

Slide 1

Bliss Intro

Slide 2 (Port Townsend's Wastewater Treatment Plant)

This is our Wastewater Treatment Plant out in the North Beach neighborhood alongside our neighbor the Chinese Garden Lagoon. Many people think that the lagoon is part of our treatment system, but it is not, we are just neighbors and lucky for us we get to see the wildlife and all the great things that come from having such a neighbor.

Slide 3 (A little history)

Let's look at some of the history of sewer in Port Townsend. I asked John Merchant who worked for the city for 40 years about the history of sewer in Port Townsend and he was very helpful in letting me know how sewer treatment came to be for us.

Slide 4 (Our Forefather's Waste Treatment Option)

Settlers started arriving in Port Townsend in 1851 before that it was home to members of the S'Klallam tribe. The forefathers of Port Townsend didn't have many choices to handle their sewage. Until around 1910 when they started having a sewer system. Around 1910 Port Townsend started installing a collection system to make it possible to have a healthier way to deal with their sewage. From 1910-1966 the wastewater was discharged through some outfalls at the end of Monroe Street, Gaines Street, and Kuhn Street out at North Beach without any treatment. What got flushed got mixed with rainwater and washed out to sea.

#### Slide 5 (Nashua River 1967)

When I was a kid, I remember hearing the term “Acid Rain” and hearing stories of rivers, mainly back East, which were so polluted that animals died trying to use the water and even having a river catch fire. When I look at pictures of rivers that took so much domestic and industrial waste and understand now more clearly how the water cycle works. It is easy to see how the water that came from these polluted waterways could be a huge problem and unusable especially to cities that relied on these rivers for their water needs.

#### Slide 6 (Clean Water Act)

In 1972 the “Clean Water Act” was passed, and it has done wonders for the waters of the United States. It set a basis for what could and could not be discharged into waters. It gave the EPA authority to implement pollution control programs and set standards for wastewater. Made it illegal for anyone to discharge any pollutant from a point source into navigable waters, unless a permit was obtained. It funded construction of sewage treatment plants under the construction grants program. Started planning to address the critical problems posed from nonpoint pollution.

#### Slide 7 (Nashua River Today)

After the “Clean Water Act” came to be, there was a huge shift in pollution in rivers, lakes, and seas. Now in the United States we are doing so much better. We are not perfect and new regulations come out regularly that help to keep water clean. Worldwide there is still a long

way to go to clean up this kind of pollution but in the United States we have come a long way. I have seen some You Tube Videos of a group that are working on cleaning up the plastics in the oceans and I am grateful that Victoria Canada now has their secondary wastewater treatment plant online so they are no longer discharging like we were prior to 1993 into the Strait of Juan de Fuca.

Slide 8 (From your house to treatment)

Here is a quick drawing that simply shows how a collection system works. Sewage come out of houses and either runs by gravity or gets pumped to a treatment facility, where it gets cleaned and discharged back out to the environment where it can be used as it is intended. Having a plan to handle wastewater is one of the key things that have to be put in place before a community can become a city because as populations become denser than the need to manage waste becomes very important to help control diseases and keep people and animals safe.

Slide 9 (Water Cycle)

Here is a drawing of the water cycle that shows how we continue to reuse water over and over again, and why it is important to remove the pollutants at any point we can to make it better and safer for the environment so that every drop is a benefit to all who need the water. Billions of dollars get spent worldwide to try and find or implement ways of replicating this process to try and get more clean water where people can use it. Think desalinization. Great steps are

being taken to try and stop or reverse desertification in some areas that have been very dry for a lot of years. Deserts have been growing as sand blows or migrates over areas that once were fertile. Educating people about better grazing practices, planting trees and grasses, and creating areas to hold the water that those areas do get has been having a great effect in rebuilding soils to once again sustain life.

#### Slide 10 (How we do it)

In the late 1960's (1966 and 1967) the city installed pump stations at the Monroe Street and Gaines Street discharge locations. The Monroe station pumped to the Gaines station and the Gaines station pumped the wastewater up to just before the golf course where it went by gravity out to the Kuhn Street treatment facility. A new sewer line was added to Water Street (from Monroe to Harrison Street) at the same time the lift stations were being built. This was to help separate the wastewater from the stormwater in this area. The old line then became a stormwater system and discharged out the old discharge lines prior to the pump stations being added.

#### Slide 11 (Port Townsend's Original Wastewater Treatment Plant)

The Kuhn Street treatment facility was built at the same time the lift stations were being installed in the late 60's. The treatment facility was just two glorified septic tanks called Imhoff tanks. These tanks settled the heavier materials but did little for the fine solids that needed to have the secondary treatment. The solids that were collected in these tanks were taken out to the Jefferson County landfill and mixed with the garbage for many years. In the mid 1970's the

solids and the septage were then put into a large pit (which we called the black lagoon). The clarified wastewater from the Imhoff tanks was then highly chlorinated prior to then being discharged out the line that goes into the Strait of Juan de Fuca. The outfall had about 450 feet of pipe added to the existing for a total distance of approximately 913 feet off the shoreline and a diffuser was added to provide better dilution and mixing out into the Strait of Juan de Fuca.

#### Slide 12 (Where the City Collects Wastewater from)

This is a pic that is zoomed out the City's GIS map that shows everywhere in town that we have sewer connections and transmission lines. This map gets much more detailed as you zoom in on a neighborhood or your house. As you can see, we cover almost all of town but there are some areas that can be added in the future. Some of the uncovered area would have to have additional pump stations added because gravity would not bring it to north beach or an existing pump station. We are in the process right now of updating our City's Sewer Plan that looks at areas not covered or areas that upgrades may be needed in the next 20 years. We have just over 75 miles of sewer pipe that cover our city. I looked online what is 75 miles from Port Townsend and found out it is around Snoqualmie Pass or Olympia. Interesting to think of it like that we have enough sewer pipe in our small city to reach all the way to Snoqualmie Pass. Along with the pipes we have over 1400 maintenance holes. As you can imagine it takes a lot of work and maintenance to ensure that all these pipes keep flowing so when we flush or take a shower all that water gets where it needs to be, safe and cleaned and put back into the environment where it can be used again.

### Slide 13 (Sewer Lift Stations Throughout Port Townsend)

The city currently has 7 lift stations that are used to move sewage around the hills that Port Townsend is built on so we can keep everything coming to the treatment plant. Some of them are pretty small serving a small neighborhood, and some are quite big that pump approximately half of the sewage we generate. We still get too much rainwater in our collection system from old stormwater collections that are still tied into the sewer lines. In a big rainstorm we get a big increase of flow to the treatment plant. We do work on getting that fixed because we don't need rainwater pushing our system to or over capacity. However, it is expensive to bury new pipes in the ground running next to ones we already have. These are projects that get worked on little by little over the years. One thing we don't want is situations like we have heard of over the years with different treatment plants that have dealt with spills when big rain events happen.

### Slide 14 (Why we **DON'T!!!** Flush Baby Wipes)

This is a picture of what happens when we get too many baby/flushable wipes in a pump at a pump station. We were called out to an alarm at one of our pump stations, right during dinner time, and this was the cause. This ragging up problem was caused by baby wipes that got wound around the impeller on this pump until the motor stopped. We found out when we sent the pump to be repaired that the shaft inside the motor broke and the pump was ruined. Those pumps cost the city taxpayers around \$20,000 each to replace. Please don't flush baby wipes!!!

They don't break down like toilet paper is designed to do and throughout the Wastewater Industry they are huge problem that costs way too much money to have to deal with. They are labeled as flushable because they will flush but after that they are a problem

Slide 15 (City of Port Townsend's Wastewater Treatment Facility)

A bird's eye view of the treatment plant. We installed the secondary treatment between 1991 and 1993 and went into operation July 16, 1993

Slide 16 (City of Port Townsend's Wastewater Treatment Facility)

This shows the processes that happen in the different buildings. If you start in the middle at the Headworks building and take a counterclockwise loop, that is basically the path the water takes as it goes through our facility.

Slide 17 (Entering Our Treatment Plant looking at our Headworks Building)

Entering the gate at our Wastewater Treatment Facility looking at the headworks building.

Slide 18 (On top of the Headworks Building)

On top of the headworks building where the garbage that gets flushed and makes it through the pumps, gets removed by the mechanical bar screen. Also, where our grit removal happens. This is the best place to get a cool view of what happens to the water that comes to us and a great place to catch a beautiful sunrise.

### Slide 19 (Aeration Ditches)

The influent leaves the headworks area and flows to the aeration ditches. Each ditch is 570,000 gallons. (The Port Townsend pool in comparison is about 200,000 gallons.) Here is where the liquid gets treated. In these ditches live billions and billions of microbes that do the work of treating sewage. They are constantly eating and reproducing and basically the brown that you see in this water is those microbes. To comply to new regulations that are possibly coming our way in the future, we may have to make some changes to these ditches to remove more nutrients. Right now, we are in a few years cycle of testing to see what amount of nutrients we are removing and is by making changes can we remove more? We are glad to do our part if we can help make Puget Sound cleaner for everything and everyone that depend on it for their lives and their futures.

### Slide 20 (Clarifiers)

We have 2 clarifiers and they do exactly what their name says. The water with the microbes' overflow weirs in the aeration ditches and comes up in the middle of the clarifiers. As they sit in these tanks the solids "bugs" settle to the bottom and leave clear liquid at the top. That clear liquid gets chlorinated and sent on.

### Slide 21 (Chlorine Contact Basins)

These basins slow the water down and give the chlorine a chance to do it's job which is to come in contact with and kill whatever pathogens and diseases that may still be alive and harmful in the effluent.



At the end discharge end of these basins, we add another chemical (Sodium Bisulfite) that neutralizes the chlorine so when the water gets released to the environment and the Strait of Juan de Fuca, the water has had the solids removed, it has been disinfected, and had the disinfectant removed. We do all of this so we know we are doing the best that we can for our community and the environment we all enjoy using and living in. The plant works 24/7/365 cleaning the water that we all pollute. We have operators there 365 days a year to make sure that the entire process is working as we all need it to.

#### Slide 22 (Digesters)

These are the tanks that were built back in the late 60's that used to be the wastewater treatment plant. Today we use them as part of our solids handling. Everyday a portion of the solids (bugs) that get produced in the Aeration Ditches need to be removed, usually the older ones, to make room for new ones. If this balance gets off, then the ditches don't work, and treatment gets more difficult, and we have to make process changes to bring the balance back.

In the first basin we make room every day for the number of bugs that need to be removed from the system. Early in the morning the blowers that keep these basins aerobic turn off so the solids can settle. When we get to work in the morning one of the first tasks, we do is try to decant clear liquid from the top of this tank, which goes back to the influent basin. If there is no clear water, then we must open a valve and send whatever amount we need to make room for wasting for that day. This is how the second tank gets filled. When we have enough in the second tank, we start the dewatering equipment. Both tanks have diffusers in the bottom that

we pump air into to keep the tanks mixed and aerobic. If these tanks didn't get this air, they would soon get anerobic and they would start to really stink.

#### Slide 23 (Belt Press)

This is our dewatering machine. It is a belt filter press. The liquid with the solids from the second digester gets pumped to this piece of equipment. Along the way we add a polymer that helps the solids coagulate so they can separate from the water. This machine removes the liquid, by gravity and by squeezing the solids, and returns it to the influent basin and sends the solids to the dump truck so they can be hauled to our team members at the Compost Facility. We are going to learn more about that next month in this "How you City Works" series.

#### Slide 24 (Main Building)

In this slide you can see our main building here is where our Lab, MCC room, blower room, dewatering room, offices, and lunchroom are located. If you ever schedule a tour of our Wastewater Treatment Plant this is the building you would check into and meet our operators.

#### Slide 25 (The Lab)

This is our lab. I was giving a tour here one day to a new employee of the city and when she saw this she said, "wow I haven't seen anything like this since high school chemistry". Here is where we do daily tests that help us determine how the plant is working. The results of these tests allow us to know the proper population of bugs in the Aeration Ditches and how the settling is working in the Clarifiers. We test for BOD, TSS, pH, Ammonia, Nitrate and daily flow. We also have a small weather station that we collect data from. These and other tests tell us how much

we need to waste every day, how much air the ditches need to keep them aerobic and the bugs alive and allow us to make changes that we see need to be made. One thing about a Wastewater treatment Plant is when we make a process change, we may not see the results of that change for up to two weeks, so we need to analyze data to hopefully see changes coming or changes we need to make before they become an issue.

This is where having experienced operators is critical. Having people who know how to react to the data they are given, but also have the experience to know as the weather changes or if there is a big event in town that our treatment plant will be affected, and what do we need to do seasonally or possibly before or after a big event. The city is very fortunate to have the great people we do that work so hard and have for so many years to keep our treatment plant operating at the exceptional level that it does. We have 2 operators with over 25 year of experience each, and one with over 10 years working in the wastewater treatment industry. I for one am thankful everyday for them and what they do. If you ever get a chance to thank them, please do because they deserve all the praise, we can give them. Also, right along with them is the crew that works on and maintains the city's collection system. No one wants a plugged sewer, but we can be so thankful that people are out there to solve issues that come up as our system continues to age. So, when you see them out working take the opportunity to thank them also.

Slide 26 (Bench Tests in the Lab)

These are some of the tests we do to simulate some of the things going on at different locations throughout the Treatment Plant. The big jar is simulating what is happening inside of the

clarifiers to let us know how fast the solids are settling to the bottom so they can be pumped out and how fast we can run the pumps. In the small beakers is the liquid that gets tested for TSS and pH. We also take samples out of these and look at them under a microscope and depending on what we see, and which bugs are present and how many there are let us know if we need to make any process changes.

#### Slide 27 (Influent/Effluent)

Here is a picture that shows what we do. On the left is a beaker with untreated influent and what the water looks like when it gets to our Treatment Plant. On the right is a picture of what the water looks like as effluent right before it leaves our plant and heads out of the outfall to the Strait. Our Outfall is a gravity line that is 913 feet off North Beach where we discharge approximately 800,000 gallons of water every day. You may have heard in the past few years that our outfall is needing some attention in the near future. We are working on this. It takes a lot of time to get all the parties involved in things that happen on the sea floor to come to an agreement on what the absolute best solution is. When that happens, we will be able to move forward but that is a big project, and we have to make sure it is done right when we do it.

Thankfully we have some very good people working on this to make it happen.

#### Slide 28 (Wall of Awards)

This is the wall that we are very proud to show people, and usually the last thing we show on a tour. The Department of Ecology started, about 25 years ago, giving awards to treatment plants throughout Washington State that have 100% compliance with all the requirements in

their permits. We have earned that award for the last 24 years. There is only one plant in the State that has gotten it more, so we are very well known at DOE for the excellent work that the operators in Port Townsend do. We have a great relationship with DOE, and they take my calls when I need them or get right back to me with an answer or the help that I need. I am thankful for the relationship Port Townsend has had with DOE way before I got involved and I hope we can continue to have well after I am gone.

Slide 29 (Closing)

It was back in 1992 when the city started building our Wastewater Treatment Plant and since it got started treating sewage it has done an incredible job. The only problem now is it is starting to show its age close to 30 years and will soon need some repairs and upgrades that are expensive, but we must keep our eye on when we can do them, so we don't get into situations where we are in emergency mode having to do repairs because of serious failures somewhere. This is defiantly worst-case scenario and a place we do not want to be. So with the help of our citizens and City Council we will continue to do the best we can do for the citizens of Port Townsend.

Thank you all for being here with me and taking an interest in how your City Works.

Are there any questions?