



Daniel B. Stephens & Associates, Inc.

Responses to Public Comments

Draft Feasibility Study Update, Portuguese Bend Landslide Complex, Rancho Palos Verdes, California

This document provides responses to public comments received regarding the Daniel B. Stephens & Associates, Inc. (DBS&A) report *Draft Feasibility Study Update, Portuguese Bend Landslide Complex, Rancho Palos Verdes, California*, dated December 22, 2017.

Each comment is reproduced in its entirety in *italics*, with DBS&A's response following in regular text.

Commenter: Bill Ailor, Palos Verdes Peninsula Land Conservancy (1/14/2018)

1. *Tranquil Beauty. Those two words were key to the preservation of the land that is now being considered for modification. In the 1980s, our community began an effort to preserve the tranquil beauty of the Portuguese Bend area. That tranquil beauty was manifest in this open space included the presence of trails where a person could be alone with his/her thoughts, could enjoy ocean views comparable with the best in the world, could see wildlife and plants in their natural home--not a zoo or museum, and could hear the wind blowing through grasses. All of this in an area isolated from the sounds and lights of the millions of people who live in the Los Angeles area. This was a place where a family could come and experience a bit of nature that has remained quiet and undisturbed for decades and more. About 20 years later, the City of Rancho Palos Verdes, supported by funds set aside by taxpayers and by donations from local residents, acquired this land and accepted the responsibility to preserve its critical natural habitat and open space values—values that are essential to the area's "tranquil beauty." As you consider the impact of the proposed modifications, please ask yourself "How will the introduction of heavy trucks bringing materials and construction crews to work in canyons and stream beds, fill fissures, and provide long-term maintenance affect the tranquil beauty of this splendid area?" Tranquil beauty brought many of us to Palos Verdes. The acres of open space and its natural inhabitants in the area under consideration are the heart of this resource. Please do not take actions that will degrade the tranquil beauty we have today.*

Response: The specific purpose of the Draft Feasibility Study (FS) Update is to identify and select a conceptual solution that meets defined goals stated in the introductory section of the FS Update report. At this conceptual stage of the process, there is not enough detail regarding the final selected remedy, or the implementation of the final remedy, to evaluate potential impacts to site aesthetic or biological resources. Once the final remedy is identified, an evaluation of the project consistent with the California Environmental Quality Act (CEQA) must be conducted. The short- and long-term project aesthetic, biological, or other impacts will be evaluated as part of that evaluation.

Commenter: Eva Cicoria and others (various dates)

2. *Which of the project proposals being floated in the FS present the greatest risk of triggering another landslide during construction? Is it not the case that 1950s infill done in the PBLC area is thought to have been, at minimum, a contributing factor to the 1956 landslide? How much new fill would be involved in the different project proposals?*



Response: Based on the evaluation and discussion presented in the previous sections, the following alternatives have been selected as the preferred remedy in the FS Update:

- Seal Surface Fractures
- Directional Subsurface Drains
- Flexible Liner System and Components
- Groundwater Extraction Wells
- Centralized Sewer System

These technologies are selected and designed to reduce the amount of water within the landslide complex. At this conceptual stage of the process of remediating the landslide complex, the detailed design and implementation of the remedy has not yet been identified, it is not envisioned the methods identified will enhance or trigger additional earth movement, including landslides. Rather, the selected technologies can be implemented with relatively low impact to the site topography and no major infilling is planned as a component of the remedy. Any necessary cut and fill volumes will be identified as a part of the final design.

3. *Mr. Cullen explained that the typical gradients they work on are 0.01 to 0.00001. The area under consideration has a 0.10 or 10% grade. What hazards could be expected working with such steep terrain?*

Response: Dr. Cullen actually stated that 0.001 to 0.0001 are typical of groundwater gradients that are commonly encountered in the field. Nonetheless, hazards to workers will be addressed as part of a standard health and safety program designed for the site. Ecological hazards and other impacts will be evaluated as part of the CEQA study discussed in Response To Comment (RTC) No. 1.

4. *Have homes in Rolling Hills located near these three canyons been examined for risk of destabilization if the project proceeds?*

Response: No. Such analysis, if appropriate, would be conducted as part of the design and implementation of the final remedy.

5. *Are there flexible materials now available that could be substituted for existing materials used on 1) the road, 2) the sewer pipe along PVDS, 3) the extraction and monitoring wells, 4) the corrugated pipe installed in past years to channel water in the lower reaches toward the ocean, in each case which would reduce the likelihood of them being torn apart by land movement?*

Response: There are flexible materials currently available. However, the final selection of the appropriate building materials to be used in the remedy implementation will be made in the final design stage. Selection will be based on the engineering application (such as described in the comment), engineered properties of the materials, City experience and other reported experience with the materials. All appropriate materials will be investigated and considered, including flexible materials such as geotextiles or geosynthetic clay liners (GCLs).

6. *If septic tanks account for a certain percentage of the groundwater and septic tank conversion is the proposal with the least impact on nature, then will that be prioritized first?*

Response: The sequence of implementation of the selected conceptual design technologies will be identified at a future time as part of the final design, and prioritized based on a number of



considerations including stakeholder feedback, site access, availability of funding, ease of implementation, and the significance of water contribution to the landslide complex.

7. *Would pipes from a centralized sewer system in Rolling Hills be routed to avoid the Preserve?*

Response: The details of implementation of the septic tank conversion to sewer lines will be identified at a future time as part of the final design based on a number of considerations including stakeholder feedback, site access, engineering feasibility, cost, and ease of implementation.

8. *Why not give full effort to dewatering instead of installing such systems and then letting them go? If it worked for Abalone Cove, if it worked for PBR in the past, why not try it ahead of other solutions? Even if the wells shear over time, would it not be cheaper and less invasive to drill them again and over time they should stop shearing as land movement slows?*

Response: Based on the data available, it is not clear that dewatering alone did provide a permanent solution for the Portuguese Bend Landslide Complex (PBLC). Regarding Abalone Cove, the geology in the Abalone Cove slide area is more favorable (ie. more permeable) than the geology in the PBLC area, thus they are not directly comparable. Lastly, it is not clear that it would be cheaper and less invasive (relative to the interests of all stakeholders) to make multiple replacements of (presumably) vertical wells. Nonetheless, dewatering using horizontal wells and, to a lesser extent, vertical wells is a primary strategy in the conceptual design to stabilize the PBLC.

9. *What subsurface water (amount and percentage) would the proposed "horizontal" drains be expected to drain and what water would not be expected to be drained by them? What would happen to the water that would not be expected to drain?*

Response: Water in the subsurface exists within the pores of the soil matrix. When water is drained, the soil pores below the water table desaturate and the water table declines. Figure 13 of the FS Update demonstrates the increasing factor of safety that results from lowering the water table. Water that is not drained remains within the soil pores and moves slowly toward the ocean driven by the gradient that results from the "tilt" of the water table towards the ocean. The FS recommends the drilling of vertical borings to characterize the detailed location and tilt of the water table. A horizontal drain pilot study is also recommended to measure the amount (the percentage is directly related to the amount) and rate at which water can be drained from the PBLC.

10. *Is there a certain amount of water or percentage of water saturation that would be expected to have a nominal effect on land movement and therefore would be acceptable under the proposed solutions?*

Response: This effect was estimated by the modeled increase in factor of safety (FOS) with the decline in groundwater elevation that would result from dewatering, or draining, the PBLC as shown in Figure 13 of the FS Update.

11. *How will dewatering wells function with the horizontal drains? Will drainage be tunneled or established under PVDS? How will the tunneling and drains under the road affect the long-term stability of the road when the land does move?*

Response: To be clear, horizontal drains is a term that refers to a type of dewatering well. The terminology "hydraugers" is also used to describe these horizontal dewatering wells, or drains. Horizontal dewatering wells will be drilled generally northward into the shore cliff face and installed



under PVDS. The cross-sectional area occupied by the boreholes needed to install the horizontal wells is minimal and not expected to impact stability of the road.

12. *From the plan view of the placement of the horizontal drains (FS Figure 14), it is not clear what subsurface water levels the horizontal drains could passively drain. (An elevation view would be useful.) Furthermore, portions of the rupture surface appear to be at a zero-elevation contour line (Geotechnical Figure 3). This would imply that the horizontal drains will not drain water passively from this area. Please clarify.*

Response: The purpose of Figure 3 is to illustrate the anticipated approximate area that could be covered by horizontal drains. Clarification of the final design of the drains, including their number, location, length, depth, area of drainage influence, and orientation in three-dimensional space will be determined as the product of the final design. 100% removal of all water is neither feasible nor practical. Multiple cross-sectional views (elevation views) are provided in Appendix B, Geotechnical Modeling Figures, based on the data available as of the publication of the FS Update. As indicated by Figure 13, improved stabilization (indicated by increasing modeled FOS as the result decreasing water table elevation) of the PBLC also does not require 100% removal. The FS drawings are based on data from approximately 20 years ago. Additional current drilling data and groundwater level data are needed to update the cross-sectional figures before hydrauger installation to target groundwater at the appropriate depths and angles.

13. *Where has the sealing of surface fractures with cement been done previously in an area with similar land movement?*

Response: Mitigation of land movement by reduction of the amount of water reaching and residing in the subsurface is a technique that has been proven in many landslide locations around the world. All along the drive along the Pacific Coast Highway northward from Santa Monica there are various locations where dewatering is being conducted by various means. Sealing of fractures is one means of preventing rapid migration of water to the deep subsurface via open fractures during runoff-inducing precipitation events. Soil cement is one means by which fractures could be filled to prevent the rapid migration of water to the deep subsurface. As indicated in the FS Update, Section 4.6.1.1: "Relatively large fractures would be infilled before the rainy winter season each year using a long-reach concrete pumping truck, conventional grout pumping rig, or other method." The final fracture-filling method and materials selected will be identified at a future time as part of the final design, and prioritized based on a number of considerations including stakeholder feedback, site access, availability of funding, ease of implementation, and the significance of water contribution to the landslide complex. Case studies of existing projects with similar technologies were not included in the FS. Case studies can be included in subsequent final design work.

14. *What will happen to the clumps of concrete filling the fissures when/if the land moves?*

Response: Please see RTC No. 13. In-filled material (not pure concrete) can be designed to continue to prevent water infiltration under a land movement scenario; that is, the material can be designed to be appropriately flexible if needed.

15. *The consultants' presentation to CC (at about 2:32) indicates that the fill substance for the fissures doesn't have to be cement, it could be soil. Is there soil in some places in the City land south of the Preserve that has been deposited by man during prior remediation attempts, that could be used as fill for the fissures or are the consultants talking about introducing foreign soil? If the latter, does*



that have any risks associated with it? Related, foreign soil was brought in to re-grade Peppertree Tr. after last year's rains. Are there any risks associated with that?

Response: The makeup of the in-filled material will be identified during final design but is not necessarily expected to be pure concrete (please see RTC No. 13) nor pure native or introduced soil. Any introduced material can be evaluated and tested in advance for potential impacts.

16. Explain the differences between the Work Areas Conceptual Design vs. the Drainage Routing graphics. The former shows the Portuguese Cyn Channel extending past the Central Channel to PVDS and the ocean discharge, whereas the Drainage Routing graphic shows drainage for Portuguese Cyn being routed to the Central Channel only.

Response: The *Work Areas Conceptual Design* ("Selected Alternatives", slide 35) figure presented in the City Council meeting is an update to the draft FS figures. The FS will be updated to include the new drawing that was prepared to reduce the footprint of the proposed design and be in further compliance with the covered projects in the NCCP/HCP. The final scale and orientation of the proposed conceptual channels will be determined in the design stage of the project.

17. Where has the geo-textile fabric lining and channelization of canyons been done previously in an area with similar features as in PBR?

Response: A composite liner for surface water or groundwater infiltration control is a common component of modern landfill construction. One example of a comparable application using a subsurface liner to control infiltration to groundwater while simultaneously providing a substrate for surface construction would be the Bowerman Landfill in Orange County, California shown at this address (see liner feature in figure inset at bottom of the illustration):

<http://www.oclandfills.com/civicax/filebank/blobdload.aspx?BlobID=60359>

The concept of an infiltration control feature is envisioned for the Portuguese Bend landslide mitigation project. In addition, as noted in RTC 13, case studies utilizing composite liner technology with habitat construction were not included in the draft FS but can be included in future work in the design stage of the FS.

18. What would the installation process be for geo-textiles where canyon walls are deep or steep-sided?

Response: Standard construction equipment is anticipated to be utilized. A variety of standard methods are available and can be fully described in detail and pre-approved before any work commences. Construction methodology cannot be reliably determined until a final design is selected. Similarly, final design will be thoroughly vetted with stakeholder input.

19. How much flex is there in the geo-textile fabric proposed to line the canyons and other proposed channels, i.e., when the land moves one foot, what happens to that fabric? Two feet?

Response: This level of detail cannot be reliably provided until a final design is selected. In general, the GCL and/or geotextile material is anticipated to be installed as over-lapped sheeting so that needed repair can be completed in an efficient manner (as compared to underground piping). It is not anticipated that the material will stretch under stress of land movement to cover additional area. The overall idea of the FS regarding lining systems is that, conceptually, partial



canyon lining to prevent surface water infiltration is a potentially workable idea that can be moved forward into a more detailed design stage to further evaluate its implementability.

20. Will plant roots perforate the geo-textile fabric, or work through seams or overlaps, and in doing so impact the fabric's effectiveness?

Response: Some allowable design compromise in the canyon lining may be anticipated due to plant growth over time, however, this element can be incorporated into the final design such that this issue is minimized and overall the liner functions as designed over time. For example, this issue would be part of an operation, maintenance, and periodic inspection plan

21. If, over time, the geo-textile fabric tears or separates, does the work need to be redone? How would someone even know?

Response: Please see RTC 19 and 20. A significant Operations and Maintenance (O&M) program has been recommended as an integral component of an effective PBLC land stabilization program. Significant defects in the geotextile would be periodically inspected in the O&M program and repairs affected as needed.

22. The FS at p. 53 says that "some engineering components would also be needed in mid-canyon high flow or flow convergence areas such as velocity dissipation structures, flow control channeling" What are these additional engineering components? Are any of those engineering components to be made of concrete? And approximately what dimensions are they likely to be? How would they be installed?

Response: This level of detail cannot be reliably provided until a final design is selected. In general, the idea is that high-velocity surface water may need to be slowed in order to minimize erosion and promote controlled flow. This can be accomplished in part with native materials such as rock placed as flow barriers in the interior of the flow channels, or engineered channel roughness (with rock), however, the structures themselves inherently need to be able to withstand high-velocity water impact. One example was provided in the draft FS (cutoff channel). Final design will be thoroughly vetted with stakeholder input.

23. What "stream restoration program" is contemplated in the reference on p. 63 of the FS?

Response: Stream restoration refers to an overall approach with the objective to enhance, promote, and develop existing native habitat while including some engineering components to supplement or stabilize the habitat. In this case, the goal would be to prevent storm water infiltration into the head scarp of the landslide. In summary, stream restoration technology is envisioned to restore and promote native habitat while simultaneously preventing storm water infiltration into the head scarp of the landslide.

24. How do the consultants envision getting construction equipment and hauling equipment to and from each of the canyons they propose to channelize?

Response: Please see RTC 18.

25. If 65 feet is the minimum width of the canyon lining and channelization is based on a 100-year flood event (per the SR), what is the maximum width that will be permitted/required?

Response: This level of detail cannot be reliably provided until a final design is selected. In general, the width of the channel lining will be based on measured hydrologic parameters. The



draft FS provides only a conceptual level of detail regarding this option. If hydrologic data indicate that the proposed channel lining areas become prohibitively wide such that other design parameters are not met (such as compliance with the NCCP/HCP), then alternative designs can be pursued. Final design will be thoroughly vetted with stakeholder input.

26. How much work area is needed adjacent to the geo-textile project to support the work? How much staging area is needed for the geo-textile work? How much area is needed for spoils from the geo-textile work?

Response: Construction methodology cannot be reliably determined until a final design is selected. Final methodology will be thoroughly vetted with stakeholder input.

27. How do consultants propose to create a 65 foot-wide channel down each of these canyons which, in some places are currently 5-10 feet wide but have steep sides--will the canyons be filled in places in order to widen them?

Response: Please see RTC 18 and 26. This level of detail cannot be reliably provided until a final design is selected. However, large-scale canyon filling is not envisioned.

28. Explain further how planting is proposed in the rip rap and, in particular, how the sacs would support large native plants with deep roots.

Response: Native plants with relatively deep roots can be incorporated into the final design as needed by allowing for deeper soil horizons. Planting would be accomplished so that the liner is a subsurface feature with soil emplaced above in order to promote designed plant growth and habitat development.

29. How do consultants propose to analyze the trade-offs between removing vegetation with deep root systems that help to control erosion in order to channelize the canyons vs. retaining that vegetation to control erosion and allowing water to flow through the canyons naturally?

Response: Allowing specific areas of existing vegetation to remain in place can be incorporated into the final design with stakeholder input and standard cost/benefit analysis while complying with the NCCP/HCP.

30. Doesn't the central channel operate at cross purpose to the goal of sending the water down the canyons to the ocean as quickly and directly as possible?

Response: The cutoff channel in the draft FS was one of several initial designs where water was intended to be directed away from the headscarp area. The "Selected Alternatives" slide (#35) presented to the City Council is an update to the draft FS figure. The cutoff channel was removed to reduce the footprint of the proposed design and be in further compliance with the NCCP/HCP. The final scale and orientation of the proposed conceptual channels will be determined in the design stage of the project and thoroughly vetted with stakeholder input.

31. Why does the central channel send most of the water, including water from Portuguese Cyn, into the area of suspected subterranean pooled water, already deemed by the consultants to be a major problem area?

Response: The channel lining system would be designed to prevent infiltration of surface water to groundwater.



32. *The CC presentation by the consultants (at about 2:28) indicates that Portuguese Cyn pretty much flows to the ocean. The pipe going under PVDS has apparently sunk some. How does the consultant justify altering the canyon to the extreme extent proposed if it is functioning fairly well currently except at the point where it reaches PVDS?*

Response: The unlined canyons, including Portuguese Canyon, allow surface water infiltration to groundwater which needs to be eliminated to promote land stability. The outfall under PVDS would be rehabilitated to full functionality during final design and construction.

33. *Provide a breakdown of the spend on PVDS, sewer and other expenses since the City's incorporation in 1973. What was the money spent on, and what jurisdiction/agency spent it?*

Response: The City of RPV can provide available data regarding this information.

34. *What would it cost and how long would it take to implement the measures of 1984, which seemed to be fairly effective and with significantly lighter environmental impacts than those currently proposed in the FS? What would it cost to properly maintain them, both monetarily and environmentally?*

Response: Based on limited documentation, work conducted c.1984 involved soil excavation and mass regrading on a large scale, including removal of an existing pond (Lake Ishibashi). Land movement subsequently continued nonetheless. No known cost records are available to DBS&A that document that work.

35. *Per Mr. Cullen, ground water wells are critical to understanding the geology and hydrology of the landscape. Over the past years, money has been invested in placement of some 20 water wells, probably more, but the data is lacking. The fact that money was spent on water wells and then not monitored or kept in repair does not give taxpayers confidence that this project will be successful or be monitored and maintained. Why should taxpayers believe that this time will be any different?*

Response: A modern electronic hydrogeologic database, readily duplicated to allow for periodic backup storage, is recommended as part of the final design.

36. *The consultants indicate that "a handful" of data would be needed before designing a system, yet the data gaps seem to be extensive. Please separate the data gap costs from the pilot testing costs provided in the slide near the end of the consultants' presentation "Order of Magnitude Costs".*

Response: Data gaps costs are already separated from other costs in Table 4 (each data gap task is preceded by the label "Data Gap").

37. *Regarding pilot testing, at what point would the determination be made that the plan isn't working and it should be scrapped, vs. it should be modified at X cost? Is the idea to go forward at all costs once we start down that road?*

Response: The overall goal of pilot testing is to evaluate selected technologies in detail and decide which are effective and which are not. A pilot testing timeline or schedule and performance objective(s) are typically included in a separate pilot testing workplan drafted before any work commences.

38. *The FS says at p. 72 that "ultimately, additional areas in the adjacent watersheds could also be lined, such as Eastern Altamira Cyn or Lower Klondike Cyn where stormwater continues to infiltrate to groundwater in the vicinity of the project area." What are the projected additional monetary and*



environmental costs of these measures and how and when will the consultants determine whether they are "necessary"?

Response: This level of detail cannot be reliably provided until a final design is selected, however, it should be recognized that these adjacent canyons also allow for surface water infiltration to groundwater and ultimately, the solution to relatively stable land in the Portuguese Bend area may in part involve eliminating this source of groundwater recharge. These issues can be evaluated in the future once initial efforts as planned in the FS are completed and evaluated.

39. Will RPV pay for updated biologic surveys and how much will that add to the cost?

Response: Overall funding sources for FS implementation are still being identified. All sources of funding are under consideration, including state and federal funding opportunities. In general a biological survey is one of the more relatively minor tasks, on a cost basis, to be completed.

40. Do the costs of the project take into account the costs for work in Rolling Hills?

Response: Yes.

41. Do the costs of the project take into account all environmental mitigation, including for Rolling Hills?

Response: Yes. However, mitigation is not included in the sense that alternative environmental projects may be completed at some other land area to account for some issue(s) identified during final FS implementation.

42. Will RPV pay for Rolling Hills septic to be converted to sewer?

Response: Overall funding sources for FS implementation are still being identified. The FS does not assume that one city will pay for capital improvements in an adjacent city.

43. If public debt is proposed for any of the project costs, whether in RPV or Rolling Hills, will a public vote be required? What happens if the public debt is not approved? Are the costs of such an election included in the project costs?

Response: Overall funding sources for FS implementation are still being identified. The cited activities are not included in estimated conceptual project costs.

44. What would be estimated to be the interest costs of any public debt required to fund the project? Provide backup documentation for the calculation of probable interest costs.

Response: Please see RTC No. 43.

45. If the canyon channelization and lining go forward, will RPV compensate donors who have given their hard-earned money trusting that the land would be protected and preserved in perpetuity?

Response: The cited issue was not within the scope of investigation of the draft FS.

46. Has exposure to liability to homeowners, including homeowners in Rolling Hills, been taken into consideration if the project triggers slope failure?

Response: The cited issue was not within the scope of investigation of the draft.



47. *When will the public see a rigorous return-on-investment analysis?*

Response: The cited issue was not within the scope of investigation of the draft FS.

48. *Why did the FS not include a "complete characterization of the hydrology of the area", since this was a top priority of the public who attended the Landslide Subcommittee meetings?*

Response: The cited issue was not within the scope of investigation of the draft FS. This a separate scope of work item that requires separate funding. The approved scope of work was to prepare an FS update. This task is identified for future work items (data gaps).

49. *How will the consultants address the data gaps, specifically addressing data from existing wells, piezometers in the streams, rainfall gauges, and multiple years of data?*

Response: A systematic approach will be implemented to design supplementary field work programs to collect the required data in order to develop and evaluate a final design. Data gap work plan(s) will be developed in advance, with stakeholder input and standard cost/benefit analysis while complying with the NCCP/HCP, to describe the planned work, objectives, and methodologies.

50. *What are the highest-priority data needs to determine the most feasible, cost effective, and least-damaging solutions?*

Response: Basic geologic and hydrogeologic data are key such as depth-to-water and stratigraphy. Basic hydrologic data are also needed in order to design a system to control surface water.

51. *What is the risk of failure of each proposed remediation solution if a full hydrologic study of the watershed is not conducted and the existing data gaps are not addressed?*

Response: Final design planning cannot proceed without addressing data gaps and completing a hydrologic study.

52. *Some of the existing landslide abatement infrastructure is in complete disrepair, some is simply not maintained. For example, this culvert between Burma Rd and Rim Tr. has overgrown vegetation blocking water flow. [photograph not reproduced here].*

It seems that if the damaged infrastructure is not repaired, hydrologic data may be skewed as water runoff and pooling is affected, thus it makes sense to postpone any future hydrologic studies until the existing damaged infrastructure is cleaned up and repaired or replaced. Has the existing infrastructure been surveyed to determine what is repairable and what isn't? Considering how long it will take to complete the projects currently contemplated in the FS, doesn't it make sense to fix what we have at least in the short term?

Response: The existing piping system was largely ineffective and was reportedly in disrepair approximately 1 year after construction. It is not anticipated that the remnants of the system will be a factor in future hydrologic studies or data collection.

53. *Is it possible to predict (and with what degree of certainty) where the land will flow in the future based on how much and where water will infiltrate the ground?*



Response: Not reliably. Annual land surveys document existing land movement and serve as the best record for actual land movement. The "red zone" described in the FS is well established as the primary area of past land movement.

54. *How much water is too much in the watershed? In other words, how much would need to be removed under certain rainfall conditions? And how much is needed to support life in the watershed?*

Response: These issues could largely be addressed once a hydrologic study and water balance is completed.

55. *Leighton estimated up to 77 acre-feet per year recharge from upslope irrigation. Mr. Cullen said that this is significant and needs further quantification to support a PBLC design. What sources of water are subsumed in "upslope irrigation"? What is the current percentage of groundwater inflow into the PBLC resulting from such irrigation upslope? What percentage is from septic tanks?*

Response: A limited water balance that includes irrigation and septic tanks was completed in 2000 (Leighton, 2000). However, an updated water balance should be conducted to address these issues.

56. *Is there a correlation between the changes in groundwater elevation from well to well and the land movement measurements from one well location to another?*

Response: A limited analysis of land movement with rainfall was completed by Douglas (2013, Figures 59, 60, and 62; pages 63 to 65). In general a positive correlation was shown between rainfall and land movement.

57. *Without the results from a hydrologic study for the watershed, that includes data specific to each canyon, what evidence is there to support the statement (in the PBLC Physical Characteristics slide presented by consultants at the CC meeting) that "infiltration of canyon runoff is a source of groundwater recharge" other than the infiltration once that runoff arrives at the lower reaches of PBR? In other words, where is the evidence that any subsurface water flow originating from water running down through the upper canyons has any significant impact on groundwater recharge in the lower reaches of PBR?*

Response: This phenomenon is described in Douglas (2013, Figure 18). Natural surface water drainage is largely destroyed in the lower canyon areas and flow is directed into the head scarp area. The evidence is in part continued land movement with reduced flow to the ocean during rain events. Nonetheless, a hydrologic study is needed to further quantify these issues.

58. *The consultants' presentation to CC indicated that "100% of storm water from [Paintbrush and Portuguese] canyon flows directly into the head of PBLC." Yet, some of that water currently percolates into the ground and transpires through vegetation in the canyons. Confirm that actually more water from the canyons will flow directly into the head of PBLC with lining and channelization and that actually what is done with the water that comes out of the canyons is going to determine whether or not the water flows into the head of the PBLC or is diverted elsewhere.*

Response: Although channel lining may pass over the head scarp area, channel lining would prevent (not promote) flow into the subsurface in the head scarp area. The resulting surface flow would be directed above the existing land surface and into the ocean.

59. *Explain the "deep" water bearing zone.*



Response: Deep is a general term describing groundwater detected below a depth at which groundwater is first encountered. That is, below “shallow” groundwater or below a more shallow depth interval (zone) that also contains groundwater. More specifically, Douglas (2013, p. 20) refers to “deep” groundwater as groundwater that originates in the upper part of the drainage basin and is largely confined to below the rupture zones.

60. In the CC presentation, the consultants indicate ponding in the head of the slide, but the arrow is moving around broadly. Where is the ponding? Is this reference different than the depression in the failure surface? Does the failure surface that drops to sea level extend under PVDS?

Response: Because the natural drainage is damaged or destroyed by land movement and historical regrading, surface water appears to be collecting or ponding in several areas near the head scarp and other areas north of PVDS where topography is relatively low.

The failure surface is below grade and is not directly related to surface water ponding. The location, extent, and elevation of the failure surface as mapped c.1999 is shown in FS Appendix B (Figure 3) and extends under PVDS to just past the shoreline.

61. Where is the depression in the failure surface relative to the one spot that showed 8 feet/year land movement?

Response: The center of the depression in the failure surface is approximately 1,110 feet northeast of land survey point PB67 which showed 8.55 feet of land movement in the 2013/2014 survey.

62. What is the suspected relationship between the depression in the failure surface and the one spot in the vicinity that showed 8 feet/year land movement?

Response: No particular relationship has been specifically quantified.

63. Regarding the Hydrogeology slide shown by the consultants at the CC meeting of 1/16/18 indicating that PBLC water enters the subsurface by different means, what amount of water entry is attributable to each of the different means?

Response: Please see RTC 54 and 55.

64. In the consultants' slide labeled Detailed Analysis--Geotechnical Modeling, the landslide mass is pulled off revealing a brown layer, but it appears that part of the landslide mass is left behind in the area of the pond/the deeper landslide. Is that correct? (about 2:16 on CC video) If the modeling left behind the pond, can it be accurate modeling?

Response: The model output figure shows the land mass above the mapped failure surface and no landslide mass is left behind on the diagram. However, this model is preliminary only. The preliminary model is based on data from c.1999 and additional data and refined modeling is needed for more detailed analysis. In addition, the coloring of the figure and various features is arbitrary.

65. How is the variation in land movement explained (1-2 feet in most areas versus 8 feet in one place)? And what is the consultants' proposal for addressing this in particular; for focusing on this area?

Response: This complex issue of differential movement is addressed and explained in prior literature documents such as Douglas (2013, page 64). The FS does not update this analysis.



However, the overall FS focuses on the area of documented primary historical movement (“red zone” area).

66. *Land movement data presented was just for 1 year. What is the movement for other years? And where?*

Response: Land survey reports are available from the city website for at least years 2007 through 2015.

67. *Are Portuguese Cyn, Ishibashi Cyn, Paintbrush Cyn and Klondike Cyn all blue-line streams?*

Response: Some of the canyons in this area are colorized as blue line streams on the Long Beach USGS quadrangle topographic map completed for this area in 1981, however, no other analysis was completed or the FS to confirm that these are currently classified as blue line streams. A hydrologic study would address this issue.

68. *Why did the FS not include a complete assessment of the environmental impacts of the proposal, since this was a top priority of the public who attended the Landslide Subcommittee meetings?*

Response: Please see RTC 1. Environmental impacts are addressed separately in a CEQA analysis as part of a project. This is a feasibility study that does not trigger CEQA.

69. *As you look out over PBR from above, you see that much of the CSS cover occurs in the canyons. [photographs not reproduced here]*

This makes sense, because the higher flat lands were the lands that were farmed in years past, while the canyons were left in their natural state, except for damming created by roads across them. How viable is a preserve for CSS-reliant species if the very highest quality CSS is removed?

Response: No final removal areas have been identified. Any final plans will be approved in advance with stakeholder input. Preserving key areas can be a component of the final design. Data gaps, including a hydrologic study, need to be completed before a final design is proposed. The final design will appropriately consider established existing habitat areas.

70. *Is there any plan going forward to assess the impact that destroying prime wildlife habitat in these canyons will have on the survivability of wildlife that currently live there and depend on the dense vegetative cover for protection from predators, for den sites, and for forage?*

Response: As noted in RTC 69, no final removal areas have been identified. Any final plans will be approved in advance with stakeholder input and preserving key habitat areas can be a component of the final design. The final design will appropriately consider established habitat areas pursuant to the NCCP/HCP. A CEQA analysis, in part, will also address these issues once the final remedy has been identified.

71. *What does it mean that the City staff worked with the consultants to make sure alignment of the surface area would avoid any of the identified species? Avoiding identified species is not something the City staff is qualified to represent fully to a consultant. A biologist should be the only person representing this kind of information on behalf of the City and in a collaborative process as well as to honor the NCCP, the City would request that a biologist from the Palos Verdes Peninsula Land Conservancy provide this information to the consultants.*



Response: The various surveyed habitat areas identified in the NCCP/HCP were overlaid onto landslide maps using a Geographic Information System (GIS) to see what areas coincide with various features of the PBLC.

72. Studies have shown us that California gnatcatchers, cactus wrens, and mammals are present in the proposed project area. What data is there to demonstrate that the noise and other impacts of heavy equipment such as bulldozers, engines roaring, men shouting, radios blaring--all common to construction sites--will not have an adverse impact on the protected species and other wildlife?

Response: As noted above in RTC 70, the CEQA process is intended to address these issues.

73. What modifications will the consultants and RPV staff make in their FS recommendations to show true prioritization of minimizing impacts on the Preserve?

Response: Some modifications to the draft FS plans have already been made to minimize the footprint (land area) of the proposed FS remedies. For example, the cutoff channel proposed in the draft FS was removed. As noted in previous RTCs, final design will be selected with stakeholder interaction and input.

74. What are the most sensitive areas of the Preserve and how will they be avoided per the NCCP requirements? Please consult PVP Land Conservancy.

Response: Please see RTC 72 and 73.

75. Per the SR, the NCCP allows 3.3 acres of CSS take within the Preserve for landslide abatement measures. Channelizing upper Portuguese Cyn, Ishibashi Cyn and Paintbrush Cyn alone is estimated to "take" more than 10 acres of CSS. If the City and consultants are truly committed to honoring the NCCP, then why isn't channelizing the canyons rejected as an option as other landslide abatement measures considered were rejected?

Response: Preventing surface water infiltration to groundwater in the head scarp area is a key component of the FS remedy. The final design of that remedy is not complete. Some initial modifications to the draft FS plans have already been made to minimize the footprint (land area) of the proposed remedies and further compliance with the NCCP/HCP plans. As noted in previous RTCs, final design will be selected with stakeholder interaction and input.

76. If the City uses its full allotment of CSS take for utilities and dewatering well maintenance simply to install the project, what is the City's plan for those activities after the project is installed?

Response: Required land area for remedy implementation, including O&M, will be incorporated into the final design. The City will not design a project that utilizes all of the acreage allocated for covered loss.

77. How will the biological values of the area in the PBLC be preserved?

Response: Please see RTC 72.

78. In years, what is the estimated timeframe that the proposal would set back the efforts already undertaken and progress already made to ensure the long-term viability and sustainability of the native ecosystem?

Response: Please see RTC 72.



79. Who was consulted regarding native plants before the FS proposed uprooting them and planting them in sacs in the channelized canyons? Are consultants aware that some native plant species in the canyons have very extensive root systems, some 30-40 feet deep or greater, which themselves offer stabilizing and transpiration benefits?

Response: The NCCP/HCP surveyed maps of various habitat types were used in FS remedy evaluation. Please also see RTC 28.

80. The FS says at p. 72 that "ultimately, additional areas in the adjacent watersheds could also be lined, such as Eastern Altamira Cyn or Lower Klondike Cyn where storm water continues to infiltrate to groundwater in the vicinity of the project area." In addition, in the consultants' presentation, Klondike Cyn was mentioned and we're told that it should be controlled eventually. The consultants acknowledge that there is a lot of CSS in that canyon. Has the take from these canyons been considered in the total take calculations?

Response: Not at this time, only estimated based on the concept described in the FS.

81. What inspections have been done in the canyons, if any, and under whose guidance?

Response: As described in the FS document, no fieldwork has been conducted for the FS.

82. "Take" in Rolling Hills is not mitigated by the NCCP. What mitigation efforts and permitting will be undertaken with respect to that take? Who will be the lead agency for that permitting?

Response: Please see RTC 41 regarding mitigation. Issues regarding Rolling Hills and permitting agencies will be addressed in later stages of the overall project.

83. What effect does dewatering have on plant life?

Response: Please see RTC 72.

84. Conversations with the consultants following the CC meeting suggest that the consultants would benefit from regular input from PVPLC staff and its volunteers. What is the plan going forward to bring in the PVPLC and its volunteers on a regular basis to engage in back-and-forth dialogue with the consultants?

Response: A stakeholder meeting is in the planning stages to facilitate this issue.

85. Was ACLAD (Abalone Cove Landslide District) consulted for their data and feedback during the FS process?

Response: Available ACLAD data was reviewed during FS development. Future contact with ACLAD regarding additional data can be completed as appropriate at later stages of the project.

86. Who is the "environmental expert" on the team; what is his/her background; and what has been his/her contribution? (When the issue was raised last summer, the public was told that there is an environmental expert on the team.)

Response: The DBS&A/GLA project team includes several expert level professionals with a background in environmental science, environmental consulting, civil and geotechnical engineering, soil science, geology, hydrogeology, hydrology, and other fields. Specifically regarding biological resources, this field will be addressed in the CEQA portion of the project.



87. *Why doesn't the FS take into account the time frame and feasibility of permitting and various agencies' reviews (other than mentioning there would be constraints) with respect to the myriad project proposals?*

Response: Permitting and agency review is always inherently included with the overall anticipated list of additional tasks to be completed in an FS. For example, see Table 4 of the Draft FS Update report, dated December 22, 2017.

88. *If we have a heavy rain year in the middle of the project when all the habitat has been torn up and nothing yet installed or only partially installed to manage the water flow, what measures will be taken to prevent Palos Verdes Drive South and the Portuguese Bend community becoming "another" Route 101 and Montecito, CA?*

Response: Modern construction methodologies can be implemented using best practices to ensure a successful installation, including an assessment of seasonal risk, traffic control measures, and sequential construction phases that accommodate maintenance of storm water flow capabilities.

89. *What measures can be implemented now without further study, such as repairing or replacing existing infrastructure (e.g., corrugated pipes) to direct water off of the lower PBR?*

Response: Please see RTC 49, 51, and 69. None of the proposed remedies can be implemented without first addressing data gaps. The rationale for eliminating the repair of the existing piping is addressed in Section 4.4.1 of the FS.

90. *What percentage of the PBLC is within the City of Rolling Hills?*

Response: The PBLC area is described in Section 1.1.1 of the FS. No part of the PBLC land movement area is within Rolling Hills, however, as described in FS Section 3.2, of the combined approximately 1,300-acre area of the PBLC and Klondike *watersheds*, approximately 360 acres (28 percent) lies within Rolling Hills.

91. *What support is there from Rolling Hills?*

Response: The City of RPV can provide information regarding this issue.

92. *What impact have past construction projects had on the land movement, for example, to what extent have Burma Rd., Peppertree Tr., and PVDS dammed the natural flow of water down the canyons to the ocean and how can those projects be re-designed to mitigate the problems?*

Response: No specific analysis was conducted for the FS regarding the impact of past road construction or the reconstruction or relocation of these roads. However, as noted in RTC 57, natural drainage has been disrupted as described in Douglas (2013). Part of the proposed remedy is to, in part, re-establish natural drainage pathways, including controlled flow under PVDS, and prevent surface water infiltration to the head scarp area.

93. *To what extent will existing poor drainage infrastructure be repaired prior to pilot projects and other work? For instance, after the rains of 2017 resulted in significant runoff on and along Peppertree Tr., the trail was filled and re-graded, resulting in damming of the naturally-formed runoff trenches. Recent rain filled these trenches and pooled in the lower part of PBR, allowing rain water to infiltrate the ground rather than running off. [photograph not reproduced here]*



Response: No such work is anticipated prior to pilot work as described in the FS. Information regarding general area or roadway maintenance can be provided by the City of RPV.

94. *What is the involvement of the Klondike Cyn landslide with the Portuguese Bend landslide as mentioned by Mr. Cullen in the CC meeting of 1/16/18?*

Response: No specific analysis has been conducted regarding this issue in the FS. However, these landslides are directly adjacent to each other in the geotechnical and hydrogeologic environment and as such they share a somewhat similar history. Dr. Cullen noted that surface water is infiltrating to groundwater in lower Klondike Canyon and this issue may promote land movement in the southern PBLC area.

95. *There's an assumption that the grading done in 1987 as per POC II (moving 500,000 yards from steep areas to flat areas) slowed the land movement. Has anybody looked at the rainfall during that time to determine whether other variables might be responsible for the slower movement?*

Response: No data regarding this issue was provided during FS development and as such, no such specific analysis was completed for the FS. No long-term historical land movement rate data (back to c.1987) are available. Some analysis of land movement with historical rainfall was conducted by Douglas (2013) which, as expected, showed a positive correlation between land movement and rainfall. Nonetheless, unacceptable land movement has continued since 1987.

96. *At what point in the process will the noise, dust, trail closures and other impacts of the extensive construction work over a long period of time, on trail users, residents of Rolling Hills and the Portuguese Bend community, and visitors to Terranea Resort be considered in the mix of concerns?*

Response: Please see RTC 1 regarding CEQA. CEQA would be completed as a component of the final design.

97. *Portuguese Bend Club is involved in slide remediation in their area. Have the possible impacts of their grading and other work on the Klondike Cyn slide and/or the PBLC, whether positive or negative, been systematically examined?*

Response: No such specific analysis has been conducted for the FS, however, the geotechnical model constructed for the FS could be utilized in the future to examine this issue. Periodic grading at PBC is anticipated to continue indefinitely nevertheless in order to maintain the existing infrastructure in that area.

98. *Surface drainage within the landslide is poor, said consultants during the CC meeting, and "can't get water to move through to the ocean where it normally and originally and natively went to. It gets essentially dammed up by the slide material." Was some of that "slide material" deposited by man and why not focus on returning to a more natural drainage course, particularly because the PBLC apparently showed little movement for decades (centuries?) until man began to grade the area for roads, damming the natural water courses?*

Response: Please see RTC 57, 60 and 92 regarding these issues.

99. *The consultants' presentation indicated that the "lower reaches of Portuguese and Paintbrush Canyons have been destroyed". They were destroyed by man. What is the feasibility of restoring the lower reaches of the canyons to allow rainwater to flow naturally to the ocean?*



Response: Please see RTC 57, 60, 92 and 98 regarding these issues.

100. *Has an analysis been done on leaving the upper reaches of the canyons in their natural state and only addressing the lower reaches, for example possibly lining "the sandbox", or part of it, with some type of flexible fabric and directing the water from that low area down to the ocean through some type of flexible piping?*

Response: This upper reach/lower reach analysis can be conducted once a hydrologic study has been completed that quantifies specifically what amount of surface water flow needs to be controlled. Conceptually this is a workable solution if surface water infiltration to groundwater can be eliminated in the head scarp area and existing groundwater flow from the upper canyon areas to areas south of Burma Road (into the "Red Zone") is minimal.

101. *What is the feasibility--risks and benefits--of creating a wetland atop a liner in the low area of the sandbox?*

Response: This is conceptually possible, however, engineered wetlands in otherwise relatively dry environments can be problematic over the long run. The primary issues are maintaining a reliable, continual, water supply and maintaining appropriate water quality. This could potentially be addressed later once the primary FS remedial action objective (RAO) is addressed (significantly reduce area land movement).

102. *What is the feasibility of supporting PVDS on caissons or other support structures down to the basalt bedrock, or creating a floating road or a bridge, anchored on both ends of the land flow, allowing the land flow to pass below the road surface?*

Response: While these are conceptually interesting ideas for consideration at the top level of technology screening, these are prohibitively expensive options well exceeding the costs of the remedies proposed in the FS.

Commenter: Ken DeLong (1/25/2018)

103. *This concerns the Portuguese Bend landslide presentation to the Council on January 26th and the subsequent request for resident comments.*

There was considerable technical detail with the presenters reported intent was to bring past concerns to a current data update. It appeared that the objective was accomplished. As I am not an engineer qualified to make technical comments, my observations are non-technical.

It appears that the presenters again confirmed what RPV has known for some time; that there is septic water from Rolling Hills and RPV as well as water from other sources that are significant contributors to the landslide. Sources have never been adequately mapped to determine exactly where the water flow begins. At the lower ocean outfall, there needs to be a buttress that can stabilize and hold the land from flowing into the ocean. We recognize that developing good solutions for landslide control is not an easy problem to solve.

Response: Comments noted and appreciated.

104. *First of all it would seem that task 1 would be to remove all of the landslide area from the Nature Preserve thus removing PVPLC involvement as the PVPLC seems to have greater concerns for habitat than landslide control. The NCCP should NOT be a component of this problem.*

Response: The PVPLC is one of many stakeholders involved in the process of developing and selecting a solution.



105. *Much of the negotiations going forward will be political as well as technical. RPV needs to engage Los Angeles County (Supervisor Hahn / LA County Sanitation / sewers) and Rolling Hills. Rather than making the San Ramon Canyon mistake of not requesting LA County's participation, get other possible participants involved early. A working committee of two Council members as well as the Public Works Director and a Public Works engineer would seem an initial process to move forward. A process for keeping the Council and staff updated would be necessary.*

Response: Comments noted and appreciated. The City of RPV will further address these issues as the overall project moves forward.

106. *To move forward, it seems there should be greater pursuit of more specific plans for eliminating / controlling septic and other water from the landslide area. Also identification of potential financial sources and mapping of the underground structure. RPV has very healthy financial reserves with Terranea now contributing over \$5 million annually in TOT in addition to property and other taxes. The RPV Council must focus on critical priorities and stop wasting resources on exercises in futility that are meaningless to the residents of this community. Demonstration of serious intent will demonstrate to other agencies that RPV is serious about fixing / slowing the Portuguese Bend Landslide.*

Response: Septic tank replacement is a component of the recommended remedy. Funding sources are currently being identified. Data gaps will in part address subsurface structure to support remedy final design or implementation. The City of RPV will further address these issues as the overall project moves forward.

Commenter: Ken Dyda, Councilmember (various dates)

107. *Executive summary: In the last sentence of paragraph 2 those that refer to the breakwater. If so it should be stated or whatever was done specifically should be stated.*

*Response: The text will be revised to include a breakwater as one of the options considered in the preliminary technology screening stage (Section 4.3).

108. *Introduction: A comment on the last paragraph on page 4. By 1987 many homes that moved sufficiently to have encroached onto adjoining property. Many were now mounted on stilts using flexible couplings for utilities. How can this not be considered significantly affecting the quality of human environment?*

Response: The text is referring to an environmental impact statement (EIS) report finding of no significant impact (FONSI) related to proposed future grading and road repair work in the slide area, not past events where homes were directly affected by slope movement.

109. *Should not the history of the Abalone Cove's landslide (1978) in its stabilization be part of this background?*

*Response: Agreed. A brief history of the Abalone Cove landslide and abatement will be included in the revised feasibility study (FS) report.

110. *Again on page 16 in paragraph 3 the focus is Shoreline protection not landslide abatement. Typical concern at that time.*

Response: Agreed. As noted in the text, "The discussions centered on the need for shoreline protection, not landslide abatement."



111. *In section 2.1 it seems the studies dealt with moving dirt around and not dealing with the primary cause water.*

Response: The FS text notes at the bottom of page 16 that the remedy implemented at that time included, in part, redistributing soils from upper slopes to the toe of the landslide in order to reduce bearing load upslope and to fortify the toe in attempt to reduce ongoing slope movement.

112. *At the end of paragraph 1 on page 17 it might be good to list what those recommendations were.*

*Response: Comment noted and agreed. This comment appears to be referring to page 18. The conclusions and recommendations of the Plan of Control (POC) assessment appear in the text as suggested in paragraphs 3 and 4 and following on page 18 of the report.

113. *Physical characteristics of the PBLC vicinity: Interesting that 28% of the watershed lies in Rolling Hills. Interesting that in the next to the last paragraph the water flowing through the ocean from the crest road area is the focus of concern for the slide.*

Response: Comments noted.

114. *Do we really need more studies for each of the existing wells if we focus on intercepting all the water from above the slide and capturing the surface and subsurface (septic tank) water within the slide. What is the cost to the study and is it included in the estimate submitted in this report.*

Response: Significant work has been completed in the past; however, some important data are no longer available in the project record. In addition, some data that can change over time need to be remeasured, such as depth to groundwater below ground surface. Additional work needed for the next step in remedy design, before pilot testing, is termed pre-design "data gap" work and is described in the FS in Section 4.6.2. Additional data gap planning, field work, analysis, and reporting costs are estimated at \$350,000, included in the project cost estimate as shown in Table 4.

115. *Feasibility Study. In the first paragraph on page 50 it states in filling surface fractures would be an ongoing event. When we are successful in controlling the slide could we not expect that fractures would be fewer and far between hopefully minimizing this activity?*

Response: Agreed. The need for fracture infilling should decline over the first several years and would eventually no longer be an annual activity. This would be evidenced by reduced land movement and therefore less resulting fracturing.

116. *The recommendation is to replace the septic tanks in Rolling Hills ocean word of crest road with the centralized sewer system. It would not only benefit the Portuguese bend slide but the city of Rolling Hills has experienced some movement in that area in the past and this would improve the stability of the area and avoid future movement.*

Response: Comment noted and agreed.

117. *In the past the movement has disconnected the rigid segments of corrugated piping. A more recent approach has been to use plastic piping which is flexible and can absorb more of the movement and therefore lie substantially longer.*



Response: Comment noted and agreed. The proposed flexible liner system for canyon channel lining is anticipated to be maintained in a similar manner to the plastic piping.

118. *Is the cost of obtaining the dating Data included in this project? Is the cost of pilot testing included in the plan? Does pilot testing take 10 years?*

Response: Yes data acquisition and pilot testing costs are included. As noted above, additional data gap planning, field work, analysis, and reporting costs are estimated at \$350,000, included in the project cost in Table 4. Data gap investigation would precede pilot testing, and data gap investigation and reporting is anticipated to be completed over approximately 1 year. Pilot testing will not take 10 years. Once permitted, the anticipated sequence and durations for the four pilot tests are listed below:

- Subsurface drains: approximately 1 to 2 years.
- Canyon liner system: approximately 1 to 2 years (partly pending rainfall conditions).
- Fracture sealing: estimated to be completed over approximately 1 year.
- Groundwater extraction wells: approximately 1 to 2 years.

These tasks could be completed concurrently based on available project funding.

119. *Does the \$31.3 million cover the activity through pilot testing and not the implementation of the Portuguese bend landslide control?*

Response: The \$31.3 million is an estimated cost and includes data gap investigation, pilot testing, full-scale planning, full-scale permitting, full-scale construction, and reporting (the estimate includes implementation of the proposed remedy for control).

120. *Is the pilot program projected for 20 to 30 years?*

Response: No, the pilot testing is a relatively short-term task. Once permitted, each of the four pilot tests is anticipated to be completed over approximately 1 to 2 years, as noted above.

121. *Surf zone option. Although the surf zone option may not be necessary should the current proposed approach be successful in controlling the slide I believe it still should be included for two reasons. One it was discussed in the workshops that were held with the community. When the community reads the feasibility report they will expect to see it included. That does not mean that it has to be part of the preferred approach. The difficulty in implementing it as well as the cost plus meeting all the regulatory agency requirements could easily eliminated as part of the preferred approach.*

*Response: Agreed. This option will be added to Section 4.3 of the FS report (General Response Actions), where a variety of technology options are considered and evaluated on a preliminary basis.

122. *Portuguese bend slide input to the NCCP: Now that we have a preferred approach which better identifies the potential impacts in the preserve it would be good to replace that portion in the NCCP. What's there now is very minimal and could very easily evolve lengthy reviews by other agencies which would make the expeditious work on the slide problematical. It would be good to get an agreement as to the work that would be necessary including remedial measures after the work is completed into the NCCP with the hope of avoiding unnecessary bureaucratic delays.*



Response: The amount of project area (acres) that the proposed remedy would occupy within the City is termed the project "footprint." The proposed project remedy footprint was measured for each different land parcel and habitat type (coastal sage scrub, grassland, etc.). The project footprint was determined to fall within the pre-allocated amount of acreage loss presented in the NCCP/HCP (Table 5-1). As a result, the City has determined that the NCCP/HCP text as written provided adequate loss coverage.

123. *Portuguese bend feasibility comments December 22, 2017. Executive summary on page 7 in paragraph 1. In paragraph 1 shouldn't a more permanent fix for surface fractures be implemented?*

Response: Fracture infilling is anticipated to be completed over the first several years of full-scale remedy implementation, with more limited work in subsequent years as land movement is reduced. The infilling treatment is anticipated to require limited maintenance over time.

124. *In paragraph 2 of an annual cost of approximately \$734,000 annually (which could increase due to inflation over time) might be more realistic.*

Response: Comment noted.

125. *What is the estimated cost to obtain the additional needed data (mentioned in Executive Summary)?*

Response: As discussed above, additional data gap planning, field work, analysis, and reporting costs are estimated at \$350,000 (Table 4).

126. *In the electronic report it would be nice if you could click on figures so that they could be viewed at the time they are identifying rather than going back and forth to find the figures.*

*Response: Links to the figures will be added into the text of the revised FS report.

127. *What is the estimated cost to reevaluate the impact duly changed recreational uses in the preserve?*

Response: This task was not included in the project cost estimates. However, DBS&A can develop an estimated cost in discussion with the City to further outline the proposed scope of work.

128. *On page 7 in the report in paragraph 4 the first word should be subsequently.*

*Response: This suggested edit will be made in the revised FS report.

129. *On page 9 add to the first paragraph the restoration of any damaged habitat to the condition in which it was prior to the destruction.*

*Response: The FS report text will be revised to include a reference to the NCCP plan, which describes habitat restoration.

130. *On page 11 in the first paragraph it states that contaminant toxicity is not an issue. What about septic tanks?*

Response: The use of the term toxicity is in reference to the common use of the CERCLA format used for the FS update. The CERCLA format is commonly used in the evaluation of cleanup



options for uncontrolled hazardous and toxic waste sites. While groundwater recharge from septic tank releases is a partial focus of the FS, potential wastewater toxicity related to septic tank discharge is not a slope stability factor, and is therefore not a focus of the FS.

131. *On page 16 in paragraph 2 the first line talks of wave erosion. Earlier the statement was made that the landslide complex deposited. In the ocean creating turbidity which then moved that soil southward.*

Response: Comments noted (and can be further discussed with City personnel as needed).

132. *On page 25 in the second paragraph it states Altamira Canyon does not drain into the PBLC. With the amount of water that flows in Altamira Canyon I find it hard to believe that water does not get into the PBLC. How certain is it that no Altamira Canyon water drains into the Portuguese bend landslide complex?*

*Response: The FS report text will be revised to clarify that surface water in Altamira Canyon does not flow into the PBLC. The amount of groundwater recharge from lower Altamira Canyon surface water flow has not been evaluated in past work, but may be the focus of future work if additional channel lining is needed in adjacent canyons, as discussed in FS Section 4.6.1.3.

133. *It is shameful with respect to the lack of data on Wells is identified on page 40.*

Response: Comment noted. As needed, DBS&A will continue to work with the City to locate, identify, file, and use available historical reports and data from past work.

134. *Executive summary on page 7 in paragraph 1, can a more permanent fix for surface fractures be implemented?*

Response: Implementation of the FS remedies is anticipated to reduce overall land movement such that surface fracturing will be reduced over time. Eventually, the need for filling surface fractures will be eliminated.

135. *On page 9 add to the first paragraph the restoration of any damaged habitat to the condition in which it was prior to the destruction.*

*Response: This suggested edit will be made in the revised FS report.

136. *On page 16 in paragraph 2 the first line talks of wave erosion. Earlier the statement was made that the landslide complex deposited dirt in the ocean creating turbidity which then moved that soil southward. A review of photos since 2003 to present shows no perceptible shoreline erosion. Is a wave erosion really a significant factor?*

Response: The discussion on page 16 recounts events reported to have occurred in 1988. Currently, shoreline erosion appears to be significant based solely on the readily observable shoreline turbidity. No specific FS analysis was requested or conducted regarding this issue. However as land movement southward continues, additional soil mass is continually introduced to the shoreline where it is mobilized by wave action. While cliff erosion is observed in many locations along the California coast (often as the result of winter storms), it is anticipated that reduction of landward PBLC movement will also reduce the amount of sediment mobilized in the ocean.



137. On page 44 reduction in movement only 8% yet on a subsequent chart the stability goes to an estimated 1.14. Does this result in a substantial slowing of the slide, from feet the year to less than an inch per year?

Response: Yes, as noted in the FS, the modeling predicts that a reasonable reduction in the elevation of the groundwater surface (i.e., 10 to 20 feet) could result in a significant reduction in land movement in the PBLC area (an increase in FOS up to approximately 8 percent). However, an exact prediction of the reduction to inches per year cannot be determined based on the currently available geotechnical information (for example, the depth to water data from c.1999 are nearly 20 years old).

138. Each pilot program cost is below the surplus over and above the city's annual 50% reserve in our budget. Is it contemplated to do them sequentially or can some of the work overlap? If the work can overlap, it would go a long way to controlling the slide and reduce the ongoing cost sooner.

Pilot program costs:

Seal surface fractures	\$250,000
Sub surface	\$650,000
Liner and channel system	\$512,000
Extraction and monitoring wells	\$556,000
Sewer system (no pilot program)	\$ 0
Pilot program total	\$1,968,000

Response: As noted in RTC 6, these tasks could be completed sequentially or simultaneously as budgeting, permitting, and other factors allow.

139. Models factor of safety plateaus at approximately 1.14.

Response: This observation is correct.

140. To what extent can the larger drainage channels be planted and still provide the requisite drainage?

Response: Detailed hydrologic data, such as anticipated storm water flow rates, are need to design the final channels. However, it is anticipated that the channels, maintained with a comprehensive O&M program, could be visually integrated into the native landscape while providing the needed flow capacity.

141. Hooray for dealing with the septic tanks in section 4.3.2.

Response: Comment noted.

142. On page 7 in the report in paragraph 4 the first word should be subsequently.

*Response: The suggested edit will be completed in the final FS.

143. The \$50 million cost characterization is misleading. The cost of the work is on the order of \$31 million. The rest is annual maintenance cost over 30 years. We could even make the cost much larger than \$15 million by calculating the annual maintenance cost out to 100 years. The real annual cost assessment is something like one half of the taxpayers are currently spending while effectively accomplish in nothing but a deterioration of the area. This reduction in maintenance cost would be a welcome relief for the taxpayers. I think the project cost should be presented separately and the



maintenance cost presented separately as an annual cost and not as an aggregate for any period of time.

Response: Comments noted. Separate construction costs and annual O&M costs are already separately provided in Table 4 and can be further explained in conversation with City personnel.

144. *The meeting (2/23/18) on the feasibility report with John, you and Deborah was one of the best informative exchanges of ideas in a long time. I've been giving some thought to two things we talked about at that meeting. The first was your excellent idea of using retention basins in some areas. One of my concerns is that in a heavy rain the retention basin could overflow. I would like to suggest a combination of detention and retention. If a detention basin is built with the outlet pipe some distance above the bottom, then the water up to the outlet pipe could act as a retention basin while should any overflow occur then you have the upper pipe going down taking care of the overflow. In this way we can solve the overflow problem as well as provide water for any of the animals in the area which should please the environmentalists no end.*

Response: Comments noted. Retention basins could be considered as part of the final design for stormwater control once hydrologic data are available to allow for final stormwater capture design.

145. *The second issue that was brought up for which hydrology issues need to be resolved was the incidence of knowing where the clay layer is so that penetrating it could allow water from below the clay layer, which could be under higher pressure, migrate to above the clay layer and exacerbate the upper portion of the slide. However, the other combination could be where the pressure above the clay layer is higher than that below and that could be a positive affect by combining the water from above and below and moving out into the ocean. Since we don't know that either case exists, I would suggest the following. Since the diagram showing how those hydroaugers would be implemented, it appears that there is a main pipe with branches at the upper end. A number of these are distributed within the slide to provide a conduit to remove the water.*

Rather than make a hydrology study independent looking for the clay layer which, due to slide motion both horizontal and vertical during the process, its position can change. Rather, as we start drilling the horizontal drains, in my mind it would be appropriate to drill exploratory holes for core samples moving upward along the path of the drain as it is being drilled. This could give us two pieces of information. One is where the clay layer is and two what is the pressure differential above and below the clay layer. We could take advantage of a case when the pressure above the clay layer is higher than that below. Further, as were drilling the horizontal drain, should we encounter water, the release of that water should reduce the pressure in that area.

At any rate we could do specific hydrological studies along the path of the proposed drains as part of the project and not as a separate study which would be subject to changes as a function of slide movement.

Response: Additional soil boring and/or well drilling work, using standard geological investigation methodologies, is recommended in order to characterize the subsurface prior to horizontal drain installation to ensure, in advance, that the appropriate overall geometry of the drain is sufficient (anticipated depth to water, etc.). Soil sampling during horizontal drilling could potentially be completed to supplement the soil boring and well drilling data as drains are installed.

Commenter: AI Edgerton (2/02/2018)

146. *Below are issues regarding the Portuguese Bend Landslide (PBLs) Abatement Feasibility Study that I would ask the consultants to address.*



I am a retired geophysicist with experience in geologic hazards, hydrology, mining, oceanographic, petroleum and space applications. I'm not a habitat expert but have served on the city's PUMP committee and have been a long-time supporter of the PVP Land Conservancy.

Firstly, the feasibility study's focus appears to have been on a "driving force" dewatering solution with no mention of the root cause of the slide and little mention of coastal buttressing/remediation alternatives.

Most continental landslides eventually self-stabilize when sufficient slide toe buttressing materials accumulate to overcome the head slope driving force load. Notable exceptions include slides into the ocean (The Big Sur Slide is an example) and others that slide into rivers and other moving water bodies.

Response: Section 2 of the FS describes and references previous studies that address in detail the cause of the historical landsliding. Section 4 presents a discussion of remediation alternatives, one of which is buttressing.

147. *Secondly, the Abalone Cove slide was fortunate to have an existing stabilizing buttress load from coastal land mass and promontories like Portuguese Point which are protected and stabilized at sea level by extremely hard, strong volcanic basalt formations. A majority of the peninsula promontories have these basaltic sea level features - including Inspiration Point and Pt. Vicente. Because of the natural buttressing effect of those features, dewatering has been effective in slowing the Abalone Cove slide.*

Response: Comments noted.

148. *Thirdly, the PBLs has no comparable buttressing load and slide material is quickly washed to sea by wave action and carried away by offshore currents.*

Earlier efforts to slow PBLs movement included moving 500,000 cubic yards of slide debris from the upper reaches of the slide to near-shore coastal lands, basically reducing driving force load while adding buttress load. Coastal wave action has washed away a majority of this slide material.

The root cause of the continual PBLs movement is the absence of stable buttressing and without remediation, erosion of remaining toe materials will continue for the foreseeable future - resulting in constantly lower buttress load and safety margin at the slide toe. Unremediated, the coastline will erode landward unrelentingly.

I strongly encourage the city to Pursue slide toe buttressing options by onshore riprap (breakwater-sized lining of the shoreline) or offshore breakwaters comparable to the LA harbor and Redondo Beach breakwaters.

Response: Section 4.4.8 describes the rationale used to screen out buttressing as a remedial alternative.

149. *Lastly, I encourage a multi-pronged approach to PBLs stabilization as outlined below:*

- Add analysis of toe buttressing options to the feasibility study.*
- Focus dewatering effort in the triangular area of greatest land movement - the best bang for the buck.*
- Finish placing all Portuguese Bend homes on sewer systems.*
- Encourage Rolling Hills to implement sewer systems for all watersheds in Portuguese, Ishibashi, Paintbrush and Klondike canyons.*
- Explore less obtrusive means of reducing runoff from canyons above the primary slide triangle using relocatable drain lines, possibly capturing runoff from the Paintbrush catch basin, the*



Portuguese Canyon drainage line outlet under Burma Rd. and at an appropriate location in Ishibashi Canyon.

Response: As noted in RTC 148, Section 4.4.8 describes the rationale used to screen out buttressing as a remedial alternative. As noted in the FS, remedial efforts, including dewatering, are focused on the “Red zone” area of greatest recorded land movement. The sewer and stormwater control and conveyance options are also already discussed in the draft FS. Stakeholder input from this forum and from an upcoming workshop (to be scheduled) will be considered during the process of final design and implementation.

150. *Many compliments to the city staff, consultants and RPV citizens for their efforts and enthusiastic work. Like many residents, we live above the PBLs and have a vested interest in your success.*

Response: Comments noted.

Commenter: Dr. Pamela G. Emch (1/15/2018)

151. *I read with interest the Draft Feasibility Study (FS) Update dated December 22, 2017, prepared by Daniel B. Stephens & Associates, Inc. (DBS&A). I have been a resident of the South Bay area for over 50 years and for many of those years I have enjoyed hiking on the Palos Verdes Peninsula – in particular in the areas on the south side of the peninsula, both before and after they were designated as preserves. I have been so impressed by the dedication that the city of Rancho Palos Verdes (RPV) has made to preserving open space in its natural form. This dedication is not matched by most other cities in the South Bay – it is truly something to be proud of. However, I also understand the dilemmas associated with the ongoing landslide areas on the peninsula and within the city of RPV. I received my PhD in Civil and Environmental Engineering / Hydrology from UCLA in 1995. One of the case studies that I read about during my studies was the Portuguese Bend landslide; I subsequently also read about the Abalone Cove landslide. In my many hikes, I have been on every trail in that area and always look at the landscape and the slide areas with the “eye” of a civil/water resource engineer. I also have friends who live in the PBLC area and are impacted by the shifting land.*

I'd like to provide you with a summary of my comments on the FS. First, I was pleased to see that DBS&A thoroughly reviewed and summarized prior material – reports, feasibility studies – that I had also read. They were also straightforward in saying what their FS encompassed, and what it did not. Here are a few points that I hope you will consider:

A hydrologic study of the PBLC area has not been conducted. There is no streamflow data; there is only one precipitation gage (at the top of the hill on Crest); the estimates for runoff for the watershed are based on 100-year runoff estimates which may or may not represent the PBLC area appropriately. Making decisions going forward without such a study is risky. Furthermore, it appears that residents of RPV who have been involved in this effort through the past year specifically requested a hydrologic study. DBS&A themselves state that a hydrologic study is not within the scope of this FS. The FS states “A full engineering and hydrologic study would be needed to appropriately design and size the liner and channel system.” I would go further and say that a full hydrologic study would be needed to determine if, or how much, a liner and channel system (as well as some of the other remediation approaches recommended) would be of benefit.

Data gaps also exist with respect to the current well system in the PBLC (apparently due to lack of record keeping within the city of RPV). Lack of this data also introduces risk; this gap could and should be remedied.



Response: Comments noted and agreed. A hydrologic study is identified as a data gap to be completed before final design.

152. *Impacts of the specific remediation approach of implementing a liner and channel system in Upper Portuguese, Ishibashi, and Paintbrush Canyons are not sufficiently detailed. The FS frequently qualifies statement of the impacts with words and phrases like “can be designed to be largely integrated into the natural habitat.” (Italics are mine.) These canyons are, in areas, more like deep clefts. I recommend seeing some examples of successful implementation of similar approaches in very topographically similar areas that preserve the natural habitat prior to making any decisions about such an approach. And this would be after a full hydrologic study of the watershed is conducted. Without this rigor, RPV would not have conducted an adequate engineering cost-benefit analysis. More details are needed on how filling fissures with cement would be successful in this specific area. New fissures are continually appearing both in the “badlands” area lower down and also on up the hill. Some are small, some are large – but there are many and they continually change. It would seem to me that this approach might not be feasible.*

Response: As noted in RTC 1, potential impacts will be addressed in the CEQA component of the project. As noted in RTC 13 and 17, case studies could be added into the scope of work for future project tasks. Also, as noted in RTC 15, the fracture in-fill material will be designed and specified in later design stages of the project. Field methodology for in-filling will also be included in this stage of the project. The overall idea is a relatively simple one in which direct surface water recharge to groundwater in the head scarp area is reduced by in-filling existing fractures – in this sense any extent of in-filling would be beneficial and help reduce direct groundwater recharge.

As noted in RTC 123, fracture infilling is anticipated to be completed over the first several years of full-scale remedy implementation, with more limited work in subsequent years as land movement is reduced. The infilling treatment is anticipated to require limited maintenance over time. Any work would be in compliance with the NCCP/HCP with stakeholder input.

153. *Mayor Brooks, Mayor Pro Tem Duhovic, and Council Members Alegria, Cruikshank and Dyda – please consider these comments in the spirit in which they are provided. Rancho Palos Verdes has made many good choices over the years that have been a model for how a city can deal with the difficulty of balancing engineering decisions with preserving the natural environment. I’m sure that your residents, as well as grateful residents from neighboring cities such as myself, will appreciate the additional time and rigor that this topic deserves.*

Response: Comments noted.

Commenter: Randall K. Harwood (various dates)

154. *I have read and reviewed the update to the Draft Feasibility Study dated Dec. 22, 2017. I understand the motivation to attempt to reduce the effects of the landslide in the Portuguese Bend area, as the inconvenience to the City and the public when Palos Verdes Drive South requires repairs and the expense, estimated at \$1 million per year for the city occurs frequently, if not annually.*

As a resident of Palos Verdes for 16 years, I have enjoyed the hiking trails throughout the Preserve and especially those in the Portuguese Bend Reserve. A number of the proposed means to reduce the slide seem to be very expensive, not at all assured of success, and most importantly to me, very destructive to the habitat of the proposed work sites, especially the three canyons slated for geotextile channeling. As I understand it, these canyons have some of the greatest concentrations of mature vegetation in the entire Reserve. Many of the native (and non-native) plants have root systems of ten to fifteen feet in depth or more. It appears the geotextile materials, as diagrammed, would not provide adequate soil depth for these plants with deeply penetrating roots, reducing the vegetation



permanently in these areas. This vital vegetation has taken years to grow and provides food and shelter for all kinds of animals, including reptiles, birds and mammals. Of course this includes the threatened and endangered California Gnatcatcher and the Coastal Cactus Wren, as well as gray foxes. As diagramed in the study, this channeling likely would require extensive grading of the steep portions of the canyons, likely extending well beyond the estimated sixty-five feet in the study. Meanwhile, this project would apparently take many years, (a decade or more?), which would result in a very unpleasant, noisy, dusty and unsightly Reserve for many years to come.

I believe the acquisition of the land and the creation of the Land Conservancy was designed to protect the area from destruction and to provide a habitat for flora and fauna to survive and thrive on this Peninsula, as much as possible, free from the deleterious effects of human activity and development. This proposal, especially the channelization of the canyons, appears to me to completely ignore the hard work and support both physically and financially of the many volunteers and the generous and committed public that have worked for decades to protect this land. I have a hard time understanding how the City would wish to disrupt this beautiful, natural area by spending upwards of \$50 million over 30 years, to save \$1 million a year, and at such a cost to the esthetic experience of the public and natural habitat that would be severely impacted for a decade or more.

Thank you for taking these comments into account when you decide on this important matter.

Response: As noted in RTC 1, potential impacts will be further addressed in the CEQA stage of the project. The issue of rooting depth and existing is discussed in RTC 28 and 29. As discussed in the City Council meeting and in the draft FS, the FS remedies would be implemented in accordance with the NCCP/HCP with stakeholder input.

155. *I attended the City Council meeting on Jan. 16, 2018, wherein consultants presented specific possible solutions to alleviate road damage and possible sewer line ruptures by reducing the movement of land in the Portuguese Bend reserve. These proposals were based on outdated studies and without considering the effects to the native habitat.*

It was obvious to me and confirmed by the consultants, that there have been no hydrological or geological studies completed recently and that their presentation was only a synopsis of past reports and studies. Particularly disturbing was the information that years of reports on the function of the de-watering wells in place in the Reserve are apparently missing and that the City failed to maintain and repair these wells for many years. Perhaps the reported success of these types of wells in the Abalone Cove Reserve and Portuguese Bend Reserve would indicate that this minimally invasive, less expensive method of reducing groundwater would be a good first attempt at lessening the harmful effects of the slide. This should be attempted only after a comprehensive hydrologic study is completed and all efforts to minimize the harmful effects of any disturbances to the Reserve are explored.

It seems to me that two of the early proposals to 'stop' the slide are very premature and reckless. The placement of geo-textile fabric in the canyons and the injection of cement in fissures are likely to be very harmful, noisy and long lasting disruptions of the quiet, natural landscape envisioned in the mission and goals of the Land Conservancy and the City of Rancho Palos Verdes. Thought needs to be given to the effects these procedures would have on the geological habitat, flora and fauna that so many people have devoted their hard work and financial resources for many decades to restore and preserve.

I applaud the Councils' efforts to confront the issues of the road repairs, safety of the sewer lines and disruption of the public along Palos Verdes Dr. S. and I hope, after careful study, with updated comprehensive information, solutions that are minimally harmful to the Reserve are discovered and implemented.

Response: As noted in RTC 1, potential impacts will be further addressed in the CEQA stage of the project. As discussed in the City Council meeting and in the draft FS, the FS remedies would



be implemented in accordance with the NCCP/HCP, and with stakeholder input. Both hydrologic and hydrogeologic work tasks are recognized as data gaps to be completed before final design.

Commenter: Barry W. Holchin (1/16/2018)

156. *I have read the comments submitted by Bill Ailor (1/14), Eva Cicoria and Ken Swenson (1/13), Randall Harwood (1/13) and Robert Kautz (1/15) regarding this subject and share the concerns expressed by all of them.*

As a 45 year Palos Verdes resident, I have until recently run or hiked on virtually every legitimate trail on the Peninsula, also having led others on probably hundreds of those hikes in what has become the Palos Verdes Nature Preserve. When the opportunity came to purchase this land in order to protect the increasingly rare habitat from development and degradation, I was heartened by the cooperation shown by multiple governmental bodies and residents in achieving that goal - habitat protection and even gradual improvement in areas where invasive plants can be supplanted with native species; but this project seems to be going in the opposite direction.

From an economic perspective, costs for projects of this nature tend to only go in one direction, and that is up. Whereas the uncertainty associated with costs for the occasional road repair appear to be within fairly narrow bounds, likely totaling less than the eventual costs for this project (which is of dubious success); and that approach appears to involve little or no risk of habitat destruction.

Response: Comments noted. As discussed in the City Council meeting and in the draft FS, the FS remedies would be implemented in accordance with the NCCP/HCP plans.

Commenter: Robert F. Kautz (1/15/2018)

157. *I expressed to you at a meeting last fall that I supported investigation to find a means to stop the landslide, but the recommendations in this FS are not a viable solution given the situation in RPV.*

My strong conclusion now is that the City Council members should vote NO on the further steps to mitigate the Portuguese Bend landslide through major construction and use of concrete in the Portuguese Bend Preserve as outlined in the Draft Feasibility Study Update dated December 22, 2017, prepared by Daniel B. Stephens & Associates, Inc. (the "FS").

For me, neither the staff report nor the feasibility study really summarize for everyone to see exactly how destructive this project will be to the views and aura of peacefulness that make RPV what it is today. Why not have an artist paint a rendering of what these giant 65 foot wide culverts will look like running up and down the hillside? And publish that picture in the Daily Breeze? The main beneficiary of the direction contemplated in the FS will be the continuing payments that the consulting firm who wrote the FS will receive, and the contractors that will come behind them.

Response: As noted in RTC 1, potential environmental impacts will be further addressed in the CEQA stage of the project. As discussed in the City Council meeting and in the draft FS, the final FS remedies would be implemented in accordance with the NCCP/HCP plans, and with stakeholder input. "Giant 65 foot wide culverts ... running up and down the hillside" are not proposed nor under consideration.

158. *My opposition to the new proposed techniques in the FS is based on the following understandings and opinions:*

1. There is no guarantee this project will work, and there is no compelling explanation of why it is expected to work on the size and scale of the Portuguese Bend landslide. The scale and nature of the landslide in RPV is very rare, even worldwide, and the channelization and concrete filling



techniques appear to only be proven to be useful in shallow canyons or situations without the massive underground clay layer causing all the mischief in RPV. After all, wasn't the original controversy when the landslide started whether the primal cause was the construction on the Crenshaw extension or the combined weight of added houses, pools, and over-watering? Now we're going to try to fix the situation by driving heavy trucks through the preserve, adding the weight of concrete channels, and filling fissures with concrete plugs. This just doesn't make sense to me.

2. The project will create a huge blighted area in the Portuguese Bend preserve during construction visible from most viewpoints, whether looking up or down the slope. The channels anticipated to be 65 feet wide will extend up and down a very wide area. Such a large project with continuing reviews will extend for a decade or more, and the blighted appearance may last forever, especially if cost estimates are over-run and aesthetic remediation and land preservation priorities come up at the end after funds run out.

Response: Comments noted. As noted in RTC 1, potential environmental impacts will be further addressed in the CEQA stage of the project. As discussed in the City Council meeting and in the draft FS, the FS remedies would be implemented in accordance with the NCCP/HCP plans, and with stakeholder input. As noted in the comment, "adding the weight of concrete channels" is not proposed nor under consideration. Alternative means of fracture filling will be considered prior to final design and implementation.

3. It is not credible to claim that after all of this construction, somehow the land will be restored to a natural state as is expected by the citizens of RPV and the legions of donors to the Palos Verdes Peninsula Land Conservancy (PVPLC). The techniques using shallow sacs above concrete culverts for plant restoration is not realistic, especially for native plants which have deep roots to help survive drought conditions.

4. It is a requirement of the NCCP and various land conservation easements and agreements that the part of the land involved in this project in the Portuguese Bend Preserve must be treated as a preserve to be restored to sage brush habitat. This is the basis upon which the public trust has been placed with the city and with PVPLC and the public's support for this objective has been demonstrated through quantifiable financial support for PVPLC – it has raised and spent approximately \$1.5 million per year in RPV for preserve restoration, education, etc. for at least five years. Large scale grading, "channelization", and other aspects described in the FS would appear to abandon these commitments.

Response: As noted in RTC 1, potential environmental impacts will be further addressed in the CEQA stage of the project. The issue of rooting depth and existing is discussed in RTC 28 and 29. As discussed in the City Council meeting and in the draft FS, the FS remedies would be implemented in accordance with the NCCP/HCP plans, and with stakeholder input. Major runs of concrete culverts are not proposed nor under consideration.

159. *5. The initial project cost estimate is over \$50 million, and actual costs on such a large and unpredictable project are likely to over-run such a preliminary estimate to at least double the initial estimate. Who knows what costs will be incurred once the construction begins to open up the ground and we find out what it will actually take to complete the project. Once gaping cuts in the land are created, RPV will be on the hook to pay for the completion of the project with little ability to control costs down the line. Once the concept of this proposal becomes more widely understood among the public in RPV, and if the city continues on the path of these unproven techniques, at great expense and with the potential to destroy much of the beauty of the Portuguese Bend area, I believe you will find very substantial opposition will arise and funds expended further investigating this avenue will be wasted.*



Response: Comments noted.

Commenter: Jim Knight (1/15/2018)

160. *The FS proposes to repair the existing corrugated piping system. If you have walked the area, you will see that the CM system is ripped apart by differential movement of the landslide. I see no reason to waste additional taxpayer dollars on “fixing” the existing system as it is as it will inevitably be torn apart again.*

Response: The FS includes this potential option in the early technology screening stage. This option was eliminated from further consideration as discussed in Section 4.4.1.2.

161. *The same differential land movement would destroy “Directional subsurface drains.” No one can predict where the earth will separate in this land flow.*

Response: A properly managed subsurface drain program, including O&M and periodic replacement, is a proven technology anticipated to be functional and cost-effective even though subject to land movement until the dewatering and a program of reducing water inputs to the PBLC results in reduced land movement.

162. *Installing concrete swales will also be torn apart for the same reason no matter how much rebar is installed.*

Response: The FS includes this potential option in the early technology screening stage. Widespread use of concrete channels and swales was eliminated from further consideration as discussed in Section 4.4.2.2.

163. *The FS states” The installation of dewatering wells by the City in areas affected by the Portuguese Bend and Abalone Cove landslides has proven to be an effective method of slowing down landslide movement by removing groundwater from the slide plane.” I am not sure where the consultant got his information, but if you look into the records of previous groundwater wells operated by the City in the PB land flow area, you will see that the wells become non-functional very rapidly (6 months to 1 year) as the ground movement shears off the extraction piping. Dewatering wells work well in the Abalone Cove Abatement District as the differential land movement is minimal. Portuguese Bend is much greater differential movement. The only feasible place for dewatering wells here is at the top of the land flow where movement is minimal. This is not discussed in this FS.*

All of the above puts into question the analysis that lead to the conclusion that these mitigation measures would have “Long-term Effectiveness and Permanence”.

Response: A properly managed groundwater extraction well program, including O&M and periodic replacement, is a proven technology anticipated to be functional and cost-effective in appropriate areas of the PBLC even though subject to land movement until the dewatering and a program of reducing water inputs to the PBLC results in reduced land movement.

164. *The map showing drainage channels does not address what happens to the water when it reaches the depressed area just north of PVDS. One just has to drive by to see it is much lower than the road. Will it be pumped? Or is the plan to tunnel under the highway? If drain pipes are installed under the road, how will this affect the long term stability of the road when those drainage pipes are separated and the new collected, concentrated drainage flow undermines the subsurface creating a sink hole?*



Response: As discussed in the FS Section 4.4.3.1 and 4.6.4.3, the existing culvert under PVDS would be refurbished to promote storm water flow under the road into the ocean. Overall stormwater capture design would be appropriate to promote storm water flow out of the Red Zone area to the ocean, such that the risk of the hypothetical catastrophic failure described would be minimized.

165. *There is no reference as to who would be served by a "Centralized Sewer System" or how it could be installed other than above ground with sewer pipes running all through the PB Preserve.*

Response: The conceptual location of the sewer system, and installation design, is described in Section 4.6.1.5.

166. *Not enough information is given to judge the feasibility of the following: Directional Subsurface Drains • Buttressing • Mechanically Stabilized Earth Wall • Drilled Piers or Flexible Liner System and Components.*

Response: As noted in Section 1, the format of this FS broadly follows the U.S. Environmental Protection Agency (U.S. EPA) FS format (U.S. EPA, 1988) developed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The time-tested CERCLA FS approach is a systematic, methodical, and thorough concept-level process widely accepted in the engineering industry to develop, analyze, and select cost effective mitigation alternatives that can be accepted by federal, state, and local regulators and community stakeholders.

167. *There were some suggestions given at the Workshops not given in this FS. For instance, someone suggested supporting PVDS on caissons down to the basalt bedrock and allowing the land flow to pass below the road surface. The caissons could be shaped below the surface with an uphill pointed edge to reduce the resistance to the flow.*

Response: Please see RTC 102.

168. *Where is the analysis of drainage coming from development projects in RPV above the head of this land flow?*

Response: Please see RTC 55.

169. *I am a Board member of the Abalone Cove Landslide District (ACLAD) and I am not aware of any attempt to formally reach out to us for information or feedback. We have many years of data with hydro-geologic, monitoring and dewatering information that might be of use.*

Response: These additional data are appreciated and will be incorporated into later stages of the overall project.

170. *In addition, there are individuals that have lived in Portuguese Bend for many years and have a wealth of historic knowledge. I have personally helped Bob Douglas measure water flow in Kelvin Canyon on the western edge of the FS project area. I have noticed that that flow under Narcissa Dr. has mysteriously ceased. Any study you approve should have made an attempt to gather as much information as possible.*

Response: Additional data are appreciated and can be incorporated into later stages of the overall project. As noted in RTC 155, both hydrologic and hydrogeologic work tasks are recognized as data gaps to be completed before final design.



Commenter: Tom Long (1/16/2018)

171. *Any slide remediation efforts seem likely to be very expensive. What will the revenue sources be? What competing capital improvements will be denied or deferred if the remediation effort is funded? And will the revenue sources match the benefits? In other words will the expense be primarily borne by the city but the benefit primarily received by private property owners? You may recall that the city in the past has not used public funds to pay for improvements, such as electrical undergrounding on private property, that primarily benefit private property owners. Some of the city's expenditures of public funds in the past, for example spending on neighborhood entry monuments on private property, have raised questions of whether the city was making gifts of public funds.*

Will the expense be justified by the prospects of a long term solution? If the base of the slide that needs to be stabilized is in the ocean, what are the realistic prospects of a long-term solution? Will the city be trying to stabilize land that is likely to be destabilized in the future by sea level rise? Rather than trying to fight nature, should the city consider accommodating it? Is the city creating plans for an orderly, managed retreat from land that is likely to erode or otherwise become unstable in the future as sea levels continue to rise? If not, why not?

Response: As noted in RTC 39, overall funding sources for FS implementation are still being identified. All sources of funding are under consideration, including state and federal. It is recognized that this is a complex problem with numerous factors to consider, including the geotechnical configuration of the slide failure plane. The future sea level is not currently anticipated to be a major factor in FS implementation.

172. *Even if the city were successful in stabilizing the base of the slide in the ocean, what will the result be? Is it likely that we will end up with a large mud flat along the coast (as the council was advised in the past was a possibility)?*

Response: The remediation action objective (RAO) of the FS is presented in Section 4.2 which outlines the goals of the overall project. FS implementation would reduce coastal and marine turbidity due to erosion of the landslide toe, however, no other engineering solutions are proposed to directly address other marine or coastal issues. The proposed remedy includes methods to dewater currently stored subsurface water and prevent future addition of water through infiltration of stormwater and septic water. These methods are specifically selected to "dry out" the PBLC "Red Zone" and avoid the creation of a mud flat.

173. *As unfortunate as the slide is, our councilmembers are charged with reasonably allocating public resources for public purposes. Until some questions are answered, I am concerned that resources devoted to trying to remediate the landslide are not being allocated reasonably and are not being allocated for public purposes.*

Response: Comments noted.

Commenter: Cathy Nichols (2/02/2018)

174. *I am out of town and just heard about DBS&A's proposal and wanted to write to say PLEASE DO NOT DO THIS!!!! My home will slide and I and others will SUE (and will organize others to also). WE WILL WIN BECAUSE WE AND YOU KNOW-- THIS WILL LAUNCH A MASSIVE LANDSLIDE!!! I was heavily involved in the 18 year fight to stop Hon from launching a slide. I spent substantially more than \$100,000 dollars in this fight, hiring numerous landslide geology experts to study all available geology in the Portuguese Canyons area, specifically where this paving the canyons project is focused. They warned me that Hon's project or any earth movement, grading or*



soil removal or additions on this ancient slide had a high probability of starting a slide. I learned a lot about landslides, earthquake risks in landslide zones, and actions which trigger landslides. This particular area is unbelievably fragile as you well know. Adding or shifting weight on an ancient landslide is one of the key triggers of a landslide. Grading, heavy equipment, adding soil, moving soil..... all are high risk actions. Denuding the area in this process can launch mudslides. They also warned that adding a fabric, sheet of any form with soil on top also is very likely to create a slide in an earthquake.

In addition to my investment in the fight, I also bought acreage in the Preserve to help pay for the Preserve. This was for wildlife. Taking the last coastal sage scrub areas out harms wildlife. Bring soil from other areas adds weeds and invasive vegetation. The water company brought in a small amount of soil to fill in exposed water lines on the Fire Station trail years ago and brought many new plants including tumbleweed. If you approve this project, I WANT ALL OF MY SUBSTANTIAL CONTRIBUTIONS TO THE PRESERVE BACK AND SO DO MY FRIENDS, SOME OF WHICH MADE HUNDREDS OF THOUSANDS IN CONTRIBUTIONS. Also you should consider reimbursing the State and other agencies for their contributions since you are ruining the place for wildlife.

I have confidence that you are smart enough not to do this, but many of you may not be aware of the risks in this particular area nor its history. Remember my home is here, if you were substantially reducing the risk of a slide given my knowledge of the area, I should be in favor of this. I AM NOT. YOU WILL DESTROY MY HOME AND THE HOMES OF SO MANY OF US THAT FOUGHT HON FOR 18 YEARS. PLEASE SAVE OUR HOMES!!!! Please save out wildlife.

Response: Comments noted. Many of these issues can be further discussed directly as needed with City personnel. As noted above in other RTCs, FS implementation will be completed in accordance with the NCCP/HCP plans and in accordance with CEQA to address and, if needed, mitigate, potential impacts.

Commenter: Noel Park (various dates)

175. *First, and most importantly, I have said at every opportunity that any project development process must include total partnership and cooperation among the City's consultants, City staff, and the professional staff of the Palos Verdes Peninsula Land Conservancy (PVPLC). The goal must be to have all of the stakeholders in agreement at the end. By this means, disagreement and acrimony, which would have a high potential to delay or even derail the project can be avoided. To date, I have not seen much evidence of any such process. As to the specifics of the report, I would offer the following. The horizontal drains seem like a good idea. They would be minimally disruptive to the Nature Preserve. The idea of passive drainage by gravity is very attractive. I am concerned that the allowance made for maintenance may be too little. The consultant points out that they are subject to the same issues of clogging as vertical wells. It would seem that unplugging a 1500 foot horizontal drain would be a serious challenge. Even though they would be oriented basically parallel to the slide, it would still seem that there would be a good possibility of damage in an area of such high current land movement.*

Response: The City strives to work collaboratively with all stakeholders in the FS process, including multiple public and council meetings discussing the FS. An additional public meeting is being planned. As noted in RTC 162, a properly managed subsurface drain program, including O&M and periodic replacement, is a proven technology anticipated to be functional and cost-effective.

176. *The proposal to convert septic systems to proper sewers is highly appropriate. I assume that negotiating an agreement with Rolling Hills would be a difficult challenge. I would hope that this effort would go forward as a matter of top priority.*



Response: Comments noted.

177. *The grouting of fissures is clearly important. But I share the concerns expressed by Ken Swenson and Eva Cicoria about access for it. I note that the staff report references the requirement in the NCCP to carefully analyze and design any required access roads to avoid and minimize habitat disruption. If access is not available within the range of a boom pumping truck, it is quite feasible to hand lay temporary pipes and hoses to minimize the need for truck access.*

Response: As noted in RTC 1, potential impacts will be addressed in the CEQA component of the project. As noted in RTC 15, the in-fill field methodology will be designed and specified in later design stages of the project. Any work would be in compliance with the NCCP/HCP.

178. *While I recognize the need to conduct storm water out of the canyons, I have to believe that creative engineers can come up with solutions much less destructive of habit than the stone and geotextile drainage swales proposed. While the cross sections shown in the report are very professional looking, they are very short on dimensions. If it is true, as the report indicates, that the width required is 65 feet, the amount of habit destruction would be extremely large.*

Response: The FS presents a conceptual plan. The final design will be developed later, after stakeholder input is complete, and in compliance with CEQA and the NCCP/HCP, to specify exact dimensions and materials.

179. *As much of the side slopes of the canyons are quite steep, one can only imagine the actual amount of grading required to achieve the cross sections shown. As others have pointed out, these canyon/creek bottoms, aka "blue features", contain some of the most valuable habitat in the Preserve. Just because the amount of habit destruction is within some allowable amount of "take" (a highly offensive turn of phrase if ever I saw one) does not mean that every possible measure should not be taken to preserve such valuable habitat.*

Response: As noted in RTC 29, allowing specific areas of existing vegetation to remain in place can be incorporated into the final design with stakeholder input and standard cost/benefit analysis while complying with the NCCP/HCP.

180. *There have to be alternatives. I envision the use of the semi-flexible plastic storm drain pipes now in common use. There could be staked in place in the same way as is commonly done for overside drains on engineered cut and fill slopes. Flow could be intercepted by catchment structures at intervals along the canyon bottoms. Hopefully, these structures could be prefabricated and/or built out of some sort of semi-flexible materials which could be installed with a minimum of disruption to habitat. Something analogous to metal or precast concrete bin wall components. Or even pressure treated timber or gabion baskets.*

Response: As noted in RTC 178, the FS presents a conceptual plan and final design would be developed later, with stakeholder input, and in compliance with CEQA and the NCCP/HCP, to specify exact dimensions and materials.

181. *The sensitivity of the habit would justify flying the components in via helicopter to minimize the impacts. Similar things have been done before as part of sincere preservation efforts. And I can envision it actually being less expensive than the massive construction proposed.*

Response: The FS presents a conceptual plan only and final design would be developed later, with stakeholder input, and in compliance with CEQA and the NCCP/HCP, to specify exact dimensions, materials, and methods.



182. *These are only suggestions. I am confident that a professional search of worldwide resources will likely turn up equal or better solutions. Bulldozing 65 foot wide swaths up the bottoms of the canyons is not acceptable in my view. I challenge the assembled engineering talents to find better solutions.*

Response: As noted in RTC 13, case studies were not included in the draft FS but can be included in future work in the design stage of the FS. The FS presents a conceptual plan only and final design would be developed later, with stakeholder input, and in compliance with CEQA and the NCCP/HCP, to specify exact dimensions, materials, and methods.

183. *Since the first public meeting, I have raised the issue that drying up the canyons will impact water resources for wildlife. A careful reading of the meeting notes in the staff report will reveal a reference to "quail guzzlers". These are structures which have built in the California desert to provide water for wildlife. Similar structures should be built in the Preserve to replace the water lost to any project. They could be filled with water diverted from the canyon drainage systems or, if need be, from domestic water sources.*

Response: As noted in RTC 1, potential impacts and mitigation will be further addressed in the CEQA stage of the project.

184. *You have to understand that the people who have given so much of their time, labor and financial resources to the preservation and restoration of this land have strong emotional involvement with the Coastal Sage Scrub (CSS) habitat. The loss of even one mature CSS plant is troubling and saddening. Never mind destruction of wildlife, whether endangered or not. You all are arguably the most important and responsible stewards of this land. I call upon you to make every possible effort to protect it, and the natural plants and wildlife which reside therein. Finally, a word about the cost. As I have said before, this project and the proposed Civic Center development combine to constitute far and away the largest level of proposed expenditure in our City's history. One of the things that I have most enjoyed about being a resident of Rancho Palos Verdes is the frugal and responsible manner in which the City's finances have been managed. While other cities have famously struggled, we have remained stable and secure. Given the level of expenditures now envisioned, I suggest that you have a responsibility to make every effort to make sure that there is community understanding and consensus on the financial consequences.*

Response: Comments noted.

185. *I want to pass along my compliments to our consultants, Steven Cullen and John Dodge. They stayed after the meeting last night and talked with several of us until almost 11:00. They were charming, and totally willing to accept new ideas and give them obviously serious consideration. I, and I think my neighbors as well, came away feeling much more optimistic that this process will produce a positive result.*

Again, I have advocated from the beginning for some sort of a collaborative design process, where the key stakeholders are intimately involved every step of the way. In thinking about it today, I realized that such a process has just taken place at lower Hesse Park.

After several years of contentious argument about the design features, the City Council wisely directed staff to work closely with the local people to achieve an appropriate design. Recreation and Parks and Public Works facilitated a series of meetings at the start of the design process and every step of the way thereafter. Input from the stakeholders was given every serious consideration, and consensus was reached at every step of the way.

The result spoke for itself. At the end of the process, everyone came to the Council together, with smiles on their faces, to recommend approval of what had once been the subject of so much argument.



Daniel B. Stephens & Associates, Inc.

While the proposed landslide project is obviously orders of magnitude larger than lower Hesse Park, the principle remains the same. The attitudes exhibited by Mr. Cullen and Mr. Dodge last night give me confidence that it can work.

I would hope that our City staff and consultants would take every opportunity to work with the expert staff of the PVPLC to optimize the design to enhance and protect the Nature Preserve. As last night clearly showed, we have community members who have a deep commitment to, and great expertise about, the Nature Preserve. I submit that it would be wise to make them part of the study and design team as well.

Again, the goal of the effort must be to achieve consensus throughout the process so that we are all on the same page at the end. It will take a big effort along the way, but it will be much more likely to achieve success than a process that ends in community discord, fighting, and all of the downsides that such things can bring.

I can be a little slow on the uptake, but the penny usually drops eventually. Obviously, another prototype exists for a "collaborative design" effort in the form of the Civic Center Advisory Committee (CCAC).

I strongly urge you to establish such a body for the landslide effort, sooner rather than later. I'm sure that an application process similar to that for the CCAC will reveal plenty of highly qualified people. I would gladly defer to them.

If you but take a look at the brilliant comment letters written by Cassie Jones, Allen Franz, Ken Swenson and Eva Cicoria, it is clear the level of talent and experience available. If and when they are on board with a project, that's all I need to know.

In addition, there needs to be a highly collaborative process for you to take advantage wealth of knowledge of the highly credentialed and experienced staff of the PVPLC. Perhaps they could be represented on the Landslide Control Committee as well. Or you might prefer to set up a different platform to get them even more involved in the design process.

I would hope that Mr. Dodge and Mr. Cullen would attend every meeting of the committee. Considering the amount of progress and good will which resulted from the ad hoc meeting in the hall after the last Council meeting, I sense the potential for real consensus to be built.

Again, much better that than fighting and disagreement after tens or hundreds of thousands of dollars have been spent on a design effort.

Response: Comments noted and appreciated. As noted in RTC 176, the City strives to work collaboratively with all stakeholders in the FS process. An additional public meeting is being planned.

Commenter: Lan Saadatnejadi (2/08/2018)

186. *The study reports that ~39 ac-ft/yr, 30 ac-ft/yr, and 77 ac-ft/yr of groundwater recharge come from stormwater, septic tanks, and upslope irrigation. However, the recommendations only addressed mitigations related to stormwater and septic tanks, and completely ignores the greatest source, irrigation. This needs to be addressed.*

Response: As noted in RTC 55, a limited water balance that includes irrigation and septic tanks was completed in 2000 (Leighton, 2000). However, an updated water balance should be conducted to address these issues. As discussed in in FS Section 3.6.2 referencing irrigation recharge, "This component of recharge should be investigated further in a water balance study developed to support the design of a land stabilization solution."



Commenter: Elias K. Sassoon, City of Rancho Palos Verdes (1/04/2018)

187. Does the total estimated cost of \$53,507,500 include softs costs (Engineering, testing, construction admin, etc?) I do not think it does. If it does not, then I suggest we add 20% for these soft costs.

*Response: The costs provided in Table 4 include limited line items for planning and permitting but not specifically for the items listed above. Additional line items for these items can be added to Table 4 in the final FS.

Commenter: Willard Somers Sr. (1/29/2018)

188. As the owner of property (7572 007 001) at 10 Pomegranate Drive E. in Rancho Palos Verdes, CA 90275, I have read the report from Daniel B. Stephens and Associates carefully.

I am supportive of both the conclusions and recommendations in the report.

Performing those actions suggested in the feasibility study will help to preserve and protect homes and other properties in the Portuguese Bend area of Rancho Palos Verdes, and to ameliorate road conditions, leading to improved safety and reduced maintenance costs. These actions will assist in preserving the beauty of one of the most scenic areas in the state, or, for that matter, the nation.

Financially, undertaking the actions has the potential to increase values in the area significantly, with an ultimate effect of lessening tax burdens in the community. Please consider these suggested actions for civic improvement.

Response: Comments noted.

Commenters: Kenneth W. Swenson and Eva Cicoria

189. We have reviewed the Draft Feasibility Study Update dated December 22, 2017, prepared by Daniel B. Stephens & Associates, Inc. (the "FS") and the phrase that comes to mind is "Just say no." The FS paints a picture of the Portuguese Bend Reserve becoming a massive construction site for a decade or more and thereafter an unsightly debris field, all at a cost of \$53 million or more with no guarantee that the slide will slow or stop or that any major destructive events will be prevented. It fails to honor the commitment to preserve the Preserve; fails to honor the Conservation Easement; and fails to avoid or minimize environmental impacts as required by CEQA and the NCCP/HCP. The FS doesn't even provide a comprehensive hydrology study, which is the one thing attendees to the Landslide Abatement Subcommittee meetings agreed should be the initial and primary focus of the consultant effort.

Response: As noted in RTC 154, as discussed in the City Council meeting and in the draft FS, the FS remedies would be implemented in accordance with CEQA and the NCCP/HCP. A hydrologic study is recognized as a data gap as noted in RTC 69 and other RTCs. Data gaps, including a hydrologic study, need to be completed before a final design is identified.

190. To begin, we oppose for multiple reasons the proposed 65 foot wide grading and channeling through the Portuguese Bend Reserve canyons.

First, the canyon areas of the Preserve contain some of the most robust vegetation available in the City's open space, and provide shelter and a water source for animal life as proven by wildlife cams placed in the Preserve. To wipe out those zones of vegetation as the FS proposes would set the Preserve and the City's required conservation efforts back by decades, perhaps permanently. Species currently in the Preserve, protected or otherwise, will be at a minimum dislocated during the decade or more of work, and possibly lost permanently. This land was set aside to mitigate loss of



habitat and animals elsewhere in the City; to destroy the habitat and animals on this land that was supposed to be protected, for a project of dubious need and success, is outrageous.

Response: As noted in RTC 69, no final removal areas have been identified. Any final plans will be approved in advance with stakeholder input. Preserving key areas can be a component of the final design. The final design will appropriately consider established habitat areas in compliance with CEQA and the NCCP/HCP.

191. *A second reason we oppose the channelization of the canyons is that, while the FS indicates that the canyon channelization could be vegetated, the exhibits illustrating that work show that any such vegetation would be minimal at best. The FS proposes "islands" of sacs filled with native soil and native plants. One problem with this is that "islands" are the epitome of fragmented habitat which science tells us is ineffective. Another problem is that native plants have very deep roots that would likely not do well in the proposed sacs. There is also the concern as to whether or how long the sacs will survive the elements and avoid being washed away in significant rain events.*

Response: As noted in RTC 28, native plants with relatively deep roots can be incorporated into the final design as needed by allowing for deeper soil horizons. Planting would be accomplished so that the liner is a subsurface feature with soil emplaced above in order to promote designed plant growth and habitat development. No specifications for habitat density are provided in the FS. Final channel design, orientation, location, width, etc, including habitat density, and operation and maintenance of the overall system, will be addressed in the final design stage of the project. This will all be developed with stakeholder input, and in compliance with CEQA and the NCCP/HCP.

192. *Our third point of opposition regarding channelizing the canyons is that the canyons in the Preserve are largely steep-sided, but all drawings of the geotextile-lined channels show canyons with shallow sides and installation methods that require the sides to be shallow. In other words, while it is never mentioned in the FS, it appears that this canyon work would in fact require massive grading of the sides of all three canyons, potentially undermining the stability of the area and affecting not only the dense habitat in the canyons, but all habitat for a significant distance on each side.*

Fourth, the canyon channelization work itself, with an average of 65 foot wide rock beds, will result in fragmentation of the Preserve, detrimental to a healthy ecosystem and something that the contiguous Preserve was created to avoid.

Response: As noted in RTC 192, no specifications for channel construction are provided in the FS. Final channel design, orientation, location, width, etc, including habitat density will be addressed in the final design stage of the project after data gaps are filled, such as a hydrologic study that provides critical design data. This will all be developed with stakeholder input, and in compliance with CEQA and the NCCP/HCP.

193. *The fifth reason we opposed canyon channelization is that the channelization will result in years of closed trails during construction, and will be a major visual blight during and after construction, with multiple 65 foot wide scars down the length of the Preserve, becoming the most visible and defining feature in what should have been a beautiful, thick cover of coastal sage and its related plant palette.*

Response: The FS was used to select a conceptual solution. No construction methodology or scheduling was presented in the FS. These issues will be addressed in the final design stage of the project, with stakeholder input, and in compliance with CEQA and the NCCP/HCP.



194. *In addition to channelization, the FS contains the proposal to pump concrete into fissures each year. While the lower slide area in particular does have quite a few fissures, the image of concrete pock marks increasingly dotting the area when one fissure after another is filled with concrete is not attractive. Water has a way of finding cracks, so the effectiveness of this approach is questionable. And what happens when the earth continues to move—where do these clumps of concrete end up? Additionally, does the concrete add weight that is counterproductive in the effort to slow the landflow? Moreover, this requires concrete pump trucks to constantly drive over and through habitat to access the fissures. Was this taken into account in assessing take? Has this method been attempted in other areas and what were the results? It is easy to imagine this resulting over years or decades in a large, concrete debris field in lower Portuguese Bend Reserve.*

Response: As noted in RTC 15, the make-up of the in-fill material will be specified later in final design. As noted in RTC 152, the overall idea is a relatively simple one in which direct surface water recharge to groundwater in the head scarp area is reduced by in-filling existing fractures – in this sense any extent of in-filling would be beneficial and help reduce direct groundwater recharge. Please also see RTC 13 and 14.

195. *The staff report accompanying the FS suggests that the NCCP in its current state provides sufficient existing “take” within the Preserve to allow for this work. Whether or not this is the case has yet to be determined, since the FS itself states that significant additional study needs to be performed to know exactly how the work would be performed. Once staging, access, spoils piles and other construction activity—along with the myriad construction impacts such as dust, noise, vibrations, access and other effects and activities that damage plant and animal life over a broader area than just the work zone for such a large project—are taken into account, it seems unlikely that the existing take would be sufficient for the proposed work.*

In any event, the existence of available take is not the end of the inquiry. Simply because take is available does not mean it is permitted or should be utilized. The FS acknowledges the necessity of complying with the NCCP/HCP, and conducting activities in the least impactful way is one of the requirements. Impacts are not ignored simply because take is available. At least with respect to channelization and filling fissures, it is not the case that the FS proposes the least impactful alternatives and we do not believe such activity is in compliance with the obligations imposed by the NCCP/HCP and CEQA.

Response: As noted, these issues will be addressed in the final design stage of the project, with stakeholder input, and in compliance with CEQA and the NCCP/HCP.

196. *Ultimately, we question whether the highly aggressive and destructive efforts proposed in the FS are necessary for the City to achieve a reasonable result in landslide mitigation. Previous mitigation efforts like dewatering wells, which have been highly successful here and in other communities, are much less expensive, invasive and destructive, and much less a blight on our community. The FS includes dewatering, and we believe the City should focus its efforts in that direction, and in the direction of long-term efforts to convert applicable neighborhoods to sewers and storm drains.*

Response: Dewatering wells and centralized sewers are a component of the proposed remedy (Section 4.6). However, as discussed in the City Council meeting, stormwater control is a much more cost-effective and process-efficient technology compared to groundwater extraction.

197. *The Portuguese Bend Landslide has been active for more than 60 years. Its current rate of movement is a tiny fraction of what it once was, due in large part to actions the City has previously taken to abate the movement. Despite vague assertions, the slide does not present imminent risk of death or injury. We understand that Palos Verdes Drive South annual repair costs are significant, but over the last 40 years the costs of that repair and of all other City repair and restoration work*



have still been less than the City proposes to pay now for a project that no one can even promise will work. The City proposes to spend an estimated \$1.75 million per year (\$53 million over the next 30 years, assuming no cost overruns), plus costs that will still be necessary to repair PV Drive South from time to time over that period and interest on public debt incurred to pay for the project, all in order to save \$1 million per year or so in roadway and other repair costs. This does not make fiscal sense.

The City, County and public utilities are already effectively managing the landflow impacts at a cost which is less than the proposed abatement work. In our view, nothing that the FS proposes offers an improved plan when considering the costs—both monetary and otherwise. We urge you first to reconsider the necessity and desirability of this project in the context of other needs and opportunities that would benefit and improve our community. If the project is to move forward we urge you to remove the canyon channelization work and filling fissures with concrete from the scope.

Response: Comments noted.

Commenter: Sunshine (1/13/2018)

198. *The community is chatting about three different projects which are on different timelines and appear to be disconnected from the RPV General Plan, Coastal Specific Plan and the Trails Network Plan. They all propose changes to the Palos Verdes Drive South Right of Way. They are Trump's application to change the CUP on Tract 50666, the Safe Bike Lanes grant application adjacent to the Portuguese Bend Club and the Feasibility Study for the Portuguese Bend Landflow.*

Have these project's Design/Engineering Consultants been directed to follow the existing Trails Network Plan including the Conceptual Trails Plan and the Conceptual Bikeways Plan? Have trail TYPE's been assigned to the existing, proposed new and/or proposed to be modified unpaved pathways? Have these projects been addressed in the Draft Trails Network Plan Update?

When will We the People and the City Council have the opportunity to comment on the continuity of the proposed bike lanes, bike paths, roadside trails and the three corridors in the California Coastal Trail?

Response: Trail and bikeway issues can be addressed in the CEQA component of the project.

Commenter: Rick Taube (2/09/2018)

199. *In my opinion the draft report should include further elaboration on the following:*

~ Effects of waves and tides on the toe of the landflow at the shore and beyond;

Response: The remedial action objective (RAO) and goals of the FS are provided in Section 4.2. Addressing the RAO will simultaneously address several goals focused on multiple issues that directly control overall land movement.

~ How to continuously monitor landflow activity in real time to identify accelerated movements and predict catastrophic failure;

Response: A modern slope monitoring system (typically a post-construction task) will be considered for inclusion in the final design.

~ How uncertainty affects the relationship of the modeled Factor of Safety to the extent of water removal;

Response: The geotechnical modeling is preliminary and based on available data from c.1999. Uncertainty cannot be quantified as part of the FS. The purpose of identifying data gaps (such as



the need for a hydrogeologic study) and filling the data gaps is to take steps to reduce uncertainty in the analysis.

~ What are the probabilities of success for each of the proposed alternative solutions and what constitutes success?

Response: Probability cannot be quantified for FS implementation. Success is defined by achieving the RAO.

~ Why horizontal drains will not shear or lose downhill trajectory with ongoing land flow;

Response: As noted in RTC 162, A properly managed subsurface drain program, including O&M and periodic replacement, is a proven technology anticipated to be functional and cost-effective even though subject to land movement in the future.

~ Why lowering the underground water level and/or filling fissures with cement will not induce the unintended consequences of surface subsidence and new fissures;

Response: Groundwater extraction and surface water control are proven technologies applied worldwide for landslide abatement.

~ How to get rechanneled water past Palos Verdes Drive South and whether such untreated water will pollute the ocean and/or erode the shore;

Response: Please see RTC 165 regarding flow under PVDS. The discharge is anticipated to be completed under permit with associated monitoring requirements.

~ Ultimately the City Council's decision on how to proceed must compare the costs of alternative prevention mechanisms (including doing nothing) to the quantified benefits of slowing the land flow and preventing a catastrophic event. In their literature review did the consultants find any information on the amount and distribution of benefits? If not, how would they propose to identify such benefits?

Response: Project benefits and potential impacts, and mitigation, will be addressed in the CEQA stage of the project. A conceptual-level comparative cost analysis is included in the FS.

200. *While possibly beyond the scope of the consultant's feasibility study, surely City Council will expect staff to provide the following information before Council goes forward with a remedy:*

~ Identify a lead staff department;

~ Immediately work with relevant agencies and organizations to prepare a disaster response plan to recover from a catastrophic land flow event (such as the loss of Palos Verdes Drive South and parallel sewer lines) together with informed estimates of probabilities of occurrences of varying severities;

Response: These issues are out of scope for FS development but can be discussed with City personnel.

~ Create a detailed testing plan with schedules and budgets to gather any additional facts needed to make an informed decision on further land flow prevention actions;

~ Complete a benefit-cost analysis, including an examination of the distribution of benefits and burdens of various alternatives through time and among stakeholders.

Response: Please see RTC 49 regarding data gap investigation work planning. Project benefits and potential impacts, and mitigation, will be addressed in the CEQA stage of the project. A conceptual-level comparative cost analysis is included in the FS.



Commenters: Kelvin Vanderlip and Lowell Wedemeyer, Landslide Subcommittee, IMAC (various dates)

201. *Feasibility Study, Figure 14 depicts proposed horizontal drains in plan view. It would be helpful if elevation views of horizontal drain placement were provided, similarly to Geotechnical Figures 3 and 9, Section H-H' and Section 1-1'. The elevation views would show what subsurface water levels the horizontal drains feasibly could and could not passively drain. Elevation views also could show what subsurface water levels would require active water extraction, such as pumped wells. Note that on Geotechnical Figure 3 a "0" (zero) elevation contour occurs along Section 1-1' between Sections G-G' and H-H'. This zero-elevation contour is inland, well north of Palos Verdes Drive South. The zero contour appears to indicate that a portion of the approximate basal rupture surface of the landslide is at the same elevation as the ocean surface. This means that there is no gravity gradient between the zero-elevation-contour area and the ocean. If this is approximately correct, then the horizontal drains cannot collect subsurface water from the zero-elevation basal rupture surface and deliver that water to the ocean. (If the zero contour is not the same elevation as the ocean surface, then a clarification of the zero contour elevation would be helpful, and a conversion of all drawings to the same contour-reference point would be helpful.)*

Response: Cross-sectional views (elevation views) can be included in final design documents once data gaps are filled. Please see RTC 145 regarding drain geometry.

202. *Could there be added to the draft Study an analysis of the feasibility of successful drainage of surface storm waters to be collected north of Palos Verdes Drive South and delivered past the road bed to the ocean?*

Response: Surface water control in this area north of PVDS and under PVDS is already included in the draft FS.

203. *Should the Draft Feasibility Study be supplemented to evaluate whether there is significant potential for rapid, catastrophic failure of land supporting the road, sewage lines and water mains? (For example, is there a significant risk of a five- to ten-foot drop in the supporting land in a few hours or days?)*

3.1 *If there is significant risk of rapid, catastrophic land failure, then what disaster planning and preparation should be done? When? At what cost?*

3.2 *If there is significant risk of catastrophic failure, will feasible measures identified in the Draft Feasibility Study adequately mitigate such risk?*

3.3 *Should there be an evaluation of the feasibility of re-routing critical infrastructure away from faster-moving portions of the landslide?*

Response: Slope failure risk analysis, risk mitigation, infrastructure management, and emergency planning is beyond the scope of the FS. These issues can be discussed directly with City personnel.

204. *Is it feasible to stage proposed mitigation measures over years? Do all parts of the proposed work have to take place concurrently, or could they be staged geographically or by function to spread funding over many years?*

Response: Please see RTC 6 and 138 regarding task sequencing.

205. *Are there well focused subsets of the proposed project that the City can afford on its internal CIP budget? Would parts of the proposed work deliver cost-effective benefits before the whole*



project achieves outside funding? Are benefits, such as a financially meaningful slowing of damage to the road, achievable with any project subset(s)?

For examples of project subsets:

- A. Successful drainage of surface storm waters from north of PVDS past the road bed to the ocean.*
- B. Sealing fissures that convey surface water into the slide (see feasibility study, section 4.4.4, pg. 54 and following).*
- C. Horizontal drainage from the subsoil to the ocean (See feasibility Figure 14 for the concept).*

Response: Please see RTC 6, 118, and 138 regarding task sequencing.

- 206. Movement of the ground surface in the Portuguese Bend landslide area will continue to cause damage to public infrastructure that will require continuing response.*

Response: Comment noted.

- 207. We (the RPV community) do not understand the mechanics of the landslide, either at the surface or at depth.*

Response: This complex issue is described in Section 2 of the FS and in several other reports referenced in Section 2.

No theoretical model of landslide movement has been validated under the peculiar conditions of Portuguese Bend sufficiently to guide longer term planning and management of public infrastructure, such as Palos Verdes Drive South (the "Road") and the twin sewage lines. Techniques that succeeded in the Abalone Cove slide have failed in Portuguese Bend. We doubt that a stability index (the Factor of Safety) is a sufficiently reliable predictor of future landslide movement to form the basis on which to plan and build a \$30 - \$60 million dollar project. There is no credible basis to believe the Portuguese Bend landslide can be halted. Sixty years of efforts by smart people repeatedly have failed. Therefore, planning analysis should at least include, if not be based upon, a dynamic flow model rather than a stability index.

Response: The geotechnical model presented in the FS is a preliminary tool used only to demonstrate the correlation between lowering the groundwater table and increasing slope stability based on existing site data. As noted in RTC 200, groundwater extraction and stormwater control are proven technologies applied worldwide for landslide abatement.

- 208. What can we (the community) find out about the landslide at an affordable cost that would be useful to management, observation and planning of public infrastructure? For example, what data could feasibly be gathered to improve prediction of three dimensional changes in velocity (accelerations) of the landslide? We (the community) do not have three dimensional data about movement of the ground surface upon which public infrastructure rests that is sufficient A) to warn of significant changes in ground surface velocity (and acceleration) and to alert us to pending damage to infrastructure, especially sudden catastrophic damage; and B) to plan where we should place (or relocate) public infrastructure.*

A detailed, current topological map of the ground surface of the landslide (that is, both vertical and horizontal motions) would be useful. A dynamic record of changes (velocities and accelerations) over time would be even more useful.

Feasibility Study Figure 4 shows significant data on horizontal movement. However, there is little data identified in the Feasibility Study on vertical movements of the ground surface (such as subsidence, slumps, fissures, scarps and grabens). The Feasibility Study does provide section, elevation views of the ground surface at some locations (Geotechnical Figures 5 – 8). However, it is



difficult to envision the topology of the whole surface from section views of abrupt changes in the ground surface.

Response: Real-time slope or subsidence monitoring and/or short-term infrastructure management or operation and maintenance is out of scope for FS development. Near-term implementation can be discussed directly with City personnel. In addition, it will be considered for incorporation into the final PBLC project design and monitoring program.

209. *Does the City have current three-dimensional (topological) maps of the landslide ground surface? Does the GIS system have this capability? We note that former Public Works Director Throne had some interns prepare a drone-mounted, imaging survey from which a whole, three dimensional, topographic model of the ground surface was prepared.*

Response: DBS&A is not aware of any such three-dimensional maps or models.

210. *Could the City afford a sensor network to measure and record velocity and acceleration of the ground surface of the entire landslide, with sufficient density of sensors and sufficient frequency of measurement, to better anticipate, momentum and inertial movement of the ground surface? We believe such data could usefully inform planning and management of the infrastructure, if reasonably affordable.*

Response: Please see RTC 209.

211. *Consider a defined, specific, engineering problem: Where can storm drains be placed under the Road so those drains that will survive for a cost-effective, useful life? (the "Road Passage Problem") If this problem of drainage of storm waters past the Road to the sea is not solved, then constructing upland drainage systems likely would do more damage than good. Upland drainage improvements would just deliver more water faster to the Ishibashi Lake area, increasing water levels at and under the Road. That likely would accelerate slide velocity.*

We may not need to validate a whole theory of the landslide's surface and underground mechanics in order to learn what actually works to drain storm water under the Road to the sea. A more traditional, practical approach might solve the key Road Passage Problem. A current, three dimensional mapping of the ground surface, and a hydrological study of surface run-off would help site and size storm drains under the Road to the sea. Then we could install drain lines under the Road, observe and measure where those lines move, and where and why they fail. Then learn from the effort and try again to achieve a focused, successful result. We are informed that there is some newer technology, including strong, high-density, polyethylene storm drain pipes which might help.

Given the importance of the threatened infrastructure and the paucity of other feasible solutions to the Road Passage Problem, design and installation risks beyond standard engineering practices for storm drains are necessary and justified.

We are aware that in the past drains under the Road fared poorly and eventually failed. If the Road Passage Problem cannot be solved in a cost-effective manner, then relocation of the Road and sewage lines likely will become necessary. This issue should be evaluated and planned now, not avoided in the unwarranted hope that all will be well indefinitely.

The feasibility of relocation of the Road and sewer lines should be evaluated at an early date. This is because of great uncertainty about the remaining useful life of the existing Road and sewage lines, and uncertain potential for catastrophic failure. Although relocation has been suggested publicly, numerous times, we do not know of any systematic effort to determine whether a physically feasible relocation route exists.



Response: Please see RTC 209 regarding infrastructure. Please see RTC 32, 92, and 165 regarding storm water flow under PVDS. Please see RTC 50, 51, 52, 54, 57 and 59 (and others) regarding hydrology.

212. *There is a difference of views: KV: It is unlikely the City can afford underground investigation of the landslide. LRW: A combination of both ground surface topological data and subterranean data is likely to be more useful than ground surface data alone. It is likely that some well-planned, affordable, cost-effective underground investigation would provide additional information critical to design, maintenance and re-location of public infrastructure. The issue should be further evaluated.*

Response: Please see RTC 209 regarding infrastructure. Please see RTC 39 regarding funding. Please see RTC 49 regarding data gap investigations.

213. *Feasibility Study Figure 14, which is a plan view of proposed hydraugers, does not propose any drainage for the steeply dipping section of the Road at the eastern side of Portuguese Point (which is the western end of Sacred Cove). This subsiding section of the Road needs to be addressed if the Road is to survive for much longer.*

Response: Please see RTC 209 regarding infrastructure management.

Commenter: Tony Baker

214. *I have read the Feasibility Study and I have serious concerns with some of the suggested remedial actions and I share many of the concerns that many other letter writers have stated.*

I preface my comments by stating that I am not a structural engineer, hydrologist or geologist. I am a 70 year resident of Portuguese Bend, a native plant landscaper and first hand observer of the slow moving P.B. Landslide as well as an active participant of a fast moving slippage at the Ocean Trails Golf Course. I am also Horticulture Chair of the South Coast Chapter of the California Native Plant Society, but I speak here only as a concerned resident.

I was about 10 yrs. old when the earth began to move here in the Bend. I recall bulldozers, scrapers, trucks and blasting prior to the crumbling road-cut face that is now the head of the landslide. Cracks began opening up all around the neighborhood and the water drained out of the swimming pool at the Portuguese Bend Club located in the lee of Inspiration Point. The construction of Crenshaw Blvd. was the trigger that set off the movement of this section of an ancient landslide that had been laying at the angle of repose. And it continues until today.

There is much we do not know. A comprehensive study of the Ancient Altamira Landslide Complex has never been implemented. We only have parts of a very large and complex puzzle. Some of the studies that are being relied upon for this report were done on private landholdings and were at the behest of land owners looking to develop segments of Port. Bend. Vonder Linden was hired by Palos Verdes Properties (subsidiary of Great Lakes Properties) and the Leighton studies were undertaken for P.V. Landholding (Barry Hon-developer). An aside--Karl Vonder Linden---said to me (1980's) that if you ask 4 geologists a question, you get 5 answers back (old joke).

Again, there is much we don't know. The potential impacts to native fauna and flora by this project as viewed is tremendous and could be devastating to many species of concern and the viability of the Preserve. Intensive surveys must be done before any work begins and impacts to the overall Preserve taken into account. Just because "take" is allowed in the NCCP doesn't mean that it should be. The elimination of habitat in this case removes some of the highest quality and densest vegetation of the Preserve.

Of all the proposals put forward, grading and lining the canyons would be devastating to vitality of the Preserve as a whole. This proposal should be taken off the table. The canyons are the heart of the Preserve with abundant habitat providing natural corridors that are irreplaceable. Cutting a 65' wide



swath through them means cutting back the steep canyon walls to run a geo-textile fabric liner down them which would require removing all the vegetation (denuding) of both the canyon bottom and steep sides. The dense vegetative cover is soaking up, storing and transpiring most of the rain that falls. The plants also break up rain as it falls and reduces runoff. When a landscape is denuded to bare earth, water runs off to form rivulets, then channels that then form gullies and they find faults that take the water to the slide plane.

I heard it said that islands of habitat can dug and replanted. I would expect mortality to be near 100% aside from the shallow rooted Opuntia cactus. The trees and large shrubs---Rhus, Toyon, Salix, Malosma, etc---of the canyons have roots that extend several dozens of feet deep. Bob Douglas (late resident and PBLs expert) told me that roots were encountered at 90 feet when the dewatering wells were being drilled. The established coastal sage plants such as Artemisia, Salvia, Encelia are more shallowly rooted but will not transplant. I'm a big proponent of habitat restoration, but we can never re-create undisturbed natural habitat with its complex web of life down to the microscopic biota. Once an area is disturbed, it is an opening for non-native invasive species. Notice that the coastal sage scrub of the Preserve that has not been subject to disturbance, has very little exotic vegetation within it.

Filling surface fissures with concrete is doomed to failure with a creeping landslide. As drivers on P.V. Drive South can tell us cracks open up in the asphalt the day after they are filled. Residents of PBLs have learned to be flexible. I picture years down the road, if the above ideas are implemented, we will have liner and concrete detritus blighting the Preserve.

Response: Comments noted. Please see RTC 69 regarding existing habitat. Also please see RTC 1 regarding CEQA. Please see RTCs 13, 14, and 15, and 152 regarding in-filling fractures.

215. *The active land slide began with a large construction project. We need to reject much of this massive construction project with its \$53 million price tag and huge negative impacts. There is no guarantee of successfully slowing slide. Is there any guarantee that the above won't actually exacerbate movement? While the lateral drain system looks promising on paper, will it perform within an actively moving landslide?*

Response: As noted in RTC 200, groundwater extraction and stormwater control are proven technologies used worldwide for landslide abatement. As noted in RTC 162, a properly managed subsurface drain program, including O&M and periodic replacement, is a proven technology anticipated to be functional and cost-effective even though subject to land movement in the future.

216. *We can look into less intrusive methods. The goal of slowing the PBLs is a laudable one. Dewatering wells have proved successful in slowing the Abalone Cove Landslide to a fraction of movement. Wells can be instrumental in lowering the water table considerably. Wells that are well placed and maintained hold much promise---especially the idea of removing water before it reaches the slide plane by placement of wells above the active slide. A study of the optimal locations should be undertaken.*

Capturing storm water after it exits the upper canyons and directing it through the sandbox area and under the drive and to the ocean needs more examination. The landslide long ago cut off the natural flows through the middle and lower sections. The efforts after the 1987 grading to collect and direct the storm waters failed quickly, but were not well designed or maintained. A large semi-flexible pipe system replacing the metal corrugated full and half pipes that are placed so that water flows at a downward angle (obviously). And Maintained!

Response: Groundwater extraction is an existing component of the proposed remedy. As discussed in the FS, well locations will be determined in part with information collected during data gap investigations. The proposed storm water control system will be further evaluated under CEQA and in final design. The FS recommends a maintenance program.



217. *Let us do everything we can to protect the habitat, wildlife, peace and tranquility of the Palos Verdes Preserve. The phrase "Less is More" comes to mind.*

Response: As noted in RTC 176, the City strives to work collaboratively with all stakeholders in the FS process and all remedy implementation will be in accordance with CEQA and the NCCP/HCP with stakeholder input.

Commenter: Donald Crocker

218. *Have you compared the cost of the continuing study and construction proposed, if invested, will cover many years of road repairs and not destroy the very unique, wild/deep and environmentally sensitive canyons and their flora and fauna habitats and Blue Line streams therein. If road repair cost is the primary reason for habitat destruction in the PVPLC please focus on new creative methods of construction, maintenance, materials etc to abate the roadway problem.*

Response: As discussed in RTC 1, these and similar issues will be addressed in the CEQA stage of the project. A preliminary cost analysis is included in the draft FS. Section 4.2 of the draft FS establish the project goals and the remedial action objective.

Commenter: Allen Franz

219. *As a concerned citizen and long-time supporter of land and habitat conservation in Portuguese Bend, I thank you for the opportunity to register concerns relating to the recently released Feasibility Study (FS), and the subsequent Staff Report, on proposals to remedy landsliding/landflow in Portuguese Bend.*

There is no disputing that the City has a responsibility to address matters that impact the safety, security, and financial condition of the City and its residents, such as the Portuguese Bend land flow. Indeed, the history of the past 60 years reflects numerous attempts by the City to better understand and remediate the land movement.

While the remedial measures proposed in the current FS draft have the potential to reduce land flow--albeit at a considerable financial cost--I urge the City to carefully weigh this potential benefit against the cost to local ecology, recreational use, and aesthetics. Without attempting a point-by-point response, I'd like to call your attention to what I see as the most controversial features of the remediation plan laid out in the FS.

Balancing landflow remediation measures against environmental impacts: There is general agreement that land flow in the area is the result of groundwater accumulation on a southward-sloping layer of bentonite clay, lying well below the surface. The solution put forward in the FS incorporates a sequence of different strategies to reduce the accumulation of water in the bentonite zone.

At the same time, the City's options are to some extent limited by "take" constraints imposed by state and federal agencies--most notably, in the present situation, by conditions in the draft Natural Communities Conservation Plan (NCCP) which stipulates that projects to be performed in minimally invasive ways. Less formally, the City is also constrained by the donors--public and private, local, county, state, and federal--who funded acquisition of the component parcels that make up the Palos Verdes Nature Preserve, with the explicit intent of establishing an NCCP-consistent, contiguous expanse of natural habitat. Continued support for the preserve may be contingent in part on donors' assessment of the City's handling of the community's investment in, and vision for, the preserve.

Having over the decades participated in numerous NCCP workshops from RPV to Carlsbad and elsewhere, my central take-away has been that the NCCP requires "no net loss of habitat value," which is a more concise expression of the goal articulated in Section 7.1 of our local NCCP draft: "The overall objective of the NCCP/HCP is to ensure that the biological values of natural resources, where land is preserved as part of the NCCP/HCP through acquisition, regulation, mitigation or other means, are maintained over time."



It bears mention that the City benefits in several ways from participation in the NCCP, in addition to the mere acquisition of open space for the recreation and enjoyment of visitors and nearby residents. Perhaps most notably, establishing and maintaining the preserves permits the City a measure of revenue-generating development "take" outside the preserve, while also removing risk of legal liability that would ensue from development of properties within and adjacent to the preserve and landflow area.

The challenge the City faces is to address groundwater accumulation in the bentonite zone while protecting the "no net loss of habitat value" objective of the NCCP-and I argue below that not all of the remediation strategies proposed in the FS support both these essential goals.

Response: Comment noted. As noted in RTC 154, 155 and 156 (and others), proposed remedy implementation will be completed in accordance with CEQA and the NCCP/HCP with stakeholder input.

220. *Fine-tuning remediation strategies: Given this predicament, I suggest refining the proposed combination of remediation strategies to prioritize those approaches that most directly address the accumulation of water in the bentonite zone, and which at the same time have the least impact on habitat value, while postponing or tabling implementation of those strategies likely to pose the greatest risk to the "no net loss of habitat value" standard.*

My suggestion takes into account the fact that the habitat value of the entire Portuguese Bend basin is shaped fundamentally by the availability of groundwater in the root zone of resident plants, and by the interconnectivity of habitat lands, both above and below ground (in the form of essential soil microorganisms, mycorrhizal fungi, roots, burrowing vertebrates and invertebrates, etc.).

In this situation, I would argue that two of the FS-recommended strategies offer the most favorable outcomes, in that they are most likely to reduce water accumulation in the bentonite zone while imposing comparatively lesser impacts on the viability of local ecosystems:

1) *While there are obvious geotechnical challenges, dewatering wells can directly reduce water accumulation in the bentonite zone where it's a problem, without dramatically impacting groundwater in the root zone of resident plants and other organisms, thereby supporting the foundations of the ecosystem.*

2) *The FS reports that as much as 30% of groundwater in the slide/flow area derives from septic discharge, most critically from sources above the slide, and elsewhere implies that more than half of all groundwater inflow derives from the combination of septic discharge and excess irrigation drainage, again originating primarily upslope from the slide in Rolling Hills. While there may be no single, tidy point source for this cumulative artificial discharge into groundwater, it can be significantly reduced by a combination of (a) upslope runoff capture with directional drains, and (b) replacement of septic systems with sewer hookups. The latter strategy is complicated by municipal boundaries, but intercity negotiations, intercession of county or state agencies, creative use of liability claims, or other tactics might hasten adoption of modern sewage collection technologies and make a greater impact than some of the other very expensive and ecologically harmful strategies proposed in the FS, particularly the liner-and-channel option.*

In sum, dewatering wells, directional drains, and proper sewage hookups would significantly reduce the introduction of artificially-derived septic and irrigation water, and remove water directly from the key problem area, the subsurface bentonite zone-and do so without substantially disrupting surface flow and root-zone groundwater infiltration derived from natural precipitation, thereby minimizing disruption of ecosystem function in the Preserve and adjacent lands.

Response: Please see RTC 6, 118, and 138 regarding task sequencing and RTC 220 regarding habitat. Comments noted regarding extraction wells and septic systems. Storm water control is a key element of the proposed remedy.



221. *In contrast, two other FS-recommended strategies-concrete surface sealing and canyon channelization--pose significant problems by disrupting the surface flow and groundwater infiltration that are vital to ecosystem functioning, and would furthermore fragment habitat and degrade the visual and recreational experience of the Preserve.*

1) The proposal to seal surface fractures by filling them with concrete has the potential to cause significant disruptions to near-surface hydrological and ecological processes, as well as significant aesthetic impacts on the landscape, degrading visitor enjoyment of the preserve. Given the wide distribution and ongoing spontaneous relocation of fissures in a landscape characterized by expansive soils, this could lead to a proliferation of permanent eyesores of only short-term utility, and which would require repeatedly moving heavy equipment all over the preserve.

As an aside, these fissures might be more reasonably addressed with geofabrics or other more flexible, less ecologically disruptive, and potentially more easily removable materials.

2) The liner and channel strategy proposed in the FS appears to be the least desirable option in terms of ecological function as well as the aesthetics of the visitor or viewer experience. In terms of ecological function, these blue line streams are the arteries of the surrounding habitat, and home to the largest and most diverse array of species in the preserve. This runs directly counter to the guidance of NCCP Section 5.5.19, which specifies that any impacts "shall be located on the least sensitive portions of the site as determined by existing site specific biological and supporting information."

More than any other methodology proposed in the FS, the liner and channel strategy would unnaturally alter-and deplete-root zone groundwater, starving the plants at the base of the food chain not just in in the canyons themselves but well beyond in zones where stream water infiltrates into the root zones. Furthermore, the channels themselves-described in the FS as spanning up to 65 feet across--would cause significant fragmentation of habitat, particularly for smaller creatures and soil-based organisms. Such habitat degradation and fragmentation is explicitly opposed in the NCCP and virtually any other serious habitat conservation or restoration plan.

Implementation of this methodology would involve disruption during construction activities extending over a number years, according to the FS, including repeatedly importing, repositioning, and removing pieces of heavy equipment, stockpiling construction equipment and materials (as well as excavation tailings and other byproducts); and upon completion this approach would leave extended "dead zones" where ecological connectivity across the 65 foot channels would be significantly disrupted except for larger and more mobile organisms.

The proposed incorporation of artificial "islands" of soil bags in the planned riprap finish of the channels might have some limited cosmetic affect, but would be extremely questionable in terms of habitat value. After prolonged and extensive habitat disruption, and with the loss of connectivity for soil microorganisms, mycorrhizal fungi, root communication, burrowing animals, etc., it's hard to imagine how this could be compatible with the objective of no net loss of habitat value.

Response: Please see RTC 13, 14, 15, and 152 regarding in-fill materials and construction. Please see RTC 69 regarding existing habitat. Please see RTC 192 and 193 regarding channel design. Please see RTC 1 (and others) regarding CEQA.

222. *Summary and concluding remarks: The City has a responsibility to address significant issues impacting its residents and operations-such as the landslide/landflow in Portuguese Bend, which is a continuation of episodic land movements extending back hundreds of thousands of years-essentially an inherent feature of the landscape here and elsewhere along the California coast.*

Several of the methodologies proposed in the FS to slow the land flow-in particular expanded use of dewatering wells, installation of directional drains, and conversion of septic treatment facilities to modern sewer hook-ups--appear promising as means to reduce inflow of "unnatural" water and remove water directly from the bentonite zone, the focus of the slide/flow.



Daniel B. Stephens & Associates, Inc.

On the other hand, FS proposals to inject concrete seals in surface fissures, and especially the plan to line and channelize the Preserve's blue line streams, seem to be in direct conflict with both the spirit and the letter of the NCCP. I would strongly urge reconsideration of these more intrusive options.

If the City is intent on pursuing the full array of remedial actions proposed in the FS, I would strongly urge investment in more current data. The FS recommendations are based on a review of research literature extending back over fifty years. Considerable land movement has occurred since even the more recent studies cited, and new, more informative technologies are available.

On a related point, the FS provides a list of applicable or relevant and appropriate environmental requirements, such as CEQA and the California Coastal Zone Management Act, that might bear on implementation of FS proposals, but does not provide guidance as to their specific bearing on any elements of the proposals, beyond stating that they would not likely be insurmountable obstacles to implementation. In this connection, it would be interesting to know why Stephens & Associates chose to apply the analytical methodology of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, aka "Superfund")-which was developed for cleanup of toxic waste sites-rather than a protocol developed for habitat management.

Finally, I'd like to underscore the point that the City is not under any obligation to expend its allotment of permitted "take" under the NCCP, especially given the projected cost and comparatively modest benefit (5 to 15% reduction in groundwater) of the projects proposed; per the NCCP, "Simply because take is available does not mean it is permitted or should be utilized." What "take" the City doesn't apply to the menu of projects advanced in this FS would remain available for future projects, or might be transferrable to comparable sites.

Thank you again for the opportunity to offer comment, and for your consideration of my comments. We all share the goal of an effective project that preserves the preserve.

Response: As noted in RTC 222, please see RTC 14, 15, and 152 regarding in-fill materials and construction. Please see RTC 69 regarding existing habitat. Please see RTC 192 and 193 regarding channel design. Please see RTC 1 (and others) regarding CEQA. Please see RTC 69 regarding data gaps. Please see RTC 152 and 154 regarding the NCCP/HCP.

As noted in Section 1 of the FS, the time-tested CERCLA FS approach is a systematic, methodical, and thorough concept-level process widely accepted in the engineering industry to develop, analyze, and select cost effective mitigation alternatives that can be accepted by federal, state, and local regulators and community stakeholders.

Commenter: Andre Ruggeri (2/01/2018)

223. *I would like to add that the trails used by Both Bikes and Horses should have always visibility and that if a blind corner Occurs that there is a sign asking to slow down. Nothing could be more dangerous, that a bicyclist coming down hill full speed with ear pods own up to a upcoming horse on a single track. There is only a couple of places that this is the case and we as riders try and avoid them But limits us from the use of this sections of beautiful trails. Also what made things wort is that the vegetation grew very large on last years rains.*

Response: Potential FS impacts to issues such as trails and bike ways will be addressed in the CEQA stage of the project.

Commenter: Al and Barbara Sattler (2/02/2018)

224. *The primary directive of the Rancho Palos Verdes Natural Communities Conservation Plan (NCCP) is to AVOID impacts to sensitive habitat areas and species. Replanting an area does not*



provide an immediate one-to-one restoration of impacts to habitat, nor does it provide any mitigation for impacts to wildlife during the actual disturbance activity.

Likewise, the notion that mature native plants can simply be dug up to be replanted later is not supported by professional botanists. In fact, the California Native Plant Society (CNPS) has a formal policy, "STATEMENT OPPOSING TRANSPLANTATION AS MITIGATION FOR IMPACTS TO RARE PLANTS" (attached) because efforts to transplant mature native plants are more likely to fail than to succeed.

It is critical that the city obtain specialized knowledgeable evaluation of this project's potential impacts from qualified biologists, botanists and ecologists before further development of a project plan. The Palos Verdes Peninsula Land Conservancy, which has the authority for biological management of the Preserve, must be consulted in these matters. The fact that this land is dedicated as a Nature Preserve warrants input and consideration of the best possible biological and ecological approach to addressing the situation, not solely an engineering report and recommendation.

Response: As noted in RTC 176 and 218 (and others), the City strives to work collaboratively with all stakeholders in the FS process and all remedy implementation will be in accordance with CEQA and the NCCP/HCP with stakeholder input.

225. *How was the total acreage of impacts from the proposed abatement project determined? Does that estimated acreage include all areas impacted by the proposed project including, but not limited to access, construction and staging areas?*

Response: Please see RTC 71.

226. *Is the degradation of existing prime contiguous habitat into fragmented "edgely" islands with subsequently degraded habitat value being counted as a significant biological impact?*

Response: Please see RTC 1 regarding CEQA.

227. *What about the temporal loss of mature functional habitat which is destroyed by the proposed project until any restoration efforts have proved successful?*

Response: Please see RTC 1 regarding CEQA.

228. *Are the sparse transplanted plants proposed to be installed for the drainage areas being counted as restoration? What if these proposed transplants of mature plants fail to thrive?*

Response: These issues can be addressed once final design is complete and an operation and maintenance program is developed.

229. *How does the proposed project justify destroying prime Coastal Sage Scrub (CSS) in the heart of the Preserve in clear violation of Section 5.5.19 of the NCCP?*

Response: As noted in RTC 225 (and others), all remedy implementation will be in accordance with CEQA and the NCCP/HCP with stakeholder input. CSS acreage is currently in compliance with the NCCP/HCP (see also RTC 16, 29, 30, 71).

230. *What was the natural hydrology of the area included in the Feasibility Study before the introduction of roads, buildings and other development? Can it be assumed that the local ecology is adapted to that original amount and pattern of ground water? How would the proposed plan alter this hydrology and what impact might this alteration have on native vegetation?*



Response: Part of the proposed hydrology study to be completed to fill data gaps would characterize the historical hydrologic system. Potential projects impacts related to FS implementation will be addressed in the CEQA stage of the project.

231. *How much water is added to the area from surface runoff due to excess irrigation on neighboring properties? How much might watering restrictions, such as we have had during periods of drought, reduce this excess of water infiltration?*

Response: Please see RTCs 54 and 55 regarding a water balance.

232. *How much of a reduction of ground water load would be achieved by conversion from septic tanks to a sewer system? What would be the impacts of sewer line installation? Can sewer lines be routed to the north of the Preserve, avoiding impacts to the Preserve?*

Response: Please see RTCs 54 and 55 regarding a water balance. Final sewer line routing would be a component of final design and not a component of the FS.

233. *Although we appreciate the desire to minimize ongoing land movement on the Palos Verdes Peninsula, any efforts to do so should not be to the detriment of the Palos Verdes Nature Preserve.*

Response: Comment noted. As noted in RTC 225 (and others), all remedy implementation will be in accordance with CEQA and the NCCP/HCP with stakeholder input.

Commenter: Janet Schoenfeld (2/02/2018)

234. *I was among those who attended the Jan. 16 City Council Meeting which included presentations on the subject study. This message is submitted to convey my deep concern with both the proposed mitigation measures and the underlying data. Before further consideration of mitigation measures, I urge that the City*

1. Place as first priority use of the least invasive mitigation strategy(-ies) and tactics. For instance, adding three 65-foot wide concrete "riverbed" equivalents through a nature preserve absolutely fails that test.

Response: As noted in RTC 225 (and others), all remedy implementation will be in accordance with CEQA and the NCCP/HCP with stakeholder input.

2. Initiate an in-house research effort to determine and document how much has been spent on prior mitigation efforts, what maintenance was performed, what effects were noticed, track development vs landslide activity, and similar historical data.

Response: This is not a component of the FS. This issue can be addressed directly with City personnel.

3. One of my neighbors, Eva Cicoria, has worked with others and prepared an in-depth document requesting additional information on this study. I fully endorse that line of inquiry.

Response: Comment noted.

Commenter: Nina Smith, Ric Dykzeul Landscape Design & Garden Consulting (2/01/2018)

235. *Has anyone looked in to what the effect would be if a mass planting/orchard of pepper or avocado trees - call to Ric Dykzeul for additional ideas of trees that the roots would drink up the water as well as hold the hill together?*



Response: This is not included in the FS. The amount of groundwater extraction from trees is not anticipated to be sufficient to address the RAO in comparison to the proposed remedy.

Commenter: John Spain (1/30/2018)

What is probability of significant and sudden land movement that can compromise infrastructure (e.g. PVDS and the LA County sanitary sewer line). It is desired this analysis be as quantitative as possible to enable city staff to perform a cost benefit analysis of mitigations of this risk. Other than sudden land movement, are there other risks that could occur rapidly and present a health or safety hazard to residents. For example, a sudden opening of a fissure that could trap a person or a vehicle. If possible, please quantitatively assess the probability of the risk occurring.

Response: It was not within the scope of work to quantify these probabilities as part of the FS. This issue can be addressed directly with City personnel. Please see RTC 209 regarding infrastructure management.

Commenter: Sunshine (various dates) (partial comments directly applicable to FS)

236. *Efforts by the City of Rancho Palos Verdes to control the Portuguese Bend Landslide Complex should not be taken lightly nor be inflated to panic mode. Most of it (if any) does not move at 8 feet per year. The last major work was effective for several years even though the water drainage designs were underengineered. We know better, now. The habitat grew back better than ever. One should not call that "irreversible".*

Response: Comment noted. Please see RTC 34 regarding prior remediation.

237. *Somehow, all this needs to be converted into a direction to the Consultant to include designing a somewhat "sustainable" trails network within and around the Project Area. Our primary, south side, evacuation route used to be the Crenshaw Extension. That should be restored. Water flow control and capture is important for making low maintenance recreational trails too.*

Response: Comment noted. As noted in RTC 99, trail issues can be addressed in the CEQA component of the project. Restoration of the proposed Crenshaw extension is not a candidate remedy evaluated in the FS.

238. *This RFP and grant application should represent the best possible, permanent, engineered solutions for the General Plan update, the Clean Watershed Plan, emergency access, recreational trails network and Landflow control. Reseeding the vegetation should be even better this time because we now have a better understanding (and seed collection) of what can/should be a "native" habitat. My plea is that you not compromise on any of the best possible, coordinated designs in favor of not impacting the existing habitat. As in, "mitigation measures" will reduce the effectiveness of the end product.*

This really is our "second in a lifetime" chance to get it done, right. No more substandard sewers. No more substandard catch basins. No more substandard storm drains. No more substandard trails and trail routes. No more substandard erosion control. Get the ideal design for everything and then take a very close look at phasing and other ways to reduce the funding complications.

Response: Please see RTC 29 and 69 regarding existing habitat. Final planting or habitat specifications will be developed during final design in compliance with the NCCP/HCP and CEQA and with stakeholder input. Please see RTC 6, 118, and 138 regarding task sequencing. Only modern engineering designs, materials, and construction methods are being contemplated in the FS.



239. *Too many public comments, concerns and suggestions are being ignored and/or being obfuscated into some "twilight zone". Thank you ever so much for attempting to schedule Special Council Meetings to address the Budget, the General Plan and the Natural Communities Conservation Plan (NCCP).*

Response: Comment noted. As noted in RTC 176 (and others), the City strives to work collaboratively with all stakeholders in the FS process, including multiple public and council meetings discussing the FS. An additional public meeting is being planned.

Personally, I do not think that you need any more public input in order to redirect a previous City Council's direction about the General Plan. Direct Staff to stop pursuing their proposed changes. You are going to have to direct them, specifically, to produce a current Land Use Map. (Oh, that means you have to fund the Staff Time to save the draft version and produce one in which the proposed changes have been deleted.) Well, that is what So Kim told me.

My next request is that you fund the Staff Time to run a "search and replace" on the draft General Plan Update. Delete all mention of sustainable development and sustainability with something like an original RPV GOAL.

Once that is done, I am sure that you will see that the Draft NCCP is not compliant with the RPV General Plan. No further discussion required. The NCCP, as a regional planning tool, was so absurd that none of the other cities on the Peninsula bought into it. Make it go away.

Why not combine all of the council's policies etc. into one document? Nobody reads them, anyway. The RPV Coastal Specific Plan speaks to a "Viewing Station" but the term is not defined in the Glossary. After much debate, a definition was agreed upon. Did it get added to the Glossary? No. It is a "Council Policy". And the site which started the whole ruckus is undergoing a Staff Level review of proposed modifications to the entitlements. Well, they are not proposing more blockage of the ocean as viewed from PV Drive West.

Please stop the degradation of the City of Rancho Palos Verdes. The PVP Land Conservancy has changed their Mission Statement. They are organized and pushy. A Delphi Technique workshop does make for a community consensus. Only three of you five may be able to save us. The question is ... Which three?

That bring up The Budget.

Response: Comments noted. These issues are not directly related to the FS and can be further discussed with City personnel as appropriate.

Commenter: Minas Yerelian (2/02/2018)

240. *Planting trees with deep roots, Roots acting capillaries suck the water up and slow down the slide or maybe even prevent it. Any other band aid (such as recommended) require costly maintenance to be effective and is not reflected in the report \$\$\$\$. When Finding the source of the springs under ground that are causing the slide, then a real solution can be more effective.*

Response: Comment noted. Please see RTC 236 regarding tree roots. Please see RTC 48, 50, 51 (and others) regarding a hydrology study.



Commenter: Andrea Vona (1/12/18 and 2/2/18), Executive Director, Palos Verdes Peninsula Land Conservancy

241. Page 1- It is stated in the introduction that PBLC stabilization will be considered achieved when a significant reduction in land displacement is recorded. Significant should be defined to help people better understand what you are optimally looking to achieve in terms of stabilization.

Page 11- the purpose of the FS study is stated to accomplish the goal of significantly reducing the risk of damage to public and private property and significant improvement of roadway infrastructure, safety and stability. Again, a definition of "significant" or of the baseline that exists for current risk of property damage would be helpful.

Page 12- - the purpose of the FS study is stated to accomplish the goal to significantly reduce human health risk and improve safety in the City of RPV. Again, there is no definition of "significant" or of the baseline for the current human health risk and safety risks for humans in RPV.

Page 12- The purpose of the FS study is stated to accomplish the goal to significantly reduce sediment dispersal and deposition. Again, there is no definition of significant for this reduction. This should be provided.

Response: At this conceptual stage of the project it is not appropriate to numerically quantify such parameters. However, moving forward some quantification may be possible. For example, preliminary modeling has shown that a reduction in groundwater elevation of about 20 feet could result in an increase in the factor of safety of approximately 8 percent (from 1.0 to 1.08).

242. Page 48- It is stated in the document that instruction operation and maintenance of PV Drive South would still be needed. It would be helpful for this to be better clarified about the level of savings or work reduction that would be expected.

Response: As noted above in RTC 241, this conceptual stage of the project it is not appropriate to numerically quantify such a parameter. In addition, the FS does not systematically analyze the historical or future cost of roadway maintenance.

243. Please update the key/legend of Figure 2, as it is not Land Conservancy owned property

Response: This edit can be completed in the final FS document.

244. Thank you for the additional time to provide comment on the draft Feasibility Study Update for the Portuguese Bend Landslide Complex, Rancho Palos Verdes, CA. After the conclusion of the Council item on January 16, 2018 for the draft Feasibility Study Update for the Portuguese Bend Landslide Complex, there was an opportunity to have a conversation with the hydrogeologist, John Dodge as several people were leaving the facility. John articulated the possibility of alternative measures for surface water capture that would presumably have many fewer impacts to the vegetated canyons. In addition he described a possible strategy to capture water in the sandbox area without the need for canyon linings. I encourage a planning session that would include Resource Agencies and the Land Conservancy to further explore the feasibility of lower impact solutions.

Response: A community meeting is planned for June 28, 2018.