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BEFORE THE

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

HEARING IN THE MATTER OF CALIFORNIA DEPARTMENT OF WATER RESOURCES AND UNITED STATES BUREAU OF RECLAMATION REQUEST FOR A CHANGE IN POINT OF DIVERSION FOR CALIFORNIA WATERFIX	TESTIMONY OF PANOS KOKKAS

I, Panos Kokkas, do hereby declare as follows:

I. INTRODUCTION

My name is Panos Kokkas. I am employed by the County of Yolo ("County") as the County Engineer, Road Commissioner, and the Director of Public Works, a division of the Department of Community Services. I have held this position continuously since 2007. I received a bachelor's degree in civil engineering from Montana State University in 1984, and a master's degree in business administration from St. Mary's College of California in 1992. I am a registered Civil Engineer in the State of California. A copy of my curriculum vitae is submitted herewith as Exhibit YOLO-2.

I have over 33 years of experience in matters relating to the design, construction, and maintenance of public roads and other infrastructure. My current duties include developing and implementing a wide range of projects relating to the County's public works, as well as managing the Public Works Division and its 48 employees. The Public Works Division provides engineering, inspection, maintenance, permitting and administrative services required to maintain and improve the County road network. The network includes 757 miles of public roads and 147 bridges, along with roadside ditches, culverts, signs, guardrails, and other appurtenances. For that reason, road issues are central to my day-to-day work as well as the long-range planning efforts of the Division.

My testimony is submitted to provide information and opinions on transportation impacts within Yolo County arising from WaterFix construction. The opinions provided herein are based on my professional experience and judgment, as well as my personal familiarity with the road segments described below, including but not limited to my expertise in County road operations and maintenance. Publicly-available WaterFix documents are relied on and cited extensively in my testimony. Those documents include the Final Recirculated Draft Environmental Impact Report/Environmental Impact Statement for the California WaterFix (the "Final EIR/EIS"), the Mitigation Monitoring and Reporting Program (the "MMRP") adopted by the California Department of Water Resources ("DWR"), and other documents cited herein.

II. OVERVIEW OF TESTIMONY

As explained in further detail below, WaterFix environmental review documents demonstrate that project construction would vastly increase traffic volumes on Clarksburg-area roads, making them the most heavily-used roads maintained by the County (see Exhibit YOLO-3 for comparative data on existing use levels of many County roads, including those discussed herein). Increased traffic on these rural roads, in turn, will cause significant delays and inconvenience, substantially increase safety risks, and rapidly accelerate pavement deterioration and failure.

The Final EIR/EIS acknowledged these potential impacts and proposed mitigation measures that DWR accepted in approving the WaterFix. These measures, however, are simply insufficient to make Clarksburg-area roads a safe or practical option for WaterFix construction traffic. There are many reasons for this, as I explain below. Aside from the inconvenience and safety issues that I will describe, the most fundamental problem is that extensive portions of the roads at issue are already in poor condition and would quickly become unusable under increased heavy truck and vehicle traffic. Unless reconstructed prior to the start of WaterFix construction and repaired regularly thereafter, Clarksburg-area roads would not be able accommodate construction traffic or even convey existing low traffic volumes.

My testimony is submitted to address these and other important realities of project construction. Specifically, my testimony covers the following issues:

Section III The setting, features, and current use and condition of Clarksburg-area road segments that would be affected by construction of the California WaterFix

Section IV A summary of general principles relating to the analysis of traffic impacts

Section V The principal transportation impacts of WaterFix construction traffic on affected road segments within Yolo County

Section VI Whether measures included in the adopted MMRP would effectively address impacts of construction traffic on affected road segments to the degree necessary to make them safe and reliable for such traffic

My testimony concludes with a summary of my conclusions and recommendations.

III. SETTING, FEATURES, AND CURRENT CONDITION OF AFFECTED ROAD SEGMENTS

For ease of reference, Exhibit YOLO-4 (PowerPoint Slide 3) includes a graphic from the Final EIR/EIS (Exhibit SWRCB-102, Figure 19-2a) depicting affected road segments within Yolo County, denominated thereon as CT 33, YOL 01, YOL 02, and YOL 03.[1] A County table of the pavement condition index ("PCI") rating for each of the three Yolo County road segments studied in the Final EIR/EIS (i.e., all but CT 33, maintained by Caltrans) is also included in Exhibit YOLO-4 (PowerPoint Slide 5).

I am familiar with each of these road segments and their current use and condition, as well as related matters. Briefly, each segment has the following characteristics:

A. CT 33.

This segment includes State Route 84, a state highway maintained by the California Department of Transportation ("Caltrans"), from the city limits of West Sacramento (within which it becomes Jefferson Boulevard) to its junction at the south with Courtland Road (YOL 03). The Yolo County General Plan designates State Route 84 as a trucking route for agricultural commodity transport (i.e., "farm-to-market") as well as other goods movement (Exhibit YOLO-5, General Plan at Figure CI-5 and Policy CI-3.10).[2] The General Plan also identifies State Route 84 as a primary route for emergency evacuation (Policy CI-1.10).

[1] Segment CT 34 is also located partly within Yolo County, and includes Courtland Road west of its junction with State Route 84 as well as a small portion of Ryer Avenue. The RDEIR does not indicate this segment will receive significant traffic. For that reason, it is not discussed herein aside from a general observation that all of the agricultural vehicle movement and pavement deficiency concerns described herein apply equally to Segment CT 34.

[2] A small portion of Jefferson Boulevard lying just within the city limits of West Sacramento (near its intersection with Southport Parkway) has a three-ton weight restriction, precluding heavy truck traffic from operating legally at that location.

Within Yolo County, State Route 84 is a two-lane highway approximately 16 miles in length and, for part of that distance, is situated atop a levee for the Sacramento River Deep Water Ship Channel. Moving south from West Sacramento, the road turns sharply when it ascends the levee and again when it descends the levee about 2.5 miles later. Vehicles must slow to safely negotiate each turn. Mainly for this alignment challenge, Caltrans will not designate State Route 84 as a STAA (Surface Transportation Assistance Act of 1982) Route for truck transportation. As State Route 84 continues south, it passes numerous small farms and agricultural facilities such as Wilson Vineyards and the Bogle Production Facility. It also passes Clarksburg Road, which extends east from State Route 84 into the town of Clarksburg, and numerous driveways and County roads such as Willow Point Road, Central Avenue, and Netherlands Road.

Some representative pictures of this road segment[3] are as follows:

Location 1: Near Wilson Vineyards

Location 2: Near Reamer Farms, south of Location 1

[3] All pictures included in this Section III are "street view" images from Google maps. Pictures of State Route 84 are indicated to have been taken in August 2014.

Location 3: Near the Bogle Production Facility (at left), south of Location 2

Location 4: Vineyards, south of Location 3

The physical characteristics of this State Route 84 segment vary, but it is generally narrow and has limited shoulder space without clear recovery zones. Its two vehicle lanes have widths that vary from about 11 feet to 12 feet, with unimproved shoulders that range from minimal or non-existent to about 1 foot in width. On the valley floor, trees and drainage ditches—many of which are below sea level, and often hold water due to the high local groundwater table—are common features along the shoulders. Pavement conditions vary and range from very good (south of the levee to Clarksburg Road) to poor (everywhere else), with areas that are cracked, subsided, or otherwise in need of significant repairs or reconstruction.[4] This is particularly true for portions of the road located on the Deep Water Ship Channel Levee, which is in very poor condition with regular slopeside (eastern lane) pavement failures (see Exhibit YOLO-4 (PowerPoint Slide 5)), as

[4] The Final EIR/EIS includes a summary of conditions, likely provided by Caltrans, that is mostly consistent with this description (SWRCB Exhibit 102 (Final EIR/EIS, Ch. 19 at p. 19-19)). The Final EIR/EIS description does not appear to account for repair work south of the levee that was performed within the last 2-3 years. My understanding is that this Caltrans work consisted of asphalt recycled in place, however, and it will likely deteriorate rapidly.

well as the entire section south of the Clarksburg Road intersection. Overall, it is a typical rural road and it is not designed or maintained to accommodate a high volume of traffic.

The current use of the road is relatively limited—the Final EIR/EIS indicates hourly traffic volumes range from 40-169 vehicles/hour, that it operates at a level of service ("LOS") B, and that its LOS Threshold is 200 vehicles/hour.[5] The hourly traffic volume data comports with my understanding of current levels of use.

A wide variety of vehicles use the road, ranging from passenger cars to wide, slow-moving agricultural equipment and heavy truck traffic. The road plays an important role in providing access to farms and wineries and the unincorporated town of Clarksburg (via Clarksburg Road), the movement of agricultural equipment between fields, trucking agricultural commodities to processing facilities and markets, and emergency vehicle traffic. Indeed, it is the only significant north-south road segment in the Clarksburg area other than South River Road, a portion of which is separately described under the heading "YOL 01" below.

B. YOL 01.

WaterFix environmental review documents expressly assume that project construction will not contribute substantial vehicle trips to this road segment. This segment is nonetheless reviewed herein due to the potential for WaterFix construction traffic to utilize different routes within Yolo County due to traffic congestion, road repairs and reconstruction, or other conditions affecting segments CT 33, YOL 02 and 03.

This segment includes South River Road extending south in Yolo County from the western landing of the Freeport Bridge about 12 miles to a junction with Courtland Road (YOL 03). South River Road is situated on the crown of the west levee of the Sacramento River. It follows the meanders of the river, with frequent turns that limit vehicle speeds and require careful driving (particularly in low-visibility conditions). Its setting is rural and scenic, passing small farms and

[5] This LOS Threshold is established by Caltrans and, as indicated below, is lower than the LOS thresholds assigned to similar County roads in accordance with the current *Highway Capacity Manual*, a publication of the Transportation Research Board (cited in SWRCB Exhibit 102 (Final EIR/EIS, App. 19A). As indicated in Section IV, below, however, LOS thresholds are of limited value in the context of small rural roads.

vineyards, numerous residential driveways, intersections with other County roads, and providing constant views of the Sacramento River. The only concentrated urban development along this segment is the town of Clarksburg, which lies directly west of South River Road and across from the proposed site of the northernmost WaterFix intake (Intake 2).

Some representative pictures of this road segment[6] are as follows:

Location 1: A short distance south of the Freeport Bridge

Location 2: Near Miner's Leap Winery, south of Location 1

Location 3: Passing the town of Clarksburg, south of Location 2

[6] These Google Maps "street view" pictures are indicated as having been taken in 2014 and 2015.

This segment of South River Road has two lanes that vary in width from 11 feet to 12 feet, with mostly unimproved shoulders of approximately 0 to 2 feet that abruptly end where the levee crown meets its water- and land-side slopes. Shoulders north of Clarksburg are wider and graveled in some locations; south of Clarksburg, the road shoulders are generally narrow with minimal gravel. This segment is in generally good to poor condition (with a PCI ranging from 100 to 37, as shown on Exhibit YOLO-4 (PowerPoint Slide 5). Like other road segments described herein, it is a typical rural road intended to accommodate limited vehicle traffic.

Traffic volumes on South River Road are low—the Final EIR/EIS indicates hourly traffic volumes range from a peak of 250 vehicles/hour to less than 100 vehicles/hour, and this comports with my understanding. As with other road segments mentioned herein, a wide variety of vehicles use the road, ranging from passenger cars to wide, slow-moving agricultural equipment and heavy truck traffic. Agricultural equipment movement is frequent during the growing season (generally, March through early November). Together with State Route 84, the road plays an important role in providing access to farms and wineries and the unincorporated town of Clarksburg, moving agricultural commodities to processing facilities and markets, and emergency vehicle traffic.

C. YOL 02 and 03.

These road segments include short stretches of South River Road from Courtland Road to the Sutter Slough Bridge, a narrow steel truss bridge spanning Elk Slough at the Sacramento County line (YOL 02), and Courtland Road from State Route 84 to South River Road (YOL 03). The segments intersect at the junction of South River Road and Courtland Road. A short distance south of the junction is the Courtland (Paintersville) Bridge, a century-old, extremely narrow two-lane steel truss bridge crossing the Sacramento River. Each segment passes farms and other rural properties, including some with residences.

Representative pictures (one of each segment) are as follows[7]:

[7] These Google Maps "street view" pictures are indicated as having been taken in August 2014.

Location 1: South River Road near Solano County (YOL 02)

Location 2: Courtland Road at Elk Slough (YOL 03)

The physical features of each segment are nearly identical. The South River Road segment (YOL 02) has width and shoulder conditions consistent with those described above for portions of YOL 01 located south of Clarksburg. In general, however, the pavement condition is worse than for portions of South River Road north of Clarksburg, with a PCI of 44 (see Exhibit YOLO-4 (PowerPoint Slide 5)). The segment of Courtland Road that comprises YOL 03 has two lanes that vary in width from approximately 10 feet to 11 feet, with mostly unimproved shoulders of approximately 0 to 1 foot. Pavement consists of (at best) about two inches of asphalt overlaid on a poor, or non-existent, road base material. Pavement conditions are very poor and its PCI rating is 36 (see *id.*)—the worst of all the County road segments discussed herein—but are adequate for current low traffic volumes and vehicle composition. It includes a narrow concrete bridge spanning Elk Slough that curves in a manner that is hard for larger trucks to negotiate. Both segments have good visibility and are typical rural roads intended to accommodate limited vehicle traffic.

Each road segment currently experiences very low traffic volumes. The Final EIR/EIS indicates hourly traffic volumes range from 50-100 vehicles/hour, and this accurately represents

current use levels in my opinion. A wide variety of vehicles use each segment, ranging from passenger cars to wide, slow-moving agricultural equipment and seasonal agricultural truck traffic. The road segments play an important role in connecting local and regional traffic from State Route 84 to South River Road and into Sacramento County via the Sutter Slough and Courtland Bridges.

The Sutter Slough Bridge lies at the south end of YOL 02 and has a sufficiency rating of 40.6 (of 100), as reported on the most recent biannual bridge inspection report prepared by Caltrans. The bridge is rated for legal loads only, and its narrowness is highlighted by the following statement in the inspection report: "There are numerous scrapes on both painted steel bridge rails from vehicular impacts." (Exhibit YOLO-6 (Caltrans Report).) The Courtland Bridge, though not technically located in Yolo County, is noteworthy for its inability to safely accommodate two-way traffic when a large truck is crossing. Extremely narrow lanes effectively convert it into a single-lane bridge in such instances, with traffic on the opposite side queuing during the delay. The bridge also features prominent concrete guardrails lining the approach on each side. The guardrails are struck regularly and bear significant damage from contact by passing vehicles, illustrating the difficulty of negotiating the sharp turns on each side of the bridge approach.

IV. TRANSPORTATION IMPACTS: GENERAL PRINCIPLES AND SUMMARY

This section reviews general aspects of the analysis in Chapter 19 (Transportation) of the Final EIR/EIS and related principles necessary to a full understanding of the two principal categories of impacts described therein: increased traffic volumes and related impacts on levels of service (LOS) and actual operations; and contributions to unacceptable pavement conditions. This discussion is followed in Section V, below, by an evaluation of these impacts in relation to the four Yolo County road segments described above.

A. Increased Traffic Volumes During Construction.

Chapter 19 describes the general traffic volume impacts of Alternative 4A (the WaterFix) during the 14-year project construction period as follows:

> Traffic volumes generated during construction of Alternative 4A would be identical to those evaluated under Alternative 4. As shown in Table 19-25, under BPBG [baseline plus background growth] conditions, a total of 23 roadway segments would exceed the

> acceptable LOS thresholds outlined in Table 19-7 for at least 1 hour during the 6:00 AM to 7:00 PM analysis period. Construction associated with Alternative 4A would cause LOS thresholds to be exceeded for at least 1 hour during the 6:00 AM to 7:00 PM analysis period on a total of 38 roadway segments under BPBGPP conditions. Alternative 4A would therefore exacerbate an already unacceptable LOS under BPBG conditions on 15 roadway segments (38 minus the 23 that would already be operating at unacceptable LOS under BPBG conditions). The effect of increased traffic volumes in excess of LOS thresholds would be adverse. (SWRCB Exhibit 102 (Final EIR/EIS, Ch. 19 at p. 19-357, emphasis added).)

As discussed below, all but one of the Yolo County road segments described in Section III will experience unacceptable LOS during WaterFix construction. None would experience such effects under the baseline plus background growth (BPBG) conditions. While I recognize that the Final EIR/EIS traffic volume estimates are conservative and likely overestimate actual traffic volumes,[8] it is appropriate to conclude that WaterFix construction traffic will dramatically increase existing use levels for all segments except possibly YOL 01 (South River Road).

In considering LOS thresholds, it is important to bear in mind the actual operations of the road segments to which they are applied. LOS thresholds can be informative regarding the vehicular capacity of certain road segments in urban settings, such as major highways, but in my opinion they have much less value when applied to small, rural roads such as those discussed below. LOS thresholds do not account for the actual operation of such roads because they fail to consider residential driveways, farm access roads, the regular movement of wide, slow-moving agricultural equipment between fields, and other common features and occurrences on rural roads.

Put simply, in a rural setting, an LOS threshold of 700 vehicles/hour becomes irrelevant when a single piece of large agricultural equipment is traveling that road at less than 10 miles per hour. Or stated differently, if 700 vehicles/hour are traveling a rural road, they will encounter agricultural equipment, large trucks, or other slow-moving vehicles. Congestion will occur, frequent passing will result (perhaps illegal passing depending on the centerline striping), and road safety will significantly decline. Eventually, as congestion becomes a daily occurrence on the road segments considered herein, other unconsidered road segments may become popular alternative routes. LOS thresholds do not capture these operational issues.

[8] See discussion in SWRCB Exhibit 102 (Final EIR/EIS) at Appendix 19A, p. 38 (explaining that anticipated vehicle trips are assigned to studied road segments for each hour of the 13-hour period analyzed).

For the road segments considered herein, in my opinion, turning conflicts at intersections (particularly on State Route 84) will be significant during WaterFix construction during periods when actual traffic volumes resemble what is described in Chapter 19 of the Final EIR/EIS. Those levels of traffic translate into a passing vehicle on the State Route 84 (CT 33), South River Road (YOL 02), and Courtland Road (YOL 03) every 4-5 seconds. This scenario is particularly significant for agricultural operations, as protracted delays will occur in moving equipment between fields due to cross-traffic on main corridors.

These are among the reasons why it is important to consider the actual operation of rural roads rather than relying solely on LOS thresholds to determine if an increase in traffic volume is safe and reasonable.

B. Contributions to Unacceptable Pavement Conditions.

Appendix 19A of the Final EIR/EIS explains how heavy vehicles uniquely contribute to accelerated pavement deterioration:

> This project has a much longer construction period than a typical construction project and truck trips in particular could contribute to pavement deterioration on study area roadways that were either not designed to accommodate truck traffic or have poor existing pavement condition.
>
> Chapter 610 of the Caltrans Highway Design Manual (2009) provides guidance on pavement engineering considerations including roadway rehabilitation techniques to extend the life of pavement. As stated in Chapter 613.1, "pavements are engineered to carry the truck traffic loads expected during the pavement design life. Truck traffic . . . is the primary factor affecting pavement design life and its serviceability." Further, information obtained from local jurisdictions suggests that some roadways identified as potential construction site access routes do not have adequate engineered pavement sections to withstand construction traffic, particularly heavy vehicles. (SWRCB Exhibit 102 (Final EIR/EIS), App. 19A at p. 10 (emphasis added).)

I agree with the conclusions set forth in the underlined language in this excerpt. Importantly, buses, heavy trucks, and other large vehicles are much harder on road surfaces than typical passenger vehicles. Exhibit YOLO-4 (PowerPoint Slide 6) illustrates the "traffic factor" for different types of vehicles. Although the accuracy of estimates such as those included in that document is a matter of debate within my profession, there is consensus that a single truck with three or more axles is equivalent to a large volume (hundreds or even thousands) of passenger cars, pickups, or vans.

Chapter 19 of the Final EIR/EIS describes the project's overall contribution to unacceptable pavement conditions during construction as follows:

> Traffic volumes generated during construction of Alternative 4A would be identical to those evaluated under Alternative 4. As shown in Table 19-26, construction of Alternative 4 would deteriorate existing pavement conditions to less than the acceptable PCI [Pavement Condition Index] or similar applicable threshold on a total of 46 roadway segments. Damage to roadway pavement is also expected throughout the study area on various local and state roads, as well as on a few intersections. The effect of roadway damage in excess of PCI thresholds would be adverse. (SWRCB Exhibit 102 (Final EIR/EIS), Ch. 19 at p. 19-358.)

Pavement Condition Index ("PCI") is a frequently used measure of road pavement conditions. PCI scoring ranges from 100 (excellent) to 0 (failed), with anything below 70 generally considered "at risk" or worse. (Exhibit YOLO-4 (PowerPoint Slide 4).)

It is important to note the PCI is a measure of surface condition, but is not a measure of structural capacity; a newly applied thin overlay can result in a high PCI for a short time, until the pavement fails under heavy loading due to inadequate structural capacity. A table showing PCI ratings for the three County road segments included in my testimony is included as Exhibit YOLO-4 (PowerPoint Slide 5). Several of the local road segments described in Section III already have portions with less than acceptable PCI (or equivalent evaluation system) ratings. Some road segments with high PCIs have been overlaid with asphalt concrete in the past year, resulting in high PCIs, although the underlying structure remains the same as the surrounding roads. Exhibit YOLO-7 illustrates some typical differences between city streets and county roads, and its content regarding county roads applies applicable to all of the County-maintained road segments discussed herein (and in all likelihood, to State Route 84 as well).[9]

Chapter 19 explains that WaterFix construction will further damage and contribute to the unacceptable pavement conditions on each of these segments (possibly excepting YOL 01, which should not receive much additional traffic). Unfortunately, neither Final EIS/EIR Chapter 19 nor Appendix 19A or other documents readily available for public review (such as Appendix 22B, cited

[9] As in many other counties, Yolo County roads are generally in an "at risk" condition according to the *California Statewide Local Streets and Roads Needs Assessment 2016* (available at www.safecaliforniastreets.org). Local conditions are representative of the statewide infrastructure crisis arising from various factors including a lack of dedicated, stable funding for road maintenance and reconstruction (*id.* at p. 57), as well as increasing real costs and system demands for roads and highways.

in Appendix 19A as the source of trip distribution and vehicle information) appear to quantify the potential volume of heavy vehicle traffic associated with WaterFix construction.

Discussion in those materials assumes, however, that heavy vehicle traffic will rise considerably during project construction and accelerate pavement deterioration. The actual volume of heavy vehicle traffic is relevant to the rate of deterioration but, most importantly, none of the road segments discussed herein will be able to withstand a significant (i.e., doubling or greater) volume of heavy vehicle traffic for long.

Clarksburg-area roads are particularly vulnerable to pavement deterioration resulting from heavy trucks and significant traffic volumes. Soil conditions are a leading reason why: the organic soils commonly found near Clarksburg expand, contract, and move laterally in saturated conditions. Saturated conditions are endemic due the area's historical status as "swamp lands," lands that were drained and reclaimed in the early part of the last century. Many ditches and culverts lie below sea level, and ongoing pumping operations by reclamation districts are required to drain the area. Moisture conditions in proximity to roads are further affected by high groundwater, rainfall or adjacent drainage ditches and similar features. Specific examples are mentioned above—e.g., levee slopeside (eastern lane) failures along State Route 84 (CT 33), and deteriorating pavement along portions of Courtland Road (YOL 03) due to high water tables and roadside ditches.

As an additional example related to construction activity damage, Hamilton Road west of State Route 84 was used as the access route for construction of the Bogle Production Facility. Exhibit YOLO-4 (PowerPoint Slide 8) shows the pavement deterioration after just the first 9 months of this construction activity. By the time the Bogle Production Facility was complete, Hamilton Road required reconstruction. [10] During the approximately 5 month-long reconstruction of Hamilton Road, Z Line Road, located west of State Route 84 near the Bogle Production Facility was used as a detour, and experienced increased truck traffic. Representative pictures of Z Line

[10] On a related note, Exhibit YOLO-4 (PowerPoint Slide 9) is a photo of a legally loaded lime transport truck that sunk into Hamilton Road during the reconstruction of the road. The failure of the soils underlying the roadway occurred despite dewatering efforts to address the high groundwater table in the vicinity. It illustrates the unique soil conditions common in the Clarksburg area.

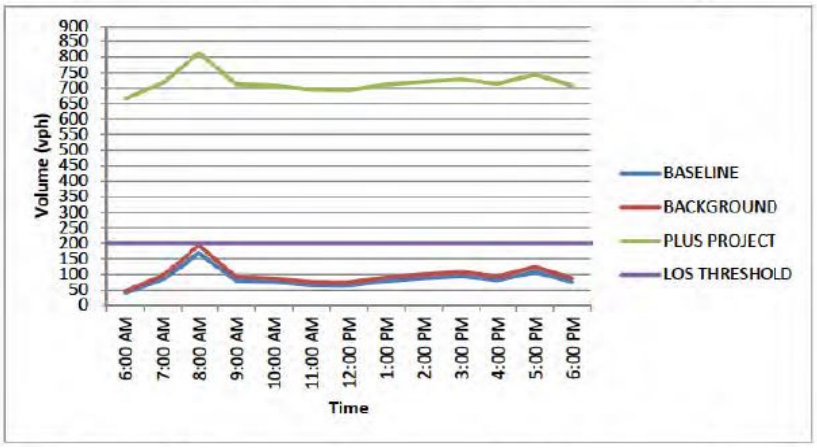
road after its use as a detour are included as Exhibit YOLO-4 (PowerPoint Slide 10). In particular, as the pictures indicate, the southbound lane subsided and cracked significantly under the weight of construction truck trips. Z Line Road was repaired following completion of the Bogle Production Facility in 2012, but today it has deteriorated under occasional agricultural truck traffic due largely to soil conditions in the Clarksburg area (see Exhibit YOLO-4 (PowerPoint Slide 11). This is an indication of how occasional trucks can damage roads in the Clarksburg area, including what could happen to State Route 84 over time.

V. SEGMENT BY SEGMENT ANALYSIS.

A. Analysis of CT 33 (Jefferson Boulevard/State Route 84) Impacts.

The Final EIR/EIS describes this segment as a "minor two-lane highway," consistent with the description provided in Section III, above, with a LOS Threshold of 200 vehicles/hour (SWRCB Exhibit 102 (Final EIR/EIS) at p. 19-226). The following chart from Appendix 19A[11] of the Final EIR/EIS illustrates current traffic volumes (baseline), anticipated future traffic volumes without the project (background growth), and projected traffic volumes with the project (plus project):

ID	Roadway	Segment	
		From	To
CT 33	SR 84 (Jefferson Blvd)	West Sacramento City Limits	Courtland Rd



This dramatic change in traffic volumes far exceeds the LOS of 200 vehicles/hour for this extensive stretch of State Route 84 during the entire 13-hour daily period (6:00 a.m./7:00 p.m.) considered in the Final EIR/EIS. Altogether, if actual project construction traffic resembles what is

[11] SWRCB Exhibit 102 (Final EIR/EIS), App. A, Att. E, p. 9.

described in the Final EIR/EIS, it will transform this road from a quiet rural highway to one of the busiest two-lane roads in Yolo County, with traffic volumes approaching and possibly exceeding 10,000 vehicles/day.

As discussed above in Section IV.A., this change will create serious operational issues. State Route 84 is a major corridor for the movement of agricultural equipment between fields, which occurs frequently (many times each day) during the growing season. Equipment operators will face significant delays attempting to turn onto State Route 84 and, once on State Route 84, wide, slow-moving equipment will create considerable congestion and safety issues when vehicles attempt to pass. All users of State Route 84 during periods of peak construction traffic will experience these issues.

The existing pavement condition of segment CT 33 is described in Chapter 19 of the Final EIR/EIS as "deficient" with the exception of a one-mile stretch (and as noted above, in areas south of the Deep Water Ship Channel Levee that were recently repaired). The pavement condition is measured by Caltrans as having an International Roughness Index ("IRI") of 157-294 (with 170 being the upper limit of an "acceptable" condition) (SWRCB Exhibit 102 (Final EIR/EIS) at Ch. 19, p. 19-19). This makes it one of the very poorest of the 114 road segments analyzed in the Final EIR/EIS (*id.* at pp. 19-17 through 19-24).

Needless to say, the Final EIR/EIS concludes that the anticipated large increase in traffic volumes noted above will exacerbate unacceptable pavement conditions on this extensive segment of State Route 84 (*id.* at p. 19-225). In my judgment, State Route 84 will deteriorate rapidly under any substantial increase in heavy vehicle traffic and could become unusable in a matter of months. Routine repair work and other customary maintenance will not prevent this outcome—the soil conditions mentioned above have exacted a heavy toll on other nearby roads. In addition to the Hamilton and Z Line Road examples discussed in the preceding section, some instances of this include:

- **Willow Point Road.** Deteriorating pavement along the northern lane of Willow Point Road, located east of State Route 84 and adjacent to a drainage and irrigation ditch that frequently holds water (see Exhibit YOLO-4 (PowerPoint Slide 12)). Fluctuating water

levels pull "fines" from the road base and, over time, erode the road base. Coupled with very high groundwater tables, this condition causes the road pavement edge to simply crumble away.

- **Netherlands Road.** Soil movement under Netherlands Road, particularly near the headquarters of Reclamation District 999, causes long stretches of Netherlands Road to exhibit a "roller coaster" effect for those traveling the road, with frequent, jarring up and down movements due to the irregular pavement surface.

The proximity of these roads to State Route 84 illustrates how it could similarly deteriorate under heavy truck traffic during WaterFix construction. Based on my observations, State Route 84 simply is not designed or capable of bearing high traffic volumes or substantial heavy vehicle traffic, and it would have to be reconstructed to accommodate WaterFix construction traffic.

B. Analysis of YOL 01 (South River Road) Impacts.

As noted in Section III.B, WaterFix construction is not anticipated (per the project proponents) to add substantial volumes of traffic to the portion of South River Road identified as segment YOL 01. In my judgment, if this later provides inaccurate, vehicles using South River Road will find it a poor substitute for State Route 84. Like State Route 84, it is a minor two-lane highway. However, the meandering nature of the road, its narrow width, limited shoulders (in many locations), current use as a corridor for moving wide, slow-moving agricultural equipment, and location atop a levee crown make it inappropriate and potentially unsafe as a major route for WaterFix construction traffic. Further, the structural base of the levee is not conducive to continuous heavy truck use and its pavement conditions (already deficient in sections) would rapidly deteriorate and fail if traffic volumes were to substantially increase.

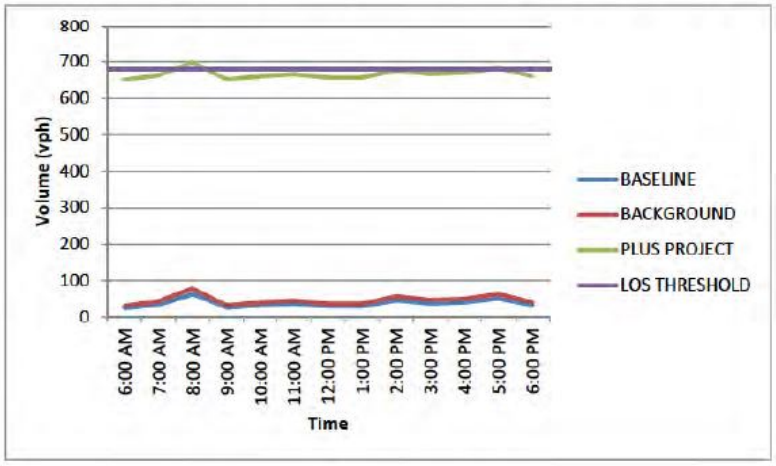
C. Analysis of YOL 02 (South River Road from Courtland Road to the Solano County line) and YOL 03 (Courtland Road from State Route 84 to South River Road) Impacts.

In all respects, WaterFix construction traffic impacts on these two road segments would be nearly identical to those described above with respect to CT 33 (State Route 84). Each is a minor two-lane highway, like State Route 84, but with a LOS threshold of 700 vehicles/hour (versus 200

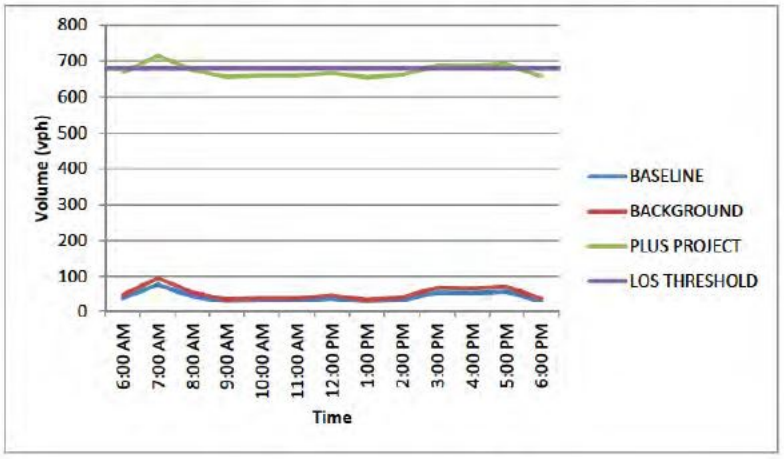
vehicles/hour for State Route 84) due to the different LOS thresholds applied by Caltrans and the County for this road type.

The following charts from Appendix 19A (Att. E) of the Final EIR/EIS illustrate project-related traffic increases relative to baseline conditions (currently and with expected background growth):

ID	Roadway	Segment	
		From	To
YOL 02	River Rd (Yolo Co.)	Courtland Rd	Sacramento Co./Yolo Co. Line



ID	Roadway	Segment	
		From	To
YOL 03	Courtland Rd	SR 84 (Jefferson Blvd)	River Rd



Similar to the conclusions expressed above regarding segment CT 33 (State Route 84), these segments will each experience a considerable increase in traffic volumes and—during WaterFix construction—transform from quiet rural roads into the busiest County-maintained roads. Effects of

increased traffic, including significant delays, increased safety risks, and complications for the movement of agricultural vehicles, are the same as described for State Route 84.

Also similar to CT 33, existing pavement conditions are deficient and will further deteriorate and fail due to WaterFix construction traffic (SWRCB Exhibit 102 (Final EIR/EIS) Ch 19 at p. 19-228). In fact, segment YOL 03 is in the worst condition of all segments discussed in my testimony, with a PCI of only 36 due in large part to the effect of soil saturation from roadside ditches and heavy vehicle traffic.

VI. PROPOSED MITIGATION MEASURES—DESCRIPTION AND ANALYSIS

In approving WaterFix and certifying the Final EIR/EIS, DWR adopted the MMRP (SWRCB Exhibit 111) to reduce or avoid the significant environmental impacts of the project. The MMRP includes an array of mitigation measures intended to address transportation impacts described in Chapter 19: traffic volume increases, LOS threshold exceedances, and pavement condition deterioration. Those measures are described in summary fashion below, together with my opinion on their potential application to affected road segments in Yolo County (excluding segment YOL 01, which is not expected to be significantly impacted).

A. Measures Proposed to Address Increased Construction Vehicle Trips Resulting in Unacceptable LOS Conditions (TRANS-1a, 1b, and 1c).

Mitigation Measure TRANS-1a (Implement Site-Specific Construction Traffic Management Plan) proposes:

> . . . site-specific construction traffic management plans (TMPs) that address the specific steps to be taken before, during, and after construction to minimize traffic impacts, including the mitigation measures and environmental commitments identified in this EIR/EIS. This will include potential expansion of the study area identified in this EIR/EIS to capture all potentially significantly affected roadway segments. (SWRCB Exhibit 111 (MMRP) at p. 2-87.)

Additional detail is included in the measure, but the various actions it identifies for potential inclusion in TMPs are likely to have little effect on the volume or impact of increased construction traffic. Many actions simply provide signage to notify the affected public of construction traffic and alternate route possibilities, while others promote compliance with basic traffic safety laws (such as pulling over for emergency vehicles) and similar measures that will not appreciably reduce traffic volumes, congestion and delays, or safety issues. Particularly due to the isolated nature of

affected road segments within Yolo County, and the impracticality of enforcing TMPs for extended periods of time in remote locations, the TMPs are not likely to have any beneficial effects.

Mitigation Measure TRANS-1b (Limit Hours or Amount of Construction Activity on Congested Roadway Segments) is similarly ineffective. It states in part:

> Where feasible, DWR would limit construction activity to fit within available reserve capacity or shift construction activity to hours with more reserve capacity so as to achieve acceptable LOS conditions based on roadway location (Chapter 19, *Transportation*, Table 19-9, of the FEIR/FEIS). Feasibility will be based on factors like reserve capacity on roadways, timing of deliveries and staging of construction. (*Id.* at p. 2-91.)

The efficacy of this measure is difficult to evaluate because the Final EIR/EIS describes daytime traffic volumes as relatively constant during the 13-hour study period (6:00 a.m. to 7:00 p.m.), resulting in exceedances of the LOS thresholds for CT 33, YOL 02 and 03. The Final EIR/EIS thus omits a description of the "reserve capacity" of these roads that is integral to the implementation of this measure.

In my judgment, however, a practical effect of implementing this measure could be to shift a significant volume of traffic to the middle of the day. The actual operation of the road would not easily accommodate such an approach. Frequent agricultural vehicle movement and other slow-moving traffic are present throughout the day. Whenever it occurs, WaterFix construction traffic will present conflicts with these existing uses. Significant delays and inconvenience, increased safety risks, and related issues mentioned above will result.

Alternatively, construction traffic could be shifted to nighttime hours. Pushing construction traffic into nighttime hours would thus reduce LOS impacts at the cost of subjecting residents along each roadway to ceaseless nighttime traffic noise impacts. It would also subject vehicle drivers to the hazards of navigating narrow, two-lane roads with negligible shoulder space and no clear recovery zones. Particularly during foggy conditions or other inclement weather, it would be irresponsible to implement such an approach.

Mitigation Measure TRANS-1c (Make Good Faith Efforts to Enter into Mitigation Agreements to Enhance Capacity of Congested Roadway Segments) is the third and final measure adopted to address traffic volume and LOS impacts. In pertinent part, it states:

> Prior to commencement of construction activities substantially affecting transportation facilities, DWR will make a good faith effort to enter into mitigation agreements with affected state, regional, or local agencies ("affected agencies") to verify the location, extent, timing, and fair share cost to be paid for reducing congestion to the identified roadway segments specified in Table 19-9 of the FEIR/FEIS.
>
> Implementation of this measure is intended to provide funding from DWR sufficient to provide its fair share of the cost of reducing congestion so that traffic operating conditions (i.e., LOS) on study area roadways do not operate at a level of service or delay that is worse than the pre-project conditions (to the extent feasible in light of costs, logistics, and other factors). DWR will include in the bid specifications requirements that the contractor(s) ensure that all enhancements are conducted in compliance with applicable standards of affected agencies and with any applicable mitigation agreements, as described below. (*Id.* at p. 2-92.)

This measure is utterly impractical. To accommodate WaterFix construction traffic, each of the three impacted Yolo County segments would have to be entirely reconstructed. The design, environmental review, land acquisition, competitive solicitation, and construction effort necessary for a major road reconstruction project of this scale would take at least 3-4 years to complete and would extend well into the WaterFix construction period.[12] Construction traffic displaced during that period would have to utilize other roads, such as South River Road. On such roads, it would end up causing precisely the same operational conflicts, LOS threshold impacts, and pavement deterioration effects that Mitigation Measure TRANS-1c is intended to address.

While these realities are alone sufficient to render Mitigation Measure TRANS-1c of no value, the measure is also fundamentally flawed because it provides only <u>partial funding</u> for the road reconstruction projects necessary to properly and safely handle WaterFix construction traffic. These projects would cost many tens of millions of dollars. In this fiscal context any "fair share contributions" by DWR would be an empty gesture. The County (and almost certainly, Caltrans) does not have funding or staff resources to make up the difference, and Mitigation Measure TRANS-1c is thus infeasible.

[12] For reference, construction of Intake 2 (across the Sacramento River from Clarksburg) is set to commence in 2024 (SWRCB Exhibit 102 (Final EIR/EIS) App. 22.B, p. 228-9). While it is possible that significant construction traffic will not be present in the Clarksburg area prior to the commencement of work on Intake 2, the Final EIR/EIS does not provide any basis for such an assumption. Also, the 2024 start date is itself in question, as Appendix 3C of the Final EIR/EIS indicates that the construction timeframes set forth in Appendix 22B may change if an alternative with fewer than five intakes is constructed (as is now the case with the approval of Alternative 4A). (*Id.* at p. 3C-2.)

B. Measures Proposed to Address Construction Vehicle Impacts on Physically Deficient Roadway Segments (TRANS-2a, 2b, and 2c).

Mitigation Measure TRANS-2a (Prohibit Construction Activity on Physically Deficient Roadway Segments) is described as follows:

> DWR will include in the bid specifications prohibitions against construction traffic from using roadway segments with pavement conditions below the thresholds identified in this study [i.e., an International Roughness Index (IRI) rating greater than 170 or a Pavement Condition Index (PCI) rating worse than 55], to the extent feasible. Implementation of this measure would prohibit all construction traffic on the 46 of the 116 roadway segments that were determined to be physically deficient as listed in Table 19-26 of the FEIR/FEIS, if feasible. Implementation of Trans-2a would require routing of construction traffic to use the remaining 70 roadway segments that meet pavement conditions thresholds. It should be noted that this may require construction traffic to make circuitous travel routes and/or be unable to access project construction sites. (SWRCB Exhibit 111 (MMRP) at p. 2-94.)

Presumably, this measure will not be implemented on any of the road segments within Yolo County. All are deficient, but the WaterFix proponents have been aware of this for years and have given no indication (including in the Final EIR/EIS) that they may or even could employ alternative routes for construction traffic. It thus does not warrant further discussion.

Mitigation Measure TRANS-2b (Limit Construction Activity on Physically Deficient Roadway Segments) is described as an alternative measure to implement if Mitigation Measure TRANS-2a cannot be implemented. It consists of the following approach:

> If complete avoidance of physically deficient roadway segments as described in Mitigation Measure TRANS-2a is not feasible, construction activity will be limited to the extent possible on the deficient roadways identified in Table 19-26 of the FEIR/FEIS. Implementation of Trans-2b would require limiting the total number and/or weight of construction traffic using the 46 roadway segments that do not meet pavement conditions thresholds. (*Id.* at p. 2-95.)

If implemented for the road segments discussed herein, this measure would shift essentially all WaterFix construction traffic to other jurisdictions (principally, Sacramento County). I have not evaluated whether the operational conflicts, LOS threshold impacts, and pavement conditions of roads in other jurisdictions are also serious, limiting implementation of this measure as a practical matter. Considering the sufficiency of available information, the WaterFix proponents should have evaluated the prospect of limiting construction activity (traffic) on segments CT 33, YOL 02 and 03, in the Final EIR/EIS rather than deferring it until close in time to actual construction.

If this measure is not capable of implementation, the consequence is that the heavy volume of WaterFix construction will be relying on roads that are deteriorating or failing. This will have

serious consequences that, as discussed above, are not accounted for by the project proponents in either the budget or construction schedule for the WaterFix.

Finally, Mitigation Measure TRANS-2c (Improve Physical Condition of Affected Roadway Segments as Stipulated in Mitigation Agreements or Encroachment Permits) conceptually mirrors Mitigation Measure TRANS-1c, discussed above. It provides in part:

> If use of physically deficient roadways cannot be avoided or limited as specified in Mitigation Measures TRANS-2a and TRANS-2b, it may be necessary to improve the deficient roadways identified in Table 219-26 [sic] of the FEIR/FEIS or make other necessary infrastructure improvements, if any, before construction to make them suitable for use during construction. Additionally, all affected roadways would be returned to preconstruction condition or better following construction. Implementation of this measure will ensure that construction activities will not worsen pavement or levee conditions, relative to Existing Conditions.
>
> Prior to construction, DWR will make a good faith effort to enter into mitigation agreements with or to obtain encroachment permits from affected agencies to verify what the location, extent, timing, and fair share cost to be paid by DWR for any necessary pre- and post-construction physical improvements. The fair share amount would be either the cost to return the affected roadway segment to its preconstruction condition or a contribution to programmed planned improvements. Repairs may be preventive or rehabilitative and occur before or after construction and may include overlays, other surface treatments, or roadway reconstruction. The flood protection benefits of roadways will also be considered in developing and implementing activities pursuant to this measure. (*Id.* MMRP) at p. 2-96.)

In responding to the County's comments on the Final EIR/EIS, the WaterFix proponents noted the potential applicability of this approach for roads in Yolo County, stating:

> The lead agencies acknowledge your concern about the ability to prohibit or limit construction traffic on physically deficient roadway segments as described in Mitigation Measures TRANS-2a and TRANS-2b. [¶] Therefore, if use of physically deficient roadways cannot be avoided or limited as specified in Mitigation Measures TRANS-2a and TRANS-2b, <u>it may be necessary to improve the deficient roadways identified in the EIR/EIS, or make other necessary infrastructure improvements, if any, before construction to make them suitable for use during construction</u>. (SWRCB Exhibit 102 (Final EIR/EIS) Response to Comments, Letter 2573, Response 33 (emphasis added).)

In some respects, this measure improves upon Mitigation Measure TRANS-1c by more clearly calling for road improvement work <u>prior to</u> WaterFix construction. It also appears to contemplate that WaterFix proponents will bear the entire cost and responsibility for performing such work.

Altogether, these are reasonable actions to propose, but the question remains whether they can be implemented prior to WaterFix construction. This is of particular concern given the amount of design, environmental review, land acquisition, competitive solicitation, and construction work that will be necessary to reconstruct the three affected road segments within Yolo County. The

construction schedule is at odds with the notion—clearly set forth in Mitigation Measure TRANS-2c—that some affected roads may require reconstruction to accommodate WaterFix construction traffic.[13] There is no indication the WaterFix proponents will adjust the project construction schedule in the manner necessary to accommodate implementation of this measure.

VII. CONCLUSION

As set forth above, if WaterFix construction traffic volumes approach what is described in the Final EIR/EIS, a number of serious problems will result. All vehicles using the three heavily-impacted road segments, including farm equipment that depends upon those roads (and in particular, State Route 84), will experience significant delays and inconvenience. Safety risks will increase with the delays as vehicles attempt to pass during periods of congestion. These are serious issues that cannot be understood simply by reference to modeling derived from estimated traffic volume data or LOS thresholds—actual operations must be considered.

Further, heavy trucks destroy roads, and none of the road segments reviewed herein can withstand the large number of truck trips associated with WaterFix construction. Substantial road reconstruction therefore must precede WaterFix construction and will likely need to be repeated periodically as construction proceeds. In my experience, projects of the magnitude necessary to reconstruct State Route 84 (CT 33) and portions of Courtland Road (YOL 02) and South River Road (YOL 03) will take 3-4 years to complete under ideal conditions. Such projects require extensive design, environmental review, land acquisitions, and competitive bidding even before construction can begin. The County has neither the funding nor the staff resources to complete such endeavors, or to entertain "fair-share" mitigation agreements to mitigate the accelerated deterioration of County roads that will be caused by the WaterFix project.

This is a daunting task, and in my opinion it is premature to provide permits and entitlements for the WaterFix until this critical precursor to construction is fully addressed by the project proponents. There are no practical options short of rerouting most construction traffic to roads outside Yolo County (which I have not evaluated). Accordingly, whether now or in the near

[13] The detailed construction schedule included in App. 22B of the Final EIR/EIS does not mention of road repairs, reconstruction, and similar work contemplated in Mitigation Measure TRANS-2c. Nor does the Final EIR/EIS elsewhere consider the timing or other details of such work.

future, WaterFix construction will have to confront this reality and address the obstacles it poses to the success of the project.

Executed on this 28 day of November, 2017 in Woodland, California.

Panos Kokkas