

**The City of Tucson’s
Stormwater Annual Report
(Fiscal Year 2018–19)**

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Annual Report Form
For Phase I MS4's -Due September 30th Each Year

PART 1: GENERAL INFORMATION

- A. Name of Permittee: City of Tucson
- B. Permit Number: AZS000001-2010
- C. Reporting Period: July 1, 2018 - June 30, 2019
- D. Name of Stormwater Management Program Contact:
Elizabeth Leibold, P.E., CPM, CFM
Mailing Address: P.O. Box 27210
City: Tucson Zip: 85726-7210 Phone: (520) 837-4934
Fax Number: (520) 791-5902 Email: Elizabeth.Leibold@tucsonaz.gov
- E. Name of Certifying Official: Diana W. Alarcon
Title: Director of Transportation
Mailing Address: P.O. Box 27210
City: Tucson Zip: 85726-7210 Phone: (520) 791-4371
Fax Number: (520) 791-5902 Email: Diana.Alarcon@tucsonaz.gov

PART 2: ANNUAL REPORT CERTIFICATION

The Annual Report Form must be signed and certified by either a principal executive officer or ranking elected official; or by a “duly authorized representative” of that person in accordance with Sections 9.2 and 9.12 of the permit.

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 gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering 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.

Signature of Certifying Official (Transportation Department Director)

Date

PART 3: SUMMARY OF STORMWATER MANAGEMENT ACTIVITIES

Overview

The City of Tucson was covered under Municipal National Pollutant Discharge Elimination System (NPDES) Stormwater Permit AZS000001 from March 19, 1997 to August 31, 2011. During that time period, the City developed several programs to improve stormwater quality and maintain compliance with the permit. On September 1, 2011, Arizona Department of Environmental Quality (ADEQ) issued the City of Tucson AZPDES Stormwater Permit AZS000001-2010. The City of Tucson is awaiting ADEQ's issuance of the new General MS4 Large (Phase 1) Permit; therefore, this is the eighth reporting year of the permit's term. Like last year, ADEQ provided an extension to the 2011-2016 permit. This report covers the time period of July 1, 2018 through June 30, 2019.

Over the last year, ADEQ has begun to revise the stormwater permits, and there may be a new General MS4 multi-jurisdictional permit created. As our responsibility to the community, the City of Tucson Stormwater Management staff is working with the Phase I Stormwater Coalition on the stakeholder input for the various new ADEQ stormwater permits that are anticipated to be issued by ADEQ in 2020.

The City has completed this year's requirements based on the 2011-2016 Permit, as summarized in this annual report. Most of the programs developed under the previous permit have been continued or refined, and are currently utilized to protect stormwater quality. In keeping with the requirements of the 2011 permit, the City includes Green Infrastructure principals in the planning and construction of main arterial routes. Recently our Mayor and Council have approved a new Green Infrastructure Fee Program that will fund green infrastructure capital plans and maintenance activities as part of our MS4 permit. Low Impact Development has become part of the culture in design. Other requirements under the 2011 permit have been utilized to fine tune the stormwater program. With high number of private potable wells and the community's commitment to a clean environment per Plan Tucson, the City of Tucson treats stormwater management as an important aspect of keeping our water clean and safe.

I. Stormwater Public Education and Outreach

A. STORMWATER OUTREACH TOPICS AND EVENTS

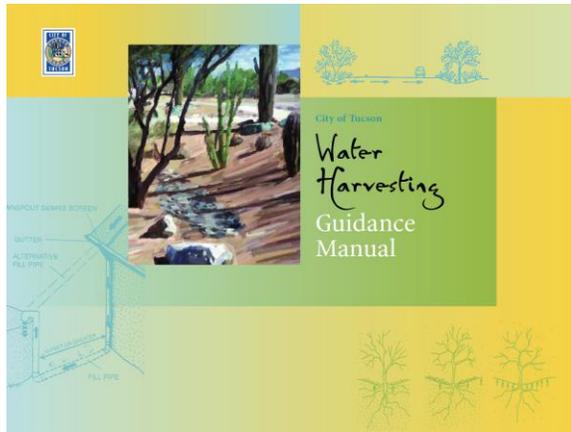
This section identifies the City departments involved in public outreach activities that enhance public awareness and understanding of stormwater pollution prevention. In addition to City departments, regional assistance was provided by Pima Association of Governments (PAG), Tucson Clean and Beautiful, Pima County DEQ, and Southern Office for ADEQ. PAG reduced funding for Stormwater Programs for the July 1, 2018 - June 30, 2019 year. This has reduced the number of cooperative outreach programs in which the City participates, with PAG and other jurisdictions. Outreach Topics and number of people reached are presented in Part 4, Table I: Stormwater Public Education and Outreach.

1. City of Tucson Department of Transportation Stormwater Program

The Transportation Department takes the lead for the City of Tucson Stormwater Management. Stormwater Management works with and encourages other City departments with their specific assigned Stormwater tasks and responsibilities. The

departments that have Stormwater programs include: Environmental/General Services, Fire, Human Resources, Safety Services, Parks and Recreation, Planning and Development Services, Water, and Transportation. The City of Tucson Stormwater Management also works closely with Tucson Clean and Beautiful, Pima Association of Governments (PAG), Pima County Flood Plain, and the University of Arizona (which has a MS4 Small Permit).

The Stormwater Management's Public Awareness Program continues to encourage the public to keep stormwater clean and report stormwater concerns. This year's Stormwater Public Education and Outreach messages included: promoting waterharvesting, preventing non-storm discharges, keeping gray water onsite, reusing rainwater for onsite irrigation, implementation of green infrastructure within Green Streets, promotion of detention systems over retention, directing residential pool backwash to sanitary cleanouts, using sediment controls for all types of grading activities, picking up after animals, and educating the public about other stormwater quality information.



The *Water Harvesting Guidance Manual* is used for new development and has been in place since 2005 when the City of Tucson Mayor and Council adopted this manual. See City website: <https://www.tucsonaz.gov/tdot/water-harvesting> and there are hard copies at the engineering offices at the Planning and Development Services Department and Transportation Department.

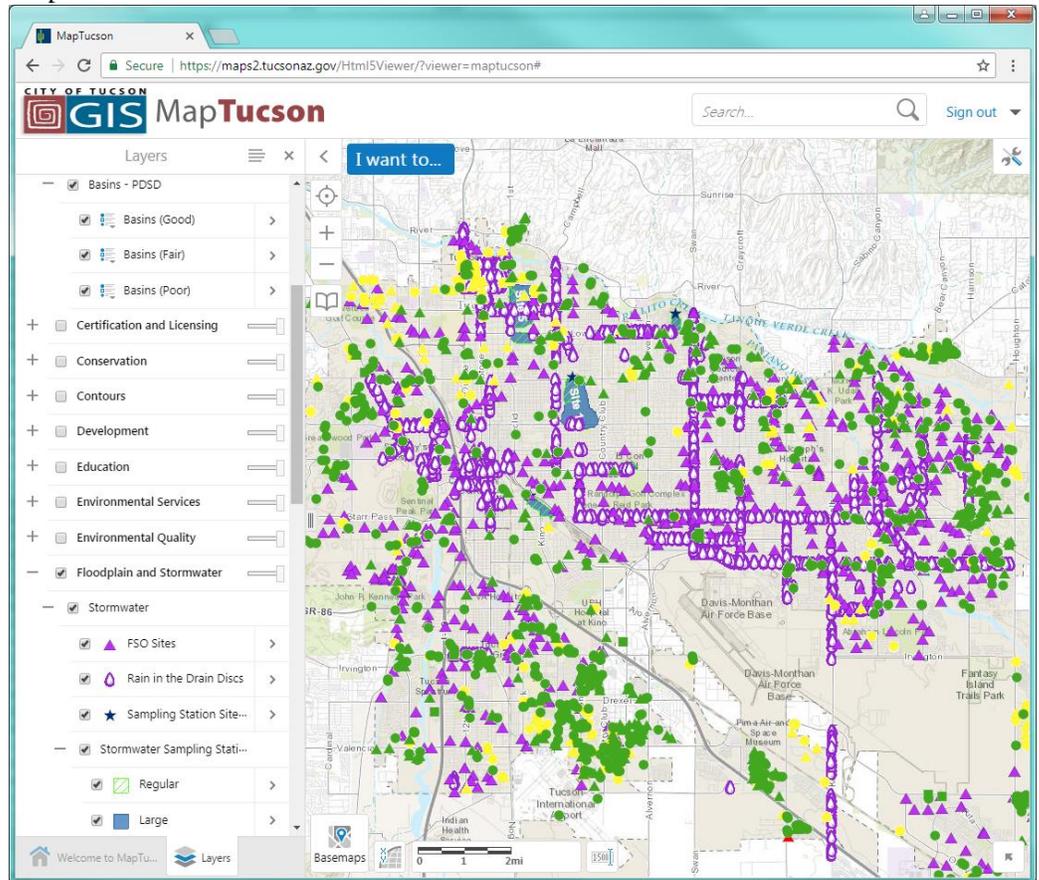
This manual was designed to assist the development community to comply with Unified Development Code requirements and maximize use of harvesting stormwater in new development. Water Harvesting is considered low-impact development and a Best Management Practice (BMP) that promotes infiltration when possible, as well as stormwater detention (the ultimate sustainable strategy for most areas within the City), and serves to reduce pollutants in stormwater runoff. Additionally, residents with existing homes or businesses can use the *Water Harvesting Guidance Manual* to retrofit their property to harvest stormwater. This year, 60 *Water Harvesting Guidance Manuals* were distributed to the general public.



To prevent illegal dumping in storm drains, the City's ongoing catch basin identification program has identified catch basins located where there is a high potential for illegal dumping and these have been marked with a weather-resistant metal disk bearing the slogan, "Only Rain in the Drain." The message "Only Rain in the Drain" was used on a variety of promotional give-away materials (listed in Part 4, Table 1, page 32). "Only Rain in the Drain" is the City of Tucson's stormwater slogan and is used to encourage everyone to think about how they impact stormwater

quality in their day-to-day activities. Catch basin markers will be installed on future City of Tucson Capital Projects.

To further increase awareness of the City's stormwater infrastructure, and to comply with permit requirements, the City developed and currently maintains a comprehensive GIS map (MapTucson). This drainage infrastructure map depicts all stormdrains, watercourses, and detention basins managed by the City of Tucson. See map below.



The City has included stormwater quality sites on MapTucson, categorized as follows:

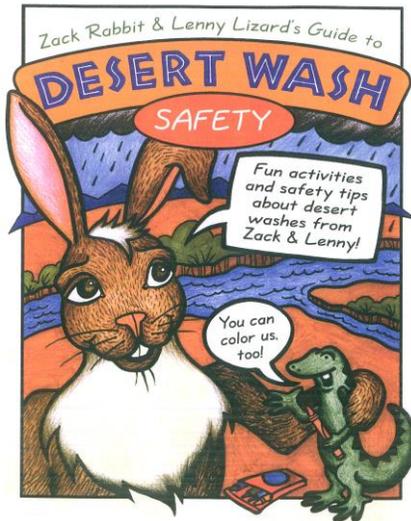
- Major outfalls used for field screening
- Catch basins marked with Only Rain in the Drain discs
- Stormwater sampling station sites

For each stormwater sampling site, MapTucson also includes the contributing drainage areas for each sampling station as well as master basin management area watersheds within the Tucson Stormwater Management System. This drainage infrastructure information can be accessed by the public through the City's website <https://www.tucsonaz.gov/gis/map-resources>

The City GIS staff and Street Inspectors continues to our update the database for stormdrain structures in the City right-of-way.

In this reporting period, the Stormwater Management Program distributed outreach materials at the following public outreach events: Ward IV Back to School Bash, Arizona Bilingual Back to School Bash sponsored by Ward I and Ward V, Tucson Children's Earth Day, and the 2018 EHSS Vendor Fair – Raytheon, and Monsoon Safety Awareness Week Safety Fair, that were intended to encourage stormwater pollution prevention. Juneteenth Event organizer was provided outreach materials since staff was unable to attend event in June 2019.

The Desert Wash Safety Activity Book, a booklet that promotes basic stormwater

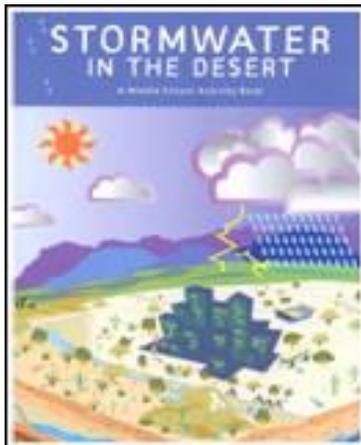


quality messages in a child-friendly format, was provided to younger residents and continues to be popular among elementary schools, recreation centers, libraries and other facilities. These activity books were distributed in both English and Spanish. Since the book's initial adoption by the City of Tucson in 2001, various other jurisdictions also use this educational booklet for public outreach.

The City of Tucson understands that education is one of the most important aspects of the stormwater program; once a person is educated on how storm quality is impacted and can appreciate the importance of individual responsibility toward stormwater quality, then the community can see the effects of stormwater management activities.

This particular handout continues to be the number one most popular piece of outreach material for the Tucson area.

Stormwater in the Desert, another booklet produced by the City of Tucson that is



geared toward students in middle school blends aspects of Tucson's *Water Harvesting Guidance Manual* with messages about flood safety and stormwater quality. This middle school activity book introduces students to complex technical concepts and includes interactive activities using the City's website, particularly the GIS and Stormwater Management Program websites. The book is geared to Arizona's educational curriculum guidelines and also includes a Teacher's Guide. Due to technical issues, during this reporting period, no books were delivered to students and teachers at schools in the Tucson area. At this time, the City of Tucson is challenged with upgrading the booklet for continued use, since the interactive software needs to be upgraded.

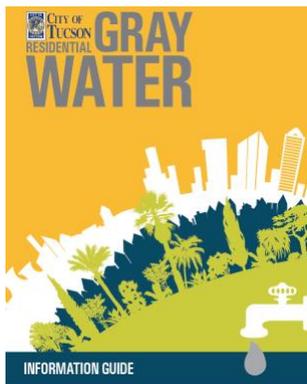
Teachers at local schools, as well as at schools within other Arizona counties, have inquired about being provided more booklets, as well as obtaining the electronic copy for their own educational efforts. Tucson is looking into addressing the technical issues and continuing the middle school booklet for the next fiscal year.

The City of Tucson continues other outreach activities related to IDDE during this FY 2018-2019, including neighborhood-focused educational outreach projects for areas indicating multiple IDDE issues. (See section C.6 for specific projects during this fiscal year).

In this report period, Stormwater Management Program continued to distribute information packets containing guidance on complying with the both the AZPDES General Permit for Construction and the Multi-sector General Permit for Industrial Activities. Topics included are listed in Part 4 Table 1.

2. City of Tucson Planning and Development Services Department

The Planning and Development Services Department continued outreach with the public through daily interactions with counter staff, handout materials and monthly meetings with contractors and developers. Post-construction maintenance of retention/detention basins was encouraged through direct mailings and inspections. Staff also attended Southern Arizona Homebuilders Association (SAHBA) meetings. Part 4, Table I includes outreach topics and numbers reached.



Gray water use has been a continually increasing water use for property owners in the City of Tucson. Although the new gray water codes have been adopted to help conserve water, restrictions are in place to protect stormwater quality.

For instance, effluent, or “black water” is not allowed to enter the MS4. Treated effluent is allowed to enter the MS4 only when special permitting is obtained from ADEQ. Also, Gray Water codes do not allow for discharge off the parcel where it is generated.

Information about the City’s gray water code and regulations and guidelines are found in the following documents generated by Planning and Development Services and Tucson Water departments:

https://www.tucsonaz.gov/files/pdsd/permits/brochure%20final%200910_1.pdf

https://www.tucsonaz.gov/files/water/docs/Gray_Water_Information_Guide.pdf

<https://www.tucsonaz.gov/files/agdocs/20080923/sept23-08-527a.pdf>

https://www.tucsonaz.gov/files/pdsd/permits/Gray_Water_Ordinance11089.pdf

<https://www.tucsonaz.gov/water/gray-water-rebate>

<http://legacy.azdeq.gov/enviro/water/permits/download/graybro.pdf>

https://www.tucsonaz.gov/files/pdsd/codes-ordinances/Grey_Water_Options_FINAL_.pdf

Although Stormwater Management inspection staff within the Transportation Department inspects sites for IDDE gray water complaints, the Planning and Development Services Inspectors provide grading and stormwater pollution prevention guidance and assistance to contractors during their construction inspections on new development projects including industrial, commercial, and residential developments on private properties.

3. Tucson Water

Tucson Water engages in a wide variety of educational outreach activities intended to increase awareness and encourage citizen action in water-related areas. The training and workshops reported in Part 4, Table I focused on rainwater harvesting techniques that may improve stormwater quality.

The City of Tucson continues to ensure reliable water resources for our community through the Santa Cruz River Heritage Project. For decades, the City of Tucson has been successfully using reclaimed water for irrigation at 50 parks, 65 schools, 18 public golf courses, by spreading the reclaimed water over golf course areas, fields and other vegetated areas. Although the majority of reclaimed water is used for irrigation, a new Tucson Water project adds up to 2.8 million gallons of recycled water daily to the Santa Cruz River. This reclaimed water re-enters our water system from an outfall located at the east side of the Santa Cruz River, near the confluence of the Santa Cruz West Branch watercourse, onto the surface of the Santa Cruz River bed, and eventually percolates through the ground to enter the aquifer. This water remains for future use, helping to provide for the future needs of our community.

<https://www.tucsonaz.gov/water/reclaimed-water-facts>

In addition, Tucson Water provides outreach with their Water Conservation Program, Tucson Water Efficiency Rebate Program, Arizona Project WET, and the Environmental Education Exchange.

4. Environmental & General Services Household Hazardous Waste Program

For Environmental and General Services Department reporting purposes, stormwater activities are reported separately by each area of responsibility. The Environmental Services stormwater staff of the Environmental/General Services Department manages community outreach related to waste reduction and recycling. Participation in the City's Household Hazardous Water Program is encouraged through a variety of educational outreach materials advertising this service, including a product-specific brochure describing the collection site locations, hours of operations, and tips on how to reduce environmental impacts entitled, "Protect Our Environment from Household Hazardous Waste". These outreach materials were distributed to the general public through direct mailings, and handouts at public events. In addition, the program provided brochures and online information to businesses through their Small Business Waste Assistance Program (SBWAP).

5. Tucson Clean and Beautiful

Tucson Clean and Beautiful (TCB) is an important partner for the City of Tucson's Stormwater Management Program. Tucson Clean & Beautiful is a nonprofit organization supported in part by the City of Tucson. TCB's mission is to preserve and improve the environment, conserve natural resources, and enhance quality of life through educational and hands on programs. These programs target Tucson's diverse population. They include Adopt-a-Park & Public Areas where volunteers clean up litter; buffelgrass and invasive plant removal, as well as Trees for Tucson

public space and neighborhood tree planting. TCB also manages community outreach related to waste reduction and recycling. This includes coordination of a live and recorded Recycling Information Line. The Recycling Information Line serves as a clearing house for area residents. It offers information on recycling and waste reduction opportunities. Topics include curbside recycling, neighborhood recycling centers, Household Hazardous Waste, and other available community environmental programs. This helps improve stormwater quality through proper disposal of materials. Callers also may request brochures, information directories, and other resources to be sent by mail or email. TCB provides information online through its website at the Reduce-Reuse-Recycle Directory. An interactive learning opportunity with professional actors teaches recycling and waste reduction concepts to elementary age school groups each year. TCB works to establish community partnerships increasing opportunities for participation in available recycling and waste reduction programs. This includes responsible electronics recycling, the Master Recycler training series, and the annual Recycled Art Showcase. In addition to these efforts, TCB offers monthly email newsletters and a website:

www.tucsoncleanandbeautiful.org

These online resources complement information provided by phone, in person, and in brochure format, highlighting local environmental education events and community volunteer opportunities. These programs, as well as the central message of TCB, encourage the public to act responsibly in simple ways that improve and promote stormwater quality. TCB offers a litter-free schools program and administers the Neighborhood Scale Stormwater Harvesting Program for Tucson Water. Part 4, Table 1 provides an overview of the scope and audience of TCB programs.

6. Pima Association of Governments Stormwater Management Working Group

Pima Association of Governments (PAG), the federally designated **208 Water Quality Planning Organization** in Pima County, conducts wastewater and stormwater quality planning activities. In this role, PAG coordinates the region's Stormwater Management Working Group to address stormwater management issues and support PAG member jurisdictions (including City of Tucson's large Phase 1 MS4 as well as smaller Phase 2 MS4's in the region) in meeting their annual stormwater permitting requirements. Outreach funding is provided through Federal Highway Administration funds for surface transportation pollution mitigation.

Activities and Impressions

In fiscal year (FY) 2018-19, stormwater outreach connected PAG's efforts in transportation pollution mitigation, travel reduction, low impact development, green infrastructure, and water quality assurance. PAG's outreach activities and estimated impressions (views) for each activity are detailed in Table I. in Part 4.

Accomplishments

PAG's "Scoop it. Bag it. Trash it." stickers are now featured on more pet waste stations along The Loop (shared use / bicycle path) which runs through the City of Tucson and other multiple MS4's in the region. Pima Animal Care Center (PACC) produced and installed approximately 50 fill-it-yourself bag dispensers at various pet waste station locations this fiscal year.



While PAG has run out of stickers, PAG can share the design with agencies interested in printing more. Pima County NRPR has shared the template for volunteers interested creating more pet waste stations.

During the previous fiscal year, PAG updated their Watershed Map with new locations, imagery and pollution prevention messaging. It is available for download here, now in full resolution at the PAG website. The Green Infrastructure Prioritization tool (<https://gismaps.pagnet.org/PAG-GIMap/Map.aspx>) has been updated with more data layers, such as a park score index, to enhance data driven decision making for stormwater infrastructure planners.

PAG's big outreach event for FY 2018-2019 was the SciTech Festival, which took place on February 26, 2019 in Sahuarita. At the event, students and teachers were encouraged to answer trivia questions about stormwater quality. Students who answered correctly were rewarded with a Clean Water Starts with Me water bottle.

Pima County DEQ has now posted the 2018 2019 Clean Air/Water Survey online, revealing community awareness and behaviors around stormwater quality. Report:

https://www.google.com/url?client=internal-uds-cse&cx=013267304805748945832:gunas2wpna&q=https://webcms.pima.gov/UserFiles/Servers/Server_6/File/Government/Environmental%2520Quality/Reports_and_Publications/Pima%2520DEQ%25202018-2019%2520report%2520-%2520final.pdf&sa=U&ved=2ahUKewi22feazqblAhXGFjQIHUHFbKMQFjAAegQIBhAB&usg=AOvVaw3WhsBQx5shhgOYjrsEAd52

Awareness of the Clean Water Starts with Me! campaign is associated with positive behaviors and awareness. Survey results show that over the last few years some of the campaign awareness levels are down. From the survey, regarding severity of the stormwater pollution problem in the Tucson area, the top six contributors by perceived degree of causation are:

1. Automotive fluids such as oil, gasoline and brake fluid

2. Pesticides, fertilizers and debris from lawns and gardens (42% “serious” contributor to stormwater pollution, up from 37% last year)
3. Chemicals and materials from construction sites
4. Household trash and bulky items like mattresses, sofas and tires
5. Household products such as cleaning fluids, detergents, paints, degreasers and Bleaches
6. Chemicals and materials from industrial facilities

Evaluation

The SWMWG was invited to participate in the PAG Area-wide Water Quality Management Plan (208 Plan) update process at Watershed Planning Subcommittee/Environmental Planning Advisory Committee meetings. Within the fiscal year, four meetings were held to discuss updates water quality issues, progress and policies in the region.

II. Stormwater Public Involvement Program

A. ACTIVITIES, NUMBER OF PARTICIPANTS

1. Stormwater Management Program

The City of Tucson Stormwater Management Program website contains a contact page allowing citizens to “Report a Concern,” including spills that threaten to enter the storm-drain system, dry weather flows, construction or industrial site runoff, and illegal dumping in stormdrains or washes. Constituents can either e-mail Stormwater@tucsonaz.gov or call (520) 791-4251. The City website received 7,805 hits as listed in Part 4 Table II.

2. Environmental Services Household Hazardous Waste

During the reporting period public participation in the City’s Household Hazardous Waste (HHW) Collection Program was tracked. The City operates the HHW facility at the Los Reales Landfill (HHW-LR) and accepts wastes from area residents. The HHW-LR recycling facility, located at Los Reales Landfill, accepts the following materials:

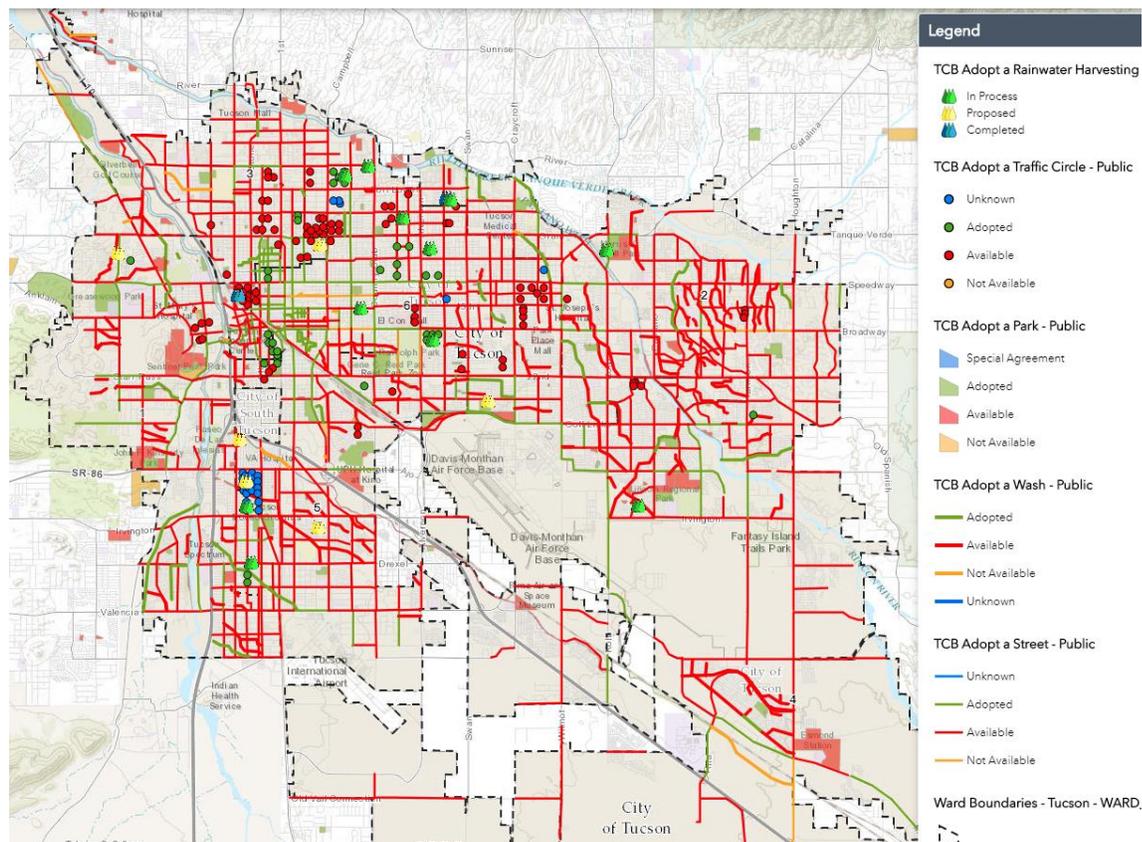
- auto fluids
- batteries
- solvents
- pool chemicals
- pesticides
- paints

Small businesses are encouraged to participate in responsible water disposal through the Environmental Services Department’s Small Business Waste Assistance Program (SBWAP). The SBWAP provides an affordable and environmentally safe alternative to qualifying businesses - Conditionally Exempt Small Quantity Generators operating within Pima County - for proper disposal of their hazardous waste at the Household Hazardous Waste facility (HHW). Registration is required with company certification of generator status.

Businesses and the general public participated in the HHW program by dropping off household hazardous waste at the designated collection facilities, at remote collection events or home pick-ups. Public participation in the Household Hazardous Waste Program, and operating costs for this reporting period are summarized in Part 4, Table II.

3. Tucson Clean & Beautiful

Through the TCB Adopt a Park and Public Areas litter cleanup program, over 300 public sites in the Tucson area have been officially adopted by community land stewardship volunteer groups. Volunteer removal of litter and illegally dumped material from public areas helps to reduce impacts to stormwater quality. Volunteer efforts continue to have a positive impact on the community, with more than 10,101 service hours provided in the past FY 2018-2019 and a growing number of sites with community stewards volunteering regularly along with one-time projects.



<https://cotgis.maps.arcgis.com/apps/webappviewer/index.html?id=d40db845579c4b208906ad55358a7e52>

The above map shows locations of adopted or available Adopt a Park, Adopt a Street, Adopt a Wash, Adopt a Traffic Circle for the Tucson Clean and Beautiful Adopt Program.

The Trees for Tucson program provided over 4,299 affordable desert-adapted shade trees to the public within the past year, including area residents for their own homes, and for community volunteer planting projects. Desert-adapted trees help trap pollutants to improve water quality and reduce runoff volumes, prevent soil erosion, reduce electricity usage, reduce atmospheric CO₂, reduce heat island effect, and add to community aesthetics and livability.

III. Illicit Discharge Detection and Elimination (IDDE) Program

A. MUNICIPAL EMPLOYEE TRAINING

1. Specialized Stormwater Inspector Training

The Stormwater Management team members, within the Transportation Department, assigned to carry out functions of the stormwater management program, participated in training/discussion sessions almost every week for 2018-2019. The topics included all activities related to the stormwater program, including training, complaints, sanitary sewer overflows, illicit discharges and dumping, sampling activities, use of new stormwater software, sample results and action needed, field screen outfall investigations, watercourse impacts from homeless encampments, Multi-Agency Inspection Team (MAIT's) inspections, industrial, commercial and construction site inspections, procedures, policies, pesticide complaints, active outreach programs, and enforcement protocols. During July 1, 2018 through June 30, 2019, the stormwater inspectors and seven construction Inspectors completed their annual Occupational Safety and Health Administration (OSHA) training that included direction on which department to contact if they encounter a spill. The Stormwater Inspectors also received RCRA training, Hazmat Safety training and pesticide training.

Stormwater Management keeps a spreadsheet of all TDOT employees that have stormwater training. This spreadsheet is available at the Stormwater Manager's office.



Construction Inspection staff continue to be cross-trained to provide assistance to the current stormwater inspection team.

2. Other Specialized Training.

The City offers specialized training for City Staff to help reduce non storm discharges and prevent pollutants from being exposed to stormwater. During this reporting period, coordination between City departments occurred to help identify training topics and establish improved tracking measures. Specialized 40 hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training was provided to fire personnel, who are first responders to spills. The 8-hr HAZWOPER refresher training is taken annually by City staff including Tucson Water, Tucson Fire, Department of Transportation, and Environmental Services, who come into contact with hazardous materials during the course of their duties.

3. Non-Stormwater Employees

Non-stormwater employees received training from Safety Services on topics including: spill prevention and response, proper storage, handling and disposal of used oil and other toxics, reporting spills, reporting spills that threaten the stormdrain system, and reporting suspicious non-storm flows. This training was provided at orientation in the “City of Tucson Employee Safety Handbook” and by watching our Stormwater DVD “Municipal Storm Water Pollution Prevention Storm Watch” and answering questions after viewing the DVD. City employees also have the opportunity to view a Power Point presentation called “Stormwater Awareness Training” through “City Learn,” which has been updated to include an audio component. City Learn is an online program that allows staff to take training individually. The numbers of employees trained are tabulated in Part 4.

Awareness videos for new employees, inspection training videos, and public outreach videos are available and a schedule and training programs are in place, and provided to new employees at first year orientation and required annually thereafter. The titles of the videos are, “Illicit Discharge Detection and Elimination”, “Rain Check”, and “Public Outreach”.

B. SPILL PREVENTION AND RESPONSE

1. Municipal Facility Assessments

During the previous report year, Stormwater Management Program assessed City owned and operated facilities for the presence of materials that have the potential to impact stormwater quality, and prioritized these facilities based on the risk of these impacts. The City utilized a Multi-Agency Inspection Team (MAIT’s) to perform annual inspections of all City owned and operated facilities. These inspections occurred each Thursday at a designated facility. The team consisted of representatives from City agencies with expertise in Industrial Hygiene, Occupational Safety and Health Administration (OSHA) Compliance, Risk Management, Fire Code, and Stormwater Quality Compliance. Facility assessments have been conducted in conjunction with the MAIT’s inspections, and were focused on determining the potential for each facility to impact stormwater quality. Special programs and SPCC’s have been established for higher risk facilities in order to address special higher risk stormwater needs for these types of facilities.

2. Identification of Higher Risk Facilities

The City continues to annually review, inspect, and prioritize the list of municipal facilities. Onsite control measures are used to minimize potential stormwater exposure.

During this reporting year 12 municipal facilities were identified as higher risk facilities: Thomas O. Price Service Center, Fred Enke Golf Course, El Rio Golf Course, Silverbell Golf Course, Randolph Golf Course, Reid Park Zoo, Fire Department Maintenance (HAZMAT), Household Hazardous Waste, Los Reales Landfill (AZMSG-61695), Sun Tran Bus Terminal (AZMSG-61745), Sun Tran Bus Terminal Northwest (AZMSG-61747), and Sun Van (AZMSG-61746).

Perfluoroalkyl and polyfluoroalkyl substances (PFAS) including Aqueous film forming foam (AFFF) have updated health advisory limits per Environmental Protection Agency. These substances have been a topic of interest for property owners in the Tucson and surrounding areas and Tucson Water has been providing monitoring. Although AFFF is a highly effective fire suppressant, the Tucson Fire Department has committed to not use AFFF for training purposes.

It was identified for the Thomas O Price Service Center that an update to the SPCC would be needed and the report was generated by a consultant for the ES/GS department.

3. Spill Tracking

As part of the City's Hazard Communications OSHA training, the City developed a Spill Response Program, S-020C, used to provide direction on how to handle spills. Part of the program includes tracking of the number of spills that occurred at City facilities. Vehicular fluid releases (mostly hydraulic oil spills) reported by Environmental/General Services, continue to occur. Each release is evaluated; and remediated by on-site staff utilizing spill kits located on the vehicles or were remediated by Tucson Fire Department with support from the Transportation Department, as required by the program. City first responders contained and cleaned up approximately 20 additional other spills City-wide. The Spill Response procedure S-020C was reviewed by interdepartmental administrative staff in 2017 and is expected to be re-evaluated and updated in 2019.

C. DRY WEATHER SCREENING OF MAJOR OUTFALLS

1. Outfall Inventory

In the early 1990s, the City of Tucson followed the procedures outlined in 40 CFR 122.26 to identify 500 outfalls that have been subsequently utilized to detect non-storm flows. Over the years, development and infrastructure improvements have eliminated or replaced several outfalls, and new outfalls have been added to the inventory, to maintain the 500 outfalls required under the municipal stormwater permit. These outfalls have been mapped on the City's Geographic Information System (GIS) Stormwater Map, and can be viewed by accessing the map online: <https://maps.tucsonaz.gov/maptucson/>

2. Outfalls Inspected

In this report period, the Stormwater Management Program through the Streets staff conducted dry weather outfall screening inspections of at least 100 outfalls located in the central portion of the City.

3. Priority Outfall Inspected

During this year, 14 priority outfalls were inspected. These priority outfalls are inspected annually. The locations of the priority outfalls are upstream from Lakeside Lake in the Atterbury Wash Watershed. There were no dry weather flows found at any of these outfall locations.

4. Results of Dry Weather Screening

Of the 100 outfall inspections conducted July 1, 2018 - June 30, 2019 in conjunction with watercourse inspections, several dry weather flows were discovered. The causes of these flows were determined to be from over-irrigation and swimming pool discharges. Several sites were referred to the City of Tucson's Water Department, which is responsible for regulating water waste (to help conserve water). The pool discharges are being addressed through interdepartmental meetings with property owners in the field and at City offices to ensure compliance with stormwater codes.

5. Eliminate Illicit Discharges (Cross Connections and Other Sources)

The City annually inspects areas of the stormdrain system for the presence of illicit discharges. The locations are based on; industrial facility inspections, complaints received from the public, reports from City Departments, and reports from other agencies. The City of Tucson reviews all Capital Improvement Projects and private development to assure connections to storm drains versus sanitary sewer lines are properly addressed, and that designs meet all stormwater, water, and building codes.

6. Reports of Dry Weather Flows

In this report period, the City received 139 reports of dry weather flow and responded to all of them. The reports were received from citizens, other City Departments, Ward offices, and other agencies. Reports of dry weather flow are considered to be a priority for response and inspection. Investigations conducted revealed that the source water originated from a variety of sources including: pool flushing / draining, pool back-washing, grey water, sanitary sewer overflows, reclaimed water discharges, potable water releases, fire suppression runoff, site runoff, power washing sidewalks or trash receptacle areas, homeless encampments, and spills.

The cost of cleaning up watercourses has increased. The population of homeless individuals who are using public watercourses for personal bathing and other non-compliant stormwater activities has also increased. Inspectors have observed people washing undergarments in drinking fountains also used by children at public parks.

There were 7 discharges reported for July 1, 2018 through June 30, 2019 to the City of Tucson for Sanitary Sewer Overflows (SSO's). Each sanitary release was properly cleaned up, sanitized, and flushed and vactored, as required. The flows were from overflowing cleanouts, manholes, grease traps, and/or broken pipes. City Stormwater Management and Pima County Reclamation Waste and Recycling Department continue to work together to update contact information so that quick response could be provided to these SSO discharge incidents.

There was a 50% increase in pool related complaints from last fiscal year. There were approximately 36 reports of pool draining or pool filter backwashing. Although inspectors provided outreach materials last year, the City still experiences pool discharge issues. The complaints include ponding water, water leaving property boundaries, erosion, and minor flooding issues.

These inspections resulted in verbal warnings, and education and outreach flyers were provided. In areas where there were discharges into an unpaved area, the discharger was directed to immediately stop the flow, remove the discharge pipe or hose from the area, and ensure that backwash water remains on-site or is directed into a sanitary sewer cleanout. Pool discharge flyers and contact information were left at properties when no one answered the door during the inspectors' visits. For the downtown student housing areas, the City of Tucson Stormwater Management staff has requested courtesy notification a week or so prior to anticipated code-compliant pool flushing incidents as well as other de minimis discharging such as annual waterline and fire testing for each student housing building. Several of the student housing management staff were contacted to explain stormwater regulations including the prohibition of pool backwash discharges.

This year's neighborhood IDDE response events has included 3 outreach events for portions of neighborhoods where alleged dog poop violations and pool backwash discharge issues have occurred. Similar to last year, there were two neighborhoods, on the east side of town, where Stormwater Management Inspection staff performed an outreach program where they distributed flyers to several dozen residential properties.

There was also one neighborhood which was canvased, where dog poop was found in the adjacent channel on the other side of back patio walls where residents owned dogs. Follow-up inspections are needed to monitor effectiveness of this dog poop outreach program.

Targeted areas are first identified by creating a map of the area where alleged IDDE violations are occurring, then Inspectors walk door-to-door, provide information flyers and handouts, and discuss stormwater compliance and why awareness is important to stormwater quality.

Spill reports continue to be discussed by staff to figure out the best ways to reduce hydraulic leaks using the Spill Response procedure (S-020C) in multi-departmental group meetings.

There were 13 discharge complaints that originated from gray water which is an increase for FY 2018-2019 from previous recent years. These complaints, including offsite discharging, obstruction of pedestrian and vehicular access, and subsidence, were addressed through stormwater inspections by City Stormwater Management staff. For this reporting year, most of the incidents involved discharging off the property, which is not in conformance to Tucson adopted gray water regulations.

Stormwater Management Inspection staff made contact with resident to stop the offsite discharge, provided copies of the gray water code and gray water regulations, and explained requirements. The information that was frequently used included explanation that:

- ◆ Gray water must be used onsite for irrigation purposes;
- ◆ Gray water must keep within 2-foot setbacks of property; and
- ◆ No gray water flows may leave the property.

https://www.tucsonaz.gov/files/pdsd/codes-ordinances/Grey_Water_Options_FINAL_.pdf
https://www.tucsonaz.gov/files/pdsd/permits/Gray_Water_Ordinance11089.pdf

There were fewer Tucson Water line break repairs in this reporting period resulting in outflows exceeding 50,000 gallons. Water department staff immediately responded to repair the large main line break.

The remaining reports of discharges were from: construction sites that did not need a Stormwater Pollution Prevention Plan (SWPPP), allowable De Minimis Permitted discharges, water line repairs, or flushing that resulted in verbal warnings or requests for better communication.

Other reports of discharges were from commercial operations, referrals, excess irrigation, and public complaints. All of the spills or discharges reported were inspected by City staff and were confirmed as cleaned and pollutant materials were properly disposed of at designated disposal sites.

Municipal Facilities Pollution Prevention/Good Housekeeping Program

A. MUNICIPAL EMPLOYEE TRAINING

1. New and Current Employees

All new City employees attend orientation where they each receive a “Safety First Manual.” This employee safety manual includes details on what to do with spills. This report year there were new employees that attended orientation. Additionally, City employees attend mandatory OSHA training during their first year and ongoing employees receive annual OSHA training through the City’s online program entitled “City Learn.” The numbers of employees trained are tabulated in Part 4. Because classes are taken individually, no dates can be reported for the majority of employees. For those employees who do not have access to a computer, the City Learn training is conducted in a class setting. OSHA training for City of Tucson employees included the following key subject areas:

- Spill Training: Topics covered include prevention, response, and practices to prevent or minimize spills or discharges to the City’s stormdrain system.
- Proper Handling, storage, transport and disposal of used oil and other toxics and hazardous materials and wastes to prevent spills, exposure to rainfall, and contamination of stormwater runoff.

More extensive training on these subjects is provided for first responders and staff who routinely work with hazardous or toxic products. These new employees receive the preliminary 40 hours HAZWOPER training, and existing employees receive the HAZWOPER refresher classes.

2. Specialized Stormwater Training

Department of Transportation stormwater staff receives extensive training during their first year of employment and refresher training every other year. New employees who work in the stormwater area each receive a copy of the Stormwater Ordinance (SWORD), the Stormwater Management Plan (SWMP), Gray Water codes, Pool Discharge procedures, the adopted TSMS Watercourse Maintenance regulations, as well as copies of the AZPDES Construction General Permit, and AZPDES Multi-Sector General Permit.

During the reporting year, 16 Construction Inspection staff continue to be cross trained to assist with construction SWPPP Inspections and with Illicit Discharge Detection and Elimination Inspection. Others were trained in Municipal Facility Controls and Industrial/Commercial Controls as well as MAIT's inspections. All were trained in Post Construction Controls. For this fiscal year, nine project managers were trained in the new ADEQ online NOT-NOI website called myDEQ. Several Users and a RCO were established.

Of the approximate 20 Department of Transportation Construction Inspectors trained in stormwater responsibilities, three of the employees are assigned to work in the stormwater sampling and industrial inspection responsibilities. Three staff were trained for Multi Agency Inspection Team inspections.

Weekly training occurred with the Department of Transportation's Construction Inspectors focusing on the following:

- Recent incidents and how handled.
- Issues at construction sites during excessive rains.
- Discussions on industrial inspection results and activities.
- Wet weather sample results and dry weather screening findings.
- Success/failures/participation with outreach activities.

On-going training for Planning and Development Services Department Stormwater staff included frequent review and discussion of City Ordinances, development standards, and stormwater regulations. New staff are trained by existing staff in a mentoring process. See Attachments at end of report for Stormwater Staff Training List.

B. MUNICIPAL FACILITY ASSESSMENTS

1. Municipal Facility Inventory

To date, the City has identified over 200 City owned and operated facilities that have been tabulated and are maintained on an inventory list. The list includes the latitude/longitude, facility contact, the operational status (operating or closed), the Standard Industrial Classification (SIC) code(s) that best reflects the services provided by each facility and a brief description of operational practices that could potentially impact stormwater quality. The City will investigate adding information from the inventory to the GIS Stormwater Map.

2. Higher Risk Facilities

(a) Multi-Agency Inspection Team (MAIT's) Inspections

This fiscal year, MAIT's inspected all City facilities on the list. The construction inspector assigned to the MAIT's inspection team assessed the potential of City owned and operated facilities to impact stormwater quality and prioritized municipally owned facilities based on the following criteria:

- Proximity to Lakeside Lake, an impaired water
- Need for an MSGP
- Potential for impacting stormwater quality based on:
 - Quantity (five gallons or more) and location of materials used and/or stored at the facility;
 - Potential for exposure to stormwater; and
 - Potential to discharge a substantial pollutant load to the MS4 or to a water of the U.S.

Eight City facilities that do not require coverage under a MSGP (but have separate special permitting requirements through ADEQ) were considered higher risk during this reporting period. These were: Thomas O. Price Service Center, Fred Enke, El Rio, Silverbell, and Randolph Golf Courses, Reid Park Zoo, Fire Department Maintenance (HAZMAT) and Household Hazardous Waste. Additionally, four City-owned facilities with MSGP coverage are also considered higher risk. The sites are listed below with their separate ADEQ permit number:

- Los Reales Landfill, (AZMSG-61695)
- Sun Tran Bus Terminal (AZMSG-61745)
- Sun Tran Bus Terminal Northwest (AZMSG-61747)
- Sun Van (AZMSG-61746)

Each facility is responsible to meet their special ADEQ permitting requirements and conditions.

(b) Proper Management of Used Oils and Toxics

The Tucson Fire Department manages the City of Tucson Hazardous Waste Disposal Program, a citywide program to ensure proper handling and disposal of all toxic wastes generated by City operations.

The General Services portion of the ES/GS Department, located at Thomas O. Price Service Center, has an automotive fluids handling procedure to contain fluids in designated storage areas. During this reporting period, a Spill Prevention, Control, and Countermeasures Plan (SPCC) report for the Thomas O. Price Service Center was developed by a consulting firm and implemented to provide an updated spill prevention and containment protocol for facilities at the Environmental and General Services Department site at 4004 South Park Avenue. Stormwater Management is working with ES/GS department staff to create a training session for administrative and inspection staff to use the new SWPP and SPCC. As of January 2019, both on-site above ground fuel islands for both unleaded gas and diesel, at Jacobs Compound and Mission Manor Compound have been properly decommissioned and emptied.

(c) **Controls for Pesticides, Herbicides, and Fertilizers**

Responsibility for proper storage and application of pesticides, herbicides, and fertilizers at City owned facilities is shared by two City Departments, City of Tucson Parks and Recreation Department, and the City of Tucson Department of Transportation, Streets and Traffic Maintenance Division. Multiple complaints continue to be received regarding the use of pesticides. During the FY 2018-2019, the City Mayor and Council have assessed the safety aspects of pesticides used to determine their continued use and have adopted an organic approach to herbicide controls similar to Irvine County, California. Several departments at the City of Tucson are working on pilot projects and developing strategies including having organics used as much as possible and limiting non-organic herbicides so they are only used when needed. The reduction in herbicide use is expected to benefit stormwater quality in the Tucson area.

Proper storage practices in terms of current stormwater BMP's were verified during the Multi-Agency Inspection Team (MAIT's) inspections. Quantities of fertilizers, herbicides, and pesticides used by City staff is recorded and were provided by Parks and Recreation. Pesticide application licenses were also documented for staff and City contracted landscape companies. Licensed Pesticide Applicators are used to control vegetation at City Parks and Centers.

The City of Tucson staff continues to follow the prohibition against applying herbicides and pesticides in areas within or adjacent to washes and drainage features.

The following Parks and Recreation Department parks have drainageways which are regularly maintained: Alvernon, Ft Lowell, Columbus, Estevan, Esquer, Kennedy, Oury, Swan, Mesa Village, Wilshire Heights, Tucson Public Safety Academy, Reid Park, Oaktree, TPD Hardesty Building, Riverview, Seminole, Vista Del Pueblo, Bristol, Rudy Garcia Park, Country Club Annex, Silverlake, and Parkview.

C. INSPECTIONS

1. Prioritizing Areas of MS4 for Inspection

The City of Tucson, Department of Transportation, Streets and Traffic Maintenance Division shared responsibility for inspection and maintenance of the City's MS4 drainage System with the City Parks and Recreation Department. The drainage system including streets, channels, and washes located within City owned parks are considered priority and are normally inspected once a year. The Parks Department continues to work on a series of parks maps that will show stormwater maintenance locations. These new stormwater parks maps are expected to increase stormwater inspection efficiency, and will be used as training tools for inspections. Based on system history, citizen complaints, and known maintenance concerns, the City annually inspects key areas of the stormdrain system located outside of City owned parks for the presence of illicit discharges, excess sediment, litter, debris or other pollutants that may obstruct flow or be transported in stormwater. In this report period, the

City considered 344 miles of the MS4 drainage system outside of City-owned parks as priority and 350 miles of these were inspected.

Pima County Flood Control District (PCRFCD) assessed the regional watercourses in the



Tucson area for sediment issues, and managed a drainage maintenance program to address aggradation within portions of the county - maintained regional watercourses. Some portions of the regional watercourses (Rillito and Santa Cruz River) were dredged, and vegetation removed, to assure containment of jurisdictional flood within the channel as a safety project. Photo at left: portion of the Rillito upstream of Santa Cruz River where part of the riverbed has been graded by PCRFCD with remaining riverbed left with existing vegetation, to improve floodwater conveyance within the watercourse to reduce flood risk to adjacent property owners.

In addition, Tucson Stormwater Inspection staff inspected 33 miles of the drainage system within the City limits.

2. Municipal Facility Assessments

The City's Multi-Agency Inspection Team (MAIT's) conducted annual inspections of over 200 City-owned and operated facilities. As required, follow-up inspections occurred to verify that corrections had been made. During the last fiscal year, three Stormwater Inspectors were assigned to MAIT's and continued to perform assessments of City facilities to determine if five or more gallons of potential stormwater pollutants were stored in areas exposed to stormwater, secondary containment was provided as needed, and if the site met other environmental (stormwater) criteria. The City of Tucson assesses municipal properties annually to reduce or eliminate discharges from city owned/operated facilities through using best management practices (BMP's) that protect stormwater quality. In order to comply with these requirements, your facility will be inspected to ensure materials are not being stored in a manner that will allow pollutants to enter the stormwater drainage system, which includes all streets, washes, catch basins, gullies, arroyos, etc. Based on this assessment, on the types of activities performed, material stored, and proximity to receiving waters, the City determined which of these facilities are considered high risk.

The City of Tucson Environmental Services owns and maintains 15 closed landfills and one active landfill; Los Reales. Los Reales Landfill operates under the MSGP 2010 (AZMSG-61695). The Los Reales Landfill Stormwater Pollution Prevention Plan (SWPPP) was written in accordance with the MSGP 2010. Los Reales Landfill staff conducts monthly routine

inspections and additional inspections during measurable storm events; a total of 14 routine inspections were conducted. During this reporting period, Los Reales Landfill staff conducted an annual comprehensive inspection of the Los Reales Landfill. This inspection is an additional measure to ensure that pollutants from landfills and municipal waste facilities are controlled. No violations or concerns were noted during the inspection of Los Reales Landfill. The Los Reales Landfill is maintained in good operating condition.

The City of Tucson Environmental Services Department conducted quarterly inspections of the closed regulated landfills and annual inspections of closed non-regulated landfills. An additional 29 weather related inspections were performed on closed landfills with engineered caps. Stormwater Inspectors conducted inspections of the 15 closed landfills during this reporting period. The closed landfills are maintained in good condition. No concerns or violations were noted.

The City's fleet operation and maintenance facility, Thomas O. Price Service Center (TOPSC), is not regulated under an MSGP. However, it is covered under the City's MS4 permit. The TOPSC maintains a SWPPP and had a Stormwater Pollution Prevention Team that conducted quarterly stormwater inspections of the facility. A new, updated SPCC was created during this reporting period. The Department of Transportation conducted an inspection of the TOPSC on during this reporting period. This inspection included inspection of the new compressed natural gas (CNG) plant and vehicle CNG fueling area.

3. MSGP Facilities

To date, the only city-owned and operated facility that qualifies for coverage under the Multi-Sector General Permit is Los Reales Landfill. Los Reales is covered under authorization number AZMSG-61695, and is inspected quarterly by the Environmental Services Department, however, as an additional landfill control measure, Los Reales is inspected annually by the Stormwater Management Program. On May 20, 2019, the Los Reales Landfill was inspected as part of these FY 2018-2019 oversight inspections. The active landfill was inspected for the following locations: tire washing station, new cell construction, perimeter road systems, trash capture systems, eastern stockpiling area (separate from east detention basin), recycling center, and household waste areas (for secondary containment proper storage of chemicals).

There are three City of Tucson owned transit facilities that are privately managed and staffed. These are the two Sun Tran Bus Maintenance Facilities and the Sun Van Facility. All three are operated under separate MSGP 2010 permits. These facilities were inspected during this reporting period. Minor housekeeping issues were identified during inspections and were immediately addressed. The MSGP permit numbers for these facilities are listed below.

- Sun Tran Bus Terminal AZMSG-61745
- Sun Tran Bus Terminal Northwest AZMSG-61747
- Sun Van AZMSG-61746

4. Summary of Follow-Ups

During the FY 2018-19 MAIT's inspections of municipally owned and operated facilities concerns were noted at 12 City facilities. The concerns were for the following deficiencies:

- At the Northwest Sun Tran facility, detention basin continues to need basin bottom re-engineering to address ponding issues.
- At same facility, areas were identified for soil removal and disposal.
- Fuel island spills from bus fueling needed absorbent and spill clean-up protocol was clarified with assistance from Fire (follow-up inspection showed compliance)
- General Housekeeping items were also noted.

During the City facility inspections, minor adjustments to good housekeeping practices were recommended and usually addressed during the inspection. All inspections included a representative of the facility to observe any deficiency. Reports were sent to the facility managers and the responsible party. The report described the deficiencies and included instructions to notify the MAIT's team, within 30 days of the corrective action, or to provide an abatement schedule. Follow-up inspections were conducted and all deficiencies were corrected.

D. INFRASTRUCTURE MAINTENANCE

1. Stormdrain System

- Miles visually inspected:
City Street and Traffic Maintenance Inspectors inspected 350 miles of drainage channels/washes. Stormwater Inspectors inspected an additional 33 miles of stormdrain /washes. In total, approximately 388 linear miles of the City's MS4 were inspected.
- Miles Cleaned or Debris Removed:
In this report period, approximately 97 miles of drainage channels outside City parks were cleaned. Drainage channels within City parks are monitored by regular site inspections.
- Cleaning of Closed Conduit:
Contracted vector services are utilized whenever there is need to clean City-owned closed conduit facilities. During this reporting period, approximately 16 miles of closed conduit were cleaned. The section of the High School Wash box culvert adjacent to TUSD sport field near 3rd Ave and 8th Street was cleaned spring 2019. Homeless protocol is implemented in each case, where notification to Homeless people was posted at least 72 hours prior to removal of encampment.
- Retention/Detention Basins Cleaned:
Accumulated sediments and debris in retention/detention basins are removed seasonally, or as necessary, contingent on flow. During this reporting period, three Retention/Detention basins located in City owned Parks were cleaned.
- Number of Catch Basins Identified to date:
The City has identified 1,168 catch basins.
- Number of Catch Basins Cleaned:

24 catch basins were cleaned by the Streets and Traffic Maintenance Department, one catch basin was cleaned by a Stormwater Inspector.

2. Roadway System

- **Street and Parking Lot Sweeping Program:**
The Streets and Traffic Maintenance Division's current schedule for street sweeping for major arterial and collector streets is twice monthly, and sweeping streets in the central business district is three times each week. These priorities are reassessed annually. Street and parking lot sweeping in public parks is also conducted through the Parks & Recreation Department within City Parks.
- **Broom Miles:**
During this reporting period, the Streets and Traffic Maintenance Division swept 22,977 broom miles of roadways. The Parks & Recreation Department performed sweeping on 44 broom miles of parking lots and roadways within City owned Parks.
- **Total Waste Collected:**
The total amount of waste collected from Streets and Traffic Maintenance Division sweeping efforts was 6,439 tons.

E. MAPPING STATUS

The City's GIS mapping system (MapTucson) is formatted as an Environmental Systems Research Institute (ESRI) Geodatabase feature class North America Datum of 1983 (NAD83) High Accuracy Reference Network (HARN) in State Plane Arizona Central Fips 0202 International Feet. The GIS based Stormwater Map, <https://maps.tucsonaz.gov/maptucson/> currently contains the following information:

- **Linear Drainage Structures:** Line layer showing the location of stormwater system pipes. The direction of flow can be determined based on the topographic layer.
- **Stormdrain Grates and Catch Basins:** Point layer showing the locations of stormdrain grates and catch basins.
- **Outfalls:** Point layer showing the location of all major outfalls (field screen locations); polygon layer showing the drainage area associated with each of the five sampling sites where stormwater is monitored.
- **Detention/Retention Basins:** Point or polygon layer showing the locations of all identified City-owned retention and detention basins.
- **Jurisdictional Boundary:** Line or polygon layer showing the jurisdictional boundaries of the MS4, including any new land annexations during the permit term.
- A new inventory was created by Streets Administrative staff and Inspectors to catalogue grated inlets.
- As-built data is being transferred to Transportation Engineering Staff to place delineations of stormdrain data onto the MapTucson GIS map.

The City of Tucson anticipates that the North American Datum of 1983 (NAD83) will be replaced by a new geometric datum which provides latitude, longitude, height, and time. The North American Vertical Datum of 1988 (NAVD88) will be replaced with a new vertical ('geopotential' / geoid model of the earth) datum, based on CORS (Continuously Operating

Reference Station) and airborne GRAV-D data. Planning has begun to prepare for this upcoming change that will affect the City of Tucson stormwater and floodplain management, but ultimately will provide more accuracy for mapping for stormdrain and floodplain systems. [Reference: National Geodetic Survey geodesy.noaa.gov]

V. Industrial Stormwater Program

A. MUNICIPAL EMPLOYEE TRAINING

The Stormwater Management Program experienced the turnover of two Inspectors. One MAIT's Inspector received training for facility inspections and sampling site activities. Another Senior Engineer Associate also received IDDE inspection training and onsite sampling training, by the outgoing inspector. In addition, current stormwater inspectors met monthly with a Lead Inspector and Program Manager to discuss stormwater activities and to review developed procedures.

B. STATUS OF INVENTORY

1. Industrial Facility Database

The Department of Transportation maintains a list of Industrial and Commercial facilities that have the potential to discharge pollutants to the City's storm sewer system. Currently the list consists of 230 facilities that are targeted by the Multi-Sector General Permit (MSGP). The Industrial Facility list currently includes the following facilities:

- Industrial facilities identified in 40 CFR 122.26(d)(2)(iv)(C);
- Industrial facilities subject to MSGP requirements, including those facilities that have submitted for a no exposure exclusion; and
- Other industrial and commercial sources (or categories of sources) that the City has inspected over the last permit term.

2. Higher Risk Industrial Facilities

During the previously reporting period, the Stormwater Management Program identified 37 higher risk industrial facilities that are more likely to be sources of stormwater pollution. The priority list was re-evaluated and risk assessment was based on the type of facility, the products or services provided by the facility, proximity to receiving waters, receiving water quality, and other factors that indicate the potential to impact water quality. This high risk facility list has increased from 37 facilities to 41. The City of Tucson provides specific inspections and outreach letters to each of the industrial facilities inspected, providing guidance to correct stormwater issues at the site and listing correction items in the correspondence. The Stormwater Inspectors perform additional follow-up inspections when warranted.

3. AZPDES Non-filers

The City continued with the program to determine whether or not a facility has obtained coverage under the Arizona Multi-Sector General Permit. When the City identifies a facility that has not obtained the required coverage, the City will report that facility's location and information to the ADEQ Unit Manager, Field Services Unit, Water Quality Compliance

Section semi-annually, by June 30 or December 31. During this reporting period, there were two facilities reported as non-filers.

C. INSPECTIONS

1. Inspection Findings

During the facility inspections, recommendations were made to improve control measures to assure permit compliance. There were no enforcement actions that involved City court. All corrective actions were minor and corrected at the time of inspection or, if needed, were corrected by the time of a scheduled re-inspection. Notable corrections made at inspected facilities included the following:

- Obtain required MSGP.
- Create a facility SWPPP and/or update a facility SWPPP.
- Update SPCC plans every 5 years.
- Train employees on stormwater pollution prevention and spill response.
- Install control measures to prevent discharges into the MS4.
- Place secure lids on 55-gallon drums and relocate drums to areas with overhead protection and secondary containment.
- Reduce inventory of 55-gallon drums used for waste.
- Improve housekeeping at fueling areas by cleaning spills with absorbents and having spill kits stationed at fueling areas.
- Improve control measures / BMP's at material storage areas to prevent discharges into MS4.
- Improve general housekeeping by cleaning spills promptly, training employees, and having spill kits available at work areas.

2. Inspect 20% of all Facilities

The City continued to include photographs and summaries in the inspection reports. This detail ensures the owner and operator clearly understand what recommendations need to be applied. During this reporting period, the City focused industrial inspection efforts on non-exposure facilities. Although these facilities are considered low risk, the recent EPA audit identified the need to inspect these facilities. A total of 26 non-exposure facilities were inspected of the total 98 non-exposure facilities on the City's list. Of these, several were identified as having materials exposed to stormwater. Facility operators were advised to either move potential stormwater pollutants under cover or apply for MSGP coverage.

This year, the target of inspecting 20% of all industrial and commercial facilities on the City's list was achieved. The City inspected 26 facilities. This total is 26% of all of the facilities identified as having the potential to discharge pollutants to the City's storm drain system. Of the 37 high risk facilities, 5 were inspected. The City will continue to review and revise the facility list, and will ensure that a minimum of 20% of facilities on the list receive inspections. For the next year (2019-2020) medium and high risk non-exposure facilities will be inspected to exceed minimum number of industrial sites to inspect.

3. Enhancing the Industrial Facility Program

During the permit term, the Department of Transportation enhanced the industrial/commercial program by continuing to educate facility operators regarding the MSGP 2010 and the sector specific requirements for their respective industry. During facility inspections, additional time was dedicated to discuss and explain the MSGP 2010 and sector specific requirements. This was performed to assist facility operators in complying with stormwater regulations.

VI. Construction Site Controls

A. MUNICIPAL EMPLOYEE TRAINING

1. New and Existing Employee Training Department of Transportation

Although the Stormwater Management Program experienced an inspection staff turn-over during this reporting period, the new Stormwater Inspectors received extensive training during their first year. Stormwater training incorporates both SWPPP review and inspections. An emphasis on cross training allows a small staff to fill in as needed to meet fluctuations in workload. They receive extensive written materials, such as, a copy of the Stormwater Ordinance (SWORD), the Stormwater Management Plan, the Watercourse Maintenance Guidelines, a copy of the AZPDES Construction General Permit, and any applicable ordinances and regulations and outreach materials for stormwater management for construction facilities.

2. New and Existing Employee Training Planning and Development Services Department

During this reporting period, Planning and Development Services Department held 26 small training sessions for their 3 member SWPPP review staff.

B. PLANNING AND LAND DEVELOPMENT

The City recognizes the need to understand Low Impact Development (LID) and Green Infrastructure Practices (GI). The City has completed a “Green Streets Active Practice Guidelines” for City streets construction projects.

C. PLAN REVIEW AND APPROVAL

1. Plan Review

Following SWPPP review and plan approval, the Planning and Development Services Department (PDSD) issues grading and building permits.

2. Plan Approval

The SWPPP and Notice of Intent to Discharge (NOI) must be completed prior to commencement of ground disturbing activities over an acre in size. SWPPPs were submitted and reviewed and ground disturbing permits were issued that met the AZPDES Construction General Permit eligibility requirements.

3. Pre-Construction Meetings

Planning and Development Services Department (PDSD) held 153 pre-construction meetings for private construction projects. The meetings provided an opportunity to review

the City's requirements that included providing a copy of ADEQ's authorization document at the preconstruction meeting. Other requirements are aimed at ensuring the contractor understood that the stormwater controls (BMP's) to be utilized for all sites regardless of the size, if pollutants potentially leave the site.

4. Transportation Capital Improvement Projects

The Department of Transportation administers the construction of roads and stormdrains within the publicly owned right-of-ways. The Stormwater Management staff, located in the Transportation Department, Engineering Review Division, reviews plans and ensures the SWPPPs for these projects meet all the requirements of the Arizona Construction General Permit. The City does not issue a Notice to Proceed until a copy of ADEQ's authorization document is received. Copies of the Notice of Termination and Stormwater inspection reports performed by Transportation Department Inspectors are provided by the Project Managers to the Stormwater Management staff.

D. STATUS OF INVENTORY

1. Permits Plus Database

The City continued to utilize the Permits Plus Database to track private development activities and inspections, and has recently started to add transportation capital improvement projects to the database. PIA plans are already utilizing the Permits Plus Database System. Information in the database included: requirements for a Construction General Permit, plan and SWPPP review comments, number of submittals, site location, construction inspections, enforcements and other information. This database is continually updated as plans are submitted and reviewed, permits are issued, and construction sites are inspected.

E. INSPECTIONS

Many construction projects are small and do not meet the disturbance limit under the AZPDES Construction General Permit. Capital projects undertaken by the City that do not require AZPDES coverage are still required to utilize good housekeeping measures and use BMP's. These projects are also inspected for compliance with the projects' Special Provisions document, where the City has this special higher standard requirement.

ROW permits for excavation, private improvements, or other earth disturbing work that do not require a SWPPP are inspected for good housekeeping measures as well.

1. Inspection Findings

During this reporting period, PDSD inspected 43 construction sites. The findings were typical of construction sites and inspectors communicated what was needed in order to comply with AZPDES construction general permit.

2. Enforcement Actions

During this reporting period, PDSD issued 215 enforcement requests for corrective actions due to site deficiencies. These included the location, installation, and maintenance of controls, and the requirement for on-going inspections. All 215 enforcement actions were resolved at the time of the follow-up inspection.

3. Transportation Projects

During this reporting period 12 inspections of 3 Capital Improvement Projects (CIP) and Public Improvement Agreement (PIA) projects involving road construction were performed. SWPPP deficiency(s) were reported to the on-site superintendent, field engineer, or designated representative. Verbal warnings were given to correct the discovered deficiency(s) that ranged from track-out, sediment accumulation along the roadway, stormdrain inlet protection maintenance, improperly installed BMP's, failed BMP's, stockpile management, concrete washout use, and record keeping. Follow-up inspections determined that all concerns were quickly addressed and resolved satisfactorily.

VII. Post-Construction Site Controls

A. MUNICIPAL EMPLOYEE TRAINING

Municipal employee training for construction and post-construction is discussed under Section VI Construction Site Controls.

B. POST-CONSTRUCTION CONTROLS

In this report period, the City did not develop any new post-construction controls methods for municipal projects. Privately developed and owned retention/detention basins were inspected by PDSG Grading and Drainage Inspectors.

1. Inspection of Privately owned Retention/Detention Basins

The Planning and Development Services Department (PDSG) has an on-going program for inspection of privately owned retention/detention basins to ensure that the basins continue to operate as designed. This fiscal year, PDSG inspected 1,480 privately owned basins and performed follow up inspections if deficiencies were found. This PDSG program is being updated with assistance by Stormwater Management.

2. Inspection of 75% of City Permitted Sites

In this report period, the City inspected all of the permitted sites. Planning and Development Services Department inspectors conducted post construction inspections of privately developed sites to ensure vegetative landscape cover was established to stabilize the site, and that permanent stormwater controls were functioning properly. The Stormwater Management Program conducted post-construction inspections for Capital Improvement Projects and Private Improvement Agreement projects that were completed during this report period. Permits and Codes Section performed post-construction inspections for AZPDES permitted projects conducted within the private right-of-way. Concerns or deficiencies were addressed.

C. COMPLIANCE ACTIVITIES/ENFORCEMENT

1. Privately Owned Retention/Detention Basins Enforcement

No major enforcement actions (citations) were issued in this report period. However, verbal and/or written requests for basin maintenance are still given. Property owners for basins that have poor condition results are sent letters for corrective action. With the new

stormwater software, digital inspection forms are being developed so that at time of inspection, letters will be automatically generated as needed. Besides being inspected by PDSI Inspectors annually, these detention/retention systems are also privately maintained, with required annual inspections and assessment for maintenance by a private Civil Engineer hired by the subdivision's homeowners association or commercial development owner's property management, per City of Tucson regulation. These annual inspection reports are to be made available to the City of Tucson upon request.

2. Summary of Follow-up Actions

Upon follow-up, all requested maintenance had been performed to keep basins functional.

PART 4: NUMERIC SUMMARY OF STORMWATER PROGRAM ACTIVITIES

I. Table I: Stormwater Public Education and Outreach FY 2018-19

City of Tucson Department of Transportation		
Target Group:	General Public	
Outreach Materials		Number
<ul style="list-style-type: none"> • Water Harvesting Guidance Manual 		25
<ul style="list-style-type: none"> • Swimming Pool Discharge Flyer 		80
<ul style="list-style-type: none"> • Yard and Landscape Waste Disposal brochure 		24
<ul style="list-style-type: none"> • Leaky vehicle flyer 		30
<ul style="list-style-type: none"> • Promotional materials given away at Public Outreach Events <ul style="list-style-type: none"> ○ July 15, 2017 - Ward IV Back to School Bash ○ April 21, 2018 - Earth Day - Childrens' Museum ○ May 9, 2018 - 2018 EHSS Vendor Fair - Raytheon ○ June 11, 2018 - Monsoon Safety Awareness Week 		850
Target Group:	General Public	
Outreach Materials		Number
<ul style="list-style-type: none"> • <i>Desert Wash Safety Activity Book</i> for grade school children <ul style="list-style-type: none"> ○ Stormwater runoff issues and residential stormwater BMP's ○ Illicit discharges and illegal dumping 		925
<ul style="list-style-type: none"> • <i>Stormwater in the Desert</i> book for middle school children and interactive website <ul style="list-style-type: none"> ○ Stormwater runoff issues and residential stormwater management practices ○ Stormwater quality impacts from application of pesticides, herbicides and fertilizer ○ Potential impacts of animal waste on stormwater quality ○ Preventing Illicit discharges and illegal dumping ○ Spill prevention, proper handling and disposal of toxic and hazardous materials 		10
Target Group:	Construction Site Operators, Development Community	
Outreach Materials		Number
<ul style="list-style-type: none"> • Construction information packets <ul style="list-style-type: none"> ○ Ordinances, design standards for stormwater in new developments/redevelopments ○ Municipal stormwater requirements and BMP's for construction sites ○ Illicit discharges and proper management of non-storm discharges ○ Spill prevention, and BMP's to contain and minimize discharges ○ Proper management and disposal of used oil and hazardous/toxic materials, ○ BMP's to minimize exposure of materials/wastes to rainfall ○ Stormwater pollution prevention plans, and facility maintenance procedures 		4
Target Group:	Industrial Commercial Businesses	
Outreach Materials		Number
<ul style="list-style-type: none"> • Industrial Information packets <ul style="list-style-type: none"> ○ Illicit discharges and proper management of non-stormwater discharges ○ Spill prevention, proper handling of toxic and hazardous materials ○ Proper management and disposal of used oil and hazardous materials, including practices to minimize exposure of materials/wastes to rainfall ○ Stormwater pollution prevention plans, and facility maintenance procedures. 		10
Subtotal Reached		1,958
Costs		\$964
City of Tucson -Planning and Development Services		

Target Group:	Development Construction	
	Outreach Materials	Number
	• 12 Monthly Outreach meetings, approximately 15 attendees	15
	Subtotal Reached:	15
	Cost:	\$1,200
City of Tucson Environmental Services Household Hazardous Waste (HHW)		
Target Group:	General Public	
	Outreach Materials	
	• Flyers for disposal of auto fluids, batteries, paints, solvents, pool chemicals, and pesticides	5,000
	• HHW webpage visits	38,246
	• News Releases on HHW collections	0
	Subtotal Reached	43,246
	Costs	\$403,947
Tucson Water		
Target Group:	General Public	
	Outreach Materials	Number
	• Rainwater Harvesting Brochures printed in FY 18, 4,500 regular program, 500 low income program	5,000
	• Rack cards to advertise both rebate (5,000) and grant/loan (4,000) programs	3,000
	• Student activity booklets including Rainwater Harvesting components distributed in FY 18	4,500
	• Pima County Flood Control bill insert regarding stormwater pollution prevention (distributed with City of Tucson Utility Services statement)	220,000
Target Group:	Homeowners	
	• SmartScape Rainwater Harvesting Workshop attendees in FY 18	398
	• Watershed Management Group Workshop attendees in FY 18	550
	• Rebate for Rainwater Harvesting systems in FY 18	410
	• All attendees receive: Tank Zoning and Permit Requirements for the City of Tucson, Rainwater Harvesting Incentives Rebate Program Most Requested Information, Pima County Development Services SOP 250.4 Permitting Requirements for Water Tanks, Eight Principles of Successful Water Harvesting, Rainwater Harvesting Best Management Practices for Installation, Rainwater Harvesting for Drylands Appendix 4, Alternative Water Sources and Backflow Assembly Requirements Brochure, Tucson Water Rainwater Harvesting Guidebook	\$389,683
	• SERI Rainwater Harvesting Workshop attendees in FY 18 (Low-Income)	237
	• Grants and loans for Low-Income Rainwater Harvesting systems in FY 18	88
	• Neighborhood Stormwater Harvesting Program: 250 brochures printed; 50 neighborhood meetings, 3 completed green infrastructure projects	\$14,714
	Subtotal Reached:	\$404,397
	Cost:	\$810,508
Tucson Clean and Beautiful		
Target Group:	General Public	
	Outreach Material	Number
	• Newsletter subscribers	10,596
	• Website visitors	42,770
	• Outreach presentations and event participants	6,780
	Subtotal Reached	51,146
	Cost:	See Table II
Pima Association of Governments		

Target Group:	Professional Audience	
	Outreach Materials	Number
	<ul style="list-style-type: none"> • Emails to PAG's Stormwater Listserve • PAG Engagement at School Events 	254 1,600
Target Group:	General Public	
	Outreach Materials	Number
	<ul style="list-style-type: none"> • Social media and Facebook Ads (PAG region) • PAG Stormwater and Green Infrastructure web page • Pet waste stations (MS4's and parks; neighborhoods by request) • Clean Water Starts with Me water bottles 	1,549 1,395 50 200
Subtotal Reached:		\$4,998

Summary of Public Education and Outreach

Jurisdiction	Reached	Costs
City of Tucson -Transportation Department		\$964
City of Tucson -Planning and Development Services Department		\$1,200
City of Tucson Environmental Services Household Hazardous Waste	43,246	\$403,947
City of Tucson -Water Department	1141	\$810,508
Pima Association of Governments		\$4,998
TOTALS:		\$1,221,617

II. Stormwater Public Involvement FY 2018-19

Stormwater Management Program		
Participants:	General Public	
	Activity	Number
	<ul style="list-style-type: none"> • Stormwater Section website hits 	7,805
Subtotal Reached:		
City of Tucson Environmental Services Household Hazardous Waste (HHW)		
Participants:	General Public	
	Activity	
	<ul style="list-style-type: none"> • Household Hazardous Waste Collection Program • Participants in the program • HHW-LR drop-off site • Participants in the program (Counted in HHW Collection Program above) • Home Pick-up <ul style="list-style-type: none"> ○ Participants in the program (counted in the HHW Collection Program above) • Outreach Events <ul style="list-style-type: none"> ○ Participants in the program (counted in the HHW Collection Program above) 	11,755 3,316 57 4,837
Participants:	Small Businesses	
	Activity	
	<ul style="list-style-type: none"> • Small Business Waste Assistance Program • Participants in the program 	• • 78
Subtotal Participants:		11,755
Subtotal Program Cost:		\$403,947

Tucson Clean and Beautiful		
Participants:	General Public	
	Activities	Number
•	Adopt a Park and Public Areas, including Streets and Washes (Participants in the program)	4,903
•	Trees for Tucson Program	4,299
•	Households Receiving Trees – Reduces soil erosion, improves stormwater quality	
	Subtotal Participants [volunteer hours]:	10,101
	Subtotal Program Cost:	\$ 256,858

Table II. Summary of Public Involvement

Jurisdiction	Reached	Costs
City of Tucson – Transportation Department - Stormwater		0
City of Tucson – Household Hazardous Waste		Not Avail.
Tucson Clean and Beautiful		\$258,858
TOTALS:		\$258,858

III. Illicit Discharge Detection & Elimination Program

A. MUNICIPAL EMPLOYEE TRAINING

The City’s Stormwater permit requires training of **field staff and stormwater inspectors** on detecting, investigating and identifying illicit discharges (non-storm flows that may contain pollutants). New employees shall receive training within the first year. Existing employees shall receive refresher training every two years.

1. Provide the number of new employees (if no new employees, indicate none) 35

STORMWATER MANAGEMENT PRACTICE OR ACTIVITY	2016-17	2017-18	2018-19	2019-20	2020-21
Number of training sessions					
Identifying and reporting non-stormwater discharges that may contain pollutants	30	52	52	•	•
Number of employees attending training	• 9	• 4	35	•	•

B. SPILL PREVENTION FOR MUNICIPAL FACILITIES

The City’s Stormwater permit requires certain municipal facilities to have site specific materials handling and spill response procedures. The affected facilities include all those where used oil or other toxic or hazardous materials are used, stored or handled, where any single container exceeds 5 gallons, and where such materials are exposed or have the potential to be exposed to stormwater.

- These facilities shall be inspected/assessed at least annually to ensure that the procedures are in place and effective.
- Copies of the site-specific materials handling and spill response procedures shall be available at all municipal facilities.
- The site- specific materials handling and spill response procedures shall be reviewed every 2 years and the review shall include the participation of personnel with stormwater expertise.

STORMWATER MANAGEMENT PRACTICE OR ACTIVITY	2016-17	2017-18	2018-19	2019-20	2020-21
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Number of municipal facilities that require site specific materials handling and Spill response procedures	• 9	• 9	•	•	•
Environmental Services (HHW, HHW-LR, HHW Remote Collections)	• 3	• 4	• 2	•	•
Fire (HAZWaste at fire stations)(HAZWaste at Yard)	• 1	• 1	• 1	•	•
General Services (Service Stations)	• 9	•	• 8	•	•
Parks & Recreation	• 3	• 9	• 1	•	•
TDOT - Streets & Traffic (storage yard)	• 2	• 2	• 2	•	•
Water (well sites)	• 185	• 173	• 163	•	•
Number of spills at municipal facilities with hazardous materials that occurred in outside areas					
Environmental Services(Los Reales Landfill, HHW, HHW Remote Collections/ Garbage Truck Leaks)	• 0/597	• 0/576	• 0,0,0/252	•	•
Fire	• 0	• 0	• 0	•	•
General Services	• 0	• 0	• 0	•	•
Parks & Recreation	• 0	• 2	• 1	•	•
TDOT - Streets & Traffic	• 0	• 0	• 0	•	•
Tucson Water	• 0	• 0	• 0	•	•
Number of inspections or assessments of these facilities completed					
Environmental Services(Los Reales Landfill, HHW / Closed Landfill Inspections)	• 26/50	• 26/33	• 18,12/17	•	•
Fire - Weekly Log/Inspection	• 52	• 52	• 52	•	•
General Services	• 3	• 108	• 50	•	•
Parks & Recreation	• 3	• 9	• 1	•	•
TDOT - Streets & Traffic	• 12	• 12	• 12	•	•
TDOT - Stormwater	• 0	• 0	•	•	•
Tucson Water (well sites x inspection per year if performed twice weekly)	• 17,760	• 17,760	• 16,952	•	•
Date of last review of sitespecific materials handling and spill response procedures					
Environmental Services	• 1/2017	• 2018	•	•	•
Fire - Weekly Inspections	• 7/27/17	• 6/28/17	• 6/29/18	•	•
General Services	• 2016	• 2018	• 2019	•	•
Parks & Recreation	• June 2016	• N/A	• N/A	•	•
TDOT - Streets & Traffic	• 12/2016	• 6/2018	• 6/2019	•	•
TDOT - Stormwater	• 6/12	• 6/2018	•	•	•
Tucson Water	• 3/31/17	• 3/31/18	• 2/28/19	•	•

C. OUTFALL INSPECTION AND ILLICIT DISCHARGE DETECTION AND ELIMINATION ACTIVITIES (TDOT-STORMWATER)

The permit requires that the City maintain an inventory or map of all major outfalls and of other field screening points (Lakeside Lake, Atterbury Wash).

- The City shall conduct ongoing dry weather field screening of major outfalls and other screening locations.
- The City shall inspect priority outfalls once each year.
- At a minimum, the City shall inspect 20% of the non-priority outfalls each year.

- The City shall document inspections, findings and report evidence of non-stormwater flows, and follow-up actions taken by the City.

STORMWATER MANAGEMENT PRACTICE OR ACTIVITY	2016-17	2017-18	2018-19	2019-20	2020-21
Total number of major outfalls identified to date	• 500	• 500	• 500	•	•
Total number inspected	• 100	• 100	• 100	•	•
Number of priority outfalls identified	• 14	• 14	• 14	•	•
Number of 'priority outfalls' inspected	• 14	• 14	• 14	•	•
Number of dry weather flows detected	• 2	• 0	• 0	•	•
Number of dry weather flows investigated	• 2	• 0	• 0	•	•
Number of major outfalls sampled during dry weather flow	• 0	• 0	• 0	•	•
Number of illicit discharges identified	• 0	• 0	• 0	•	•
Number of illicit discharges eliminated	• 0	• 0	• 0	•	•

D. INSPECTIONS FOR POTENTIAL ILLICIT DISCHARGES (TDOT STORMWATER AND TUCSON WATER)

- The Stormwater Section shall inspect the drainage system in response to reports of potential illicit discharges. These reports may be received from Parks and Recreation or Streets and Traffic Maintenance as a result of their annual, priority inspections of the storm drain system.
- If non-storm connections (pipes, hose or channel carrying non-storm flow) are detected, the Stormwater Section shall be notified to investigate to determine if they are a source of pollutants, and the Stormwater Section shall use escalating enforcement action to eliminate these connections.
- The City shall respond to reports of dry weather flow including irrigation overflow, irrigation ponding or other incidents of wasting water, **Tucson Water** shall investigate and use escalating enforcement actions to correct these situations.

STORMWATER MANAGEMENT PRACTICE OR ACTIVITY	2016-17	2017-18	2018-19	2019-20	2020-21
TDOT Stormwater:					
Miles of Stormwater drainage system inspected for illicit discharges	• 383	• 383	• 338	•	•
Total Number of investigations of non-storm connections (cross connections) to stormwater drainage features	• 0	• 1	• 0	•	•
Total Number of pollution carrying, non-storm flows detected	• 1	• 1	• 0	•	•
Total Number of non-storm, pollution carrying connections eliminated (TDOT Storm)	• 1	• 0	• 0	•	•
Number of verbal warnings	• 306	• 175	• 131	•	•
Number of written warnings	• 0	• 4	• 4	•	•
Total number turned over to court for enforcement action	• 0	• 0	• 0	•	•
Number of corrective or enforcement actions initiated within 60 days of inspection and identification	• 0	• 0	• 0	•	•

Percent of cases resolved or transferred to City Court System within 1 calendar year of original enforcement action	• 0	• 0	• 0	•	•
Number of illicit discharge reports received	• 78	• 136	• 145	•	•
Percent of illicit discharge reports responded to	• 100	• 100	• 100	•	•
Percent of responses initiated within 3 business days	• 100	• 100	• 100	•	•
Tucson Water					
Total number of incidents of over-irrigation, irrigation overflow and ponding investigated	• 514	• 375	• 322	•	•
Total number of verbal warnings for above	• 270	• 175	• 299	•	•
Total number of written warnings for above	• 1	• 0	• 1	•	•
Total number turned over to court for enforcement action	• 0	• 0	• 0	•	•
Total number of corrective or enforcement actions initiated within 60 days of inspection and identification	• 0	• 0	• 0	•	•
Total percent of cases resolved or transferred to City Court System within 1 calendar year of original enforcement action	• 100%	• N/A	• N/A	•	•

IV. Municipal Facility Stormwater Program

A. MUNICIPAL FACILITY POLLUTION PREVENTION/GOOD HOUSEKEEPING EMPLOYEE TRAINING

For employees directly involved in certain activities (see list below) the permit requires that the City provide training for new employees once per year and refresher training for existing employees every two years.

1. Proper street repair and road improvement practices to minimize dischargers to the storm drain system
2. Specific Procedures and spill management practices to prevent or minimize spills or discharges to the storm drain system
3. Proper handling, storage, transportation, and disposal of used oil and other toxic and hazardous materials and wastes to prevent spills, exposure to rainfall, and contamination of stormwater runoff.
4. Stormwater specific Training: Staff involved in stormwater inspections including General Services (SWPPP for Price), Environmental Services (SWPPP for Los Reales), and the Stormwater Section shall be trained in stormwater quality management practices and pollution prevention plans. Other stormwater training topics include: Floodplain and Erosion Hazard Management Ordinance, Watercourse Maintenance Guidelines, supporting development standards of the Tucson Code, stormwater regulations and permit requirements.

STORMWATER MANAGEMENT PRACTICE OR ACTIVITY	2016-17	2017-18	2018-19	2019-20	2020-21
Number of training events (topics 1,2,3 above)					
Environmental Services	• 1/7	• 6	• 2	•	•
Fire	• 0	• 2	• 2	•	•
General Services	• 1	• 1	• 0	•	•
Parks & Recreation	• 6	• 3	• 2	•	•
PDSB	• 36	• 45	• 26	•	•
TDOT - Engineering	• 7	• 6	• 3	•	•
TDOT - Streets & Traffic	• 1	• 3	• 0	•	•
TDOT - Stormwater	• 99	• 45	• 3	•	•

Tucson Water	• 1	• 1	• 6	•	•
Total Number of staff trained					
Environmental Services (drivers/HHHW/EMP)	• 456/104/6	• 474/6/0	• 15/5/0	•	•
Fire	• 0	• 4	• 5	•	•
General Services	• 1	• 3	• 0	•	•
HR	• 0	• 0	• 0	•	•
Parks & Recreation (monthly/RCRA/spills)	• 41	• 9	• 11	•	•
PDS	• 3	• 5	• 5	•	•
TDOT - Engineering	• 7	• 16	• 27	•	•
TDOT - Streets & Traffic	• 86	• 8	• 0	•	•
TDOT - Stormwater	• 16	• 5	• 5	•	•
Tucson Water	• 25	• 25	• 90	•	•
Number of Stormwater Specific Training Sessions/number trained (Topic 4 above)					
Environmental Services (Los Reales SWPPP)	• 0	• 0	• 0	•	•
General Services (Price SWPPP)	• 2	• 0	• 0	•	•
Parks & Recreation	• 6	• 3	• 2	•	•
PDS	• 3	• 5	• 5	•	•
TDOT - Engineering	• 0	• 6	• 5	•	•
TDOT - Streets & Traffic	• 1/86	• 0	• 0	•	•
TDOT - Stormwater	• 16	• 45	• 5	•	•
Tucson Water	• 1	• 1	• 6	•	•

B. MUNICIPAL FACILITY INVENTORY (TDOT STORMWATER MAIT'S)

STORMWATER MANAGEMENT PRACTICE OR ACTIVITY	2016-17	2017-18	2018-19	2019-20	2020-21
Total number of facilities on inventory	• 221	• 221	• 207	•	•
Date identification of "higher risk" facilities complete and date of prioritization of municipal facilities completed	• Dec. 15 *	• Dec 2017	• June 2019	•	•
Number of municipally-owned high risk facilities identified	• 12	• 12	• 12	•	•

C. INSPECTIONS OF STORMWATER DRAINAGE SYSTEM (STORM DRAINS, WASHES, DETENTION AND RETENTION BASINS, AND ROADSIDE DRAINAGE FEATURES.)

The City shall conduct visual inspections of drainage features to identify the presence of non-storm discharges, excess sediment, litter, debris or other pollutants that may obstruct flow or be transported in stormwater, and to determine maintenance needs.

- The City shall define areas of the drainage system that are a priority for inspection, based on system history, and other factors, these priority areas shall be inspected at least once per year.
- If non-storm connections (pipes, hose or channel carrying non-storm flow) are detected, the Stormwater Section shall be notified to investigate to determine if they are a source of pollutants, and the Stormwater Section shall use escalating enforcement action to eliminate these connections.

STORMWATER MANAGEMENT PRACTICE OR ACTIVITY	2016-17	2017-18	2018-19	2019-20	2020-21
Miles of MS4 drainage system prioritized for inspection					
Parks & Recreation	• 23.2	• 23.2	• 23.2	•	•
TDOT - Streets & Traffic	• 383	• 383	• 383	•	•
Miles of priority drainage system visually inspected					
Parks & Recreation	• 2.1	• 4	• 5	•	•
TDOT - Streets & Traffic	• 385	• 363	• 266	•	•

D. Inspections of Higher Risk Municipal Facilities

The permit requires the City to prioritize high risk municipal facilities based on the potential to cause a substantial pollutant load. The City has identified the following municipal facilities as High Risk:

- Parks & Recreation: El Rio, Fred Enke, Randolf and Silverbell Golf Courses
- General Services: Price Service Center
- Environmental Services: Household Hazardous Waste
- Tucson Fire Department - HazMat Storage Facility

These facilities shall be inspected every two years and shall note any improvements needed. Recommended improvements shall be initiated within 3 months of the inspection and a schedule established for implementation. The City shall maintain a system for tracking the status of improvements and date(s) of implementation.

- The City shall develop practices to facilitate the proper management and disposal of used oil and other toxic materials.
- The City shall develop a program to minimize pollution from pesticide/herbicide use at City facilities. Tucson shall only apply pesticides that are Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) approved for aquatic use in any area within or adjacent to waters of the US, including dry washes. Research will be performed to check for safety issues related to pesticide/herbicide application.

Total Number of "higher risk" municipal facilities inspected	• 7	• 30	• 30	•	•
Parks & Recreation	• 3	• 3	• 3	•	•
General Services	• 1	• 12	• 12	•	•
Environmental Services	• 2	• 14	• 2	•	•
Tucson Fire	• 1	• 1	• 1	•	•
Total Number of "higher risk" municipal facilities found needing improved stormwater controls	• 7	• 0	• 0	•	•
Parks & Recreation	• 0	• 0	• 0	•	•
General Services	• 0	• 0	• 0	•	•
Environmental Services	• 0	• 0	• 0	•	•
Tucson Fire	• 0	• 0	• 0	•	•

E. Infrastructure Maintenance

The City shall address maintenance needs identified as deficient by inspections, monitoring, or other reporting including: maintenance and cleaning of linear drainage system, municipal retention and detention basins and municipal streets used for stormwater conveyance, catch basins, and storm drain inlets.

- The City shall evaluate drainage system maintenance priorities and update the inspection schedule at least once per year.

The City shall sweep municipal roads, and within Parks, roads and parking areas

- The City shall evaluate street sweeping frequency at least once a year.
- The City shall develop a control measure field manual for municipal maintenance activities including: paving and road repairs, saw cutting, concrete work, curb and gutter replacement, buried utility repairs and installation, vegetation removal, street and parking lot striping, drainage channel cleaning

STORMWATER MANAGEMENT PRACTICE OR ACTIVITY	2016-17	2017-18	2018-19	2019-20	2020-21
Total Linear miles of drainage channel cleaned (city to maintain records documenting specific street cleaning events)					
Parks & Recreation	• <5	• <3	• <3	•	•
TDOT - Streets & Traffic	• 83	• 97	• 97	•	•
Linear miles of closed conduit cleaned					
Parks & Recreation	• <1	• <1	• <1	•	•
TDOT - Streets & Traffic	• 14 sites	• 10 sites	• 5 sites	•	•
Street sweeping (Total broom miles)					
Parks & Recreation	• 75	• 75	• 95	•	•
TDOT - Streets & Traffic	• 23,901	• 20,769	• 22,977	•	•
Amount of waste collected from street and lot sweeping (tons)					
Parks & Recreation *(cu/yards)	• 49	• 49.5	• 52.6	•	•
TDOT - Streets & Traffic (tons)	• 7,174	• 6,986	• 6,439	•	•
Total Number of public retention/detention basins cleaned					
Parks & Recreation	• 3	• 0	• 5	•	•
Total number of catch basins identified to date					
Parks & Recreation	• 47	• 47	• 47	•	•
TDOT -Streets & Traffic	• 1,168	• 1,168	• 1,168	•	•
Total Number of catch basins cleaned					
Parks & Recreation	• 5	• 8	• 7	•	•
TDOT - Streets & Traffic	• 50	• 143	• 202	•	•
TDOT - Stormwater	• 0*	• 30*	• 26*	•	•

*Stormwater Inspector emailed/called in request for cleanup to Transportation Streets Division

V. Industrial Stormwater Program (TDOT-Stormwater)

A. Municipal Employee Training

The permit requires that the City provide training for new employees once per year and refresher training for existing employees every two years. Training shall include educating and updating stormwater inspectors on stormwater management requirements for industrial and commercial activity.

STORMWATER MANAGEMENT PRACTICE OR ACTIVITY	2016-17	2017-18	2018-19	2019-20	2020-21
Number of training events for MS4 staff	• 36	• 45	• 29	•	•
Number of staff trained	• 3	• 5	• 5	•	•

A. INVENTORY

The city shall develop and maintain an inventory of facilities that have the potential to discharge pollutants to the MS4. The list shall include industrial facilities subject to MSGP requirements, other industrial and commercial sources which the City determines to be a significant source of pollutants.

- The City shall inspect a minimum of 20% of the facilities on the inventory, including re-inspections as necessary.

STORMWATER MANAGEMENT PRACTICE OR ACTIVITY	2016-17	2017-18	2018-19	2019-20	2020-21
Number of Industrial facilities inspected					
Total number of facilities on the priority list	• 72	• 28	• 3*	•	•

C. ENFORCEMENT ACTIONS

STORMWATER MANAGEMENT PRACTICE OR ACTIVITY	2016-17	2017-18	2018-19	2019-20	2020-21
Number of corrective or enforcement actions initiated on industrial facilities	• 17	• 10	• 2	•	•
Percent of cases resolved within one (1) calendar year of original enforcement action	• 17	• 10	• 2	•	•
Number of cases referred to the City Court System	• 0	• 0	• 0	•	•

VI. Stormwater Construction Program Activities

A. Municipal Employee Training

For employees directly involved in review and inspection of Construction sites requiring Stormwater General Permit Requirements and review and inspection of Post Construction Controls, the permit requires that the City provide training for new employees once per year and refresher training for existing employees every two years.

- Training for plan reviewers shall include:

Grading and drainage design standards, plan review procedures, municipal ordinances related to stormwater and construction, requirements for structural and non-structural control measures on construction sites, Post-Construction stormwater controls.

- Training for inspectors shall include:

Municipal ordinances related to stormwater and construction, requirements for structural and non-structural control measures on construction sites, Construction BMP maintenance requirements, inspection procedures, and enforcement procedures.

STORMWATER MANAGEMENT PRACTICE OR ACTIVITY	2016-17	2017-18	2018-19	2019-20	2020-21
Total Number of training events for SWPPP plan review staff					
PDS	• 26	• 30	• 28	•	•
TDOT -Engineering (CIP)	• 15	• 6	• 3	•	•
TDOT -Engineering (ROW/PIA/excavation)	• 20	• 8	• 8	•	•
Tucson Water	• 0	• 0	• 0	•	•
Total Number of Training Events for Inspection Staff					
PDS	• 50	• 45	• 52	•	•
TDOT -Engineering (CIP)	• 15	• 6	• 18	•	•
TDOT -Engineering (ROW/PIA/excavation)	• 20	• 6	• 26	•	•
Tucson Water	• 0	• 0	• 0	•	•
Total Number of staff trained					
PDS	• 3	• 5	• 5	•	•
TDOT -Engineering (CIP)	• 5	• 16	• 31	•	•
TDOT -Engineering (ROW/PIA/excavation)	• 16	• 16	• 17	•	•
Tucson Water	• 0	• 0	• 0	•	•

B. PLAN REVIEW

STORMWATER MANAGEMENT PRACTICE OR ACTIVITY	2016-17	2017-18	2018-19	2019-20	2020-21
Number of grading plans/SWPPPs submitted for review					
PDS	• 110	• 55	• 121	•	•
TDOT -Engineering (CIP)	• 3	• 2	• 5	•	•
TDOT -Engineering (ROW/PIA/excavation)	• 4	• 1	• 5	•	•
TDOT -Stormwater	• 0	• 0	• 6	•	•
Tucson Water	• 0	• 3	• 3	•	•
# of ground disturbing permits issued that meet the AZPDES Construction General Permit eligibility					
PDS	• 70	• 48	• 88	•	•
TDOT -Engineering (CIP)	• 2	• 2	• 5	•	•
TDOT -Engineering (ROW/PIA/excavation)	• 1	• 1	• 4	•	•
Number of construction/grading plans reviewed for those that fall under AZPDES					
PDS	• 70	• 75	• 88	•	•
TDOT -Engineering (CIP)	• 2	• 2	• 5	•	•
TDOT -Engineering (ROW/PIA/excavation)	• 1	• 1	• 4	•	•

TDOT -Stormwater	• 0	• 0	• 6	•	•
Tucson Water	• 0	• 0	• 2	•	•
Number of AZPDES permitted construction sites					
PDS	• 50	• 99	• 59	•	•
TDOT -Engineering (CIP)	• 2	• 1	• 6	•	•
TDOT -Engineering (ROW/PIA/excavation)	• 1	• 1	• 4	•	•
TDOT -Stormwater	• 0	• 0	• 5	•	•
Tucson Water	• 0	• 0	• 1	•	•

C. INSPECTIONS AND ENFORCEMENT ACTIONS

STORMWATER MANAGEMENT PRACTICE OR ACTIVITY	2016-17	2017-18	2018-19	2019-20	2020-21
# of AZPDES construction sites inspected					
PDS	• 20	• 43	• 28	•	•
TDOT -Engineering (CIP)	• 2	• 3	• 12	•	•
TDOT -Engineering (ROW/PIA/excavation)	• 2	• 2	• 4	•	•
# of corrective or enforcement actions initiated on construction facilities					
PDS	• 115	• 268	• 215	•	•
TDOT -Engineering (CIP)	• 5	• 4	• 3	•	•
TDOT -Engineering (ROW/PIA/excavation)	• 0	• 0	• 0	•	•
Number of corrective actions resolved					
PDS	• 115	• 268	• 215	•	•
TDOT -Engineering (CIP)	• 5	• 4	• 3	•	•
TDOT -Engineering (ROW/PIA/excavation)	• 0	• 0	• 0	•	•
Total Number of corrective actions turned over to the City Court System					
PDS	• 0	• 0	• 0	•	•
TDOT -Engineering (CIP)	• 0	• 0	• 0	•	•
TDOT -Engineering (ROW/PIA/excavation)	• 0	• 0	• 0	•	•

VII. Post Construction Program Activities

The City shall inspect projects in the post-construction phase to ensure controls are installed, and are being maintained.

- The City shall inspect at least 75% of the sites that have received permits for ground disturbing activities within 1 year following construction to determine the effectiveness of stormwater controls.
- The City shall develop an inspection, maintenance and tracking program, and shall report the number of sites that receive post-construction inspections.
- The City shall implement an effective compliance and escalating enforcement program.
- The City shall assign maintenance responsibility for post construction controls through policies, maintenance agreements, or easements.

STORMWATER MANAGEMENT PRACTICE OR ACTIVITY	2016-17	2017-18	2018-19	2019-20	2020-21
Number of post-construction inspections completed					
PDS	• 2,880	• 2,684	• 2,518	•	•
TDOT -Engineering	• 5	• 4	• 4	•	•
TDOT -Streets & Traffic	• N/A	• N/A	• N/A	•	•

PIA/ROW	• 5	• 2	• 2	•	•
TDOT -Stormwater	• 20	• 5	• 4	•	•
Number of corrective or enforcement actions initiated for post-construction activities					
PDS	• 10	• 15	• 9	•	•
TDOT -Engineering	• 0	• 0	• 0	•	•
TDOT -Streets & Traffic	• N/A	• N/A	• N/A	•	•
PIA/ROW	• 0	• 0	• 0	•	•
TDOT -Stormwater	• 0	• 0	• 0	•	•

PART 5 EVALUATION OF THE STORMWATER MANAGEMENT PROGRAM

The City's Stormwater Management Program has been overall effective during this report year, although seasonal sampling had been less effective due to the transition to new equipment. The City's Stormwater Management Program received feedback on stormwater outreach which demonstrated that people have a better understanding of the need for keeping pollutants from contacting stormwater, which is key to increasing the effectiveness of the program, as indicated from the latest regional 2018 2019 Clean Air/Water Survey results. Contact, through outreach events, has also demonstrated that the general public is interested in keeping stormwater clean and willing to do their part to help.

During industrial and construction inspections, staff noted that the operator's base knowledge is improving and they are amiable to learning and complying with the stormwater regulations. During one industrial inspection of a fire protection company, recent discussion with the local business indicated a change from using environmentally safer substances to less safe compounds due to pricing.

For student housing areas, where the majority of reported discharges have been determined to be de minimis discharge activities, stormwater management with assistance by Planning and Development Services Department, Tucson Water, and Environmental Services (waste management and code enforcement) continues to provide regular inspections and monitoring to look for illicit discharges. Pool water discharges and trash pick-up containers have been identified as sources of illicit discharges from some student housing properties and actions have been taken in the form of notice of violation of code, corrective action plans, as well as code enforcement actions.

This year's neighborhood IDDE outreach response events appear to have been successful for SFR residential subdivision pool issues. For the other neighborhood IDDE response events, additional monitoring is needed to see if the outreach is effective, especially for neighborhood areas where dog poop was allegedly thrown over the backyard walls into watercourses. Although there was an increase in gray water complaints, there was no concentration of areas where neighborhood outreach response would have been effective.

Regarding watercourse preservation and maintenance, Police, Parks and Recreation, and Transportation Departments have worked with Stormwater Management and continue to increase concentrated efforts to clean up segments of publicly maintained watercourses that have homeless debris and encampments. The Homeless Protocol process has been effective in providing homeless encampments a warning of upcoming cleaning efforts. A number of volunteer groups work to clean up washes and public places as an example of the dedication the public has for keeping the environment pollution free. The TCB Adopt-A-Wash program was very active due to TCB's involvement and successful programs.



Artwork: Erika Segura

PART 6 STORMWATER MANAGEMENT PROGRAM MODIFICATIONS

This Stormwater Management Program (SWMP) has been in use for 8 years. During this reporting period, some modifications have occurred to refine and improve the stormwater program. The City of Tucson has purchased stormwater software (SAMS for Stormwater) to improve the inspection and sampling process. Newly purchased stormwater sampling equipment was installed summer 2018 and calibration has been completed, however some modifications to the notification device for the sampling equipment is being completed in September 2019.

A new Program Manager was assigned to oversee the MS4 Program in February 2016. Three additional staff worked intermittently on inspections, MAIT's, outreach, and other stormwater management duties during the FY2018-2019. New staff (two specialized Construction Inspectors and one Senior Engineering Associate) is expected to be working full-time with the Program Manager starting in September 2019. The total number of Industrial and Commercial inspections were not completed for FY2018-2019, however the intent for FY2019-2020 is to achieve more than the average number of Industrial and Commercial Inspections. This is primarily due to the new and easy-to-use inspection forms being generated in 2019 and other improvements by the new SAMS software, as well as staffing improvements. The Program Manager has Construction Inspectors assigned for this program, with special Inspectors assigned to MAIT's, Industrial Inspections, training, and sampling duties. These inspectors perform inspections to monitor and document the Department of Transportation's construction activities, as well as assist with some IDDE inspection response. Department of Transportation Streets staff who currently inspect stormdrain systems annually will be performing the Stormwater Management's outfall inspections, since this activity was identified as an overlapping, redundant activity. All current Construction Inspectors have been trained to perform AZPDES SWPPP construction inspection. A more concentrated effort will be placed on training for staff (OSHA, RCRA, HAZ MAT, HAZWOPER, Industrial, and other Stormwater related training).

City of Tucson Department of Transportation is the lead department for Stormwater Management in the City. Meetings with all other departments will occur each quarter or as needed to discuss issues. Stormwater Management team will be continuing to update training modules for both "on-boarding" (new hires) as well as specialized training for Parks Department, TOPSC and other Environmental and General Services Department staff that perform stormwater tasks. Tucson will be addressing the technical issues in order to continue the middle school booklet for the fiscal year 2019-2020. Department of Transportation will be continuing to add Only Rain in the Drain markers to new Capital project inlets. Stormwater Management staff will continue to attend ADEQ and Stormwater Coalition meetings to contribute stakeholder input to upcoming new general MS4 Large (Phase 1) permit, and other permits, and new procedures for reporting improvements. Stormwater Management will continue to assist the Streets staff within the Department of Transportation as well as multiple departments and agencies in their efforts to address the marked increase in homeless issues within the watercourses.

In September 2019, Mayor and Council approved the Green Stormwater Infrastructure Program which will assist with funding toward design, installation, as well as training and performance of and maintenance of public green infrastructure within the City limits. This program uses a monthly utility fee to finance Green Stormwater Infrastructure projects. This fee is expected to generate \$3 million per year, which would be used to maintain and build city projects capturing stormwater from parking lots and roads.

PART 7 MONITORING LOCATIONS

Stormwater is monitored at five locations within the City of Tucson. They are:

Site	Land Use	Physical Location	Location	Watershed Area (acres)	Receiving Waters *
1	Single Family Residential	Grant Road & Wilson Avenue	32° 15' 02.83" N 110° 56' 15.23" W	400	SC
2	Multi-family Residential	Greenlee Road	32° 16' 14.9" N 110° 53' 56.88" W	49	R, SC
3	Commercial	El Con Mall / Randolph Way	32° 13' 16.16" N 110° 55' 04.77" W	38	SC
4	Industrial	17 th Street	32° 12' 48.33" N 110° 57' 12.33" W	91	SC
5	Mixed Use	First Avenue at Limberlost Road	32° 16' 58.28" N 110° 57' 40.35" W	380	R, SC

- Receiving Waters: SC = Santa Cruz River, R = Rillito River, P = Pantano Wash, TV = Tanque Verde

The stormwater runoff from Sites 2 and 5 flows to the Rillito River and then to the Santa Cruz River. The other sites flow directly into the Santa Cruz River. At the discharge points, the Santa Cruz and Rillito are both normally dry, ephemeral washes with no aquatic habitat.

All five of the City's monitoring stations are equipped with automated sampling equipment. The automated equipment is programmed to collect flow-weighted samples at fixed time intervals. Three years ago we purchased and installed new stormwater sampling equipment for each of our five sites; however the final equipment installation did not occur until November of 2018. Calibrations occurred through Fall of 2018 and early 2019. In May 2019 we have installed SAMS (Stormwater module) Software and continue to create customize software with the consultant to provide a more effective sampling program. Sampling opportunities were minimal for this reporting period due to new modem replacement issues, sampling site installation issues, and inspection staff changes. Samples are composited at the laboratory based on storm hydrographs to achieve a flow-weighted composite for analysis.

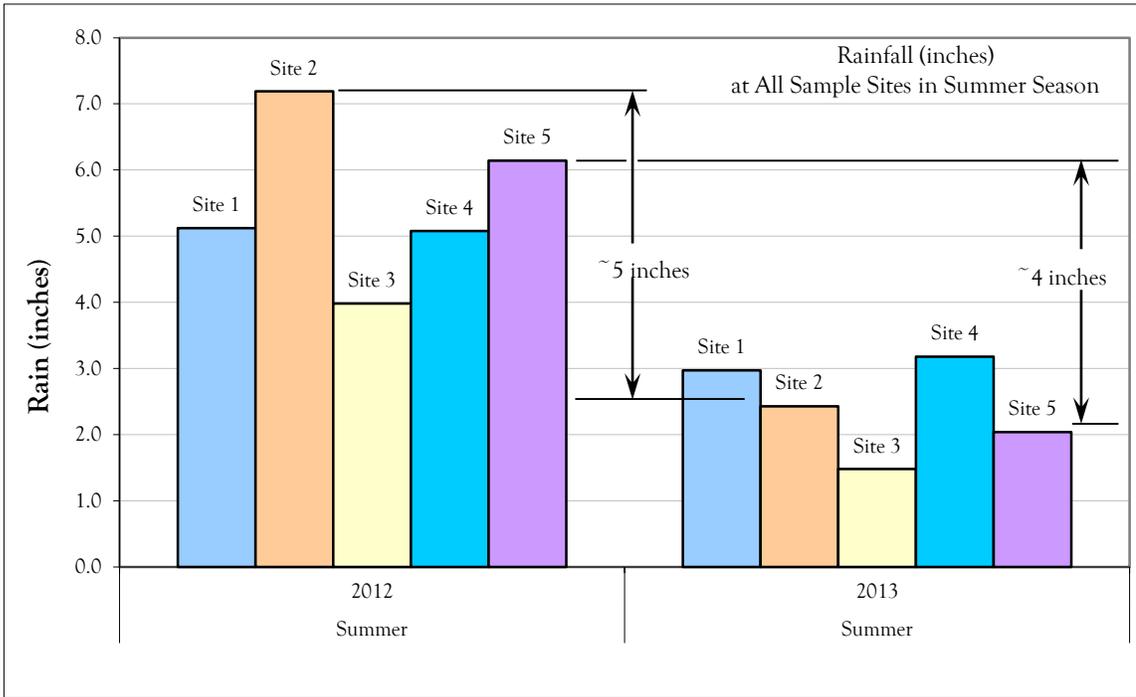
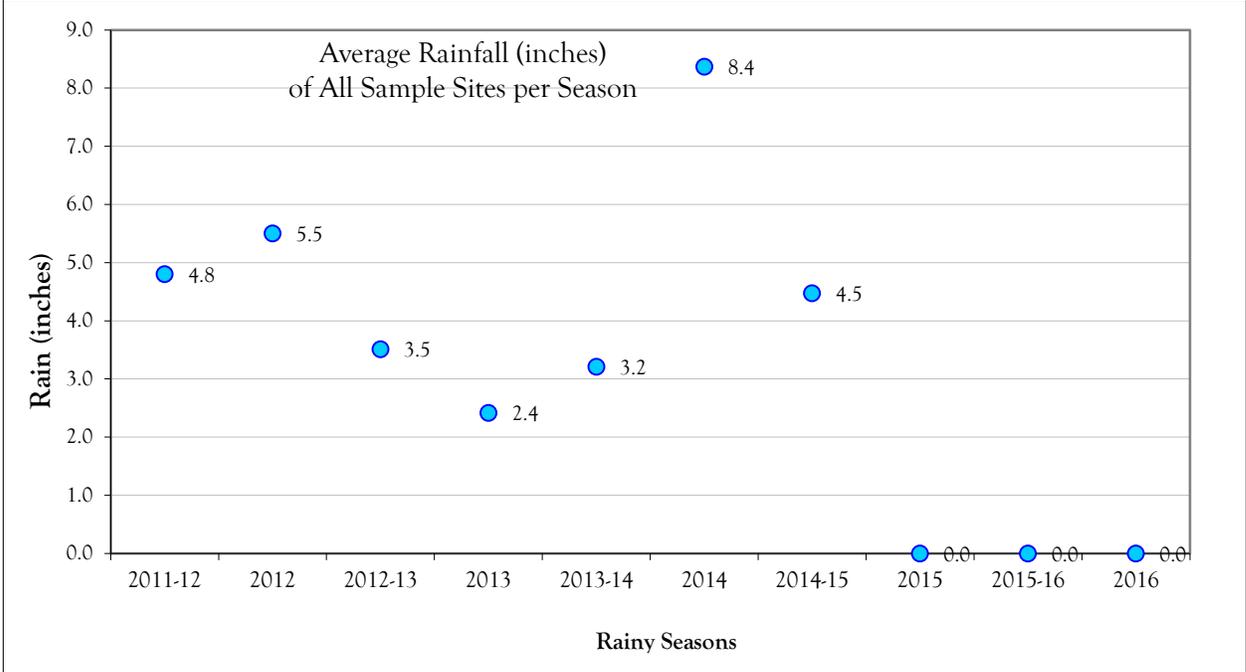
PART 8 STORM EVENT RECORDS

Rainfall (RF) in inches at each site (1,2,3,4,5) along with the status of the site and sampling.

	Date	1	RF	2	RF	3	RF	4	RF	5	RF
Summer Season	16JUN18			EF	N/A					SC	0.20
	5JUL18	IF	0.02	EF	N/A	IF	0.04				
	15JUL18			EF	N/A			IF	0.04		
	21JUL18			EF	N/A			EF	N/A		
	25JUL18			EF	N/A	IF	0.04	IF	0.02		
	27JUL18			EF	N/A			IF	0.04		
	1AUG18			EF	N/A	C	0.24	C	0.71		
	7AUG18			EF	N/A	C	0.28				
	8AUG18			EF	N/A			72	0.04	72	0.04
	10AUG18			EF	N/A					72	0.04
	11AUG18			EF	N/A			72	0.04		
	14AUG18			EF	N/A			C	0.20		
	21AUG18			EF	N/A	IF	0.04	IF	0.04	IF	0.08
	24AUG18	C	0.04	EF	N/A	C	0.51	C	0.04	C	0.04
	27AUG18			EF	N/A	C	0.51	C	0.02		
	29AUG18			EF	N/A	72	0.04	72	0.02		
	30AUG18	IF	0.02	EF	N/A					IF	0.04
	1SEP18			EF	N/A			C	0.31		
	2SEP18			EF	N/A			72	0.83		
	3SEP18			EF	N/A			72	0.12		
19SEP18	C	0.04	EF	N/A	C	0.16			C	0.04	
1OCT18	SC	0.24	EF	N/A	IF	0.04					
3OCT18	72	0.55	EF	N/A	72	0.39			72	0.59	
Winter Season	26DEC18					IF	0.20	IF	0.20		
	28DEC18					72	0.90	72	0.30		
	20JAN19	SC	0.48								
	4FEB19					IS	0.70				
	6FEB19			IF	0.40			IF	0.40	IF	0.40
	14FEB19					SC	0.47	IS	0.39		
	21FEB19					IF	0.15				

Key

72	Station closed for 72 hours	IS	Insufficient Staff
C	Site Closed - Waiting to sweep streets	LB	Laboratory Closed
DC	Dangerous Conditions	NC	Not on-call -no rain forecasted
EF	Equipment Failure, new equipment at all sampling sites	NF	No Flow
IF	Insufficient Flow (to collect sample)	SC	Sample Collected



PART 9 SUMMARY OF MONITORING DATA (BY LOCATION)

I. Sample Site 1

Site ID: 1 Grant/Wilson		Monitoring Season Summer: June 1 - October 31, Winter: November 1 - May 31													
Receiving Water: Santa Cruz		Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer
Land Use: SFR		2011-12	2012	2012-13	2013	2013-14	2014	2014-15	2015	2015-16	2016	2016-17	2017	2017-18	2018
Sampling Date(s):		11/7/11	7/20/12	12/19/12	8/2/13	11/22/13	7/3/14	12/13/14	8/1/15	11/15/15	9/7/16 **	11/1/17	7/28/17	1/20/2018	10/1/2018
Monitoring Parameters	SWQS														
Conventional Parameters															
Flow	n/a	2.01	1.18	1.24	12.57	1.55	2.04	4.49	2.71	0.76	17.84	7.65	24.92	17.56	3.54
pH	6.5 - 9	7.07	7.33	8.55	8.11	8.2	5	5	7.5	7.7	7.5	8.1	7.3	7.3	7.3
Temperature	n/a	54	84	49	84	62	92	58	84	70	60	56	43	40	71.4
Hardness	<400	60	48	53	56	34	110	30	46	44	55	88	120	47	78
TDS (mg/L)	n/a	120	180	110	88	69	390	60	63	84	180	66	180	140	180
TSS (mg/L)	n/a	180	110	120	250	180	310	68	140	170	44	190	300	79	31
BOD (mg/L)	n/a	25	74	110	20	25	21	29	17	23	36	10	38	39	20
COD (mg/L)	n/a	230	250	110	190	240	750	70	120	170	260	83	220	250	120
Inorganics															
Cyanide, total (ug/L)	84	<100	<100	<5.0	<38	<38	41	<82	<33	38	<25	<28	<28	1.2	<36
Nutrients (mg/L)															
Nitrate + Nitrite as N	n/a	<0.0015	1.3	<0.1	1.1	1	1.7	0.89	0.86	0.87	0.53	0.84	7.1	1.2	
Ammonia as N	n/a	0.63	1.8	<0.5	0.87	<0.50	3.7	<0.083	0.25	<0.50	0.94	<0.094	<0.078	1.3	<0.078
Total Kjeldahl Nitrogen (TKN)	n/a	3.4	4.9	1.9	3.1	2.7	23	1.5	1.9	1.9	3.6	1.8	5.2	3.8	1.2
Total Phosphorus	n/a	0.43	0.38	0.6	2.4	0.44	2.1	0.34	0.41	0.46	0.24	0.41	0.55	0.39	0.4
Total Orthophosphate	n/a	<0.045	0.22	<0.5	0.51	<0.50	0.65	<0.22	<0.23	<0.50	<0.50	0.14	0.11	<0.056	
Microbiological (MPN)															
Escherichia coli (E. coli)	575	>2400	2000	>2400	>2400	>2400	2400	>2400	2400	830	2400	2400	2400	820	2400
Total Metals (ug/L)															
Antimony	747	3.1	1.9	0.82	1.6	2.1	1.9	1.7	0.78	1	2.4	1.1	1.9	3.1	3.1
Arsenic	200	<4.8	6.7	<40	<4	<40	9	4.6	8.7	6.8	8.3	<4.7	11	<5.9	24
Barium	98,000	130	92	66	110	98	160	47	73	88	70	77	160	80	69
Beryllium	1,867	<0.19	<2.0	<2.0	<0.17	<2.0	<0.93	<0.93	<0.22	<2.0	<2.0	<1.3	<0.33	<0.33	<0.33
Cadmium	<3 ^{State 1}	<0.31	0.29	<2.0	<0.16	<2.0	<0.82	<0.82	<0.28	<2.0	<2.0	<1.4	<0.87	<0.87	<0.87
Chromium	1,000	<0.61	5.1	<30	<0.35	30	8.1	3.1	4.6	5.7	3.8	5	5.1	6.2	3.3
Copper	<3 ^{State 2}	87	50	33	46	47	110	22	32	44	49	28	59	52	38
Lead	<17 ^{State 3}	21	8.6	14	24	21	20	10	16	18	5	19	24	11	4.6
Mercury	5	<0.014	<1.0	0.09	<0.049	<1.0	<0.039	0.077	0.092	<1.0	<1.0	<0.094	<0.079	<0.079	<0.079
Nickel	<882 ^{State 4}	<1.1	9.6	<50	<4.1	50	16	1.9	2.9	6.7	8.4	5	6.4	5.7	<4.7
Selenium	33	<0.062	0.68	0.35	0.4	0.14	1.1	<0.082	0.2	<2.5	0.37	0.46	<1.2	<0.25	0.59
Silver	<0.14 ^{State 5}	<0.46	0.87	0.067	0.23	0.23	<0.029	0.2	0.079	<0.50	<0.50	0.18	0.00027	<0.000021	<0.000021
Thallium	75	<0.0036	0.048	<0.063	<0.043	0.055	<0.013	0.023	<0.019	0.059	0.053	0.12	0.11	0.028	0.039
Zinc	<235 ^{State 6}	230	140	100	150	170	310	88	110	140	160	82	200	200	83

Site ID: 1 Grant/Wilson		Monitoring Season Summer: June 1 - October 31, Winter: November 1 - May 31														
Receiving Water: Santa Cruz		Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	
Land Use: SFR		2011-12	2012	2012-13	2013	2013-14	2014	2014-15	2015	2015-16	2016	2016-17	2017	2017-18	2018	
Sampling Date(s):		11/7/11	7/20/12	12/19/12	8/2/13	11/22/13	7/3/14	12/13/14	8/1/15	11/15/15	9/7/16 **	1/14/17	7/28/17	1/20/2018	10/1/2018	
SWQS																
Organic Toxic Pollutants (mg/L)																
Total Petroleum Hydrocarbons	n/a	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	3.10	2.4	<5.00	<5.00	2.4	<0.600	8.90	<1.35	
Total Oil and Grease	n/a	6.4	<5.00	<5.00	<5.00	6	6.4	3.80	1.9	5.9	<5.00	5.1	1.7	17.5	<1.4	
VOCs, Semi-VOCs, and Pesticides (ug/L)																
Acrolein	467	<10		<10	<10			<0.76	<0.76			<0.76	<3.0			
Acrylonitrile	37,333	<10		<10	<10			<0.65	<0.65			<0.65	<2.6			
Benzene	3,733	<2.0		<2.0	<2.0			<0.25	<0.48			<0.48	<1.9			
Bromoform	18,667	<2.0		<2.0	<2.0			<0.33	<0.50			<0.50	<2.0			
Carbon tetrachloride	1,307	<2.0		<2.0	<2.0			<0.18	<0.35			<0.35	<1.4			
Chlorobenzene	18,667	<2.0		<2.0	<2.0			<0.24	<0.37			<0.37	<1.5			
Chlorodibromomethane	n/a	<2.0		<2.0	<2.0			<0.21	<0.27			<0.27	<1.1			
Chloroethane	n/a	<5.0		<5.0	<5.0			<0.17	<0.45			<0.45	<1.8			
2-chloroethylvinyl ether	n/a	<2.0		<10	<10			<0.56	<0.56			<0.56	<2.3			
Chloroform	9,333	<2.0		<2.0	<2.0			<0.19	<0.37			<0.37	<1.5			
Dichlorobromomethane	n/a	<2.0		<2.0	<2.0			<0.20	<0.33			<0.33	<1.1			
1,2-dichlorobenzene	5,900	<2.0		<2.0	<2.0			<0.49	<0.37			<0.37	<1.5			
1,3-dichlorobenzene	n/a	<2.0		<2.0	<2.0			<0.35	<0.38			<0.38	<1.5			
1,4-dichlorobenzene	6,500	<2.0		<2.0	<2.0			<0.41	<0.36			<0.36	<1.4			
1,1-dichloroethane	n/a	<2.0		<2.0	<2.0			<0.17	<0.50			<0.50	<2.0			
1,2-dichloroethane	186,667	<2.0		<2.0	<2.0			<0.21	<0.43			<0.43	<1.7			
1,1-dichloroethylene	46,667	<2.0		<2.0	<2.0			<0.28	<0.59			<0.59				
1,2-dichloropropane	84,000	<2.0		<2.0	<2.0			<2.0	<0.45			<0.45	<1.8			
1,3-dichloropropylene	n/a	<2.0		<2.0	<2.0			<0.30	<0.78			<0.43				
Ethylbenzene	93,333	<2.0		<2.0	<2.0			<0.24	<0.31			<0.31	<1.2			
Methyl bromide (Bromomethane)	n/a	<2.0		<2.0	<2.0			<0.21	<0.49			<0.49	<2.0			
Methyl chloride (Chloromethane)	n/a	<5.0		<5.0	<5.0			<0.28	<0.46			<0.46	<1.8			
Methylene chloride	n/a	<10		<10	<10			<0.28	<0.47			<0.47	<1.9			
1,1,2,2-tetrachloroethane	93,333	<2.0		<2.0	<2.0			<0.50	<0.40			<0.40	<1.6			
Tetrachloroethylene	9,333	<2.0		<2.0	<2.0			<0.29	<0.38			<0.40	<1.6			
Toluene	373,333	<2.0		<2.0	<2.0			0.26	<0.32			<0.32	<1.3			
1,2-trans-dichloroethylene	n/a	<2.0		<2.0	<2.0			<0.23	<0.48			<0.48	<1.9			
1,1,1-trichloroethane	186,666.667	<2.0		<2.0	<2.0			<0.23	<0.34			<0.34	<1.3			
1,1,2-trichloroethane	3,733	<2.0		<2.0	<2.0			<0.32	<0.59			<0.59	<2.4			
Trichloroethylene	280	<2.0		<2.0	<2.0			<0.19	<0.47			<0.47	<1.9			
Trimethylbenzene	n/a			<2.0	<2.0			<2.0	<0.71			<0.38	<1.5			
Vinyl chloride (chloroethylene)	2,800	<2.0		<2.0	<2.0			<0.32	<0.38			<0.38	<1.5			
Xylene	186,667	<6.0		<6.0	<6.0			<0.63	<0.99			<0.99	<4.0			

Site ID: 1 Grant/Wilson		Monitoring Season Summer: June 1 - October 31, Winter: November 1 - May 31														
Receiving Water: Santa Cruz		Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	
Land Use: SFR		2011-12	2012	2012-13	2013	2013-14	2014	2014-15	2015	2015-16	2016	2016-17	2017	2017-18	2018	
Sampling Date(s):		11/7/11	7/20/12	12/19/12	8/2/13	11/22/13	7/3/14	12/13/14	8/1/15	11/15/15	9/7/16 **	1/14/17	7/28/17	1/20/2018	10/1/2018	
SWQS																
SVOCs - Acid Extractables (ug/L)																
2-chlorophenol	4,667	<9.8		<9.8	<10			<0.77	<0.76							
2,4-dichlorophenol	2,800	<9.8		<9.8	<10			<0.63	<0.62							
2,4-dimethylphenol	18,667	<9.8		<9.8	<10			<0.54	<0.53							
4,6-dinitro-o-cresol (4,6-Dinitro-2	3,733	<20		<20	<20			<0.89	<0.88							
2,4-dinitrophenol	1,867	<49		<49	<50			<5.0	<4.9							
2-nitrophenol	n/a	<9.8		<9.8	<10			<3.6	<3.6							
4-nitrophenol	n/a	<49		<49	<50			<0.54	<0.53							
p-chloro-m-cresol (4-Chlor-3-metl	n/a	<9.8		<9.8	<10			<0.62	<0.61							
Pentachlorophenol	<18 ^{Note7}	<29		<29	<1.5			3.6	4.4							
Phenol	180,000	<9.8		<9.8	<10			<0.90	<0.89							
2,4,6-trichlorophenol	130	<9.8		<9.8	<10			<0.82	<0.81							
SVOCs - Bases/Neutrals (ug/L)																
Acenaphthene	56,000	<4.9		<4.9	<5.0			<0.73	<0.72							
Acenaphthylene	n/a	<4.9		<4.9	<5.0			<0.62	<0.61							
Anthracene	280,000	<4.9		<4.9	<5.0			<0.70	<0.69							
Benzo(a)anthracene	0.2	<0.63		<0.6	<0.62			<0.76	<0.75							
Benzo(a)pyrene	0.2	<0.51		<4.9	<0.77			<0.56	<0.55							
Benzo(b)fluoranthene	n/a	<9.8		<1.6	<1.6			<1.3	<1.3							
Benzo(g,h,i)perylene	n/a	<4.9		<4.9	<5.0			<1.6	<1.5							
Benzo(k)fluoranthene	1.9	<1.3		<1.6	<1.6			<1.3	<0.55							
Chrysene	19	<4.9		<4.9	<5.0			<0.67	<0.66							
Dibenzo(a,h)anthracene	1.9	0.48		<0.93	<0.96			<0.91	<0.90							
3,3'-dichlorobenzidine	3	<1.1		<0.99	<1.0			<1.5	<1.5							
Diethyl phthalate	746,667	<9.8		<9.8	<10			<1.1	<1.0							
Dimethyl phthalate	n/a	<9.8		<9.8	<10			<0.56	<0.55							
Di-n-butyl phthalate	n/a	<9.8		<9.8	<10			3.1	<2.7							
2,4-dinitrotoluene	1,867	<9.8		<9.8	<10			<1.0	<1.0							
2,6-dinitrotoluene	3,733	<9.8		<9.8	<10			<1.1	<1.1							
Di-n-octyl phthalate	373,333	<9.8		<9.8	<10			1.3	<0.75							
1,2-diphenylhydrazine (as azoben	1.8	<9.8		<9.8	<10			<1.0	<0.99							
Fluoranthene	37,333	<4.9		<4.9	<5.0			<0.81	<0.80							
Fluorene	37,333	<4.9		<4.9	<5.0			<0.60	<0.59							
Hexachlorobenzene	747	<9.8		<9.8	<10			<1.1	<1.0							
Hexachlorobutadiene	187	<9.8		<9.8	<10			<1.1	<1.1							
Hexachlorocyclopentadiene	11,200	<9.8		<9.8	<10			<0.71	<0.70							
Hexachloroethane	850	<9.8		<9.8	<10			<1.4	<1.4							
Indeno(1,2,3-cd)pyrene	1.9	0.91		<0.8	<0.83			<1.2	<1.2							
Isophorone	186,667	<9.8		<9.8	<10			<0.82	<0.81							

Site ID: 1 Grant/Wilson		Monitoring Season Summer: June 1 - October 31, Winter: November 1 - May 31													
Receiving Water: Santa Cruz		Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer
Land Use: SFR		2011-12	2012	2012-13	2013	2013-14	2014	2014-15	2015	2015-16	2016	2016-17	2017	2017-18	2018
Sampling Date(s):		11/7/11	7/20/12	12/19/12	8/2/13	11/22/13	7/3/14	12/13/14	8/1/15	11/15/15	9/7/16 **	1/14/17	7/28/17	1/20/2018	10/1/2018
SWQS															
SVOCs - Bases/Neutrals (ug/L) continued															
Naphthalene	18,667	<4.9		<4.9	<5.0			<0.78	<.77						
Nitrobenzene	467	<9.8		<9.8	<10			<1.1	<1.1						
N-nitrosodimethylamine	0.03	<0.18		<1.6	<1.6			<2.3	<2.2						
N-nitrosodi-n-propylamine	88,667	<9.8		<9.8	<10			<1.1	<1.1						
N-nitrosodiphenylamine	n/a	<9.8		<9.8	<10			<0.89	<0.88						
Phenanthrene	n/a	<4.9		<4.9	<5.0			<0.63	<0.62						
Pyrene	28,000	<4.9		<4.9	<5.0			<0.57	<0.56						
1,2,4-trichlorobenzene	9,333	<9.8		<9.8	<10			<0.96	<0.95						
Pesticides (ug/L)															
Aldrin	<0.003 ^{Notes}	<0.097		<0.098	<0.10			<0.016	<0.013						
Alpha-BHC	n/a	<0.097		<0.098	<0.10			<0.010	<0.020						
Beta-BHC	n/a	<0.097		<0.098	<0.10			<0.017	<0.0099						
Gamma-BHC	n/a	<0.097		<0.098	<0.10			<0.023	<0.039						
Delta-BHC	n/a	<0.097		<0.098	<0.10			<0.012	<0.011						
Chlordane (alpha, gamma)	3.2	<0.097		<0.0134	<0			<0.0078	<0.0137						
4,4'-DDT	n/a	<0.097		<0.098	<0.10			<0.014	<0.0069						
4,4'-DDE	n/a	<0.097		<0.098	<0.10			<0.010	<0.0051						
4,4'-DDD	n/a	<0.097		<0.098	<0.10			<0.010	<0.0099						
Dieldrin	<0.003 ^{Notes}	<0.097		<0.098	<0.10			<0.0084	<0.0083						
Alpha-endosulfan (Endosulfan I)	n/a	<0.097		<0.098	<0.10			<0.0091	<0.0056						
Beta-endosulfan (Endosulfan II)	n/a	<0.097		<0.098	<0.10			<0.0061	<0.0051						
Endosulfan sulfate	3	<0.097		<0.098	<0.10			<0.059	<0.041						
Endrin	0.004	<0.097		<0.098	<0.10			<0.011	<0.0098						
Endrin aldehyde	0.7	<0.097		<0.098	<0.10			<0.0090	<0.025						
Heptachlor	0.9	<0.097		<0.098	<0.10			<0.0083	<0.0091						
Heptachlor epoxide	0.9	<0.097		<0.098	<0.10			<0.013	<0.0083						
PCB-1016 (Aroclor 1016)	n/a	<0.09		<0.97	<1.0			<0.93	<1.0						
PCB-1221 (Aroclor 1221)	n/a	<0.09		<0.97	<1.0			<1.0	<1.0						
PCB-1232 (Aroclor 1232)	n/a	<0.09		<0.97	<1.0			<1.0	<1.0						
PCB-1242 (Aroclor 1242)	n/a	<0.09		<0.97	<1.0			<1.0	<1.0						
PCB-1248 (Aroclor 1248)	n/a	<0.09		<0.97	<1.0			<1.0	<1.0						
PCB-1254 (Aroclor 1254)	n/a	<0.09		<0.97	<1.0			<1.0	<0.61						
PCB-1260 (Aroclor 1260)	n/a	<0.09		<0.97	<1.0			<0.61	<0.93						
Toxaphene	0.005	<0.97		<0.98	<1.0			<1.0	<1.0						
Assume a 1:1 total to dissolved ratio															
* Recovery of surrogate compounds were low; extraction error at Lab, so no results.															
** Data from special stormwater analysis															
*** Stormwater equipment was being exchanged for new equipment															

II. Sample Site 2

Site ID: 2 Greenlee		Monitoring Season Summer: June 1 - October 31, Winter: November 1 - May 31													
Receiving Water: Rillito Wash		Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer
Land Use: Multi-Family Residential		2011-12	2012	2012-13	2013	2013-14	2014	2014-15	2015	2015-16	2016	2016-17	2017	2017-18	2018
Sampling Date(s):		3/18/12	7/15/12	1/26/13		11/22/13	8/12/14	12/4/14	10/6/15	1/4/16	7/1/16	*	*	*	
Monitoring Parameters		SWQS													
Conventional Parameters															
Flow	n/a	0.1	3.32	1.02		0.19	0.09	0.19	2.67	0.13	6.51				
pH	6.5 - 9	7.97	8.61	6.3		7.09	7.4	6.5	7.3	6					
Temperature	n/a	48.7	79.2	62.2		59	82	55	76	52.8					
Hardness	<400	30	27	16		10	32	11	29	14					
TDS (mg/L)	n/a	160	79	43		24	71	34	42	72					
TSS (mg/L)	n/a	15	70	24		<10	87	<10	10	13					
BOD (mg/L)	n/a	37	16	20		15	15	12	27	14					
COD (mg/L)	n/a	160	89	64		51	110	42	54	36					
Inorganics															
Cyanide, total (ug/L)	84	<100	<100	<100		<100	<38	<82	54	52					
Nutrients (mg/L)															
Nitrate + Nitrite as N	n/a	<0.1	<0.1	<0.10		<0.6	0.74	0.5	0.69	<0.10					
Ammonia as N	n/a	0.87	<0.5	0.56		1.1	0.72	<0.50	0.13	<0.50					
Total Kjeldahl Nitrogen (TKN)	n/a	2.5	2.2	1.2		1.8	2.8	1	1.2	0.87					
Total Phosphorus	n/a	0.32	0.36	0.35		0.1	0.4	0.38	0.35	0.12					
Total Orthophosphate	n/a	<0.50	0.19	<0.50		<0.50	<0.5	<0.50	0.15	<0.50					
Microbiological (MPN)															
Escherichia coli (E. coli)	575	87	>2400	770		54	32	2400	870	35					
Total Metals (ug/L)															
Antimony	747	<0.50	0.34	0.25		0.3	<0.5	<0.50	0.26	<0.50					
Arsenic	200	<40	<40	<40		<40	8	<4.5	2.7	<40					
Barium	98,000	<50	49	<50		<50	<50	<50	27	<50					
Beryllium	1,867	<2.0	<2	<2.0		<2.0	<2.0	<0.93	<0.22	<2.0					
Cadmium	<3 ^{Note 1}	<2.0	0.4	<2.0		<2.0	<2.0	<0.82	<0.28	<2.0					
Chromium	1,000	<30	1.8	<30		<30	2.8	<0.61	<0.95	<30					
Copper	<3 ^{Note 2}	<20	19	<20		<20	23	<20	16	<20					
Lead	<17 ^{Note 3}	0.96	2.7	1.4		0.49	3.8	<0.50	1.6	0.98					
Mercury	5	<1.0	<1	<1.0		<1.0	<0.039	0.11	<0.011	0.064					
Nickel	<882 ^{Note 4}	<50	3	<50		<50	2.4	2.2	<1.7	2.2					
Selenium	33	<2.5	0.26	<2.5		0.18	0.39	<0.082	0.22	0.056					
Silver	<0.14 ^{Note 5}	<10	0.99	0.014		<0.007	<0.029	0.049	0.024	<0.50					
Thallium	75	<0.50	0.022	<0.5		<0.043	<0.013	<0.013	0.026	0.053					
Zinc	<235 ^{Note 6}	56	78	<40		<40	76	<40	36	70					

Site ID: 2 Greenlee		Monitoring Season Summer: June 1 - October 31, Winter: November 1 - May 31													
Receiving Water: Rillito Wash		Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer		
Land Use: Multi-Family Residential		2011-12	2012	2012-13	2013	2013-14	2014	2014-15	2015	2015-16	2016	2016-17	2017	2017-18	2018
Sampling Date(s):		3/18/12	7/15/12	1/26/13		11/22/13	8/12/14	12/4/14	10/6/15	1/4/16	7/1/16	*	*	*	
SWQS															
Organic Toxic Pollutants (mg/L)															
Total Petroleum Hydrocarbons	n/a	<5.00	<5.00	<5.00		<5.00	<5.00	<5.00	<1.38	<5.00					
Total Oil and Grease	n/a	<5.00	<5.00	<5.00		<5.00	<5.00	<5.00	0.7	<5.00					
VOCs, Semi-VOCs, and Pesticides (ug/L)															
Acrolein	467	<10		<10				<10	<2.5						
Acrylonitrile	37,333	<10		<10				<10	<2.4						
Benzene	3,733	<2.0		<2.0				<2.0	<0.48						
Bromoform	18,667	<2.0		<2.0				<2.0	<0.50						
Carbon tetrachloride	1,307	<2.0		<2.0				<2.0	<0.35						
Chlorobenzene	18,667	<2.0		<2.0				<2.0	<0.37						
Chlorodibromomethane	n/a	<2.0		<2.0				<2.0	<0.27						
Chloroethane	n/a	<5.0		<5.0				<5.0	<0.45						
2-chloroethylvinyl ether	n/a	<2.0		<10				<10	<0.38						
Chloroform	9,333	<2.0		<2.0				<2.0	<0.37						
Dichlorobromomethane	n/a	<2.0		<2.0				<2.0	<0.33						
1,2-dichlorobenzene	5,900	<2.0		<2.0				<2.0	<0.37						
1,3-dichlorobenzene	n/a	<2.0		<2.0				<2.0	<0.38						
1,4-dichlorobenzene	6,500	<2.0		<2.0				<2.0	<0.36						
1,1-dichloroethane	n/a	<2.0		<2.0				<2.0	<0.50						
1,2-dichloroethane	186,667	<2.0		<2.0				<2.0	<0.43						
1,1-dichloroethylene	46,667	<2.0		<2.0				<2.0	<0.59						
1,2-dichloropropane	84,000	<2.0		<2.0				<2.0	<0.45						
1,3-dichloropropylene	n/a	<2.0		<2.0				<4.0	<0.78						
Ethylbenzene	93,333	<2.0		<2.0				<2.0	<0.31						
Methyl bromide (Bromomethane)	n/a	<2.0		<2.0				<2.0	<0.49						
Methyl chloride (Chloromethane)	n/a	<5.0		<5.0				<5.0	<0.46						
Methylene chloride	n/a	<10		<10				<10	<0.47						
1,1,2,2-tetrachloroethane	93,333	<2.0		<2.0				<2.0	<0.40						
Tetrachloroethylene	9,333	<2.0		<2.0				<2.0	<0.38						
Toluene	373,333	<2.0		<2.0				<2.0	<0.32						
1,2-trans-dichloroethylene	n/a	<2.0		<2.0				<2.0	<0.48						
1,1,1-trichloroethane	186,666,667	<2.0		<2.0				<2.0	<0.34						
1,1,2-trichloroethane	3,733	<2.0		<2.0				<2.0	<0.59						
Trichloroethylene	280	<2.0		<2.0				<2.0	<0.47						
Trimethylbenzene	n/a			<2.0				<4.0	<0.71						
Vinyl chloride (chloroethylene)	2,800	<2.0		<2.0				<2.0	<0.38						
Xylene	186,667	<6.0		<6.0				<6.0	<0.99						

Site ID: 2 Greenlee		Monitoring Season Summer: June 1 - October 31, Winter: November 1 - May 31														
Receiving Water: Rillito Wash		Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	
Land Use: Multi-Family Residential		2011-12	2012	2012-13	2013	2013-14	2014	2014-15	2015	2015-16	2016	2016-17	2017	2017-18	2018	
Sampling Date(s):		3/18/12	7/15/12	1/26/13		11/22/13	8/12/14	12/4/14	10/6/15	1/4/16	7/1/16	*	*	*		
SWQS																
SVOCs - Acid Extractables (ug/L)																
2-chlorophenol	4,667	<9.8		<9.9				<10	<0.77							
2,4-dichlorophenol	2,800	<9.8		<9.9				<10	<0.63							
2,4-dimethylphenol	18,667	<9.8		<9.9				<10	<0.54							
4,6-dinitro-o-cresol (4,6-Dinitro-2	3,733	<20		<20				<21	<0.89							
2,4-dinitrophenol	1,867	<49		<50				<51	<5.0							
2-nitrophenol	n/a	<9.8		<9.9				<10	<3.6							
4-nitrophenol	n/a	<49		<50				<51	<0.54							
p-chloro-m-cresol (4-Chlor-3-metl	n/a	<9.8		<9.9				<10	<0.62							
Pentachlorophenol	<18 ^{Note7}	<29		<30				<31	<1.0							
Phenol	180,000	<9.8		<9.9				<10	<0.90							
2,4,6-trichlorophenol	130	<9.8		<9.9				<10	<0.82							
SVOCs - Bases/Neutrals (ug/L)																
Acenaphthene	56,000	<4.9		<5.0				<5.1	<0.73							
Acenaphthylene	n/a	<4.9		<5.0				<5.1	<0.62							
Anthracene	280,000	<4.9		<5.0				<5.1	<0.70							
Benzo(a)anthracene	0.2	<0.63		<5.0				<0.78	<0.76							
Benzo(a)pyrene	0.2	<0.51		<0.75				<0.57	<0.56							
Benzo(b)fluoranthene	n/a	<9.8		<1.6				<1.3	<1.3							
Benzo(g,h,i)perylene	n/a	<4.9		<5.0				<5.1	<1.5							
Benzo(k)fluoranthene	1.9	<1.3		<1.6				<1.3	<1.3							
Chrysene	19	<4.9		<5.0				<5.1	<0.67							
Dibenzo(a,h)anthracene	1.9	0.48		<0.94				<0.93	<0.91							
3,3'-dichlorobenzidine	3	<1.1		<1.0				<1.5	<1.5							
Diethyl phthalate	746,667	<9.8		<9.9				<10	<1.1							
Dimethyl phthalate	n/a	<9.8		<9.9				<10	<0.56							
Di-n-butyl phthalate	n/a	<9.8		<9.9				<10	<2.7							
2,4-dinitrotoluene	1,867	<9.8		<9.9				<10	<1.0							
2,6-dinitrotoluene	3,733	<9.8		<9.9				<10	<1.1							
Di-n-octyl phthalate	373,333	<9.8		<9.9				<10	<0.76							
1,2-diphenylhydrazine (as azoben	1.8	<9.8		<9.9				<10	<1.0							
Fluoranthene	37,333	<4.9		<5.0				<5.1	<0.81							
Fluorene	37,333	<4.9		<5.0				<5.1	<0.60							
Hexachlorobenzene	747	<9.8		<9.9				<10	<1.0							
Hexachlorobutadiene	187	<9.8		<9.9				<10	<1.1							
Hexachlorocyclopentadiene	11,200	<9.8		<9.9				<10	<0.71							
Hexachloroethane	850	<9.8		<9.9				<10	<1.4							
Indeno(1,2,3-cd)pyrene	1.9	0.91		<0.81				<1.2	<1.2							
Isophorone	186,667	<9.8		<9.9				<10	<0.82							

Site ID: 2 Greenlee		Monitoring Season Summer: June 1 - October 31, Winter: November 1 - May 31													
Receiving Water: Rillito Wash		Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer
Land Use: Multi-Family Residential		2011-12	2012	2012-13	2013	2013-14	2014	2014-15	2015	2015-16	2016	2016-17	2017	2017-18	2018
Sampling Date(s):		3/18/12	7/15/12	1/26/13		11/22/13	8/12/14	12/4/14	10/6/15	1/4/16	7/1/16	*	*	*	
SWQS															
SVOCs - Bases/Neutrals (ug/L) continued															
Naphthalene	18,667	<4.9		<5.0				<5.1	<0.78						
Nitrobenzene	467	<9.8		<9.9				<10	<1.1						
N-nitrosodimethylamine	0.03	<0.18		<1.6				<2.3	<2.3						
N-nitrosodi-n-propylamine	88,667	<9.8		<9.9				<10	<1.1						
N-nitrosodiphenylamine	n/a	<9.8		<9.9				<10	<0.89						
Phenanthrene	n/a	<4.9		<5.0				<5.1	<0.63						
Pyrene	28,000	<4.9		<5.0				<5.1	<0.57						
1,2,4-trichlorobenzene	9,333	<9.8		<9.9				<10	<0.96						
Pesticides (ug/L)															
Aldrin	<0.003 ^{Notes}	<0.097		<0.099				<0.10	<0.013						
Alpha-BHC	n/a	<0.097		<0.099				<0.10	<0.020						
Beta-BHC	n/a	<0.097		<0.099				<0.10	<0.010						
Gamma-BHC	n/a	<0.097		<0.099				<0.10	<0.040						
Delta-BHC	n/a	<0.097		<0.099				<0.10	<0.011						
Chlordane (alpha, gamma)	3.2	<0.097		<0.099				<0.2	<0.0137						
4,4'-DDT	n/a	<0.097		<0.099				<0.10	<0.0070						
4,4'-DDE	n/a	<0.097		<0.099				<0.10	<0.0051						
4,4'-DDD	n/a	<0.097		<0.099				<0.10	<0.0099						
Dieldrin	<0.003 ^{Notes}	<0.097		<0.099				<0.10	<0.0084						
Alpha-endosulfan (Endosulfan I)	n/a	<0.097		<0.099				<0.10	<0.0057						
Beta-endosulfan (Endosulfan II)	n/a	<0.097		<0.099				<0.10	<0.0051						
Endosulfan sulfate	3	<0.097		<0.099				<0.10	<0.041						
Endrin	0.004	<0.097		<0.099				<0.10	<0.0098						
Endrin aldehyde	0.7	<0.097		<0.099				<0.10	<0.026						
Heptachlor	0.9	<0.097		<0.099				<0.10	<0.0091						
Heptachlor epoxide	0.9	<0.097		<0.099				<0.10	<0.0084						
PCB-1016 (Aroclor 1016)	n/a	<0.09		<1.0				<0.99	<0.99						
PCB-1221 (Aroclor 1221)	n/a	<0.09		<1.0				<0.99	<0.99						
PCB-1232 (Aroclor 1232)	n/a	<0.09		<1.0				<0.99	<0.99						
PCB-1242 (Aroclor 1242)	n/a	<0.09		<1.0				<0.99	<0.99						
PCB-1248 (Aroclor 1248)	n/a	<0.09		<1.0				<0.99	<0.99						
PCB-1254 (Aroclor 1254)	n/a	<0.09		<1.0				<0.99	<0.60						
PCB-1260 (Aroclor 1260)	n/a	<0.09		<1.0				<0.99	<0.92						
Toxaphene	0.005	<0.99		<0.99				<1.0	<1.0						

Assume a 1:1 total to dissolved ratio

* Sampling Site 2 had equipment failure in July 2016; new equipment was purchased in June 2017, installation was not completed during reporting period.

* Sampling Site 2 had equipment failure in July 2016, new equipment was purchased in June 2017, Installation, calibration, and other sampling sites issues were not resolved /completed until FY 2018-2019 reporting period.

III. Sample Site 3

Site ID: 3 Randolph/Broadway		Monitoring Season Summer: June 1 - October 31, Winter: November 1 - May 31													
Receiving Water: Santa Cruz		Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer
Land Use: Commercial		2011-12	2012	2012-13	2013	2013-14	2014	2014-15	2015	2015-16	2016	2016-17	2017	2017-18	2018
Sampling Date(s):		12/12/11	7/20/12	2/20/13	7/15/13	3/1/14	7/16/14	12/14/14	7/28/15	12/12/15	6/26/16	12/21/16	none	2/14/18	10/1/2018
Monitoring Parameters		SWQS													
Conventional Parameters															
Flow	n/a	1.59	2.25	1.25	1.15	3.73	5.75	0.8457	1.04	2.63	1.7	0.57		1.7	2.11
pH	6.5 - 9	6.74	8.39	7.5	5	5.5	5.5	6.5	7.5	7.7	7.1	7.5		6.8	7.2
Temperature	n/a	54.3	88.3	44.2	86.2	59.4	91.8	55*	82.3	55	83.8	40.5		45.14	72.6
Hardness	<400	23	28	25	48	20	51	21	34	17	35	23		23	28
TDS (mg/L)	n/a	33	92	63	120	40	66	48	95	54	86	42		67	80
TSS (mg/L)	n/a	86	57	59	120	93	100	52	38	29	110	33		80	<10
BOD (mg/L)	n/a	20	100	15	10	10	11	24	21	190	33	12		21	24
COD (mg/L)	n/a	140	110	130	180	110	110	120	160	74	170	63		150	110
Inorganics															
Cyanide, total (ug/L)	84	<100	<100	<100	<38	<38	85	<82	<33	<100	<25	<28		<36	<36
Nutrients (mg/L)															
Nitrate + Nitrite as N	n/a	<0.0015	<0.10	<0.1	<0.1	<0.1	0.57	0.59	0.586	0.6	0.93	0.37		<0.0040	
Ammonia as N	n/a	<1.0	1.3	0.63	1.4	0.58	1.1	0.72	0.58	0.52	1.3	<0.094		0.65	<0.50
Total Kjeldahl Nitrogen (TKN)	n/a	0.58	2.3	1.3	13	1.6	0.63	2	2.9	1.5	3.7	0.37		1.2	2
Total Phosphorus	n/a	0.19	0.25	0.16	0.5	0.24	0.23	0.39	0.38	0.16	0.54	0.12		0.28	0.19
Total Orthophosphate	n/a	<0.045	0.13	<0.50	<0.50	<0.50	<0.50	<0.50	<0.23	<0.50	<0.50	0.13		<0.056	
Microbiological (MPN)															
Escherichia coli (E. coli)	575	770	370	580	130	170	1600	610	550	730	2400	210		240	2400
Total Metals (ug/L)															
Antimony	747	3.3	3.5	2	4	3.5	3.9	2	1.9	0.96	2.6	0.96		1.8	1.5
Arsenic	200	<4.8	<40	<40	<40	<40	8.4	6.1	5.5	3.7	5.7	6.4		<5.9	15
Barium	98,000	60	50	57	80	64	60	<50	37	<50	67	28		<0.36	<0.36
Beryllium	1,867	<0.19	<2.0	<2.0	<2.0	<2.0	0.93	<0.93	<0.22	<2.0	<2.0	<1.3		<0.33	<0.33
Cadmium	<3 ^{new 1}	<0.31	0.44	<2.0	<2.0	<2.0	0.82	<0.82	0.29	<2.0	<2.0	<1.4		1.3	<0.87
Chromium	1,000	<0.61	3.6	<30	<30	<30	3.7	1.8	1.5	1.3	3.5	1.6		<3.0	4.2
Copper	<3 ^{new 2}	61	34	44	60	60	35	37	49	24	71	22		42	30
Lead	<17 ^{new 3}	19	7.9	12	16	20	14	6.4	4.4	3.7	41	4.3		9.8	3.4
Mercury	5	<0.014	<1.0	<0.032	0.12	0.11	0.058	0.12	0.05	<1.0	<1.0	<0.094		<0.079	<0.079
Nickel	<882 ^{new 4}	<1.1	4.8	<50	<50	<50	4.3	3.5	3.4	2.4	1.7	2.2		4.9	<4.7
Selenium	33	<0.062	<2.5	1.7	0.24	0.14	0.082	0.12	0.24	0.11	0.32	0.42		<0.25	<0.25
Silver	<0.14 ^{new 5}	<0.46	0.95	0.0054	0.086	0.21	0.12	0.13	0.062	<0.50	<0.00050	0.08		<0.000021	<0.000021
Thallium	75	<0.0036	0.018	0.018	<0.50	2.5	0.052	<0.013	0.11	0.024	<0.50	<0.028		<0.023	<0.023
Zinc	<235 ^{new 6}	240	150	190	250	190	120	160	180	100	350	85		190	120

Site ID: 3 Randolph/Broadway		Monitoring Season Summer: June 1 - October 31, Winter: November 1 - May 31														
Receiving Water: Santa Cruz		Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	
Land Use: Commercial		2011-12	2012	2012-13	2013	2013-14	2014	2014-15	2015	2015-16	2016	2016-17	2017	2017-18	2018	
Sampling Date(s):		12/12/11	7/20/12	2/20/13	7/15/13	3/1/14	7/16/14	12/4/14	7/28/15	12/12/15	6/26/16	12/21/16		2/14/18	10/1/2018	
SWQS																
Organic Toxic Pollutants (mg/L)																
Total Petroleum Hydrocarbons	n/a	8	<5	<5.00	<5.00	<5.00	<5.00	<5.00	2.7	<5.00	<5.0	3.2		<0.600	<1.40	
Total Oil and Grease	n/a	7.4	<5	5.9	<5.00	6	0.42	<5.00	4	7	<5.0	4.9		7.2	<4.77	
VOCs, Semi-VOCs, and Pesticides (ug/L)																
Acrolein	467	<0		<10	<10			<10	<0.76			<2.5				
Acrylonitrile	37,333	<0.92		<10	<10			<10	<0.65			<2.4				
Benzene	3,733	<0.25		<2.0	<2.0			<2.0	<0.48			<0.48				
Bromoform	18,667	<0.33		<2.0	<2.0			<2.0	<0.50			<0.50				
Carbon tetrachloride	1,307	<0.18		<2.0	<2.0			<2.0	<0.35			<0.35				
Chlorobenzene	18,667	<0.24		<2.0	<2.0			<2.0	<0.37			<0.37				
Chlorodibromomethane	n/a	<0.20		<2.0	<2.0			<2.0	<0.27			<0.27				
Chloroethane	n/a	<0.17		<5.0	<5.0			<5.0	<0.45			<0.45				
2-chloroethylvinyl ether	n/a	<0.31		<10	<10			<10	<0.56			<0.38				
Chloroform	9,333	<0.19		<2.0	<2.0			<2.0	<0.37			<0.37				
Dichlorobromomethane	n/a	<0.21		<2.0	<2.0			<2.0	<0.33			<0.33				
1,2-dichlorobenzene	5,900	<0.48		<2.0	<2.0			<2.0	<0.37			n/a				
1,3-dichlorobenzene	n/a	<0.35		<2.0	<2.0			<2.0	<0.38			n/a				
1,4-dichlorobenzene	6,500	<0.41		<2.0	<2.0			<2.0	<0.36			n/a				
1,1-dichloroethane	n/a	<0.17		<2.0	<2.0			<2.0	<0.50			<0.50				
1,2-dichloroethane	186,667	<0.21		<2.0	<2.0			<2.0	<0.43			<0.43				
1,1-dichloroethylene	46,667	<0.28		<2.0	<2.0			<2.0	<0.59			<0.59				
1,2-dichloropropane	84,000	<0.0		<2.0	<2.0			<2.0	<0.45			<0.45				
1,3-dichloropropylene	n/a	<0.30		<2.0	<2.0			<4.0	<0.78			n/a				
Ethylbenzene	93,333	<0.24		<2.0	<2.0			<2.0	<0.31			<0.31				
Methyl bromide (Bromomethane)	n/a	<0.21		<2.0	<2.0			<2.0	<0.49			<0.49				
Methyl chloride (Chloromethane)	n/a	<0.28		<5.0	<5.0			<5.0	<0.46			<0.46				
Methylene chloride	n/a	<0.28		<10	<10			<10	<0.47			<0.47				
1,1,2,2-tetrachloroethane	93,333	<0.50		<2.0	<2.0			<2.0	<0.40			<0.40				
Tetrachloroethylene	9,333	<0.29		<2.0	<2.0			<2.0	<0.38			<0.38				
Toluene	373,333	<0.22		<2.0	<2.0			<2.0	<0.32			<0.32				
1,2-trans-dichloroethylene	n/a	<0.23		<2.0	<2.0			<2.0	<0.48			<0.48				
1,1,1-trichloroethane	186,666,667	<0.23		<2.0	<2.0			<2.0	<0.34			<0.34				
1,1,2-trichloroethane	3,733	<0.32		<2.0	<2.0			<2.0	<0.59			<0.59				
Trichloroethylene	280	<0.19		<2.0	<2.0			<2.0	<0.47			<0.47				
Trimethylbenzene	n/a			<2.0	<2.0			<4.0	<0.71			n/a				
Vinyl chloride (chloroethylene)	2,800	<0.32		<2.0	<2.0			<2.0	<0.38			<0.38				
Xylene	186,667	<0.63		<6.0	<6.0			<6.0	<0.99			<0.99				

Site ID: 3 Randolph/Broadway		Monitoring Season Summer: June 1 - October 31, Winter: November 1 - May 31														
Receiving Water: Santa Cruz		Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	
Land Use: Commercial		2011-12	2012	2012-13	2013	2013-14	2014	2014-15	2015	2015-16	2016	2016-17	2017	2017-18	2018	
Sampling Date(s):		12/12/11	7/20/12	2/20/13	7/15/13	3/1/14	7/16/14	12/4/14	7/28/15	12/12/15	6/26/16	12/21/16			10/1/2018	
SWQS																
SVOCs - Acid Extractables (ug/L)																
2-chlorophenol	4,667	<9.2		<20	<10			<10	<0.16			<0.76				
2,4-dichlorophenol	2,800	<7.9		<20	<10			<10	<0.16			<0.62				
2,4-dimethylphenol	18,667	<2.4		<20	<10			<10	<0.48			<0.53				
4,6-dinitro-o-cresol (4,6-Dinitro-2	3,733	<12		<41	<21			<20	<0.24			<0.88				
2,4-dinitrophenol	1,867	<14		<100	<52			<50	<4.0			<4.9				
2-nitrophenol	n/a	<7.3		<20	<10			<10	<0.16			<3.6				
4-nitrophenol	n/a	<5.1		<100	<52			<50	<4.0			<0.53				
p-chloro-m-cresol (4-Chlor-3-met	n/a	<4.1		<20	<10			<10	<0.48			<0.61				
Pentachlorophenol	<18 ^{Note7}	<9.2		<3	<1.5			3.4	<0.32			<1.0				
Phenol	180,000	<19		<20	<10			<10	1.8			<0.89				
2,4,6-trichlorophenol	130	<8.4		<20	<10			<10	<0.16			<0.81				
SVOCs - Bases/Neutrals (ug/L)																
Acenaphthene	56,000	<5.1		<10	<5.2			<5.0	<0.32			<0.72				
Acenaphthylene	n/a	<5.0		<10	<5.2			<5.0	<0.24			<0.61				
Anthracene	280,000	<5.3		<10	<5.2			<5.0	<0.24			<0.69				
Benzo(a)anthracene	0.2	<6.3		<1.2	<0.63			<0.76	2.1			<0.75				
Benzo(a)pyrene	0.2	<5.0		<1.5	<0.79			<0.56	<0.16			<0.55				
Benzo(b)fluoranthene	n/a	<13		<3.3	<10			<1.3	<0.24			<1.3				
Benzo(g,h,i)perylene	n/a	<7.4		<10	<5.2			<5.0	<0.24			<1.5				
Benzo(k)fluoranthene	1.9	<13		<3.3	<1.7			<5.0	<0.48			n/a				
Chrysene	19	<2.5		<10	<5.2			<5.0	<0.16			<0.66				
Dibenzo(a,h)anthracene	1.9	<3.7		<1.9	<0.98			<0.91	<0.56			<0.90				
3,3'-dichlorobenzidine	3	<11		<2	<10			<1.5	ND			<1.5				
Diethyl phthalate	746,667	<2.3		<20	<5.2			<10	2.2			<1.0				
Dimethyl phthalate	n/a	<3.2		<20	<10			<10	<0.24			<0.55				
Di-n-butyl phthalate	n/a	<18		<20	<10			<10	3.2			<2.7				
2,4-dinitrotoluene	1,867	<2.1		<20	<10			<10	<0.16			<1.0				
2,6-dinitrotoluene	3,733	<1.8		<20	<10			<10	<0.40			<1.1				
Di-n-octyl phthalate	373,333	<4.5		<20	<10			<10	<0.16			<0.75				
1,2-diphenylhydrazine	1.8	<9.7		<5.1	<10			<10	<0.48			<0.99				
Fluoranthene	37,333	<5.9		<10	<5.2			<5.0	<0.40			<0.80				
Fluorene	37,333	<5.8		<10	<5.2			<5.0	<0.16			<0.59				
Hexachlorobenzene	747	<7.6		<20	<10			<10	<0.24			<1.0				
Hexachlorobutadiene	187	<2.1		<20	<10			<10	<0.40			<1.1				
Hexachlorocyclopentadiene	11,200	<9.7		<20	<10			<10	<1.6			<0.70				
Hexachloroethane	850	<2.2		<20	<10			<10	<0.16			<1.4				
Indeno(1,2,3-cd)pyrene	1.9	<6.9		<1.7	<0.85			<1.2	<0.48			<1.2				
Isophorone	186,667	<1.8		<20	<10			<10	<1.6			<0.81				

Site ID: 3 Randolph/Broadway		Monitoring Season Summer: June 1 - October 31, Winter: November 1 - May 31														
Receiving Water: Santa Cruz		Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	
Land Use: Commercial		2011-12	2012	2012-13	2013	2013-14	2014	2014-15	2015	2015-16	2016	2016-17	2017	2017-18	2018	
Sampling Date(s):		12/12/11	7/20/12	2/20/13	7/15/13	3/1/14	7/16/14	12/4/14	7/28/15	12/12/15	6/26/16	12/21/16			10/1/2018	
SWQS																
SVOCs - Bases/Neutrals (ug/L) continued																
Naphthalene	18,667	<5.6		<10	<5.2			<5.0	<0.16			<0.77				
Nitrobenzene	467	<3.0		<20	<10			<10	<0.16			<1.1				
N-nitrosodimethylamine	0.03	<1.7		<3.3	<1.7			<2.3	<0.16			<2.2				
N-nitrosodi-n-propylamine	88,667	<2.4		<20	<10			<10	<0.24			<1.1				
N-nitrosodiphenylamine	n/a	<7.2		<20	<10			<10	<0.24			<0.88				
Phenanthrene	n/a	<4.8		<10	<5.2			<5.0	<0.32			<0.62				
Pyrene	28,000	<5.8		<10	<5.2			<5.0	1.9			<0.56				
1,2,4-trichlorobenzene	9,333	<1.7		<20	<10			<10	<0.24			<0.95				
Pesticides (ug/L)																
Aldrin	<0.003 ^{Notes}	<0.0098		<0.10	<0.10			<0.10	<0.032			<0.013				
Alpha-BHC	n/a	<0.020		<0.10	<0.10			<0.10	<0.0062			<0.020				
Beta-BHC	n/a	<0.020		<0.10	<0.10			<0.10	<0.0184			<0.0099				
Gamma-BHC	n/a	<0.0098		<0.10	<0.10			<0.10	0.16			<0.039				
Delta-BHC	n/a	<0.020		<0.10	<0.10			<0.10	<0.024			<0.011				
Chlordane (alpha, gamma)	3.2	<0.0076		<0.10	<0.10			<0.2	<0.014			<1.0				
4,4'-DDT	n/a	<0.0029		<0.10	<0.10			<0.10	0.29			<0.0069				
4,4'-DDE	n/a	<0.0069		<0.10	<0.10			<0.10	<0.0166			<0.0050				
4,4'-DDD	n/a	<0.0098		<0.10	<0.10			<0.10	<0.0122			<0.0099				
Dieldrin	<0.003 ^{Notes}	<0.0049		<0.10	<0.10			<0.10	<0.0138			<0.0083				
Alpha-endosulfan (Endosulfan I)	n/a	<0.0098		<0.10	<0.10			<0.10	<0.0104			<0.0056				
Beta-endosulfan (Endosulfan II)	n/a	<0.029		<0.10	<0.10			<0.10	0.14			<0.0051				
Endosulfan sulfate	3	<0.088		<0.10	<0.10			<0.10	<0.0142			<0.041				
Endrin	0.004	<0.0059		<0.10	<0.10			<0.10	<0.0108			<0.0097				
Endrin aldehyde	0.7	<0.0049		<0.10	<0.10			<0.10	<0.026			<0.025				
Heptachlor	0.9	<0.020		<0.10	<0.10			<0.10	<0.0186			<0.0091				
Heptachlor epoxide	0.9	<0.020		<0.10	<0.10			<0.10	<0.0118			<0.0083				
PCB-1016 (Aroclor 1016)	n/a	<0.089		<0.98	<1.1			<1.0	<1.0			<1.0				
PCB-1221 (Aroclor 1221)	n/a	<0.97		<0.98	<1.1			<1.0	<1.0			<1.0				
PCB-1232 (Aroclor 1232)	n/a	<0.97		<0.98	<1.1			<1.0	<1.0			<1.0				
PCB-1242 (Aroclor 1242)	n/a	<0.97		<0.98	<1.1			<1.0	<1.0			<1.0				
PCB-1248 (Aroclor 1248)	n/a	<0.97		<0.98	<1.1			<1.0	<1.0			<1.0				
PCB-1254 (Aroclor 1254)	n/a	<0.97		<0.98	<1.1			<1.0	<0.054			<0.61				
PCB-1260 (Aroclor 1260)	n/a	<0.060		<0.98	<1.1			<1.0	<0.068			<0.93				
Toxaphene	0.005	<0.98		<0.10	<1.0			<1.0	<0.06			<1.0				
Assume a 1:1 total to dissolved ratio																

IV. Sample Site 4

Site ID: 4 17th Street		Monitoring Season Summer: June 1 - October 31, Winter: November 1 - May 31															
Receiving Water: Santa Cruz		Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer		
Land Use: Industrial		2011-12	2012	2012-13	2013	2013-14	2014	2014-15	2015	2015-16	2016	2016-17	2017	2017-18	2018		
Sampling Date(s):		11/13/11	7/15/12	2/20/13	9/6/13	3/1/14	7/5/14	12/13/14	6/9/15	1/4/16	7/26/16	none	8/3/17	none	none		
Monitoring Parameters	SWQS																
Conventional Parameters																	
Flow	n/a	3.82	1.89	0.9	2.43	2.43	0.54	3.08	0.87	4.14	4.53		2.43				
pH	6.5 - 9	7.95	7.78	7.7	6	6.5	7.2	7.03	7.7	8	7.5		7.3				
Temperature	n/a	60.1	74.7	44	93.5	59	82	58	75	55	46.22		39				
Hardness	<400	60	76	180	390	280	170	42	51	74	110		68				
TDS (mg/L)	n/a	98	44	130	170	100	490	64	180	72	56		94				
TSS (mg/L)	n/a	170	200	590	1100	650	300	77	46	180	490		300				
BOD (mg/L)	n/a	10	14	26	25	13	23	25	33	24	14		6.5				
COD (mg/L)	n/a	96	140	370	420	230	660	76	230	140	250		130				
Inorganics																	
Cyanide, total (ug/L)	84	<100	<100	<100	<38	<38	65	<82	90	43	59		<28				
Nutrients (mg/L)																	
Nitrate + Nitrite as N	n/a	<0.0015	<0.10	<0.10	1	0.62	3.5	0.61	0.86	0.9	0.85		0.89				
Ammonia as N	n/a	<0.068	0.74	0.99	0.96	0.81	3.2	<0.083	1.5	<0.50	0.78		0.58				
Total Kjeldahl Nitrogen (TKN)	n/a	1.5	1.7	2.4	4.3	2.2	17	1.6	4.5	1.8	3.1		2.7				
Total Phosphorus	n/a	0.33	0.39	0.5	2.6	0.75	1.3	0.25	0.43	0.26	0.51		0.36				
Total Orthophosphate	n/a	<0.045	0.12	<0.5	<0.50	<0.50	<0.22	<0.22	0.49	<0.50	<0.50		0.13				
Microbiological (MPN)																	
Escherichia coli (E. coli)	575	>2400	>2400	54	>2400	1000	2400	>2400	2400	>2400	920		2400				
Total Metals (ug/L)																	
Antimony	747	1.2	1.2	2.5	1.9	0.97	4	1.3	2.1	1.1	1.5		2				
Arsenic	200	<4.8	6.1	<40	<4.0	23	12	7.7	3.5	8.5	7.1		13				
Barium	98,000	72	100	270	450	280	190	45	52	91	160		100				
Beryllium	1,867	<0.19	<2.0	<2.0	<0.17	<2.0	<0.93	<0.93	<0.22	<2.0	<2.0		<0.33				
Cadmium	<3 ^{Note 1}	<0.31	0.5	<2.0	<0.16	<0.16	<0.82	<0.82	<0.28	<2.0	<2.0		<0.87				
Chromium	1,000	<0.61	5.5	<30	<0.35	15	11	3.5	2.3	4.9	9.9		3.9				
Copper	<3 ^{Note 2}	52	67	160	340	130	190	24	43	50	84		47				
Lead	<17 ^{Note 3}	16	19	42	80	51	20	7.6	5.7	14	33		17				
Mercury	5	<0.014	<1.0	<0.032	0.16	0.31	<0.039	0.081	<0.011	0.065	0.23		<0.079				
Nickel	<882 ^{Note 4}	<1.1	6	<50	<4.1	14	6.3	2.6	6.5	5	8.5		5.2				
Selenium	33	<0.062	0.32	1.9	0.44	<0.082	1.7	<0.082	0.35	0.28	<2.5		0.65				
Silver	<0.14 ^{Note 5}	<0.46	0.85	0.24	1	0.51	<0.029	0.19	0.033	<0.50	<0.00050		9E-05				
Thallium	75	<0.0036	0.063	0.1	0.18	0.16	<0.013	0.022	<0.019	0.082	0.07		0.068				
Zinc	<235 ^{Note 6}	190	220	440	800	330	690	110	350	220	430		190				

Site ID: 4 17th Street		Monitoring Season Summer: June 1 - October 31, Winter: November 1 - May 31														
Receiving Water: Santa Cruz		Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	
Land Use: Industrial		2011-12	2012	2012-13	2013	2013-14	2014	2014-15	2015	2015-16	2016	2016-17	2017	2017-18	2018	
Sampling Date(s):		11/13/11	7/15/12	2/20/13	9/6/13	3/1/14	7/5/14	12/13/14	6/9/15	1/4/16	7/26/16	none	8/3/17	none	none	
SWQS																
Organic Toxic Pollutants (mg/L)																
Total Petroleum Hydrocarbons	n/a	<5.00	<5.00	<5.00	6.1	<5.00	<5.00	2.70	3.8	8.3	6.5		1.5			
Total Oil and Grease	n/a	<0.570	11.5	8.5	40.5	8.4	<5.00	5.80	14.8	10.7	8.7		4.6			
VOCs, Semi-VOCs, and Pesticides (ug/L)																
Acrolein	467	<10		<10	<10			<0.76	<2.5				<0.76			
Acrylonitrile	37,333	<0.92		<10	<10			<0.65	<2.4				<0.65			
Benzene	3,733	<0.25		<2.0	<2.0			<0.25	<0.48				<0.48			
Bromoform	18,667	<0.33		<2.0	<2.0			<0.33	<0.50				<0.50			
Carbon tetrachloride	1,307	<0.18		<2.0	<2.0			<0.18	<0.35				<0.35			
Chlorobenzene	18,667	<0.24		<2.0	<2.0			<0.24	<0.37				<0.37			
Chlorodibromomethane	n/a	<0.21		<2.0	<2.0			<0.21	<0.27				<0.27			
Chloroethane	n/a	<0.17		<5.0	<5.0			<0.17	<0.44				<0.44			
2-chloroethylvinyl ether	n/a	<0.31		<10	<10			<0.56	<0.38				<0.56			
Chloroform	9,333	<0.19		<2.0	<2.0			<0.19	<0.37				<0.37			
Dichlorobromomethane	n/a	<0.20		<2.0	<2.0			<0.20	<0.33							
1,2-dichlorobenzene	5,900	<0.48		<2.0	<2.0			<0.49	<0.37				<0.37			
1,3-dichlorobenzene	n/a	<0.35		<2.0	<2.0			<0.35	<0.38				<0.38			
1,4-dichlorobenzene	6,500	<0.41		<2.0	<2.0			<0.41	<0.36				<0.36			
1,1-dichloroethane	n/a	<0.17		<2.0	<2.0			<0.17	<0.50				<0.50			
1,2-dichloroethane	186,667	<0.21		<2.0	<2.0			<0.21	<0.43				<0.43			
1,1-dichloroethylene	46,667	<0.28		<2.0	<2.0			<0.28	<0.59							
1,2-dichloropropane	84,000	<2.0		<2.0	<2.0			<2.0	<0.45				<0.45			
1,3-dichloropropylene	n/a	<0.17		<4.0	<4.0			<0.30	<0.78							
Ethylbenzene	93,333	<0.24		<2.0	<2.0			<0.24	<0.31				<0.31			
Methyl bromide (Bromomethane)	n/a	<0.21		<2.0	<2.0			<0.21	<0.49				<0.49			
Methyl chloride (Chloromethane)	n/a	<0.28		<5.0	<5.0			<0.28	<0.46				<0.46			
Methylene chloride	n/a	<0.28		<10	<10			<0.28	<0.47				<0.47			
1,1,2,2-tetrachloroethane	93,333	<0.50		<2.0	<2.0			<0.50	<0.40				<0.40			
Tetrachloroethylene	9,333	<0.29		<2.0	<2.0			<0.29	<0.38							
Toluene	373,333	<0.22		<2.0	<2.0			<0.22	<0.32				<0.32			
1,2-trans-dichloroethylene	n/a	<0.23		<2.0	<2.0			<0.23	<0.48							
1,1,1-trichloroethane	186,666,667	<0.23		<2.0	<2.0			<0.23	<0.34				<0.34			
1,1,2-trichloroethane	3,733	<0.32		<2.0	<2.0			<0.32	<0.59				<0.59			
Trichloroethylene	280	<0.19		<2.0	<2.0			<0.19	<0.47							
Trimethylbenzene	n/a			<2.0	<2.0			<2.0	<0.74							
Vinyl chloride (chloroethylene)	2,800	<0.32		<2.0	<2.0			<0.32	<0.38				<0.38			
Xylene	186,667	<0.63		<6.0	<6.0			<0.63	<0.99				<0.99			

Site ID: 4 17th Street		Monitoring Season Summer: June 1 - October 31, Winter: November 1 - May 31														
Receiving Water: Santa Cruz		Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	
Land Use: Industrial		2011-12	2012	2012-13	2013	2013-14	2014	2014-15	2015	2015-16	2016	2016-17	2017	2017-18	2018	
Sampling Date(s):		11/13/11	7/15/12	2/20/13	9/6/13	3/1/14	7/5/14	12/13/14	6/9/15	1/4/16	7/26/16	none	8/3/17	none	none	
SWQS																
SVOCs - Acid Extractables (ug/L)																
2-chlorophenol	4,667	<9.2		<20	<20			<0.77	<3.1					<76		
2,4-dichlorophenol	2,800	<7.9		<20	<20			<0.63	<2.5					<62		
2,4-dimethylphenol	18,667	<2.4		<20	<20			<0.54	<2.1					<53		
4,6-dinitro-o-cresol (4,6-Dinitro-2	3,733	<12		<39	<40			<0.89	<3.5					<88		
2,4-dinitrophenol	1,867	<14		<98	<100			<5.0	<20					<490		
2-nitrophenol	n/a	<7.3		<20	<20			<3.6	<14					<360		
4-nitrophenol	n/a	<5.1		<98	<100			<0.54	<2.1					<53		
p-chloro-m-cresol (4-Chlor-3-metl	n/a	<4.1		<20	<20			<0.62	<2.5					<61		
Pentachlorophenol	<18 ^{Note7}	<9.2		<2.9	<3			3.4	<4.0					<100		
Phenol	180,000	<19		<20	<20			<0.90	<3.6					<89		
2,4,6-trichlorophenol	130	<8.4		<20	<20			<0.82	<3.3					<81		
SVOCs - Bases/Neutrals (ug/L)																
Acenaphthene	56,000	<5.1		<9.8	<10			<0.73	<2.9					<72		
Acenaphthylene	n/a	<5.0		<9.8	<10			<0.62	<2.5					<61		
Anthracene	280,000	<5.3		<9.8	<10			<0.70	<2.8					<69		
Benzo(a)anthracene	0.2	<6.3		<1.2	<1.2			<0.76	<3.0					<75		
Benzo(a)pyrene	0.2	<5.0		<1.5	<15			<0.56	<2.2					<55		
Benzo(b)fluoranthene	n/a	<13		<3.2	<3.3			<1.3	<5.0					<130		
Benzo(g,h,i)perylene	n/a	<7.4		<9.8	<10			<1.5	<6.2					<150		
Benzo(k)fluoranthene	1.9	<13		<3.2	<3.3			<1.3	<5.0					<130		
Chrysene	19	<2.5		<9.8	<10			<0.67	<2.7					<66		
Dibenzo(a,h)anthracene	1.9	<3.7		<1.9	<1.9			<0.91	<3.6					<90		
3,3'-dichlorobenzidine	3	<11		<2.0	<20			<1.5	<5.9					<150		
Diethyl phthalate	746,667	<2.3		<20	<20			<1.1	<4.2					<100		
Dimethyl phthalate	n/a	<3.2		<20	<20			<0.56	<2.2					<55		
Di-n-butyl phthalate	n/a	<18		<20	<20			<2.7	<11					<270		
2,4-dinitrotoluene	1,867	<2.1		<20	<20			<1.0	<4.1					<100		
2,6-dinitrotoluene	3,733	<1.8		<20	<20			<1.1	<4.3					<110		
Di-n-octyl phthalate	373,333	<4.5		<20	<20			<0.76	<3.0					<75		
1,2-diphenylhydrazine (as azoben	1.8	<97		<4.9	<20			<1.0	<4.0					<99		
Fluoranthene	37,333	<5.9		<9.8	<10			<0.81	<3.2					<80		
Fluorene	37,333	<5.8		<9.8	<10			<0.60	<2.4					<59		
Hexachlorobenzene	747	<7.6		<20	<20			<1.0	<4.2					<100		
Hexachlorobutadiene	187	<2.1		<20	<20			<1.1	<4.5					<110		
Hexachlorocyclopentadiene	11,200	<9.7		<20	<20			<0.71	<2.8					<70		
Hexachloroethane	850	<2.2		<20	<20			<1.4	<5.7					<140		
Indeno(1,2,3-cd)pyrene	1.9	<6.9		<1.6	<1.6			<1.2	<4.7					<120		
Isophorone	186,667	<1.8		<20	<20			<0.82	<3.3					<81		

Site ID: 4 17th Street		Monitoring Season Summer: June 1 - October 31, Winter: November 1 - May 31													
Receiving Water: Santa Cruz		Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer
Land Use: Industrial		2011-12	2012	2012-13	2013	2013-14	2014	2014-15	2015	2015-16	2016	2016-17	2017	2017-18	
Sampling Date(s):		11/13/11	7/15/12	2/20/13	9/6/13	3/1/14	7/5/14	12/13/14	6/9/15	1/4/16	7/26/16	none	8/3/17	none	
SWQS															
SVOCs - Bases/Neutrals (ug/L) continued															
Naphthalene	18,667	<5.6		<9.8	<10			<0.78	<3.1					<77	
Nitrobenzene	467	<3.0		<20	<20			<1.1	<4.3					<110	
N-nitrosodimethylamine	0.03	<1.7		<3.2	<3.2			<2.3	<9.0					<220	
N-nitrosodi-n-propylamine	88,667	<2.4		<20	<20			<1.1	<4.4					<110	
N-nitrosodiphenylamine	n/a	<7.2		<20	<20			<0.89	<3.5					<88	
Phenanthrene	n/a	<4.8		<9.8	<10			<0.63	<2.5					<62	
Pyrene	28,000	<5.8		<9.8	<10			<0.57	<2.3					<56	
1,2,4-trichlorobenzene	9,333	<1.7		<20	<20			<0.96	<3.8					<95	
Pesticides (ug/L)															
Aldrin	<0.003 ^{Note8}	<0.0098		<0.099	<0.099			<0.016	<0.013					<0.013	
Alpha-BHC	n/a	<0.020		<0.099	<0.099			<0.0099	<0.020					<0.020	
Beta-BHC	n/a	<0.020		<0.099	<0.099			<0.017	<0.0097					<0.0099	
Gamma-BHC	n/a	<0.0098		<0.099	<0.099			<0.023	<0.039					<0.039	
Delta-BHC	n/a	<0.020		<0.099	<0.099			<0.012	<0.010					<0.011	
Chlordane (alpha, gamma)	3.2	<0.0076		<0.099	<0.099			<0.0077	<0.0134					<0.0059	
4,4'-DDT	n/a	<0.0029		<0.099	<0.099			<0.014	<0.0068					<0.0078	
4,4'-DDE	n/a	<0.0068		<0.099	<0.099			<0.0099	<0.0050					<0.0070	
4,4'-DDD	n/a	<0.0097		<0.099	<0.099			<0.0099	<0.0097					<0.0051	
Dieldrin	<0.003 ^{Note8}	<0.0049		<0.099	<0.099			<0.0083	<0.0082					<0.0099	
Alpha-endosulfan (Endosulfan I)	n/a	<0.0098		<0.099	<0.099			<0.0090	<0.0055					<0.0084	
Beta-endosulfan (Endosulfan II)	n/a	<0.029		<0.099	<0.099			<0.0061	<0.0050					<0.0057	
Endosulfan sulfate	3	<0.088		<0.099	<0.099			<0.059	<0.040					<0.0051	
Endrin	0.004	<0.0059		<0.099	<0.099			<0.011	<0.0096					<0.041	
Endrin aldehyde	0.7	<0.0049		<0.099	<0.099			<0.0089	<0.025					<0.0098	
Heptachlor	0.9	<0.020		<0.099	<0.099			<0.0082	<0.0089					<0.025	
Heptachlor epoxide	0.9	<0.020		<0.099	<0.099			<0.013	<0.0082					<0.0091	
PCB-1016 (Aroclor 1016)	n/a	<0.090		<1.0	<1.0			<0.99	<0.99					<0.0084	
PCB-1221 (Aroclor 1221)	n/a	<0.98		<1.0	<1.0			<0.99	<0.99					<1.0	
PCB-1232 (Aroclor 1232)	n/a	<0.98		<1.0	<1.0			<0.99	<0.99					<1.0	
PCB-1242 (Aroclor 1242)	n/a	<0.98		<1.0	<1.0			<0.99	<0.99					<1.0	
PCB-1248 (Aroclor 1248)	n/a	<0.98		<1.0	<1.0			<0.99	<0.99					<1.0	
PCB-1254 (Aroclor 1254)	n/a	<0.98		<1.0	<1.0			<0.61	<0.61					<1.0	
PCB-1260 (Aroclor 1260)	n/a	<0.060		<1.0	<1.0			<0.92	<0.92					<0.61	
Toxaphene	0.005	<0.98		<0.99	<0.99			<0.99	<0.98					<0.93	
Assume a 1:1 total to dissolved ratio															

V. Sample Site 5

Site ID: 5 Limberlost/1st Av	Monitoring Season Summer: June 1 - October 31, Winter: November 1 - May 31														
Receiving Water: Rillito Wash	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	
Land Use: Mixed	2011-12	2012	2012-13	2013	2013-14	2014	2014-15	2015	2015-16	2016	2016-17	2017	2017-18	2018	
Sampling Date(s):	2/14/12	7/10/12	1/26/13		12/20/13	7/3/14	12/4/14	6/9/15	12/12/15	6/26/16	12/17/16	none	none	6/16/2018	
Monitoring Parameters	SWQS														
Conventional Parameters															
Flow	n/a	1.07	10.19	6.52		4.2	3.34	7.75	1.54	5.45	3.11	0.8			3.43
pH	6.5 - 9	7.75	8.25	6.5		7.67	7	6	7.7	5.5	8.2	8.2			7.3
Temperature	n/a	52.7	85.3	66		53	82	55*	78.3	55	81.3	57.1			46.94
Hardness	<400	100	92	28		30	130	34	88	27	170	65			72
TDS (mg/L)	n/a	300	120	49		83	330	27	210	64	94	96			160
TSS (mg/L)	n/a	170	500	160		92	260	110	130	80	1200	220			110
BOD (mg/L)	n/a	100	27	17		14	21	31	40	200	35	46			31
COD (mg/L)	n/a	470	260	130		120	540	120	300	110	240	190			250
Inorganics															
Cyanide, total (ug/L)	84	<100	<100	<100		<38	53	<82	96	<100	<100	<28			<36
Nutrients (mg/L)															
Nitrate + Nitrite as N	n/a	2	1.1	<0.10		1.1	1.8	0.79	0.72	0.93	0.84	1			0.91
Ammonia as N	n/a	3.7	1.1	<0.50		1.5	3.3	<0.50	0.58	0.63	0.54	1.1			0.94
Total Kjeldahl Nitrogen (TKN)	n/a	8.8	19	0.97		2.6	13	2.1	4	2.3	4.6	2.3			5.5
Total Phosphorus	n/a	0.69	0.9	0.55		0.32	1.1	0.48	0.54	0.27	2.5	0.61			0.66
Total Orthophosphate	n/a	0.5	0.16	<0.5		<0.50	<0.22	<0.50	0.27	<0.50	2.5	0.18			<0.056
Microbiological (MPN)															
Escherichia coli (E. coli)	575	93	>2400	>2400		210	580	>2400	2400	2000	2400	2400			1400
Total Metals (ug/L)															
Antimony	747	<0.2	2.2	0.99		1.3	4	2.1	4.5	1.1	0.85	1.4			3.6
Arsenic	200	<40	7.3	<40		<4.0	8.4	6.9	8.5	2.9	12	6.9			10
Barium	98,000	130	180	<50		60	150	70	89	62	250	90			89
Beryllium	1,867	<2.0	<2.0	<2.0		<0.17	<0.93	<0.93	<0.22	<2.0	<1.3	<1.3			<0.33
Cadmium	<3 ^{Note 1}	<2.0	<2.0	<2.0		<0.16	<0.82	<0.82	<0.28	<2.0	<1.4	<1.4			<0.87
Chromium	1,000	<30	12	<30		<0.35	8.1	3.4	5	3.2	17	5.5			<3.0
Copper	<3 ^{Note 2}	99	97	22		33	130	38	61	38	94	47			71
Lead	<17 ^{Note 3}	<0.04	40	12		7.4	20	12	11	8.7	75	15			14
Mercury	5	<1.0	<1.0	0.04		<0.049	0.056	0.12	<0.011	<1.0	0.12	<0.094			5
Nickel	<882 ^{Note 4}	<50	13	<50		<4.1	7.4	6	7	4.8	13	5.7			<4.7
Selenium	33	<0.04	0.36	0.36		0.21	1	0.24	0.37	0.25	<1.6	0.33			0.48
Silver	<0.14 ^{Note 5}	<10	<10	0.013		0.11	<0.029	0.15	0.098	<0.50	0.0006	0.099			0.049
Thallium	75	<0.05	0.04	<0.5		0.048	<0.013	0.1	0.04	0.05	0.18	0.11			0.031
Zinc	<235 ^{Note 6}	720	420	210		260	1000	240	220	210	450	310			630

Site ID: 5 Limberlost/1 rst		Monitoring Season Summer: June 1 - October 31, Winter: November 1 - May 31														
Receiving Water: Rillito Wash		Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	
Land Use: Mixed		2011-12	2012	2012-13	2013	2013-14	2014	2014-15	2015	2015-16	2016	2016-17	2017	2017-18	2018	
Sampling Date(s):		2/14/12	7/10/12	1/26/13		12/20/13	7/3/14	12/4/14			6/26/16	12/17/16		none	6/16/2018	
SWQS																
Organic Toxic Pollutants (mg/L)																
Total Petroleum Hydrocarbons	n/a	8.9	<5.00	<5.00		<5.00	<5.00	<5.00	1.8	<5.00	<5.00	0.9			ND	
Total Oil and Grease	n/a	10.6	13	6.2		7	5.6	<5.00	2.8	5.3	6.1	2.7			ND	
VOCs, Semi-VOCs, and Pesticides (ug/L)																
Acrolein	467	<50		<50				<10	<13			<0.76				
Acrylonitrile	37,333	<50		<50				<10	<12			<0.65				
Benzene	3,733	<10		<10				<2.0	<2.4			<0.48				
Bromoform	18,667	<10		<10				<2.0	<2.5			<0.50				
Carbon tetrachloride	1,307	<10		<10				<2.0	<1.7			<0.35				
Chlorobenzene	18,667	<10		<10				<2.0	<1.8			<0.37				
Chlorodibromomethane	n/a	<10		<10				<2.0	<1.4			<0.27				
Chloroethane	n/a	<25		<25				<5.0	<2.2			<0.45				
2-chloroethylvinyl ether	n/a	<50		<50				<10	<1.9			<0.56				
Chloroform	9,333	<10		<10				<2.0	<1.9			<0.37				
Dichlorobromomethane	n/a	<10		<10				<2.0	<1.7			<0.33				
1,2-dichlorobenzene	5,900	<10		<10				<2.0	<1.8			<0.37				
1,3-dichlorobenzene	n/a	<10		<10				<2.0	<1.9			<0.38				
1,4-dichlorobenzene	6,500	<10		<10				<2.0	<1.8			<0.36				
1,1-dichloroethane	n/a	<10		<10				<2.0	<2.5			<0.50				
1,2-dichloroethane	186,667	<10		<10				<2.0	<2.1			<0.43				
1,1-dichloroethylene	46,667	<10		<10				<2.0	<2.9			<0.47				
1,2-dichloropropane	84,000	<10		<10				<2.0	<2.3			<.45				
1,3-dichloropropylene	n/a	<10		<10				<4.0	<3.8			n/a				
Ethylbenzene	93,333	<10		<10				<2.0	<1.6			<.31				
Methyl bromide (Bromomethane)	n/a	<10		<10				<2.0	<2.5			<0.49				
Methyl chloride (Chloromethane)	n/a	<25		<25				<5.0	<2.3			<0.46				
Methylene chloride	n/a	<50		<50				<10	<2.4			<0.47				
1,1,2,2-tetrachloroethane	93,333	<10		<10				<2.0	<2.0			<0.40				
Tetrachloroethylene	9,333	<10		<10				<2.0	<1.9			<0.38				
Toluene	373,333	<10		<10				<2.0	<1.6			<.32				
1,2-trans-dichloroethylene	n/a	<10		<10				<2.0	<2.4			<0.43				
1,1,1-trichloroethane	186,666,667	<10		<10				<2.0	<1.7			<0.34				
1,1,2-trichloroethane	3,733	<10		<10				<2.0	<3.0			<0.59				
Trichloroethylene	280	<10		<10				<2.0	<2.3			<0.47				
Trimethylbenzene	n/a			<10				<4.0	<3.6			<.33				
Vinyl chloride (chloroethylene)	2,800	<10		<10				<2.0	<1.9			<0.38				
Xylene	186,667	<30		<30				<6.0	<5.0			<0.99				

Site ID: 5 Limerlost/1 rst	Monitoring Season Summer: June 1 - October 31, Winter: November 1 - May 31													
Receiving Water: Rillito Wash	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer
Land Use: Mixed	2011-12	2012	2012-13	2013	2013-14	2014	2014-15	2015	2015-16	2016	2016-17	2017	2017-18	2018
Sampling Date(s):	2/14/12	7/10/12	1/26/13		12/20/13	7/3/14	12/4/14			6/26/16	12/17/16		none	6/16/2018
SWQS														
SVOCs - Acid Extractables (ug/L)														
2-chlorophenol	4,667	<9.9	<10				<9.9	<3.1			28			
2,4-dichlorophenol	2,800	<9.9	<10				<9.9	<2.5			<20			
2,4-dimethylphenol	18,667	<9.9	<10				<9.9	<2.2			<20			
4,6-dinitro-o-cresol (4,6-Dinitro-2methylphe	3,733	<9.9	<20				<20	<3.6			<20			
2,4-dinitrophenol	1,867	<49	<50				<49	<20			<20			
2-nitrophenol	n/a	<9.9	<10				<9.9	<14			<20			
4-nitrophenol	n/a	<49	<50				<49	<2.2			<20			
p-chloro-m-cresol (4-Chlor-3-methylphenol	n/a	<9.9	<10				<9.9	<2.5			36			
Pentachlorophenol	<18 ^{Note7}	<30	<30				3.4	<4.0			96			
Phenol	180,000	<9.9	<10				<9.9	<3.6			<20			
2,4,6-trichlorophenol	130	<9.9	<10				<9.9	<3.3			<20			
SVOCs - Bases/Neutrals (ug/L)														
Acenaphthene	56,000	<4.9	<5.0				<4.9	<2.9			20			
Acenaphthylene	n/a	<4.9	<5.0				<4.9	<2.5			<20			
Anthracene	280,000	<4.9	<5.0				<4.9	<2.8			<20			
Benzo(a)anthracene	0.2	<0.64	<0.61				<0.75	<3.0			<20			
Benzo(a)pyrene	0.2	<4.9	<0.76				<0.55	<2.2			<20			
Benzo(b)fluoranthene	n/a	<1.3	<1.6				<1.3	<5.1			<20			
Benzo(g,h,i)perylene	n/a	<4.9	<5.0				<4.9	<6.2			<20			
Benzo(k)fluoranthene	1.9	<1.3	<1.6				<1.3	<5.1			<20			
Chrysene	19	<4.9	<5.0				<4.9	<2.7			<20			
Dibenzo(a,h)anthracene	1.9	<0.37	<0.95				<4.9	<3.6			<20			
3,3'-dichlorobenzidine	3	<1.1	<1.0				<1.5	<6.0			n/a			
Diethyl phthalate	746,667	<9.9	<10				<9.9	<4.2			<20			
Dimethyl phthalate	n/a	<9.9	<10				<9.9	<2.2			<20			
Di-n-butyl phthalate	n/a	<9.9	<10				12	<11			<20			
2,4-dinitrotoluene	1,867	<9.9	<10				<9.9	<4.2			<20			
2,6-dinitrotoluene	3,733	<9.9	<10				<9.9	<4.4			<20			
Di-n-octyl phthalate	373,333	<9.9	<10				<9.9	<3.0			<20			
1,2-diphenylhydrazine (as azobenzene)	1.8	<9.9	<10				<9.9	<4.0			n/a			
Fluoranthene	37,333	<4.9	<5.0				<4.9	<3.2			<20			
Fluorene	37,333	<4.9	<5.0				<4.9	<2.4			<20			
Hexachlorobenzene	747	<9.9	<10				<9.9	<4.2			<20			
Hexachlorobutadiene	187	<9.9	<10				<9.9	<4.5			<20			
Hexachlorocyclopentadiene	11,200	<9.9	<10				<9.9	<2.8			<20			
Hexachloroethane	850	<9.9	<10				<9.9	<5.8			<20			
Indeno(1,2,3-cd)pyrene	1.9	<0.7	<0.82				<1.2	<4.8			<20			
Isophorone	186,667	<9.9	<10				<9.9	<3.3			<20			

Site ID: 5 Limberlost/1 rst		Monitoring Season Summer: June 1 - October 31, Winter: November 1 - May 31													
Receiving Water: Rillito Wash		Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer		
Land Use: Mixed		2011-12	2012	2012-13	2013	2013-14	2014	2014-15	2015	2015-16	2016	2016-17	2017	2017-18	2018
Sampling Date(s):		2/14/12	7/10/12	1/26/13		12/20/13	7/3/14	12/4/14			6/26/16	12/17/16			6/16/2018
SWQS															
SVOCs - Bases/Neutrals (ug/L) continued															
Naphthalene	18,667	<4.9		<5.0				<4.9	<3.1			<20			
Nitrobenzene	467	<9.9		<10				<9.9	<4.3			<20			
N-nitrosodimethylamine	0.03	<0.18		<1.6				<2.2	<9.1			<20			
N-nitrosodi-n-propylamine	88,667	<9.9		<10				<9.9	<4.4			<20			
N-nitrosodiphenylamine	n/a	<9.9		<10				<9.9	<3.6			<20			
Phenanthrene	n/a	<4.9		<5.0				<4.9	<2.5			<20			
Pyrene	28,000	<4.9		<5.0				<4.9	<2.3			20			
1,2,4-trichlorobenzene	9,333	<9.9		<10				<9.9	<3.8			<20			
Pesticides (ug/L)															
Aldrin	<0.003 ^{Note8}	<0.099		<0.10				<0.10	<0.013			<0.138			
Alpha-BHC	n/a	<0.099		<0.10				<0.10	<0.020			<0.106			
Beta-BHC	n/a	<0.099		<0.10				<0.10	<0.0098			<0.134			
Gamma-BHC	n/a	<0.099		<0.10				<0.10	<0.039			<0.124			
Delta-BHC	n/a	<0.099		<0.10				<0.10	<0.010			<0.096			
Chlordane (alpha, gamma)	3.2	<0.099		<0.10				<0.20	<0.0134			<0.14			
4,4'-DDT	n/a	<0.099		<0.10				<0.10	<0.0069			<0.38			
4,4'-DDE	n/a	<0.099		<0.10				<0.10	<0.0050			<0.166			
4,4'-DDD	n/a	<0.099		<0.10				<0.10	<0.0098			<0.176			
Dieldrin	<0.003 ^{Note8}	<0.099		<0.10				<0.10	<0.0083			<0.178			
Alpha-endosulfan (Endosulfan I)	n/a	<0.099		<0.10				<0.10	<0.0056			<0.14			
Beta-endosulfan (Endosulfan II)	n/a	<0.099		<0.10				<0.10	<0.0050			<0.166			
Endosulfan sulfate	3	<0.099		<0.10				<0.10	<0.040			<0.146			
Endrin	0.004	<0.099		<0.10				<0.10	<0.0097			<0.18			
Endrin aldehyde	0.7	<0.099		<0.10				<0.10	<0.025			<0.124			
Heptachlor	0.9	<0.099		<0.10				<0.10	<0.0090			<0.12			
Heptachlor epoxide	0.9	<0.099		<0.10				<0.10	<0.0083			<0.148			
PCB-1016 (Aroclor 1016)	n/a	<0.99		<1.0				<0.98	<0.98			<0.34			
PCB-1221 (Aroclor 1221)	n/a	<0.99		<1.0				<0.98	<0.98			<5.0			
PCB-1232 (Aroclor 1232)	n/a	<0.99		<1.0				<0.98	<0.98			<5.0			
PCB-1242 (Aroclor 1242)	n/a	<0.99		<1.0				<0.98	<0.98			<5.0			
PCB-1248 (Aroclor 1248)	n/a	<0.99		<1.0				<0.98	<0.98			<5.0			
PCB-1254 (Aroclor 1254)	n/a	<0.99		<1.0				<0.98	<0.60			<5.0			
PCB-1260 (Aroclor 1260)	n/a	<0.99		<1.0				<0.98	<0.91			<0.27			
Toxaphene	0.005	<0.99		<1.0				<1.0	<0.99			<0.6			
Assume a 1:1 total to dissolved ratio															
** Data for next reporting period															

VI. Range of Hardness and pH Dependent SWQS Constituents at all Sites

This table was generated to assist in the review of constituents that vary with hardness or pH, according to the Surface Water Quality Standards (SWQS).

Notes from Samples at all Sites for Constituents Standards that vary based on Hardness or pH

SWQS for constituents (ug/L) for Hardness Range (mg/L) of:	Min	Max	SWQS Table
Cadmium (Note 1)	2.42	85.49	6
Copper (Note 2)	2.66	83.85	12
Lead (Note 3)	10.35	577.51	15
Nickel (Note 5)	593	13,151	18
Silver (Note 6)	0.06	33.42	19
Zinc (Note 7)	158	3523	21

Hardness Range of All Samples	
Min	Max
10	390

pH Range of All Samples	
Min	Max
5	8.61

	Min	Max	SWQS Table
For pH Range of	5.0	8.61	
Pentachlorophenol (Note 8)	4.925	183.534	24

SWQS are for dissolved
Assume 1:1 ratio

Sum	
Aldrin + Dieldrin (Note 9)	< 0.003 ug/L

SWQS A.A.C. Title 18, Ch. 11
Surface Water Quality Standards

The Surface Water Quality Standards (SWQS) for cadmium, copper, lead, nickel, silver and zinc, are all based on hardness of the stormwater sample. Pentachlorophenol SWQS is based on pH. To understand how to read this table, look at the heading that shows "Min" and "Max". These represent the range of hardness at all of the sites that is from 10 to 390 mg/L. These hardness values are used to find the minimum and maximum range of each constituent (cadmium, copper, lead, nickel, silver and zinc) in the SWQS. For example, Table 6 of the SWQS shows the standard for cadmium at a hardness of 10 as 2.42 µg/L. Similarly, the standard for cadmium at a hardness of 390 mg/L is 85.49 µg/L. Each of the constituents is found in the SWQS. Copper is tabulated in table 12, lead is tabulated in table 15 etc. Further discussions are in Part 10.

PART 10 ASSESSMENT OF MONITORING DATA

I. Stormwater Quality

This report is the seventh of a five year permit. The sampling results are similar to those submitted last year and in the last permitting term. Sampled stormwater exhibited typical constituent concentrations for stormwater runoff from an arid or semi-arid southwestern city. This fiscal year's samples were well within the historical range of sampling data collected in earlier permit reporting periods. Sample Site 4's value for copper concentration normalized during this sampling season (discussed in Part 10. III.)

II. Water Quality Standards (WQS)

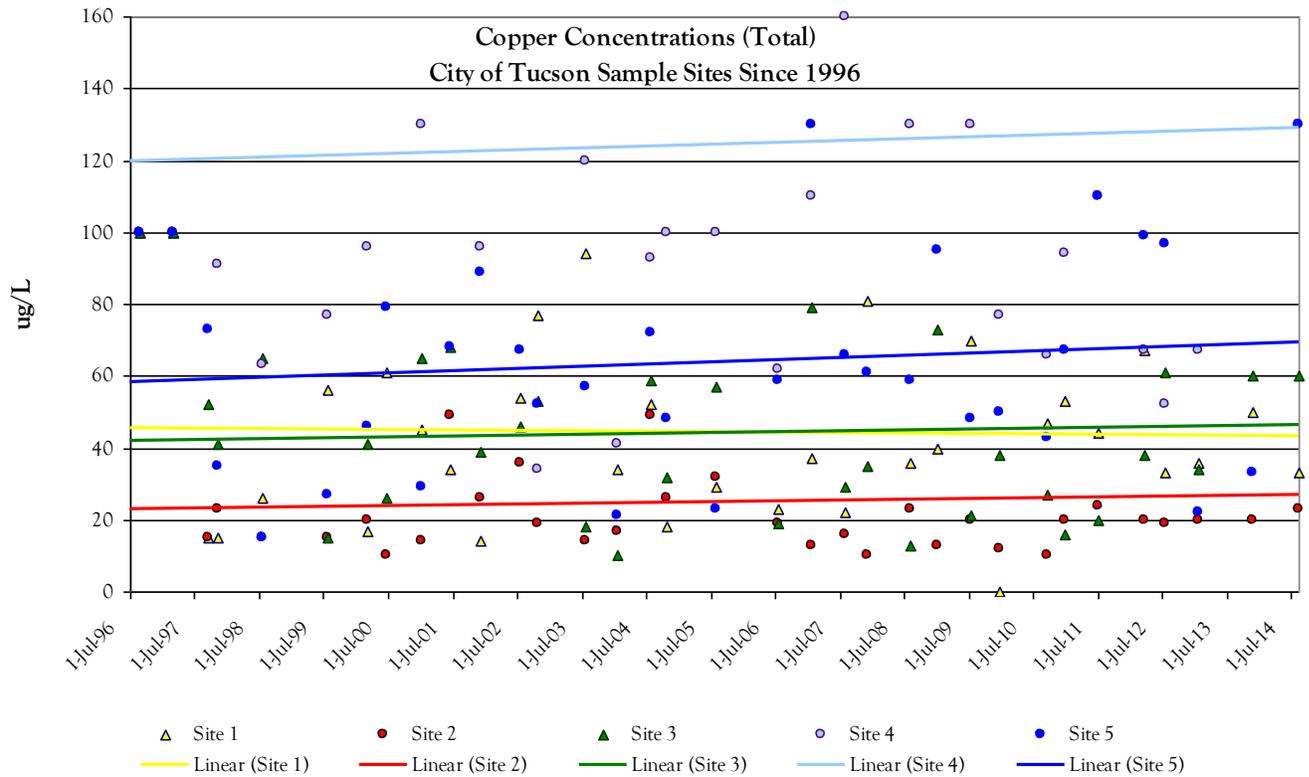
The surface water quality standards are listed in the tables found in Part 9 and Part 10 III (below). All sites were well below the surface water quality standards excluding those listed and discussed in Part 10. III.

III. Exceeding Water Quality Standards (WQS)

The concentration of copper continues to exceed the SWQS in all sample sites. A review was performed and updated to compare the results since 1996 (see below). The results that were below the detection limit of the laboratory equipment (less than) were reported for this report as the value. For example, <0.1 was reported as 0.1 rather than 0. Therefore the actual value is lower than what is graphed below. There continues to be a lot of scatter in the data, yet trend lines indicate the copper concentration is declining at most of the sites or the laboratory detection/reporting limits are getting lower. It appears from the data since 1996 that the copper concentrations, on the most part, have not changed. However, the trend lines for Sites 4 and 5 are increasing. Again, the Stormwater Inspectors combed through all the sites trying to determine the cause of the copper in the stormwater. In the watershed of Site 4, the Stormwater Inspectors found a shop that winds alternators (with copper wire) that had poor management practices. Our Industrial Stormwater Inspector did a thorough inspection of the site, identified areas where they needed improvement and provided them with assistance. During a follow-up inspection the Industrial Stormwater Inspector noted that the site was very clean and all of his concerns had been addressed. We are convinced that the cause of higher copper values resulted from this site and should be reflected in future sample results. Last summer's sample showed a more normal result for copper (significantly less than the higher values in 2013) and so the next reporting period sampling for 2019-2020 will be compared to the last few years to see if any trend exists.

The Stormwater Team continues to believe that the higher level of copper at the sites is likely from native background in soils and landscape material and possibly brake dust from automobiles.

The cause of the *E-coli* is suspected to be from birds (aves), bats (chiroptera), cat (feline) and dog/coyote (canine) droppings, and increase in homeless population (*h. sapiens*) activity in the Tucson area. There are considerations by Stormwater Management to perform more frequent *E-coli* testing to differentiate being pathotypes so that sources of *E-coli* can be better assessed. In 2017, PAG had studied the possibility of additional funding for these extra tests and more discussion is expected.



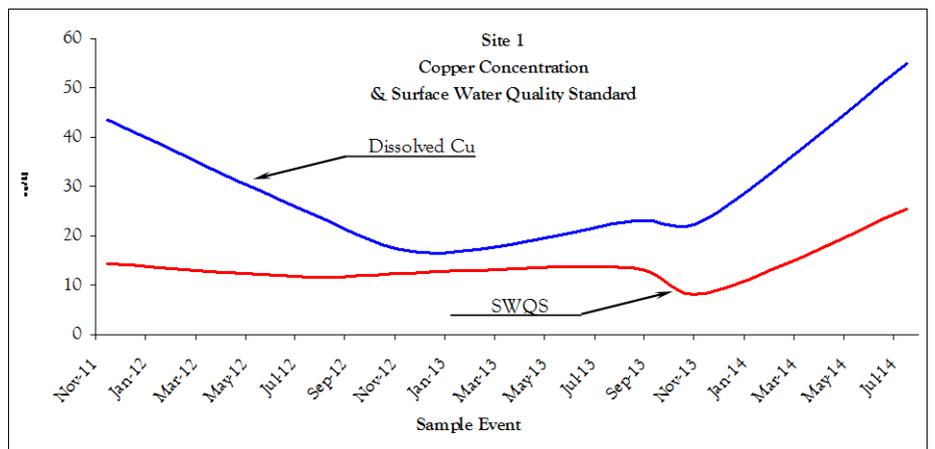
In a number of samples, the laboratory could not measure as low as the SWQS's for a number of constituents. They were: copper, silver, pentachlorophenol, cyanide, benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, 1,2-diphenylhydrazine, n-nitrosodimethylamine, aldrin, dieldrin, endrin, and toxaphene.

A. Summary of Constituents SWQS that varies with Hardness or pH at Site 1.

Site ID: 1 Grant/Wilson	Sample Date:	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer
		2011-12	2012	2012-13	2013	2013-14	2014	2014-15	2015	2015-16	2016	2016-17	2017	2017-18	2018
Receiving Water: Rillito	Hardness	60	48	53	56	34	110	30	46	44	55	88	120	47	78
SWQS: Table 6 (ug/L) Dissolved		13.87	11.17	12.30	12.97	7.98	25.02	7.06	10.71	10.26	12.75	20.14	27.23	10.94	17.91
Value (ug/L) Total		0.31	0.29	2	0.16	2	<0.82	<0.82	<0.28	<2.0	<2.0	<1.4	<0.87	<0.87	<0.87
Assume 1:1 Ratio Total to Dissolved		0.155	0.145	1	0.08	1	0.41	0.41	0.14	1	1	0.7	0.435	0.435	0.435
Exceed Cadmium Standard?		No	No	No	No	No	No	No	No	No	No	No	No	No	No
SWQS: Table 12 (ug/L) Dissolved		14.37	11.65	12.79	13.47	8.42	25.45	7.48	11.19	10.73	11.88	20.62	27.62	11.42	18.41
Value (ug/L) Total		87	50	33	46	47	110	22	32	44	49	28	59	52	38
Assume 1:1 Ratio Total to Dissolved		43.5	25	16.5	23	23.5	55	11	16	22	24.5	14	29.5	26	19
Exceed Copper Standard?		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
SWQS: Table 15 (ug/L) Dissolved		77.83	60.78	67.85	71.11	41.38	151.18	35.96	57.97	55.18	70.69	118.55	166.13	59.38	103.89
Value (ug/L) Total		21	8.6	14	24	21	20	10	16	18	5	19	24	11	4.6
Assume 1:1 Ratio Total to Dissolved		10.5	4.3	7	12	10.5	10	5	8	9	2.5	9.5	12	5.5	2.3
Exceed Lead Standard?		No	No	No	No	No	No	No	No	No	No	No	No	No	No
SWQS: Table 18 (ug/L) Dissolved		2699	2235	2430	2546	1669	4508	1502	2156	2076	2508	3732	4852	2195	3370
Value (ug/L) Total		1.1	9.6	50	4.1	50	16	1.9	2.9	6.7	8.4	8.4	6.4	6.4	<4.7
Assume 1:1 Ratio Total to Dissolved		0.55	4.8	25	2.05	25	8	0.95	1.45	3.35	4.2	4.2	3.2	3.2	2.35
Exceed Nickel Standard?		No	No	No	No	No	No	No	No	No	No	No	No	No	No
SWQS: Table 19 (ug/L) Dissolved		1.34	0.91	1.08	1.19	0.5	3.79	0.41	0.85	0.78	1.15	2.58	4.4	0.88	2.1
Value (ug/L) Total		0.46	0.87	0.067	0.23	0.23	<0.029	0.2	0.079	<0.50	<0.50	0.18	0.0003	0.00002	0.000021
Assume 1:1 Ratio Total to Dissolved		0.23	0.435	0.0335	0.115	0.115	0.0145	0.1	0.0395	0.25	0.25	0.09	0.0001	1E-05	1E-05
Exceed Silver Standard?		No	No	No	No	No	No	No	No	No	No	No	No	No	No
SWQS: Table 21 (ug/L) Dissolved		721	597	649	680	446	1206	401	576	555	670	998	1298	587	901
Value (ug/L) Total		230	140	100	150	170	310	88	110	140	160	82	200	200	83
Assume 1:1 Ratio Total to Dissolved		115	70	50	75	85	155	44	55	70	80	41	100	100	41.5
Exceed Zinc Standard?		No	No	No	No	No	No	No	No	No	No	No	No	No	No
	pH	7.07		8.55	8.11		5	5	7.5		7.7	7.5	8.1	7.3	7.3
SWQS: Table 24 (ug/L) Dissolved		40		166	111			4.925	74.284						
Value (ug/L) Total		29		29	1.5			3.6	4.4						
Exceed Pentachlorophenol Standard?		No		No	No			No	No						
Aldrin Value (ug/L)		<0.097		<0.098	<0.10			<0.016	<0.013						
Dieldrin Value (ug/L)		<0.097		<0.098	<0.10			<0.0084	<0.0083						
SWQS Aldrin + Dieldrin < 0.003 ug/L		<0.194		<0.292	<0.2			<0.0244	<0.0244						
Exceed Aldrin/Dieldrin Standard?		Unk		Unk	Unk			Unk	Unk						
E.coli (MPN)		>2400	2000	>2400	>2400	>2400	2400	>2400	2400	830	2400	2400	2400	820	2400
Exceed E.coli Standard? (575)		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

This table shows copper and E coli exceed SWQS repeatedly at Site 1

The concentration of copper increased at Site 1 (blue line). We suspect the increase may be due to collecting samples after several months of dry weather. Site 1 has a small watershed in a residential area. The source of copper is unknown and could not be determined and is suspected to be native to soils. SWQS is the red line.

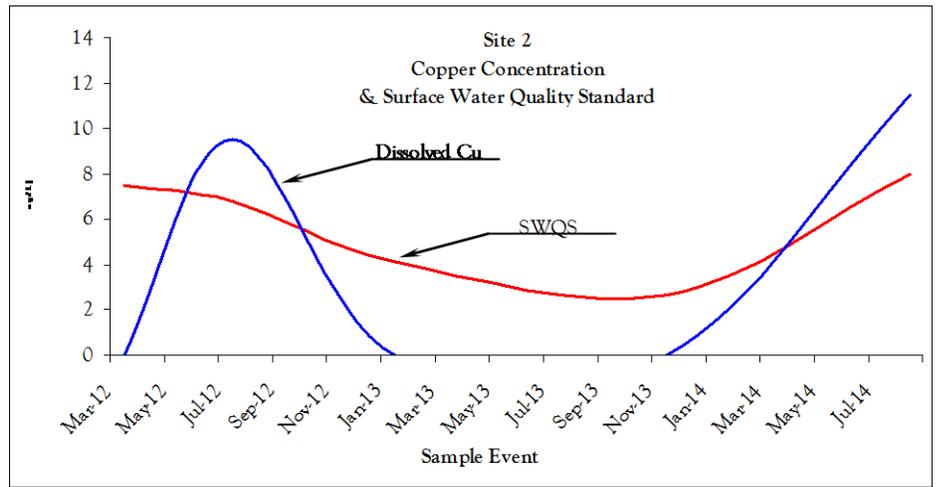


B. SUMMARY OF CONSTITUENTS SWQS THAT VARIES WITH HARDNESS OR pH AT SITE 2.

Site ID: 2 Greenlee	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer
	2011-12	2012	2012-13	2013	2013-14	2014	2014-15	2015	2015-16	2016	2016-17	2017	2017-18	2017
Receiving Water: Rillito	Sample Date: 3/8/12	7/15/12	1/26/13		11/22/13	8/12/14	12/4/14	10/6/15	14/16	7/16				
	Hardness	30	27	16		10	32	11	29	14				
SWQS: Table 6 (ug/L) Dissolved	7.06	6.37	3.83		2.42	7.52	2.65	6.83	3.36					
Value (ug/L) Total	2	0.4	2		2	<2.0	<0.82	<0.28	<2.0					
Assume 1:1 Ratio Total to Dissolved	1	0.2	1		1	<1.0	0.41	0.14	1					
Exceed Cadmium Standard?	No	No	No		No	No	No	No	No					
SWQS: Table 12 (ug/L) Dissolved	7.48	6.77	4.14		2.66	7.95	2.91	7.25	3.65					
Value (ug/L) Total	<20	19	<20		<20	23	<20	16	<20					
Assume 1:1 Ratio Total to Dissolved	<10	9.5	<10		<10	11.5	<10	8	10					
Exceed Copper Standard?	Unk	Yes	Unk		Unk	Yes	Unk	Yes	Unk					
SWQS: Table 15 (ug/L) Dissolved	35.96	31.95	17.69		10.35	38.66	11.54	34.62	15.2					
Value (ug/L) Total	0.96	2.7	1.4		0.49	3.8	0.5	1.6	0.98					
Assume 1:1 Ratio Total to Dissolved	0.48	1.35	0.7		0.245	1.9	0.25	0.8	0.49					
Exceed Lead Standard?	No	No	No		No	No	No	No	No					
SWQS: Table 18 (ug/L) Dissolved	1502	1374	882		643	1586	643	1459	788					
Value (ug/L) Total	50	3	50		50	2.4	2.2	<1.7	2.2					
Assume 1:1 Ratio Total to Dissolved	25	1.5	25		25	1.2	1.1	0.85	1.1					
Exceed Nickel Standard?	No	No	No		No	No	No	No	No					
SWQS: Table 19 (ug/L) Dissolved	0.41	0.34	0.14		0.06	0.45	0.07	0.38	0.11					
Value (ug/L) Total	<10	0.99	0.014		0.007	<0.029	0.049	0.024	<0.50					
Assume 1:1 Ratio Total to Dissolved	<5	0.495	0.007		0.0035	<0.015	0.0245	0.012	0.25					
Exceed Silver Standard?	Unk	Yes	No		No	No	No	No	Unk					
SWQS: Table 21 (ug/L) Dissolved	401	367	235		158	423	171	390	210					
Value (ug/L) Total	56	78	40		40	76	40	36	70					
Assume 1:1 Ratio Total to Dissolved	28	39	20		20	38	20	18	35					
Exceed Zinc Standard?	No	No	No		No	No	No	No	No					
	pH	7.97		6.3				6.5	7.3					
SWQS: Table 24 (ug/L) Dissolved	100		18				22.24	49.70						
Value (ug/L) Total	29		<30				<31	<1.0						
Exceed Pentachlorophenol Standard?	No		Unk				Unk	Unk						
Aldrin Value (ug/L)	<0.097		<0.099				<0.10	<0.013						
Dieldrin Value (ug/L)	<0.097		<0.099				<0.10	<0.0084						
SWQS Aldrin + Dieldrin < 0.003 ug/L	<0.194		<0.198				<0.20	<0.0214						
Exceed Aldrin/Dieldrin Standard?	Unk		Unk				Unk	Unk						
E.coli (MPN)	87	>2400	770	0	54	32	2400	870	35					
Exceed E.coli Standard? (575)	No	Yes	Yes	No	No	No	Yes	Yes	No					

This table shows copper exceeding SWQS a couple times, silver once, and *e. coli* twice at Site 2.

The concentrations of copper collected at Site 2 (blue line) are variable. The minimum detection of samples from the Winter of 2011-12, 2012-13, and 2013-14 were above the Surface Water Quality Standard so it is not known if they exceeded the standard. The sources of the metal could not be determined. The watershed from Site 2 is multi-family residential. SWQS is the red line.

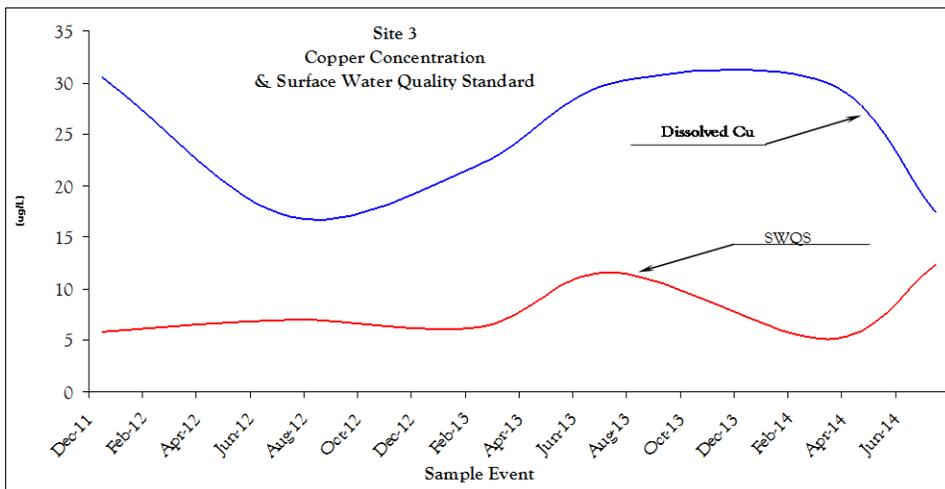


C. SUMMARY OF CONSTITUENTS SWQS THAT VARIES WITH HARDNESS OR pH AT SITE 3.

Site ID: 3 Randolph/Broadway	Winter 2011-12	Summer 2012	Winter 2012-13	Summer 2013	Winter 2013-14	Summer 2014	Winter 2014-15	Summer 2015	Winter 2015-16	Summer 2016	Winter 2016-17	Summer 2017	Winter 2017-18	Summer 2018
Sample Date:	12/12/11	7/20/12	2/20/13	7/15/13	3/1/14	7/16/14	12/4/14	7/28/15	12/12/15	6/26/16			2/4/18	10/120/18
Receiving Water: Santa Cruz	Hardness												23	28
SWQS: Table 6 (ug/L) Dissolved	5.45	6.60	5.91	11.17	4.76	11.84	4.99	7.98	4.06	8.21			5.4	17.91
Value (ug/L) Total	0.31	0.44	2	2	2	0.82	<0.82	0.29	<2.0	<2.0			1.3	<0.87
Assume 1:1 Ratio Total to Dissolved	0.155	0.22	1	1	1	0.41	0.41	0.145	1	1			0.65	0.435
Exceed Cadmium Standard?	No	No			No	No								
SWQS: Table 12 (ug/L) Dissolved	5.82	7.01	6.30	11.65	5.11	12.33	5.35	8.42	4.38	8.65			5.82	18.41
Value (ug/L) Total	61	34	44	60	60	35	37	49	24	71			42	30
Assume 1:1 Ratio Total to Dissolved	30.5	17	22	30	30	17.5	18.5	24.5	12	35.5			21	15
Exceed Copper Standard?	Yes	Yes			Yes	No								
SWQS: Table 15 (ug/L) Dissolved	26.67	33.28	29.3	60.78	22.77	65.01	24.07	41.38	18.95	43			27	103.89
Value (ug/L) Total	19	7.9	12	16	20	14	6.4	4.4	3.7	41			9.8	3.4
Assume 1:1 Ratio Total to Dissolved	9.5	3.95	6	8	10	7	3.2	2.2	1.85	20.5			4.9	1.7
Exceed Lead Standard?	No	No			No	No								
SWQS: Table 18 (ug/L) Dissolved	1199	1416	1287	2235	1066	2352	1110	1669	929	1711			1199	3370
Value (ug/L) Total	1.1	4.8	50	50	50	4.3	3.5	3.4	2.4	1.7			4.9	<4.7
Assume 1:1 Ratio Total to Dissolved	0.55	2.4	25	25	25	2.15	1.75	1.7	1.2	0.85			2.45	2.35
Exceed Nickel Standard?	No	No			No	No								
SWQS: Table 19 (ug/L) Dissolved	0.26	0.36	0.30	0.91	0.2	1.01	0.22	0.5	0.15	0.53			0.26	2.1
Value (ug/L) Total	0.46	0.95	0.0054	0.086	0.21	0.12	0.13	0.062	<0.50	<0.00050			<0.000021	<0.000021
Assume 1:1 Ratio Total to Dissolved	0.23	0.475	0.0027	0.043	0.105	0.06	0.065	0.031	0.25	0.00025			1.1E-05	1.1E-05
Exceed Silver Standard?	No	Yes	No	No	No	No	No	No	Unk	No			No	No
SWQS: Table 21 (ug/L) Dissolved	320	378	344	597	284	629	296	446	248	457			320	901
Value (ug/L) Total	240	150	190	250	190	120	160	180	100	350			190	120
Assume 1:1 Ratio Total to Dissolved	120	75	95	125	95	60	80	90	50	175			95	60
Exceed Zinc Standard?	No	No			No	No								
pH	6.74		7.5	5			6.5	7.5	7.7	7.1	7.5	0	6.8	
SWQS: Table 24 (ug/L) Dissolved	27		61	5			22.24	60.76						
Value (ug/L) Total	9.2		<3	<1.5			3.4	<0.32						
Exceed Pentachlorophenol Standard?	No		No	No			No	No						
Aldrin Value (ug/L)	<0.0098		<0.10	<0.10			<0.10	<0.032						
Dieldrin Value (ug/L)	<0.0049		<0.10	<0.10			<0.10	<0.0138						
SWQS Aldrin + Dieldrin < 0.003 ug/L	<0.0147		<0.20	0.000			<2.0	<0.0458						
Exceed Aldrin/Dieldrin Standard?	Unk		Unk	Unk			Unk	Unk						
E.coli (MPN)	770	370	580	130	170	1600	610	550	730	2400			240	
Exceed E.coli Standard? (575)	Yes	No	Yes	No	No	Yes	Yes	No	Yes	Yes			No	

This table shows copper exceeding SWQS repeatedly, silver once, and *e. coli* six times at Site 3.

The concentration of copper collected at Site 3 (blue line) declined. However, it is still above the Surface Water Quality Standard (red line). Site 3's stormwater flows from a small shopping mall. The site is impervious; there are not any industrial or construction activities that are more likely sources of the metal.

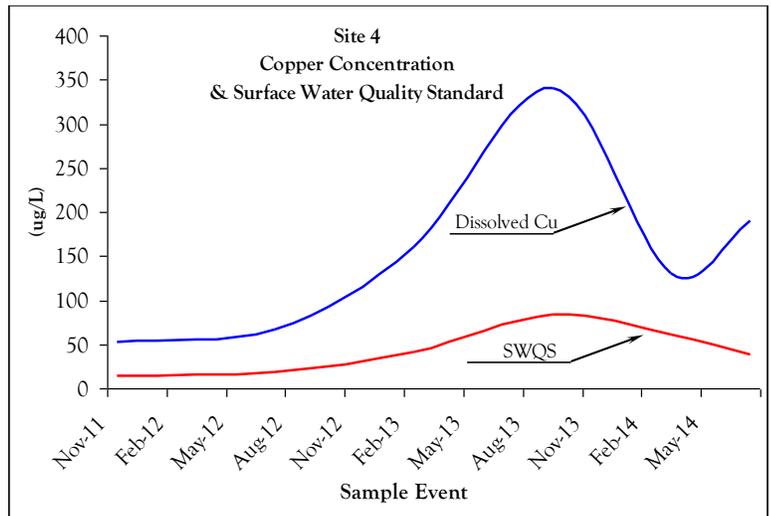


D. SUMMARY OF CONSTITUENTS SWQS THAT VARIES WITH HARDNESS OR PH AT SITE 4.

Site ID: 4 17th Street		Winter 2011-12	Summer 2012	Winter 2012-13	Summer 2013	Winter 2013-14	Summer 2014	Winter 2014-15	Summer 2015	Winter 2015-16	Summer 2016	Winter 2016-17	Summer 2017	Winter 2017-18	Summer 2017
Sample Date:		11/13/11	7/15/12	2/20/13	9/6/13	3/1/14	7/5/14	12/13/14	6/9/15	1/4/16	7/26/16	none	8/3/17		8/3/17
Receiving Water: Santa Cruz	Hardness	60	76	180	390	280	170	42	51	74	110	0	68		
SWQS: Table 6 (ug/L) Dissolved		13.87	17.46	40.37	85.49	61.99	38.19	9.8	11.84	17.02	25.02	20.14	15.67		17.91
Value (ug/L) Total		0.31	0.5	2	0.16	0.16	<0.82	<0.82	<0.28	<2.0	<2.0	<2.0	<0.87		
Assume 1:1 Ratio Total to Dissolved		0.155	0.25	1	0.08	0.08	0.41	0.41	0.14	1	1	1	0.435		
Exceed Cadmium Standard?		No	No	No	No	No	No	No	No	No	No	No	No		
SWQS: Table 12 (ug/L) Dissolved		14.37	17.96	40.47	83.85	61.37	38.35	10.27	12.33	17.52	25.45	20.62	16.17		18.41
Value (ug/L) Total		52	67	160	340	130	190	24	43	50	84	0	47		
Assume 1:1 Ratio Total to Dissolved		26	33.5	80	170	65	95	12	21.5	25	42	0	23.5		
Exceed Copper Standard?		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes		
SWQS: Table 15 (ug/L) Dissolved		77.83	100.97	256.85	577.51	409.62	241.64	52.39	65.01	98.05	151.18	118.55	89.35		103.89
Value (ug/L) Total		16	19	42	80	51	20	7.6	5.7	14	33	0	17		
Assume 1:1 Ratio Total to Dissolved		8	9.5	21	40	25.5	10	3.8	2.85	7	16.5	0	8.5		
Exceed Lead Standard?		No	No	No	No	No	No	No	No	No	No	No	No		
SWQS: Table 18 (ug/L) Dissolved		2699	3297	6837	13151	9936	6514	1996	2352	3223	4508	3732	3001		3370
Value (ug/L) Total		1.1	6	50	4.1	4.1	6.3	2.6	6.5	5	8.5	0	5.2		
Assume 1:1 Ratio Total to Dissolved		0.55	3	25	2.05	2.05	3.15	1.3	3.25	2.5	4.25	0	2.6		
Exceed Nickel Standard?		No	No	No	No	No	No	No	No	No	No	No	No		
SWQS: Table 19 (ug/L) Dissolved		1.34	2.01	8.84	33.42	18.9	8.01	0.72	1.01	1.92	3.79	2.58	1.66		2.1
Value (ug/L) Total		0.46	0.85	0.24	1	0.51	<0.029	0.19	0.033	<0.50	<0.00050	0	9E-05		
Assume 1:1 Ratio Total to Dissolved		0.23	0.425	0.12	0.5	0.255	0.0145	0.095	0.0165	0.25	0.0003	0	5E-05		
Exceed Silver Standard?		No	No	No	No	No	No	No	No	No	No	No	No		
SWQS: Table 21 (ug/L) Dissolved		721	881	1830	3523	2661	1743	533	629	862	1206	998	802		901
Value (ug/L) Total		190	220	440	800	330	690	110	350	220	430	0	190		
Assume 1:1 Ratio Total to Dissolved		95	110	220	400	165	345	55	175	110	215	0	95		
Exceed Zinc Standard?		No	No	No	No	No	No	No	No	No	No	No	No		
pH		7.95		7.7	6			7.03	7.7			7.5	7.3		7.3
SWQS: Table 24 (ug/L) Dissolved		100		74	13			36.76	74.28			60.758			
Value (ug/L) Total		9.2		<2.9	3			3.4	<4.0			0			
Exceed Pentachlorophenol Standard?		No		No	No			No	Unk			Unk			
Aldrin Value (ug/L)		<0.0098		<0.099	<0.099			<0.016	<0.013			0			
Dieldrin Value (ug/L)		<0.0049		<0.099	<0.099			<0.0083	<0.0082			0			
SWQS Aldrin + Dieldrin < 0.003 ug/L		<0.0147		<0.198	<0.198			<0.0243	<0.0212			<.0213			
Exceed Aldrin/Dieldrin Standard?		Unk		Unk	Unk			Unk	Unk			Unk			
E.coli (MPN)		>2400	>2400	54	>2400	1000	2400	>2400	2400	>2400	920	0	2400		
Exceed E.coli Standard? (575)		Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes		

This table shows copper and e. coli exceeding SWQS repeatedly at Site 4.

Similar to Site 1, the concentration of copper (blue line) collected at Site 4 increased. Site 4's storm-water flows from an industrial site where the possible source of copper may have originated from a facility with poor BMP's that have been corrected. Further sample results may reveal this to be the case. (Red line is SWQS.)

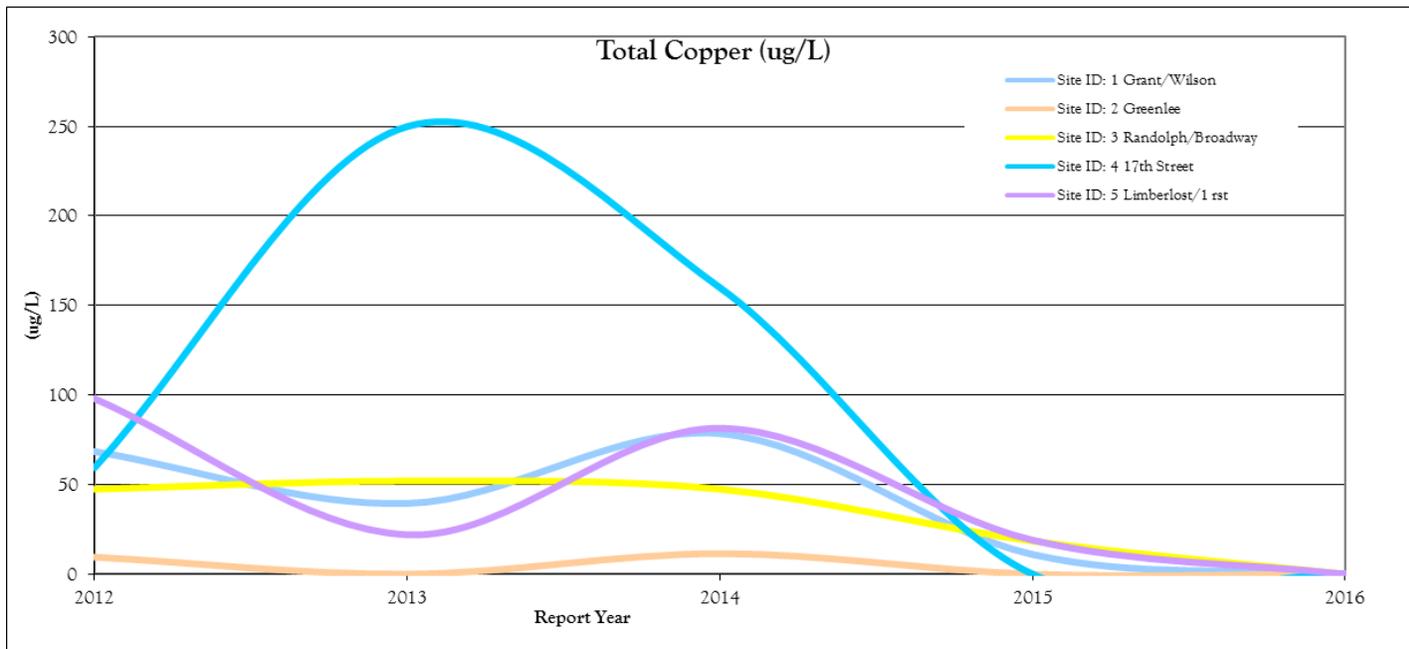
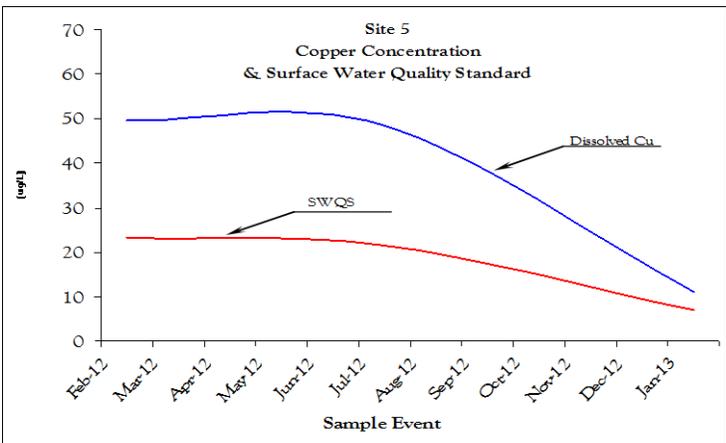


E. SUMMARY OF CONSTITUENTS SWQS THAT VARIES WITH HARDNESS OR PH AT SITE 5.

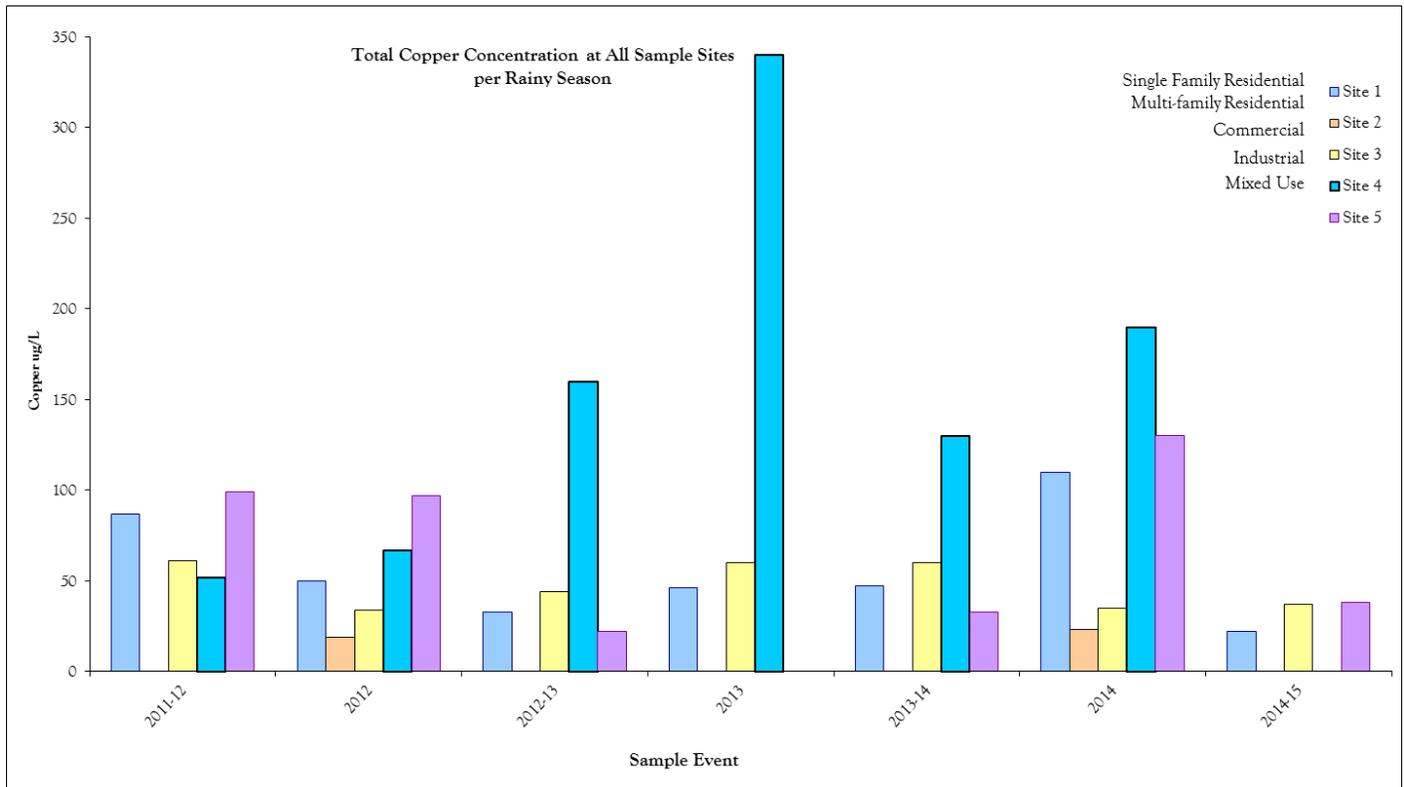
Site ID: 5 Limberlost/1st Av	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer
	2011-12	2012	2012-13	2013	2013-14	2014	2014-15	2015	2015-16	2016	2016-17	2017	2017-18	2018
Sample Date:	2/4/12	7/10/12	12/6/13	none	12/20/13	7/3/14	12/4/14	6/9/15	12/12/15	6/26/16				
Receiving Water: Rillito	Hardness													
	100	92	28	0	30	130	34	88	27		65		0	
SWQS: Table 6 (ug/L) Dissolved	22.81	21.03	6.60		7.06	29.43	7.98	20.14	6.37		15		16.57	17.91
Value (ug/L) Total	2	2	2		0.16	<0.82	<0.82	<0.28	<2.0		<1.4			<0.87
Assume 1:1 Ratio Total to Dissolved	1	1	1		0.08	0.41	0.41	0.14	1		0.07			0.435
Exceed Cadmium Standard?	No	No	No		No	No	No	No	No		No		Yes	No
SWQS: Table 12 (ug/L) Dissolved	23.26	21.50	7.01		7.48	29.78	8.42	20.62	6.77		15.5		17.07	18.41
Value (ug/L) Total	99	97	22		33	130	38	61	38		47		0	71
Assume 1:1 Ratio Total to Dissolved	49.5	48.5	11		16.5	65	19	30.5	19		23.5		0	35.5
Exceed Copper Standard?	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes		No	Yes
SWQS: Table 15 (ug/L) Dissolved	136.3	124.45	33.28		35.96	181.14	41.38	118.55	31.95		85.01		95.14	103.89
Value (ug/L) Total	0.04	40	12		7.4	20	12	11	8.7		15		0	14
Assume 1:1 Ratio Total to Dissolved	0.02	20	6		3.7	10	6	5.5	4.35		7.5		0	7
Exceed Lead Standard?	No	No	No		No	No	No	No	No		No		No	No
SWQS: Table 18 (ug/L) Dissolved	4158	3875	1416		1502	5192	1669	3732	1374		2888		3186	3370
Value (ug/L) Total	50	13	50		4.1	7.4	6.0	7.0	4.8		5.7			<4.7
Assume 1:1 Ratio Total to Dissolved	25	6.5	25		2.05	3.7	3.0	3.5	2.4		2.9			2.35
Exceed Nickel Standard?	No	No	No		No	No	No	No	No		No		Yes	No
SWQS: Table 19 (ug/L) Dissolved	3.22	2.79	0.36		0.41	5.05	0.5	2.58	0.34		1.53		1.83	2.1
Value (ug/L) Total	<10	<10	0.013		0.11	<0.029	0.15	0.098	<0.50		0.099			0.049
Assume 1:1 Ratio Total to Dissolved	<5	<5	0.0065		0.055	0.0145	0.075	0.049	0.25		0.0495			0.0245
Exceed Silver Standard?	Unk	Unk	No		No	No	No	No	No		No		Yes	No
SWQS: Table 21 (ug/L) Dissolved	1112	1036	378		401	1389	446	998	367		772		842	901
Value (ug/L) Total	720	420	210		260	1000	240	220	210		310			630
Assume 1:1 Ratio Total to Dissolved	360	210	105		130	500	120	110	105		155			315
Exceed Zinc Standard?	No	No	No		No	No	No	No	No		No		Yes	No
	pH													
	7.75		6.5				6	7.7			8.5			7.3
SWQS: Table 24 (ug/L) Dissolved	100		22				13.456	74.284			165.985			
Value (ug/L) Total	30		<30				3.4	<4.0	0		96			
Exceed Pentachlorophenol Standard?	No		Unk				No	Unk			No			
Aldrin Value (ug/L)	<0.099		<0.10				<0.10	<0.013			<0.138			
Dieldrin Value (ug/L)	<0.099		<0.10				<0.10	<0.0083			<0.178			
SWQS Aldrin + Dieldrin < 0.003 ug/L	<0.198		<0.20				<0.20	<0.213			<0.316			
Exceed Aldrin/Dieldrin Standard?	Unk		Unk				Unk	Unk			Unk			
E.coli (MPN)	93	>2400	>2400		210	580	>2400	2400	2000		2400			1400
Exceed E.coli Standard? (575)	No	Yes	Yes		No	Yes	Yes	Yes	Yes		Yes		Yes	Yes

This table shows copper and *e. coli* exceeding SWQS repeatedly at Site 5.

Similar to Site 3, the concentration of copper (blue line) collected at Site 5 declined in 2013. Site 5's stormwater flows from a mixed use area. The recent values are close to the Surface Water Quality Standard (red line).



This graph clearly shows copper concentration at Site 4 is much higher than the other Sample Sites.



Similarly, this graph shows Site 4's higher copper concentration than the other Sample Sites.

PART 11 ESTIMATES OF ANNUAL POLLUTANT LOADINGS

To estimate the annual pollutant load, rainfall totals are collected at each of the five stations, tabulated monthly, and used to calculate the event mean concentration for constituents monitored under the City's MS4 permit, along with the pollutant loading calculations.

Laboratories report constituent values that were below the detection limit as less than the minimum Practical Quantitation Limit (<PQL) or the Minimum Detection Limit (MDL). These values are reported as zero for calculating purposes.

Runoff volumes were calculated for each drainage area, utilizing the area and impervious fraction developed by Pima County Flood Control District specifically for the Tucson metropolitan area, along with rainfall data collected at each sample site. Runoff volumes are shown in Table 11.3.

Annual pollutant load estimates were developed in accordance with guidance found in the EPA's "Guidance Manual for the Preparation of Part 2 of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems." The simple method described in this document was followed. This method involves using the event mean concentrations and multiplying by the runoff volumes for each watershed. The following formula was used to determine the annual load of each pollutant for each drainage basin:

$$L = (R)(C)(A)(N)$$
$$V = (R)(A)$$

- L = Pollutant load (tons/year).
- R = Runoff (inches)
- C = Pollutant concentration (mg/L)
- A = Area (acres)
- N = Conversion (1.65×10^{-3})
- V = Volume of runoff (acre-feet).

$$R = (P)(P_j)(R_v)$$

- P = Rainfall (inches)
- P_j = Fraction of annual rainfall events that produce runoff
- R_v = Runoff coefficient
- I_a = Impervious fraction

$$R_v = 0.05 + 0.9(I_a)$$

P is obtained and averaged from raw data collected from sample sites where P_j is calculated from actual rain events at sample sites that produce flow for the winter and summer seasons. In the last annual report P_j was 0.77 for the summer rainy season and 0.62 for the winter rainy season. It has been updated and averaged over the previous seasons to 0.65 and 0.59 respectfully. Therefore the values in the following tables have changed and are reflected with the updated constant P_j .

Table 11.1
Average Annual Load for the City of Tucson's Monitoring Program 2011 – 2016

mg/L	TDS	TSS	BOD	COD	N	TKN	PO ₄
2012	123	156	42	195	1.1	4.7	0.4
2013	87	261	28	179	0.6	3.0	0.9
2014	166	207	17	292	1.6	6.7	0.7
2015	17	23	10	35	0.1	0.7	0.2
2016	0	0	0	0	0.0	0.0	0.0
S.D.	70	114	16	121	0.7	2.8	0.4

ug/L	Sb	As	Ba	Be	Cd	Cr	Cu	Pb	Hg	Ni	Se	Ag	Tl	Zn
2012	1.7	2.0	86	0.0	0.2	3	57	14	0.0	4	0.2	0.4	0.0	244
2013	1.5	0.0	103	0.0	0.0	0	73	21	0.0	0	0.6	0.2	0.0	235
2014	2.2	6.9	106	0.1	0.1	8	76	18	0.1	10	0.5	0.1	0.3	315
2015	0.6	1.8	12	0.0	0.0	1	10	3	0.0	1	0.0	0.1	0.0	49
2016	0.0	0.0	0	0.0	0.0	0	0	0	0.0	0	0.0	0.0	0.0	0
S.D.	1	3	52	0	0	3	36	9	0	4	0	0	0	136

Table 11.2a
Drainage Characteristics

Drainage Basin	Area (sq mi)	Impervious Fraction	Rv no units
	"A"	"I"	
SANTA CRUZ RIVER	142.96	8.72	8.95
RILLITO CREEK	19.73	0.22	4.28
PANTANO WASH	29.06	0.08	2.44
TANQUE VERDE CREEK	10.91	0.16	1.74
SABINO CREEK	0.6	0.43	0.26
Atterbury Wash (into Lakeside Lake)	11.66	0.06	0.10

Table 11.2b

Total Runoff "V" [acre-feet] The runoff volumes have changed from the previous reports because the runoff co-efficient (Pj) was obtained from real data at the sample sites and averaged for each of the rainy seasons.

Table 11.3

Drainage Basin Sizes, Impervious Fraction, and Rv

Drainage Basin	Area (sq mi) "A"	Impervious Fraction "I"	Rv no units
Santa Cruz River	142.96	8.72	8.95
Silvercroft Wash (DL)	13.44	0.12	0.16
West Branch Santa Cruz River (CG)	10.22	0.08	0.12
Hughes Wash (AC)	8.33	0.42	0.43
El Vado Wash (AG)	2.29	0.36	0.37
Santa Clara Wash (AH)	0.39	0.26	0.28
Valencia Wash (AL)	1.64	0.42	0.43
Airport Wash (AW)	24.17	0.09	0.13
Wyoming Wash (BC)	0.7	0.25	0.28
Irvington Wash (BL)	0.25	0.25	0.28
Rodeo Wash (BR)	8.39	0.21	0.24
Tucson Diversion Channel (BW)	43.53	0.20	0.23
Mission View Wash (CC)	1.62	0.48	0.48
18th Street Wash (CL)	3.59	0.42	0.43
Cushing Street Wash (CR)	0.5	0.57	0.56
Downtown Wash (CT)	0.31	0.85	0.82
Arroyo Chico (CW)	11.17	0.52	0.52
West University Wash (DA)	0.76	0.63	0.62
Bronx Wash (DC)	1.26	0.50	0.50
Grant Road Wash (DD)	0.77	0.69	0.67
Krueger Wash (DF)	0.38	0.46	0.46
Flowing Wells Wash (DG)	6.47	0.42	0.43
Ruthrauff Wash (EG)	2.78	0.52	0.52
Rillito Creek	19.73	0.22	4.28
Stone Avenue Wash (HG)	0.6	0.61	0.60
First Avenue Wash (GR)	0.5	0.37	0.38
North Mountain Avenue Wash (GQ)	0.62	0.25	0.28
Tucson General Wash (GM)	0.42	0.34	0.36
Christmas Wash (GL)	3.28	0.45	0.46
Alvernon Wash (GG)	3.24	0.54	0.54
Christopher City Wash (GF)	0.21	0.49	0.49
Alamo Wash (GC)	9.81	0.46	0.46
Swan Road Wash (GD)	0.52	0.42	0.43
Creekside Wash (GE)	0.53	0.27	0.29

Drainage Basin	Area (sq mi) "A"	Impervious Fraction "I"	Rv no units
Pantano Wash	29.06	0.08	2.44
Rose Hill Wash (UL)	2.11	0.49	0.49
Guillermo Wash (UZ)	0.75	0.42	0.43
Atterbury Wash (UG)	16.71	0.06	0.10
Mesquite Ranch Wash (UN)	1.15	0.05	0.10
Civano Wash (UR)	3.07	0.05	0.10
Owens Park Wash (UJ)	0.75	0.35	0.37
Rolling Hills Wash (UC)	1.17	0.39	0.40
Eastview Wash (TW)	0.75	0.17	0.20
Spanish Trail Wash (TR)	1.46	0.10	0.14
Escalante Wash (TL)	1.14	0.08	0.12
Tanque Verde Creek	10.91	0.16	1.74
Udall Park Wash (MD)	1.03	0.35	0.37
Robb Wash (MW)	3.51	0.31	0.33
Este Wash (MG)	2.49	0.30	0.32
Wrightstown Wash (ML)	0.67	0.19	0.22
Reyes Wash (MC)	1.18	0.17	0.20
Hidden Hills Wash (MR)	2.03	0.28	0.30
Sabino Creek	0.6	0.43	0.26
Fahringer Wash (MN)	0.6	0.23	0.26

Table 11.4
Annual Pollutant Loading for the City of Tucson's Monitoring Program
Annual Pollutant Load (tons/rainy season)

	Winter 2011-12	Summer 2012	Winter 2012-13	Summer 2013	Winter 2013-14	Summer 2014	Winter 2014-15	Summer 2015	Winter 2015-16	Summer 2016
Total Runoff (Acre-Ft)	8,541	10,833	6,244	5,364	5,707	16,476	7,958	0		
TDS	2,007	1,844	815	1,117	596	7,335	613			
TSS	1,753	3,355	1,967	4,344	1,915	5,756	808			
BOD	542	827	388	163	145	496	318			
COD	3,094	3,040	1,659	2,334	1,417	11,817	1,126			
N	15	18	4	10	8	65	2			
TKN	47	108	16	60	21	307	22			
PO ₄	6	8	4	16	3	28	5			
Sb	0	0	0	0	0	0.1	0.0			
As	0.0	0.1	0.0	0.0	0.0	0.1	0.0			
Ba	1.1	1.7	0.8	0.9	0.0	0.2	0.1			
Be	0	0	0	0	1	3.0	0.4			
Cd	0	0	0	0	0	0.0	0.0			
Cr	0.0	0.1	0.0	0.1	0.0	0.0	0.0			
Cu	0.8	1.0	0.5	0.5	0.1	0.2	0.0			
Pb	0.2	0.3	0.2	0.2	0.5	2.7	0.3			
Hg	0.0	0.0	0.0	0.0	0.2	0.4	0.1			
Ni	0.0	0.1	0.0	0.1	0.0	0.0	0.0			
Se	0.0	0.0	0.0	0.0	0.1	0.2	0.0			
Ag	0	0	0	0	0	0.0	0.0			
Tl	0	0	0	0	0	0.0	0.0			
Zn	4.1	3.6	1.9	1.7	0.0	0.0	0.0			

The runoff volumes have changed from the previous report because actual rainfall and the runoff co-efficient (P_i) was averaged obtained from real data at the sample sites and averaged for each of the rainy seasons. These averaged values also changes the Pollutant Load calculations from the previous reports.

PART 12 ANNUAL EXPENDITURES

Expenditures for the many components of the City’s Stormwater Program are funded by City Departments and through City membership, sponsorship and contributions to agencies such as Tucson Clean and Beautiful, Pima Association of Governments, and the University of Arizona. The majority of funds expended on programs benefiting stormwater quality come from the City’s General Fund. Two City Departments are enterprise funded and many of their costs are not reflected in the table below. Stormwater management activities are also funded by the Stormwater Fee on the water bill. It is recognized that a number of costs associated with stormwater protection are not readily available and staff are working toward identifying and developing a tracking mechanism to estimate the costs.

An estimate of annual expenditures for programs with direct stormwater quality benefit is provided in the Table 12.1 below:

Table 12.1

STORMWATER MANAGEMENT PRACTICE OR ACTIVITY		2016-17	2017-18	2018-19	2019-20	2020-21
I	Public Awareness	\$472,378	\$724,870	\$461,583		
II	Public Involvement	\$1,414,633	\$713,221	\$646,541		
III	IDDE	\$300,000	\$32,000	\$181,728		
IV	Municipal Facility Stormwater	\$2,152,519	\$2,150,000	\$2,150,000		
V	Industrial Stormwater	\$27,943	\$35,000	\$15,005		
VI	Construction Stormwater	\$223,125	\$275,000	\$415,470		
VII	Post-Construction Stormwater	VI above	VI above	\$26,267		
VIII	Stormwater Sampling	\$128,226	\$29,000	\$181,890		
IX	Program Administration & Management	\$195,024	\$374,147	\$259,509		
Total Stormwater Expenditures		\$4,913,848	\$4,333,238	\$4,337,993		

PART 13 ATTACHMENTS

- Laboratory reports
- Vector Service locations and dates
- New or revised ordinances (none; not included in this report)
- New or revised public outreach documents (See updated Tucson's Operation Splash campaign which includes an extended sand bag distribution program)
<https://www.tucsonaz.gov/files/transportation/Op-Splash.pdf>
- Drainage System Maps – see Map Tucson: open Stormwater layers to view FSO locations, sampling sites and other GIS info: <https://maps.tucsonaz.gov/maptucson/>