



**NASA Langley Research Center
Municipal Separate Storm Sewer System (MS4)
Annual Report**

Covering the period of July 1, 2021 – June 30, 2022



Submitted to the Virginia Department of Environmental Quality (DEQ) in compliance with Permit No. VAR040092

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Annual Reporting Requirements
Part I D 2

The annual report shall include the following general information:

- a. The permittee, system name, and permit number;
- b. The reporting period for which the annual report is being submitted;
- c. A signed certification as per Part III K;
- d. Each annual reporting item as specified in an MCM in Part I E; and
- e. An evaluation of the MS4 program implementation, including a review of each MCM, to determine the MS4 program's effectiveness and whether changes to the MS4 program plan are necessary.

General information:

- a. NASA Langley Research Center, VAR040092
- b. The reporting period for this annual report is July 1, 2021 through June 30, 2022
- c. The signed Certification Statement can be found on the last page of this annual report
- d. Each annual reporting item as specified in an MCM in Part I E can be found on pages 5-20.
- e. A Program evaluation can be found on pages 3 – 4.

Part I D 2 e - Evaluation of MS4 Program Implementation

The Program Plan has guided NASA Langley Research Center (LaRC) in effectively implementing the requirements of the permit. MS4 program effectiveness was evaluated through the LaRC Environmental Management Office (EMO) internal review process considering public input. Opportunities for improvement were evaluated and the program's implementation was determined to be effective, thus no major changes were necessary. A review of each MCM is included below:

MCM 1 – Three new high priorities were selected based on the most pressing stormwater-related issues at LaRC, and the public contact information was updated. LaRC continued to advertise educational outreach on the public website, through distribution of articles, flyers and targeted e-mails, and numerous training sessions. LaRC successfully informed a diverse audience on how to reduce stormwater pollution and improve the water quality of local waterways. This component of the program was evaluated for effectiveness through EMO internal review process and public input. It was found to be effective, and no changes are necessary.

MCM 2 – LaRC solicits public input via *Inside Langley*, an internal website available to all employees, to improve the Program Plan. Additionally, public input is encouraged at any time through our public environmental webpage. Reporting of illicit discharges is encouraged continuously during trainings, on our public website, and through outreach articles and flyers that are distributed quarterly. Personnel can contact EMO staff or visit the public site for information on LaRC's IDDE program. LaRC's environmental team coordinates a variety of internal events and advertises external events to encourage public involvement. This component of the program was evaluated for effectiveness through EMO internal review process and public input. DEQ suggested tracking public participation at these events, and the Program Plan has been updated to address this improvement.

MCM 3 – Illicit discharges are prohibited at LaRC and are addressed primarily through LaRC's IDDE Handbook, Langley Procedural Requirements (LPR) 8500.1, LaRC's approved Annual Standards and Specifications for Stormwater Management and Erosion and Sediment Control (AS&S), and annual trainings offered to personnel. LaRC also operates under a VPDES industrial permit and has robust procedures in place to minimize and prevent pollutant discharges. The IDDE component of the program was evaluated for effectiveness through EMO internal review process. This program was found to be effective, and no Program Plan changes are needed.

MCM 4 – This component of the program is implemented primarily through LaRC's DEQ approved AS&S and LaRC's Environmental Construction Specifications Section 01 35 40.00 99. The AS&S provides detailed information on LaRC's stormwater construction program and ensure compliance with all regulatory requirements as well as Part I E 4 a 3 of the MS4 permit. The AS&S are evaluated annually by DEQ, while this component of the program was evaluated for effectiveness through EMO internal review process. This program was found to be effective. No Program Plan changes are needed beyond updating program contact and certification information.

MCM 5 – This component of the program is implemented primarily through LaRC's approved AS&S. Projects also comply with LaRC's Environmental Construction Specifications Section 01 35 40.00 99 and NASA Environmental Design Standards. The EMO also provides continuous feedback during design and construction to ensure compliance. In addition, LaRC's Green Infrastructure Maintenance Handbook was developed and has been updated to ensure adequate long-term operation and maintenance of SWM facilities. Minor document updates were completed as needed. This component of the program was evaluated for effectiveness through EMO internal review process. This program was found to be effective, and no Program Plan changes are needed.

MCM 6 – LaRC uses a variety of operational and maintenance best management practices (BMPs) to prevent and minimize pollutant discharge during Center operations. Appropriate control measures and pollution prevention practices are implemented primarily through language in procedural documents, including the Environmental and Energy Program Manual (LPR 8500.1), LaRC’s AS&S, and LaRC’s IDDE Handbook. The Center also utilizes a robust training plan that includes targeted training for workers completing maintenance and construction tasks. LaRC also enforces the use of the Langley Form 461 (LF461), the “Environmental Project Planning Form”, that allows EMO to review projects and provide feedback or requirements to reduce environmental impacts. LaRC has met the requirement to develop and implement a SWPPP for the high-priority facility, Grounds Maintenance Yard, and continues to monitor and inspect the facility. Minor document updates were completed as needed. This component of the program was evaluated for effectiveness through EMO internal review process. The program was found to be effective. LaRC continues to make improvements in written procedures for onsite personnel and maintenance contractors, and updates the Program Plan accordingly.

Chesapeake Bay TMDL Special Conditions– LaRC submitted its Chesapeake Bay Phase Two Action Plan to the DEQ on October 31, 2019 and received approval from the DEQ on July 14, 2021. LaRC is implementing the action plan and the program has been found to be effective. The action plan is maintained and implemented by EMO, and a copy is available upon request.

Back River TMDL Special Conditions– LaRC was allocated a waste load reduction for the Back River TMDL. To meet conditions of Part II of the General Permit, LaRC developed and implemented an action plan. LaRC submitted its Back River Action Plan to the DEQ on May 5, 2021 and received approval from the DEQ on January 1, 2022. The action plan is maintained and implemented by EMO, and a copy is available upon request.

**Minimum Control Measure One – Public Education and Outreach
Annual Reporting Requirements – Part I E 1 g**

- (1) A list of the high-priority stormwater issues the permittee addressed in the public education and outreach program; and
- (2) A list of strategies used to communicate each high-priority stormwater issues.

The table below lists the high-priority stormwater issues addressed and the communication strategies used:

(1) High-Priority Stormwater Issues Addressed	(2) Strategies Used to Communicate
<p>Reducing Pollutants from Urban Wildlife</p>	<p>Media materials-</p> <ol style="list-style-type: none"> 1. Educational article: <i>Reducing Urban Wildlife Pollutants: Back River TMDL</i>. The article provides an overview of NASA Langley’s Back River bacterial TMDL and the potential cause and effect of the increasing level of fecal coliform in the waterway. The article highlights multiple actions NASA Langley has taken to reduce the amount of fecal coliforms entering the local waterways and steps individuals can take to reduce their stormwater impacts at the office and home. 2. Educational article: <i>Chesapeake Bay and Back River Waterways</i>. The article describes the Environmental Protection Agency (EPA) pollution limits placed on the Chesapeake Bay and the Chesapeake Clean Water Blueprint. The article explains some best management practices (BMPs) NASA Langley utilizes to assist Virginia in reaching TMDL goals for the Chesapeake Bay and the Back River. The article highlights Langley’s green infrastructure, ongoing projects, and the Grounds Maintenance contract that assist in pollution reduction for TMDL and bacterial discharges. The article also features every-day steps individuals can take to reduce water pollution at work and in their home, such as BMPs for yard maintenance to prevent illicit discharge and how to report illicit discharges or suspected water pollution on NASA Langley. <p>Metric and Evaluation of Benefits:</p> <ol style="list-style-type: none"> 1. <i>Reducing Urban Wildlife Pollutants: Back River TMDL</i>: Published 06/17/2022 on the public environmental website and advertised on <i>Inside Langley</i>. The <i>Inside Langley</i> advertisements received 117 “views” and the environmental website received 1,271 “hits”. 2. <i>Chesapeake Bay and Back River Waterways</i>: Published on 03/28/2022 to the public environmental website and advertised on <i>Inside Langley</i>. The <i>Inside Langley</i> advertisements received 137 “views” and our environmental website received 20,396 “hits*”.

(1) High-Priority Stormwater Issues Addressed	(2) Strategies Used to Communicate
<p>Water Pollution: Illicit Discharge Detection and Elimination (IDDE)</p>	<p>Media materials- Two (2) educational articles, <i>Keep It Clear- Keep <u>F</u>ats, <u>O</u>ils, and <u>G</u>rease Out of the Drain!</i>, and <i>Facility Stormwater Connections at NASA Langley</i>. The <i>Keep It Clear</i> article describes F.O.G. the importance of keeping it and other harmful chemicals out of drains, including at NASA Langley. The article provides preventative steps individuals can take at work and home. Additionally, the article discusses how LaRC Environmental staff work to prevent F.O.G. and other harmful substances/chemicals from entering drains on Center, and how staff frequently monitor NASA Langley’s sixteen (16) permitted stormwater outfalls to ensure clean and clear water is leaving Center.</p> <p>The <i>Facility Stormwater Connection</i> article provides an overview for employees returning to on-site work on the various stormwater connections at or around Center facilities in order to reacquaint employees with their specific stormwater connections, spill kits, spill procedures, and overall surroundings. The article identifies multiple examples of stormwater connections or green infrastructure personnel may encounter around their facility. Additionally, the article lays out the five steps for responding to illicit discharges and spills and provides emergency contact information for NASA Langley.</p> <p>Metric and Evaluation of Benefits: The education article <i>Keep It Clear-Keep <u>F</u>ats, <u>O</u>ils, and <u>G</u>rease Out of the Drain!</i> was published five times on 09/20/2022, 09/23/2022, 09/28/2022, 09/29/2022, and 09/30/2022 to the public environmental website and advertised via <i>atLaRC</i>. The article advertisement received a total of 196 “hits” and the webpage received 8,087 “hits*”. The educational article <i>Facility Stormwater Connections</i> was published on 12/17/2021 to the public environmental website and advertised via <i>Inside Langley</i>. The article received a total of 21 “views” and 43,585 “hits*”.</p> <p>Speaking engagements- A detailed list of training events conducted in accordance with Part I E 6 m can be found under MCM 6 section. The following training sessions covered topics on stormwater pollution prevention, detecting and reporting illicit discharges, and spill response: <i>Environmental Refreshers: Erosion, Stormwater, and Waste</i>, held on 05/02/2022; <i>Annual Facility Environmental Coordinator (FEC) trainings</i>, held on 08/12/2021, 08/24/2021, 08/31/2021, 09/01/2021, and 09/09/2021; <i>Annual Waste Management and Spill Response Training</i>, held on 07/20/2021, 08/11/2021, 11/09/2021, 06/14/2022, and 06/15/2022; <i>Stormwater, Recognizing Illicit Discharges and Other LaRC Water Program Information</i>, held on 11/02/2021 and 04/14/2022. LaRC received positive feedback on all events.</p>

(1) High-Priority Stormwater Issues Addressed	(2) Strategies Used to Communicate
<p>Chesapeake Bay and Back River TMDL Education</p>	<p>Media materials- an educational article <i>Reducing Urban Wildlife Pollutants: Back River TMDL</i>. The article provides a brief overview of NASA Langley’s Back River bacterial TMDL and the potential cause and effect of the increasing level of fecal coliform in the waterway. The article highlights multiple actions NASA Langley has taken to reduce the amount of fecal coliforms entering the local waterways and steps individuals can take to reduce their stormwater impacts at the office and home.</p> <p>An educational article <i>Chesapeake Bay and Back River Waterways</i>. The article describes the Environmental Protection Agency (EPA) pollution limits placed on the Chesapeake Bay and the Chesapeake Clean Water Blueprint. The article explains some best management practices (BMPs) NASA Langley utilizes to assist Virginia in reaching TMDL goals for the Chesapeake Bay and the Back River. The article highlights Langley’s green infrastructure, ongoing projects, and the Grounds Maintenance contract that assist in pollution reduction for TMDL and bacterial discharges. The article also features every-day steps individuals can take to reduce water pollution at work and in their home, such as BMPs for yard maintenance to prevent illicit discharge and how to report illicit discharges or suspected water pollution on NASA Langley.</p> <p>Metric and Evaluation of Benefits: The education article <i>Reducing Urban Wildlife Pollutants: Back River TMDL</i> was published on 06/17/2022 the public environmental website and advertised on <i>Inside Langley</i>. The <i>Inside Langley</i> advertisements received 117 “views” and the environmental website received 1,271 “hits”. The educational article <i>Chesapeake Bay and Back River Waterways</i> was published on 03/28/2022 to the public environmental website and advertised on <i>Inside Langley</i>. The <i>Inside Langley</i> advertisements received 137 “views” and our environmental website received 20,396 “hits*”.</p> <p>Speaking engagements- A detailed list of training events conducted in accordance with Part I E 6 m can be found under MCM 6 section. The following training sessions covered topics on stormwater pollution prevention, detecting and reporting illicit discharges, and spill response: <i>Environmental Refreshers: Erosion, Stormwater, and Waste</i>, held on 05/02/2022; <i>Annual FEC trainings</i>, held on 08/12/2021, 08/24/2021, 08/31/2021, 09/01/2021, and 09/09/2021; <i>Annual Waste Management and Spill Response Training</i>, held on 07/20/2021, 08/11/2021, 11/09/2021, 06/14/2022, and 06/15/2022; <i>Stormwater, Recognizing Illicit Discharges and Other LaRC Water Program Information</i>, held on 11/02/2021 and 04/14/2022. LaRC received positive feedback on all events.</p>

*NASA believes the “hits” count is inflated due to spam website interactions. The number of advertisement views was used to determine evaluation of benefits for the MS4 Annual Report.

**Minimum Control Measure Two – Public Education and Participation
Annual Reporting Requirements – Part I E 2 f**

- (1) A summary of any public input on the MS4 program received (including stormwater complaints) and how the permittee responded;
- (2) A webpage address to the permittee's MS4 program and stormwater website;
- (3) A description of the public involvement activities implemented by the permittee;
- (4) A report of the metric as defined for each activity and an evaluation as to whether the activity is beneficial to improving water quality; and
- (5) The name of other MS4 permittees with whom the permittee collaborated in the public involvement opportunities.

(1) LaRC requests public input on the MS4 program via the *Inside Langley* announcement system (accessible to all employees). Additionally, public input is encouraged at any time through the environmental public webpage (which is also routinely promoted). The following is a summary of public input received on the MS4 program:

Public Input Received	Response and Implementation
<p>10/26/2021: Public input was received from a LaRC employee giving feedback on current and future outreach activities. Some comments provided by the employee included but are not limited to:</p> <ul style="list-style-type: none"> • Infographic posters/handouts are easily digestible • Potential use of short video communications • Utilizing SharePoint calendar feature • Information for work and home • How to improve environmental practices at home • Keeping the website up to date with most recent information and workable links 	<p>LaRC was appreciative for the comments. Many of these ideas are things that LaRC is already completing annually, and the employee was pointing out the methods of communication they value. The employee was also adding emphasis on the importance of sharing ways individuals can improve their routines at home to reduce water pollution.</p> <p>LaRC will continue to promote its water quality program using easily digestible methods (handouts/posters/emails). The use of short videos is a method LaRC hasn't used before and is being evaluated as a new tool to reach audiences.</p> <p>LaRC is continuing to review the public webpage to ensure the most up to date information is available and to add more information on how to improve environmental practices for the home.</p>

(2) The LaRC MS4 program and stormwater website: <https://environmental.larc.nasa.gov/water/ms4/>.

(3,4, 5) Public involvement activities implemented during the reporting year are described below. Each subsection lists the metric defined for each and an evaluation of the activity benefits. Participation in events for all Center personnel was encouraged through promotion, sponsorship, and/or involvement.

Category of Public Involvement Opportunity – Educational Events

1) NASA Langley’s Earth Day/Arbor Day Expo

Activity Description: For much of 2021 and 2022, NASA Langley was still operating in a limit capacity under COVID-19 restraints. Therefore, EMO hosted the annual Earth Day and Arbor Day Expo virtually from 04/01/2022 to 05/03/2022. The virtual event was comprised of webinars, local tours, expo, volunteer opportunities, and a nature photo contest. The Earth Day expo featured seven websites including LaRC earth science programs and local environmental groups, such as askHRgreen, The Recycling Partnership, Elizabeth River Project, National Park Service, and EarthDay.org. These sites linked to daily environmental challenges, educational content, outreach flyers, and sustainability tips.

Metric and Evaluation of Water Quality Benefits: The event was coordinated by EMO staff, and announcements were advertised on the *Inside Langley* announcement page, the public environmental blog, and center-wide emails. The *Inside Langley* announcements received a total of 279 “views” from 04/01/2022 to 05/03/2022. The nature photo contest received 36 entries, the *Installing Solar* webinar had 11 attendees, the *24 ways to Kill a Tree* webinar had 17 attendees, the *Preventing and Reporting Water Pollution* webinar had 8 attendees, and the *Global Climate Change* webinar had 25 attendees. Attendees learned about impacts of stormwater pollution, water and energy conservation, proper techniques for tree care, and climate change impacts. The virtual format of the overall event was well received and LaRC was able to cross promote local community events and those from other NASA centers.

2) Joint Base Langley Eustis – Langley Volunteer Opportunities

Activity Description: LaRC partnered with another MS4 permittee, Joint Base Langley Eustis (JBLE-L), for multiple volunteer opportunities throughout the month of April. Events included Spring Bird Count, Nature Trail Restoration, Langley Clean-up, Frog Ladder Building, and an Arbor Day Tree Celebration. LaRC advertised these volunteer opportunities on the *Inside Langley* announcement page, public environmental blog, and center-wide emails.

Metric and Evaluation of Water Quality Benefits: The event was coordinated by EMO staff, and announcements were advertised on the *Inside Langley* announcement page, the public environmental blog, and center-wide emails. The advertisements received numerous views and NASA contributed eight volunteers to the events. The Spring Bird Count observed 686 individual birds of 70 different species; Nature Trail Restoration project was able to replace 14 boards and spread fresh mulch throughout the trail; Langley Clean-up was able to remove 118 pounds of trash from along the shores and waterways of the facility; a total of 7 Frog Ladders were built and installed in storm drains around the installation; and during the Arbor Day Tree Celebration, JBLE-L celebrated 22 years as a Tree City by planting a redbud tree with the assistance of The Department of Forestry.

Category of Public Involvement Opportunity – Disposal or Collection Events

1) Household hazardous chemicals collection

Activity Description: LaRC promotes local household chemical collection events held around Hampton Roads throughout the year. Advertising collection events for proper disposal of household chemicals

prevents the waste from potentially entering our local landfills, waterways, and groundwater. These events are promoted through the *Inside Langley* announcement page.

Metric and Evaluation of Water Quality Benefits: LaRC promoted several collection events via *Inside Langley* announcements. The advertisements ran on throughout the year and received a total of 112 “views”. During LaRC’s annual Waste Management Spill Response trainings, attendees were polled to see who participated in an advertised collection event. A total of 67 attendees responded in the affirmative. Household chemical collection events occur throughout the year and serve communities that surround NASA Langley.

2) NASA Langley Plastic Bag Recycling

Activity Description: LaRC continued its partnership with the York/Poquoson Master Gardeners to recycle plastic bags and film packaging. LaRC collected plastic bag material from Center personnel for four weeks in observance of Earth Day/Arbor Day Month in April 2022. All plastic material collected on Center was donated to the York/Poquoson Master Gardeners to make composite benches for community parks, schools, or learning gardens.

Metric and Evaluation of Water Quality Benefits: The event was coordinated by EMO staff, and announcements were posted on the *Inside Langley* events calendar and public environmental blog throughout the month of April 2022. NASA volunteers collected 152 pounds of plastic and film in 2022. This brings the total amount of recycled single-use plastic material up to 1,623 pounds since 2016.

3) 34th Annual Clean the Bay Day

Activity Description: The 34th Annual Clean the Bay Day by the Chesapeake Bay Foundation was a five-day event spanning from 05/31/2022 through 06/04/2022. This year’s week-long event ensured volunteers had the flexibility to participate and introduced participants to some of the greater unseen problems the Chesapeake Bay watershed faces. LaRC partnered with JBLE-L for a shoreline clean up event.

Metric and Evaluation of Water Quality Benefits: LaRC promoted the partnership of the JBLE-L event via *Inside Langley* announcements. The advertisements received numerous views and NASA contributed one volunteer to the event. The JBLE-L clean-up event included 85 volunteers throughout the week and removed approximately 3220 pounds of trash along 18 miles of shoreline. The most common items removed were many pieces of lumber, numerous plastic bottles, and plastic bags.

Category of Public Involvement Opportunity – Restoration

1) Arbor Day Tree Planting

Activity Description: NASA Langley completed a reforestation project in April 2022. The Environmental Office coordinated a project to convert 1.25 acres of open space to a forested area, providing new wildlife and riparian buffer habitat, reducing erosion, and improving local water quality. The reforestation effort was completed utilizing the Grounds contract and called for planting 500 seedlings of a mixture of hardwood and pine species. The project’s completion was announced via *Inside Langley* on 4/14/2022 and received 50 “views”.

Metric and Evaluation of Water Quality Benefits: Prior to planting, LaRC provided educational training to the Grounds contract personnel on the benefits of new reforestation areas and planting best practices. LaRC also provided education on the use of tree shelter tubes with protective bird netting. Additionally, outreach to Center personnel was provided on the new reforestation area through an educational flyer and

presentations to various NASA agency groups. The 1.25-acre forest area borders the wetlands and reduces runoff and erosion, while providing valuable habitat LaRC's natural resources.

2) America Recycles Day

Activity Description: Hampton Roads and askHRgreen.org celebrated *America Recycles Day* on November 13 and 20, 2021. This two-day event is the only nationally recognized day dedicated to promoting and raising awareness about recycling in the U.S. In Hampton Roads, the event was focused on curbside recycling and how to reduce household waste.

Metric and Evaluation of Water Quality Benefits: LaRC participated through promotion of this event via *Inside Langley* announcements. The announcement was published November 2021 and received 73 "views". By advertising the *America Recycles Day* event, LaRC increases public awareness for environmental restoration activities and promotes community participation. LaRC's year-round recycling program has high participation, but this event encourages employees to reduce and reuse in their local communities as well to protect local waterways.

**Minimum Control Measure Three – Illicit Discharge Detection and Elimination
Annual Reporting Requirements – Part I E 3 e**

- (1) A confirmation statement that the MS4 map and information table have been updated to reflect any changes to the MS4 occurring on or before June 30 of the reporting year;
- (2) The total number of outfalls screened during the reporting period as part of the dry weather screening program; and
- (3) A list of illicit discharges to the MS4 including spills reaching the MS4 with information as follows:
 - (a) The source of illicit discharge;
 - (b) The dates that the discharge was observed, reported, or both;
 - (c) Whether the discharge was discovered by the permittee during dry weather screening, reported by the public, or other method (describe);
 - (d) How the investigation was resolved;
 - (e) A description of any follow-up activities; and
 - (f) The date the investigation was closed.

- (1) **Confirmation Statement:** LaRC's MS4 map and information table have been updated to reflect any changes to the MS4 occurring on or before 06/30/2022. LaRC will continue to maintain a robust GIS-based MS4 map that includes a storm sewer map and information table.
- (2) NASA LaRC has 16 MS4 outfalls. All 16 outfalls were inspected quarterly, totaling 64 inspections during the reporting period. Additionally, visual outfall inspections often occur weekly for several outfalls in the core industrial area. Screening reports are stored physically and electronically with the EMO.
- (3) A total of four (4) illicit discharges were reported and investigated:

Illicit Discharge Investigation #1: Metal Cutting Fluid Outfall #009

- (a) Coolant level in a CNC milling machine was low and an operator added 25 gallons of coolant mixture (mixed at 92% water and 8% coolant) to the reservoir. The CNC machine is situated on top of an old utility trench. An unknown floor drain (not on any records dating back to 1969) that was not properly plugged during a previous renovation sits at the bottom of the trench. Metal chips likely blocked the coolant flow causing coolant to overflow from the machine's containment and enter the utility trench and ultimately the storm drain;
- (b,c) Observed and reported by Jacobs Environmental personnel on 10/20/2021. Jacobs Environmental received a report from the maintenance employee conducting routine outfall maintenance at Outfall #009;
- (d-f) Immediately the NASA Fire Department and other spill response personnel began placing absorbents and sandbags past the outfall. Oil absorbent booms were also placed about 50 yards downstream from Outfall #009. A vacuum truck and two 21,000 gallon frac tanks were used to pump out the storm system at various manholes in between the facility and the outfall. LaRC also flushed water from the floor drain inside B1225 where the spill originated with a vacuum truck positioned at the closest downstream manhole until the water ran clear. The absorbent booms and sandbags were removed 10/25/2021 and the outfall was monitored throughout the week to determine if additional response was needed. The investigation was closed on 10/29/2021.

Illicit Discharge Investigation #2: Puddle Sheen

- (a) Sheen observed in a small puddle on an impervious surface near a work vehicle;
- (b,c) Observed and reported by LaRC environmental personnel during a routine construction inspection on 02/23/2022;
- (d-f) Jacobs Environmental immediately placed absorbent socks and oily absorbent pads to mitigate the sheen. The sheen was not observed in any storm drain or outfall. The investigation was closed on 02/23/2022.

Illicit Discharge Investigation #3: North 40 Concrete Wash Water

- (a) Liquid from a construction project concrete washout dumpster was observed actively leaking;
- (b,c) Observed and reported by LaRC environmental personnel during a routine construction inspection on 04/28/2022;
- (d-f) EMO notified the contractor utilizing the concrete washout and explained the issues to the prime contractor. The contractor proceeded to clean up the spilled washout material and mitigated contaminated rock and soil. The investigation was closed on 04/28/2022.

Illicit Discharge Investigation #4: North 40 Concrete Wash Water

- (a) Liquid from a construction project concrete washout dumpster was observed actively leaking;
- (b,c) Observed and reported by LaRC environmental personnel during a routine construction inspection on 06/07/2022;
- (d-f) EMO notified the contractor utilizing the concrete washout. The contractor proceeded to clean up the spilled washout material and raised one end of the dumpster to prevent potential future leaks. The investigation was closed on 06/07/2022.

Minimum Control Measure Four – Construction Site Stormwater Runoff Control Annual Reporting Requirements – Part I E 4 d		
<p>(1) If the permittee implements a construction site stormwater runoff program in accordance with Part I E 4 a (3):</p> <p style="margin-left: 40px;">(a) A confirmation statement that land disturbing projects that occurred during the reporting period have been conducted in accordance with the current department approved standards and specifications for erosion and sediment control; and</p> <p style="margin-left: 40px;">(b) If one or more of the land disturbing projects were not conducted with the department approved standards and specifications, an explanation as to why the projects did not conform to the approved standards and specifications.</p> <p>(2) Total number of inspections conducted; and</p> <p>(3) The total number and type of enforcement actions implemented and the type of enforcement actions.</p>		

- (1) NASA LaRC implements a construction site stormwater runoff program in accordance with Part I E 4 a (3).
- (a) **Confirmation Statement:** Land disturbing projects that occurred during the reporting period have been conducted in accordance with the current Department approved standards and specifications for erosion and sediment control and stormwater management.
- (b) Not applicable.
- (2) The total number of NASA LaRC (MS4 staff) inspections conducted was 44 for the reporting year.
- (3) Per approved LaRC Annual Standards and Specifications, the contractor may remedy minor deficiencies that have no environmental impacts without formal enforcement action, if this is done in a timely manner and not a recurring issue. One (1) issue required formal enforcement action, through a signed *Corrective Action Notice* form.

Project and No. of Enforcement Actions	Type of Enforcement	Issues Driving the Enforcement
<p>VAR10P840: 1 Enforcement Action</p>	<p>Formal written Corrective Action Notice (CAN) submitted to the contractor and project team.</p> <p>Required corrective action to be completed within 72 hours.</p> <p>Issue was corrected and closed out on time.</p>	<ul style="list-style-type: none"> • 03/04/2022 – Maintaining SWPPP Compliance: Unprotected inlet with inadequate controls (B1200 site). • Observed inlet that has been improperly protected using filter fabric – Inlets are to be protected in accordance with the ESC Plan of the SWPPP to prevent an environmental release. Inlet is in a high-risk area and has been noted as needing attention on NASA’s 2/23 and 2/25 inspection reports. • Action Required: Install inlet protection in accordance with the SWPPP. Implement corrective action in accordance with timeline below.

**Minimum Control Measure Five – Post Construction Stormwater Management
Annual Reporting Requirements – Part I E 5 i**

- (1) Implementation of a Virginia Stormwater Management Program in accordance with Part I E 5 a (1) and (2); (a) & (b)
- (2) Total number of inspections conducted on stormwater management facilities owned or operated by the permittee;
- (3) A description of the significant maintenance, repair, or retrofit activities performed on the stormwater management facilities owned or operated by the permittee to ensure it continues to perform as designed. This does not include routine activities such as grass mowing or trash collection;
- (4) A confirmation statement that the permittee submitted stormwater management facility information through the Virginia Construction Stormwater General Permit database for those land disturbing activities for which the permittee was required to obtain coverage under the General VPDES Permit for Discharges of Stormwater from Construction Activities in accordance with Part I E 5 f or a statement that the permittee did not complete any projects requiring coverage under the General VPDES Permit for Discharges of Stormwater from Construction Activities; and
- (5) A confirmation statement that the permittee electronically reported BMPs using the DEQ BMP Warehouse in accordance with Part I E 5 g and the date on which the information was submitted.

- (1) Not applicable. LaRC does not implement a Virginia SWM Program in accordance with Part I E 5 a (1) and (2). LaRC's SWM program fits Part I E 5 a (3).
- (2) Thirty-two (32) formal inspections were conducted, once for each of the 32 stormwater management facilities operated at LaRC. EMO and the support contractor also conduct frequent SWM facility inspections during construction as part of the Construction General Permit (CGP) inspection process.
- (3) Much of the maintenance completed on the SWM facilities was routine (sweeping, weeding, mulch applications, litter removal, etc.). There was no significant maintenance to SWM facilities performed.
- (4) **Confirmation Statement:** LaRC had three projects under the General VPDES Permit for Discharges of Stormwater from Construction Activities during the permit year. All projects obtained proper coverage through the DEQ. Below is a summary of LaRC's projects:
 - VAR10J220 (B2104 Construction): Received Notice of Termination on 04/08/2022
 - VAR10P840 (B1194/B1200 Demolition): Ongoing; Received coverage on 06/23/2021
 - VAR10Q866 (B2105 Construction): Ongoing; Received coverage on 03/22/2022
- (5) **Confirmation Statement:** LaRC electronically reported BMPs using the DEQ BMP Warehouse on 09/27/2021. The approved submission was labeled as 20210927.

**Minimum Control Measure Six – Pollution Prevention/Good Housekeeping
Annual Reporting Requirements – Part I E 6 q**

- (1) A summary of any operational procedures developed or modified in accordance with Part I E 6 a during the reporting period;
- (2) A summary of any new SWPPPs developed in accordance Part I E 6 c during the reporting period;
- (3) A summary of any SWPPPs modified in accordance with Part I E 6 f or the rationale of any high priority facilities delisted in accordance with Part I E 6 h during the reporting period;
- (4) A summary of any new turf and landscape nutrient management plans developed that includes:
 - (a) Location and the total acreage of each land area; and
 - (b) The date of the approved nutrient management plan
- (5) A list of the training events conducted in accordance with Part I E 6 m, including the following information:
 - (a) The date of the training event;
 - (b) The number of employees who attended the training event; and
 - (c) The objective of the training event.

- (1) LaRC has not developed any new or modified any existing operational procedures during the reporting period. Existing written procedures are in accordance with Part I E 6 a, and are summarized in the MS4 Program Plan.
- (2) No new SWPPPs were developed during the reporting period. One existing SWPPP continued to be implemented.
- (3) No SWPPP modifications were needed or implemented. The one high priority facility was not delisted during the reporting period.
- (4) No new turf and landscape nutrient management plans were developed during the reporting period. LaRC has no applicable lands where nutrients are applied to a contiguous area of more than one (1) acre.
- (5) The following is a summary of completed training during the reporting year:

Training Requirement/ Objective	Selected Audience	Summary
<p>(1) Field personnel receive training in the recognition and reporting of illicit discharges no less than once per 24 months</p>	<p>Facility Environmental Coordinators (FECs)</p>	<p>Annual FEC Training – Trainings were held on 08/12/2021, 08/24/2021, 08/31/2021, 09/01/2021, and 09/09/2021 with 16, 10, 13, 3, and 4 attendees, respectively. A total of 46 FECs were trained. FECs are asked to monitor their facilities for illicit discharge concerns and are the primary “eyes and ears” for the EMO. The FEC training course goes into detail about stormwater pollution prevention and the importance of LaRC’s IDDE program. It also discusses how to make proper reports to the EMO.</p> <p>Annual Waste Management and Spill Response Training – Trainings were held on 07/20/2021, 08/11/2021, 11/09/2021, 06/14/2022, and 6/15/2022 with 80, 56, 87, 145, and 149 attendees, respectively. This annual training is mandatory for all Center employees (including FECs) that use, handle, or request disposal of hazardous materials, oils, or hazardous waste. A total of 517 Center employees were trained. Stormwater pollution prevention is covered in the training, along with appropriate spill response to prevent materials from reaching storm drains.</p>
	<p>Environmental Management Office (EMO) employees, Jacobs (primary Center contractor) personnel, and any interested LaRC personnel</p>	<p>Illicit Discharge/Stormwater Management Training – Center-wide training sessions, titled <i>Stormwater, Recognizing Illicit Discharges and Other LaRC Water Program Information</i>, were held on 11/02/2021 and 04/14/2022 with 54 and 7 attendees, respectively. This training focused on stormwater runoff pollution, impacts on water quality, and possible sources of pollution around LaRC facilities. The training also provided tips on how to recognize illicit discharges, and resources available at LaRC to report an illicit discharge.</p>
	<p>Personnel who handle waste on Center.</p>	<p>Annual Waste Management and Spill Response Training – Trainings were held on 07/20/2021, 08/11/2021, 11/09/2021, 06/14/2022, and 6/15/2022 with 80, 56, 87, 145, and 149 attendees, respectively. This annual training is mandatory for all Center employees (including FECs) that use, handle, or request disposal of hazardous materials, oils, or hazardous waste. A total of 517 Center employees were trained. Stormwater pollution prevention is covered in the training, along with appropriate spill response to prevent materials from reaching storm drains.</p>

Training Requirement/ Objective	Selected Audience	Summary
<p>(2) Employees performing road, street, and parking lot maintenance receive training in pollution prevention and good housekeeping associated with those activities no less than once per 24 months</p>	<p>Grounds Maintenance Contractor</p>	<p>Grounds Management Training – This training is delivered biannually. The most recent training was held on 06/10/2021 and had a total of 10 attendees. The training is focused on several stormwater best management practices specific to their daily workload, including the management of grass clippings, removing debris from catch basins, and spill cleanup. Attendees were also given information on what illicit discharges might look like at LaRC, and how to report issues or concerns of water pollution to the EMO.</p>
	<p>Jacobs (primary Center contractor) Personnel, and any interested LaRC personnel</p>	<p>Maintenance and Construction Specific Stormwater Management Training – A special training session, titled <i>Environmental “Refreshers” Erosion, Stormwater, and Waste</i>, was held on 05/02/2022 with 47 attendees. This training educated personnel on the stormwater connections around LaRC and reviewed types of illicit discharges, various types of erosion and sediment controls, and possible sources of pollution in the workplace. The training also provided tips on how to properly utilize the LF461 <i>Environmental Project Planning Form</i> prior to the start of any projects. This form allows the EMO to define ESC and SWM requirements prior to the start of any construction or maintenance task. Specific Technical Points of Contact and Program Manager trainings were held on 09/22/2021 and 05/10/2022 with 36 and 28 attendees, respectively.</p>
<p>(3) Employees working in and around maintenance, public works, or recreational facilities receive training in good housekeeping and pollution prevention practices associated with those facilities no less than once per 24 months</p>	<p>Facility Environmental Coordinators (FECs)</p>	<p>Annual FEC Training – Trainings were held on 08/12/2021, 08/24/2021, 08/31/2021, 09/01/2021, and 09/09/2021 with 16, 10, 13, 3, and 4 attendees, respectively. A total of 46 FECs were trained. FECs are asked to monitor their facilities for illicit discharge concerns and are the primary “eyes and ears” for the EMO. The FEC training course goes into detail about stormwater pollution prevention and the importance of LaRC’s IDDE program. It also discusses how to make proper reports to the EMO.</p> <p>Annual Waste Management and Spill Response Training – Trainings were held on 07/20/2021, 08/11/2021, 11/09/2021, 06/14/2022, and 6/15/2022 with 80, 56, 87, 145, and 149 attendees, respectively. This annual training is mandatory for all Center employees (including FECs) that use, handle, or request disposal of hazardous materials, oils, or hazardous waste. A total of 517 Center employees were trained. Stormwater pollution prevention is</p>

Training Requirement/ Objective	Selected Audience	Summary
		covered in the training, along with appropriate spill response to prevent materials from reaching storm drains.
	Jacobs (primary Center contractor) Personnel	<p>Maintenance Stormwater Management Training – A special training session, titled <i>Environmental “Refreshers” Erosion, Stormwater, and Waste</i>, was held on 05/02/2022 with 47 attendees. This training educated personnel on the stormwater connections around LaRC and reviewed types of illicit discharges, various types of erosion and sediment controls, and possible sources of pollution in the workplace. The training also provided tips on how to properly utilize the LF461 <i>Environmental Project Planning Form</i> prior to the start of any projects. This form allows the EMO to define ESC and SWM requirements prior to the start of any construction or maintenance task. Specific Technical Points of Contact and Program Manager trainings were held on 09/22/2021 and 05/10/2022 with 36 and 28 attendees, respectively.</p>
	Grounds Maintenance Contractor	<p>Grounds Management Training – This training is delivered biannually. The most recent training was held on 06/10/2021 and had a total of 10 attendees. The training is focused on several stormwater best management practices specific to their daily workload, including the management of grass clippings, removing debris from catch basins, and spill cleanup. Attendees were also given information on what illicit discharges might look like at LaRC, and how to report issues or concerns of water pollution to the EMO.</p>
(4) Employees and contractors hired by the permittee who apply pesticides and herbicides are trained or certified in accordance with the Virginia Pesticide Control Act.	Grounds Maintenance Contractor	<p>LaRC has very limited recreational facilities due to its small size. There are a few ball/soccer fields and tennis court areas, but no nutrients are applied. However, LaRC reviews good housekeeping and pollution prevention practices around Center, including these facilities, during Grounds Management Training. The Grounds Maintenance contract is responsible for the minor amounts of pesticides and herbicides applied on Center. The program is primarily need-based and done via spot treatments (e.g., someone calls in a wasp nest to be sprayed). LaRC has required, through specific contract language, that the Grounds Maintenance contract operator carry all required applicator licenses. This contract language ensures that this requirement is met, or the operator can’t work at LaRC.</p>

Training Requirement/ Objective	Selected Audience	Summary
<p>(5) Employees and contractors serving as plan reviewers, inspectors, program administrators, and construction site operators obtain the appropriate certifications as required under the Virginia Erosion and Sediment Control Law and its attendant regulations; and (6) Employees and contractors implementing the stormwater program obtain the appropriate certifications as required under the Virginia Stormwater Management Act and its attendant regulations;</p>	<p>Environmental Management Office (EMO)</p>	<p>Mrs. Ande Remington serves as LaRC’s Water Program Manager. Mrs. Remington oversees all ESC and SWM Plan reviews and inspection programs. Mrs. Remington has ESC and SWM Combined Administrator certifications.</p> <p>Ande Remington, Certification #DCA0291 (Expires 10/29/2025)</p> <p>Mr. Sarat Calamur supports LaRC’s Water Program by participating in plan reviews and overseeing the inspection programs. Mr. Calamur has ESC and SWM Combined Administrator certifications.</p> <p>Sarat Calamur, Certification #DCA0487 (Expires 9/22/2023)</p> <p>Ms. Jazmin Argarin provides contract support to LaRC’s Water Program Manager. Support includes site inspections and conducting multi-media field inspections of construction sites and maintenance tasks. Ms. Argarin is a Dual Combined Inspector and Dual Combined Plan Reviewer for ESC and SWM.</p> <p>Dual Combined Inspector #DIN0965 (Expires 8/11/2024)</p> <p>Dual Plan Reviewer #DPR0193 (Expires 05/24/2025)</p> <p>Ms. Jennifer Bradley also provides additional contract support to LaRC’s Water Program Manager and conducts multi-media field inspections of construction sites and maintenance tasks. Ms. Jennifer Bradley is a Dual Combined Inspector for ESC and SWM.</p> <p>Dual Combined Inspector #DIN1614 (Expires 02/15/2025)</p>
<p>(7) Employees whose duties include emergency response have been trained in spill response. Training of emergency responders such as firefighters and law-enforcement officers on the handling of spill</p>	<p>All applicable Center Personnel</p>	<p>Annual Waste Management and Spill Response Training – Trainings were held on 07/20/2021, 08/11/2021, 11/02/2021, 06/14/2022, and 6/15/2022 with 80, 56, 87, 145, and 149 attendees, respectively. This annual training is mandatory for all Center employees (including FECs) that use, handle, or request disposal of hazardous materials, oils, or hazardous waste. A total of 517 Center employees were trained. Stormwater pollution prevention is covered in the training, along with appropriate spill</p>

Training Requirement/ Objective	Selected Audience	Summary
<p>releases as part of a larger emergency response training shall satisfy this training requirement and be documented in the training plan.</p>		<p>response to prevent materials from reaching storm drains.</p>
	<p>Emergency responders such as firefighters and law-enforcement officers</p>	<p>Emergency responders receive training on the handling of spill releases as part of a larger emergency response training. This includes personnel from the NASA LaRC Fire Department, and the on-site HAZMAT Response contractor.</p>

Part II TMDL Summaries	
TMDL Special Conditions – Chesapeake Bay TMDL Annual Reporting Requirements – Part II A 13	
a.	A list of BMPs implemented during the reporting period but not reported to the DEQ BMP Warehouse in accordance with Part I E 5 g and the estimated reduction of pollutants of concern achieved by each and reported in pounds per year;
b.	If the permittee acquired credits during the reporting period to meet all or a portion of the required reductions in Part II A 3, A 4, or A 5, a statement that credits were acquired;
c.	The progress, using the final design efficiency of the BMPs, toward meeting the required cumulative reductions for total nitrogen, total phosphorus, and total suspended solids; and
d.	A list of BMPs that are planned to be implemented during the next reporting period.

- a. All BMPs implemented during the reporting period were reported to the DEQ BMP Warehouse in accordance with Part I E 5 g. Submission ID was 20210927.
- b. Not applicable. NASA LaRC did not acquire credits to meet required reductions.
- c. The cumulative progress is detailed in the table below. The tasks scheduled for PY4 were annual street sweeping, catch basin cleaning, land use change (reforestation), and land conversion via demolition of facilities. Due to COVID and funding impacts, the schedule of buildings planned for demolition was altered. In PY4, the construction of B2105 began and the demolition of B1194 and B1200 continued. NASA LaRC completed a 1.25-acre reforestation project (pervious to forest land use change, and forest buffer credit). The following table outlines the progress toward meeting the required cumulative reductions for total nitrogen, total phosphorus, and total suspended solids.

Permit Cycle 2 progress for end of PY4:

Sub source	Pollutant	Permit Cycle 2 Progress		
		Load Reduction by End of Permit Cycle	Total Load Reduction Achieved to Date	Remaining Load Reductions Planned PY5
Regulated Urban Impervious	TN	57.28	42.72	33.1
Regulated Urban Pervious		46.04	11.33	14.0
Regulated Urban Impervious	TP	21.03	11.07	6.4
Regulated Urban Pervious		3.71	1.08	1.7
Regulated Urban Impervious	TSS	7952.08	3413.1	2352.1

Regulated Urban Pervious		638.79	188.23	172.3
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Cumulative progress (all permit years) achieved by end of PY4:

Sub source	Pollutant	Total Required Reduction (lbs)	Cumulative Total Load Reductions Achieved as of 6/30/22	Percent Complete
Regulated Urban Impervious	TN	143.2	142.7	99.67%
Regulated Urban Pervious		115.1	42.3	36.78%
Regulated Urban Impervious	TP	52.6	33.1	62.82%
Regulated Urban Pervious		9.3	4.2	45.04%
Regulated Urban Impervious	TSS	19880.2	10970.1	55.18%
Regulated Urban Pervious		1597.0	715.2	44.79%

d. The following is a list of control measures expected to be implemented during PY5:

- Three facilities (B1202, B1299, B1256) planned for demolition (pending funding) will equate to a land-use change removing 5.23 acres of impervious surface and converted to a grass condition.
- One-acre reforestation activity is scheduled that will equate to a land-use change of pervious to forest and include the credit for forest buffer.
- A 0.6-acre turf area will be converted back to a natural wetland area. This is planned as a land use change (turf to mixed open) and will include the credit for forest buffer.
- LaRC will continue the street sweeping program, annual mass load credit approach, during PY5.
- LaRC will continue to implement a catch basin cleaning program.
- LaRC will continue to implement ESC controls on land disturbing activities.

<p>Part II TMDL Summaries</p> <p>Local TMDL Special Conditions – Back River TMDL</p> <p>Annual Reporting Requirements – Part II B 9</p> <p>For each reporting period, each annual report shall include a summary of actions conducted to implement each local TMDL action plan.</p>
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The following is a summary of planned and completed actions during the reporting year and permit cycle, per LaRC’s Back River TMDL Action Plan:

Actions for Permit Cycle: Nov 1, 2018 through Oct 31, 2023

Action	Schedule/Frequency	Implementation Status
Finalize and publish LaRC’s Back River TMDL Action Plan to the public website; advertise to LaRC personnel via the @LaRC employee notification system	May 2021	Completed May 25, 2021
Complete the public website update to include information on the Back River TMDL	June 2021	Completed May 25, 2021; maintained throughout permit year
Publish an educational article to the public website; advertise to LaRC personnel via the @LaRC employee notification system	At least one article annually	LaRC published the following educational articles to the public website and advertised to LaRC personnel via the <i>Inside Langley</i> employee notification system: <ul style="list-style-type: none"> • <i>Reducing Urban Wildlife Pollutants in the Back River</i> published 06/21/2022, received 117 “views” • <i>Back River and Chesapeake Bay Waterways</i> published 03/28/2022, received 137 “views” • Five educational articles on LaRC’s native wildlife and safety information on wildlife interactions.
Complete training on stormwater and water quality, with added emphasis on	LaRC Facility Environmental Coordinator (FEC) training	At least two “in person” classes annually; virtual training available anytime
		LaRC Annual FEC training held five “in person” classes training a total of 46 FECs. Additionally, several FEC’s completed the training via a

pollutants and urban wildlife			recorded on-demand training option.
	Illicit Discharge Specific Stormwater Management Training for the Center’s primary maintenance contractor personnel and any interested LaRC personnel	Annually	<p>LaRC held the following training sessions:</p> <ul style="list-style-type: none"> • <i>Stormwater, Recognizing Illicit Discharges and Other LaRC Water Program Information</i> training held two virtual classes (11/02/2021 and 04/14/2022); training a total of 61 employees. • <i>Environmental “Refreshers” Erosion, Stormwater, and Waste Training</i> was held on 05/02/2022 with 47 attendees.
	LaRC Waste Management and Spill Response Training	At least three “in person” classes annually; virtual training available anytime	<p>LaRC Annual Waste Management and Spill Response training held five “in person” classes training a total of 517 employees. Additionally, several LaRC personnel completed the training via a recorded on-demand training option.</p>
	Grounds Maintenance Contractor Stormwater Management (Best Management Practices) Training	Biannually	The most recent training was held on 06/10/2021 and had a total of 10 attendees.
	Maintenance-Specific Stormwater Management Training for maintenance personnel performing roadway and recreational area maintenance	Biannually	A special training session, titled <i>Environmental “Refreshers” Erosion, Stormwater, and Waste</i> , was held on 05/02/2022 with 47 attendees.

Signed Certification Statement

“I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.”


Kristen Poultney, Environmental Branch Head

9/29/2022
Date

VAR040092 NASA Langley Research Center
Permit Number MS4 Name