



Disaster Planning and Response Handbook for Onsite Septic Systems



This document was prepared by
The Oregon Department of Environmental Quality
Onsite Septic Program
700 NE Multnomah St., Portland, OR 97232
Contact: DEQ Onsite Program 541-686-7838
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www.oregon.gov/deq

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Contact: 800-452-4011 | TTY: 711 | deqinfo@deq.state.or.us

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Introduction



The intent of this handbook is to help county onsite agents in Oregon prepare for natural disasters and navigate the recovery process. County agents regulate septic systems around the state – receiving and processing applications; issuing permits; enforcing rules; and performing inspections. In the event of a disaster, agents will be called on to coordinate with state and local agencies, assess damage, and assist property owners with repairs and replacement systems.

Wildfires in 2020 burned more than 1 million acres and destroyed over 3,000 homes and other structures across Oregon. Many of these properties used an onsite septic system as the primary means for sewage disposal. In Marion County alone there were over 700 septic systems impacted by the Beachie Creek and Lionshead fires. This handbook highlights the potential impacts of various natural disasters and actions that counties can take now and after a disaster. It also describes the roles of county and state agencies after a natural disaster and the importance of coordinating recovery efforts.

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- Deb Mailander, DEQ
- Marty Easter, former DEQ
- Randy Trox, DEQ
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- Erin O’Connell, Columbia County
- Todd Cleveland, Deschutes County



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What is a natural disaster?

A natural disaster is the negative impact following a natural hazard if it significantly harms a community, according to the Federal Emergency Management Agency. Natural disasters include catastrophic events with atmospheric, geological and hydrological origins – such as droughts, earthquakes, floods, hurricanes and landslides – that can cause fatalities, property damage and social environmental disruption¹. This handbook focuses on the most common types of disasters with potential significant impacts to septic systems that are likely to occur in Oregon: wildfires, floods and earthquakes. Climate change takes place over a long period of time and although it is not categorized as a natural disaster, it can have a direct effect on the frequency and intensity of natural disasters.

Awareness, education, preparedness and warning systems can reduce the disruptive impacts of a natural disaster on communities, according to the National Academies of Sciences, Engineering and Medicine. Mitigation measures such as the adoption of zoning, land-use practices and building codes are needed to prevent or reduce actual damage from hazards.²

Planning and preparation

The planning and preparation for natural disaster recovery can be started now. You can create processes and workflows now that will greatly reduce inefficiencies, rather than waiting until a disaster has already occurred. Please evaluate your existing tracking mechanisms and potential new tools to determine how your jurisdiction will evaluate impacts and recovery needs.

The first phase following a disaster is emergency response, rescue efforts and immediate mitigating the damage caused by the event. Following the first phase, many property owners and community leaders will be looking for technical and financial assistance with assessing the extent of the damage and beginning rebuilding efforts. As a registered environmental health specialist, you will likely be part of these efforts at the local level.

Counties can encourage property owners to learn more about their own septic system including age, system type, and location of the drainfield. Online records of permits and maintenance records also are increasingly available to property owners. SepticSmart events provide an opportunity to help homeowners and septic professionals to be prepared before disaster strikes.

¹ International Journal of Disaster Risk Reduction, August 2016

² National Academies of Sciences, Engineering and Medicine. 1991. [A Safer Future: Reducing the Impacts of Natural Disasters](#). Washington, DC: The National Academies Press.

Records

One of the biggest needs from your onsite program following a disaster will be other agencies or members of the public seeking septic records. These records requests will come from federal agencies, such as FEMA; state agencies, such as the Oregon Department of Transportation; local agencies, such as a fire department; and property owners or buyers. Counties should consider ahead of time where their records are kept and who might be a point person for responding to these requests.

How are your records stored?

- **Hard Copies**
 - How will you handle the increase in records requests?
 - Do you have a formal process for records requests? How will these be tracked?
 - Do you have a single point person who will fill these requests?
 - Is your records storage facility likely to survive a wildfire, flood or earthquake?
- **Online Records**
 - How will you direct the public to your online database?
 - Do you have a fact sheet that can show them how to access these records?
 - How will you handle walk-ins that do not have access to the internet?
 - How will you help those agencies that are requesting records?
 - Are staff trained and able to access documents remotely?
 - Is there an offsite or cloud backup to keep them safe in case of wildfire, flood, or earthquake?

Communications

Communication during and after an emergency is extremely important. If you can answer these questions, then you can speed up the recovery process.

- Does your jurisdiction have a dedicated onsite phone number for emergencies?
- Does your jurisdiction have a dedicated onsite email address?
- How will you reach the communities that are affected by the disaster?

Paper Storage Considerations

In 2014, DEQ's Bend office had a fire damaging files and rendering their office inaccessible for weeks. Asbestos releases may need to be addressed after a structure fire. Fire sprinklers also damage physical records.

In 1996, Clackamas County's Onsite Program office flooded and many records were damaged, destroyed and lost. Flooding concerns extend beyond a septic system!

- Community Facebook groups and other social media have been a successful tool in connecting to these communities. They also may be where rumors spread, so be ready to address them.
- Placing fact sheets and contact info on community bulletin boards is a great way to reach large groups of people easily.
- Townhall meetings
 - These can be a great place to address rumors and give timely information.

Safety

Physical safety is a critical component when you are going onto disaster affected areas. Your safety as an inspector is key to the recovery efforts. If you are hurt at one of these sites, then the rebuilding effort will be much more difficult. Take care of yourself.

- Communication tools and procedures including cell phones, satellite-enabled communications, and designated meet up spaces can save time and reduce confusion when the worksite is disrupted by a disaster.
- Safety Items
 - Hard Hat
 - Reflective safety vests
 - Steel toed and puncture resistant boots
 - Respirator
 - (Other items)

Emotional needs

Emotional resilience is adapting to stressful situations and being able to deal with increased levels of stress. During past emergencies, the emotional needs of the responders were often overlooked. In your role after the disaster, resilience does not eliminate stress or erase life's difficulties, but allows you to tackle or accept problems, live through adversity and move on.

- Many of the individuals that you will interact with will have varying levels of trauma and when you interact with them it is very normal to have sympathy and empathy with them.
- Discuss with your supervisor about these very real feelings that you are going through.
- Consider what options are available to you including counseling with your peers or getting professional help.

Fees and Emergency Regulations

- Local leaders may make the decision to reduce or waive County fees or issue emergency orders or county codes to facilitate response and recovery.

- If the decision to reduce or waive fees occurs, then you should track the decision, approvals and fiscal impact of those reduced or waived fees.
- If you are going to request a future reimbursement, such as from FEMA or the state, you will need to show proof of those reduced or waived fees.
- Communicate with DEQ about any emergency proposals to change fees or procedures.



The Patton Meadow Fire burns in August 2021 near Lakeview.
(InciWeb via Oregon Office of the State Fire Marshal)

Wildfires

Wildfires are not new to Oregon, but the 2020 Wildfires and more recent wildfires damaged thousands of homes in developed communities. Use this portion of the handbook when responding to wildfire affected areas.

It is important to protect people from possible injuries and to prevent further damage to the septic system, which may be hard to identify after a disaster. Be sure to have property owners or licensed installers, pumpers or maintenance providers mark off all system components including tanks, piping, advanced treatment systems and the drainfield.

Septic system damage may occur during the wildfire, but also after the fire. When homes are destroyed and contractors are out digging out and removing structures and soils that may have been exposed to toxic materials (ash with asbestos for example), the soil is removed. Septic system components such as tanks and drainfields may be damaged or destroyed in the debris removal phase.

Your Wildfire Checklist

- Flag or fence off all system components.
- Communicate with emergency response teams and homeowners to prevent septic system damage during cleanup.
- Avoid exposure to toxic materials such as asbestos.
- Keep protective gear on hand before they are needed.

Most common items that could be damaged by fires:

- Septic tank – heat from a structure burning may impact the septic tank by proximity to the building but also transported into the tank by sewer pipe. What kind of tank is it?
 - Concrete
 - How old is the tank?
 - Structural integrity is compromised if exposed to high heat of an intense fire.
 - Steel
 - Systems have not included steel tanks for over 30 years, so the tank will be old.
 - Be very careful, as the structural integrity of a steel tank is likely already compromised. Soil and steel are not compatible for the tank's structural integrity.
 - Plastic
 - High heat from wildfires can melt, weaken and severely damage these tanks.
- Risers, service ports and sanitary tees on tanks
 - Many risers are made of plastic and are easily destroyed by high heat.
 - If the risers are visible this can be an easy way to identify where the system is located.
 - Sanitary tees inside a tank in a septic system may be concrete, cast iron or plastic.
- Pumps
 - Electrical issues. Do not touch any service panels.
 - Many pumps will need to be replaced including the piping going to the pump.
- Drainfield media
 - Drainfield products for the last 25 years have increasingly been made of plastic and are much more likely to be destroyed due to the high heat.
 - Many drainfield products may be damaged or destroyed if large vehicles are driven over them.
- Sand filters
 - Most sand filters will have their internal components destroyed due to high heat. A licensed installer or maintenance provider will need to assess if there was damage to the internal components of the sand filter.
 - Some sand filters have been destroyed by firefighting vehicles when they are creating fire lines.
- ATTs (Advanced Treatment Technologies)
 - Many ATTs are made of plastic or a material that will be damaged by exposure to a wildfire.
 - Contact the property's maintenance provider to inspect the unit for damage.



Flooding along Interstate 84 near Hermiston in February 2020. (Oregon State Police)

Floods

Oregon has seen its share of atmospheric river rain events which deliver large amounts of precipitation in a short period of time and can cause significant flooding in multiple basins. In coastal areas, flooding is more common than other parts of the state where floodplains are less developed, or flood controls upriver can generally store some of the precipitation. With climate change, storm events are becoming more extreme and rising sea levels can inundate coastal systems. Warming trends and rain can cause sudden snow melt.

Flooding may also bring landslides. Major storm events can cause debris flows especially where debris has accumulated in unmaintained ditches, culverts, and seasonal drainage areas. In early December 2007, a large storm hit northwest Oregon. The heavy rainfall caused small landslides and triggered debris flows that engulfed the town of Woodson and Highway 30.

Your Flood Checklist

- Water conducts electricity, and you should avoid wading in it during a flood event.
- Advise homeowners to limit water use to reduce impacts to the saturated drainfield.
- Floodwaters contain a variety of contaminants including biohazards, sewage, and industrial chemicals.

Several items to consider with regard to floods and septic systems are:

- Silts and clays can be transported by floodwaters to septic tanks during floods. Pumping out the septic tank may be needed after these events.
- Do not pump out the septic tank more than halfway or the tank may float out of the ground due to the saturated soil around the tank.
- Reduce all nonessential water use, such as dishwashing, washing clothes, showering.
- Flush toilets as little as possible or use a temporary toilet.
- Floods may cause erosion around a property.
- Avoid exposure to flood water. Flood waters can contain a variety of contaminants including sewage, pesticides and industrial chemicals.

For more information see the Environmental Protection Agency's website:

[Septic Systems – What to Do after the Flood.](#)

Earthquakes

Living on the West Coast means living with earthquakes. While many earthquakes are small with minor impacts, geologists predict that a major earthquake from the Cascadia Subduction Zone could register magnitude 9 or more. Coastal areas are susceptible to a tsunami following an earthquake, which may impact a very large area limiting access. A tsunami can deliver ocean debris far inland and inundate septic systems.

The Regional Disaster Preparedness Organization ([RDPO](#)) Disaster Sanitation workgroup has noted that a Cascadia Subduction earthquake is expected to be significantly damaging to all properties and regulators could be expected to play a role in sanitation needs across the spectrum.

Since most components of a septic system are underground, determining damage from an earthquake is a challenge. The following items should be checked for damage:

- **Septic tank**
Contact a professional to ensure the septic tank is working properly including all fittings and piping exiting the tank. A concrete tank may crack.
- **Piping**
Ensure that all pipes are secure and have not become dislodged or sheared off during the earthquake.

- **Electrical components**

Ensure that you are not exposing yourself to electrical shock as many portions of the septic system (ATT, pumps, etc.) can become a potential for injury.

- **Drainfield**

Look over the area of the drainfield and determine if there are signs of failure. Contact a licensed installer or pumper to determine if there are problems.

The [EmergencyToilet.org](https://www.emergencytoilet.org) website includes additional information and tools to help respond in a major event. The Emergency Toilet Guidebook could also be helpful in other disaster situations.

Rising sea level

Rising sea level is a concern for many coastal communities. The wave action associated with higher sea levels and storm surges increases the likelihood for extensive coastal erosion and damage to infrastructure. In low-lying areas, as the water table rises it can reduce the separation between the drainfield and groundwater or inundate a system with sea water. Older homes on conventional gravity systems without advanced treatment are most at risk. A septic system's ability to filter out phosphorus and nitrogen will decrease with sea level rise, which would also affect the ability of the system to remove bacteria before it interacts with groundwater. Septic systems near tidal areas that become inundated by high groundwater may cause human health or environmental hazards from improperly treated sewage.

This issue is one that will be difficult to remedy, and more evaluation of risks associated with sea level rise on Oregon's coastal counties is needed. Due to new higher surface and groundwater levels that were not present during initial site approvals, site evaluation findings or designated repair areas may no longer meet setbacks or separation to groundwater requirements.

"As groundwater levels rise in coastal areas, you can have a mixture of groundwater and untreated waste rising to the surface and even backing into homes. Additional treatment or separation to the groundwater may be needed as sea levels rise."

-Geological Society of America.
"Rising sea levels mean rising groundwater, and that spells trouble for coastal septic systems."
ScienceDaily, 11 October 2022.

Reasonable repairs

During the recovery phase of the 2020 wildfires, many onsite inspectors found it extremely difficult to help property owners rebuild on their properties. Inspectors struggled to find enough

usable area, maintain setbacks to foundations and water sources and several other issues on these impacted lots.

Oregon Administrative Rules, specifically [OAR 340-071-0215\(4\)\(b\)](#), addresses what the state considers reasonable repairs. Many inspectors have used reasonable repairs throughout their career especially on difficult sites that do not meet the specifics of a rule. When a natural disaster causes widespread damage to challenging sites, these rules may require discussions with planning departments and homeowners about rebuilding options. Onsite agents in Marion and Lane counties noted that after the 2020 wildfires many sites were extremely difficult to permit due to their small lot size and proximity to surface public waters. DEQ's Onsite wastewater specialists can provide technical assistance to County agents for help on difficult sites.

After action report

After the disaster recovery phase, capture lessons learned so that communities and the state can better anticipate the needs for future response efforts. These items can be a source for learning and growth in the event of future disasters. This needs to be an honest time to reflect on the successes and shortcomings. Some items to discuss could be:

- Detailed description of the event.
 - Extent of property loss, local county-wide response, how event impacted overall development as some examples.
 - Financial cost estimates of the damage.
- Review and evaluation.
 - What were unexpected challenges?
 - Identify areas for improvement; what issues were not anticipated that you will need to prepare for in the future? Be very detailed in these items and give specific examples of how you changed course and what the outcomes were.
- Tally successes.
 - What were your successes?
 - Were these successes based on a course correction? Did you succeed because of a past practice that had worked in a previous event? Make sure that you note these victories.
- Develop a list of questions that could be used to evaluate a future event.
 - Was there any question that you wish you would have asked earlier?
- Revise your current plan to address any areas that did not work as well as expected, and any new issues or methods you learned.

Incident Command Structure

In many disasters the Incident Command Structure, or ICS, will be implemented at the county, state and federal levels. ICS is a structure that gives clear roles and a chain of command during an emergency or natural disaster.

Contact your county emergency management program to determine how your onsite program can fit into this structure.

The Oregon Department of Emergency Management will be a valuable resource for your county during these disasters. OEM coordinates and maintains a statewide emergency services system for emergency and disaster communications. It is a collaborative statewide agency that focuses on preparedness, response, recovery, and mitigation phases of a disaster.

FEMA's Emergency Management Institute many of the [basic ICS courses for free and online](#). ICS 100, 200, 700 and 800 are all provided for free and will give the trainee a basic understanding of the ICS structure.

Tracking

In all disaster recovery efforts, tracking is necessary to assess damage, assist with recovery efforts, and document the need for emergency management and financial assistance. Consider using existing platforms such as county GIS applications and Accela e-permitting to track applications related to natural disaster recovery.

Sample templates for setting up tracking tools using Excel or Forms can be found in Appendix A. In many circumstances, counties will need to develop customized forms and online resources to assist with evaluating impacts and communicating with property owners. For example, after the 2020 Beachie Creek Fire, Marion County Public Works developed checklists, a supplement to DEQ's Existing System Evaluation Report, and fact sheets for property owners.

Be aware, be prepared

Every part of our state is subject to natural disasters, and it is important to get started now to position your program well before the next event occurs. Use the topics in this handbook to prepare in your program. Please reach out to DEQ for technical assistance or to provide additional information and resources about natural disaster response.

Additional resources

- Appendix A: DEQ Disaster Impact and Response Tracking Tools
- [NEHA Preparedness & Response for Septic Systems](#)
- [EPA factsheet for floods and septic systems](#)
- [Oregon Office of Emergency Management](#)
<https://www.oregon.gov/oem/pages/default.aspx>
- [National Risk Index](#)
- [Regional Disaster Preparedness Organization](#)

Appendix A: Septic Impacts Tracking Tool

Natural Disaster Septic Systems Report

County: _____

Description of natural disaster (date(s), type, geographic scope, method of tracking impacts and repair work, other relative summary info):

Reporting Month/Year	Total number of affected septic systems	Number of authorizations Issued	Number of major repair permits issued	Number of minor repair permits issued	Other applications or permitting actions	Notes: (Status of assessment, cleanup, and recovery, estimated costs/funding needs)

Disaster Recover Onsite Systems Property Tracker

Address	Application Number	Date inspected	Notes on damage and recommended action	Applied Date	Application Type: Authorization, Major Repair, Minor Repair	Issuance Date	Status Notes	Cost of permit and repair if known	Financial assistance provided (\$ amount and source)