



TECHNICAL MEMORANDUM NO. 1

PROJECT: **Reclassification of the Tampa Bypass Canal,
Hillsborough County, From Class III to Class I**

TITLE: **Historic Exceedances and IWR Analysis of Class I vs.
Class III Standards in the Alafia River**

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PURPOSE AND OBJECTIVES

The Florida Department of Environmental Protection (FDEP) lists the surface water quality criteria for Class I and Class III-F waters in Florida Administrative Code (FAC) Chapter 62-302.530. Currently, the freshwater portion of the Tampa Bypass Canal is classified as a Class-III-F (F refers to fresh water) waterbody for Recreation, Propagation and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife. Tampa Bay Water uses the Tampa Bypass Canal for potable water supply and is currently pursuing the reclassification of portions of the Tampa Bypass Canal to a Class I standard for Potable Water Supply. In this classification system, Class I has the most stringent water quality requirements, and Class V has the least stringent water quality requirements. The purpose of this memorandum is to describe ambient surface water quality data collected in the Tampa Bypass Canal with respect to Class III-F and Class I standards and assess changes in standards exceedance frequency and IWR impairment status based on potential reclassification.

The FDEP compiles surface water quality data collected throughout Florida to assess impairment of waterbodies under the Impaired Waters Rule (IWR) using its STORET database and its Waterbody Identification (WBID) system. Data from STORET are used by computer software that assesses water quality based on Waterbody Identifiers (WBIDs). The following is an excerpt from the Impaired Waters Rule describing in part, the principal used to assess impaired waters in Florida.

“Subsection 303(d) of the CWA and Section 403.067, F.S., describe impaired waters as those not meeting applicable water quality standards, which is a broad term that includes designated uses, water quality criteria, the Florida anti-degradation policy, and moderating provisions. However, as recognized when the water quality standards were adopted, many water bodies naturally do not meet one or more established water quality criteria at all times, even though they meet their

designated use. It is not the intent of this chapter to include waters that do not meet otherwise applicable water quality criteria solely due to natural conditions or physical alterations of the water body not related to pollutants. Similarly, it is not the intent of this chapter to include waters where designated uses are being met and where water quality criteria exceedances are limited to those parameters for which permitted mixing zones or other moderating provisions (such as site-specific alternative criteria) are in effect. Waters that do not meet otherwise applicable water quality standards due to natural conditions or to pollution not related to pollutants shall be noted in the state's water quality assessment prepared under subsection 305(b) of the CWA [305(b) Report]”.

Tampa Bay Water, as part of its reclassification effort for the Tampa Bypass Canal, has undertaken a comprehensive assessment of ambient surface water quality data to assess how reclassification to Class I standards might change the exceedance frequency and impairment status for a host of water quality parameters assessed by FDEP under the Impaired Water Rule. This memorandum summarizes the results of this evaluation for the Tampa Bypass Canal.

DATA SOURCES AND METHODS

Surface water quality data for the Tampa Bypass Canal were subset from the master IWR database (Run27). These data were then augmented by additional available datasets known to not have been used by FDEP for the IWR assessment. These datasets included data collected by Tampa Bay Water in the Tampa Bypass Canal and data from the Hillsborough County Environmental Protection Commission (EPCHC). Combined, these data represent the overwhelming preponderance of surface water quality data collected in this system not directly associated with a point source discharge.

To assess how the proposed reclassification might change the frequency of standards exceedances, a list of water quality constituents and the associated water quality exceedance criteria for Class I and Class III-F standards was generated for assessment (Table 1). The FDEP employs several types of exceedance criteria depending upon the parameter being assessed including:

- Exceedances of a specific value for a given sample;
- Exceedances of a monthly average;
- Exceedances of an annual average;
- Exceedances where a value lower than the standard is considered an exceedance;
- Exceedances which rely on specific calculations of other constituents (e.g., hardness for metals);
- Exceedances with special conditions e.g., relative to historic or background conditions.

All types of exceedances were considered except those which required special considerations such as relevance to background conditions (e.g., total dissolved gases, pH, turbidity, conductivity, chlorophyll-a).

When examining the water quality data with respect to the Class I and Class III standards exceedances, there are nine possible combinations of outcomes. We chose to assess the change in

status with respect to reclassification by considering two of the nine possible combinations to represent change in status:

1. Those conditions where a value exceeded a Class I standard but did not exceed a Class III standard;
2. Those conditions where there was no Class III standard but a Class I standard was exceeded.

These two combinations were chosen because they best reflect a change in exceedance frequency associated with a more stringent set of standards. Therefore, only these conditions would qualify a value as an exceedance under this scenario. All of the other seven combinations were taken to represent “no change” with respect to reclassification. A simple cross tabulation was used to determine whether reclassification would impact the exceedance frequency for each of the constituents listed in Table 1. The evaluation was constructed on two levels; the WBID level used by FDEP for evaluation of impaired waters (Figure 1); and the basin level used by Hillsborough County to delineate watershed sub-basins in the Tampa Bypass Canal watershed (Figure 2). Using this approach, the ambient water quality master dataset was evaluated, and tables were generated indicating those water body segments where the status changed for a particular constituent according to the criteria described above.

When evaluating exceedance frequencies it was important to consider the relevance of exceedances over the history of data collection within the water body segments under examination. The FDEP uses a 7.5-year time frame to evaluate water quality data for listing impaired waters under the IWR. In this memorandum, tables are provided that summarize exceedance frequencies by WBID (and sub-basin) and water quality constituent for an IWR period of record (IWR run 27: Jan. 1999 - Aug. 2006) and provide a date for the last observed exceedance. These tables are used to assess how reclassification might affect FDEP listing as impaired waterbodies, and the potential impacts to local governments with respect to total maximum daily load (TMDL) obligations. Only waterbodies with at least 10 samples were considered for this analysis.

This memorandum also provides detailed information on exceedances encompassing the entire period of record using time series plots to display the data for each WBID (and sub-basin) by water quality constituent with labels indicating whether each value represents a standards exceedance for Class I and/or Class III water quality standard. These time series plots provide information on how water quality in the Tampa Bypass Canal has changed over the recorded history of water quality data collection and can be used to gain insight on the relationship of recent water quality to prior years.

The FDEP is mandated to address impaired waters under the TMDL program. The Tampa Bypass Canal is part of Group 1 planning list for TMDL development slated to be completed by 2008. Currently, portions of the Tampa Bypass Canal are listed as impaired (Table 2). Therefore, as part of this reclassification assessment, consideration was given as to how reclassification to Class I might impact the TMDL process. To accomplish this, the latest IWR run (Run 29z; July 3, 2007) was obtained for WBIDs in the Tampa Bypass Canal watershed and an evaluation was

completed to assess the impact of potential reclassification to Class I standards on impairment status of WBIDs within the watershed. The same logic was used to evaluate the effects on reclassification as for the exceedance frequency analysis. That is, only constituents whose standards changed between Class III-F and Class I, or constituents with no Class III-F standard but a Class I standard, were evaluated.

RESULTS AND DISCUSSION

In the Tampa Bypass Canal, reclassification would result in no additional exceedances for 7 of the 8 WBIDs in the Tampa Bypass Canal which had data available for assessment using the criteria established above to assess impact of reclassification. Only a single WBID (1536F) would contain additional exceedances due to reclassification (see Table 3 in Technical Memorandum No. 2).

Only 9 of the approximately 70 water quality constituents examined for this assessment would have an exceedance frequency change resulting from the proposed reclassification. Additional exceedance frequencies were found to occur for industrial chemicals requiring evaluation of annual averages. The constituents showing an increase in exceedance frequency include:

- Arsenic
- Beryllium
- Bromodichloromethane
- Bromoform
- Carbon tetrachloride
- Chloroform
- Hexachlorobutadiene
- Lindane
- Thallium

Interestingly, when evaluating exceedances on the sub-basin level as opposed to by WBID, the annual averages drop below the exceedance thresholds leaving only a few isolated daily exceedances for arsenic and thallium. These findings indicate that the Tampa Bypass Canal generally meets Class I standards currently, except for infrequent minor exceedances for 9 industrial chemicals. The data show that there have been no historic violations of Class III standards for these constituents, but that a total of 21 violations of the more stringent Class I standards would have occurred for these parameters had the TBC been a Class I water for the entire period of record. These findings further indicate the need to control pollutant discharges from industrial facilities in the Tampa Bypass Canal watershed.

According to IWR run 29z, reclassification would not result in a change of impairment status for any WBID in the TBC basin. While some WBIDs would remain impaired, adopting Class I standards would not change their impairment status. Therefore, based on this assessment, no additional TMDL obligations to owners/operators of municipal separate storm sewers systems (MS4s) would be incurred as a result of the proposed reclassification of the TBC to Class I standards.

Table 1. FDEP surface water quality criteria (FAC 62-302-530) for Class III – F and Class I standards.

Parameter Name	Class III - Fresh Standard	Class I Standard
2,4-D (ug/l)	NS	=100 ug/l
Silver (ug/l)	=0.07ug/l	=0.07ug/l
Aldrin (ug/l)	=0.00014 ug/l annual avg.; 3.0 ug/l max	=0.00013 ug/l annual avg.; 3.0 ug/l max
Alkalinity (mg/l)	>20mg/l as CaCO3	>20mg/l as CaCO3
Gross Alpha (pc/l)	=15 pc/l	=15 pc/l
Arsenic (ug/l)	=50 ug/l	=10 ug/l
Barium (ug/l)	NS	=1000 ug/l
Beta BHC (ug/l)	=0.046 ug/l annual avg.	=0.014 ug/l annual avg.
Bromodichloromethane (ug/l)	<=22 ug/l annul avg.	<=0.27 ug/l annul avg.
Beryllium (ug/l)	=0.13 ug/l annual avg.	=0.0077 ug/l annual avg.
Bromoform (ug/l)	=360 annual avg.	=4.3 ug/l annual avg.
Benzene (ug/l)	=71.28 ug/l annual avg.	=1.18 ug/l
Cadmium (ug/l)	=e[0.7409[lnH]-4.719	=e[0.7409[lnH]-4.719
Chlordane (ug/l)	=0.00059 ug/l annual avg.; 0.0043 ug/l max	=0.00058 ug/l annual avg.; 0.0043 ug/l max
Chlorodibromomethane (ug/l)	=34 annual avg.	=0.41 ug/l annual avg.
Chloroform (ug/l)	=470.8 ug/l annual avg.	=5.67 ug/l annual avg.
Chloride (mg/l)	NS	=250 mg/l
Chlorine (mg/l)	=0.01 mg/l	=0.01 mg/l
Cyanide (mg/l)	=5.2 ug/l	=5.2 ug/l
Conductance (uohm/cm)	1275 or >50% Nat. Background	1275 or >50% Nat. Background
Chromium III (ug/l)	=e(0.819[LnH]+0.6848) ug/l	=e(0.819[LnH]+0.6848) ug/l
Carbon Tetrachloride (ug/l)	=4.42 ug/l annual avg.	=0.25 ug/l annual avg., 3.0 ug/l max
Copper (ug/l)	=e(0.8545[LnH]-1.702) ug/l	=e(0.8545[LnH]-1.702) ug/l
Detergents (mg/l)	=0.5 mg/l	=0.5 mg/l
Dissolved Solids (mg/l)	NS	=500 mg/l monthly avg
Dissolved Oxygen (mg/l)	=5 mg/l	=5 mg/l
Endrin (ug/l)	=0.0023 ug/l	=0.0023 ug/l
Fluoride (mg/l)	=10.0 mg/l	=1.5 mg/l
Fecal Coliform (/100ml)	=400 MPN	=400 MPN
Iron (ug/l)	=1.0 mg/l	=1.0 mg/L
Halomehtanes (ug/l)	NS	=80 ug/l
Hexachlorobutadiene (ug/l)	=49.7 ug/l annual avg.	=0.45 ug/l annual avg.
Heptachlor (ug/l)	=0.00021 ug/l annual avg.; 0.0038 ug/l max	=0.00021 ug/l annual avg.; 0.0038 ug/l max
Mercury (ug/l)	=0.012 ug/l	=0.012 ug/l
Lindane (ug/l)	=0.063 ug/l annual avg.; 0.08 ug/l max	=0.019 ug/l annual avg.; 0.08 ug/l max

Parameter Name	Class III - Fresh Standard	Class I Standard
Malathion (ug/l)	=0.1 ug/l	=0.1 ug/l
Methyl Chloride (ug/l)	=470.8 ug/l annual avg.	=5.67 ug/l annual avg.
Mirex (ug/l)	=0.001 ug/l	=0.001 ug/l
Methoxychlor (ug/l)	=0.03 ug/l	=0.03 ug/l
Nickel (ug/l)	= $e(0.846[\text{LnH}]+0.0584)$ ug/l	= $e(0.846[\text{LnH}]+0.0584)$ ug/l
Nitrate (mg/l)	NS	=10 mg/l as N or that concentration that exceeds the nutrient criteria
Oil/Grease (mg/l)	Dissolved or emulsified oils and greases shall not exceed 5.0 mg/l	Dissolved or emulsified oils and greases shall not exceed 5.0 mg/l
PAH (ug/l)	=0.031 ug/l annual avg.	=0.0028 ug/l annual avg.
Parathion (ug/l)	=0.04 ug/l	=0.04 ug/l
Lead (ug/l)	= $e(1.273[\text{LnH}]-4.705)$ ug/l	= $e(1.273[\text{LnH}]-4.705)$ ug/l
PCB (ug/l)	=0.000045 ug/l annual avg.; 0.014 ug/l max	=0.000044 ug/l annual avg.; 0.014 ug/l max
Pentachlorophenol (ug/l)	=30 ug/l max, 8.2 annual avg, $e(1.005[\text{ph}]-5.29)$	30 ug/l max, 8.2 annual avg, $e(1.005[\text{ph}]-5.29)$
pH (SU)	<6, >8.5	<6, >8.5
Phenol (ug/l)	=0.3 mg/l	=0.3 mg/l
Phthalate Esters (mg/l)	=3.0 ug/l	=3.0 ug/l
Radium (pc/l)	=5 pc/l	=5 pc/l
Antimony (ug/l)	=4,300 ug/l	=14 ug/l
Selenium (ug/l)	=5.0 ug/l	=5.0 ug/l
Silvex (ug/l)	NS	=10 ug/l
1,1,2,2-Tetrachloroethane (ug/l)	=8.85 ug/l annual avg.	=0.17 ug/l annual avg.
Total Dissolved Gases (%)	=110% of saturation value	=110% of saturation value
Thallium (ug/l)	=6.3 ug/l	=1.7 ug/l
Toxaphene (ug/l)	=0.0002 ug/l	=0.0002 ug/l
Turbidity (NTU)	=29 NTU above natural background conditions	=29 NTU above natural background conditions
Unionized Ammonia (mg/l)	=0.02 mg/l as NH ₃	=0.02 mg/l as NH ₃
Zinc (ug/l)	= $e(0.8473[\text{LnH}]+0.884)$ ug/l	= $e(0.8473[\text{LnH}]+0.884)$ ug/l

Table 2. Impaired Water Body Segments in the Tampa Bypass Canal watershed.

WBID ¹	Segment	Type	IWR ² Parameters	Status ³	TMDL Priority	TMDL Date
1536C	Tampa Bypass Canal	STREAM	Coliforms (Total)	VL	Medium	2008
1536C	Tampa Bypass Canal	STREAM	Nutrients (chlorophyll)	VL	Medium	2008
1536C	Tampa Bypass Canal	STREAM	Dissolved Oxygen	VL	Low	2008

Notes: Source: FDEP, 2003. 1. WBID - water body identification number. 2. IWR - state of Florida impaired waters rule. 3. Status: VL - verified list

Table 3. Results of status evaluation for each water quality constituent of interest in the Alafia and TBC basin by WBID. Exceed CI standard and Exceed CIII standard are assigned 1 (exceed) or 0 (not) using cross tabulation method described in the methods section.

Basin	WBID	Constituent	Exceed CI_standard	Exceed CIII_standard	Number of additional exceedances	Percent of Total	Total # of samples	Date of last exceedance	Type of standard
TBC	1536F	Arsenic (ug/l)	1	0	2	5.9	34	12/19/2005	Greater daily
TBC	1536F	Beryllium (ug/l)	1	0	1	12.5	8	1/1/2006	Greater yearly
TBC	1536F	Bromodichloromethane (ug/l)	1	0	4	50.0	8	1/1/2004	Greater yearly
TBC	1536F	Bromoform (ug/l)	1	0	1	12.5	8	1/1/2000	Greater yearly
TBC	1536F	Carbon Tetrachloride (ug/l)	1	0	3	37.5	8	1/1/2006	Greater yearly
TBC	1536F	Chloroform (ug/l)	1	0	2	25.0	8	1/1/2000	Greater yearly
TBC	1536F	Hexachlorobutadiene (ug/l)	1	0	2	50.0	4	1/1/2002	Greater yearly
TBC	1536F	Lindane (ug/l)	1	0	2	40.0	5	1/1/2005	Greater yearly
TBC	1536F	Thallium (ug/l)	1	0	1	3.2	31	5/30/2001	Greater daily

Table 4. Results of status evaluation for each water quality constituent of interest in the Alafia and TBC basin by EPC Basin.
Exceed CI standard and Exceed CIII standard are assigned 1 (exceed) or 0 (not) using cross tabulation method described in the methods section.

Basin	EPC Basin	Parameter	Exceed CI_standard	Exceed CIII_standard	Number of additional exceedances	Percent of total	Total # of samples	Date of last exceedance	Type of standard
TBC	Tampa Bypass Canal	Arsenic (ug/l)	1	0	1	4.5	22	8/25/2004	Greater daily
TBC	Mango	Arsenic (ug/l)	1	0	1	8.3	12	12/19/2005	Greater daily
TBC	Tampa Bypass Canal	Thallium (ug/l)	1	0	1	4.8	21	5/30/2001	Greater daily

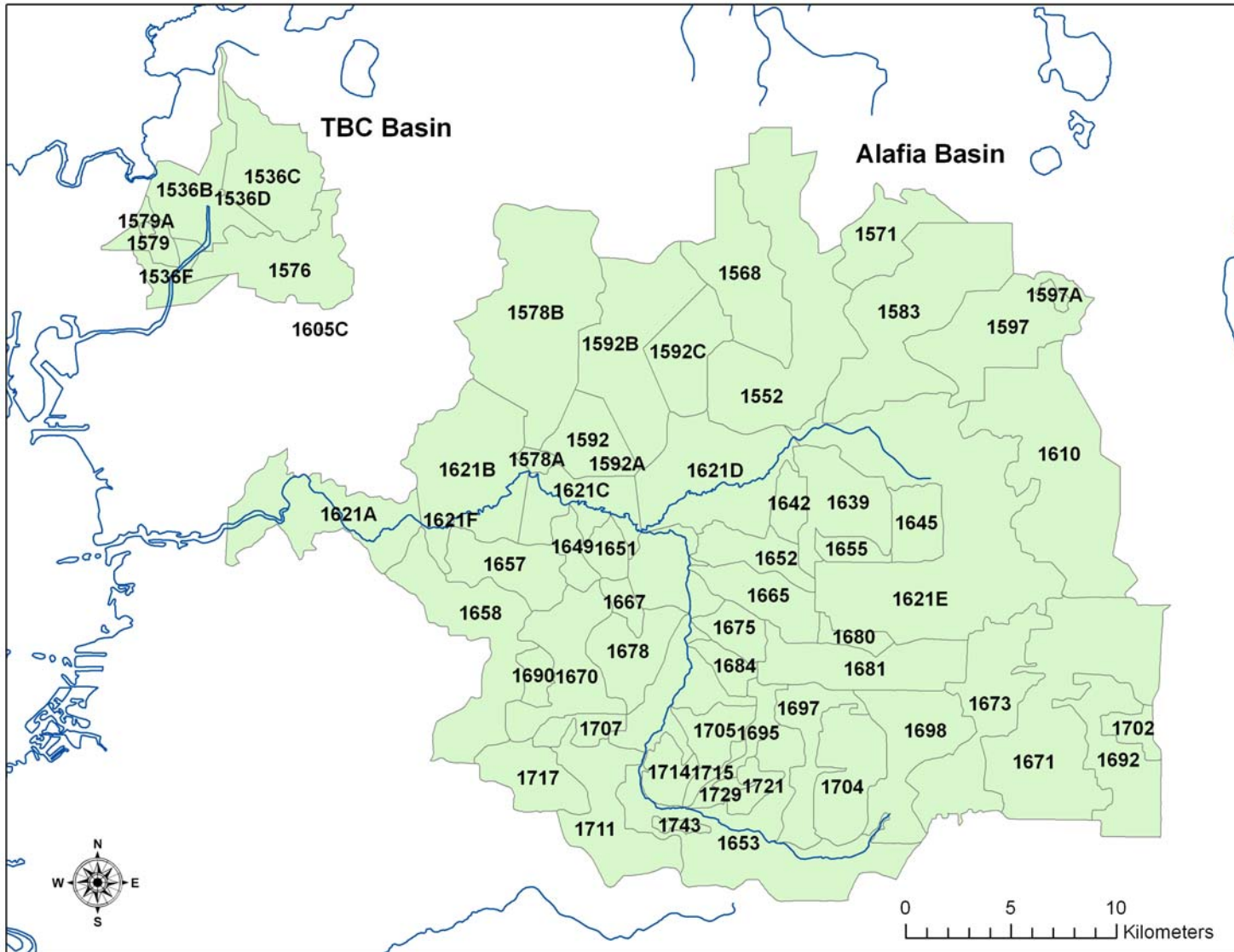


Figure 1. FDEP WBIDS comprising the geographic scope assessed as part of the Tampa Bay Water potential reclassification petition.

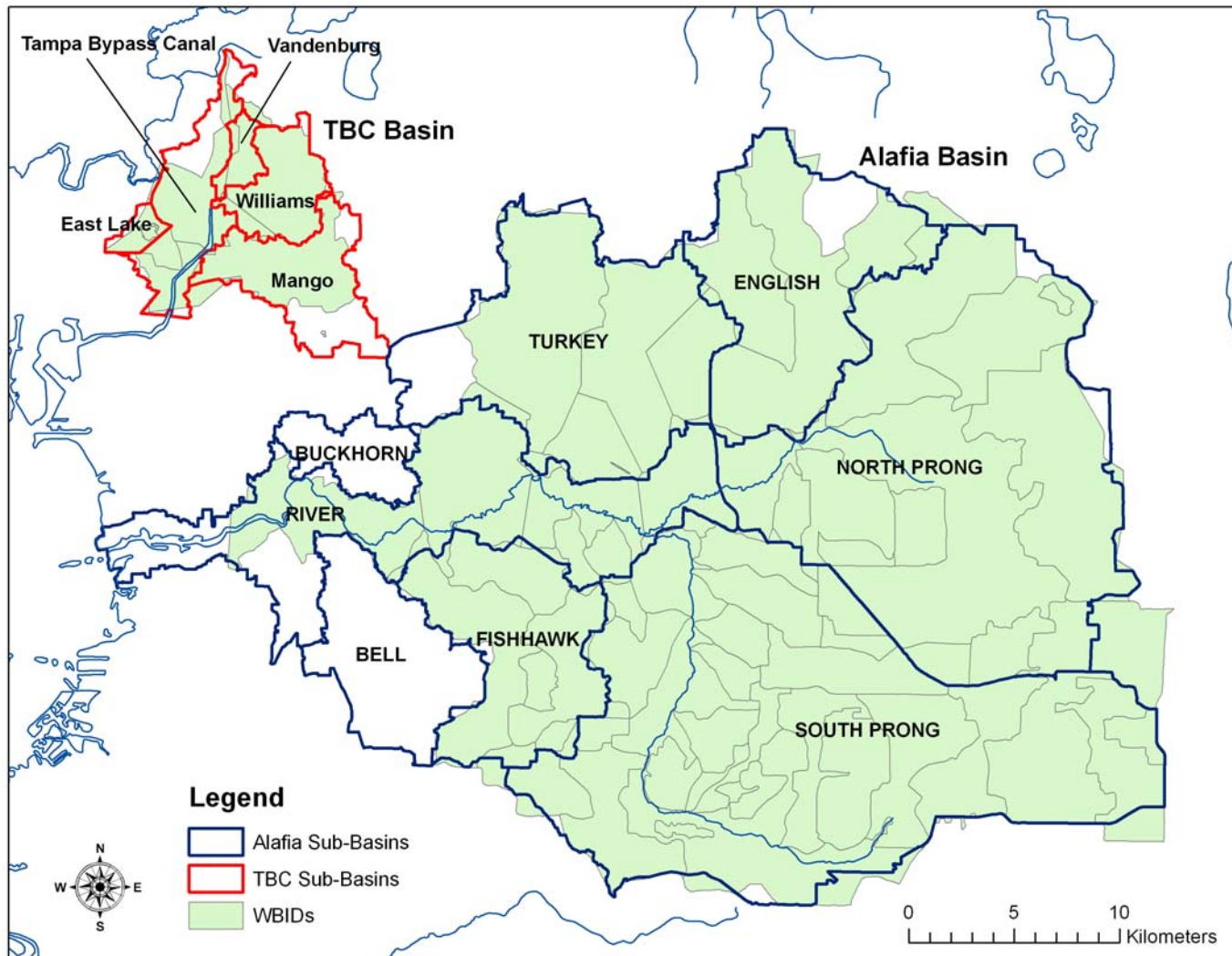


Figure 2. EPC Basin designations comprising the geographic scope assessed as part of the Tampa Bay Water potential reclassification petition.

Appendix 1
Water Quality Time Series plots by WBID and Constituent

Appendix 2
Water Quality Time Series plots by Hillsborough County Sub-basin and
Constituent