Development and Implementation of Hydromodification Control Criteria Methodology for the Central Coast Region

A Scope of Work for Phase 1 of the Joint Effort for Hydromodification Control
Submitted to:

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December 22, 2009

Executive Summary

The following is a detailed Scope Of Work (SOW) for the Central Coast Joint Effort for Hydromodification Control. The Joint Effort will be a two-phased approach. This SOW is for Phase 1, whose primary goals are to:

1. Develop a methodology for the development of numeric hydromodification control criteria for new and redevelopment.
2. Implement the initial steps of the methodology within Region 3 (Central Coast), which will provide the foundation for watershed characterization and process analysis that will be necessary to develop meaningful and effective hydromodification criteria.

Phase 2 (not part of this SOW) will further implement the methodology, culminating in the development of criteria that can be used in the site planning, design, and development process. The overall project goal is to develop an approach to the management of hydromodification that will meet both resource protection goals and regulatory requirements. This will be accomplished by addressing the changes in watershed functions and processes (physical, chemical, and biological) that are caused by urban development that affect watershed health. This approach can be used to protect and restore watershed functions that have been subject to degradation, and it will be applicable to new development projects (e.g., green fields) and redevelopment projects.

The scope of work includes a review and acknowledgment of previous, relevant studies; a compilation of spatial data; regional analyses of watershed and receiving water characteristics; and a preliminary analysis of key watershed processes. As part of the final deliverable for Phase 1, the team will summarize each of these tasks and will provide a clear step-by-step road-map ("methodology") for municipal stormwater dischargers to use the deliverables from Phase 1 to develop meaningful and effective hydromodification control criteria in Phase 2. Described below in the Background Section is a brief introduction to the foundation for the approach. This is followed by a detailed description of the SOW.

Background

The overarching strategy of this hydromodification management approach is to **maintain and restore key watershed processes**. Although there are myriad watershed processes, only a subset of these can be assumed to be critical in the analysis and mitigation of hydromodification impacts. These key watershed processes most likely include:

- Infiltration
- Surface runoff
- Sediment delivery to stream channels
- Evapotranspiration
- Sediment (and pollutant) transport and deposition in receiving waters

The relative importance of these key watershed processes varies within and across watersheds, and so the relative emphasis on their protection—and thus the strategies needed to protect their integrity—will also vary across the region. This is a fundamentally different approach to watershed management than has yet been seen in recent hydromodification control efforts. Developing a unique strategy for every location, however, is not practical and could never be implemented. So, part of the work in this scope includes an analysis intended to stratify the Central Coast landscape into a tractable number of relatively homogeneous terrains on the basis of their watershed attributes (including dominant watershed processes) and receiving-water characteristics. This will be accomplished through a thoughtful combination of GIS-based datasets and targeted field reconnaissance, recognizing the type, scale, quality, and value of available data. Then, the project team will identify a range of physical, chemical, and biological indicators to track the success of mitigation, recognizing that the goal of this

effort is not limited, for example, to "stable channels," but rather that channel condition is one method to evaluate whether watershed processes are maintaining their proper functions. This perspective also represents a different approach to hydromodification management—one that links watershed processes (and management of those processes) to measurable outcomes, and that recognizes that urbanization does not affect all watersheds (and the waterbodies within them) in the same way.

This work has been structured to utilize existing scientific approaches and techniques, and it explicitly is not a "research project." Achieving genuine watershed protection in a developing landscape, however, is still challenging, and this project will attempt a balance that neither oversimplifies nor overanalyzes the subject. This effort will seek to develop and implement an approach to hydromodification management that is comprehensive enough to achieve the goal of healthy functioning watersheds in a scientifically credible fashion, but is also simple and reasonable enough to ensure implementation success.

Scope of Work

As described above, the development of the hydromodification management approach for the region will be a two-phase effort. This first phase SOW will focus on methods and techniques for watershed management analysis, planning, and implementation. Its objective is to develop methods that are applicable to all jurisdictions within the boundaries of the Central Coast Regional Board in the site planning and development process. The tools developed in Phase 2 will be based on sound scientific principles that are practical for the development and permit review communities. The integration of these methods into the development process, and the development of detailed site planning approaches, will also be accomplished in Phase 2 of the effort.

The SOW is divided into five tasks that will be used to produce products that display the progress of the project, and that allow for feedback and input by the jurisdictions and stakeholders within the region. The approach was developed through an initial scoping effort by the project team that included a series of workshops with stakeholder participation. A brief summary of the tasks are:

Task 1: *Information Collection and Data Review.* Classification and evaluation of watershed conditions and receiving-water characteristics;

Task 2: *Watershed Characterization.* Identification of the geographic-specific, dominant landscape and meteorological characteristics that impact key watershed processes (e.g., effects urban development), and grouping those characteristics for subwatersheds throughout the Central Coast Region;

Task 3: *Receiving Water Classification*. Evaluation of the conditions of receiving waters within representative subwatersheds identified in Task 2 and grouping them into a limited number of discrete classes for subsequent analyses;

Task 4: *Linkage Analysis*. Analysis of potential linkages between watershed and receiving water characteristics, and determination of how to use these linkages to establish varying management targets and strategies to protect or restore watershed processes; and

Task 5: *Documentation of the hydromodification control criteria methodology*. Documentation of the step-by-step tasks required to develop hydromodification control criteria for new and redevelopment.

Scope of Work – Phase 1 of the Joint Effort

The primary goal of Phase 1 (namely, Tasks 1–5 below) is to provide the foundational watershed characterization and process analysis necessary to develop meaningful and effective hydromodification control criteria, which is the ultimate objective of a second phase of the Joint Effort ("Phase 2," not included in this scope of work). The Phase 1 work includes a review and acknowledgment of previous and relevant studies, a compilation of spatial data, a rigorous data stratification effort, and an analysis of key watershed processes. As part of the final deliverable, the team will summarize these efforts and will provide a clear step-by-step road-map ("methodology") for municipal stormwater dischargers to use the deliverables from Phase 1 to develop meaningful and effective hydromodification control criteria in Phase 2.

The following tasks will be completed by the Project Team.

Task 1 Information Collection and Data Review

Significant datasets and previous studies are available to support this project, which must be considered to ensure that the approach is built upon and does not duplicate previous efforts. This information can support a wide range of efforts for this task, but can be roughly grouped into two main areas of study: watershed characteristics; receiving water characteristics. The following subtasks outline specific data and literature compilation/review efforts associated with each area of study:

Task 1.1 Review and Acknowledgment of Relevant Studies and Approaches

The Project Team will assess the current science of watershed processes, with particular focus on how recent and ongoing work on hydromodification control criteria in California and nationwide can inform the watershed-based approach of the current project. This assessment will identify applications for which existing approaches provide valuable guidance and areas where those existing approaches could be improved. This review will also assess the applicability of current hydromodification approaches to receiving waters other than stream channels, and it will highlight those prior studies that embrace a watershed-process framework, suitable for regional application, that supports the broader mission of the Regional Board. Results of this review will be summarized in a technical memorandum.

Task 1.2 Review of Existing Data

A key element of this project is the ability of the Project Team to effectively allocate limited resources in a targeted pursuit of data. The identification, review, compilation, and processing efforts must carefully consider the scale/resolution, accuracy, and value that each dataset contributes toward overall project objectives. To ensure that the optimal balance between these factors is achieved, rules must be established to govern the data management process. Setting these criteria for data scale/resolution, accuracy, and value requires strong scientific and engineering judgment associated with extensive experience and a deep understanding of the principles of watershed processes.

Data management techniques, including the establishment of criteria thresholds are included throughout the tasks in this scope. The following tasks will be needed to review existing data necessary for this project:

Task 1.2.1 Identification and Prioritization of Data Needs

The Project Team will identify the priority needs and goals of the data collection process. Criteria will be established, based on the team's prior experience, to ensure that these data needs cover the watershed characteristics and receiving water attributes long understood to play key roles in watershed processes (i.e., impervious cover, land use, soil types, topography). Based upon experience with previous similar work, the

Project Team will limit the variety of data that will be pursued only to those valuable characteristics necessary to adequately understand local watershed processes.

Task 1.2.2 Collection and Review of Existing Watershed Characteristics Information

Building upon the needs identified in Task 1.2.1, the Project Team will collect and review all relevant Geographic Information System (GIS) datasets and previous studies that support regional characterization of watershed physical, hydrologic, and meteorological conditions. This review will consider information that supports characterization of existing as well as historic conditions to support more detailed analyses in Task 2. Additionally, the Project Team will solicit locally relevant data from individual municipalities throughout the region needed to achieve further refinement in urban areas. The data review process will assemble and organize the metadata associated with each dataset (e.g., source, scale/resolution) and will determine data accuracy based upon criteria agreed upon by Regional Board staff and the Project Team. A technical memorandum will be developed that summarizes the datasets available to support comprehensive watershed characterizations.

Task 1.2.3 Collection and Review of Existing Receiving Water Characteristics Information

The Project Team will collect and review all relevant GIS and monitoring datasets and previous studies that will support regional characterization of receiving water conditions as they relate to disruption of key watershed processes. Similar to Task 1.2.2, this review will consider information that supports characterization of both existing and historic conditions to support more-detailed analyses in subsequent tasks. As in Task 1.2.2, the Project Team will solicit locally-relevant data from individual municipalities throughout the region needed to achieve further refinement in urban areas. The data review process will assemble and organize the metadata associated with each dataset (e.g., source, scale/resolution) and will determine data accuracy based upon criteria agreed upon by Regional Board staff and the Project Team. A technical memorandum will be developed that summarizes the datasets available to support comprehensive receiving water and geomorphological characterizations in the region. The technical memorandum will also include an assessment, based on the review of data as well as the Project Team's professional judgment, as to whether there is sufficient data (e.g. type, amount, quality) to support subsequent tasks in the SOW as well as overall project objectives (Note: a similar assessment and corresponding technical memorandum will be conducted in Task 3 as relates to the ability of field investigations and data to support project objectives).

Task 1.2.4 Identification of Data Gaps

Based upon the data needs identified in Task 1.2.1 and the availability of existing data, the Project Team will identify if any key data gaps could compromise the value or integrity of the analyses to be performed in all subsequent tasks.

Deliverables

- Draft Technical Memorandum summarizing the review and acknowledgment of relevant studies
- Data collection meetings with participating municipalities (8 total)
- Draft Technical Memorandum summarizing the review of existing data and assessment of data quality, usability, and whether data can support subsequent SOW efforts.
- Draft Technical Memorandum II, incorporating Regional Board staff Comments
- Final Technical Memorandum incorporating stakeholder comments

Task 2 Watershed Characterization

The purpose of this task is to examine the full diversity of spatial watershed attributes and develop useful GIS layers by grouping landscape characteristics that influence key watershed processes. In subsequent tasks, these groupings will be used to evaluate potential adverse impacts to key watershed processes due to existing and anticipated future development patterns throughout the region. To accomplish this, the Project Team will perform comprehensive analyses of datasets identified in Task 1 to develop general categories and groupings of hydrologic, meteorological, and landscape characteristics. Datasets likely considered for analyses include, but are

not limited to: historic meteorological data and GIS data representing topography, soils/geology, present and past land use, vegetation cover, groundwater, etc. The anticipated outcome of this task is a series of GIS data groupings that accurately represents key characteristics of the landscape in each individual subwatershed throughout the region.
The following subtasks outline key efforts to support region-wide watershed characterization:

Task 2.1 Composite GIS Layers

The purpose of this task is to carefully assemble region-wide composite GIS layers of each key watershed characteristic from the data collected and reviewed in Task 1.2. The raw GIS information identified and collected as parts of Task 1.2 will likely come from many separate sources, each with a possibly distinct purpose, spatial resolution, and accuracy. The Project Team will carefully select threshold criteria for the scale/resolution and accuracy for each of the GIS layers. The development of the criteria will be documented and justified by the Project Team to strike the balance necessary to achieve the project objectives within the given resources. It may be necessary to develop criteria that results in heterogeneous spatial resolution for some of the GIS layers to meet project objectives. For example, higher resolution may be warranted near urban areas, current and projected, while less resolution is needed for large open spaces. The deliverable of this task will include individual composite GIS layers of each key watershed and receiving water characteristic for the entirety of the Central Coast Region (as data are available).

Task 2.2 Subwatershed Delineation

Accuracy and resolution of subwatersheds represented for the Central Coast Region are keys to categorizing those attributes that impact receiving waters. Although CALWTR, a state-wide watershed delineation available in public domain, is a good source for general delineations, it is not sufficiently accurate for the purposes of this project, nor are the subwatersheds appropriately sized. Therefore, an automated delineation process will be performed for the entire Central Coast Region. Part of this process will include development of a systematic method for determining subwatershed size based on insight gained from Task 2.1 for representation of key land characteristics.

The Project Team understands that Regional Board staff has a working knowledge and existing efforts underway to establish useful subwatershed delineations. Our team will work closely with the Regional Board staff to discuss ways in which these efforts can be easily integrated into this project and how the results of this project may be tailored to support future watershed analysis tasks for Regional Board staff.

Task 2.3 Meteorological Characterization

The Project Team will analyze historical rainfall measurements throughout the region to assess temporal and spatial characteristics that drive hydrology and critical periods and areas requiring special attention for management. This will include evaluation of storm frequencies and intensities historically observed in the region, with additional focus on both typical and extreme conditions. The Project Team will analyze special variations, map rainfall isohyetals, and identify “zones” to provide categorization of rainfall characteristics on a regional scale.

Task 2.4 Watershed Analysis and Characterization

The purpose of the watershed characterization process is to process a wide range and scale of spatial data and reduce its complexity to meet the needs of subsequent watershed processes analyses. It is anticipated that the characterization process will result in simple but meaningful representation of key watershed attributes. The following tasks are necessary to characterize the key watershed GIS layers compiled in Task 1.

Task 2.4.1 Watershed Data Categorization

Based upon the Project Team's previous experience with landscape stratification and the findings of the initial review of previous hydromodification studies, we will begin this subtask by identifying the key land characteristics that influence the disruption of natural watershed processes (hydromodification) in the region. The full array of data contained in the GIS layers compiled in Task 1 will likely carry significant detail and a high degree of spatial variability. It will be necessary to simplify these datasets by grouping similar information based upon well-understood criteria, resulting in a more manageable range of representative conditions. These landscape characteristics will be spatially classified into groups that have similar impacts on watershed processes (e.g., topography, land use, geology, meteorological conditions). Ultimately, this classification approach will provide powerful tools for the Region-wide assessment of watershed processes.

Task 2.4.2 Watershed Data Grouping

Once the watershed characteristics data has been classified and simplified, it is important to develop an understanding of any prominent patterns or combinations of different conditions that may exist in individual subwatersheds throughout the region. This will be done by combining the watershed classification layers to identify all possible combinations of watershed characteristics across the region. Although the total number of combinations may be quite high, many combinations will not exist in any significant way. For instance, if urban development is limited to low-slope areas, there will be no need to include grouping categories that combine urban landscape types with high slopes. This will reduce the total number of possible groupings and will result in overall simplification of the process. The Project Team will perform a statistical spatial analysis and establish threshold criteria to help identify the important combinations of these characteristics and will develop a list of groupings that encompass the range and variety of physical landscape features for the region.

Task 2.4.3 Identification of Representative Subwatersheds for Field Verification and Subsequent Analyses

The region-wide grouping of watershed data (Task 2.4.2) provides a provisional framework for future watershed management applications; however, locally validated field data will be necessary to reliably assess watershed processes. Since it is not feasible to field verify receiving water conditions region-wide given the budget and schedule of this project, field work executed in Task 3 must be focused on a subset of "representative" subwatersheds. This will occur by selecting subwatersheds throughout the Central Coast Region that, in total, provide at least one "zonal representative" from the groupings identified in Task 2.4.2, focusing on urban areas, common groupings, and other areas where management is most needed. We anticipate between 20 and 30 such examples. Within the overarching goal of providing an example from each zone, the final selections will be informed by:

- Geographic distribution of examples across the Central Coast Region
- Potential for future urban development
- Availability and quality of jurisdiction-specific data
- Degree to which legacy effects may influence current conditions and complicate potential future mitigation options

Deliverables

- Draft Report summarizing:
    - GIS data compilation process
    - Subwatershed delineation process
    - Meteorological characterization process
    - Watershed characterization process
- Draft Report II incorporating Regional Board staff comments
- Final Report incorporating stakeholder comments
- GIS layers/summary tables:
    - Watershed characteristics (raw, categorized, and grouped)

    - Subwatersheds
    - Rainfall isohyetals and "zones"
- Draft technical memorandum listing subwatersheds for field verification
- Final technical memorandum listing subwatersheds for field verification, incorporating Regional Board staff comments

Task 3 Receiving Water Classification

The purpose of this task is to evaluate the variety and conditions of receiving waters within the subwatersheds identified in Task 2.4.3, grouping them into a limited number of discrete classes amenable to more targeted analyses in subsequent tasks. Obvious classifications will be based on the type of receiving water (stream, lake, etc.), but we will also seek information from regional data compilations, local jurisdictions, and targeted field investigations to classify receiving water conditions corresponding to the key watershed groupings identified in Task 2. The following subtasks outline key efforts to support the classification of receiving waters:

Task 3.1 Receiving Water Types

The first basic subdivision of receiving waters within the representative subwatersheds of Task 2.4.3 will be made using their basic physical attributes. Categories will include:

- Major rivers (Santa Ynez, Santa Maria, Salinas, etc.)
- Other streams
- Lakes
- Identified groundwater basins
- Nearshore zones with direct inflow from adjacent shoreline areas.

A minimum size of receiving water features will need to be determined that maintains an appropriate balance of detail and cost. The initial criteria will be the presence/absence on USGS 1:24,000 scale topographic maps (i.e., the "blue-line" drainage network), but it is likely that greater detail will be acquired and incorporated in urban and near-urban areas, and less in areas lying far from urbanizing areas and extensive past human disturbance.

Task 3.2 Receiving Water Conditions

The Project Team will work with Regional Board staff, local jurisdictions, and other stakeholders to identify and compile existing data sets of receiving water conditions. Data acquisition will be limited to the subwatersheds previously identified as "representative" in Task 2.4.3. . Although chemical parameters are likely to be the most voluminous of available data sets, physical (e.g., stream measurements) and biological data (e.g., trophic levels, B-IBI scores) will be at least as strongly emphasized in this compilation because of their relevance in subsequent tasks. Data acquisition will also include the identification of physical modifications, such as dams, levees, channelized reaches, and debris basins. Our priority for data collection will be as follows:

1. Mapped or inventoried physical controls on flow or morphology (dams, levees, etc.)
2. Compiled usage (current or past) of species of concern (including listed T&E species) by life stage; from CDFG, NOAA, and/or local agencies; and/or other biological data such as from B-IBI monitoring or biological assessments.
3. Most recent chemical measurements (if any) of priority pollutants, as compiled by the Regional Board or local agencies
4. Local knowledge of historic changes
5. Historical aerial photos, if/as available from project cooperators

Task 3.3 Field Evaluation and Verification

The purpose of the field evaluation is to confirm overall receiving-water characteristics within a consistent framework, to identify unique or otherwise unrecognized (in GIS) attributes that are likely to influence watershed processes or receiving-water conditions, and to recognize the physical expression of any significant legacy effects of past disturbance on receiving waters.

This work will normally be combined with acquisition of local knowledge in Task 3.2 for logistical efficiency. Quantitative measurements will be very limited, because the objectives of this reconnaissance are limited (yet critical to the overall validity of the project results):

- confirm the physical expression of dominant watershed process(es) responsible for the downstream delivery of water and sediment (erosion, mass failures, etc.);
- identify significant impediments to sediment flux down the drainage network;
- indentify any morphological indicators of active morphological instability (e.g., recent channel-bank erosion, incision, etc.);
- identify significant receiving water conditions not captured by either GIS or the local information collected in Task 3.2 (e.g., human modification of channels or shorelines, recent erosion/deposition, etc.)
- for channels, evaluate whether discrete stage(s) in the Channel Evolution Model (Simon, 1989) is (are) evident as a reflection of legacy effects; and
- assess gross morphological characteristics of the water bodies for known or anticipated biological suitability.

These objectives are best achieved (and, in many cases, can only be achieved) through on-the-ground observations by the appropriate disciplinary experts. For those receiving waters for which one-time measurements are meaningful (particularly streams), a few selected morphological measurements will be useful to determine whether the channel corresponds to regional patterns from relatively undisturbed watersheds, or if its morphology is already expressive of legacy and/or ongoing disturbance. This project scope does not include any measurements to document trends over time, although any measurements that are made will be sufficiently well-documented that subsequent investigators or local agency staff could continue to monitor the rate of morphological change. A technical memorandum will be developed that provides an assessment, based on the classification process, field verifications, and receiving water classes, as well as the Project Team's professional judgment, as to whether there is sufficient information (e.g. type, amount, quality) to support the comprehensive set of objectives for this SOW.

Deliverables

- Draft report of classification process, results of field verification, and final receiving water classes
- Technical Memorandum summarizing the ability of the classification process, field verification, and receiving water classes to support comprehensive SOW objectives.
- Draft Report II incorporating Regional Board staff comments
- Final Report incorporating stakeholder comments
- GIS layers/summary tables of receiving waters considered, and preliminary and final classifications and characteristics

Task 4 Linkage Analysis of Watershed Processes

The purpose of this task is to analyze the likely linkages between watershed conditions and receiving water characteristics, expressed in terms of altered (or intact) key watershed processes in the representative subwatersheds of Task 2.4.3. An understanding of these linkages will play a central role in establishing varying management targets and strategies to protect or restore those watershed processes, and ultimately the receiving waters that depend upon their function.

This task builds on the information regarding characteristics of each subwatershed throughout the Central Coast Region, produced in Task 2, and on the conditions of the subset of receiving waters evaluated in Task 3. The linkage analysis of this task will assess the condition of, and potential impacts on, watershed processes and the degree to which our "representative" examples can truly be generalized across the Region. The impacts to receiving waters can be viewed as indicators of the degree of disturbance of watershed processes as a whole, but most importantly they can serve this study in determining the need for multiple levels of performance criteria that can potentially be used as targets to restore watershed processes to their desirable conditions. The Project Team will provide a comprehensive analysis of the combinations of watershed conditions, receiving water characteristics, and observed or inferred watershed processes to determine if linkages can be established. Products from this task will set the framework for development of the methodology for establishing performance criteria in Task 5.

Different watershed characteristics tend to have varying impacts to receiving water conditions in different parts of the landscape. For example, increased urbanization in a watershed can result in higher storm volumes and peak storm flows that must be conveyed by downstream receiving waters, but these effects will differ depending on variations in geology, vegetation, slope, and other characteristics that can have varying influences on watershed processes. The Team will analyze results of field investigations for receiving waters and corresponding watershed characteristics to determine if such trends can be established. If combinations of watershed characteristics can be linked to receiving water conditions, on the basis of both scientific understanding of watershed processes and our empirical data, we will have a sound basis for extrapolating to the other subwatersheds in the region sharing similar characteristics. Based on the watershed characteristics determined for all subwatersheds in the Region (Task 2), predicted receiving water conditions can form the basis of multiple levels of performance criteria, which can then be assigned to different subwatersheds. Refinement of these assignments of receiving water conditions for each subwatershed can be verified in future separate efforts, as determined necessary.

Deliverables

1. Draft Report summarizing results of linkage analysis: watershed conditions, receiving water characteristics, and the watershed processes that connect them
2. Draft Report II incorporating Regional Board staff comments
3. Final Report incorporating stakeholder comments

Task 5 Methodology

The purpose of this task is to provide a methodology for determining regionally appropriate hydromodification control criteria throughout the Central Coast Region. This will be done by using the products developed in the previous tasks to assess key watershed processes and evaluate how they can be protected by new and re-development standards. It is anticipated that each of the deliverables resulting from Tasks 1 through 4 will provide a valuable tool or information for understanding and analyzing watershed functions at the regional and subwatershed scale. The methodology developed under this task will clearly describe how each of these tools should be used in subsequent applications.

These instructions will encapsulate the overall approach that will constitute Phase 2 of this project. That approach will entail the application and improvement of the GIS tools developed in Tasks 2 and 3, and the application of the watershed processes linkage analyses of Task 4. The watershed categorization and receiving water classification tools provide a science-based framework for assessing existing conditions, but it may be necessary to refine the criteria for any given system, populate the database with more information, or field-verify existing data in Phase 2. The Project Team will provide detailed instructions for accomplishing these tasks. Once the framework and GIS information are adequately populated for site-specific use, the tools must be applied according to the linkage analysis strategy identified in Task 4. This task will provide step-by-step instructions for building upon any empirical linkages established between development patterns and altered watershed processes. Depending upon the desired certainty of the linkage and the anticipated resources available for this analysis, these Phase 2 steps may include development of a watershed modeling system to simulate process dynamics and predict watershed condition outcomes. Alternatively, these steps may involve simpler, more presumptive assessments to

build upon the empirical linkages, presumably with more conservative control criteria to reflect their greater uncertainty. The information gained and assessed as part of Tasks 1-4 will provide an indication of the degree to which the Methodology can be based on the relationship between important watershed functions/processes, impacts to those functions/processes, and the appropriate hydromodification management practices to mitigate those impacts.

In summary, it is anticipated that the linkage analysis will aid in the determination of regionally appropriate hydromodification control criteria throughout the Central Coast Region. This will be done by using the linkage analysis to evaluate which new and re-development project requirements at a site scale can protect watershed processes. The Project Team will provide detailed instructions for (1) identifying the dominant watershed processes present in each subwatershed, (2) identifying specific storm water control measures most appropriate for individual groupings of watershed characteristics, and (3) setting performance criteria necessary to meet target objectives for protecting the dominant watershed processes. By following this methodology, control measures and performance criteria will be specifically tailored to meet the needs of individual subwatershed types.

Deliverables

1. Draft Methodology
2. Draft Methodology II incorporating Regional Board staff comments
3. Final Methodology incorporating stakeholder comments

Task 6 Project Management and Reporting

The Project Team will maintain communication with Regional Board staff and/or other designee to keep them apprized of progress, upcoming milestones, and any issues that could potentially impact project performance.

Bi-Monthly Invoicing and Reporting

In Addition to invoicing requirements described in the Contract, a separate bi-monthly project report will accompany each invoice and will include the following information:

1. Work completed in the reporting period (activities and accomplishments) by task.
2. Work anticipated in the following reporting period by task.
3. Any issues or problems encountered and how they were resolved.
4. Identification of any current or anticipated issues related to scope, schedule, and/or budget.
5. Description of any task revisions currently necessary or anticipated.

A report template will be provided that includes the above information. The style, format and length will be suitable for distribution to various project stakeholders. Contractors will coordinate bi-monthly reports to provide comprehensive reporting.

Additional Project Management Support

Task Work Plans

The Project Team will work with Regional Board staff and/or their designee to create work plans for each Task item. The purpose of the work plan is to outline all steps in chronological fashion required to complete the task to efficiently coordinate task completion by the project team (i.e., Regional Board staff, the Project Lead, and additional contractors))This includes scope work, review, meetings, submittal of interim and final task deliverables, etc. Additionally, the work plans will include indication of coordination with participating MS4s.

General Project Outreach

The Project Team will provide a reader-friendly description of each task, subtask including a general description, staff (name, title, background, photo) assigned to the task(s), whether the task will include coordination with any MS4s, expected outcomes/deliverables, and how the work fits into the overall project objective(s).

Coordination Meetings

Communication and coordination will be integral to ensuring project success. Anticipated meetings include those with the Regional Board staff lead as well as other staff as appropriate. The Project Team will attend (via phone or in person), meetings with the Regional Board's Joint Effort Regional Team (JERT) stakeholder group. Additionally, the Project Team will hold weekly meetings to discuss project scope, schedule, and budget, to coordinate current and upcoming tasks, and to ensure that the overall project objectives and guiding principles provide the foundation for each task and deliverable. This includes Project Team meetings conducted prior to the implementation of a task to ensure that the deliverable is clear and provides value in context of Phase 1 (Methodology) and Phase 2 (parcel level hydromodification management) deliverables.

Deliverables:

- Bi-monthly project reports
- Task Work Plans developed in conjunction with the implementation of new task(s)
- Project outreach to occur in parallel with initial implementation of tasks. Ten (10) one- to two- page project task descriptions will be developed by the Contractor(s) and will be coordinated and posted on a appropriately identified website.
- Coordination Meetings.
    1. Project Team with Regional Board staff- two times per quarterly (phone meetings)
    2. Project Team attendance of Regional Board JERT- quarterly (half phone meetings)
    3. Project Team (all)- 1 hour weekly
    4. Email summary of subtask work and how deliverable(s) will be used for subsequent task(s) and Joint Effort (Phase 1 and 2) objectives- to be submitted prior to subtask implementation with Task work plans.

Specific Role of the Project Lead

The Regional Board's designated Project Lead will support timely and satisfactory progress on this scope of work. The Project Lead will provide overall Project Management support for items described above as well as technical expertise as appropriate throughout the scope. Project management tasks include:

Deliverables (consistent with deliverable schedule described above).

- Compilation of invoices, progress reports- to be provided in hard and electronic copy to the Regional Board
- Lead on development of subtask work plans- to be provided in hard and electronic copy
- Coordination, formatting and posting of project progress- web pages to be posted on the an appropriate site.
- Coordination meetings- participation in meetings with Regional Board staff, JERT, and Project Team meetings. Additional meetings as requested by the Regional Board staff.