Economic Analysis of the 2008 Draft General Permit for Stormwater Discharges Associated with Construction Activity

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Executive Summary

The purpose of this report is to determine the economic consequences of new storm water regulations promulgated by the California State Water Resources Control Board (SWRCB). Specifically, the report provides a qualitative and quantitative analysis of the impacts of storm water regulation on construction activity such as housing development, highway and school construction projects.

SWRCB is proposing a draft Construction General Permit ("Draft Permit") to supersede the previous Construction General Permit Order 99-08-DWQ (CGP) that will regulate all construction activity for sites one acre or larger in California. The Board's stated aim is to regulate runoff from construction sites in order to protect the beneficial uses of water bodies. New to the Draft Permit is a risk based permitting approach that utilizes a risk calculator to rank construction sites based on their potential to negatively impact water bodies. Specific requirements that sites must undertake to comply with the Draft Permit are dependent on their risk categorization.

The study presents a calculation of economic impacts for Ventura County. This region was chosen because it is typical of many areas in Southern California: there is a large presence of impaired water bodies in the region, a large amount of development is occurring, and the climate is fairly dry. Figure ES-1 depicts the study area. The approach to valuing the impacts of the Draft Permit conducted in this report can generally be applied to other counties in California.

The analysis is forward looking and assesses the costs of the Draft Permit between 2008 and 2030. A key component of the analysis is projections of land use changes over the study period. Cities in Ventura County have adopted a number of citizen-initiated proposals to limit the footprint of urban development. By far, the most important of these efforts is Save Open-Space and Agricultural Resources (SOAR), which requires voter approval for development outside of defined areas. The report projects development under the SOAR restrictions, and uses the resulting information about the location of future development to assess the likely risk categories into which future development in Ventura County will fall.

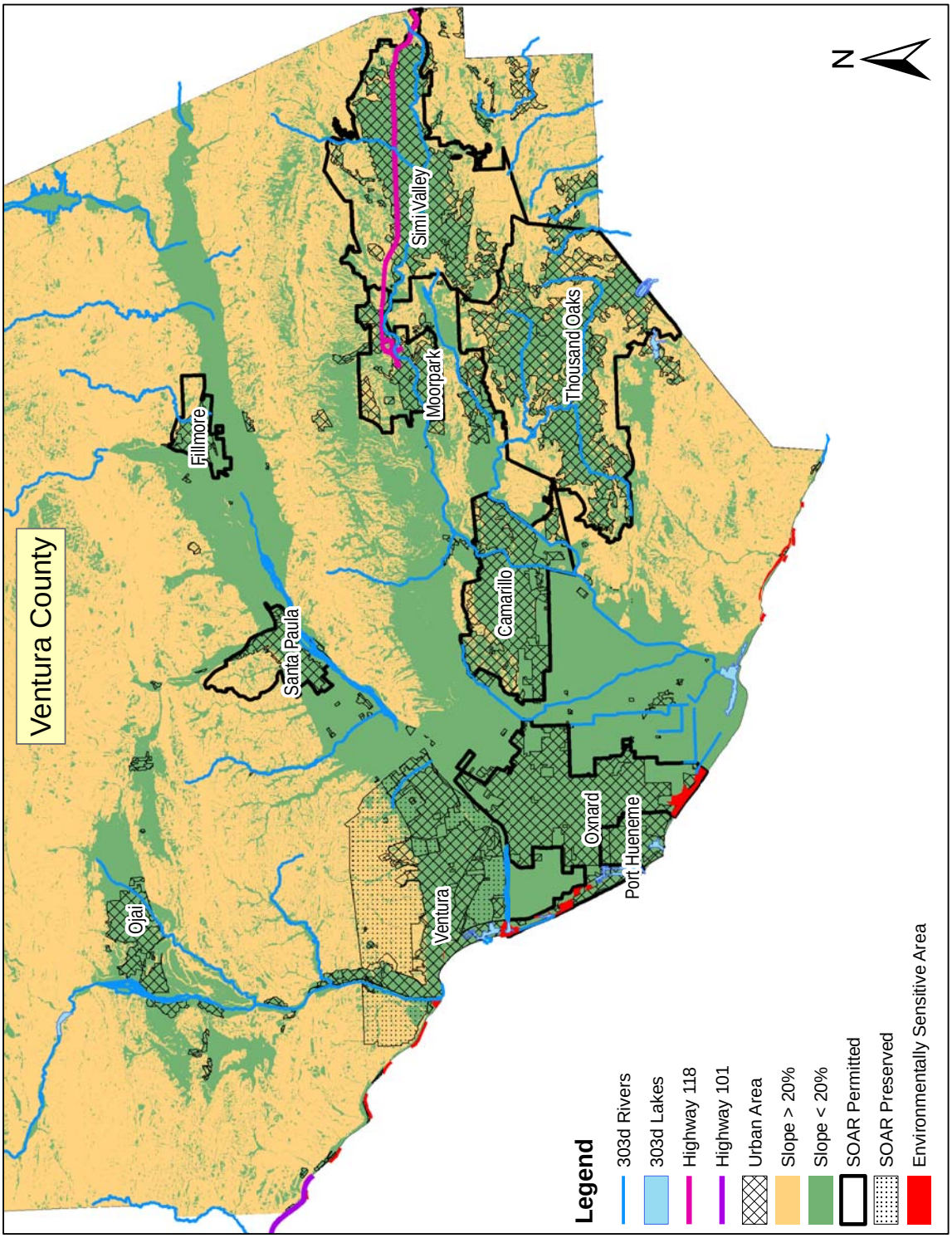

Figure ES-1: Ventura County Study Area

The analysis presents information on the per acre costs resulting from compliance with the Draft Permit. One finding of the study is that the per-acre costs of compliance can be significantly higher for small sites than for large sites. This result stems from the economies of scale inherent in important technologies to control and treat storm water. Table ES-1 below summarizes the results on per acre compliance costs.

Table ES-1: Per Acre Costs of the Draft Permit

	Site Size	Per Acre Cost
Transportation Risk Level 2		$159,100
Transportation Risk Level 3		$170,900
Development Risk Level 2	5 Acre	$10,000
	50 Acre	$5,600
Development Risk Level 3	5 Acre	$38,400
	50 Acre	$31,600
School	5 Acre	$10,000

The analysis also presents information on the aggregate costs of the Draft Permit for the Ventura County study area. Aggregating across the acres of development projected in the County to 2030, the total costs to comply with the Draft Permit are approximately $203 million in 2008 dollars.

Table ES-2: Ventura County Costs

Development	Schools	Transportation	Total
$190,400,000	$2,200,000	$10,000,000	$203,000,000

The analysis demonstrates that the Draft Permit will impose substantial costs on the regulated community, which is composed of both public and private sector entities. While it is difficult to extrapolate the results of this analysis, it is clear that the Draft Permit will impose statewide costs in the billions of dollars over the coming two decades.

Other economic impacts of the Draft Permit are treated qualitatively in this study. For instance, there is considerable uncertainty at the project level regarding the potential costs to comply with the Draft Permit. The study shows that compliance costs can vary considerably with site-specific conditions that are difficult to ascertain prior to conducting certain detailed investigations. The impacts of such uncertainty are especially burdensome for public projects that operate with fixed budgets.

The report does not consider the economic costs resulting from compliance with hydromodification requirements, but rather focuses on storm water management procedures occurring during the construction period. These costs will be in addition to the ones estimated in the report.

I. Background

1. Clean Water Act

The Federal Water Pollution Control Act Amendments of 1972 arose out of a growing concern with surface water quality. As amended in 1977, this law became commonly known as the Clean Water Act (CWA). The CWA gave the Environmental Protection Agency (EPA) the authority to implement water pollution control programs. The focus of EPA regulations logically began with the easiest pollution targets – those confined to enclosed locations and containing the greatest sources of pollution; a source and pollutant approach directed at discharges from traditional facilities such as sewage plants and industrial facilities. In recent years the EPA has been targeting runoff from streets and construction sites using a watershed based strategy that aims to both protect and repair water bodies.[1]

The CWA includes a number of provisions to protect water quality. The CWA created requirements to set water quality standards for all contaminants in surface waters. The CWA made it unlawful for any person to discharge any pollutant from a point source into navigable waters, unless a permit was obtained under its provisions.[2] The 1987 amendments to the CWA added Section 402(p), which established a framework for regulating municipal and industrial storm water discharges under the National Pollution Discharge Elimination System (NPDES) Program. It also funded the construction of sewage treatment plants under the construction grants program and recognized the need for planning to address the critical problems posed by nonpoint source pollution. On November 16, 1990, the EPA published final regulations that established storm water permit application requirements for specified categories of industries.[3]

2. Construction Storm Water Regulation

Exposed soil at construction sites is highly vulnerable to erosion by rainfall and wind, and the movement of trucks and machinery can "track" soil to the adjacent streets. There are a number of pollutants of concern at construction sites such as petroleum products and upturned sediment that can run off into the storm water. Additionally, development projects also create increased impervious surfaces that impede the absorption of water and the capture of pollutants in soils. Impervious surfaces also increase the risk of flooding and diminish the capacity for groundwater recharge to occur. As a result the propensity for pollutants to be discharged to receiving waters increases and can reduce water quality.

The EPA regulates discharge from construction sites in two phases. Phase I of the regulations on construction activity established in 1990 provide that discharges of storm water to waters of the United States from construction projects that encompass five or more acres of soil disturbance are effectively prohibited unless the discharge is in

[1] US EPA website available at http://www.epa.gov/watertrain/cwa/, accessed on December 17, 2007.
[2] US EPA website available http://www.epa.gov/lawsregs/laws/cwa.html, accessed on December 17, 2007.
[3] State Water Resources Control Board, Fact Sheet for Water Quality Order 2008-XX-DWQ on March 18, 2008.

compliance with an NPDES Permit. Phase II which became final in 1999 lowered the permitting threshold from five acres to one acre.[4]

In California, the State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (RWQCBs) enforce the NPDES storm water program. Federal regulations allow two permitting options for issuing construction permits for storm water discharge, individual permits and General Permits. Discharges of runoff from construction sites are subject to dual (state and local) storm water regulation to ensure the most effective oversight of construction site discharges. Under this dual system, the RWQCB is responsible for enforcing the CGP.[5]

In 1999, SWRCB opted to adopt only one general permit[6] to cover all construction activities in California that are greater than one acre. By issuing a general permit SWRCB hopes to minimize the administrative costs of reviewing individual construction permits. Construction activity subject to this permit includes clearing, grading, and disturbances to the ground such as stockpiling, or excavation, but does not include regular maintenance activities.[7]

The CGP, Order 99-08-DWQ, prohibits the discharge of materials other than storm water and authorized non-storm water discharges and all discharges which contain a hazardous substance in excess of reportable quantities unless a separate NPDES Permit has been issued to regulate those discharges. The discharge materials include sediment, Total Petroleum Hydrocarbons (TPH), toxics, and alkaline materials disrupting the pH of the storm water.[8]

In accordance with the requirements of CWA, effluent limitations contained in the 1999 CGP are narrative and include the requirement to implement appropriate Best Management Practices (BMP). The BMPs primarily emphasize source controls such as erosion control and pollution prevention methods. The 1999 General Permit requires dischargers to install structural controls as necessary. Other guidelines for sediment are those which will constitute best available technology (BAT) economically achievable and best conventional pollutant control technology (BCT) that will achieve compliance with water quality standards.

According to the CGP, construction related activities, which cause or contribute to an exceedance of water quality standards must be corrected. The dynamic nature of construction activity allows the discharger the ability to quickly identify and correct the source of the exceedances. Water quality standards consist of the designation of

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[4] *Ibid.*

[5] California State Water Resources Control Board, Water Quality Order No. 2003-0005-DWQ, Waste Discharge Requirements for Storm Water Discharges From Small Municipal Separate Storm Sewer Systems (General Permit) available at http://www.swrcb.ca.gov/stormwtr/municipal.html, accessed on December 18, 2007

[6] State Water Resources Control Board National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction Activity (General Permit) Water Quality Order 99-08-DWQ

[7] *Ibid*

[8] *Ibid*.

beneficial uses of surface waters and the adoption of ambient criteria necessary to protect those uses. The best method to ensure compliance with receiving water standards is to implement BMPs that prevent pollutants from coming into contact with storm water or from leaving the construction site in runoff.[9]

The 1999 General Permit requires development and implementation of a Storm Water Pollution Prevention Plan (SWPPP). Required elements of a SWPPP include:

- Site description addressing the elements and characteristics specific to the site
- Descriptions of BMPs for erosion and sediment controls
- BMPs for construction waste handling and disposal
- Implementation of approved local plans
- Proposed post-construction controls, including description of local post-construction erosion and sediment control requirements, and
- Non-storm water management

According to Order 99-08-DWQ all dischargers are required to conduct inspections of the construction site prior to anticipated storm events and after actual storm events. During extended storm events, inspections must be made during each 24-hour period. Equipment, materials, and workers must be available for rapid response to failures and emergencies.

The discharger is required to retain records of all monitoring information, copies of all reports and records of all data used to complete the Notice of Intent (NOI) for all construction activities for a period of at least three years.[10]

2.2 Regulatory History and the Proposed Construction General Permit

The San Francisco Baykeeper, Santa Monica Baykeeper, San Diego Baykeeper, and Orange Coast Keeper filed a petition for writ of mandate challenging the Order 99-08-DWQ in Superior Court, County of Sacramento. The court directed the State Water Board to modify the provisions of the General Permit to require permittees to implement specific sampling and analytical procedures to determine the efficacy of BMPs implemented on a construction site. On December 27, 2001, the Court acknowledged that the permit had been modified, but required further actions by the SWRCB. In general, the Court expressed concern that certain aspects of the modifications might be ambiguous and might result in misinterpretation by dischargers. The 2008 Draft Permit incorporates portions of the legal rulings that are applicable.

[9] *Ibid*
[10] *Ibid*

On January 14, 2003, the Ninth Circuit issued its decision in *Environmental Defense Center v. USEPA*. This ruling found that EPA's Phase II regulations were deficient on three procedural grounds. The court determined that applications for general permit coverage (including the Notice of Intent and Storm Water Management Program [SWMP]) must be made available to the public, the applications must be reviewed and determined to meet the applicable standard by the permitting authority before coverage commences, and there must be a process to accommodate public hearings. The basis of the ruling was that the regulations did not require specific provisions and that they allowed dischargers, in essence, to write their own permits.[11]

In response to the environmental challenges to NPDES permits, in 2005 and 2006, the SWRCB convened an expert panel (Panel) to address the feasibility of Numeric Effluent Limits (NELs) in California's storm water permits. Specifically, the panel was asked to address:

> "Is it technically feasible to establish numeric effluent limitations, or some other quantifiable limit, for inclusion in storm water permits? How would such limitations or criteria be established, and what information and data would be required?"
>
> "The answers should address industrial general permits, construction general permits, and area-wide municipal permits. The answers should also address both technology-based limitations or criteria and water quality-based limitations or criteria. In evaluating establishment of any objective criteria, the panel should address all of the following:
>
> 1) The ability of the State Water Board to establish appropriate objective limitations or criteria;
>
> 2) How compliance determinations would be made;
>
> 3) The ability of dischargers and inspectors to monitor for compliance; and
>
> 4) The technical and financial ability of dischargers to comply with the limitations or criteria."

The panel made the following observations:

> "Limited field studies indicate that traditional erosion and sediment controls are highly variable in performance, resulting in highly variable turbidity levels in the site discharge.
>
> Site-to-site variability in runoff turbidity from undeveloped sites can also be quite large in many areas of California, particularly in more arid regions with less natural vegetative cover and steep slopes.

[11] *Ibid*

> Active treatment technologies involving the use of polymers with relatively large storage systems now exist that can provide much more consistent and very low discharge turbidity. However, these technologies have as yet only been applied to larger construction sites, generally five acres or greater. Furthermore, toxicity has been observed at some locations, although at the vast majority of sites, toxicity has not occurred. There is also the potential for an accidental large release of such chemicals with their use.
>
> To date most of the construction permits have focused on TSS and turbidity, but have not addressed other, potentially significant pollutants such as phosphorus and an assortment of chemicals used at construction sites.
>
> Currently, there is no required training or certification program for contractors, preparers of soil erosion and sediment control Storm water Pollution Prevention Plans, or field inspectors.
>
> The quality of storm water discharges from construction sites that effectively employ BMPs likely varies due to site conditions such as climate, soil, and topography.
>
> The States of Oregon and Washington have recently adopted similar concepts to the Action Levels."[12]

The panel made the following conclusions:

> "It is the consensus of the Panel that active treatment technologies make Numeric Limits technically feasible for pollutants commonly associated with storm water discharges from construction sites (e.g. TSS, pH, turbidity) for larger construction sites. Technical practicalities and cost-effectiveness may make these technologies less feasible for smaller sites, including small drainages within a larger site, as these technologies have seen limited use at small construction sites. If chemical addition is not permitted, then Numeric Limits are not likely feasible."
>
> "The Board should consider Numeric Limits or Action Levels for other pollutants of relevance to construction sites, but in particular pH. It is of particular concern where fresh concrete or wash water from cement mixers / equipment is exposed to storm water."
>
> "The Board should consider the phased implementation of Numeric Limits and Action Levels, commensurate with the capacity of the dischargers and support industry to respond."

The SWRCB reviewed the panel's findings as well as public comments. As a result, the following significant changes are proposed to amend the Construction General Permit, as

[12] Storm water Panel Recommendations to the California State Water Resources Control Board, *The Feasibility of Numeric Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction activities*; June 19, 2006

outlined in the Draft Permit. All of these changes have the potential to affect construction costs.

- Technology-based Numeric Action Levels (NALs): NALs for pH, turbidity, and Suspended sediment concentration. The numeric Action Levels are 6.5-8.5 pH and site specific not to exceed 1000 NTU turbidity.

- Technology-based Numeric Effluent Limitations (NELs): NELs for pH should range between 6.0 and 9.0, for sites using ATS discharges turbidity shall be less than 10 NTU for daily flow weighted average of all samples and 20NTU for any single sample and residual chemical from ATS shall be <10% of MATC.[13]

- Numeric Action Level Exceedance Report: If a discharger conducts any effluent and/or receiving water monitoring, the results must be submitted to the Regional Water Board within 10 days of the initial monitoring effort.

- Risk-based Permitting Approach: Dischargers must identify site sediment risk and site receiving water risk, which together determines which specific actions are required (Levels 1 through 3 are covered by this General Permit).

- Minimum Requirements Specified: Specifies more minimum BMPs and requirements that were previously only required as elements of the SWPPP or were suggested by guidance or NAL exceedance.

- Project Site Soil Characteristics Monitoring and Reporting: all projects must monitor and report the soil characteristics at the project location. The primary purpose of this requirement is to provide better risk determination and eventually better program evaluation.

- Effluent Monitoring and Reporting: effluent monitoring and reporting for pH and turbidity in storm water discharges. The primary purpose of this monitoring is to compare against the NEL of pH and NALs for the other parameters. The secondary purpose is to provide needed information to use in overall program evaluation.

- Receiving Water Monitoring and Reporting: risk level 2 must monitor receiving water for pH and turbidity and in the event of an NEL exceedance must include Suspended Sediment Concentration (SSC) sampling during future monitoring. Risk level 3 must monitor receiving water for pH, turbidity and SSC.

- Active Treatment System (ATS): construction sites opting to use ATS must comply with monitoring NALs, and NELs as outlined above.

[13] The Maximum Allowable Threshold Concentration (MATC) is the allowable concentration of residual, or dissolved, coagulant/flocculant in effluent. The MATC shall be coagulant/flocculant-specific, and based on toxicity testing conducted by an independent, third-party laboratory. The MATC is equal to the geometric mean of the NOEC (No Observed Effect Concentration) and LOEC (Lowest Observed Effect Concentration) Acute and Chronic toxicity results for most sensitive species determined for the specific coagulant. The most sensitive species test shall be used to determine the MATC.

- New and Re-development Performance Standards for Hydromodification Impacts: this General Permit requires all dischargers to maintain predevelopment hydrologic characteristics in order to minimize post-development impacts to offsite water bodies.

- Rain Event Action Plan (REAP): within 48 hours prior to any likely precipitation event sites must develop and implement a REAP that must be designed to protect all exposed portions of the site.

- Annual Reporting: all projects that are enrolled for more than one quarter must submit information and annually certify that their site is in compliance with these requirements. Most of the information required to be reported is to be submitted throughout the year (usually within some specified time after a triggering event occurs). The primary purpose of this requirement is to provide information needed for overall program evaluation and pubic participation.

- Certification / Training Requirements for Key Project Personnel: key personnel (e.g. SWPPP preparers, inspectors, etc.) must have specific training or certifications to ensure their level of knowledge and skills are adequate to ensure compliance.[14]

It should be noted that the 2008 Draft Permit only covers discharges to jurisdictional waters (as determined by the US Army Corps of Engineers).[15] This stipulation may modify the distribution of the impacts of Draft Permit compliance depending on whether a given area has jurisdictional waters.

3. Municipal Separate Storm Sewer System Regulation

Many cities have constructed an infrastructure to collect storm water separately from municipal wastewater. Municipal Separate Storm Sewer Systems (MS4) collect storm water and eventually distribute it to open flood control channels, rivers, and oceans. Alternatively wastewater generated by toilets and showers enters a closed network of pipes and is carried to treatment plants where it is treated before being discharged. Runoff pollutants in MS4s are different in nature from those in sewage. Pathogens are present, but in far smaller concentrations, as are nutrients such as phosphorus and nitrogen. There may be more petroleum hydrocarbons, dust, sediments, and settled air pollutants in runoff, but total organic content in runoff is usually much lower than in wastewater.[16]

The EPA regulates MS4s as part of the CWA by issuing permits to municipalities with separate storm sewer systems. Construction activity disturbing more than one acre that takes place in an area that meets the criteria of an MS4 (small or larger MS4) would be

[14] SWRCB, Fact Sheet for Water Quality Order 2008-XX-DWQ, Preliminary Draft, March 18, 2008, obtained from SWRCB website at: http://www.waterboards.ca.gov/stormwtr/constpermits.html, site accessed April, 2008.
[15] *Ibid.*
[16] Devinney, Joseph S. et al, "Alternative Approaches to Storm water Quality Control," August, 2005.

required to apply for coverage under both the construction general permit and an MS4 permit.

4. Implications of Permit Provisions for Construction Projects

The Draft Permit has added a number of important provisions to the CGP. The requirement for project modifications depends on the construction project's site evaluation and risk assessment. That is, risk level 3 sites have more requirements for project modifications than does a risk level 2 construction site.

The Draft Permit uses a risk-based permitting approach. Risk is evaluated based on the potential of the project to negatively impact water quality. Risk is calculated separately for both receiving water and sediment characteristics. Sediment risk factors include: time of planned construction with exposed soils, the hydraulic connection to sensitive receiving waters, soil rainfall "R" factor, soil erodibility "K" factor, soil Length Slope "LS" factor, and soil analysis – hydrologic soil group. Each factor is assigned a range of point values corresponding to specific soil characteristics that increase risk. Receiving water risk is based on state or federal 303d lists for sediment impairment, the channel stability index rating, and beneficial uses for SPAWN and COLD habitat. Furthermore, the addition of Active Treatment Systems (ATS) and/or increasing the distance of the site from the receiving water will lower the site's risk score. [17]

4.1 Active Treatment Systems

The Draft Permit would impose specific monitoring and reporting requirements for sites opting to use ATS. ATS systems (or the chemicals utilized by them), while not covered under the CGP, are addressed in the CASQA BMP Handbook under SE-11: Chemical Treatment. Under this BMP guidance document, the user is required to obtain authorization from the Regional Water Quality Control Board prior to implementation of the chemical treatment system.

The Draft Permit definition for ATS lists chemical coagulation, chemical flocculation, and electrocoagulation as three separate ATS treatment processes. ATS is required because depending on the nature of the suspended particles and the runoff hydraulics, conventional sedimentation and filtration processes may not provide sufficient reductions in turbidity without first aggregating smaller particles into larger agglomerates via coagulation and flocculation processes. Additionally, filtration processes are often incorporated into ATS.

Implementation information and hypothetical cost estimates for ATS show that costs of technology becomes prohibitive as volume of runoff decreases (either in dry climates and/or for smaller sites). Comparative studies (both from case studies and from

[17] SWRCB Draft Construction Attachment A risk worksheet March 18, 2008

hypothetical cost studies) show that ATS costs are significantly higher than implementing both standard and/or enhanced traditional BMPs on a construction site.[18]

4.2 Pre-Project Runoff Replication and Channel Protection

Pre-project runoff and channel protection is necessary to prevent hydromodification. Hydromodofication is defined as an increase in runoff peak flow, volume, and flow durations which is caused by development increasing impervious surface area. Pre-project runoff replication and channel protection is necessary to protect stream channels from intensifying sediment transport and erosion processes.

A new provision in the Draft Permit is to require all sites to meet new and re-development performance standards designed to encourage all constructed sites disturbing over one acre in California to replicate pre-project runoff and to protect channels. The SWPPP shall ensure that flow patterns, and surface retention and recharge rates, are maintained in order to minimize post-development impacts to offsite water bodies.[19]

Although there are likely to be significant economic impacts from complying with the pre-project runoff and channel protection requirement, this analysis does not include these impacts. Hydromofication and efforts to conserve pre-project runoff and conduct channel protection are too site-specific for costs to be adequately estimated.

4.3 Numerics

The Draft Permit sets numeric compliance limits on runoff whereas the CGP had qualitative requirements. These numeric limits are uniform over time (once fully implemented) and across the state. Numerics are included in Numeric Effluent Limitations (NELs), Numeric Action Levels (NALs), and for ATS discharges. It includes NALs for pH, turbidity, and Suspended Sediment Concentration (SSC). Numeric discharges from ATS are outlined for the parameters of turbidity, pH, acute toxicity, and chronic toxicity.

Penalties are set for exceedances of numeric limits. Any discharger exceeding the NALs for a single parameter at a single effluent sampling location must electronically submit to the State Water Board (and make publicly available) a report of the exceedance and their response.

Complying with these numeric limits in different weather events, in different climates, and discharging to receiving water bodies with differing characteristics, can pose significant economic impacts. It is likely that many sites will need to implement ATS

[18] Geosyntech Consultants for CBIA, "Evaluation of Active Treatment Systems (ATS) for Construction Site Runoff," November 6, 2007. Personal communication with Joe Gannon at Clear Creek Systems on May 30, 2008

[19] SWRCB Fact Sheet for Order 2008-XX-DWQ on March 18, 2008, available at http://www.waterboards.ca.gov/water_issues/programs/stormwater/constpermits.shtml, accessed on June 11, 2008.

technology to meet NELs and to avoid compliance failure penalties and corrective action which pose significant costs.

4.4 SWPPP Uncertainty and Delay

Under the Draft Permit, Regional Water Boards may require changes to SWPPPs, REAPs, and Monitoring Programs. Additionally, Regional Water Boards may require a site to reevaluate their risk classification, and by extension, their permit compliance requirements. These provisions create additional uncertainty and potential delay for developers that will create significant economic impacts.

There are several factors that contribute to the uncertain impacts of the Draft Permit. As explained earlier, the requirements to comply with the permit are heavily dependent on site-specific characteristics, many of which are difficult to ascertain without investigation. Further, given the complexity of the risk calculator, it is entirely possible that different practitioners would come to different conclusions regarding the appropriate way to classify a site. Even conditional on a risk classification, the Draft Permit does not clearly specify what measures are needed to comply with the permit, again reserving an important role for site-specific characteristics.

The uncertainty inherent in the Draft Permit is important economically because the cost implications of the permit vary widely depending on risk level and site characteristics. A risk-averse developer attempting to comply with the permit is effectively forced to take a gamble with respect to compliance costs. Such cost uncertainty is especially problematic for public sector projects such as schools and highway projects. A public agency has a predetermined budget for a particular project, and cost surprises can lead to requests for additional appropriations and potential delays in project completion.

The procedure spelled out in the Draft Permit for obtaining needed permits can impose its own costs through delay effects. A project developer begins the process of obtaining a storm water permit after completing other aspects of the development process such as entitlement. Delays in the initiation of construction translate into delays in receipt of project revenues, and delays in consumers receiving their new homes. There are numerous reasons to suspect that the Draft Permit as written will result in delay costs. The Board has reserved for itself the final decision in determining what is appropriate for a site to undertake in order to receive a permit. In addition the Board can revoke the permit at any time and issue a cease work order if there are concerns voiced internally or by the public.

5. Ventura County

This analysis uses a case-study approach, assessing impacts of storm water regulation in Ventura County. Ventura is typical of counties in Southern California for its hydrology, climate and scale of development; however, it is also unique in its urban growth regulation and local MS4 permit provisions. While the impacts calculated for Ventura County may not be representative of other counties in California, the method used to

assess impacts in this case study can be applied to other counties in California, given similar data availability.

In the tentative draft Ventura County MS4 Permit (the most recent permit available), ORDER 08-xxx, a grading ban was instituted which limits grading to the dry season only (April 15th to October 1st) for sites with the following characteristics:

1. On hillsides with slopes 20% or steeper prior to land disturbance (if hillside development is not defined by a zoning ordinance, then the prohibition will apply to steep or long continuous slopes, or areas with silty soils, fine sands, or soils lacking vegetative cover).
2. Directly discharging to a water body listed on the CWA § 303 (d) list for siltation or sediment; or
3. Within or adjacent to an environmentally sensitive area (ESAs)

In addition there is a specific suite of BMPs that all construction projects are required to implement.

A Grading Prohibition Variance may be granted where the project proponent can demonstrate that the proposed BMP measures can be reasonably expected to:

(1) Not cause or contribute to the degradation of water quality.

(2) Ensure that Total Suspended Solids discharged is 100mg/L or less.

(3) Ensure that Turbidity of the discharge is 50 NTU or less.

(4) Not impair beneficial uses.

(5) Includes a monitoring program to ensure effectiveness. [20]

Sites complying with the Draft Permit would satisfy the factors outlined above when implementing ATS technology. [21]

II. Methodology

1. Risk

The Draft Permit uses a risk-based permitting approach where risk is a function of proximity to receiving water bodies, soil erosivity, slope, rainfall, and receiving water characteristics.[22] Risk is evaluated on a point system based on the potential of the project to negatively impact water quality. Depending on the total number of points, each construction site is placed in either risk category 1, 2, 3 or 4. Risk level 4 sites are not covered under the Draft Permit and are required to apply for an individual NPDES permit including a formal CEQA report.

[20] California Regional Water Quality Control Board, Los Angeles Region, Order No. 08-xxx; April 29, 2008, draft tentative.
[21] *Ibid*
[22]. SWRCB Fact Sheet for Order 2008-XX-DWQ on March 18, 2008, Attachment A: Risk Determination Worksheet, http://www.waterboards.ca.gov/water_issues/programs/stormwater/constpermits.shtml, accessed on June 11, 2008.

- Risk level 1 classification suggests that a site is not discharging directly or indirectly to a sediment-impaired receiving water body, construction will not occur during a rainy season, and the soil characteristics are favorable. There is not expected to be a significant number of these sites throughout Ventura County. This analysis expects that there will be minimal compliance costs for risk level 1 sites in the study area due to the relatively low cost of compliance per site and the low probability that any sites will be classified as low risk. The compliance requirements for the low risk sites under the Draft Permit are visual monitoring, REAP, and submitting an annual report.

- There are multiple combinations or risk factors that will yield risk level 2. If a site's sediment and receiving water risk are classified as low and/or medium a site will typically be classified as risk level 2. These sites will have to comply with all new storm water requirements described above.

- Risk level 3 sites have sediment and receiving water risk ranging from medium or high, to extreme. At a minimum, sites directly or indirectly discharging to a receiving water listed as 303d impaired by sediment will fall into this category. Sites that are classified as risk level 3 will be required to implement the new storm water requirements, as described below.

- Risk Level 4 sites are those that have extreme sediment risk and high receiving water risk. These sites are not covered under the Draft Permit and are required to apply for an individual NPDES permit. The requirements for these sites are dependent on the control methods and site designs determined to preserve receiving water quality.[23]

The risk calculator gives an overall site risk based on the combined receiving water risk score and the sediment risk score. The receiving water and sediment are evaluated separately then combined in a matrix to determine the site's risk level. There are multiple combinations of the combined risk score that yield risk level 2 or 3, while there are fewer combinations that yield risk level 1 or 4. For example, a sediment risk level of high and a receiving water risk of high will assign a risk level 3 to the site.

The requirements to comply with the Draft Permit are determined in part by a construction site's risk category, as shown in Table 1 below. Note that receiving water monitoring is required at all risk level 2 and 3 sites for pH and turbidity. Additionally, risk level 2 must monitor for SSC when the discharge from any drainage area exceeds the NAL for turbidity while risk level 3 must always monitor for SSC.[24]

[23] SWRCB Fact Sheet for Order 2008-XX-DWQ on March 18, 2008, http://www.waterboards.ca.gov/water_issues/programs/stormwater/constpermits.shtml, accessed on June 11, 2008.
[24] *Ibid*

Table 1: Summary of Risk Categories and Required Elements			
Compliance Reqirements	**Risk 1**	**Risk 2**	**Risk 3**
SWPPP	X	X	X
Housekeeping	X	X	X
Visual Monitoring	X	X	X
Erosion Control	X	X	X
Sediment Controls	X	X	X
SWPPP Uncertainty [1]	X	X	X
NAL [1]	X	X	X
NEL [1]	X	X	X
Trained SWPPP Preparer [1]	X	X	X
ATS [1,2]	X	X	X
Sampling and Reporting Frequency [1]	X	X	X
Runoff Controls [1]		X	X
REAP [1]		X	X
Additional Site Specific Measures [1]			X
Cover for all Inactive Areas [1]			X

Notes:

1. These measures are new to the 2008 Draft of the Construction General Permit

2. ATS implementation may be required depending on site characteristics

The risk calculator stipulates that a site can discharge directly or indirectly to a 303d listed water body for sediment impairment is automatically assigned a high risk level for receiving water.[25] This is true regardless of storm water management technology used on site. As a result the combined sediment and receiving water score will increase the overall risk level of the site.

Further, this analysis assumes that all projects would commence at the beginning of the dry season and run continuously. It is reasonable that a developer would try to avoid being classified in a higher risk category and so attempt to begin projects in the dry season. Since the dry season is defined as the period between April 15th and October 15th, only projects which are predicted to take longer than six months to grade would run into at least one wet season.

2. Mapping Risk

Using georeferenced attributes of the risk assessment calculator as an input to GIS, it is possible to reach some general conclusions about the distribution of different risk categories in Ventura County. Receiving water and slope are used to estimate the total

[25] SWRCB Fact Sheet for Order 2008-XX-DWQ on March 18, 2008, Attachment A: Risk Determination Worksheet, http://www.waterboards.ca.gov/water_issues/programs/stormwater/constpermits.shtml, accessed on June 11, 2008.

number of acres in the County that would fall into each risk category. There are more specific factors such as the R, K, and hydrologic soil group that are too site specific to be included in this analysis.

The SWRCB maintains a list of all impaired water bodies, referred to as the 303(d) list. Under Section 303(d) of the 1972 Clean Water Act, states, territories and authorized tribes are required to develop a list of water quality limited segments. The waters on the list do not meet water quality standards, even after point sources of pollution have installed the minimum required levels of pollution control technology. The law requires that these jurisdictions establish priority rankings for water on the lists and develop action plans, called Total Maximum Daily Loads (TMDL), to improve water quality.[26]

The most recent available year for the 303(d) list is the 2006 data available on the SWRCB website. Geographic Information System (GIS) files are provided for all impaired bays and harbors, coastal and bay shorelines, estuaries, lakes, rivers, and wetlands. These data were used to ascertain the proximity of any region within the study area to sensitive receiving water.

Caltrans developed a database called the California Transportation Investment System (CTIS). CTIS2 includes spatial data on all planned highway projects from regional transportation plans approved as of summer 2003 as well as all programmed projects from the 2004 State Transportation Improvement Program (STIP) and the State Highway Operation and Protection Program (SHOPP). CTIS organizes, displays, and provides the locations of transportation projects planned over the next 20 years. Included in this tool are highway, Proposition 1B Bond, local, rail, airport, bicycle, pedestrian, and transit projects at both the State and regional levels. [27]

CTIS2 data were supplemented with more recent 2007 Caltrans data from Ventura County's local District 7 Office. These show the location, description, and cost of all road construction projects in Los Angeles and Ventura County that were under design in 2007 and are scheduled to start between 2008 and 2011. These data were used in conjunction with the Ventura County Department of Transportation 2008 Five Year Plan that includes the location, description, and cost of all planned capital projects in the County.

The USGS National Elevation Dataset (NED) has been developed by merging the highest-resolution, best quality elevation data available across the United States into a seamless raster format. NED is the result of the maturation of the USGS effort to provide 1:24,000-scale Digital Elevation Model (DEM) data for the conterminous US.[28] Using this dataset it is possible to synthesize a slope layer that characterizes the study area.

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[26] SWRCB website's 303(d) List page, available at http://www.waterboards.ca.gov/tmdl/docs/303dlists2006/gis/ accessed on June 11, 2008.
[27] Caltrans website, CTIS page, available at http://www.caltrans.ca.gov/hq/tpp/offices/osp/ctis.html, accessed on October 26, 2007.
[28] Data available from U.S. Geological Survey, EROS Data Center, Sioux Falls, SD; http://seamless.usgs.gov/

Environmentally sensitive areas (ESA) GIS files were obtained from the Ventura County Watershed Protection District.[29] These areas may require additional conservation measures to protect the habitats. Construction activities undertaken within proximity to these areas are subject to stricter storm water regulations under both the Draft Permit and Ventura MS4 permit.

Available data on local environmental conditions in Ventura County were used to deduce risk categories in areas projected for urban development. If a site has standard receiving water conditions (that is, not discharging directly to a sediment impaired water and that construction does not occur in the stream channel), its risk category would be low (risk level 1) or medium (risk level 2). Moreover, approximately 50 percent of the area available for development in Ventura County has a slope of at least 20 percent. Holding the R and K factors constant for average conditions and assuming that the slope is 20 percent and the length is 200ft, these sites would have a sediment risk of extreme. Given the above assumptions with respect to receiving water and sediment specific to Ventura County, the combined sediment and receiving water risk would indicate that the site's risk class is going to be risk level 3.

Based on these considerations, this analysis assumes that 50 percent of new development in Ventura County will be risk level 2 and 50 percent will be risk level 3. While there are sediment impaired receiving waters in Ventura County, there is not enough information to accurately determine the number of sites falling into the risk level 4 category.

3. Future Construction: Residential Development, Highways and Schools

The analysis relies on a number of data on future development in Ventura County including urban growth boundaries, Southern California Association of Governments (SCAG) forecasts of real estate development, SWRCB storm water permit notice of intent (NOI) database, and Caltrans forecasted transportation projects. Using these data a model was constructed to predict the estimated acres of residential development, school and transportation projects for the study area between 2008 and 2030 for development and 2008 and 2014 for transportation.

Ventura County has adopted strict and far-reaching urban growth boundaries that condition the location of future growth. Save Open-Space and Agricultural Resources (SOAR) is an initiative in Ventura County designed to protect against the conversion of agricultural land to urban uses. The first SOAR initiative was approved by the voters in the City of Ventura in 1995. Since the first 1995 initiative**,** SOAR initiatives have passed in all major cities in Ventura County, and also on a countywide basis throughout Ventura County. [30] This initiative affects the location of construction activities by bounding growth to city limits and promoting densification. The SOAR boundaries have built-in 15 or 20-year expiration dates and may be extended.[31]

[29] Electronic communication with David Thomas, Ventura County Watershed Protection District, on March 26, 2008.
[30] SOAR website, available at http://www.soarusa.org/, accessed on March 11, 2008.
[31] *Ibid*

SOAR GIS boundaries were obtained that delineate the geographic scope of this analysis. This analysis assumes that all development is restricted by these boundaries in the study period 2008 to 2030. In order to accurately portray where development is likely to occur within the SOAR limits, GIS data from the California Department of Conservation's Farmland Mapping and Monitoring Program (FMMP) were used that show the location of areas that are already urbanized.[32]

The primary sources for estimates of future housing and population was the study area's federally designated Metropolitan Planning Organization (MPO). Typically created by county governments, these forecasts are the preferred source for growth estimates because they are created using detailed knowledge about local growth trends and characteristics, potentially resulting in more accurate estimates than those obtained with mathematical forecasting techniques. The MPO which created the estimates used in this analysis is the Southern California Association of Governments (SCAG). The SCAG population growth projections account for the SOAR growth restriction. In order to accommodate the growth predicted by census tract, it was necessary to overlay the census tract with the available land.

The analysis locates the census tract level projections for future population growth, within the undeveloped land in the SOAR boundaries. A historical density ratio was ascertained for each city. The resulting density is representative of the current built environment (i.e. the same distribution of municipal, industrial, residential and open space). The inverse density (acres per population) was applied to the cities' population growth projections to determine the acres required to accommodate the increase in population. It was assumed that development would occur uniformly within the available land. Future development would spread into greenfield areas (i.e. previously undeveloped land) within the SOAR boundaries, unless there was not sufficient available area to support the projected population (at historic density ratios), in which case density would increase or redevelopment would occur. This analysis assumes greenfield and redevelopment must comply with the same requirements under the Draft Permit.

Furthermore, Notice of Intent (NOI) data were used to determine the historic ratio of development types. SWRCB's NOI data include all construction activity that took place in California between 1992 and 2007. For the purposes of this analysis it is reasonable to assume that future development will resemble past development given similar characteristics of the data over time.

The data were examined to determine the percentage of sites less than 50 acres (37 percent) and greater than 50 acres (63 percent). For sites less than 50 acres a 5-acre hypothetical site is used for the cost analysis, and for projects greater than 50 acres in size, a 50-acre design site is used. Size is an important factor in the analysis because it informs the site's risk category and costs. The risk category is in part a function of exposure to rain events that is determined by site size (larger sites take longer to complete and are more likely to fall into one or more rainy season).

[32] California State Department of Conservation Farmland Mapping and Monitoring Program, available at http://www.conservation.ca.gov/dlrp/fmmp/Pages/Index.aspx, accessed on March 24, 2008.

Table 2: Total Area Projected for Development 2008-2030 in Ventura County			
City	**Population Growth**	**Developed Area**	**Projected Schools**
Camarillo	22,000	4,500	7
Fillmore	3,000	400	1
Moorpark	5,000	1,600	2
Oxnard	26,000	2,200	7
Santa Paula	12,000	1,200	5
Simi Valley	12,000	2,500	4
Thousand Oaks	6,000	1,900	1
Ventura	10,000	1,300	3
Total	**95,900**	**15,645**	**30**
Total Land Available to be Developed under SOAR: 50,190			
Note: numbers may not sum due to rounding			

As shown in Table 2, most of the anticipated development projects are located in the cities of Camarillo, Simi Valley, and Oxnard. The area available for development in the City of Ventura will be fully utilized given the development projections in this analysis. However, all other cities have room to accommodate the expected population during the study period.

Development projects are divided into categories based on the SWRCB NOI database. The residential and commercial as well as the commercial and industrial categories refer to mixed use development projects. Each development project category is additionally classified by size in order to better represent the BMP cost characteristics. For the purposes of this analysis the storm water compliance requirements for each category of development are assumed to be the same.

Table 3 below shows the distribution of development types and their likely risk classification under the three scenarios of growth restrictions. In order to categorize the total area of development that resulted from the GIS analysis, representative statistics were generated from the SWRCB NOI database. It is assumed that new development will mimic old development patterns.

Table 3: Acres of Types of Development Projects								
Type	**Residential**	**Commercial**	**Industrial**	**Utility**	**Transportation**	**Misc.**	**Res./Comm.**	**Comm./Ind.**
Acres	7,100	1,700	770	380	145	3,800	1,500	310
Note: numbers may not sum due to rounding								

The cost implications of the Draft Permit for public schools were also considered in the analysis. Similar to the development section, growth in public schools was assumed to follow historic patterns. To ascertain the number of public schools that will be built between 2008 and 2030, the current school to population ratio was ascertained. The number of public schools in different cities in Ventura County was determined using the

2007-2008 Ventura County Public Schools Directory. [33] Each city's population to public school ratio was applied to the projected population growth in that city, to determine the number of public schools that will be built.

Public schools were assumed to be located within proximity to projected development. Therefore, public schools were equally divided into risk level 2 and 3. Schools were assumed to be approximately five acres in size. School construction costs are assumed to be the same as residential construction costs due to the similarity in construction phases.

The analysis also considers cost impacts to highway projects. The CTIS2 database and Ventura County COG identify two major projects in Ventura County that will be affected by the Draft Permit: the road widening project along Highway 118 between the LA county line and Highway 23, and the High Occupancy Vehicle (HOV) lane addition along Highway 101 near Santa Barbara County. The HWY 118 widening project is approximately 15 miles long. The section of the HOV lane project on HWY 101 that is within the Ventura County boundary is five miles long.

These road construction projects will be undertaken in five-mile increments. It is estimated that one five-mile segment takes between 1.5 and two years to complete.[34] Consistent with the assumption made for housing and school projects, we estimate the costs for transportation assuming that all sites fall equally between risk level 2 and risk level 3.

4. Calculating Economic Impacts

This analysis calculates the cost to comply with the Draft Permit. As detailed in Table 1, compliance costs include direct outlays for BMPs, ATS, and the like, and indirect costs such as losses resulting from delay in completion of development projects. Costs are calculated for the period 2008 to 2030, and future costs are discounted to be comparable with current costs. All impacts are presented in 2008 dollars.

Complying with the conditions of the Draft Permit will result in some delay in completing projects. Delay primarily originates from SWPPP review and approval. It is reasonable to assume that risk level 3 sites will be required to conduct a SWPPP revision due to the site-specific measures that are required by the Board. This analysis assumes delay of approximately 2 weeks while the SWPPP is resubmitted and approved; construction cannot commence prior to SWPPP approval. While projects may experience further delay if there are complications with or opposition to their SWPPP, the probability of this circumstance occurring and the amount of further delay is difficult to predict.

The welfare cost of delay is measured by assuming that economic surplus generated by development could have been invested at the market interest rate. Moreover, the SWPPP

[33] Charles Weis, Ph.D. 2007-2008 Ventura County Public Schools Directory, published by the Ventura County Office of Education.
[34] Personal communication with Ron Kazinsky, CalTrans District 7 Deputy District Director for Environmental Planning, on January 29, 2008.

review process and the public availability of the document expose the developer to additional uncertainty about the magnitude and timing of development. This analysis assumes that delay cost is measured with a seven percent rate of interest; this is a conservative rate less than the rate that is commonly used by developers to value a risky cash flow. Mathematically, delay costs are computed by multiplying the period of delay (two weeks for SWPPP revision) by the surplus from development (the extensive margin value of land) and by the interest rate.

The surplus from development is a function of the selling price of new homes, the cost of development, and the inverse density in Ventura County. Data on the selling prices of new homes were obtained from DataQuick Information Systems, which maintains a database of new home transactions in the study area. The cost of development includes construction costs, design costs, and local development impact fees. Data on the cost of construction was obtained from Marshall & Swift, which publishes a quarterly guide to building cost per square foot indexed by region, construction quality (average, good, very good, or excellent), and home size. The design cost is assumed to be equal to twenty percent of the cost of construction. Development impact fees (which include local fees such as utility hookups and are included in the cost of house development) were collected from the engineering and planning departments of cities in Ventura County. The inverse density of development (acres per house) was estimated in each census tract to be the number of acres projected for development divided by the number of houses projected to be built. These variables were obtained from SCAG.

Transportation delays are measured differently than development delays because Caltrans is a public service agency and is not maximizing profit. Rather, there is a loss in consumer surplus for commuters caused by the delay in decreased travel time from adding HOV lanes or expanding the highway. To compute the per acre cost of delay this analysis estimates the impacts of delay on the highway lane addition caused by the two week SWPPP delay. The lost surplus is measured by multiplying the commuter valuation of adding an HOV lane, measured at $325 per commuter per year.[35] This number is multiplied by an estimate of the total travel days per year (250 days) and by local highway HOV lane commuter statistics during peak commute times (5,843 commuters).[36] The per acre cost of transportation delay is thus estimated at $3,000.

All future impacts are presented in this report using a real discount rate. This discounting represents the value of a payment or a stream of payments in common dollar terms. That is, it is the sum of a series of past or future cash flows expressed in terms of today's dollars. Translation of economic impacts of past and future costs to 2008 dollars requires the following information: a) projected future costs of compliance with storm water regulation; and b) the specific years in which these impacts have been or are expected to be incurred. For the purposes of this analysis, all development and public schools

[35] Cy Ulberg, "An Evaluation of the Cost Effectiveness of HOV Lanes," from Washington State Department of Transportation. Accessed at http://www.wsdot.wa.gov/Research/Reports/100/121.1.htm on February 6, 2008.
[36] CalTrans District 7, HOV Annual Report, accessed at http://www.dot.ca.gov/dist07/resources/hov/, on February 6, 2008.

construction are expected to occur uniformly within the study period 2008-2030.[37] All transportation projects are expected to occur uniformly within the period 2008-2014, which is when the highway construction projects in question are scheduled to occur.

With these data, the present value in 2008 dollars of the past or future stream of impacts of storm water compliance efforts (PV_c) from year t to T is measured according to the following standard formula: [38]

$$PVc = \sum_{t}^{T} \frac{Ct}{(1+r)^{T-t}}$$

Where C_t is the cost of compliance efforts in year t and r is the discount rate.

This analysis uses a five percent discount rate that is the midpoint of the discount rates recommended by the Office of Management and Budget (OMB). To discount and annualize costs, OMB specifies the use of a real rate of seven percent. In addition, OMB recommends sensitivity analysis using other discount rates such as three percent, which some economists believe better reflects the social rate of time preference.[39]

III. Results

1. Project-Level Costs

Table 1 in the previous section outlines the general requirements of the Draft Permit for sites classified in various risk categories. As described above, the specific requirements of the permit may vary considerably depending on site conditions. The cost figures presented in this section are intended to be representative for the study area.

The development of the SWPPP is expected to delineate the appropriate sediment and erosion controls for compliance. The site-specific nature of BMP implementation complicates the task of determining appropriate BMPs. The cost estimates for BMPs that follow are conservative in that they do not account for extra site-specific measures that may be needed to comply with the permit.

Interviews with industry participants indicated that a representative BMP cost for a 5-acre site in Southern California is $4,500 per acre.[40] The representative cost for enhanced BMPs is $15,000 per acre, essentially doubling the BMPs to provide extra durability in a storm event as well as implementing soil cover for all inactive areas.[41]

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[37] Impacts were calculated to 2030 (a 23 year time frame) because future impacts can accurately be projected for that time period. SCAG projects housing and population to the year 2030.
[38] To derive the value in 2008 dollars of future compliance efforts, t is 2008 and T is 2030 for development and public schools and t is 2008 and T is 2014 for transportation projects.
[39] U.S. Office of Management and Budget, Circular A-4, September 17, 2003 and U.S. Office of Management and Budget, "Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations; Notice," 68 *Federal Register* 5492, February 3, 2003
[40] Personal communication with BIA and BIA stakeholders on June 9, 2008.
[41] *Ibid*

Sites classified as risk level 3 may be required to use ATS technology as additional source control measures. ATS technology is expected to cost approximately $11,000 per acre for a 5-acre site assuming average rainfall conditions for Ventura County of 15 inches per year and 18 days of rain. Alternately, for a site over 50 acres the costs for ATS are expected to be $6,400. These figures reflect significant economies of scale in ATS technologies, a fact that is widely recognized by industry participants.[42]

Table 4 summarizes the per-acre cost to comply with the Draft Permit for projects of various types and sizes.

Table 4: Per Acre Costs of the Draft Permit

	Site Size	Per Acre Cost
Transportation Risk Level 2		$159,100
Transportation Risk Level 3		$170,900
Development Risk Level 2	5 Acre	$10,000
	50 Acre	$5,600
Development Risk Level 3	5 Acre	$38,400
	50 Acre	$31,600
School	5 Acre	$10,000

2. Economic Impacts to Ventura County

The estimated cost of the Draft Permit to future development, public school, and transportation projects in Ventura County is approximately $203 million between 2008 and 2030. This figure incorporates the outlays for equipment, labor and other goods needed to comply with the requirements of the permit. Additionally, it includes the costs of delay in project initiation and completion resulting from the Draft Permit. This estimated cost does not include any expenditure or loss associated with preventing hydromodification.

Table 5 below disaggregates total projected costs to Ventura County by sector. There are a total of 20 miles of transportation projects with secured funds in Ventura County. Impacts are calculated as the requirements for a new Caltrans permit to comply with the Draft Permit. Reliable Ventura County transportation data is only available until 2014 and hence impacts are assessed between 2008 and 2014.

The largest share of the projected cost is associated with residential development. This finding is consistent with the fact that the largest number of acres of development projected in the County is for construction of homes. School projects are a good example of locally funded public activities potentially affected by the Draft Permit. While the calculated impacts on school projects may appear modest in comparison with residential

[42] *Ibid*

development, it should be remembered that school projects are undertaken with fixed budgets, and cost overruns may result in additional delays that are not considered here. Further, the costs in Table 5 are calculated using representative site conditions. Actual costs may be much larger than assumed here, and public entities are poorly positioned to absorb such risk.

Table 5: Ventura County Costs

Development	Schools	Transportation	Total
$190,400,000	$2,200,000	$10,000,000	$203,000,000

The analysis demonstrates that the Draft Permit will impose substantial costs on the regulated community. While it is difficult to extrapolate the results of this analysis, it is clear that the Draft Permit will impose statewide costs well in excess of a billion dollars over the coming two decades. Given this finding, the SWRCB should undertake a comprehensive economic analysis of the Draft Permit to ascertain whether such expenditures are reasonable given the water quality benefits achieved.

The report also does not consider the economic costs resulting from compliance with hydromodification requirements, but rather focuses on impacts occurring during the construction period. These costs will be in addition to the ones estimated here.

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3. California Department of Transportation District 7, HOV Annual Report website: http://www.dot.ca.gov/dist07/resources/hov/

4. California State Water Resources Control Board, Water Quality Order No. 2003-0005-DWQ, Waste Discharge Requirements for Storm Water Discharges From Small Municipal Separate Storm Sewer Systems (General Permit).

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6. California State Water Resources Control Board, National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction Activity (General Permit) Water Quality Order No. 2008-XX-DWQ, March 18, 2008.

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