Chessia Consulting Services LLC

April 13, 2021

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

RE: Professional Engineering Review
Proposed Comprehensive Permit
The Sanctuary
School Street, Manchester-by-the-Sea, MA

Dear Mr. Hill:

Chessia Consulting Services, LLC has performed a review of the revised plans and drainage calculations for the above referenced project relative to a Comprehensive Permit Application to the Town of Manchester-by-the-Sea Zoning Board of Appeals (ZBA). The plans were revised on March 23, 2022, with newly-submitted test pit data.

The data reviewed included the following information:

Plans Entitled:

- "Site Development Plans for The Sanctuary School Street Manchester-by-the-Sea, MA" dated July 16, 2021 revised 3-23-2022 consisting of 20 Sheets of Civil Site plans prepared by Allen & Major Associates, Inc. (Site Plans). Landscape Plans prepared by Bohler Engineering (Landscape Plans) and Architectural Plans prepared by Embarc (Architectural Plans) have not been revised according to the cover sheet.
- "Conceptual ADA Ramp Plan" dated 7/16/2021, prepared by Allen & Major Associates, Inc.
- "Conceptual Land Plan (Overall)" undated, prepared by Allen & Major Associates, Inc.

Supporting Data:

- The Sanctuary at Manchester by the Sea, Manchester by the Sea, MA Application for a Comprehensive Permit Submitted To: Manchester by the Sea Zoning Board of Appeals, undated on the Cover Sheet. *Previously submitted.*
- "Drainage Report Site Development The Sanctuary at Manchester by the Sea Manchester-by-the-Sea, MA" dated 7/16/2021 revised 3/23/2022 prepared by Allen & Major Associates, Inc.

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- Response to Comments from SLV, this includes the Beals + Thomas, Inc. review letter with responses from the Applicant below the comment.
- Preliminary Narrative to Snow Storage dated March 24, 2022.
- Letter from SLV discussing proposed sewer system extension to the project site.
- Table of Waivers from Zoning Bylaw dated March 23, 2022.

I. Existing Conditions – the Project Site

1. The Project Site is located north of Route 128, west of School Street and east of Old School Street. The property is undeveloped woodland consisting of 1,015,729 square feet (23.32 acres). There are wetland resources including Bordering Vegetated Wetlands to the north and northwest as well as through the central part of the site that appears to flow to the northeast part of the site. The central wetlands contain two vernal pools. There is also an area listed as Isolated Land subject to Flooding (ILSF) that also contains a vernal pool. The site has frontage along School Street in the northeast part of the property.

Applicant Response:
The applicant takes no exception to this statement.

2. Topographically, the site is generally comprised of high areas with very steep slopes to the property edges, the central wetlands and the ILSF. There is also a confined depression on the west side of the site and a steep valley on the east side sloping off site.

Applicant Response:
The applicant takes no exception to this statement.

3. As noted there are vernal pools on and immediately adjacent to the Site, some of these are listed by the Natural Heritage Endangered Species Program (NHESP). The Site is not identified as being in a Zone II of water supply wells or a Zone A to a surface water supply by MassGIS mapping, but is within the Zone III for the Town's Lincoln Street well, and therefore within the Surface and Ground Water Resource Protection Overlay District under the Zoning Bylaw. The Site is tributary to a Cold Water Fishery according to MassGIS.

Applicant Response:
The applicant takes no exception to this statement.

4. Based on a review of data in the Drainage Report ("Report"), included within the Application, and on the Natural Resource Conservation Service (NRSC) website, the parcel is identified as containing Chatfield-Hollis-Rock outcrop complex soils over most of the site with an area of Udorthents in the northwesterly part of the site. Chatfield soils are considered Hydrologic Soil Group (HSG) B (moderate hydraulic conductivity), Hollis soils are considered HSG D (very low hydraulic conductivity),

and rock outcrops are essentially impervious excepting minor flow through fractures. Udorthents are altered soils, in this cased described as fill over either sands and gravel or coarse friable till. The revised data indicates some soil testing was performed on April 8 & 9, 2020 with additional testing witnessed by DEP on November 18 & 19, 2020. There is a new plan sheet that indicates the test pit locations. It is unclear why the initial submission withheld this critical information.

Applicant Response:
The applicant takes no exception to this statement.

5. Based on the testing performed over a limited portion of the site, soils are deeper and have a higher hydraulic conductivity, than assumed for drainage runoff calculations. The Report claims that since they did not test other areas, they used the most restrictive and highest runoff potential soil assumptions. This is not consistent with on-site testing performed. It is recommended that additional testing be performed on site to both establish the soil conditions overall and any potential for infiltration at other locations. I recommend that the ZBA request that an agent of the Town witness any future testing proposed and that any testing be performed by a Soil Evaluator licensed in the Commonwealth of Massachusetts.

Applicant Response:
The applicant has updated the drainage report model to include the areas with higher hydraulic conductivity. The applicant has provided sufficient test pit information to confirm the soils for the drainage runoff calculations. The currently non-accessible areas of steep outcrops and the low poor drainage areas area correctly modeled s HSG D. The applicant is not proposing any additional test pits at this time. All test pits were performed by Soil Evaluator licensed in the Commonwealth of Massachusetts as noted on the soil logs. In addition, the soil logs performed on 11/18 & 11/19/2020 were witnessed by Paul Blain a senior hydrologist with the MassDEP.

The applicant will be conducting additional soil testing post permitting when the entire site is characterized as part of the preparation of construction documents.

II. The Proposed Project

6. The Applicant proposes a multi-family building of three stories set above a parking garage. There are two courtyard areas that would also be constructed above the proposed garage. Access would be off of School Street and the proposed drive would wrap around the building to provide access to the parking garage on the north side of the building. The access road varies in grade from 8% on the west side with 1% slopes to a high point at the main entrance on the east side.

Applicant Response:
The applicant takes no exception to this statement.

7. Water Utilities - The plans indicate that water would be brought to the site from School Street and an extension of over a mile in length, including the on-site portion, would be required to connect to the existing water main. The capacity of existing water main feeding the proposed system should be determined as part of this Application.

Applicant Response:
Per discussions with the Town DPW and information provided by the municipality, the Town has adequate capacity to service this project. The applicant is continuing to work with the DPW to assess infrastructure needs specific to the proposed project.

8. Sewer Utilities - The revised submittal proposes an extension to the existing sanitary sewer system. The plans indicate a proposed pumping station on-site with a force main proposed in School Street. The application does not include any information on the proposed extension other than the force main label, and although it is stated that the treatment plant has capacity, the capacity of existing sewer mains at the tie in point should also be determined as part of this Application.

Applicant Response:
Per discussions with the Town DPW and information provided by the municipality, the Town has adequate capacity to service this project. The applicant is continuing to work with the DPW to assess infrastructure needs specific to the proposed project

9. Stormwater Utilities - The Stormwater design has been revised to have one subsurface infiltration system and two open bio-retention/rain gardens. The collection system includes standard catch basins with storm sewers and manholes as well as proprietary treatment units with a swale proposed along one side of the road to collect slope and walkway runoff. There is also a roof drainage collection system, listed as TBD (to be determined). The sizing of the collection system should be done at this stage with a performance requirement given to the mechanical engineer that is designing the roof collection system, as the entire roof in all storms is assumed to connect to the subsurface system. The Utility Plan indicates that gas, electric and cable services are available in School Street and would be extended into the site along the access drive.

Applicant Response:
The applicant takes no exception to this statement.

III. General Design Comments

10. Steep Slopes and Walls - The site has extremely steep slopes and shallow depth to ledge based on a review of available data. There are proposed retaining walls up to 28 feet high. Some walls are within 5 feet of the property line. Some of these walls are proposed to be installed on existing slopes of steeper than 3:1. There are sections with up to three terraced walls with a total height of up to 42 feet. The

details on the plans indicate modular block walls with geotextile reinforcing tying back into the slope. It is not specified how far back the reinforcing will extend. There are utilities including water, wastewater leaching and stormwater infiltration close to these walls. It should be demonstrated to the Board that the design is feasible for these walls on this Site as they are an integral part of the plan.

Applicant Response:
As is standard practice, the applicant will prepare stamped retaining wall design plans for the review by the building department as part of the building permit application.

11. Foundation Drain - The plans include a detail of a foundation drain but do not indicate where this drain is proposed to discharge. Foundation drains for a building area this large can have significant flows depending upon groundwater conditions, etc. The foundation drain outlet(s) should be indicated on the plans and designed for outlet protection and impacts from this system assessed.

Applicant Response:
The building is located on the top of the hill and has been designed to provide positive pitch away from the building. It is unlikely to encounter any significant flows and require a foundation drain. If required, all building foundation drains will be tied into the onsite infiltration system.

IV. Water Supply

12. It is proposed to construct over a mile of dead-end water main to service the Site. The pipe is proposed to be 8-inch ductile iron. There is no data on the available flow, pressure, etc. to determine if this proposal meets Massachusetts DEP water supply requirements. In addition, the project proposes five (5) on-site fire hydrants. Flow testing and hydraulic analysis of the proposed system should be performed to determine that the project will be able to meet requirements for safe pressure and flow both for domestic use and fire protection.

Applicant Response:
The applicant is proposing an onsite booster pump to meet the requirements for safe pressure and flow for both domestic use and fire protection. The boosted pump design and approval is under the jurisdiction of the MassDEP with review by the Town DPW. That review and approval process cannot begin until a local approval for a project has been obtained.

13. The DPW should comment on the suitability of the proposed dead-end water main to meet DEP requirements. Long dead-end water mains can be problematic due to stagnation, pressure drops due to emergency uses, etc. The Fire Chief also should comment on the suitability of the proposed system for public safety purposes.

Applicant Response:

The applicant takes no exception to this statement.

V. Sanitary Sewer

14. The Applicant no longer proposes to construct a wastewater treatment facility (WWTF) but intends to connect to the municipal sewer system. The flow is reportedly 28,000 gpd. The Application should include sufficient data for the Board to review this aspect of the project including preliminary pumping station design data, existing sewer collection system capacity, etc. This would be a significant contribution to flow at the connection point and the pumping rate proposed, pipe size, etc. should all be addressed sufficiently for the Board to make a determination on the suitability of this proposal.

Applicant Response:
The applicant is continuing to work with the DPW to assess infrastructure needs specific to the proposed project.

VI. 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 DEP Handbook has extensive requirements that describe appropriate types of BMP's to use based on applicability for each Standard, suitability for specific locations, etc. The Application appears to have ignored many of these aspects of the Handbook. Projects should be developed by first reviewing what types of BMP's are suitable and where they can be located. After this effort a plan should be developed to properly implement the proposed BMP's.

Standard 1 – Untreated Stormwater

15. 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.

Applicant Response:
All outlets discharging to abutting wetlands will have scouring protection sized appropriately.

16. The Project's stormwater system includes one new point source discharge and connection to an existing culvert with associated discharge point. There are other issues as noted below, which would impact flows at some of the outlets. The submittal includes the required computations for sizing outlet protection at discharge points. In the case of outlet FES-5, which discharges at the property line

and 5-10 feet from wetlands, the design is inconsistent with the detail as over 10 feet of grade change is indicated on the plans but the base is proposed to be level.

Applicant Response:
FES-5 was revised such that the discharge area and scouring protection is level.

17. This design will likely result is erosion and scour offsite as the stone stops at the property line. The existing outlet should, at a minimum, be inspected for condition and if there are erosion or scour issues mitigation should be required. It is unclear that the Town has or will grant permission to install a new pipe for this project in the public way, typically an easement from the Town would be required.

Additional design data is required for FES-5 as noted above.

Applicant Response:
An easement is not customarily required for a utility connection in a public right-of-way. In addition to approvals issued under c. 40B, the Applicant will work with the Town to ensure work within a right of way is consistent with standard practices.

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. It is required to maintain runoff rates to pre-construction rates. It is also important to maintain flow conditions where wetlands and vernal pools are located to prevent impacts to these resources.

In this case the existing conditions analysis assess five separate control points as follows:

- E1 flows to the D series wetlands to the north, which are associated with a Vernal Pool CVP Q series flag. Insufficient data has been provided to indicate whether this area has an overflow outlet at some elevation, but as a vernal pool it likely is a depression that would trap flow except in extreme storms.
- E2 flows to the F series wetlands to the west that appear to be associated with Sawmill Brook.
- E3 is a small area that flows off site to the southwest. No wetlands have been identified within 100 feet of this area but flow appears to ultimately discharge to the wetlands associated with Sawmill Brook as well.

- E4 is indicated as all flowing to the culvert under School Street on the plans. The contours are discontinuous in the wetlands and there is a significant portion that is identified as a vernal pool. MassGIS indicates a separate wetland in this area. If there is a low area associated with the vernal pool it should be modeled as a separate area as maintaining the water conditions in a vernal pool within a regulated wetland is an important aspect of a design.
- E5 is the area that flows to an isolated low area in the southwest part of the site.

18. The HydroCAD model assumes that the Site consists of all Hydrologic Soil Group (HSG) D soils based on NRCS data. The information provided for on-site testing, although performed well before the initial submission and apparently withheld from the Application, indicates differing, more favorable soil conditions.

Applicant Response:
The applicant has updated the drainage report model to include the areas with higher hydraulic conductivity.

19. The design includes a large subsurface recharge system consisting of 96-inch pipes that would hold and infiltrate 32,555 cubic feet (243,511 gallons) in a 2 year storm and 63,670 cubic feet (476,252 gallons) in a 100 year storm. The bioretention/raingarden (2P in the model) also recharges volume runoff. The model uses an infiltration rate of 2.41 inches/hour based on a loamy sand. Obviously if the soils are suitable for this recharge the correct HSG should also be used in these areas for runoff computations as well.

Applicant Response:
The applicant has updated the drainage report model to include the areas with higher hydraulic conductivity.

20. Only one test indicated ledge at 24 inches below grade. There are certainly ledge outcrop and shallow to ledge areas but the soils encountered are more permeable and the limits of more pervious soils should be determined and the HSG corrected to reflect actual conditions on the site.

Applicant Response:
The applicant has updated the drainage report model to include the areas with higher hydraulic conductivity.

21. Use of HSG D soils overestimates existing runoff where more permeable soils are present on the site. Based on available results, there has been insufficient testing to determine soil conditions across the site.

Applicant Response:
The applicant has updated the drainage report model to include the areas with higher hydraulic conductivity.

22. The flow paths used for time of concentration assumptions is not the most hydraulically distant flow path for E3. It is not feasible to have a longer post development flow path in unaltered land.

Applicant Response:
All time or concentration flow paths were reviewed and revised as necessary.

23. The model uses a 12-inch culvert under School Street. The plans indicate an 18-inch culvert.

Applicant Response:
The pipe under School Street was revised from a 12" RCP to an 18" RCP.

2. *Proposed Conditions*

24. Under the proposed case, sub-area E5 is eliminated as the low area is proposed to be filled in. The other four general discharge areas are the same but the flow paths are not consistent with the existing in some cases. As noted under Existing Conditions, the model should assess impact to the vernal pool to the east of the proposed building. It is assumed that all runoff flows to the culvert under School Street.

Applicant Response:
The design has been updated to provide a subwatershed to the vernal pool to the east of the proposed building.

25. The proposed conditions assumes that the slope between the access road and the building (west of the building) would be developed with a "good brush" condition. This is a questionable assumption as it takes some effort to develop soil conditions associated with "good brush". This condition has a lower runoff curve number than the existing "good woods" condition and would underestimate runoff.

Applicant Response:
The soil condition for the slope between the access road and the proposed building was revised from "good brush" to "dense grass".

26. Open stormwater basins (bioretention and/or rain gardens in the model would be inundated with water during storms and should have a runoff curve number of 98 for water. Area P6 assumes that the impervious area is disconnected and would be adjusted by uptake through flow over vegetated areas. The vegetated area appears to be swales between the walls. Runoff in this area would flow over the 5-foot wall, and then the 13.5-foot-high wall at the transformer. I note that there is an error in the time of concentration in P6, and Bermuda grass is a southern species that does not grow in New England.

Applicant Response:

The design has been updated to provide runoff curve numbers of 98 for the open bioretention areas and removed the reference to Bermuda grass.

27. The storm sewer system is designed for the 25-year storm; it is not a reasonable assumption that all of the runoff in a 100-year storm would be conveyed to the various systems since the pipe and inlet sizing has not been designed for that case. The design should assess the capacity of inlets and pipes, in particular where catch basins are located on a slope, where bypass would discharge to a different system than assumed in the HydroCAD calculations. This Site is on a very steep hill with a constant steep slope from the building entrance on the east, all the way around to School Street at the northerly end. Catch basin inlets along this slope discharge to three different systems and bypass of one would impact flows to the next system. Capacity of the inlets in particular is a critical factor to be considered.

Applicant Response:
Catch basin inlets calculations for the 100-year storm have been provided for the entry driveway; pipe sizing calculations were revised to reflect the 100-year storm intensity (10.3 inches/hour).

28. The use of bioretention areas and rain gardens for rate control is not consistent with the DEP Handbook and Specifications. Volume 2, Chapter 1 provides a description of the selection process for appropriate BMP's. Appropriate BMP's for rate control are listed on page 29 of Volume 2, Chapter 1. In addition, the Specifications for bioretention areas and rain gardens cited in Volume 2, Chapter 2, page 23 of the Handbook includes a Table that lists the applicability for Standard 2 as N/A (not applicable).

Applicant Response:
The bioretention areas are provided to control Water Quality and Quantity as recommended in the DEP Handbook.

29. In addition to the basic use of these systems, the design and calculations are not consistent between details and the HydroCAD calculations. Sheet C 505 has two details, one for a "Typical Filtering Bioretention Area" and one for a "Rain Garden". The Plans identify both the area to the north of the access road (2P in HydroCAD) and at the south side of the entrance (RG-2 in HydroCAD) as "bio-retention area/rain garden". The details are quite different as the Typical Filtering Bioretention Area has an impervious liner where the Rain Garden is designed to exfiltrate.

Applicant Response:
The design and calculations have been revised to clarify.

30. In the case of the northerly system (2P) the bottom of the media and stone, i.e. the exfiltration surface below the treatment zone, is at EL 54.7 +/- and ledge is listed as EL 55 in Test Pit 14. The design includes exfiltration although it is not going to

occur in ledge. The rate in the HydroCAD calculations is for loamy sand, although the test pits encountered fill and sandy loam; even if exfiltration were feasible, the rate is over estimated. The plans and details do not provide sufficient data on elevations to construct the system properly to match the values in the calculations.

Applicant Response:
The design has been adjusted to provide adequate separation to Test Pit 14.

31. The system southeast of the entrance did not include any soil tests and is not designed to infiltrate. This system assumes that flow through the media would be at a rate of 0.27 in./hr. without providing any documentation for the rate. This is lower than found in an on-line review of acceptable flow rates and at the rate listed it would be time to replace the media. This impacts the rate and volume in the calculations by underestimating the flow.

Applicant Response:
The design rate of 0.27 in./hr was used to provide a conservative method of design and has little impact on the flows.

32. The detail indicates a 12-inch beehive grate yet the model uses a flat grate with 16 2-inch square openings. The overflow outlet is located within the Town right-of-way. The project should provide sufficient space to install BMPs within the property.

Applicant Response:
The detail was revised to indicate a 2 24"x24" grate. The proposed project will alter the right-of-way significantly by installing the entrance driveway. The plan has been revised to illustrated the BMPs completely out of the right-of-way.

33. The DEP Handbook also lists subsurface structures as not suitable for rate control in the same table as listed above, 29 of Volume 2, Chapter 1. The Specifications for subsurface structures cited in Volume 2, Chapter 2 page 103 of the Handbook also includes a Table that lists the applicability for Standard 2 as N/A (not applicable). Although it is understood that frequently these structures are used for rate control purposes and infiltration trenches are listed as suitable for rate control, the design of these systems should comply with setback requirements for infiltration trench systems at a minimum when used for this application. In this case there is both a retaining wall and steep slope (greater than 20% slope) within 15 feet of the system. The exterior face of the retaining wall is EL 94+/- and the base of the stone for the system is at EL 101. The maximum water level in the system varies from 102.82 in the 2-year storm to EL 106.78 in the 100-year storm. It is likely that there would be breakout through the wall or discharge to the proposed wall drainage system as indicated in the details for the wall. Soil testing indicates both sandy loam and loamy sand in the small part of the system area that was tested (testing was limited to the southeastern corner of the system). The slowest Rawls rate should be used for the design to comply with DEP Handbook

requirements. In this case additional testing at the north and west sides should be performed. The limit of the geotextile reinforcing is not indicated but should also be a factor in the design. The submittal should include site specific details, cross sections, etc. This is a critical component of the stormwater management system and it does not appear to have been well thought out relative to requirements and impacts.

Overall, the Applicant has not provided sufficient documentation to demonstrate compliance with Standard 2.

Applicant Response:
The subsurface infiltration system is provided to control Water Quality and Quantity as recommended in the DEP Handbook.

The subsurface infiltration system and retaining wall was designed using the MassDEP "Guidelines for Design and Installation of Impervious Barriers and Slope Stabilization for title 5 Systems" to address the breakout concern.

The Rawls rate used for UIS-1 was revised from a loamy sand (2.41 in/hr) to a sandy loam (1.02 in/hr).

Standard 3 – Recharge to Groundwater

34. This standard requires recharge of runoff to compensate for the increase in impervious area. The submittal claims that the Site is not suitable for recharge due to poorly drained soils and high groundwater and has only complied to the extent practicable. As noted, insufficient testing has been performed to justify this claim. Although there is exposed ledge and shallow to ledge areas, the Applicant should perform sufficient testing to demonstrate that there are no other areas available. In particular, infiltration should be provided to the vernal pool to the east of the building if feasible.

Applicant Response:
The checklist has been updated to note that the recharge BMPs have been sized to infiltrate the Required Recharge Volume.

The applicant has updated the design to provide a recharge system that is directed to the same subwatershed as the vernal pool.

35. The recharge calculations are based on the entire site consisting of HSG D soils, although as noted in the Report, soils are not HSG D in the areas tested. The submittal needs to quantify the limits of soil types to accurately estimate required recharge. This calculation should be based on each receiving area.

Applicant Response:
The applicant has updated the drainage report model to include the areas with higher hydraulic conductivity.

36. Where vernal pools are present it is critical to maintain the water balance. In addition, the existing site has a large recharge area in sub-area E5. This volume should be included as part of the overall requirement as this low area is completely eliminated. The Applicant should review the requirements of Volume 3, Chapter 1 of the DEP Handbook, in particular page 17 that discusses impacts for vernal pools due to redirected recharge. The design does not meet this requirement.

Applicant Response:
The existing HydroCAD model accurately indicates the recharge area in sub-area E-5.

The applicant has updated the design to provide a recharge system that is directed to the same subwatershed as the vernal pool.

As noted under Standard 2, although there appear to be suitable soils under the subsurface infiltration system, slope conditions, retaining wall design, etc. impact the practicality of the design.

37. Based on the data provided, the northerly bioretention area/rain garden would not be suitable as designed due to ledge. Soil conditions also vary from the infiltration rate used. There appears to be sufficient soil depth but it is proposed to excavate to ledge removing most of the available soil. It is likely that less than four feet of soil separation could be provided, which would also require a mounding analysis.

Applicant Response:
The design has been revised to remove the system from the ledge.

A mounding analysis is required when a system has less than four of separation and the recharge system is proposed to attenuate the peak discharge rates. The northerly bioretention area is not proposing to attenuate peak discharges so no mounding analysis would be required.

38. The drawdown calculations should be for the 100-year storm where infiltration is part of the rate control component, or at a minimum drawdown time for the volume below the outlet should be used. The basis for the volumes provided has not been explained in the submittal but is a significantly lower volume than the storage below the outlets.

    Insufficient data has been provided to demonstrate that Standard 3 has been met, including relief from the Standard due to soil conditions.

Applicant Response:

Drawdown calculations were revised utilizing the 100-year storm volume and using 1.02 in/hr infiltration rate. Storm events were extended from 30 hours to 72 hours to show that the system is empty within the required time.

Standard 4 – 80% TSS Removal

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

39. The submittal erroneously combines treatment trains for the northerly bioretention area/rain garden. This area would receive direct runoff from several catch basins that do not flow through the subsurface infiltration system. Treatment trains should be broken out based on the areas.

Applicant Response:
TSS removal calculations were revised to include a table for all treatment trains.

40. Catch basins can provide 25% TSS removal provided that the tributary area is .25 acre or less. Most of the catch basins may meet this requirement but the Applicant should document the area tributary complies.

Applicant Response:
All catch basins meet the required area minimum. CB-15 is the only catch basin with greater than 0.25 acres flowing to it and all of the area is pervious

41. The proposed proprietary units (CDS) can provide 50% TSS removal and the supporting data has been provided for these units.

Applicant Response:
The applicant takes no exception to this statement.

42. The Subsurface Infiltration system could receive 80% TSS removal subject to other design comments above. The system has in excess of the WQV stored within the system.

Applicant Response:
The applicant takes no exception to this statement.

43. Bioretention areas and Rain Gardens are credited with 90 % TSS removal subject to proper design. As noted above under Standard 2 in particular there are several issues to address in the design.

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

Applicant Response:
The applicant's design meets the requirements of Standard 2.

Standard 5 – Higher Potential Pollutant Loads

The Project is be considered a Land Use with Higher Potential Pollution Loads (LUHPPL).

44. As a LUHPPL certain BMPs are required and some are unsuitable in these locations. Subject to other design comments the proposed BMPs would be suitable in this location as 44% TSS removal is proposed for pretreatment.

Applicant Response:
The applicant takes no exception to this statement.

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 tributary to both a Cold Water Fishery and Certified Vernal Pools.

45. The submittal proposes an outlet within 100 feet of a vernal pool and does not comply with this Standard. In addition, a habitat evaluation must be performed and potentially a Thornthwaite water balance analysis for all vernal pools to confirm that there would not be an impact.

The proposed BMPs could be used in this location as tributary to a cold-water fishery, subject to other comments on the design as noted above.

The submittal does not comply with Standard #6.

Applicant Response:
The MassDEP Stormwater guidelines note that the stormwater best management practices (BMPs) should be set back 100'. The stormwater outlet is not considered a BMP. The design does comply with this standard.

Water budgeting analysis is not required if the recharge is directed to the same watershed where the impervious surfaces are proposed. The project is proposing recharge be directed to the same watershed where the impervious surfaces are proposed. Therefore, it is not required.

Standard 7 – Redevelopment Projects

The Site is not a redevelopment project.

Applicant Response:
The applicant takes no exception to this statement.

Standard 8 – Erosion/Sediment Control

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

46. In this case a NPDES SWPPP will be required. As a detailed construction management plan has not been provided at this time, I have not reviewed this aspect in detail.

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 etc.

Applicant Response:
It is not customary to prepare a SWPPP without a general contractor's input. The applicant will prepare a SWPPP prior to the submittal of a building permit and would anticipate a condition of the Comprehensive Permit requiring as much.

Standard 9 – Operation and Maintenance Plan

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

47. A Long-Term Pollution Prevention Plan was included in the Report. In this case, aspects of the construction phase are included with the long-term plan. There should be separate plans, as the long-term plan will be transferred to the homeowner's association and the construction phase involves different BMP's etc.

The following structural BMPs are proposed:

Catch basins – Catch basin O&M complies with DEP requirements.

Bioretention areas – The O&M should specify monthly inspections and include when to replace all of the media.

Proprietary treatment units – The manufacturers maintenance manual should be included in the O&M.

Subsurface Systems – No data on maintenance of this critical system, which will be difficult to maintain, has been provided.

Applicant Response:
The O&M plan can be provided as a standalone document at such time it needs to be transferred to a property management company. The applicant is agreeable to providing this as a condition of approval prior to the final occupancy permit, as is customary.

48. There is a Plan included with the O&M that identifies, snow storage areas (which appear to be limited on this site), but the plan should also include all BMP locations.

The Operation and Maintenance Plan needs additional information as discussed above.

Applicant Response:
The Snow Storage Plan was revised to show all BMP locations.

Standard 10 - Illicit Discharge

49. The DEP Checklist states that an illicit discharge statement has been provided, but it was not found in the Report.

Applicant Response:
A signed and executed Illicit Discharge Statement was included with the revised Drainage Report.

This report is for your use and for submission to the Town of Manchester-by-the-Sea 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.