

## Freedom

### Water Supply

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#### ■ Source Water Assessment

Water is provided from both surface and groundwater sources in the Freedom District. The unconfined fractured rock aquifer in the Sykesville Formation is the source of groundwater supply for the Freedom District. This system is comprised of three groundwater supply wells. The Fairhaven well is located within the Piney Run Watershed and is drilled to approximately 600 feet. The Raincliffe well is approximately .5 mile south of the Fairhaven well and was drilled to approximately 500 feet. The Freedom District groundwater supply is susceptible to VOCs and radionuclides, but not susceptible to SOCs, nitrates, other regulated inorganic compounds, or microbiological contaminants.

Carroll County has a water treatment plant on the western shore of Liberty Reservoir. The reservoir was constructed in 1954 on the North Branch of the Patapsco River and is operated by Baltimore City. Carroll County, under agreement with Baltimore City, purchases raw water from this source. The treatment plant was expanded and now has a capacity greater than 3 mgd.

Potential sources of contamination for the Liberty Reservoir include point and non-point sources, including industrial sites, transportation (e.g., highways), a railroad, a petroleum product pipeline, agriculture, and septic tanks in rural portions of the watershed. The majority of point sources are located in the North Branch and Liberty subwatersheds.

The City of Baltimore maintains an extensive water quality monitoring program for Liberty Reservoir and its tributaries, as well as the Ashburton Water Filtration Plant. Routine sampling is performed at the City's water treatment plant, six tributaries of Liberty Reservoir, and four in-reservoir locations in an effort to monitor and improve the water quality conditions of the Liberty Reservoir water supply.

#### ■ Water Supply Demand

For purposes of the background assessments and this plan document, the total future water demand assumes that everything within the 2001 Growth Area Boundary (GAB) builds out according to the adopted land use plans (which include the area covered by both the 2001 *Freedom Community Comprehensive Plan* and the 2003 *Master Plan for the Town of Sykesville*). If this were to occur, the total future water supply demand for the Freedom system would be 4,510,882 gpd. It should be recognized, however, that for Freedom in particular, it is very unlikely that everything within the existing Growth Area Boundary will be served by public water. A significant portion of the land within the GAB but outside the planned water service area is designated for Agriculture, Conservation, or low-density

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residential growth. These lower-density areas are not typically planned to be served by public water service in Carroll County. In reality, the No Planned Service area represented by Other Potential Demand is unlikely to ever be served at the current planned densities.

In addition, the numbers in the “Freedom Future Water Supply Demand” table are based strictly on *Buildable Land Inventory* (BLI) calculations. They do not reflect factors unique to this municipal system that may have been considered in the capacity management plan (CMP) worksheet calculations and figures presented in the next table, “Freedom Water Supply Capacity *Currently Available* for Existing and Future Growth.”

**Freedom Future Water Supply Demand  
(Gallons per Day)**

Community	Current Demand <sup>1</sup>	Planned Future Demand <sup>2</sup>		Other Potential Demand <sup>3</sup>	Total Demand
		Infill Demand	Future Demand		
Freedom	2,182,422	641,250	712,590	974,620	4,510,882
Community	Current Demand <sup>1</sup>	Additional Demand by Land Use			Total Demand
		Residential	Commercial	Industrial	
Freedom	2,182,422	1,754,750	33,950	539,760	4,510,882

<sup>1</sup> These data are the greatest annual average daily demand for the five-year period from 2003 through 2007.

<sup>2</sup> These data relate to areas located within the designated planned water service area. Infill demand is calculated for areas classified in the “Existing/Final Planning” service category; Future demand is calculated for the combined area classified in the “Priority” or “Future” service category.

<sup>3</sup> These data relate to areas designated in the “No Planned Water Service Area” but located within the Community Growth Area Boundary.

Source: Carroll County Department of Planning, December 2008

Future water demand calculations were taken from the CMP data. This demand is reflected under “Infill + Future” (shown as “priority+future” in the Malcolm Pirnie reports). However, the CMP data do not account for additional demand that would occur within the balance of the area that is designated in the “No Planned Water Service Area.” (To factor in this further demand, future development potential and existing development that would be served were estimated and calculated for water demand and are reported under “Other Potential Demand.”)

### ■ Water Supply Capacity

If Freedom were to build out according to the planned land uses adopted within the 2001 GAB (which includes the area covered by both the 2001 *Freedom Community Comprehensive Plan* and the 2003 *Master Plan for the Town of Sykesville*), the water supply system would need to be expanded beyond its current capacity to make available another 1,281,124 gpd. The information in the following table is based on the December 2008 CMP worksheets.

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## Freedom Water Supply Capacity Currently Available for Existing and Future Growth (in Gallons per Day)

Community	Current			Remaining Capacity	Unserved Demand		Net Avg Day Capacity Available at Buildout
	Permitted	Avg Day Capacity Limitation	Avg Day Drought Demand <sup>1</sup>		Infill + Future	No Planned Service	
Freedom	4,648,000	3,448,000	2,400,664	1,047,336	1,353,840	974,620	(1,281,124)

<sup>1</sup> Average Day Drought Demand here includes an additional 10% for drought demand

Source: Carroll County Department of Planning, December 2008

In addition to the water demand calculated above, there is a 399.0-acre area of industrial zoning located on the west side of MD 97 (in the general Hoods Mill area) that is located outside, but adjacent to, the Freedom growth area. Given its location, the possibility exists that future development of this site could eventually be served by the Freedom community water supply system. Average-day water demand generated by future development of this site is estimated to be 319,200 gpd.

With completion of the Freedom Water Treatment Plant expansion to 4.0 mgd, which came online in May of 2009, the Freedom plant has a total treatment capacity of 7.0 mgd. The water source for the plant is Liberty Reservoir. Presently, there is an agreement with Baltimore City which provides for a 4.2 mgd withdrawal for the average day and 180 million gallons total during the month of maximum use. In addition, the system has two wells with an average day withdrawal allocation of 0.438 mgd. This provides the Freedom water system with a 4.638 mgd average day capacity.



The expanded Freedom is designed to accommodate additional expansion capability to 12.0 mgd.

### ■ Water Supply Limitations

Based on the recent expansion of the Freedom water supply system to a permitted capacity of 7 mgd, the system should have adequate capacity to serve existing and planned demand. Should additional water supply be needed beyond this demand, the only limitation for the Freedom system would be the agreement with Baltimore City to allow for withdrawal from Liberty Reservoir. If an agreement to withdraw additional water from Liberty can be made, the Freedom system would have additional supply available. The design capacity of the water treatment plant has the ability to be expanded to up to 12 mgd.

## Wastewater

The WWTP serving the Sykesville/Freedom area is owned by the State of Maryland and operated by the Maryland Environmental Service (MES). Effluent is discharged to the South Branch of the Patapsco River.

### ■ Wastewater Demand

For purposes of the background assessments and this plan document, the total future wastewater demand assumes that everything within the 2001 GAB builds out according to the adopted land use plan (which includes the area covered by both the 2001 *Freedom Community Comprehensive Plan* and the 2003 *Master Plan for the Town of Sykesville*). If this were to occur, the total future wastewater demand for the Freedom District WWTP would be 5,026,420 gpd. However, it should be recognized that, for Freedom in particular, it is very unlikely that everything within the existing GAB will be served by public sewer. A significant portion of the land within the GAB but outside the planned sewer service area is designated for Agriculture, Conservation, or low-density residential growth. These lower-density areas are not typically planned to be served by public sewer service in Carroll County. In reality, the No Planned Service area represented by Other Potential Demand is unlikely to ever be served at the current planned densities.

It should be noted that the numbers in the “Freedom Future Wastewater Demand” table are based strictly on BLI calculations. They do not reflect factors unique to this municipal system that may have been considered in the CMP worksheet calculations and figures presented in the next table, “Freedom Wastewater Capacity *Currently Available* for Existing and Future Growth.”

**Freedom Future Wastewater Demand  
(in Gallons per Day)**

Community	Current Demand <sup>1</sup>	Planned Future Demand <sup>2</sup>		Other Potential Demand <sup>3</sup>	Total Demand
		Infill Demand	Future Demand		
Freedom	2,160,000	445,100	1,077,130	1,344,190	5,026,420
Community	Current Demand	Additional Demand by Land Use			Total Demand
		Residential	Commercial	Industrial	
Freedom	2,160,000	2,339,000	33,740	493,680	5,026,420

<sup>1</sup> These data represent, in general, the annual average daily demand over the three-year period 2005-2007, and include I&I.

<sup>2</sup> These data relate to areas located within the designated planned sewer service area. Infill demand is calculated for areas classified in the “Existing/Final Planning” service category; Future demand is calculated for the combined area classified in the “Priority” or “Future” service category.

<sup>3</sup> These data relate to areas designated in the “No Planned Sewer Service Area” but located within the Community Growth Area Boundary.

Source: Carroll County Department of Planning, December 2008

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## ■ Wastewater Capacity

If Freedom were to build out according to the planned land uses adopted within the 2001 GAB (which includes the area covered by both the 2001 *Freedom Community Comprehensive Plan* and the 2003 *Master Plan for the Town of Sykesville*), the system would need to expand beyond its current capacity to make available an additional 1,894,643 gpd in wastewater flows. The information in the following table is based on the December 2008 capacity management plan worksheets.

**Freedom Wastewater Capacity Currently Available for Existing and Future Growth  
(in Gallons per Day)**

Community	Current			Existing Flows	Capacity Needed			Capacity Available at Buildout
	Permitted	I&I	Remaining Capacity		Infill	Future	No Planned Service	
Freedom	3,500,000	630,000	2,870,000	1,530,000	494,123	1,077,130	1,344,190	(1,894,643)

Source: Carroll County Department of Planning, December 2008

In addition to the sewer demand calculated above, there is a 399.0-acre area of industrial zoning located on the west side of MD 97 (in the general Hoods Mill area) that is located outside, but adjacent to, the Freedom growth area. Given its adjacent location, the possibility exists that future development of this site could eventually be served by the Freedom community sewerage system. Average-day wastewater demand generated by future development of this site is estimated to be 319,200 gpd.

In Freedom's case, demand beyond the BLI estimates used for residential demand was added to account for allocations (21,488 gpd) and reservations (27,765 gpd). The infill demand numbers in the Wastewater Capacity table, therefore, will not exactly match the infill demand numbers shown in the Wastewater Demand table.

For the Freedom sewer service area, allocations represent capacity set aside to accommodate development that has already paid its area connection charges. These are typically sites for which building permits have already been issued, a site plan has been approved, or a minor subdivision has been approved. The capacity is "set aside" for two years after the area connections charges are paid. After two years, it is assumed that the development is connected to the system.

Reservations represent a capacity that is unofficially 'reserved' for development that is in the pipeline, and represents a known quantity. However, the area connection charges have not yet been paid. Both allocations and reservations are likely double-counting capacity demand. However, these numbers were included in the demand and capacity calculations knowing that it would provide very conservative numbers for the Freedom system but ensures the demand is accounted for.

The planned ENR upgrade would allow the WWTP to comply with the Bay-related nutrient caps. However, the upgrade will not provide additional design capacity. Discharge would still be limited to approximately 3.5 mgd.

## ■ Limitations Based on Design Capacity

Wastewater flows in 2007 (about 2.1 mgd) were well below the 3.5-mgd design capacity of the Freedom District WWTP. However, the facility would have to expand in order to accommodate the projected planned service area (“infill+future”) and DGA buildout wastewater demands of 3.7 and 5.4 mgd, respectively.

Expansion of the Freedom District WWTP presents engineering and regulatory challenges due to space constraints, wetlands on site, and the low strength of influent wastewater. As an alternative to expansion, a larger plant could be built at another location. The State also has raised the possibility of pumping wastewater to a collection line in the Patapsco River drainage basin owned by the City of Baltimore, to take advantage of Baltimore’s excess treatment capacity.

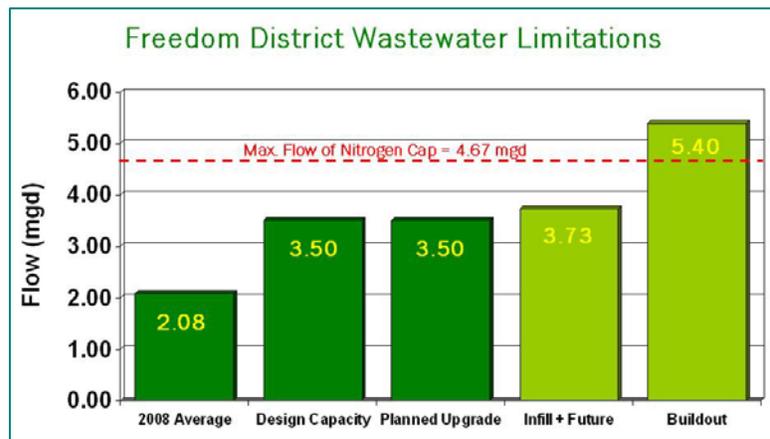
## ■ Limitations Based on Local Water Quality

Limits for parameters such as ammonia were derived for local water quality protection and are expected to remain achievable even under higher effluent flows. As long as it stays in compliance with water-quality based permit limits, the Freedom District is not expected to be a cause of biological impairments in the receiving stream.

## ■ Limitations Based on Bay Nutrient Caps

The Tributary Strategy Statewide Implementation Plan assigned nutrient loading caps for both total nitrogen and total phosphorus based on a design capacity of 3.5 mgd, a total nitrogen concentration of 4.0 mg/L, and a total phosphorus concentration of 0.3 mg/L. As with other major facilities, these nutrient caps will become enforceable NPDES permit limits in the future.

The planned ENR upgrade project will be designed to achieve 3.0 mg/L total nitrogen and a maximum 0.3 mg/L total phosphorus. At these concentrations, the total phosphorus loading limits would be more controlling than the nitrogen limit, and would limit discharge to approximately 3.5 mgd. However, it is expected that the plant will be able achieve lower effluent phosphorus concentrations, such that the nitrogen cap will represent a more controlling limitation. At 3.0 mg/L total nitrogen, the Freedom District WWTP would be limited to discharging approximately 4.67 mgd, which is more than the projected planned service area (“infill+future”) wastewater demand but less than the projected DGA buildout demand.



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## ■ Summary of Wastewater Limitations

The existing design capacity (3.5 mgd) of the Freedom District WWTP represents the controlling limitation under current conditions. Longer-term, the Bay-related nitrogen loading cap represents a 4.67-mgd limit to surface water discharges.

## System-Specific Strategies: Freedom

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*Note: Numbers for each objective correspond to the relevant objective in the countywide strategies section of this plan. Objectives included below are those that apply specifically and uniquely to this system. Strategies that apply to the County and all of the municipal systems are included in the Countywide Strategies section of this plan.*

### 1. Protect and sustain existing water supplies serving existing development

#### System-Specific “To Do” Action Items:

##### Short-term

- Amend the Freedom Community Comprehensive Plan to reduce the size of the Freedom GAB, thereby reducing water supply demand to a level below what the WWTP can accommodate based on the limits imposed by the nitrogen caps; eliminate areas planned for rural residential densities in the No Planned Service areas
- Update the WSCMP worksheets developed as background data for this plan document to reflect the most current information, then complete and submit a full WSCMP to MDE for review

### 2. Identify and develop, as needed, new water supplies adequate to support planned future growth without over-allocating available sources

#### Long-term Water Supply Options

*Note: These are options that will be considered for long-term supply. However, inclusion here does not imply that there is a definite plan to move forward with an option.*

*Exploring additional sources, even for those systems that currently project enough capacity to meet demand, is included in order to be prepared for policy changes or other changes that would result in the need for additional available water capacity.*

- Piney Run Reservoir (as built): Safe yield 3.65 mgd with normal pool elevation of 524 ft.; existing reservoir; to serve as regional source of supply for Mount Airy and Sykesville/Freedom Service Areas
  - Direct pumping of raw water from Piney Run to Liberty to augment ‘flows’ at Liberty Reservoir accompanied by an increase in withdrawal from Liberty OR
  - Water treatment plant at Piney Run
- Piney Run Reservoir (expanded): Safe yield 4.11 mgd; increase capacity of existing reservoir by raising the spillway riser and emergency spillway; to serve as regional source of supply for Mount Airy and Sykesville/Freedom Service Areas
- Groundwater Wells: Drill and develop additional groundwater wells to meet projected demand requirements

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- Obtain control (annex, purchase, or designate as planned WSA) over sufficient acreage in the appropriate watershed(s) to meet the MDE-required amount of recharge
- Begin MDE water appropriation permitting process
- Acquire ownership or easement of well site(s)
- Drill and develop well site(s)
- Conduct pumping test(s) and source water quality analyses
- Finalize MDE water appropriation permit process
- Install permanent wellhead(s) and fencing and construct treatment/transmission infrastructure necessary to connect wells to the WSA distribution system
- Gillis Falls Reservoir (as planned): Safe yield 3.85 mgd with normal pool elevation of 610 ft.; planned reservoir; to serve as regional source of supply for Mount Airy and Sykesville/Freedom Service Areas

#### 4. Promote water conservation measures and manage demand for potable water to ensure adequate supplies are available for planned development

##### Specific Action Items Already in Place: (“Continue to...”)

- ✓ Public Education Measures: Produce and distribute brochures on water-saving measures through Bureau of Utilities
- ✓ Drought Management Measures: Restrict or limit water use in Freedom

#### 5. Sustain existing wastewater treatment capacity

##### Specific “To Do” Action Items:

###### Short-term

- Amend the Freedom Community Comprehensive Plan to reduce the size of the Freedom GAB to more closely reflect the greater area planned for public water or sewer service, whichever is larger, eliminating the No Planned Service area planned for rural residential densities
- Work with MES to complete an I&I study that would identify where reductions in I&I could result in regaining capacity, reducing the 630,000 gpd estimate based on the difference in flows from 2002 to 2003 closer to or below MES’s estimate of 300,000 gpd
- Update the WWCMP worksheets developed as background data for this plan document to reflect the most current information, then complete and submit a full WWCMP to MDE for review

###### Long-term

- Conduct an I&I study to determine the current level of inflows from I&I to potentially regain some capacity; make system improvements to reduce I&I; adjust the capacity on the WWCMP worksheets to update available capacity
- Continue efforts for planned ENR upgrade, enabling the current facility to operate at the limits of technology for nitrogen and phosphorus removal
- Identify potential industrial/manufacturing users for which water reuse in operations may be pursued

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- ❑ Identify potential areas for spray irrigation to gain additional wastewater capacity at the WWTP
  - For an increase of 1,890,000 gpd, and an expected 5.39 mgd reuse flow, an estimated 454 acres of land would be required to reuse 50 percent of the buildout flow; assuming the demand is reduced to a level below the nitrogen cap, the estimated acreage needed would be reduced