

Memorandum

To: Michelle Wind, Brown and Caldwell
CC: Mark Richards, Brown and Caldwell
From: William P. Ruzzo, P.E.
Date: January 12, 2007
Re: CCBWQA Watershed Model – Reservoir Direct Flow Areas

In preparation of the watershed model, the WQCD recommended that the Authority improve the accounting of flows and phosphorus loads entering the Reservoir from various components. One of the components identified were the Reservoir direct flow areas (DFA), which are defined as tributary sub-basins that are not monitored for flow and phosphorus loads. A map of the DFA boundaries and names is attached to this memorandum and listed in the table below.

The purpose of this memorandum is to provide DFA information required for the watershed model such that DFA flows and loads can be calculated in the model using the approved algorithms for surface runoff. This information includes the sub-basin areas and percent imperviousness, which are provided on the attached map. This information should be included in the watershed model as a direct input to the Reservoir, as hydraulic routing is not required.

Analysis

To identify the boundaries of the DFA, the following information was used:

- UDFCD December 1990. *Drainage Basin Description Maps*. These maps provided the boundaries between major drainageways, such as between Goldsmith Gulch and DFA to the Reservoir along the west side.
- Greenhorne & O'Mara, Inc. 1989. *Stream Stabilization and Major Crossing Planning Piney Creek & Tributaries*. This report provided the boundary for Piney Creek.
- Boyle Engineering Corporation 1985. *Outfall Systems Planning Quincy Drainage & Shop Creek*. This report provided the boundary for Quincy Drain and Shop Creek.

- USGS Topographic Maps. All remaining boundaries were determined using USGS Quadrangle Topographic Maps.

Areas were calculated by using the USGS topographic base, which were scaled up, and a CAD program. To identify land use, GoogleEarth™ was used. Land use imperviousness values were estimated based on the following:

- Residential = 48%, based on previous memorandum on land use¹.
- Open Space = 5% (ibid)
- High Density Residential = 80% based on UDFCD², Table RO-3 for apartments
- Commercial = 85%, based on UDFCD Table RO-3 for neighborhood business

The resulting DFA, their watershed areas and imperviousness values are provided in the table below:

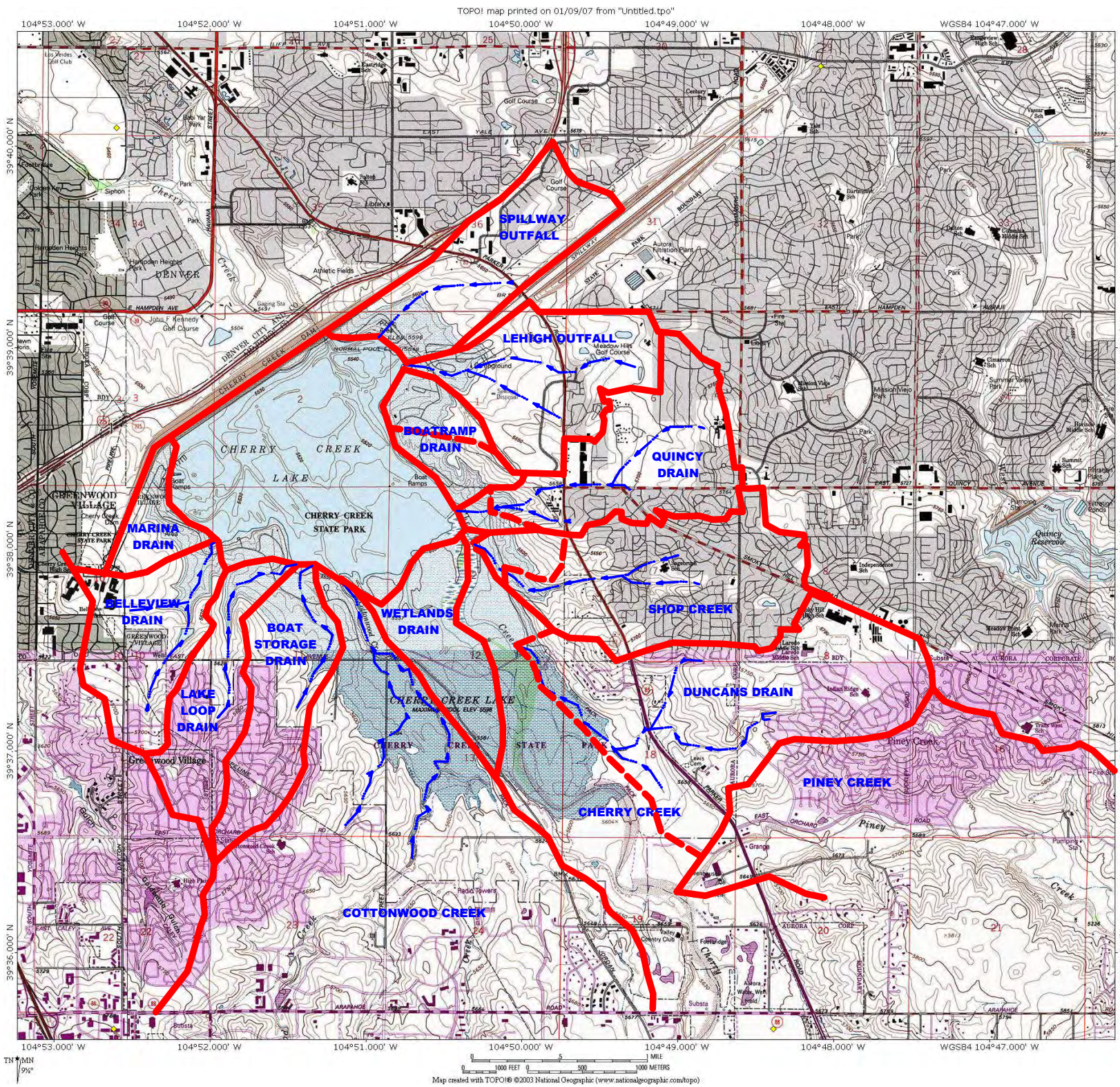
Basin Name	Area (acres)	Land Use				Basin Imperviousness (%)
		Residential	High Density Residential	Commercial	Open Space	
(imperviousness)		48	80	85	5	(%)
Spillway Outfall	476	0	93	50	333	28
Lehigh Outfall	512	0	60	7	445	15
BoatRamp Drain	205	0	0	0	205	5
Quincy Drain	570	0	157	80	333	37
Wetlands Drain	300	0	0	0	300	5
Boat Storage Drain	396	190	0	0	206	26
Lake Loop Drain	335	215	0	0	120	33
Belleview Drain	400	200	0	55	145	38
Marina Drain	130	0	0	13	117	13
Total (acres)	3324	605	310	205	2204	25
Total (sq. miles)	5.2					

It is also noted that loads for Belleview Drain and Quincy Drain were previously monitored and reported in the Authority's annual monitoring report, which have been discontinued. Since both of these watersheds have detention ponds before discharging to the Reservoir, the modeling subcommittee should determine if and how these watersheds are included in the watershed model.

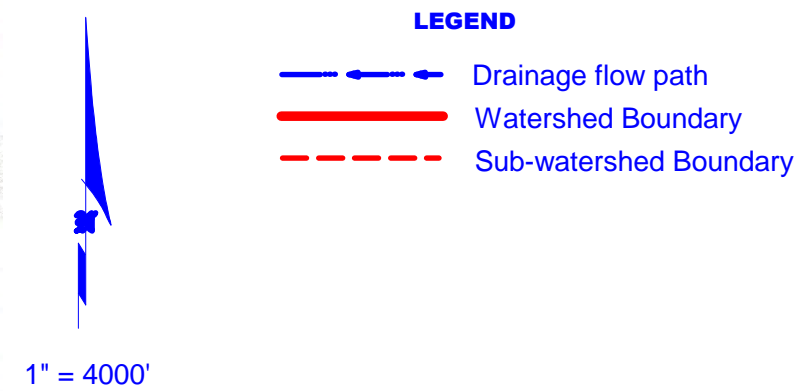
Attachment: Figure "Delineation of Direct Flow Areas".

¹ William P. Ruzzo, PE, LLC, November 15, 2005. *Land Use and Imperviousness Values - Revision*

² UDFCD June 2001. *Urban Storm Drainage Criteria Manual, Volume 1*. Table RO 3 for apartments



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