



6116.0001

STORMWATER MANAGEMENT OPERATION & MAINTENANCE MANUAL

**For: Major Site Plan located on Block 4, Lot 630
Manchester Township, Ocean County, NJ**

Prepared By:
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Responsible Maintenance Party:
QOZB NJ Impact Fund LLC
917 Main Street
Belmar, NJ 07719
732-749-7709

State of New Jersey

S.S.

County of _____

I certify that on this _____ day of _____, 20____, before me, _____ the subscriber, a Notary Public / an Attorney at Law of the State of New Jersey, personally appeared _____ the managing member of **QOZB NJ Impact Fund LLC** who, being by me duly sworn on his oath that **QOZB NJ Impact Fund LLC** is the owner and responsible party for the maintenance of the stormwater management areas located on Block 4, Lot 630.

Sworn and subscribed before me
the date aforesaid. Ss.

(Owner to Sign Here)

NOTARY OR ATTORNEY
SIGN AND SEAL

My Commission expires on
_____, 20____

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I. INTRODUCTION

This manual is for the maintenance of the stormwater management system proposed for the Major Site Plan located on Block 4, Lot 630 in Manchester Township, Ocean County, NJ. Regular and thorough maintenance is necessary to keep the systems performing effectively and reliably. Failure to perform necessary maintenance can lead to diminished performance, deterioration, failure, health, and safety problems, mosquito breeding, and vermin. This maintenance plan includes maintenance tasks and schedules to be completed by the owner of the systems.

The owner and responsible party for the stormwater management system must be recorded on the deed of property on which they are located. Any change in this information or change in property ownership must also be recorded on the deed. In the event that the owner fails to maintain the stormwater management system, Manchester Township has the right, but not the obligation, to perform necessary maintenance at the owner's expense.

The person or party with maintenance responsibility must retain and upon request, make available the maintenance plan and associated logs and other records for review by a public entity with administrative, health, environmental, or safety authority over the site.

II. PREVENTATIVE AND CORRECTIVE MAINTENANCE

An informal onsite inspection should be performed during every visit to the site by maintenance or supervisory personnel in addition to the following required reviews and inspections. A chain of command for reporting and addressing maintenance needs should be established. Everyone from field personnel to the maintenance director should be encouraged to report any problems or suggest any changes to the maintenance program.

The personnel with maintenance responsibility shall review and evaluate the effectiveness of the regularly scheduled Preventative and Aesthetic Maintenance procedures and identify where changes in the extent and scheduling of the procedures are warranted at least twice a year and revise, as necessary.

A routine inspection must be performed at least four times a year by qualified personnel and a formal inspection must be performed at least once a year by a licensed professional engineer to ascertain the operational condition and safety of the site and stormwater management systems. A sample inspection checklist is provided in Section III of this manual and shall be filled out during each of these onsite inspections.

A copy of the completed inspection checklist forms and maintenance work orders shall be kept in the Detailed Log section of this manual.

PREVENTATIVE MAINTENANCE PROCEDURES

The purpose of Preventative Maintenance (routine maintenance) is to assure that the stormwater management systems are operational and safe at all times, while minimizing the need for emergency or corrective maintenance. All maintenance procedures are to be performed in accordance with OSHA regulations.

1. Grass Cutting

A regularly scheduled program of mowing and trimming the grass on site and particularly around the basins during the growing season will help to maintain a tightly knit turf, prevent diseases, pests and the intrusion of weeds. At a minimum, grass should be mowed at least once a month during the growing season; however, the site should be evaluated routinely to determine if more frequent mowing needs to take place. In general, grass should not be allowed to grow more than 1 to 2 inches between cuttings. Allowing the grass to grow more than this amount prior to cutting it may result in damage to the grass' growing points and limit its continued healthy growth. Grass cuttings should be bagged and removed from the site. Agencies such as the Ocean County Soil Conservation District can provide valuable assistance in determining optimum mowing requirements.

2. Grass Maintenance

Grassed areas require periodic fertilizing, de-thatching and soil conditioning to maintain healthy growth. Inspection of established grass areas should be performed at least twice annually during both the growth and non-growth season. Provisions should be made to re-seed and re-establish any grassed areas damaged by sediment accumulation, storm water flow, or other causes. When re-establishing or restoring grassed areas, biweekly inspections of the grass health should be performed during the first growing season or until the grass is established. Agencies such as the Ocean County Soil Conservation District can provide valuable assistance in establishing a suitable grass maintenance program.

3. Vegetative Cover

Trees, shrubs, and ground cover require periodic maintenance, including fertilizing, pruning, and pest control to maintain a healthy growth. Inspection of vegetated areas health, density, and diversity must be done at least twice annually, and provisions should be made to restore any vegetation, correct any erosion or scouring problems and maintain optimum vegetation health. When restoring vegetation, biweekly inspections of the vegetation's health should be performed during the first growing season or until the vegetation is established. Any damage must be addressed through replanting. Whenever possible vegetation deficiencies should be addressed without the use of fertilizers and pesticides. Any unwanted growth should be removed with minimum disruption to the remaining vegetation and the subsoil. The Ocean County Soil Conservation District can be of assistance in establishing a preventative maintenance program for the site.

4. Removal and Disposal of Trash and Debris

A regularly scheduled program of debris and trash removal will reduce the chance of structures becoming clogged and inoperable during storm events. Additionally, removal of trash and debris will prevent possible damage to vegetated areas and eliminate potential mosquito breeding habitats. Disposal of debris and trash must comply with all local, county, state, and federal waste management control regulations. Only suitable disposal and recycling sites should be utilized. Agencies such as the Division of Solid Waste Management of the New Jersey Department of Environmental Protection should be contacted for information on disposal regulations.

5. Stormwater Pipe Inspection and Cleaning

Stormwater pipes can become clogged with accumulated sediment and threaten the operation or storage volume in the collection system and lead to onsite flooding and downstream concerns. Therefore, regular inspection for excessive debris and sediment, maintenance, and cleaning of drainage pipes should be performed when the systems are thoroughly dry. Sediment can be removed by hand using shovels where possible. After all trash and easily accessible sediment is collected, a Vactor truck shall be used to clean inside the stormwater pipes, starting at the highest elevation. After vacuuming and jetting, all liquid should be vacuumed back up into the truck. Disposal of debris, sediment, trash, and other waste material should be done at suitable disposal/recycling sites and in compliance with local, county, state and federal regulations. The Division of Solid Waste Management of the New Jersey Department of Environmental Protection can be contacted for information on disposal regulations.

6. Sediment Removal and Disposal

Accumulated sediment should be removed before it threatens the operation or storage volume of the stormwater management facilities. The basins must be inspected for clogging and excessive debris and sediment accumulation at least four times annually as well as after every storm exceeding one (1) inch of rainfall. Some of the components that will require careful inspection for excessive debris and sediment accumulation are but not limited to, the system bottom, scour holes, and inflow points. Sediment and debris removal should take place when the systems are thoroughly dry. Disposal of debris, trash, sediment and other waste material should be done at suitable disposal / recycling sites and in compliance with all local, count, state and federal regulations. The sediment removal in the basins must also include testing or monitoring of the porosity of the bottom to determine if replacement or cleansing of the pervious materials is necessary. If water fails to infiltrate within 72 hours after the end of the storm event, corrective measures must be taken. Agencies such as the Division of Solid Waste Management of the New Jersey Department of Environmental Protection should be contacted for information on disposal regulations.

GENERAL PROCEDURES

1. Elimination of Potential Mosquito Breeding Habitats

The most effective mosquito control program is one that eliminates potential breeding habitats. Almost any stagnant pool of water can be attractive to mosquitoes, and the source of a large mosquito population. Ponded water in areas such as open cans and bottles, debris and sediment accumulations, and areas of ground settlement provide ideal locations for mosquito breeding. A maintenance program dedicated to eliminating potential breeding areas is certainly preferable to controlling the health and nuisance effects of flying mosquitoes. The Ocean County Mosquito Extermination Commission can provide valuable information on establishing this maintenance program.

2. Inspection

Regularly scheduled “formal” inspections of the basins should be performed by qualified inspectors. The primary purpose of the inspections is to ascertain the operational condition and safety of the systems. Inspections will also provide information on the effectiveness of regularly scheduled Preventative and Aesthetic Maintenance procedures and will help to identify where changes in the extent and scheduling of the procedures are warranted. Finally, the inspections should also be used to determine the need for and timing of Corrective Maintenance procedures.

3. Reporting

The recording of all maintenance work and inspections provides valuable data. Review of this information will also help to establish more efficient and beneficial maintenance procedures and practices.

CORRECTIVE MAINTENANCE PROCEDURES

Corrective Maintenance (emergency or non-routine maintenance) should be performed when necessary to correct problems or malfunctions and to restore the intended operation and safe condition of the stormwater management system. All maintenance procedures are to be performed in accordance with OSHA regulations.

1. Removal of Debris and Sediment

Sediment, debris and trash which threaten the discharge capacity of the systems should be removed immediately and properly disposed of in a timely manner. If water is failing to infiltrate in the basins within 72 hours after the end of the storm, soil restoration measures must be taken to restore the soil porosity. Equipment and personnel must be available to perform the removal work on short notice. The lack of an available disposal site should not delay the removal of trash, debris, and sediment. Temporary disposal sites should be utilized if necessary.

Restoration of compacted soils through deep tillage should be performed only where there is no danger to underground utilities.

1. It is important to have dry conditions at the site prior to any soil restoration.
2. All trash and debris should be removed from the area.
3. Any accumulated sediment should be removed from the area.
4. The restoration area should be deeply tilled (12" minimum) with a rotary tiller or disc harrow followed by compaction testing. If compaction testing fails additional tilling and retesting is required.
5. Upon completion of the compaction testing the area shall be smoothed out and all surface debris and rocks removed.

All procedures should be performed with lightweight, rubber-tired equipment.

A minimum of two (2) compaction tests shall be performed for areas with an overall restoration area of up to one (1) acre and additional tests at a rate of two (2) tests per acre for larger areas which shall be evenly distributed over the restoration area.

Probing Wire Test Method

This test is performed by the contractor or engineer and shall be conducted with a firm wire (15 ½" gauge steel wire- e.g. survey marker flag), 18 to 21 inches in length with 12" inches from one end visibly marked on the wire. Conduct test by holding the wire flag near the flag end and push it vertically into the soil 12-inches in depth or the depth at which the wire bends due to resistance in the soil. Record the depth at which the wire bends due to resistance in the soil. If penetration fails and an obstruction is suspected (rocks, root, debris, etc) the test can be repeated in the same general area. If the wire should penetrate without bending or deforming at least 12" inches into the ground by hand, without the use of tools then the test is successful, and the soil is not excessively compacted. If the test fails further testing is required or the contractor shall complete additional compaction mitigation. Test results shall be logged, and the operating party shall sign off on the results.

2. Structural Repairs

Structural damage to outlet and inlet structures, trash racks, and headwalls from vandalism, flood events, or other causes must be repaired promptly. Equipment, materials and personnel must be available to perform these repairs on short notice. The immediacy of the repairs will depend upon the nature of the damage and its effects on the safety and operations of the systems. The analysis of structural damage and the design and performance of structural repairs should only be undertaken by qualified personnel.

3. Embankment and Slope Repairs

Damage to embankments and side slopes must be repaired promptly. This damage can be the result of rain or flood events, vandalism, animals, vehicles, or neglect. Typical problems include settlement, scouring, cracking, sloughing, seepage, and rutting. Equipment, materials and

personnel must be available to perform these repairs on the nature of the damage and its effects on the safety and operation of the facility. The analysis of damage and the design and performance of geotechnical repairs should only be undertaken by qualified personnel.

4. Dewatering

It may be necessary to remove ponded water from within the systems if they are not performing properly. Portable pumps may be necessary to remove the ponded water temporarily until a permanent solution can be implemented.

5. Extermination of Mosquitoes

If neglected, the systems can readily become an ideal mosquito breeding area. Extermination of mosquitoes will usually require the services of an expert, such as the Ocean County Mosquito Extermination Commission. Proper procedures carried out by trained personnel can control the mosquitoes with minimum damage or disturbance to the environment. If mosquito control becomes necessary, the preventative maintenance program should also be re-evaluated, and more emphasis placed on control of mosquito breeding habitats.

6. Erosion Repair

Vegetative cover or other protective measures are necessary to prevent the loss of soil from the erosive forces of wind and water. Where a re-seeding program has not been effective in maintaining a non-erosive vegetative cover, or other factors have exposed soils to erosion, corrective steps should be initiated to prevent further loss of soil and any subsequent danger to the stability of the facility. Soil loss can be controlled by a variety of materials and methods, including riprap, gabion lining, sod, seeding, concrete lining and re-grading. The Ocean County Soil Conservation District can provide valuable assistance in recommending materials and methodologies to control erosion.

7. Elimination of Trees, Brush, Roots and Animal Burrows

The stability of embankments and side slopes can be impaired by large roots and animal burrows. Additionally, burrows can present a safety hazard for maintenance personnel. Trees and brush with extensive, woody root systems should be completely removed from embankments to prevent their destabilization and the creation of seepage routes. Roots should also be completely removed to prevent their decomposition within the embankment. Root voids and burrows should be plugged by filling with material similar to the existing material, and capped just below grade with stone, concrete or other material. If plugging of the burrows does not discourage the animals from returning, further measures should be taken to either remove the animal population or to make critical areas of the facility unattractive to them.

8. Snow and Ice Removal

Accumulations of snow and ice can threaten the functioning of the systems. Providing the equipment, materials and personnel to monitor and remove snow and ice is necessary to assure the continued function during the winter months.

AESTHETIC MAINTENANCE PROCEDURES

Aesthetic Maintenance (routine maintenance), although not required to keep the basins operational, it will maintain the visual appeal and will benefit everyone within the local community. All maintenance procedures are to be performed in accordance with OSHA regulations.

1. Graffiti Removal

The timely removal of this obvious eyesore will restore the aesthetic quality of the community. Removal can be accomplished by painting or otherwise covering it, or removing it with scrapers, solvents or cleansers. Timely removal is important to discourage further graffiti and other acts of vandalism.

2. Grass Trimming

Although time consuming, trimming of grass edges around structures and fences will provide for a neat and attractive appearance of the facilities.

3. Control of Weeds

Although a regular grass maintenance program will keep weed intrusion to a minimum, some weeds will invariably appear. Periodic weeding, either chemically or mechanically, will not only help to maintain a healthy turf, but will also keep grassed areas looking attractive.

4. Details

Careful, meticulous, and frequent attention to the performance of maintenance items such as painting, tree pruning, leaf collection, debris removal, and grass cutting will result in the systems remaining both functional and attractive.

III. DETAILED LOG SHEET

A copy of every inspection form completed, maintenance work orders, and preventative and corrective maintenance procedures performed must be filed in this section of the manual. If any reviews are performed by a public entity with administrative, health, environmental, or safety authority over the site, a copy of their report or findings must also be placed in this section of the manual.

A blank Inspection Checklist and Maintenance Work Order are enclosed.

INSPECTION CHECKLIST

FACILITY: _____

LOCATION: MANCHESTER TOWNSHIP, OCEAN COUNTY, NEW JERSEY

INSPECTOR: _____ DATE: _____ TIME: _____

Infiltration Basin 1

Facility Item	Ok condition	Routine Maintenance	Urgent Maintenance	Comments
Basin Embankments and Side Slopes				
A. Vegetation growth				
B. Erosion				
C. Sediment				
D. Trash and Debris				
E. Aesthetics				
F. Other				
Basin Bottom				
A. Vegetation growth				
B. Erosion				
C. Standing Water				
D. Sediment				
E. Trash and Debris				
F. Aesthetics				
G. Other				
Basin Inlet Structures				
A. Condition of Structure				
B. Erosion				
C. Trash and Debris				
D. Sediment				
E. Aesthetics				
F. Other				
Basin Outlet Structures				
A. Condition of Structure				
B. Erosion				
C. Trash and Debris				
D. Sediment				
E. Mechanical Components				
F. Aesthetics				
G. Other				
Basin Perimeter				
A. Vegetation				
B. Erosion				
C. Trash and Debris				
D. Aesthetics				
E. Fences and Gates				
F. Other				

Miscellaneous				
A. Effectiveness of Existing Maintenance Program				
B. Potential Mosquito Habitats				
C. Mosquitoes				
D. Animal burrows				

Infiltration Basin 2

Facility Item	Ok condition	Routine Maintenance	Urgent Maintenance	Comments
Basin Embankments and Side Slopes				
A. Vegetation growth				
B. Erosion				
C. Sediment				
D. Trash and Debris				
E. Aesthetics				
F. Other				
Basin Bottom				
A. Vegetation growth				
B. Erosion				
C. Standing Water				
D. Sediment				
E. Trash and Debris				
F. Aesthetics				
G. Other				
Basin Inlet Structures				
G. Condition of Structure				
H. Erosion				
I. Trash and Debris				
J. Sediment				
K. Aesthetics				
L. Other				
Basin Outlet Structures				
A. Condition of Structure				
B. Erosion				
C. Trash and Debris				
D. Sediment				
E. Mechanical Components				
F. Aesthetics				
G. Other				
Basin Perimeter				
A. Vegetation				
B. Erosion				
C. Trash and Debris				
D. Aesthetics				
E. Fences and Gates				
F. Other				

Miscellaneous				
A. Effectiveness of Existing Maintenance Program				
B. Potential Mosquito Habitats				
C. Mosquitoes				
D. Animal burrows				

Infiltration Basin 3

Facility Item	Ok condition	Routine Maintenance	Urgent Maintenance	Comments
Basin Embankments and Side Slopes				
A. Vegetation growth				
B. Erosion				
C. Sediment				
D. Trash and Debris				
E. Aesthetics				
F. Other				
Basin Bottom				
A. Vegetation growth				
B. Erosion				
C. Standing Water				
D. Sediment				
E. Trash and Debris				
F. Aesthetics				
G. Other				
Basin Inlet Structures				
M. Condition of Structure				
N. Erosion				
O. Trash and Debris				
P. Sediment				
Q. Aesthetics				
R. Other				
Basin Outlet Structures				
A. Condition of Structure				
B. Erosion				
C. Trash and Debris				
D. Sediment				
E. Mechanical Components				
F. Aesthetics				
G. Other				
Basin Perimeter				
A. Vegetation				
B. Erosion				
C. Trash and Debris				
D. Aesthetics				
E. Fences and Gates				
F. Other				

Miscellaneous				
A. Effectiveness of Existing Maintenance Program				
B. Potential Mosquito Habitats				
C. Mosquitoes				
D. Animal burrows				

Infiltration Basin 4

Facility Item	Ok condition	Routine Maintenance	Urgent Maintenance	Comments
Basin Embankments and Side Slopes				
A. Vegetation growth				
B. Erosion				
C. Sediment				
D. Trash and Debris				
E. Aesthetics				
F. Other				
Basin Bottom				
A. Vegetation growth				
B. Erosion				
C. Standing Water				
D. Sediment				
E. Trash and Debris				
F. Aesthetics				
G. Other				
Basin Inlet Structures				
A. Condition of Structure				
B. Erosion				
C. Trash and Debris				
D. Sediment				
E. Aesthetics				
F. Other				
Basin Outlet Structures				
A. Condition of Structure				
B. Erosion				
C. Trash and Debris				
D. Sediment				
E. Mechanical Components				
F. Aesthetics				
G. Other				
Basin Perimeter				
A. Vegetation				
B. Erosion				
C. Trash and Debris				
D. Aesthetics				
E. Fences and Gates				
F. Other				

Miscellaneous				
A. Effectiveness of Existing Maintenance Program				
B. Potential Mosquito Habitats				
C. Mosquitoes				
D. Animal burrows				

Roof Recharge System

Maintenance Item	Ok condition	Routine Maintenance	Urgent Maintenance	Comments
A. Pipes clear of debris				
B. Manhole clear of debris				
C. Sediment Accumulation				
D. Standing Water				

MAINTENANCE WORK ORDER CHECKLIST

FACILITY: _____

LOCATION: MANCHESTER TOWNSHIP, OCEAN COUNTY, NEW JERSEY

CREW: _____ WORK STARTED: date _____ time _____

EQUIPMENT: _____ WORK COMPLETED: date _____ time _____

WEATHER: _____ TOTAL MANHOURS OF WORK: _____

PREVENTATIVE MAINTENANCE

Work Item	Items Required	Items Done	Comments and Special Instructions
1. Grass Cutting			
2. Grass Maintenance			
A. Fertilizing			
B. Re-Seeding			
C. De-Thatching			
D. Pest Control			
E. Other			
3. Vegetative Cover			
A. Fertilizing			
B. Pruning			
C. Pest Control			
D. Other			
4. Trash and Debris Removal			
5. Sediment Removal			
6. Elimination of Potential Mosquito Breeding Habitats			
7. Animal Burrows Filled In			
8. Other Preventative Maintenance			
A.			
B.			

CORRECTIVE MAINTENANCE

Work Item	Items Required	Items Done	Comments and Special Instructions
1. Removal of Debris & Sediment			
2. Structural Repairs			
3. Embankment & Side Slope Repairs			
4. Dewatering			
5. Control of Mosquitoes			
6. Erosion Repair			
7. Elimination of Trees, Brush, Roots & Animal Burrows			
8. Snow & Ice Removal			
9. Basin Bottom tilling			
10. Jet flushing / vacuor cleaning			
11. Other			

AESTHETIC MAINTENANCE

Work Item	Items Required	Items Done	Comments and Special Instructions
1. Graffiti Removal			
2. Grass Trimming			
3. Weeding			

NOTES:

IV. DEFINITIONS

Debris: rough, broken bits of stone, wood, glass, etc.

Deterioration: to become less in quality or value

Formal Inspection: to be completed once a year by a licensed professional engineer. A copy of every inspection must be kept in the Log Section of the Maintenance Plan.

Jet cleaning / vactor cleaning: Jet cleaning flushes the storm sewer pipes and inlets with water and collects the material flushed from the sewer in a basket as it flows down the pipe. A vactor assembly is often combined with the jet to vacuum out the flushed water and debris

Porosity: the ratio of the volume of a material's pores to its total volume.

Qualified inspector/personnel: Individual who has Stormwater Inspection Training

Routine Inspection: to be completed four times a year by a qualified site inspector. A copy of every inspection must be kept in the Log Section of the Maintenance Plan.

Scouring: the washing away or removal of particles.

Sediment: matter that settles to the bottom and deposited.

Sloughing: material that is worn down or discarded.

APPENDIX A

APPENDIX B