

Water reclamation in Washington State:

An analytical review of WAC 173-219

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CHAPTER ONE: PURPOSE OF THE STUDY

The purpose of this paper is to identify the implications of the proposed changes to water rights impairment analysis and the impacts on transaction costs for water reclamation facilities. Will the new impairment analysis prove too burdensome for reclamation facilities? Will the transaction costs to comply with the proposed state rule prevent water resources from going to their most valuable activity? Transaction costs are defined as the costs of carrying out a transaction by means of an exchange on the open market or in this case, the costs of permitting a new or existing water reclamation facility (Wang, 2003). My analysis will conclude that the new state law is unlikely to result in the growth and expansion of reclaimed water facilities in Washington State as the new legislation was directed to encourage.

Historically, water has been in vast and steady supply in the state of Washington. Global climate change, lack of available water rights, population growth and the impact on the environment from that growth are forcing awareness that water in Washington is now a scarce resource. Steps need to be taken immediately to ensure that enough water will be available to sustain both ecosystems and the growing population of Washington State indefinitely. The Department of Ecology, whose mission is to protect and manage the environment of the state, has outlined five ways it intends to secure water resources in the future for Washington state (Department of Ecology, 2009). These five methods of securing water are:

- reducing the causes of climate change and drought;
- protect and preserve groundwater through stronger regulation of homestead wells;

- encourage and support the reclamation and reuse of wastewater;
- encourage water conservation and
- develop new water supplies (Department of Ecology, 2009).

Of these five options, water reclamation is an option that offers a renewable and drought tolerant solution. Water reclamation also has guidelines for management of the process in the Revised Code of Washington (RCWs). With proper oversight from the Washington State Department of Health (Health) and the Department of Ecology of Washington State (Ecology), reclaimed water can help preserve potable water sources, provide an alternate water source and reduce the amount of pollutant discharge released into Washington water bodies (Department of Ecology, 2009).

Water reclamation in Washington State is overseen by both the Department of Health (Health) and the Department of Ecology (Ecology) through a series of guidelines. At the end of 2011 when the state's moratorium on non-essential legislation is lifted, a new rule will be forwarded that will govern water reclamation in Washington State through law. The rule is intended to provide administrative procedures and define the permitting, application process, and technical requirements (Department of Ecology, 2010c). The intent of this new rule is to increase water reclamation in Washington State (Department of Ecology, 2010c).

The proposed legislation will create changes for the current guidelines for water rights impairment analysis. Currently the purpose of water rights impairment analysis is to evaluate the potential downstream impairment in quantity and quality that water rights holders might face from existing or new water reclamation facilities and provide technical guidelines on the required quality of the reclaimed water (Department of Ecology, 2009b). Here a water right is an Ecology approved allocation of water an entity can withdraw from a water body. To provide

greater clarity on this subject, an example of a water rights impairment analysis scenario would exist if a water reclamation facility were to withdraw so much effluent from a wastewater treatment plant that downstream water rights holders (whom normally receive the effluent) would not have enough water to fill their water right. If a reclamation facility is found to negatively impair an existing water rights holder's access to their legally recognized share of water on a non-marine body of water, then per the guidelines, the reclamation facility must mitigate the loss of the water right holder. In this instance, mitigation is where the reclamation facility tries to find mutually agreeable terms allowing the facility and the water rights holder access to water or equitable compensation for the water access negotiated on in the transaction. Ultimately, then, downstream users have vested rights to their usage.

This current impairment analysis is slightly out of line with the water rights appropriation laws in Washington that assign water rights based on priority date (first in time, first in line approach) and availability of resources. This is because it gives reclamation facilities first right to the wastewater treatment plant effluent that they reclaim, so long as it does not impair a water rights holder downstream.

The intent of the changes to water rights impairment analysis in the proposed legislation is to align the reclaimed water laws with the water rights appropriation process. The proposed legislation will remove the downstream only limitation for water rights impairment analysis and requires any reclamation facility to look at water rights both upstream and downstream of any freshwater discharge point. It also converts the water reclamation guidelines into state rule, forcing a water rights impairment analysis to always take place for existing and new facilities trying to obtain a permit. The proposed legislation will also force Ecology to determine the scope of the evaluation, because an evaluation will always be required. In this new scenario, the party

most adversely affected will be the water reclamation facilities existing and new because of the additional parties they must mitigate with (upstream and downstream) and the requirement to conduct a water rights impairment analysis.

CHAPTER TWO: LITERATURE REVIEW

Impacts of Climate Change on Washington

The average annual temperature in the Pacific Northwest rose 1.5° F in the 20th century and is expected to rise another .5° F per decade in the first half of the 21st century (Mote, P. & Salathe, E., 2009). This is projected to result in increased amounts of rain in the winter, dryer summers, reduced snow stored in the Cascade Mountains, earlier snow melt, more frequent stream flooding in the winter months, and diminished stream flows in the summer and fall (Department of Ecology, 2009b). This is important because a large portion of Washington's water supply is stored in mountain snowpack and delivered to the population via rivers during the highest demand times in the summer (Department of Ecology, 2009b). It is estimated that economic impacts from this could include a 50% increase in costs to fight wildfires (up to \$75 million annually) and crop losses due to water shortages (Niemi, 2009). The Yakima Basin alone could face a loss of \$66 million in agricultural products during drought years out of a total annual yield of \$1 billion annually (Niemi, 2009). The Puget Sound by 2020 could also face a \$531 million fishing export loss in reduced salmon populations (Niemi, 2009).

Washington Water Quantity

Water from rain, snow and rivers percolates through soil into aquifers, creating a potable groundwater source. Groundwater serves as a source for drinking water through wells to ~ 61% of Washington residents, as well as a critical source of recharge to rivers, lakes and wetlands (Department of Ecology, 2009). Groundwater is not only the main source of Eastern Washington's drinking water, it also irrigates more than 385,000 acres of crops and supplies

more than 138 million gallons per day for Washington's industrial needs (Department of Ecology, 2009b).

The current state population is over 6.7 million and expected to rise to 8 to 9 million by 2030 (Department of Ecology, 2009). According to Ecology, much of the water in Washington has already been allocated or claimed, making access to new water rights that would bring additional users to new supplies increasingly difficult to obtain (Department of Ecology, 2008a). Ecology further states that obtaining a new water right may take anywhere from months to years due to the lack of access to additional water resources (Department of Ecology, 2008a).

APPENDIX A is a map that shows the age of all of the outstanding water rights applications and claims in Washington, most being anywhere from ten to twenty years old (Department of Ecology, 2010d).

Washington Water Quality

Not only is the volume of the water supply being adversely affected, the quality of the water in surface and groundwater is being affected as well. There are 321 wastewater treatment facilities in Washington. Of those, 103 are located in Western Washington and discharge their treated effluent into the Puget Sound basin (Trim, et. al, 2008). These wastewater treatment plants and 15 industrial plants discharge approximately 180 billion gallons per year of class B treated effluent (Trim, et. al., 2008). Even though the effluent is treated to Washington State standards, it is a major source of pollutants into Puget Sound. For example, the wastewater treatment plants (releasing 99% of effluent to streams and lakes and 68% of the effluent to Puget Sound) along with industrial factories (that release less than 1% of the effluent into freshwater and 32% of the effluent into Puget Sound), release 2.0 metric tons of arsenic, 3.6 of lead and 0.5

of cadmium into Puget Sound annually (Trim, et. al, 2008). In the Puget Sound Basin alone, wastewater treatment plants are responsible for 400 million gallons per day of effluent discharge into surface waters and septic systems are responsible for 175 million gallons per day, serving a total population of 4 million of the total 6.7 million residents of Washington State (Department of Health, 2007).

Nitrogen is also a pollutant that comes from wastewater treatment plants and septic systems that can be detrimental to aquatic life in surface waters. Excess nitrogen in the water causes excess growth of algae. As the algae die and decay, dissolved oxygen is stripped from the water, stressing and potentially killing aquatic organisms in the affected area (Department of Ecology, 2008b). This can create what's known as a hypoxic zone. A 2008 Department of Ecology study found that 24 locations in the Puget Sound were impaired due to lack of dissolved oxygen and that 27 had also been identified as areas of concern (Department of Ecology, 2008b).

In a separate study of dissolved oxygen overloading in the Puget Sound, it was found that the nitrogen releases that generate dissolved oxygen overloading comes from four main sources (Department of Ecology, 2008b). These four primary sources are discharge from wastewater treatment plants, rivers, storm water, and other natural sources such as atmospheric deposition and inputs from the northern parts of Puget Sound and the Pacific Ocean (Department of Ecology, 2008b). Of these four ways that nitrogen is entering the water bodies, the two largest contributors in South and Central Puget Sound are wastewater treatment plants at 79% and rivers at 21% (Department of Ecology, 2008b). For wastewater treatment plants and onsite septic systems, the state requires primary nitrogen reduction processes to reduce the negative impact. These processes only remove 10% to 40% of the nitrogen in the effluent (Department of Health, 2007). In a study conducted during September 2007, wastewater treatment plants were

identified as contributing 90% of the nitrogen in the Central and South Puget Sound watersheds. On an annual basis, it is estimated that wastewater treatment plants contributed 79% of the nitrogen in the South and Central Puget Sound (Department of Ecology, 2008b). Although some may look to attribute the effluent to the users, the effluent is correctly attributed to the wastewater treatment plants because of the different levels of treatment they can provide.

While wastewater treatment plants dominate the discharge of wastewater effluent into surface waters, clustered and individual onsite septic systems also constitute an important source of wastewater effluent into groundwater. It is estimated that there are over 700,000 septic systems in Washington state and that as many as one third may be failing, discharging wastewater effluent with high levels of pathogens and toxins into groundwater that eventually discharges into lakes, streams and the Puget Sound (Marcellis & Douglas, 2009). The reason for the failure could stem from overloading, age of infrastructure and inappropriate design for the location or soil type (Marcellis & Douglas, 2009).

Wastewater Treatment Regulation

Wastewater treatment is a highly regulated industry from the local government to the federal level. The requirements in place work to mitigate the amount of pollutants released back into the environment for reasons of public health and environmental concern. In 1972, when the federal Clean Water Act was passed, section 303(d) mandated that states identify sources of pollution in waters that fail to meet state water quality standards and create Water Quality Improvement Reports that address the pollution issue (Department of Ecology, n.d.). When a water body fails to meet water quality standards, Washington State's Department of Ecology is required to develop a clean-up plan (Department of Ecology, 2002). Ecology works with local

government entities to conduct water quality technical studies to identify the sources of pollution and generate a plan to reduce or eliminate those sources of pollution (Department of Ecology, 2002).

These Water Quality Improvement Reports include a total maximum daily load (TMDL) assessment that determines the limit of pollutants that can be discharged into a water body and still meet state standards (Department of Ecology, n.d. a). When a TMDL identifies a wastewater treatment plant as the source of pollution that needs to be addressed, it seeks to limit the amount of pollution that can be discharged from the wastewater treatment plant. Because one cannot stop people from flushing their toilets, this in turn creates the need for an alternative solution for the treatment of the discharge that accumulates daily from a wastewater treatment plants.

Water Reclamation

One way the Department of Health and the Department of Ecology are trying to address both water supply limitations and water quality impacts in Washington state is by encouraging water reclamation for wastewater treatment plants and onsite sewerage (meaning decentralized or satellite systems) when applicable. Reclaimed water can be characterized as domestic wastewater or industrial wastewater that goes through a tertiary treatment process before application for some other purpose rather than returning to the original water body as effluent. The treatment process generates one of four classes of treatment (A through D) (Department of Health, 2007). Reclaimed water is not considered wastewater because of the high level of treatment it has undergone (Department of Ecology, 2005). Unlike wastewater, reclaimed water is not discarded, but instead considered a valuable resource for a community.

Reclaimed water can be used for a number of different non-potable uses including irrigation, toilet flushing, industrial heating and cooling, wetlands generation, and dust control (Department of Ecology, 2005). The legislature has encouraged reclaimed water usage since the passage of the State's Reclaimed Water Act in 1992 and the standards from 1997 under Chapter 90.46 RCW (Department of Ecology, 2005). For example, Ecology is encouraging reclamation as an alternative water source when a community has no access to additional water rights. Reclaiming wastewater is not a state or local government requirement, but when a local government entity or company chooses reclamation it is regulated under a permitting system that addresses public health protection through minimum treatment requirements, along with saleable water distribution and use (Department of Ecology, 2005).

A reclaimed water permit is issued and regulated jointly by the Department of Health and the Department of Ecology (Department of Ecology, 2009). The Washington 1997 standards for reclamation and reuse divide reclaimed water into four classes that are determined by the level of treatment and effluent quality limits. With regard to these effluent quality limits, total coliform bacteria counts per 100 milliliters based on a seven day median of daily sampling are used as the main indicator of treatment consistency and water quality (Department of Ecology, 1997). High levels of coliform bacteria indicate the likelihood that excessive pathogenic bacteria and viruses might be present in the water due to a breakdown in treatment or breach of the distribution system. The presence in effluent of fecal coliform, a subset of the larger group of total coliform bacteria that are directly associated with human intestinal tracts, can trigger the closure of adjacent beaches from swimming and shellfish beds from harvesting and eating (United States Environmental Protection Agency, n.d.).

According to the 1997, Department of Ecology Reclamation standards the variation among the four classes are as follows.

- Class A is derived from oxidized, coagulated, filtered, disinfected wastewater with no more than 2.2 coliforms per 100 milliliters of water in a seven day median and no more than 23 coliforms for 100 milliliters in any single sample.
- Class B is derived from the same as A, just without coagulation and filtration.
- Class C is derived from oxidized and disinfected wastewater with no more than 23 coliforms per 100 milliliters of water in a seven day median and no more than 240 coliforms for 100 milliliters in any single sample.
- Class D is derived from oxidized, disinfected wastewater with no more than 240 coliforms per 100 milliliters of water in a seven day median of samples.

Class A is the only class that qualifies for food crop irrigation and water uses that allows human contact without drinking, such as a decorative water fountains (Department of Ecology, 1997).

Under the current regulations, the owner of the reclaimed water facility receives an exclusive right to the water and is able to waive water rights permitting, so long as it does not impair the water rights (reduce the quantity or quality of water) of downstream water rights holders without compensation or mitigation (Department of Ecology, 2005). Per the statute, this is determined through water rights impairment analysis when effluent discharge is reduced or eliminated (Department of Ecology, 2005). As previously mentioned, water rights impairment analysis determines whether a water rights holder is negatively impacted in water quality or quantity by a water reclamation facility's projected withdrawal from the same non-marine body

of water. Under the current state permitting system it is required that the transfer of the reclaimed water from the reclamation facility for usage must be transferred under a legal contract assuring proper and safe use (Department of Ecology, 2005).

The Washington State Reclaimed Water Act came to fruition in 1992 through a proposal submitted by King County and resulted in the eventual Water Reclamation and Reuse Standards in 1997 (Department of Ecology, 2005). To date there are 24 wastewater treatment facilities in Washington State that reclaim water, generating over 31.5 million gallons per day with 7 more under construction and 11 in the planning phase (Department of Ecology, 2009). However, King County recently reported that of the average 200 million gallons of wastewater they treat per day, only 1% of that water receives additional treatment and is considered reclaimed (King County: Waste Water Treatment Division, 2010).

Via a purple piping conveyance system (the nationally recognized color for reclaimed water), the end product, reclaimed water, is sent to customers for various non-potable uses. When the wastewater treatment plant effluent does not return to the original body of water this could lead to negative impacts in the existing water body due to a concentration of the contaminants already in the water body, however, this process normally results in a cleaner water body because the wastewater treatment plant effluent is no longer returned to the original water body. It is for this reason that reclamation is often seen by Ecology as a means to deal with wastewater treatment plant effluent overloading a water body with pollutants.

Trends in Reclamation

There are a number of factors pushing Washington State towards a higher adoption rate of water reclamation projects. The state faces a population increase of 20-30% by 2030, which

will increase the volumes of wastewater requiring treatment and of effluent discharged into the environment (Department of Ecology, 2009). In addition, more wastewater treatment plants will have to come into compliance with TMDLs established by Ecology. The need to find an alternative for effluent discharge when pollution levels are unsustainable, is a primary driver for the development of reclamation projects.

The other large driver pushing local governments towards a higher adoption rate of water reclamation projects is a need for an additional water source. The majority of Washington's water rights are already allocated (Department of Ecology, 2009). There are thousands of pending applications for new water rights or applications to existing water rights and most are ten to twenty years old (Department of Ecology, 2010d). Reclaimed water offers a community a non-potable water source that can be used for purposes such as flushing toilets or irrigation.

Regulatory Challenges

There are plans for a new rule to go before the Washington State House and Senate on water reclamation (WAC 173-219) once the one year moratorium on non-essential rule-making from Governor Gregoire passes. As directed by the House of Representatives, the reclamation rule is meant to be enabling for water reclamation facilities. It requires that the Department of Health and the Department of Ecology promote the development and use of reclaimed water in Washington State (Department of Ecology, 2010). The passage of this new rule would also establish administrative procedures and technical requirements, making reclamation recognized through procedure and regulation within the regulatory structure (Department of Ecology, 2010).

Within the proposed legislation are changes to the water rights impairment analysis process. This is a requirement to conduct an analysis on whether the reclaimed water being withdrawn negatively impairs a senior or junior water rights holder's access to clean water (Department of Ecology, 2005). The

current water rights impairment analysis starts with Ecology developing a list of potentially affected water rights holders that could be negatively impaired by the planned reclamation facility. Next either the applicant or the Department of Ecology conducts the water rights impairment analysis. The results go out for public comment and finally the Department of Ecology makes a determination about whether the project can proceed (Department of Ecology, 2010). If there is impairment then the applicant may modify the project to eliminate or compensate for the water rights impairment.

As a consequence of stakeholder review and discussion, the new requirement for the impairment analysis in statute was also extended to water rights holders' upstream (Department of Ecology, 2009). The old guidelines also transitioned over to the new requirement, forcing an impairment analysis for any reclamation facility discharging into a non-marine water body. According to Craig Riley of the Department of Health "The problem is that this requirement can add years to the development project, can be very costly and, under current policies in the opinion of one attorney, would prevent all projects except those that are currently discharging to the Puget Sound or Pacific Ocean" (C. Riley, Personal Communication, January 31, 2011). Language from the proposed legislation on water rights impairment analysis can be found in Appendix C.

Both the drinking water standard (WAC 246-290) provided by the Department of Health and the groundwater standard (WAC 173-200) provided by the Department of Ecology will apply to the proposed rule to reclaimed water in terms of the water quality standards it must meet. The Washington State groundwater standard requires a higher level of water quality than the drinking water standard (Department of Ecology, 2010). The difference is that groundwater has an anti-degradation clause to minimize the risk of contaminants leeching into drinking water sources and requires a demonstration that all known, available and reasonable methods of prevention, control and treatment (AKART) have been applied to mitigate contamination (Department of Ecology, 2010). Because there are a large number of pollutants used to evaluate ground water quality and not all are used for each evaluation, concerns have been raised that the evaluation standards are ambiguous and dependent on the regulator evaluating the

project. Jim McCauley, of the Department of Ecology explained the potential for misunderstanding of the application of the rule, specifically that the ground water standard is not applicable when a utility is discharging into a marine body of water. In such cases only the less stringent drinking water standard applies (J. McCauley, Personal Communication, November 17, 2010). This means that for most water reclamation plants, only the drinking water standard applies. However, water reclamation plants that cannot distribute or sell the water and are discharging into more sensitive bodies of water like rivers and streams will be required to comply with the highest standards to protect the water bodies against further degradation.

CHAPTER THREE: METHODOLOGY

Analytical Review

The research presented here anticipates and compares transaction costs under existing and anticipated rulers as well as their likely impact on efficient water usage and reclamation. Additionally, the efficiency of the law is analyzed by comparing assumed transaction costs under different legal regimes found in key states. Additionally, I have compared the new proposed legislation to other states water rights, reclaimed water rights, transaction processes, transaction costs and determined who their laws favor, reclamation facilities or water rights holders. The specific states that were chosen for comparison were based on the following criteria:

- 1) Located in the western part of the United States;
- 2) Had defined laws and processes for water rights impairment analysis from reclamation; and
- 3) Had a regulatory process for water rights appropriation and water reclamation.

The final comparison list of states was Utah, California, Colorado, Nevada, Oregon and Washington.

In this paper, I attempt to answer:

- 1) What is the effective impact of property rights as it relates to water reclamation?
- 2) How does this improve or reduce efficiency?
- 3) What are the transaction costs of bargaining for an agreement in this instance of water rights impairment analysis?

CHAPTER FOUR: RESULTS AND DISCUSSION

Economic Theory and the Current Guidelines

In his famous paper, *The Problem of Social Cost*, Ronald Coase argues that if trade in an externality is possible and there are no transaction costs, bargaining will be efficient regardless of the initial allocation of property rights (Tietenberg, 1984). As previously mentioned, transaction costs are the cost of carrying out a transaction by means of an exchange on the open market (Wang, 2003). This means that if there were no transaction costs, people would bargain until the most efficient allocation of resources was reached regardless of how the allocation was initially distributed. In practice, obstacles to bargaining or poorly defined property rights can prevent Coasian bargaining (Tietenberg, 1984). This means that in reality when bargaining is made costly, then the outcome of the bargaining may not be the most efficient.

In water reclamation there is an obstacle to effective bargaining and that obstacle is poorly defined property rights. Efficient property rights have the following four characteristics: universality where all resources are privately owned and entitlements are specified; exclusivity that all costs and benefits go to the owner; transferability where all property rights are transferable from one owner to another and; enforceability so that the property rights cannot be taken or encroached upon by others (Cooter & Ullen, 2000). The reclamation facilities receive the wastewater treatment plant effluent to process and once they reclaim it, per the state reclamation guidelines, they are supposed to have first access to the water so long as they are not negatively impairing another water rights holder (Department of Ecology, 1997). However, the Washington facilities are trying to reclaim water (wastewater treatment plant effluent) that in many cases has already been allocated in a water right downstream of the facility. In order to

determine who the rightful owner of the incoming effluent from the wastewater treatment plant is, water rights impairment analysis must be conducted. In this case, water rights are not clear and require the determination of those rights for every individual case. Reclamation facilities have poorly defined property rights for reclaimed water because not all the resources are privately owned and the entitlements to those resources are not clearly defined (Cooter & Ullen, 2000).

According to Coase, the assignment of property rights does not matter when transaction costs are zero, potentially offering a way to get around the existing challenge of poorly defined property rights in water reclamation as they currently exist today (Tietenberg, 1984). Unfortunately in bargaining there are often obstacles such as transaction costs (Tietenberg, 1984). The water rights impairment analysis process may be considered a way to monitor and measure potentially tradable objects, over which the two parties may bargain.

In Washington State, there are 24 reclamation facilities online (Department of Ecology, 2009) and no state managed or required mitigation has been necessary to get any of the facilities online or maintain their existence. Anecdotally it was reported by Craig Riley of the Department of Health that five new facilities *have* mitigated their impact upon water rights holders, but have done so outside the official permit process, making data about the current impact of this process difficult to collect. Through this research process, I contacted all five of the facilities and no one could quantify the amount the mitigation costs, though the timeframes to complete the water rights impairment analysis when mitigation was needed were indicated to be roughly two years. This essentially makes the financial transaction costs in the mitigation process from water rights impairment analysis unknown. Because these costs are unknown under the current guidelines,

making the impairment analysis a state rule requirement creates an unknown financial impact that is very concerning to reclamation facilities.

Through Coasian theory, however, the three general transaction costs of bargaining can be applied to this problem to better understand what is going on. These costs are the cost of communication, strategic costs and the costs of monitoring and policing (Cooter & Ullen, 2000). The first general cost is the cost of communication. As the number of stakeholders goes up, the cost to communicate increases (Cooter & Ullen, 2000). Under the current guidelines, there are a large number of stakeholders, including the water rights holders, the reclamation facilities, the municipalities, the Department of Ecology and the Department of Health. The next cost is the strategic cost when one is trying to anticipate what the other party is willing to agree to according to Coasian theory (Cooter & Ullen, 2000). If one gets this wrong, then no transaction will take place (Cooter & Ullen, 2000). For reclamation facilities, a strategic cost includes negotiating mitigation with Ecology and water rights holders in order to get a permit and bring a facility online or keep it in existence. If the mitigation in the water rights impairment analysis is unsuccessful and no agreement is reached then the facility will not be able to come online. The third cost is the costs of monitoring and policing, which are fairly clear in this instance once the permit is in place. This cost is borne in fees to Ecology and/or to consultants to monitor the reclamation facilities and ensure compliance with their permits for withdrawal and water quality.

Economic Theory and the Proposed Legislation

Using economic theory to look at the current guidelines and the proposed legislation, one can begin to understand some of the impacts of the proposed changes. In the case of property rights, the proposed legislation will elevate water rights impairment analysis from guidelines to

state rule. The current water rights impairment processes require a self-assessment for water rights impairment analysis (Department of Ecology, n.d. b). The proposed legislation will also require impairment analysis to consider both downstream *and* upstream water rights impairment. This will increase the number of stakeholders vying for water rights, further diluting the universality of the property right. Because not all the property is privately owned and entitlements are not specified to begin with, adding additional stakeholders only further complicates the problem. This in turn is likely to make bargaining more difficult. Water reclamation facilities will have to expand the number of water rights holders evaluated for impairment and will need to mitigate with all those deemed impacted in order to get their facility online.

The transaction costs of bargaining in the water rights impairment analysis are likely to be impacted as well under the proposed legislation. It was recognized by a number of stakeholders, including representatives of Ecology and the Department of Health, that the new transaction process may make permitting some new and existing facilities difficult or impossible (Department of Ecology, 2009c). The Department of Ecology has noted that this increased level of difficulty in impairment analysis is to deter upstream water rights holders from taking legal action against reclamation facilities (Department of Ecology, 2009c). To date there has been no documented legal action like this occurring and no documented cases of mitigation for water rights holders up or downstream having ever taken place within the process laid out by the guidelines. The lack of legal action to date suggests that this is not currently a large issue. But with the passage of the new rule making water rights impairment analysis law and increased transaction costs, instead of enabling the establishment of reclamation facilities, this is likely to deter reclamation facilities from coming online. The ultimate objective of the state rule is to

bring more water reclamation facilities online in a manner that protects the environment and provides enhanced access to water resources, both potable and non-potable.

The generally understood transaction costs of bargaining in Coasian Theory help us to further clarify the potential impacts of the proposed legislation. First under the costs of communication, it is understood that as the number of stakeholders increases, the cost to communicate with all parties increases (Cooter & Ullen, 2000). The proposed legislation will add additional stakeholders to include both upstream and downstream water rights holders making bargaining, or in this case mitigation more difficult for reclamation facilities. The strategic costs are the costs to anticipate what the other party is willing to agree to; if this is incorrectly determined then no bargaining will take place (Cooter & Ullen, 2000). As previously mentioned, in this case the strategic costs are getting water rights holders to agree to mitigation when they are found to be impaired. In the proposed legislation, mitigation with the water rights holders will be required in order for a reclamation facility to go online if impairment is found. While this is currently the case, the proposed legislation requires impairment analysis, increasing the frequency that impairment analysis process will be conducted and ultimately the amount of mitigation that may be found. The cost implications to this are unknown right now because of the infrequency of mitigation taking place within or outside the water rights impairment analysis process. In this instance, mitigation is side payments to the water rights holders or mutually agreed upon water withdrawal volumes during various times of year. The monitoring costs to make sure all parties comply with their permitted water allocations will increase as the number of stakeholders increases, making the permits more complex and increasing the fees that must be paid to Ecology to monitor compliance with existing permits.

Transaction Costs: Absent vs. Present

It has been established that there are transaction costs in water reclamation, although the real-world examples reveal little about actual costs in applied scenarios because of a lack of documentation on the time and financial impacts. To bring some clarity to this issue, we can step through a theoretical example of how transaction costs could affect a water reclamation facility once the proposed legislation is in place, with one scenario where transaction costs are present and another where they are absent.

First in this example scenario, if there were no transaction costs once the proposed legislation has passed, the bargaining might work like the following: A reclamation facility has the ability to make \$100,000 annually in profit before mitigation payments. Then impairment analysis takes place and results in a total of \$75,000 in annual mitigation payments that must be made to various junior and senior water rights holders upstream and downstream of the reclamation facility. The reclamation facility keeps the remaining profit of \$25,000 to reinvest and make additional bond repayments.

When one factors in the transaction costs in this example scenario, the outcome can change quite drastically. The reclamation facility still has the ability to produce \$100,000 in profit before mitigation payments. After impairment analysis, the facility is still found to be responsible for a total of \$75,000 in mitigation payments that must be made to the various junior and senior water rights holders both upstream and downstream of the reclamation facility. Before the remaining profit is taken, the transaction costs must be factored in. These transaction costs have the following implications; increased number of stakeholders increases the costs of communication; monitoring costs remain relatively the same through fees to Ecology; and the

strategic costs would increase because of the additional stakeholders requiring additional time to find a mutual agreement.

All of these transaction costs combined could easily eliminate any profit and create a strong disincentive to bring a new reclamation facility online in Washington State. This example shows that with the passage of the proposed water reclamation legislation there is a greater likelihood that continuing to pay the compliance costs for discharging the wastewater treatment plant effluent may be a less costly course of action than bringing a new reclamation facility online. The pressures to reclaim water such as rising population and new TMDL restrictions are not likely to motivate potential reclamation facilities to look past the costs of bringing a facility online. This current scenario of transaction costs could deter future reclamation facilities from coming online.

Water Rights Impairment Analysis in Other States

Water rights impairment analysis should have a simplified process of transferring ownership rights and clearly defined rights for both the effluent and the reclaimed water. Water rights impairment analysis laws and procedures in other states can provide some examples for comparison. These states can be looked at in terms of a spectrum where one side favors water rights appropriation and the other side of the spectrum favors the rights to reclaim water (Schempp & Austin, 2007). In the grid that can be found in Appendix B, I have created a table of states that looks at the following:

1. how the water rights appropriation in the state is determined;
2. how the water reclamation rights in the state are determined;

3. what the transaction process is for a reclamation facility to get the right to reclaim water;
4. who is favored in the state laws as it applies to water reclamation;
5. what are the transaction costs in time; and
6. what are the transaction costs from a financial standpoint.

The grid shows that under the proposed legislation, Washington assigns water rights by date and availability of resources. It also shows that Washington water reclamation facilities have the right to reuse water so long as there is no impairment to both upstream and downstream water reclamation facilities. How the Washington State transaction process works is that each reclamation facility goes through water rights impairment analysis. If they are found to be negatively impairing a junior or senior water rights holder then they must take steps to mitigate the impairment before they are eligible for the permit. In Washington water rights impairment analysis, the water rights holders are clearly favored over the water reclamation facilities. There is relatively little known about the transaction costs except that it has been anecdotally said that the process can take anywhere from two to four years to complete. The only thing that is known about the transaction costs in financial terms is that because the number of stakeholders will increase that the transaction costs are likely to go up as well. This creates an even greater financial battle for reclamation as across the country it is sold on the market at about 70% of potable and requires the additional cost of a separate conveyance system (K. Fowler, Personal Communication, November 20, 2010).

The state model that favors water rights appropriation the most is Utah. Their water rights appropriation system works in a similar fashion to Washington. They are issued based on date and availability of resources (Schempp & Austin, 2007). What is different in Utah is that the

water reclamation facilities have no rights to the effluent or the water (Schempp & Austin, 2007). In Utah a water reclamation facility must contract with all of the water rights holders and the wastewater treatment plant to use the water (Schempp & Austin, 2007). In this model the water rights holders are clearly favored. The transaction cost of time and money is high and the majority of the burden falls on the reclamation facility. The reclamation facility must mitigate and communicate with each water rights holder until it is either able to get the amount of water needed for the facility to begin reclaiming water or decides the cost is too high and does not reclaim water.

The state model that most favors the right to reuse water is Arizona. The water rights in Arizona do not recognize effluent as water in their water rights appropriation system (Schempp & Austin, 2007). The wastewater treatment plants and water reclamation facilities have a first right to reclaim the effluent (Schempp & Austin, 2007). This transaction process is handled through their water courts system (Schempp & Austin, 2007). In this model, the laws clearly favor the reclamation facilities over the water rights holders. The transaction costs of time are low for the water reclamation facilities because the rights are clearly established. The transaction costs financially are higher compared to the other states because there is both the permitting system and the water courts system that the facility may have to go through if problems arise. Although both states allow and have water reclamation facilities, in Arizona both the water law and the courts decisions support reclamation, while in Utah the primacy of private property rights makes it difficult for a reclamation facility to get the water they need and come online.

The state most like Washington in water rights reclamation is California. The water rights are assigned by appropriation date and availability of resources and effluent is included in the water right (Schempp & Austin, 2007). A wastewater treatment plant or reclamation facility has

a direct right to use the effluent it produces so long as it does not impair any water rights holder downstream of the facility. However, California does not give those who reclaim water a priority date to establish their right to the wastewater effluent (Schrempp & Austin, 2007). This leaves reclamation facilities exposed to future losses of their effluent access and ability to reclaim water. In this state model the transaction costs in time and money are high with a low guarantee of the future right to access the effluent, making this an unfavorable model for Washington.

A good balance between water rights appropriation and the absolute right to reuse water is the state of Colorado. They use a water court system that determines water appropriation for existing and new reclamation facilities in place of a permitting process, but does not negate the monitoring and reporting requirements by the state (Schempp & Austin, 2007). Colorado has not had legislative influence on the water appropriation rules, but instead has strong precedent from the courts establishing who can claim rights to various types of water (Schempp & Austin, 2007). Colorado water cases have set the precedent that the appropriation of wastewater effluent is prohibited by downstream users even if they were utilizing the effluent in the past, giving reclamation facilities the clear property right to the wastewater effluent (Schempp & Austin, 2007). Also according to the courts, the reclamation facilities have the first right to the effluent, much like Washington State (Schempp & Austin, 2007). This model provides a clear establishment of property rights for both the water rights holders and the reclamation facilities. In this model there are controlled costs in communication through the water court system. The monitoring costs to check water withdrawals are borne through the Colorado Division of Water Resources and any appeal goes straight to the Colorado Supreme Court (Schempp & Austin, 200&). The strategic costs for the Colorado system remain the same in trying to determine what

the other party will do. There will be winners and losers in every case, especially those who do not feel fairly compensated, but the Colorado model provides a clear administrative process for the transfer of rights with clear laws determining who has rights to the effluent.

Washington reclamation facilities need clear rights to the effluent from wastewater treatment facilities downstream to be able to convert it to reclaimed water with little to no hassle. Colorado and Arizona do have an extra layer of bureaucracy for reclamation facilities to contend with, while Washington only has the water rights impairment analysis. Still, ours is the more complicated system. This is because the property rights for both reclamation facilities and water rights holders are not clearly assigned in Washington and must be determined with every attempt for a reclamation facility to come online.

CHAPTER FIVE: CONCLUSIONS

Policy Suggestions for Reclamation in Washington

While this issue is not at the forefront of the minds of legislators in Washington, water quality and availability are likely to become increasingly problematic given the projected impacts from global climate change (such as reduced summer stream flows) and increase in population (Department of Ecology, 2009). Awareness of the impacts of nitrogen overload in water bodies may also push regulating authorities to lower their pollutant discharge limits. Reclamation is not the only answer to solving water quality and quantity challenges in Washington State, but it is a viable option that can reduce the volume of water we withdraw from our water resources and the mass of pollutants we put into them. As such, it can help preserve water availability for future generations.

The new state law requires water impairment rights both upstream and downstream of the water reclamation facility. This is unlikely to result in the growth and expansion of reclaimed water facilities in Washington State. This legislation was proposed with the intent of supporting reclamation facilities', however as the legislation is currently shaped for water rights impairment analysis it supports water rights holders over water reclamation facilities. Currently, among water reclamation facilities in Washington State there is a high level of concern about what kind of impact the water rights impairment analysis will have on reclamation facilities because of the unknown financial implications that it could have.

In order to best support water reclamation in Washington State, there needs to be a way to assign property rights clearly and have an efficient way to be able to transfer the rights to others. In this case, my policy recommendation is for the elimination of the ability of water rights

holders in Washington State to be able to claim effluent as part of their water right. Getting clear property rights established is a huge step in the right direction towards creating an enabling environment for water reclamation facilities to thrive in Washington State. The current system through water rights impairment analysis does not establish clear property rights and the newly proposed legislation does not get water reclamation towards that goal either.

If Washington State were to have clear property rights for the effluent from wastewater treatment plants, the outcome in various parts of the state would likely be different. In water scarce areas such as Spokane this would result in water rights holders to be the clear losers in a transaction process as reclamation facilities would gain the clear right to the effluent and ease their ability to reclaim water. However, the losers of the transaction in places like Spokane would still receive benefits. The discharge that would normally be released into their freshwater sources would be transformed from a waste into a commodity they could purchase, getting cleaner water for their money and reduced impact on their environmental systems. In places without as much scarcity, such as Seattle, there would be minimal impacts on water rights holders. In addition, in both scenarios water reclamation facilities across the region would be able to sell-back the non-potable water at approximately 70% of the market value of potable water, providing an additional source of water that could offset lack of access to additional water rights.

Additional Research

Additional research in water rights reclamation in Washington should be a multiple case study analysis of the five anecdotally reported cases of mitigation that have taken place in Washington, specifically in the City of Airway Heights, the City of Euphrata, the Town of

Twisp, the City of Medical Lake and the City of Carnation. While each case will generate unique findings, looking at all the mitigation cases in a multiple case study analysis may allow for the development of themes and patterns within this specific topic.

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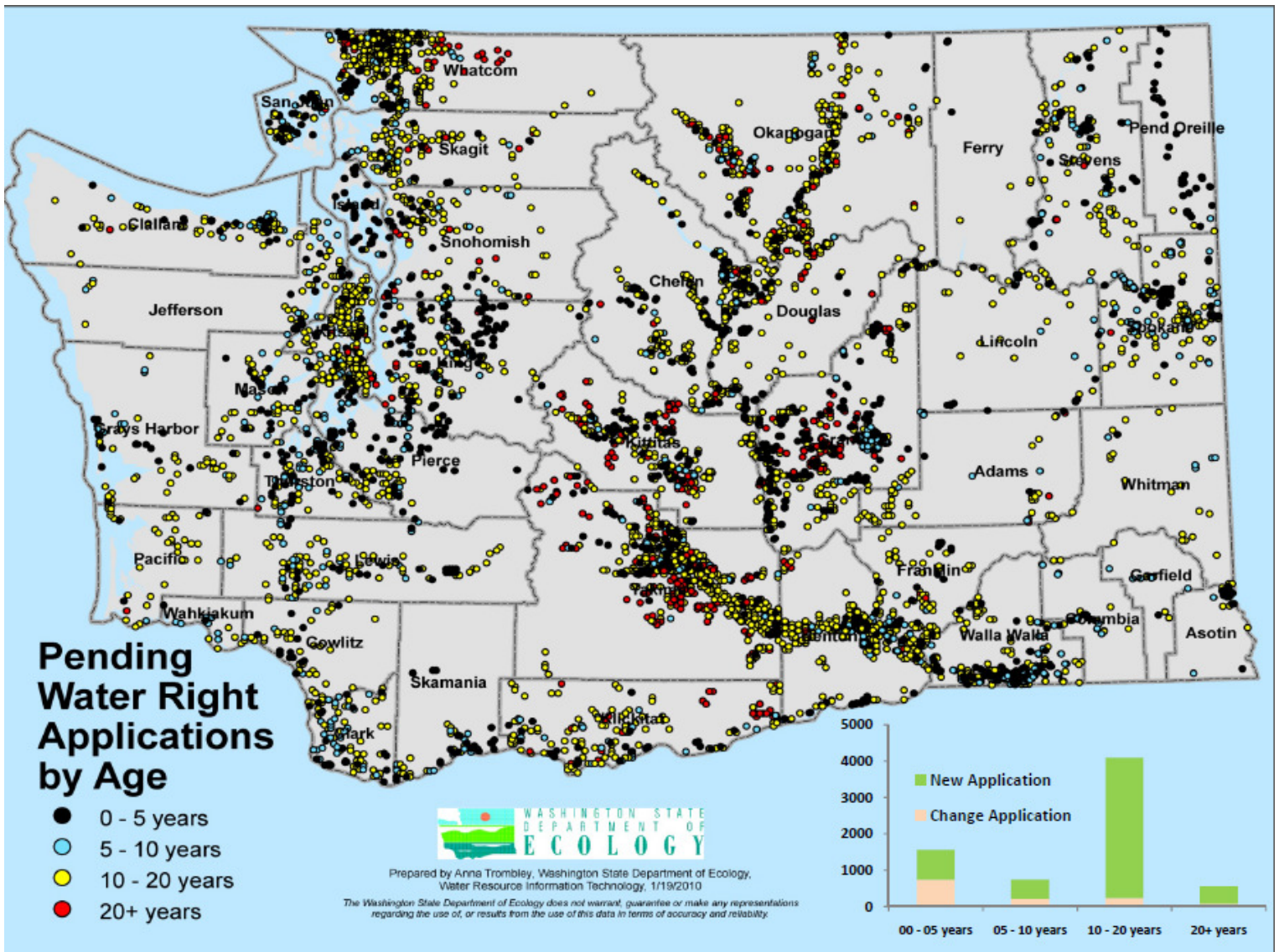
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APPENDIX A

Department of Ecology: Pending Water Right Applications by Age

January, 2010

Retrieved from: http://www.ecy.wa.gov/programs/wr/rights/Images/pdf/01252010_appbacklog_map.pdf



This map shows that most pending water rights applications are 10 to 20 years old in Washington State.

APPENDIX B

Water Rights Impairment: State to State Comparison

State	Water Right	Reclaimed Water Right	Transaction Process	Who is Favored	Transaction Costs: Time	Transaction Costs: Money
WA	Appropriation by date and availability of resources.	Facility has right after existing up & downstream water rights holders	Negotiation following Water Rights Impairment (no ceiling)	Water rights holders.	High and likely to increase (Currently approx. 2 yrs)	Increase in # of stakeholders is likely to increase costs.
UT	Appropriation by date.	No right.	WWTX must contract for the right to use reclaimed water.	Water rights holders.	High cost with the burden on the reclamation facility	Transaction costs are high because of the requirement to contract with each facility.
AZ	Rights do not recognize effluent.	WWTX plants entitled to effluent.	Water Courts	Reclamation Facilities	Low because of the clear rights established.	Permitting & court system (highest)
CO	Water rights holders cannot claim effluent	Facilities has rights to use effluent	Water Courts: by basin: no permitting	hybrid	Case by case transfer of rights (higher)	No permitting, but court system (high)
CA	Appropriation by date and availability of resources.	Facility has right after existing downstream water rights holders without priority date.	Mitigation petition process	Water rights holders	High with low guarantee of certainty	Medium to low

APPENDIX C

New Water Rights Impairment Analysis Legislation


NEW SECTION


WAC 173-219-100 Evaluation of potential impairment of existing water rights. (1) **Purpose.** This section describes the requirement to address the potential for water right impairment. Under RCW 90.46.130, reclaimed water facilities shall not impair any existing water right downstream from any freshwater discharge points of the reclaimed water facility unless compensation or mitigation for such impairment is agreed to by the affected water right holder.

(2) **Applicability.** This section applies to any reclaimed water facilities permitted under chapter 90.46 RCW where there are water rights downstream of any freshwater discharge point of those facilities.

(3) **Existing water rights.** Existing water rights include any rights in existence when the reclaimed water permit is issued.

[10]

OTS-3438.4

 Existing water rights include instream flows established by rule or otherwise.

(4) **Cost reimbursement agreements.** Ecology may enter into a cost-reimbursement agreement with the applicant for a reclaimed water permit under RCW 43.21A.690 at any stage of the impairment scoping and evaluation process.

(5) **Evaluation process.**

(a) Applicant responsibilities:

(i) Request a preevaluation meeting(s) with ecology, if the applicant desires, to obtain information about the impairment evaluation process or discuss possible project approaches.

(ii) Meet or otherwise work with affected water users, water right holders, water purveyors, tribes, Washington department of fish and wildlife (WDFW), and other affected parties, if they desire, during the initial development of the project.

(iii) Submit a written request to ecology to begin the impairment evaluation process. The request must include the following together with any other relevant data requested by ecology:

(A) Who will own, operate, and maintain the reclaimed water facilities.

(B) Existing and proposed uses of the reclaimed water. Uses not considered upon initial application may require a separate evaluation and impairment determination as described in subsection (8) of this section.

(C) An estimate of the annual or seasonal volumes of both the

reclaimed water generated and the projected consumptive use.

(D) A description of the areas where reclaimed water is or may be distributed and used.

(E) Whether the applicant intends to conduct the evaluation or requests ecology to conduct the evaluation.

(F) If the applicant completes the evaluation, the applicant may make a recommendation to ecology regarding the existence of any impairment to existing water rights.

(b) **Ecology responsibilities:**

(i) Notify affected tribes and the WDFW within fifteen working days of receipt of a written request to begin the impairment evaluation process.

(ii) Determine the appropriate scope of the impairment evaluation and necessary information submittals after discussion with the applicant. The scope must include existing ground water rights in hydraulic continuity with surface waters, and surface water rights, downstream from any freshwater discharge point of the reclaimed water facility.

(iii) Complete an impairment evaluation or determine the adequacy of an evaluation completed by the applicant of the potential for impairment of existing water rights.

(iv) Provide for notice to the public of the impairment evaluation completed by either ecology or the applicant. Adequate notice to the public may include electronic mail, posting on the lead agency's internet site, publication in a local newspaper, press releases, mailings, or other means of notification that

ecology determines appropriate.

(v) Consult with WDFW, and any affected tribe, before making a preliminary determination on the potential for impairment of existing water rights.

(vi) Make a preliminary determination on impairment within one hundred eighty days of receipt of the completed impairment evaluation. If additional time to review the preliminary determination is required, ecology must notify the applicant of the reason for the delay and an estimated decision time.

(vii) Notify the applicant, affected water right holders, affected tribes, WDFW, and other persons that submitted comment during the notice to the public of the preliminary determination.

(viii) If ecology has made a preliminary determination that existing water rights may be impaired, notify the applicant of the option to negotiate compensation or mitigation with the water rights holder(s) ecology has identified as potentially impaired.

(6) **Compensation or mitigation of potential impairment.**

(a) The applicant may:

(i) Choose to negotiate compensation or mitigation with the water rights holder(s) identified by ecology as potentially impaired.

(ii) Request that ecology participate in the negotiations. Ecology's participation, as a third party, in any negotiation is at the agency's discretion.

(iii) Abandon the project.

(b) If the applicant decides to negotiate with water right holders, and the negotiation is successful, the applicant must:

↳ (i) Submit a signed agreement and documentation to ecology that the affected water right holder(s) have agreed to compensation or mitigation. The applicant may submit that documentation at any stage of the reclaimed water permitting process, but no later than approval of the engineering report unless ecology grants an extension of the deadline under (b)(ii) of this subsection.

(ii) Upon request, ecology may extend the deadline for submittal of a signed agreement and documentation of mitigation or compensation. In no case will ecology extend the deadline beyond submittal of plans and specifications.

(iii) Where ecology accepts mitigation for an impaired instream flow right, ecology may condition the reclaimed water permit as appropriate to ensure that mitigation is in place for the life of the reclaimed water project.

(7) **Appeal.** Ecology's final determination of impairment is made as part of the final reclaimed water permit. Formal opportunity to appeal ecology's determination of impairment shall be in accordance with WAC 173-219-070 when the final reclaimed water permit decision is made. A reclaimed water permit may be issued prior to construction.

(8) **Reclaimed water permit modification and renewals.** A supplemental impairment evaluation and determination of impairment are required if the permittee elects to modify the project in such a way that the original evaluation does not match the proposed modification or operation. If the project is modified to include

new uses of reclaimed water, changes in consumptive quantities, or other changes that may affect existing rights, the permittee must submit a written request to ecology to determine if a supplemental impairment evaluation is required. The supplemental evaluation and determination apply only to the proposed changes.

NEW SECTION

WAC 173-219-110 Use of reclaimed water for water right mitigation. (1) Applicability.

(a) This section applies to the use of reclaimed water for mitigation of new surface or ground water rights and changes to existing surface or ground water rights.

(b) The generator may use or supply reclaimed water for mitigation for a new water right or for a change to an existing water right.

(2) Minimum requirements.

(a) The water right mitigation use must be described in an approved plan and engineering report.

(b) The water right mitigation use must have been included in an approved impairment evaluation and determination under WAC 173-219-100.

(c) If the use is approved by ecology, the use must be included in a reclaimed water permit under chapter 90.46 RCW.

(d) To use reclaimed water for mitigation of a new water right or a change to an existing water right, the water right applicant must prepare a mitigation plan and submit it in support of an application for a new water right or an application to change an existing water right.

(e) Ecology must approve the mitigation plan and permit the new water right or water right change under chapter 90.03 or 90.44 RCW. Ecology must condition the new water right or water right

or a change to an existing water right, the water right applicant must prepare a mitigation plan and submit it in support of an application for a new water right or an application to change an existing water right.

(e) Ecology must approve the mitigation plan and permit the new water right or water right change under chapter 90.03 or 90.44 RCW. Ecology must condition the new water right or water right change to ensure the availability of mitigation water for the life of the water right.

(f) The generator or water right holder may change the mitigation water to another type of use if:

- (i) A replacement source of water is provided;
- (ii) The reclaimed water permit is modified; and

(iii) A change to the mitigated water right is approved by ecology.