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August 2, 2021

Mr. Dennis Audette
Chairman
New Bedford Conservation Commission
New Bedford City Hall
133 William Street
New Bedford, MA 02744

RE: Nitsch Project #9972
Green International Affiliates, Inc.
Buttonwood Park Community Center
Site Improvements
1 Oneida Street
Stormwater Review
New Bedford, MA

Dear Mr. Audette:

This letter is regarding the stormwater review associated with the Notice of Intent (NOI) submitted for the proposed site improvements at Buttonwood Park Community Center. As requested, Nitsch Engineering received and reviewed the following documents:

- Green International Affiliates, Inc. response letter dated July 28, 2021.

The project involves the full depth reconstruction of the existing parking lot and installation of new vertical granite curb, concrete sidewalks, and Americans with Disabilities Act (ADA) accessible wheelchair ramps. Stormwater improvements include two (2) proposed bioretention areas with overflow spillways discharging to Buttonwood Park Pond to the west.

As requested, Nitsch Engineering is providing comments based on our review of the project based on Massachusetts Department of Environmental Protection (MassDEP) Stormwater Management Standards and hydraulic calculations for the drainage reconfiguration.

For clarity, we have provided our initial comments from July 16, 2021 in blue font, the Green International Affiliates, Inc. response in black font, and our updated response is provided in **blue bolded font.**

1. Based on the HydroCAD model, the northern bioretention basin overflows during the 10-year storm. There is approximately 85 feet between the spillway and Buttonwood Park Pond. Although existing contours generally flow downhill towards the pond, Nitsch Engineering recommends designing a swale that more accurately directs water towards the pond to minimize potential dispersion and reduce the potential for erosion entering the pond.

   An emergency spillway is provided that is 10 feet long in addition to the beehive grate. There is about 85 feet between the end of the spillway to the edge of the pond consisting of a gently sloping grassed area that acts as a vegetated filter strip with additional plantings at the edge of the pond to prevent erosion; therefore, we feel the swale is not needed. In addition, this is part of the active recreational area of the park and installing a swale would result in more impacts to the lawn area reducing its usability.

   This item has been addressed. We note that this area should be monitored over time, and especially after storm events to identify any issues with erosion.

2. In the southern portion of the parking lot, there is a flat area between the 97 contour and the western curb line, which has a bottom of curb elevation of 97.0. For proper drainage, the Applicant should provide a minimum slope of 1% towards the low point.

   The grading of the parking area in this location has been updated to ensure a minimum of a 1% slope towards the low point.

This item has been addressed.

3. For the southern bioretention area, the 100-year storm event has a peak elevation of 97.02 feet, meaning that it is likely that water will back up into the parking lot. Nitsch Engineering recommends designing the basin so that water does not back up into the parking area for any design storms, including the 100-year design storm.

   The outlet elevation of the spillway for the Southern Bioretention area has been adjusted so that the peak elevation for the 100-year storm event is lower than the parking lot.

   This item has been addressed.

4. The HydroCAD model does not appear to account for infiltration for either bioretention area. The test pits indicate that an infiltration rate of 1.02 inches per hour. Nitsch Engineering recommends including infiltration in the HydroCAD model to better depict the proposed site conditions.

   A conservative approach was used for the design by not using an infiltration rate since there is less than 4 feet of separation between seasonal high ground water and the bottom of the bioretention basins. The calculations have been revised to use an infiltration rate of 1.02 inches per hour for both bioretention basins in the HydroCAD model. This results in the following revised peak rate attenuations for DP-1, which discharges to the Pond.

   This item has been addressed.

5. Bioretention areas appear to have a crushed stone diaphragm/sediment forebay for pre-treatment before entering the basin. Nitsch Engineering recommends removing the diaphragm/forebay from the HydroCAD storage volume calculations, as diaphragms/forebays typically are not included as storage for peak-rate mitigation. In addition, per the detail on sheet 8, the diaphragm/forebay includes 2 feet of ¾" double washed crushed stone. Crushed stone diaphragms can create a maintenance challenge when sediment builds up in the crushed stone. Nitsch Engineering recommends the Applicant consider designing a traditional sediment forebay that requires less maintenance or explain why a crushed stone diaphragm is more suitable on this site.

   The crushed stone diaphragm/forebay is not being used in HydroCAD storage volume calculations. The area that is taking credit for the 30% voids is the storage within the bioretention media. The storge volume descriptions have been updated in HydroCAD to provide more clarity.

   Nitsch Engineering confirms that the descriptions have been added and provide clarity. The HydroCAD calculations for the storage volumes show the above ground storage has the same invert as the bioretention soil media. For example, the North Bioretention Basin inverts are set at 96.00 feet. Since the soil media has a depth of 2 feet, the invert should be 2 feet below the bottom of the basin and have a corresponding height of 2 feet. The same comment is also applicable to the South Bioretention Basin. The Applicant should update the HydroCAD calculations and confirm the basins will still function as intended.

   The crushed stone diaphragm is more suitable for the site over a traditional sediment forebay since the crushed stone diaphragm can provide the same volume of pretreatment as a sediment forebay with a much smaller horizontal footprint. The design intent is to provide the city with the maximum amount of useable lawn area for the Park while also providing stormwater treatment. We have revised our detail to wrap the crushed stone diaphragm with filter fabric. This allows the top 6" of stone to act as sacrificial layer

and the rest of the diaphragm will be protected by filter fabric. This will allow for easier maintenance and only 6" of stone will need to be replaced if the crushed stone diagram becomes clogged with sediment.

Nitsch Engineering has concerns with the continued function and maintenance requirements for the stone diaphragm as it may be prone to clogging; however, the design provides the pretreatment volume understands required by the MassDEP Stormwater Handbook. We understand that the project is a retrofit and that the crushed stone diaphragm improves stormwater conditions onsite and defer to the City of New Bedford as to whether the diaphragm maintenance will be a challenge for those maintaining them.

This comment is closed pending the HydroCAD storage areas are updated for both bioretention areas.

6. The Applicant shall provide an Operation & Maintenance (O&M) Plan for the proposed stormwater management system, including street sweeping and ongoing inspection and maintenance activities for the pretreatment and bioretention basins. The O&M Plan shall comply with the requirements of Standard 9 of the MassDEP Stormwater Management Standards.

While the City of New Bedford has their own "Standard Operating Procedures" for the City for maintenance of stormwater BMPs, attached is a site specific Operation & Maintenance Plan for Buttonwood Park.

This item has been addressed.

7. Nitsch Engineering recommends the Applicant provide additional grading detail at both bioretention areas, specifically between the curb and the bioretention basin and at the spillways. Additional spot grades/contours are needed to show the intended volume within the diaphragm/sediment forebay and clearly depict the elevations of spillways within the bioretention basin.

The bioretention basin detail has been updated to include additional grading for each basin.

Nitsch Engineering confirms that additional spot grades have been added to the detail on Sheet C-8. Nitsch Engineering notes that spot grades on Sheet C-5 show the concrete walk over the sidewalk inlet to be flat. Nitsch Engineering recommends that the sidewalk have a minimum 1% slope to prevent ponding. This comment is closed pending the refinement of the sidewalk grading for positive drainage.

8. The trees to the east of the parking lot are called out to be protected. The proposed condition of the parking lot includes a vertical granite curb that appears to travel through the root zone of the trees. This may cause harm to the trees. Please comment whether or not this was accounted for in the design of the parking lot and whether other alternatives where considered during design to minimize rootzone impacts.

In the existing condition, cars currently park outside of the edge of pavement and there is significant erosion and impacts on the existing tree roots. Installing a curb will control parking and protect the tree roots. The location of the proposed curb is very close to the existing edge of pavement and should have minimal impacts to the rootzone of the trees.

Nitsch Engineering understands the benefits of curbing on the site, however, we still have concerns that the trees will be impacted by installation of curbing. Nitsch Engineering recommends that the Applicant consider wheel stops used on the eastern side of the parking lot

to reduce the potential of damaging the trees but defers to the Conservation Commission and the City for acceptance of the proposed design.

9. Google Earth images show trees south of the building near the proposed bioretention area that are provided in the survey. If the trees still exist, please locate them on the survey and determine whether there are any impacts to the proposed bioretention area. We note these trees appear to be located within the 100-foot Buffer Zone to the pond.

   The survey was not performed by Green. We will reach out to the city to add these trees to the survey.

   This item is ongoing.

10. There are two (2) depressions on the eastern side of the site. Please explain the design intent of these depressions.

    Under existing conditions, there is significant erosion along the hillside and where it meets the Buttonwood Park Community Center parking lot from the baseball field. The intent of these depressions is to improve runoff from the existing baseball field by promoting some infiltration and slowing down the flow of water traveling from the East towards the parking lot. By slowing down the water and reducing the volume at this location, it will reduce erosion across Oneida Street and into the pond.

    This item has been addressed.

11. The inlet to bioretention basin #1 and bioretention basin #2 has different hatch patterns. Please call out on the plans what material is at the inlets of the bioretention basin.

    The inlet to Bioretention #1 utilizes a riprap channel to convey stormwater over existing gas lines to the crushed stone diaphragm. The inlet to Bioretention #2 flows directly into the crushed stone diaphragm. These materials are noted in the legend on drawing C-4, Site Layout & Materials Plan.

    This item has been addressed.

12. Per the Massachusetts Stormwater Handbook Volume 2, Chapter 2, the depth of soil media in bioretention areas must be between 2 feet and 4 feet. The southern bioretention basin appears to have 1.3 feet of subsurface material. Nitsch Engineering recommends considering extending the soil media to a 2-foot depth even if the required 2-foot groundwater separation cannot be met, or commenting on why the 1.3 foot depth should be maintained.

    There is only 1.3 feet of soil media proposed in Basin 1 because of the season high groundwater constraint. By providing 1.3’ of soil media the bottom of our system has 2 feet separation to groundwater. The 2 feet of separation to groundwater is an important design component to maintain to make sure mounding of groundwater within the basin doesn’t happen. In addition, 1.3’ of soil media is sufficient enough to provide the water quality treatment and TSS removal required as well as enough soil media for the plants to grow above. If the basin has less than 2’ separation to groundwater, then the bioretention basin is not considered an infiltration BMP, will require a liner, an underdrain, and add additional costs to the project.

    We have designed bioretention basins on previous projects throughout Massachusetts with less than 2 feet of media and they have functioned properly.

The Applicant has provided justification for the reduced depth of bioretention soil media, which deviates from the design standard in the MassDEP Stormwater Handbook. We understand that they are maximizing the depth while considering the existing site constraints, and that this is a retrofit project that will result in an improvement to the stormwater discharging to the adjacent pond. Therefore, this item has been addressed.

If you have any questions, please call us at (617) 338-0063.

Very truly yours,

Nitsch Engineering, Inc.

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