



# Water Conservation

## BASELINE AUDIT, GRADES 9-12

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Consider contacting local, regional or state water conservation non-profits, and/or your water municipality for assistance conducting the audit. Their involvement is a great way to connect to the community, inspire students, demonstrate career possibilities and share resource expertise.

Invite parents and community members to participate in the auditing process. Students can participate in Public Participation in Scientific Research ([PPSR](#)) projects. This experience is a great way to build community.

### REQUIRED METRICS

1. Number of water using devices monitored.
2. On average, by how many gallons has the school's water usage decreased?

### SURVEY

Before starting the water audit or going further, survey students and record the average response.

1. We have an infinite source of usable water.  True  False  Unsure
2. Our school's water sources are free of contaminants, such as bacteria and lead.  
 True  False  Unsure
3. Water use has environmental and financial impacts.  True  False  Unsure

On a scale from 1-10, 10 being the most important and 1 being the least important,

4. How important is the topic of water conservation to you? \_\_\_\_\_
5. How important is it to install water conserving appliances or devices? \_\_\_\_\_



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## SCHOOL MAP

Using a highlighter, mark the locations on a school blueprint map (typically provided at the beginning of the year to show fire escape and safe room locations), where auditing will occur. Work with the team/class to complete the audit and calculations. These tables and charts will be used to draw conclusion about water use and to inform the action plan to make recommendations for better water stewardship at the school.

**TABLE 1. DEFINING THE STUDY SITE**

<p>1. Our school’s water sources have been tested for the following contaminants.* (faucets, fountains, showers)  <a href="#">2016 WIIN Act – Provision, Sec. 2107: Lead testing in school and child care program drinking water</a></p>	<p>___ lead ___ bacteria ___ iron ___ mercury          ___ copper ___ nitrates ___ unsure</p>
<p>2. What is the source of the school’s water supply?</p>	<p>___ well          ___ municipal water supply          ___ unsure</p>
<p>3. If a municipal water supply, what is its source?</p>	<p>___ lake or river ___ well (aquifer/groundwater)          ___ N/A ___ unsure</p>
<p>4. Where does water used inside the school go?          Check all that apply.</p>	<p>___ on-site septic systems          ___ drainage field          ___ municipal sewer system          ___ recycled for use as grey water</p>
<p>5. How much is the district charged for water use?</p>	<p>_____ dollars per _____ gallons</p>
<p>6. How many gallons of water does the school and district use each year?</p>	<p>_____ gallons per year at the school          _____ gallons per year at the district</p>
<p>7. What is the estimated total cost for water use at the school and district?</p>	<p>_____ dollars per year at the school          _____ dollars per year at the district</p>

\*Do you have questions regarding water quality at school? The [Healthy Schools Pathway](#) can help. If the team needs a timely response, please contact us at [eco-schoolsusa@nwf.org](mailto:eco-schoolsusa@nwf.org).



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## HEATING AND AIR CONDITIONING (HVAC)

### CHART 1. HEATING AND AIR CONDITIONING (HVAC)

1. Does your school have boilers (commercial hot water systems)?	____ Yes ____ No ____ Unsure
If yes, continue answering questions 2 and 3. If no or unsure, go to the summary questions at the bottom of the page.	
2. How many boilers does the school have installed?	_____
3. The average commercial boiler uses 193 gallons of water per hour. Estimate the number of gallons the boiler(s) uses at the school.	_____ Hours in use x _____ gallons of water per hour = _____ gallons used by boiler(s)/day

**Think about the following questions as you summarize the information in Chart 1.**

1. What prior knowledge did students have related to water usage in school heating and cooling systems?
2. How might this information help inform the student's action plan?
3. Are there alternatives to boiler systems, new technology in the pipeline? What are they? What is their return on a school's initial investment (ROI)?
4. Do students have ideas about how to engineer a better system?



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## IRRIGATION

### CHART 2. GENERAL IRRIGATION

<p>1. After walking the school grounds, what type of land cover was observed most?</p>	<p>____ grass and/or other natural plant cover</p> <p>____ natural rock ground covers</p> <p>____ concrete/asphalt</p> <p>____ turf or man-made ground covers</p>
<p>2. Water consumption for irrigation is sometimes billed separately from in-school water consumption. If known, how many gallons of water is used per year for irrigation?</p>	<p>_____ gallons of water per year</p>
<p>3. What is the water rate the district pays for irrigation?</p>	<p>_____ dollars per _____ gallons</p>
<p>4. What is the average rainfall, in inches, for each month during the school year, August through June?  <a href="https://www.usclimatedata.com/">https://www.usclimatedata.com/</a></p> <p style="text-align: center;">August _____ in.</p> <hr/> <p style="text-align: center;">September _____ in.</p> <hr/> <p style="text-align: center;">October _____ in.</p> <hr/> <p style="text-align: center;">November _____ in.</p> <hr/> <p style="text-align: center;">December _____ in.</p> <hr/> <p style="text-align: center;">January _____ in.</p> <hr/> <p style="text-align: center;">March _____ in.</p> <hr/> <p style="text-align: center;">April _____ in.</p> <hr/> <p style="text-align: center;">May _____ in.</p> <hr/> <p style="text-align: center;">June _____ in.</p>	

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## CHART 3. IRRIGATION SYSTEM

1. Is an irrigation system installed throughout the school grounds?	___ Yes ___ No ___ Unsure
If yes, continue answering questions 2-4. If no or unsure, go to Chart 5.	
2. What is the irrigation schedule?	
3. How many stations/zones are installed?	_____
4. Survey the heads, drips and/or bubblers in each zone/station. How many were observed to be broken, leaking or cut?	_____

## CHART 4. SPRINKLERS WITH A HOSE ATTACHMENT

1. Are sprinklers used to irrigate school green spaces?	___ Yes ___ No ___ Unsure
If yes, continue answering questions 2-4. If no or unsure, go to the summary questions at the bottom of the page.	
2. What is the sprinkler schedule?	
3. How many sprinklers are used around the school grounds?	_____
4. Survey the outdoor faucets, hoses and sprinklers. How many were observed to be leaking, worn out or broken?	_____

**Think about the following questions as you summarize the information in Charts 2-4.**

1. What do landscape design (or lack of) and weather have to do with water conservation and irrigation?
2. Do schools have local or state regulations or guidelines regarding irrigation? Explain.
3. Explain any concerns teams/classes have regarding the results of their irrigation audit? Who can they contact?
4. What actions can the team/class take to improve water conservation on the school grounds?



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## CHART 5. SCHOOL BATHROOMS

Using a highlighter, mark the locations on a school map, where auditing will occur. Work with the team/class to complete the audit and calculations. These tables and charts will be used to draw conclusion about water use and to inform the action plan to make recommendations for better water stewardship at the school.

(A) Automatic (S) Sensor (M) Manual (GPF) Gallons per Flush (GPM) Gallons per Minute

Location or Room Number	Toilets				Urinals				Bathroom Faucets				Shower Heads				Other			
	A	S	M	GPF	A	S	M	GPF	A	S	M	GPM	A	S	M	GPM	A	S	M	
Girls locker room next to Gym A			X	3.5					X			2.5			X	2.5				
<b>Total appliance numbers observed at each location</b>	A	S	M		A	S	M		A	S	M		A	S	M		A	S	M	
<b>Any observed leaks?</b>	___ Yes ___ No				___ Yes ___ No				___ Yes ___ No				___ Yes ___ No				___ Yes ___ No			



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## CHART 6. KITCHEN

Collect data on up to three areas that best represent the kitchen equipment found at the school. For safety reason, student may not be allowed in the kitchen area. If that is the case, work with the kitchen manager to collect the data.

(A) Automatic (S) Sensor (M) Manual (GPF) Gallons per Minute (GPH) Gallons per Hour

Location or Room Number	Sinks				Sink Disposal				Dishwashers				Steamers				Other							
	A	S	M	GPM	A	S	M	GPM	A	S	M	GPM	A	S	M	GPH	A	S	M					
<b>Total appliance numbers observed at each location</b>	<b>A</b>	<b>S</b>	<b>M</b>		<b>A</b>	<b>S</b>	<b>M</b>		<b>A</b>	<b>S</b>	<b>M</b>		<b>A</b>	<b>S</b>	<b>M</b>		<b>A</b>	<b>S</b>	<b>M</b>					
<b>Any observed leaks?</b>	___ Yes ___ No				___ Yes ___ No				___ Yes ___ No				___ Yes ___ No				___ Yes ___ No							



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## CHART 7. OTHER WATER USING APPLIANCES

Collect data on up to five areas that best represent other water using appliances or devices found at school.

(A) Automatic (S) Sensor (M) Manual (GPHP) Gallons per Hundred Pounds (GPM) Gallons per Minute (GPL) Gallons per Load

Location or Room Number	Ice Makers				Lab Faucets				Clothes Washing Machines				Utility Closet(s) or Other Faucets				Water Fountains				Other			
	A	S	M	GPHP	A	S	M	GPM	A	S	M	GPL	A	S	M	GPM	A	S	M	GPH	A	S	M	
<b>Total appliance numbers observed at each location</b>	A	S	M		A	S	M		A	S	M		A	S	M		A	S	M		A	S	M	
<b>Any observed leaks?</b>	___ Yes ___ No				___ Yes ___ No				___ Yes ___ No				___ Yes ___ No				___ Yes ___ No							





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**Think about the following questions as you summarize the information in Charts 5-7.**

1. Provide an overall assessment of water use at your school using Charts 5-7.
2. What's an estimate for the gallons of water used by all of the in-building sources audited?
3. Explain any concerns teams/classes have regarding the results of their in-building audit? Who can be contacted?
4. What actions can the team/class take to improve water conservation inside the building?



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**TABLE 2. WATER CONSERVING APPLIANCES, DEVICES AND PRACTICES**

1. Is the school certified as an Energy Star School?	___ Yes ___ No ___ Unsure
2. Do all indoor faucets/showerheads have aerators?	___ Yes ___ No ___ Unsure
3. Do any appliances and/or devices bear the WaterSense label? <a href="https://www.epa.gov/watersense/types-facilities">https://www.epa.gov/watersense/types-facilities</a>	___ Yes ___ No ___ Unsure
4. Estimate what percentage of the school's toilets and urinals are considered low-flow/high-efficiency?	_____ %
5. Does the school use greywater? <a href="https://greywateraction.org/greywater-reuse/">https://greywateraction.org/greywater-reuse/</a>	___ Yes ___ No ___ Unsure
6. Does the school have water bottle filling stations?	___ Yes ___ No ___ Unsure How many? _____
7. Does the school encourage students to bring and use reusable water bottles?	___ Yes ___ No ___ Unsure
8. Does the school have functioning rain barrels?	___ Yes ___ No ___ Unsure How many? _____
9. Does the school have functioning cisterns?	___ Yes ___ No ___ Unsure How many? _____
10. Does the school use native grasses, trees, shrubs and flowers in its landscape design?	___ Yes ___ No ___ Unsure Estimate % of Native Plants _____
11. Do any parts of the school grounds use xeriscaping, have installed rain gardens or bioretention ponds?	___ Yes ___ No ___ Unsure Estimate percentage? _____
12. List any other water conserving practices used at the school.	

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**Think about the following question as you summarize the data in Table 2.**

1. Based on the responses in Table 2, how would the team/class rate their water conservation measures currently in use? Explain.
2. In what area(s) of water conservation do students feel they can have the most impact?
3. What actions can students take to improve water stewardship?

## **Review of All Data**

1. Based on what is known and has been learned, what claims can be made based on the data and other evidence collected?
2. Be prepared in the post-audit to explain the role **systems and system models** play in understanding water conservation at school.
3. Be prepared in the post-audit to explain **cause and effect** relationships related to water conservation.
4. Be prepared in the post-audit to explain **patterns** students have identified through their investigations.
5. Be prepared in the post-audit to explain the relationship **matter and energy** have on water conservation at the school.