Draft Summary of Water Supply Alternatives Matrix ("Required Alternatives" shaded in green and "Baseline Alternatives" shaded in yellow)

No.	Raw Water Source	Description	Evaluation Criteria: Reliable Capacity	Raw Water Quality	Cost	Implementability	Flexibility	Environmental Benefits	Recreation
Non-Structural Alternatives									
1	Water Efficiency Measures	Better management of water including water conservation, public outreach, system optimization, water reuse, etc. Full cost pricing of water including setting rates to reflect the full cost of service to help utilities capture the actual cost of operating water systems, raise revenues and help conserve water. Efficient water use including reducing leaks, metering, building retrofits, water sensing fixtures, irrigation systems, rainwater harvesting, etc. Watershed approaches including source water protection, return water to river, etc.	- Satisfies a portion of 32 mgd river deficit in 2060. - In aggregate, Water Efficiency Measures likely reduce water demands by 5% or 10% and potentially up to 30% of the total unrestricted demand. - Continued reliance on Normandy Reservoir (208 sq mi drainage area) as sole source of water during severe droughts to satisfy many needs.	- No change.	$?? Cost to implement water efficiency measures.	- Public acceptance could delay implementation of certain water efficiency measures. - Minimal permitting, property acquisition or constructability issues. - Voluntary participation required by customers for certain water efficiency measures.	- Alternative can be implemented in multiple phases.	- Water Efficiency Measures can reduce water supply withdrawals and thereby provide environmental benefits.	- No recreational benefits or impacts.
2	Increase Normandy Reservoir Release to Meet Columbia Constraint Without Raising Dam or Pool Levels	Modify Normandy Reservoir release protocol to increase releases during low flow conditions (i.e., drought events) to meet the 64 mgd (100 cfs) constraint at the Columbia gage. This alternative does not include raising the Normandy Dam height or pool levels.	- Satisfies entire river deficit of 32 mgd in 2060. - Compared to 2010 conditions, release from Normandy Reservoir to meet Columbia constraint in 2060 results in approximately 3 ft lower water levels in Normandy Reservoir under conditions of 2007 drought and 2060 water demands. - Continued reliance on Normandy Reservoir (208 sq mi drainage area) as sole source of water during severe droughts to satisfy many needs.	- No change.	$?? Consider cost of impact on recreation due to lower water levels. Consider increased cost for treatment and pumping.	- EIS involving detailed environmental studies of flow alteration will be required, but ability to obtain necessary permits is likely.	- Alternative can be implemented in multiple phases.	- Need to identify if increased release has significant impact/ environmental benefits associated with hydrologic regime, physical habitat, water quality and biota.	- Lower water levels in Normandy Reservoir as a result of satisfying constraint at Columbia (maximum of 3 ft additional drawdown during critical drought and 2060 demands) could further impact recreation during drought.
3	Regional Drought Management Plan	Develop drought management plan that reflects both human and environmental uses of flow. Drought Plan will identify triggers or actions to be taken during drought conditions based on numerous factors which could include time of year, reservoir water levels, groundwater conditions, downstream flow conditions, etc. Consequently, the Drought Management Plan would consist of a package of alternatives and would define the timing and trigger for enacting elements of alternatives such as water use restrictions, reductions in releases from Normandy Reservoir, etc.	- Reduction in demand or storage preserved in Normandy Reservoir covered by implementation of other alternatives under this Drought Management Plan. - Drought management planning could involve demand management during droughts that could extend the supply availability. Could also involve reduced releases during initial stages of droughts for use at latter stages of drought. - Continued reliance on Normandy Reservoir (208 sq mi drainage area) as sole source of water during severe droughts to satisfy many needs.	- No change.	$?? Reduced demand has potential for negative revenue impacts on utilities.	- EIS involving detailed environmental studies of flow alteration will be required, but ability to obtain necessary permits is likely. - Requires participation and actions from State agencies.	- Alternative can be implemented in multiple phases.	- Need to identify if increased release and modified operating protocol has significant impact/ environmental benefits associated with hydrologic regime, physical habitat, water quality and biota.	- Benefits or impacts to recreation associated with changes in reservoir operation are uncertain.
4	Optimize Releases from Normandy Reservoir	Install stream gages and modify dam controls as needed to allow releases from Normandy Reservoir to more closely match flow requirements at Shelbyville. Alternative preserves storage at initial stages of drought and allows for releases in latter stages when lower flow conditions occur.	- Projected deficits used in this study were computed assuming optimization of releases from Normandy Reservoir. - Continued reliance on Normandy Reservoir (208 sq	- No change.	$?? Cost for installation and maintenance of stream gages.	- No change in operating rules.	- Alternative can be implemented in multiple phases.	- Need to identify if reduced release during initial stages of drought has significant impact/ environmental benefits associated with hydrologic regime,	- Preserves pool storage for recreation in Normandy Reservoir due to ability to match required release.

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			mi drainage area) as sole source of water during severe droughts to satisfy many needs.					physical habitat, water quality and biota.	
5	Raise Normandy Reservoir Winter/Spring Pool Level without Raising Dam	Raise Normandy Reservoir Winter/Spring pool level from 864 ft to 869 ft to preserve water storage from Winter/Spring pool for human and environmental needs during drier Summer/Fall months. This alternative would need to be combined with a modified release from Normandy Reservoir to satisfy the projected deficit of the downstream users.	- Satisfies entire river deficit of 32 mgd in 2060. - Increases water supply storage by approximately 5 BG and 1.4 BG needed to meet Columbia constraint in 2060. Reduces flood storage volume by roughly 5 BG. - Continued reliance on Normandy Reservoir (208 sq mi drainage area) as sole source of water during severe droughts to satisfy many needs.	- No change.	$?? May require land acquisition in flood prone areas downstream of dam.	- EIS involving detailed environmental studies of flow alteration will be required, but ability to obtain necessary permits is likely. - May require land acquisition in flood prone areas downstream of dam.	- Alternative can be implemented in multiple phases.	- Potential negative impacts on stream due to higher frequency of flooding.	- Preserves pool storage and extends recreation in Normandy Reservoir during drought due to higher water levels.
6	Modify Normandy Reservoir Flood Rule Curve	Initiate refill of Normandy Reservoir earlier in the Spring (say February 1st instead of March 1st) in order to capture high Spring flows and refill prior to dry weather conditions which begin in June. This alternative would need to be combined with a modified release from Normandy Reservoir to satisfy a portion of the projected deficit of the downstream users. This alternative could be combined with other alternatives involving modification of the operating rule curve at Normandy Reservoir.	- No added reliable capacity. - Increases storage for water supply by capturing high spring flood flows. Risk associated with potential for no storm event in Normandy Reservoir drainage area between February 1st and March 1st. - Reduces volume of flood storage between February 1st and March 1st. - Continued reliance on Normandy Reservoir (208 sq mi drainage area) as sole source of water during severe droughts to satisfy many needs.	- No change.	$?? May require land acquisition in flood prone areas downstream of dam.	- EIS involving detailed environmental studies of flow alteration will be required and ability to obtain necessary permits is uncertain. - May require land acquisition in flood prone areas downstream of dam.	- Alternative can be implemented in multiple phases.	- Downstream restrictions could be an issue but this alternative is better for reservoir biota. Objective is to fill it and maintain a steady pool level in the reservoir for spawning.	- Preserves pool storage and extends recreation in Normandy Reservoir during drought due to higher water levels.
7	Reduce Irrigation Withdrawals **(FATAL FLAW)**	Reduce irrigation withdrawals and develop a plan to compensate farmers or provide water storage for use during drought conditions.	- No added reliable capacity. - Withdrawals could be significant for short term (i.e., a few days) but cannot be defined because irrigation withdrawals are not restricted and effectiveness of incentives will have to be based on voluntary participation.	- No change.	$??	- Delays in implementation possible due to need for voluntary participation. - Requires legislative action.	- Alternative can be implemented in multiple phases.	- Not applicable.	- No recreational benefits or impacts.
8	Modify River Constraints to Preserve Storage in Normandy Reservoir	Modify flow constraints at Columbia by changing instantaneous requirement of 100 cfs to weekly average (or similar) or by reducing 100 cfs instantaneous flow requirement.	- Potential to satisfy entire river deficit of 32 mgd in 2060. - Reduced releases during droughts which preserves storage for use at latter stages of drought. - Continued reliance on Normandy Reservoir (208 sq mi drainage area) as sole source of water during severe droughts to satisfy many needs.	- Raw water quality improvement if wastewater discharge treated to a higher level.	$?? Cost for wastewater treatment improvements to allow flow reductions.	- EIS involving detailed environmental studies of flow alteration will be required and ability to obtain necessary permits is uncertain.	- Alternative can be implemented in multiple phases.	- Environmental benefits associated with improvements in level of wastewater treatment.	- Preserves pool storage and extends recreation in Normandy Reservoir during drought due to higher water levels.

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Structural Alternatives									
9	Raise Normandy Dam *(Alternative D from 2000 PEIS)*	Increase the height of Normandy Dam and Winter/Fall pool level by 5 ft (i.e., increase flood pool from 880 ft to 885 ft, retain Summer/Fall pool at 875 ft, and increase Winter/Spring pool from 864 ft to 869 ft). Increase releases from Normandy Reservoir to meet needs at Shelbyville and Columbia.	- Satisfies entire river deficit of 32 mgd in 2060. - Increases storage by approximately 5.5 BG. - No impact on flood storage volume. - Continued reliance on Normandy Reservoir (208 sq mi drainage area) as sole source of water during severe droughts to satisfy many needs.	- No change.	$?? Costs for dam modifications, as well as roadway and boat launch modifications. Affected area to be inundated is in public ownership.	- EIS involving detailed environmental studies of flow alteration will be required, but ability to obtain necessary permits is likely. - Need to document number of stream miles inundated. - Short Springs (State Designated Natural Area) along Bobo Creek could experience prolonged periods of occasional inundation and impede approval or limit increase in height of dam. Higher pool level will inundate 2 to 3 acres of flora and hiking trails at Short Springs. - Loss of shoreline vegetation.	- No flexibility to phase implementation for construction, but could phase increases in pool level.	- No apparent environmental benefits associated with hydrologic regime, physical habitat, water quality and biota.	- Potential impacts to campgrounds and boat ramps.
10	Improve DRUC Intake	Modify the existing DRUC intake to allow access to water below the current low water level threshold (approximately 840 ft). This alternative would need to be combined with a modified release from Normandy Reservoir to satisfy the projected deficit of the downstream users.	- No added reliable capacity to meet deficit for downstream users. - Provides DRUC with more reliable access to roughly 10 BG of storage between elevation 845 ft and 830 ft.	- Potentially lower raw water quality compared to other alternatives. - In the event of a severe drought, DRUC would make alternative provisions (i.e., floating intake, etc.) to utilize this storage and water would also continue to be released to meet downstream needs.	$?? Cost for intake modifications.	- EIS involving detailed environmental studies of intake modifications will be required, but ability to obtain necessary permits is likely.	- No flexibility to phase implementation.	- No direct impact associated with hydrologic regime, physical habitat, water quality and biota, because the minimum required instream flow would be maintained.	- No recreational benefits or impacts.
11	Construct Second DRUC Intake	Construct a second 20 mgd intake and pumping station for DRUC near the Normandy Dam to allow access to water below the operating range of the existing DRUC intake (approximately 840 ft). Construct a 30-inch pipe (4 miles) to convey flow from the new intake to the existing DRUC WTP. This alternative would need to be combined with a modified release from Normandy Reservoir to satisfy the projected deficit of the downstream users.	- No added reliable capacity to meet deficit for downstream users. - Provides DRUC with more reliable access to roughly 15 BG of storage between elevation 845 ft and 800 ft.	- Potentially lower raw water quality compared to other alternatives. - In the event of a severe drought, DRUC would make alternative provisions (i.e., floating intake, etc.) to utilize this storage and water would also continue to be released to meet downstream needs. - Construct a multi-port intake to obtain highest quality water available.	$?? Cost for new intake and piping.	- EIS involving detailed environmental studies of new intake will be required, but ability to obtain necessary permits is likely.	- No flexibility to phase implementation.	- No direct impact associated with hydrologic regime, physical habitat, water quality and biota, because the minimum required instream flow would be maintained.	- No recreational benefits or impacts.

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12	Construct Fountain Creek Reservoir *(Alternative B from 2000 PEIS)*	Construct a dam on Fountain Creek 0.2 miles upstream of confluence with Duck River at River Mile 145.8. At this location, the watershed drainage area for Fountain Creek Reservoir is 102 square miles. The inundated area of the reservoir under normal pool level is approximately 2,200 acres. Alternative includes construction of 32 mgd reservoir intake and pumping station, a 42-inch pipeline to a treatment plant (5 miles) and a continuous downstream release of 5 cfs.	- Satisfies entire river deficit of 32 mgd in 2060. - 48 mgd yield based on 2000 PEIS. - Potential for significant water loss from reservoir due to karst geology. - Reduces reliance on Normandy Reservoir (208 sq mi drainage area) as sole source of water during severe droughts to satisfy many needs.	- Shallow reservoir with long residence time yields high potential for nutrient enrichment, low dissolved oxygen, and water quality issues based on 2000 PEIS. - Construct a multi-port intake to obtain highest quality water. - Fountain Creek watershed contains high levels of nutrients. - Potential to discharge high temperature and low DO water to free flowing segment of Duck River. - Two 303(d) listed streams drain to Fountain Creek. Stream listing due to municipal/industrial landfills (Cedar Ridge Landfill and other landfill are regulated by solid waste). - Basin management plan may be required to minimize watershed impacts on reservoir water quality.	$?? Costs for dam, intake, pumping station, 5 miles of pipeline based on PEIS 800 acres of land needed for reservoir and 50 acres of easements needed along pipeline route based on 2000 PEIS. Identify mitigation costs for environmental impacts.	- EIS involving detailed environmental studies will be required and ability to obtain necessary permits is uncertain. - 2000 PEIS identified potential impacts on species diversity, wetlands, and T&E species habitat. - Potential substantial loss of forested wetlands (225 acres) - Inundation of Fountain Creek will alter ecology of the impounded tributary. - Need field determination of wetland impacts and development of a mitigation plan. - Need to establish release downstream of dam. - Rare, threatened, or endangered species may exist in Fountain Creek.	- No flexibility to phase implementation.	- No apparent environmental benefits associated with hydrologic regime, physical habitat, water quality and biota.	- Inundation of Fountain Creek results in loss of riverine environment on Fountain Creek and land on Game Reserve. - Potential for fishing and other recreational opportunities associated with Fountain Creek Reservoir.
13	Construct Reservoir on Fountain Creek with Downstream Release	Construct dam on Fountain Creek just upstream of confluence with Duck River at River Mile 145.8. Alternative includes construction of 32 mgd reservoir intake and a continuous downstream release of 5 cfs. Storage in Fountain Creek Reservoir is released downstream to the existing Columbia Pool for withdrawal at the existing Columbia intake.	- Satisfies entire river deficit of 32 mgd in 2060. - 48 mgd yield based on 2000 PEIS. - Potential for significant water loss from reservoir due to karst geology. - Reduces reliance on Normandy Reservoir (208 sq mi drainage area) as sole source of water during severe droughts to satisfy many needs.	- Shallow reservoir with long residence time yields high potential for nutrient enrichment, low dissolved oxygen, and water quality issues based on 2000 PEIS. - Construct a multi-port intake to obtain highest quality water. - Fountain Creek watershed contains high levels of nutrients. - Potential to discharge high temperature and low DO water to free flowing segment of Duck River. - Two 303(d) listed streams drain to Fountain Creek. Stream listing due to municipal/industrial landfills (Cedar Ridge	$?? Cost for dam and intake. 800 acres of land needed for reservoir.	- EIS involving detailed environmental studies will be required and ability to obtain necessary permits is uncertain. - 2000 PEIS identified potential impacts on species diversity, wetlands, and T&E species habitat. - Potential substantial loss of forested wetlands (225 acres) - Inundation of Fountain Creek will alter ecology of the impounded tributary. - Need field determination of wetland impacts and development of a mitigation plan. - Need to establish release downstream of dam. - Rare, threatened, or	- No flexibility to phase implementation.	- No apparent environmental benefits associated with hydrologic regime, physical habitat, water quality and biota.	- Inundation of Fountain Creek results in loss of riverine environment on Fountain Creek and land on Game Reserve. - Potential for fishing and other recreational opportunities associated with Fountain Creek Reservoir.

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				Landfill and other landfill are regulated by solid waste). - Basin management plan may be required to minimize watershed impacts on reservoir water quality.		endangered species may exist in Fountain Creek.			
14	Upgrade Existing Columbia City Dam to Allow Releases **(FATAL FLAW)**	Install valves or gates in the existing Columbia Dam to allow intermittent releases downstream of the dam to temporarily maintain flow constraint at Columbia with refill of the Columbia Reservoir occurring from releases from Normandy Reservoir, releases from quarry storage, or from the Duck River watershed.	- No added reliable capacity.	- Potential impact due to release of sediments downstream of the dam. - Requires review of data on sediment accumulation behind dam and the need for dredging.	$?? Cost for dam improvements to allow controlled releases.	- EIS involving detailed environmental studies of flow alteration will be required and ability to obtain necessary permits is uncertain.	- No flexibility to phase implementation.	- No apparent environmental benefits associated with hydrologic regime, physical habitat, water quality and biota.	- No recreational benefits or impacts.
15	Build Offstream Storage Reservoir along Duck River	Construct 5 BG offstream storage reservoir along Duck River. Construct new dam, pumping station along the Duck River, and piping (say 2 miles) to allow refill of the storage reservoir from the Duck River with supply back to the Duck River during low flow conditions. Refilling of the storage reservoir would occur by "skimming" high flows from the Duck River.	- 5 BG of new storage satisfies 1.4 BG river deficit in 2060. - Capacity would be sized to meet projected needs. - Reduces reliance on Normandy Reservoir (208 sq mi drainage area) as sole source of water during severe droughts to satisfy many needs.	- Construct a multi-port intake to avoid release of cold water from storage.	$?? Cost for new dam, intakes, pumping stations, piping, and land.	- EIS involving detailed environmental studies of flow alteration will be required and ability to obtain necessary permits is uncertain.	- No flexibility to phase implementation.	- No apparent environmental benefits associated with hydrologic regime, physical habitat, water quality and biota.	- Potential for fishing and other recreational opportunities associated with construction of an offstream storage reservoir.
16	Utilize Quarries	Utilize storage in existing inactive quarries (Hardison Mills and Belfast) to supply flow to Duck River during low flow conditions. For Hardison Mills Quarry (estimated 300 MG of storage), construct 5 mgd intake and pumping station on the Duck River, 16-inch pipeline from Duck River to quarry (1300 ft), and 5 mgd intake and pumping station at quarry. Use quarry water storage to augment flows in the Duck River during low flow conditions to meet Columbia constraint and refill quarry by "skimming" water from the Duck River during high flow conditions. For Belfast Quarry (estimated 500 MG of storage), utilize existing Lewisburg intake and pipeline during low water production periods and high river flows to pump water from Lewisburg WTP to Belfast Quarry and supply water from Belfast Quarry to Lewisburg WTP and Duck River during low flow conditions. Construct new 5 mgd pumping station at Lewisburg WTP, 16-inch pipeline (3 miles), and intake and pumping station at Belfast Quarry.	- Existing inactive quarries satisfy estimated 0.8 BG of 1.4 BG river deficit in 2060. - Reduces reliance on Normandy Reservoir (208 sq mi drainage area) as sole source of water during severe droughts to satisfy many needs.	- Need to construct multi-port intake or floating intake to allow withdrawal of appropriate temperature water from storage.	$?? Cost for new intakes, pumping stations, and piping.	- EIS involving detailed environmental studies of flow alteration may be required and ability to obtain necessary permits is likely.	- No flexibility to phase implementation. Numerous quarries along the Duck River that could be added in the future as they become inactive.	- Utilizing quarries protects quarry site from illicit dumping or other uses that could impact water quality.	- No recreational benefits or impacts.
17	Construct Pipeline from Tennessee River	Construct 32 mgd intake and pumping station and 42-inch pipeline from Tennessee River near I-40 crossing to Columbia WTP (60 miles). Additional piping could be constructed in the future to extend supply to other utilities.	- Satisfies entire river deficit of 32 mgd in 2060. - Drought proof and highly reliable. - Potential for future increases in supply. - Reduces reliance on Normandy Reservoir (208 sq mi drainage area) as sole source of water during severe droughts to satisfy many needs.	- No change.	$?? Cost for new intake, pumping station and 50 miles of piping.	- EIS involving detailed environmental studies of flow alteration may be required and ability to obtain necessary permits is likely. - DRA may need to obtain condemnation authority to obtain ROWs. - Potential to artificially extend range of exotic species or increase the likelihood that exotic species could invade these watersheds.	- Could be constructed in stages starting in Columbia and working toward the Tennessee River.	- No apparent environmental benefits associated with hydrologic regime, physical habitat, water quality and biota.	- No recreational benefits or impacts.

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18	Construct Pipeline from Tims Ford Reservoir *(Alternative E from 2000 PEIS)*	Construct 10 mgd intake and pumping station at Tims Ford and 24-inch pipeline from Tims Ford Reservoir to DRUC WTP or intake (16 miles). This alternative would need to be combined with a modified release from Normandy Reservoir to satisfy the projected deficit of the downstream users.	- Satisfies entire river deficit of 32 mgd in 2060. - Drought proof and highly reliable. - Potential for future increases in supply. - Provides emergency backup source of supply for DRUC customers if Normandy Reservoir water is unavailable. - Supplying 1.4 BG of storage deficit during critical drought in 2060 from Tims Ford Reservoir would result in a drop in water level in Tims Ford Reservoir of approximately 8 inches.	- Need to construct multi-port intake to allow withdrawal of appropriate temperature and quality of water from Tims Ford.	$?? Cost for new intake, pumping station, booster pumping station, and 16 miles of pipeline based on 2000 PEIS Approximately 75 acres of permanent easements and 125 acres of construction easements needed along pipeline based on 2000 PEIS.	- Need to address interbasin transfer concerns. - Potential to artificially extend range of exotic species or increase the likelihood that exotic species could invade these watersheds.	- No flexibility to phase implementation.	- No apparent environmental benefits associated with hydrologic regime, physical habitat, water quality and biota.	- No recreational benefits or impacts likely due to maximum water level drop of 8 inches during critical drought.
19	Discharge Arnold Cooling Water to Duck River	Release cooling water from cooling lake at Arnold AFB to the Little Duck River which is tributary to Normandy Reservoir.	- Concerns related to reliable capacity because periodic operation.	- Need to define source and location of water contamination. - Need to address temperature concerns for discharge of cooling water.	$?? Cost to provide temperature reduction at discharge location.	- EIS involving detailed environmental studies of flow alteration will be required and ability to obtain necessary permits is uncertain.	- No flexibility to phase implementation.	- No apparent environmental benefits associated with hydrologic regime, physical habitat, water quality and biota.	- No recreational benefits or impacts.
20	Purchase Water from Nearby Systems	Construct 42-inch finished water pipeline from Nashville to Columbia (50 miles).	- No added reliable capacity. - Serious concerns regarding access to reliable capacity. - Requires an interbasin transfer.	- No change.	$?? Cost of new pumping stations and piping.	- Minimal permit requirements. - Requires an interbasin transfer.	- No flexibility to phase implementation.	- No apparent environmental benefits associated with hydrologic regime, physical habitat, water quality and biota.	- No recreational benefits or impacts.
21	Utilize Groundwater Sources **(FATAL FLAW)**	Construct new groundwater wells or access underground flow for the Duck River between Shelbyville and Columbia.	- No added reliable capacity. - Serious concerns regarding access to reliable groundwater sources.	- No change.	$?? Cost for new wells, pumping station and piping.	- EIS involving detailed environmental studies of flow alteration will be required and ability to obtain necessary permits is uncertain.	- Alternative can be implemented in multiple phases.	- No apparent environmental benefits associated with hydrologic regime, physical habitat, water quality and biota.	- No recreational benefits or impacts.
22	Pump Treated Wastewater from Columbia WWTP to Columbia Dam	Construct a 20 mgd pumping station at the Columbia WWTP and a 36-inch pipeline (5 miles) to return treated wastewater from the Columbia WWTP to a location just downstream of the existing Columbia Dam. Pumping flow back to the location downstream of the Columbia Dam would only be required under this alternative during low flow conditions in the Duck River.	- Satisfies 20 mgd of 32 mgd river deficit in 2060. - Drought proof and highly reliable. - Capacity increases over time. - Reduces reliance on Normandy Reservoir (208 sq mi drainage area) as sole source of water during severe droughts to satisfy many needs.	- Must meet TDEC water quality requirements for discharge. - Higher levels of treatment may be needed to avoid impacts on raw water quality immediately downstream of dam where threatened and endangered species exist.	$?? Cost for new pumping station, 5 miles of piping and potential upgrades for WWTP.	- EIS involving detailed environmental studies will likely be required and ability to obtain necessary permits is uncertain. - TDEC may not permit or may require a higher level of treatment of wastewater. - Potential impact to threatened and endangered mussels immediately downstream of existing Columbia Dam.	- High level of flexibility in that capacity can be increased over time.	- Potential environmental benefit if higher level of treatment is provided for Columbia WWTP discharge to meet assimilative capacity requirements just downstream of Columbia Dam.	- No recreational benefits or impacts.
23	Construct New Water Intake for Maury County at River Mile 163	Construct a 32 mgd water intake on Duck River at River Mile 163 and 42-inch pipeline (24 miles) for Maury and South Williamson Counties (Columbia gage is at River Mile 132 which is roughly 30 river miles downstream).	- No added reliable capacity.	- No change.	$?? Cost for new intake, pumping	- TDEC permit needed for water supply withdrawal but ability to obtain necessary permits is likely.	- No flexibility to phase implementation.	- No apparent environmental benefits associated with hydrologic regime, physical habitat, water	- No recreational benefits or impacts.

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	(FATAL FLAW)				station and 24 miles of piping.			quality and biota.	
24	Construct New Water Intake for Maury County at River Mile 108 *(Alternative C from 2000 PEIS)*	Construct a 32 mgd water intake and pumping station on Duck River in vicinity of River Mile 108 near Williamsport and 17 miles of 42-inch pipeline to the Columbia water treatment plant.	- <u>Satisfies entire river deficit of 32 mgd in 2060.</u> - Drought proof and highly reliable. - Minor reduction in downstream flows due to consumptive uses in the Maury and South Williamson County water systems. - Reduces reliance on Normandy Reservoir (208 sq mi drainage area) as sole source of water during severe droughts to satisfy many needs.	- No change.	$?? Cost for new intake, pumping station, and 13 miles of pipeline based on 2000 PEIS. Roughly 2 acres of land needed for intake and pumping station along Duck River. Approximately 50 acres of permanent easements and 80 acres of construction easements needed along pipeline based on 2000 PEIS.	- EIS involving detailed environmental studies of flow alteration will be required but ability to obtain necessary permits is likely. - Lower downstream flows not likely to cause adverse impacts on aquatic life.	- No flexibility to phase implementation but piping could become part of future solution such as Tennessee River option.	- No apparent environmental benefits associated with hydrologic regime, physical habitat, water quality and biota.	- No recreational benefits or impacts.
25	Construct New Water Intake at River Mile 108 and Pump Back to Columbia Dam Pool	Construct a 32 mgd water intake and pumping station on Duck River at River Mile 108 near Williamsport and a 42-inch pipeline (17 miles) to convey water to the pool behind the existing Columbia Dam.	- <u>Satisfies entire river deficit of 32 mgd in 2060.</u> - Drought proof and highly reliable. - Minor reduction in downstream flows due to consumptive uses in the Maury and South Williamson County water systems. - Reduces reliance on Normandy Reservoir (208 sq mi drainage area) as sole source of water during severe droughts to satisfy many needs.	- No change.	$?? Cost for new intake, pumping station and 17 miles of piping.	- EIS involving detailed environmental studies of flow alteration could be required but ability to obtain necessary permits is likely.	- Alternative could ultimately be a component of the Tennessee River pipeline alternative.	- No apparent environmental benefits associated with hydrologic regime, physical habitat, water quality and biota.	- No recreational benefits or impacts.
26	Construct Infrastructure to Return Treated Wastewater from Tullahoma WWTP to Normandy Reservoir	Construct 10 mgd pumping station and 24-inch pipeline (9 miles) to return treated wastewater from Tullahoma WWTP to Normandy Reservoir. This alternative would need to be combined with a modified release from Normandy Reservoir to satisfy the projected deficit of the downstream users.	- <u>Satisfies entire river deficit of 32 mgd in 2060.</u> - Reliable 2 mgd in 2010 increasing over time to 3 mgd in 2060 as Tullahoma wastewater flow increases (assumes 70% return flow). - Slight reduction in the level of reliance on Normandy Reservoir.	- Must meet TDEC water quality requirements for discharge, but current level of treatment is apparently adequate.	$?? Cost for new pumping station and 9 miles of piping.	- Need to conduct studies and obtain a new NPDES permit for wastewater discharge, but ability to obtain necessary permits is likely.	- Flexible to accommodate increases in flow over time. - Could extend piping to Tims Ford Reservoir in future to convey flow to Normandy Reservoir or DRUC WTP.	- No apparent environmental benefits associated with hydrologic regime, physical habitat, water quality and biota.	- No recreational benefits or impacts.