Nonstructural Non-Modeled Activity Pollutant Load Reduction Research – Addendum (Final)

City of San Diego

November 5, 2014

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Attachments

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1. Background

In June 2014, HDR prepared for the City of San Diego (City) the "Nonstructural Non-Modeled Activity Pollutant Load Reduction Research" technical memorandum (memo). The memo presented research findings that may potentially be used to quantify pollutant load reductions as well as the uncertainties associated with those findings.

The memo concluded that each nonstructural strategy may be anticipated to produce a wide range of pollutant load reduction. Factors influencing the results include the level of control the City has over the strategy, and the behavioral constructs that are affected by the outreach campaigns (guilt, social norm, etc.). The range of pollutant load reduction could be as low as around 2% for a minor pollutant that is a partial consequence of a strategy, to as high as 72% for a major pollutant that is entirely the consequence of a behavior that the City has significant control over (i.e. City staff behaviors). These pollutant reductions were *per strategy* and no single strategy was expected to be responsible for all of the pollutants entering the watershed. Each of the corrections to behaviors and implementation of potential strategies will only affect some fraction of the pollutant entering the watershed as there are typically numerous sources of a pollutant. That fraction was not evaluated. The original memo is included as Attachment 1.

2. Average Percent Removal

To streamline the modeling of pollutant load reduction, the City has asked HDR to estimate a generalized average percent removal that can be used for all nonstructural activities and for all pollutants.

The memo presented the pollutant load reductions that may be anticipated from each nonstructural activity as either "High" percent removal or "Low" percent removal. The "High" values represented the pollutant removal that may be anticipated from any strategies with which the City has significant direct control (i.e. city staff are performing the behavior desired). The "Low" value would be anticipated with any strategies associated with only public behavior change.

To determine an appropriate percent removal for the activities, Appendix D – Range of Anticipated Pollutant Reduction for Nonstructural Strategies of the memo was reviewed. Each nonstructural strategy was evaluated to determine if it would be considered City controlled or public education. An additional document was prepared and the activities that were considered to be City controlled and therefore the higher pollutant removal anticipated are highlighted in orange in Attachment 2. The activities highlighted in blue are the public behavior change focused activities and would be anticipated to have lower pollutant removal. The average percent removal of all activities was then calculated for each constituent.

Table 1 presents an example showing two activities and the average percent removal of each constituent. For example, operations and maintenance of roads would be controlled by the City. The previous memo presented both the high and low range of percent removal that may be anticipated. Those values are shown in Table 1. Because this is a City controlled activity, the

higher percent removal could be used and the value used to calculate the average percent pollutant removal is shown with an orange highlight in Table 1. An activity like pet waste pickup would rely more on public education and the lower value could be used (shown in blue highlight). It should be noted that this value does not include any additional factors, such as guilt, that would increase the percent removal that may be anticipated. Activities previously found to have varying benefits that were not previously evaluated are not evaluated herein.

Table 1. Range of Pollutant Load Reduction Effectiveness (%)

Nonstructural Strategy/Pollutant Generating Activity	Description	O&M for public streets, unpaved roads, paved roads, and paved highways.	Pet Waste Pick Up	Average Percent
Bacteria	**Low**	3.6	10.7	**13.3**
	High	15.8	47.5	
Metals	**Low**	10.7	0	**23.8**
	High	47.5	0	
Organics	**Low**	3.6	0	**7.9**
	High	15.8	0	
Sediment	**Low**	10.7	0	**23.8**
	High	47.5	0	
Pesticides	**Low**	0	0	**0**
	High	0	0	
Nutrients	**Low**	10.7	7.1	**27.3**
	High	47.5	31.7	
Oil and Grease	**Low**	0	0	**0**
	High	0	0	
Dissolved Minerals	**Low**	3.6	0	**7.9**
	High	15.8	0	
Trash	**Low**	10.7	0	**23.8**
	High	47.5	0	

3. Results

Using the values as described above (high value for city controlled activities, low value for public activities) for each constituent, the average removals for each of the constituents (bacteria, metals, organics, sediment, pesticides, nutrients, oil and grease, dissolved minerals, and trash) were calculated. The results are presented in Table 2 below.

Table 2. Average Pollutant Removal per Constituent

Description	%
Bacteria	11.7%
Metals	10.2%

Table 2. Average Pollutant Removal per Constituent

Description	%
Organics	7.2%
Sediment	17.9%
Pesticides	9.2%
Nutrients	13.4%
Oil and Grease	4.6%
Dissolved Minerals	6.4%
Trash	10.0%
Average of the averages above	**10.1%**

4. Conclusions

The overall average percent removal for all constituents and all activities is 10.1%. Because the lower public education value used does not consider any of the other behavioral constructs that are affected by the outreach campaigns (guilt, social norm, etc.), this overall percent removal may be lower than what will be observed. When considering the pollutant load removal of all nonstructural activities, 10% may be generally applied.

5. Assumptions and Limitations

The following assumptions and limitations should be taken into account when considering using the values presented.

- The percent removals are not based on specific geographic areas and may not apply equally to all geographic areas. For example, activities with a high degree of City control where they are performed by City employees, these may only apply to areas where City employees act, such as maintenance facilities or public buildings and may represent a fairly small portion of the entire pollutant load to a watershed of a particular pollutant. This geospatial variance is not taken into consideration in the averaging techniques employed.
- If only pollutant removals for activities with low degrees of City control – i.e. those that require public behavior change were to be included, the overall average percent removals would be lower. This assumes that the activities affective public behavior change do not achieve all the constructs necessary to maximize behavior change (Intention, Moral Norm, Attitude, Perceived Behavioral Control, Guilt, Social Norm, Internal Attribution, Problem Awareness).
- If all the constructs necessary to maximize behavior change were successfully achieved throughout the population of the City, then the percent removals would potentially be higher than the average values presented herein.
- The percent reductions are based on a theoretical assessment of the potential reduction that could occur for a specific pollutant within a limited geography should a behavior actually change with respect to the release of that pollutant. Specific field studies are few that have measured changes in pollutant loads as correlated with behavior change.

- The data is more thorough for the measurement of behavior change through the use of survey instruments and observations of random samples through a population to correlate the constructs with changed behavior. The relationship between the behavior change and a measured concentration of a pollutant in runoff is more tenuous and the authors are relying on theoretical relationships between behavior associated with use of certain materials and pollutant releases during the uses of those materials.

Attachment 1

Nonstructural Non-Modeled Activity Pollutant Load Reduction Research Memo

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To: Clem Brown, Karina Danek / City of San Diego

From: Stephanie Shamblin Gray, Richard Haimann

Reviewed By: Scott Lowe

Date: June 2014

Subject: Final - Nonstructural Non-Modeled Activity Pollutant Load Reduction Research

1. Introduction

The City of San Diego (City) seeks to quantify pollutant load reductions from nonstructural strategies that have not been modeled and for which pollutant load reductions have not been quantified. This technical memorandum (memo) presents research findings that may potentially be used to quantify pollutant load reductions. This memo also presents the uncertainties associated with those findings. The research includes available literature that reports studied effectiveness of nonstructural non-modeled Best Management Practice (BMP) activities that fall within the City's minimum Jurisdictional Runoff Management Programs (JURMP).

2. Background

As part of the Comprehensive Load Reduction Plan (CLRP), the City identified several nonstructural BMPs for the Scripps, Tecolote Creek, Chollas Creek, Los Penasquitos, and San Dieguito watersheds. The requirements of the municipal separate storm sewer system (MS4) permit include development of Water Quality Improvement Plans (WQIPs) by the permittees to identify the strategies they will implement to achieve Waste Load Allocations (WLAs) in Total Maximum Daily Load (TMDL) basin plan amendments. The City is leading three WQIPs: Mission Bay, San Dieguito, and Los Penasquitos. A significant part of the WQIPs is to identify the strategies that can be implemented and the pollutant load reductions expected from the implementation of those strategies. As a result, the City has prepared draft Potential Water Quality Improvement Strategies documents (Potential Strategies). The Potential Strategies documents also provide pollutant reduction assumptions for each strategy and the associated water chemistry, physical, and biological benefits achieved from strategy implementation. These use best professional judgment based on literature reviews, practical experience, and stakeholder input. Structural strategies are also evaluated in the Potential Strategies documents, but are not evaluated as part of the scope of this memo.

3. Approach

The nonstructural strategies discussed herein are a combination of the identified BMPs in the City's Potential Strategies documents. The Potential Strategies document prepared for Mission Bay served as the primary list of strategies. Strategies that were identified in the San Dieguito and Los Penasquitos documents, but not in the Mission Bay document were added.

Regarding identification of the pollutants, the Potential Strategies documents were initially reviewed and used as the base of evaluation. The CLRPs and information found in the Center for Watershed Protection's (CWP's) Urban Subwatershed Restoration Manual Series were also reviewed to determine the pollutants that may be affected by each strategy.

The pollutant evaluation focused on the water chemistry benefits and not physical or biological benefits. The pollutants evaluated are as follows:

- Bacteria
- Metals
- Organics
- Sediment
- Pesticides
- Nutrients
- Oil and Grease
- Dissolved Minerals
- Trash

The anticipated reduction of each of these pollutants was evaluated based on literature review, which presented a behavioral modeling approach to determine the effects of education and outreach efforts.

4. Behavior Change, Education, and Identification of Pollutants

A number of the nonstructural strategies identified are activities within Minimum Control Measure (MCM) categories. MCMs include 1) public education and outreach, 2) public participation and involvement, 3) pollution prevention and good housekeeping, 4) illicit discharge detection and elimination, 5) construction site runoff control, and 6) post construction site runoff control.

MCMs 1 through 3, public education and outreach, public participation and involvement, pollution prevention and good housekeeping, are contingent upon education and behavior change. Although some of the strategies listed in the Potential Strategies documents could, upon initial review, belong in the MCM 4 through 6 categories, they have aspects that would include behavior change and have been left in the evaluation for inclusiveness.

The following section discusses the methodology for evaluating the impacts of behavior change, education, and the identification of pollutants.

4.1. Estimating Behavior Change

To determine how behavior change could be estimated, research of meta-analytic studies and pro-environmental behavior was conducted. Meta-analytic studies pool from decades of studies evaluating the behavioral change based on public education and outreach. The most relevant of these studies is "Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour" by Sebastian Bamberg and Guido Moser published in the Journal of Environmental Psychology in 2006. Bamberg and Guido

based their analysis on 57 samples of psycho-social variables and pro-environmental behavior and found that these studies generally view pro-environmental behavior as either:

- motivated by self-interest; or
- Motivated by pro-social interests such as concern for other species or later generations.

Motivations for self-interest behaviors encourage people to seek rewards and avoid punishment. This type of behavior inspires an **attitude**, the **intention** to adopt a behavior, and a perceived behavioral control (**PBC**) based on an estimation of personal ability to perform a behavior.

Motivations for pro-social behaviors are typically associated with conceived **moral** and **social norms**, **internal attribution**, and feelings of **guilt**. Each of these constructs may be viewed as predictors of behavior change, and research indicates that the self-interest and pro-social motives are not exclusive and may be best evaluated combined (Bamberg, 2006).

The constructs noted above have the following definitions:

- **Behavior Change**. The actual adoption of the intended pro-environmental behavior.
- **Intention**. The intention to adopt a pro-environmental behavior.
- **Moral Norm**. The belief that oneself has a moral obligation to adopt a pro-environmental behavior.
- **Attitude**. A positive attitude or disposition towards a pro-environmental behavior.
- **PBC**. Stands for "**Perceived Behavioral Control**." The belief that adopting a pro-environmental behavior is within your power and you have the tools to do so.
- **Guilt**. The feeling that one ought to adopt a pro-environmental behavior and failure to do so includes negative emotions.
- **Social Norm**. The belief that everyone else has adopted a pro-environmental behavior and that to not adopt the same would set you apart.
- **Internal Attribution.** The concept of attribution is used to explain how you make sense of your own pro-environmental behavior and that of others.
- **Problem Awareness**. Awareness that a behavior is a problem and understanding of the consequences of that problem.

The research conducted shows that the constructs described above impact each other to some extent. Studies showed correlations between one type of construct and other behavior constructs. From these studies, researchers were able to hypothesize the potential degree of change one could observe in one behavior construct when another behavior construct was observed to change.

The average impact of the predictors is displayed in a matrix in Table 1. In this matrix, the relative effect of one behavior construct on every other behavior construct is shown. For example, reading across the first row, "Behavior," shows that the "Intention" to undertake a behavior explains 52% of the change in actual behaviors; the adoption of a "Moral Norm" explains 15% of the change in actual behaviors, and so on until "Problem Awareness" (i.e., education) explains 18% of the observed behavior change. As can be seen in Table 1, intention has the largest potential affect on pro-environmental behavior. Of the research reviewed,

attribution had limited correlation to social norm, guilt, PBC, and attitude. It is included here for completeness, but should be used conservatively as a predictor of behavior.

Table 1. Standardized Total Effects (Bamberg, 2006)

Construct	Behavior Change	Intention	Moral Norm	Attitude	PBC	Guilt	Social Norm	Attribution	Problem Awareness
Behavior Change	—	.52	.15	.15	.16	.11	.13	.10	.18
Intention		—	.29	.29	.31	.21	.26	.18	.35
Moral norm			—	—	—	.25	.26	.29	.65
Attitude				—	—	.27	.36	.25	.34
PBC					—	.19	.25	.08	.19
Guilt						—	.32	.22	.63
Social norm							—	.23	.40
Internal Attribution								—	.43
Problem Awareness									—

What the public education and outreach type of activities generally control is Problem Awareness. Problem Awareness then can cause some change in attribution, social norm, guilt, PBC, attitude, or moral norm. These behavioral constructs can then affect intention. Intention then affects behavior change. One must intend to change, before actually changing. In order to intend to change, one must have some context in which to develop the intent to change: feel guilty, want to fit into a new norm, change one's general attitude toward the importance of the behavior. In order to intend to change, one must also believe that one can change (PBC) and that one's change matters (internal attribution).

Figure 1 presents graphically the relationships between the constructs and applies the correlation values from Table 1. This can be called a meta-analytical structural equation model based on the pooled random-effects correlations. The figure represents the effects on each predictor as influenced by each independent variable.

Public education and outreach strategies affect problem awareness most. Although the model shows correlations in constructs and is not necessarily causative, we can estimate that our strategies would achieve, on average, an 18% change in behavior. That is, of all the population that receives our messaging, we can expect, on average, that approximately 18% may change behavior in some manner depending on the nature of the message and the change being sought. It is important to note that the residuals in the statistical analysis of the data are in a range that shows fairly weak correlations, suggesting a wide variability in the observed outcomes. This shows that our messaging needs to include promotions of social norms, moral norms, possibly some guilt, and persuasion that individuals have the ability to change and that change will make a difference, in order to achieve greater than 18% behavior change. The figure below and the consideration of 18% behavior change both assume that the messaging is consistent and will be heard – that is, the messaging sent out will capture the recipients' attention when competing with other messaging being promoted to capture what is understood to be a fixed amount of available attention among recipients.

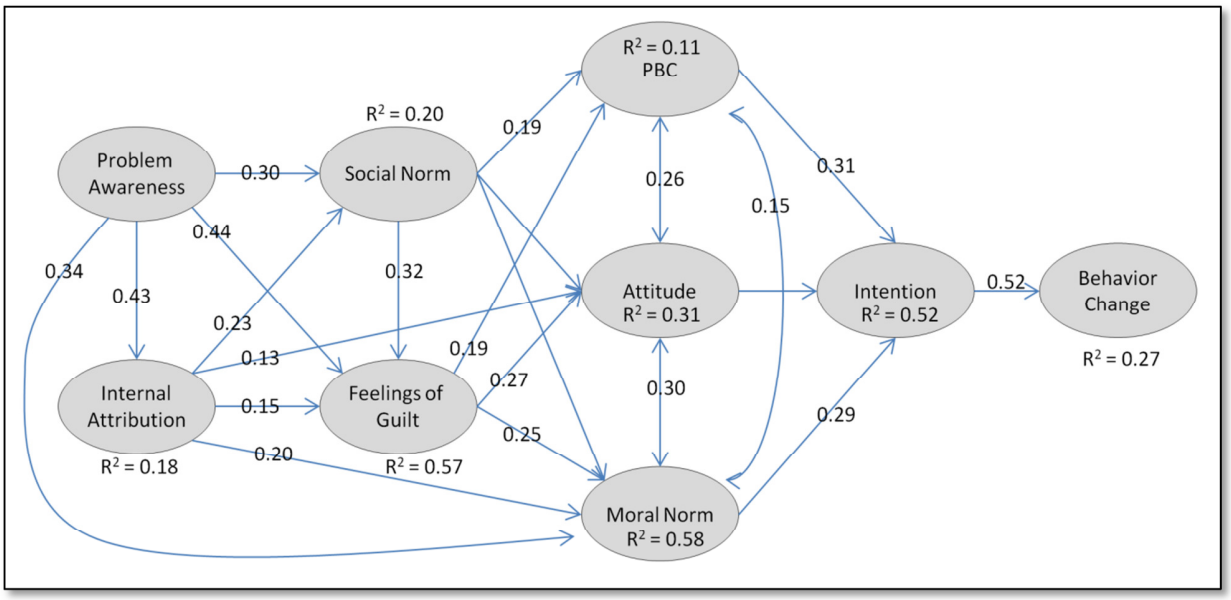

Figure 1. Results of Meta Analytic Structural Equation Modeling. Single headed arrows = standardized path coefficients. Double headed arrows = correlations. R^2 = explained variance. (Bamberg, 2006)

The meta-analysis provides a comprehensive model to evaluate behaviors. To test how closely this would replicate public education regarding stormwater BMP adoption, a report prepared in 2013 for the University of Maryland's (UMD's) Center for Agricultural & Natural Resource Policy titled "Adoption of Household Stormwater Best Management Practices" was reviewed. The report summarizes the findings of a household survey conducted in 2012 by the UMD regarding the adoption of stormwater BMPs on residential properties. The study evaluated the adoption and awareness of the following four BMPs: low fertilizer lawn care, conservation landscaping, rain barrels, and rain gardens. For the survey, letters were sent to 10,000 households in Howard County, Maryland that resulted in 1,716 completed questionnaires. The results of the study are presented in Table 2.

Table 2. Results of the 2013 UMD Study

Practice Type	**Percentage of Households**		
(n = 1,716 Households)	Aware **and** Adopted	Aware But Not Adopted	Not Aware
Low Fertilizer Lawn Care	23.4%	56.0%	20.6%
Conservation Landscape	10.2%	50.0%	39.8%
Rain Barrel	7.6%	83.5%	8.9%
Rain Garden	2.5%	42.4%	55.0%

Note: Results based on self-reporting by residents.

If we evaluate the results of the study to consider only awareness, the average percentage of awareness with adoption versus awareness without adoption was evaluated and found to be 15% (see Table 3). Evaluating further, the rain garden BMP has both the highest percentage of "Not Aware" and the lowest percentage of "Aware But Not Adopted." This may indicate that only

residents particularly interested in the practice are using rain gardens and are not part of significant outreach efforts, and therefore this practice may not be an appropriate indicator. Considering the average of awareness-to-adoption of 15% and the higher adoption rate of a more common and easier to institute practice such as low-fertilizer lawn care of 29%, using 18% appears reasonable as a predictor for estimating the correlation of adoption following awareness for stormwater BMPs.

Table 3. Evaluation of UMD Study Considering Only Awareness of Each Practice

Practice Type	Total Households			Percentage of Households	
Description	Total Households Aware and Adopted	Total Households Aware But Not Adopted	Total Households Aware	Percent of Households Aware and Adopted	Percent of Households Aware But Not Adopted
Low Fertilizer Lawn Care	402	961	1,363	29%	71%
Conservation Landscape	175	858	1,033	17%	83%
Rain Barrel	130	1,433	1,563	8%	92%
Rain Garden	43	728	770	6%	94%
Averages	187	995	1,182	15%	85%

Note: Table prepared using the values in the UMD study when "Not Aware" is removed from the study results.

4.2. Estimating Education and Outreach Efforts

The predictors presented in Table 1 can be used to determine the effectiveness of the public education or outreach efforts. As discussed previously, 18% of behavioral change is observed from becoming aware of a problem, presumably through education. This correlation will be used herein to calculate the effect of education. All outreach efforts are assumed to begin with education, and the effect of outreach campaigns that include multiple components, such as implications of a social norm, may be anticipated to increase the effectiveness of the campaign. Table 4 shows the standardized total effect of the combinations and the calculations used to obtain the range of results. As an example, an outreach campaign that implies a social norm that "everyone picks up after their pet" may be anticipated to result in an effectiveness of between 18% and 29% as presented in Table 4. The lower range implies the additional component provides no additional impact and the higher range implies maximum impact.

Table 4. Estimated Public Education or Outreach Effectiveness

Outreach Method	Calculation	Standardized Total Effect
Education (i.e., Problem Awareness)	1 – (1 – .18)	.18
Education and Attribution	1 – ((1 – .18) x (1 – .10))	.18 to .26
Education and Guilt	1 – ((1 – .18) x (1 – .11))	.18 to .27

Outreach Method	Calculation	Standardized Total Effect
Education and Social Norm	1 – ((1 – .18) x (1 – .13))	.18 to .29
Education and Attitude	1 – ((1 – .18) x (1 – .15))	.18 to .30
Education and Moral Norm	1 – ((1 – .18) x (1 – .15))	.18 to .30
Education and PBC	1 – ((1 – .18) x (1 – .16))	.18 to .31
Education and Intention	1 – ((1 – .18) x (1 – .52))	.18 to .61

4.3. Identification of Polluting Behavior and Related Pollutants

The assumption in reviewing the nonstructural strategies is to identify the pollutants that may be affected as a result of the strategy. The Potential Strategies documents considered the pollutants associated with each strategy for each watershed and this report will use those findings. For example, "Implement pet waste program may include installation and maintenance of pet waste bag dispensers and trash bins, signage and education, physical removal of pet waste, or enforcement" will consider the pollutants that would be contributed from the pet waste wash off if it was not collected, namely, bacteria and nutrients. Likewise, "Review policies and procedures to ensure discharges from swimming pools meet permit requirements" will consider the dissolved minerals (i.e., chlorine) that may be released from a pool discharge and "Amend BMP Design Manual for animal-related facilities" will consider nutrients, bacteria, sediment, and pesticide that may be released from a facility such as an animal shelter if proper BMPs are not followed. See Appendix A for a list of the nonstructural strategies and associated pollutants.

5. Estimating Behavioral Impact of Pollutant Category Per Nonstructural Strategy

To consider the effect of implementing the nonstructural strategies, each pollutant associated with the strategy needed to be considered. The Potential Strategies documents identified the pollutant reductions of each strategy as either primary, secondary, or not addressed. The additional literature reviewed, particularly CWP's Urban Subwatershed Restoration Manuals, identifies pollutant contributions from various polluting behaviors as major, moderate, or minor. Many of the polluting behaviors are similar to what the Potential Strategies are attempting to address. For example, CWP Manual 8 considers bacteria a major pollutant contribution regarding pet waste wash-off, while the Potential Strategies documents consider pet waste pick up a primary pollutant removal benefit for bacteria.

The Potential Strategies information was reviewed and values were assigned to each pollutant for each strategy. It was determined to begin with three levels of pollutant removal in the calculations for each strategy. This is similar to how the pollutant contributions from polluting behaviors were identified in the CWP documents. The Stormwater Manager's Resources Center offers BMP Fact Sheets on various structural BMPs. These fact sheets were reviewed to determine the various ranges of possible pollutant removal to begin the calculation for the nonstructural strategies. No pollutant was considered to be removed 100% in any of the strategies, so the highest value considered was 90%. Thus, reasonable values for major, moderate, and minor removal are 90%, 60%, and 30%, respectively. The primary pollutants identified were assigned a pollutant reduction factor of 90%. The secondary pollutants were

assigned a value of either 60% or 30% based on additional literature review of the CWP Manuals and engineering judgment. Pollutants identified as not being reduced by that strategy or behavior was assigned a value of 0%. See Appendix B for a list of nonstructural strategies and the assigned pollutant removal factors.

Next, the effect of the nonstructural strategy on the pollutant needed to be considered. For each strategy we categorize the pollutants as *entirely*, *largely*, or *partially* the consequence of the polluting behavior the strategy addresses. This is based primarily on the amount of control a strategy has on behavior. A discussion of the differences with examples follows.

Some pollutant consequences would be *entirely* the result of a potential nonstructural strategy. For example, water from swimming pools is discharged or it is not discharged. If the water is not discharged, the pollutants from that activity are assumed to not be released to the environment. Some nonstructural strategies would *largely* affect their pollutant consequences by taking steps that reduce the associated pollutants. For example, the strategy addressing the correct application and use of pesticides and fertilizers on commercial, industrial, and municipal property would be expected to largely result in the reduction of pollutants associated with this behavior or activity. This would be different than strategies that are binary, such as the swimming pool example because the polluting behavior does not cease completely, but is modified to reduce pollutants. Nonstructural strategies that offer only some mitigation will *partially* affect the pollutant consequences. Outreach for over-watering would be a good example of a partial effect because watering will still occur, as well as natural precipitation. The difference between *largely* and *partially* is primarily the level of control available.

To determine how the pollutant consequences would affect each of the pollutants in each of the nonstructural strategies, a value needed to be assigned. The values for *entirely*, *largely*, and *partially* were assigned 100%, 66%, and 33%, respectively. Considering the pollutant removal potential and the pollutant consequences together results in the matrix presented in Table 5.

Table 5. Matrix of Pollutant Removal Potential and Pollutant Consequence (% Reduction)

Pollutant Removal Type	Entirely (100%)	Largely (66%)	Partially (33%)
Major (90%)	90.0%	59.4%	29.7%
Moderate (60%)	60.0%	39.6%	19.8%
Minor (30%)	30.0%	19.8%	9.9%

Each of the City's nonstructural strategies were assigned a pollutant behavior consequence of either entirely, largely, or partially based on the engineering judgment from a review of the City provided description of each. See Appendix C for the results of the pollutant behavior consequences on each of the nonstructural strategies. There is no way to guarantee that a behavior would result in a consequence entirely, largely, or partially controlled, but this assignment of consequences will help identify the range of pollutant reduction that may be anticipated.

6. Sample Evaluation

As shown in Table 4, the correlation between behavior change and education is 18%. For the purposes of this study, that will be the minimum impact that would be anticipated from an outreach campaign. Table 6 presents a matrix of the impacts of education on the pollutant removal and behavior consequences.

Table 6. Matrix of Impacts from Education (% Removal)

Pollutant Removal Type	Entirely (100%)	Largely (66%)	Partially (33%)	Factor	Entirely (100%)	Largely (66%)	Partially (33%)
Major (90%)	90.0%	59.4%	29.7%		16.2%	10.7%	5.3%
Moderate (60%)	60.0%	39.6%	19.8%	x .18	10.8%	7.1%	3.6%
Minor (30%)	30.0%	19.8%	9.9%		5.4%	3.6%	1.8%

To understand the effects of these impacts, it is helpful to consider a few examples. Table 7 presents three example strategies from the Potential Strategies documents prepared by the City. The titles of each strategy have been shortened for simplicity, but the pollutants are as indicated by the City.

Table 7. Pollutants Identified in Potential Strategies

Nonstructural Strategy	Bacteria	Metals	Organics	Sediment	Pesticides	Nutrients	Oil and Grease	Dissolved Minerals	Trash
Procedures for Swimming Pool Discharge	○	○	○	○	○	○	○	●	○
Pet Waste Pick Up	●	○	○	○	○	◗	○	○	○
Outreach for Over Irrigation	◗	◗	◗	◗	●	●	◗	◗	◗
Per the Potential Strategies documents, pollutant reductions identify the primary (●) pollutants, the secondary (◗) pollutants, and the pollutants that the strategy does not address (○).									

The pollutant indicators were then transformed into values based on the removal potential. As discussed previously, pollutants were classified as major, moderate, and minor removal at 90%, 60%, and 30%, respectively. These are applied to the three example strategies above to generate Table 8.

Table 8. Pollutant Assigned Values (% Removal)

Nonstructural Strategy	Bacteria	Metals	Organics	Sediment	Pesticides	Nutrients	Oil and Grease	Dissolved Minerals	Trash
Procedures for Swimming Pool	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	90.0%	0.0%

Nonstructural Strategy	Bacteria	Metals	Organics	Sediment	Pesticides	Nutrients	Oil and Grease	Dissolved Minerals	Trash
Discharge									
Pet Waste Pick Up	90.0%	0.0%	0.0%	0.0%	0.0%	60.0%	0.0%	0.0%	0.0%
Outreach for Over Irrigation	30.0%	30.0%	30.0%	30.0%	90.0%	90.0%	30.0%	30.0%	30.0%

Nonstructural strategies were then determined to be entirely, largely, or partially responsible for the pollutant consequence. The appropriate factor from Table 5 was used to develop the results of the pollutant consequences presented in Table 9 for the examples. See Appendix C for a complete listing for all strategies.

Table 9. Results of Pollutant Consequence (% Removal)

Nonstructural Strategy	Bacteria	Metals	Organics	Sediment	Pesticides	Nutrients	Oil and Grease	Dissolved Minerals	Trash	Consequence
Procedures for Swimming Pool Discharge	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	90.0%	0.0%	Entirely
Pet Waste Pick Up	59.4%	0.0%	0.0%	0.0%	0.0%	39.6%	0.0%	0.0%	0.0%	Largely
Outreach for Over Irrigation	9.9%	9.9%	9.9%	9.9%	29.7%	29.7%	9.9%	9.9%	9.9%	Partially

The pollutant consequences demonstrate what may be addressed in the nonstructural strategies if 100% control of behavior was possible, but do not consider the correlation between behavior change and education. To determine the affects of education and behavior change we assume that each nonstructural strategy's pollutant consequence will be 18% effective as presented in Table 10.

Table 10. Results of Education Impacts (% Removal)

Nonstructural Strategy	Bacteria	Metals	Organics	Sediment	Pesticides	Nutrients	Oil and Grease	Dissolved Minerals	Trash	Consequence
Procedures for Swimming Pool Discharge	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	16.2%	0.0%	Entirely
Pet Waste Pick Up	10.7%	0.0%	0.0%	0.0%	0.0%	7.1%	0.0%	0.0%	0.0%	Largely
Outreach for Over Irrigation	1.8%	1.8%	1.8%	1.8%	5.3%	5.3%	1.8%	1.8%	1.8%	Partially

Other variations will affect the percent effectiveness of each nonstructural strategy. As shown in Table 4, other constructs, such as guilt or implication of a social norm, may increase the range of percent effectiveness up to 61%.

It is important to remember that the behavior being corrected is likely not responsible for 100% of the pollutants entering the watershed. Of all of the pollutant sources entering the watershed, the behavior being corrected is responsible for only some fraction of those sources. This paper does not estimate the fraction of the sources coming from the behavior being corrected.

For example, there are hundreds of potential sources of a pollutant, such as bacteria, into the receiving water. If a pet waste cleanup program and behavior modification program keeps people from leaving pet waste on the streets, the bacteria from pet waste will be reduced. However, this will not reduce the bacteria from other sources.

The percent effectiveness will increase significantly if the nonstructural strategy is controlled by the City and could be as high as 100%. However, various factors such as accidents and variations in locations and staff may decrease effectiveness. To be conservative, this control is evaluated herein with a percent effectiveness of 80%. A matrix is presented in Table 11.

Table 11. Matrix of Impacts from Municipal Operational Changes (% Removal)

Pollutant Removal Type	Entirely (100%)	Largely (66%)	Partially (33%)	Factor	Entirely (100%)	Largely (66%)	Partially (33%)
Major (90%)	90.0%	59.4%	29.7%	x .80	72.0%	47.5%	23.8%
Moderate (60%)	60.0%	39.6%	19.8%		48.0%	31.7%	15.8%
Minor (30%)	30.0%	19.8%	9.9%		24.0%	15.8%	7.9%

This identifies the high range of effectiveness that may be anticipated from each of the nonstructural strategies. See Table 12 for the example strategies from before. This is used to demonstrate the highest range that may be anticipated for all activities, even activities such as pet waste pickup where there will be limited City control.

Table 12. Results of Municipal Change Impacts (% Removal)

Nonstructural Strategy	Bacteria	Metals	Organics	Sediment	Pesticides	Nutrients	Oil and Grease	Dissolved Minerals	Trash	Consequence
Procedures for Swimming Pool Discharge	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	72.0%	0.0%	Entirely
Pet Waste Pick Up	47.5%	0.0%	0.0%	0.0%	0.0%	31.7%	0.0%	0.0%	0.0%	Largely
Outreach for Over Irrigation	7.9%	7.9%	7.9%	7.9%	23.8%	23.8%	7.9%	7.9%	7.9%	Partially

Table 13 presents the range of removal effectiveness for each nonstructural strategy's pollutants. See Appendix D for the range of anticipated pollutant reduction for all of the nonstructural strategies.

Table 13. Range of Pollutant Load Reduction Effectiveness (% Removal)

Nonstructural Strategy	Bacteria		Metals		Organics		Sediment		Pesticides		Nutrients		Oil and Grease		Dissolved Minerals		Trash	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Procedures for Swimming Pool Discharge	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.2	72.0	0.0	0.0
Pet Waste Pick Up	10.7	47.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.1	31.7	0.0	0.0	0.0	0.0	0.0	0.0
Outreach for Over Irrigation	1.8	7.9	1.8	7.9	1.8	7.9	1.8	7.9	5.3	23.8	5.3	23.8	1.8	7.9	1.8	7.9	1.8	7.9

Note: Values shown are percentages.

7. Using These Results for Modeling Reductions

To quantify the reductions that may be expected from each strategy, use the following guidelines:

- Review Appendix D to determine the low (changes from education) and the high (changes under City control) percent reduction that may be anticipated for each strategy.
  - The "Low" values should be used with any strategies based primarily on education efforts.
  - The "High" values should be used with any strategies with which the City has significant direct control (i.e. city staff are performing the behavior desired).
  - A value in-between the two could be used if it is determined that the strategy would have other behavioral constructs that would improve public participation (guilt, social norm, etc.).
- Determine the pollutant load of each pollutant for each strategy. Note that each strategy affects some part of the pollutant load to the catchment. For example, bacteria enters the catchment from many sources other than only from pet waste, and behavioral change to reduced pet waste would be anticipated to only reduce that particular source of bacteria as shown in the tables.
- Multiply the determined percent reduction by the pollutant load to estimate the modified pollutant load.

8. Conclusions and Recommendations

Each nonstructural strategy may be anticipated to produce a wide range of pollutant load reduction. Factors influencing the results include the level of control the City has over the strategy, and the constructs that are affected by the outreach campaigns (guilt, social norm,

etc.). The range of pollutant load reduction could be as low as around 2% for a minor pollutant that is a partial consequence of a strategy, to as high as 72% for a major pollutant that is entirely the consequence of a behavior that the City has significant control over (i.e. City staff behaviors). It should be reiterated that these pollutant reductions are *per strategy* and that no single strategy is expected to be responsible for all of the pollutants entering the watershed. Each of the corrections to behaviors and implementation of potential strategies will only affect some fraction of the pollutant entering the watershed as there are typically numerous sources of a pollutant. That fraction is not evaluated herein.

For public education and outreach efforts, it is recommended to assume the lower pollutant load reduction presented in Appendix D will occur. For City efforts involving mandates on pollution prevention that provide additional control over the pollutants, the higher pollutant reduction may be assumed. If a pattern of lack of enforcement occurs, the assumed value of pollutant reduction will need to be lowered.

9. References

Bamberg, S. and Moser, G. (2007). *Twenty years after Hines, Hungerford and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour.* Journal of Environmental Psychology, 27, 14–25.

Center for Watershed Protection. *Municipal Pollution Prevention / Good Housekeeping Practices: Version 1.0. Urban Watershed Restoration Manual Series*. September 2008.

Center for Watershed Protection. *Pollution Source Control Practices: Version 2.0. Urban Watershed Restoration Manual Series*. September 2005.

City of San Diego. *Los Penasquitos Watershed Management Area Water Quality Improvement Plan – Draft*. April 2014.

City of San Diego. *Los Penasquitos Watershed Management Area Water Quality Improvement Plan: Potential Water Quality Improvement Strategies – Draft*. April 2014.

City of San Diego. *Mission Bay Watershed Management Area Water Quality Improvement Plan – Draft*. April 2014.

City of San Diego. *Mission Bay Watershed Management Area Water Quality Improvement Plan: Potential Water Quality Improvement Strategies – Draft*. April 2014.

City of San Diego. *San Dieguito River Watershed Management Area Water Quality Improvement Plan – Draft*. April 2014.

City of San Diego. *San Dieguito River Watershed Management Area Water Quality Improvement Plan: Potential Water Quality Improvement Strategies – Draft*. April 2014.

Stormwater Manager's Resources Center. BMP Fact Sheets. Available at www.stormwatercenter.net. Accessed April 24, 2014.

University of Maryland. Center for Agricultural & Natural Resource Policy. *Adoption of Household Stormwater Best Management Practices*. 2013.

10. Resources

Armitage, C. & Conner. M (2001). *Efficacy of the theory of planned behaviour: A meta-analytic review.* British Journal of Social Psychology. 40, 471–499.

Methods for Quantifying Mercury and PCB Loads Reduced from Urban Runoff: Assessing municipal stormwater progress towards TMDL Wasteload allocations through control measure implementation. BASMAA technical draft. September 2010.

City of San Diego. *San Diego Bay, Chollas Watershed CLRP*. 2013Coffman, L. S. *Reducing Nonpoint Pollution with Public Outreach/Education Programs*. Maryland Department of Environmental Resources.

Hayden, D. and Deng, F. (2013). *The Science of Goal Setting: A Practitioner's Guide to Goal Setting in the Social Marketing of Conservation*. Social Marketing Quarterly, 2013, 19:13.

Hines, J. M., Hungerford, H. R., & Tomera, A. N. (1986/87). *Analysis and synthesis of research on responsible environmental behaviour: A meta-analysis*. Journal of Environmental Education, 18, 1–8.

Nordlund, A. M, & Garvill, J. (2003). *Effects of values, problem awareness, and personal norm on willingness to reduce personal car use.* Journal of Environmental Psychology, 23, 339–347.

United States Environmental Protection Agency. *Pollution Prevention / Good Housekeeping Minimum Control Measure*. January 2000. Factsheet 2.8.

United States Environmental Protection Agency. *Public Participation / Involvement Minimum Control Measure*. January 2000. Factsheet 2.4.Weiner (2000). *Intrapersonal and interpersonal theories of motivation from an attributional perspective*. Educational Psychology Review. 12, 1–14.

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ID	NONSTRUCTURAL STRATEGY	Reference[1]	Water Chemistry Benefit									Physical and Biological Benefit			
			Bacteria[2]	Metals	Organics	Sediment	Pesticides	Nutrients	Oil and Grease	Dissolved Solids	Trash	Flow Rate	Volume Reduction	Habitat/ Wildlife	Aquatic Life
JRMP Strategies															
Development Planning															
	All Development Projects														
A	For all development projects, administer a program to ensure implementation of source control BMPs to minimize pollutant generation at each project and implement low-impact development (LID) BMPs to maintain or restore hydrology of the area, where applicable and feasible.	MS4 Permit Section E.3.a	*Not Evaluated Herein*												
B	Amend municipal code and ordinances, including zoning ordinances, to facilitate and encourage LID opportunities.	CLRP Strategy, Enhancement	*Not Evaluated Herein*												
C	Train staff on LID regulatory changes and LID Design Manual.	CLRP Strategy, Enhancement													
	Priority Development Projects (PDPs)														
D	For PDPs, administer a program requiring implementation of on-site structural BMPs to control pollutants and manage hydromodification. Includes confirmation of design, construction, and maintenance of PDP structural BMPs.	MS4 Permit Sections E.3.b, E.3.c, & E.3.e	*Not Evaluated Herein*												
E	Update BMP Design Manual procedures to determine nature and extent of storm water requirements applicable to development projects and to identify conditions of concern for selecting, designing, and maintaining appropriate structural BMPs.	MS4 Permit Section E.3.d	*Not Evaluated Herein.*												
	1. Amend BMP Design Manual for trash areas. Require full four-sided enclosure, siting away from storm drains and cover. Consider the retrofit requirement.	CLRP Strategy, MS4 Permit Section E.3.d	●	◗	○	○	○	○	◗	○	●	○	○	◗	◗
	2. Amend BMP Design Manual for animal-related facilities.	CLRP Strategy, MS4 Permit Section E.3.d	●	○	○	●	●	●	○	○	○	◗	◗	○	◗
	3. Amend BMP Design Manual for nurseries and garden centers.	CLRP Strategy, MS4 Permit Section E.3.d	◗	○	●	●	●	●	○	○	○	◗	◗	○	◗
	4. Amend BMP Design Manual for auto-related uses.	CLRP Strategy, MS4 Permit Section E.3.d	◗	◗	◗	◗	○	○	●	○	●	◗	◗	○	◗

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			Bacteria[2]	Metals	Organics	Sediment	Pesticides	Nutrients	Oil and Grease	Dissolved Solids	Trash	Flow Rate	Volume Reduction	Habitat/ Wildlife	Aquatic Life
F	Administer an alternative compliance program to on-site structural BMP implementation (includes identifying Watershed Management Area Analysis [WMAA] candidate projects).	MS4 Permit Section E.3.c(3)	*Not Evaluated Herein*												
	1. Develop a mitigation policy for public and private development projects that links development with mitigation within the same watershed.	WQIP[3] Input, Enhancement													
	1. Create an In-Lieu Fee	WQIP Input, MS4 Permit Section E.3.c(3)													
Construction Management															
G	Administer a program to oversee implementation of BMPs during the construction phase of land development. Includes inspections at an appropriate frequency and enforcement of requirements.	MS4 Permit Sections E.4.c & E.4.d(1)	○	○	○	●	○	○	◗	○	◗	●	●	○	●
Existing Development															
	Commercial, Industrial, Municipal, and Residential Facilities and Areas														
H	Administer a program to require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types, and PGAs, as appropriate. Includes inspecting existing development at appropriate frequencies and using appropriate methods.	MS4 Permit Section E.5.c	*Not Evaluated Herein*												
	1. Update minimum BMPs for existing residential, commercial, and industrial development and enforce them.	CLRP Strategy, MS4 Permit Section E.5.b	*Not Evaluated Herein*												
	2. Design, implement, and enforce property- and PGA-based inspections.	CLRP Strategy, MS4 Permit Section E.5.c	◗	◗	◗	◗	◗	◗	◗	◗	◗	◗	◗	◗	◗
	1. Review policies and procedures to ensure discharges from swimming pools meet permit requirements.	WQIP Input, MS4 Permit Section E.2.a and E.5.b	○	○	○	○	○	○	○	●	○	○	◗	○	◗
	3. Develop a self-reporting inspection option for select industrial and commercial facilities.	WQIP Input, Enhancement	◗	◗	◗	◗	◗	◗	◗	◗	◗	◗	◗	◗	◗

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I	Implement pet waste program. May include installation and maintenance of pet waste bag dispensers and trash bins, signage and education, physical removal of pet waste, or enforcement.	WQIP Input, Enhancement	●	○	○	○	○	◗	○	○	○	○	○	○	○
J	Promote and encourage implementing designated BMPs at residential areas.	MS4 Permit Section E.5.b(2)	◗	◗	◗	◗	●	●	◗	◗	◗	◗	◗	◗	◗
	1. Expand residential BMP (irrigation, rainwater harvesting, and turf conversion) rebate programs to multi-family housing in target areas.	CLRP Strategy, Enhancement	◗	◗	◗	◗	●	●	◗	◗	◗	◗	◗	◗	◗
	2. Residential BMP: Rain Barrel	CLRP Strategy, Enhancement	◗	◗	◗	◗	●	●	◗	◗	◗	◗	◗	○	◗
	3. Residential BMP: Irrigation Control (Turf Conversion)	CLRP Strategy, Enhancement	◗	◗	◗	◗	●	●	◗	◗	◗	◗	◗	○	◗
	4. Residential BMP: Downspout Disconnect	CLRP Strategy, Enhancement	◗	◗	◗	◗	●	●	◗	◗	◗	◗	◗	○	◗
	5. Provide financial incentives to property owners to convert landscaping to site-specific native plants.	WQIP Input, Enhancement	○	○	◗	○	◗	◗	○	◗	○	●	●	◗	◗
K	Develop pilot project to identify and carry out site disconnections in targeted areas.	CLRP Strategy, Enhancement	◗	◗	◗	◗	○	◗	○	◗	○	●	◗	○	◗
L	Identify and reduce incidents of power washing discharges from nonresidential sites.	CLRP Strategy, Enhancement	◗	◗	◗	◗	◗	◗	◗	◗	◗	◗	◗	◗	◗
L.1	Promote and encourage implementation of designated BMPs in nonresidential areas.	WQIP Input, MS4 Permit Section E.5.b(2) and E.7.a	*Not Evaluated Herein*												
M	Proactively monitor for erosion, and complete minor repair and slope stabilization on municipal property.	CLRP Strategy, Enhancement	◗	○	○	●	○	◗	○	◗	○	○	○	◗	◗
	MS4 Infrastructure														
N	Implement operation and maintenance activities (inspection and cleaning) for MS4 and related structures (catch basins, storm drain inlets, detention basins, etc.).	MS4 Permit Section E.5.b(1)	*Not Evaluated Herein*												
	1. Optimize catch basin cleaning to maximize pollutant removal.	CLRP Strategy, Enhancement	◗	●	○	●	○	○	○	○	●	○	○	○	◗

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			Bacteria[2]	Metals	Organics	Sediment	Pesticides	Nutrients	Oil and Grease	Dissolved Solids	Trash	Flow Rate	Volume Reduction	Habitat/ Wildlife	Aquatic Life
	2. Proactively repair and replace MS4 components to provide source control from MS4 infrastructure.	CLRP Strategy, Enhancement	◗	●	○	●	○	◗	○	○	○	○	○	○	◗
	3. Increase frequency of open-channel cleaning and scour pond repair to reduce pollutant loads.	CLRP Strategy, Enhancement	◗	●	○	●	○	◗	○	○	○	○	○	○	◗
O	Implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers.	MS4 Permit Section E.5.b(1)(c)(iv)	◗	○	○	●	◗	◗	○	○	○	○	○	○	◗
	1. Identify sewer leaks and areas for sewer pipe replacement prioritization.	CLRP Strategy, MS4 Permit Section E.5.b(1)(c)(iv)	◗	○	○	●	◗	◗	○	○	○	○	○	○	◗
	Roads, Streets, and Parking Lots														
P	Implement operation and maintenance activities for public streets, unpaved roads, paved roads, and paved highways.	MS4 Permit Section E.5.b	◗	●	◗	●	○	●	○	◗	●	○	○	○	◗
	1. Enhance street sweeping through equipment replacement and route optimization.	CLRP Strategy, MS4 Permit Section E.5.b	◗	●	◗	●	○	●	○	◗	●	○	○	○	◗
	2. Initiate sweeping of medians on high-volume arterial roadways.	CLRP Strategy, MS4 Permit Section E.5.b	◗	●	◗	●	○	●	○	◗	●	○	○	○	◗
	3. Increase maintenance on access roads and trails.	WQIP Input, Enhancement	○	○	○	●	○	○	○	○	◗	○	○	○	◗
Q	Require sweeping and maintenance of private roads and parking lots in targeted areas.	CLRP Strategy, Enhancement	◗	●	◗	●	○	●	○	◗	●	○	○	○	◗
R	Identify sites for pilot study to test Permeable Friction Course (PFC), which is a porous asphalt that overlays impermeable asphalt.	WQIP Input, Enhancement	◗	●	◗	●	●	◗	◗	◗	◗	●	●	○	◗
	Pesticide, Herbicides, and Fertilizer Program														

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S	Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education, permits, and certifications.	MS4 Permit Section E.5.b(1)(d)	○	○	●	○	●	●	○	○	○	○	○	◗	●
	Retrofit and Rehabilitation in Areas of Existing Development														
T	Develop and implement a strategy to identify candidate areas of existing development appropriate for retrofitting projects and facilitate the implementation of such projects.	WQIP Input, MS4 Permit Section E.5.e(1)	*Not Evaluated Herein*												
U	Develop and implement a strategy to identify candidate areas of existing development for stream, channel, or habitat rehabilitation projects and facilitate implementation of such projects.	WQIP Input, MS4 Permit Section E.5.e(2)	*Not Evaluated Herein*												
IDDE Program															
V	Implement IDDE Program per the JRMPs. Requirements include maintaining an MS4 map, using municipal personnel and contractors to identify and report illicit discharges, maintaining a hotline for publicly reporting illicit discharges, monitoring MS4 outfalls, and investigating and addressing any illicit discharges.	MS4 Permit Section E.2	*Not Evaluated Herein*												
Public Education and Participation															
W	Implement a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce pollutant discharge in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences.	MS4 Permit Section E.7	*Not Evaluated Herein*												
	1. Expand outreach to homeowners' association (HOA) common lands and HOA rebates.	CLRP Strategy, MS4 Permit Section E.7.a	◗	◗	◗	◗	●	●	◗	◗	◗	◗	◗	○	◗

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	2. Develop an outreach and training program for property managers responsible for HOAs and maintenance districts.	CLRP Strategy, MS4 Permit Section E.7.a	◗	◗	◗	◗	●	●	◗	◗	◗	◗	◗	○	◗
	3. Conduct trash cleanups through community-based organizations involving target audiences.	CLRP Strategy, Enhancement	◗	◗	◗	○	◗	○	◗	○	●	○	○	●	◗
	4. Target human behavior in parks and other public areas including trash reduction or other high-impact behavior to habitat, wildlife, and water quality.	WQIP Input, MS4 Permit Section E.7.a	*Not Evaluated Herein*												
	5. Improve consistency and content of websites to highlight enforceable conditions and reporting methods.	CLRP Strategy, MS4 Permit Section E.7.a	◗	◗	◗	◗	◗	◗	◗	◗	◗	◗	◗	◗	◗
	6. Contribute to San Diego County-led effort through regional education group for outreach, education, and policy measures for the equestrian community and property owners.	CLRP Strategy, MS4 Permit Section E.7.a	●	○	○	◗	○	◗	○	○	○	○	○	○	◗
	1. Develop a targeted education and outreach program for homeowners adjacent to or with tributaries or streams within their property.	WQIP Input, Enhancement	●	◗	◗	●	◗	◗	◗	◗	◗	◗	◗	●	◗
	1. Develop a targeted education and outreach program for homeowners with orchards or other agricultural land uses on their property.	WQIP Input, Enhancement	◗	○	○	●	●	●	○	◗	◗	◗	◗	○	◗
	2. Enhance school and recreation-based education and outreach	WQIP Input, MS4 Permit Section E.7.a	*Not Evaluated Herein*												
	3. Develop education and outreach to reduce over-irrigation	WQIP Input, MS4 Permit Section E.7.a	◗	◗	◗	◗	●	●	◗	◗	◗	◗	◗	○	◗
	7. Develop regional training for water-using mobile businesses.	WQIP Input, Enhancement	◗	◗	◗	◗	◗	◗	◗	◗	◗	◗	◗	◗	◗

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X	Enhance education and outreach based on results of effectiveness survey and changing regulatory requirements.	CLRP Strategy, Enhancement	*Not Evaluated Herein*												
Y	Provide technical education and outreach to the development community on the design and implementation requirements of the MS4 Permit and Water Quality Improvement Plan requirements.	WQIP[3] Input, Enhancement	*Not Evaluated Herein*												
Enforcement Response Plan															
Z	Implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Enforcement Response Plan.	MS4 Permit Section E.6	*Not Evaluated Herein*												
	1. Increase enforcement of over-irrigation.	CLRP Strategy, MS4 Permit E.6	◗	◗	◗	◗	●	●	◗	◗	◗	●	●	○	◗
	2. Focus locally on enforcement of water-using mobile businesses.	WQIP Input, MS4 Permit E.6	◗	◗	◗	◗	◗	◗	◗	◗	◗	◗	◗	◗	◗
AA	Increase identification and enforcement of actionable erosion and slope stabilization issues on private property and require stabilization and repair.	CLRP Strategy, Enhancement	◗	○	○	●	○	◗	○	◗	○	○	○	◗	◗
Optional Strategies															
AB	Continue participating in source reduction initiatives.	CLRP Strategy, Enhancement	*Not Evaluated Herein*												
AC	Develop a program to address and capture trash and debris.	WQIP Input, Enhancement	○	○	○	○	○	○	○	○	●	○	○	◗	◗
AD	Support partnership efforts by social service providers to provide sanitation and trash management for persons experiencing homelessness.	CLRP Strategy, Enhancement	●	○	○	○	○	◗	○	○	●	○	○	●	◗
AE	Protect areas that are functioning naturally.	WQIP Input, MS4 Permit Section B.3.b.(1)(b)	◗	◗	◗	●	◗	◗	◗	◗	◗	●	●	●	●
	1. Develop a policy to avoid additional hardscape development and degradation in unpaved open space areas.	WQIP Input, MS4 Permit Section B.3.b.(1)(b)	◗	◗	◗	●	◗	◗	◗	◗	◗	●	●	●	●

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	2. Add permanent open space protections to undeveloped city-owned land.	WQIP Input, MS4 Permit Section B.3.b.(1)(b)	◗	◗	◗	●	◗	◗	◗	◗	◗	●	●	●	●
	3. Acquire privately owned undeveloped parcels of land.	WQIP Input, MS4 Permit Section B.3.b.(1)(b)	◗	◗	◗	●	◗	◗	◗	◗	◗	●	●	●	●
	Mapping and risk assessment of agricultural operations.	WQIP Input, Enhancement	◗	◗	◗	◗	◗	◗	◗	◗	◗	◗	◗	◗	◗
	Implement a program to target on-site wastewater treatment (septic) systems. May include mapping and risk assessment, inspection, or maintenance practices.	WQIP Input, Enhancement	◗	◗	◗	◗	◗	◗	◗	◗	◗	◗	◗	○	◗
	Removal of invasive plants and animals.	WQIP Input, Enhancement	◗	○	○	●	○	○	○	○	○	◗	○	●	●
AF	Conduct a feasibility study to determine if implementing an urban tree canopy (UTC) program would benefit water quality and other goals.	WQIP Input, Enhancement	*Not Evaluated Herein*												
	Investigate alternative pollutant removal or treatment strategies such as fungus used to remove soil contaminants.	WQIP Input, Enhancement	*Not Evaluated Herein*												
AG	Conduct special studies to gather additional monitoring information about priority conditions or beneficial uses.	WQIP Input, Enhancement	*Not Evaluated Herein*												

Appendix A – Potential Strategies and Associated Pollutants - FINAL

ID	NONSTRUCTURAL STRATEGY	Reference[1]	Water Chemistry Benefit									Physical and Biological Benefit			
			Bacteria[2]	Metals	Organics	Sediment	Pesticides	Nutrients	Oil and Grease	Dissolved Solids	Trash	Flow Rate	Volume Reduction	Habitat/ Wildlife	Aquatic Life
AH	Collaborate with entities potentially including, but not limited to: • Departments within the same Responsible Agency. • Other governmental agencies such as water, transportation, or public health agencies. • Nongovernmental agencies such as environmental and community groups and private corporations. • Dischargers regulated under other permits including the Phase II National Pollutant Discharge Elimination System (NPDES) Permit, Industrial General Permit, and Construction General Permit. Collaboration may take the form of joint participation in stakeholder meetings, studies or development studies or BMPs, hiring of a Watershed Coordinator to facilitate communication between community groups and the City, formation of a City Watershed team to protect and restore the watershed, or participating in existing groups, such as Integrated Regional Water Management (IRWM) groups.	WQIP Input, Enhancement	*Not Evaluated Herein*												
	1. Funding for collaborative strategies may include providing in-kind services, shared costs through agreements, and preparation and competition for grant funding.	WQIP Input, Enhancement	*Not Evaluated Herein*												
Pollutant reductions identify the primary (●) pollutants, the secondary (◗) pollutants, and the pollutants that the strategy does not address (O).															

1. Reference indicates the source of the strategy. Strategies are from the MS4 Permit, the Tecolote or Scripps Comprehensive Load Reduction Plan (CLRP), or the Water Quality Improvement Plan development process, including Consultation Committee and public input (City of San Diego, 2012a, 2012b, 2013a, 2013b). Strategies identified as part of the JRMP requirements in MS4 Permit Section E.2 through E.7 are identified in the table with the appropriate MS4 Permit section. Strategies that may be implemented as part of the JRMPs, but are not specifically required in the MS4 Permit are designated as "Enhancements."
2. Orange-shaded cells indicate the highest priority water quality condition for the WMA.
3. WQIP = Water Quality Improvement Plan

*Purple highlighting: deviation between the "Potential Strategies" documents. Added to be comprehensive.

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Appendix B – Nonstructural Strategies and Assigned Pollutant Removal Factors - FINAL

ID	NONSTRUCTURAL STRATEGY	Bacteria	Metals	Organics	Sediment	Pesticides	Nutrients	Oil and Grease	Dissolved Minerals	Trash
Jurisdictional Runoff Management Program (JRMP) Strategies										
Development Planning										
All Development Projects										
A	For all development projects, administer a program to ensure implementation of source control BMPs to minimize pollutant generation at each project and implement low-impact development (LID) BMPs to maintain or restore hydrology of the area, where applicable and feasible.	*Not Evaluated Herein*								
B	Amend municipal code and ordinances, including zoning ordinances, to facilitate and encourage LID opportunities.	*Not Evaluated Herein*								
C	Train staff on LID regulatory changes and LID Design Manual.	*Not Evaluated Herein*								
Priority Development Projects (PDPs)										
D	For PDPs, administer a program requiring implementation of on-site structural BMPs to control pollutants and manage hydromodification. Includes confirmation of design, construction, and maintenance of PDP structural BMPs.	*Not Evaluated Herein*								
E	Update BMP Design Manual procedures to determine nature and extent of storm water requirements applicable to development projects and to identify conditions of concern for selecting, designing, and maintaining appropriate structural BMPs.	*Not Evaluated Herein*								
	1. Amend BMP Design Manual for trash areas. Require full four-sided enclosure, siting away from storm drains and cover. Consider the retrofit requirement.	90.0%	30.0%	0.0%	0.0%	0.0%	0.0%	30.0%	0.0%	90.0%
	2. Amend BMP Design Manual for animal-related facilities.	90.0%	0.0%	0.0%	90.0%	90.0%	90.0%	0.0%	0.0%	0.0%
	3. Amend BMP Design Manual for nurseries and garden centers.	60.0%	0.0%	90.0%	90.0%	90.0%	90.0%	0.0%	0.0%	0.0%
	4. Amend BMP Design Manual for auto-related uses.	30.0%	60.0%	30.0%	30.0%	0.0%	0.0%	90.0%	0.0%	90.0%

Appendix B – Nonstructural Strategies and Assigned Pollutant Removal Factors - FINAL

ID	NONSTRUCTURAL STRATEGY	Bacteria	Metals	Organics	Sediment	Pesticides	Nutrients	Oil and Grease	Dissolved Minerals	Trash
F	Administer an alternative compliance program to on-site structural BMP implementation (includes identifying Watershed Management Area Analysis [WMAA] candidate projects).	*Not Evaluated Herein*								
	1. Develop a mitigation policy for public and private development projects that links development with mitigation within the same watershed.	*Not Evaluated Herein*								
	1. Create an In-Lieu Fee	*Not Evaluated Herein*								
Construction Management										
G	Administer a program to oversee implementation of BMPs during the construction phase of land development. Includes inspections at an appropriate frequency and enforcement of requirements.	0.0%	0.0%	0.0%	90.0%	0.0%	0.0%	30.0%	0.0%	30.0%
Existing Development										
Commercial, Industrial, Municipal, and Residential Facilities and Areas										
H	Administer a program to require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types, and Pollutatant Generating Activities (PGAs), as appropriate. Includes inspecting existing development at appropriate frequencies and using appropriate methods. (Inspections for PGAs of concern: Vehicle Washing area inspections and inspections for food-related businesses, animal-related businesses, nurseries and garden centers, and auto-related businesses.)	*Not Evaluated Herein*								
	1. Update minimum BMPs for existing residential, commercial, and industrial development and enforce them.	*Not Evaluated Herein*								
	2. Design, implement, and enforce property- and PGA-based inspections.	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
	1. Review policies and procedures to ensure discharges from swimming pools meet permit requirements.	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	90.0%	0.0%

Appendix B – Nonstructural Strategies and Assigned Pollutant Removal Factors - FINAL

ID	NONSTRUCTURAL STRATEGY	Bacteria	Metals	Organics	Sediment	Pesticides	Nutrients	Oil and Grease	Dissolved Minerals	Trash
	3. Develop a self-reporting inspection option for select industrial and commercial facilities.	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
I	Implement pet waste program. May include installation and maintenance of pet waste bag dispensers and trash bins, signage and education, physical removal of pet waste, or enforcement.	90.0%	0.0%	0.0%	0.0%	0.0%	60.0%	0.0%	0.0%	0.0%
J	Promote and encourage implementing designated BMPs at residential areas.	60.0%	30.0%	30.0%	60.0%	90.0%	90.0%	30.0%	30.0%	30.0%
	1. Expand residential BMP (irrigation, rainwater harvesting, and turf conversion) rebate programs to multi-family housing in target areas.	60.0%	30.0%	30.0%	60.0%	90.0%	90.0%	30.0%	30.0%	30.0%
	2. Residential BMP: Rain Barrel	60.0%	30.0%	30.0%	60.0%	90.0%	90.0%	30.0%	30.0%	30.0%
	3. Residential BMP: Irrigation Control (Turf Conversion)	60.0%	30.0%	30.0%	60.0%	90.0%	90.0%	30.0%	30.0%	30.0%
	4. Residential BMP: Downspout Disconnect	60.0%	30.0%	30.0%	60.0%	90.0%	90.0%	30.0%	30.0%	30.0%
	5. Provide financial incentives to property owners to convert landscaping to site-specific native plants.	0.0%	0.0%	30.0%	0.0%	60.0%	60.0%	0.0%	30.0%	0.0%
K	Develop pilot project to identify and carry out site disconnections in targeted areas.	30.0%	30.0%	30.0%	30.0%	0.0%	30.0%	0.0%	30.0%	0.0%
L	Identify and reduce incidents of power washing discharges from nonresidential sites.	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
L.1.	Promote and encourage implementation of designated BMPs in nonresidential areas.	*Not Evaluated Herein*								
M	Proactively monitor for erosion, and complete minor repair and slope stabilization on municipal property.	30.0%	0.0%	0.0%	90.0%	0.0%	30.0%	0.0%	30.0%	0.0%
MS4 Infrastructure										
N	Implement operation and maintenance activities (inspection and cleaning) for MS4 and related structures (catch basins, storm drain inlets, detention basins, etc.).	*Not Evaluated Herein*								
	1. Optimize catch basin cleaning to maximize pollutant removal.	30.0%	90.0%	0.0%	90.0%	0.0%	0.0%	0.0%	0.0%	90.0%

Appendix B – Nonstructural Strategies and Assigned Pollutant Removal Factors - FINAL

ID	NONSTRUCTURAL STRATEGY	Bacteria	Metals	Organics	Sediment	Pesticides	Nutrients	Oil and Grease	Dissolved Minerals	Trash
	2. Proactively repair and replace MS4 components to provide source control from MS4 infrastructure.	30.0%	90.0%	0.0%	90.0%	0.0%	30.0%	0.0%	0.0%	0.0%
	3. Increase frequency of open-channel cleaning and scour pond repair to reduce pollutant loads.	30.0%	90.0%	0.0%	90.0%	0.0%	30.0%	0.0%	0.0%	0.0%
O	Implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers.	60.0%	0.0%	0.0%	90.0%	30.0%	30.0%	0.0%	0.0%	0.0%
	1. Identify sewer leaks and areas for sewer pipe replacement prioritization.	60.0%	0.0%	0.0%	90.0%	30.0%	30.0%	0.0%	0.0%	0.0%
Roads, Streets, and Parking Lots										
P	Implement operation and maintenance activities for public streets, unpaved roads, paved roads, and paved highways.	30.0%	90.0%	30.0%	90.0%	0.0%	90.0%	0.0%	30.0%	90.0%
	1. Enhance street sweeping through equipment replacement and route optimization.	30.0%	90.0%	30.0%	90.0%	0.0%	90.0%	0.0%	30.0%	90.0%
	2. Initiate sweeping of medians on high-volume arterial roadways.	30.0%	90.0%	30.0%	90.0%	0.0%	90.0%	0.0%	30.0%	90.0%
	3. Increase maintenance on access roads and trails.									
Q	Require sweeping and maintenance of private roads and parking lots in targeted areas.	30.0%	90.0%	30.0%	90.0%	0.0%	90.0%	0.0%	30.0%	90.0%
R	Identify sites for pilot study to test Permeable Friction Course (PFC), which is a porous asphalt that overlays impermeable asphalt.	30.0%	90.0%	30.0%	90.0%	90.0%	30.0%	30.0%	30.0%	30.0%
Pesticide, Herbicides, and Fertilizer Program										
S	Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education, permits, and certifications.	0.0%	0.0%	90.0%	0.0%	90.0%	90.0%	0.0%	0.0%	0.0%
Retrofit and Rehabilitation in Areas of Existing Development										
T	Develop and implement a strategy to identify candidate areas of existing development appropriate for retrofitting projects and facilitate the implementation of such projects.	*Not Evaluated Herein*								

Appendix B – Nonstructural Strategies and Assigned Pollutant Removal Factors - FINAL

ID	NONSTRUCTURAL STRATEGY	Bacteria	Metals	Organics	Sediment	Pesticides	Nutrients	Oil and Grease	Dissolved Minerals	Trash
U	Develop and implement a strategy to identify candidate areas of existing development for stream, channel, or habitat rehabilitation projects and facilitate implementation of such projects.	*Not Evaluated Herein*								
IDDE Program										
V	Implement Illicit Discharge, Detection, and Elimination (IDDE) Program per the JRMPs. Requirements include maintaining an MS4 map, using municipal personnel and contractors to identify and report illicit discharges, maintaining a hotline for publicly reporting illicit discharges, monitoring MS4 outfalls, and investigating and addressing any illicit discharges.	*Not Evaluated Herein*								
Public Education and Participation										
W	Implement a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce pollutant discharge in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences.	*Not Evaluated Herein*								
	1. Expand outreach to homeowners' association (HOA) common lands and HOA rebates.	30.0%	30.0%	30.0%	30.0%	90.0%	90.0%	30.0%	30.0%	30.0%
	2. Develop an outreach and training program for property managers responsible for HOAs and maintenance districts.	30.0%	30.0%	30.0%	30.0%	90.0%	90.0%	30.0%	30.0%	30.0%
	3. Conduct trash cleanups through community-based organizations involving target audiences.	60.0%	30.0%	30.0%	0.0%	30.0%	0.0%	30.0%	0.0%	90.0%
	4. Target human behavior in parks and other public areas including trash reduction or other high-impact behavior to habitat, wildlife, and water quality.	*Not Evaluated Herein*								
	5. Improve consistency and content of websites to highlight enforceable conditions and reporting methods.	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%

Appendix B – Nonstructural Strategies and Assigned Pollutant Removal Factors - FINAL

ID	NONSTRUCTURAL STRATEGY	Bacteria	Metals	Organics	Sediment	Pesticides	Nutrients	Oil and Grease	Dissolved Minerals	Trash
	6. Contribute to San Diego County-led effort through regional education group for outreach, education, and policy measures for the equestrian community and property owners.	90.0%	0.0%	0.0%	30.0%	0.0%	30.0%	0.0%	0.0%	0.0%
	1. Develop a targeted education and outreach program for homeowners adjacent to or with tributaries or streams within their property.	90.0%	60.0%	60.0%	90.0%	60.0%	60.0%	30.0%	30.0%	30.0%
	1. Develop a targeted education and outreach program for homeowners with orchards or other agricultural land uses on their property.	30.0%	0.0%	0.0%	90.0%	90.0%	90.0%	0.0%	30.0%	30.0%
	2. Enhance school and recreation-based education and outreach.	*Not Evaluated Herein*								
	3. Develop education and outreach to reduce over-irrigation.	30.0%	30.0%	30.0%	30.0%	90.0%	90.0%	30.0%	30.0%	30.0%
	7. Develop regional training for water-using mobile businesses.	60.0%	60.0%	60.0%	60.0%	30.0%	30.0%	60.0%	30.0%	30.0%
X	Enhance education and outreach based on results of effectiveness survey and changing regulatory requirements.	*Not Evaluated Herein*								
Y	Provide technical education and outreach to the development community on the design and implementation requirements of the MS4 Permit and Water Quality Improvement Plan requirements.	*Not Evaluated Herein*								
Enforcement Response Plan										
Z	Implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Enforcement Response Plan.	*Not Evaluated Herein*								
	1. Increase enforcement of over-irrigation.	30.0%	30.0%	30.0%	30.0%	90.0%	90.0%	30.0%	30.0%	30.0%
	2. Focus locally on enforcement of water-using mobile businesses.	60.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%

Appendix B – Nonstructural Strategies and Assigned Pollutant Removal Factors - FINAL

ID	NONSTRUCTURAL STRATEGY	Bacteria	Metals	Organics	Sediment	Pesticides	Nutrients	Oil and Grease	Dissolved Minerals	Trash
AA	Increase identification and enforcement of actionable erosion and slope stabilization issues on private property and require stabilization and repair.	30.0%	0.0%	0.0%	90.0%	0.0%	30.0%	0.0%	30.0%	0.0%
Optional Strategies										
AB	Continue participating in source reduction initiatives. (Varies. For example, the Brake Pad Partnership is existing. Considered may be a plastic bag ban, banning leaf blowers, banning pesticides or herbicide.)	*Not Evaluated Herein*								
AC	Develop a program to address and capture trash and debris.	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	90.0%
AD	Support partnership efforts by social service providers to provide sanitation and trash management for persons experiencing homelessness.	90.0%	0.0%	0.0%	0.0%	0.0%	30.0%	0.0%	0.0%	90.0%
AE	Protect areas that are functioning naturally.	30.0%	30.0%	30.0%	90.0%	30.0%	30.0%	30.0%	30.0%	30.0%
	1. Develop a policy to avoid additional hardscape development and degradation in unpaved open space areas.	30.0%	30.0%	30.0%	90.0%	30.0%	30.0%	30.0%	30.0%	30.0%
	2. Add permanent open space protections to undeveloped city-owned land.	30.0%	30.0%	30.0%	90.0%	30.0%	30.0%	30.0%	30.0%	30.0%
	3. Acquire privately owned undeveloped parcels of land.	30.0%	30.0%	30.0%	90.0%	30.0%	30.0%	30.0%	30.0%	30.0%
	Mapping and risk assessment of agricultural operations.	30.0%	30.0%	60.0%	60.0%	60.0%	60.0%	30.0%	60.0%	60.0%
	Implement a program to target on-site wastewater treatment (septic) systems. May include mapping and risk assessment, inspection, or maintenance practices.	30.0%	30.0%	30.0%	60.0%	30.0%	30.0%	30.0%	30.0%	30.0%
	Removal of invasive plants and animals.	60.0%	0.0%	0.0%	90.0%	0.0%	0.0%	0.0%	0.0%	0.0%
AF	Conduct a feasibility study to determine if implementing an urban tree canopy (UTC) program would benefit water quality and other goals.	*Not Evaluated Herein*								

Appendix B – Nonstructural Strategies and Assigned Pollutant Removal Factors - FINAL

ID	NONSTRUCTURAL STRATEGY	Bacteria	Metals	Organics	Sediment	Pesticides	Nutrients	Oil and Grease	Dissolved Minerals	Trash
	Investigate alternative pollutant removal or treatment strategies such as fungus used to remove soil contaminants.	*Not Evaluated Herein*								
AG	Conduct special studies to gather additional monitoring information about priority conditions or beneficial uses. (Monitoring may include investigative measures such as genetic tracking for bacteria sources or geomorphic studies for sediment sources or processes. - LOS PEN)	*Not Evaluated Herein*								
AH	Collaborate with entities potentially including, but not limited to:	*Not Evaluated Herein*								
	• Departments within the same Responsible Agency.									
	• Other governmental agencies such as water, transportation, or public health agencies.									
	• Nongovernmental agencies such as environmental and community groups and private corporations.									
	• Dischargers regulated under other permits including the Phase II National Pollutant Discharge Elimination System (NPDES) Permit, Industrial General Permit, and Construction General Permit.									
	Collaboration may take the form of joint participation in stakeholder meetings, studies or development studies or BMPs, hiring of a Watershed Coordinator to facilitate communication between community groups and the City, formation of a City Watershed team to protect and restore the watershed, or participating in existing groups, such as Integrated Regional Water Management (IRWM) groups.									
	1. Funding for collaborative strategies may include providing in-kind services, shared costs through agreements, and preparation and competition for grant funding.	*Not Evaluated Herein*								

*Purple highlighting: deviation between the "Potential Strategies" documents. Added to be comprehensive.

Appendix C – Results of Pollutant Behavior Consequences on Nonstructural Strategies - FINAL

ID	NONSTRUCTURAL STRATEGY	Bacteria	Metals	Organics	Sediment	Pesticides	Nutrients	Oil and Grease	Dissolved Minerals	Trash	Entirely, Largely, or Partially?
Jurisdictional Runoff Management Program (JRMP) Strategies											
Development Planning											
All Development Projects											
A	For all development projects, administer a program to ensure implementation of source control BMPs to minimize pollutant generation at each project and implement low-impact development (LID) BMPs to maintain or restore hydrology of the area, where applicable and feasible.	*Not Evaluated Herein*									Largely
B	Amend municipal code and ordinances, including zoning ordinances, to facilitate and encourage LID opportunities.	*Not Evaluated Herein*									Largely
C	Train staff on LID regulatory changes and LID Design Manual.	*Not Evaluated Herein*									Entirely
Priority Development Projects (PDPs)											
D	For PDPs, administer a program requiring implementation of on-site structural BMPs to control pollutants and manage hydromodification. Includes confirmation of design, construction, and maintenance of PDP structural BMPs.	*Not Evaluated Herein*									Largely
E	Update BMP Design Manual procedures to determine nature and extent of storm water requirements applicable to development projects and to identify conditions of concern for selecting, designing, and maintaining appropriate structural BMPs.	*Not Evaluated Herein*									Largely
	1. Amend BMP Design Manual for trash areas. Require full four-sided enclosure, siting away from storm drains and cover. Consider the retrofit requirement.	59.4%	19.8%	0.0%	0.0%	0.0%	0.0%	19.8%	0.0%	59.4%	Largely
	2. Amend BMP Design Manual for animal-related facilities.	59.4%	0.0%	0.0%	59.4%	59.4%	59.4%	0.0%	0.0%	0.0%	Largely
	3. Amend BMP Design Manual for nurseries and garden centers.	39.6%	0.0%	59.4%	59.4%	59.4%	59.4%	0.0%	0.0%	0.0%	Largely

Appendix C – Results of Pollutant Behavior Consequences on Nonstructural Strategies - FINAL

ID	NONSTRUCTURAL STRATEGY	Bacteria	Metals	Organics	Sediment	Pesticides	Nutrients	Oil and Grease	Dissolved Minerals	Trash	Entirely, Largely, or Partially?
	4. Amend BMP Design Manual for auto-related uses.	19.8%	39.6%	19.8%	19.8%	0.0%	0.0%	59.4%	0.0%	59.4%	Largely
F	Administer an alternative compliance program to on-site structural BMP implementation (includes identifying Watershed Management Area Analysis [WMAA] candidate projects).	*Not Evaluated Herein*									Entirely
	1. Develop a mitigation policy for public and private development projects that links development with mitigation within the same watershed.	*Not Evaluated Herein*									Entirely
	1a. Create an In-Lieu Fee	*Not Evaluated Herein*									Entirely
Construction Management											
G	Administer a program to oversee implementation of BMPs during the construction phase of land development. Includes inspections at an appropriate frequency and enforcement of requirements.	0.0%	0.0%	0.0%	59.4%	0.0%	0.0%	19.8%	0.0%	19.8%	Largely
Existing Development											
Commercial, Industrial, Municipal, and Residential Facilities and Areas											
H	Administer a program to require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types, and PGAs, as appropriate. Includes inspecting existing development at appropriate frequencies and using appropriate methods. (Inspections for PGAs of concern: Vehicle Washing area inspections and inspections for food-related businesses, animal-related businesses, nurseries and garden centers, and auto-related businesses.)	*Not Evaluated Herein*									Largely
	1. Update minimum BMPs for existing residential, commercial, and industrial development and enforce them.	*Not Evaluated Herein*									Largely
	2. Design, implement, and enforce property- and PGA-based inspections.	19.8%	19.8%	19.8%	19.8%	19.8%	19.8%	19.8%	19.8%	19.8%	Largely

Appendix C – Results of Pollutant Behavior Consequences on Nonstructural Strategies - FINAL

ID	NONSTRUCTURAL STRATEGY	Bacteria	Metals	Organics	Sediment	Pesticides	Nutrients	Oil and Grease	Dissolved Minerals	Trash	Entirely, Largely, or Partially?
	1. Review policies and procedures to ensure discharges from swimming pools meet permit requirements.	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	90.0%	0.0%	Entirely
	3. Develop a self-reporting inspection option for select industrial and commercial facilities.	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	Entirely
I	Implement pet waste program. May include installation and maintenance of pet waste bag dispensers and trash bins, signage and education, physical removal of pet waste, or enforcement.	59.4%	0.0%	0.0%	0.0%	0.0%	39.6%	0.0%	0.0%	0.0%	Largely
J	Promote and encourage implementing designated BMPs at residential areas.	39.6%	19.8%	19.8%	39.6%	59.4%	59.4%	19.8%	19.8%	19.8%	Largely
	1. Expand residential BMP (irrigation, rainwater harvesting, and turf conversion) rebate programs to multi-family housing in target areas.	19.8%	9.9%	9.9%	19.8%	29.7%	29.7%	9.9%	9.9%	9.9%	Partially
	2. Residential BMP: Rain Barrel	60.0%	30.0%	30.0%	60.0%	90.0%	90.0%	30.0%	30.0%	30.0%	Entirely
	3. Residential BMP: Irrigation Control (Turf Conversion)	19.8%	9.9%	9.9%	19.8%	29.7%	29.7%	9.9%	9.9%	9.9%	Partially
	4. Residential BMP: Downspout Disconnect	60.0%	30.0%	30.0%	60.0%	90.0%	90.0%	30.0%	30.0%	30.0%	Entirely
	5. Provide financial incentives to property owners to convert landscaping to site-specific native plants.	0.0%	0.0%	30.0%	0.0%	60.0%	60.0%	0.0%	30.0%	0.0%	Entirely
K	Develop pilot project to identify and carry out site disconnections in targeted areas.	30.0%	30.0%	30.0%	30.0%	0.0%	30.0%	0.0%	30.0%	0.0%	Entirely
L	Identify and reduce incidents of power washing discharges from nonresidential sites.	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	Entirely
L.1.	Promote and encourage implementation of designated BMPs in nonresidential areas.	*Not Evaluated Herein*									Largely
M	Proactively monitor for erosion, and complete minor repair and slope stabilization on municipal property.	9.9%	0.0%	0.0%	29.7%	0.0%	9.9%	0.0%	9.9%	0.0%	Partially
MS4 Infrastructure											
N	Implement operation and maintenance activities (inspection and cleaning) for MS4 and related structures (catch basins, storm drain inlets, detention basins, etc.).	*Not Evaluated Herein*									Partially

Appendix C – Results of Pollutant Behavior Consequences on Nonstructural Strategies - FINAL

ID	NONSTRUCTURAL STRATEGY	Bacteria	Metals	Organics	Sediment	Pesticides	Nutrients	Oil and Grease	Dissolved Minerals	Trash	Entirely, Largely, or Partially?
	1. Optimize catch basin cleaning to maximize pollutant removal.	9.9%	29.7%	0.0%	29.7%	0.0%	0.0%	0.0%	0.0%	29.7%	Partially
	2. Proactively repair and replace MS4 components to provide source control from MS4 infrastructure.	9.9%	29.7%	0.0%	29.7%	0.0%	9.9%	0.0%	0.0%	0.0%	Partially
	3. Increase frequency of open-channel cleaning and scour pond repair to reduce pollutant loads.	9.9%	29.7%	0.0%	29.7%	0.0%	9.9%	0.0%	0.0%	0.0%	Partially
O	Implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers.	60.0%	0.0%	0.0%	90.0%	30.0%	30.0%	0.0%	0.0%	0.0%	Entirely
	1. Identify sewer leaks and areas for sewer pipe replacement prioritization.	60.0%	0.0%	0.0%	90.0%	30.0%	30.0%	0.0%	0.0%	0.0%	Entirely
Roads, Streets, and Parking Lots											
P	Implement operation and maintenance activities for public streets, unpaved roads, paved roads, and paved highways.	19.8%	59.4%	19.8%	59.4%	0.0%	59.4%	0.0%	19.8%	59.4%	Largely
	1. Enhance street sweeping through equipment replacement and route optimization.	19.8%	59.4%	19.8%	59.4%	0.0%	59.4%	0.0%	19.8%	59.4%	Largely
	2. Initiate sweeping of medians on high-volume arterial roadways.	19.8%	59.4%	19.8%	59.4%	0.0%	59.4%	0.0%	19.8%	59.4%	Largely
	3. Increase maintenance on access roads and trails.	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Largely
Q	Require sweeping and maintenance of private roads and parking lots in targeted areas.	19.8%	59.4%	19.8%	59.4%	0.0%	59.4%	0.0%	19.8%	59.4%	Largely
R	Identify sites for pilot study to test Permeable Friction Course (PFC), which is a porous asphalt that overlays impermeable asphalt.	19.8%	59.4%	19.8%	59.4%	59.4%	19.8%	19.8%	19.8%	19.8%	Largely
Pesticide, Herbicides, and Fertilizer Program											
S	Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education, permits, and certifications.	0.0%	0.0%	59.4%	0.0%	59.4%	59.4%	0.0%	0.0%	0.0%	Largely
Retrofit and Rehabilitation in Areas of Existing Development											

Appendix C – Results of Pollutant Behavior Consequences on Nonstructural Strategies - FINAL

ID	NONSTRUCTURAL STRATEGY	Bacteria	Metals	Organics	Sediment	Pesticides	Nutrients	Oil and Grease	Dissolved Minerals	Trash	Entirely, Largely, or Partially?
T	Develop and implement a strategy to identify candidate areas of existing development appropriate for retrofitting projects and facilitate the implementation of such projects.	*Not Evaluated Herein*									Largely
U	Develop and implement a strategy to identify candidate areas of existing development for stream, channel, or habitat rehabilitation projects and facilitate implementation of such projects.	*Not Evaluated Herein*									Largely
IDDE Program											
V	Implement Illicit Discharge, Detection, and Elimination (IDDE) Program per the JRMPs. Requirements include maintaining an MS4 map, using municipal personnel and contractors to identify and report illicit discharges, maintaining a hotline for publicly reporting illicit discharges, monitoring MS4 outfalls, and investigating and addressing any illicit discharges.	*Not Evaluated Herein*									Entirely
Public Education and Participation											
W	Implement a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce pollutant discharge in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences.	*Not Evaluated Herein*									Entirely
	1. Expand outreach to homeowners' association (HOA) common lands and HOA rebates.	30.0%	30.0%	30.0%	30.0%	90.0%	90.0%	30.0%	30.0%	30.0%	Entirely
	2. Develop an outreach and training program for property managers responsible for HOAs and maintenance districts.	30.0%	30.0%	30.0%	30.0%	90.0%	90.0%	30.0%	30.0%	30.0%	Entirely
	3. Conduct trash cleanups through community-based organizations involving target audiences.	39.6%	19.8%	19.8%	0.0%	19.8%	0.0%	19.8%	0.0%	59.4%	Largely
	4. Target human behavior in parks and other public areas including trash reduction or other high-impact behavior to habitat, wildlife, and water quality.	*Not Evaluated Herein*									Largely

Appendix C – Results of Pollutant Behavior Consequences on Nonstructural Strategies - FINAL

ID	NONSTRUCTURAL STRATEGY	Bacteria	Metals	Organics	Sediment	Pesticides	Nutrients	Oil and Grease	Dissolved Minerals	Trash	Entirely, Largely, or Partially?
	5. Improve consistency and content of websites to highlight enforceable conditions and reporting methods.	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	Entirely
	6. Contribute to San Diego County-led effort through regional education group for outreach, education, and policy measures for the equestrian community and property owners.	59.4%	0.0%	0.0%	19.8%	0.0%	19.8%	0.0%	0.0%	0.0%	Largely
	1. Develop a targeted education and outreach program for homeowners adjacent to or with tributaries or streams within their property.	90.0%	60.0%	60.0%	90.0%	60.0%	60.0%	30.0%	30.0%	30.0%	Entirely
	1. Develop a targeted education and outreach program for homeowners with orchards or other agricultural land uses on their property.	30.0%	0.0%	0.0%	90.0%	90.0%	90.0%	0.0%	30.0%	30.0%	Entirely
	2. Enhance school and recreation-based education and outreach	*Not Evaluated Herein*									Entirely
	3. Develop education and outreach to reduce over-irrigation	9.9%	9.9%	9.9%	9.9%	29.7%	29.7%	9.9%	9.9%	9.9%	Partially
	7. Develop regional training for water-using mobile businesses.	60.0%	60.0%	60.0%	60.0%	30.0%	30.0%	60.0%	30.0%	30.0%	Entirely
X	Enhance education and outreach based on results of effectiveness survey and changing regulatory requirements.	*Not Evaluated Herein*									Entirely
Y	Provide technical education and outreach to the development community on the design and implementation requirements of the MS4 Permit and Water Quality Improvement Plan requirements.	*Not Evaluated Herein*									Entirely
Enforcement Response Plan											
Z	Implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Enforcement Response Plan.	*Not Evaluated Herein*									Largely
	1. Increase enforcement of over-irrigation.	9.9%	9.9%	9.9%	9.9%	29.7%	29.7%	9.9%	9.9%	9.9%	Partially

Appendix C – Results of Pollutant Behavior Consequences on Nonstructural Strategies - FINAL

ID	NONSTRUCTURAL STRATEGY	Bacteria	Metals	Organics	Sediment	Pesticides	Nutrients	Oil and Grease	Dissolved Minerals	Trash	Entirely, Largely, or Partially?
	2. Focus locally on enforcement of water-using mobile businesses.	39.6%	19.8%	19.8%	19.8%	19.8%	19.8%	19.8%	19.8%	19.8%	Largely
AA	Increase identification and enforcement of actionable erosion and slope stabilization issues on private property and require stabilization and repair.	9.9%	0.0%	0.0%	29.7%	0.0%	9.9%	0.0%	9.9%	0.0%	Partially
Optional Strategies											
AB	Continue participating in source reduction initiatives. (Varies. For example, the Brake Pad Partnership is existing. Considered may be a plastic bag ban, banning leaf blowers, banning pesticides or herbicide.)	*Not Evaluated Herein*									Entirely
AC	Develop a program to address and capture trash and debris.	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	59.4%	Largely
AD	Support partnership efforts by social service providers to provide sanitation and trash management for persons experiencing homelessness.	90.0%	0.0%	0.0%	0.0%	0.0%	30.0%	0.0%	0.0%	90.0%	Entirely
AE	Protect areas that are functioning naturally.	9.9%	9.9%	9.9%	29.7%	9.9%	9.9%	9.9%	9.9%	9.9%	Partially
	1. Develop a policy to avoid additional hardscape development and degradation in unpaved open space areas.	9.9%	9.9%	9.9%	29.7%	9.9%	9.9%	9.9%	9.9%	9.9%	Partially
	2. Add permanent open space protections to undeveloped city-owned land.	9.9%	9.9%	9.9%	29.7%	9.9%	9.9%	9.9%	9.9%	9.9%	Partially
	3. Acquire privately owned undeveloped parcels of land.	9.9%	9.9%	9.9%	29.7%	9.9%	9.9%	9.9%	9.9%	9.9%	Partially
	Mapping and risk assessment of agricultural operations.	30.0%	30.0%	60.0%	60.0%	60.0%	60.0%	30.0%	60.0%	60.0%	Entirely
	Implement a program to target on-site wastewater treatment (septic) systems. May include mapping and risk assessment, inspection, or maintenance practices.	30.0%	30.0%	30.0%	60.0%	30.0%	30.0%	30.0%	30.0%	30.0%	Entirely
	Removal of invasive plants and animals.	60.0%	0.0%	0.0%	90.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Entirely
AF	Conduct a feasibility study to determine if implementing an urban tree canopy (UTC) program would benefit water quality and other goals.	*Not Evaluated Herein*									Entirely

Appendix C – Results of Pollutant Behavior Consequences on Nonstructural Strategies - FINAL

ID	NONSTRUCTURAL STRATEGY	Bacteria	Metals	Organics	Sediment	Pesticides	Nutrients	Oil and Grease	Dissolved Minerals	Trash	Entirely, Largely, or Partially?
	Investigate alternative pollutant removal or treatment strategies such as fungus used to remove soil contaminants.	*Not Evaluated Herein*									Entirely
AG	Conduct special studies to gather additional monitoring information about priority conditions or beneficial uses. (Monitoring may include investigative measures such as genetic tracking for bacteria sources or geomorphic studies for sediment sources or processes. - LOS PEN)	*Not Evaluated Herein*									Entirely
AH	Collaborate with entities potentially including, but not limited to:	*Not Evaluated Herein*									Entirely
	• Departments within the same Responsible Agency.										Entirely
	• Other governmental agencies such as water, transportation, or public health agencies.										Entirely
	• Nongovernmental agencies such as environmental and community groups and private corporations.										Entirely
	• Dischargers regulated under other permits including the Phase II National Pollutant Discharge Elimination System (NPDES) Permit, Industrial General Permit, and Construction General Permit.										Entirely
	Collaboration may take the form of joint participation in stakeholder meetings, studies or development studies or BMPs, hiring of a Watershed Coordinator to facilitate communication between community groups and the City, formation of a City Watershed team to protect and restore the watershed, or participating in existing groups, such as Integrated Regional Water Management (IRWM) groups.										Entirely
	1. Funding for collaborative strategies may include providing in-kind services, shared costs through agreements, and preparation and competition for grant funding.	*Not Evaluated Herein*									Entirely

*Purple highlighting: deviation between the "Potential Strategies" documents. Added to be comprehensive

Appendix D – Range of Anticipated Pollutant Reduction for Nonstructural Strategies - FINAL

ID	NONSTRUCTURAL STRATEGY	Bacteria		Metals		Organics		Sediment		Pesticides		Nutrients		Oil and Grease		Dissolved Minerals		Trash		Entirely, Largely, or Partially?
		Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	
Jurisdictional Runoff Management Program (JRMP) Strategies																				
Development Planning																				
All Development Projects																				
A	For all development projects, administer a program to ensure implementation of source control BMPs to minimize pollutant generation at each project and implement low-impact development (LID) BMPs to maintain or restore hydrology of the area, where applicable and feasible.	*Not Evaluated Herein*																		Largely
B	Amend municipal code and ordinances, including zoning ordinances, to facilitate and encourage LID opportunities.	*Not Evaluated Herein*																		Largely
C	Train staff on LID regulatory changes and LID Design Manual.	*Not Evaluated Herein*																		Entirely
Priority Development Projects (PDPs)																				
D	For PDPs, administer a program requiring implementation of on-site structural BMPs to control pollutants and manage hydromodification. Includes confirmation of design, construction, and maintenance of PDP structural BMPs.	*Not Evaluated Herein*																		Largely
E	Update BMP Design Manual procedures to determine nature and extent of storm water requirements applicable to development projects and to identify conditions of concern for selecting, designing, and maintaining appropriate structural BMPs.	*Not Evaluated Herein*																		Largely
	1. Amend BMP Design Manual for trash areas. Require full four-sided enclosure, siting away from storm drains and cover. Consider the retrofit requirement.	10.7%	47.5%	3.6%	15.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.6%	15.8%	0.0%	0.0%	10.7%	47.5%	Largely
	2. Amend BMP Design Manual for animal-related facilities.	10.7%	47.5%	0.0%	0.0%	0.0%	0.0%	10.7%	47.5%	10.7%	47.5%	10.7%	47.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Largely
	3. Amend BMP Design Manual for nurseries and garden centers.	7.1%	31.7%	0.0%	0.0%	10.7%	47.5%	10.7%	47.5%	10.7%	47.5%	10.7%	47.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Largely
	4. Amend BMP Design Manual for auto-related uses.	3.6%	15.8%	7.1%	31.7%	3.6%	15.8%	3.6%	15.8%	0.0%	0.0%	0.0%	0.0%	10.7%	47.5%	0.0%	0.0%	10.7%	47.5%	Largely
F	Administer an alternative compliance program to on-site structural BMP implementation (includes identifying Watershed Management Area Analysis [WMAA] candidate projects).	*Not Evaluated Herein*																		Entirely
	1. Develop a mitigation policy for public and private development projects that links development with mitigation within the same watershed.	*Not Evaluated Herein*																		Entirely
	1a. Create an In-Lieu Fee	*Not Evaluated Herein*																		Entirely
Construction Management																				

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Appendix D – Range of Anticipated Pollutant Reduction for Nonstructural Strategies - FINAL

ID	NONSTRUCTURAL STRATEGY	Bacteria		Metals		Organics		Sediment		Pesticides		Nutrients		Oil and Grease		Dissolved Minerals		Trash		Entirely, Largely, or Partially?
		Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	
G	Administer a program to oversee implementation of BMPs during the construction phase of land development. Includes inspections at an appropriate frequency and enforcement of requirements.	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	10.7%	47.5%	0.0%	0.0%	0.0%	0.0%	3.6%	15.8%	0.0%	0.0%	3.6%	15.8%	Largely
Existing Development																				
Commercial, Industrial, Municipal, and Residential Facilities and Areas																				
H	Administer a program to require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types, and PGAs, as appropriate. Includes inspecting existing development at appropriate frequencies and using appropriate methods. (Inspections for PGAs of concern: Vehicle Washing area inspections and inspections for food-related businesses, animal-related businesses, nurseries and garden centers, and auto-related businesses.)	*Not Evaluated Herein*																		Largely
	1. Update minimum BMPs for existing residential, commercial, and industrial development and enforce them.	*Not Evaluated Herein*																		Largely
	2. Design, implement, and enforce property- and PGA-based inspections.	3.6%	15.8%	3.6%	15.8%	3.6%	15.8%	3.6%	15.8%	3.6%	15.8%	3.6%	15.8%	3.6%	15.8%	3.6%	15.8%	3.6%	15.8%	Largely
	1. Review policies and procedures to ensure discharges from swimming pools meet permit requirements.	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	16.2%	72.0%	0.0%	0.0%	Entirely
	3. Develop a self-reporting inspection option for select industrial and commercial facilities.	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	Entirely
I	Implement pet waste program. May include installation and maintenance of pet waste bag dispensers and trash bins, signage and education, physical removal of pet waste, or enforcement.	10.7%	47.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	7.1%	31.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Largely
J	Promote and encourage implementing designated BMPs at residential areas.	7.1%	31.7%	3.6%	15.8%	3.6%	15.8%	7.1%	31.7%	10.7%	47.5%	10.7%	47.5%	3.6%	15.8%	3.6%	15.8%	3.6%	15.8%	Largely
	1. Expand residential BMP (irrigation, rainwater harvesting, and turf conversion) rebate programs to multi-family housing in target areas.	3.6%	15.8%	1.8%	7.9%	1.8%	7.9%	3.6%	15.8%	5.3%	23.8%	5.3%	23.8%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	Partially
	2. Residential BMP: Rain Barrel	10.8%	48.0%	5.4%	24.0%	5.4%	24.0%	10.8%	48.0%	16.2%	72.0%	16.2%	72.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	Entirely
	3. Residential BMP: Irrigation Control (Turf Conversion)	3.6%	15.8%	1.8%	7.9%	1.8%	7.9%	3.6%	15.8%	5.3%	23.8%	5.3%	23.8%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	Partially
	4. Residential BMP: Downspout Disconnect	10.8%	48.0%	5.4%	24.0%	5.4%	24.0%	10.8%	48.0%	16.2%	72.0%	16.2%	72.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	Entirely
	5. Provide financial incentives to property owners to convert landscaping to site-specific native plants.	0.0%	0.0%	0.0%	0.0%	5.4%	24.0%	0.0%	0.0%	10.8%	48.0%	10.8%	48.0%	0.0%	0.0%	5.4%	24.0%	0.0%	0.0%	Entirely
K	Develop pilot project to identify and carry out site disconnections in targeted areas.	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	0.0%	0.0%	5.4%	24.0%	0.0%	0.0%	5.4%	24.0%	0.0%	0.0%	Entirely

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Appendix D – Range of Anticipated Pollutant Reduction for Nonstructural Strategies - FINAL

ID	NONSTRUCTURAL STRATEGY	Bacteria		Metals		Organics		Sediment		Pesticides		Nutrients		Oil and Grease		Dissolved Minerals		Trash		Entirely, Largely, or Partially?
		Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	
L	Identify and reduce incidents of power washing discharges from nonresidential sites.	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	Entirely
L.1.	Promote and encourage implementation of designated BMPs in nonresidential areas.	*Not Evaluated Herein*																		Largely
M	Proactively monitor for erosion, and complete minor repair and slope stabilization on municipal property.	1.8%	7.9%	0.0%	0.0%	0.0%	0.0%	5.3%	23.8%	0.0%	0.0%	1.8%	7.9%	0.0%	0.0%	1.8%	7.9%	0.0%	0.0%	Partially
MS4 Infrastructure																				
N	Implement operation and maintenance activities (inspection and cleaning) for MS4 and related structures (catch basins, storm drain inlets, detention basins, etc.).	*Not Evaluated Herein*																		Partially
	1. Optimize catch basin cleaning to maximize pollutant removal.	1.8%	7.9%	5.3%	23.8%	0.0%	0.0%	5.3%	23.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.3%	23.8%	Partially
	2. Proactively repair and replace MS4 components to provide source control from MS4 infrastructure.	1.8%	7.9%	5.3%	23.8%	0.0%	0.0%	5.3%	23.8%	0.0%	0.0%	1.8%	7.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Partially
	3. Increase frequency of open-channel cleaning and scour pond repair to reduce pollutant loads.	1.8%	7.9%	5.3%	23.8%	0.0%	0.0%	5.3%	23.8%	0.0%	0.0%	1.8%	7.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Partially
O	Implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers.	10.8%	48.0%	0.0%	0.0%	0.0%	0.0%	16.2%	72.0%	5.4%	24.0%	5.4%	24.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Entirely
	1. Identify sewer leaks and areas for sewer pipe replacement prioritization.	10.8%	48.0%	0.0%	0.0%	0.0%	0.0%	16.2%	72.0%	5.4%	24.0%	5.4%	24.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Entirely
Roads, Streets, and Parking Lots																				
P	Implement operation and maintenance activities for public streets, unpaved roads, paved roads, and paved highways.	3.6%	15.8%	10.7%	47.5%	3.6%	15.8%	10.7%	47.5%	0.0%	0.0%	10.7%	47.5%	0.0%	0.0%	3.6%	15.8%	10.7%	47.5%	Largely
	1. Enhance street sweeping through equipment replacement and route optimization.	3.6%	15.8%	10.7%	47.5%	3.6%	15.8%	10.7%	47.5%	0.0%	0.0%	10.7%	47.5%	0.0%	0.0%	3.6%	15.8%	10.7%	47.5%	Largely
	2. Initiate sweeping of medians on high-volume arterial roadways.	3.6%	15.8%	10.7%	47.5%	3.6%	15.8%	10.7%	47.5%	0.0%	0.0%	10.7%	47.5%	0.0%	0.0%	3.6%	15.8%	10.7%	47.5%	Largely
	3. Increase maintenance on access roads and trails.	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Largely
Q	Require sweeping and maintenance of private roads and parking lots in targeted areas.	3.6%	15.8%	10.7%	47.5%	3.6%	15.8%	10.7%	47.5%	0.0%	0.0%	10.7%	47.5%	0.0%	0.0%	3.6%	15.8%	10.7%	47.5%	Largely
R	Identify sites for pilot study to test Permeable Friction Course (PFC), which is a porous asphalt that overlays impermeable asphalt.	3.6%	15.8%	10.7%	47.5%	3.6%	15.8%	10.7%	47.5%	10.7%	47.5%	3.6%	15.8%	3.6%	15.8%	3.6%	15.8%	3.6%	15.8%	Largely
Pesticide, Herbicides, and Fertilizer Program																				
S	Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education, permits, and certifications.	0.0%	0.0%	0.0%	0.0%	10.7%	47.5%	0.0%	0.0%	10.7%	47.5%	10.7%	47.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Largely
Retrofit and Rehabilitation in Areas of Existing Development																				

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Appendix D – Range of Anticipated Pollutant Reduction for Nonstructural Strategies - FINAL

ID	NONSTRUCTURAL STRATEGY	Bacteria		Metals		Organics		Sediment		Pesticides		Nutrients		Oil and Grease		Dissolved Minerals		Trash		Entirely, Largely, or Partially?
		Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	
T	Develop and implement a strategy to identify candidate areas of existing development appropriate for retrofitting projects and facilitate the implementation of such projects.	*Not Evaluated Herein*																		Largely
U	Develop and implement a strategy to identify candidate areas of existing development for stream, channel, or habitat rehabilitation projects and facilitate implementation of such projects.	*Not Evaluated Herein*																		Largely
IDDE Program																				
V	Implement Illicit Discharge, Detection, and Elimination (IDDE) Program per the JRMPs. Requirements include maintaining an MS4 map, using municipal personnel and contractors to identify and report illicit discharges, maintaining a hotline for publicly reporting illicit discharges, monitoring MS4 outfalls, and investigating and addressing any illicit discharges.	*Not Evaluated Herein*																		Entirely
Public Education and Participation																				
W	Implement a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce pollutant discharge in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences.	*Not Evaluated Herein*																		Entirely
	1. Expand outreach to homeowners' association (HOA) common lands and HOA rebates.	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	16.2%	72.0%	16.2%	72.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	Entirely
	2. Develop an outreach and training program for property managers responsible for HOAs and maintenance districts.	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	16.2%	72.0%	16.2%	72.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	Entirely
	3. Conduct trash cleanups through community-based organizations involving target audiences.	7.1%	31.7%	3.6%	15.8%	3.6%	15.8%	0.0%	0.0%	3.6%	15.8%	0.0%	0.0%	3.6%	15.8%	0.0%	0.0%	10.7%	47.5%	Largely
	4. Target human behavior in parks and other public areas including trash reduction or other high-impact behavior to habitat, wildlife, and water quality.	*Not Evaluated Herein*																		Largely
	5. Improve consistency and content of websites to highlight enforceable conditions and reporting methods.	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	Entirely
	6. Contribute to San Diego County-led effort through regional education group for outreach, education, and policy measures for the equestrian community and property owners.	10.7%	47.5%	0.0%	0.0%	0.0%	0.0%	3.6%	15.8%	0.0%	0.0%	3.6%	15.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Largely
	1. Develop a targeted education and outreach program for homeowners adjacent to or with tributaries or streams within their property.	16.2%	72.0%	10.8%	48.0%	10.8%	48.0%	16.2%	78.0%	10.8%	48.0%	10.8%	48.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	Entirely
	1. Develop a targeted education and outreach program for homeowners with orchards or other agricultural land uses on their property.	5.4%	24.0%	0.0%	0.0%	0.0%	0.0%	16.2%	72.0%	16.2%	72.0%	16.2%	72.0%	0.0%	0.0%	5.4%	24.0%	5.4%	24.0%	Entirely

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Appendix D – Range of Anticipated Pollutant Reduction for Nonstructural Strategies - FINAL

ID	NONSTRUCTURAL STRATEGY	Bacteria		Metals		Organics		Sediment		Pesticides		Nutrients		Oil and Grease		Dissolved Minerals		Trash		Entirely, Largely, or Partially?
		Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	
	2. Enhance school and recreation-based education and outreach	*Not Evaluated Herein*																		Entirely
	3. Develop education and outreach to reduce over-irrigation	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	5.3%	23.8%	5.3%	23.8%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	Partially
	7. Develop regional training for water-using mobile businesses.	10.8%	48.0%	10.8%	48.0%	10.8%	48.0%	10.8%	48.0%	5.4%	24.0%	5.4%	24.0%	10.8%	48.0%	5.4%	24.0%	5.4%	24.0%	Entirely
X	Enhance education and outreach based on results of effectiveness survey and changing regulatory requirements.	*Not Evaluated Herein*																		Entirely
Y	Provide technical education and outreach to the development community on the design and implementation requirements of the MS4 Permit and Water Quality Improvement Plan requirements.	*Not Evaluated Herein*																		Entirely
Enforcement Response Plan																				
Z	Implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Enforcement Response Plan.	*Not Evaluated Herein*																		Largely
	1. Increase enforcement of over-irrigation.	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	5.3%	23.8%	5.3%	23.8%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	Partially
	2. Focus locally on enforcement of water-using mobile businesses.	7.1%	31.7%	3.6%	15.8%	3.6%	15.8%	3.6%	15.8%	3.6%	15.8%	3.6%	15.8%	3.6%	15.8%	3.6%	15.8%	3.6%	15.8%	Largely
AA	Increase identification and enforcement of actionable erosion and slope stabilization issues on private property and require stabilization and repair.	1.8%	7.9%	0.0%	0.0%	0.0%	0.0%	5.3%	23.8%	0.0%	0.0%	1.8%	7.9%	0.0%	0.0%	1.8%	7.9%	0.0%	0.0%	Partially
Optional Strategies																				
AB	Continue participating in source reduction initiatives. (Varies. For example, the Brake Pad Partnership is existing. Considered may be a plastic bag ban, banning leaf blowers, banning pesticides or herbicide.)	*Not Evaluated Herein*																		Entirely
AC	Develop a program to address and capture trash and debris.	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	10.7%	47.5%	Largely
AD	Support partnership efforts by social service providers to provide sanitation and trash management for persons experiencing homelessness.	16.2%	72.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.4%	24.0%	0.0%	0.0%	0.0%	0.0%	16.2%	72.0%	Entirely
AE	Protect areas that are functioning naturally.	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	5.3%	23.8%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	Partially
	1. Develop a policy to avoid additional hardscape development and degradation in unpaved open space areas.	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	5.3%	23.8%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	Partially
	2. Add permanent open space protections to undeveloped city-owned land.	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	5.3%	23.8%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	Partially
	3. Acquire privately owned undeveloped parcels of land.	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	5.3%	23.8%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	Partially

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Appendix D – Range of Anticipated Pollutant Reduction for Nonstructural Strategies - FINAL

ID	NONSTRUCTURAL STRATEGY	Bacteria		Metals		Organics		Sediment		Pesticides		Nutrients		Oil and Grease		Dissolved Minerals		Trash		Entirely, Largely, or Partially?
		Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	
	Mapping and risk assessment of agricultural operations.	5.4%	24.0%	5.4%	24.0%	10.8%	48.0%	10.8%	48.0%	10.8%	48.0%	10.8%	48.0%	5.4%	24.0%	10.8%	48.0%	10.8%	48.0%	Entirely
	Implement a program to target on-site wastewater treatment (septic) systems. May include mapping and risk assessment, inspection, or maintenance practices.	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	10.8%	48.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	Entirely
	Removal of invasive plants and animals.	10.8%	48.0%	0.0%	0.0%	0.0%	0.0%	16.2%	72.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Entirely
AF	Conduct a feasibility study to determine if implementing an urban tree canopy (UTC) program would benefit water quality and other goals.	*Not Evaluated Herein*																		Entirely
	Investigate alternative pollutant removal or treatment strategies such as fungus used to remove soil contaminants.	*Not Evaluated Herein*																		Entirely
AG	Conduct special studies to gather additional monitoring information about priority conditions or beneficial uses. (Monitoring may include investigative measures such as genetic tracking for bacteria sources or geomorphic studies for sediment sources or processes. - LOS PEN)	*Not Evaluated Herein*																		Entirely
AH	Collaborate with entities potentially including, but not limited to:	*Not Evaluated Herein*																		Entirely
	• Departments within the same Responsible Agency.																			Entirely
	• Other governmental agencies such as water, transportation, or public health agencies.																			Entirely
	• Nongovernmental agencies such as environmental and community groups and private corporations.																			Entirely
	• Dischargers regulated under other permits including the Phase II National Pollutant Discharge Elimination System (NPDES) Permit, Industrial General Permit, and Construction General Permit.																			Entirely
	Collaboration may take the form of joint participation in stakeholder meetings, studies or development studies or BMPs, hiring of a Watershed Coordinator to facilitate communication between community groups and the City, formation of a City Watershed team to protect and restore the watershed, or participating in existing groups, such as Integrated Regional Water Management (IRWM) groups.																			Entirely
	1. Funding for collaborative strategies may include providing in-kind services, shared costs through agreements, and preparation and competition for grant funding.																			Entirely

*Purple highlighting: deviation between the "Potential Strategies" documents. Added to be comprehensive

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Attachment 2

Range of Anticipated pollutant Reduction of Nonstructural Strategies with Recommended Value Selected

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Range of Anticipated Pollutant Reduction of Nonstructural Strategies with Recommended Value Selected - Final

ID	NONSTRUCTURAL STRATEGY - Pollution Generating Activity	Bacteria		Metals		Organics		Sediment		Pesticides		Nutrients		Oil and Grease		Dissolved Minerals		Trash		Entirely, Largely, or Partially?
		Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	
Jurisdictional Runoff Management Program (JRMP) Strategies																				
Development Planning																				
All Development Projects																				
A	For all development projects, administer a program to ensure implementation of source control BMPs to minimize pollutant generation at each project and implement low-impact development (LID) BMPs to maintain or restore hydrology of the area, where applicable and feasible.	*Benefit Varies*																		Largely
B	Amend municipal code and ordinances, including zoning ordinances, to facilitate and encourage LID opportunities.	*Benefit Varies*																		Largely
C	Train staff on LID regulatory changes and LID Design Manual.	*Benefit Varies*																		Entirely
Priority Development Projects (PDPs)																				
D	For PDPs, administer a program requiring implementation of on-site structural BMPs to control pollutants and manage hydromodification. Includes confirmation of design, construction, and maintenance of PDP structural BMPs.	*Benefit Varies*																		Largely
E	Update BMP Design Manual procedures to determine nature and extent of storm water requirements applicable to development projects and to identify conditions of concern for selecting, designing, and maintaining appropriate structural BMPs.	*Benefit Varies*																		Largely
	1. Amend BMP Design Manual for trash areas. Require full four-sided enclosure, siting away from storm drains and cover. Consider the retrofit requirement.	10.7%	47.5%	3.6%	15.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.6%	15.8%	0.0%	0.0%	10.7%	47.5%	Largely
	2. Amend BMP Design Manual for animal-related facilities.	10.7%	47.5%	0.0%	0.0%	0.0%	0.0%	10.7%	47.5%	10.7%	47.5%	10.7%	47.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Largely
	3. Amend BMP Design Manual for nurseries and garden centers.	7.1%	31.7%	0.0%	0.0%	10.7%	47.5%	10.7%	47.5%	10.7%	47.5%	10.7%	47.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Largely
	4. Amend BMP Design Manual for auto-related uses.	3.6%	15.8%	7.1%	31.7%	3.6%	15.8%	3.6%	15.8%	0.0%	0.0%	0.0%	0.0%	10.7%	47.5%	0.0%	0.0%	10.7%	47.5%	Largely
F	Administer an alternative compliance program to on-site structural BMP implementation (includes identifying Watershed Management Area Analysis [WMAA] candidate projects).	*Benefit Varies*																		Entirely
	1. Develop a mitigation policy for public and private development projects that links development with mitigation within the same watershed.	*Benefit Varies*																		Entirely
	1a. Create an In-Lieu Fee	*Benefit Varies*																		Entirely

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Range of Anticipated Pollutant Reduction of Nonstructural Strategies with Recommended Value Selected - Final

ID	NONSTRUCTURAL STRATEGY - Pollution Generating Activity	Bacteria		Metals		Organics		Sediment		Pesticides		Nutrients		Oil and Grease		Dissolved Minerals		Trash		Entirely, Largely, or Partially?
		Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	
Construction Management																				
G	Administer a program to oversee implementation of BMPs during the construction phase of land development. Includes inspections at an appropriate frequency and enforcement of requirements.	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	10.7%	47.5%	0.0%	0.0%	0.0%	0.0%	3.6%	15.8%	0.0%	0.0%	3.6%	15.8%	Largely
Existing Development																				
Commercial, Industrial, Municipal, and Residential Facilities and Areas																				
H	Administer a program to require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types, and PGAs, as appropriate. Includes inspecting existing development at appropriate frequencies and using appropriate methods. (Inspections for PGAs of concern: Vehicle Washing area inspections and inspections for food-related businesses, animal-related businesses, nurseries and garden centers, and auto-related businesses.)	*Benefit Varies*																		Largely
	1. Update minimum BMPs for existing residential, commercial, and industrial development and enforce them.	*Benefit Varies*																		Largely
	2. Design, implement, and enforce property- and PGA-based inspections.	3.6%	15.8%	3.6%	15.8%	3.6%	15.8%	3.6%	15.8%	3.6%	15.8%	3.6%	15.8%	3.6%	15.8%	3.6%	15.8%	3.6%	15.8%	Largely
	1. Review policies and procedures to ensure discharges from swimming pools meet permit requirements.	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	16.2%	72.0%	0.0%	0.0%	Entirely
	3. Develop a self-reporting inspection option for select industrial and commercial facilities.	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	Entirely
I	Implement pet waste program. May include installation and maintenance of pet waste bag dispensers and trash bins, signage and education, physical removal of pet waste, or enforcement.	10.7%	47.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	7.1%	31.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Largely
J	Promote and encourage implementing designated BMPs at residential areas.	7.1%	31.7%	3.6%	15.8%	3.6%	15.8%	7.1%	31.7%	10.7%	47.5%	10.7%	47.5%	3.6%	15.8%	3.6%	15.8%	3.6%	15.8%	Largely
	1. Expand residential BMP (irrigation, rainwater harvesting, and turf conversion) rebate programs to multi-family housing in target areas.	3.6%	15.8%	1.8%	7.9%	1.8%	7.9%	3.6%	15.8%	5.3%	23.8%	5.3%	23.8%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	Partially
	2. Residential BMP: Rain Barrel	10.8%	48.0%	5.4%	24.0%	5.4%	24.0%	10.8%	48.0%	16.2%	72.0%	16.2%	72.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	Entirely
	3. Residential BMP: Irrigation Control (Turf Conversion)	3.6%	15.8%	1.8%	7.9%	1.8%	7.9%	3.6%	15.8%	5.3%	23.8%	5.3%	23.8%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	Partially
	4. Residential BMP: Downspout Disconnect	10.8%	48.0%	5.4%	24.0%	5.4%	24.0%	10.8%	48.0%	16.2%	72.0%	16.2%	72.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	Entirely
	5. Provide financial incentives to property owners to convert landscaping to site-specific native plants.	0.0%	0.0%	0.0%	0.0%	5.4%	24.0%	0.0%	0.0%	10.8%	48.0%	10.8%	48.0%	0.0%	0.0%	5.4%	24.0%	0.0%	0.0%	Entirely
K	Develop pilot project to identify and carry out site disconnections in targeted areas.	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	0.0%	0.0%	5.4%	24.0%	0.0%	0.0%	5.4%	24.0%	0.0%	0.0%	Entirely

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Range of Anticipated Pollutant Reduction of Nonstructural Strategies with Recommended Value Selected - Final

ID	NONSTRUCTURAL STRATEGY - Pollution Generating Activity	Bacteria		Metals		Organics		Sediment		Pesticides		Nutrients		Oil and Grease		Dissolved Minerals		Trash		Entirely, Largely, or Partially?
		Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	
L	Identify and reduce incidents of power washing discharges from nonresidential sites.	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	Entirely
L.1.	Promote and encourage implementation of designated BMPs in nonresidential areas.	*Benefit Varies*																		Largely
M	Proactively monitor for erosion, and complete minor repair and slope stabilization on municipal property.	1.8%	7.9%	0.0%	0.0%	0.0%	0.0%	5.3%	23.8%	0.0%	0.0%	1.8%	7.9%	0.0%	0.0%	1.8%	7.9%	0.0%	0.0%	Partially
MS4 Infrastructure																				
N	Implement operation and maintenance activities (inspection and cleaning) for MS4 and related structures (catch basins, storm drain inlets, detention basins, etc.).	*Benefit Varies*																		Partially
	1. Optimize catch basin cleaning to maximize pollutant removal.	1.8%	7.9%	5.3%	23.8%	0.0%	0.0%	5.3%	23.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.3%	23.8%	Partially
	2. Proactively repair and replace MS4 components to provide source control from MS4 infrastructure.	1.8%	7.9%	5.3%	23.8%	0.0%	0.0%	5.3%	23.8%	0.0%	0.0%	1.8%	7.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Partially
	3. Increase frequency of open-channel cleaning and scour pond repair to reduce pollutant loads.	1.8%	7.9%	5.3%	23.8%	0.0%	0.0%	5.3%	23.8%	0.0%	0.0%	1.8%	7.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Partially
O	Implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers.	10.8%	48.0%	0.0%	0.0%	0.0%	0.0%	16.2%	72.0%	5.4%	24.0%	5.4%	24.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Entirely
	1. Identify sewer leaks and areas for sewer pipe replacement prioritization.	10.8%	48.0%	0.0%	0.0%	0.0%	0.0%	16.2%	72.0%	5.4%	24.0%	5.4%	24.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Entirely
Roads, Streets, and Parking Lots																				
P	Implement operation and maintenance activities for public streets, unpaved roads, paved roads, and paved highways.	3.6%	15.8%	10.7%	47.5%	3.6%	15.8%	10.7%	47.5%	0.0%	0.0%	10.7%	47.5%	0.0%	0.0%	3.6%	15.8%	10.7%	47.5%	Largely
	1. Enhance street sweeping through equipment replacement and route optimization.	3.6%	15.8%	10.7%	47.5%	3.6%	15.8%	10.7%	47.5%	0.0%	0.0%	10.7%	47.5%	0.0%	0.0%	3.6%	15.8%	10.7%	47.5%	Largely
	2. Initiate sweeping of medians on high-volume arterial roadways.	3.6%	15.8%	10.7%	47.5%	3.6%	15.8%	10.7%	47.5%	0.0%	0.0%	10.7%	47.5%	0.0%	0.0%	3.6%	15.8%	10.7%	47.5%	Largely
	3. Increase maintenance on access roads and trails.	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Largely
Q	Require sweeping and maintenance of private roads and parking lots in targeted areas.	3.6%	15.8%	10.7%	47.5%	3.6%	15.8%	10.7%	47.5%	0.0%	0.0%	10.7%	47.5%	0.0%	0.0%	3.6%	15.8%	10.7%	47.5%	Largely
R	Identify sites for pilot study to test Permeable Friction Course (PFC), which is a porous asphalt that overlays impermeable asphalt.	3.6%	15.8%	10.7%	47.5%	3.6%	15.8%	10.7%	47.5%	10.7%	47.5%	3.6%	15.8%	3.6%	15.8%	3.6%	15.8%	3.6%	15.8%	Largely
Pesticide, Herbicides, and Fertilizer Program																				
S	Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education, permits, and certifications.	0.0%	0.0%	0.0%	0.0%	10.7%	47.5%	0.0%	0.0%	10.7%	47.5%	10.7%	47.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Largely

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ID	NONSTRUCTURAL STRATEGY - Pollution Generating Activity	Bacteria		Metals		Organics		Sediment		Pesticides		Nutrients		Oil and Grease		Dissolved Minerals		Trash		Entirely, Largely, or Partially?
		Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	
Retrofit and Rehabilitation in Areas of Existing Development																				
T	Develop and implement a strategy to identify candidate areas of existing development appropriate for retrofitting projects and facilitate the implementation of such projects.	*Benefit Varies*																		Largely
U	Develop and implement a strategy to identify candidate areas of existing development for stream, channel, or habitat rehabilitation projects and facilitate implementation of such projects.	*Benefit Varies*																		Largely
IDDE Program																				
V	Implement Illicit Discharge, Detection, and Elimination (IDDE) Program per the JRMPs. Requirements include maintaining an MS4 map, using municipal personnel and contractors to identify and report illicit discharges, maintaining a hotline for publicly reporting illicit discharges, monitoring MS4 outfalls, and investigating and addressing any illicit discharges.	*Benefit Varies*																		Entirely
Public Education and Participation																				
W	Implement a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce pollutant discharge in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences.	*Benefit Varies*																		Entirely
	1. Expand outreach to homeowners' association (HOA) common lands and HOA rebates.	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	16.2%	72.0%	16.2%	72.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	Entirely
	2. Develop an outreach and training program for property managers responsible for HOAs and maintenance districts.	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	16.2%	72.0%	16.2%	72.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	Entirely
	3. Conduct trash cleanups through community-based organizations involving target audiences.	7.1%	31.7%	3.6%	15.8%	3.6%	15.8%	0.0%	0.0%	3.6%	15.8%	0.0%	0.0%	3.6%	15.8%	0.0%	0.0%	10.7%	47.5%	Largely
	4. Target human behavior in parks and other public areas including trash reduction or other high-impact behavior to habitat, wildlife, and water quality.	*Benefit Varies*																		Largely
	5. Improve consistency and content of websites to highlight enforceable conditions and reporting methods.	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	Entirely
	6. Contribute to San Diego County-led effort through regional education group for outreach, education, and policy measures for the equestrian community and property owners.	10.7%	47.5%	0.0%	0.0%	0.0%	0.0%	3.6%	15.8%	0.0%	0.0%	3.6%	15.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Largely
	1. Develop a targeted education and outreach program for homeowners adjacent to or with tributaries or streams within their property.	16.2%	72.0%	10.8%	48.0%	10.8%	48.0%	16.2%	72.0%	10.8%	48.0%	10.8%	48.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	Entirely
	1. Develop a targeted education and outreach program for homeowners with orchards or other agricultural land uses on their property.	5.4%	24.0%	0.0%	0.0%	0.0%	0.0%	16.2%	72.0%	16.2%	72.0%	16.2%	72.0%	0.0%	0.0%	5.4%	24.0%	5.4%	24.0%	Entirely

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		Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	
	2. Enhance school and recreation-based education and outreach	Benefit Varies																		Entirely
	3. Develop education and outreach to reduce over-irrigation	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	5.3%	23.8%	5.3%	23.8%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	Partially
	7. Develop regional training for water-using mobile businesses.	10.8%	48.0%	10.8%	48.0%	10.8%	48.0%	10.8%	48.0%	5.4%	24.0%	5.4%	24.0%	10.8%	48.0%	5.4%	24.0%	5.4%	24.0%	Entirely
X	Enhance education and outreach based on results of effectiveness survey and changing regulatory requirements.	*Benefit Varies*																		Entirely
Y	Provide technical education and outreach to the development community on the design and implementation requirements of the MS4 Permit and Water Quality Improvement Plan requirements.	*Benefit Varies*																		Entirely
Enforcement Response Plan																				
Z	Implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Enforcement Response Plan.	*Benefit Varies*																		Largely
	1. Increase enforcement of over-irrigation.	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	5.3%	23.8%	5.3%	23.8%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	Partially
	2. Focus locally on enforcement of water-using mobile businesses.	7.1%	31.7%	3.6%	15.8%	3.6%	15.8%	3.6%	15.8%	3.6%	15.8%	3.6%	15.8%	3.6%	15.8%	3.6%	15.8%	3.6%	15.8%	Largely
AA	Increase identification and enforcement of actionable erosion and slope stabilization issues on private property and require stabilization and repair.	1.8%	7.9%	0.0%	0.0%	0.0%	0.0%	5.3%	23.8%	0.0%	0.0%	1.8%	7.9%	0.0%	0.0%	1.8%	7.9%	0.0%	0.0%	Partially
Optional Strategies																				
AB	Continue participating in source reduction initiatives. (Varies. For example, the Brake Pad Partnership is existing. Considered may be a plastic bag ban, banning leaf blowers, banning pesticides or herbicide.)	*Benefit Varies*																		Entirely
AC	Develop a program to address and capture trash and debris.	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	10.7%	47.5%	Largely
AD	Support partnership efforts by social service providers to provide sanitation and trash management for persons experiencing homelessness.	16.2%	72.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.4%	24.0%	0.0%	0.0%	0.0%	0.0%	16.2%	72.0%	Entirely
AE	Protect areas that are functioning naturally.	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	5.3%	23.8%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	Partially
	1. Develop a policy to avoid additional hardscape development and degradation in unpaved open space areas.	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	5.3%	23.8%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	Partially
	2. Add permanent open space protections to undeveloped city-owned land.	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	5.3%	23.8%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	Partially
	3. Acquire privately owned undeveloped parcels of land.	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	5.3%	23.8%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	1.8%	7.9%	Partially

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		Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	
	Mapping and risk assessment of agricultural operations.	5.4%	24.0%	5.4%	24.0%	10.8%	48.0%	10.8%	48.0%	10.8%	48.0%	10.8%	48.0%	5.4%	24.0%	10.8%	48.0%	10.8%	48.0%	Entirely
	Implement a program to target on-site wastewater treatment (septic) systems. May include mapping and risk assessment, inspection, or maintenance practices.	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	10.8%	48.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	5.4%	24.0%	Entirely
	Removal of invasive plants and animals.	10.8%	48.0%	0.0%	0.0%	0.0%	0.0%	16.2%	72.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Entirely
AF	Conduct a feasibility study to determine if implementing an urban tree canopy (UTC) program would benefit water quality and other goals.	*Benefit Varies*																		Entirely
	Investigate alternative pollutant removal or treatment strategies such as fungus used to remove soil contaminants.	*Benefit Varies*																		Entirely
AG	Conduct special studies to gather additional monitoring information about priority conditions or beneficial uses. (Monitoring may include investigative measures such as genetic tracking for bacteria sources or geomorphic studies for sediment sources or processes. - LOS PEN)	*Benefit Varies*																		Entirely
AH	Collaborate with entities potentially including, but not limited to:	Benefit Varies																		Entirely
	• Departments within the same Responsible Agency.																			Entirely
	• Other governmental agencies such as water, transportation, or public health agencies.																			Entirely
	• Nongovernmental agencies such as environmental and community groups and private corporations.																			Entirely
	• Dischargers regulated under other permits including the Phase II National Pollutant Discharge Elimination System (NPDES) Permit, Industrial General Permit, and Construction General Permit.																			Entirely
	Collaboration may take the form of joint participation in stakeholder meetings, studies or development studies or BMPs, hiring of a Watershed Coordinator to facilitate communication between community groups and the City, formation of a City Watershed team to protect and restore the watershed, or participating in existing groups, such as Integrated Regional Water Management (IRWM) groups.																			Entirely
	1. Funding for collaborative strategies may include providing in-kind services, shared costs through agreements, and preparation and competition for grant funding.																			Entirely