

# **Frequently Asked Questions about Silver Lake's Water Levels**

## **Water Level Basics**

**Question:** I hear about many different water level measures. **What are the different measures of lake water levels and what do they mean?**

**Answer:**

- 1%-annual-chance flood: This oftentimes is called the 100-year flood level. For Silver Lake, we ran 60 years of climate data in a model, found the high water level for each year, and did a statistical analysis to determine the 1%-probability flood level.
- 100-year flood: This is typically the water level that would occur if the drainage area to the lake receives a 1%-probability precipitation event. The current 1%-probability precipitation event for a 24-hour period is 7.3 inches. Note this elevation rises with increases in precipitation. This term is being renamed 1%-annual-chance flood level.
- FEMA flood elevation: For basins, FEMA typically maps the 100-year flood level.
- Ordinary High Water Level (OHW): This is a DNR term set by state statute: The DNR website describes OHW for lakes as: an elevation delineating the highest water level that has been maintained for a sufficient period of time to leave evidence upon the landscape, commonly the point where the natural vegetation changes from predominantly aquatic to predominantly terrestrial. For details see: [https://www.dnr.state.mn.us/waters/surfacewater\\_section/hydrographics/ohw.html](https://www.dnr.state.mn.us/waters/surfacewater_section/hydrographics/ohw.html)
- Outlet level or discharge level: This the elevation when water leaves the lake through the v-shaped weir.
- No-wake level: This is a water level set by others to limit wakes by watercrafts. Silver Lake Improvement Association (SLIA) sets a voluntary no-wake level of 989.3 feet to reduce the amount of shoreline erosion due to wave action during high water conditions.
- Datum. A datum is a reference system used by surveyors to determine elevations. Official datums have changed over the past 100+ years and can result in slight changes in stated elevation data.

Elevation Type	Elevation (feet)	Source	Notes
1% Annual-Chance Flood Elevation	991.0 Datum: NAVD88	VBWD	Used for VBWD modeling and permitting. Same as 100-year flood.
100-Year Flood	991.0 Datum: NAVD88	VBWD	Used for VBWD modeling and permitting. Same as 1%-annual-chance flood elevation.
FEMA Flood Elevation	991.2 Datum: NAVD88	FEMA	Used for flood insurance.
Ordinary High Water Level	989.57 Datum: 1912  989.84 Datum: NAVD88	DNR	Used for DNR and VBWD permitting.
Outlet Level	988.81 Datum: NAVD88	VBWD 2015 Survey by Cornerstone Land Surveying	Elevation when water starts flowing out of lake.
No-Wake Level	989.3 Datum: 1912  (This translates to 989.57 NAVD88)	SLIA	Used to reduce erosion. Voluntary.

**Question: How many homes around Silver Lake would be impacted by a 100-year flood?**

**Answer:** VBWD has identified three homes that might have low-entry elevations at or below the 100-year flood level. (Low entry is when surface water can come into a window, door, or other opening. Basement floor elevations can be lower than low-entry elevations.) A survey would be needed to determine if these three homes are truly below the 100-year flood level. VBWD requires new homes to have their minimum floor elevation (basement, walkout, etc.) at least 2 feet higher than the 100-year flood level.

**Question:** In the current plan for Silver Lake, VBWD discussed the possibility of petitioning to lower the FEMA 100-year flood elevation through a Letter of Map Amendment or Letter of Map Revision process.

**What would be the impact for home owners if the FEMA flood elevation was successfully changed?**

**Answer:** VBWD's 2015 study found the 100-year flood level only 0.2 foot lower than the FEMA mapped flood level. While anybody (above or below the FEMA-mapped floodplain) can purchase flood insurance, lowering the FEMA flood elevation might affect the rates people pay. VBWD enforces its 100-year flood level so that whatever the FEMA mapped flood level is, new construction would have to be built at least 2 feet higher than the VBWD 100-year flood level. Going through the very expensive process of updating the FEMA map would not do anything to reduce water levels in Silver Lake.

**Question:** The Silver Lake weir was installed more than 40 years ago. **Who installed the weir and with what purpose and authority did they install it?**

**Answer:** Following is the history of the outlet and weir plate, based on various correspondence from the DNR.

- A 24-inch-diameter concrete culvert under Century Avenue was constructed in 1942 or early 1943, with an invert (discharge) elevation of 988.0 (unknown datum). This culvert elevation was approved by the Commissioner of Conservation, following a public hearing.
- In the early 1950s and again from 1962 to 1965, stoplogs were used to maintain a water level higher than 988.0. During the latter period, a V-notch weir was installed (assumed by Ramsey County) at Elevation 988.5 (unknown datum), but there is no explanation why. People reportedly interfered with the outlet during the high water of 1965, leading a “lake improvement engineer” to investigate the outlet. The engineer decided no stoplogs were necessary since “vegetation encroachment at the outlet structure kept the lake above 988.00.” Vegetation apparently still controlled the discharge elevation in 1972 at Elevation 988.3 (unknown datum).
- In 1975, Ramsey County apparently re-built the weir at the culvert and installed a locking system to prevent tampering. The weir has a V-notch with a bottom at Elevation 988.5 (unknown datum), and the bottom of the weir plate is 988.0 (unknown datum).
- Around 1984, two new padlocks were added, which were meant to keep the weir plate secure in its frame.
- In 2006, in response to tampering and leaking, the VBWD Managers hired a contractor who welded the weir plate to the rails of the outlet structure and installed some seals.
- In May 2008, a caller reported tampering of the outlet to VBWD. The welds had been cut, the weir plate had been raised, and a block had been placed under it.

Tampering with the outlet is a crime (MR 6115.0255).

Note: The elevations listed above are in unknown datums. Because of uncertainty of the datums used to report the elevation of various outlet features, the VBWD hired Cornerstone Land Surveying, Inc. in 2015 to survey the culvert and weir in one consistent datum (NAVD88).

**Question:** Does the water leaving Silver Lake flow in a culvert all the way to Long Lake or does it flow into another water body before reaching Long Lake?

**Answer:** It flows through pipes and ditches to the St Croix River. The first major downstream water body is Minnesota Protected Wetland #82-0375W in the Greens of Silver Lake development. Silver Lake’s water flows through several lakes, including Long Lake, Lake DeMontreville, Lake Olson, Eagle Point Lake, Lake Elmo, and Horseshoe Lake before reaching the St. Croix River.

## **Controlling Water Levels**

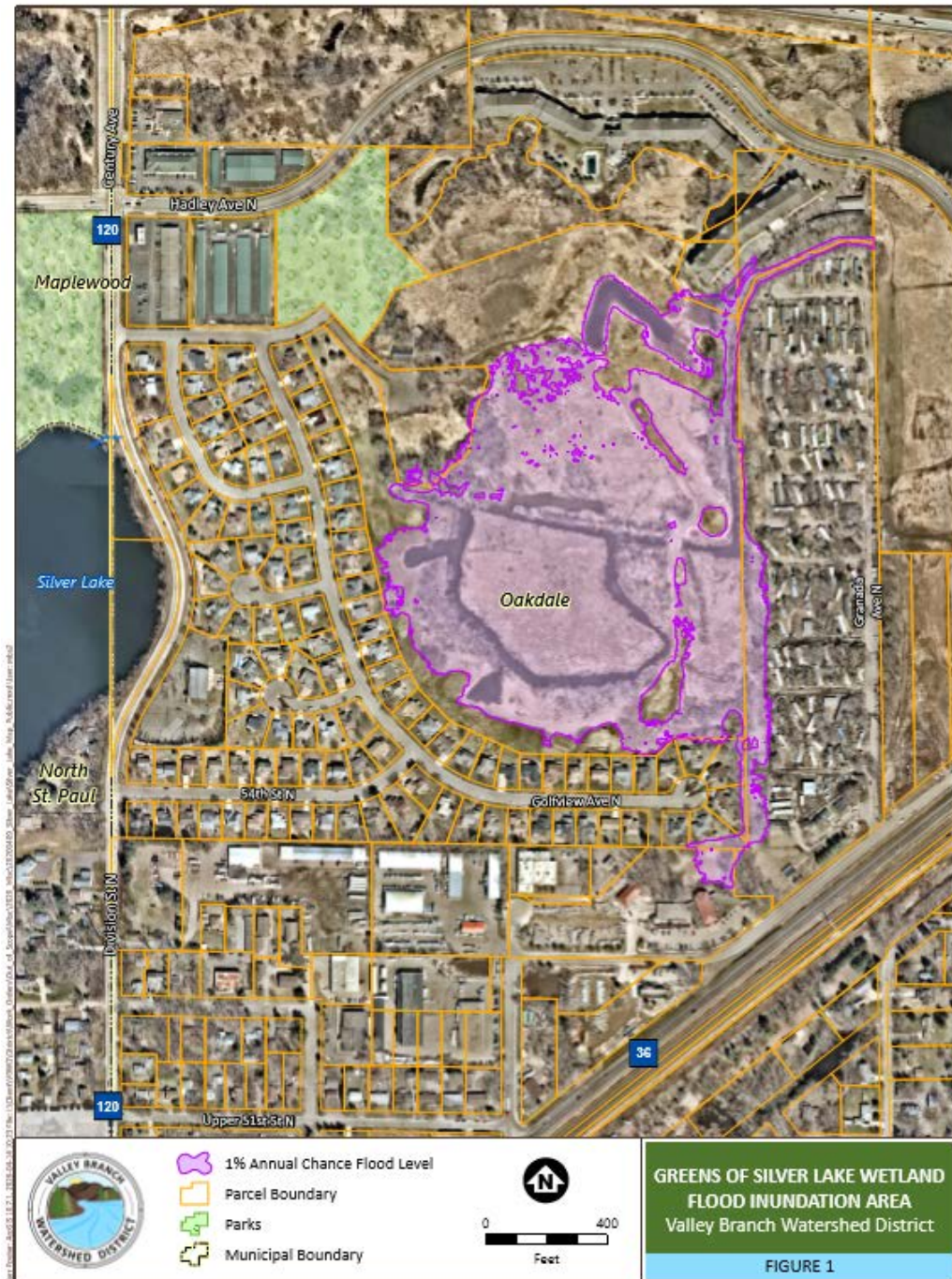
**Question: Why can't the excess water flowing into Silver Lake be diverted to White Bear Lake (especially the water runoff from Century College parking lots)?** This would not only reduce water levels in Silver Lake it would also increase water levels in White Bear Lake, which has been low.

**Answer:** Mixing the water could introduce pollution or invasive plants and animals into White Bear Lake and is prohibited by state law. Diversions could also essentially drain wetlands south of Century College. Even if laws allowed it, the cost of diverting large amounts of water even for what appears to be short distances would cost hundreds of thousands to millions of dollars to construct. This would likely be a significant percentage of the value of the homes that would potentially be protected from flooding, making for an unlikely use of public funds. Diverting the small drainage area might do nothing to the groundwater level at and near Silver Lake.

**Question: What would be the flood impact of changing the shape of the Silver Lake outlet to a flat weir?**

**Answer:** The following map shows the wetland area immediately to the east of Silver Lake. The purple area on the map shows the area that would likely be flooded by a 1%-chance flood level. The 1%-chance flood level is an elevation so the boundary shown in purple is actually an estimate of the areas that would likely see flooding based on available land elevation information.

Eight single family homes, several homes in Twenty Nine Pines Mobile Home Park, as well as their roads and possibly even some of the Cedric's Landing apartments all appear to be perilously close to flood risk. If the weir shape were to be changed this would likely result in a 0.9 inch higher flood level, which could increase the area flooded, especially near Twenty Nine Pines which is very flat. One inch doesn't seem like much but has the potential to flood several dwellings. Neither flooded homes nor erosion along Silver Lake shoreline are something we want, but protecting homes from flooding takes priority. Changing the weir shape without downstream property owners' permission through the purchase of easements could result in liability for VBWD; this would be costly for taxpayers if flooding were to occur.



**Question:** Water is constantly flowing from Silver Lake into the Oakdale wetland, and it has been constantly flowing for over 5 years. If the Silver Lake weir was flat there would be a one-time adjustment down to the official discharge level. **Is this true?** At this lower level Silver Lake would be able to hold more rain. For most days in the summer, the level would be below the discharge level and NO water would be flowing to the Oakdale wetland. **Wouldn't this actually reduce the chances of having a 100-year flood?**

**Answer:** Changing the current v-shaped weir to a flat weir would not change the discharge elevation, unless the flat weir was lower. If the weir shape was changed to be flat, water would leave Silver Lake faster and get to downstream wetlands and lakes faster—increasing their water levels from various storms. Silver Lake would continue to experience high water levels after a storm. Consider that 1 inch of rain over 70 acres is a lot of water and will take time to drain whether the outlet is 2 feet wide or 4 feet wide. The primary impact would be that water would be received by downstream lakes, streams, and wetlands faster and combine with many other water sources flowing into those water bodies. Making changes to a water system is complex. Whether increasing the capacity of Silver Lake’s outlet or changing a wetland upstream of Silver Lake, the resulting flood impacts need to be understood before any changes are made.

**Question: Why can’t the water elevation of Silver Lake just be lowered to reduce flooding and erosion?**

**Answer:** The physical act of lowering the Silver Lake weir outlet elevation is easy, but the impacts of an elevation change, the regulatory hurdles, and climate conditions influencing water levels are complex. People who have properties downstream may be at greater risk of flooding and shoreline erosion if the water level is lowered. Lowering the elevation may make boat access for some Silver Lake home owners difficult. Wildlife habitat, water quality, and groundwater would be impacted by changes in the outlet elevation. The laws and regulations are in place to treat everyone as fairly as possible, protect the environment and our water resources, and help protect all of us from increasingly severe storm events we are experiencing due to climate change. As you can see, many competing issues must be considered, and it is not likely that any one individual will get all of the outcomes they would like. To address these competing issues state statutes and rules specify that:

- All property owners provide an easement up to the Ordinary High Water Level (El. 989.84) (MS 103G.407 a (1)).
- The benefit to Silver Lake would need to be determined, alternatives identified, and the impact on downstream waters evaluated (MR 6115.0221 Subd. 2, A.4.).
- It is a crime to tamper with the outlet (MR 6115.0255).

These are some high hurdles to overcome both in meeting the requirements and in the costs. While changing the Silver Lake outlet level is possible, there are many challenges to accomplishing it.

**Question: Would it be possible to lower the outlet for Wetland #82-0375W in the Greens of Silver Lake development along with a change in the shape of the Silver Lake outlet weir?** The desired result would be that the increased water flow from Silver Lake would not raise the wetland’s 1%-chance flood elevation and flood duration.

**Answer:** Changing the discharge elevation of a wetland is under the jurisdiction of several entities that are charged with enforcing laws that do not allow draining of wetlands. These wetlands actually help reduce flooding by allowing water to permeate the ground while providing habitat, reducing water pollution, and slowing water flow. Changing the outlet of the Greens of Silver Lake outlet might also require changing the outlets of Long Lake, Lake Olson, Eagle Point Lake, etc. to mitigate for higher water levels. Making such changes is a complex and costly process that must consider the impact on everyone and balance it with the benefits that would result.

**Question:** It looks like the discharge for the Oakdale wetland is just a ditch. **Would it be possible to modify the ditch to address concerns about the wetland flooding?**

**Answer:** Changing a ditch flowing through a wetland is similar to changing the outlet. See above response.

## **Groundwater**

**Question:** How can I tell if I have a groundwater infiltration problem or flooding?

**Answer:** If water is seeping into your basement, that's a groundwater issue. If water is entering your home through a door or window, that's flooding from surface water.

**Question:** Aren't groundwater levels influenced by nearby lake water levels?

**Answer:** Yes. See illustrations at the end of this document.

**Question:** I know that VBWD is concerned about surface-water flooding and invests much of its resources into reducing and minimizing floods. **What can VBWD do to help people who are having groundwater problems?**

**Answer:** VBWD addresses groundwater problems by regulating construction in a way that minimizes groundwater issues—working with other agencies to collect groundwater-level data, occasionally modeling groundwater levels, and informing citizens about groundwater issues (including groundwater infiltration). Resolving groundwater problems is primarily the responsibility of property owners.

**Question:** What can I do as a homeowner to control groundwater infiltration problems?

**Answer:** Many homeowners install perimeter drain tile and sump pumps. Drain tile and sump pumps are a very affordable method for addressing groundwater infiltration. Many residents on Silver Lake have installed sump pumps and have expressed their satisfaction with the results. This FEMA document provides information on sump pumps, exterior drain tile systems, and interior drain tile systems that may be useful: [https://www.fema.gov/media-library-data/20130726-1756-25045-8598/protecting\\_home\\_book\\_508compliant.pdf](https://www.fema.gov/media-library-data/20130726-1756-25045-8598/protecting_home_book_508compliant.pdf)

## **Shoreline Erosion**

**Question:** Are shorelines eroding faster in recent years?

**Answer:** We do not have specific data that measures shoreline erosion on Silver Lake. Lakes go through natural cycles of high and low water levels. Over the years, Silver Lake water levels have fluctuated due to these natural cycles. High water levels do cause shoreland erosion both in the summer due to wave action and in the winter due to ice pushing against the shore. Recently, we have seen significant changes in water levels due to increased precipitation in our area, so we can assume that erosion is on the rise. This makes taking preventive measures important to reduce erosion especially through planting and maintaining deep-rooted native vegetation along the shoreline.

**Question:** The property owner at 2605 Poplar recently took down 24 trees, many of which were falling into the lake. The shoreline has also receded by about 10 feet over the years. This erosion is occurring all over the lake. **Besides lowering the water levels, what else can I do as a homeowner to reduce erosion?**

**Answer:** Don't mow at the shoreline. Instead, plant deep-rooted vegetation. Deep-rooted vegetation can hold the soils as well as give cover to hunters like fox and reduce the number of geese that graze on lawns. See "How can I stabilize my eroding shoreline?" under "Vegetation and Land Alteration" here:

[https://www.dnr.state.mn.us/waters/watermgmt\\_section/shoreland/property-owners.html](https://www.dnr.state.mn.us/waters/watermgmt_section/shoreland/property-owners.html)

**Question: Will riprap solve my shoreline erosion problem?**

**Answer:** The DNR regulates the type of material that can be placed at a shoreline. See the above link and this factsheet:

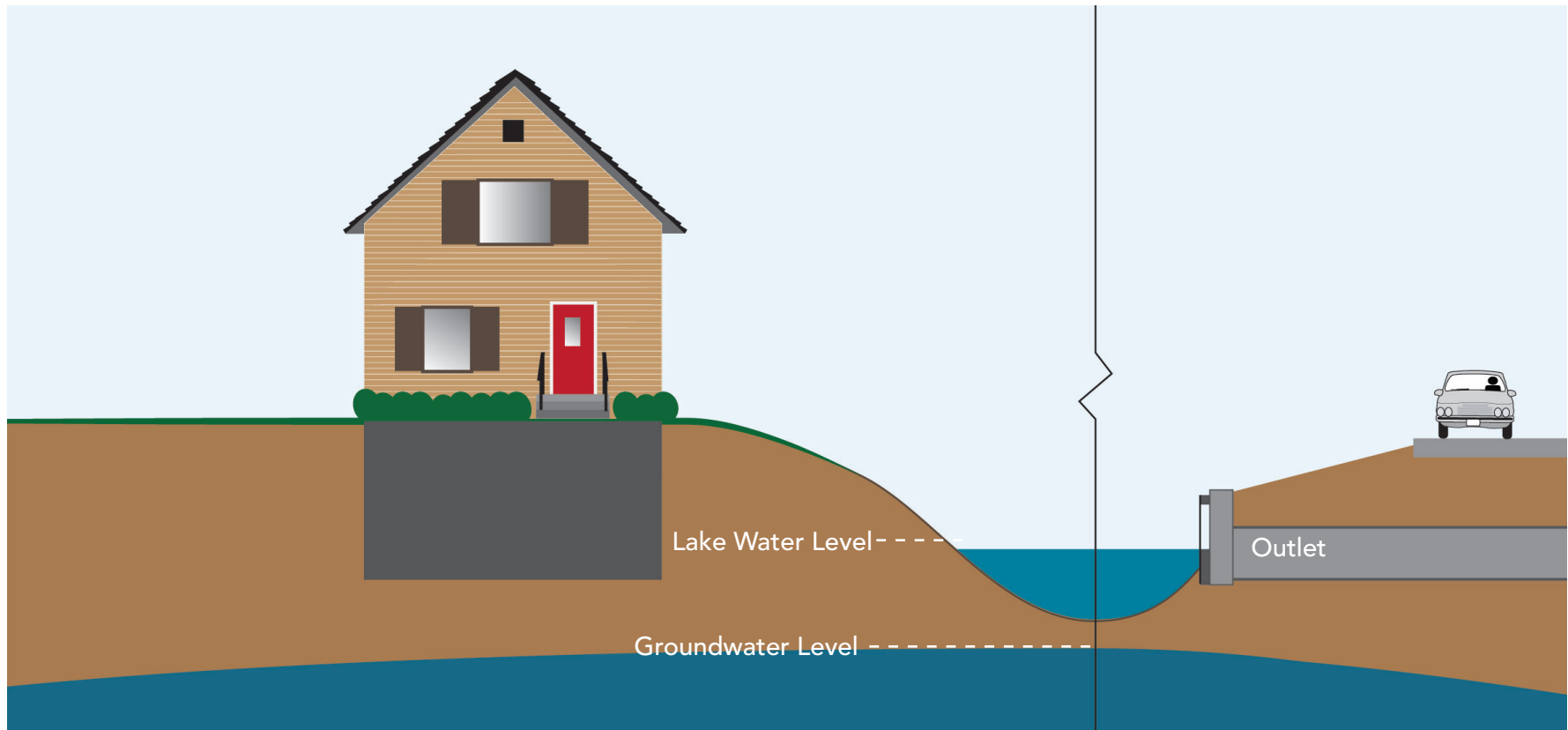
[https://files.dnr.state.mn.us/publications/waters/shoreline\\_alterations\\_riprap.pdf](https://files.dnr.state.mn.us/publications/waters/shoreline_alterations_riprap.pdf)

The VBWD regulates how much fill is placed below the 100-year flood level so that the 100-year flood level does not go up 0.1 foot.

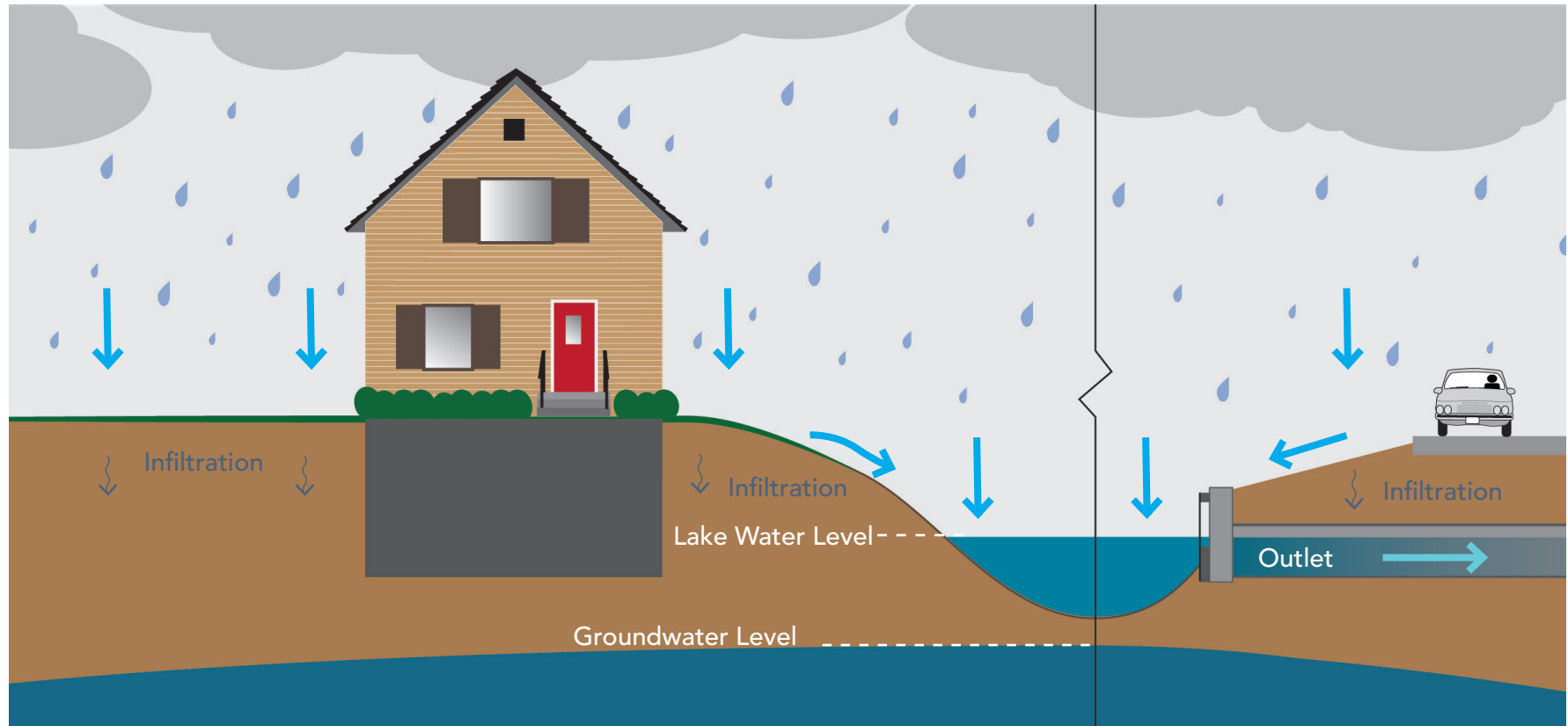
**Question: What can VBWD do to help reduce erosion along shorelines?**

**Answer:** The VBWD has had a cost-share program for several years and promoted the program to the SLIA and individuals in the area. Some individuals have participated in the program. Use this link for more information:

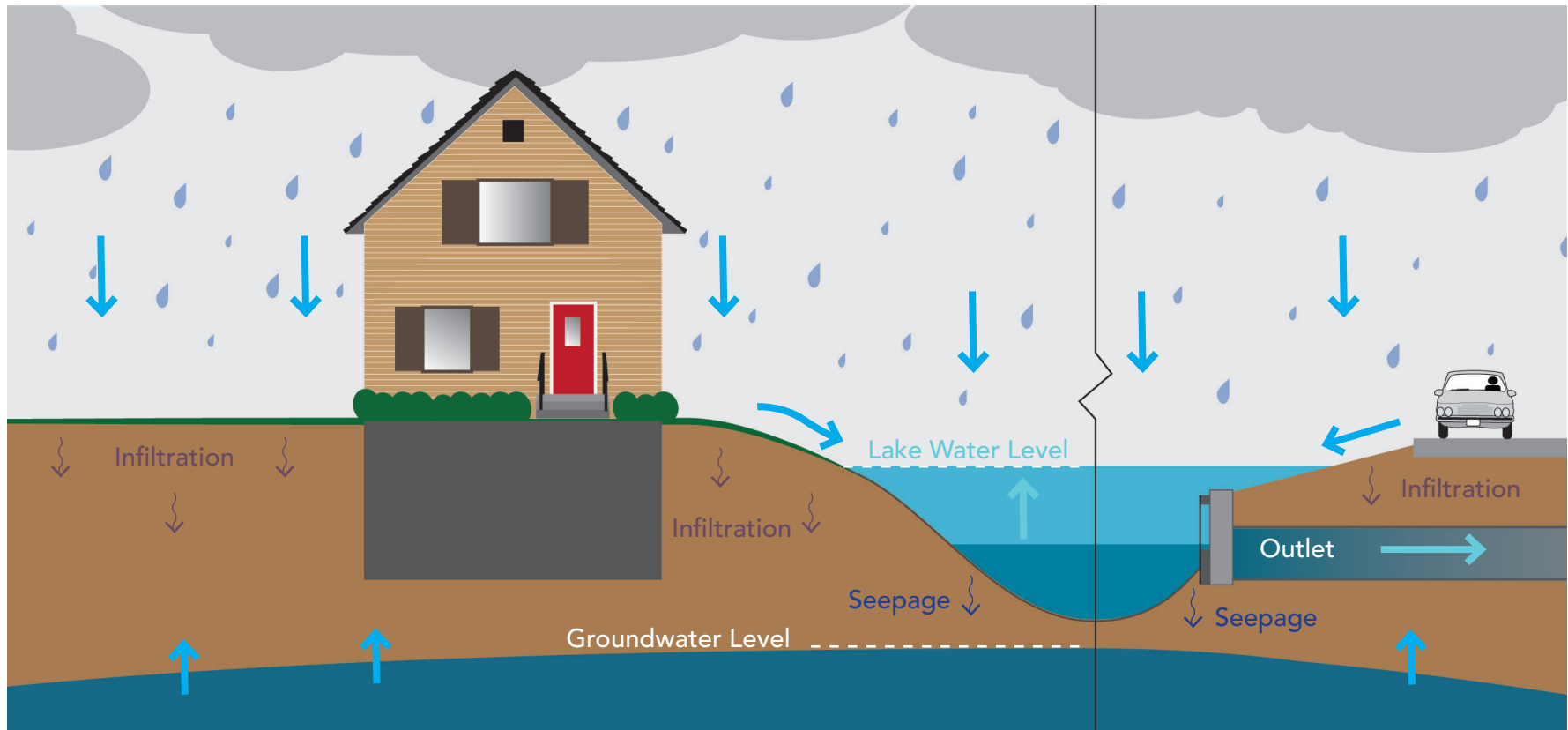
[https://www.vbwd.org/Grants/best\\_management\\_practices\\_stewardship\\_grant\\_program.php](https://www.vbwd.org/Grants/best_management_practices_stewardship_grant_program.php)



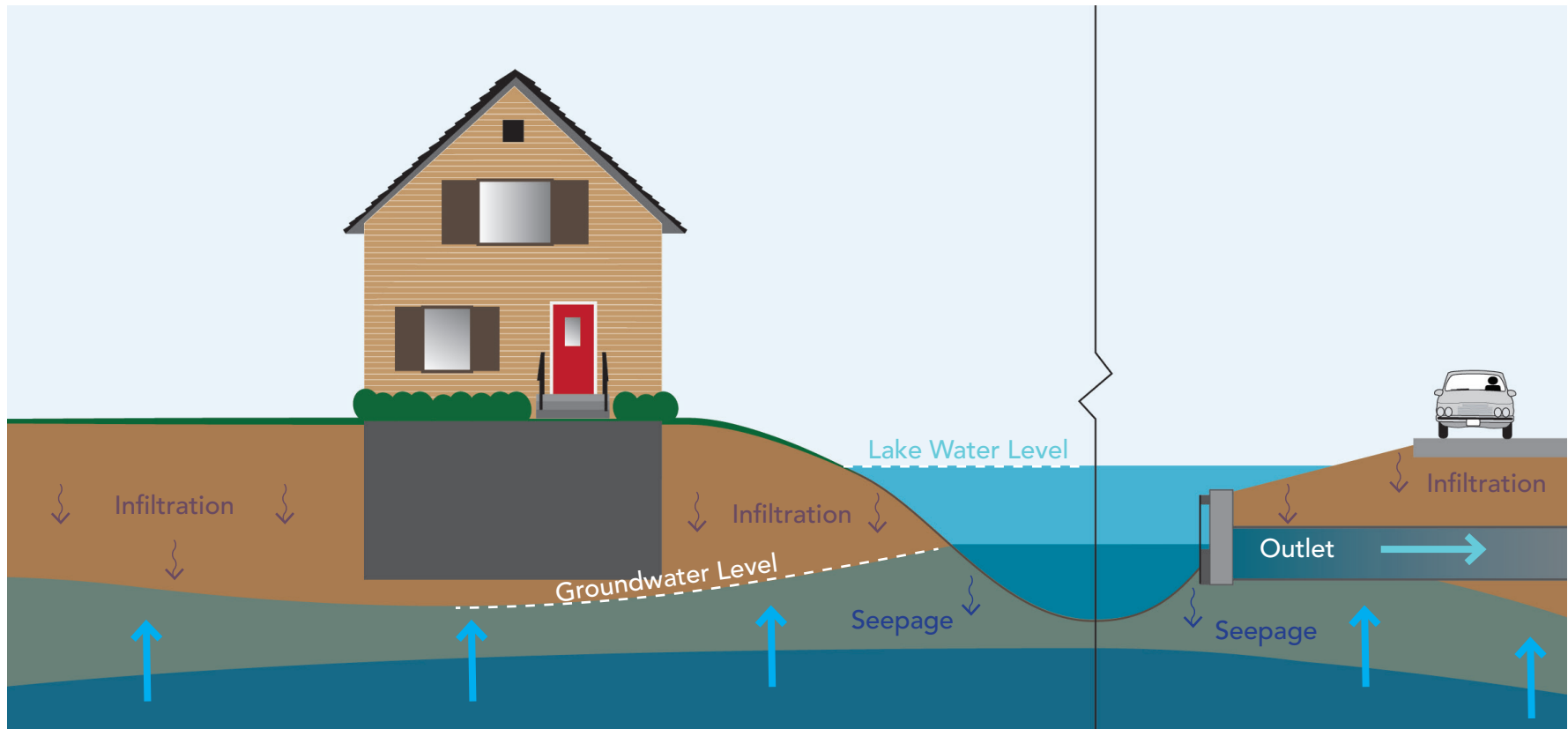
1. Water levels prior to rain event



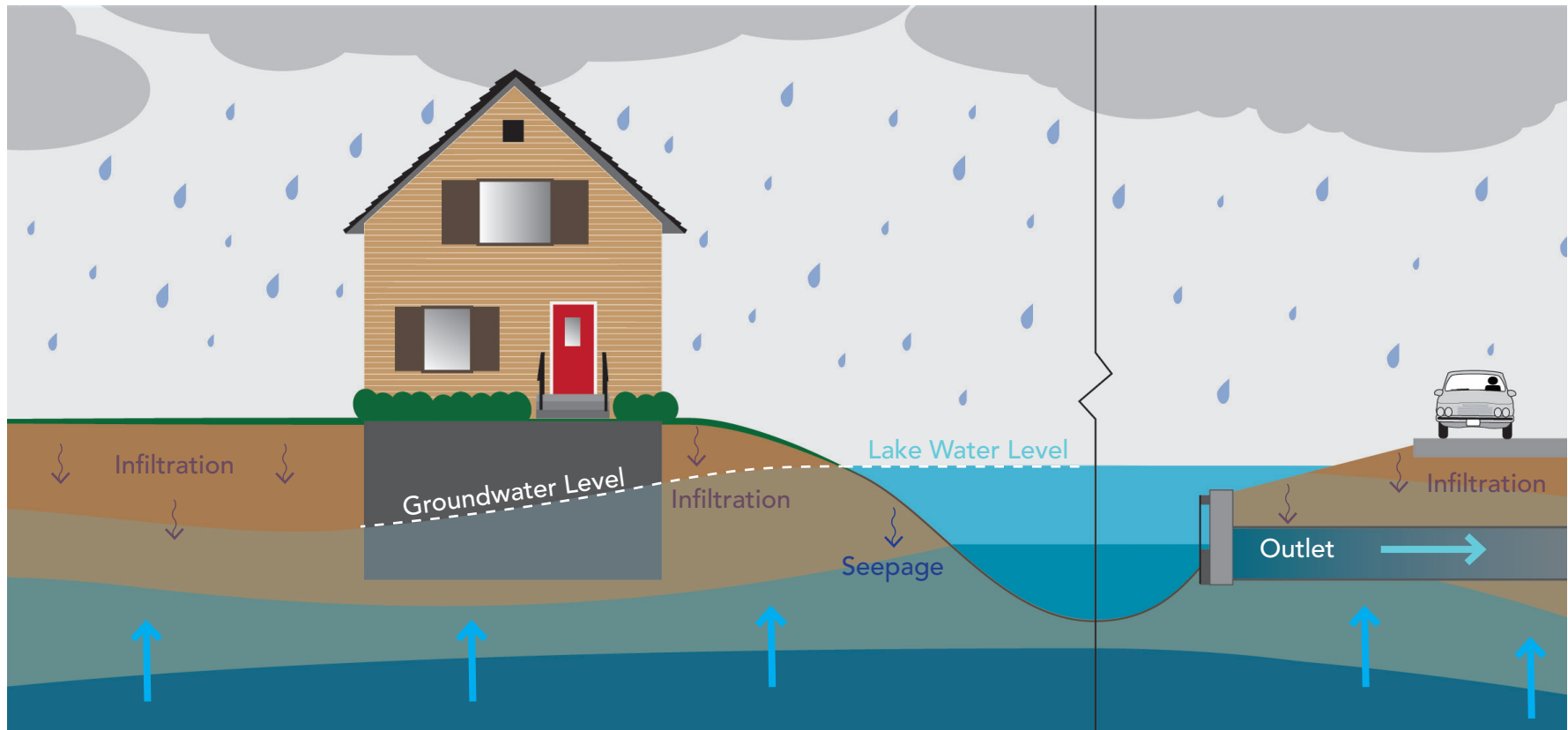
2. During a rain event, water infiltrates in green spaces and runoff begins to raise the lake's water level. Water starts to discharge through the outlet.



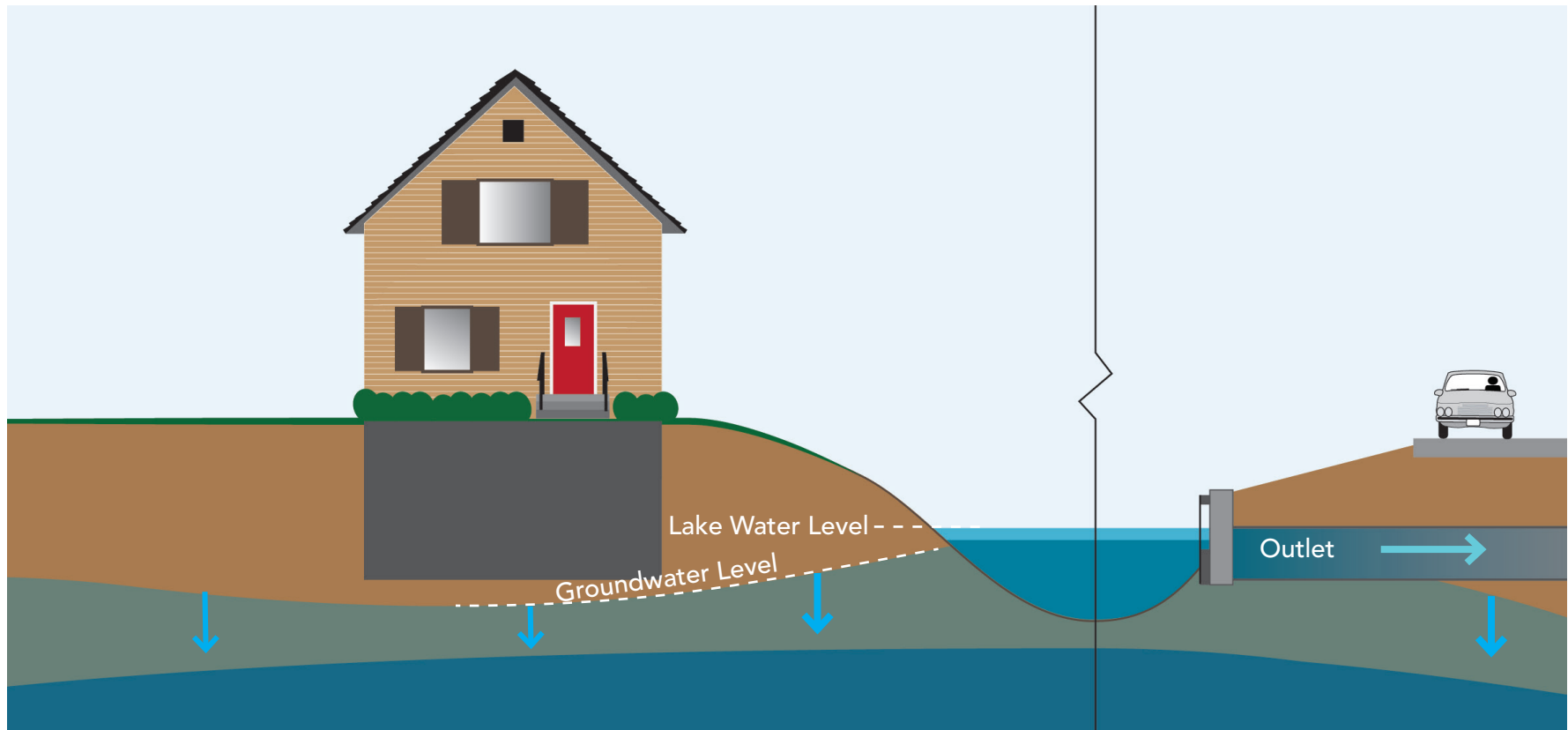
3. As the rain event continues, the infiltration from the green space begins to raise the groundwater level. The water from the lake also seeps into soils below, adding additional water to the groundwater.



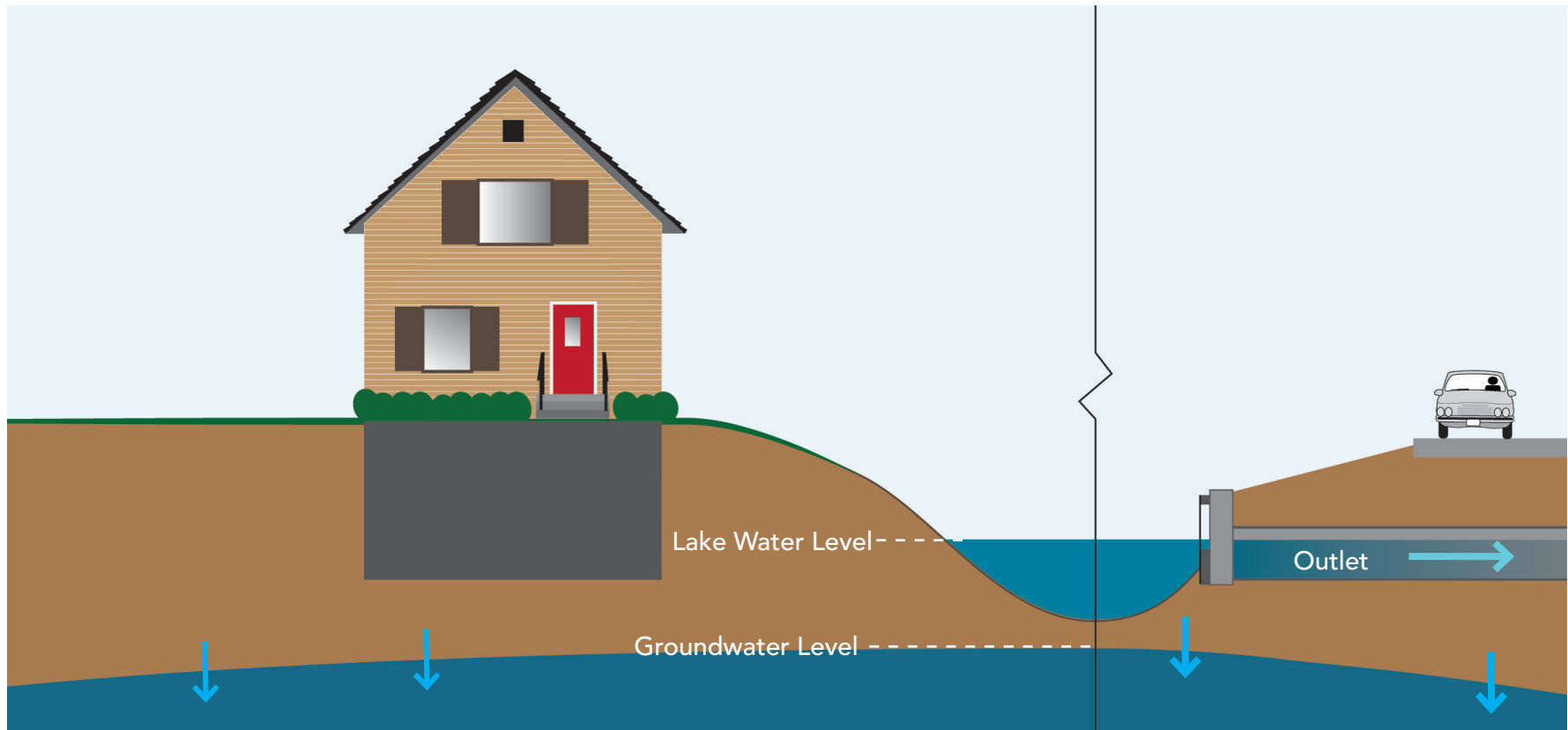
4. Immediately after the rain event, the lake water level begins to be lowered by way of the outlet, but the groundwater level remains high, as water continues to move from the surface to the groundwater.



5. When multiple rain events occur, the groundwater continues to rise, resulting in a high groundwater level that can reach basement floors.



6. It can take weeks for groundwater and surface water levels to drop to normal levels after a large rain event. It can take even longer for levels to recede to normal levels if there are a series of rain events.



7. If no other storm events occur and there is no additional groundwater inflow following a larger storm event (100-year storm), the water levels in Silver Lake will drop to normal levels within roughly a month. Groundwater levels can take longer to return to a normal level. A series of snow and/or rain events can raise groundwater levels too.