A trash grate with 3” square openings is proposed. This design will be prone to clogging and will likely impact the function of the system. The pond area is required to have a low level drain, which has not been provided here. The design should comply with the specifications in the DEP Handbook.

Detention Basins – The dry basins P1-2 and P3-2 have very small outlets, 1.5 inch and 2 inch respectively. These are highly prone to clogging and are protected by a trash grate with 3” square openings, which clearly is not protective of the smaller opening. Smaller trash rack opening sizes would also likely clog and result in ineffective operation of these systems. Maintenance also requires an access route for maintenance, and a minimum bottom slope of 2%, according to the DEP Handbook. The design should comply with

the specifications in the DEP Handbook and the plans should identify how these basins will be accessed and maintained. Mowing of the entire basin, including both sides of the embankment, is required at least twice per year.

There should be a Plan included with the O&M that identifies all BMP's, snow storage areas (which appear to be limited on this site), etc.

*The Operation and Maintenance Plan needs additional information.*

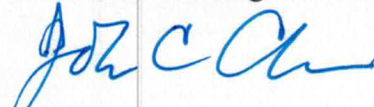
#### Standard 10 - Illicit Discharge

The DEP Checklist states that an illicit discharge statement will be provided prior to any discharges to any post construction BMP's.

This report is for your use and for submission to the Town of Newbury land use agencies only, and provides no engineering, planning or other advice that may be relied upon by any other party. If you have any questions please do not hesitate to contact us.

Very truly yours,

Chessia Consulting Services, LLC



John C. Chessia, P.E.