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CENTRAL DISTRICT OF CALIFORNIA
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UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA

24 NATURAL RESOURCES DEFENSE
25 COUNCIL, SANTA MONICA BAYKEEPER,
26 TERRY TAMMINEN,
27 Plaintiffs,
28 vs.
29 CALIFORNIA DEPARTMENT OF
30 TRANSPORTATION; JAMES W. VAN LOBEN
31 SELS,
32 Defendants.

Case No. 93-6073-ER (JRX)

STIPULATION AND ~~PROPOSED~~ ORDER
REGARDING LA COSTA INFILTRATION
BASIN RETROFIT PILOT PROJECT

ENTER ON ICMS
MAY 2 2001
WNL

WHEREAS, this Court issued a Permanent Injunction in this matter on December 14, 1994;
WHEREAS, pursuant to the injunction, Defendant is required to comply with the federal Clean
Water Act, applicable NPDES permit and stormwater management plan;

1916

1 WHEREAS, on January 26, 1998, this Court entered the Stipulation and Order Re Agreement to
2 Conduct Retrofit Pilot Studies (the "Retrofit Study Stipulation");

3 WHEREAS, Defendant has embarked upon a retrofit pilot program pursuant to the Retrofit
4 Study Stipulation, including the design and construction of an infiltration basin along the I-5 freeway at
5 La Costa Avenue in San Diego County (the "La Costa Infiltration Basin");

6 WHEREAS, the La Costa Infiltration Basin has not performed as intended and, at least at times,
7 has failed to infiltrate at a rate adequate to accomplish its intended purposes;

8 WHEREAS, on January 12, 2000, Plaintiffs invoked "Level 1" of the parties' Dispute Resolution
9 Process, filed with the Court on September 30, 1997, for the purposes of addressing Plaintiffs' concerns
10 about the La Costa Infiltration Basin;

11 WHEREAS, on February 22, 2000, Plaintiffs noticed a lack of consensus of the "Level 1"
12 dispute and the parties thereafter proceeded to engage in "Level 2" discussions pursuant to the Dispute
13 Resolution Process;

14 WHEREAS, since that time, Plaintiffs and Defendant have engaged in "Level 2" discussions,
15 which have led to a mutual understanding and agreement between the parties as to a course of action;

16 WHEREFORE, subject to approval of the Court, the parties hereby stipulate as follows:

17 I. Defendant will fund and implement a site selection study ("Study") to be performed by qualified
18 consultants selected by Defendant. The purpose of the Study will be to examine a selected freeway
19 corridor or corridors to identify potential infiltration basin ("IFB") sites, apply the site selection
20 procedures as set forth in Infiltration Basin Siting and Design Lessons Learned for the BMP Retrofit
21 Pilot Study (attached as Exhibit A) to each potential IFB site, and determine whether an IFB is feasible
22 for such site.

23 II. The Study will be subject to the following conditions:

24 (a) the only Best Management Practices ("BMPs") to be studied will be IFBs;

25 (b) the freeway corridor or corridors shall be selected in areas where there will be construction
26 projects in the near future;

27 (c) the Study will not involve the preparation of any preliminary designs for BMPs;

28

1 (d) Defendant will be under no additional obligation, other than as required by the federal Clean
2 Water Act, applicable NPDES permit, stormwater management plan, and the Permanent
3 Injunction, to develop or install any IFB;

4 (e) Defendant will not be required to spend more than \$1,000,000 for the Study, which sum
5 includes any monies for peer review pursuant to section V;

6 (f) Defendant will not be required to study any sites outside the area(s) of the Study as
7 determined pursuant to section II(b) above;

8 (g) The Study will be commenced within six (6) months of the date this Stipulation is entered by
9 this Court and shall be completed within twenty-four (24) months thereof; and

10 (h) Defendant and Plaintiffs will designate representatives for the purpose of meeting with
11 applicable California Regional Water Quality Control Board personnel to discuss IFB strategies
12 and considerations.

13 III. The Study shall consist of the following stages:

14 (a) Selection of the corridor or corridors to be studied;

15 (b) Preparation of a scope of work, including budgetary milestones, for consultants who will be
16 selected to perform the Study;

17 (c) Identification of potentially suitable IFB sites, with a report thereon to be provided by the
18 Defendant to the Plaintiffs; and

19 (d) Application of the Infiltration Basin Siting and Design Lessons Learned for the BMP Retrofit
20 Pilot Study (Exhibit A) to each of the potentially suitable IFB sites, and determination of the
21 feasibility of an IFB at each such site, with a report thereon to be provided by the Defendant to
22 the Plaintiffs.

23 IV. The stages in Section III above shall be conducted by Defendant, subject to the approval of
24 Plaintiffs as provided herein, and the agreement of both parties shall be required before the stage is
25 deemed complete and the Study moves to the next stage. Such agreement shall not be unreasonably
26 withheld by any party. Such agreement shall be binding on the parties and shall estop the parties from
27 any later challenge to the matters agreed. If agreement is not reached, either party may institute the
28 dispute resolution process at the second level of dispute resolution, with the panel consisting of the

1 members of the Level II panel that addressed this matter, unless the parties agree to different
2 members or a member is unavailable. Notwithstanding Section II(g) above, the period of twenty-four
3 (24) months for completion of the Study shall be extended for the period or periods during which the
4 dispute resolution process is on going.

5 V. The reports prepared pursuant to Sections III(c) and (d) above shall be peer-reviewed by qualified
6 reviewers. The reviewers shall be selected from faculty of a state university located in California, or
7 otherwise in a contracting manner acceptable to both parties, by mutual agreement between the
8 parties. If the parties cannot reach agreement, then an equal number of reviewers shall be selected
9 by Defendant and by Plaintiffs. The peer review process identified herein shall not cost more than
10 \$25,000, unless a different amount is agreed to by the parties, and shall not be subject to the twenty-
11 four (24) month deadline identified in Section II(g) above, but shall be completed within three (3)
12 months after completion of the Study.

13 VI. Each party shall designate a single representative, who shall not be an attorney, to act for it with
14 regard to the Study. The written acts and agreements of each such representative shall be binding on
15 the party that designated such representative. The representatives shall consult on a regular basis to
16 address issues that arise and work cooperatively toward their resolution.

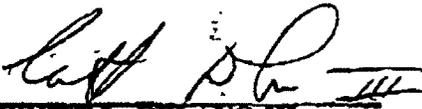
17 VII. As of the date of entry of this Stipulation, the La Costa Infiltration Basin shall cease to be
18 considered a part of the retrofit pilot program for the purposes of this litigation; however, the parties

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1 hereby agree to use the lessons learned from the design and construction of this site in any final
2 retrofit report prepared pursuant to the Retrofit Study Stipulation.

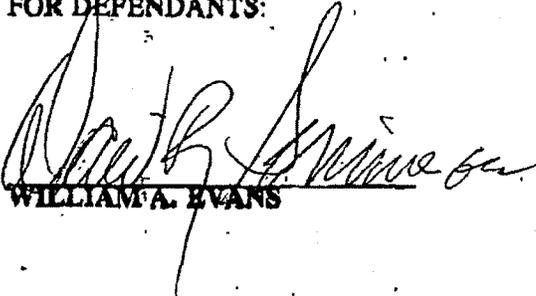
3
4 SO AGREED:

5 FOR PLAINTIFFS:

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7
8 
9 EVERETT L. DELANO III

1-3-00
Date

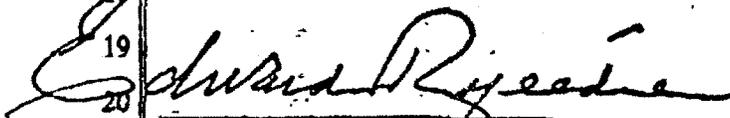
10 FOR DEFENDANTS:

11
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13 
14 WILLIAM A. EVANS

1/3/00
Date

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16 **ORDER**

17 GOOD CAUSE APPEARING, THE STIPULATION IS GRANTED. IT IS SO ORDERED:

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19 
20 Edward Ryzek
21 Judge of the U.S. District Court

APR 27 2001
Date

Infiltration Basin Siting and Design

Lessons Learned from the BMP Retrofit Pilot Program

Background

This paper presents the lessons learned during siting and design of infiltration basins as a part of the Caltrans BMP Retrofit Pilot Program. The information gained through geotechnical testing of the Retrofit Pilot Program infiltration basin site in Caltrans District 11 and the subsequent geotechnical peer review of this site are discussed as they relate to future siting and site evaluation for infiltration basins.

A recommended site evaluation procedure is presented that incorporates information from the current literature and the lessons learned from the BMP Retrofit Pilot Program.

Lessons Learned

Geotechnical Testing and Groundwater Elevation Determination

The forensic analysis of the La Costa infiltration basin site in District 11 shows that the failure occurred due to high groundwater and unsuitable soils. This experience indicates that careful geotechnical testing must be completed at multiple locations within the proposed basin site. The groundwater elevation has been recorded at the La Costa site for about a year and a half. The data show surprisingly erratic fluctuations in the water table, varying more than 5.5 feet overall and about 2 feet in the first six months. Fluctuations became much more stable in the last year (about 0.7 ft). One year of groundwater elevation monitoring may not represent seasonal highs in following years. For example, if the period from 5/18/99 to 5/12/2000 was selected to monitor the groundwater elevation at the site, the highest recorded groundwater elevation during this time would be about 6.1 feet (msl), about 1.8 feet lower than the maximum groundwater elevation experienced at the site of 7.9 (msl) feet. Caltrans has also experienced significant groundwater rise along I-105 as a result of groundwater recharge at the Whittier-Narrows aquifer forebay. The groundwater elevation rose several feet along I-105 over the course of about a year.

The *Geotechnical Engineering Peer Review* (URS Greiner Woodward Clyde, 1999) developed a finite element model to assess the drain time for the basin under various conditions. The model indicated that the basin (invert elevation 6.56 msl) should drain within 5 days with the groundwater table at least two feet from the basin invert, using the minimum acceptable permeability rate (0.27 in/hr). The data collected relative to pond depth vs. the ground water table elevation over the past year show that even when the groundwater separation condition is satisfied, (3/26/99 through 4/2/99) the pond did not drain as predicted, suggesting other contributing factors for the failure, such as an insufficient soil permeability. The peer review report notes substantially longer drain times in the finite element model for the case when soil permeability is lower than the

reported field permeability rate (1450 days if the laboratory permeability from the site of $1.3(10^{-6})$ cm/sec) is used. Other conclusions from the Peer Review Report were as follows:

- The permeability was measured primarily in near-surface fill outside of the basin. It is possible that the materials located beneath the basin have a lower permeability than measured at this location.
- Groundwater measurements were not representative of the stabilized groundwater elevation, as they were obtained approximately 30 minutes after drilling. It is common to wait at least 24 hours or more to obtain a stabilized reading.
- The initial findings indicated that the site geotechnical conditions were commensurate with the minimum basin design criteria. However, the boring on which that conclusion was based was located outside of the proposed basin and penetrated a relatively small zone beneath the basin invert.
- Greater attention should have been directed at monitoring the groundwater condition, rather than addressing it as a short-term transient issue.
- The practical approach in assessing infiltration is to make several infiltration tests and then use the lowest measured rate in design.
- Clayey materials found at the base of one boring provided some indication that subsurface conditions were not uniform, and that less permeable materials may be present below the basin invert. The laboratory permeability test conducted with these materials gave results approximately two orders of magnitude lower than the field test performed in near-surface fill outside of the proposed basin. Further exploration and in-hole permeability testing may have been warranted.

Based on the conclusions the Peer Review Report made the following recommendations for future infiltration basin siting and design:

- All explorations should be carefully logged to determine variations in the subsurface profile, of greatest importance being the presence of fine-grained materials such as silts and clays.
- At least two monitoring wells should be established, one near the basin but down-gradient by no more than approximately 10 meters and the other within the proposed basin. The wells should extend at least 5 meters below the proposed invert. They should be monitored at least monthly over both a wet and a dry season (over more than one year if the wet season is unusually dry).
- At least three in-hole conductivity tests should be performed using USBR 7300-89 or Bouwer-Rice procedures (the latter if groundwater is encountered within the boring), two within the proposed basin and the third down gradient by no more than approximately 10 meters. The tests should measure permeability in the side slopes and the bed within a depth of 3 meters of the invert. The lowest value of permeability should be used in design.
- The minimum acceptable hydraulic conductivity is 3×10^{-4} cm/s if the basin needs to be drained within 3 days and there is a minimum separation of the invert from groundwater of 2 ft. If the separation is 4 ft or more, a minimum conductivity of 2×10^{-4} cm/s appears to be reasonable.

- Groundwater modeling should be performed if infiltration conditions are marginal.

Application of the Testing and Peer Review Results

Preliminary site selection of infiltration basins for the Pilot Program was based on the method and criteria developed in, *Composite Siting Study, District 11*, Caltrans report ID CTSWRT-98-035, May 1998. The following are additional points to be incorporated into the siting/design procedure based on the conditions found at the La Costa site:

Initial Investigation

- An initial site investigation shall be made by a registered geotechnical engineer to determine if further exploration is warranted. All soil borings or samples should be carefully logged to determine variations in the subsurface profile, of greatest importance being the presence of fine-grained materials such as silts and clays, which should be determined by direct measurement of particle size distribution.
- An initial indication of the seasonal high water table elevation shall be obtained by establishing a monitoring well within the proposed basin and observing it at the end of the wet season and at least 24 hours after drilling. If this initial elevation indication is within 4 feet of the invert of the proposed infiltration basin, eliminate the site from further consideration. If there is not a reliable indication that the seasonal high water table is at least 10 feet below the invert of the proposed infiltration basin, perform a more extensive ground water table elevation investigation as described below. If the ground water elevation exceeds 10 feet from the proposed basin invert, proceed with in-drill hole permeability testing. A registered geotechnical engineer must oversee this initial ground water elevation determination.

Detailed Investigation

- If a more detailed investigation to determine the groundwater elevation is required per the guidance above, establish at least two monitoring wells, one near the basin but down gradient by no more than approximately 10 meters and the other within the proposed basin footprint. The two wells shall be observed over a wet and dry season; this observation period shall be extended to a second wet season if the initially observed wet season produces rainfall less than 80% of that in a normal year. The minimum acceptable spacing between the proposed infiltration basin invert and the seasonal high water table, as measured at either of the two established monitoring wells, is 4 feet. A registered geotechnical engineer must oversee the detailed investigation, and must also consider other potential factors that may influence the ground water elevation such as local or regional groundwater recharge projects, future urbanization or agriculture. The geotechnical engineer shall also examine the soil borings for indications of previous high water.
- At least three in-hole conductivity tests shall be performed using USBR 7300-89 or Bouwer-Rice procedures (the latter if groundwater is encountered within the boring), two tests at different locations within the proposed basin and the third

down gradient by no more than approximately 10 meters. The tests shall measure permeability in the side slopes and the bed within a depth of 3 meters of the invert.

- The minimum acceptable hydraulic conductivity as measured in any of the three required test holes is 0.5 in/hr. If any test hole shows less than the minimum value, the sites shall be disqualified from further consideration.
- In Equation 1, use the minimum measured value of hydraulic conductivity multiplied by a safety factor of 0.5.
- Exclude from consideration sites constructed in fill or partially in fill unless no silts or clays are present in the soil boring. Fill tends to be compacted, with clays in a dispersed rather than flocculated state, greatly impacting permeability.
- The geotechnical investigation shall be such that a good understanding is gained as to how the storm water runoff will move in the soil (horizontally or vertically), and if there are any geological conditions that could inhibit the movement of water.

Recommended Site Evaluation Procedure

The following siting procedure is recommended for infiltration basin site selection:

1. Preliminary selection considerations include:
 - Determine soil type (consider RCS soil type 'A, B or C' only) from mapping and consult USDA soil survey tables to review other parameters such as the amount of silt and clay, presence of a restrictive layer or seasonal high water table, and estimated permeability. Eliminate sites that are clearly unsuitable for infiltration.
 - Site area (sufficient for the basin footprint and 30 foot setback from the edge of traveled way, calculated by assuming an infiltration rate and checking the area required according to the method provided below).
 - Location away from buildings, slopes and highway pavement (greater than 20 feet) and wells and bridge structures (greater than 100 feet)
 - Modifications needed to existing drainage system (to collect sufficient tributary area)
 - Maintenance access (is adequate access available)
 - The site should not be constructed in fill, or on any slope greater than 15 %.
 - Base flow should not be present in the tributary watershed.
2. Secondary screening based on site geotechnical investigation.
 - Apply the procedures outlined in the bullets under Application of the Testing and Peer Review Results above.
 - Perform geological investigation to adequately understand soil lithology and determine, a) if there are potential problems in the soil structure that would inhibit the rate or quantity of infiltration desired, or b) if there are potential adverse impacts that could result from locating the infiltration basin at the site to either adjacent structures, slopes or ground water

- The soil shall not have more than 30 percent clay or more than 40 percent of clay and silt combined.
- Test the soil in the first 15 cm below the basin invert for organic content, pH, and cat ion exchange capacity. Values that promote pollutant capture in the soil are, respectively, >5 percent, 6-8, and >5 meq/100 g of soil.

The following procedure is recommended for determining the area required for the infiltration facility:

1. Determine the water quality capture volume from the appropriate design storm.
2. Compute the area required using the following equation:

$$A_{perc} = \frac{V_{out}}{kt} \quad (\text{Eq. 1})$$

Where:

A_{perc} = area of invert of basin (ft²)

V_{out} = water quality volume calculated from the design storm

k = 0.5 times the lowest field-measured hydraulic conductivity (permeability) (ft/s)

t = draw down time, 48 hours, expressed in seconds

Determine if the basin sized in Step 2 can be accommodated at this site including space needed for maintenance access.

Other design considerations guard infiltration basins against clogging by sediment deposition or other causes associated with extended ponding. Also, there are important construction considerations to prevent sediments from entering and avoid modification of the soil to the detriment of infiltration. These design and construction considerations are documented by Horner (1999). Finally, infiltration basins must be operated and maintained according to specific guidelines to assure long-term functioning. Horner (1999) and Watershed Management Institute (1997) are references to these guidelines.

References

California Department of Transportation, "BMP Retrofit Pilot Program, Composite Siting Study, District 11," Sacramento CA, Caltrans Report ID: CTSWRT-98-035, May 1998.

Horner, R.R., "Infiltration Facilities for Stormwater Quality Control," Workshop manual prepared for Managing Stormwater Runoff Workshop, Milwaukee, Wisconsin, Milwaukee River Revitalization Council and Wisconsin Department of Natural Resources, June 8, 1999.

URS Greiner Woodward Clyde, "Geotechnical Engineering Peer Review, I-5/LaCosta Avenue Infiltration Basin, Caltrans BMP Retrofit Program, Carlsbad, CA, URS Greiner Woodward Clyde, San Diego, CA, June 1999.

Watershed Management Institute, Inc., "Operation, Maintenance, and Management of Stormwater Management Systems," U.S. Environmental Protection Agency, Washington, D.C., August 1997.

1 **PROOF OF SERVICE**

2 Declarant says: I am employed in the County of Los Angeles; I am over the age of
3 eighteen years and not a party to the within entitled action; my business address is 865 South
4 Figueroa Street, Suite 400, Los Angeles, California 90017. On January 3, 2001 I served the
5 within: STIPULATION AND [PROPOSED] ORDER REGARDING LA COSTA INFILTRATION
6 BASIN RETROFIT PILOT PROJECT on those parties of record in said action listed below, by
7 placing a true copy thereof enclosed in a sealed envelope with postage thereon fully prepaid,
8 addressed as follows:

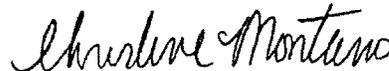
9 **Everett L. DeLano, III**
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David S. Beckman
Natural Resources Defense Counsel
6310 San Vincente Boulevard, Suite 250
Los Angeles, California 90048

- 12 |x| by *mail*, placing original true copy(ies) thereof enclosed in a sealed envelope
13 with postage thereon fully prepaid, addressed as indicated below.
- 14 | | by transmitting via facsimile true and correct copy(ies) thereof to the recipient and
15 fax number(s) set forth below.
- 16 | | by personally delivering original true copy(ies) thereof enclosed in a sealed
17 envelope to the offices of the addressee as indicated below.
- 18 | | by overnight courier of the original true copy(ies) thereof enclosed in a
sealed envelope with postage thereon fully prepaid, addressed as indicated below.

19 |X| As follows: I am "readily familiar" with the firm's practice of
20 collection and processing correspondence for mailing. Under that practice it would
21 be deposited with U.S. postal service on that same day with postage thereon fully
22 prepaid at Los Angeles, California in the ordinary course of business. I am aware
that on motion of the party served, service is presumed invalid if postal cancellation
date or postage meter date is more than one day after date of deposit for mailing in
affidavit.

23 I declare under penalty of perjury under the laws of the State of California that the above is
24 true and correct. Executed on January 3, 2001 Los Angeles, California.

25
26 
27 Christine Montano
28 Declarant

RICHARD R. HORNER, PH.D

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SEATTLE, WASHINGTON 98107

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June 6, 2002

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Legal Division
865 South Figueroa Street, Suite 400
Los Angeles, CA 90017-5472

**Re: Stipulation and Order Regarding La Costa Infiltration Basin Retrofit Pilot Project,
Case No. 93-6073-ER (JRX)**

Dear Mr. DeLano and Mr. Evans:

As representatives of the two parties appointed pursuant to paragraph VI of the Stipulation and Order, we wish to submit for the record our joint decisions concerning several aspects of the Los Angeles Infiltration Basin Site Selection Study ("the Study") that deviate from the express terms of the Stipulation and Order or the consultant's Scope of Services issued at the outset. The decisions reflect circumstances that arose during the early stages of work. In each case we believe that they represent the best courses to advance the work toward fulfilling its objectives.

1. We have agreed to proceed to Detailed Investigation despite not having received at least 80 percent of the long-term average precipitation during the 2001-2002 wet season.

This decision is contrary to the Infiltration Basin Siting and Design Lessons Learned from the BMP Retrofit Pilot Program, which is an attachment to the Stipulation and Order. The provision is intended to provide reliable indication that the groundwater table will not approach the basin floor too closely. We conferred extensively with and received the expert opinions of the URS consultants, who determined that observed groundwater levels are far enough beneath the areas selected for Detailed Investigation, and even all but one of those considered but rejected for other reasons, that even a wet year would produce a low risk of excessive groundwater rise. They do not anticipate that the expected wet winter next year will cause water table rise within the restricted (<4 ft) or questionable (4-10 ft) spacings. If there is substantial rise but still outside those intervals, it would be advisable to recheck infiltration rate measurements. These rechecks can be accomplished at relatively small cost (\$26,000; 2.6 percent of total budget), already set aside as a contingency. The consequences of not proceeding despite the low rainfall and waiting a year are several: (1) loss of momentum in an effectively functioning project; (2) adequate rainfall next year is not assured anyway; and (3) the stipulated 24-month term of the Study would be exceeded by a full year, because of a late

start due to the pace of legal paperwork movement, which precluding any work after the wetter 2000-2001 winter.

We recognize that the Plaintiffs have expressed concern, in light of the initial delay, with going ahead if there is any risk of wasting a portion of the Study's budget on a site or sites that ultimately fails the acceptance criteria with higher precipitation. While they are willing to proceed with the plan discussed herein, they reserve their right to reopen the discussion on this point should the analysis be wrong and unanticipated groundwater conditions lead to any failure.

2. The phases and priorities identified and mutually agreed upon pursuant to Stipulation and Order paragraph III(a) and incorporated in the Scope of Services will not continue in use.

The phases represented two sets of freeway corridors considered to offer the best (Phase I) and next best (Phase II) opportunities for infiltration basins in conjunction with future highway construction. The priorities distinguished opportunities within the phases. This approach served its purpose, as work first concentrated on the Phase I corridors in priority order. As Preliminary Investigation proceeded, however, criteria eliminated an entire high priority location. It quickly became evident that moving into Phase II was warranted. That decision yielded a number of promising sites for further investigation. With an extensive screening process now complete and the locations for detailed work identified in corridors from both phases, the original distinctions no longer have meaning.

3. The preliminary report written pursuant to Stipulation and Order paragraph III(c) covers the work at Phase I locations but not at Phase II sites, some of which ultimately were chosen for further work. It is our mutual belief that the best use of funds is to keep this scope for the preliminary report, finalizing it with minor edits. We then propose to cover the Preliminary Investigation of the Phase II sites in the final report and to abstract from the preliminary report to present equivalent information from Phase I in the final report.

We both have emphasized applying the maximum budget toward obtaining results in the field. The preliminary report is thorough and has served its purpose well, particularly in recording methods and rationale. We believe that it would be budget-wasting "busy work" to produce a parallel account of preliminary work on the Phase II sites at this time. All of the information for such a report has been assembled and considered in detail by the parties. It will be more efficient, and more useful to future readers, to give a concise account of work on all sites in one place, the final report, than to divert from field work at a critical time and expand an interim report.

4. The Scope of Services did not allot monies for testing potential contaminants in soil and groundwater, but we have concluded that devoting a relatively modest sum (\$15,000, 1.5 percent of total budget) to this purpose would be money well spent.

The Regional and State Water Quality Control Boards have expressed some concerns with infiltrating urban stormwater runoff to groundwater instead of collecting it for

conveyance to surface receiving waters. The Boards have worked to set reasonable conditions for accepting the practice though. We have sought in this study to address all concerns and meet all conditions. They involve the quality of runoff, distance between the surface and groundwater, speed of travel through the soil, soil characteristics pertaining to capture and retention of pollutants, and pre-existing contaminants in soil and groundwater. Our methods have addressed each area. Because there are often no existing site-specific data on soil and groundwater quality, we propose the expenditure to collect such data at all sites given Detailed Investigation. We will then have directly addressed all Board concerns.

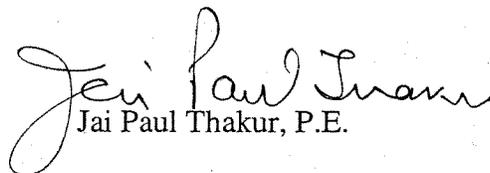
5. We propose to start the peer review process earlier than scheduled in the Scope of Services, at no additional cost.

We have agreed that giving the peer reviewers only one opportunity to review a final report after all work is done may cause problems in acceptance that could be alleviated earlier. While a reviewer can always argue with the interpretation of results, we do not want to get into a situation where a reviewer says we have no basis to make any interpretation. While we have not decided on exactly when or how reviewers will first be involved, we do want them to have an opportunity to comment on the methods being used while there are chances for correction if warranted. We intend to allocate a minority of the \$25,000 peer review budget for this purpose and save the balance for the final review.

Sincerely,



Richard R. Horner, Ph.D



Jai Paul Thakur, P.E.