

**LONG-TERM OPERATION AND MAINTENANCE PLAN  
&  
LONG TERM POLLUTION PREVENTION PLAN**

**located at**

**COUNCIL OF AGING COMMUNITY CENTER  
8 ANDREW AVENUE  
WAYLAND, MASSACHUSETTS**



**Prepared for:**

Town of Wayland  
41 Cochituate Road  
Wayland, Massachusetts 01778

**Prepared by:**

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**May 15, 2023**



**Project Name:** Council on Aging Community Center  
8 Andrew Avenue  
Wayland, MA 01778

**Applicant Name:** Town of Wayland  
41 Cochituate Road  
Wayland, MA 01778

**Party Responsible for Maintenance of the Stormwater Management System:\***

Town of Wayland  
41 Cochituate Road  
Wayland, MA 01778

*Michael McCall*

Signature

*Town Manager*

*5/16/23*

Date

\* The future owners of the property are to be notified of the stormwater management system and the requirements for proper operation and maintenance of said system. The new owners should be added to the Operations and Maintenance Plan upon transfer of property ownership.

**Conservation Commission and Town Access to the Site:**

Provisions for the Conservation Commission or its designee to enter the property at reasonable times and in a reasonable manner for the purpose of inspection of the stormwater management system, shall be provided by the property owner.

Anticipated Long Term Maintenance Budget:

Catch Basin Inspection and Cleaning: \$300/basin * 5 basins * 4 times per year =	\$6,000;
Infiltration System Inspection and Cleaning: \$1,000/system * 1 system * 2 times per year =	\$2,000;
Level Spreader Inspection and Cleaning: \$250/spreader * 1 spreader * 2 times per year =	\$500;
Budgeted Total Maintenance Budget Per Year:	\$8,500



## **Project Description:**

The former Raytheon facility in Wayland occupied approximately 83 acres of land at 430 Boston Post Road from circa 1955 through 1996. It was developed into the 'Wayland Town Center' between 2012 and 2015. The subject property is located at 8 Andrew Avenue and is located within the "Wayland Town Center". The subject property includes four (4) individual parcels with a combined total area of approximately 4.16 acres. The project site previously contained two buildings used for radar equipment testing. The buildings were demolished in 1999 and the current 12,759 sf building was constructed in 2000. The intention was to use this building as a daycare center for the tenants of Raytheon's former main building but the building was never completed or occupied. The unoccupied building is connected to sanitary sewer, domestic and fire water services, natural gas, electric, telephone and data service connections.

The project site also includes several easements for existing sanitary sewer and stormwater drainage utilities. The western portion of the project site is adjacent to the Sudbury River and the one hundred (100) foot and two hundred (200) foot riverfront Riparian Zones extend onto the site. There are bordering vegetated wetlands downhill of the project site adjacent to the Sudbury River and there is a small area of bordering vegetated wetlands between the building and the Boston Post Road. A portion of the project site contains priority habitats of rare species as mapped by Natural Heritage and is partially located within the one hundred (100) year flood plain. Per the Town of Wayland Zoning Map, the project site is located within the Limited Commercial District Zoning District and the Aquifer Protection District (Zone IIs Wellhead Protection Area).

The topography on the eastern and northern portions of the project site gradually slopes towards the Sudbury River while the topography west of the building slopes more steeply towards the Sudbury River. The area surrounding the building and to the west towards the Sudbury River contains woods. The area on the eastern and northern portions of the project site is covered by grass. There is an existing drainage basin between the project site and the Boston Post Road that collects the stormwater runoff flowing from the Boston Post Road.

The Town of Wayland is proposing renovations and additions to the existing unoccupied building and other improvements including parking areas, sidewalks that connect to Andrew Avenue and Lillian Way, patio, stormwater management system, site grading, utility connections, stone dust trails, landscaping, hardscaping and lighting.

## **LONG TERM OPERATION AND MAINTENANCE PLAN**

The inspection of the following BMP's are to be documented in the Inspection Schedule and Evaluation Checklist. The Inspection Schedule and Evaluation Checklist utilizes the required inspections as outlined below. A description of how each of the BMP conditions are to be evaluated and classified from excellent to poor, utilizing a condition rating system, has been described below and in this report.

### **Condition Rating System**

Excellent: The component or system is in new or like new condition and no deferred maintenance is recommended.

Good: The component or system is sound and performing its function, and/or scheduled maintenance can be accomplished through routine maintenance. It may show signs of normal aging or wear and tear and some remedial and routine maintenance or rehabilitation work may be necessary.

Fair: The component or system is performing but may be obsolete or is approaching the end of its expected useful life. The component or system may exhibit evidence of deferred maintenance, previous repairs, or workmanship not in compliance with commonly accepted standards. Significant repair or replacement may be recommended to prevent further deterioration, restore it to good condition, prevent premature failure, or to prolong its expected useful life.

Poor: The component or system has either failed or cannot be relied upon to continue performing its original function as a result of having exceeded its typical expected useful life, excessive deferred maintenance, or state of disrepair. Present conditions could contribute to, or cause, the deterioration of other adjoining elements or systems. Repair or replacement is recommended.

### **Erosion Control**

Eroded sediments can adversely affect the performance of the stormwater management system. Eroding or barren areas should be immediately re-vegetated.

Eroded areas should be removed of eroded materials and immediately revegetated or stabilized with loam and seed, jute netting, tackifier or other similar methods that will cease the current erosion and prevent further erosion from occurring.

Areas that have been repaired, should be inspected on a weekly basis until these areas have been deemed to be stabilized.

### **Debris and Litter Removal**

All debris and litter shall be removed from the site when necessary. Debris and litter should be removed as deemed appropriate and in accordance with all local, State and Federal requirements.

Debris and litter comprised of common waste and/or trash should be collected by hand or with the use of hand tools and disposed of in the appropriate vessels, trash bags, trash barrels, dumpsters etc. in accordance with all local, State and Federal requirements. Leaves, branches and other natural debris should be raked, blown or other wise collected and disposed of in accordance with all local, State and Federal requirements.

At no time, should any debris or litter be swept, raked, washed, placed or in any other matter directed into the stormwater management system.

### **Deep Sump Hooded Catch Basins**

Deep sump hooded catch basins are designed to capture surface runoff from the paved parking lots and other similar areas via the inlet grates, which are generally flush with the adjacent ground cover. The runoff should fill the sump and then exit the structure through the hooded outlet pipe. There should be standing water in the catch basin sump which will allow for the sediment, such as sand and other debris, to settle out and remain in the structure and not travel further into the stormwater management system.

The catch basins shall be inspected four (4) times per year. Typically, the catch basin should be inspected by removing the grate and visually observing the interior of the concrete structure for defects in the concrete walls, defects to the frame, grate and the riser cone, damage to the outlet hood and sediment build up. A measurement should be taken to determine the depth of standing water and the depth of sediment in the structure. At a minimum, the catch basins shall be cleaned two (2) times per year, or when sediment in the bottom of the sump reaches twenty-four (24) inches below the bottom of the outlet. Inlet and outlet pipes should be checked for clogging. The conditions of the various components of the catch basins should be noted in the Inspection Checklist located at the end of this report. Tools such as, but not limited to, a flashlight, a 'spade' shovel, a tape measure, a flat head screwdriver, other similar hand held tools and a camera will be helpful to have in performing the inspections.

If necessary, any maintenance shall be performed such that the catch basin will function as intended. Typical repairs would require the patching of cracks in the concrete, re grouting the pipe connections to the concrete structure, resetting the grade bricks near the grate and removal of sediment. Repairs can generally be performed with hand tools and in the case of sediment removal, a vac truck is typically used for it efficiency.

### **Filter Media Unit**

The primary purpose of the Filter Media Unit is to filter and prevent pollutants from entering the waterways. Like any effective filtration system, periodically these pollutants must be removed to restore the Filter Media Unit to its full efficiency and effectiveness. Maintenance requirements and frequency are dependent on the pollutant load characteristics of each site. Maintenance activities may be required in the event of a chemical spill or due to excessive sediment loading from site erosion or extreme storms. It is a good practice to inspect the system after major storm events.

A detailed Operations and Maintenance Plan, provided by the manufacturer has been included in this report. Maintenance of the Filter Media Unit is recommended to be performed by the manufacturer or a representative thereof. The inspection and maintenance requirements listed below are for general guidance, but anyone inspecting the Filter Media Unit should be approved to do so by the manufacturer.

In the event of any hazardous material spill maintenance should be performed immediately. Maintenance should be performed by a licensed liquid waste hauler. The appropriate regulatory agencies should also be notified.

Typically, maintenance is performed by the Vacuum Service Industry, a well-established sector of the service industry that cleans underground tanks, sewers, and catch basins. Costs to clean the treatment unit will vary based on the size of the unit and transportation distances.

The requirements for the disposal of material from a treatment unit are similar to that of any other Best Management Practices (BMPs). Local guidelines should be consulted prior to disposal of the filter media unit contents. In most areas the sediment, once dewatered, can be disposed of in a sanitary landfill. It is

not anticipated that the sediment would be classified as a hazardous waste. In all disposal options, approval from the disposal facility agency is required. Petroleum waste products collected in the treatment unit (oil/chemical/fuel spills) should be removed by a licensed waste management company.

The following is a snippet from the Manufacturers Documentation attached at the end of this report:

- Inspection; which includes trash and floatables collection, sediment depth determination, and visible determination of backwash pool depth; shall be easily conducted from grade (outside the structure).
- Manual rinsing of the reusable filter cartridges shall promote restoration of the flow capacity and sediment capacity of the filter cartridges, extending cartridge service life.
- The filter device shall have a minimum 12 inches of sediment storage depth, and a minimum of 12 inches between the top of the sediment storage and bottom of the filter cartridge tentacles, unless otherwise specified by the design engineer. Variances may have an impact on the total performance and/or longevity between cartridge maintenance/replacement of the device.
- Sediment removal from the filter treatment device shall be able to be conducted using a standard maintenance truck and vacuum apparatus, and a minimum one point of entry to the sump that is unobstructed by filter cartridges.
- Maintenance access shall have a minimum clear height over all of the filter cartridges (length of cartridge + 6 inches) or be accessible by a hatch or other mechanism that provides vertical clear space over all of the filter cartridges such that the cartridges can be lifted straight vertically out of the receptacles and deck for the entire length of the cartridge.
- The device shall be inspected and cleaned as necessary based on the Manufacturer's recommended inspection and maintenance guidelines and the local regulatory agency/body.
- When replacement membrane filter elements and/or other parts are required, only membrane filter elements and parts approved by the manufacturer for use with the Filter Media Unit filter shall be installed.
- Filter cartridges shall be able to be maintained without the use of additional lifting equipment.

### **Subsurface Infiltration Facility**

The Subsurface infiltration system is designed to detain and infiltrate stormwater back into the ground. If the system is clogged with sediment and debris it will no longer be able to function as designed. As such, a strict inspection and cleaning schedule must be followed to ensure that the system functions as designed.

The Subsurface Infiltration System should be inspected after all major storm events, rainfall amount of 1.5 inches, or greater, over a 24-hour period, and a minimum of one (1) time per year, to ascertain whether captured runoff drains within seventy-two (72) hours following the rain event.

### **Ponded Water**

Inspections typically occur by opening the observation ports, using a flat head screwdriver, pick, crow bar or other similar hand held tools, and looking into the system to look for ponded water. The inspector should use a flashlight to help to see the bottom of the infiltration system. Should ponded water be observed after a storm event, the inspector should re-inspect the system within 72 hours to allow the system to properly exfiltrate the contained stormwater. If the inspector still observes ponded water inside the infiltration system, after several dry days or more than 72 hours after the end of the storm event, that often indicates that the bottom of the system is clogged. If the water has not drained in the time frame specified above, then a qualified professional should be retained to determine the cause of apparent infiltration failure and recommend corrective action. Such corrective action should be immediately implemented by the Owner.

### **Sediment Build Up**



Inspections typically occur by opening the observation ports, using a flat head screw driver, pick, crow bar or other similar hand held tools, and looking into the system to look for sediment build up. The inspector should use a flashlight to help to see the bottom of the infiltration system. Should sediment be observed, it should be measured. If depth of sediment is observed to be greater than three (3) inches in the bottom of the infiltration system, then the system should be cleaned. The Owner shall contact a qualified professional sewer and drain cleaning company to flood the system via pump truck so the water is forced back to the upstream cleanout where sediment can be vacuumed out.

#### Structural Integrity

Inspections of the structural integrity of the subsurface chambers should be inspected, per manufacturers recommendations to ensure that the system has not or is not in structural failure. This inspection would typically be performed using a remote-controlled camera to meander throughout the chamber system to observe the chambers. Should chambers be observed to be in failure or near failure, the Owner should immediately contact a qualified professional to determine the cause of apparent failure and recommend corrective action. Such corrective action should be immediately implemented by the Owner.

#### Level Spreader

The Level Spreader has been designed to dissipate the rate at which stormwater exits the discharge pipes prior to travelling over land and eventually into resource areas. If the level spreader is not functioning as designed, down stream erosion could occur which may impact the nearby resource areas. As such, a strict inspection and cleaning schedule must be followed to ensure that the system functions as designed.

Inspect rip rap outlet structures a minimum of two (2) times per year for erosion at sides and ends of outlet structures and for stone displacement.

Eroded areas should be removed of eroded materials and immediately make repairs using appropriate stone sizes such that the area will cease the current erosion and prevent further erosion from occurring. Eroded areas can be cleaned and/or cleared using handheld shovels, rakes, picks and pry bars. The new rip rap stones will typically be placed by hand and compacted into place using a small 'Bobcat' style excavator. Do not place stones above finished grade, stones must be installed 'into' the ground.

Rip rap areas that have been repaired, should be inspected on a weekly basis until these areas have been deemed to be stabilized. Eroded areas created from the installation of the new rip rap should be immediately revegetated or stabilized with loam and seed, jute netting, tackifier or other similar methods that will cease the current erosion and prevent further erosion from occurring.

#### **Good Housekeeping Practices (in accordance with Standard 10 of the Stormwater Management Handbook to prevent illicit discharges)**

##### **Provisions for storing paints, cleaners, automotive waste and other potentially hazardous household waste products inside or under cover**

- All materials on site will be stored inside in a neat, orderly, manner in their appropriate containers with the original manufacturer's label.
- Only store enough material necessary. Whenever possible, all of a product shall be used up before disposing of container.
- Manufacturer, local, and State recommendations for proper use and disposal shall be followed.

##### **Vehicle washing controls**

- A commercial car wash shall be used when possible. Car washes treat and/or recycle water.
- Cars shall be washed on gravel, grass, or other permeable surfaces to allow filtration to occur.

- Use biodegradable soaps.
- A water hose with a nozzle that automatically turns off when left unattended.

#### **Spill prevention and response plans**

- Spill Control Practices shall be in conformance with the guidelines set forth in the National Pollutant Discharge Elimination System (NPDES) Stormwater Pollution Prevention Plan (SWPPP)

#### **Construction requirements**

- Contractor shall follow the guidelines set forth in the National Pollutant Discharge Elimination System (NPDES) Stormwater Pollution Prevention Plan (SWPPP)

#### **Provisions for maintenance of lawns, gardens, and other landscaped areas**

- Grass shall not be cut shorter than 2 to 3 inches and mulch clipping should be left on lawn as a natural fertilizer.
- Use low volume water approaches such as drip-type or sprinkler systems. Water plants only when needed to enhance root growth and avoid runoff problems.
- The use of mulch shall be utilized where possible. Mulch helps retain water and prevents erosion.

#### **Requirements for storage and use of fertilizers, herbicides and pesticides**

- Fertilizers used will be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer will be worked into the soil to limit exposure to storm water. Storage will be in a covered shed. The contents of any partially used bags of fertilizer will be transferred to a sealable plastic bin to avoid spills.
- Do not fertilize before a rainstorm.
- Consider using organic fertilizers. They release nutrients more slowly.
- Pesticides shall be applied on lawns and gardens only when necessary and applied only in the minimum amounts recommended by the manufacturer.

#### **Pet waste management**

- Scoop up and seal pet wastes in a plastic bag. Dispose of properly, in the garbage.

#### **Provisions for operation and management of septic systems**

- Not applicable.

#### **Provisions for solid waste management**

- All solid waste shall be disposed of or recycled in accordance with local town regulations.

#### **Snow disposal and plowing plans relative to Wetland Resource Area**

- Snow shall be plowed and stored on gravel, grass, or other permeable surfaces to allow filtration to occur.
- Once snow melts all sand salt and debris shall be extracted from surface and properly disposed of.
- Snow shall not be disposed of in any wetland resource area or waterbody.

#### **Winter drive salt use and storage restrictions**

- Salt use shall be strictly prohibited at all times due to the projects location within a Zone II water protection overlay.
- Alternative uses to 'salt' shall be implemented by the Owner only on an as needed basis, and should be used per the manufacturers minimum requirements.

**Driveway sweeping and cleaning routine maintenance schedule**

- Vacuum sweeping and power washing shall be conducted as needed but at a frequency of not less than once per year.
- Removal of any accumulated sand, grit, and debris from driveway shall be completed shortly after snow melts for the season.

**Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL**

- Spill Control Practices shall be in conformance with the guidelines set forth in the National Pollutant Discharge Elimination System (NPDES) Stormwater Pollution Prevention Plan (SWPPP)

**Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan**

Town of Wayland  
41 Cochituate Road  
Wayland, MA 01778

**List of Emergency contacts for implementing Long-Term Pollution Prevention Plan**

Town of Wayland  
41 Cochituate Road  
Wayland, MA 01778  
Kenneth “Ben” Keefe, Public Works Director

**STORMWATER MANAGEMENT POST CONSTRUCTION PHASE**  
**INSPECTION SCHEDULE AND EVALUATION CHECKLIST**  
(attached on following pages)

**PROJECT LOCATION**

8 Andrew Avenue, Wayland, Massachusetts

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- (1) Refer to the Massachusetts Stormwater Handbook, Volume Two: Stormwater Technical Handbook (February 2008) for recommendations regarding frequency for inspection and maintenance of specific BMP's.
  - (2) Inspections to be conducted by a qualified professional such as an environmental scientist or civil engineer.  
Limited or no use of sodium chloride salts, fertilizers or pesticides recommended.

Stormwater Control Manager: \_\_\_\_\_



LONG TERM OPERATIONS AND MAINTENANCE PLAN INSPECTION SCHEDULE AND EVALUATION CHECKLIST  
CATCH BASINS

STRUCTURE NAME	DATE OF OBSERVATION	INSPECTOR INITIALS	LAST INSPECTION / CLEAN	DEPTH TO SEDIMENT/ BOTTOM OF STRUCTURE (INCH)	DEPTH TO TOP OF WATER (INCH)	DEPTH TO LOWEST PIPE INVERT (INCH)	OBSERVED TRASH/ DEBRIS/ OIL?	HOOD VISIBLE	PIPE BLOCKED/ CLOGGED?	CONDITION OF GRATE	CONDITION OF FRAME	CONDITION OF RISER (BRICK ETC, AREA BETWEEN F&G AND CONE/TOP SLAB)	CONDITION OF CONE/TOP SLAB	CONDITION OF BARRELL	CONDITION OF BASE (IF N/A: CANNOT SEE BOTTOM)	CONDITION OF INVERTS (PIPE CONNECTION)	ACTION ITEM	SCHEDULED REPAIR DATE	NOTES

**LONG TERM OPERATIONS AND MAINTENANCE PLAN INSPECTION SCHEDULE AND EVALUATION CHECKLIST**  
**SUBSURFACE INFILTRATION SYSTEM**

STRUCTURE NAME	DATE OF OBSERVATION	INSPECTOR INITIALS	DATE OF LAST INSPECTION / CLEANING	DEPTH OF PONDED WATER? (INCHES)	DEPTH OF SEDIMENT? (>3")?	ACTION ITEM	SCHEDULED REPAIR DATE	NOTES

LONG TERM OPERATIONS AND MAINTENANCE PLAN INSPECTION SCHEDULE AND EVALUATION CHECKLIST

LEVEL SPREADER

STRUCTURE NAME	DATE OF OBSERVATION	INSPECTOR INITIALS	DATE OF LAST INSPECTION / CLEANING	OBSTRUCTION AT OUTLET?	SCOUR UNDERMINING / EROSION?	OVERALL OUTLET CONDITION	RIP-RAP CONDITION	ACTION ITEM	SCHEDULED REPAIR DATE	NOTES

LONG TERM OPERATIONS AND MAINTENANCE PLAN INSPECTION SCHEDULE AND EVALUATION CHECKLIST  
FILTER MEDIA UNIT

STRUCTURE NAME	DATE OF OBSERVATION	INSPECTOR INITIALS	DATE OF LAST INSPECTION / CLEANING	DEPTH TO SEDIMENT/ BOTTOM (INCHES)	PIPE BLOCKED/ CLOGGED?	OIL/DEBRIS?	CONDITION OF FRAME AND GRATE/COVER	CONDITION OF RISER	CONDITION OF PIPE INVERTS	ACTION ITEM	SCHEDULED REPAIR DATE	NOTES



## StormFilter Inspection and Maintenance Procedures



## Maintenance Guidelines

The primary purpose of the Stormwater Management StormFilter® is to filter and prevent pollutants from entering our waterways. Like any effective filtration system, periodically these pollutants must be removed to restore the StormFilter to its full efficiency and effectiveness.

Maintenance requirements and frequency are dependent on the pollutant load characteristics of each site. Maintenance activities may be required in the event of a chemical spill or due to excessive sediment loading from site erosion or extreme storms. It is a good practice to inspect the system after major storm events.

## Maintenance Procedures

Although there are many effective maintenance options, we believe the following procedure to be efficient, using common equipment and existing maintenance protocols. The following two-step procedure is recommended::

### 1. Inspection

- Inspection of the vault interior to determine the need for maintenance.

### 2. Maintenance

- Cartridge replacement
- Sediment removal

## Inspection and Maintenance Timing

At least one scheduled inspection should take place per year with maintenance following as warranted.

First, an inspection should be done before the winter season. During the inspection the need for maintenance should be determined and, if disposal during maintenance will be required, samples of the accumulated sediments and media should be obtained.

Second, if warranted, a maintenance (replacement of the filter cartridges and removal of accumulated sediments) should be performed during periods of dry weather.

In addition to these two activities, it is important to check the condition of the StormFilter unit after major storms for potential damage caused by high flows and for high sediment accumulation that may be caused by localized erosion in the drainage area. It may be necessary to adjust the inspection/maintenance schedule depending on the actual operating conditions encountered by the system. In general, inspection activities can be conducted at any time, and maintenance should occur, if warranted, during dryer months in late summer to early fall.

## Maintenance Frequency

The primary factor for determining frequency of maintenance for the StormFilter is sediment loading.

A properly functioning system will remove solids from water by trapping particulates in the porous structure of the filter media inside the cartridges. The flow through the system will naturally decrease as more and more particulates are trapped. Eventually the flow through the cartridges will be low enough to require replacement. It may be possible to extend the usable span of the cartridges by removing sediment from upstream trapping devices on a routine as-needed basis, in order to prevent material from being re-suspended and discharged to the StormFilter treatment system.

The average maintenance lifecycle is approximately 1-5 years. Site conditions greatly influence maintenance requirements. StormFilter units located in areas with erosion or active construction may need to be inspected and maintained more often than those with fully stabilized surface conditions.

Regulatory requirements or a chemical spill can shift maintenance timing as well. The maintenance frequency may be adjusted as additional monitoring information becomes available during the inspection program. Areas that develop known problems should be inspected more frequently than areas that demonstrate no problems, particularly after major storms. Ultimately, inspection and maintenance activities should be scheduled based on the historic records and characteristics of an individual StormFilter system or site. It is recommended that the site owner develop a database to properly manage StormFilter inspection and maintenance programs..





## Inspection Procedures

The primary goal of an inspection is to assess the condition of the cartridges relative to the level of visual sediment loading as it relates to decreased treatment capacity. It may be desirable to conduct this inspection during a storm to observe the relative flow through the filter cartridges. If the submerged cartridges are severely plugged, then typically large amounts of sediments will be present and very little flow will be discharged from the drainage pipes. If this is the case, then maintenance is warranted and the cartridges need to be replaced.

**Warning:** In the case of a spill, the worker should abort inspection activities until the proper guidance is obtained. Notify the local hazard control agency and Contech Engineered Solutions immediately.

To conduct an inspection:

**Important:** Inspection should be performed by a person who is familiar with the operation and configuration of the StormFilter treatment unit and the unit's role, relative to detention or retention facilities onsite.

1. If applicable, set up safety equipment to protect and notify surrounding vehicle and pedestrian traffic.
2. Visually inspect the external condition of the unit and take notes concerning defects/problems.
3. Open the access portals to the vault and allow the system vent.
4. Without entering the vault, visually inspect the inside of the unit, and note accumulations of liquids and solids.
5. Be sure to record the level of sediment build-up on the floor of the vault, in the forebay, and on top of the cartridges. If flow is occurring, note the flow of water per drainage pipe. Record all observations. Digital pictures are valuable for historical documentation.
6. Close and fasten the access portals.
7. Remove safety equipment.
8. If appropriate, make notes about the local drainage area relative to ongoing construction, erosion problems, or high loading of other materials to the system.
9. Discuss conditions that suggest maintenance and make decision as to whether or not maintenance is needed.

## Maintenance Decision Tree

The need for maintenance is typically based on results of the inspection. The following Maintenance Decision Tree should be used as a general guide. (Other factors, such as Regulatory Requirements, may need to be considered).

Please note Stormwater Management StormFilter devices installed downstream of, or integrated within, a stormwater storage facility typically have different operational parameters (i.e. draindown time). In these cases, the inspector must understand the relationship between the retention/detention facility and the treatment system by evaluating site specific civil engineering plans, or contacting the engineer of record, and make adjustments to the below guidance as necessary. Sediment deposition depths and patterns within the StormFilter are likely to be quite different compared to systems without upstream storage and therefore shouldn't be used exclusively to evaluate a need for maintenance.

1. Sediment loading on the vault floor.
  - a. If  $>4"$  of accumulated sediment, maintenance is required.
2. Sediment loading on top of the cartridge.
  - a. If  $>1/4"$  of accumulation, maintenance is required.
3. Submerged cartridges.
  - a. If  $>4"$  of static water above cartridge bottom for more than 24 hours after end of rain event, maintenance is required. (Catch basins have standing water in the cartridge bay.)
4. Plugged media.
  - a. While not required in all cases, inspection of the media within the cartridge may provide valuable additional information.
  - b. If pore space between media granules is absent, maintenance is required.
5. Bypass condition.
  - a. If inspection is conducted during an average rain fall event and StormFilter remains in bypass condition (water over the internal outlet baffle wall or submerged cartridges), maintenance is required.
6. Hazardous material release.
  - a. If hazardous material release (automotive fluids or other) is reported, maintenance is required.
7. Pronounced scum line.
  - a. If pronounced scum line (say  $\geq 1/4"$  thick) is present above top cap, maintenance is required.



## Maintenance

Depending on the configuration of the particular system, maintenance personnel will be required to enter the vault to perform the maintenance.

**Important:** If vault entry is required, OSHA rules for confined space entry must be followed.

Filter cartridge replacement should occur during dry weather. It may be necessary to plug the filter inlet pipe if base flows is occurring.

Replacement cartridges can be delivered to the site or customers facility. Information concerning how to obtain the replacement cartridges is available from Contech Engineered Solutions.

**Warning:** In the case of a spill, the maintenance personnel should abort maintenance activities until the proper guidance is obtained. Notify the local hazard control agency and Contech Engineered Solutions immediately.

To conduct cartridge replacement and sediment removal maintenance:

1. If applicable, set up safety equipment to protect maintenance personnel and pedestrians from site hazards.
2. Visually inspect the external condition of the unit and take notes concerning defects/problems.
3. Open the doors (access portals) to the vault and allow the system to vent.
4. Without entering the vault, give the inside of the unit, including components, a general condition inspection.
5. Make notes about the external and internal condition of the vault. Give particular attention to recording the level of sediment build-up on the floor of the vault, in the forebay, and on top of the internal components.
6. Using appropriate equipment offload the replacement cartridges (up to 150 lbs. each) and set aside.
7. Remove used cartridges from the vault using one of the following methods:

### Method 1:

- A. This activity will require that maintenance personnel enter the vault to remove the cartridges from the under drain manifold and place them under the vault opening for lifting (removal). Disconnect each filter cartridge from the underdrain connector by rotating counterclockwise 1/4 of a turn. Roll the loose cartridge, on edge, to a convenient spot beneath the vault access.

Using appropriate hoisting equipment, attach a cable from the boom, crane, or tripod to the loose cartridge. Contact Contech Engineered Solutions for suggested attachment devices.

- B. Remove the used cartridges (up to 250 lbs. each) from the vault.



**Important:** Care must be used to avoid damaging the cartridges during removal and installation. The cost of repairing components damaged during maintenance will be the responsibility of the owner.

- C. Set the used cartridge aside or load onto the hauling truck.
- D. Continue steps a through c until all cartridges have been removed.

### Method 2:

- A. This activity will require that maintenance personnel enter the vault to remove the cartridges from the under drain manifold and place them under the vault opening for lifting (removal). Disconnect each filter cartridge from the underdrain connector by rotating counterclockwise 1/4 of a turn. Roll the loose cartridge, on edge, to a convenient spot beneath the vault access.
- B. Unscrew the cartridge cap.
- C. Remove the cartridge hood and float.
- D. At location under structure access, tip the cartridge on its side.
- E. Empty the cartridge onto the vault floor. Reassemble the empty cartridge.
- F. Set the empty, used cartridge aside or load onto the hauling truck.
- G. Continue steps a through e until all cartridges have been removed.

8. Remove accumulated sediment from the floor of the vault and from the forebay. This can most effectively be accomplished by use of a vacuum truck.
9. Once the sediments are removed, assess the condition of the vault and the condition of the connectors.
10. Using the vacuum truck boom, crane, or tripod, lower and install the new cartridges. Once again, take care not to damage connections.
11. Close and fasten the door.
12. Remove safety equipment.
13. Finally, dispose of the accumulated materials in accordance with applicable regulations. Make arrangements to return the used **empty** cartridges to Contech Engineered Solutions.

## Related Maintenance Activities - Performed on an as-needed basis

StormFilter units are often just one of many structures in a more comprehensive stormwater drainage and treatment system.

In order for maintenance of the StormFilter to be successful, it is imperative that all other components be properly maintained. The maintenance/repair of upstream facilities should be carried out prior to StormFilter maintenance activities.

In addition to considering upstream facilities, it is also important to correct any problems identified in the drainage area. Drainage area concerns may include: erosion problems, heavy oil loading, and discharges of inappropriate materials.

## Material Disposal

The accumulated sediment found in stormwater treatment and conveyance systems must be handled and disposed of in accordance with regulatory protocols. It is possible for sediments to contain measurable concentrations of heavy metals and organic chemicals (such as pesticides and petroleum products). Areas with the greatest potential for high pollutant loading include industrial areas and heavily traveled roads.

Sediments and water must be disposed of in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid wastes. This typically requires coordination with a local landfill for solid waste disposal. For liquid waste disposal a number of options are available including a municipal vacuum truck decant facility, local waste water treatment plant or on-site treatment and discharge.



# Inspection Report

Date: \_\_\_\_\_ Personnel: \_\_\_\_\_

Location: \_\_\_\_\_ System Size: \_\_\_\_\_ Months in Service: \_\_\_\_\_

System Type: Vault ☐ Cast-In-Place ☐ Linear Catch Basin ☐ Manhole ☐ Other: \_\_\_\_\_

Sediment Thickness in Forebay: \_\_\_\_\_ Date: \_\_\_\_\_

Sediment Depth on Vault Floor: \_\_\_\_\_

Sediment Depth on Cartridge Top(s): \_\_\_\_\_

Structural Damage: \_\_\_\_\_

Estimated Flow from Drainage Pipes (if available): \_\_\_\_\_

Cartridges Submerged: Yes ☐ No ☐ Depth of Standing Water: \_\_\_\_\_

StormFilter Maintenance Activities (check off if done and give description)

☐ Trash and Debris Removal: \_\_\_\_\_

☐ Minor Structural Repairs: \_\_\_\_\_

☐ Drainage Area Report \_\_\_\_\_

Excessive Oil Loading: Yes ☐ No ☐ Source: \_\_\_\_\_

Sediment Accumulation on Pavement: Yes ☐ No ☐ Source: \_\_\_\_\_

Erosion of Landscaped Areas: Yes ☐ No ☐ Source: \_\_\_\_\_

Items Needing Further Work: \_\_\_\_\_

Owners should contact the local public works department and inquire about how the department disposes of their street waste residuals.

Other Comments:

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Review the condition reports from the previous inspection visits.

# StormFilter Maintenance Report

Date: \_\_\_\_\_ Personnel: \_\_\_\_\_

Location: \_\_\_\_\_ System Size: \_\_\_\_\_

System Type: Vault ☐ Cast-In-Place ☐ Linear Catch Basin ☐ Manhole ☐ Other: \_\_\_\_\_

List Safety Procedures and Equipment Used: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## System Observations

Months in Service: \_\_\_\_\_

Oil in Forebay (if present): Yes ☐ No ☐

Sediment Depth in Forebay (if present): \_\_\_\_\_

Sediment Depth on Vault Floor: \_\_\_\_\_

Sediment Depth on Cartridge Top(s): \_\_\_\_\_

Structural Damage: \_\_\_\_\_

## Drainage Area Report

Excessive Oil Loading: Yes ☐ No ☐ Source: \_\_\_\_\_

Sediment Accumulation on Pavement: Yes ☐ No ☐ Source: \_\_\_\_\_

Erosion of Landscaped Areas: Yes ☐ No ☐ Source: \_\_\_\_\_

## StormFilter Cartridge Replacement Maintenance Activities

Remove Trash and Debris: Yes ☐ No ☐ Details: \_\_\_\_\_

Replace Cartridges: Yes ☐ No ☐ Details: \_\_\_\_\_

Sediment Removed: Yes ☐ No ☐ Details: \_\_\_\_\_

Quantity of Sediment Removed (estimate?): \_\_\_\_\_

Minor Structural Repairs: Yes ☐ No ☐ Details: \_\_\_\_\_

Residuals (debris, sediment) Disposal Methods: \_\_\_\_\_

Notes:

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#### Support

- Drawings and specifications are available at [www.conteches.com](http://www.conteches.com).
- Site-specific design support is available from our engineers.

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SECTION (\_\_\_\_)  
JELLYFISH® MEMBRANE FILTRATION SYSTEM  
STORMWATER QUALITY – MEMBRANE FILTRATION SYSTEM STANDARD SPECIFICATION

1. GENERAL

1.1. The Contractor shall furnish and install the Jellyfish, complete and operable as shown and as specified herein, in accordance with the requirements of the plans and contract documents. The water quality treatment flow shall be as determined and approved by the Engineer of Record. The Jellyfish system removes pollutants from stormwater runoff through the unit operations of sedimentation, floatation, and membrane filtration.

1.2. The Jellyfish shall be of a type that has been installed and in use for a minimum of five (5) consecutive years preceding the date of installation of the system. The manufacturer shall have been, during the same consecutive five (5) year period, engaged in the engineering design and production of systems deployed for the treatment of storm water runoff and which have a history of successful production, acceptable to the Engineer of Record and/or the approving Jurisdiction. The manufacturer of the Jellyfish shall be, without exception:

Contech Engineered Solutions  
9100 Centre Pointe Drive  
West Chester, OH, 45069  
Tel: 1 800 338 1122

1.3. Submittals: Shop drawings for the structure and performance are to be submitted with each order to the contractor. Contractor shall forward shop drawing submittal to the consulting engineer for approval. Shop drawings are to detail the structure precast concrete and call out or note the internals/components.

1.4. Product Substitutions: Any proposed product substitution to this specifications must be submitted for review and approved 10 days prior to project bid date by the Engineer of Record. Review package should include third party reviewed performance data for both flow rate and pollutant removal. Contractor to coordinate with the Engineer of Record any applicable modifications to the project estimates of cost, bonding amount determinations, plan check fees for changes to approved documents, and/or any other regulatory requirements resulting from the product substitution.

1.5. American Society for Testing and Materials (ASTM) Reference Specifications:

1.5.1. ASTM C891: Standard Specification for Installation of Underground Precast Concrete Utility Structures

1.5.2. ASTM C478: Standard Specification for Precast Reinforced Concrete Manhole Sections

1.5.3. ASTM C858: Standard Specification of Underground Precast Concrete Utility Structures

1.5.4.ASTM C857: Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures

1.5.5.ASTM C990: Standard Specification for Joints for Concrete Manholes Using Preformed Flexible Joint Sealants

1.5.6.ASTM D4101: Standard Specification for Copolymer steps construction

1.5.7.ASTM D4097: Standard Specification for Contact-Molded Glass-Fiber-Reinforced Thermoset Resin Corrosion-Resistant

## 2. MATERIALS

2.1. Precast Concrete Structure: The device shall be an all concrete structure (including risers), constructed from precast concrete riser and slab components or monolithic precast structure(s). Precast concrete vault shall be provided according to ASTM C857 and C858 and manholes shall be provided according to ASTM C478. Both structure types shall be installed to conform to ASTM C891 and to any required state highway, municipal or local specifications; whichever is more stringent. All precast concrete components shall be manufactured to a minimum live load of HS-20 truck loading or greater based on local regulatory specifications, unless otherwise modified or specified by the design engineer.

2.2. Gaskets: Gaskets and/or sealants shall be used to seal between concrete joints. Joints shall be sealed with preformed joint sealing compound conforming to ASTM C990.

2.3. Internal Components:

2.3.1. Cartridge Deck: The deck insert shall be bolted and sealed inside the precast concrete chamber. The insert shall serve as: (a) a horizontal divider between the lower treatment zone and the upper treated effluent zone; (b) a deck for attachment of filter cartridges such that the membrane filter elements of each cartridge extend into the lower treatment zone; (c) a platform for maintenance workers to service the filter cartridges; (c) a conduit for conveyance of treated water to the effluent pipe.

2.3.1.1. Fiberglass: In cylindrical configurations, the fiberglass portions of the filter device shall be constructed in accordance with the following standard: ASTM D4097: Contact Molded Glass Fiber Reinforced Chemical Resistant Tanks.

2.3.1.2. Aluminum: In rectangular configurations, the aluminum cartridge deck shall be ¼" thick, 5052-H32 Aluminum with all welds to be 100% continuous waterproof weld using 5356 filler.

2.3.2. Membrane Filter Cartridges: Filter cartridges shall be comprised of reusable cylindrical membrane filter elements connected to a perforated head plate. The number of membrane filter elements per cartridge shall be a minimum of eleven 2.75-inch (70-mm) or greater diameter elements. The length of each filter element

shall be a minimum 15 inches (381 mm). Each cartridge shall be fitted into the cartridge deck by insertion into a cartridge receptacle that is permanently mounted into the cartridge deck. Each cartridge shall be secured by a cartridge lid that is threaded onto the receptacle, or similar mechanism to secure the cartridge into the deck. The maximum treatment flow rate of a filter cartridge shall be controlled by an orifice in the cartridge lid, or on the individual cartridge itself, and based on a design flux rate (surface loading rate) determined by the maximum treatment flow rate per unit of filtration membrane surface area. The maximum design flux rate shall be 0.21 gpm/ft<sup>2</sup> (0.142 lps/m<sup>2</sup>).

- 2.3.3. Each membrane filter cartridge shall allow for manual installation and removal. Each filter cartridge shall contain no less than 7 ft<sup>2</sup> of surface area per inch of length and have filtration membrane surface area and dry installation weight as follows (if length of filter cartridge is between those listed below, the surface area and weight shall be proportionate to the next length shorter and next length longer as shown below):

Filter Cartridge Length (in)	Minimum Filtration Membrane Surface Area (ft <sup>2</sup> / m <sup>2</sup> )	Maximum Filter Cartridge Dry Weight (lbs / kg)
15 / 381	106 / 9.8	10.0 / 4.5
27 / 686	190 / 17.7	14.5 / 6.6
40 / 1016	282 / 26.2	19.5 / 8.9
54 / 1372	381 / 35.4	25.0 / 11.4

- 2.3.4. Backwashing Cartridges: The filter device shall have a weir extending above the cartridge deck, or other mechanism, that encloses the high flow rate filter cartridges when placed in their respective cartridge receptacles within the cartridge deck. The weir, or other mechanism, shall collect a pool of filtered water during inflow events that backwashes the high flow rate cartridges when the inflow event subsides. All filter cartridges and membranes shall be reusable and allow for the use of filtration membrane rinsing procedures to restore flow capacity and sediment capacity; extending cartridge service life.

- 2.3.5. Maintenance Access to Captured Pollutants: The filter device shall contain an opening(s) that provides maintenance access for removal of accumulated floatable pollutants and sediment, removal of and replacement of filter cartridges, cleaning of the sump, and rinsing of the deck. Access shall have a minimum clear height over all of the filter cartridges (length of cartridge + 6 inches), or be accessible by a hatch or other mechanism that provides vertical clear space over all of the filter cartridges such that the cartridges can be lifted straight vertically out of the receptacles and deck for the entire length of the cartridge.

- 2.3.6. Baffle: The filter device shall provide a baffle that extends from the underside of the cartridge deck to a minimum length equal to the length of the membrane filter elements. The baffle shall serve to protect the membrane filter elements from

contamination by floatables and coarse sediment. The baffle shall be flexible and continuous in cylindrical configurations, and shall be a straight concrete or aluminum wall in rectangular configurations.

2.3.7.Sump: The device shall include a minimum 24 inches (610 mm) of sump below the bottom of the cartridges for sediment accumulation, unless otherwise specified by the design engineer. Depths less than 24 inches may have an impact on the total performance and/or longevity between cartridge maintenance/replacement of the device.

2.3.8.Steps: Steps shall be constructed according to ASTM D4101 of copolymer polypropylene, and be driven into preformed or pre-drilled holes after the concrete has cured, installed to conform to applicable sections of state, provincial and municipal building codes, highway, municipal or local specifications for the construction of such devices.

2.3.9.Double-Wall Containment of Hydrocarbons: The cylindrical precast concrete device shall provide double-wall containment for hydrocarbon spill capture by a combined means of an inner wall of fiberglass, to a minimum depth of 12 inches (305 mm) below the cartridge deck, and the precast vessel wall.

2.4.Bend Structure: The device shall be able to be used as a bend structure with minimum angles between inlet and outlet pipes of 90-degrees or less in the stormwater conveyance system.

2.5.Frame and Cover: Frame and covers must be manufactured from cast-iron or other composite material tested to withstand H-20 or greater design loads, and as approved by the local regulatory body. Frames and covers must be embossed with the Contech or the Jellyfish brand name.

2.6.Doors and Hatches: If provided shall meet designated loading requirements or at a minimum for incidental vehicular traffic.

### 3. PERFORMANCE

3.1.Function: The Jellyfish filter shall function to remove pollutants by the following unit treatment processes; sedimentation, floatation, and membrane filtration.

3.2.Pollutants: The Jellyfish filter shall remove oil, debris, trash, coarse and fine particulates, particulate-bound pollutants, metals and nutrients from stormwater during runoff events.

3.3.Bypass: The Jellyfish filter shall typically utilize an external bypass to divert excessive flows. Where an internal bypass is utilized, systems shall be equipped with a floatables baffle, and bypass water shall not pass through the treatment sump or cartridge filtration zone.

3.4.Treatment Flux Rate (Surface Loading Rate): The Jellyfish filter shall treat 100% of the required water quality treatment flow based on a maximum design flux rate (surface

loading rate) across the membrane filter cartridges not to exceed 0.21 gpm/ft<sup>2</sup> (0.142 lps/m<sup>2</sup>).

3.5. Field Testing: At a minimum, the Jellyfish filter shall have been field tested and verified with a minimum 25 qualifying storm events and field monitoring conducted according to the TARP Tier II or TAPE field test protocol, and have received NJCAT verification.

3.6. Suspended Solids Removal: The Jellyfish filter shall have demonstrated a minimum median TSS removal efficiency of 85% and a minimum median SSC removal efficiency of 95%.

3.7. Fine Particle Removal: The Jellyfish filter shall have demonstrated the ability to capture fine particles as indicated by a minimum median removal efficiency of 75% for the particle fraction less than 25 microns, an effluent d<sub>50</sub> of 15 microns or lower for all monitored storm events, and an effluent turbidity of 15 NTUs or lower.

3.8. Nutrient (Total Phosphorus & Total Nitrogen) Removal: The Jellyfish filter shall have demonstrated a minimum median Total Phosphorus removal of 55%, and a minimum median Total Nitrogen removal of 50%.

3.9. Metals (Total Zinc & Total Copper) Removal: The Jellyfish filter shall have demonstrated a minimum median Total Zinc removal of 50%, and a minimum median Total Copper removal of 75%.

#### 4. EXECUTION

4.1. Handling and Storage: Prevent damage to materials during storage and handling.

4.2. Precast Concrete Structure: The installation of the precast concrete device should conform to ASTM C891 and to any state highway, municipal or local specification for the installation of underground precast concrete structures, whichever is more stringent. Selected sections of a general specification that are applicable are summarized below.

4.2.1. The precast concrete device is installed in sections in the following sequence:

- aggregate base
- base slab
- treatment chamber and cartridge deck riser section(s)
- bypass section
- connect inlet and outlet pipes
- concrete riser section(s) and/or transition slab (if required)
- maintenance riser section(s) (if required)
- frame and access cover

4.2.2. The precast base should be placed level at the specified grade. The entire base should be in contact with the underlying compacted granular material. Subsequent sections, complete with joint seals, should be installed in accordance with Contech's recommendations.

- 4.2.3. Adjustment of the Jellyfish filter can be performed by lifting the upper sections free of the excavated area, re-leveling the base, and re-installing the sections. Damaged sections and gaskets should be repaired or replaced as necessary to restore original condition and seals. Once the Jellyfish filter has been constructed, any/all lift holes must be plugged with mortar or non-shrink grout.
- 4.3. Inlet and Outlet Pipes: Inlet and outlet pipes should be securely set into the device using approved pipe seals (flexible boot connections, where applicable), and such that any pipe intrusion into the device does not impact the device functionality.
- 4.4. Frame and Cover Installation: Adjustment units (e.g. grade rings) should be installed to set the frame and cover at the required elevation. The adjustment units should be laid in a full bed of mortar with successive units being joined using sealant recommended by Contech. Frames for the cover should be set in a full bed of mortar at the elevation specified.
- 4.5. In some instances the Maintenance Access Wall, if provided, shall require an extension attachment and sealing to the precast wall and cartridge deck at the job site, rather than at the precast facility. In this instance, installation of these components shall be performed according to instructions provided by Contech.

## 5. ACTIVATION, INSPECTION AND MAINTENANCE

- 5.1. Filter cartridges shall be installed in the cartridge deck in accordance with the manufacturer's guidelines and recommendations. Contractor to contact the manufacturer to schedule cartridge delivery and review procedures/requirements to be completed to the device prior to installation of the cartridges and activation of the system.
- 5.2. Manufacturer shall coordinate delivery of filter cartridges and other internal components with contractor. Filter cartridges shall be installed after site is stabilized and/or unit is isolated from construction influent and ready to accept cartridges. Unit is ready to accept cartridges after it has been cleaned out and any standing water, debris, and other materials have been removed. Contractor shall take appropriate action to protect the filter cartridge receptacles and filter cartridges from damage during construction, and in accordance with the manufacturer's recommendations and guidance. For systems with cartridges installed prior to full site stabilization, the contractor shall plug inlet and outlet pipes to prevent stormwater and other influent from entering the device. Plugs are to be removed once the site is stabilized and unit is ready to receive stormwater runoff.
- 5.3. Durability of membranes are subject to good handling practices during inspection and maintenance (removal, rinsing, and reinsertion) events, and site specific conditions that may have heavier or lighter loading onto the cartridges, and pollutant variability that may impact the membrane structural integrity. Membrane maintenance and replacement shall be in accordance with Contech's recommendations.

- 5.4. Inspection; which includes trash and floatables collection, sediment depth determination, and visible determination of backwash pool depth; shall be easily conducted from grade (outside the structure).
- 5.5. Manual rinsing of the reusable filter cartridges shall promote restoration of the flow capacity and sediment capacity of the filter cartridges, extending cartridge service life.
- 5.6. The filter device shall have a minimum 12 inches (610 mm) of sediment storage depth, and a minimum of 12 inches between the top of the sediment storage and bottom of the filter cartridge tentacles, unless otherwise specified by the design engineer. Variances may have an impact on the total performance and/or longevity between cartridge maintenance/replacement of the device.
- 5.7. Sediment removal from the filter treatment device shall be able to be conducted using a standard maintenance truck and vacuum apparatus, and a minimum one point of entry to the sump that is unobstructed by filter cartridges.
- 5.8. Maintenance access shall have a minimum clear height over all of the filter cartridges (length of cartridge + 6 inches), or be accessible by a hatch or other mechanism that provides vertical clear space over all of the filter cartridges such that the cartridges can be lifted straight vertically out of the receptacles and deck for the entire length of the cartridge.
- 5.9. After construction and installation, and during operation, the device shall be inspected and cleaned as necessary based on Contech's recommended inspection and maintenance guidelines and the local regulatory agency/body.
- 5.10. When replacement membrane filter elements and/or other parts are required, only membrane filter elements and parts approved by Contech for use with the Jellyfish filter shall be installed.
- 5.11. Filter cartridges shall be able to be maintained without the use of additional lifting equipment.
- 5.12. Contech shall provide an Owner's Manual upon request.

END OF SECTION