

THE RANCH PLAN PLANNED COMMUNITY
PLANNING AREAS 3 AND 4 RUNOFF MANAGEMENT PLAN

Michael Baker
INTERNATIONAL

TECHNICAL APPENDIX O.2

**RMV PA-3&4 Local Hydrology Analysis – Land use
Designation and Hillslope Areas**

TECHNICAL MEMORANDUM

To: Robert McLean, PE

JN 152623

From: Rebecca Kinney, PE

Date: February 15, 2017

Subject: Rancho Mission Viejo Planning Area 3 and 4 Local Hydrology Analysis – Land use designation of hillslope areas

Michael Baker International received the comment response to the January 19, 2017 memo “PA-3 and 4 ROMP Submittal 1 Review Meeting – Follow Up Recommendations.” Reviewer comments on the memo recommended that the PA-3 and 4 ROMP follow the approach used in the PA-2 ROMP by changing hillslope land use from an “open brush fair” designation to that of the adjacent pads. The hillslope areas were originally designated “open brush fair” because that cover type has higher curve numbers than the “residential or commercial landscaping” cover, resulting in higher runoff. While the actual cover may look more similar to the residential or commercial landscaping, the steeper slopes would result in a higher runoff than a typical urban landscape area. Table 1 shows the curve numbers for open brush and residential/commercial landscaping.

Table 1 – Land Use Curve Number

Cover Type	Curve Number – Soil Group			
	A	B	C	D
Residential or Commercial Landscaping	32	56	69	75
Open Brush Fair	46	66	77	83

Taken from The County of Orange Hydrology Manual Figure C-3

The first submittal of the PA-3 and 4 ROMP had 636 acres of open space (excluding parks) areas inside the PA-3 planning area boundary, so the change in land use could result in a significant change to detention and water quality facility sizing. Michael Baker performed additional hydrologic modeling to quantify the effects of this change in land use designation. Models considered a representative portion of Watershed A in PA-3 (Nodes 100-114, shown on attached Exhibit) for the smallest and largest storm events (2-yr expected value and 100-year high confidence). Model descriptions are shown below:

- Open brush:** Hillslopes were designated as open brush. Other land uses were not changed. This model was from the 1st submittal of the PA-3 and 4 ROMP. Hillslope areas were defined as:

- Slopes greater than 50-ft wide (25-ft high) along a road
- Slopes along a road starting at least 50-ft wide (25-ft high) and tapering to less than 50-ft wide
- Slopes greater than 50-ft wide (25-ft high) not adjacent to a road

2. **No open brush, adjacent land use:** Hillslopes were designated the land use of the adjacent pad. The land use of the pad was not changed.

3. **No open brush, adjacent land use and adjusted imperviousness:** Hillslopes were designated the land use of the adjacent pad. The land use of the pad and hillslope were changed to maintain approximately the same area-weighted impervious percentage.

4. **Hillslopes as 10 percent impervious land use:** Following the approach used by Hunsaker & Associates for the PA-2 detailed hydrology study for Cow Camp Road, hillslopes were designated a 10% impervious land use, 0.4 dwellings/acre.

Table 2 shows the results of the land use comparison.

Table 2. Hydrology Modeling Land Use Comparison at Node 114

Model	Area (ac)	100-YR HC			2-YR EV			Water Quality Volume				
		Q node 114 (cfs)	tc node 114 (min)	100-yr Vol (ac-ft)	Q node 114 (cfs)	tc node 114 (min)	2-yr Vol (ac-ft)	Pervious fraction at node 114	% imp	C	Water quality 85% depth (in)	DCV (ac-ft)
Open Brush	230.8	676.94	13.48	84.80	80.51	17.78	10.33	0.60	0.40	0.45	0.90	7.79
Adjacent land use	230.8	682.57	13.48	85.32	94.51	17.63	12.17	0.49	0.51	0.53	0.90	9.22
Adjacent land use - adjusted impervious	230.8	679.01	13.47	83.83	85.40	17.74	10.71	0.56	0.44	0.48	0.90	8.31
10% impervious	230.8	678.00	13.48	83.42	83.03	17.75	10.34	0.58	0.42	0.47	0.90	8.05

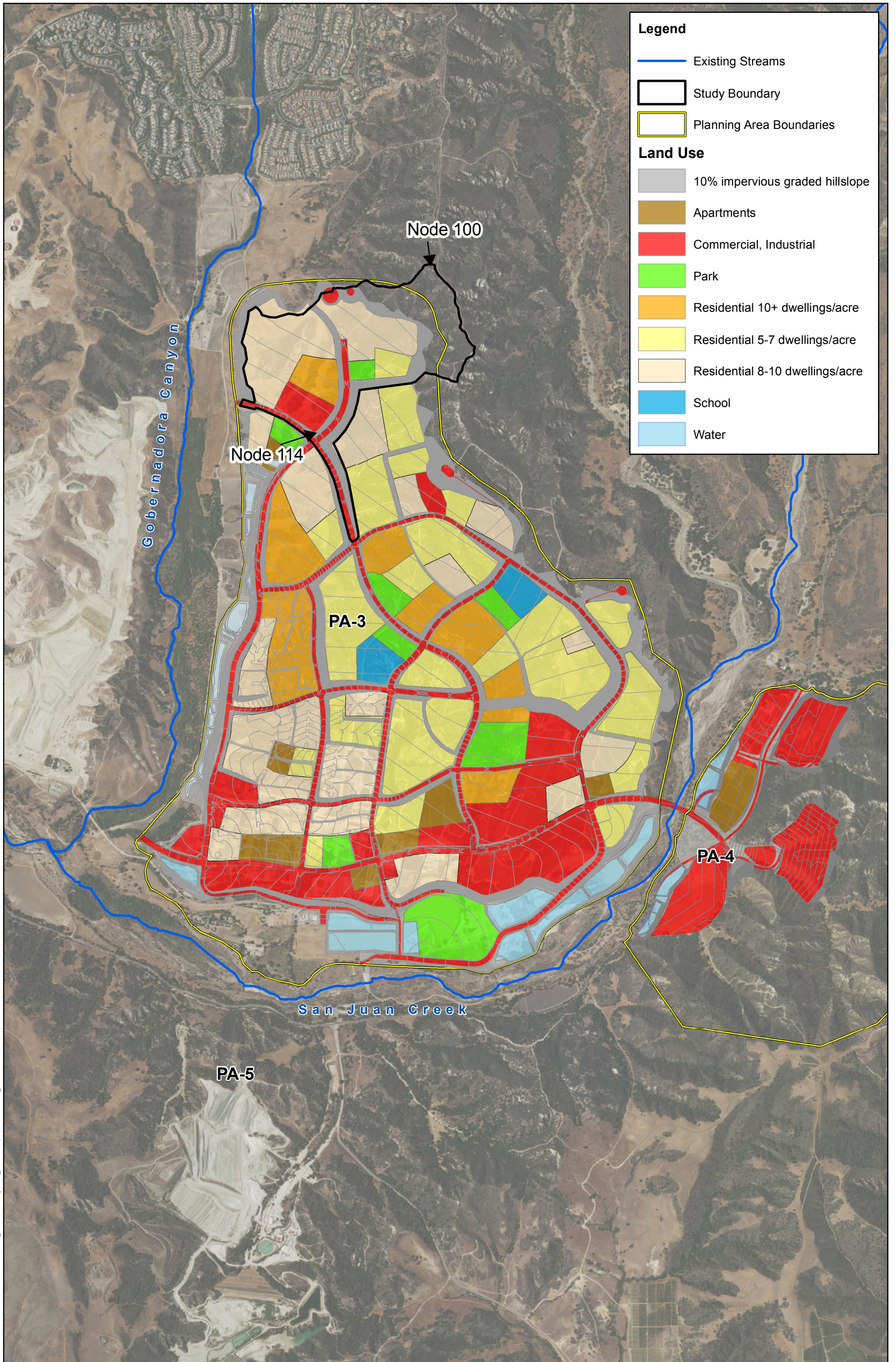
As shown in Table 1, there is a negligible difference in flow between all models except for the adjacent land use model. The 2-yr EV volume from the adjacent land use model is 14% higher than the next highest volume (adjacent land use, adjusted impervious). The DCV for the adjacent land use model was 11% higher than the next highest volume (adjacent land use, adjusted impervious).

Due to the significant increase in volume produced by the change from open brush designation to the land use of the adjacent pad, Michael Baker does not recommend the adjacent land use method. The adjacent land use, adjusted impervious model is not recommended because it does not accurately represent the imperviousness of the tract developments, which could lead to undersized on-tract storm drain facilities in the future design. Michael Baker proposes utilizing a 10% impervious land use for graded hillslope areas. The 10% impervious land use is consistent with the approach used by Hunsaker & Associates for the PA-2 detailed hydrology study for Cow Camp Road. In addition, slopes greater than 60-ft wide (30-ft high) are required to include a concrete terrace drain for drainage,

which is accounted for in the 10% imperviousness. Proposed land uses have been updated and are shown on the attached exhibit. Proposed criteria for hillslope land within the PA-3 planning area boundary use are summarized below:

Table 3. Proposed Hillslope Land Use for PA-3

Criteria	Hydrologic Land Use	Area (ac)
Slopes outside of grading boundary	Existing condition land use	201.9
Slopes greater than 60-ft wide (30-ft high), and slopes tapering down from 60-ft wide	10% impervious (0.4 DU/ac)	320.4
Slopes less than 60-ft wide (30-ft high) at all points	Land use of adjacent pad	18.3



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