4.0 WASTEWATER COLLECTION, TREATMENT AND DISPOSAL ALTERNATIVES

This chapter of the report presents wastewater collection, treatment and disposal alternatives for the Town of Oxford for the planning period 2010 – 2030. To better understand where wastewater from needs areas and existing sewered areas may be treated in the future, Table 4-1 presents a breakdown of the flows from the existing sewered areas and the needs areas within the three focus areas. The source of these flows is Tables 4-4 through 4-6 in the Phase I Report. Figure 4-1 provides a pictorial presentation of the needs areas and extents of the existing sewers.

Table 4-1 indicates that in 2030 the total projected wastewater flow from the North focus area and the existing sewered area between the North and Central focus areas is 462,400 gpd. Of this amount, 119,700 gpd originates from the ORSD, and 342,700 gpd originates from the remainder of the North focus area and the existing sewered area between the North and Central focus areas. For the Central focus area, the projected wastewater flow is 540,300 gpd, and for the South focus area, the projected wastewater flow is 285,900 gpd. The estimated wastewater flow for the entire Town of Oxford in 2030 is 1,288,600 gpd, or 1.3 MGD.

Based on the results of the Phase I Report and groundwater recharge options presented in the previous chapter, Table 4-2 summarizes various wastewater treatment and disposal methods that we will examine to handle the Town's wastewater needs through 2030. The table identifies nine alternatives, including individual onsite subsurface disposal systems, treatment at the ORSD, UBWPAD and Webster/Dudley WWTFs, and treatment at new WWTFs within Oxford with groundwater recharge. The alternatives do not consider flow reduction because the Town's per capita water consumption is already at a very reasonable rate of around 65 gpd. Also, other than the possibility of groundwater recharge, there does not appear to be much potential for water reuse of treated wastewater because the one golf course in Oxford has not expressed an interest in an alternative water supply, and the same holds true for the few industries in town.

The following discusses the likely combination of the treatment and disposal methods in Table 4-2, first considering options for just the North focus area, and then for the entire Town. Our evaluation includes a preliminary assessment of the major environmental, technical, financial and institutional considerations to screen and short-list the alternatives. Also considered in this evaluation are the proposed layout and impacts of the associated collection system.

A. NORTH FOCUS AREA WASTEWATER COLLECTION, TREATMENT AND DISPOSAL OPTIONS

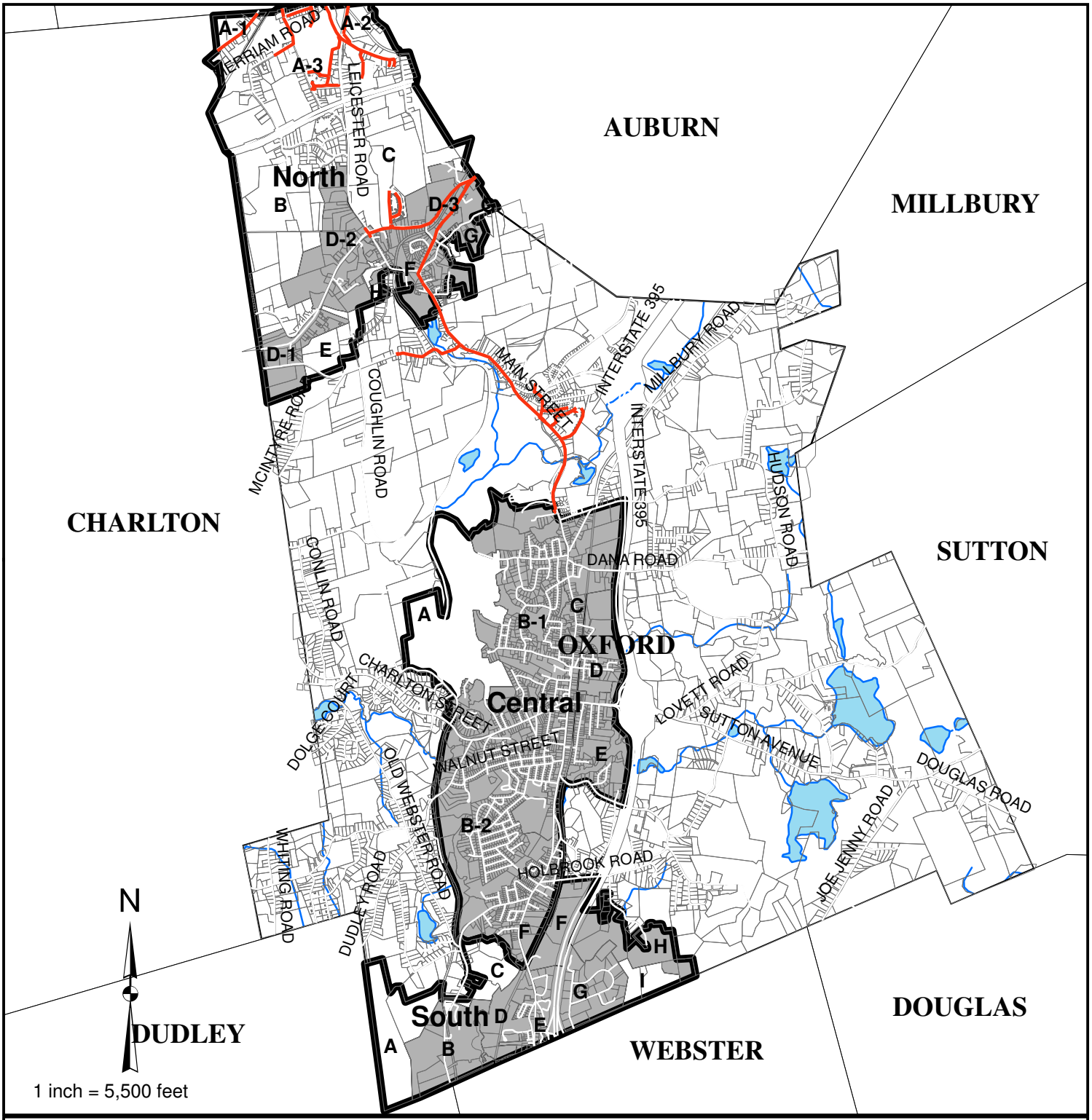
Because of the very large capital cost and adverse impact of construction associated with town-wide wastewater collection, treatment and disposal options, the Town of Oxford will take a stepwise approach to managing its future wastewater needs. Specifically, the Town first will implement alternatives in the most critical area of the community – the North focus area. This area has a number of current and future residential, business and industrial districts that will require alternatives to individual septic systems to remain viable and grow in accordance with Town plans for future development, and with the *Oxford Open Space and Recreation Plan*

TABLE 4-1
WASTEWATER FLOWS FOR EXISTING SEWERED AND NEEDS AREAS IN 2030

Area	Wastewater Flow (gpd)
North Focus Area	
2007 Flow to ORSD WWTP*	56,400
Future Flow within ORSD	
North A-2	17,200
North A-3	46,100
Total Flow within ORSD	**119,700**
2008 Flow to UBWPAD WWTF**	39,000
Future Flow to UBWPAD WWTF/Other WWTF	
North C	34,200
North D-1	40,600
North D-2	107,800
North D-3	41,400
North F	46,600
North G	3,500
Sewered Areas Outside Focus Areas	29,600
Total Flow to UBWPAD WWTF/Other WWTF	**342,700**
Total Flow for North Focus Area and	
Sewered Areas Outside Focus Areas	**462,400**
Central Focus Area	
Central B-1	139,600
Central B-2	193,500
Central C	142,000
Central D	14,800
Central E	23,300
Central F	27,100
Total Flow for Central Focus Area	**540,300**
South Focus Area	
South B	76,800
South D	45,500
South E	13,700
South F	31,900
South G	73,200
South H	44,800
Total Flow for South Focus Area	**285,900**
Total Projected Flow for Town in 2030	**1,288,600**

* Includes North A-1, which is outside North focus area.

** Includes sewered areas between the North and Central focus areas.



Legend

- Sewers
- Parcels
- Focus Areas

Needs Area

- No
- Yes
- Stream, River
- Water Bodies

TOWN OF OXFORD,
MASSACHUSETTS
FIGURE 4-1
NEEDS AREAS AND EXISTING SEWERS

Data compiled from MassGIS and FST

FAY, SPOFFORD & THORNDIKE - SEPTEMBER 2010

TABLE 4-2
WASTEWATER TREATMENT AND DISPOSAL ALTERNATIVES

Components	Treatment	Disposal
1	Individual Onsite Subsurface Treatment	Groundwater Recharge
2	0.084 MGD at UBWPAD WWTF	Discharge to Blackstone River
3	0.120 MGD at ORSD WWTP	Discharge to French River
4	0.258 MGD at New Onsite WWTF	Groundwater Recharge
5	0.378 MGD from Oxford at ORSD WWTP	Discharge to French River and 0.26 MGD Groundwater Recharge
6	0.258 MGD at Webster/Dudley AWWTF	Discharge to French River
7	0.826 MGD at Webster/Dudley AWWTF	Discharge to French River
8	1.08 MGD at New Onsite WWTF	Groundwater Recharge
9	1.08 MGD at Webster/Dudley AWWTF	Discharge to French River

prepared in March 2007 by the Central Massachusetts Regional Planning Commission (CMRPC).

1. Alternative A

The first alternative for handling wastewater flow from the North focus area is Alternative A, which is comprised of Components 1, 2, 3, and 4 (Table 4-2). Figure 4-2 is a flow diagram that graphically depicts this alternative.

a. Component 1

The Phase I Report indicated that individual on-site wastewater treatment systems would be feasible to use for the 2010 – 2030 planning period in 10 of the 27 sub-areas included in the needs analysis. In addition, individual on-site wastewater treatment systems would continue to be viable in areas outside of the three focus areas that are not contiguous to the existing sewer system. Currently about 1,250 of these systems fall into this category, and many more would be added through the design year 2030. **This alternative will be a part of all wastewater treatment options investigated for the Town**, and will include continued maintenance, repair and upgrade of the individual on-site systems that will remain in the community.

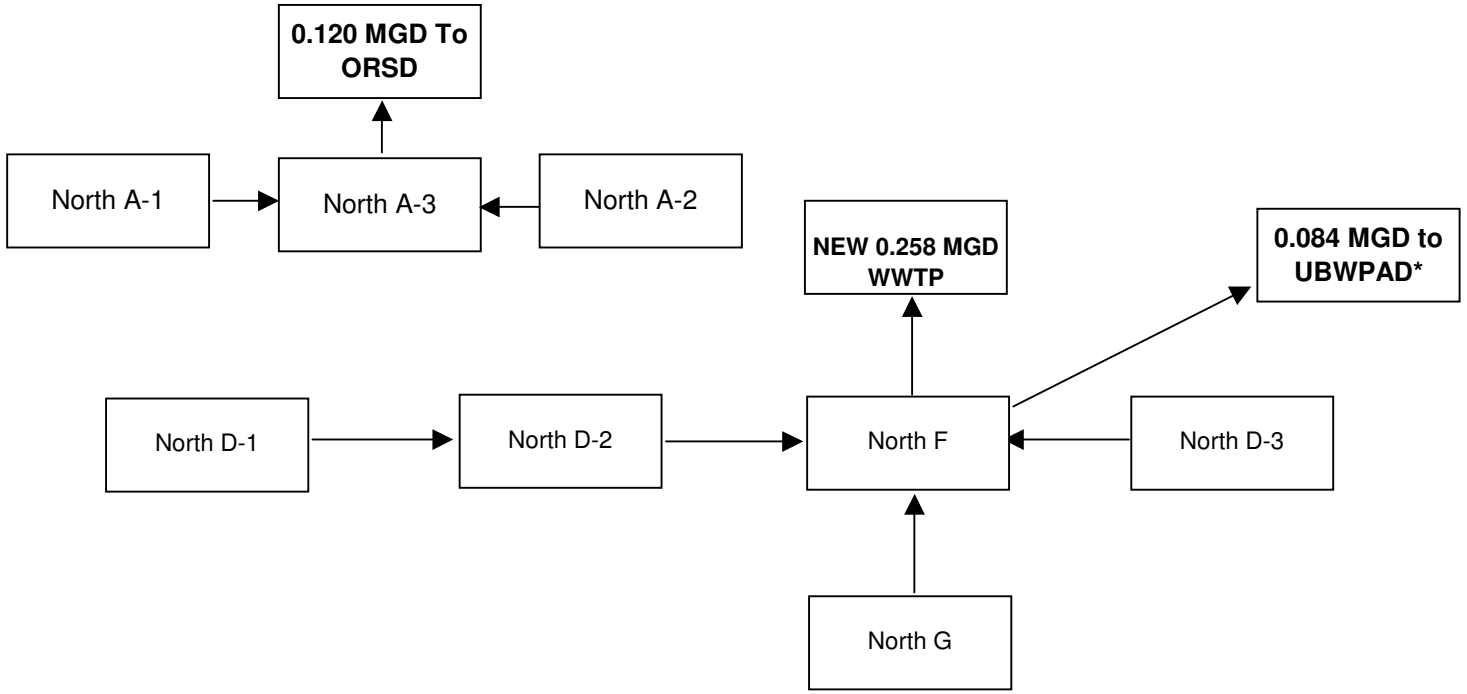
The unshaded areas in Figure 4-1 show where continued use of individual on-site treatment systems is anticipated over the 20-year planning period.

b. Component 2

Component 2 involves delivering wastewater from the majority of the currently sewered areas in Oxford, outside of the ORSD, to the town of Auburn for eventual treatment at the UBWPAD WWTF. As described in Chapter 2 of this report, Oxford's municipal sewer system consists of about 11,000 feet of gravity sewer, 22,000 feet of force main and four pumping stations – High School, Old Worcester Road, Leicester Road, and Thayer Pond Village Pump Stations. The

Figure 4-2

Alternative A



* Thayer Pond Village Pumping Station flows to be redirected to new WWTP

entire existing municipal sewer system is located in the North focus area, and in between the North and Central focus areas.

The municipal sewer system currently delivers all of its wastewater (39,000 gpd on average in 2008) to the Town of Auburn's sewer system through the Thayer Pond Village Pump Station or the Leicester Road Pump Station. The former has a capacity of 24,000 gpd, and the latter, 60,000 gpd. The combination of these two flows – 84,000 gpd – is the basis for the Interbasin Transfer Limit currently established by the Massachusetts Water Resources Commission (MWRC) for transfer of wastewater in Oxford from the French River Basin to the Blackstone River Basin. Oxford lies primarily within the French River Basin, but all of the wastewater from the municipal sewer system is treated at the UBWPAD WWTF and discharged into the Blackstone River.

Component 2 is a continuation of the current means for collecting and treating wastewater from the existing municipal sewer system, and from a portion of the needs areas in the North focus area, up to an average daily flow of 84,000 gpd. Additionally, there is an intermunicipal agreement in place between the towns of Oxford and Auburn that allows the transfer of up to 100,000 gpd of wastewater from Oxford to Auburn. However, the lower interbasin transfer limitation of 84,000 gpd established by the MWRC governs.

Construction of all of the municipal gravity sewers associated with this alternative has occurred since 2000, so there is little concern regarding I/I in the municipal sewer system. Private sewers serving Thayer Pond Village (condominiums) in north Oxford are older, so a future I/I evaluation of the sewers in this condominium complex may be in order. The Town built the High School, Old Worcester Road and Leicester Road Pump Stations in 2002, and there should be no major modifications to these facilities over the 20-year timeframe of this study. On the other hand, the Thayer Pond Village Pump Station, which was constructed in 1985 and upgraded in 2002, has been experiencing problems, and will likely require upgrading within the next 20 years.

Component 2 meets technical and institutional criteria as a viable wastewater collection, treatment and disposal option because the system is presently in place, albeit at a lower flow rate, and the future flow rate of 84,000 gpd is acceptable to both the Town of Auburn and MWRC. Environmentally, it is not the best alternative because of the interbasin transfer issue. However, the amount of interbasin transfer meets MWRC's criteria for insignificance, so there is no major environmental impact. Table 4-3 shows the present worth cost of this alternative, including capital and 20-year O&M costs.

c. Component 3

Component 3 includes the collection of wastewater from the Town of Oxford within the ORSD, and treatment of that wastewater at the ORSD WWTP. Like Component 2, this option is currently in place, with Oxford flows anticipated to increase from about 56,000 gpd in 2007, to about 120,000 gpd in 2030.

Table 4-3
North Focus Area Alternatives
Capital, O&M and Present Worth Costs[1]

	Alternative A Components 1-4[2] New 0.26 WWTF						Alternative B Components 1, 2 & 5[2] Expanded ORSD WWTP						Alternative C Components 1, 2, 3 & 6[2] 0.26 MGD to Webster/Dudley WWTF		
	Site 9, 10, 11[3]			Site 5[3]			Site 9, 10, 11[3]			Site 5[3]					
	Capital	O&M	Present Worth	Capital	O&M	Present Worth	Capital	O&M	Present Worth	Capital	O&M	Present Worth	Capital	O&M	Present Worth
0.084 MGD to UBWPAD	$0	$113,000	$1,966,000	$0	$113,000	$1,966,000	$0	$113,000	$1,966,000	$0	$113,000	$1,966,000	$0	$113,000	$1,966,000
0.120 MGD to ORSD	$0	$210,000	$3,654,000	$0	$210,000	$3,654,000	$0	$210,000	$3,654,000	$0	$210,000	$3,654,000	$0	$210,000	$3,654,000
New WWTF[4]	$11,894,000	$490,000	$20,420,000	$11,894,000	$490,000	$20,420,000	--	--	--	--	--	--	--	--	--
Land Purchase	$2,132,000	$0	$2,132,000	$0	$0	$0	$884,000	$0	$884,000	$0	$0	$0	--	--	--
Expanded ORSD WWTP[4]	--	--	--	--	--	--	$1,479,000	$99,000	$3,202,000	$1,479,000	$99,000	$3,202,000	--	--	--
Groundwater Recharge Piping	$203,000	$0	$203,000	--	--	--	$203,000	$0	$203,000	$5,285,000	$0	$5,285,000	--	--	--
Oxford Sewer Extensions	$12,289,000	$32,000	$12,846,000	$23,432,000	$49,000	$24,285,000	$13,043,000	$36,000	$13,669,000	$13,043,000	$36,000	$13,669,000	$28,623,000	$53,000	$29,545,000
Webster Sewer Extensions	--	--	--	--	--	--	--	--	--	--	--	--	$1,087,000	$891,000	$16,590,000
Webster P.S. Upgrades	--	--	--	--	--	--	--	--	--	--	--	--	$250,000	--	$250,000
TOTAL	$26,518,000	$845,000	**$41,221,000**	$35,326,000	$862,000	**$50,325,000**	$15,609,000	$458,000	**$23,578,000**	$19,807,000	$458,000	**$27,776,000**	$29,960,000	$1,267,000	**$52,005,000**

NOTES:

1. See Appendix A for cost backup information and details.

2. Component descriptions are as follows:

Components	Treatment	Disposal
1	Individual Onsite Subsurface Treatment	Groundwater Recharge
2	0.084 MGD at UBWPAD WWTF	Discharge to Blackstone River
3	0.120 MGD at ORSD WWTP	Discharge to French River
4	0.258 MGD at New Onsite WWTF	Groundwater Recharge
5	0.378 MGD from Oxford at ORSD WWTP	Discharge to French River and 0.26 MGD Groundwater Recharge
6	0.258 MGD at Webster/Dudley AWWTF	Discharge to French River

3. Site descriptions are as follows:
Site 5 is a 31-acre town owned parcel on Locust Street in the Central area of Town.
Sites 9, 10, and 11 are a combined acreage of 10 acres located in the Northern area of Town. Site 9 is owned by ORSD, and Sites 10 and 11 are owned by the Ashworth Hill Development.

4. Includes the cost of groundwater recharge, other than land acquisition costs and site specific groundwater recharge piping.

As discussed in Chapter 2, the ORSD, which serves residents in northwest Oxford and the southern part of Leicester, operates and maintains about 14 miles of sewers and four pumping stations within the district. Sewers serving Oxford residents are all located in the North focus area, north of the Massachusetts Turnpike. Portions of the sewer system date back to 1910, with construction continuing through 2003. The sewer system has experienced I/I issues that result in increased flows at the WWTP during and after wet weather events; the District is currently developing a three- to five-year plan to address these concerns. The plant recently upgraded its headworks facility, and has plans to enlarge the size of its primary clarifier. There are no other near-term significant plant modifications anticipated, and it may be possible to offset some of the future wastewater flow increase due to population growth with I/I reduction in the sewer system.

The scope of the Phase I Report did not cover wastewater flow increases for the ORSD associated with the Town of Leicester. For the purposes of the current evaluation, the assumption is that the total flow to the ORSD WWTP will remain within its permitted limit of 0.50 MGD through the year 2030, provided the WWTP does not receive wastewater from areas outside of current district boundaries.

Component 3 gets high marks for meeting technical and institutional criteria because it is presently functioning successfully, and the option only accounts for wastewater management within current district boundaries. On an environmental note, the ORSD WWTP discharges to the French River, so there are no interbasin transfer issues with regard to treatment of wastewater from Oxford residents or businesses at this facility. Table 4-3 contains the present worth cost of this alternative, including capital and 20-year O&M costs.

d. Component 4

The scope for Component 4 involves collection, treatment and disposal of 0.26 MGD of wastewater at a new onsite WWTF within Oxford. The flow rate of 0.26 MGD is the amount remaining in 2030 from the existing municipally sewered areas and portions of needs areas to be sewered in the North focus area, after deducting the flow to Auburn (84,000 gpd) and Oxford's flow to the existing ORSD WWTP (120,000 gpd). The collection part of Component 4 includes collection of wastewater from the currently unsewered portions of the needs areas in the North focus area, and a portion of the existing sewered areas that lie inside and south of the North focus area. Collection components consist of gravity and low pressure sewers, force mains and pump stations to serve all of the above areas. Appendix A contains a tabulation of the collection system components and present worth costs.

Based on the results of the three-tier screening process in Chapter 3, treatment under Component 4 is achieved at a WWTF located on either Site 5, 10 or 11, with the adjacent Sites 10 and 11 considered to be one location. For the purposes of obtaining preliminary costs, we assumed the treatment process would be a sequencing batch reactor (SBR) process with ultraviolet disinfection. A preliminary breakdown of the treatment plant components and present worth costs is in Appendix A, and Table 4-3 provides a summary of the present worth cost of this alternative. Site 5 or the combination of Sites 9, 10 and 11 also serves as the primary groundwater recharge site for taking the treated wastewater.

Component 4 provides groundwater recharge within the French River Basin, so it is advantageous from an environmental prospective, although short-term negative impacts will occur from extensive sewer construction. Also, the proposed SBR process is a well-known, technically feasible option for wastewater treatment prior to groundwater recharge. This option has significant institutional and political barriers, however, because it involves siting a new WWTF with groundwater recharge within the Town of Oxford.

2. Alternative B

Alternative B is another option for handling flows from the North focus area, and is comprised of Components 1, 2, and 5 (Table 4-2). Figure 4-3 is a flow diagram that graphically depicts this alternative. The collection, treatment and disposal methods for Components 1 and 2 are as described previously. Below is a detailed discussion of Component 5.

a. Component 5

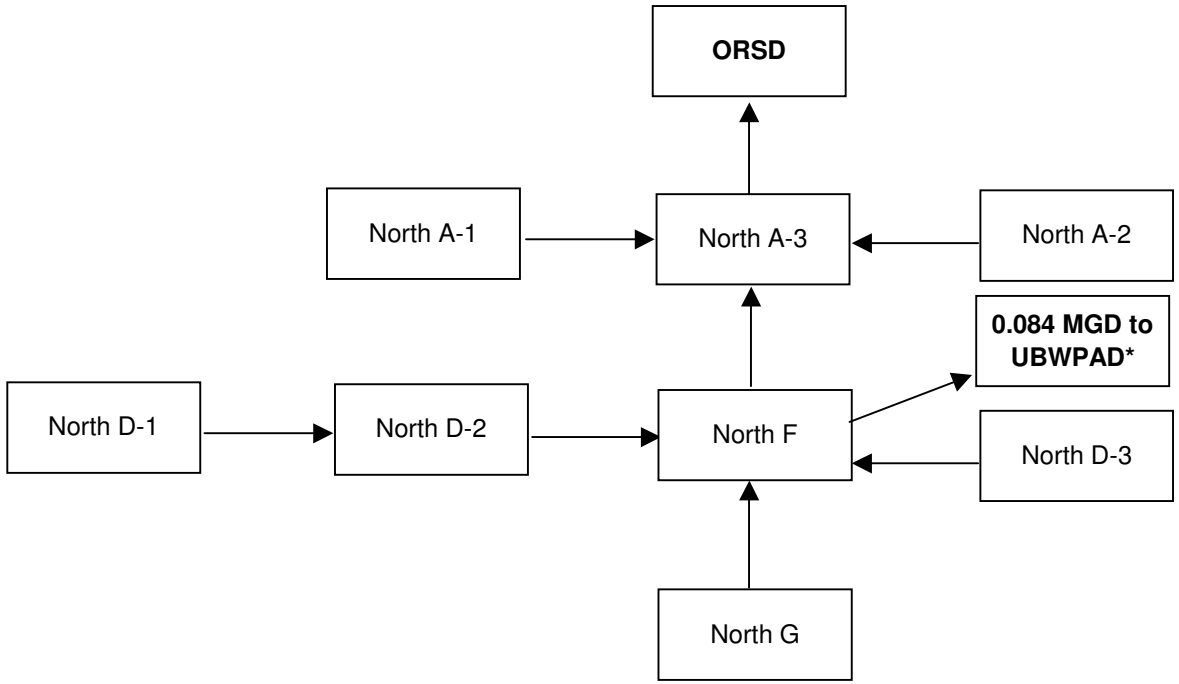
Component 5 encompasses collection and treatment of 378,000 gpd of wastewater at an expanded ORSD WWTP. This flow is the amount remaining in 2030 from the existing municipally sewered areas and portions of needs areas to be sewered in the North focus area, after deducting the flow to Auburn (84,000 gpd). Included in the 378,000 gpd is 120,000 gpd of future flows from Oxford within existing ORSD boundaries. The collection part of Component 5 involves collection of wastewater from the unsewered portions of the needs areas in the North focus area, and a portion of the existing sewered areas that lie inside and south of the North focus area. Collection components consist of gravity and low pressure sewers, force mains and pump stations to serve all of the above areas. Appendix A contains a tabulation of the collection system components and costs.

Treatment is achieved by expanding the ORSD WWTP to accommodate the additional 260,000 gpd of future flows originating outside of current ORSD boundaries. Disposal of the additional 260,000 gpd of treated future flows would be handled by groundwater recharge on either Site 5, or the combination of Sites 9, 10 and 11, as determined by the three-tier screening process in Chapter 3. The remaining 120,000 gpd of wastewater - equating to flow that originates from Oxford within ORSD boundaries - would discharge to the French River. Appendix A contains a detailed breakdown of WWTF components and costs, and Table 4-3 provides a summary of the present worth cost of the collection and treatment portions of this alternative.

Because this alternative provides groundwater recharge within the French River Basin, it is advantageous from an environmental prospective, despite the initial environmental impact of the extensive sewer construction. This option involves expansion of an existing WWTF, employing the same treatment on the same site, which again is a positive scenario. Siting a new groundwater recharge facility will require overcoming political and institutional obstacles, however.

Figure 4-3

Alternative B



* Thayer Pond Village Pumping Station flows to be redirected to ORSD

3. Alternative C

Alternative C, the combination of Components 1, 2, 3 and 6 (Table 4-2), is another option for handling the North focus area's wastewater needs through 2030. Components 1, 2, and 3 are described in detail above, and a discussion of Component 6 follows. Figure 4-4 displays a flow diagram of Alternative C.

a. Component 6

Component 6 encompasses collection and treatment of 0.26 MGD of wastewater at the Webster/Dudley AWWTF. This flow is the amount remaining in 2030 from the existing municipally sewered areas and portions of needs areas to be sewered in the North focus area, after deducting the flow to Auburn (84,000 gpd) and Oxford's flow to the existing ORSD WWTP (120,000 gpd). The collection part of this component includes gravity and low pressure sewers, force mains and pump stations to serve all of the above areas, and to transport the wastewater south to the Oxford-Webster town line. In addition to costs for the collection system in Oxford, there is a cost to construct/upgrade sewers and pumping stations in the Town of Webster to handle the increased flow. Appendix A contains a detailed tabulation of the collection and treatment system components and costs, and Table 4-3 provides a summary of the present worth cost of this alternative. At this preliminary stage, the basis for the cost to transport and treat wastewater within Webster is the proposed user charge rate that Webster plans to charge all users within Webster and Dudley once the phosphorus removal upgrade at the plant is complete, and which includes both collection and treatment O&M costs in Webster and Dudley.

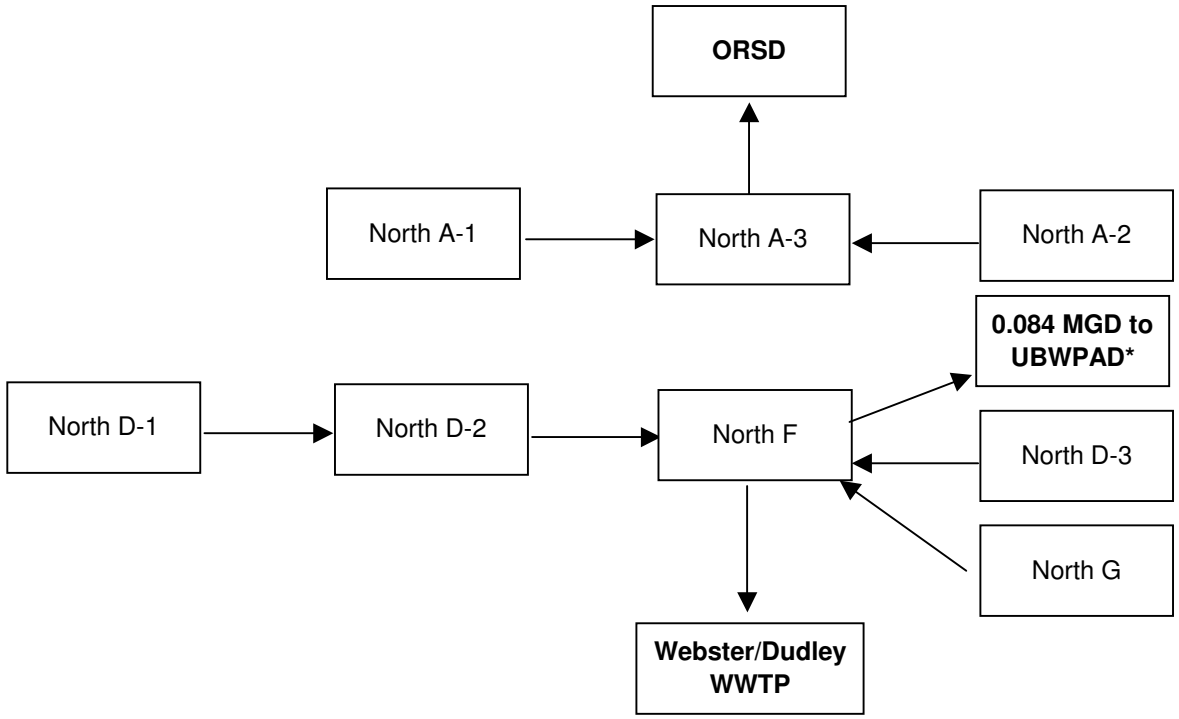
This option has extensive short-term impacts from sewer construction in the North focus area, and also from the construction of five pumping stations, force main and interceptor from this area to the Oxford-Webster town line. There is no interbasin transfer of water, because the Webster/Dudley AWWTF discharges to the French River. However, this alternative does not offer the groundwater recharge aspect of Components 4 or 5, and has a high-energy impact associated with pumping 0.26 MGD of wastewater over several miles through Oxford and to the Webster/Dudley AWWTF.

Component 6 is a technically sound choice because the Webster/Dudley AWWTF has been operating successfully for many years, is about to undergo an upgrade for improved phosphorus removal, and has abundant capacity to handle the 0.26 MGD wastewater flow from Oxford due to the loss of industry in Webster over the last decade.

From an institutional perspective, the Towns of Oxford and Webster would need to develop an intermunicipal agreement for transporting and treating Oxford's wastewater in the town of Webster. This agreement would establish payment terms and other criteria for transferring wastewater from Oxford into Webster. Another arrangement might be development of a Webster/Dudley/Oxford regional sewer district, which would need approval of the State Legislature.

Figure 4-4

Alternative C



* Thayer Pond Village Pumping Station flows to be redirected to Webster/Dudley WWTP

B. TOWN-WIDE WASTEWATER COLLECTION, TREATMENT AND DISPOSAL OPTIONS

1. Alternative D

This alternative combines Alternative B – Components 1, 2, and 5 – which handles the flows from the North focus area, with Component 7 (Table 4-2) to make it a town-wide option. It is also possible to combine Component 7 with Alternative A, but this would result in a more costly project. Figure 4-5 is a flow diagram of this alternative. A discussion of Component 7 follows.

a. Component 7

Component 7 encompasses collection of 0.826 MGD of future flow from the needs areas in the Central and South focus areas, and then treatment of this flow at the Webster/Dudley AWWTF. The collection part of this component includes gravity and low pressure sewers, force mains and pump stations to serve all of the above areas. In addition, there is a need to construct or upgrade sewers and pumping stations in the Town of Webster to handle the increased flow.

Treatment for this component would be at the existing Webster/Dudley AWWTF with discharge to the French River. There is adequate capacity at this facility to take this additional flow. The environmental, technical and institutional impacts of this alternative are similar to those described for Alternative C, although the current option involves a greater short-term environmental impact because of the extensive collection system required for the Central and South focus areas.

Appendix A contains a detailed tabulation of the collection and treatment system components and present worth costs, and Table 4-4 summarizes this information.

2. Alternative E

Alternative E consists of Components 1, 2, 3 and 8, and is another town-wide option for future wastewater management. Components 1, 2 and 3 are as described earlier, and the following presents the details of Component 8. Figure 4-6 is the flow diagram for this alternative.

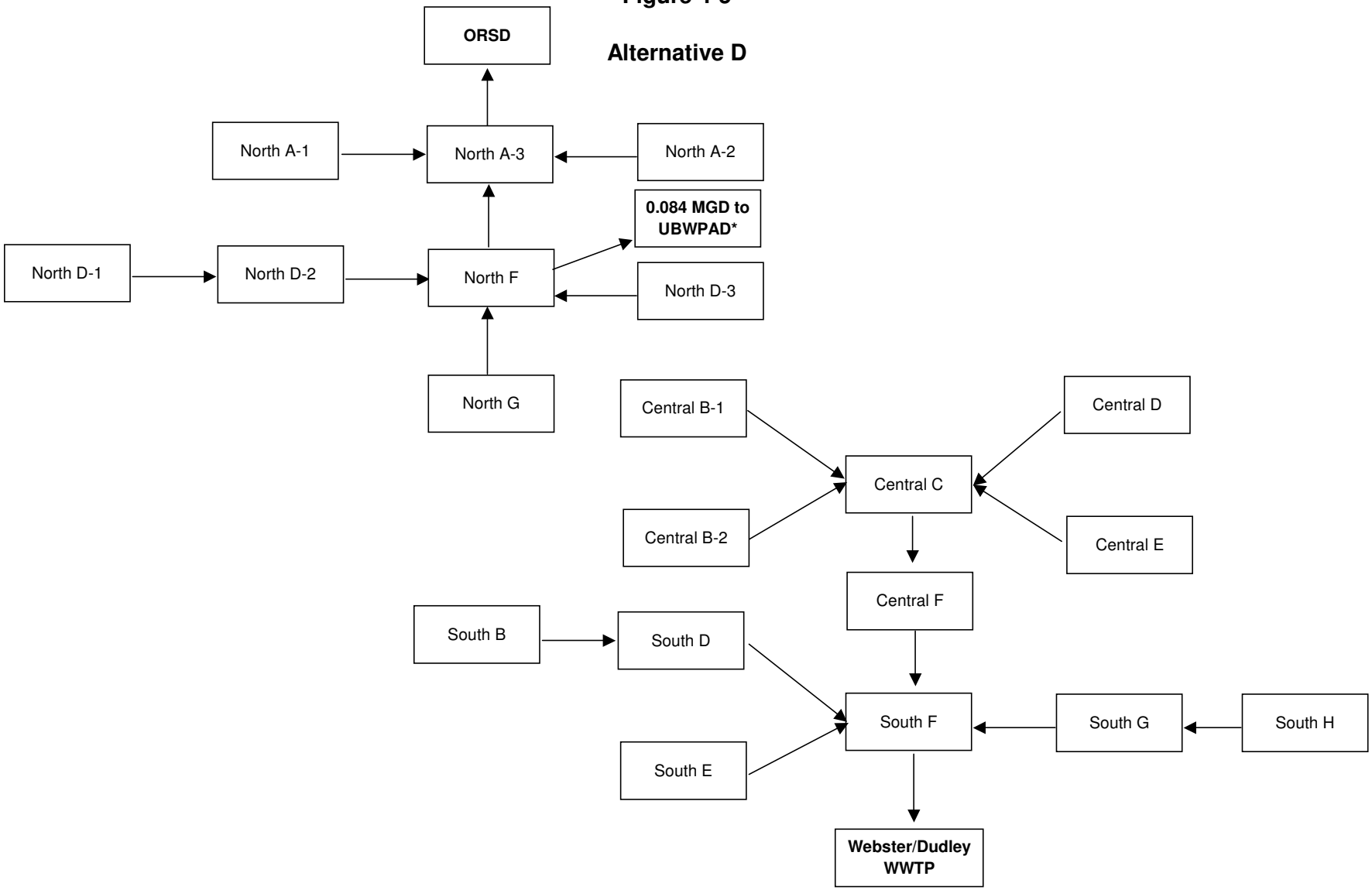
a. Component 8

Component 8 encompasses collection and treatment of the entire Town's projected wastewater flow of 1.3 MGD, excluding the projected flow within ORSD (120,000 gpd), and interbasin transfer of the current limit of 84,000 gpd between the French and Blackstone River Basins. This results in a flow of 1.1 MGD. This alternative handles wastewater from all of the needs areas in the three focus areas, as well as a portion of the existing municipally sewered areas.

The collection part of this alternative includes gravity and low pressure sewers, force mains and pumping stations to serve all of the above areas. Appendix A contains a detailed tabulation of the collection system components and present worth costs, and Table 4-4 shows a cost summary.

Figure 4-5

Alternative D



* Thayer Pond Village Pumping Station flows to be redirected to ORSD

Table 4-4
Town-wide Alternatives
Capital, O&M and Present Worth Costs[1]

	Alternative D Components 1, 2, 5 & 7[2] Expanded ORSD WWTP and Central/South to Webster/Dudley WWTF						Alternative E Components 1, 2, 3 & 8[2] New 1.1 MGD WWTF			Alternative F Components 1, 2, 3 & 9[2] 1.1 MGD to Webster/Dudley WWTF		
	Site 9, 10, 11[3]			Site 5[3]			Site 5[3]					
	Capital	O&M	Present Worth	Capital	O&M	Present Worth	Capital	O&M	Present Worth	Capital	O&M	Present Worth
0.084 MGD to UBWPAD	$0	$113,000	$1,966,000	$0	$113,000	$1,966,000	$0	$113,000	$1,966,000	$0	$113,000	$1,966,000
0.120 MGD to ORSD	$0	$210,000	$3,654,000	$0	$210,000	$3,654,000	$0	$210,000	$3,654,000	$0	$210,000	$3,654,000
New WWTF[4]	--	--	--	--	--	--	$21,165,000	$915,000	$37,086,000	--	--	--
Land Purchase	$884,000	$0	$884,000	$0	$0	$0	--	--	--	--	--	--
Expanded ORSD WWTP[4]	$1,479,000	$99,000	$3,202,000	$1,479,000	$99,000	$3,202,000	--	--	--	--	--	--
Groundwater Recharge	$203,000	$0	$203,000	$5,285,000	$0	$5,285,000	--	--	--	--	--	--
Oxford Sewer Extensions	$65,153,000	$181,000	$68,302,000	$65,153,000	$181,000	$68,302,000	$74,308,000	$258,000	$78,797,000	$78,232,000	$216,000	$81,990,000
Webster Sewer Extensions	$1,087,000	$2,795,000	$49,720,000	$1,087,000	$2,795,000	$49,720,000	--	--	--	$1,087,000	$3,761,000	$66,528,000
Webster P.S. Upgrades	$250,000	--	$250,000	$250,000	--	$250,000	--	--	--	$250,000	--	$250,000
TOTAL	$69,056,000	$3,398,000	**$128,181,000**	$73,254,000	$3,398,000	**$132,379,000**	$95,473,000	$1,496,000	**$121,503,000**	$79,569,000	$4,300,000	**$154,388,000**

NOTES:

1. See Appendix A for cost backup information and details.

2. Component descriptions are as follows:

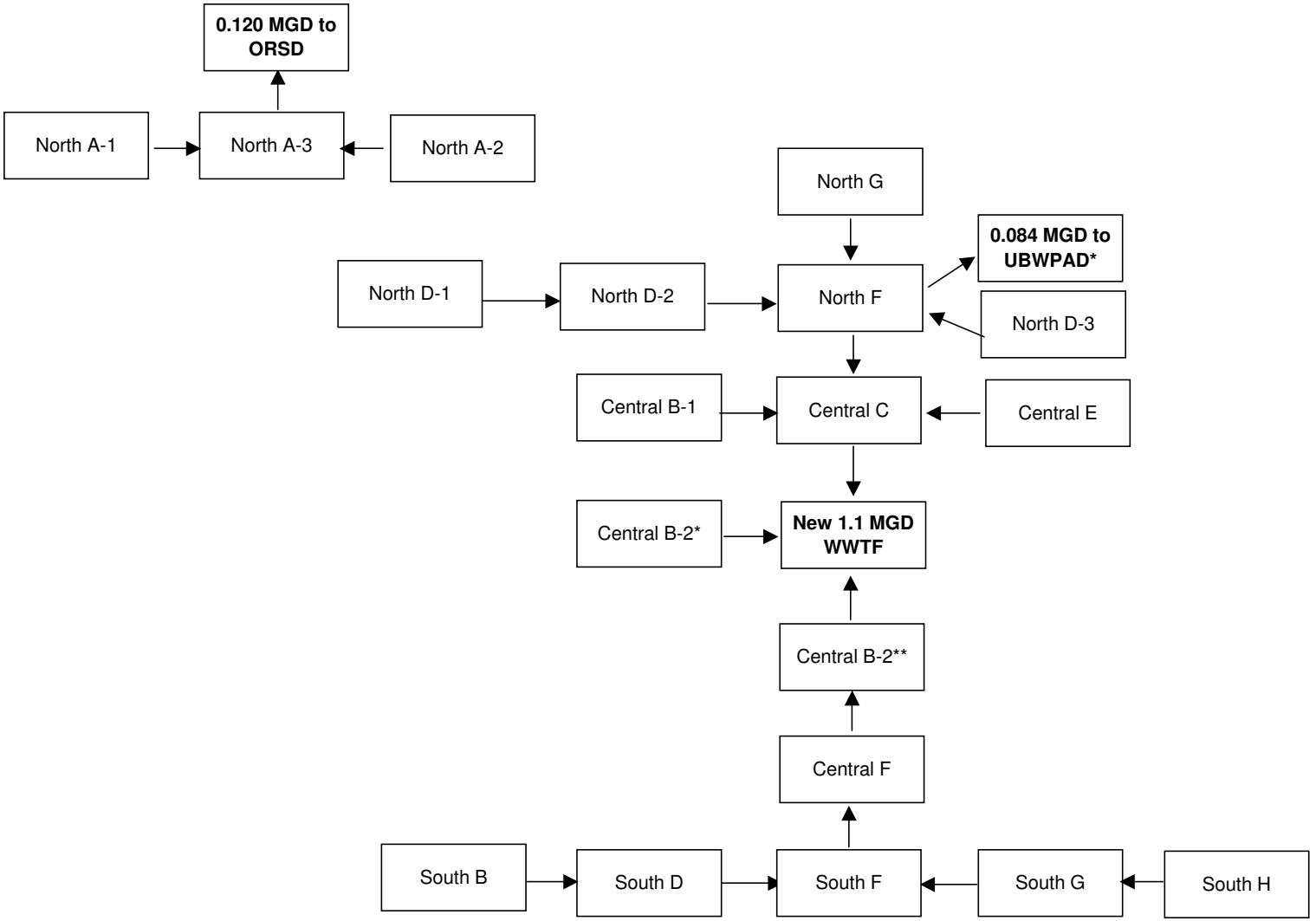
Components	Treatment	Disposal
1	Individual Onsite Subsurface Treatment	Groundwater Recharge
2	0.084 MGD at UBWPAD WWTF	Discharge to Blackstone River
3	0.120 MGD at ORSD WWTP	Discharge to French River
5	0.378 MGD from Oxford at ORSD WWTP	Discharge to French River and 0.26 MGD Groundwater Recharge
7	0.826 MGD at Webster/Dudley AWWTF	Discharge to French River
8	1.08 MGD at New Onsite WWTF	Groundwater Recharge
9	1.08 MGD at Webster/Dudley AWWTF	Discharge to French River

3. Site descriptions are as follows:
Site 5 is a 31-acre town owned parcel on Locust Street in the Central area of Town.
Sites 9, 10, and 11 are a combined acreage of 10 acres located in the Northern area of Town. Site 9 is owned by ORSD, and Sites 10 and 11 are owned by the Ashworth Hill Development.

4. Includes the cost of groundwater recharge, other than land acquisition costs and site specific groundwater recharge piping.

Figure 4-6

Alternative E



* Thayer Pond Village Pumping Station flows to be redirected to new WWTF
** Central B-2 gravity flows split

As described in Chapter 3, treatment is achieved at a WWTF located on Site 5. This site is advantageous because it is town-owned and centrally located. As in Component 4, we assumed the treatment process would be an SBR system with ultraviolet disinfection. A preliminary breakdown of the treatment plant components and present worth costs is in Appendix A. Site 5 also serves as a groundwater recharge site for a portion of the treated wastewater. This component also includes the cost of purchasing Sites 6 and 7 to assist with groundwater recharge.

Because this alternative provides groundwater recharge within the French River Basin, it is advantageous from an environmental prospective, despite the initial environmental impact of the extensive sewer construction. The SBR process is a tried-and-true operation for wastewater treatment prior to groundwater recharge, so it is technically feasible. There may be some political issues, however, because Site 5 is adjacent to residential neighborhoods. If the cost of treatment of town-wide flow with groundwater recharge is not prohibitive, the Town can explore locating a WWTF on Sites 6 or 7, and use Site 5 just for groundwater recharge, or replace Site 5 with Sites 3 and/or 4 for groundwater recharge.

3. Alternative F

Alternative F, another town-wide option for future wastewater management, consists of the combination of Components 1, 2, 3 and 9. Components 1, 2 and 3 are as described earlier, and details of Component 9 follow. Figure 4-7 is the flow diagram for this alternative.

a. Component 9

As with Component 8, this option handles 1.1 MGD of wastewater that originates from all of the needs areas in the three focus areas, as well as a portion of the municipally sewered areas. However, instead of bringing this wastewater to an onsite treatment facility with groundwater recharge, Component 9 transports it to the Webster/Dudley AWWTF for treatment and discharge to the French River.

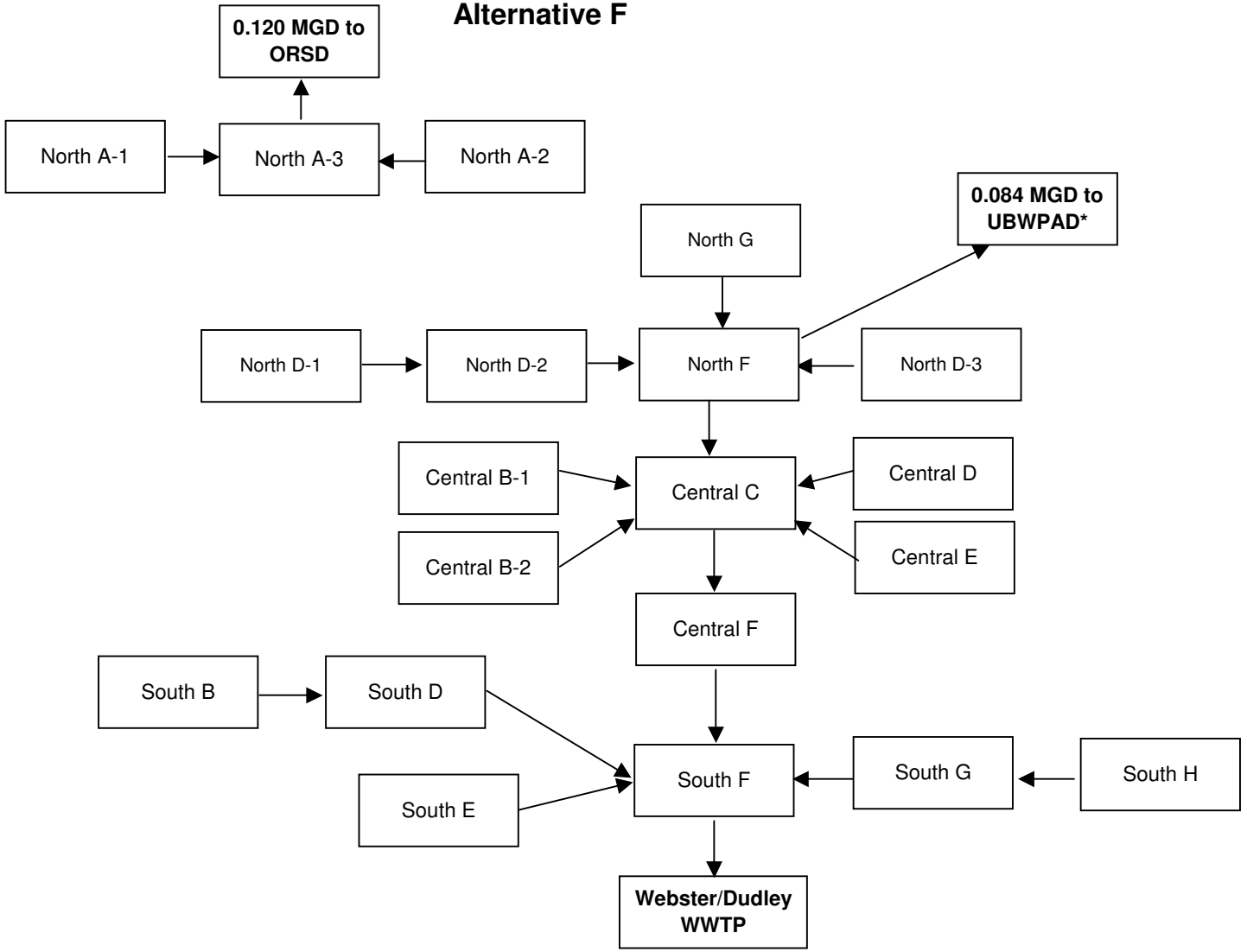
The collection part of this alternative includes gravity and low pressure sewers, force mains and pump stations to serve the above areas. In addition to wastewater collection within Oxford, this option involves the construction and/or upgrade of sewers and pumping stations in the Town of Webster.

The environmental, technical and institutional impacts of this alternative are similar to those described for Component 7, except that the current option sends another 0.26 MGD of flow to the Webster/Dudley AWWTF for treatment and discharge to the French River. The extensive amount of wastewater pumping makes it a high energy use alternative, as well.

Appendix A contains a detailed tabulation of the collection and treatment system components and present worth costs, and Table 4-4 summarizes this information.

Figure 4-7

Alternative F



* Thayer Pond Village Pumping Station flows to be redirected to Webster/Dudley WWTP

C. ALTERNATIVES ANALYSIS SUMMARY

1. North Focus Area Alternatives

Of the three North focus area alternatives, Alternative B, 0.26-MGD expansion of the ORSD WWTP with groundwater recharge on Sites 9, 10, and 11, is the least costly alternative as shown in Table 4-3. This option involves expansion of an existing WWTF, employing the same treatment on the same site. This should encounter fewer political, environmental, legal and other obstacles than siting a new WWTF. Siting a new groundwater recharge facility will require overcoming many of these same obstacles, however, but it will keep the treated wastewater within the French River Basin.

2. Town-wide Alternatives

Regarding management of wastewater from the North, Central and South focus areas, the least costly alternative of the three presented is Alternative E, building a new 1.1-MGD onsite WWTF with groundwater recharge within the Town of Oxford. The present worth cost for Alternative D, expanding the ORSD WWTP to treat the North focus area of town, and sending the wastewater from the Central and South focus areas to the Webster/Dudley AWWTF is not much more costly, however. As stated above, expansion of the existing ORSD facility should have far fewer obstacles than siting a new facility. Additionally, the Webster/Dudley AWWTF has adequate capacity to handle the increased flows, and it discharges to the French River. Because the present worth costs for Alternatives D and E are so similar, we advise pursuing both these alternatives in the following phase of this CWMP – *Alternatives Evaluation and Plan Selection*.