

Heavy rain, flooding, landslides, and typhoons






Disasters caused by typhoons and heavy rains can be forecast in advance. By checking meteorological and other information ahead of time, you can limit your activities and make preparations.

However, heavy rain that exceeds expectations can increase the likelihood of flooding and landslides.

Be sure to prepare for such events by reviewing how to obtain information in the event of a disaster in advance. Additionally, you should use hazard maps to review the disaster risk in your area and talk with members of your family about how you would evacuate and get in touch.



Strength of rainfall

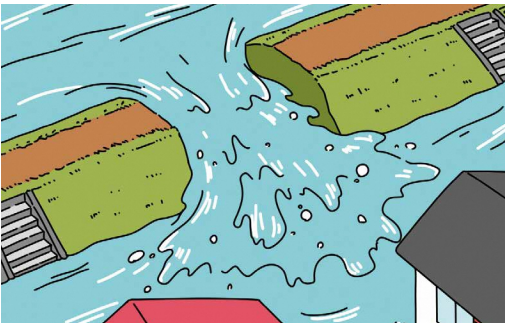
1-hour rainfall (mm)	Forecast terminology	How it actually feels		Damage
Greater than or equal to 10 and less than 20	Raining little hard		Continuous, consistent rainfall	Caution is necessary if rain continues for a long period of time.
Greater than or equal to 20 and less than 30	Heavy rain		Downpour	Storm drains, sewers, and small rivers may overflow, and small-scale landslides may occur.
Greater than or equal to 30 and less than 50	Heavy rain		Raining buckets	Landslides become more likely; residents of high-risk areas should prepare to evacuate.
Greater than or equal to 50 and less than 80	Extremely heavy rain		Waterspout-like conditions (continuous, heavy rainfall)	<ul style="list-style-type: none"> Water flows up out of manholes. Debris flows are more likely to occur. Extensive damage occurs.
80 or greater	Intense storm		<ul style="list-style-type: none"> A perception of pressure makes it feel difficult to breathe. You may feel afraid. 	Rainfall may cause large-scale damage, making extreme caution necessary.

(Japan Meteorological Agency)

Flooding

River and rainfall-triggered flooding

There are two types of flooding, based on where the flood water originates: river flooding, in which an area is inundated by an overflowing river, and rainfall-triggered flooding, in which rainwater overflows in communities because it can't drain away. Whereas water from rivers is known as "outside water," water located on land protected by dikes is known as "inside water."



River flooding

Sustained, intense rainfall causes rivers to rise until they overtop dikes or cause dikes to collapse, leading to flooding. Even if rain does not fall in the immediate vicinity, rainfall in upstream areas can cause water levels to rise, resulting in flooding.

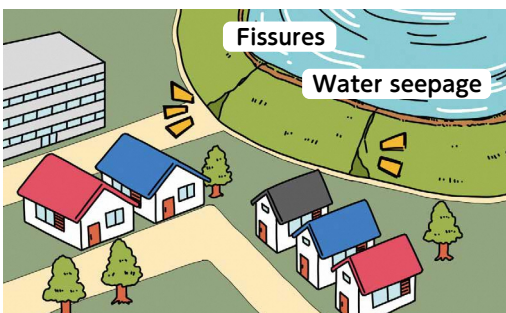


Rainfall-triggered flooding

Rainfall that is concentrated over a short period of time in a community or other location can cause flooding when the locality's ability to drain and treat sewage is exceeded. Manholes and storm drains may overflow, causing flooding of urban areas and roads.

Collapse of reservoirs

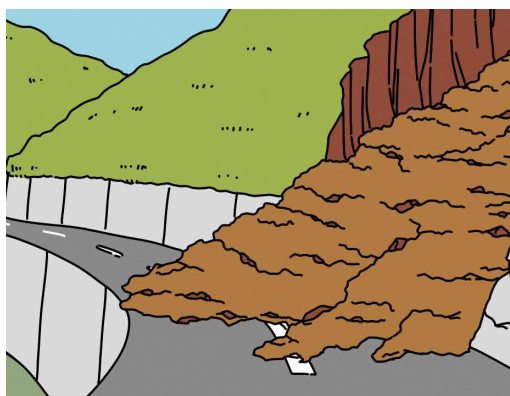
Heavy rain and earthquakes can cause reservoirs to collapse. The resulting outflow of water can cause flooding and landslides.



Landslides

Heavy rainfall, typhoons, and earthquakes can cause the ground to weaken, leading to landslides.

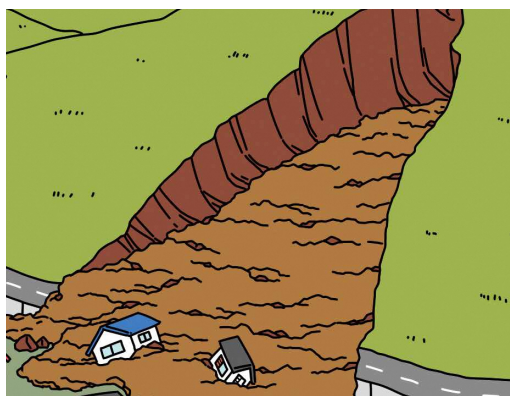
Be sure you understand the different types of landslides. If you see any of the signs of an imminent landslide as illustrated on the page to the right, leave the area immediately*. It's essential to exercise caution even after rainfall ends.



Mud and rock slide (collapse of a steep slope)

In this phenomenon, soil loosened by rainfall that has soaked into the ground suddenly collapses.

Such collapses occur in an instant, causing significant harm, for example when people are unable to escape quickly enough.



Landslide

In this phenomenon, a clay stratum or other layer in the ground on a comparatively moderate slope gradually moves downhill. Landslides occur at once across a large area, so they cause significant damage to houses, roads, and other structures.



Debris flow

In this phenomenon, soil, rocks, sand, and other material that has accumulated in a valley or on a slope flows together with water from heavy rainfall.

Due to the high speed and destructive power of such events, they can cause significant, widespread damage.





These warning signs indicate heightened risk of a landslide!

- If there has been heavy rainfall or if you notice anything out of the ordinary in an area with a heightened risk of a landslide
- If a landslide alert information is issued
- If the city issues a senior citizen or general evacuation order



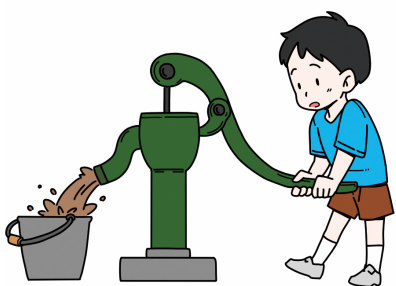
Small rocks fall from a cliff.



Cracks or fissures develop on a slope.



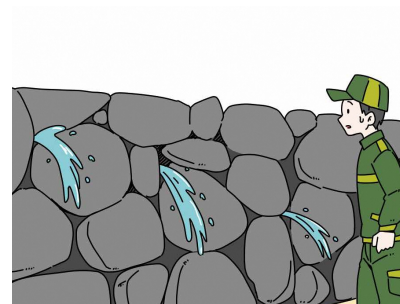
The amount of water seeping out of the ground on a cliff increases.



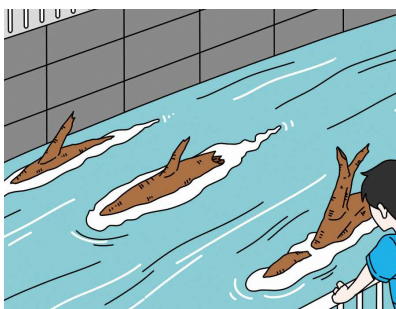
The properties of groundwater or spring water change abruptly; well water become turbid.



Cracks or fissures develop on the ground.



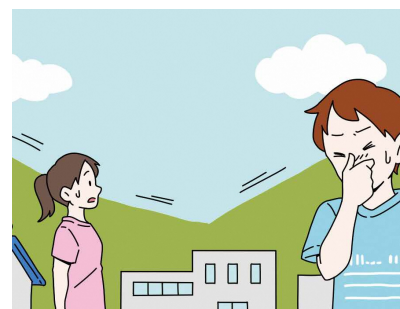
Water seeps out of a slope.



Rivers become turbid, and the amount of driftwood increases.



The water level in rivers falls, despite continued rainfall.



A rumbling sound can be heard. The area smells like rotten soil.

Typhoons

What is a typhoon?

Storms with a maximum wind speed of at least 17 meters per second that develop from tropical low-pressure areas in the northwestern Pacific Ocean and South China Sea are called typhoons. Numerous typhoons make landfall from July through October. As a typhoon approaches, the air pressure falls, and the strength of rain and wind increases.

Even in recent years, powerful rain and wind have been causing flooding and landslides. When a typhoon is forecast to approach, keep tabs on factors like its size, strength, and projected path by checking sources like meteorological information. The most important thing is to ensure your safety, for example by avoiding going out and evacuating before it's too late.

Looking back on past typhoons

Typhoon 21 (Typhoon Jebi) (2018)

During Typhoon 21 (Typhoon Jebi), which made landfall in the Kinki region on September 4, an instantaneous wind speed of 40.2 meters per second, the highest figure ever measured in Hirakata, was recorded. These powerful winds blew away roof tiles and signs across the city, downed numerous trees, and caused many power outages, causing a level of damage that has not been experienced with other recent typhoons.

Hirakata opened 43 shelters after issuing an evacuation advisory for 1,216 households located in landslide warning areas and ordering 24,905 households located in areas



placed at risk by rising water levels in the Hotani River to prepare to evacuate and senior citizens to start to evacuate.

The storm displaced 236 people and damaged more than 5,400 homes.



Major damage in Hirakata City

Injuries.....11 people

(Including 2 people with moderate injuries; most minor injuries were caused by glass.)

Damage to roads caused by flying objects, fallen trees, etc.

.....392 incidents

Damage to parks caused by fallen trees, damage to facilities, etc.

.....134 incidents

Other fallen trees...139 incidents

Damage to homes

(number of disaster certificates issued documenting damage)

Total collapse.....5 homes

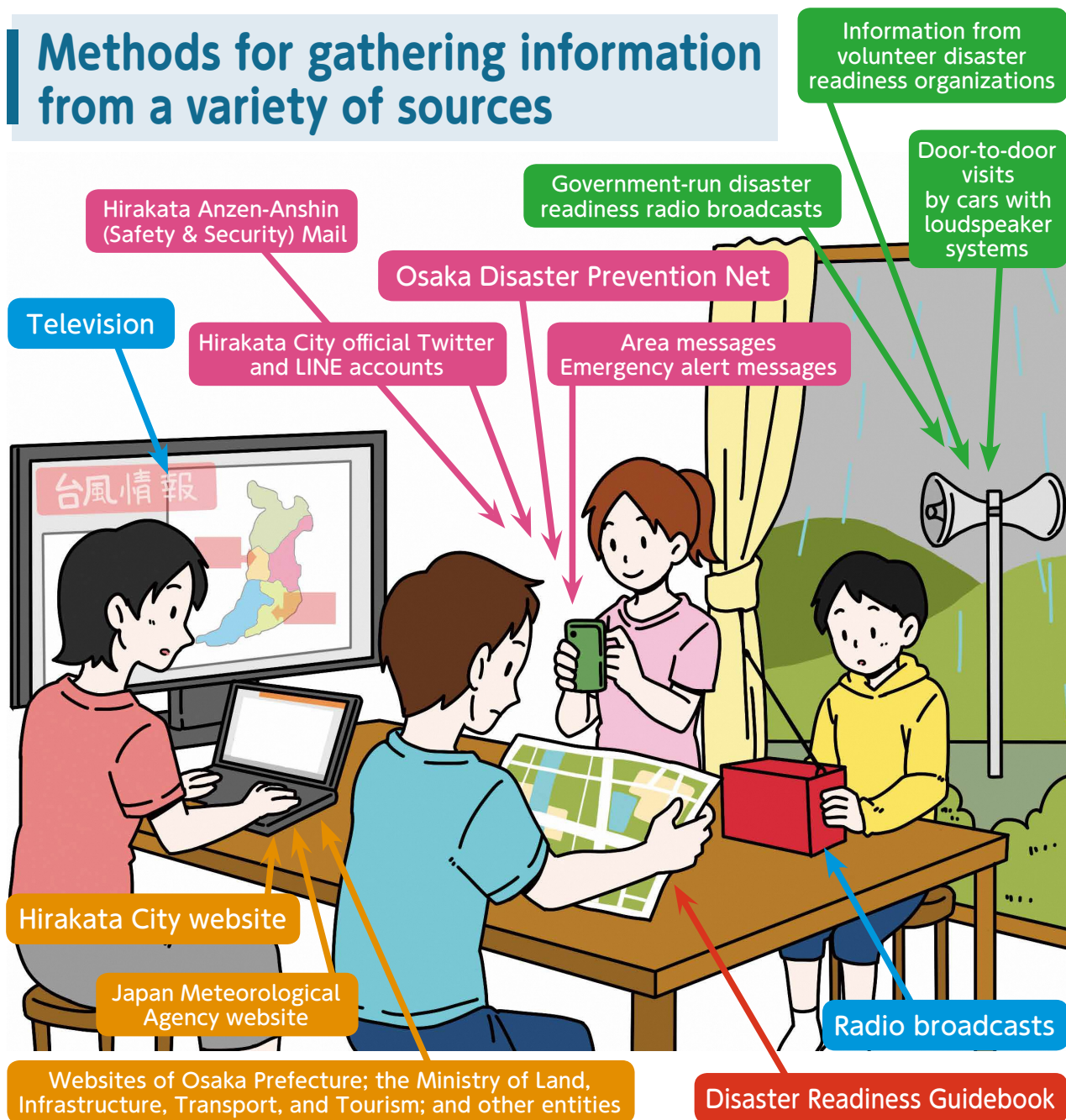
Partial collapse.....8 homes

Localized damage...5,468 homes

Gathering disaster information

To ensure your own safety as well as that of your family members, it's important to take the initiative to gather information in the event of a disaster and to stay calm, taking action while reviewing the situation.

Methods for gathering information from a variety of sources



The next page introduces methods for obtaining information from a variety of sources.

Winds, Flooding, and Landslides

How to obtain disaster information

Various services let you sign up in advance to receive automatic broadcasts of disaster information.

Choose the service or services that you find easiest to use and sign up in advance.

Obtaining information issued by Hirakata City

Be sure to sign up in advance

In the event of a disaster, Hirakata City will issue related information.

Hirakata Anzen-Anshin (Safety & Security) Mail

In addition to disaster readiness information about topics like earthquakes and crime prevention information like information about suspicious individuals and anti-crime campaigns, this system provides information specific to the city. Scan the 2D code to the right or sign up on the city's website.



<https://service.sugumail.com/hirakata/>

Hirakata City official Twitter account

This account provides the latest information, information about events, and other updates. In the event of a disaster, the city will use it to provide information about shelters, damage, and other related topics.



https://twitter.com/hirakata_city

Automated voice message phone service

This service automatically communicates evacuation information from Hirakata City (senior citizen evacuation, evacuation order, etc.) in the event of high wind and flooding, for example during typhoons, or landslides to fixed phone lines at residences in the city. It targets residents who don't have a smartphone or other mobile phone. (Please contact the city for details.) Advance sign-up is necessary. Residents who wish to sign up should contact the city's Crisis Management Department.

Phone: 072-841-1270

Fax: 072-841-3092

Hirakata City official LINE account

You can receive emergency information from Hirakata City by friending its official LINE account. In the event of a disaster, people can use the account to report information about damage, dangerous locations, and other related topics to the city. There are three ways to friend the account:

① Scan the 2D code

Scan the code to the right.



② Search for the account's ID

Enter “@hirakata_city” in the search field for adding friends and then add the city's account as a friend.

③ Click the “Add Line Friend” button

Click the “Add Line Friend” button on the city's website.



«Frequently asked questions»

Q.1 Does the service cost anything?

A.1 No, it's free to sign up, and the calls are free to receive. However, if you call back to listen to a message again, you will be charged about ¥10 for every 3 minutes.

Q.2 Can I sign up if I live with other family members?

A.2 You can sign up if nobody in the household has a mobile phone. You can also sign up if any family members who do have a mobile phone are absent during the day, for example because they work or attend school, leaving nobody at the home with a mobile phone.

Obtaining information issued by Osaka Prefecture and others

Osaka Disaster Prevention Net

<http://www.osaka-bousai.net/pref/index.html>

This website provides information about earthquakes and typhoons in real time. You can receive a wide range of disaster readiness information about topics including the weather, earthquakes, tsunami, typhoons, and river levels in real time as email messages on your mobile phone. Sign up by scanning the 2D Code to the right or by sending an empty email to touroku@osaka-bousai.net.



Area messages and emergency alert messages

You can receive emergency information like evacuation orders issued by the city as bulletins on your mobile phone. No advance sign-up is needed, but you may not receive bulletins if you don't set up your device appropriately. For details, please contact your mobile carrier.

Obtaining information from the Internet

Hirakata City website

In the event of a large-scale disaster, the entire website will switch to emergency- and disaster-specific content, including links to a variety of information sites.

<https://www.city.hirakata.osaka.jp/>



River disaster readiness information from the Ministry of Land, Infrastructure, Transport, and Tourism

This website lets you check high-precision rainfall measurements.

<https://www.river.go.jp/portal/#86>



River disaster readiness information from Osaka Prefecture

Access information for waterways including the Funahashi River, Hotani River, and Amano River.

<http://www.osaka-kasen-portal.net/suibou/>



Location-specific flooding simulation and search system from the Ministry of Land, Infrastructure, Transport, and Tourism

Access information including anticipated dike failures and flood conditions on rivers managed by the Japanese government.

<https://suiboumap.gsi.go.jp/>



Flood risk chart for Osaka Prefecture

Access flood risk for anticipated flood zones and other areas for all 154 rivers managed by Osaka Prefecture.

<http://www.river.pref.osaka.jp/>



Japan Meteorological Agency website

Major types of accessible weather information

- Weather forecasts.....Access observed data including raincloud movements and rain conditions.
- Meteorological warnings and advisories.....Access information about heavy rain and flood warning and the distribution of landslide and flood risk.
- Earthquakes.....Access the latest seismic intensity data and other information.

<https://www.jma.go.jp/jma/index.html>



Obtaining information from the media

Television and radio

When heavy rains or strong winds are anticipated, for example due to a typhoon, you can check detailed meteorological information via media outlets including television and radio stations.

Government-run disaster readiness radio broadcasts

Simultaneous broadcasts provide emergency information from speakers installed at 77 locations around the city, for example at elementary schools. You can also access broadcast messages by dialing the phone number below.

☎ 0120-35-1221 (can be dialed from mobile phones)

You may have difficulty getting through during times of heavy call volume. In such cases, you can also access the city's website, which posts broadcast messages.

Winds, Flooding, and Landslides

Assessing disaster information and determining the best course of action

Typhoons and concentrated rainfall can result in sustained, heavy rainfall, or intense, short-term rainfall, causing rivers to rise and increasing landslide risk. Be sure to check meteorological information and evacuation information, and give top priority to ensuring your own safety and that of your family members.

River	Water level observation point	Location
Yodo River	Hirakata	Next to Yodogawa Stadium at Yodo Riverbed Park
Funahashi River	Nishi Kawara Bridge	Vicinity of Makino Elementary School
Hotani River	Yamagaito Bridge	Vicinity of Sakaimaike Park
Amano River	Kin'ya Bridge	Vicinity of Hirakata Police Station

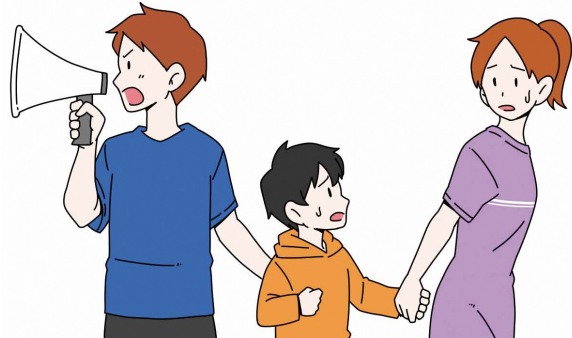
Meteorological condition	Japan Meteorological Agency information*1		River level information		Alert level
Heavy rainfall (once in several decades)	Heavy rain emergency warning	Flood information	Anticipated flooding start level	Yodo River: 8.38 m	5
				Funahashi River: 4.10 m	
				Hotani River: 3.55 m	
				Amano River: 5.66 m	
	Landslide alert information	Flood risk information	Flood risk level	Yodo River: 5.50 m	4
				Funahashi River: 3.20 m	
				Hotani River: 2.70 m	
				Amano River: 4.50 m	
From several hours to about 2 hours before start of heavy rain	Heavy rainfall warning Flood warning	Flood alert information	Evacuation level	Yodo River: 5.40 m	3
				Funahashi River: 3.10 m	
				Hotani River: 2.60 m	
				Amano River: 4.30 m	
From half a day to several hours before heavy rain	Heavy rain advisory*2 Flood advisory	Flood precautionary information	Flood precaution watch level	Yodo River: 4.50 m	2
				Funahashi River: 2.00 m	
				Hotani River: 2.25 m	
				Amano River: 3.50 m	
From several days to about 1 day before heavy rain	Early advisory information (warning level potential)	—	Flood prevention team standby level	Yodo River: 2.70 m	1
				Funahashi River: 1.00 m	
				Hotani River: 1.00 m	
				Amano River: 1.00 m	

*1 Emergency warnings, warnings, and advisories issued by the Japan Meteorological Agency and other agencies are generally issued by village, town, or city; risk distribution information is issued for zones measuring about 1 kilometer on each side; and designated river flood forecasts (consisting of flood information, flood risk information, flood alert information, and flood precautionary information) are issued by river.

*2 In the event of an advisory that is likely to be changed to a heavy rain warning (landslide) later that night or during the early hours of the following morning, increase your level of readiness so that you can comply without needing to hurry.

In addition to **paying attention to the issuance of evacuation information** by Hirakata City, residents of anticipated flood zones and landslide warning areas should take steps themselves to **ensure their own safety**, even if the city has not issued any official information.

Additionally, people who require additional time to evacuate should start the process early. Keep in mind that **it's important to evacuate while the alert level remains at 3 or 4** since it's likely that you won't be able to evacuate at alert level 5, when a disaster has already occurred.



Alert level	Evacuation information (issued by Hirakata City)	Action to be taken by residents	Meteorological condition
5	Emergency safety measure (River level) The water level has reached the level at which flooding begins. (Landslides) A heavy rain emergency warning (landslide) has been issued.	<ul style="list-style-type: none"> ● A disaster is already occurring. ● Take steps to protect yourself from imminent danger. 	
4	Evacuation order (River level) The water level has reached a level that poses a risk of flooding and is expected to continue rising (for the Yodo River, 6 meters, the equivalent of adding 50 centimeters to the level that poses a risk of flooding). (Landslides) Landslide alert information has been issued, and the landslide risk distribution has reached the "extreme risk (light purple)" level.	<ul style="list-style-type: none"> ● Evacuate immediately to a shelter. ● If you determine that it would be dangerous to relocate to a public shelter, seek shelter at a nearby safe location or at a safer location in your own home. 	Heavy rainfall (once in several decades)
3	Senior citizen evacuation (River level) The water level has reached the evacuation decision level. (Landslides) Heavy rain warning (landslide) has been issued, and the landslide risk distribution has reached the "alert (red)" level.	<ul style="list-style-type: none"> ● People who require additional time to evacuate (for example senior citizens, people with disabilities, and infants) should evacuate, along with their caregivers. ● Senior citizens, people with disabilities, infants, and their caregivers should evacuate. ● Other people should prepare to evacuate. 	From several hours to about 2 hours before start of heavy rain
2	—	<ul style="list-style-type: none"> ● Prepare to evacuate, and review your own evacuation plans based on hazard maps and other resources. 	From half a day to several hours before heavy rain
1	—	<ul style="list-style-type: none"> ● Increase your level of readiness, for example by checking precautionary information issued by the Japan Meteorological Agency. 	From several days to about 1 day before heavy rain

*With regard to the Kizu River, the city will issue evacuation information after flooding has already occurred due to the waterway's distance from the city. (Any flood damage in the city would be estimated to occur about five hours after flooding occurs.)

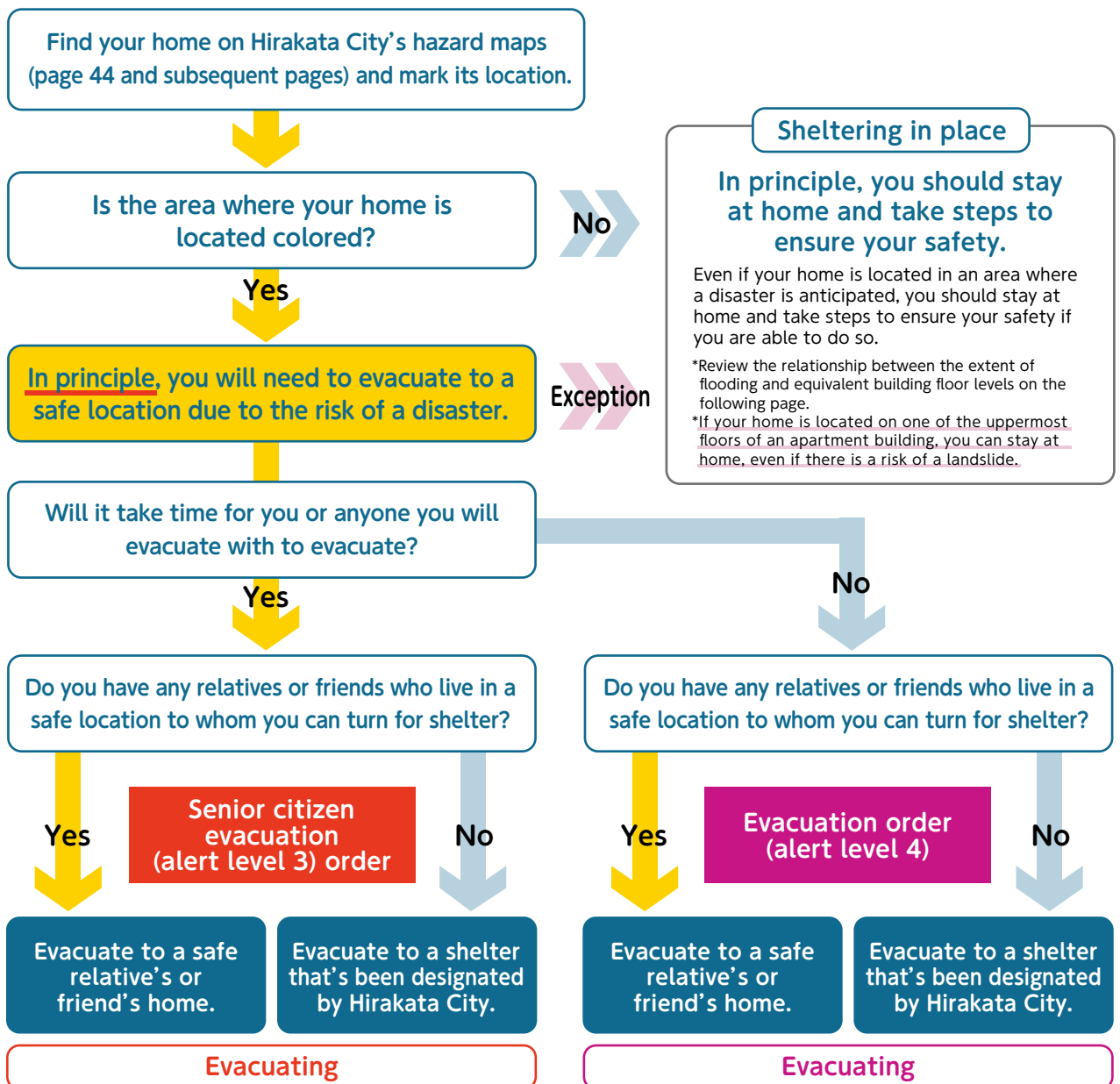
*Information is created by the city by modifying the Japan Meteorological Agency's five alert levels and disaster readiness meteorological information (<https://www.jma.go.jp/jma/kishou/now/bosai/alertlevel.html>).

Choosing to evacuate

If there is a possibility of heavy, sustained rainfall, flooding, or a landslide, it's important to review the best course of action with regard to evacuating for yourself and your family members.

Use the following evacuation decision-making flowchart to review the action you should take.

Evacuation decision-making flowchart



Evacuating and sheltering in place

There are two ways to deal with a disaster: evacuating (leaving your home) and sheltering in place (staying in a safe place inside your home).

Evacuating

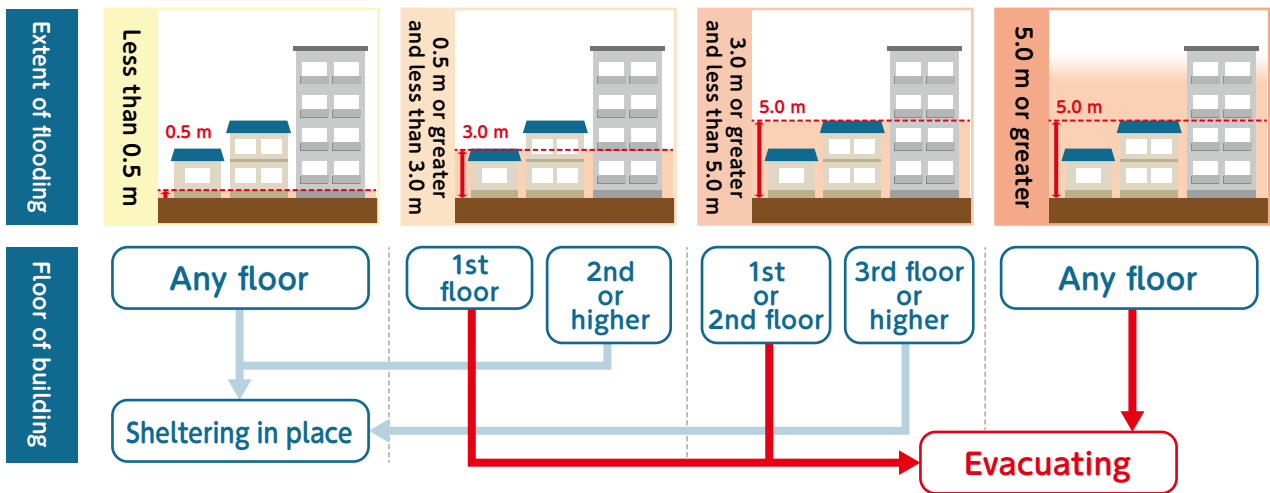
If your home is likely to be impacted by a disaster, for example because it's located in an anticipated flood zone, you should evacuate to the home of a relative or friend in a safe location or to a shelter designated by Hirakata City.

Sheltering in place

If you can confirm that your home or the building you're in is safe, you should shelter in place (stay at home). Depending on the extent of flooding, you may need to move to a higher floor.

Extent of flooding and how to decide whether to evacuate or shelter in place

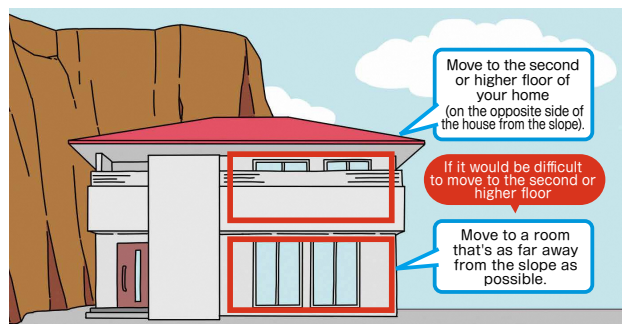
*Check the floodwater depth at your home using hazard maps (page 44 and subsequent pages).



Evacuating from a landslide warning area

If you notice any landslide warning signs, please contact Hirakata City immediately. If evacuation information is issued, follow the instructions and evacuate (leave your home), even if you were planning to shelter in place. If you require additional time to evacuate, you should take action as early as possible.

Most people who sustain injuries in landslides were on the first floor of a wooden building. If it would be difficult to evacuate your home, for example because it's too late, move to a safer location inside your home, such as a room located as far as possible from the nearby slope and on the second floor or higher.

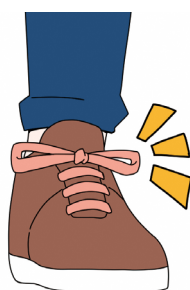


See page 32 for more information about sheltering in place, and page 30 for more information about shelters.

Key considerations when evacuating

If you need to evacuate your home during heavy rainfall, walk (don't use a car). Evacuating in your car may interfere with emergency vehicles and cause traffic congestion.

Additionally, your car could become immobilized if the road floods.



Don't go barefoot or wear rain boots. Tennis shoes that lace up are a good choice of footwear.



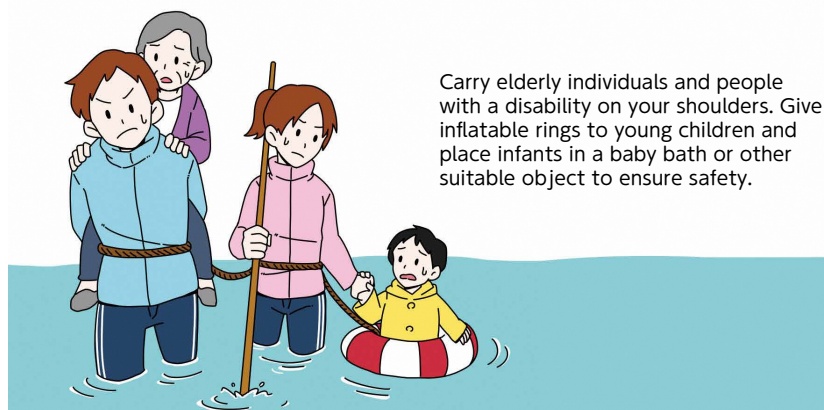
Men and women can generally walk in water that's about 70 centimeters or 50 centimeters deep, respectively. Don't take unnecessary risks by trying to walk in water that comes up to your lower back. Get to a high place and wait to be rescued.



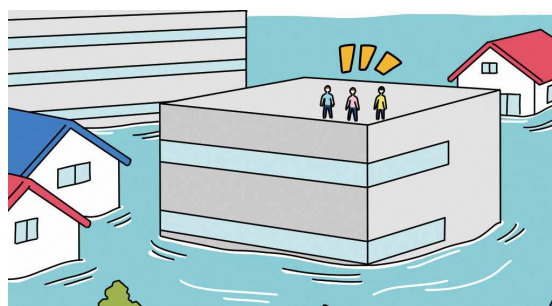
Groups of people should rope themselves together while evacuating so that nobody gets separated from the group. Be especially careful to keep an eye on children.



It's impossible to know what dangers lurk below the surface of the water. Use a long pole as a walking stick and verify the path is safe as you walk.



Carry elderly individuals and people with a disability on your shoulders. Give inflatable rings to young children and place infants in a baby bath or other suitable object to ensure safety.

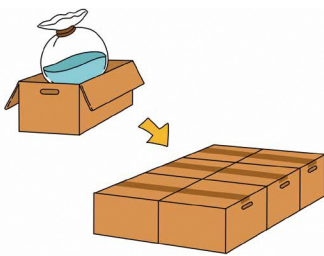


If you find yourself delayed in evacuating and in a dangerous situation, seek shelter on as high a floor as possible in a nearby sturdy building.

Preparing for flooding with water sacks and water stops

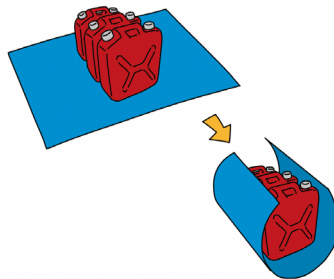
Using water sacks to deal with flooding

You can use everyday items to prevent small-scale, shallow flooding during its initial stages. Review how to make a water sack below.



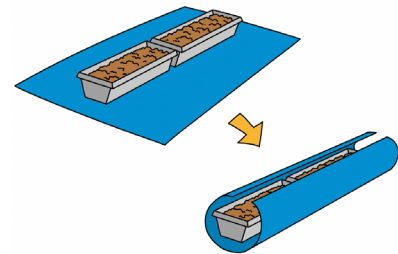
Using trash bags and cardboard boxes

Put two or three trash bags inside each other, fill halfway with water, and cinch them tightly closed to create a simple water sack. Place these simple water sacks inside cardboard boxes and line them up to make a wall.



Using plastic water cans and plastic sheeting

Fill plastic water cans or similar containers with water, place them in a row on top of tarpaulin or plastic sheeting, and wrap the tarpaulin or sheet around them before use.



Using planters and plastic sheeting

If you have dirt-filled planters that you can use in place of plastic water tanks, you can use them as sandbags.

If you're concerned about flood damage

Taking advantage of subsidy programs to construct a water stop

A water stop is a structure for preventing ingress of flood water at building entrances and other areas.

Hirakata City offers subsidies for installing structures such as water stops as a way to support residents who are concerned about flood damage from heavy rainfall.

Eligibility

Anyone who has constructed a water stop or similar structure at a residence or business in the city (excluding temporary structures and structures owned by businesses for the purpose of sale)
*Be sure to consult with the city before building the water stop.

Subsidy amount

Half the cost of the structure, up to a maximum of ¥500,000 (rounded down to the nearest ¥1,000)

Please contact Hirakata City's Crisis Management Department for details.

Phone: 072-841-1270 Fax: 072-841-3092

More information is available on the city's website.

<https://www.city.hirakata.osaka.jp/0000003922.html>



Example: Removable aluminum water stop in the entryway of a home

