

Appendix F6: Prioritization Criteria and Scoring for Mitigation
of Erosion Prone Areas, 2016





Prioritization Criteria and Scoring for Mitigation of Erosion Prone Areas

**For the City and County of Honolulu
Municipal Separate Storm Sewer System
National Pollutant Discharge Elimination System
Permit No. HI S000002**

Final

February 2016

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INTRODUCTION

The City and County of Honolulu's Erosion Control BMP's Program aims to identify erosional areas, located within the City's right-of-ways and small MS4 facilities, with the potential for significant water quality impacts. Erosional areas shall be defined as areas where there is evidence of rilling, gullying, and/or other evidence of significant sediment transport. Identification of these areas shall be conducted on an island-wide basis and accomplished through visual site inspections.

Once identified, a determination will be made regarding the ownership or jurisdictional responsibility of the erosional area. Sites determined to be owned by or under the jurisdiction of the City will be compiled to establish the City's erosional area remediation list. This initial inventory of sites will be slated for erosion remediation improvements as determined by a priority based schedule.

A quantitative formula based primarily upon water quality impacts will be developed to determine the prioritization criteria. Public safety and property damage/loss considerations will also factor into the priority schedule to align with the City's capital improvement program (CIP) mission, through which these remediation measures will be administered.

PRIORITIZATION OF EROSIONAL AREAS

Criteria for Prioritization

Water quality impact factors considered in the prioritization of erosional areas include the following: watershed priority, receiving water classification, proximity to receiving water, estimated erosional area, average annual rainfall, soil type, site slope, and flood zone. Priority will be given to areas within critical watersheds, areas in close proximity to receiving waters listed as impaired, and to areas experiencing greater quantities of erosion.

Implementation considerations include the following: public safety concerns and property damage/loss potential.

Points are assigned to each factor, as described in the following paragraphs, with higher point values assigned to those factors that are considered a higher priority. The total sum of these points determines the score and thus, prioritization ranking of the identified erosional site. The order of implementation of BMP improvements correlates with the total point scoring for each erosion site from highest to lowest. Sites with higher scores are given priority in regards to erosion control (or BMP) improvement implementation over sites with lower scores. The priority ranking criteria is based on the following equation:

Priority Score = Water Quality Impacts + Program Implementation Considerations

Where,

Water Quality Impacts = Watershed Priority + Receiving Water Classification + Proximity to Receiving Water + Estimated Erosional Area + Average Annual Rainfall + Soil Type + Site Slope + Flood Zone

Program Implementation Considerations = Public Safety + Property Damage/Loss Potential

Water Quality Impact Criteria

Watershed Priority

The watersheds on the island of Oahu are categorized into three levels of prioritization ranking. The highest level consists of critical watersheds and are defined as those which have been designated by the EPA as a Wasteload Allocation (WLA). This comprises the highest level of the prioritization ranking. The critical watersheds include Ala Wai, Kawa, Waimanalo, Kapaa, Kaneohe, Kaukonahua, Waikele, Kaelepulu and Kawainui. This group of watersheds are assigned the maximum value of points.

The watersheds with inland or marine waters that appear on the EPA's 303(d) list of impaired waters based on turbidity and/or total suspended solids (TSS) make up the second level of the prioritization ranking and are assigned an intermediate point value.

The third level consists of all remaining watersheds. These watersheds are assigned the minimum value of points.

The points applied to Watershed Priority are as follows:

<u>Criteria</u>	<u>Points</u>
Critical Watersheds (EPA designated WLA)	10
EPA's 303(d) Listed Watersheds w/ High Turbidity and/or TSS	5
All other Remaining Watersheds	1

Receiving Water Classification

The receiving water bodies of the island of Oahu are classified as either inland waters or marine waters. Inland waters are streams, flowing springs, ditches and flumes, lakes, reservoirs and wetlands. Marine waters are embayment, open coastal or oceanic waters.

These receiving waters are also classified according to water uses and water quality standards. Inland waters are classified as either Class 1 or Class 2. The objective of Class 1 waters is to remain in their natural state as nearly as possible with an absolute minimum of pollution from any human-caused source. Class 2 waters are to be protected for their use for recreational purposes, the support and propagation of aquatic life, agricultural and industrial water supplies, shipping and navigation. Marine waters are classified as either Class AA or Class A. It is the objective of Class AA waters that these waters remain in their natural pristine state as nearly as possible with an absolute minimum of pollution or alteration of water quality from any human-caused source or actions. Class A waters are to be protected for their use for recreational purposes and aesthetic enjoyment.

Receiving waters with an inland classification of Class 1 or a marine classification of Class AA are assigned the maximum value of points because they are the most strictly protected. Receiving waters with an inland classification of Class 2 or a marine classification of Class A are assigned the minimum value of points because they are not as protected.

The points applied to Receiving Water Classification are as follows:

<u>Criteria</u>	<u>Points</u>
Class 1 or Class AA	5
Class 2 or Class A	1

Proximity to Receiving Water

The location of the receiving water in proximity to the erosional area is critical. The receiving water has a greater risk of contamination if the site of erosion is adjacent to or within a short distance to the receiving water. The risk of contamination would also be high if the erosional site is adjacent to storm drain structures that receive and discharge runoff to open water. Therefore, the highest priority and maximum value of points are assigned to these erosional sites.

Discharge of contaminants into an open drainage channel allows for the potential of contaminants to be intercepted or settle within the channel before discharging into open water. Erosional areas where runoff is discharged into open channels are assigned an intermediate point value.

Overland flow of a distance greater than 100 feet has the most potential for storm water runoff to be naturally filtered through infiltration, sediment entrapment and pollutant absorption. Potential contaminants have a much greater chance of settling or being intercepted. This is considered the most desirable runoff flow condition, therefore, these types of erosional sites are assigned the minimum value of points.

The points applied to Proximity to Receiving Water are as follows:

<u>Criteria</u>	<u>Points</u>
Erosion Site Adjacent to Receiving Water or Piped Directly to Receiving Water	6
Erosion Site Runoff Discharges to Open Drainage Channel	3
Erosion Site Runoff Discharges by Overland Flow for a Distance Greater than 100 feet	1

Estimated Erosional Area

Sites with larger erosional areas will have a higher potential for water quality impact due to the larger amounts of sediment and/or pollutants exiting the erosional site during a storm event. Smaller erosional sites will also result in pollutant and sediment transport during a storm event, but the amount of sediment and pollutant will be less significant when compared to a larger site. There is also a higher possibility of the contaminants settling or being entrapped during overland flow when there is a smaller amount of sediment and/or pollutants.

The points applied to Estimated Erosional Area are as follows:

<u>Criteria</u>	<u>Points</u>
More than 1000 square yards	10
600 to 999 square yards	6
300 to 599 square yards	3
100 to 299 square yards	1
0 to 99 square yards	0

Average Annual Rainfall

Sites with higher amounts of rainfall have a higher potential for storm water runoff occurrences. Rainfall varies across Oahu, as the annual rainfall on the island ranges from 20 inches to 280 inches.

Rainfall values are obtained from *Rainfall Atlas of Hawaii 1986, Report R76, Department of Land and Natural Resources*. The threshold for the maximum point value is 60 inches since annual rainfall above 60 inches occur mostly in inaccessible mountainous areas where erosion mitigation projects are unlikely to occur. The remaining rainfall ranges below 60 inches are divided incrementally and assigned point values that decrease proportionately.

The points applied to Average Annual Rainfall are as follows:

<u>Criteria</u>	<u>Points</u>
More than 60 inches annually	3
40 to 59 inches annually	2
20 to 39 inches annually	1
0 to 19 inches annually	0

Soil Type

Soil type is a factor in the amount of storm water runoff leaving a site. The amount of runoff leaving a site decreases when the onsite soil has high percolation potential as is evident with sand. The amount of runoff increases when the onsite soil has low percolation potential as it is with clay. Therefore, the highest priority and maximum point value is assigned to clay soil because runoff is less likely to percolate into the ground. Sand is given the lowest priority and lowest point value because runoff is more likely to percolate.

The points applied to Soil Type are as follows:

<u>Criteria</u>	<u>Points</u>
Clay	3
Silt	2
Rock or Filled Land	1
Sand	0

Site Slope

Site slope is an indicator of the relative time of concentration of surface runoff. Sites with relatively flat slopes have a longer time of concentration, resulting in a higher potential for storm water runoff to be detained or naturally filtered onsite. Sites with steep slopes have a shorter time of concentration and would cause storm water runoff to flow through the site at a faster rate. Steep slopes result in the highest potential for contaminated runoff leaving the site and discharging into receiving waters.

The points applied to Site Slope are as follows:

<u>Criteria</u>	<u>Points</u>
Very Steep (More than 100%)	3
Steep (40% to 100%)	2
Medium (10% to 40%)	1
Flat (0% to 10%)	0

Flood Zone

Erosional areas located within flood zones are more likely to discharge sediment and pollutants into open waters than those not located in a flood zone. The Flood Insurance Rate Map (FIRM) is used to determine where the flood zones are located. The FIRM categories considered to be in a flood zone include Zones A, AE, AO and X500. The categories considered not in a flood zone include Zones X and D.

The points applied to Flood Zone are as follows:

<u>Criteria</u>	<u>Points</u>
Erosion Site Completely in a Flood Zone	3
Erosion Site Partially in a Flood Zone	2
Erosion Site Not in a Flood Zone	0

Program Consideration Criteria

Public Safety

Sites where the severity of erosion is more likely to cause harm to public safety are of concern to the City and are thus included for consideration in the prioritization ranking. Areas where severe erosion is causing the undermining of structures or loss of property in highly-traveled or well-frequented areas pose a “high” concern for public safety. These areas are assigned the maximum value of points. Areas where the severity of erosion is characterized with steep eroding

slopes, but not in close proximity to highly-traveled or well-frequented areas are a cause for “moderate” concern for public safety. Therefore, these areas are assigned an intermediate value. All other erosion sites that do not fall into the previous two criteria are considered as “negligible” concern for public safety and are thus not assigned any point value.

The points applied to Public Safety are as follows:

<u>Criteria</u>	<u>Points</u>
“High” Public Safety Concerns	5
“Moderate” Public Safety Concerns	2
“Negligible” Public Safety Concerns	0

Property Damage/Loss Potential

Sites where the severity of erosion is causing and/or has caused damage or loss to either City or adjacent private properties are another concern that merits consideration in the prioritization ranking. Areas where severe erosion is currently causing the undermining of structures and damage or loss of property are assigned the maximum value of points.

Areas where the erosion is in close proximity to city or private property and has a “high” potential to cause damage or property loss are assigned an intermediate value of points.

All other erosion sites that do not fall into the previous two criteria are considered to have a “negligible” potential for property damage or loss and are thus not assigned any point value.

The points applied to Property Damage/Loss Potential are as follows:

<u>Criteria</u>	<u>Points</u>
Property Damage/Loss Occurred	5
“High” Potential for Property Damage/Loss	2
“Negligible” Potential for Property Damage/Loss	0

CONCLUSION

This prioritization criteria, developed for the City's NPDES Erosion Prone Area Improvements Program, will be used as the basis to score and rank the identified erosional area sites for the implementation of permanent BMP improvements. The criteria used includes both water quality impact and project implementation considerations. Water quality impact includes the following factors: watershed priority, receiving water classification, proximity to receiving water, estimated erosional area, annual rainfall, soil type, site slope, and flood zone. Project implementation considerations includes the following factors: public safety, and property damage/loss potential. The priority scoring is based on the cumulative sum of the point values applied to each component of the criteria formula. The order of the erosional area implementation schedule will be based on the total score from highest to lowest, with the highest scores correlating to the highest need for implementation.