

1 **PCB Strategy: Priority Margin Unit Conceptual Model Development**

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3 Oversight group: PCB Workgroup  
4 Proposed by: Jay Davis, SFEI  
5

6 **Proposed Funding**

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8 1) Completion of San Leandro Bay Conceptual Model:

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10 (\$30,000 for this task will be provided as part of a  
11 Supplemental Environmental Project settlement.  
12 No RMP Special Study funds need to be allocated.)  
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15 2) Conceptual Model for Priority Margin Unit #3 (Steinberger Slough): \$60,000  
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18 **Proposed Deliverables And Timeline**

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<b>Deliverable</b>	<b>Due Date</b>
Draft report on San Leandro Bay	Dec 2016
Final report on San Leandro Bay	Mar 2017
Draft report on PMU #3	Apr 2017
Final report on PMU #3	Aug 2017

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22 **Summary**

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24 The goal of RMP PCB Strategy work over the next few years is to inform the review and  
25 possible revision of the PCB TMDL and the reissuance of the Municipal Regional Permit for  
26 Stormwater (MRP), both of which are tentatively scheduled to occur in 2020. Conceptual  
27 model development for a set of four representative priority margin units will provide a  
28 foundation for establishing an effective and efficient monitoring plan to track responses to  
29 load reductions and also help guide planning of management actions. The Emeryville  
30 Crescent was the first PMU to be studied in 2015-2016. The San Leandro Bay PMU is  
31 second (2016-2017). The third PMU will either be Santa Fe Channel/Parr Channel in  
32 Richmond Harbor, or Steinberger Slough in San Carlos. A report on this third PMU will be  
33 completed in 2017.  
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35 **Introduction and Background**

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37 The RMP PCB Strategy Team formulated a PCB Strategy in 2009. The Team  
38 recognized that a wealth of new information had been generated since the PCBs TMDL Staff  
39 Report (SFBRWQCB 2008) was prepared. The Strategy articulated management questions

1 to guide a long-term program of studies to support reduction of PCB impairment in the Bay.  
2 The PCB Team recommended two studies to begin addressing these questions. The first  
3 recommended study was to take advantage of an opportunity to piggyback on the final year  
4 of the three-year prey fish mercury sampling in 2010 to collect data on PCBs in prey fish  
5 also. The second study that was recommended was a synthesis and conceptual model  
6 update based on the information that had been generated since the writing of the TMDL  
7 Staff Report.  
8

9 The prey fish monitoring revealed extremely high concentrations of PCBs in the  
10 food web in several areas on the Bay margins (Greenfield and Allen 2013), and highlighted  
11 a need to develop a more detailed conceptual model than the one-box model used as a basis  
12 for the TMDL. A model that would support the implementation of actions to reduce loads  
13 from small tributaries, a primary focus of the TMDL, would be of particular value. A revised  
14 conceptual model was developed that shifted focus from the open Bay to the contaminated  
15 areas on the margins where impairment is greatest, where load reductions are being  
16 pursued, and where reductions in impairment in response to load reductions would be  
17 most apparent (Davis et al. 2014).  
18

19 The margins appear to be a collection of distinct local food webs that share some  
20 general similarities but are largely functionally discrete from each other. Monitoring,  
21 forecasting, and management should therefore treat these margin locations as discrete  
22 local-scale units. Local-scale actions within a margin unit, or in upstream watersheds, will  
23 likely be needed to reduce exposure within that unit. Better characterization of impairment  
24 on the margins through more thorough sampling of sediment and biota would help focus  
25 attention on the margin units where the need for action is greatest (“priority margin units”  
26 or PMUs), and will also provide an important performance measure for load reduction  
27 actions taken in local watersheds. Davis et al. (2014) recommended a focus on assessing  
28 the effectiveness of small tributary load reduction actions in priority margin units, and  
29 provided an initial foundation for these activities.  
30

31 The 2014 update of the PCB Strategy called for a multi-year effort to implement the  
32 recommendations of the PCB Synthesis Report (Davis et al. 2014) pertaining to:

- 33 1. identifying margin units that are high priorities for management and monitoring,
- 34 2. development of conceptual models and mass budgets for margin units downstream  
35 of watersheds where management actions will occur, and
- 36 3. monitoring in these units as a performance measure.

37 A thorough and thoughtful planning effort is warranted given the large expenditures of  
38 funding and effort that will be needed to implement management actions to reduce PCB  
39 loads from urban stormwater.  
40

41 Work conducted in 2015 initiated the multi-year PMU effort. The first phase of the  
42 2015 work consisted of a preliminary assessment of margin units downstream of six pilot  
43 watersheds that have been prioritized for management actions. In the second phase of the  
44 2015 workplan (implementation of which has continued into 2016), a detailed assessment  
45 of one of the four PMUs (Emeryville Crescent) has been developed.  
46

1 An updated draft of the multi-year plan is presented in Table 1. The goal of RMP  
2 PCB special studies over the next few years is to inform the review and possible revision of  
3 the PCB TMDL and the reissuance of the Municipal Regional Permit for Stormwater (MRP),  
4 both of which are tentatively scheduled to occur in 2020. Conceptual model development  
5 for the set of PMUs is the element of the PCB workplan that will have the greatest value in  
6 informing the consideration of a revised TMDL and MRP. A conceptual understanding of  
7 the anticipated response of these PMUs to load reductions, in addition to providing a  
8 foundation for establishing an effective and efficient monitoring plan, will also help guide  
9 planning of management actions. As conceptual models are developed for these PMUs,  
10 consideration will be given to whether a general model or family of models can be  
11 developed that could apply to margin units more broadly. The monitoring plans that are  
12 produced will be designed to maximize sensitivity to detecting reduced impairment in the  
13 margin units.

### 14 15 16 **Study Objective and Applicable RMP Management Questions**

17  
18 The objectives of this study are:

- 19 1. to develop a conceptual understanding of the anticipated response of two PMUs to  
20 load reductions, and
- 21 2. to develop sensitive monitoring strategies to detect the effectiveness of watershed  
22 management actions in reducing PCB impairment in PMUs.

### 23 24 25 **PCB Strategy Questions Addressed**

- 26  
27 1. What are the rates of recovery of the Bay, its segments, and in-Bay contaminated sites  
28 from PCB contamination?
- 29 4. Which small tributaries and contaminated margin sites are the highest priorities for  
30 cleanup?
- 31 5. What management actions have the greatest potential for accelerating recovery or  
32 reducing exposure?
- 33 6. What are the near-term effects of management actions on the potential for adverse  
34 impacts on humans and aquatic life due to Bay contamination?

### 35 36 37 **RMP Management Questions Addressed**

- 38  
39 4. Have the concentrations, masses, and associated impacts of contaminants in  
40 the Estuary increased or decreased?
  - 41 B. What are the effects of management actions on the potential for  
42 adverse impacts on humans and aquatic life due to Bay  
43 contamination?

### 44 45 46 **Study Approach**

1  
2 The multi-year plan for studying PCBs in the margins has three components:  
3 conceptual model development, field studies to support/confirm the models, and trend  
4 monitoring. The funding requested for 2016 and 2017 would support continued conceptual  
5 model development through synthesis and simple modeling based on existing information.  
6

- 7 ○ The revised multi-year plan calls for the development of conceptual models  
8 for four PMUs (Emeryville Crescent, Richmond Harbor, Steinberger Slough,  
9 and San Leandro Bay) from 2015-2018. Work on this component began for  
10 Emeryville Crescent in 2015. Development of a conceptual model for San  
11 Leandro Bay was partially funded in 2016. This proposal includes funding  
12 for completion of the conceptual model for San Leandro Bay and for a  
13 conceptual model for the next PMU (Steinberger Slough).  
14
- 15 ○ To support conceptual model development, a budget for field studies is also  
16 included in the multi-year plan. These studies could include, for example,  
17 analysis of spatial patterns in surface sediments or of sampling to determine  
18 the presence of indicator species and their PCB concentrations. Funding from  
19 the RMP Supplemental Environmental Project fund is likely to be available to  
20 support field work in San Leandro Bay in 2016. A proposed design for this  
21 work will be prepared for PCBWG review if the funding is in.  
22
- 23 ○ According to the multi-year plan, as the conceptual models and preliminary  
24 field studies are completed, trend monitoring can be phased in. It is  
25 anticipated that this monitoring can begin in San Leandro Bay in 2018  
26 because funding for the preliminary field studies has been identified. The  
27 cost will be estimated after the conceptual model is completed.  
28

29 Given the long-term plan discussed above, the work proposed for 2016 and 2017 is  
30 to complete a conceptual site model for a second PMU (San Leandro Bay) and to develop a  
31 conceptual site model for a third PMU (Steinberger Slough). The timing of preliminary field  
32 studies and trend monitoring will depend on the level of funding for the PCB Strategy.  
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### 34 **Tasks for 2016 and 2017**

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37 Task 1 (2016): Complete a conceptual site model and first order mass budget for San  
38 Leandro Bay  
39 Budget: \$30K for SFEI labor to synthesize information and conduct modeling. (These funds  
40 will be provided as part of a Supplemental Environmental Project settlement. No RMP  
41 Special Study funds need to be allocated.)  
42

43 Conceptual model development for the second PMU (San Leandro Bay) began in 2016 and  
44 will be completed with the funding from this proposal. Additional funding is needed for  
45 this task because the original proposal was only partially funded in 2016. The conceptual  
46 model will follow the template established for the Emeryville Crescent PMU, with

1 evaluations of loading, initial deposition, long-term fate, and bioaccumulation. While  
2 ideally the site model evaluations will conclude that it is possible to detect reduced  
3 concentrations in the Bay, it is also possible that the effort will conclude that this is not  
4 feasible with a realistic effort given the relative magnitude of the reduced loading, the  
5 reservoir of PCBs already in the PMU, and environmental variation.

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7 **Timing and Deliverables:**

- 8 • A draft technical report documenting a conceptual site model and monitoring plans  
9 for San Leandro Bay by December 2016. Final report in Mar 2017.

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12 **Task 2 (2017): Complete a conceptual site model and first order mass budget for**  
13 **Steinberger Slough**

14 **Budget: \$60K for SFEI labor to synthesize information and conduct modeling.**

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16 **The approach will be the same as that described under task 1.**

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18 **Timing and Deliverables:**

- 19 • A draft technical report documenting a conceptual site model and monitoring plans  
20 for Steinberger Slough by April 2017. Final report in Aug 2017.

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26 **References**

27  
28 Davis, J.A., L.J. McKee, T. Jabusch, D. Yee, and J.R.M. Ross. 2014. PCBs in San Francisco Bay:  
29 Assessment of the Current State of Knowledge and Priority Information Gaps. RMP  
30 Contribution No. 727. San Francisco Estuary Institute, Richmond, California.

1 Table 1. PCB studies and monitoring in the RMP from 2010 to 2019. Numbers indicate budget allocations in \$1000s. Numbers in  
 2 parentheses are expected funds from the RMP Supplemental Environmental Project fund.

Element	PCB Questions Addressed	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Food Web Uptake (Small Fish)	1, 4	50									
PCB Conceptual Model Update	1,2,3,4,5,6		53								
Development and updating of multi-year workplan and continued support of PCB Workgroup meetings							10	10	10	10	10
Prioritize Margin Units	1, 4, 5, 6						30				
Develop Conceptual Site Models and Mass Balances for PMUs (4 PMUs)	1, 4, 5, 6						45	30 (30)	60	60	
PMU Field Studies to Support Development of Conceptual Site Models and Monitoring Plans	1, 4, 5, 6							(52)	TBD	TBD	TBD
PMU Trend Monitoring (5 PMUs)	1, 4, 5, 6									TBD	TBD
RMP Total		50	53				85	40	TBD	TBD	TBD
SEP Funding								82			
Overall Total									TBD		