Introduction

Every year, millions of litres of water flow into the municipal drainage system from residential rooftops and indoor plumbing. Most people don’t think about how the water is collected, or where it goes. It’s a different matter though when a torrential storm comes, the drainage system falters or there is water in the basement.

Water damage from flooding costs time, money and inconvenience. Fortunately, there are many things you can do to reduce your risk. Prevention and maintenance are the keys. Looking at your home now and fixing any problem areas before the next major rainstorm can save you a lot of grief.

The Homeowner’s Guide to Flood Prevention contains information that can help you identify problem areas and properly upgrade, repair or maintain your home’s drainage system. This booklet is filled with practical drainage tips, and projects that you can do yourself.

Details of various projects, relative costs and degrees of difficulty are provided throughout. Even if you prefer to hire a professional, this booklet offers knowledge and insights that may help you make a more informed choice. It is recommended that you obtain three quotes and ask for references, particularly if you are unfamiliar with the company or individual.

Definitions of words or phrases highlighted in bold can be found in the Glossary of Terms in Chapter 8.
The storm sewer deals with roof and surface water that comes from rainfall or snowmelt. Sloped lawns and driveways direct water from the roof and the ground to the street or the back lane, where catch basins are located. The catch basins are connected to large underground stormwater pipes (See Figure 1).

Water that seeps through the ground is collected by weeping tile located at the bottom of your home’s foundation. Weeping tile is either connected to a sump pump, which sends excess water up to the surface, or to a sewer pipe under your basement floor (See Figure 1).

In some Edmonton neighbourhoods, homes have a separate storm service. In these homes, roof downspouts go into the ground and connect to the pipe. This pipe sends the water to a larger stormwater pipe located under the street or the back lane (See Figure 2).

*Downspouts may still be connected to a home’s sanitary service pipe in neighbourhoods with a combined sewer service, however this type of connection has not been allowed in the City of Edmonton since 1988 (See Figures 1 and 3).
Chapter 2
Why Homes Flood

Edmonton gets about 345 millimetres (14 inches) of rain each year. Most of this comes in the form of thundershowers or summer storms, any one of which can drop a large amount of water in a concentrated area in a short period of time. When a major rainstorm hits, the huge volume of water that occurs can overwhelm drainage systems and cause flooding. Snow poses a similar threat in the spring if there is a rapid snowmelt.

During a rainstorm, the pressure on your home drainage and the municipal drainage systems increases dramatically. The condition and capacity of these systems are equally important in managing wet weather. Blocked or broken pipes, poor lot grading, excess hail and other factors can restrict the flow of water substantially increasing the risk of flooding.

In Edmonton, the municipal stormwater drainage system design standard is one in five years. This means the system can handle any typical rainstorm but could have its capacity exceeded, on average, once every five years. This is based on historical weather patterns. The municipal sanitary system design is based on sewage flows, plus an allowance for water that gets into the system during wet weather.
Toilets add water to a system that may already be overloaded. The water may have nowhere to go but up your floor drain and into your basement. This is particularly true if you have a backwater valve. The valve is designed to close during extreme conditions and keep outside water from getting in. When this happens, water from the inside also can’t get out.

Many people forget to put their downspout extensions down before it rains. A long downspout extension is of no value when it’s propped up against the side of the house. If you have a sump pump, double check to see that it is plugged in and the breaker is on during a storm. More than one homeowner has searched for the cause of a flooded basement only to discover the sump pump lacked the power to perform.

**Five Quick, Inexpensive Ways To Get You Started**

An assessment of your home drainage system may have pointed out a number of deficiencies. So where do you start? Here are some quick, inexpensive actions you can take that will make a difference in reducing your flood risk.

1. **Plug the leaks.** A ladder, silicone, and time are all you need to seal holes or cracks in your eavestroughs, downspouts, extensions, sidewalks, patio and driveway.

2. **Repair or replace downspout extensions.** This might be a matter of simply putting down the extension that’s already there or putting back the splash pad. Purchasing and installing extensions or splash pads is inexpensive but very important in getting water away from foundation walls.

3. **Clean your eavestroughs and downspouts.** The downspout extensions have little value if leaves, and other debris are preventing water from getting down the downspout. A gloved hand (or garden spade), ladder and garden hose are what you need to get the job done.
You can test the effectiveness of your eavestroughs by pouring water at the end furthest away from the downspout. If water leaks out or pools at any point you need to clean, repair or replace it.

Eavestroughs should direct water on a gentle slope down towards the downspout. Use a level inside the eavestrough to check that the downhill grade is consistent from one end of the eavestrough to the downspout. Sometimes a sagging eavestrough can be repositioned to prevent pooling and re-establish the grade. If this is not possible, replace it.

Eavestrough leaks typically occur at joints. Fortunately, they can be repaired quickly and easily with silicone. Silicone comes in a tube and is usually clear or white. Once dry, it is water resistant and stands up well to extreme temperatures. When repairing a leak, do it from the inside of the eavestrough. Make sure the surface is clean and dry before applying the silicone.

The eavestrough should be replaced if the leak is from a large hole or crack. When replacing an eavestrough or downspout, make sure to seal all connector joints and end caps with silicone.

Downspouts are hollow pipes that take water from the eavestrough and channel it to the ground. Ideally, the downspout should end in an elbow and extension that directs the water 1.8 metres (six feet) away from the house and towards the street or back lane. The extension should be at a 30 degree or more angle in relation to the ground. In Edmonton, it must end at least 15 centimetres (six inches) inside your property line. Make sure the water is not directed
An Exception to the Rule: In many older Edmonton homes, roof downspouts are directly connected to an underground separate storm sewer pipe. In these cases, disconnecting a roof downspout from the pipe may not have much impact in reducing a flood risk. In fact, it may increase the risk if the lot is not properly graded to drain water away from the home.

Chapter 4
Improving Lot Grading

Good eavestroughs, downspouts and extensions help make your outdoor drainage system better but it can’t make up for poor lot grading. Proper lot grading is one of the most important things you can do to prevent water from getting into your home. Since 1997, the City of Edmonton has required every new home to have an approved lot grading plan.

Lot grading starts at your basement wall. Walk around your home and measure the slope from the wall. This includes under stairs, steps and decks. The dirt or sod should slope down from the wall at a continuous angle for at least five feet. If the surface is decorative rock, bark or another porous material that lets water through easily, take the measurement from where the dirt begins.

The soil at your basement wall should be at least 15 centimetres (6 inches) higher than the ground five feet away. Use a slope gauge (see box) to see if the angle of the slope is adequate.
Window wells should be used where the bottom of a basement window is at or near ground level. They not only allow for proper grading but they also prevent dirt from rotting window sills. A window well is a U-shaped ribbed, light metal product that can be purchased in most hardware stores. They come in various widths and heights so measure your window before purchase.

The outer edges of the window well should surround the window and be tight against the basement wall.

The bottom of the window well should be at least a foot below the bottom of the window sill. The area inside the window well should be cleared of dirt and backfilled with loose gravel or rock. This should be done from the bottom of the well to three to six inches below the bottom of the window sill. This will allow water to easily drain and filter down to the foundation weeping tile. The dirt or sod on the outside of the window sill should be graded like the remainder of the house.

In some cases, houses may have existing window wells that don’t drain properly. In extreme cases, a pipe may have to be inserted that runs directly from the bottom of your window well towards your weeping tile. Seek the advice of a professional before doing such work.
In some cases, a neighbour's property may have the right grading but be lower than yours. A retaining wall along the property line is a good solution to this problem. This can be done in front of an existing fence or other feature you don't want disturbed. The wall allows you to create an internal swale that can safely channel water away.

It is always best if neighbours can discuss and resolve lot grading issues together. City of Edmonton Lot Grading Inspectors can investigate complaints or concerns about surface water drainage. They also will visit your home if you have any doubts about what to do about lot grading.

Chapter 5
Backwater Valves, Weeping Tile and Sump Pumps

Flood prevention devices like backwater valves and sump pumps can be valuable home drainage assets but not everyone needs one. Consider your entire home drainage system, what type of home you have, where you live, method of servicing and your flooding history before rushing out to buy and install these devices.

Backwater Valves

A backwater valve sits inside a home's branch or main sanitary sewer line. Its job is to prevent sewage from returning up a
Weeping Tile

Weeping tile is a perforated plastic pipe that surrounds the foundation of a home. It sits in a bed of gravel. This allows excess groundwater to seep into it. This water is channelled to a sump pump, or the sanitary sewer system, or the stormwater sewer system, depending on the age of the home.

For development prior to 1988, weeping tile flows were directed to the sanitary and combined sewer systems. As of 1988, new development is required to direct weeping tile to the storm sewer system where available.

Installing or repairing weeping tile is expensive but necessary in some cases. For example, weeping tile that is collapsed or clogged by debris should be repaired to prevent damage to the foundation and basement walls. You should seek professional advice from a plumber or qualified contractor before making any decisions.

Sump Pumps

Over 60,000 homes in the Edmonton region may need their sump pumps replaced in the next five years. Yours may be one of them.

The majority of homes built since 1988 have a sump pump. A working pump plays an important part in flood prevention, channelling groundwater out and away from the home. If your home was built after 1988, you should be aware of the condition of your pump and whether it needs replacing. A good quality pump should last around 10 years, depending on how often it is working and the acidity and dirtiness of the water.
Other Factors

**Freezing:** If your pump is operating during freezing weather there is a risk of freezing and line blockage. To prevent problems it is best to disconnect outside hoses prior to winter.

**Recycling:** If water from your sump hose discharges too close to your foundation, the water may recycle and end up back in your system, possibly endangering your foundation.

What to Look for When Replacing Your Sump Pump

There are some basic criteria for choosing a pump: size or capacity, pump type and horsepower. There are other factors specific to your home that may also influence your choice of pump, such as the volume of water your drainage system has to handle or the amount of grit in the water. In the end, you have to balance your needs with how much you want to pay. You can buy a cheaper pump but don’t expect it to perform as long or as well. A higher quality pump is built from top quality components.

**Horsepower (hp)**
- Minimum 1/3 hp recommended.

**Size/Capacity/Performance**
- Make sure to size your pump properly to ensure greatest efficiency.
- Get information on the pump capacity (the amount of water pumped in gallons per minute) and the height and distance the water needs to travel (referred to as “head”).
- To avoid clogging, the pump should be able to pass stones of up to 10 millimetres through the pipes.
- Pumping head should be a minimum of approximately 10 feet.
- Discharge line should be 1 1/4 inch pipe.
**Purchasing Checklist**

(Use to compare models you are considering for purchase)

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<th>Feature</th>
<th>Minimum requirement</th>
<th>Model:</th>
<th>Model:</th>
<th>Model:</th>
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<td></td>
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<tr>
<td>Pump capacity (gallons per minute)</td>
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<tr>
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<td>Approved by Canadian Standards Association</td>
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Inside

Foundation Walls
✓ Check for moisture along the walls and the floor.
✓ Fill and seal any visible cracks.

Sump Pump
✓ Check for power.
✓ Test the pump by pouring water into the pump well.
✓ Check the outside pipe to confirm water is flowing towards the street or back lane.
✓ Check and repair any leaks in the sump pump pipe.
✓ Disconnect sump pump discharge hose in winter conditions to avoid freezing in the line.

Backwater Valve
✓ Open the top and clean out any debris.
✓ Check the flapper. Make sure it is moving freely.

Plumbing Fixtures
✓ Maintain proper water levels in traps in floor drains and toilets to minimize odours.

Fats, Oils, and Grease - Store it, don't pour it.

Pouring fats, oils, and grease (FOG) down your drain can cause significant problems in your home sewer system as the FOG solidifies in your pipes and causes sewer back up. The result can be property damage and considerable expense and inconvenience to you and to the City.

Store your used fats and grease in a disposable container. When it is full, put it in the garbage. Used cooking oil should be cooled and put into a covered plastic bottle, labeled, and put out for garbage collection. If you need to dispose of four or more litres of used cooking oil, take it to an Eco Station.
**Drainage and Sewer Trouble Line**

311

This is a 24-hour emergency response service that you should call:
- If you are experiencing a drainage problem on your property.
- If you see a drainage problem on the street.
- If you get any basement flooding as a result of a rainstorm.
- If you consistently smell sewer odours coming from a catch basin or manhole.

**Drainage Services Lot Grading**

780-496-5576

[www.edmonton.ca/lotgrading](http://www.edmonton.ca/lotgrading)

Call this number for all lot grading concerns. After normal business hours this number will call forward to a voice mail system; provide your contact information to receive a call back from a grading specialist to answer questions and provide grading advice. Based on the situation, a lot grading inspector may visit your home to help you deal with any unusual grading issues or to help you to resolve a grading problem.

**Plumbers and Landscapers**

If you would like professional help correcting a drainage problem, look to professional plumbers and landscapers for help. Lists of plumbers or landscapers can be found in the Yellow Pages or by contacting the Better Business Bureau of Central and Northern Alberta at 780-482-2341. The Better Business Bureau can provide you with company reports 24 hours a day. Regardless of whom you contact, it’s a good idea to get three estimates and references before choosing a contractor.
Chapter 8
Glossary of Terms

Backwater valve
A backwater valve is located in a house’s sanitary sewer line. The valve closes under pressure, preventing sewage from returning up the line and back into the home.

Catch basin
A catch basin collects stormwater from the street through an open metal grate and channels it to an underground stormwater pipe. Below street level is a trap where sand, gravel and other material is captured for removal.

Combined sewer
A combined sewer collects both stormwater and wastewater in the same pipe. Since about 1960, combined sewers are no longer built in Edmonton.

Downspout
A downspout is a length of pipe that is connected to an eavestrough and runs vertically from the roof to the ground.

Downspout extension
A downspout extension is a length of pipe that is connected to bottom of the downspout and runs at a downward angle away from a building.

Dry pond
A dry pond is a man-made depression created to capture surface runoff during major rains.

Eavestrough
An eavestrough is attached directly below the roofline. It collects stormwater from the roof and channels it to a downspout.
Storm sewer
The storm sewer collects rainwater and snowmelt and channels it via pipes to creeks, ravines, dry ponds, stormwater lakes or the North Saskatchewan River.

Sump
A basement sump is a pit in the ground under the basement floor that collects excess groundwater from weeping tile or surrounding soil.

Sump pump
A sump pump is a motorized mechanical device that keeps basements dry by pumping excess water from a sump to the surface.

Swale
A swale is a shallow, sloped channel in the ground that conveys water in a specific direction.

Weeping tile
Weeping tile is a perforated pipe that surrounds the foundation of a home and collects excess groundwater. In some homes, this excess water is released to a sump pump, which carries it to the surface.

Window well
A window well is a corrugated metal product that surrounds a basement window at or below ground level. Installation allows for proper lot grading around the basement window.