Hydrodynamic Separator Operation and Maintenance

Standard Operating Procedures

Prepared for:

Bay Area Stormwater Management Agencies Association

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF APPENDICES

1.0 PURPOSE AND APPLICABILITY

The purpose of this Standard Operating Procedure is to detail all necessary steps for inspecting and cleaning Permittee-owned and operated hydrodynamic separators (HDSs) to ensure that they are operated at a level necessary to maintain their designation as a full-capture as required by the State Water Resources Control Board (State Water Board).

2.0 DEFINITIONS AND ACRONYMS

2.1 ACRONYMS

HDS: Hydrodynamic Separator
OSHA: Occupational Safety and Health Administration
POTW: Publicly Owned Treatment Works
PPE: Personal Protection Equipment
SOP: Standard Operating Procedures

2.2 DEFINITIONS

Debris: Natural, not man-made, material, including vegetation and sediment. This does not include trash.
Full- Capture Device: A single device or series of devices that can trap all particles retained by a 5 mm mesh screen, and has a treatment capacity that exceeds the peak flow rate resulting from a one-year, one-hour storm in the subdrainage area.
Hydrodynamic Separator: A device which uses the tangential forces created by the incoming flow of water to separate trash, debris, oil and other pollutants from stormwater.
Litter: As defined by California Government Code Section 68055.1(g), litter means all improperly discarded waste material, including, but not limited to, convenience food, beverage, and other product packages or containers constructed of steel, aluminum, glass, paper, plastic, and other natural and synthetic materials, thrown or deposited on the lands and waters of the state, but not including the properly discarded waste of the primary processing of agriculture, mining, logging, sawmilling, or manufacturing (State of California 2011).
Stormwater: Runoff from roofs, roads and other surfaces that is generated during rainfall events and snow melt; and flows into a stormwater conveyance system.
Stormwater Conveyance System: Any pipe, ditch or gully, or system of pipes, ditches, or gullies, that is owned or operated by a government entity and used for collecting and conveying stormwater.

Trash: Man-made litter (as defined by California Government Code Section 68055.1(g) that cannot pass through a 5 mm mesh screen. Litter does not include sediments, sand vegetation, oil and grease, and exotic species.

3.0 HDS System Operation

A hydrodynamic separator (HDS), also known as a vortex separator or swirl concentrator (Figure 1) is a non-mechanical, self-operating system that uses the physics of flowing water to remove pollutants from stormwater. These systems are manufactured by several different vendors, each with their own design. All HDS systems contain large cylindrical separation chambers where stormwater enters creating a swirling vortex to separate floatables (e.g., trash, vegetation, and oil) and settleable particles (e.g., sediment) from stormwater. The velocity is highest at the outer edge of the vortex, keeping the floatables from clogging the holes and allowing the stormwater to leave the cylinder. HDS systems are not effective for removing very fine solids or dissolved pollutants (USEPA 1999).

The floatables and sediment are cleaned out with a vacuum truck or portable vacuum system. Alternatively, HDS systems can be fitted with a large basket that collects settleable particles, which can be lifted using a boom truck and emptied into a container for disposal. HDS systems come in a large variety of types and sizes, and may be scaled up to handle peak flows of several hundred cubic feet per second.

Depending on the size and manufacturer of the HDS system, access may occur through two manhole access covers – one which allows inspection (and cleaning) of the separation chamber and storage sump, and the other which allows inspection (and cleaning) of solids captured and retained outside the separation screen. HDS systems that are deep usually have a single access cover which allows both storage sump cleaning and access outside the separation screen.

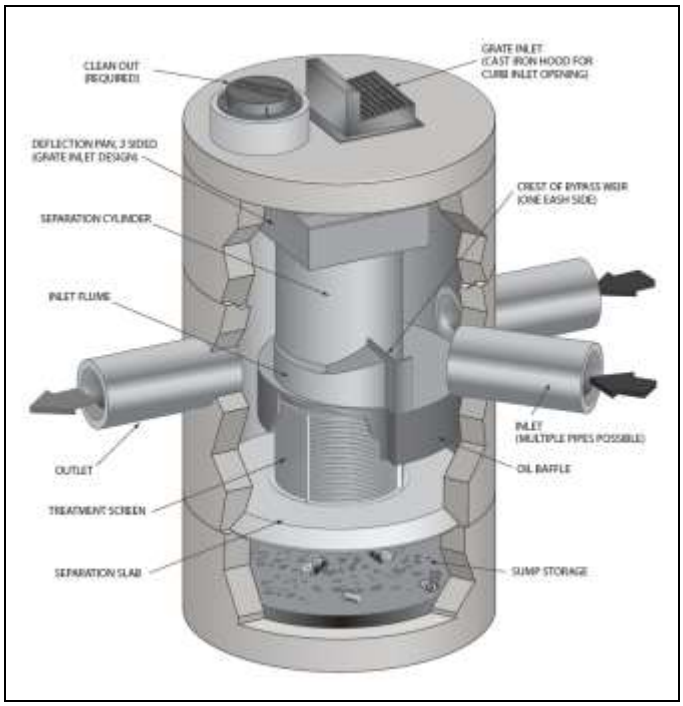

Figure 1. Internal components of Contech CDS® hydrodynamic separator
(Source: http://www.conteches.com/products/stormwater-management/treatment)

Full capture systems certified by the State Water Board are considered certified for use. The most common HDS system installed is the Continuous Deflective Separation (CDS) unit manufactured by Contech Engineered Solutions.

4.0 PERSONNEL QUALIFICATIONS/RESPONSIBILITIES

Inspection
At a minimum, one person with experience inspecting HDS systems should perform the inspection. Supervision may be required for inexperienced field staff to inspect the device.

Cleaning
At a minimum, two people with experience cleaning HDS systems should perform the cleaning. Supervision may be required for inexperienced field staff to clean the device.

In most cases, it is not necessary to enter the HDS system since cleaning can be done from street or parking lot level. Anyone who enters a HDS must have attended OSHA Confined Space Entry training and have current certification (OSHA 1999).

5.0 EQUIPMENT AND SUPPLIES

The following equipment and supplies may be needed when inspecting or cleaning a HDS system:

Inspection

- Arrow boards or channelizing devices (e.g., drums, cones, tabular markers, vertical panels, etc.) to visually alert pedestrian and vehicular traffic;
- Personal Protection Equipment (PPE) including high visibility safety apparel;
- Broom to clean materials off and around access cover(s);
- Tool to remove access cover;
- Calibrated dip stick, tape measure or other measuring instrument to measure accumulated solids within the HDS storage sump;
- Trash Full Capture Device Inspection and Cleaning Field Log.

Additional Equipment for Cleaning

- Empty vacuum truck or portable vacuum system with holding tank free of liquid and solids;
- Portable water pump (e.g., trash pump or diaphragm pump) to directly pump the top water fraction from HDS;
- Sand bags, or similar device, to block HDS inlet pipe(s) and outlet pipe (only used if HDS system will not drain);
- Pressure washer to remove or loosen solids from HDS components;
- Scraping tool with long handle to remove trash and debris from HDS separation screen;
- Trash Full Capture Device Inspection and Cleaning Field Log.

6.0 PROCEDURES

6.1 INSPECTION

Routine inspection is necessary to ensure proper HDS system performance and ease of maintenance. The rate as which solids (e.g., debris and trash) accumulate within the HDS system is related to the number of storm events with runoff. To determine the appropriate cleaning frequency, it is necessary to perform regular inspections. HDS systems should be inspected according to the frequency identified in your municipality's Operation and Maintenance (O&M) Verification Program.

It is important to document inspection results for each HDS system because it is required by the MRP Provision C.10.b.i.b. Additionally, information collected during inspection may lead to changing inspection and cleaning frequencies. Several independent variables (e.g., rainfall frequency, storm events with runoff, trash generation rates, and presence of deciduous street trees) influence the accumulation of debris and trash within HDS systems. Inspection frequencies may change as variables change over time.

Visual inspection of HDS system components is the primary method to determine the appropriate cleaning frequency and if the system is working properly. The MRP requires that all trash full capture devices be inspected and maintained at least once per year. Devices in high or very high trash generation areas devices must be inspected twice a year with inspections spaced at least three months or more apart. The inspection frequency can be reduced to once per year if found excessive after two inspections. Maintenance frequencies must be increased if the device is determined to have a plugged or blinded screen or if HDS storage sump is greater than 50 percent "full" of debris and/or trash during a maintenance event. The maintenance frequency must be increased so that the HDS system is neither plugged nor more than half full of debris and/or trash at the next maintenance event. Due to the requirements for changing frequencies, it is important to document the current inspection frequency for each HDS system.

HDS system cleaning should be initiated when floatables exceed two inches within the diversion box, solids are obstructing inlet pipe(s), outlet pipe and separation screen, solids are present outside the separation screen, and significant amounts of floatables are present in the separation chamber. As part of the inspection process, it is necessary to measure the amount of accumulated solids within the HDS storage sump. It is recommended that the HDS system be cleaned when accumulated solids exceed 50 percent of the storage sump capacity.

Any observation of malfunctioning or defective HDS components will require repair.

The following procedures should be conducted when inspecting the HDS system. A flow chart showing the HDS inspection process is provided as **Figure B-1 in Appendix B**.

PRE-INSPECTION

To determine if the amount of accumulated solids exceeds 50 percent of the storage sump capacity, the following two values should be determined before conducting the inspection: 1) the storage sump depth and 2) distance from rim

to bottom of sump. The values can be determined from the as-built drawings prepared for the HDS system. Field staff will be provided both values prior to conducting inspections.

An example as-built drawing is provided as **Figure 2** below to demonstrate where to locate the required values.

Rim Elevation = 100.84 feet (On As-built drawing)
Outside Bottom Elevation = 77.91 feet (On As-built drawing)
Standard Vault Thickness= 1 foot (Not on As-built drawing)

D_{Total} = Distance from Rim to Bottom of Sump (Calculated)
D_{Total} = 101 -78 -1 = **22 feet**

D_{Sump} = Storage Sump Depth
D_{Sump} = **3 feet** (On As-built drawing)

$D_{50\%}$ = Distance from Rim to Half of the Sump Storage Depth(Calculated)
D_{Total} = 22 –(3/2) = **20.5 feet**

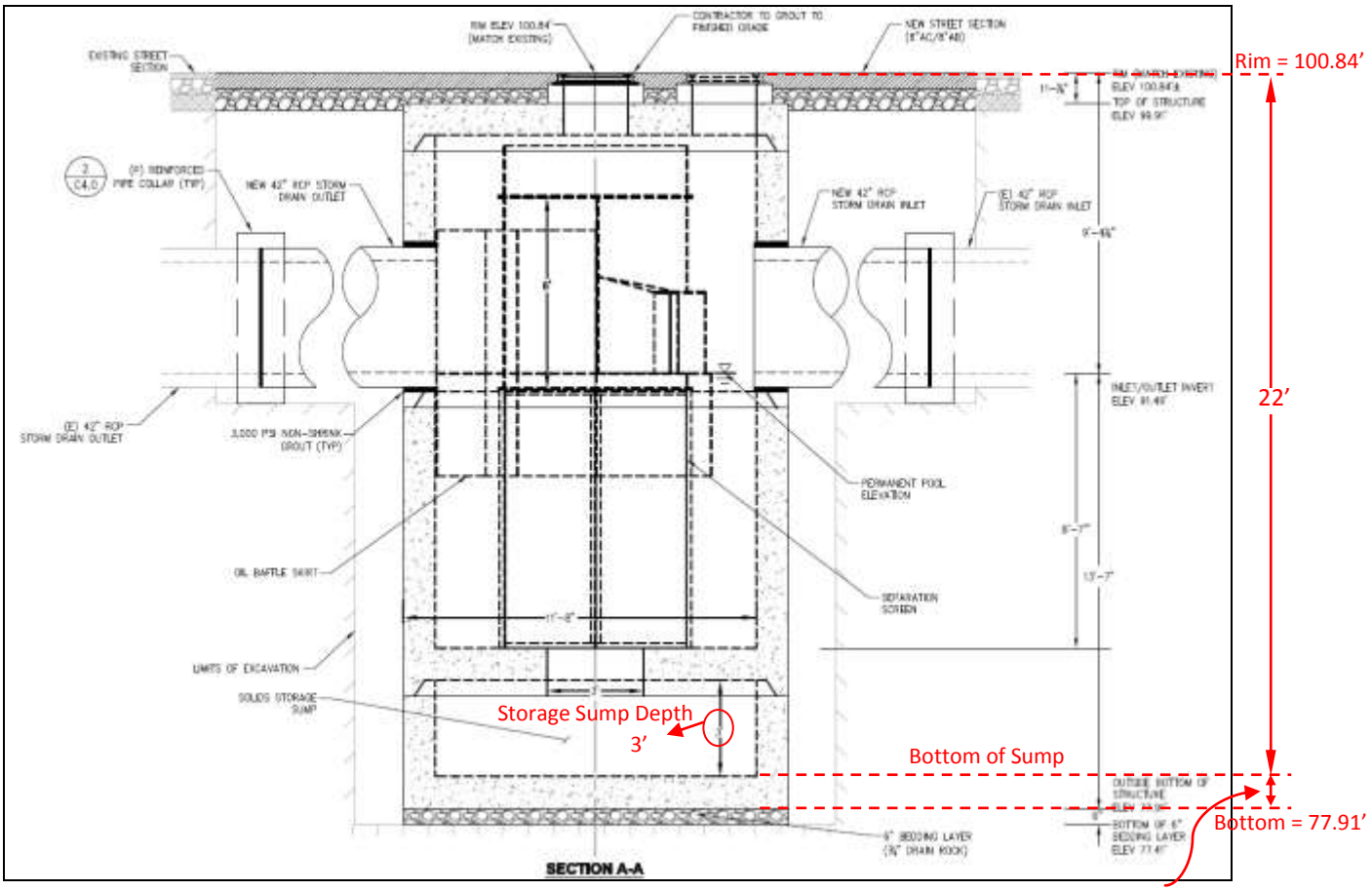

Figure 2. Plan view of HDS unit with measurements Assume 1'

These values are used with the measured distance from the rim to the top of the accumulated solids in the storage sump to determine if cleaning is required. Values will be provided to municipal staff via a reference sheet or inscribed on the unit.

INSPECTION

1) Wear appropriate PPE.

2) If HDS access cover(s) are within an active street, road or parking lot where vehicle traffic is present, set up work zone and traffic control devices per the *Manual on Uniform Traffic Control Devices*, as needed.

3) Prior to opening the HDS access cover(s), remove or sweep away all material (i.e., debris and/or trash) that is present on top or in close proximity to the HDS access cover(s). Leave material in street or gutter so it may be removed by street sweeping practices.

4) Open the access cover(s). If the cover(s) can be held open, ensure that they are locked. If not, remove the cover(s) and set aside in a safe area.

5) Look inside the access cover(s). If the HDS system has a diversion box, visually inspect to determine the presence of floatables. Cleaning should occur if the floatable layer exceeds two (2) inches in depth or interferes with normal operation of the system.

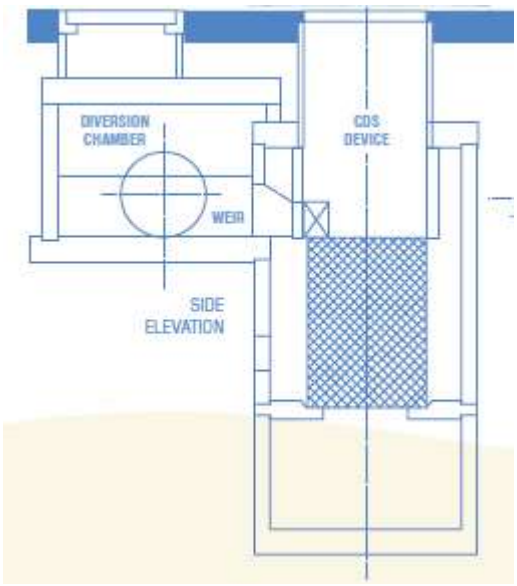

Figure 3. CDS (picture from CDS Off-Line Units brochure)

6) Visually inspect the inlet flume, oil baffle, separation chamber and separation cylinder to determine working order (see Figure 1). Which components are visible for inspection depends on the orientation of the manhole over the system. If any components are observed to be malfunctioning or defective, document and notify appropriate municipal staff. Contact the manufacturer regarding next steps.

7) Visually inspect the separation chamber to determine the amount of floatables. Cleaning should occur if the floatable layer exceeds one (1) foot in depth.

8) Visually inspect the inlet pipe(s), outlet pipes and separation screen to determine obstructions (see Figure 1). Which components are visible for inspection depends on the orientation of the manhole over the system. Additionally, inspect the area surrounding the separation screen to determine the amount of solids captured and retained outside the screen. Cleaning should occur if the inlet pipe(s), outlet pipe and separation screen are determined to be obstructed, or if solids are present outside the separation screen.

9) Measure the amount of accumulated solids within the storage sump using a calibrated dip stick, tape measure or other measuring instrument. This is accomplished by measuring the distance from the finished grade down to the top of the accumulated solids. To avoid underestimating the level of solids in the storage sump, it is highly recommended that the measuring device be carefully lowered to the top of the accumulated solids. It is not recommended that the distance to the bottom of the accumulated solids be measured since the solids are likely to be highly compacted resulting in measuring a "false bottom" of the sump floor.

10) The distance to the top of the accumulated solids ($D_{Measure}$) is used with the values obtained from the as-built drawings to determine if the height of accumulated solids off the bottom of the sump floor exceeds 50 percent of the total height of the storage sump. An example as-built drawing is provided as **Figure 2**. Cleaning should occur if the percent of accumulated solids is determined to exceed 50 percent.

    The following values from the as-built drawings are required to calculate the percent of accumulated solids in the storage sump. The *Pre-Inspection* procedures section details how to obtain these values.

    - Storage Sump Depth (D_{Sump})
    - Distance from Rim to Bottom of Sump (D_{Total})

    The Height of Accumulated Solids in the Storage Sump:
    $D_{Solids} = D_{Total} - D_{Measure}$
    The Percentage of Storage Sump full of Accumulated Solids:
    $D_{Solids} / D_{Sump} * 100$

    An example calculation is provided below:

D_{Total} = Distance from Rim to Bottom of Sump (Calculated) = **22 feet**

$D_{Measure}$ = Distance to Top of Accumulated Solids in Storage Sump (Measured) = **19.5 feet**

D_{Solids} = Height of Accumulated Solids in Storage Sump (Calculated) = 22 -19.5 = **2.5 feet**

D_{Sump} = Storage Sump Depth = **3 feet** (On As-built drawing)

Percentage of Storage Sump full of Accumulated Solids = 2.5 /3 X 100 % = **83 %**

result > 50% therefore **HDS system is in need of cleaning**

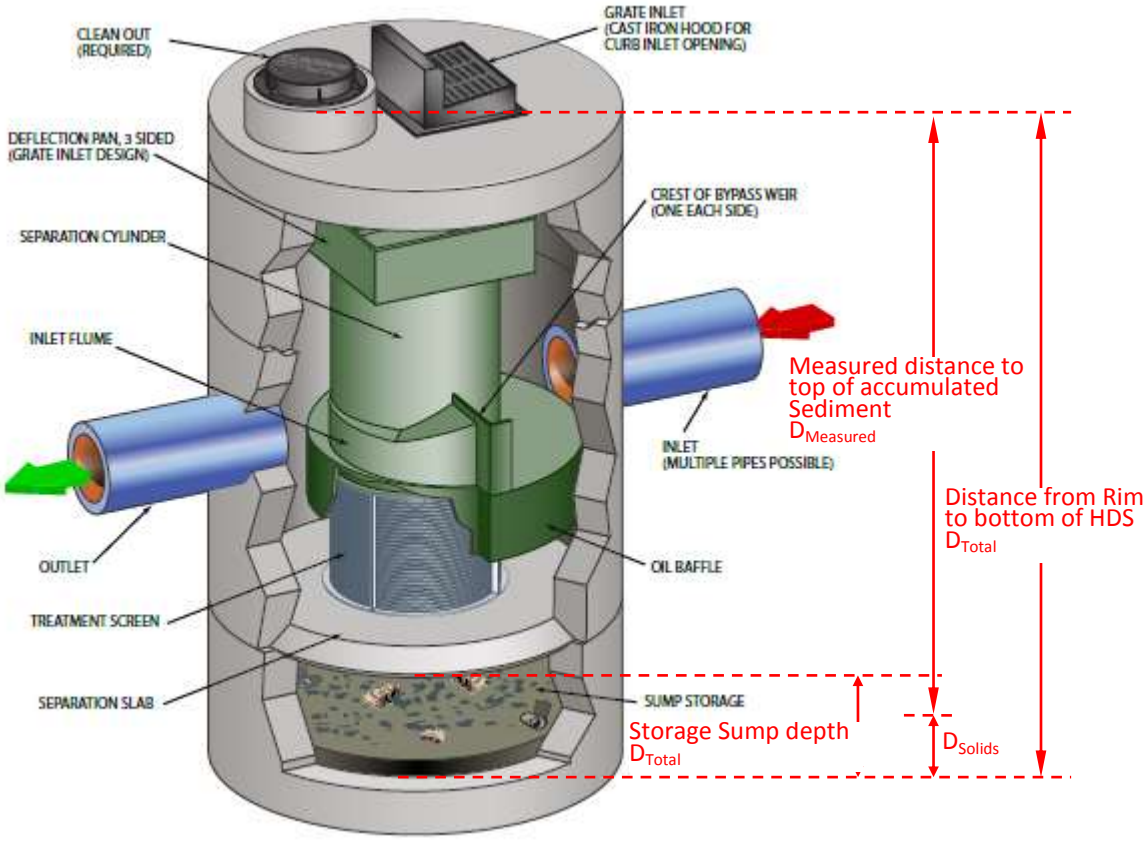

Figure 4 Picture from Contech Hydrodynamic Separation Solution Guide

11) A "sludge judge" may also be used to measure the amount of accumulated solids within the storage sump. This is accomplished by slowly lowering the sludge judge to the bottom of the storage sump. It must be lowered slowly and not plunged to the bottom. Plunging the sludge judge will result in an inaccurate reading and possible damage to the bottom of the float valve.

When the bottom of the storage sump has been reached, tug slightly on the rope as you begin to raise the device. This will set the float valve and trap the column of accumulated solids and water in the device. Raise the device to the surface and note the depth of accumulated solids within the column. Cleaning should occur if the amount of accumulated solids is determined to exceed 50 percent of the storage sump capacity.

12) During the inspection, look for any evidence of vector infestation.

13) Document the inspection using the Trash Full Capture Device Inspection and Cleaning Field Log. If any HDS components are in need of cleaning, schedule a time to clean the HDS system. The Trash Full Capture Device Inspection and Cleaning Field Log is provided in **Appendix A**. Documentation requirements are detailed in Section 6.4.

14) Replace the device's access cover(s).

15) Remove any traffic control equipment that may have been setup.

16) Submit Trash Full Capture Device Inspection and Cleaning Field Logs to appropriate staff when inspections are completed.

6.2 CLEANING

Cleaning frequency will depend on how fast solids are accumulating within various components of the HDS system. When cleaning is needed, it should be conducted during dry weather when no flows are entering the system. The use of a vacuum truck or portable vacuum system is the most effective method of removing accumulated solids (e.g., debris and trash) from the HDS system.

It is highly recommended that the HDS system be cleaned at the end of the wet season due to the presence of organic material within the system and its potential odor generation and decomposition during the summer months. Cleaning will also prevent the discharge of water of poor quality to the stormwater conveyance system. A routine cleaning will also prevent the compaction of accumulated solids over a long period of time, making solids removal more difficult and time consuming.

The procedures described below should be conducted when cleaning the HDS system. A flow chart showing the HDS cleaning process is provided as **Figure B-2**

in Appendix B. Observed field conditions and corrective actions implemented as a result of inspection are provided in **Figure B-3 in Appendix B**.

1) Wear appropriate PPE.

2) If HDS access cover(s) are within an active street, road or parking lot where vehicle traffic is present, set up work zone and traffic control devices per the *Manual on Uniform Traffic Control Devices* as needed.

3) Prior to opening the HDS access cover(s), remove or sweep away all material (e.g., debris and/or trash) that is present on top or in close proximity to the HDS access cover(s). Leave material in street or gutter so it may be removed by street sweeping practices.

4) Open the access cover(s). If the cover(s) can be held open, ensure that they are locked. If not, remove the cover(s) and set aside in a safe area.

5) If cleaning requires only the removal of floatables from the separation chamber, manually remove all floatables from the top water fraction. A vacuum truck, portable vacuum system or dip net (e.g., pool skimming tool) may be used.

6) All water should be removed from the HDS system prior to removing accumulated solids from the storage sump. This may be accomplished by:
   - Using a portable water pump (e.g., trash pump or diaphragm pump) to directly pump the top water fraction within the system to a nearby sanitary sewer manhole. This is the preferred method to remove water. It is <u>not recommended</u> that water pumped from the system be placed into the stormwater conveyance system; **OR**
   - Removing the top water fraction with vacuum tube or hose. It is recommended that water be transported to a sanitary sewer manhole or POTW for disposal. Repeat as necessary to remove all water from the system. It is <u>not</u> <u>recommended</u> that water pumped from the HDS system be placed into the stormwater conveyance system.

7) During the process of removing the top water fraction, it is also possible to remove water contained in the inlet pipe(s) and outlet pipe connected to the HDS system. This may happen when water is seeping into the inlet pipe(s) from groundwater or other sources and/or the outlet pipe is directly discharging below grade to a water body. In both cases, physical access into the HDS system is required to prevent (i.e., block) water from entering these entry points. The use of sand bags is the preferred method to block inlet pipe(s) and the outlet pipe. Other equivalent flow obstruction devices may be used. The inlet pipe also includes the pipe flowing into the diversion box (if applicable). OSHA confined space entry procedures must be followed if physical access is required. Personnel conducting cleanouts must have a current confined space training certificate. Once all inlet pipe(s) and the outlet pipe are blocked, remove all water from the HDS system.

8) If solids are present on the separation screen, manually remove them with a scraping tool or pressure washer. All solids manually removed from the separation screen should be removed with a vacuum tube or hose. If solids are present outside the separation screen area, remove them with a vacuum tube or hose.

9) After removing all solids outside the separation screen area, lower a vacuum tube or hose into the storage sump. Completely remove all solids within the storage sump. If the storage sump is large and deep, power wash the inside of the storage sump to loosen solids located in hard to reach places. This will allow the majority of solids to migrate to the center of the sump allowing easier removal by the vacuum tube or hose. **Note:** the dimensions of the storage sump are larger than the separation cylinder that provides access to the sump. Equipment that can power wash the entire sump area should be chosen.



10) Once the HDS cleaning process is complete, replace the access cover(s) and ensure that it is securely in place to prevent runoff from entering the HDS system.

11) Remove any traffic control equipment that may have been setup.

12) Prior to departing the HDS cleanout site, document the cleaning using the Trash Full Capture Device Inspection and Cleaning Field Log. It is provided in **Appendix A**. Documentation requirements are detailed in Section 6.4. Submit Field Log to appropriate personnel when activities are completed.

6.3 SOLIDS DRYING AND DISPOSAL

1) Transport all collected solids to a designated facility for drying. The drying area must be in a secure area, flat in nature and within an area where leachate may drain to the sanitary sewer. At a minimum, the designated drying area should be at least 20 feet by 20 feet. Good housekeeping practices should be implemented.

2) When arriving at the designated drying area, remove all solids from the vacuum truck or portable vacuum system and place within the area. Allow solids to dry for a minimum of 96 hours. During the wet season, solids should be managed to prevent exposure to wind and rain.

3) Once the solids are dry, dispose in accordance with all applicable regulations. Common practice is to dispose solids in the same manner as sediments collected from street sweeping operations, storm drain cleanouts and deep sump manhole cleanouts unless they are contaminated with hazardous materials or hazardous waste.

4) Individual agencies may require additional data collection of the amount and/or type of trash collected. Prior to disposing solids, fill-out any additional agency forms, as needed.

6.4 DOCUMENTATION

The MRP Provision C.10.b.i.b requires Permittees to retain device specific maintenance records that include, at a minimum:

- Date(s) of maintenance,
- Capacity condition of the device at the time of maintenance (full and overflowing or with storage capacity remaining), and
- Special problems such as
    - Flooding,
    - Screen blinding or plugging from leaves, plastic bags, or other debris causing overflow,
    - Damage reducing function
    - Other negative conditions

MRP Provision C.10.f.iii requires certification that each full trash capture system is operated and maintained to meet full trash capture system requirements in the Annual Report (due September 30th each year). You also must provide a description of any device that did not meet full trash capture system requirements (e.g., due to plugging or overflowing) and any corrective actions taken.

Additional inspection and maintenance data is collected as needed for internal operation metrics.

7.0 REFERENCES

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Appendix A

Trash Full Capture Device Inspection and Cleaning Field Log

Santa Clara Valley Urban Runoff Pollution Prevention Program

Trash Full Capture Device Inspection and Cleaning Field Log

Date	ID	Location	Inspectors

Plugged/Blinded?*	Device > 50% full?*	Evidence of Overflow?	Evidence of Flooding?	Cleaned?	Damaged?	HDS Solids Depth (in):
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	

Comments/Corrective Actions:

Date	ID	Location	Inspectors

Plugged/Blinded?*	Device > 50% full?*	Evidence of Overflow?	Evidence of Flooding?	Cleaned?	Damaged?	HDS Solids Depth (in):
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	

Comments/Corrective Actions:

Date	ID	Location	Inspectors

Plugged/Blinded?*	Device > 50% full?*	Evidence of Overflow?	Evidence of Flooding?	Cleaned?	Damaged?	HDS Solids Depth (in):
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	

Comments/Corrective Actions:

Date	ID	Location	Inspectors

Plugged/Blinded?*	Device > 50% full?*	Evidence of Overflow?	Evidence of Flooding?	Cleaned?	Damaged?	HDS Solids Depth (in):
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	

Comments/Corrective Actions:

Date	ID	Location	Inspectors

Plugged/Blinded?*	Device > 50% full?*	Evidence of Overflow?	Evidence of Flooding?	Cleaned?	Damaged?	HDS Solids Depth (in):
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	

Comments/Corrective Actions:

Date	ID	Location	Inspectors

Plugged/Blinded?*	Device > 50% full?*	Evidence of Overflow?	Evidence of Flooding?	Cleaned?	Damaged?	HDS Solids Depth (in):
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	

Comments/Corrective Actions:

***If "Yes", must increase inspection frequency.**

Data Points	Definitions
Date	The inspection and/or cleaning date of the trash full capture device.
ID	The unique identification code assigned to the site. The ID is used to track trash full capture device inspection and cleaning activities within tabular formats, databases or other data collection tools. **This box may be pre-populated prior to inspection and cleaning.**
Location	The physical location of the trash full capture device in relation to roads and/or physical landmarks. (e.g., buildings, bus stops, signs). Example descriptors: Northeast corner of Main Street and First Avenue, Main Street in front of Burger King, next to bus stop. **This box may be pre-populated prior to inspection and cleaning.**
Inspectors	The names or initials of staff performing the inspection and cleaning.
Plugged/Blinded?*	Indicate if the trash full capture device's 5 mm screen is plugged or blinded with leaves, plastic bags or other debris which likely causes overflow or bypass. ***MRP 2.0 states that if the device is found to have a plugged or blinded screen during a maintenance event, the maintenance frequency shall be increased so that the device is neither plugged nor more than half full of trash at the next maintenance event**. Ensure that the inspection frequency for such a device has been increased to a new frequency. Document in Co-permittee records.
Device > 50% full?*	**Connector pipe screens and insert filters**, indicate if the 5 mm screen is greater than 50 percent "full" of trash (i.e., 50 percent of the screen's capacity below the overflow is covered with debris and trash) during a maintenance event. **For HDS systems**, indicate if the HDS sump is more than 50 percent full of solids. This will be determined by using a measuring instrument or "sludge judge". **For gross solids removal devices (GSRDs)**, indicate if accumulated solids are greater than 50 percent of the screened pipe capacity. **For netting system**, indicate if the net is greater than 50 percent full. ***MRP 2.0 states if such device is greater than 50 percent full of trash during a maintenance event, the maintenance frequency shall be increased so that the device is not more than half full of trash at the next maintenance event**. Ensure that the inspection frequency for such a device has been increased to a new frequency. Document in Co-permittee records.
Evidence of Overflow?	Indicate if there is any evidence of overflow for trash full capture devices. For small devices, evidence of overflow includes but is not limited to the following situations: overflow observed during a storm event, trash present inside the device (e.g., trash that bypassed the device and is present adjacent to the connector pipe screen) and trash present on top of the device (e.g., if the device has a top). For HDS systems, evidence of overflow includes but is not limited to solids being present outside the separation screen.
Evidence of Flooding?	Indicate if there is any evidence of flooding associated or caused by trash full capture devices. For small devices, evidence of flooding includes but is not limited to the following situations: flooding observed during a storm event, flooding observed due to tidal activity, flooding reported to municipal staff by eyewitnesses, and observing a storm drain completely full of trash and debris (with a significant amount of trash and debris present on the storm drain grate) which likely floods during a storm event.
Cleaned?	Indicate if the trash full capture device was cleaned.
Damaged?	Indicate if the trash full capture device is damaged which reduces its functionality. **If damaged, indicate if the device should be repaired in the comments/corrective action box.**
HDS Solids Depth (in)	**This box is to be filled-out when inspecting and/or cleaning HDS systems**. If a "sludge judge" is used, record the amount of solids within the column. If the measured solids exceed the pre-determined solids depth requiring HDS maintenance, initiate cleaning or schedule a time to clean the HDS system. If a measuring device is used to determine the distance from the HDS rim to the top of solids in the sump, record the distance. If this distance is shorter than the pre-determined distance requiring HDS maintenance, initiate cleaning or schedule a time to clean the HDS system. All pre-determined solids depths were determined to ensure that HDS systems are no greater than 50 percent full
Comments/ Corrective Actions	Provide any comments or corrective actions pertaining to the trash full capture device inspection and cleaning event.

Appendix B

Cleanout Process Flow Charts

Figure B-1. HDS Inspection Process

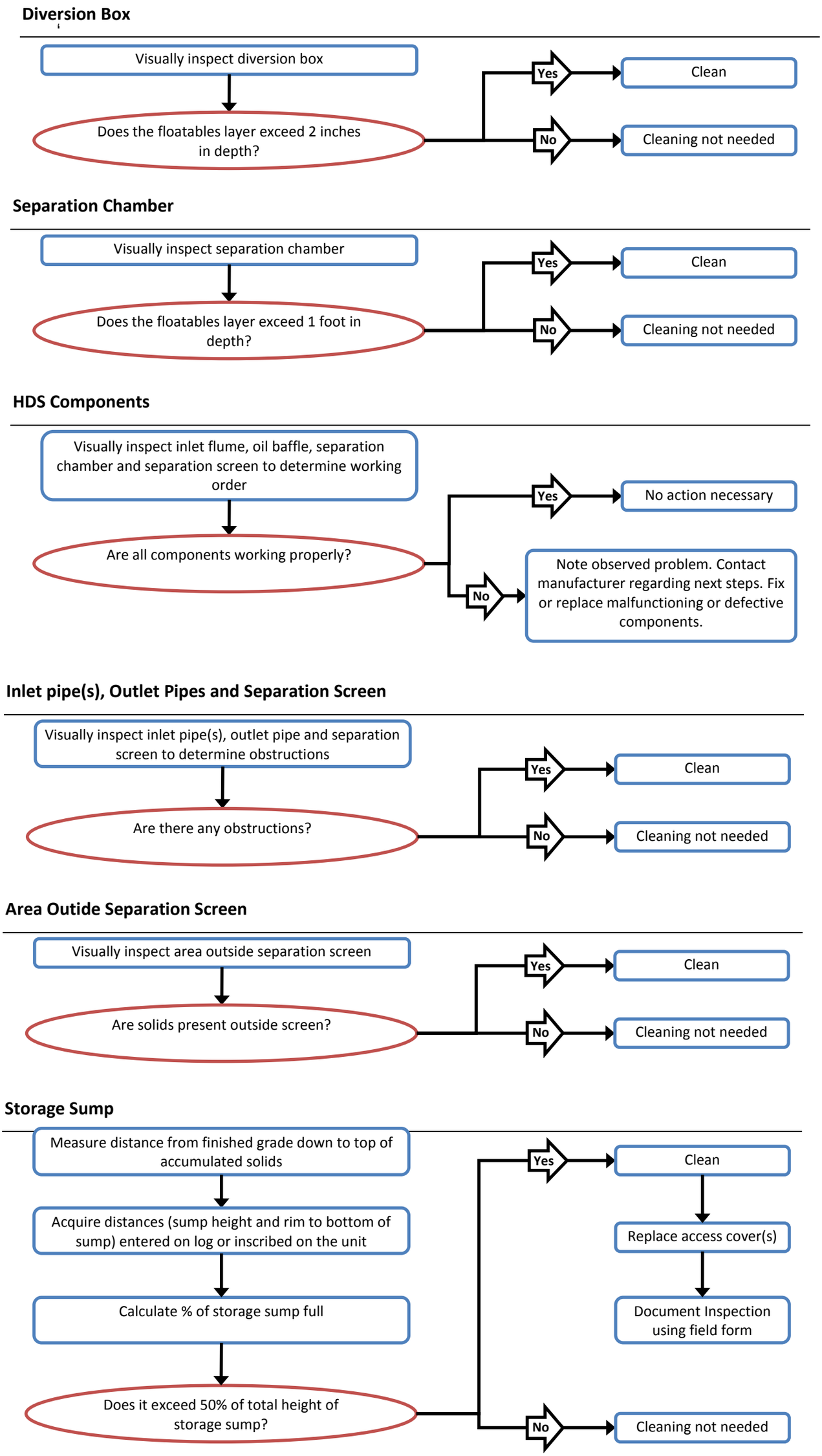

Figure B-2. HDS Cleaning Process

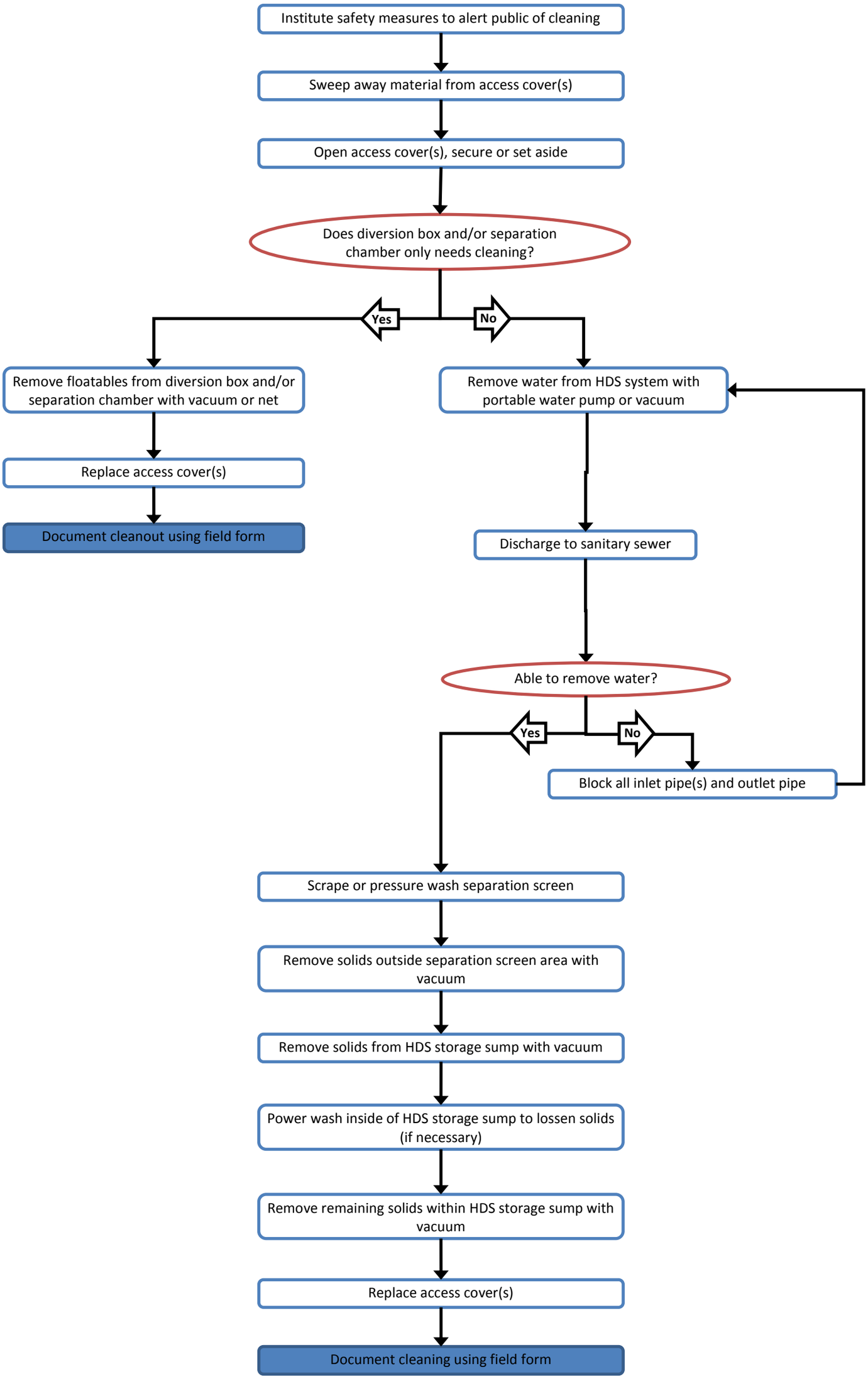

Figure B-3. HDS Inspection
Observed Field Conditions and Corrective Actions