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# POWERLINE, VINEYARD ROAD, AND RITTENHOUSE FLOOD RETARDING STRUCTURES ON-CALL DESIGN PROJECT

CONTRACT FCD 2013C004

## BEDLOAD SEDIMENT YIELD CROSS SECTION PLACEMENT

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Date: November 14, 2014  
To: Rajrshi Shrestha – FCDMC  
From: Brian Wahlin, Project Manager – WEST Consultants, Inc.  
Chuck Davis – WEST Consultants, Inc.  
Jesse Piotrowski – WEST Consultants, Inc.  
CC: Felicia Terry, Project Manager – FCDMC  
Mike Gerlach, Project Manager – Stantec



In Work Assignment #2 for Contract FCD 2013C004, WEST Consultants, Inc. (WEST) will refine, update, and provide recommended sediment yield volumes contributing from the Powerline, Vineyard Road, and Rittenhouse (PVR) watersheds. Using previously developed washload sediment yield estimates prepared by the Flood Control District of Maricopa County (District) and reviewed and updated in Work Assignment No. 1, one of WEST's subtasks for Work Assignment #2 is to update the bedload sediment yield estimates for the three watersheds. With the updated bedload sediment yield estimates and the previous washload sediment yield estimates, WEST will compute an updated total watershed sediment yield for each basin. Previous studies by JE Fuller Hydrology & Geomorphology, Inc., (JEF) and the District have estimated total watershed sediment yields for these three structures. However, calculations of bedload sediment yield require updates for the current design; therefore, the total computed watershed sediment yield estimates need to be updated as well. The remainder of this technical memorandum presents proposed changes in the estimates of bedload sediment yield for the watersheds for the District's review and approval before proceeding with the calculations.

Bedload sediment yield estimates using the District's methodology require a cross section to be cut in order to estimate hydraulic parameters for a normal depth routing approximation given a computed estimate of hydrology and cross-section information. The cross section locations used in the previous studies by JEF and the District for bedload sediment yield estimates for PVR were reviewed by WEST for this study. The cross section locations used for the Vineyard Road watershed (see Figure 1) and the Rittenhouse watershed (see Figure 2) were considered suitable for this study, as the alignment of these structures has not changed significantly since the



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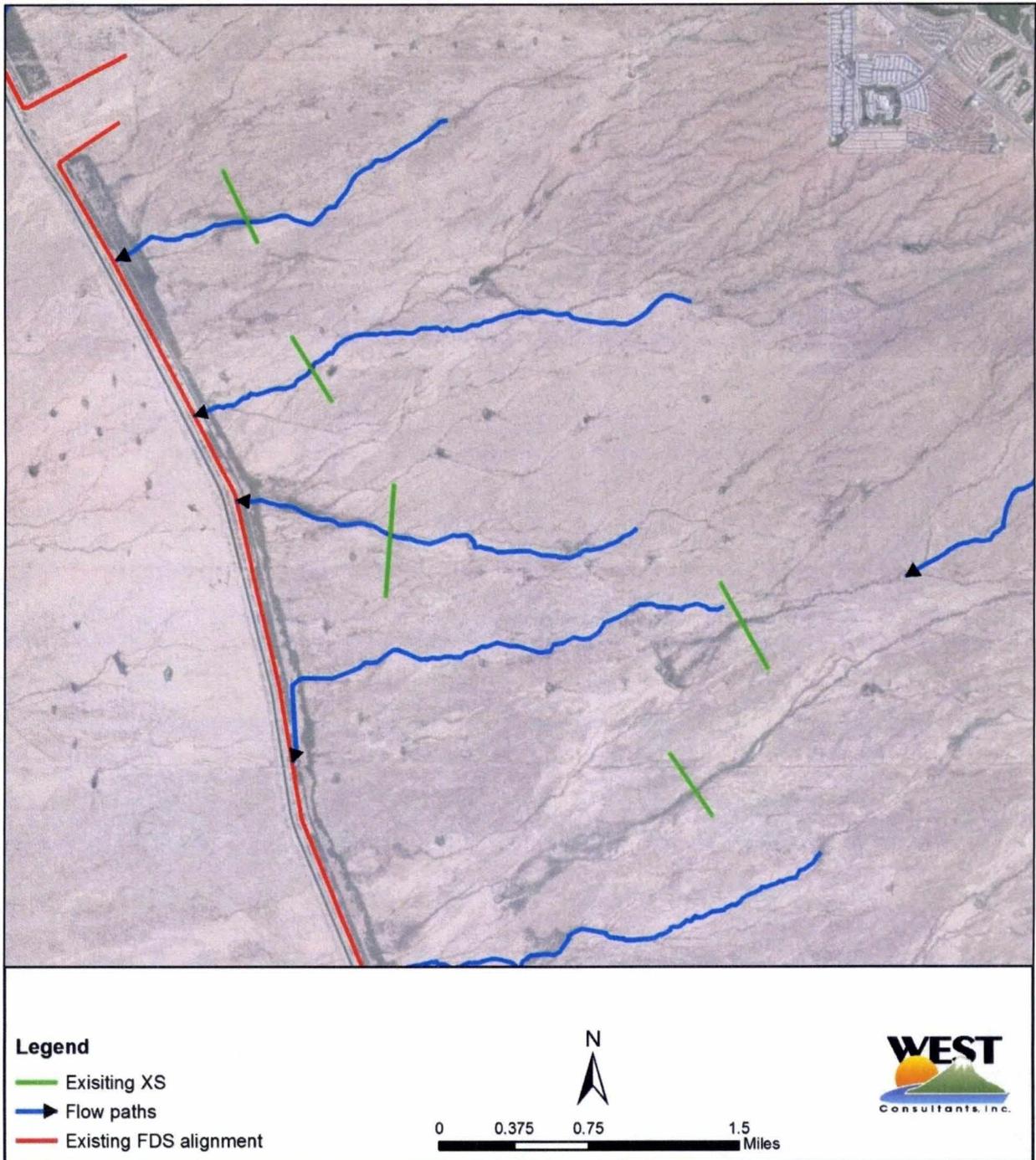


previous studies. WEST will recut these cross sections with the most recent topographic information provided by the District for the updated bedload sediment yield estimates.

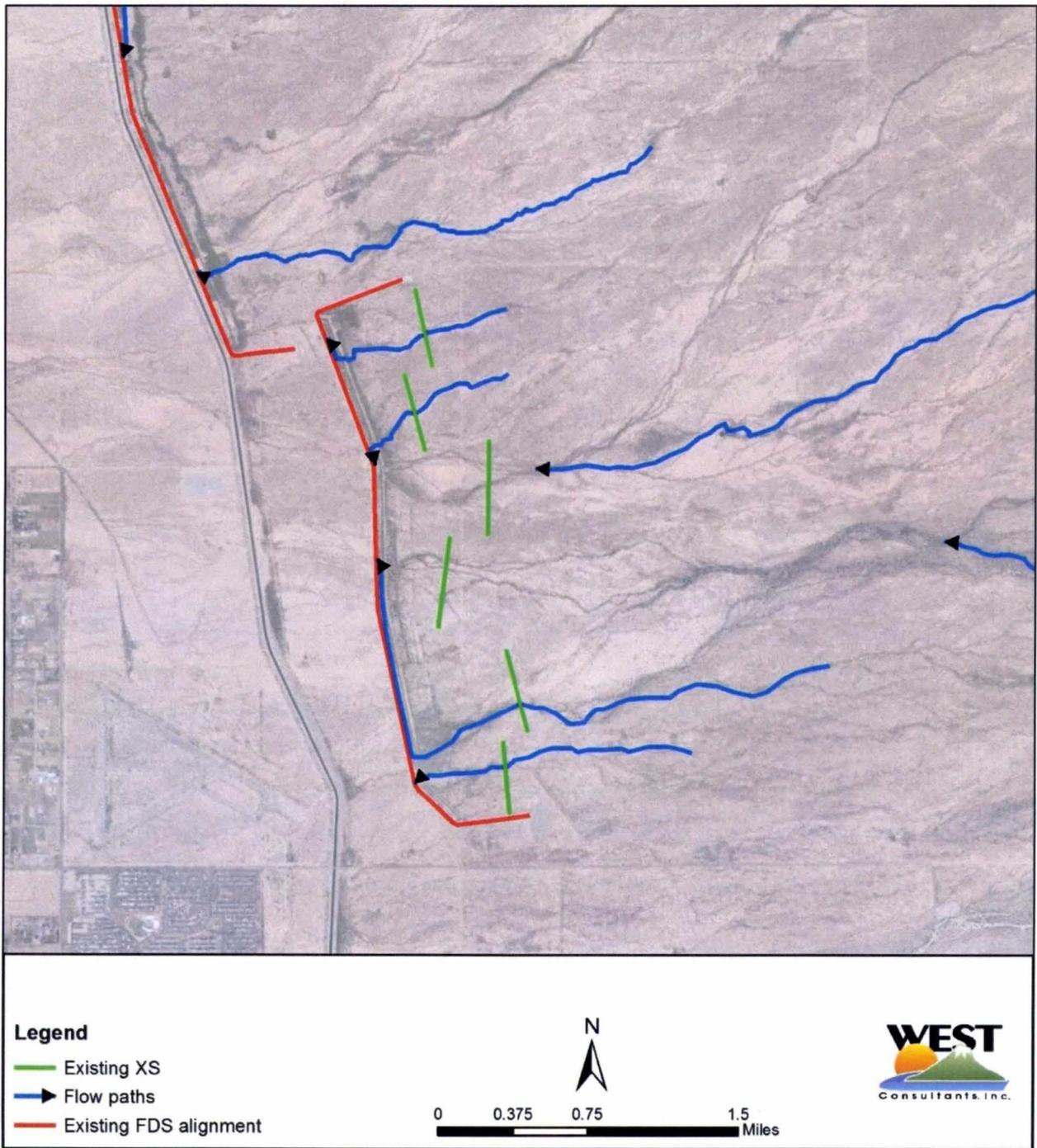
Due to the proposed realignment of the Powerline channel to the east, the cross sections used to estimate hydraulic parameters for bedload sediment yield estimates from the previous studies are now downstream of the proposed channel alignment. As such, these cross section need to be relocated for the study herein. Figure 3 displays the subbasins for the existing Powerline watershed. The existing alignment of the Powerline FRS and the proposed alignment of the Powerline Channel are also displayed in the figure. Figure 4 displays the bedload sediment yield estimate cross section locations used by the District in their 2014 sediment yield study (titled *Sediment Yield Analysis Update for Powerline, Vineyard, and Rittenhouse Flood Retarding Structures*). Note that in the District's 2014 report, cross section #6 was used in the final analysis, but cross sections #3, #4, and #5 were considered (and eventually discarded). Cross section #6 represents the combined flow from cross sections #3, #4, and #5.

For the Powerline cross sections, because cross sections #1 and #6 are downstream of the proposed structure, new cross section locations (also displayed in Figure 4) are required for bedload sediment yield estimates along these two flow path alignments. Because updated topographic data is available and the Powerline Channel alignment is further east than the original Powerline FRS alignment, all cross section locations (including #2, #3, #4, and #5) were considered and modified.

To relocate cross sections for the Powerline watershed, WEST considered multiple cross section locations along each flow path alignment (see Figure 4) and selected a single cross section that best represented the channel geometry and best contained flow along each of the five flow path alignments. The final selected cross sections were cut from the most recent topographic data provided by the District. To define flows for normal depth calculations, hydrologic data from District's 2014 report were used (because updated hydrology to be completed in Work Assignment #2 is not currently available). Figure 5 through Figure 9 show plots of the selected cross sections.



**Figure 1. Existing cross section locations for Vineyard Road FRS.**



**Figure 2. Existing cross section locations for Rittenhouse FRS.**

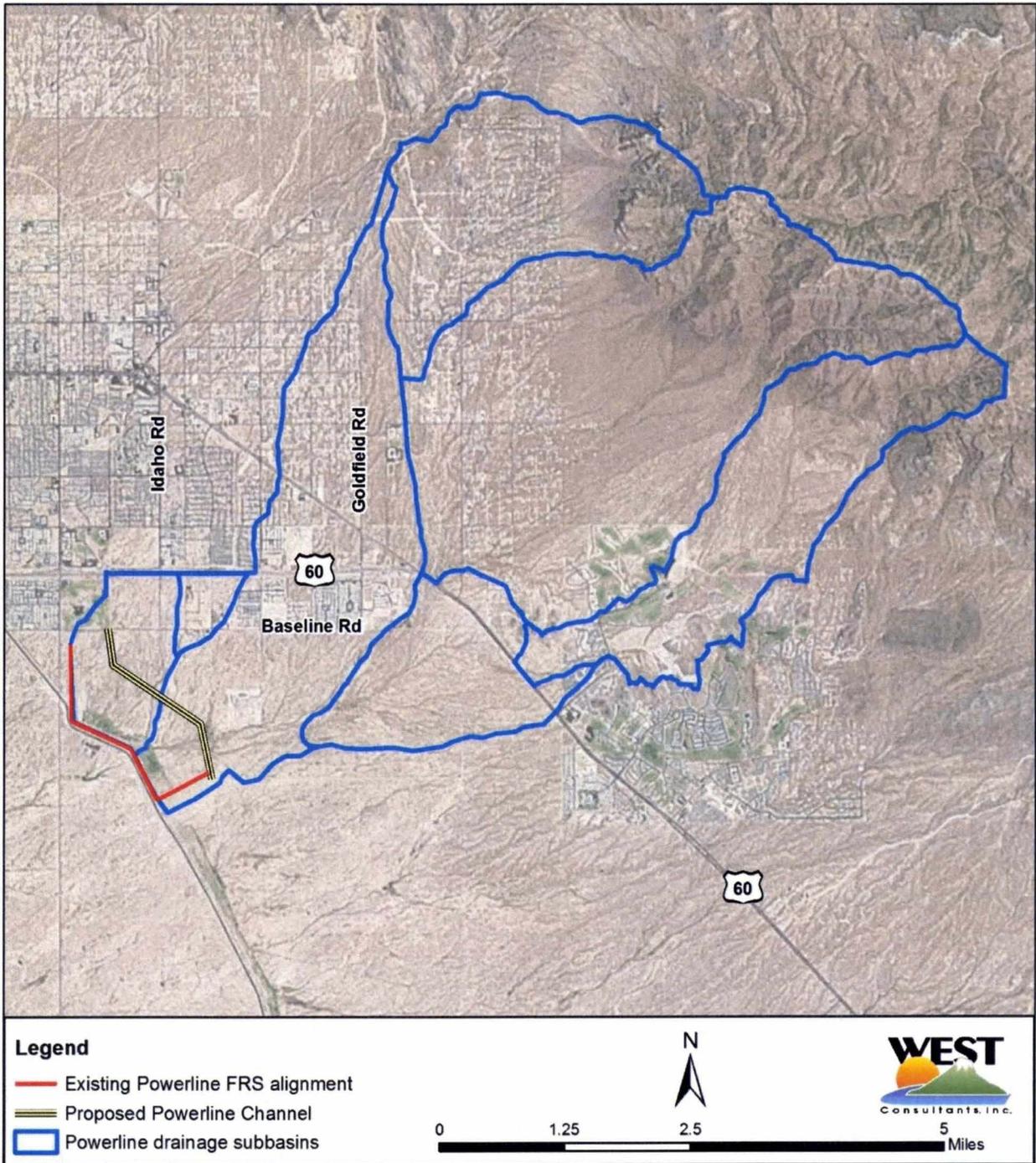
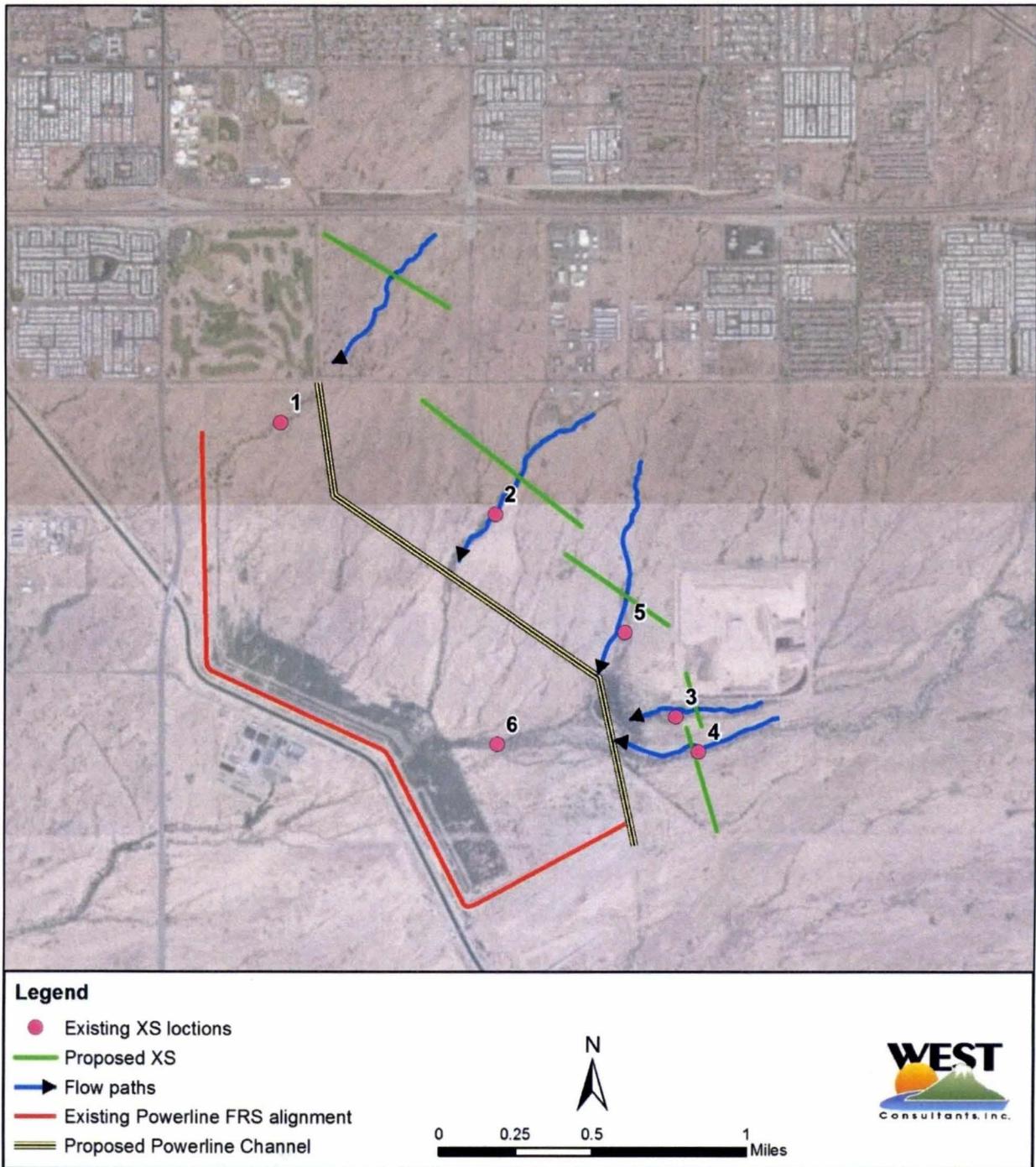


Figure 3. Subbasins draining to Powerline Channel.



**Figure 4. Existing and proposed cross section locations for Powerline Channel.**

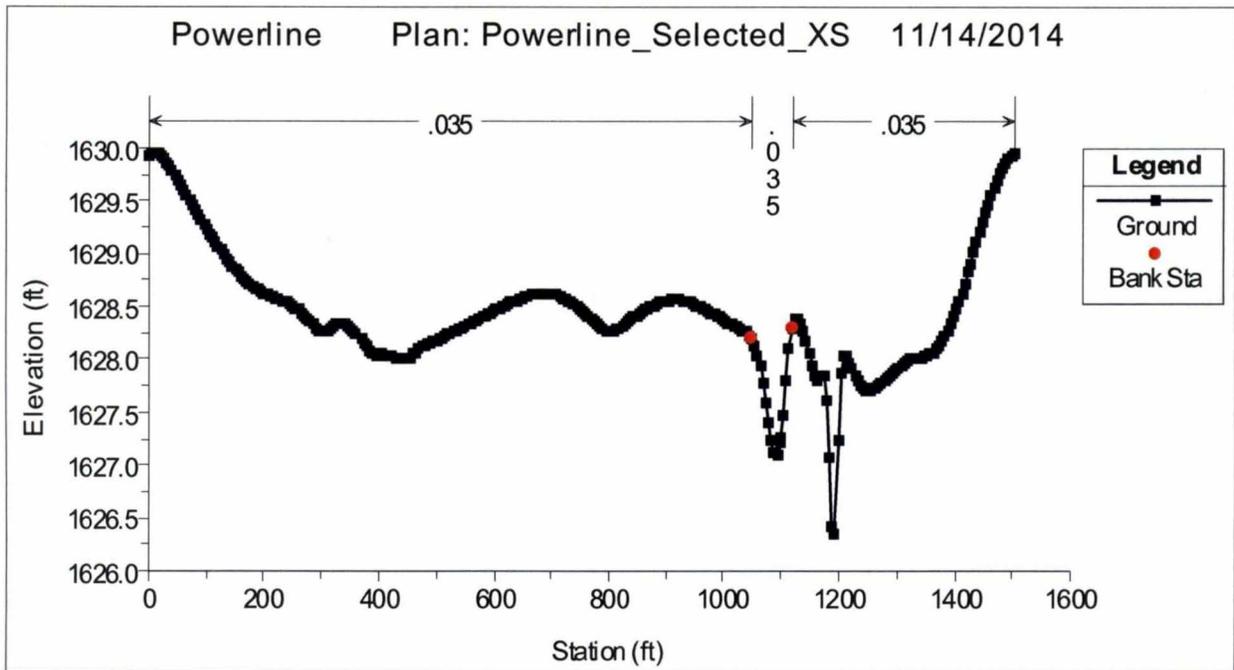


Figure 5. Selected Cross Section at Location #1 for the Powerline Channel.

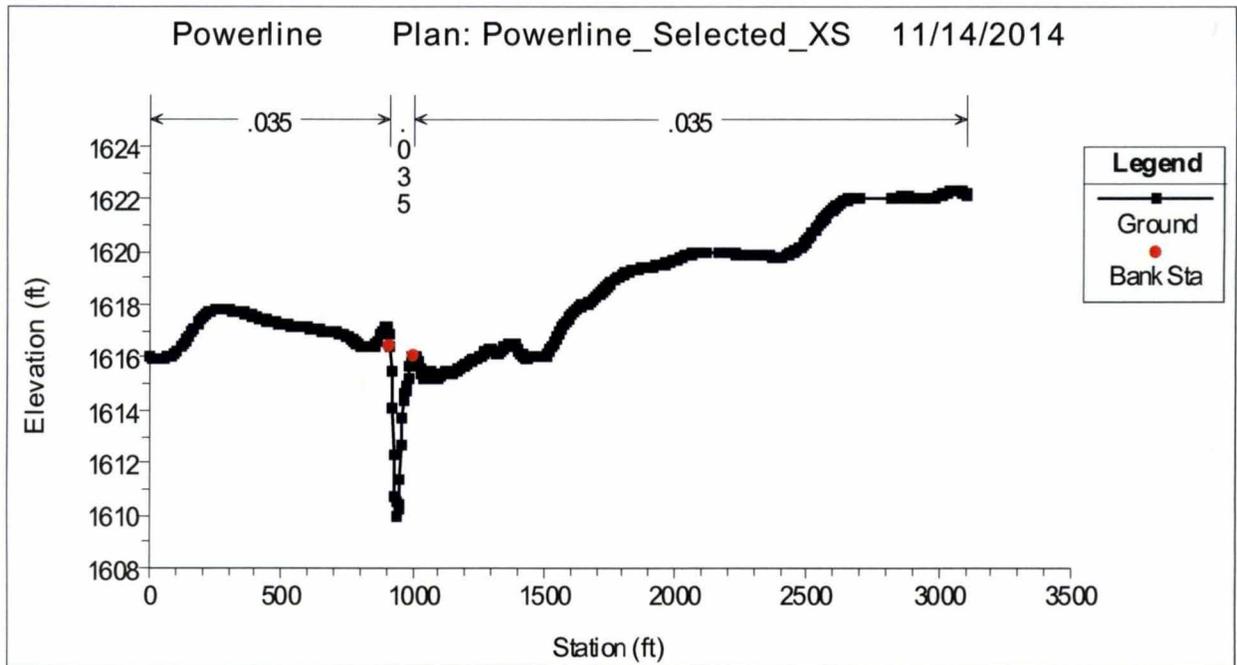


Figure 6. Selected Cross Section at Location #2 for the Powerline Channel.

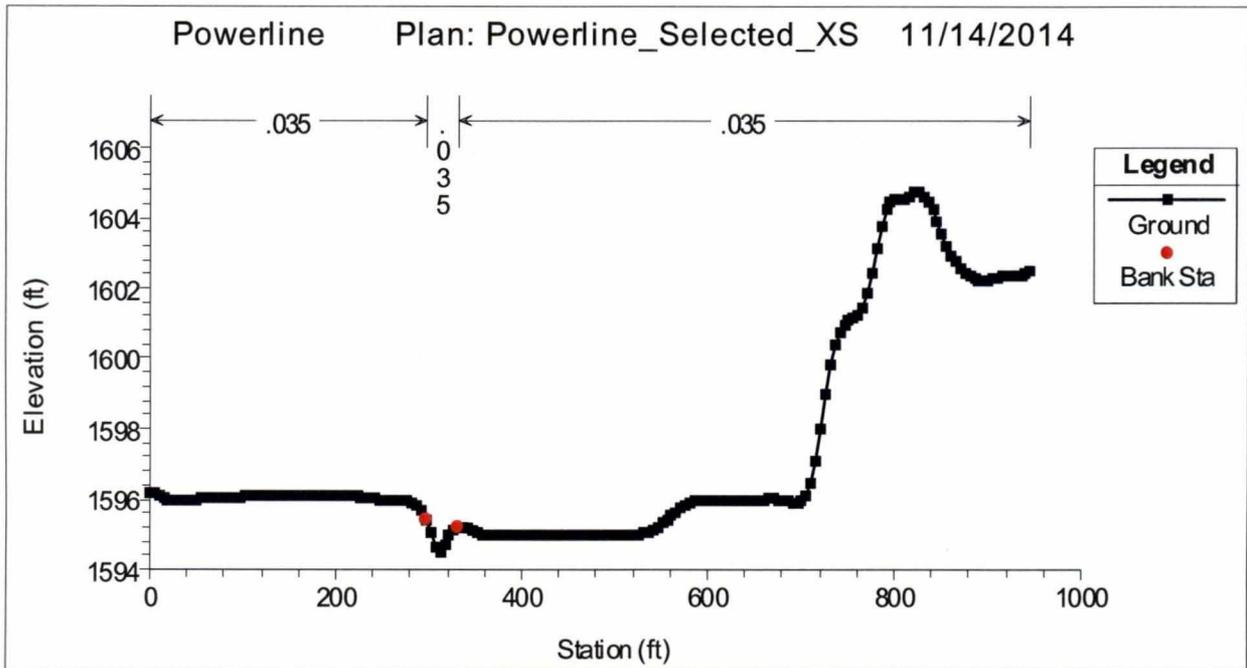


Figure 7. Selected Cross Section at Location #3 for the Powerline Channel.

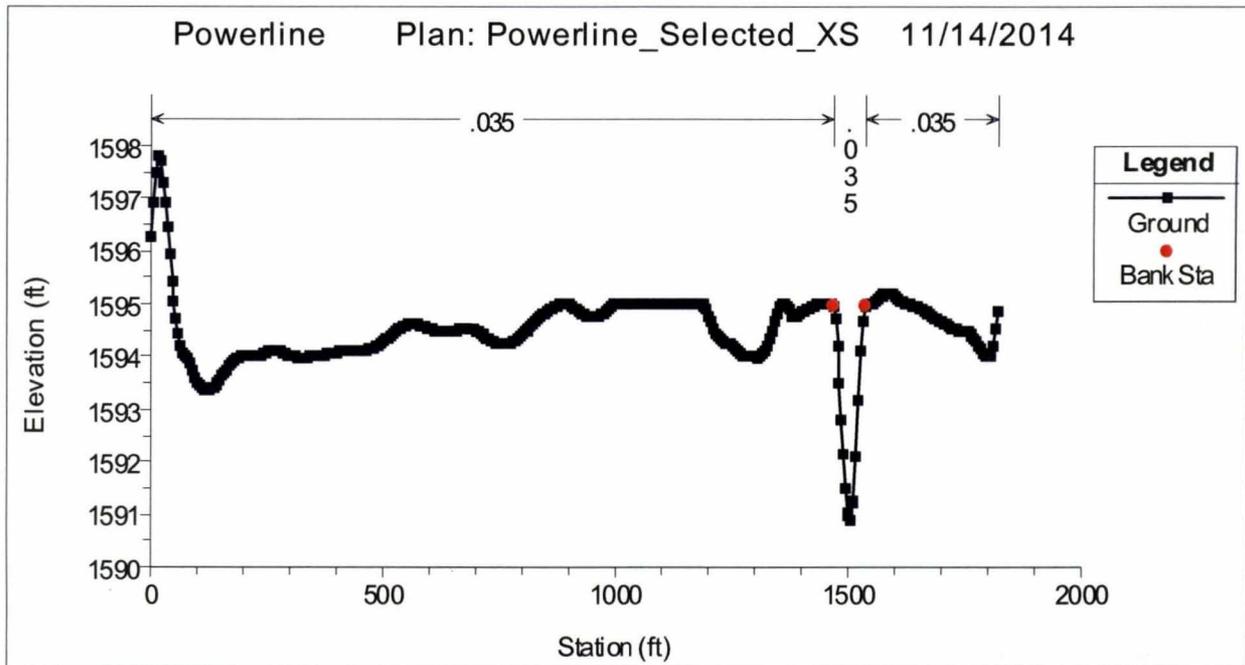


Figure 8. Selected Cross Section at Location #4 for the Powerline Channel.

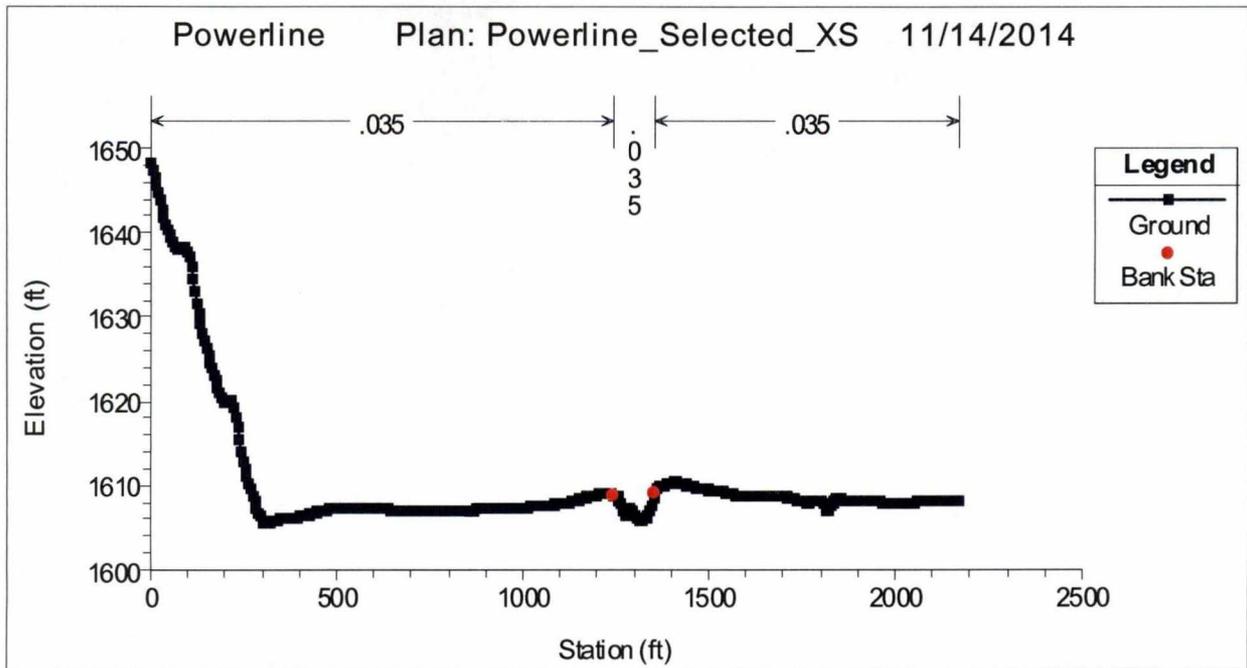


Figure 9. Selected Cross Section at Location #5 for the Powerline Channel.