

**Wapato Lake Water Quality Management Plan for Wapato Improvement
District
July 2009**

This plan is adopted by:

Wapato Improvement District (WID)

Board Members Include: Ron Bates, Dick Adamson, Alvin Van Dyke, Alfred Spry

Completion of the Plan was assisted by:

Oregon Department of Environmental Quality (DEQ)

Joint Water Commission (JWC)

USDA - Natural Resources Conservation Service (NRCS)

Tualatin Soil and Water Conservation District (SWCD)

Executive Summary

The Wapato Improvement District owns and runs a drainage project to support farming in the Wapato Lake bed. During December of 2007, the dike surrounding Wapato Lake breached, allowing the lake to flood. Under normal operations, whatever winter water accumulates in the lake is dewatered in the spring. The December 2007 breach prevented dewatering until summer, which resulted in the release of poor quality water. This incident brought to light the possibility that emergency conditions at the dike could lead to water quality problems. It also highlighted the need for WID to file a Water Quality Management Plan with DEQ to fulfill the requirements for the existing Total Maximum Daily Load (TMDL) Order for the Tualatin Basin.

This management plan describes management actions WID will take to minimize impacts to downstream water quality both during normal operation and abnormal or emergency situations such as future dike breaches. The plan also outlines necessary maintenance activities WID will take to reduce the risk of future dike damage and includes a communication plan so that downstream water users will be aware of and can prepare for Wapato Lake releases.

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WID Water Quality Management Goals

The goals of this management plan are:

- 1) To describe WID management actions that will minimize impacts to downstream water quality,
- 2) To outline necessary WID maintenance activities to ensure that the dike will not breach again,
- 3) To develop a communication plan so that downstream water users will be aware of and can prepare for Wapato Lake releases, and
- 4) To identify Wapato Improvement District responsibilities if the dike breaches again.

Goal 1, Wapato and Water Quality: This management plan outlines when WID will begin pumping, what rate of pumping will occur, what monitoring is required during pumping, and how this management plan can be changed to respond to future data and observations (see the Management Actions section of this document).

Goal 2, Dike Maintenance: This management plan identifies actions to maintain the general condition of the dike.

Goal 3, Communication Plan: This plan identifies a communication strategy including the WID, Department of Environmental Quality (DEQ), and the Joint Water Commission so that the lake may be lowered effectively with minimal downstream impact. The plan also identifies additional parties that will be notified under specified circumstances.

Goal 4, Contingency Action Plan for Future Problems: This Plan identifies which parties should be notified, and how soon, under a future dike-breach or other mal-function at the WID that interferes with the normal operating scenario.

Wapato Improvement District Project Description

Wapato Lake is located in Gaston, Oregon, in southwest Washington County and Northwest Yamhill County in the Tualatin River watershed (see Figure 1). The Wapato Improvement District (WID) drained the lake in the 1930's to create farmland. This drainage project includes an elongated U-shaped dike, roughly 3,000 feet in length that protects the lakebed from winter flooding by the surrounding creeks.

The topographic map in Figure 2 provides a sense of the project area. The earthen dike was constructed during the 1930's. Irrigation canals were constructed both inside and outside the dike to deliver water to cropland. A series of open drainage ditches and sub-surface drains inside the dike flow to a main drainage ditch that terminates at a pumping plant located near the confluence of Wapato and Hill Creeks by Springhill Road. Wapato Creek flows adjacent to and outside of the dike on the west and north sides of the project. Hill Creek flows adjacent to and outside of the dike on the east side of the project. Hill Creek is a tributary to Wapato Creek and Wapato Creek is a tributary to the Tualatin River.

During the rainy season the lakebed floods with a foot or two of water from rain and creeks that flow into the lake area. The flood water is pumped out of the lake in late winter or early spring, allowing the soil time to dry for spring and summer planting. Originally farmed for onions, currently about 12 members of the Wapato Improvement District (WID) farm 750 acres for corn and other vegetables.

Pipe turnouts penetrate the dike and allow for the controlled diversion of water from Wapato Creek into the project to supply irrigation water during the summer. The turnouts discharge into drainage ditches inside the dike. Farmers pump this irrigation water out of the drainage ditches and apply it to their crops with either big gun travelling sprinklers, wheel-line sprinklers or hand-line sprinklers. Thus, the Wapato Lake drainage ditches provide two functions: drainage of the lakebed in the spring and transport of irrigation water in the summer.

Flashboard dams on Wapato Creek help enable the diversion of Wapato Creek water into the pipe turnouts. One of these flashboard dams, located just downstream of the Wapato Creek/Hill Creek confluence, can back water up Hill Creek to provide irrigation water to farms located outside of the east dike. A canal diverts some water from the Tualatin River, allowing it to flow under Gaston Road and into Wapato Creek. This diverted Tualatin River water increases irrigation capabilities from Wapato and Hill Creeks as the natural flow in the creeks drops considerably during the summer. Some of the irrigation on project land and surrounding lands is done under the auspices of the Tualatin Valley Irrigation District.

2007-2008 Events

Wapato Lake bed normally floods to a depth of about a foot due to high winter rains, and is pumped dry by the WID during March and early April. In December of 2007 the west side of the dike breached allowing Wapato Creek to flood the lake bed to a depth of about 8 feet. Damage to the dike prevented WID from dewatering the lake bed, as Wapato Creek water would flood into the lake through the damaged dike as water was pumped out at the pump house. By late

June Wapato Creek receded, and pumping to dewater the lake bed was possible in July. Although it was too late to plant crops, dewatering the lake was necessary to repair the dike.

Water quality problems were observed downstream of Wapato Creek during the summer of 2008. The Joint Water Commission, the drinking water providers in the county, experienced significantly greater difficulty and increased cost to treat Tualatin River water during summer 2008. Monitoring the watershed above their intake demonstrated that much of the water treatment problem came from the Wapato area. A bloom of potentially toxic blue-green algae was observed in the lower Tualatin more than 40 river miles downstream of Wapato in mid-July. Such blooms had not been seen in the Tualatin River since upgrades were made to the Washington county sewage treatment plants more than a decade ago. On July 31, the Tualatin Riverkeepers reported a fish kill in the canal below the Wapato pump house. The Oregon Department of Fish and Wildlife and the Department of Environmental Quality both responded to the report, visiting the site on July 31 and August 1, 2009 respectively.

Water pumped from the lake during the summer of 2008 may have contributed to various water quality problems in the basin. The need to avoid similar water quality impacts in future years prompted the completion of this Water Quality Management Plan. In an August meeting of some of the stakeholders, the WID agreed to develop and follow a water quality management plan to protect water quality. The plan addresses both the potential water quality impacts that may occur under normal operations, and also provides guidance to manage for water quality impacts under abnormal situations such as the breached dike of 2008.

Management Actions To Minimize Water Quality Impacts

This Water Quality Management Plan describes an adaptive management approach for managing Wapato Lake water. The plan identifies a starting point for WID operations, outlines a communication strategy among WID, the JWC, DEQ and other stakeholders as appropriate, and allows operations to be modified based on water quality and quantity data, and conditions experienced by both WID and JWC. This document also includes a check list of WID management and maintenance actions that serves as both a reminder for actions to be taken throughout the year, and the template for the annual implementation report to DEQ.

The actions in this management plan were identified in the fall of 2008, working with DEQ, JWC, Natural Resources Conservation Service (NRCS), the Soil and Water Conservation District (SWCD) and Oregon Department of Agriculture (ODA). WID is already implementing this management plan. They were able to de-water the lake in early spring of 2009, and have continued communicating with the JWC and DEQ as agreed. JWC has been monitoring water quality in the Wapato Canal since the summer of 2008. In December, JWC placed a

transmitter in the Wapato pump station that flashes at the treatment plant indicates when the Wapato pumps are active, and decreased the need for constant notification between WID and the JWC.

Management Plan Revisions:

This Management Plan may be revised when needed with the approval of DEQ. The Plan will be revised when necessary to meet requirements of revised Total Maximum Daily Loads (TMDLs) adopted by DEQ, including requirements to update water quality implementation plans. This management plan will be revised whenever the operations at Wapato Lake and pump house are altered significantly from those described here.

Manage Pumping Rate and Timing:

WID performs two distinct pumping activities; dewatering the lake in spring to allow farming activities to begin and managing water levels in the canals for irrigation during summer. For the purposes of this management plan, dewatering is defined as activities to remove water from inundated cropland. Irrigation is defined as delivering water to crops in the lake basin, and includes pumping that is necessary to maintain appropriate flow in the irrigation canals inside and outside of the dike. Irrigation occurs during the May through October growing season.

WID maintains two pumps at the pump house; a 15,000 gallon per minute (75 horse power) pump, and a smaller pump (30 horse power) that pumps at least 2500 gallons a minute. Both of the pumps are old, and may no longer pump as much as their ratings indicate. The larger capacity pump is needed to de-water the lake; irrigation management can occur using only the smaller pump. WID can influence downstream water quality through the timing and magnitude of discharges made from the lake. During the summer of 2008, a switch to use only the smaller pump greatly improved water quality in the Wapato Canal. Therefore, when it is desirable to release water from the lake at a rate that is greater than inflow to the system, releases should occur at a time and at a rate that will minimize the effect on downstream water quality.

Timing and Pumping Rates for Dewatering and Irrigation:

1. Timing for Dewatering: From a water quality perspective, based on seasonal water temperatures and river flow rates, dewatering in November through April is expected to have less impact on downstream water quality. In addition to lower water temperatures, the TMDLs for temperature and total phosphorus are in effect from May 1 through October 31.

Dewatering is restricted to November 1 through April 30. Results from the JWC water quality monitoring and water treatment records will inform what timing and pump rate is best, and whether additional

steps or changes in pumping rate and timing should be taken to protect downstream water quality. If these results indicate that dewatering should occur during a different time period than November 1 through April 30, this Management Plan will be revised.

Water releases from Hagg Lake sometimes influence water stage in Wapato Creek. Closer monitoring of water flow, stage level in the Wapato Canal downstream of the WID pump house, and water quality may indicate whether it is beneficial to coordinate dewatering with releases from Hagg Lake. WID will work with DEQ, JWC, and the appropriate managers for Hagg Lake to determine if more coordination is desirable.

2. Pumping rates for irrigation activities: During the summer of 2008, summertime pumping was largely a de-watering effort, and did not include controlling irrigation flow. With the lack of irrigation water in the canals, water quality may have been much lower than that observed under normal operations. Even after the lake was dry in late July, intervals of pumping water through the WID system were detected through changes in water quality at the drinking water treatment plant. Starting August 1, only the smaller of the two pumps was used to move water out of the canals.

Either the large pump, small pump, or both pumps may be used for dewatering activities from November through April. Between May 1 and October 31, only the small pump will be used at the Wapato Pump House. Future monitoring of water quality and flow will demonstrate whether normal spring dewatering and summer irrigation will contribute to downstream water quality issues. If these monitoring results indicate that pumping rates should be different than described above, this Management Plan will be revised.

3. Other management strategies: **There may be times when Wapato Lake water supports algal blooms, or is unusually high in suspended sediments. If these occur, WID will work with DEQ and others to determine whether there are feasible treatment options such as filtration, and whether these options are necessary and effective to improve the quality of water prior to pumping into the Wapato Canal.**
4. Dike Breach or other WID project impairment: The events of 2008 indicate that summertime dewatering can lead to water quality impairment downstream. Thus WID agrees that they will not undertake dewatering activities during May through October.

If the dike breaches, or some other event occurs that precludes dewatering during November through April, WID may alter the dates for dewatering, and discharge at high pumping rates only if DEQ determines, based on monitoring data, that downstream water

quality degradation will not occur. Details for this monitoring will be determined at the time of a dike breach. Additional management strategies to follow when a dike breach occurs are included in the Monitoring and Communication sections below.

Maintenance Activities:

Dike maintenance is critical to decrease the chance that the dike will fail. The breached dike cost Wapato Improvement District Farmers the ability to farm the land and accrue income in 2008. The summer water release impacted downstream water quality and water users, including increased water treatment costs for the Joint Water Commission. The dike is also important for the Tualatin Valley Irrigation District irrigation delivery system, providing water to farmers surrounding the Wapato District. Heavy rains and high water can result in damage to the dike as it did in 1996 and 2007. A well maintained dike is more likely to withstand smaller flood events, and may suffer less damage during a large flood event. WID will implement the following maintenance activities for the dike with the goal of protecting water quality:

- 1. May, June, July: Mow top of dike to allow dike inspection.**
- 2. If WID desires, spray dike to deter blackberries. Pesticide application will be completed in compliance with Oregon Department of Agriculture pesticide program, including any requirements for applicators to be certified for pesticide application, and following any buffer requirements to protect downstream water quality and endangered salmonid species.**
- 3. August: Check ditches and clean when necessary. Ditch cleaning activities will comply with any necessary local, state and federal permits. Ditch cleaning will include using best management practices to limit turbidity, and minimize the spread of non-native weeds.**
- 4. September: Check dikes for beaver/nutria problems, and repair as necessary.**
- 5. October: Close gates to deter water entry.**
- 6. November: Lock gates at bridges.**
- 7. November: Take dam boards that control water height out for winter.**
- 8. WID will review maintenance activities at least once each year, and determine whether additional dike maintenance is necessary. If so, this management plan will be modified, and WID will implement the additional practices the following year.**

Monitoring:

- 1. WID will visually assess lake and canal water levels and will use this information to determine when WID will initiate and conclude the spring water drawdown (within the November-May time period).**
- 2. WID will contact DEQ and JWC when severe algae blooms are present in Wapato Lake water to be discharged. Blue-green algae blooms are of special interest due to the potential for blue-green**

- algae to produce and release powerful neuro- and liver toxins. Blue-green algae is generally vivid in color, usually a turquoise or bright green. It may look like spilled paint, or grass clippings suspended in the water. WID will work with DEQ to receive training regarding the identification of potential blooms.
3. WID will also visually monitor for algal blooms that they observe in the Wapato Canal.
 4. WID will coordinate with the JWC to allow:
 - a. Installation of a transmitter in the WID pump house that informs the JWC treatment plant operator when pumping occurs
 - b. Installation of a staff gauge in the lake
 - c. Installation of flow meter to track Wapato Pump discharge more accurately
 - d. Water quality monitoring in Wapato Canal on a routine basis
 - e. Water quality monitoring in lake as necessary
 5. At the time this Management Plan is written, the Joint Water Commission collects weekly water quality samples downstream of the WID pump house. Should the Joint Water Commission discontinue sampling at this site, the WID will work with DEQ to develop an appropriate monitoring plan, and the WID will be responsible for implementing that plan.
 6. In the event of a dike breach, If WID is not able to dewater the lakebed between November 1 and April 30, WID will have the responsibility to monitor the water quality in the lake before dewatering the lake may occur. WID will develop a monitoring plan for DEQ approval that at a minimum will include measuring temperature, dissolved oxygen, pH, total and dissolved phosphorus concentrations, chlorophyll and a visual assessment for blue-green algae.

Communication:

Water quality problems in Wapato Creek and the Tualatin River caused by Wapato Lake water can be influenced by the WID management activities described in this document. This section outlines key events that trigger communication, and identifies the responsible parties, including the initiating party, when communication should occur. Optimal water quality outcomes will occur when all interested stakeholders reach out to others in the basin as necessary; WID is not the only party with communication responsibilities.

1. Normal Operations:
 - a. WID will contact DEQ, and JWC informing them of plans to alter lake level. This notification is intended to inform DEQ and JWC when a major change will occur in the rate of pumping at the Wapato Pump house. These notifications will most likely occur during the spring when the lake is drawn down and then again when dewatering is complete. WID will

- strive to inform DEQ and JWC about these changes a week in advance, but will inform even on occasions when the pumping change will need to occur sooner than one week.
- b. JWC and DEQ will communicate with the WID with questions that may address problems or improve water quality management through the adaptive approach.
 - c. WID may work with the Tualatin Valley Irrigation District and the Bureau of Reclamation to coordinate dewatering activities with flow and reservoir management at the Hagg Lake.
2. Technical Assistance for Farmers: The SWCD and NRCS can assist with soil testing and provide advice on nutrient management for individual farm plots. They can also provide advice on appropriate pesticides and application rates. **WID should encourage its special district members to seek technical assistance and/or complete farm plans from the Natural Resources Conservation Service, and the Tualatin Soil and Water Conservation District to minimize water quality impacts. Practices of particular interest for these farms are nutrient and pesticide management.**
 3. Blue Green Algae Blooms: **WID will notify DEQ and the JWC if they observe algal blooms that are potentially bluegreen algae species. DEQ will work with the WID to receive training to identify these blooms.**
 4. Monitoring Data: **DEQ will work with the JWC and the WID to review the monitoring data and determine whether changes to this management plan are warranted.**
 5. Dike Breach:
 - a. **WID will contact DEQ, JWC and TVID in the event of damage to the dike within 72 hours. Contact names and information are included below.**
 - b. **WID will coordinate a meeting of interested stakeholders to help identify what steps will be taken to address the dike breach.**
 - c. **WID may contact NRCS, SWCD, Army Corps of Engineers, JWC, Clean Water Services, or any other agency to seek financial or technical assistance for dike repair.**

Reporting:

1. **WID will submit a summary report annually to DEQ using the attached checklist. WID may supplement the checklist with any additional information that reflects WID actions, concerns or questions while addressing water quality issues during the year. The Annual Reporting form at the end of this document will be completed**

- for the November 1-October 31 time period, and submitted to DEQ by the following January 1 of each year.
2. The WID will compile a list of crops grown inside the dike each year, and provide it to DEQ and the Tualatin SWCD. The list will be used to identify pesticides that are likely to be used on Wapato crop land, and to estimate quantities of fertilizer applied in the Wapato Basin.

Contact Names, Addresses and Phone Numbers

Primary Contacts:

Wapato Improvement District

Contacts:

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Other Stakeholders

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Email
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Figure 1. Map showing general location of Wapato Lake area

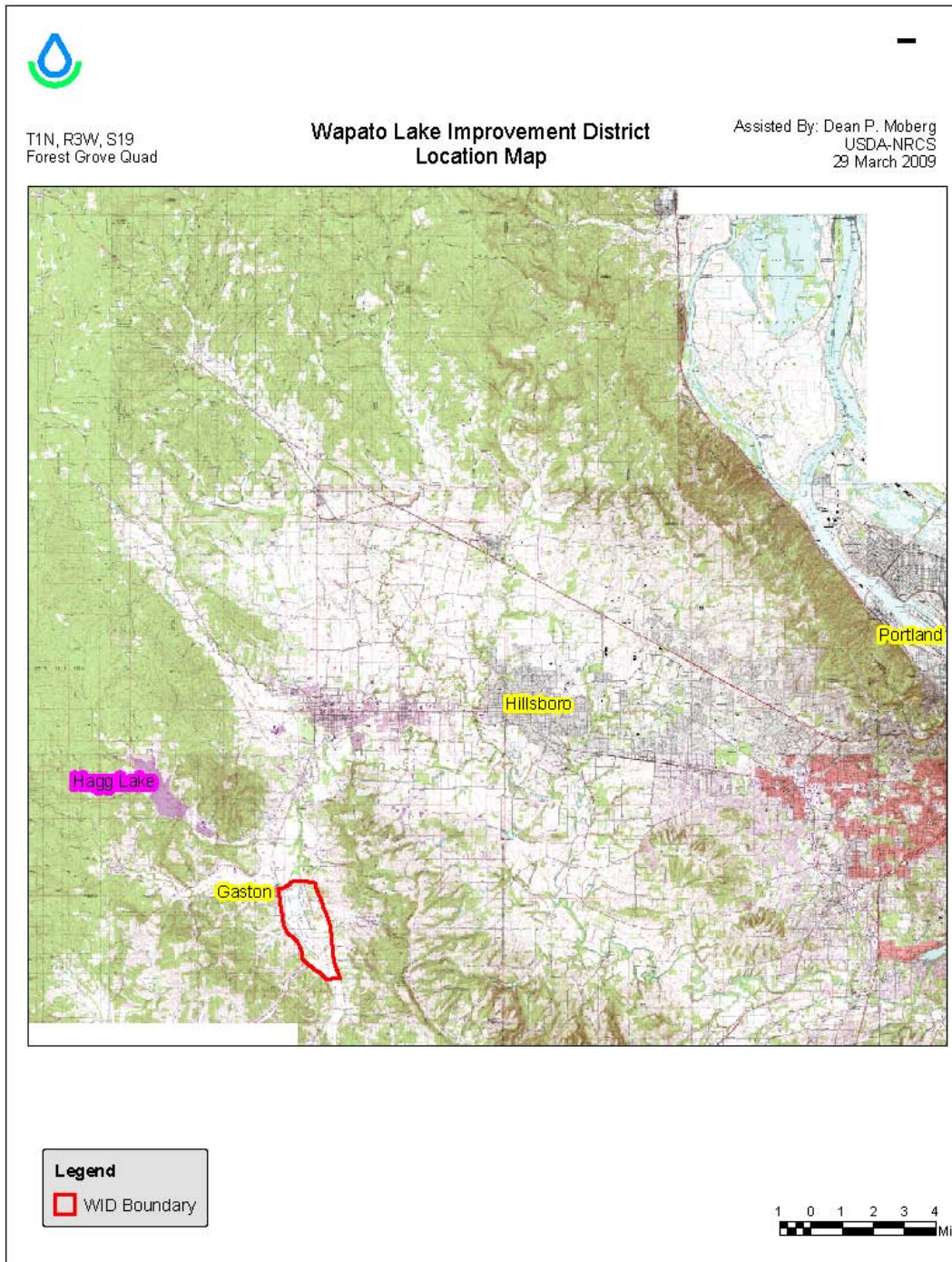
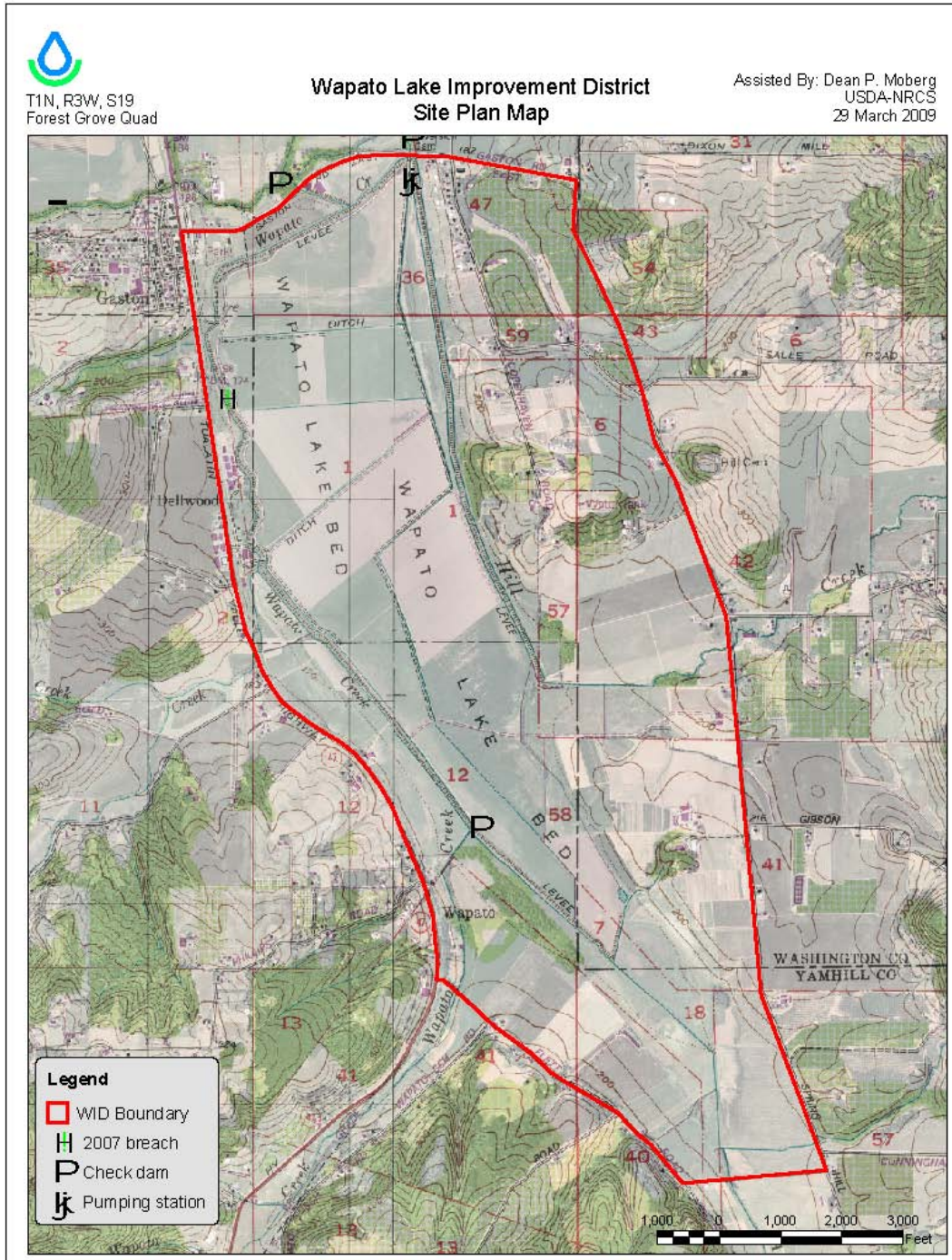


Figure 2. Map of Wapato Lake



Signature Page

This Implementation Plan describing the Wapato Improvement District responsibilities under the Tualatin Basin Total Maximum Daily Load was completed in compliance with Oregon Administrative Rule 340-042-0080. Upon signing this document, the Wapato Improvement District agrees to implement this Plan and to submit annual reports in the format of the attached form, or as modified with approval from DEQ. Upon receipt of signatures from the Wapato Improvement District, the Oregon Department of Environmental Quality will sign this signature page, in agreement that this plan, when implemented is sufficient to meet the requirements of OAR 340-042-0080.

Wapato Improvement District Directors:

Ron Bates Date

Dick Adamson Date

Alvin VanDyke Date

Alfred Spry Date

Oregon Department of Environmental Quality:

Sally Puent, Water Quality Manager Date:

Annual Reporting Form

This checklist is designed to serve two purposes; to provide a checklist to WID for activities during the year, and to provide an easy way to summarize WID management activities for annual DEQ reporting.

1. Management Activities:

a. Pump Timing and Rates:

b. Dewatering: Notified DEQ & JWC of initial dates: _____

Date initiated: _____

Notified DEQ & JWC of end date: _____

Date Completed: _____

Average Pumping rate _____
(which pumps and hours/day)

c. Irrigation: Begin and End Dates: _____
(which pumps, and hours/day)

Notes, issues, concerns, other comments:

2. Maintenance Activities:

a. Mowing & Spraying the dike (check months implemented)

May June July August September October

b. Ditch Cleaning: Summarize activity here:

i. Which ditches? (inside or outside dike) _____

ii. When (which month, how many times) _____

iii. Any problems to report? _____

iv. Any recommended changes to ditch maintenance?

v. Quantity and description of material removed

vi. Disposal or location of removed material

REPORTING YEAR _____

3. Monitoring:

a. Spring Lake and Canal levels:

- i. What was the maximum depth of winter water in lake?
- ii. When was pumping initiated? _____ DEQ and JWC notified in advance?
- iii. Were there problems dewatering lake because of high water levels from Hagg Lake releases? (describe).

4. Algae blooms observed? (when and where?) _____
DEQ and JWC notified?

5. Notification: (Most notification actions are noted with actions reported above.)

a. Did the dike breach? (yes or no, and actions taken)

b. Did other events happen that prevented WID from dewatering on schedule? (describe situation and actions taken)

6. Additional comments, notes, concerns