Philip Williams and Associates, Ltd., "Memorandum Regarding Channel Geomorphic Assessment of Potrero Canyon" (June 12, 2007; 2007e)

PWA
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M E M O R A N D U M

Date:	June 12, 2007
To:	Matt Carpenter and Corey Harpole
Organization:	Newhall Land and Farming Company
From:	Andrew Collison
PWA Project #:	1820.02
PWA Project Name:	Newhall Ranch
Subject:	Channel geomorphic assessment of Potrero Canyon
Copy(ies) To:	Lisa Austin, File

Purpose of Investigation

PWA conducted reconnaissance-level geomorphic assessments and collected sediment samples from the beds and banks of Potrero Canyon near Valencia, CA, to support sediment transport modeling, geomorphic and channel design activities.

Data Collection

Fieldwork was carried out between February 7th and 9th 2006 with repeat visits to selected sites in summer of 2006. The channel was walked for its entire length within the Newhall Ranch project area. A total of 24 sediment samples were taken from the channel bed. Sediment samples were collected approximately every 1000 feet along the channels. Sites were selected by pre-programming GPS coordinates along the streambed at fixed intervals and then identifying geomorphically-typical reaches close to the site. At each sampling point the nearest mid–channel or point bar was selected and a sample taken from a position one third from the upstream edge of the bar, in accordance with sediment sampling protocols outlined by Reid and Dunne (1996) and Thomas and Gee (2005). Sediment taken from this location is believed to be representative of average-sized sediment that is in transport through the system. Samples were collected by digging a 6 inch pit in the bed and transferring the entire sample to a polythene bag. Bank samples were taken from actively eroding banks where they appeared to be the main source of sediment in the channel. Typically in all creeks studied the bed samples had a thin veneer of gravel but were dominated by sand beneath that. Samples were transferred to Cooper Testing Laboratory for particle size distribution. Most samples were clearly non-cohesive and were analyzed by wet sieving. A few appeared to be cohesive and were sampled using the hydrometer method to differentiate silt and clay from coarser sediment.

The sample locations and particle size distribution curves are shown in the attached figure, with typical sediment sizes and channel geomorphic assessment for context. A reconnaissance-level geomorphic assessment was conducted, primarily focused on the degree of channel incision (disconnection between the bankfull channel and floodplain). This was assessed by running a HEC-RAS model with the 5-year flow (model and data supplied by PACE) to determine the extent to which the 5-year flow was confined in a well defined bankfull channel or not. This was based on the observation of SCCWRP (Coleman et. al. 2005) that stable channels in this area contain the 5-year flow. Where the 5-year flow did not fill what appeared to be the bankfull channel and qualitative geomorphic evidence supported the assessment the channel was classified as incised or widening. Figures from the reconnaissance are attached to this memo.

Summary of Sediment Characteristics

18 samples were classified as sand with 3 silt and 3 gravel.

Summary of Geomorphic Assessment

Potrero Canyon has steep headwaters with incised, erosive channels (Image #1) that deliver a lot of coarse sediment to a downstream braided reach (Images #2-7). The downstream reach is relatively stable with areas of slight incision some of slight aggradation (Images #8-10). There is a short reach where the channel is confined against the valley side and is deeply incised with highly unstable banks (Image #11). The channel then become more stable, though again with some fluctuations between slightly erosive and slightly aggradational sub reaches (Images #12, 23, 22). The channel then has a long and unusual reach of alkaline meadow much of which takes the form of a swale rather than a channel (Images 20, 19, 18). Towards the downstream end the channel becomes increasingly well defined, culminating in an unstable knickpoint that is migrating headwards. The channel transitions sharply into a steep, incised section with several knickpoints (Image #17c) before emptying into the Santa Clara River.

References

Coleman, D., MacRae, C. and Stein, E.D., 2005, Effect of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams.

Reid, L. M. and T. Dunne, 1996. Rapid Evaluation of Sediment Budgets. GeoEcology Paperback. Catena Verlag Gmbh. 164 p.

Thomas, William, and Gee, D. M. 2005. Sedimentation in Stream Networks (HEC-6T) – Supplement to the User Manual. 36 p.

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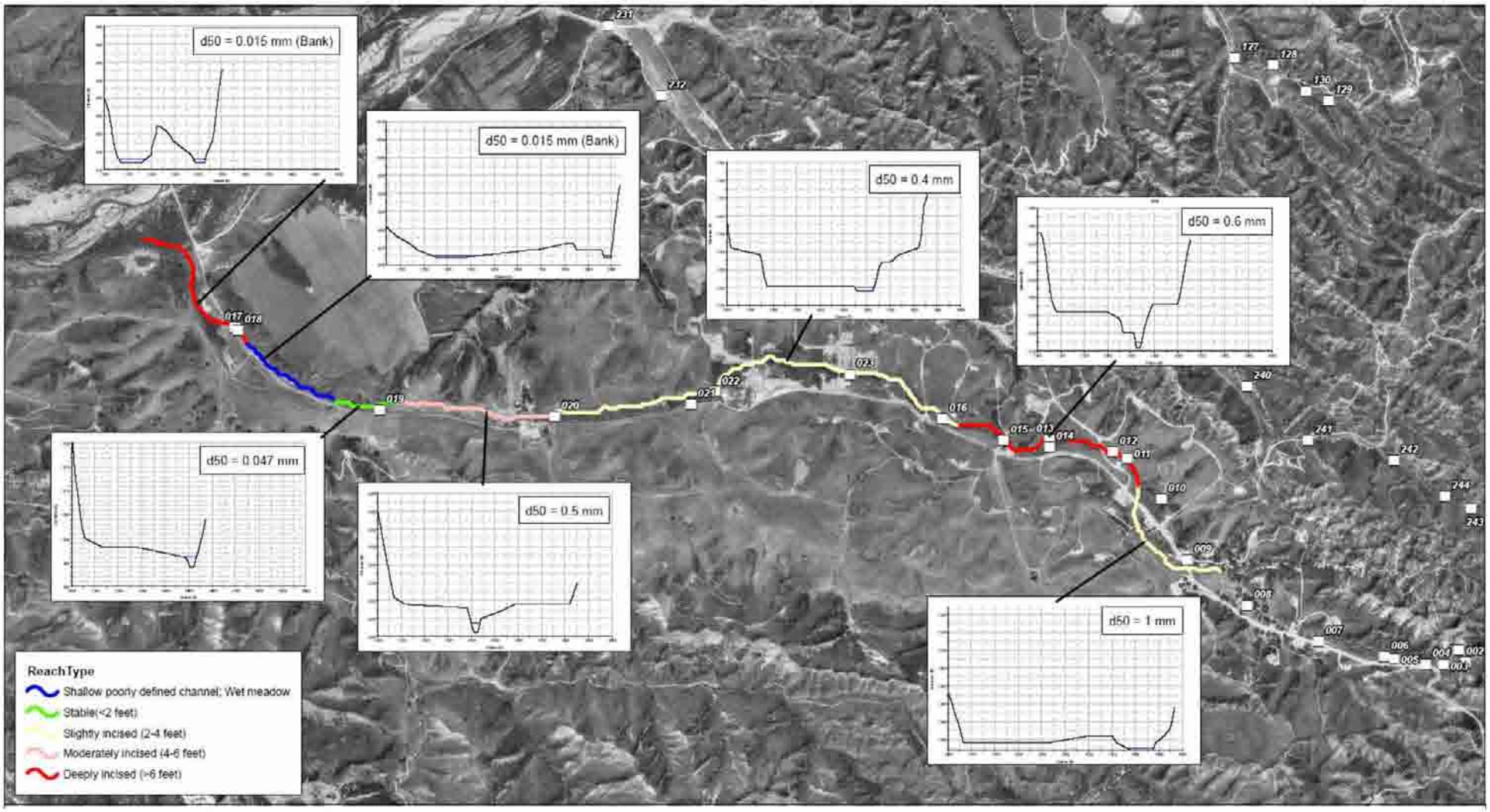
Potrero Canyon

Geomorphic Reconnaissance

Reach distribution (Note: project does not include photopoints Potrero#1-8)



Steep, incised headwaters channel

Potrero #1


Steep braided headwaters channel
Potrero #3


Steep braided headwaters channel
Potrero #4a


Steep braided headwaters channel
Potrero #5


Steep braided headwaters channel
Potrero #6a


Steep braided headwaters channel
Potrero #7


Relatively stable channel
Potrero #8b


Stable-slightly aggradational channel
Potrero #9


Stable-slightly aggradational channel
Potrero #10


Deeply incised channel
Potrero #11

Stable channel

Potrero #12-14


Stable-slightly
incised channel
Potrero #23


Stable-slightly aggradational channel
Potrero #22


Mesic meadow
stable swale
Potrero #20


Mesic meadow
stable channel
Potrero #19


Mesic meadow currently stable swale (unstable migrating knickpoint in foreground)
Potrero #18c

Steep, unstable reach
with knickpoints

Potrero #17c