Fairfax County 2018 MS4 Program Plan and Annual Report

Appendix P13

Floatables Monitoring Standard Operating Procedures

VSMP Permit Number VA0088587
9-28-2018

Department of Public Works and Environmental Services
POLICIES AND PROCEDURES Memorandum No.: SWPD17-01

SUBJECT: Standard Operating Procedures for the MS4 Floatables Monitoring Program

Effective: 3-30-2017 Revised: Approval: 3.30.17

Clean Fairfax Council Approval:

I. Purpose

Under the MS4 permit, Fairfax County is required to develop and implement a floatables monitoring program to determine the loading of floatables from the MS4 to streams within Fairfax County. This SOP describes Fairfax County's program for floatables monitoring.

Fairfax County's (renewed) 2015 Virginia Stormwater Management Program (VSMP) Municipal Separate Storm Sewer System (MS4) permit includes the following provisions for floatables monitoring (Part I, Section C.3):

No later than 24 months after the effective date of the permit, the permittee shall develop and implement a floatables monitoring program. The intent of the monitoring program is to determine the loading of floatables from the MS4 to streams within Fairfax County. The permittee will implement the floatables monitoring program as follows:

a. *Monitoring shall be conducted at five (5) monitoring sites located at MS4 outfalls and/or streams receiving discharges from the MS4.*
b. *Monitoring shall be conducted once per quarter after program implementation.*
c. *The monitoring program shall include the count of floatables visually observed and length or area of sites assessed.*

SPECIFIC REPORTING REQUIREMENTS:

- *The annual report due October 1, 2016 shall include an update on the development of the floatables monitoring program.*
- *The annual report due October 1, 2017 shall include the monitoring protocols for the floatables monitoring program.*
- *Beginning with the annual report due October 1, 2018, each following annual report shall include a list of sites monitored, a summary of the monitoring protocols used, and a summary of the monitoring results and analyses.*

This Floatables Monitoring Program Standard Operating Procedure (SOP) describes Fairfax County's site selection, field reconnaissance, and floatables monitoring protocols for evaluating the loading of floatables from the County's MS4 and provides a framework for full compliance with the above MS4 permit requirements. This SOP may be modified over time as additional data are gathered or as the needs of Fairfax County's program change.

This document contains the following sections:

- Project Management
- Site Selection and Priority Determination
- Field Protocol for Floatables Monitoring
- Data Management and Reporting
- Public Education and Outreach

II. Project Management

The MS4 Program Coordination Section (MPCS) of the Stormwater Planning Division (SWPD) of the Department of Public Works and Environmental Services (DPWES) has partnered with the Clean Fairfax Council, Inc. (CFC) to conduct the floatables monitoring required by the MS4 permit and to develop a litter prevention public education and outreach plan. All major project decisions are made jointly by CFC and the MPCS, and CFC is responsible for conducting field work, data entry, ensuring data quality, and preparing reports. The site selection procedure is detailed below.

Floatables monitoring is used to assess the effectiveness of the County's litter prevention program by documenting trends in trash discharged from the MS4. More specifically, the project will determine the floatables loading at the five (5) sites selected to be representative of land use in the County's MS4 service area.

III. Site Selection and Priority Determination

a. Criteria for Identifying Candidate Sites

The intent of the floatables monitoring program is to determine the loading of floatables from the MS4 to streams within Fairfax County. The County used the data listed in Table 1 to target appropriate sites for floatables monitoring. The way these data sources were used to identify suitable areas for floatables monitoring during the desktop GIS analysis is described below.

Table 1: GIS layers used to select floatable sites for monitoring

GIS Layer	Dataset Name
MS4 service area	FairfaxCounty_MS4ServiceArea_2016
Land use	IPLS.IPLS_GENER_EXIST_LAND_USE
Fairfax hydrography layer	GISMGR.HYDRO_EDGES
Easements	STWMGR.EASEMENTS_POLYGONS

1. MS4 Service Area

Floatable monitoring activities are focused on those areas that are regulated under the County's VSMP MS4 discharge permit. The County's MS4 service area consists of those drainage areas that discharge to an MS4 outfall that is owned or operated by Fairfax County. An MS4 outfall is defined as a point of discharge from a man-made channel or conveyance to surface waters of the State.

2. Categorization of MS4 Contributing Drainage Area

One key factor in selecting candidate areas for monitoring is land use, as represented by the County's land use codes for parcels. Detailed land uses categories are organized into generalized index values according to the predominant activities occurring on the parcel that consist of agricultural, commercial, industrial, institutional, recreational, open land, low density residential (LDR), medium density residential (MDR), and high density residential (HDR). Appendix A contains a list of all of the detailed land use categories in the county and their corresponding generalized values (or types). The distribution of land use types in the County's MS4 service area is presented in Table 2.

Table 2: Distribution of Land Use Types in the County's MS4 Service Area

Rank	Land Use Type	Acres	Percentage (%)
1	Low Density Residential	39,122.1	56.4
2	Open Land	10,203.1	14.7
3	Commercial	4,517.3	6.5
4	Institutional	4,272.4	6.2
5	Medium Density Residential	3,244.6	4.7
6	High Density Residential	2,779.3	4.0
7	Recreational	2,687.4	3.9
8	Industrial	1,459.3	2.1
9	Utilities	580.2	0.8
10	Public	428.2	0.6
11	Agricultural	20.0	0.03
	Total	**69,313.8**	**100.0**

The top six land uses (low density residential (LDR), open land, commercial, institutional, medium density residential (MDR), and high density residential (HDR)) comprise the majority (92.5%) of the County's MS4 service area. Because there is no target audience for litter prevention messaging in open land areas, and they are not likely to be a significant source of litter, this land use type is not included in the land uses targeted for site selection. As a result, the five land use types used to select sites for the floatables monitoring program are HDR, MDR, LDR, institutional, and commercial.

3. Identification of Stream Segments

The County's hydrography layer is used to identify stream segments that receive stormwater discharges from MS4 service areas and are of sufficient length for sampling.

4. Easements

Maintenance and repair easements are required to allow the County to legally access portions of the storm drain network on private property for the purpose of conducting monitoring. The presence of easements is therefore another key factor in selecting candidate areas for monitoring.

b. Site Selection Protocol

The goal of the floatables monitoring program is to characterize the loading rate of floatables from the County's MS4. The most prevalent land uses in the MS4 service area were identified and prioritized for site selection as described in the previous section. This approach allows the floatables data collected at each site to be used to help target litter prevention outreach to each drainage area, and to detect any changes in the floatables loading from each area following targeted outreach efforts.

Level 1: Desktop Analysis

Step 1: Overlay MS4 service area and land use layers to determine the proportions of each land use type for individual service areas.

Step 2: Identify the predominant land use (greater than 60%) for each service area.

Step 3: Exclude service areas with very small contributing drainage areas (< 5 acres).

Step 4: Select stream segments with at least 100 feet below the outfall that are free of other outfalls or tributaries that are potential floatable sources.

Step 5: Identify the watershed and supervisor district where sites are located to ensure sites are distributed across the County and therefore more likely to be representative of the floatables loads from each land use type.

Step 6: Identify any nearby community groups that may help conduct stream cleanups, if needed.

Step 7: Coordinate with internal stakeholders to ensure that candidate sites are not scheduled for outfall repair, stream restoration activities, or trash collection device installation.

Level 2: Field Reconnaissance

Step 9: Candidate sites from the site selection protocol are visited to assess suitability for monitoring, accessibility, safety, cooperative residents, and presence of a flowing stream.

1. Confirm that the MS4 outfall discharges to a flowing stream, preferably headwaters.
2. Evaluate site accessibility, landowner permission, and safety of the area for the purpose of conducting stream cleanups. If access to the outfall is impeded by dangerous terrain or fences, then choose another site.

c. Site Characterization for Floatables Loading Analysis

For each monitoring site, the following information is used to characterize the location in the GIS data layer:

1. Outfall Stormnet ID
2. Predominant Land Use Type
3. MS4 contributing drainage area in acres
4. Percentage of each land use type
5. Location description (address or street intersection)
6. Magisterial District
7. Watershed
8. Receiving waterbody stream name
9. Community Association (for targeted outreach, support with clean ups)

IV. Field Protocol for Floatables Monitoring

This section provides details of the protocols to be followed during floatables monitoring deployments and includes descriptions of sampling equipment, sampling frequency, and antecedent condition requirements.

a. Health and Safety

Ensuring the health and safety of field personnel is the responsibility of every member of the staff for the project. The collective effort of all staff members in providing a healthy and safe

work environment helps to minimize or eliminate the potential for accidents. Safety protocols designed to protect the field staff are outlined in Appendix B of this document.

- STW are to sign out on the board near the administration staff.
- Perform field work in teams of at least two.
- Wear hi-visibility vest.
- Bring mobile phone and first aid kit on all field site visits.
- Exercise caution when encountering any wildlife and hazardous plants. In addition, many outfalls are located in remote areas that may be near gathering places for homeless or transient individuals. Do not enter a potentially hostile area.
- Do not conduct sampling during electrical storms and/or when severe conditions (e.g., high wind, hail) develop. The safety of field staff overrides all other considerations.
- Storm sewers contain a variety of water-borne bacteria and other harmful chemicals. Wash hands or use anti-bacterial wipes or hand gels liberally, especially prior to lunch breaks, etc.

Additional information on Health and Safety may be found in Appendix B, including information on field staff conduct, personal protective equipment, dangerous flora and fauna, unknown hazardous substances and wastes, blood borne pathogens, remote areas, hand tool safety, weather-related hazards, and heat and cold stress.

b. Sampling Methods

Monitoring at all five sites is conducted exclusively by SWPD and/or CFC staff. Staff performing monitoring for the first time will be trained in the implementation of this protocol.

1. Site Establishment

At each of the five monitoring sites, staff measure and mark off 100 linear feet of the stream receiving discharge from the MS4. Staff place additional flags at the midpoint (50 feet) of the monitoring area, as well as determine and mark off the bank full width at each site. Staff photograph markings for inclusion in program documentation and to ensure consistency of the monitored area at each site. On monitoring events, all trash is enumerated within the marked area; which consists of the bank full width along the 100 foot stream segment.

2. Site Visits and Monitoring

Field staff use the MS4 Floatables Monitoring data sheets to tally and summarize counts of trash within the sampling area marked at each site. The datasheets consist of:

1. Cover sheet with detailed site identification and a floatable count summary of individual tally sheets the reverse side, and
2. Tally sheet(s) with floatable subcategory type definitions on the reverse side.

The MS4 Floatables Monitoring data sheets were created through coordination with the MPCS and CFC. Where possible, efforts were made to be consistent with the Metropolitan Washington Council of Governments' Anacostia Watershed Trash Survey form. The tally sheet is organized by five major categories:

1. Food and beverage,
2. Household items,

3. Recreation equipment and advertising,
4. Hazardous materials, and
5. Other trash items.

Each of the major categories contains a series of more detailed subcategory options that are included on the tally sheets. The cover sheet and tally sheet are included in Appendix C.

For each monitoring event, the following occurs:

1. The designated crew chief fills out the cover sheet for the monitoring event.
2. The crew chief determines the number of data recorders needed to enumerate the floatables for the monitoring event and distributes data sheets to the recorders.
3. When a site is subdivided into more than one monitoring area, the crew chief assigns data recorders to clearly delineated sections for each subarea.
4. Data recorders fill out each item in the header section of the datasheet; no items are to be left blank. Slashes, zeros or "N/A" are used for any item as needed, to confirm that there has not been an omission.
5. Data recorders tally the types (subcategories) of floatables observed in the monitoring area on the datasheet in pencil. In order to ensure legibility, mistakes are crossed out instead of erased.
6. Data recorders review the subcategory definitions on the reverse side of the form if there are any questions about the appropriate category for an item.
7. After counting all of the floatables in the monitoring area, data recorders reconvene and identify the total number of data sheets that have been used. Each sheet is then numbered individually, starting with the cover sheet, and including the total number of sheets that have been used.
8. On the tally sheet(s), data recorders count all tally marks and summarize the total numbers for each detailed subcategory of trash in the total column.
9. Data recorders exchange tally sheets and perform independent reviews of each other's datasheet(s) for completeness, and to check the calculation of totals by subcategory and category. The reviewer initials the "Reviewed by" section to document that the review is complete.
10. On the 'Floatable Count Summary' (rear of the cover sheet), the crew chief summarize the totals for each subcategory of trash from each datasheet to determine the overall total. This summary includes the arithmetic used to determine overall totals.
11. The following digital photographs are taken on each monitoring event and numbered on the cover sheet.
    a. Photo of cover sheet to identify site and subsequent photos
    b. Photo of the MS4 outfall
    c. Photo of the survey area from the downstream end facing upstream.
    d. Photo of the survey area from the outfall looking downstream.
    e. Additional photos of any notable observations
12. The file names of the digital photos are recorded on the cover sheet in the photo documentation section.
13. The crew chief confirms that tally sheets have been reviewed, and reviews the Floatable Count Summary and Cover sheets for completeness and accurate arithmetic.

14. After the site visit, the crew chief scans the completed and reviewed datasheet(s) and saves them on the MS4 SharePoint site using the conventions described in Section V.b (Field Sheet Retention and Storage).

Steps 12 through 14 are conducted when the team returns to the office.

c. Sampling Frequency

The County's permit specifies sampling must take place four times per year at five sites. Under this protocol, sampling is performed once per quarter during a yearly monitoring period at each floatables monitoring site.

The program is designed to monitor five areas on a quarterly basis. Cleanup events are conducted twice per year (spring and fall) at each monitoring location. These events are planned to engage local communities, provide education and outreach to target audiences, and to remove previously enumerated trash items for the next monitoring event. The Floatable Monitoring Cover sheet includes a section to record the date of the last clean up event, since these events can impact the amount of floatables observed.

d. Rainfall Criteria

Sampling shall not take place if it has rained 0.2 inches or more in the 48 hours preceding the sampling event. This is intended to ensure staff safety and to minimize the possibility of turbid conditions in receiving waters that could interfere with the sampling crew's ability to detect trash items. The Floatable Monitoring Cover sheet includes a section to record the total amount of precipitation within the 48 hours preceding the monitoring event to confirm adherence to this requirement. Rainfall data is obtained from the National Weather Service weather station at Washington/Dulles International Airport.

V. Data Management and Quality Control

Quality control is designed to ensure a high level of quality for the data collected through the floatables monitoring protocol. This includes the actions necessary to verify and control the quality of the data collected, with an overall goal of producing dependable data. The following elements of the floatables monitoring protocol are implemented in order to ensure data quality:

a. Reliability and Consistency of Recording

In an effort to minimize discrepancies in the recorded data that may stem from interpersonal variability of the field staff, data recorders periodically conduct duplicate surveys of a monitoring area. Staff then compare results and discuss any differences in counts due to differences in the categorization of floatables or other ways that counts were recorded. Staff review the subcategories of floatables (and their descriptions) and repeat these duplicate surveys until consistent results are achieved. Staff clearly identify the datasheets from these exercises as QA/QC, retain them, and file them appropriately.

The process described in Section IV.b.2 provides details on the multiple reviews that are intended to minimize the recording of illegible writing, arithmetic errors, and other oversights. The section also includes procedures intended to minimize the possibility of lost or missing datasheets and misinterpretation of blank values.

b. Field Sheet Retention and Storage

The following processes are used to digitize and store original datasheets to maintain data integrity and to support the necessary reporting requirements.

1. Paper data sheets are used in the field and scanned within 3 business days in the office. Scanned sheets are named using the convention: `SITE-QUARTER-MMDDYYYY` (e.g. HDR-Q2-03262017 (High Density Residential, 2nd quarter, March 26, 2017), LDR-3-06012017 (Low Density Residential, 3rd quarter, June 1st, 2017)).
2. Digital Photos are re-named using the convention: `SITE-QUARTER-MMDDYYYY-#` (e.g. COM-Q2-03262017-1 (Commercial, 2nd quarter, March 26th, 2017, 1st photo)).
3. Scanned datasheets and digital photos are uploaded to the MS4 Coordination SharePoint site (http://fairfaxnet.fairfaxcounty.gov/dept/DPWES/ms4) for the floatable monitoring program into the appropriate directory. The naming convention used for directories is `YEAR-QUARTER` (e.g. 2016-Q2 (second quarter of 2016).
4. Original datasheets are delivered to the MS4 Program Coordination Section and filed by the MS4 program staff.
5. The final, reviewed counts are entered into ArcGIS Collector with seven (7) business days of the monitoring event.

Typically, data entry is completed by CFC. QA/QC of the data entry is performed by comparing the data entered into ArcGIS Collector with the scanned data sheets. In the event that CFC is unable to complete the QA/QC for the data entry, County staff from SWPD will perform it. Tables and figures used in the annual reports are reviewed for accuracy by the MPCS prior to use in the reports.

c. Monitoring Reports Retention and Storage

Floatables Monitoring Program data are store in ArcGIS Collector. Annually, this data is exported from ArcGIS and analyzed. All analyzed data is placed on the MS4 Coordination SharePoint site. The analysis of this data allows staff to define a target audience and message to conduct public outreach and education, as well as estimate the loading rate of floatables from the MS4. CFC will provide quarterly progress reports via email that include a brief summary of progress and identify any barriers the project has encountered. Annual reports will be created by the MPCS. CFC and the MPCS will retain all data reports for 5 years after the permit expiration date.

d. Monitoring Yearly Report

Annual reporting is conducted by the MPSC at the end of each MS4 reporting cycle (July 1 – June 30) as part of the County's Annual MS4 report to VA DEQ. For permit years two and three, reports will include the monitoring protocols for the floatables monitoring program and data collected using the protocols. For permit years four and five, reports will include comparisons to previous years monitoring efforts and results. The year five report will also include an overall summary of the floatables monitoring program and recommendations for future floatables screening efforts. The report will contain narratives for each area monitored and briefly describe results. The yearly report includes the following:

- a list of the sites monitored,

- a summary of the monitoring protocols used; and
- a summary of the monitoring results and analyses.

VI. Public Education and Outreach

Clean Fairfax Council identifies community gathering places (libraries, churches, community centers, businesses, shopping centers, etc.) located within the area draining to each monitoring site using existing County GIS overlays and field verification. Whenever possible, efforts are made to involve community members in developing solutions to a litter problem. Also, community members are encouraged to join available environmental stewardship programs such as watershed "Friends of" groups.

Outreach and education may include the following:

- Litter prevention educational outreach messages that are specific to each monitored location using compelling and easy-to-understand information about the short- and long-term effects of floatables pollution. This could include articles and/or pictures for newsletters, bulletin board posters, flyers, website postings, and the use of social media.
- Distribution of free reusable water bottles and/or grocery bags, depending on what is the most frequently found item in the monitored area
- CFC will conduct location-specific presentations once per year, following one monitoring/clean up event to engage citizens in their own backyard
- Yearly participant survey to determine changes in attitude and/or behavior regarding litter/recycling and the use of reusable materials
- Installation of additional trash and/or recycling receptacles, anti-littering signage, etc.

VII. Contacts

Agency	Contact	Phone
MS4 Program Coordination Section	Kate Bennett	703-324-5816
MS4 Program Coordination Section	Marty Hurd	703-324-5644
MS4 Program Coordination Section	Emily Burton	703-324-5637
Clean Fairfax Council, Inc.	Jen Cole	703-324-5471
Clean Fairfax Council, Inc.	Wendy Cohen	703-951-3497

VIII. Administrator of the SOP

This SOP document is administered by the MPCS within the SPWD. For more information about this document, please call the Stormwater Planning Division at (703) 324-5500.

IX. Appendices

A. Land Use Codes and Descriptions

B. Health and Safety Guidance for Floatables Monitoring Field Work

C. Floatables Monitoring Field Data Sheets

Appendix A: Land Use Codes (LUC) and Descriptions.

LUC	Detailed Land Use Description	Generalized Value	Sub Category
910	Agriculture activities and related services	AGRICULTURAL	Industrial
920	Forestry activities and related services	AGRICULTURAL	Industrial
930	Horticultural activities	AGRICULTURAL	Industrial
081	Motel w/o restaurant and/or other commercial amenity	COMMERCIAL	Retail
082	Motel w/ restaurant and/or other commercial amenity	COMMERCIAL	Retail
083	Hotel w/o restaurant and/or other commercial amenity	COMMERCIAL	Retail
084	Hotel w/ restaurant and/or other commercial amenity	COMMERCIAL	Retail
085	Tourist home	COMMERCIAL	Retail
089	Other Transient Lodging, NEC	COMMERCIAL	Retail
311	Neighborhood shopping center	COMMERCIAL	Retail
312	Specialty shopping center	COMMERCIAL	Retail
313	Community shopping center	COMMERCIAL	Retail
314	Regional shopping center	COMMERCIAL	Retail
315	Super regional shopping center	COMMERCIAL	Retail
316	Promotional shopping center	COMMERCIAL	Retail
317	Town shopping center	COMMERCIAL	Retail
318	Condo shopping center	COMMERCIAL	Retail
320	Building materials, hardware, farm equipment	COMMERCIAL	Retail
331	Department stores	COMMERCIAL	Retail
332	Discount stores	COMMERCIAL	Retail
333	Variety or junior department stores	COMMERCIAL	Retail
334	Apparel and accessories	COMMERCIAL	Retail
335	Furniture, house furnishings	COMMERCIAL	Retail
336	Drug stores	COMMERCIAL	Retail
337	Condo retail	COMMERCIAL	Retail
341	Supermarket	COMMERCIAL	Retail
342	Supermarket plus general merchandise	COMMERCIAL	Retail
343	Convenience grocery	COMMERCIAL	Retail
349	Other food NEC (including fruit, meat, fish, etc.)	COMMERCIAL	Retail
351	Restaurant with alcohol includes a wide range of b	COMMERCIAL	Retail
352	Restaurant without alcohol typified by a high rat	COMMERCIAL	Retail
353	Carry-out Kitchen distinguishing characteristic is	COMMERCIAL	Retail
354	Carry-out with seating generally a fast food opera	COMMERCIAL	Retail
359	Other eating and drinking NEC	COMMERCIAL	Retail
361	Motor vehicle sales (new and used)	COMMERCIAL	Retail
362	Gasoline and service station	COMMERCIAL	Retail
363	Gasoline sale only	COMMERCIAL	Retail
364	Gasoline sales and car wash	COMMERCIAL	Retail
365	Service station out of operation, but not yet conv	COMMERCIAL	Retail

LUC	Detailed Land Use Description	Generalized Value	Sub Category
369	Other automotive, marine, aircraft, and accessories	COMMERCIAL	Retail
390	Other retail NEC	COMMERCIAL	Retail
410	Office Park	COMMERCIAL	Office
421	General low rise office	COMMERCIAL	Office
422	Medical and/or dental low rise office	COMMERCIAL	Office
425	Condominium office (general, low rise)	COMMERCIAL	Office
426	Condominium office (medical and/or dental, low ris	COMMERCIAL	Office
427	Cluster office (general, low rise)	COMMERCIAL	Office
428	Cluster office (medical and/or dental, low rise)	COMMERCIAL	Office
429	Converted residential office (ex-dwellings which h	COMMERCIAL	Office
431	General medium or high rise office	COMMERCIAL	Office
432	Medical and/or dental medium or high rise office	COMMERCIAL	Office
435	Condominium office (general, medium or high rise)	COMMERCIAL	Office
436	Condominium office (medical and/or dental, medium	COMMERCIAL	Office
490	Other office NEC	COMMERCIAL	Office
510	Finance, insurance, real estate and professional s	COMMERCIAL	Retail
520	Personal services	COMMERCIAL	Retail
530	Motor vehicle repair when provided separately from	COMMERCIAL	Retail
540	Other repair services	COMMERCIAL	Retail
490	Other office NEC	COMMERCIAL	Office
338	Comm Use in Res Condo Dev	COMMERCIAL	
040	Garden apartments, rental	HIGH DENSITY RESIDENTIAL	Multi-family
041	Garden apartments, condominium	HIGH DENSITY RESIDENTIAL	Multi-family
042	Medium rise apartments, apartments rental	HIGH DENSITY RESIDENTIAL	Multi-family
043	Medium rise apartments, condominium	HIGH DENSITY RESIDENTIAL	Multi-family
044	High rise apartments, rental, without commercial/p	HIGH DENSITY RESIDENTIAL	Multi-family
045	High rise apartments, condm, without commercial/p	HIGH DENSITY RESIDENTIAL	Multi-family
046	High rise apartments, rental, with commercial/prof	HIGH DENSITY RESIDENTIAL	Multi-family
047	High rise apartments, condm, with commercial/p	HIGH DENSITY RESIDENTIAL	Multi-family
048	Combination of structure types, predominantly apts.	HIGH DENSITY RESIDENTIAL	Multi-family
049	Apartments, NEC, including cooperatives	HIGH DENSITY RESIDENTIAL	Multi-family

LUC	Detailed Land Use Description	Generalized Value	Sub Category
071	Rooming and boarding houses	HIGH DENSITY RESIDENTIAL	Government/Institution
072	Membership lodgings	HIGH DENSITY RESIDENTIAL	Single Family
073	Residence halls and dormitories	HIGH DENSITY RESIDENTIAL	Multi-family
074	Retirement homes and orphanages	HIGH DENSITY RESIDENTIAL	Multi-family
075	Religious quarters	HIGH DENSITY RESIDENTIAL	Government/Institution
076	Nursing homes	HIGH DENSITY RESIDENTIAL	Government/Institution
079	Other group quarters NEC (except. Military & Correc	HIGH DENSITY RESIDENTIAL	Government/Institution
111	Planned industrial park	INDUSTRIAL	Industrial
112	Industrial conglomeration	INDUSTRIAL	Industrial
121	Durable manufacturing	INDUSTRIAL	Industrial
126	Durable manufacturing (where in a condominium devl	INDUSTRIAL	Industrial
127	Durable manufacturing (where in a cluster devl.)	INDUSTRIAL	Industrial
131	Nondurable manufacturing	INDUSTRIAL	Industrial
135	Printing and publishing	INDUSTRIAL	Industrial
136	Nondurable manufacturing (where in a condo devl.)	INDUSTRIAL	Industrial
137	Nondurable manufacturing (where in a cluster devel	INDUSTRIAL	Industrial
140	Research and testing, where not in office bldg or	INDUSTRIAL	Industrial
146	Research and testing (where in condo devl.)	INDUSTRIAL	Industrial
147	Research and testing (where in cluster devl.)	INDUSTRIAL	Industrial
150	Wholesale, warehousing and storage	INDUSTRIAL	Industrial
151	Mini-warehouses	INDUSTRIAL	Retail
156	Wholesale, warehousing and storage (where in a con	INDUSTRIAL	Industrial
157	Wholesale, warehousing and storage (where in a clu	INDUSTRIAL	Industrial
160	Contract construction	INDUSTRIAL	Industrial
166	Contract construction (where in condo devl.)	INDUSTRIAL	Industrial
167	Contract construction (where in cluster devl.)	INDUSTRIAL	Industrial
190	Other industrial NEC	INDUSTRIAL	Industrial
941	Sand and gravel quarrying	INDUSTRIAL	Industrial
949	Other resource production and extraction	INDUSTRIAL	Industrial
550	Veterinary hospitals	INSTITUTIONAL	Retail
610	Cemeteries	INSTITUTIONAL	Government/Institution
620	Hospital and health facilities (except nursing home	INSTITUTIONAL	Government/Institution
660	Correctional institutions	INSTITUTIONAL	Government/Institution

LUC	Detailed Land Use Description	Generalized Value	Sub Category
670	Military institutions	INSTITUTIONAL	Government/Institution
680	Welfare and charitable services	INSTITUTIONAL	Government/Institution
690	Other public and quasi public service land uses NE	INSTITUTIONAL	Government/Institution
710	Chruches, synagogues	INSTITUTIONAL	Government/Institution
720	Civic, social, fraternal, professional, business a	INSTITUTIONAL	Government/Institution
730	Libraries	INSTITUTIONAL	Government/Institution
740	Permanent exhibitions	INSTITUTIONAL	Government/Institution
751	Nursery schools	INSTITUTIONAL	Government/Institution
752	Public elementary, intermediate, secondary, high a	INSTITUTIONAL	Government/Institution
753	Private schools	INSTITUTIONAL	Government/Institution
754	College, universities	INSTITUTIONAL	Government/Institution
755	Special training schools	INSTITUTIONAL	Government/Institution
759	Other educational services NEC	INSTITUTIONAL	Government/Institution
790	Other cultural and entertainment service land uses	INSTITUTIONAL	Government/Institution
011	Single-family, detached	LOW-DENSITY RESIDENTIAL	Single Family
012	Single-family, semidetached or garden court	LOW-DENSITY RESIDENTIAL	Townhouse
051	Mobile homes in park or court	LOW-DENSITY RESIDENTIAL	Multi-family
052	Mobile homes not in park or court	LOW-DENSITY RESIDENTIAL	Single Family
060	Residential hotels and motels	LOW-DENSITY RESIDENTIAL	Multi-family
091	Other residential on separate but adjacent parcel	LOW-DENSITY RESIDENTIAL	Low Density Single Fam
099	Other residential NEC	LOW-DENSITY RESIDENTIAL	Low Density Single Fam
013	Two or more single-family, detached on single parcel	MEDIUM-DENSITY RESIDENTIAL	Single Family
014	Single-family structure NEC	MEDIUM-DENSITY RESIDENTIAL	Single Family
015	Single-family residences located in an area where	MEDIUM-DENSITY RESIDENTIAL	Single Family
021	Duplex, either vertical or horizontal	MEDIUM-DENSITY RESIDENTIAL	Townhouse

LUC	Detailed Land Use Description	Generalized Value	Sub Category
029	Two-family NEC	MEDIUM-DENSITY RESIDENTIAL	Townhouse
031	Townhouse, in ownership development	MEDIUM-DENSITY RESIDENTIAL	Townhouse
032	Townhouse, in condominium development	MEDIUM-DENSITY RESIDENTIAL	Townhouse
033	Townhouse, in rental development	MEDIUM-DENSITY RESIDENTIAL	Townhouse
034	Multiplex (except duplex) in ownership development	MEDIUM-DENSITY RESIDENTIAL	Multi-family
035	Multiplex (except duplex) in ownership development	MEDIUM-DENSITY RESIDENTIAL	Multi-family
036	Multiplex (except duplex) in rental development	MEDIUM-DENSITY RESIDENTIAL	Multi-family
037	Combination of structure types, predominantly townh	MEDIUM-DENSITY RESIDENTIAL	Townhouse
039	Townhouse or mutiplex structures NEC, including co	MEDIUM-DENSITY RESIDENTIAL	Townhouse
092	Private open space with a planned development or	OPEN LAND, NOT FORSTED OR DEVELOPED	Private Open Space
093	Private open space, not in a planned development	OPEN LAND, NOT FORSTED OR DEVELOPED	Private Open Space
950	Permanent conservation areas	OPEN LAND, NOT FORSTED OR DEVELOPED	Private Open Space
971	Vacant land	OPEN LAND, NOT FORSTED OR DEVELOPED	Vacant Land
972	"Improved lands with dilapidated structure of no v	OPEN LAND, NOT FORSTED OR DEVELOPED	Vacant Land
990	Other resource uses and undeveloped are NEC	OPEN LAND, NOT FORSTED OR DEVELOPED	Vacant Land
423	Government leased low rise office	PUBLIC	Government/Institution
424	Government owned low rise office	PUBLIC	Government/Institution
433	Government leased medium or high rise office	PUBLIC	Office
434	Government owned medium or high rise office	PUBLIC	Government/Institution
630	Post offices	PUBLIC	Government/Institution
640	Police Stations	PUBLIC	Government/Institution
650	Fire and rescue stations	PUBLIC	Government/Institution
760	Places of public assembly	PUBLIC	Government/Institution

LUC	Detailed Land Use Description	Generalized Value	Sub Category
811	Private recreation facilities and parks outdoor	RECREATION	Private Open Space
812	Commercial recreation facilities and parks Outdoor	RECREATION	Private Open Space
813	Government owned open to public with or without fe	RECREATION	Public Recreation
821	Private recreation facilities INDOOR	RECREATION	Retail
822	Commercial recreation facilities and parks INDOOR o	RECREATION	Private Recreation
823	Government owned open to public without fee INDOO	RECREATION	Government/Institution
831	Private golf course	RECREATION	Private Recreation
832	Commercial golf course	RECREATION	Private Recreation
833	Government owned golf course	RECREATION	Private Recreation
841	OUTDOOR swimming pools (except HOA pools)	RECREATION	Private Recreation
842	INDOOR swimming pools (except HOA pools)	RECREATION	Private Recreation
850	Boating Marinas	RECREATION	Government/Institution
851	Condominium Boat slips	RECREATION	Government/Institution
094		RECREATION	
211	Railroad	UTILITIES	Government/Institution
212	Rail rapid transit	UTILITIES	Government/Institution
213	Bus	UTILITIES	Government/Institution
214	Motor freight transportation	UTILITIES	Industrial
215	Street and highway right-of-way	UTILITIES	Industrial
216	Auto parking	UTILITIES	Industrial
217	Air	UTILITIES	Government/Institution
218	Marine terminals	UTILITIES	Industrial
219	Other transportation NEC	UTILITIES	Industrial
221	Utilities, Electric	UTILITIES	Government/Institution
222	Utilities, Gas	UTILITIES	Government/Institution
223	Utilities, Water	UTILITIES	Government/Institution
224	Utilities, Sewage	UTILITIES	Government/Institution
225	Utilities, Solid waste disposal	UTILITIES	Government/Institution
226	Pipeline rights-of-way and pressure control station	UTILITIES	Government/Institution
229	Other Utilities	UTILITIES	Government/Institution
231	Telephone and telegraph	UTILITIES	Industrial

LUC	Detailed Land Use Description	Generalized Value	Sub Category
232	Radio and television	UTILITIES	Industrial
239	Other communications, NEC	UTILITIES	Industrial

Appendix B: Health and Safety Guidance for Floatables Monitoring Field Work

General

Health and safety responsibility and accountability involves every employee. The collective effort of all employees in providing a healthy and safe work environment will minimize or eliminate the potential for accidents. In general, field sampling will require the following safety protocol to protect the field staff:

1. Stormwater staff will sign in/out on the board near the administration staff.
2. Perform field work in teams of at least two.
3. Bring cell phone and first aid kit on all field site visits.
4. Exercise caution when encountering any wildlife and hazardous plants. In addition, many outfalls are located in remote areas that may be near gathering places for homeless or transient individuals. Do not enter a potentially hostile area.
5. Use common sense during electrical storms and/or when severe conditions (e.g., high wind, hail) develop. The safety of field staff overrides all other considerations.

Conduct

All field staff are expected to:

- Understand and comply with health and safety policies. Each employee is not only responsible and accountable for his/her own actions, but for those others around him/her.
- All employees shall show professional courtesy to fellow employees, clients, contractors, regulators, and visitors.
- Understand and follow good health and safety practices.
- Horseplay, practical joking, inattention to work or other inappropriate accident- causing behavior will not be tolerated.
- Smoking, eating, drinking and chewing shall be conducted only in designated areas.
- Use of alcohol or controlled substances is prohibited.
- While traveling to and from the job site, employees shall: obey all federal, state and local regulations regarding seat belt use, all traffic laws, and any other laws regarding proper conduct in public areas.

Personal protective equipment (PPE)

Fairfax County high visible vest shall be worn during all monitoring. All employees shall dress appropriately for the tasks to be performed. Specialized health and safety equipment, including personal protective equipment, monitoring equipment, and other devices designed to protect the employee shall be issued to the employee on an as-needed basis.

Dangerous flora and fauna

During the course of field activities, employees may come in contact with a wide range of dangerous or toxic animals and plants. Dangerous animals may include: black widow and brown recluse spiders; fire ants; mosquitoes and biting flies; bees, wasps and hornets; ticks and chiggers; microbial organisms (e.g., found in water, soil, and air and on carrier/host organisms); rabid mammals; and venomous snakes. Dangerous plants may include: thorny plants; poison ivy, oak, and sumac; and molds, mildews, and fungi (which may cause allergic reactions). Contact with these organisms can cause effects from

simple discomfort (such as from thorny bush scratches) to severe allergic reactions and possibly death. If interactions do occur, take appropriate actions related to specific interaction and individual response to interaction.

Unknown hazardous substances and wastes

The nature of environmental consulting often times requires the investigation of hazardous substances or wastes whose identity is not known. Because of the serious personal and environmental consequences of unintentional release of chemicals, very specific health and safety procedures must be implemented to monitor ambient conditions, mitigate releases to the environment, and protect workers from exposure. Most of these procedures dovetail with site investigation, sampling, and remediation techniques outlined by EPA policy and should be included in the project comprehensive work plan.

Bloodborne pathogens

Exposure to blood borne pathogens (BBP) is possible in the case of certain emergency situations. Personnel may be exposed to body fluids such as blood, saliva, vomit, mucus or others. These fluids could contain pathogens that have the potential for causing disease in humans. Should personnel be required to administer lifesaving procedures, such as CPR, the following procedures will be followed to minimize the potential for exposure:

1. Wear disposable gloves when hand contact with blood, mucus membranes, non-intact skin or other potentially infectious materials could be involved;
2. Use disposable mouthpieces, pocket masks or other ventilation devices for administering artificial ventilation;
3. Wash hands with soap and water after administering first aid;
4. In the case of eye contact, flush eyes using an eye wash for at least 15 minutes;
5. Remove garments contacted by blood or other body fluids as soon as possible;
6. Do not eat, drink, smoke or handle contact lenses in areas with possible BBP exposure; and
7. Persons cleaning up an accident scene should not pick up broken glass or other sharp objects by hand. All clothes and other items at the first aid scene should be safely secured prior to leaving.

Employees who may have been exposed to BBPs should report the incident at once.

Weather related hazards

Weather-related hazards include the potential for heat or cold stress, electrical storms, treacherous weather-related working conditions, high winds, and limited visibility. These hazards correlate with the season in which site activities occur. In the event of adverse weather conditions, the Field Team Leader will determine if work can continue without endangering the health and safety of site personnel.

Heat stress

Heat stress is a significant potential hazard during the warmer months. Heat stress manifests itself as one of three conditions: heat cramps, heat exhaustion, or heat stroke. Heat cramps are brought about by a prolonged exposure to heat. As an individual sweats, water and salts are lost by the body, triggering painful muscle cramps. The signs and symptoms of heat cramps include:

- Severe muscle cramps, usually in the legs and abdomen;
- Exhaustion, often to the point of collapse; and
- Dizziness or periods of faintness.

First aid treatment includes shade, rest, and fluid replacement. The individual will drink electrolyte-replacement fluids (e.g., Gatorade, Squencher, 10-K), which will be made available to field personnel. If the individual has not recovered within ½ hour, then he/she will be transported to the hospital for medical attention.

Heat exhaustion usually occurs in a healthy individual who has been exposed to excessive heat while working or exercising. Blood collects near the skin in an effort to rid the body of excess heat. The signs and symptoms of heat exhaustion include:

- Rapid and shallow breathing;
- Weak pulse;
- Cold and clammy skin, with heavy perspiration;
- Skin appears pale;
- Fatigue, weakness, and/or dizziness; and
- Elevated body temperature.

First aid treatment includes cooling the victim, elevating the feet, and replacing fluids. If the individual has not recovered within ½ hour, he/she will be transported to the hospital for medical attention.

Heat stroke occurs when an individual is exposed to excessive heat, and their body systems become overwhelmed by heat and begin to stop functioning. This condition is a medical emergency, requiring the immediate cooling of the victim and transport to the hospital immediately. The signs and symptoms of heat stroke include:

- Victim has stopped sweating;
- Dry, hot, red skin;
- Body temperature approaching or above 105° F;
- Dilated (large) pupils; and
- Loss of consciousness; victim may lapse into a coma.

Local weather conditions may produce an environment which will require restricted work schedules in order to protect employees. The Field Team Leader will observe workers for any potential symptoms of heat stress. Adaptation of work schedules and training in recognition of heat stress conditions will help prevent heat-related illnesses from occurring.

Cold stress

Cold stress is a danger at low temperatures and when the wind chill factor is low. Cold stress is generally described as a local cooling (frost nip, frost bite, and freezing) or a general cooling (hypothermia). Personnel working outdoors in temperatures at or below freezing may be subject to local cooling. Areas of the body that have a high surface area-to-volume ratio, such as fingers, toes, and ears, are the most susceptible. The three categories of local cooling include:

- Frost nip - characterized by a blanching or whitening of the skin;
- Frost bite - skin has a waxy or white appearance and is firm to the touch, but the tissue beneath is resilient; and
- Freezing - skin tissue is cold, pale, and solid.

Frost nip and frost bite first aid includes covering the affected area with warmth and retreating to a warm area. Frozen tissue is a medical emergency, and the victim will be transported to the hospital immediately.

General cooling (hypothermia) occurs when exposure to cold reduces body temperature. With prolonged exposure, the body becomes unable to maintain its proper internal temperature. Without treatment, hypothermia will lead to stupor, collapse, and death. The signs and symp- toms of mild hypothermia include:

- Shivering;
- Numbness; and
- Drowsiness.

First aid for mild hypothermia includes using heat to raise the individual's body temperature. Heat may be applied to the victim in the form of heat packs, hot water bottles, and blankets.

The signs and symptoms of severe hypothermia include:

- Unconsciousness;
- Slowed respiration or respiratory arrest;
- Slowed pulse or cardiac arrest;
- Irrational or stuporous state; and
- Muscular rigidity.

First aid for severe hypothermia includes handling the victim very gently; rough handling may set off an irregular heartbeat. Do not attempt to re-warm the severely hypothermic victim; re-warming may cause the development of an irregular heartbeat. Severe hypothermia is a medical emergency, and the victim will be transported to the hospital immediately.

Prevention of cold stress is a function of whole body protection. Adequate insulated clothing will be worn when the air temperature drops below 50 °F. Reduced work periods may be necessary in extreme conditions to allow adequate periods in a warm area.

Appendix C: Floatables Monitoring Field Data Sheet