

## **Main Report**

### **Chapter 6**

#### **Figures**

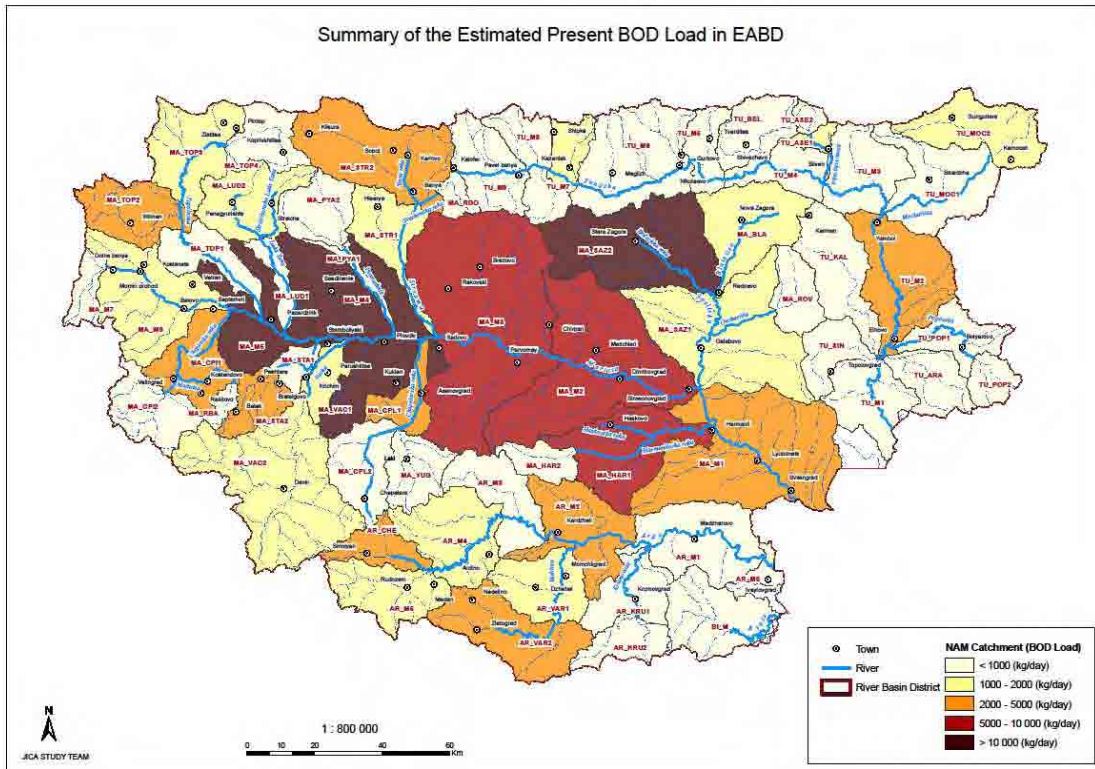


Figure 6.2.1 Present BOD Load in EABD

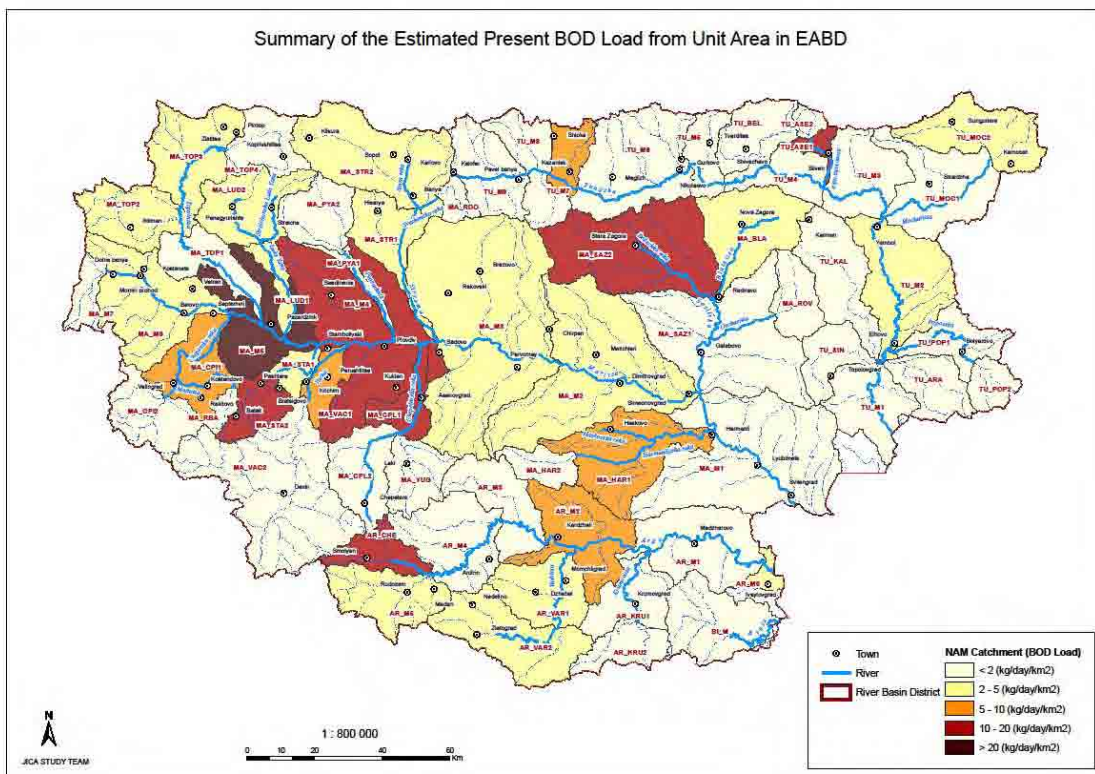
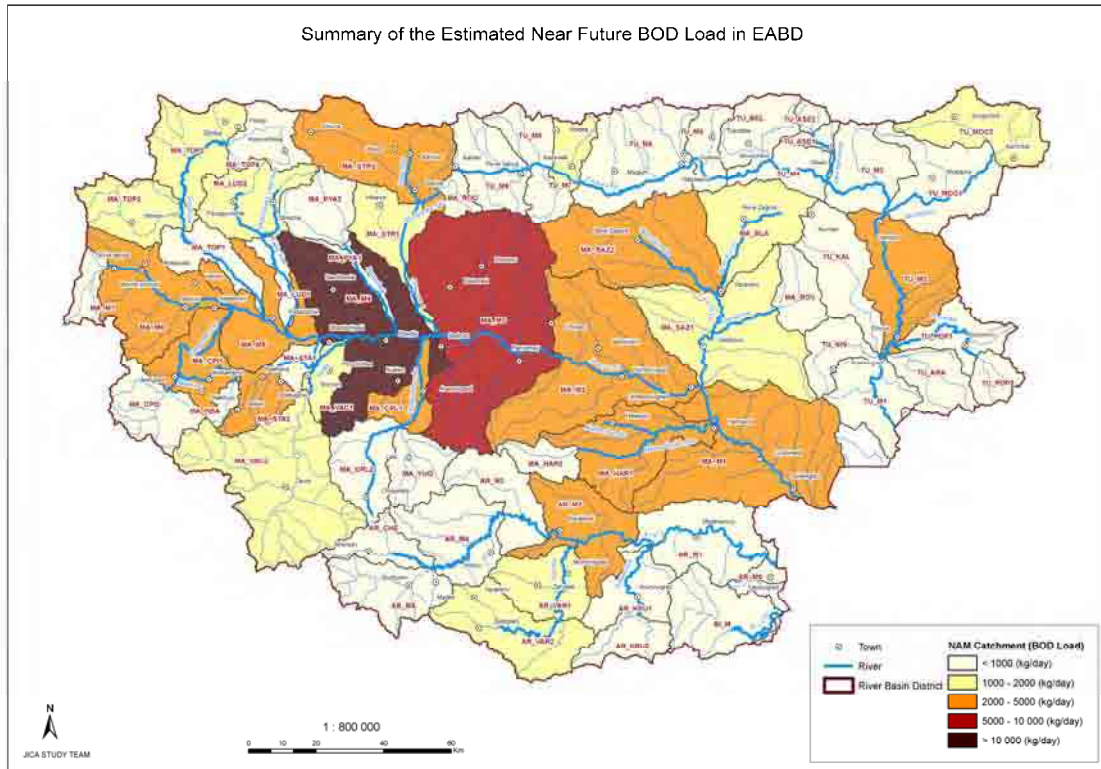
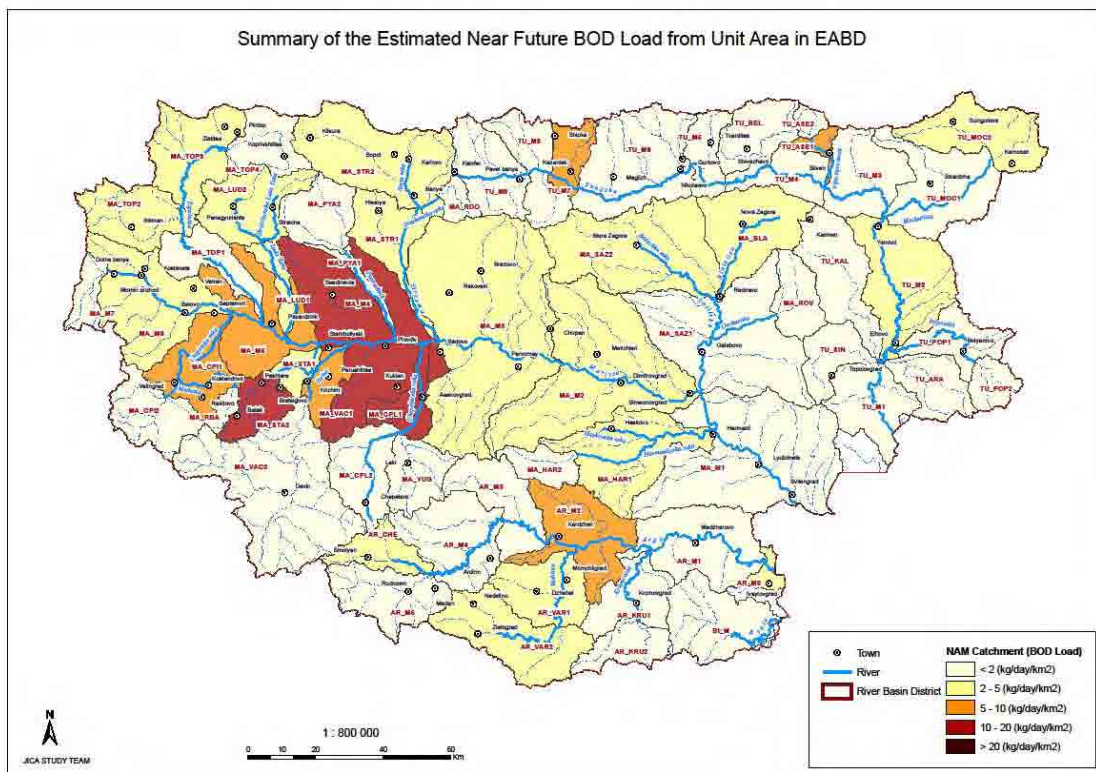


Figure 6.2.2 Present BOD Load from Unit Area in EABD



**Figure 6.2.3** Near Future BOD Load in EABD (with under-constructed and tendering WWTPs)



**Figure 6.2.4** Near Future BOD Load from Unit Area in EABD (with under-constructed and tendering WWTPs)



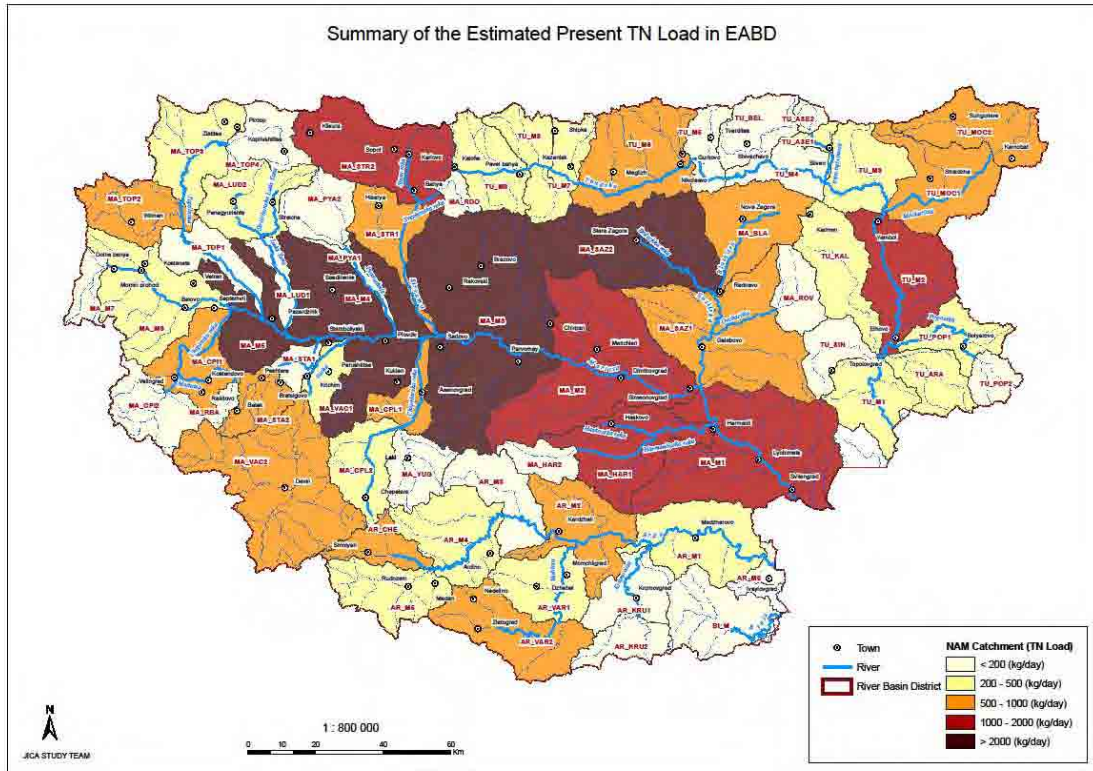


Figure 6.2.5 Present TN Load in EABD

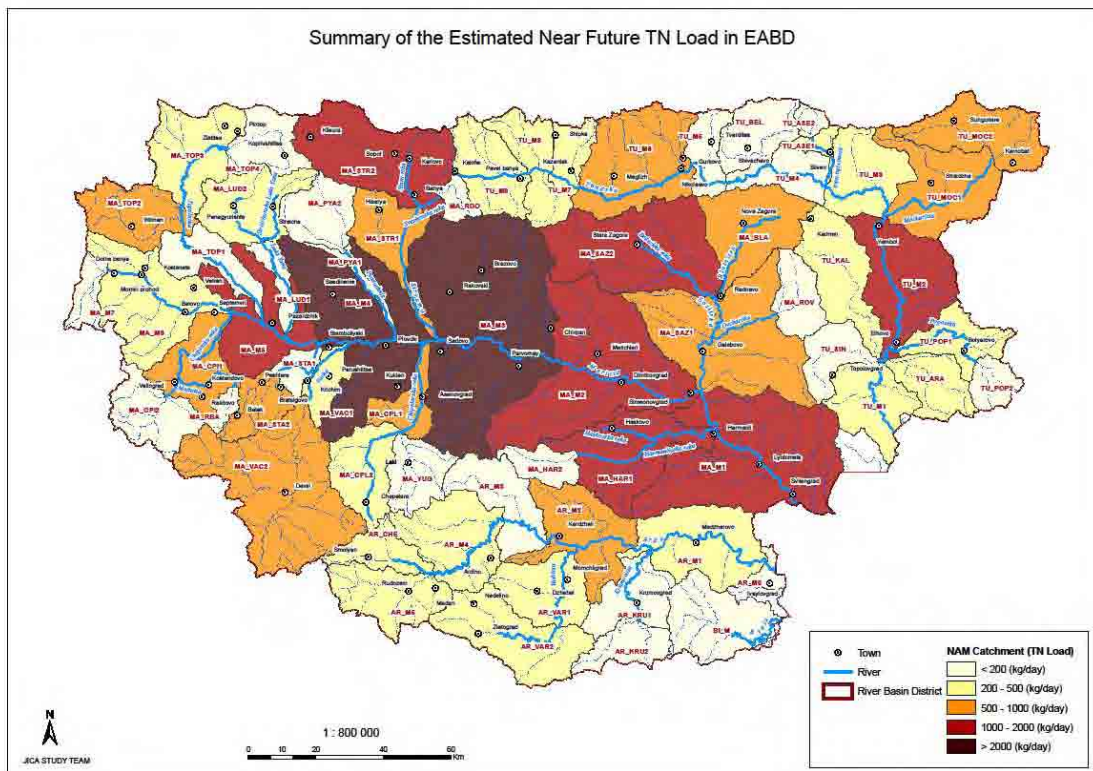
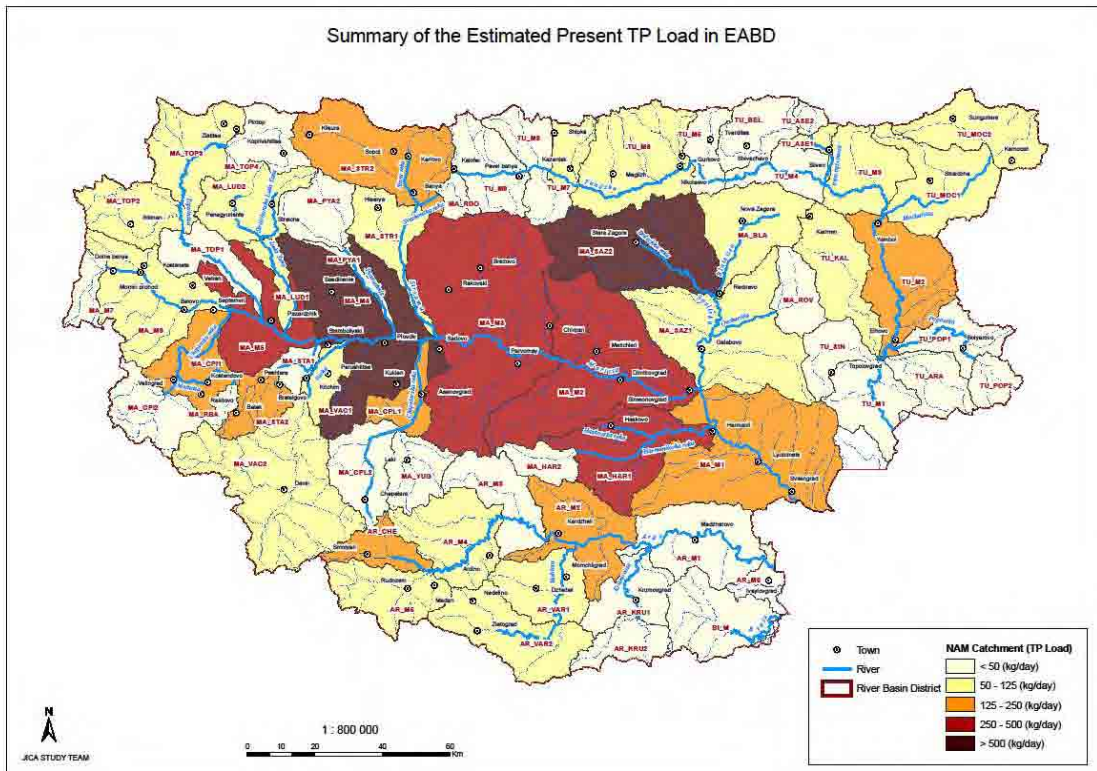
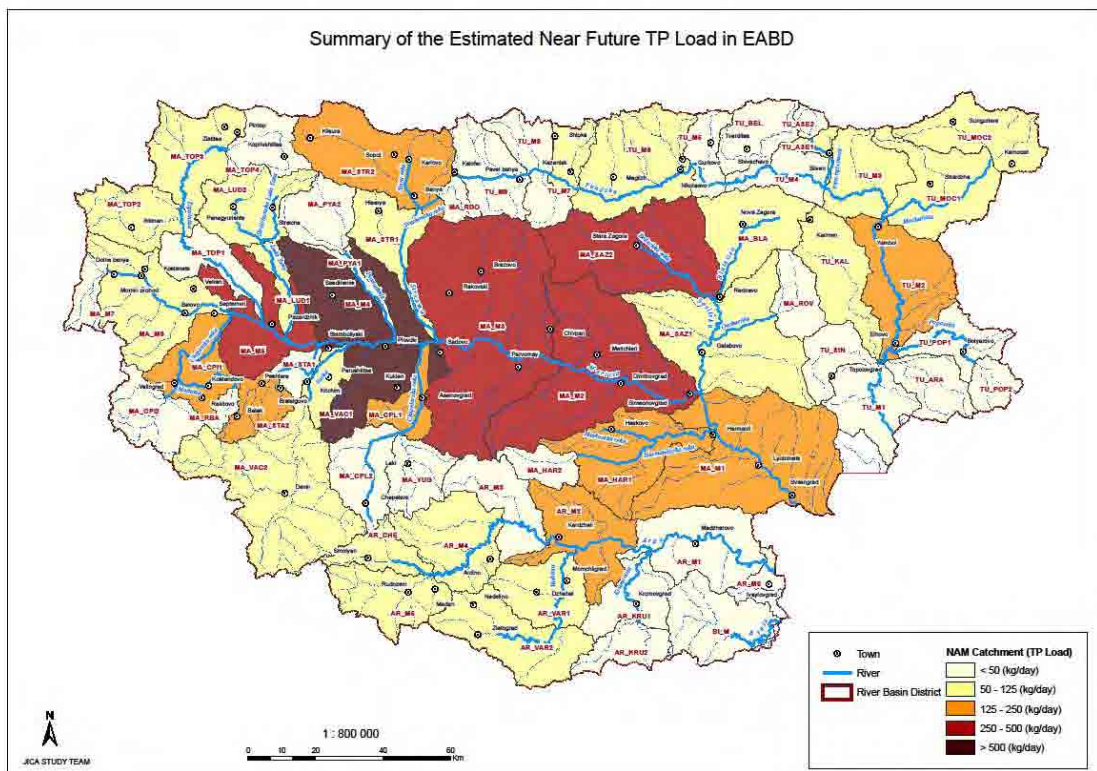


Figure 6.2.6 Near Future TN Load in EABD



**Figure 6.2.7 Present TP Load in EABD**



**Figure 6.2.8 Near Future TP Load in EABD**



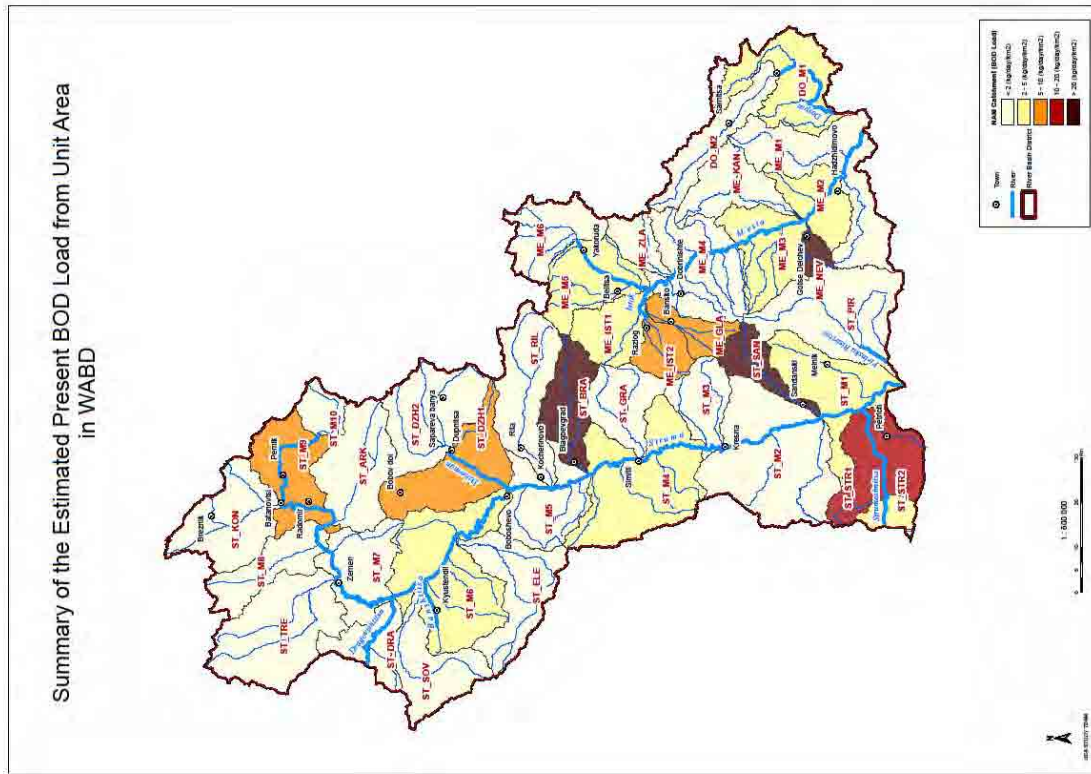


Fig. 6.2.10 Present BOD Loads from Unit Area in WABD

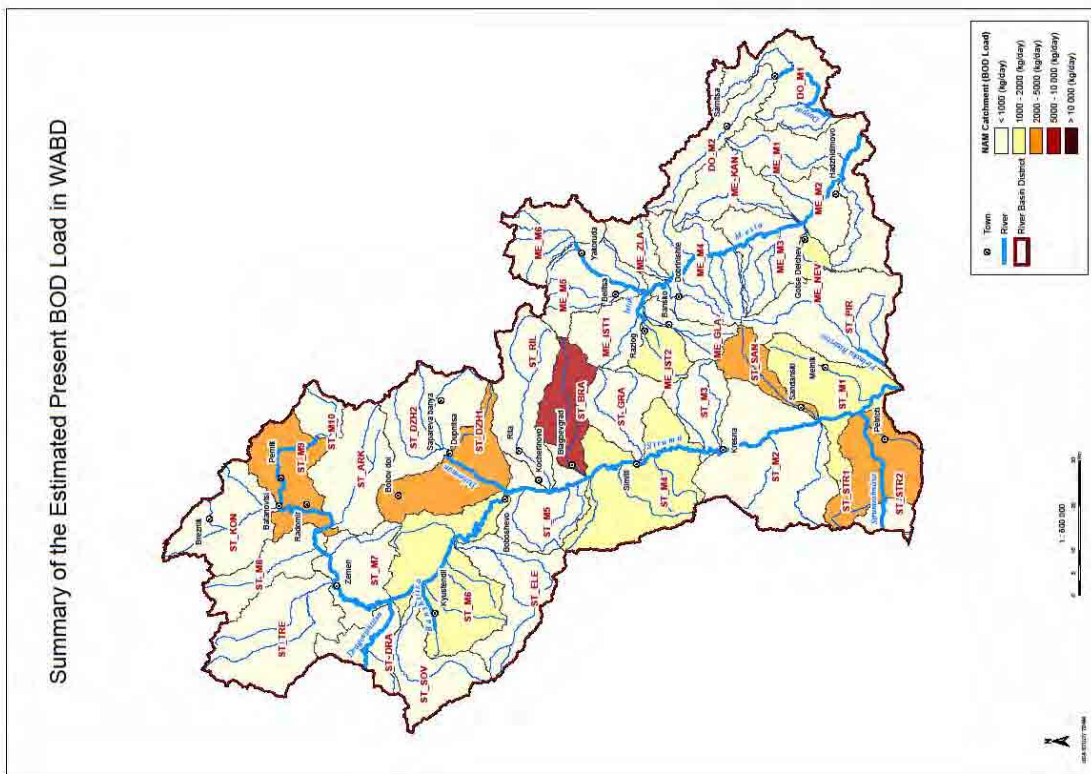


Fig 6.2.9 Present BOD Loads in WABD

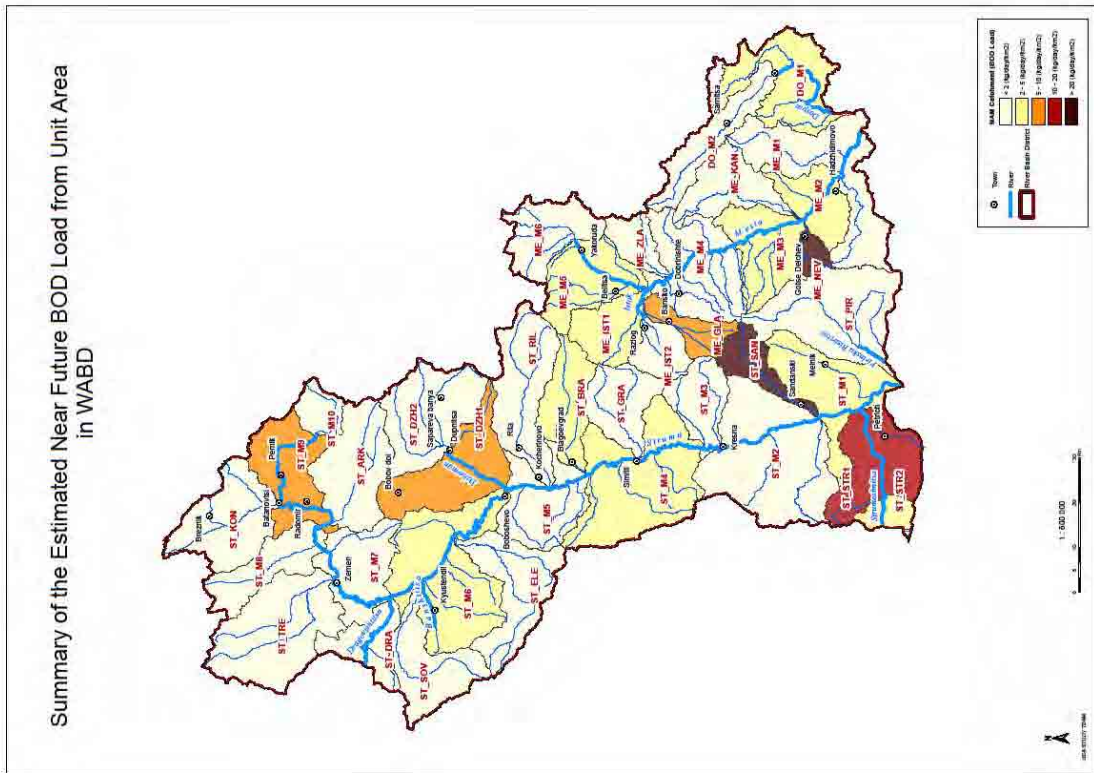


Fig. 6.2.12 Near Future BOD Loads from Unit Area in WABD

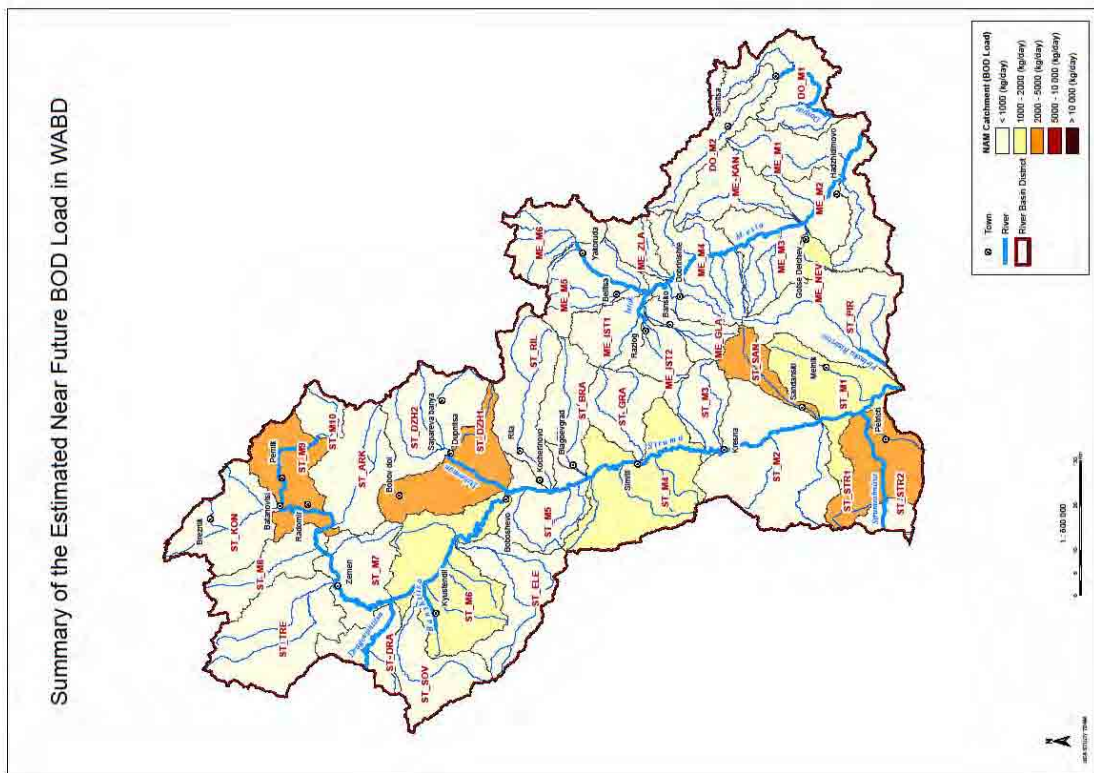


Fig. 6.2.11 Near Future BOD Loads in WABD with Under-constructed and Tendering WWTPs



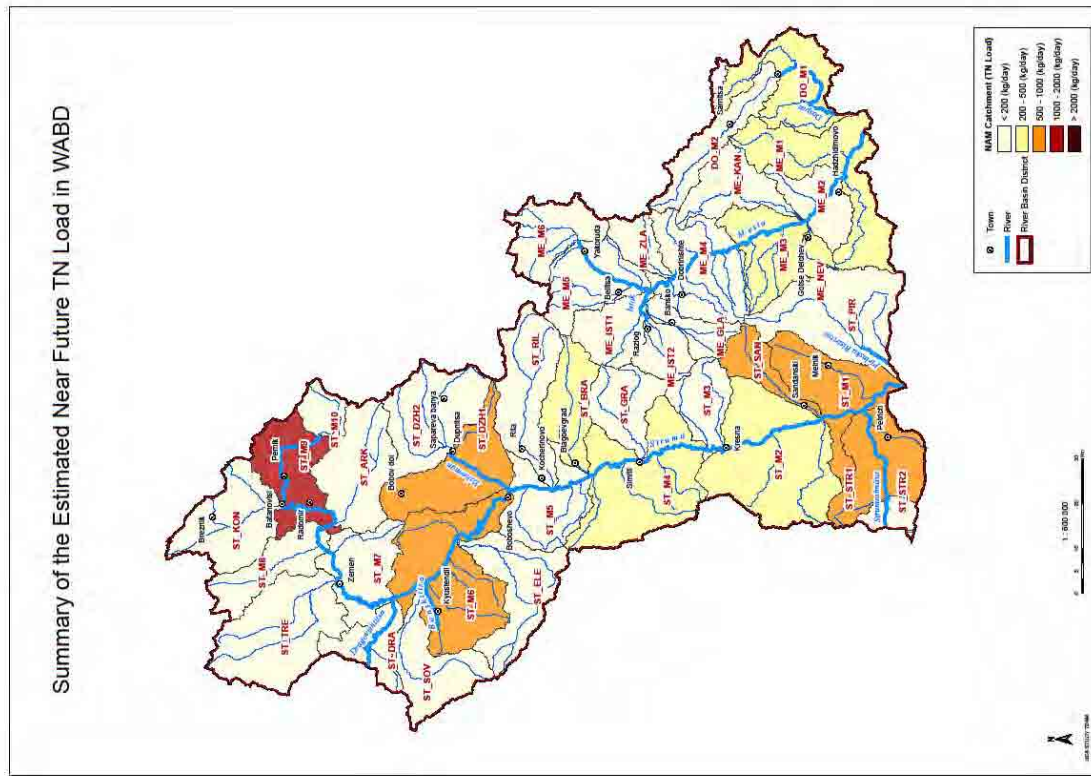


Fig. 6.2.14 Near Future TN Loads in WABD

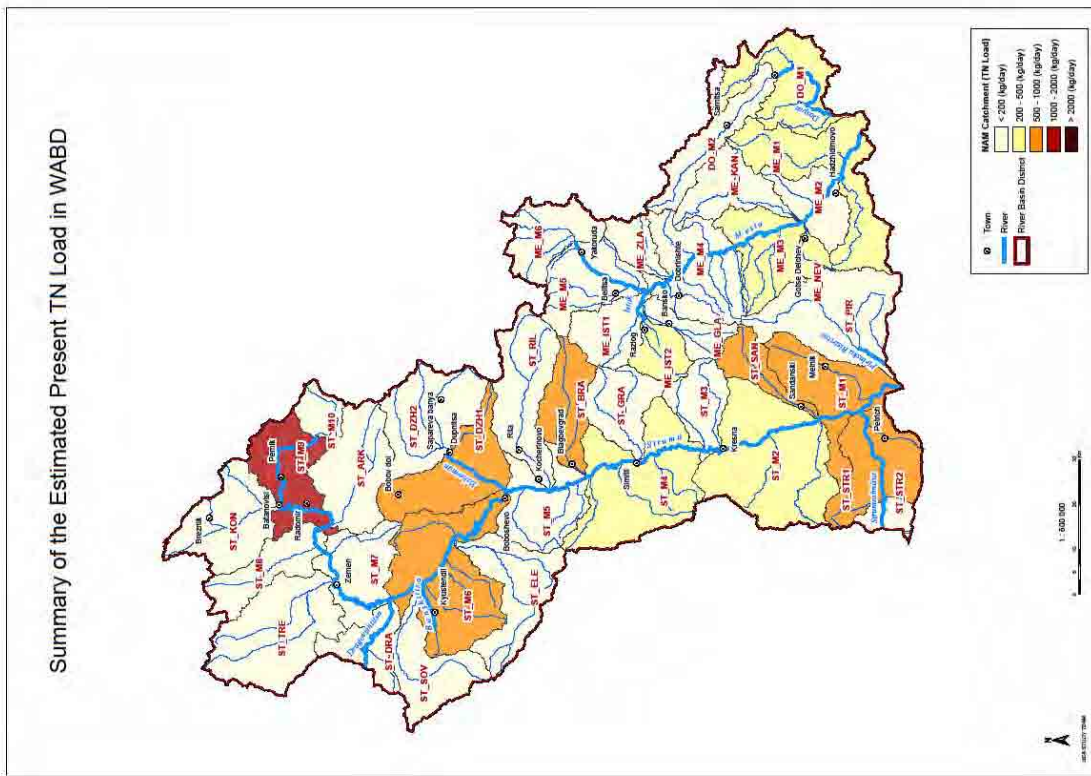


Fig. 6.2.13 Present TN Loads in WABD



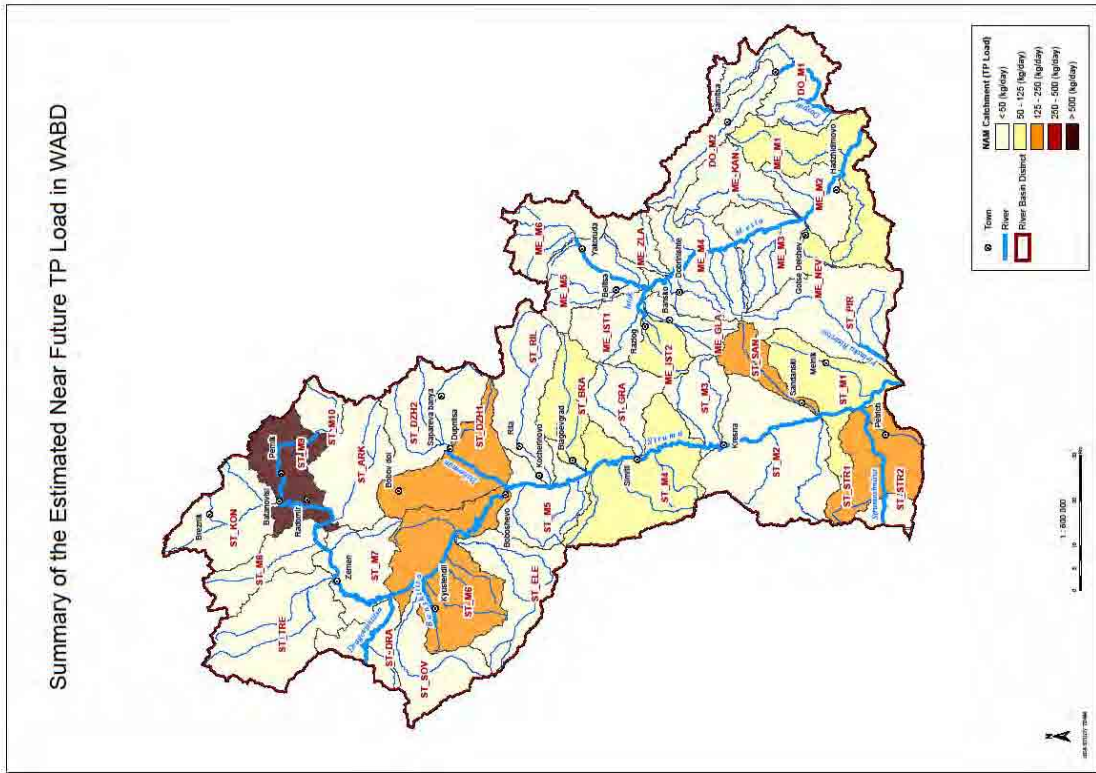


Fig. 6.2.16 Near Future TP Loads in WABD

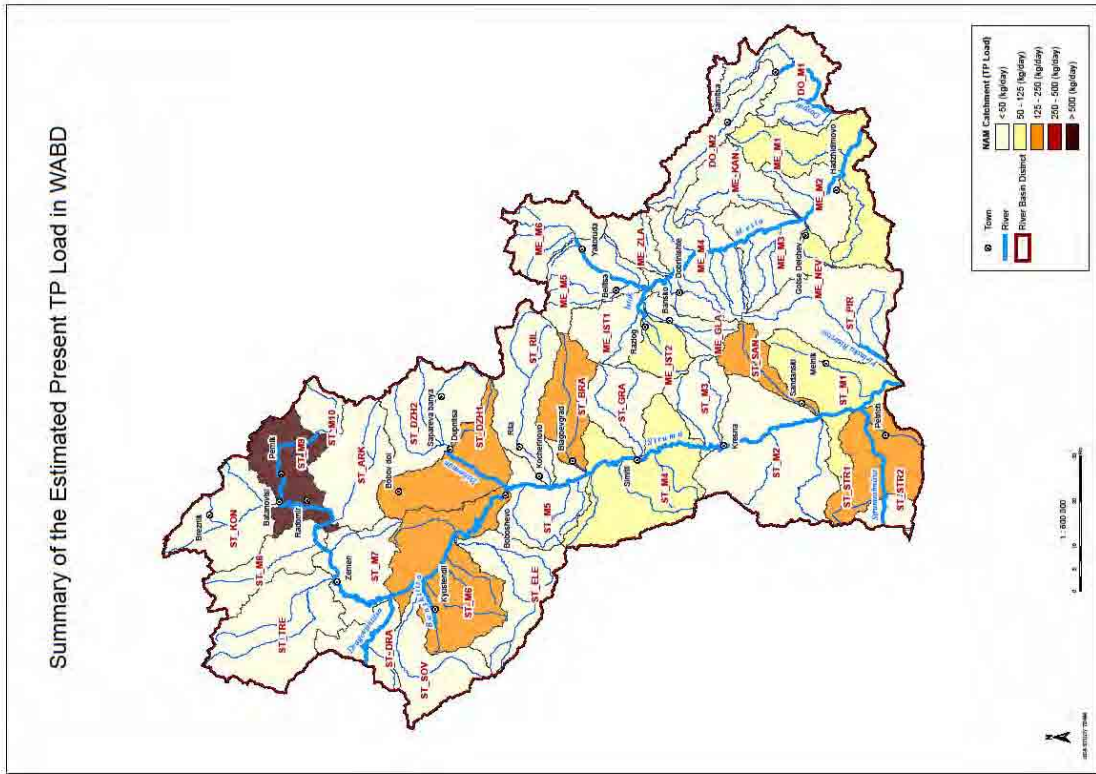
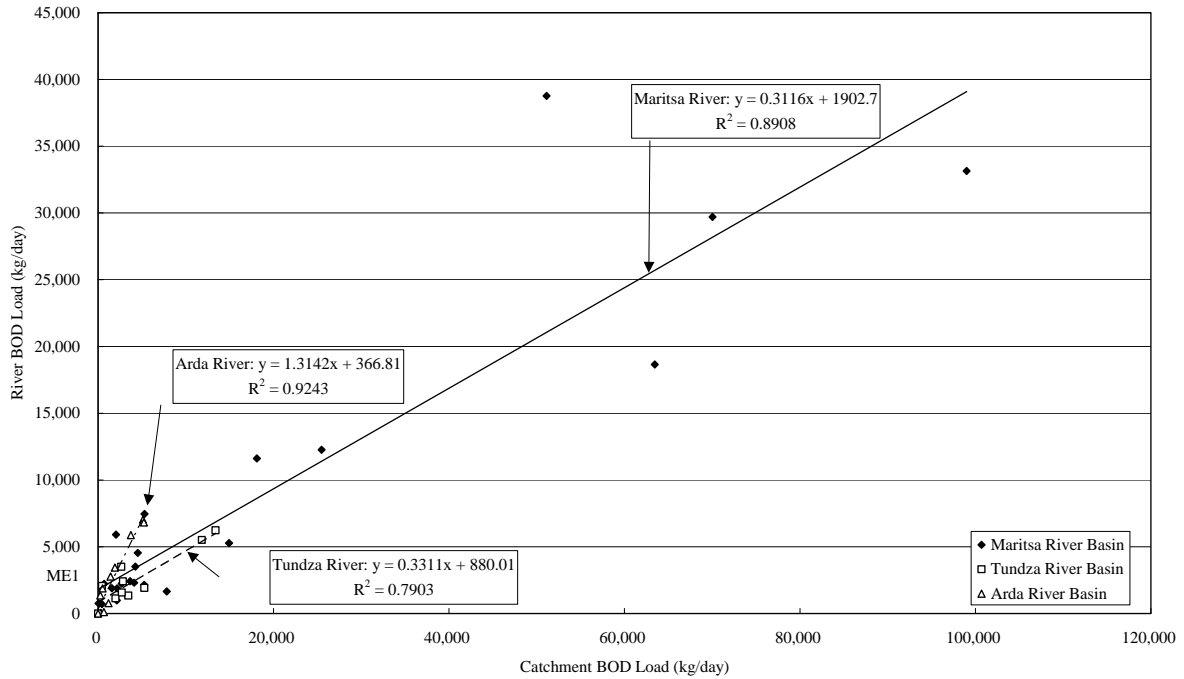
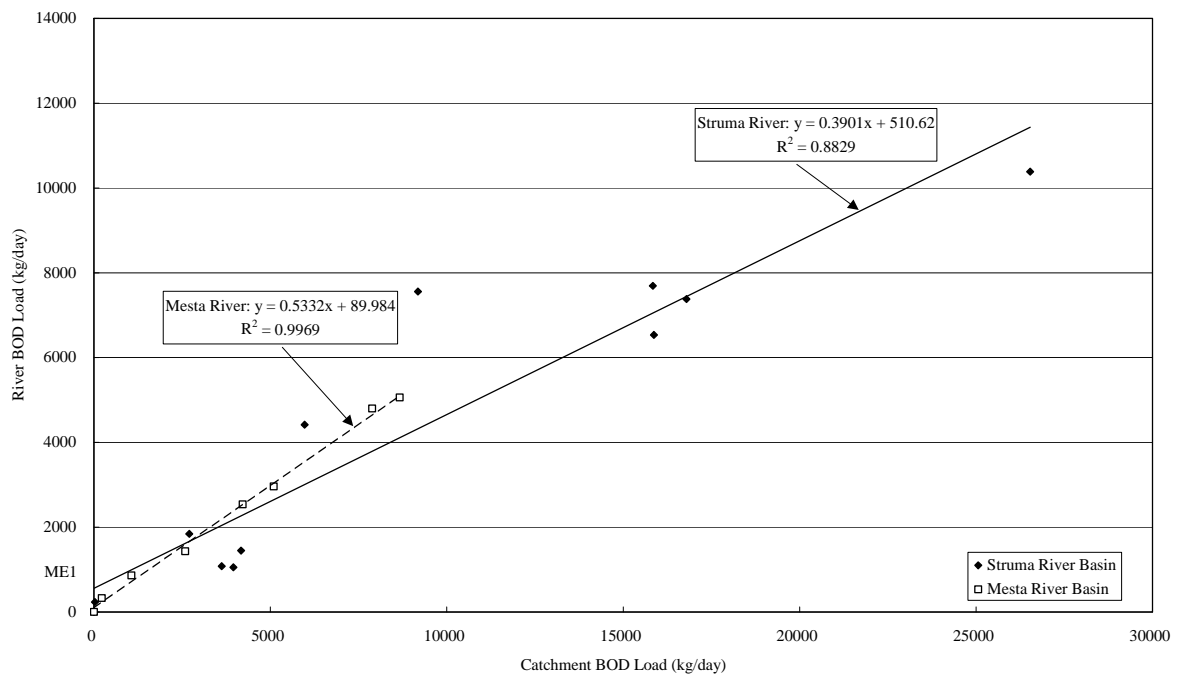


Fig. 6.2.15 Present TP Loads in WABD



**Figure 6.2.17 EABD: Co-relation between Present Catchment BOD Load and River BOD**



**Figure 6.2.18 WABD: Co-relation between Present Catchment BOD Load and River BOD Load**



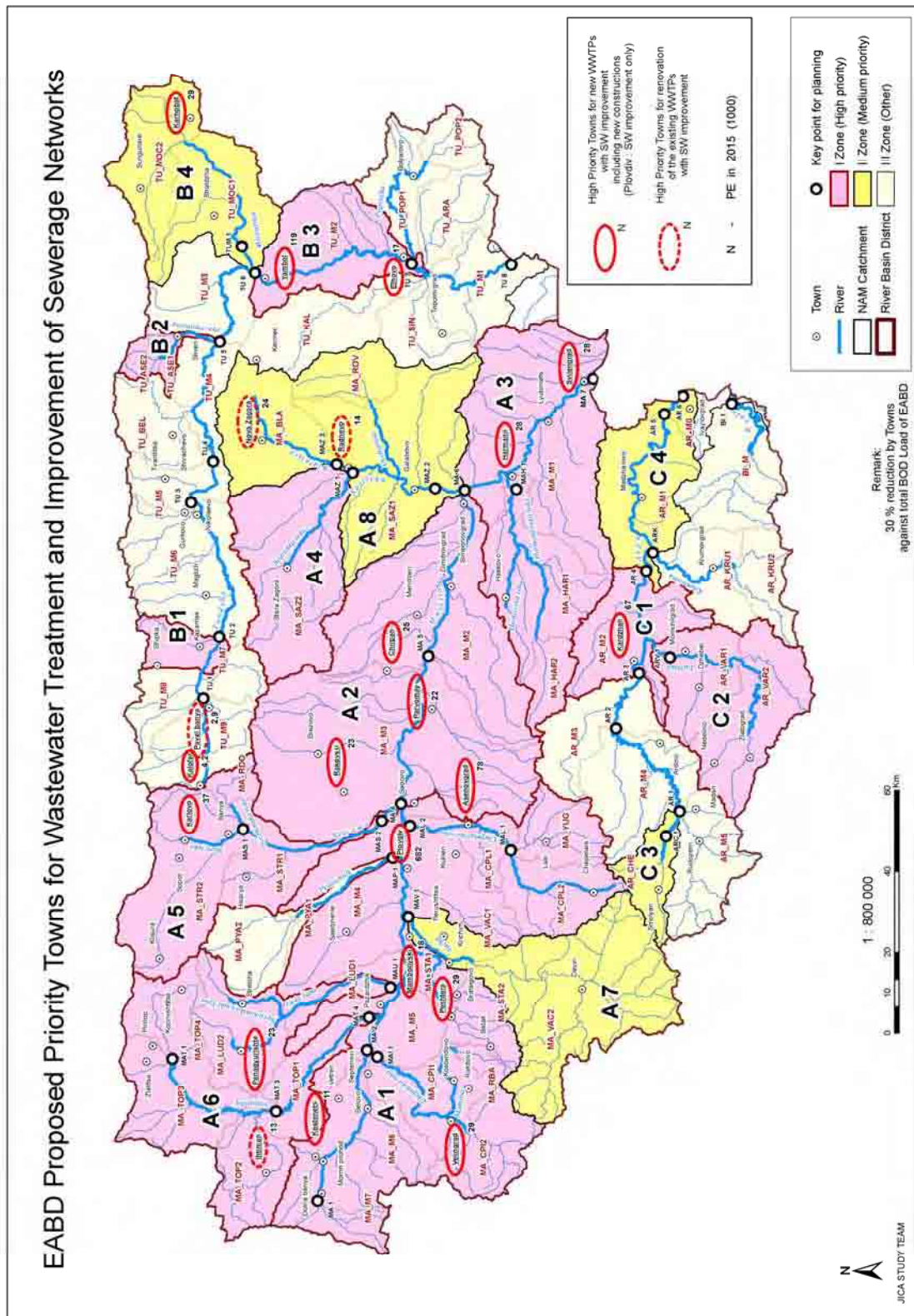
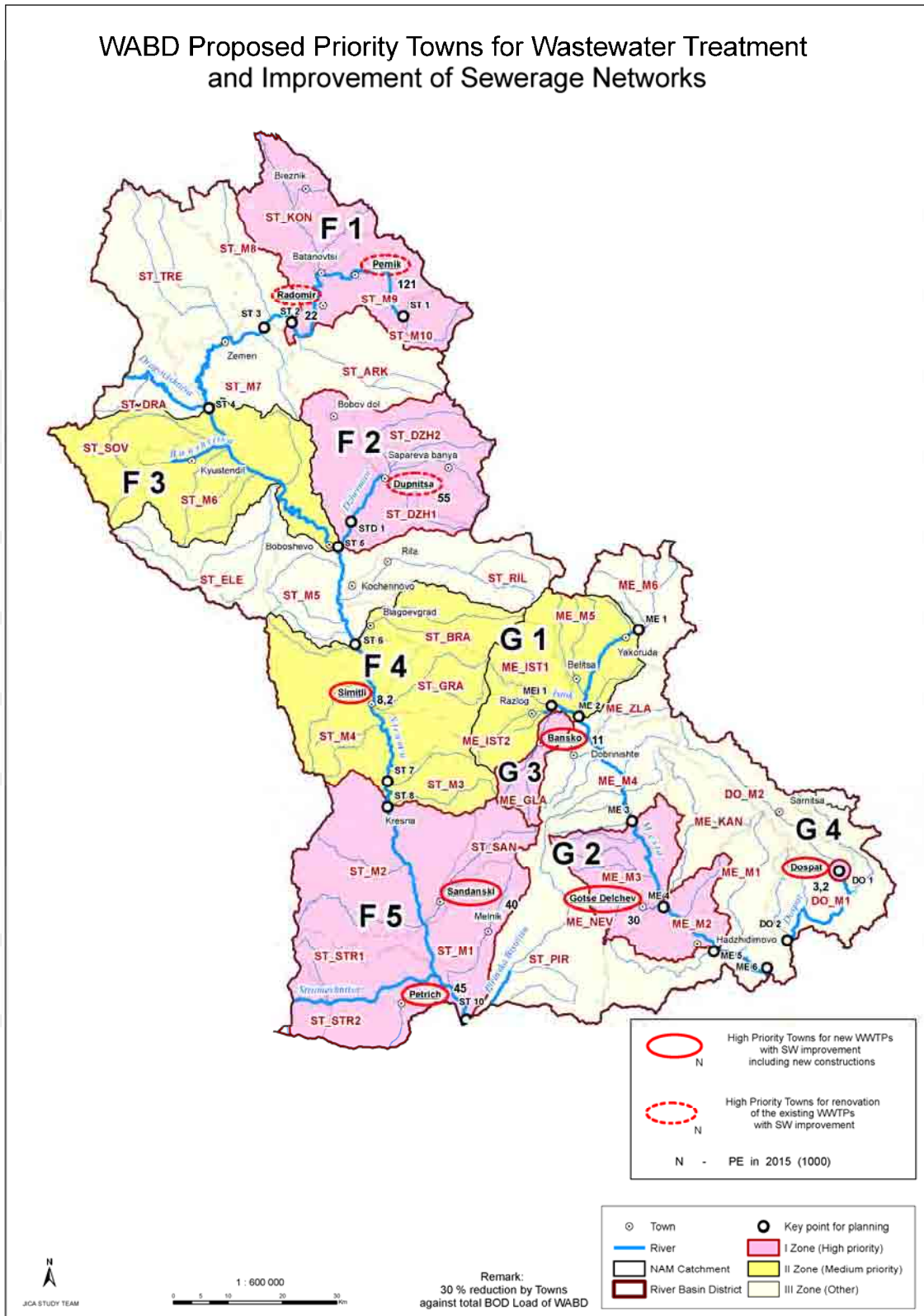


Figure 6.2.19 EABD Proposed High Priority Towns for Wastewater Treatment and Improvement of Sewerage Networks



**Figure 6.2.20 WABD Proposed High Priority Towns for Wastewater Treatment and Improvement of Sewerage Networks**



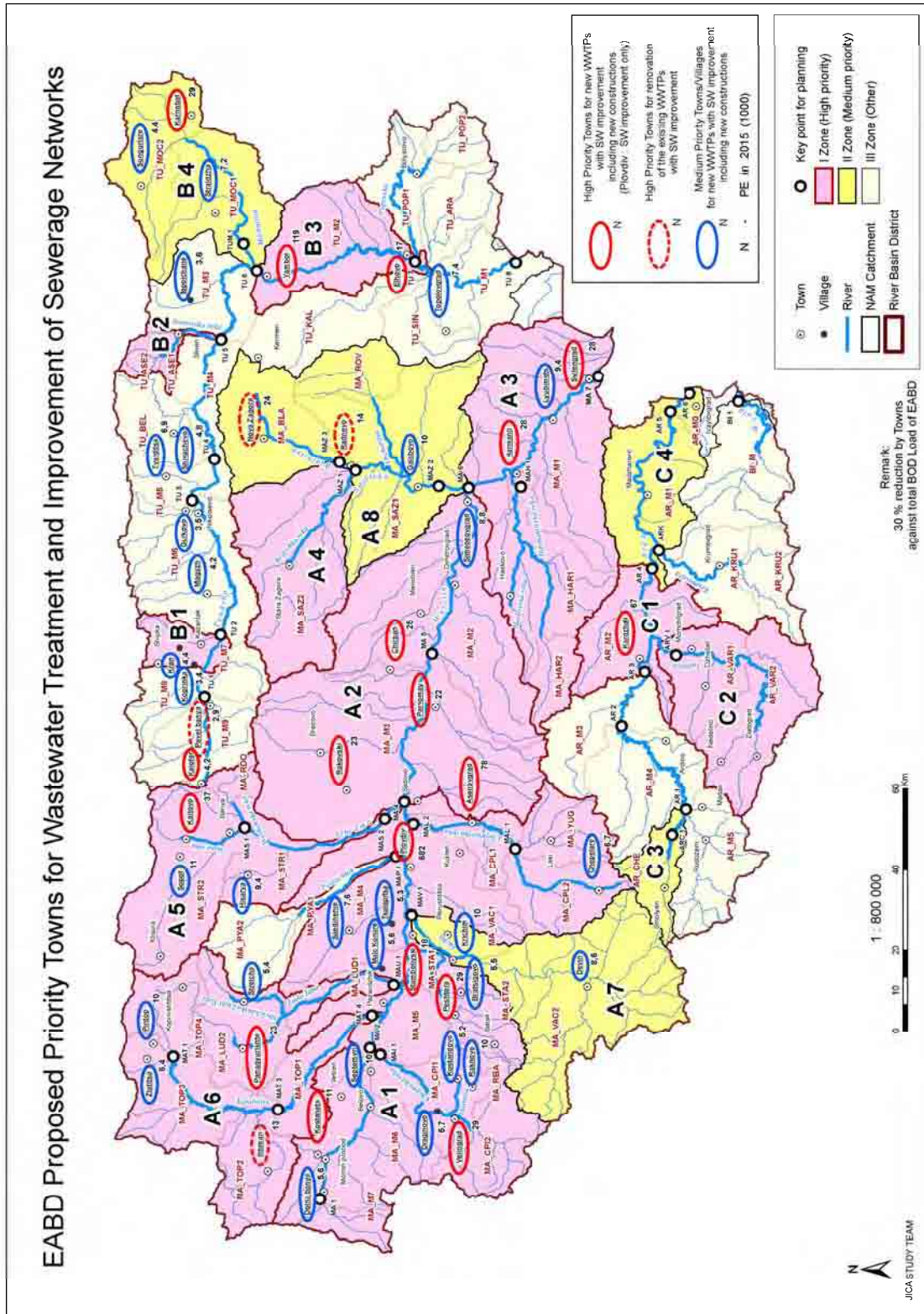
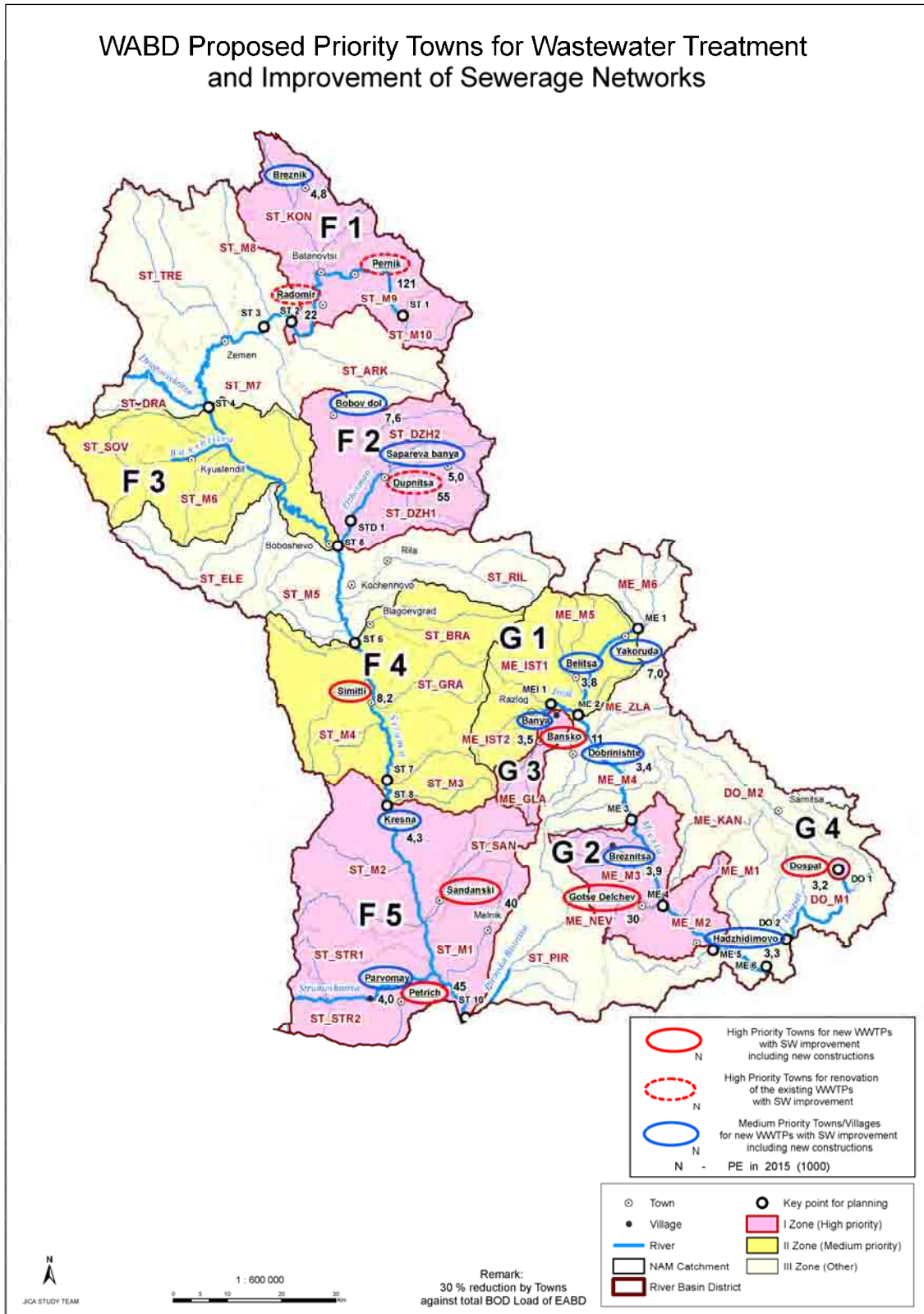


Figure 6.2.21 EABD Proposed High and Medium Priority Towns for Wastewater Treatment and Improvement of Sewerage Networks



**Figure 6.2.22 WABD Proposed High and Medium Priority Towns for Wastewater Treatment and Improvement of Sewerage Networks**



No.	Town / Settlement	PE in 2015	New Construction or Renovation of the WWTPs		Improvement (including Expansion) or New Sewerage Networks			Total Cost of WWTPs and Sewerage (EUR)	Acc. Cost (EUR)	Year											Occurrence of Cost		
			New or Renovat.	Sub-total Cost of WWTPs (EUR)	Improv. / New	Required Length (m)	Sub-total Cost of Sewerage Improvement (EUR)			2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2009 to 2014	2015 to 2020
<b>I. High Priority Towns and Settlements in EABD</b>																							
<b>I-1 New WWTPs and Improvements of SW in the Maritsa River Basin</b>																							
I-1-1	Asenovgrad	78,054	New	19,587,651	Improv.	249,773	119,291,489	138,879,141	138,879,141												138,879,141		
I-1-2	Plovdiv	681,985	-	0	Improv.	613,787	552,408,012	552,408,012	691,287,153												552,408,012		
I-1-3	Karlovo	37,181	New	13,107,056	Improv.	148,722	60,678,576	73,785,632	765,072,784												73,785,632		
I-1-4	Velinograd	28,752	New	10,994,765	Improv.	117,883	47,106,127	58,100,892	823,173,676												58,100,892		
I-1-5	Peshtera	28,691	New	10,971,247	Improv.	117,631	47,005,368	57,976,615	881,150,291												57,976,615		
I-1-6	Hamnanli	28,538	New	10,912,740	Improv.	117,004	46,754,699	57,667,439	938,817,729												57,667,439		
I-1-7	Svilengrad	28,050	New	10,726,320	Improv.	115,005	45,817,992	56,544,312	995,362,041												56,544,312		
I-1-8	Chirpan	25,413	New	10,173,459	Improv.	106,735	42,266,902	52,440,361	1,047,802,402													52,440,361	
I-1-9	Rakovski	23,453	New	9,528,751	New	98,501	38,887,997	48,416,748	1,096,219,150													48,416,748	
I-1-10	Panagyurishte	23,029	New	9,356,796	Improv.	96,723	38,186,231	47,543,027	1,143,762,178													47,543,027	
I-1-11	Parvomay	22,200	New	9,019,860	Improv.	93,240	36,699,264	45,719,124	1,189,481,302													45,719,124	
I-1-12	Stamboliyski	18,068	New	8,204,452	Improv.	83,111	32,413,095	40,617,547	1,230,098,848													40,617,547	
I-1-13	Kostenets	11,048	New	5,215,121	Improv.	62,976	24,182,738	29,397,859	1,259,496,707													29,397,859	
		<b>1,034,460</b>		<b>127,798,218</b>		<b>2,021,089</b>	<b>1,131,698,489</b>	<b>1,259,496,707</b>													<b>995,362,041</b>	<b>264,134,666</b>	
<b>I-2 New WWTPs and Improvements of SW in the Tundzha River Basin</b>																							
I-2-1	Yambol	118,971	New	20,614,700	Improv.	297,428	162,395,415	183,010,115	183,010,115													183,010,115	
I-2-2	Kamobat	28,916	New	11,057,287	Improv.	118,554	47,373,999	58,431,286	241,441,401													58,431,286	
I-2-3	Elhovo	16,808	New	7,331,011	Improv.	80,676	31,366,829	38,697,840	280,139,241													38,697,840	
I-2-4	Kalofer	4,229	New	2,299,304	Improv.	30,447	10,924,513	13,223,817	293,363,058													13,223,817	
		<b>168,923</b>		<b>41,302,303</b>		<b>527,104</b>	<b>252,060,755</b>	<b>293,363,058</b>														<b>241,441,401</b>	<b>51,921,657</b>
<b>I-3 New WWTPs and Improvements of SW in the Arda River Basin</b>																							
I-3-1	Kardzhali	67,346	New	17,302,850	Improv.	228,976	104,962,657	122,265,508	122,265,508													122,265,508	
		<b>67,346</b>		<b>17,302,850</b>		<b>228,976</b>	<b>104,962,657</b>	<b>122,265,508</b>														<b>122,265,508</b>	<b>0</b>
<b>I-4 Renovation of the Existing WWTPs and Improvements of SW</b>																							
I-4-1	Nova Zagora	36,185	Renovat.	6,003,009	Improv.	144,738	59,053,104	65,056,113	65,056,113													65,056,113	
I-4-2	Radnevo	20,691	Renovat.	6,007,115	Improv.	88,971	34,805,573	40,812,687	105,868,800													40,812,687	
I-4-3	Ihtiman	20,234	Renovat.	5,874,291	Improv.	87,004	34,035,984	39,910,275	145,779,075													39,910,275	
I-4-4	Pavel banya	4,407	Renovat.	1,762,525	Improv.	32,171	11,465,780	13,228,305	159,007,380													13,228,305	
		<b>81,516</b>		<b>19,646,939</b>		<b>352,884</b>	<b>139,360,441</b>	<b>159,007,380</b>														<b>159,007,380</b>	<b>0</b>
		<b>1,352,245</b>		<b>206,050,310</b>		<b>3,130,054</b>	<b>1,628,082,342</b>	<b>1,834,132,652</b>														<b>1,518,076,329</b>	<b>316,056,323</b>
<b>II. High Priority Towns and Settlements in WABD</b>																							
<b>II-1 New WWTPs and Improvements of SW in the Struma River Basin</b>																							
II-1-1	Petrich	45,020	New	12,324,088	Improv.	171,074	71,235,255	83,559,343	83,559,343													83,559,343	
II-1-2	Sandanski	40,358	New	11,489,780	Improv.	157,394	64,783,473	76,273,254	159,832,597													76,273,254	
II-1-3	Simithi	8,242	New	3,790,312	No info.	51,922	19,501,933	23,292,245	183,124,842													23,292,245	
		<b>93,619</b>		<b>27,604,180</b>		<b>380,390</b>	<b>155,520,662</b>	<b>183,124,842</b>														<b>159,832,597</b>	<b>23,292,245</b>
<b>II-2 New WWTPs and Improvements of SW in the Mesta River Basin</b>																							
II-2-1	Gotse Delchev	30,185	New	10,576,649	Improv.	123,756	49,750,093	60,326,742	60,326,742													60,326,742	
II-2-2	Bansko	11,493	New	5,034,065	Improv.	64,362	24,715,192	29,749,258	90,075,999													29,749,258	
		<b>41,678</b>		<b>15,610,714</b>		<b>188,119</b>	<b>74,465,285</b>	<b>90,075,999</b>														<b>90,075,999</b>	<b>0</b>
<b>II-3 New WWTPs and Improvements of SW in the Dospat River Basin</b>																							
II-3-1	Dospat	3,218	New	1,515,384	Improv.	23,494	8,457,955	9,973,339	9,973,339													9,973,339	
		<b>3,218</b>		<b>1,515,384</b>		<b>23,494</b>	<b>8,457,955</b>	<b>9,973,339</b>														<b>0</b>	<b>9,973,339</b>
<b>II-4 Renovation of the Existing WWTPs and Improvements of SW</b>																							
II-4-1	Pemik	121,350	Renovat.	11,110,806	Improv.	327,645	174,962,430	186,073,236	186,073,236													186,073,236	
II-4-2	Dupnitsa	55,224	Renovat.	10,485,657	Improv.	204,329	86,553,680	97,039,337	283,112,573													97,039,337	
II-4-3	Radomir	21,621	Renovat.	5,747,402	Improv.	92,970	36,593,110	42,340,512	325,453,085													42,340,512	
		<b>198,195</b>		<b>27,343,865</b>		<b>624,944</b>	<b>298,109,220</b>	<b>325,453,085</b>														<b>283,112,573</b>	<b>42,340,512</b>
		<b>336,710</b>		<b>72,074,143</b>		<b>1,216,948</b>	<b>536,553,122</b>	<b>608,627,265</b>														<b>533,021,169</b>	<b>75,606,096</b>
				<b>278,124,454</b>			<b>2,164,635,464</b>	<b>2,442,759,918</b>														<b>2,051,097,498</b>	<b>391,662,420</b>

Figure 6.2.23 Implementation Schedule: Practical Scenario



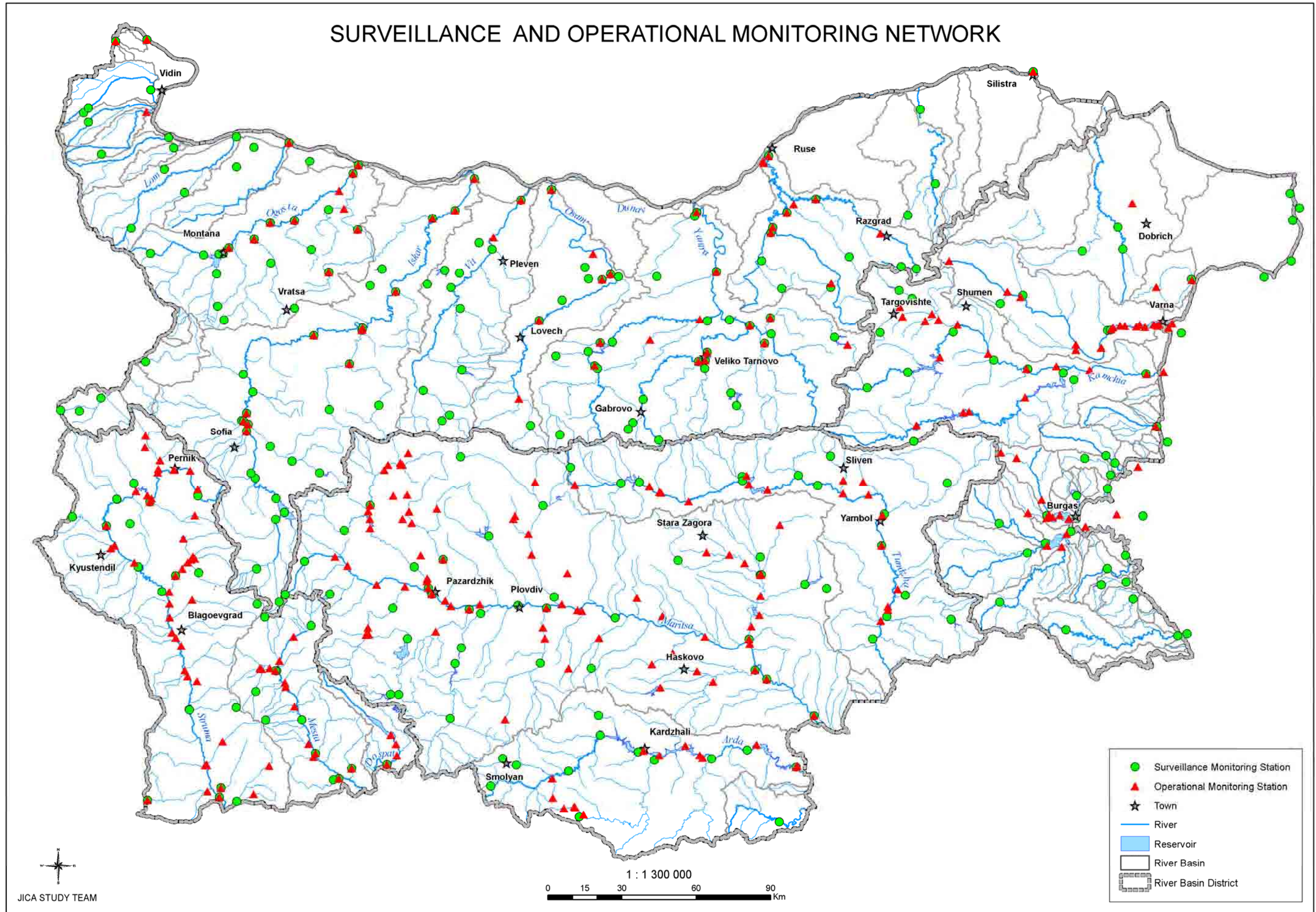


Figure 6.24 Surveillance and Operational Monitoring Network



### Proposed Key and Important Monitoring Zones in EABD and WABD

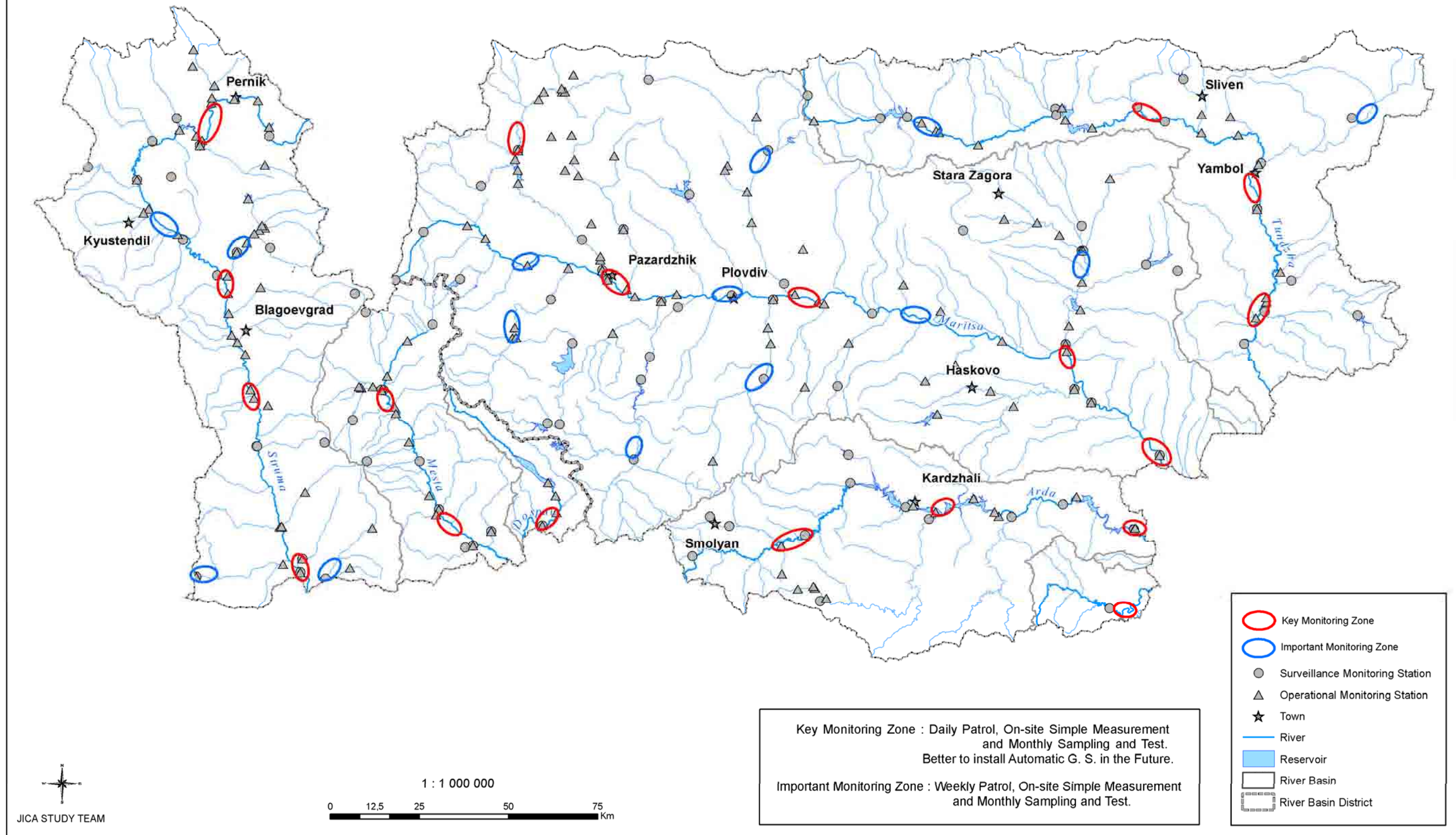


Figure 6.2.25 Proposed Key and Improvement Monitoring Zones in EABD and WABD



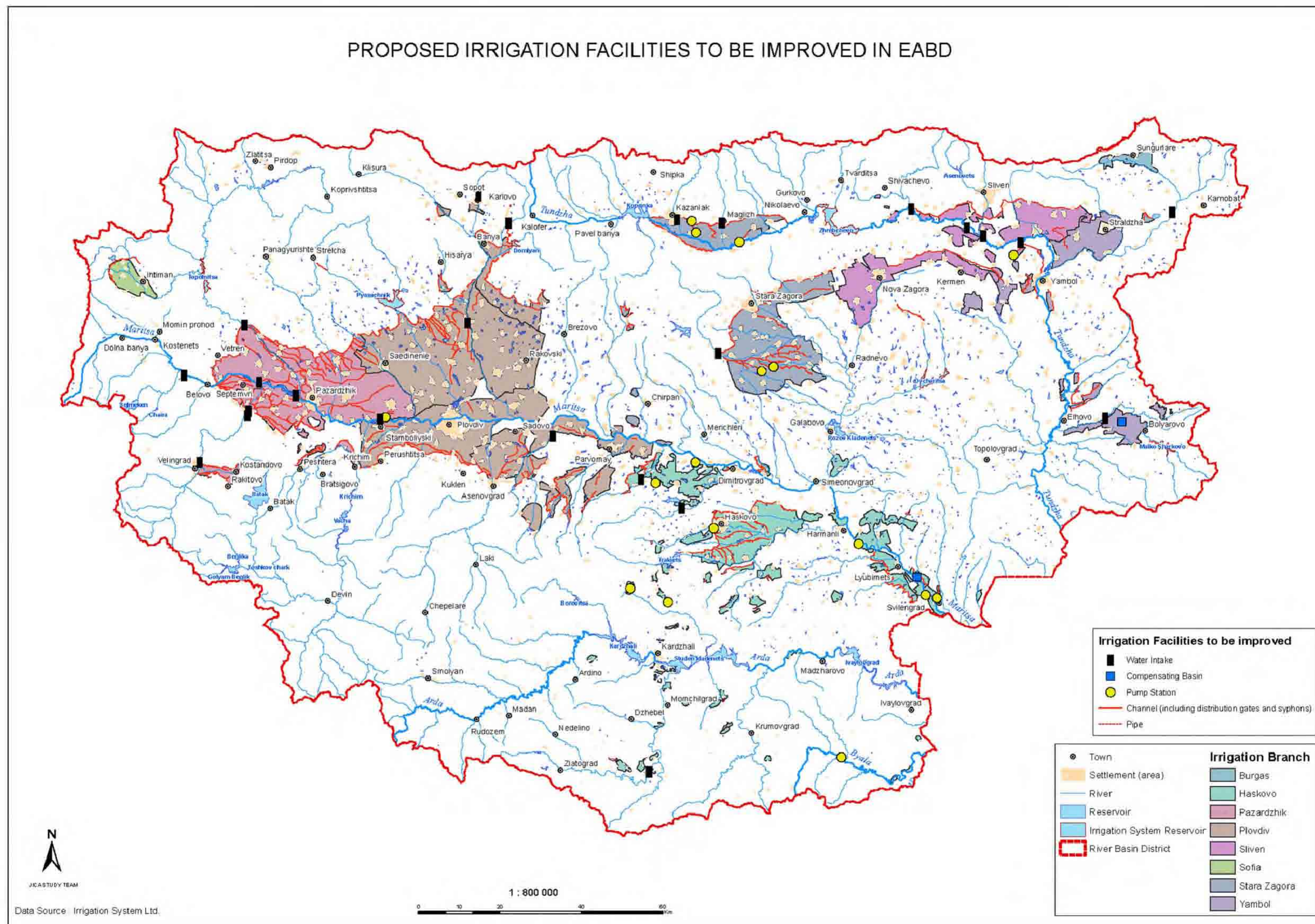


Figure 6.3.1 Proposed Irrigation Facilities to be Improved (EABD)



PROPOSED IRRIGATION FACILITIES TO BE IMPROVED IN WABD

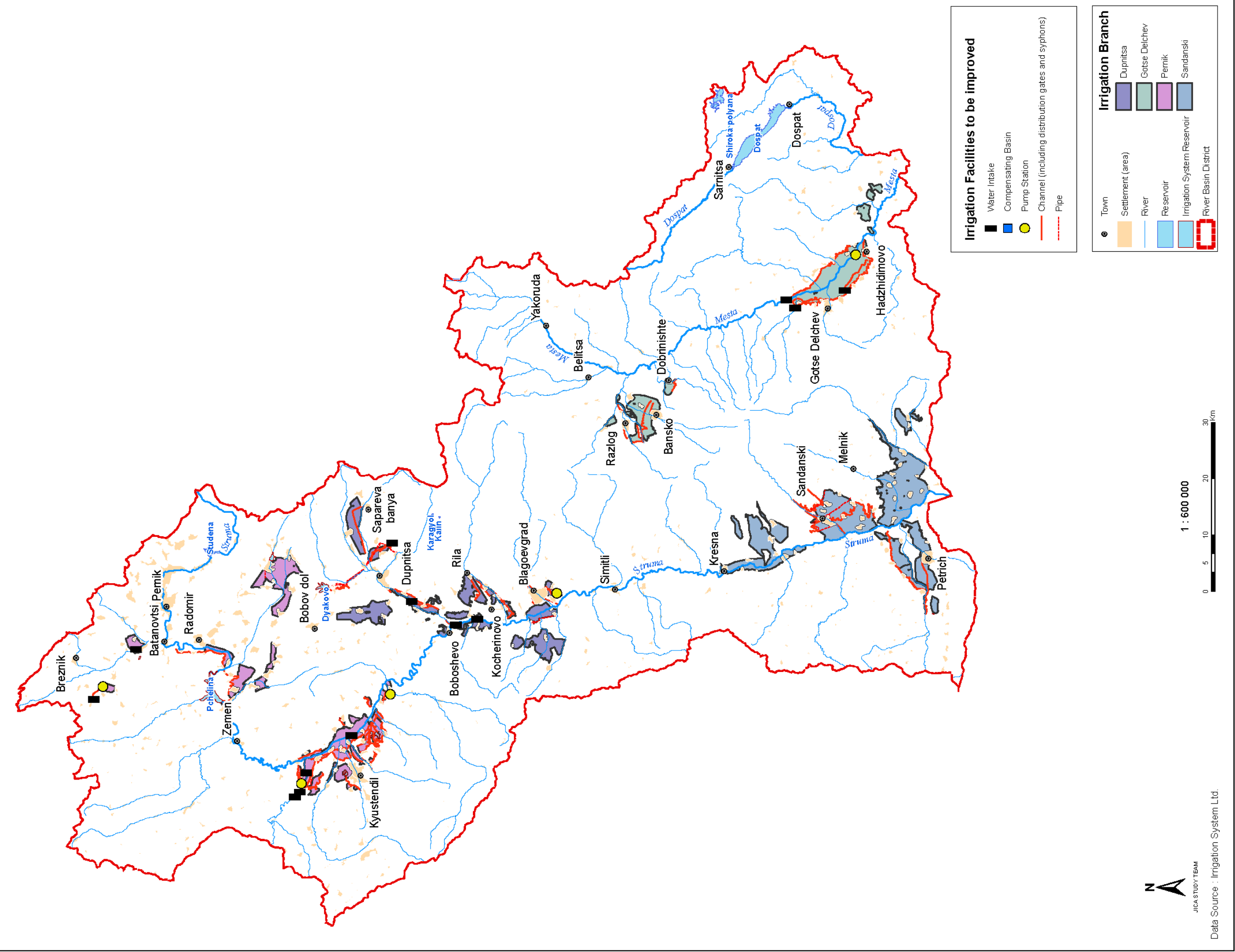


Figure 6.3.2 Proposed Irrigation Facilities to be Improved (WABD)



DUMMY

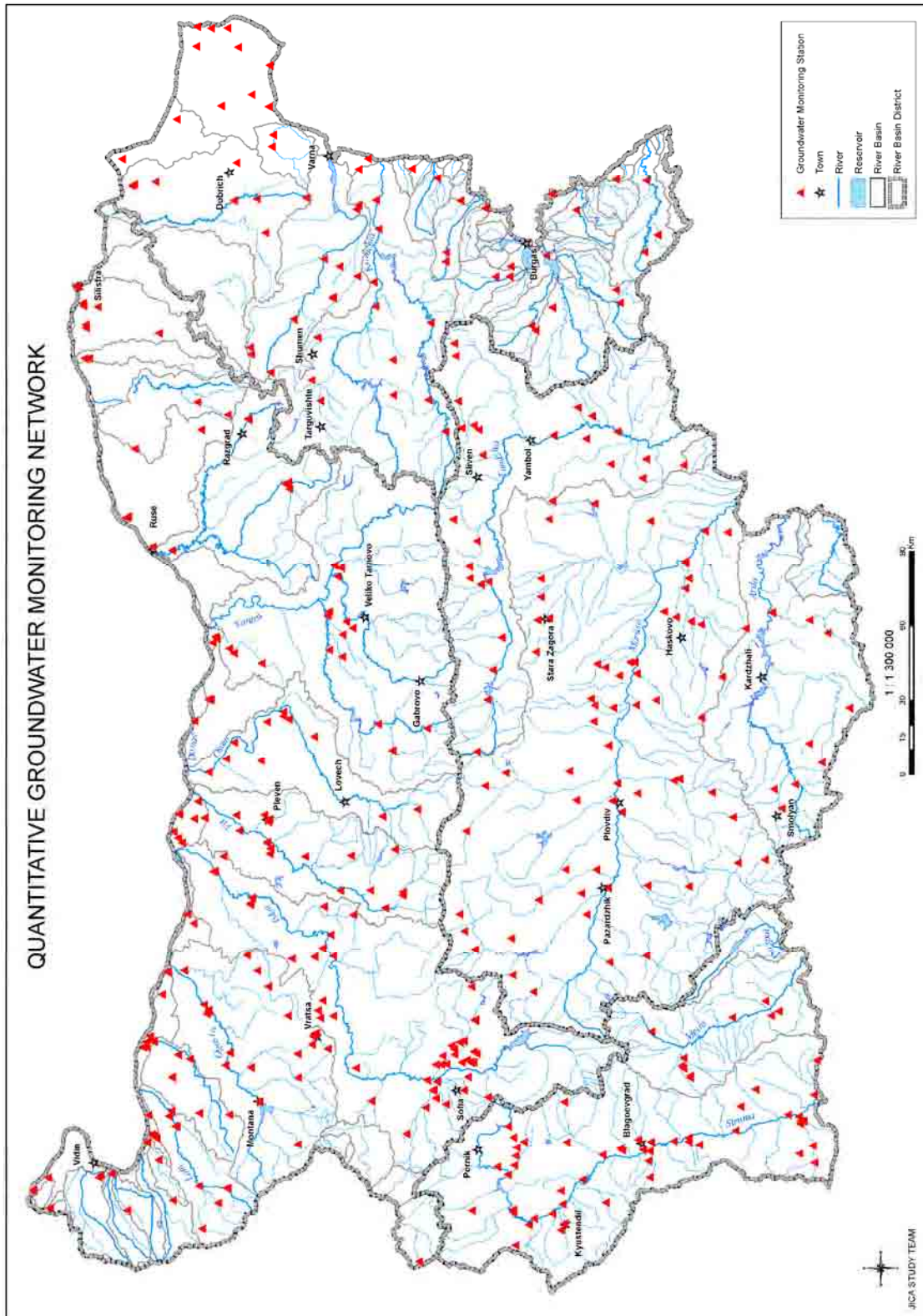


Figure 6.4.1 New Quantitative Groundwater Monitoring Network

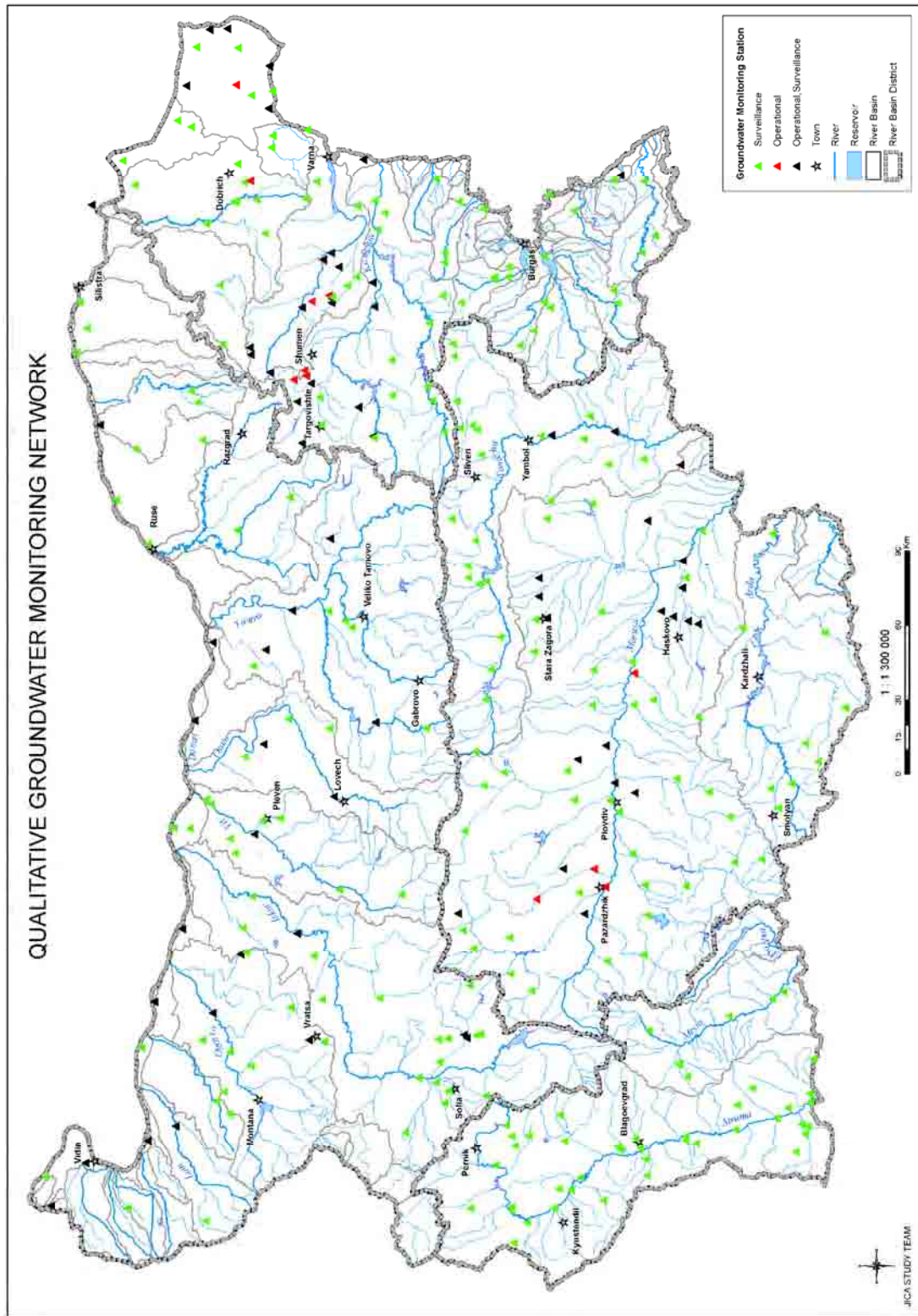


Figure 6.4.2 New Qualitative Groundwater Monitoring Network



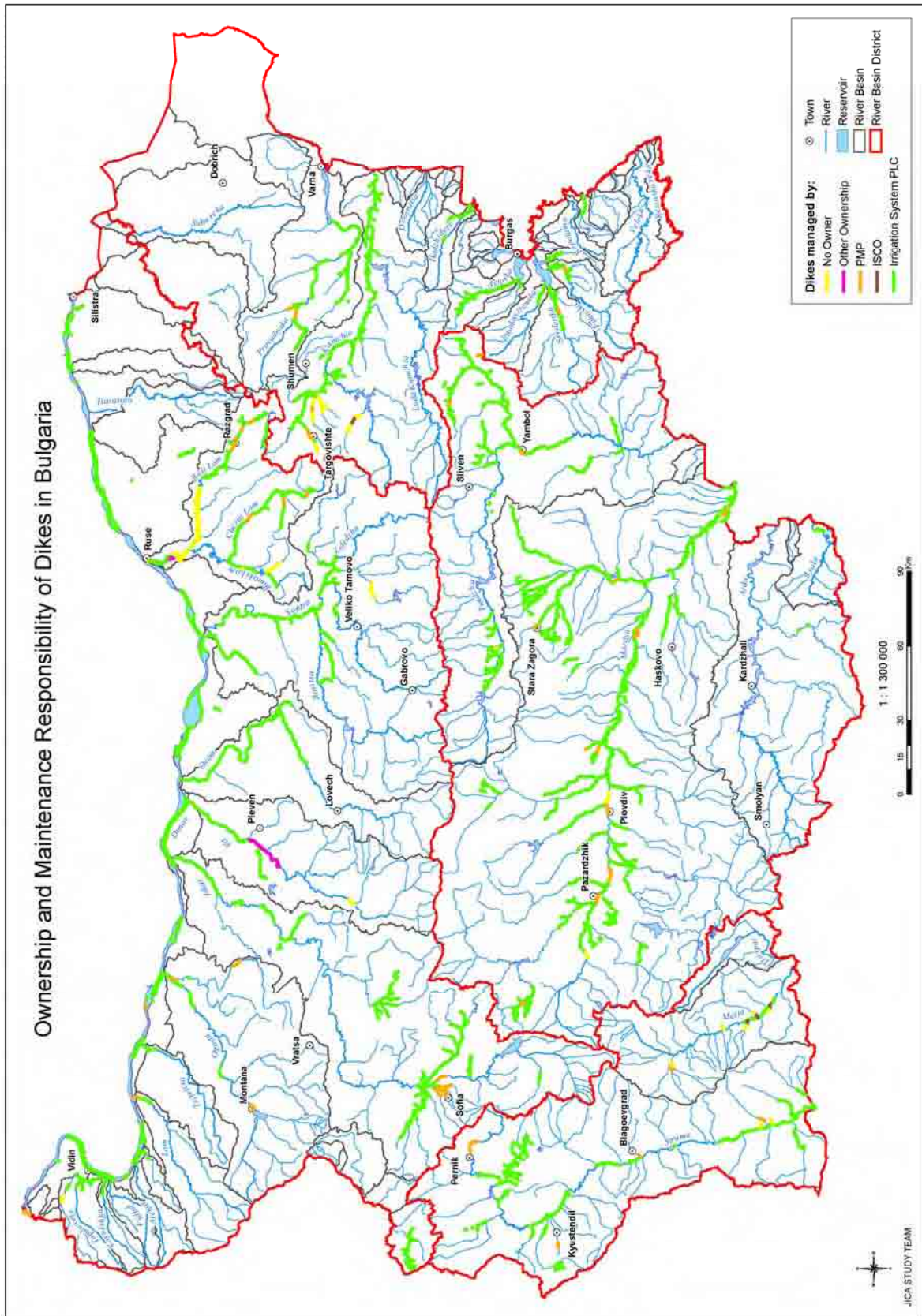
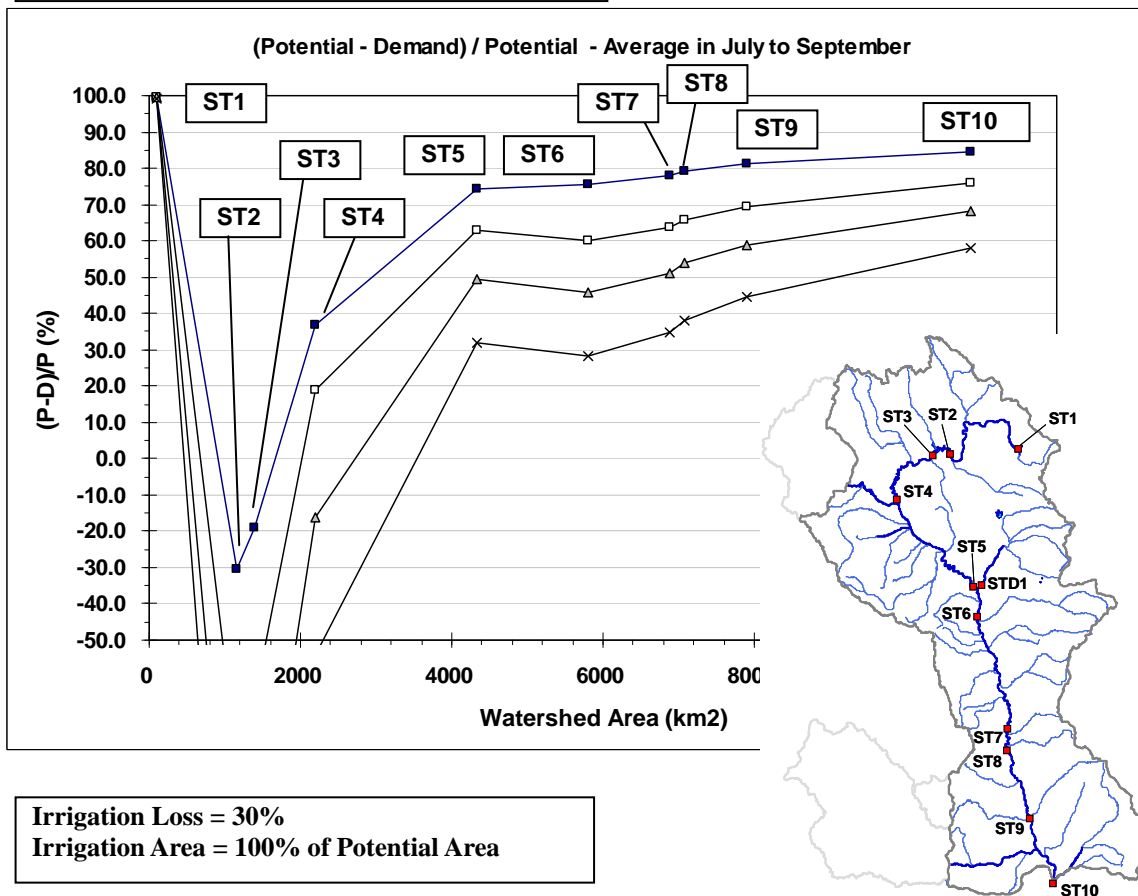


Figure 6.5.1 Ownership and maintenance Responsibility in Bulgaria

Irrigation Loss = Current Condition (48-74%)  
Irrigation Area = 5% of Potential Area



Irrigation Loss = 30%  
Irrigation Area = 100% of Potential Area

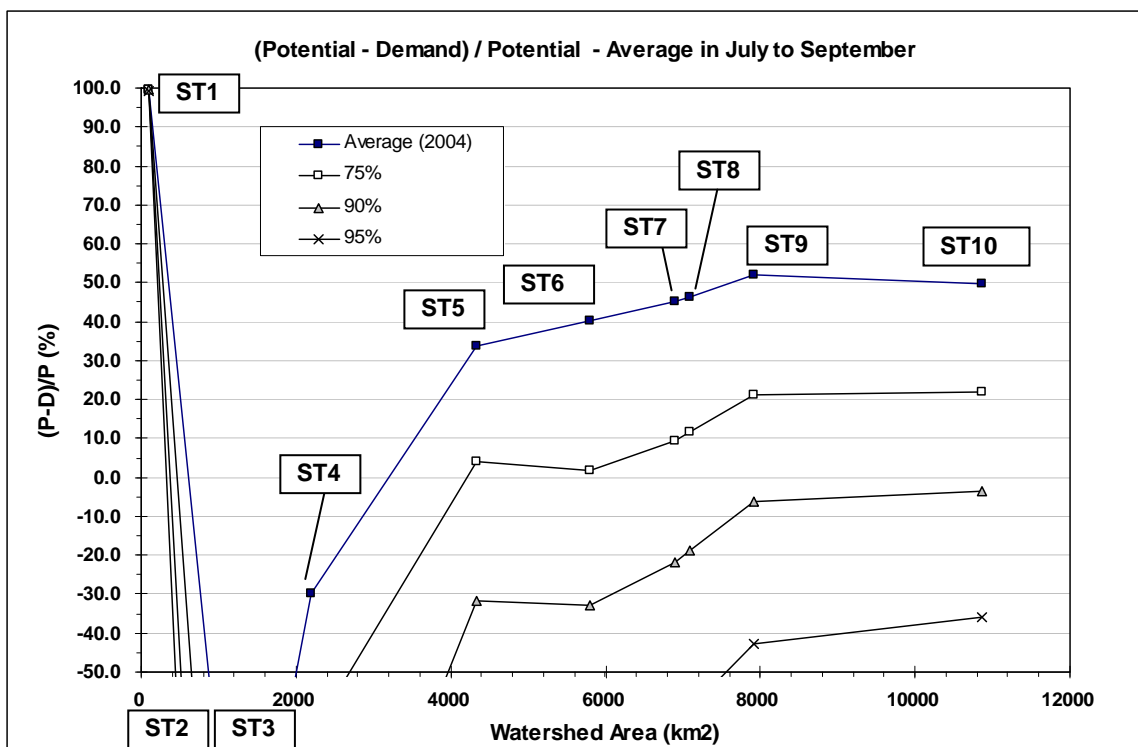
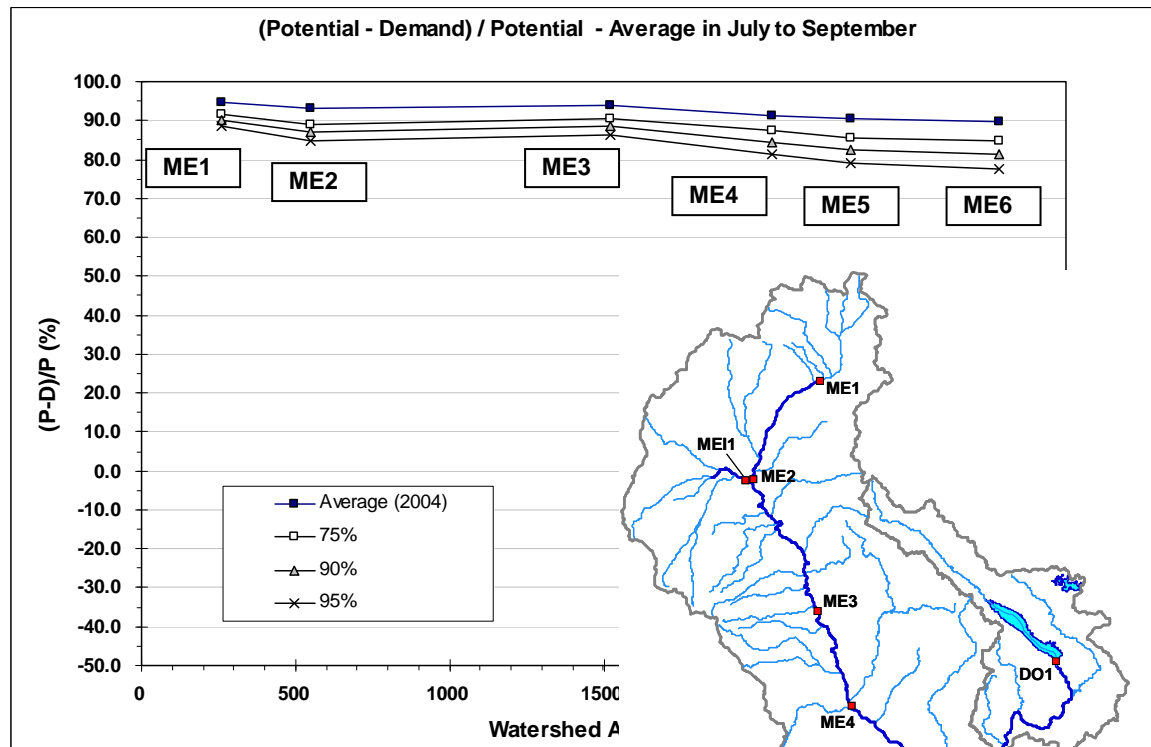


Figure 6.6.1 Balance between Water Resources Potential and Water Demand along Main Stream of the Struma River Basin (Average in Jul. to Sep.)

Irrigation Loss = Current Condition (64%)  
Irrigation Area = 15% of Potential Area



Irrigation Loss = 30%  
Irrigation Area = 100% of Potential Area

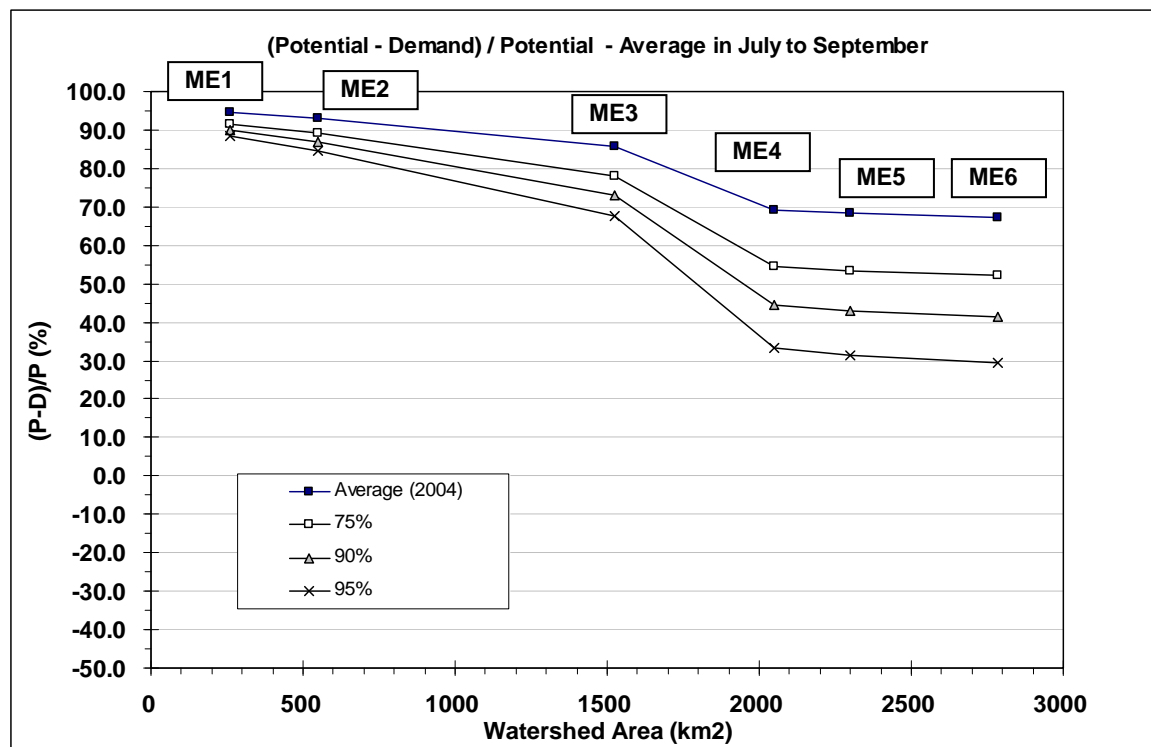
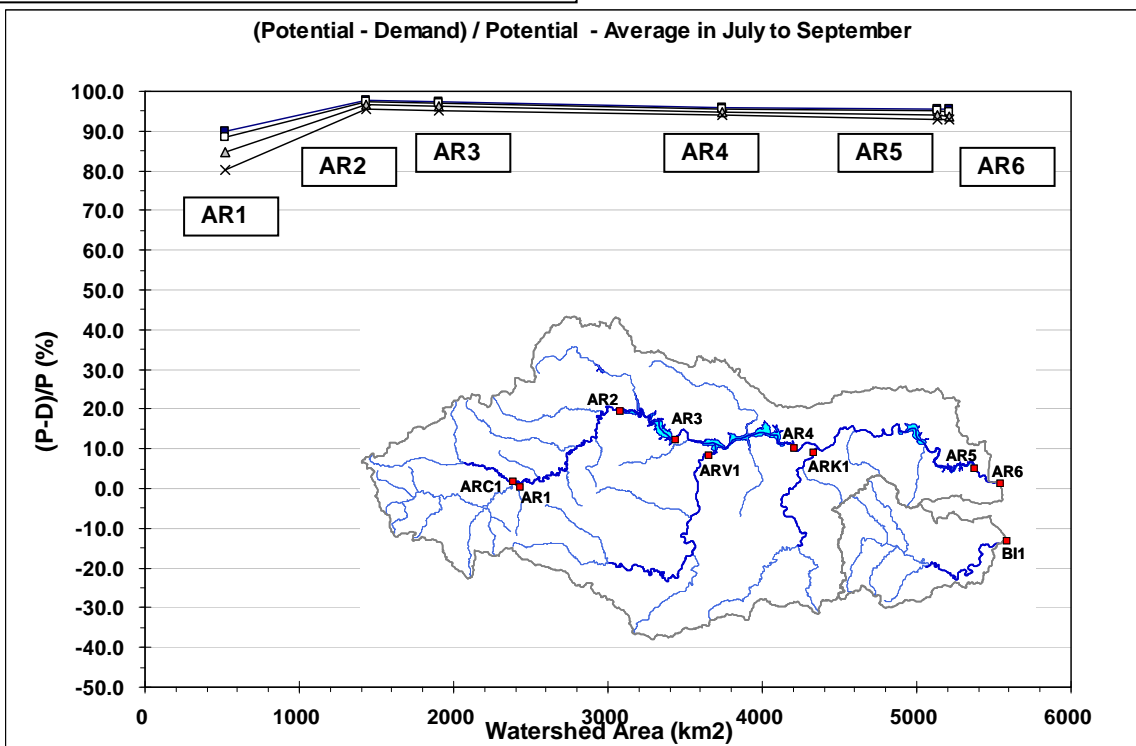


Figure 6.6.2 Balance between Water Resources Potential and Water Demand along Main Stream of the Mesta River Basin (Average in Jul. to Sep.)



Irrigation Loss = Current Condition (73%)  
Irrigation Area = 5% of Potential Area



Irrigation Loss = 30%  
Irrigation Area = 100% of Potential Area

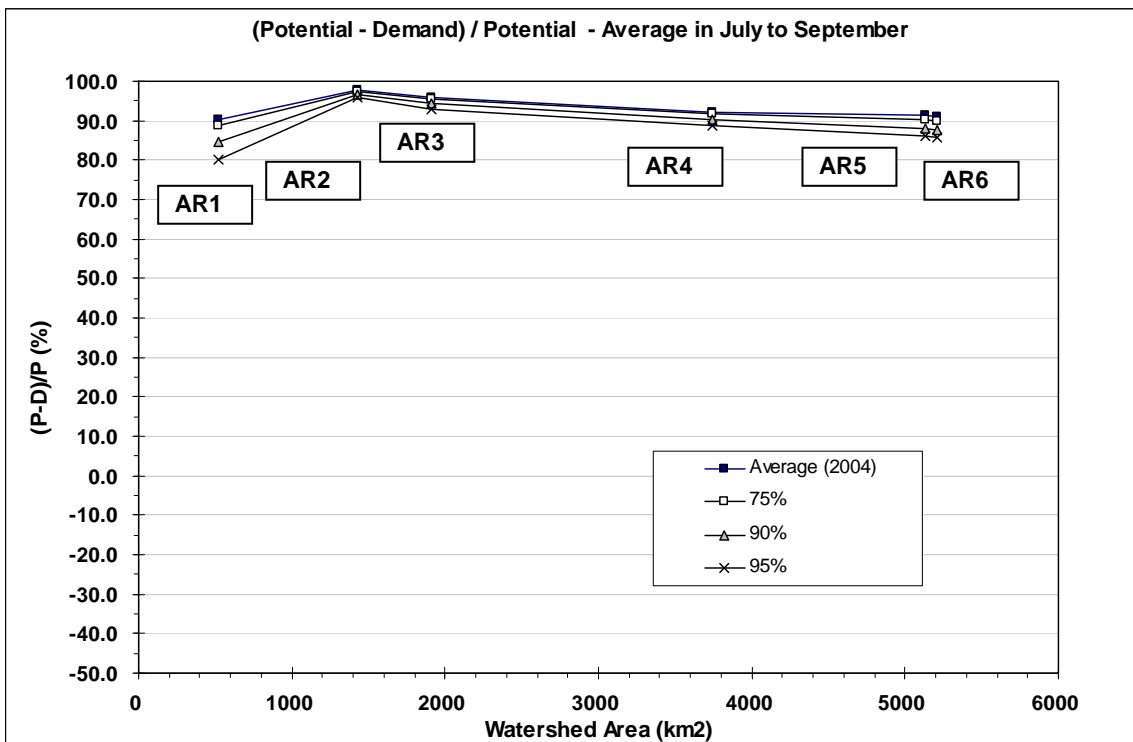
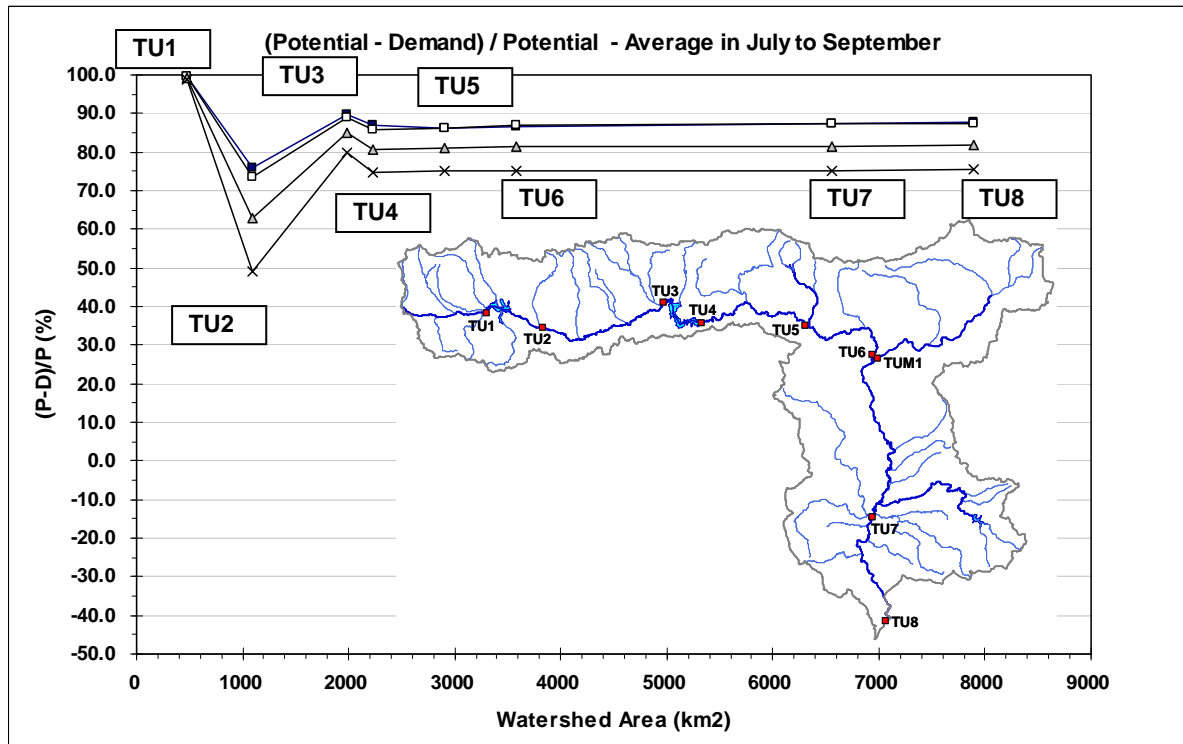


Figure 6.6.3 Balance between Water Resources Potential and Water Demand along Main Stream of the Arda River Basin (Average in Jul. to Sep.)

Irrigation Loss = Current Condition (61-84%)  
Irrigation Area = 5% of Potential Area



Irrigation Loss = 30%  
Irrigation Area = 70% of Potential Area

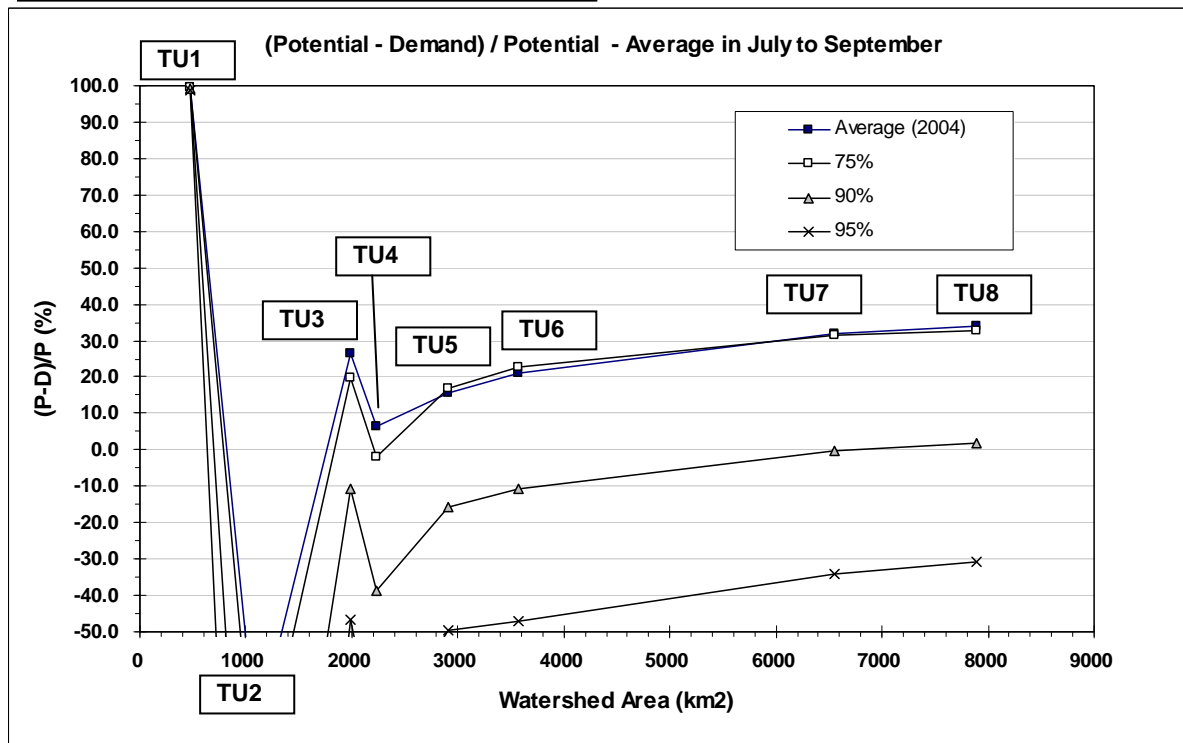
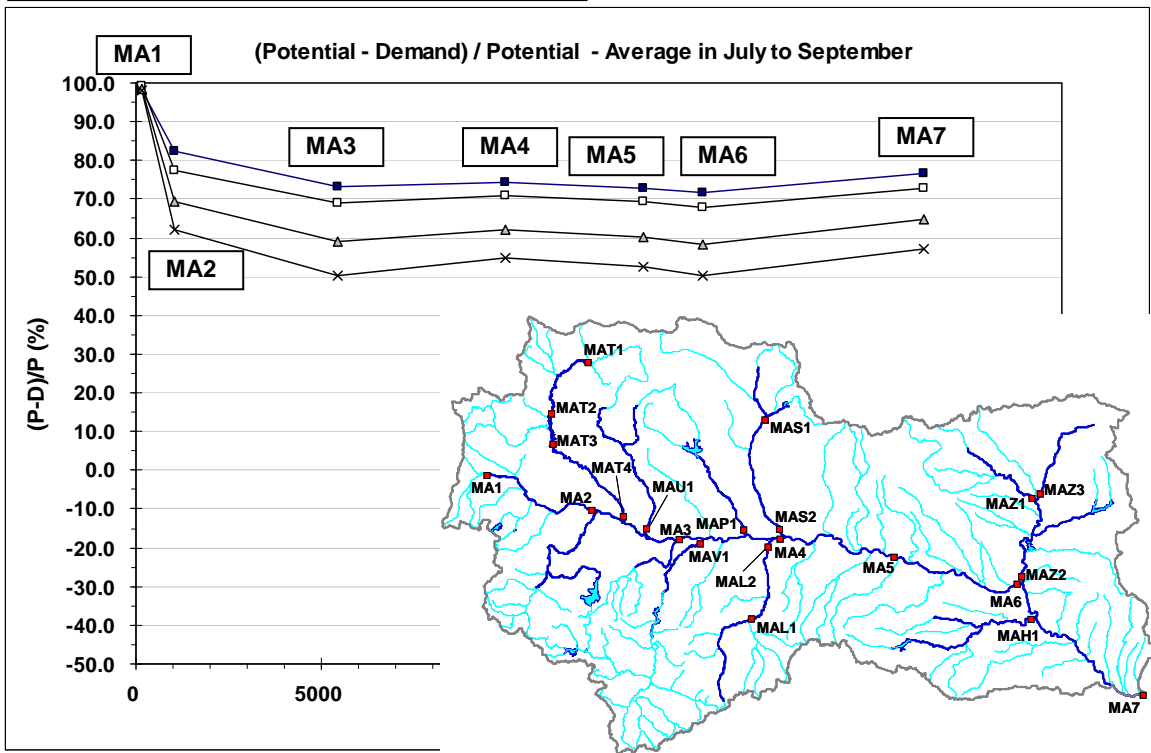


Figure 6.6.4 Balance between Water Resources Potential and Water Demand along Main Stream of the Tundzha River Basin (Average in Jul. to Sep.)

Irrigation Loss = Current Condition (60-74%)  
Irrigation Area = 5% of Potential Area



Irrigation Loss = 30%  
Irrigation Area = 30% of Potential Area

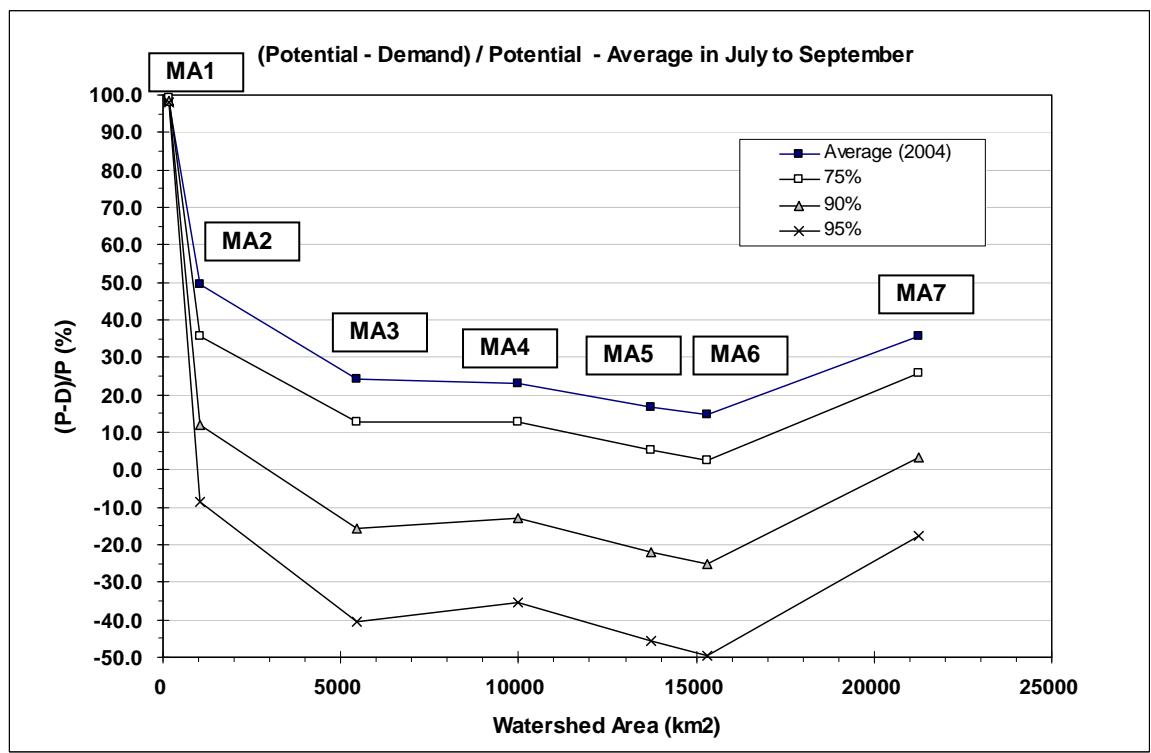
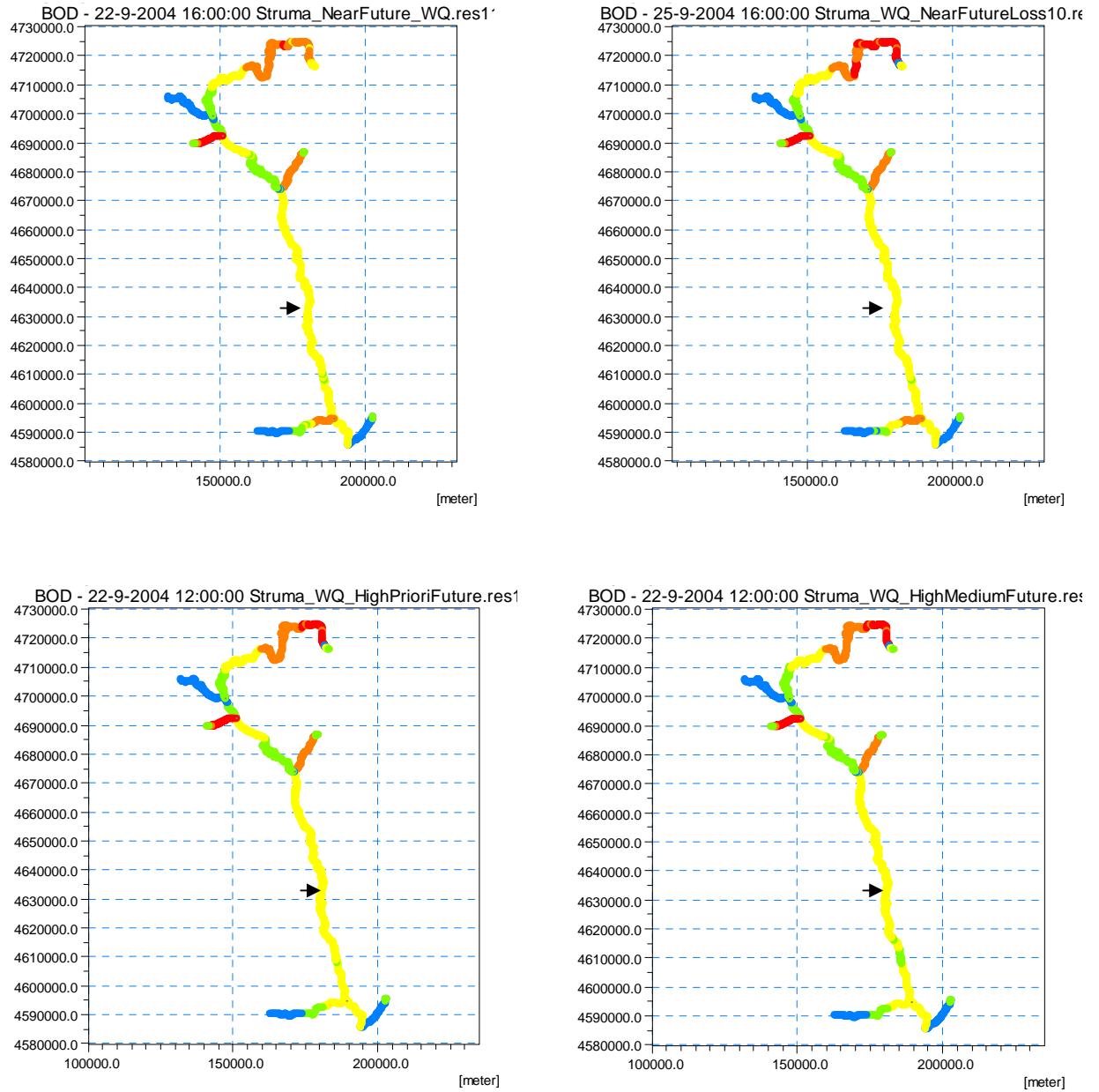


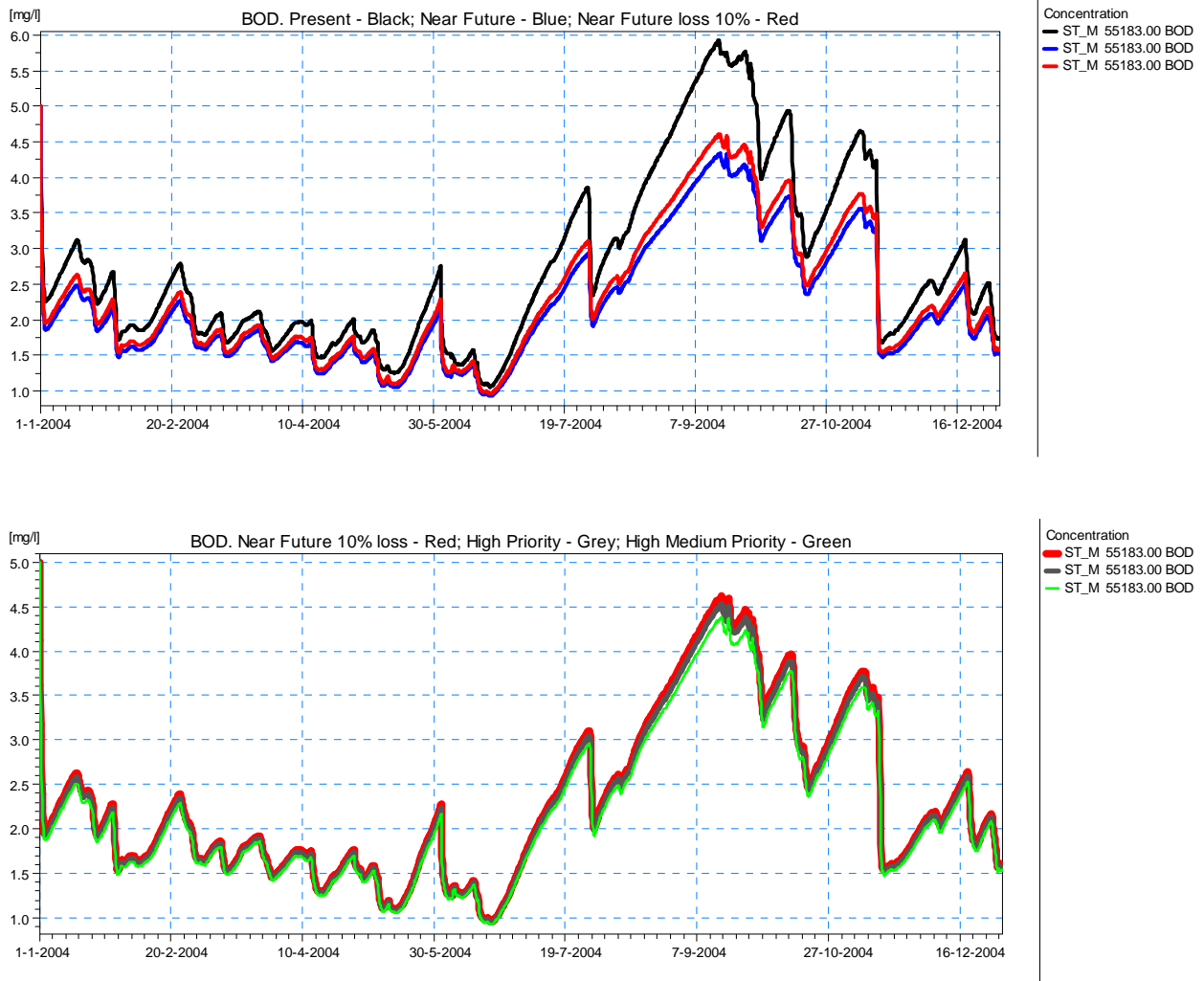
Figure 6.6.5 Balance between Water Resources Potential and Water Demand along Main Stream of the Maritsa River Basin (Average in Jul. to Sep.)





Note: On the top curve indicates location of time series in Figure 6.7.2

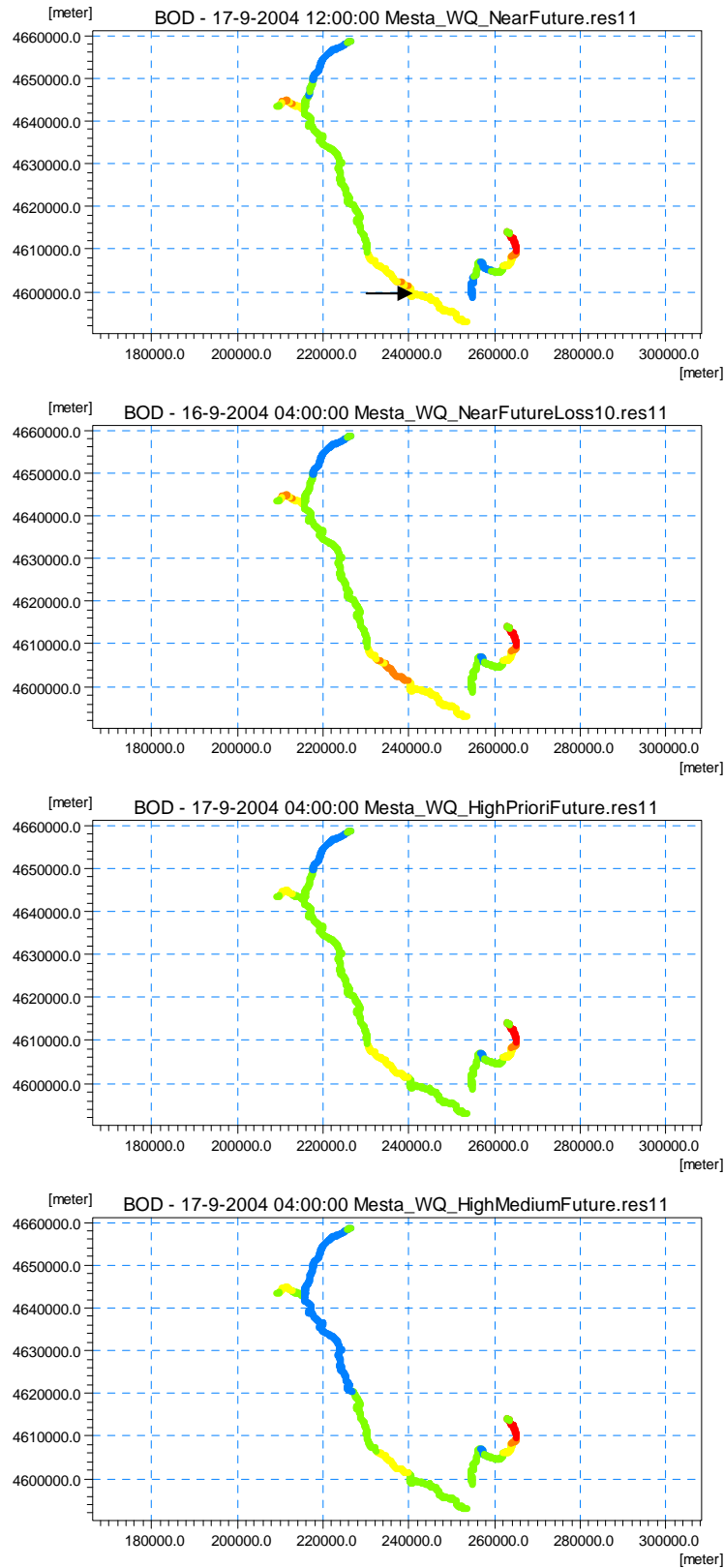
**Figure 6.7.1 BOD Concentrations in the Struma River for Different Future Scenarios at Low Flow Situation**



Note: Location marked on Figure 6.7.1

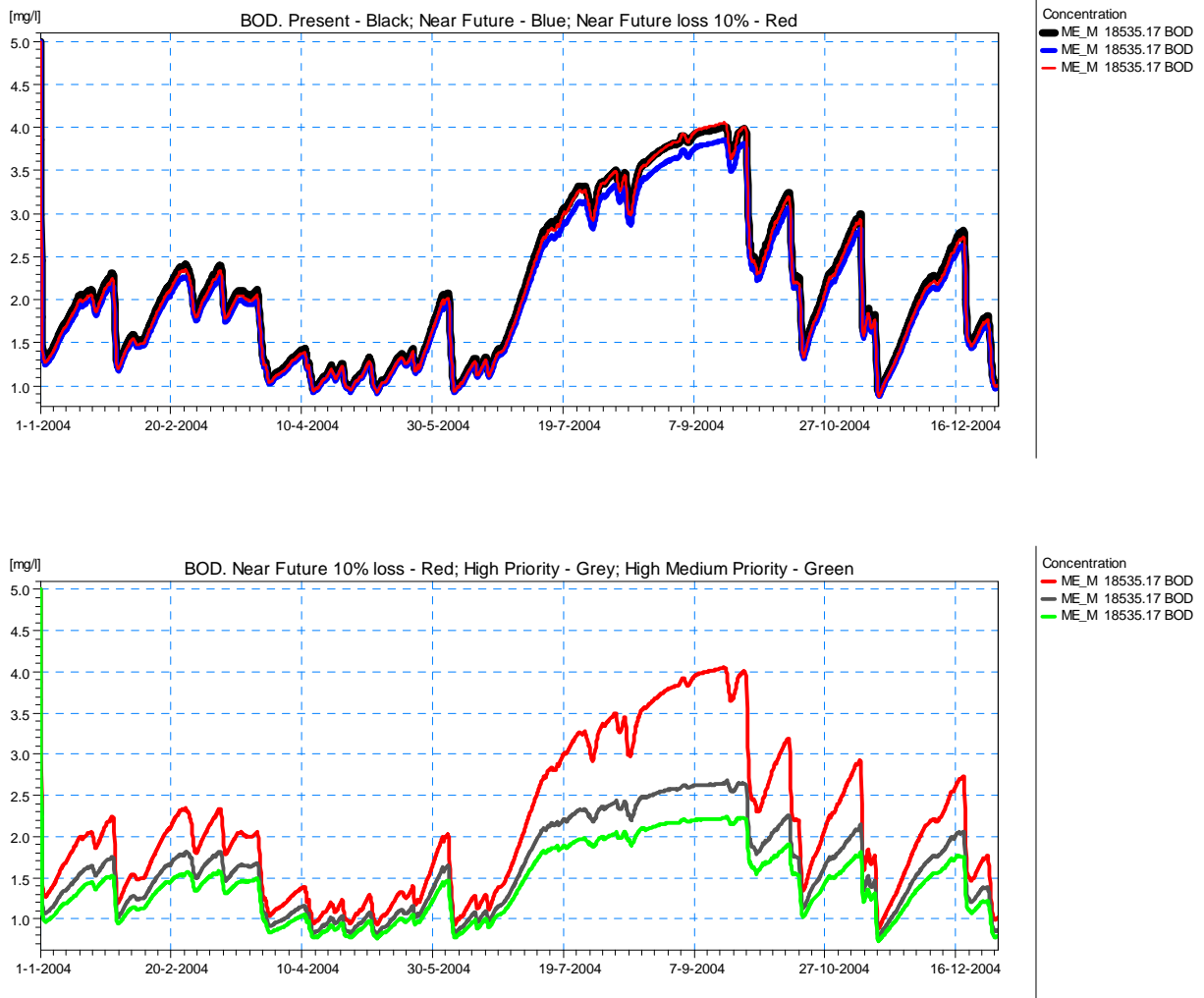
**Figure 6.7.2 BOD Concentration during the Year at a Station the Middle Reach of the Struma River.**





Note: On the top curve indicates location of time series in Figure 6.7.4

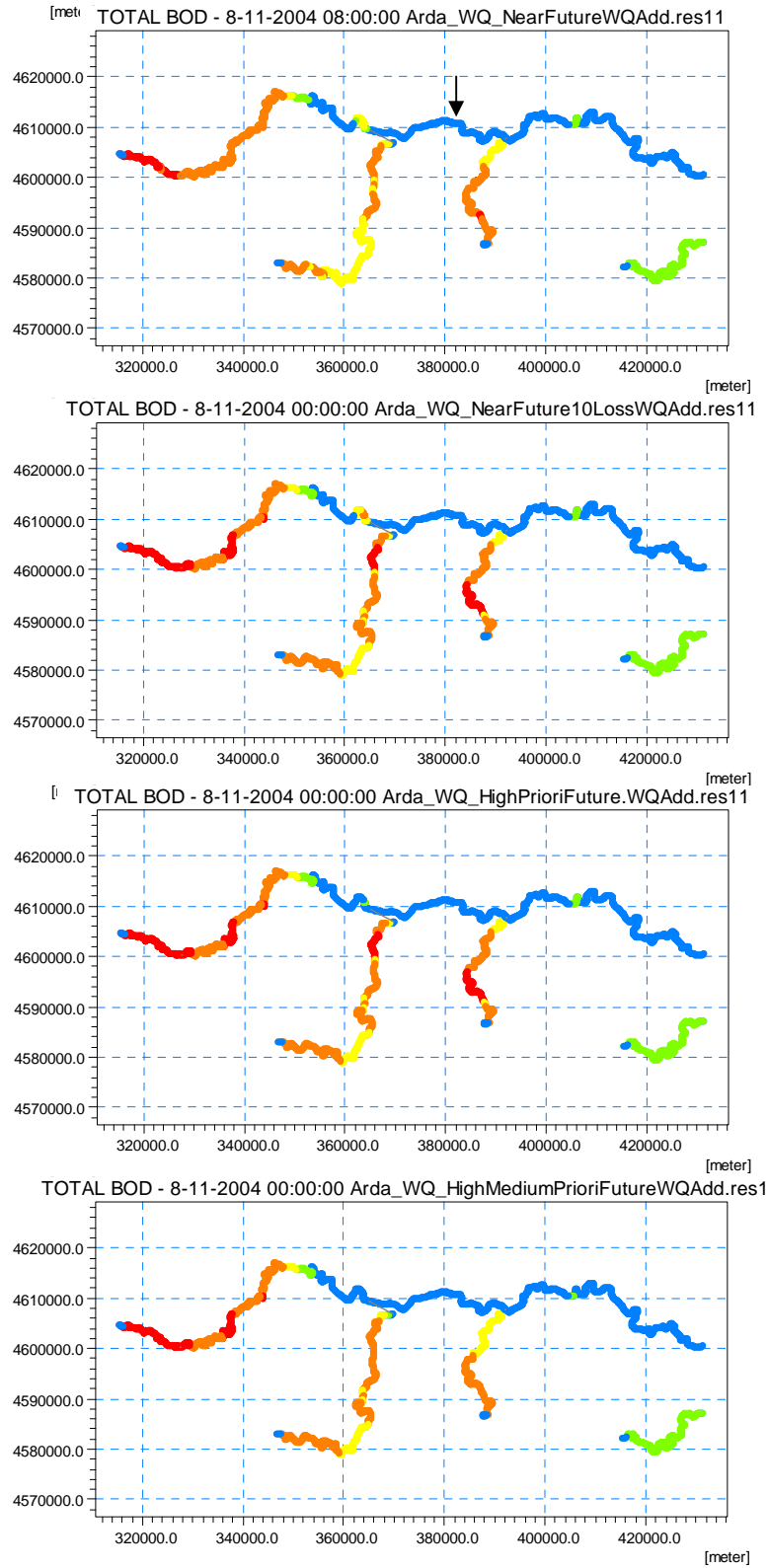
**Figure 6.7.3 BOD Concentrations in the Mesta River for Different Future Scenarios at Low Flow Situation**



Note: Location marked on Figure 6.7.3

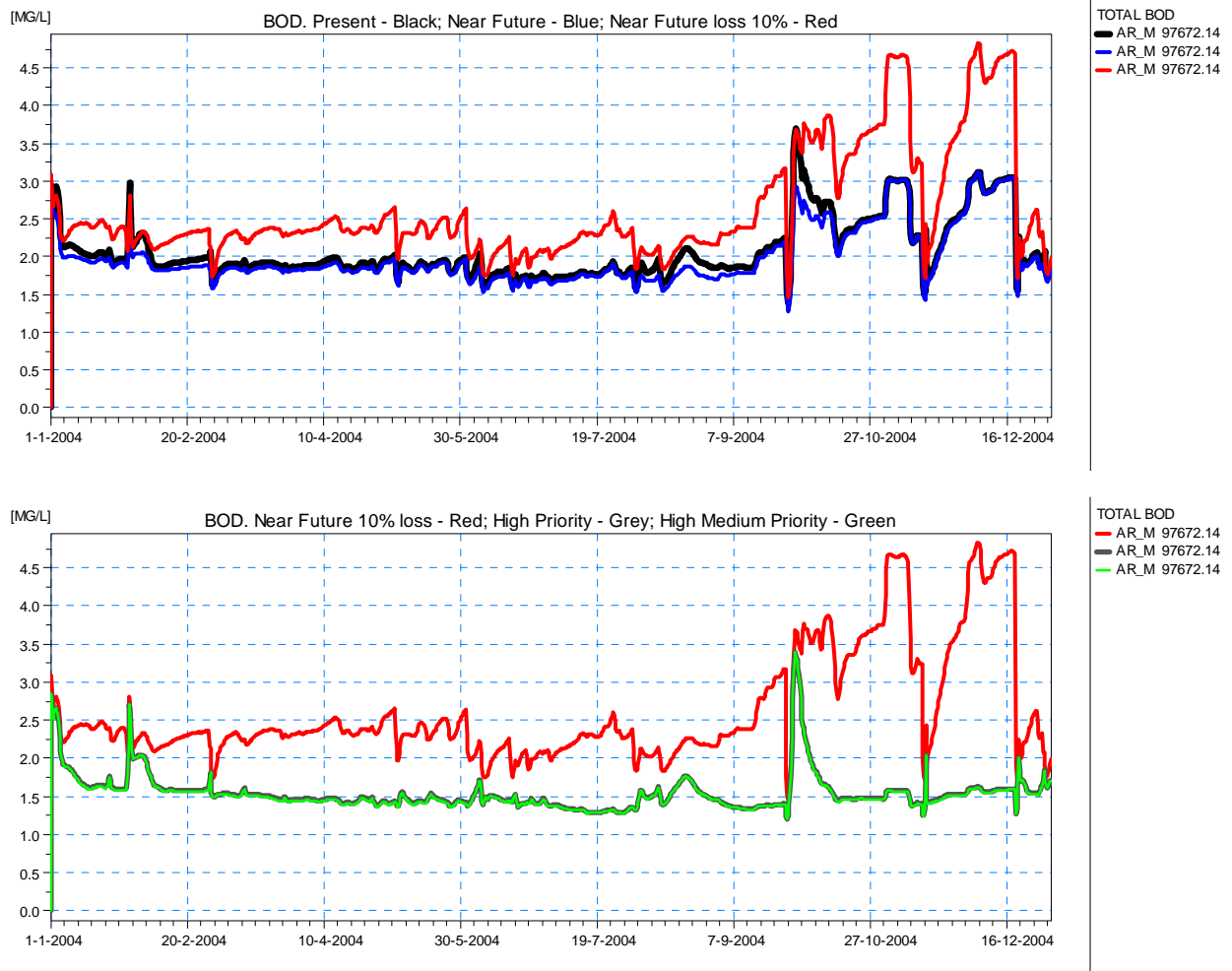
**Figure 6.7.4 BOD Concentration during the Year at a Station the downstream Reach of the Mesta River**





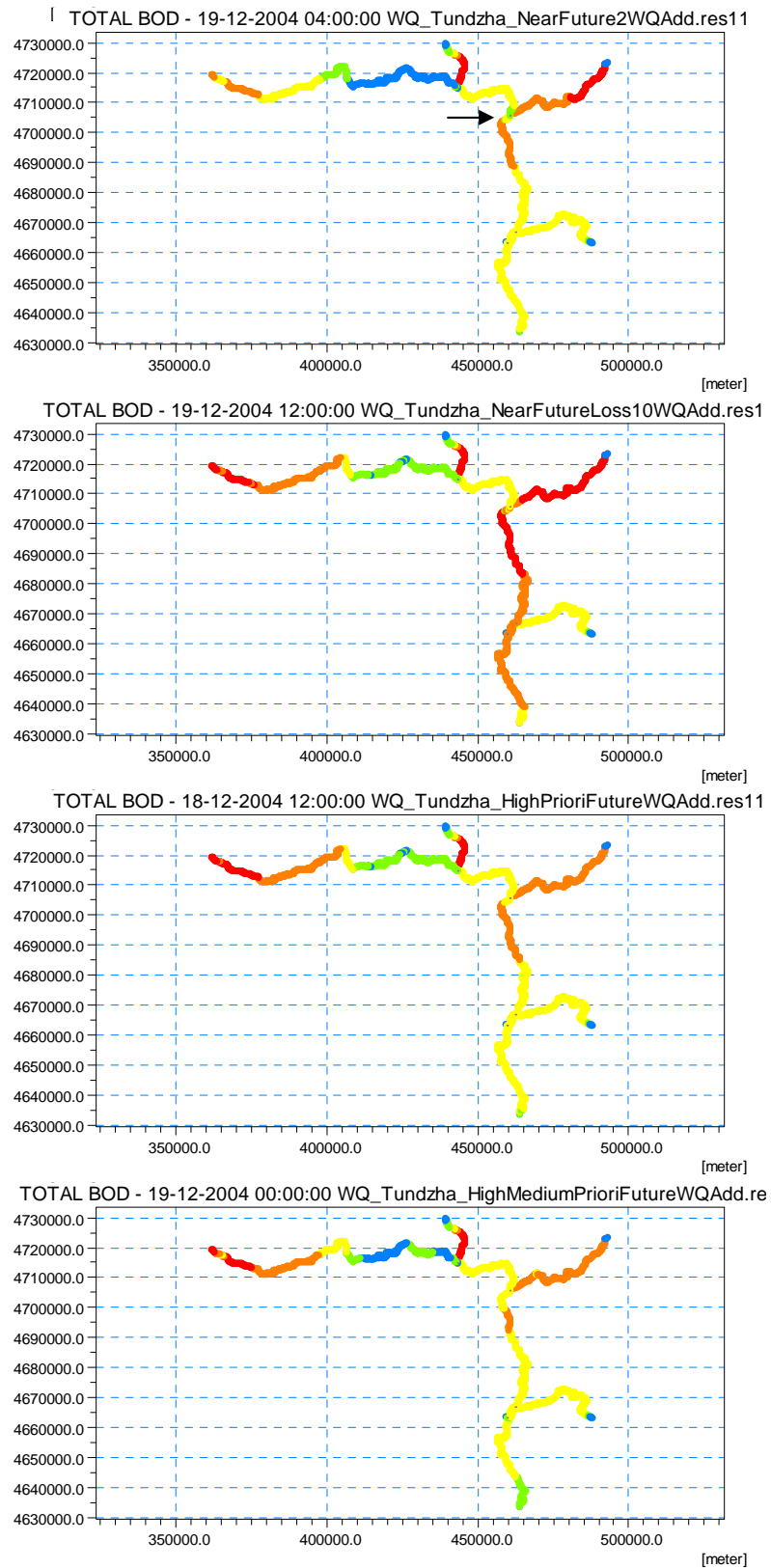
Note: On the top curve indicates location of time series in Figure 6.7.6

**Figure 6.7.5 BOD Concentrations in the Arda River for Different Future Scenarios at Low Flow Situation**



Note: Location marked on Figure 6.7.5

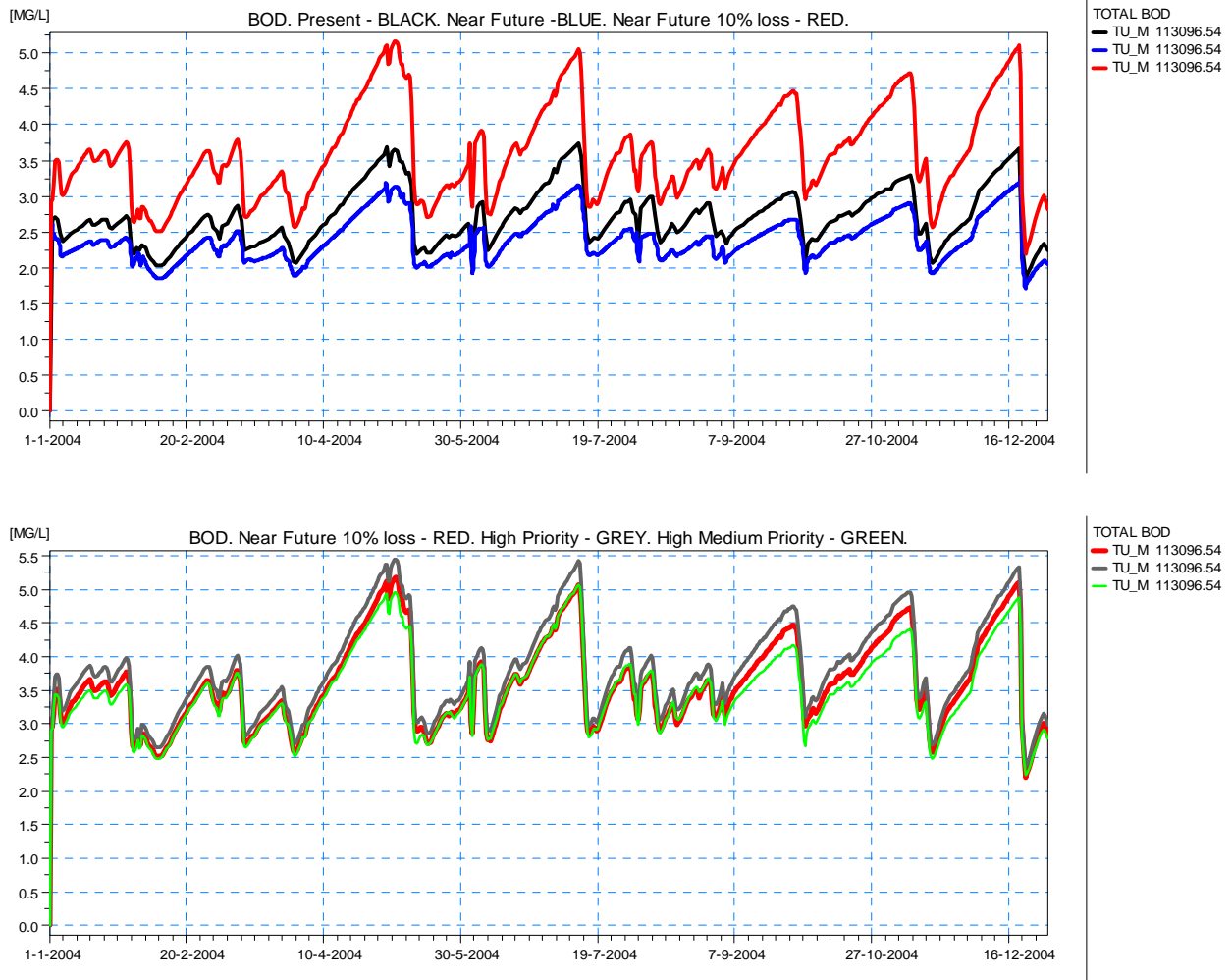
**Figure 6.7.6 BOD Concentration during the Year at a Station the Middle Reach of the Arda River**



Note: On the top curve indicates location of time series in Figure 6.7.8

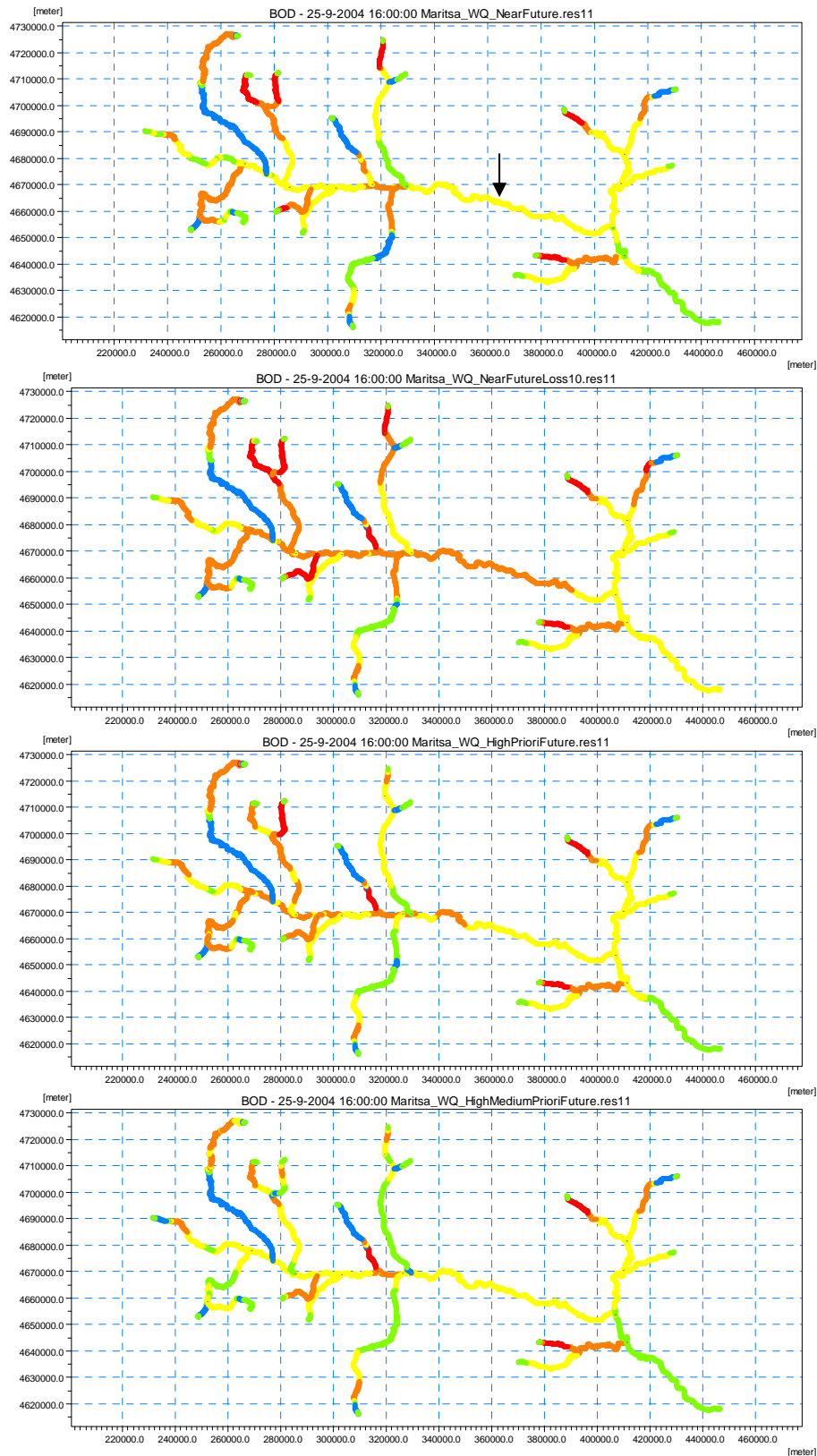
**Figure 6.7.7 BOD Concentrations in the Tundzha River for Different Future Scenarios at Low Flow Situation**





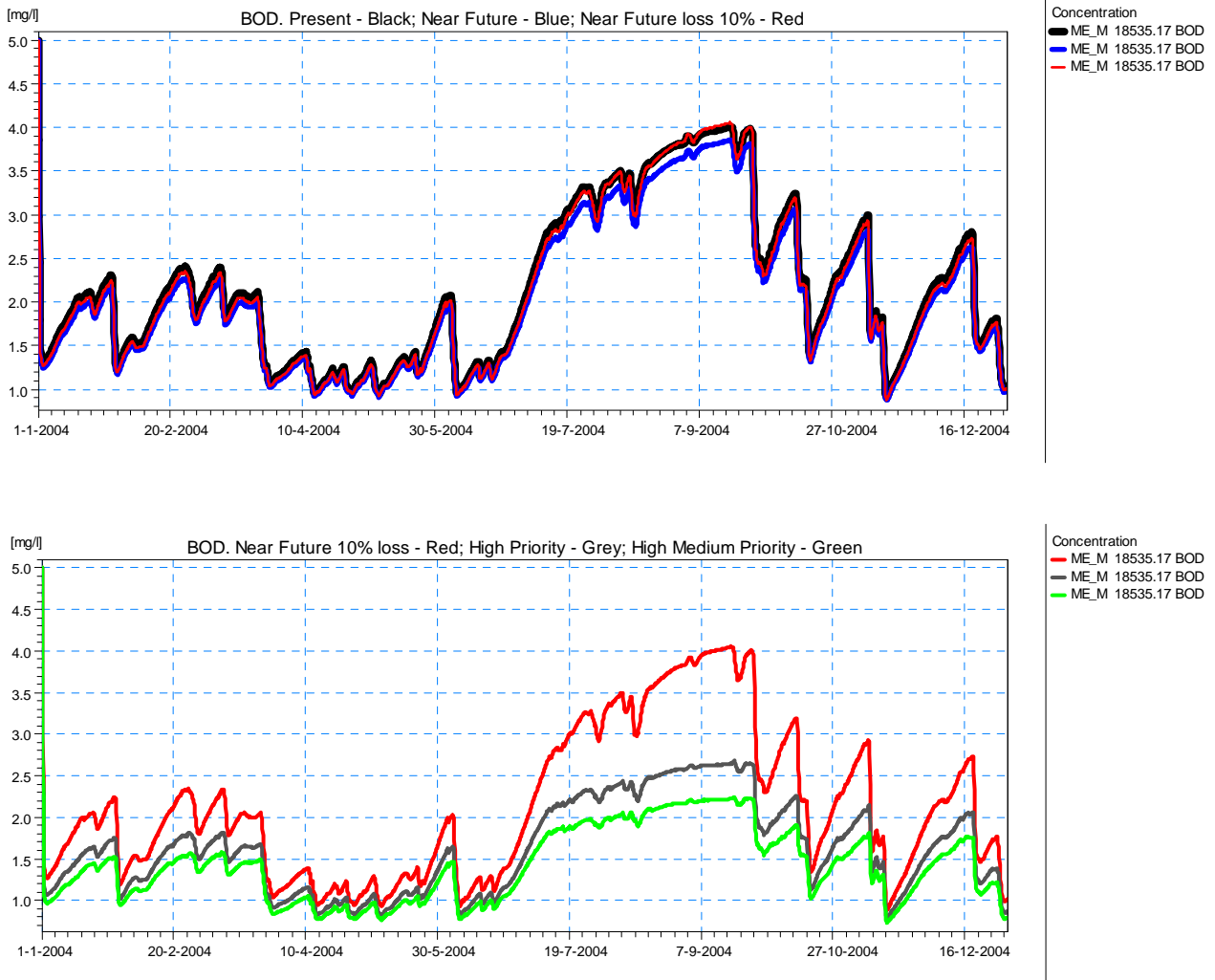
Note: Location marked on Figure 6.7.7

**Figure 6.7.8 BOD Concentration during the Year at a Station the Middle/Downstream Reach of the Tundzha River**



Note: On the top curve indicates location of time series in Figure 6.7.10

**Figure 6.7.9 BOD Concentrations in the Maritsa River for Different Future Scenarios at Low Flow Situation**



Note: Location marked on Figure 6.7.9

**Figure 6.7.10 BOD Concentration during the Year at a Station the Downstream Reach of the Maritsa River**