

# GUIDE TO SETTLEMENT OF CANTERBURY FLAT LAND CLAIMS



April 2013

---

# Introduction

---

This guide focuses on repair methods for some of the types of land damage that occurred on flat residential land as a result of the Canterbury earthquakes.

EQC costs land repair for the purposes of calculating the land settlement. For these costings, EQC will often use the potential land repair methods that are described generally in this guide. EQC will not in most cases be carrying out, or arranging to carry out, the land repair.

Land damage claims will mainly be settled by EQC with a cash settlement to the homeowner or mortgagee. This will enable you to undertake or arrange the work yourself.

The repair methods in this guide are general in nature. The actual repair methods used on your insured land need to be considered on a case-by-case basis, appropriate for your specific site and the nature of the land damage.

In some cases there will be other methods not covered in this guide that may be more appropriate or practical for your land. This guide should not be read as implying that any particular repair method must be undertaken or that a particular repair method is suitable in every case. You will need to take appropriate advice before starting repairs on your insured land.

This guide does not provide engineering or design documentation for repair purposes. Any such documentation (if required) will need to be drawn up for your specific situation.

Detailed provisions on EQC land cover can be found in the Earthquake Commission Act 1993 at [www.legislation.govt.nz](http://www.legislation.govt.nz). The provisions of that Act will be applied by EQC at all times. This guide is a summary only.

# Land damage

## Types of land damage

There is land damage where the land has been materially physically changed as a direct result of an earthquake, and that change has materially affected the physical use of the land.

Nine types of land damage have been identified on the flat residential land in Canterbury.

Seven types identify physical damage that can be seen by looking at the land.

Two types involve physical changes to the land that are not easily seen, but which have increased the future vulnerability to liquefaction or to flooding.

The table below describes the land damage types in general terms.

Type	Description
<b>DAMAGE THAT CAN BE SEEN</b>	
Land cracking caused by lateral spreading.	Lateral spreading is the sideways movement of land, typically toward watercourses. Blocks of the earth crust move sideways over liquefied soils toward a lower area. Surface damage can include minor or major cracks in the land and tilting of ground crust blocks.
Land cracking caused by oscillation movements.	Cracks to land can result from both lateral spreading (see above) and oscillation (backwards and forwards ground movement during earthquake shaking). Cracks resulting from oscillation are typically minor and isolated.
Undulating land.	Undulating land is caused by the uneven settlement of the ground surface as a result of the ejection of sand and silt, and, to a lesser extent, the uneven settlement of liquefied soils below ground.
Local ponding.	Local settlement or lowering of the land resulting in water forming ponds on the ground surface for extended periods in locations where it did not pond before the earthquake.
Local settlement causing drainage issues.	In some areas residential land has settled more than the adjacent land beneath which public services are located (and vice-versa). This results in drains now flowing the opposite way.
Groundwater springs.	New groundwater springs have emerged and are now flowing over the ground surface where this was not happening before the earthquake. The spring usually occurs at a specific location on residential land.
Inundation by ejected sand and silt.	Sand and silt is ejected to the ground surface from the zone below the water table through cracks in the crust. The ejected sand and silt may be deposited in isolated mounds, under houses, or over large areas.
<b>DAMAGE INVOLVING AN INCREASED VULNERABILITY</b>	
Increased liquefaction vulnerability.	In some areas the ground surface has subsided and the groundwater table has typically remained at a constant level. Therefore the ground surface is closer to the water table than prior to the earthquake. This generally reduces the non-liquefying ground crust thickness. As a result there has been an increase in the future vulnerability to the liquefaction hazard of some sites.
Increased flooding vulnerability.	In some areas, the ground surface has subsided. As a result, there has been an increase in the future vulnerability to flooding of some sites situated near waterways.

Further information can be found in the Earthquake Commission: Canterbury Earthquakes 2010 and 2011 – Land Report as at 29 February 2012 (July 2012). This Report can be found on the EQC website at [www.eqc.govt.nz/land](http://www.eqc.govt.nz/land).

# Potential repair methods

## About the repair methods

This guide sets out some potential repair methods for the seven types of observable land damage.

The repair methods for reinstating land:

- for one type of land damage may also repair other land damage types at the same time. For example, the repair of undulating land may fully or partially repair local ponding
- generally comprise earthworks and/or drainage works
- focus on the repair of individual sites only – not area wide solutions.

## Consents and other statutory approvals

You may need local authority resource or building consents before undertaking repairs.

We recommend that you contact your local authority to confirm:

- the site specific requirements of the property, and
- whether there is a global consent which authorises the repair.

In some instances, you may need to apply for additional resource consents. Engineering or drainage advice may be required to assist in the repair.

Environment Canterbury and your local authority have worked together to streamline the consent process. If you live in the Christchurch City Council area, visit the land repair page on the website, [www.ccc.govt.nz/landrepair](http://www.ccc.govt.nz/landrepair) to find out more about the process and to understand what may, or may not be, required as you continue with your land repair. If you live in the Waimakariri District Council or Selwyn District Council areas then you will need to contact them directly for more information.

Before you contact your local authority, you'll need to talk to your private insurer, mortgagee and also, where necessary, the contractor you will engage to make the repairs. When you contact the local authority, please have the information about the type of land damage and the way it is proposed to repair it.



# Land cracking caused by lateral spreading

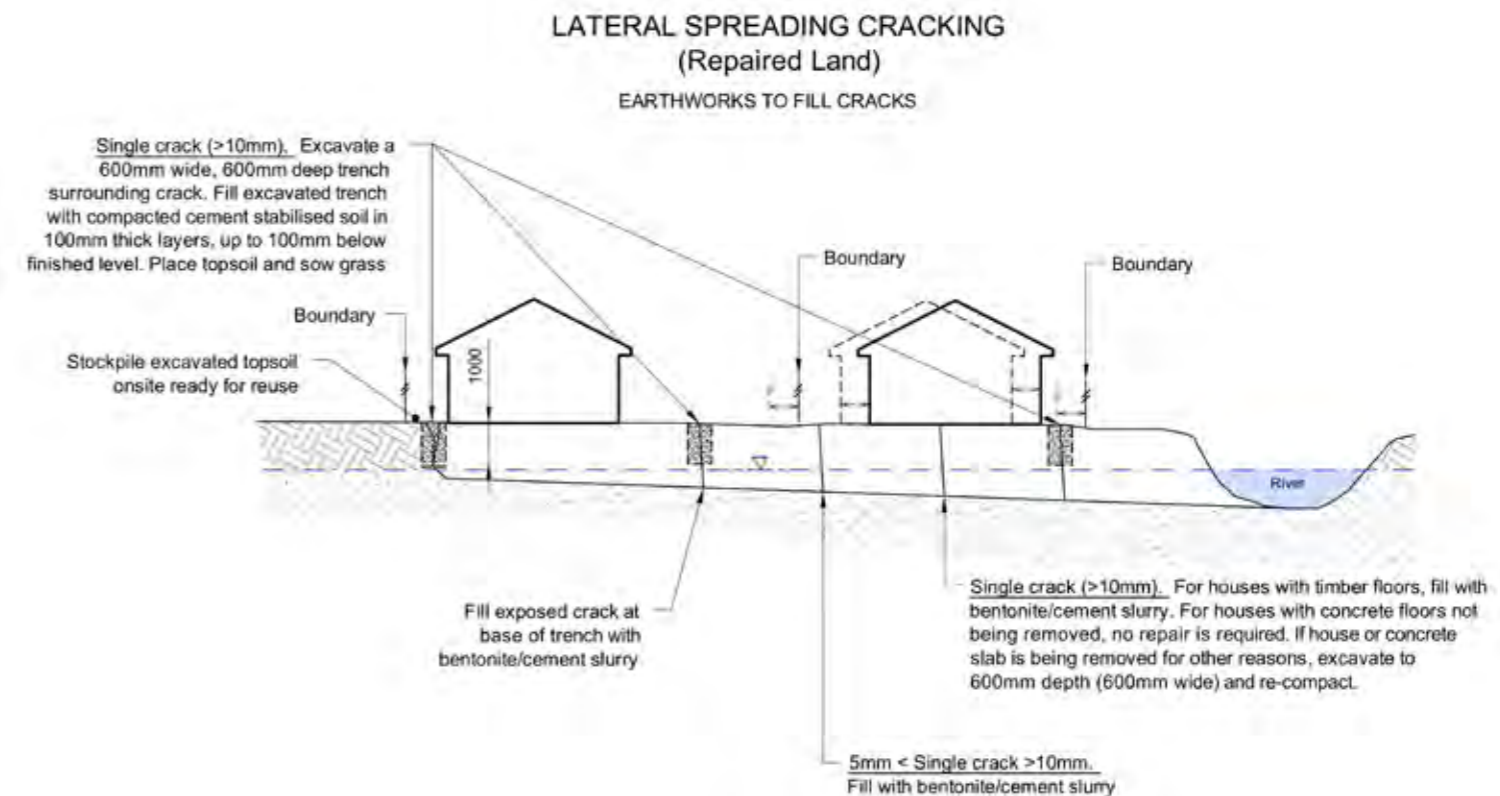
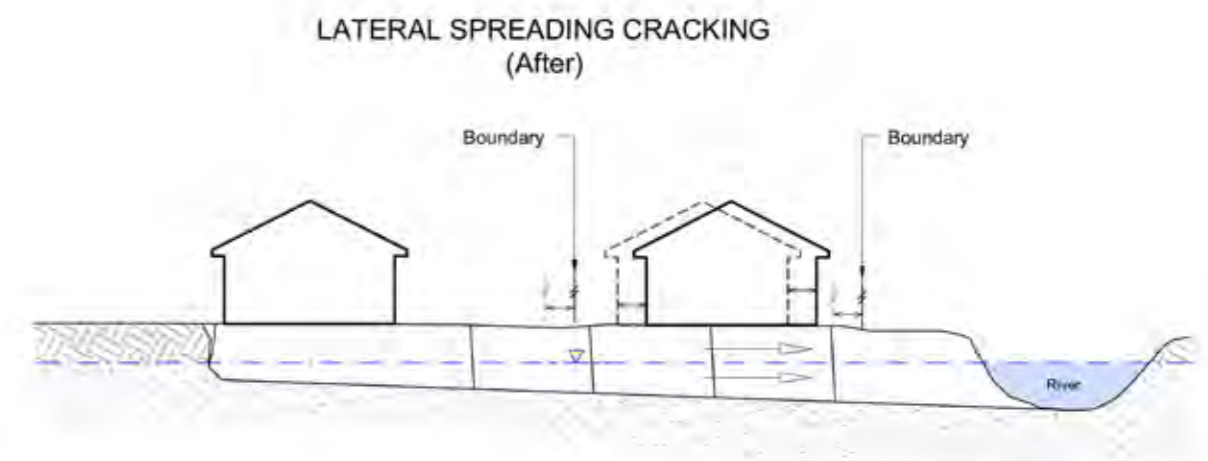
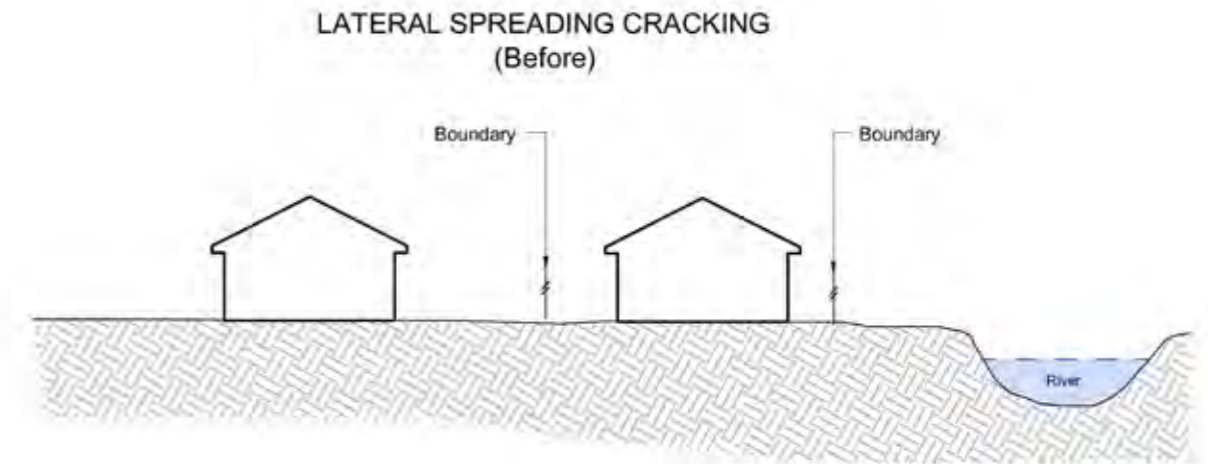
The insured land has an open crack that is wider than 5mm or a crack that has a vertical separation of more than 5mm that is caused by lateral spreading. The lateral spreading is the sideways movement of blocks of land crust that tilt toward an open channel or dip (eg. a river) which is reasonably close by.

The land is considered damaged because a crack wider than 5mm:

- is a potential pathway for future sand ejection
- is a tripping hazard
- can restrict the normal maintenance to the property (e.g. lawn mowing).

If a crack is more than 5mm wide, then the crack needs repair. This is unless the crack is under a drive or other paving where it does not affect physical use of the land.

Potential repair methods	
Crack open more than 10mm wide or more than 10mm vertical separation.	<p><b>METHOD: Earthworks to fill crack</b></p> <p><b>Outside any structure:</b> Excavate to 600mm depth (600mm wide trench) and re-compact</p> <p><b>Under any structure:</b> <i>For house with timber floors</i> Fill with bentonite/cement slurry. If house is removed for other reasons then excavate to 600mm depth (600mm wide trench) and re-compact</p> <p><i>For house with concrete floors</i> No repair required if the concrete slab is not being removed. If the slab is being removed for other reasons, excavate to 600mm depth (600mm wide trench) and re-compact</p>
Crack open between 5mm to 10mm wide or between 5mm to 10mm vertical separation.	Fill with a bentonite/cement slurry



# Land cracking caused by oscillation movements

The insured land has a crack more than 5mm wide caused by ground oscillation (backwards and forwards ground movement) as a direct result of the earthquake. This land is considered damaged because a crack wider than 5mm:

- is a potential pathway for future sand ejection
- is a tripping hazard
- can restrict the normal maintenance to the property (e.g. lawn mowing).

If a crack is more than 5mm wide, then the crack needs repair. This is unless the crack is under a drive or other paving where it does not affect physical use of the land.



## Potential repair methods

Crack more than 5mm wide.

### **METHOD: Earthworks to fill crack**

#### **Outside any structure:**

Fill with bentonite/cement slurry

#### **Under any structure:**

*For house with timber floors*

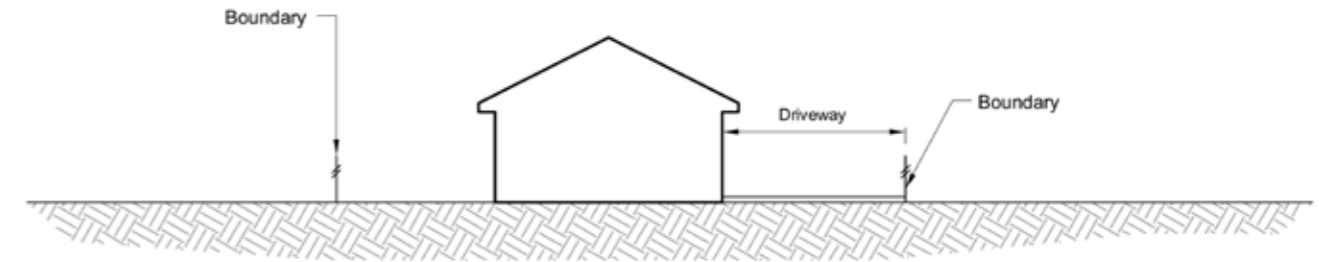
Fill with bentonite/cement slurry

*For house with concrete floors*

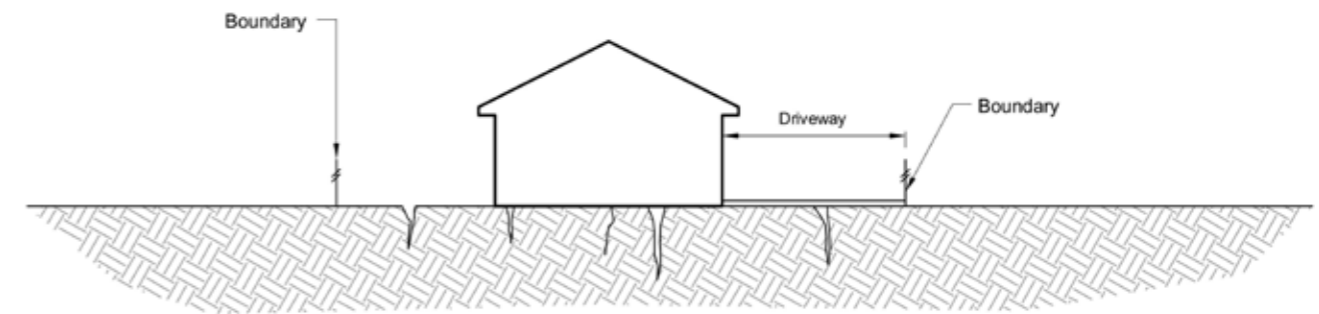
No repair required if the concrete slab is not being removed.

If the slab is removed, then fill with bentonite/cement slurry

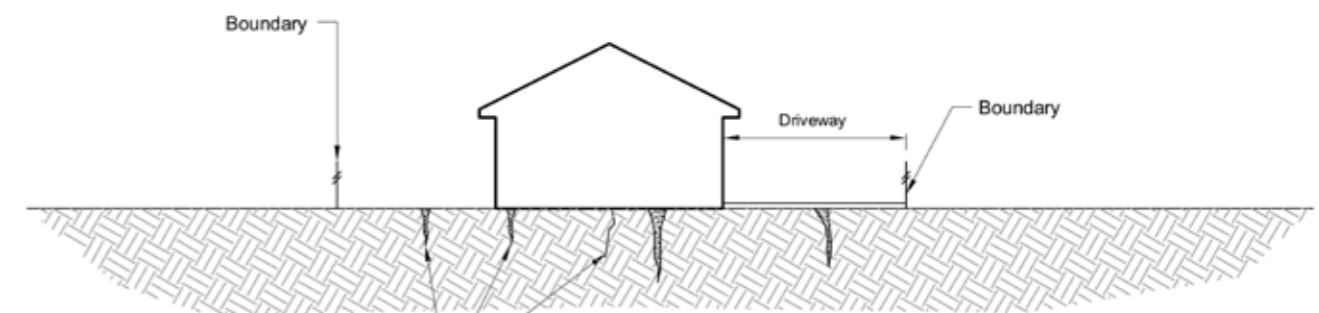
LAND CRACKING - OSCILLATION MOVEMENTS  
(Before)



LAND CRACKING - OSCILLATION MOVEMENTS  
(After)



LAND CRACKING - OSCILLATION MOVEMENTS  
(Repaired Land)  
EARTHWORKS TO FILL CRACKS



Crack > 5mm. Fill exposed cracks with bentonite/cement slurry and top with topsoil and sow grass where required  
(Note: for houses with concrete floors, no repair is required if the floor is not being removed)

# Undulating land

Undulating land is caused by the uneven settlement of the ground surface as a result of the ejection of sand and silt, and to a lesser extent the uneven settlement of liquefied soils below ground.

This is considered damaged because undulations:

- are tripping hazards
- restrict the normal maintenance to the property (eg. lawn mowing).

Undulations under lawns will generally affect the physical use of land less than undulations under paths/patios/access areas.

## Potential repair methods

Undulation more than 50mm high (if on lawn)

### METHOD: Earthworks to re-level ground

Undulation more than 25mm high (if under path/patio).

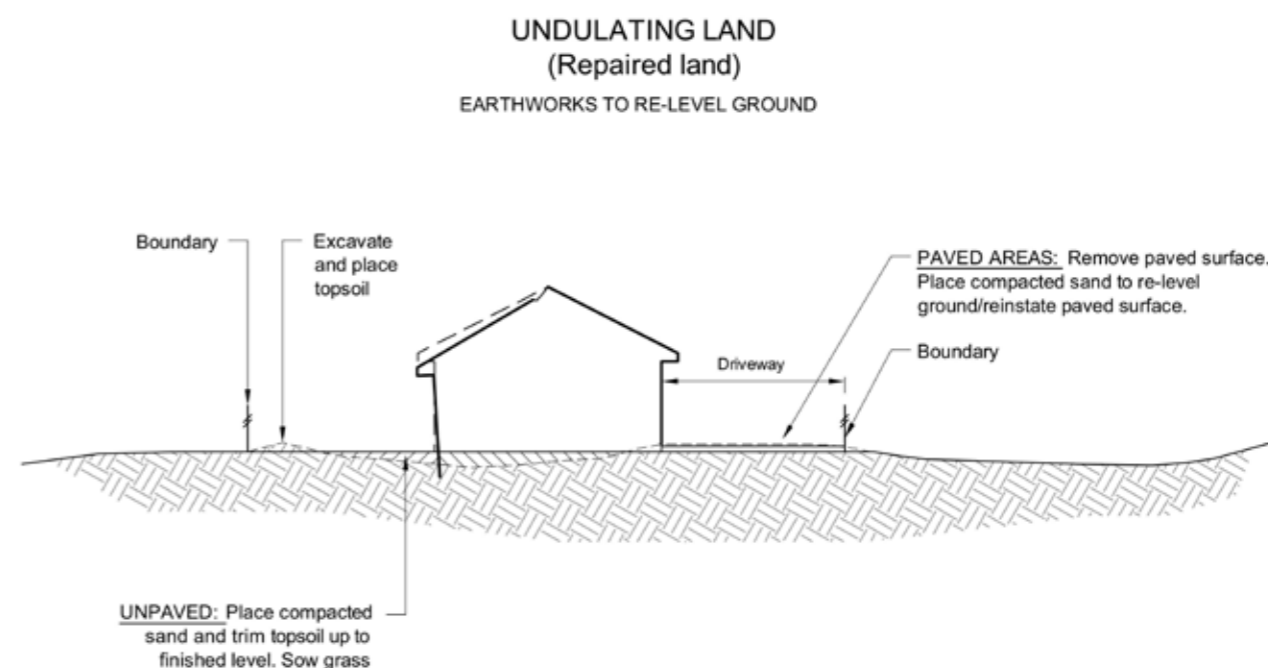
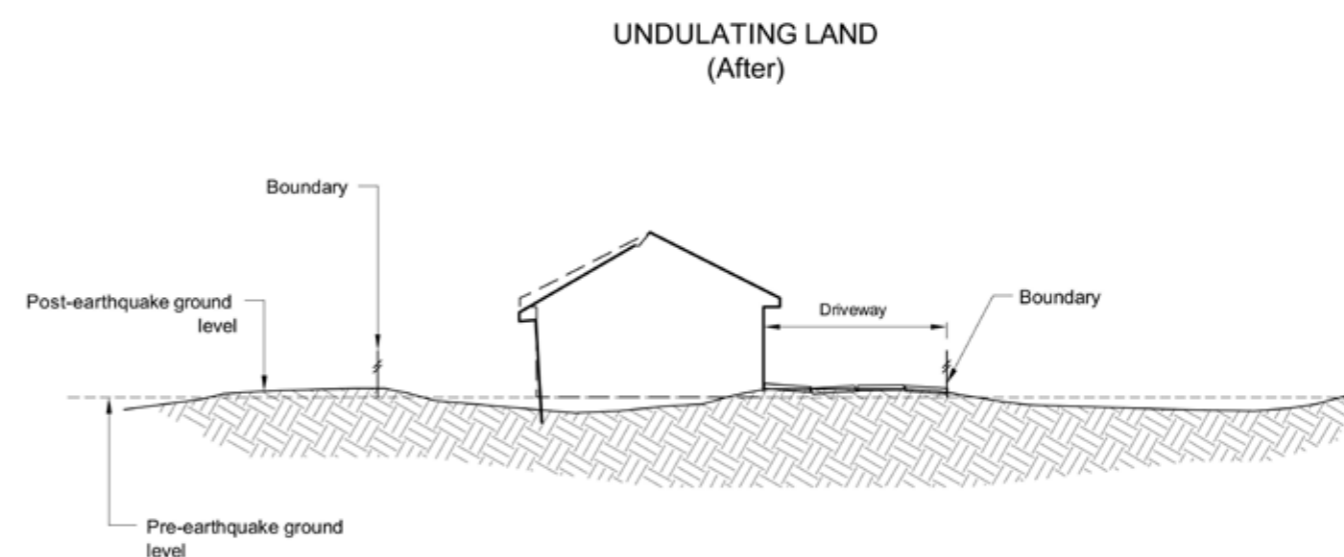
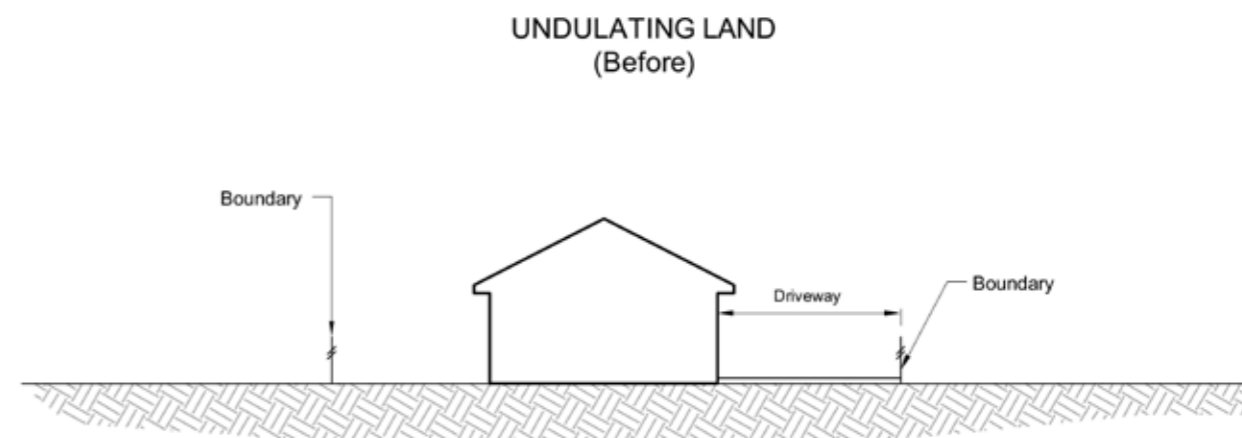
#### Earthworks for unpaved areas:

Remove topsoil and raise the land to the same level as the surrounding ground with compacted sand, topsoil and grass.

#### Earthworks for paved areas:

Remove paved surface. Place compacted sand to re-level ground.

The pavement (including basecourse) if damaged by the earthquake may be covered by your private insurer. We recommend that you contact your private insurer to check.





# Local ponding

The local settlement of the ground has occurred as a direct result of the earthquake. The ground lowering has resulted in water ponding on the ground surface in locations where it did not pond previously.

If water now ponds in a depression in the ground surface, and this affects the physical use of the land, then the land is considered to be damaged.

## Potential repair methods

Local ponding on ground surface for extended periods following rainfall where the land is lower than pre-earthquake level.

### METHOD 1: Earthworks to re-level ground

#### Earthworks for unpaved areas:

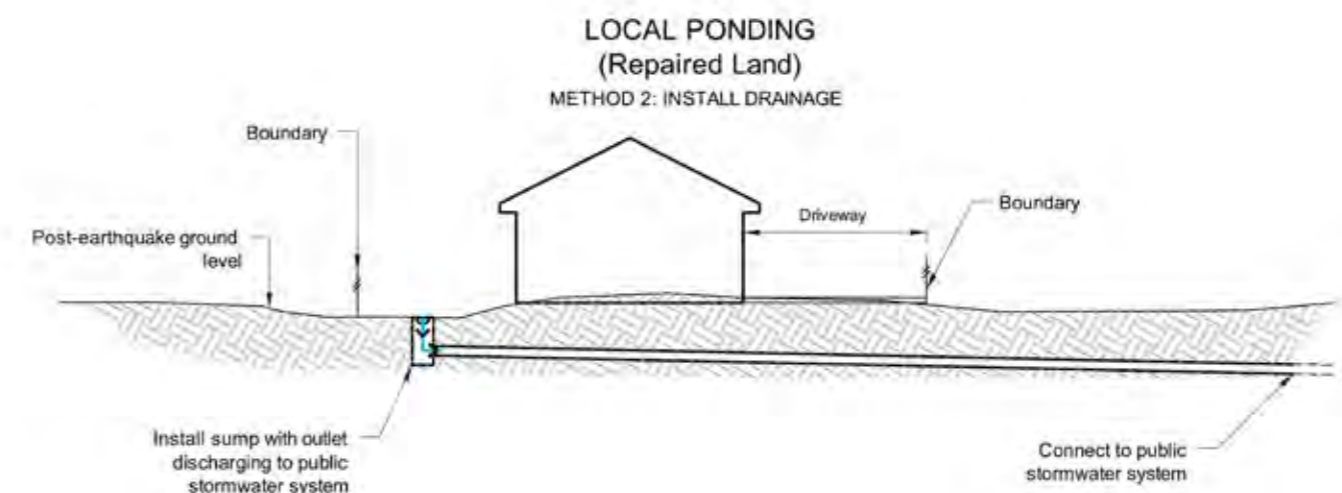
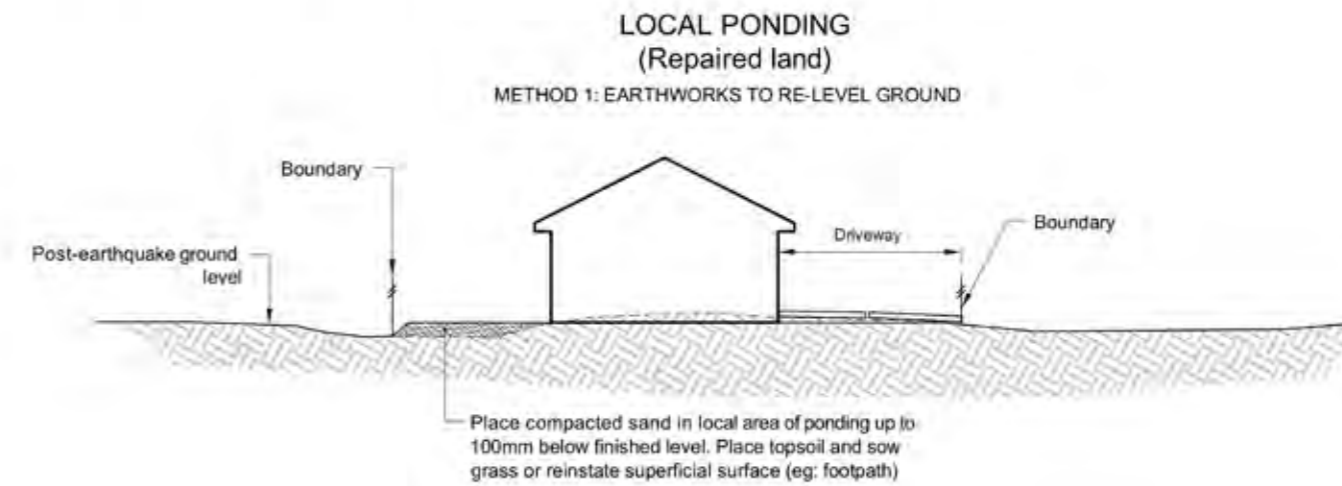
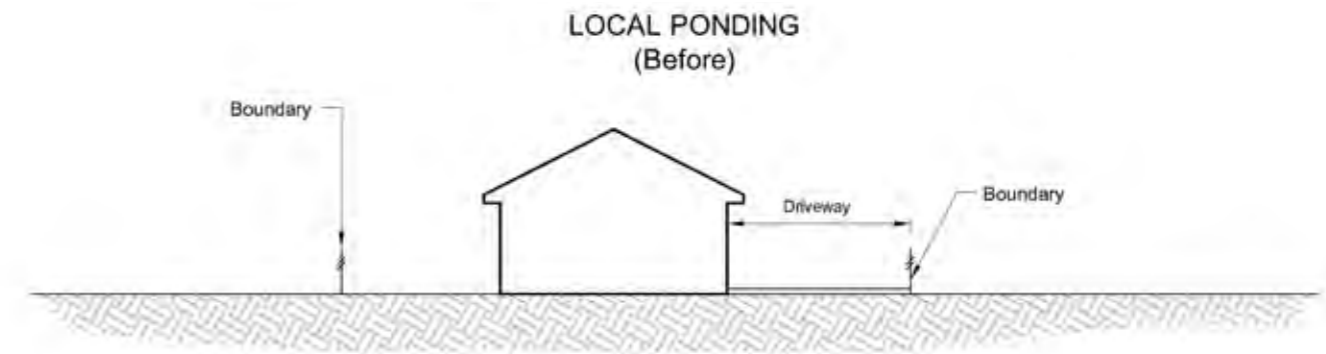
Remove topsoil and raise the land to the same level as the surrounding land with compacted sand, topsoil and grass.

#### Earthworks for paved areas:

The surface will need to be removed above areas with local ponding and built up with compacted soil. The pavement (including basecourse) if damaged by the earthquake may be covered by your private insurer. We recommend that you contact your private insurer to check.

### METHOD 2: Install drainage

This may comprise a sump with an outlet pipe discharging to the nearest public stormwater system. Locate the sump at the lowest point of the damaged land to ensure all surface water flows to the sump.



# Local settlement causing drainage issues

If insured land has settled as a direct result of the earthquake so that the land is no longer high enough to provide sufficient fall for drainage services, then the physical use of the land has been compromised.



## Potential repair methods

Local settlement results in drains now flowing the opposite way.

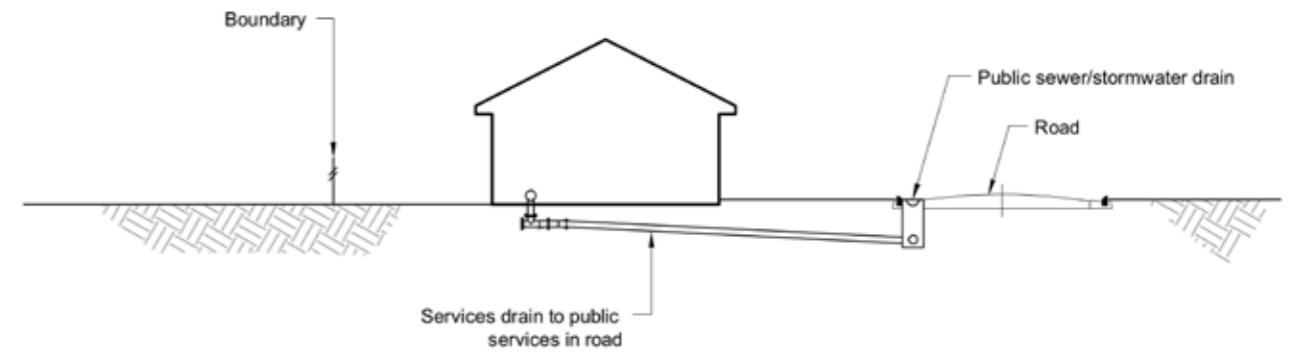
### **METHOD 1: Re-lay private drains – Not covered in this Guide**

Re-laying the private site drains to public services could be considered – but note that this approach would be part of the residential building cover and not costed as a residential land repair.

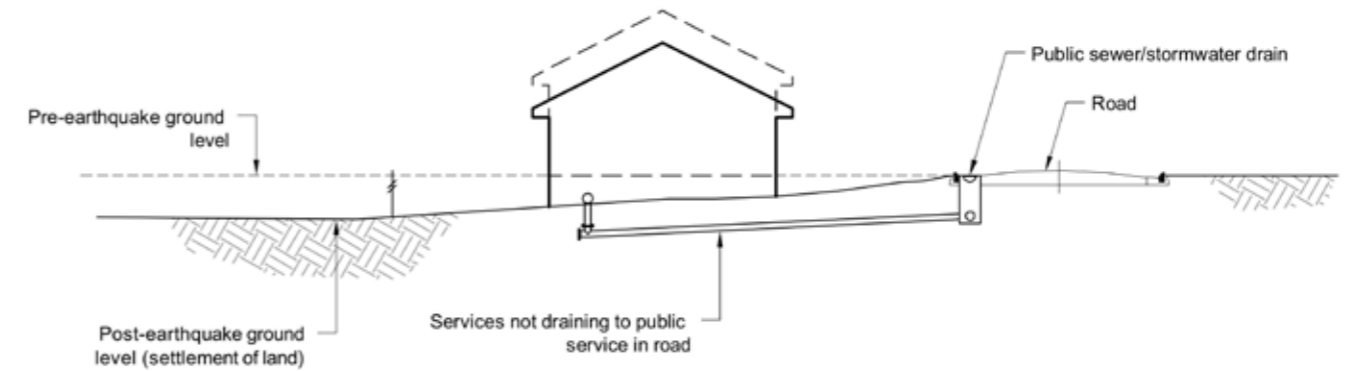
### **METHOD 2: Earthworks to raise the land – Covered in this Guide**

As an alternative, raise the level of the insured land to allow the installation of drainage with fall to the existing public service network. Note that this reinstatement may require the removal/relocation of the residential building.

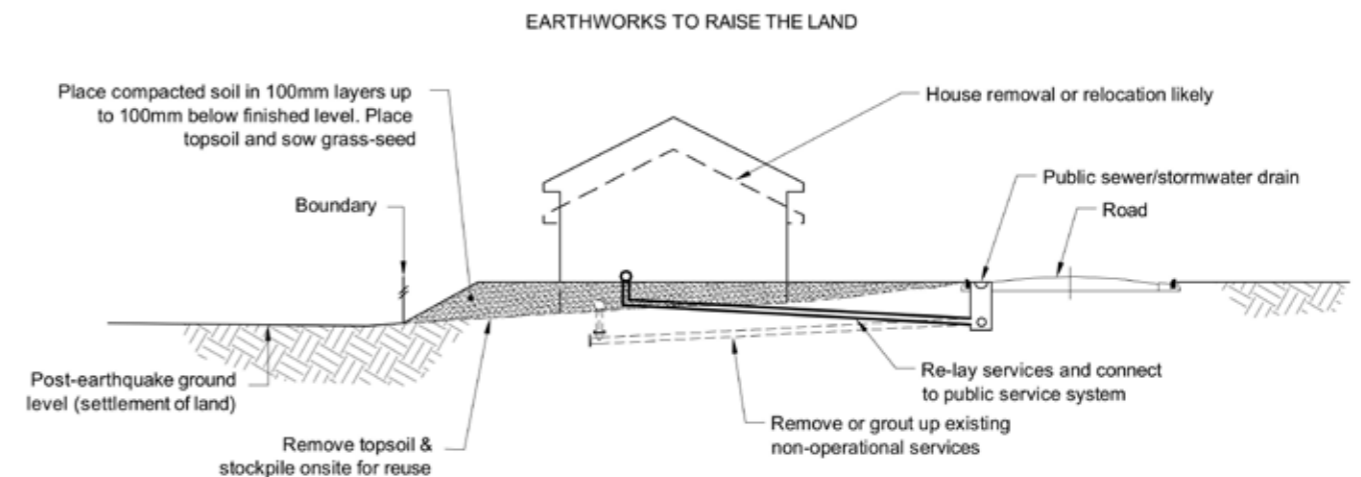
## LOCAL SETTLEMENT CAUSING DRAINAGE ISSUES (Before)



## LOCAL SETTLEMENT CAUSING DRAINAGE ISSUES (After)



## LOCAL SETTLEMENT CAUSING DRAINAGE ISSUES (Repaired Land)





# Groundwater springs

If, as a direct result of the earthquake, a new groundwater spring is flowing water onto insured land, then the land located at the spring and the land covered by water flowing from the spring is considered to be damaged.

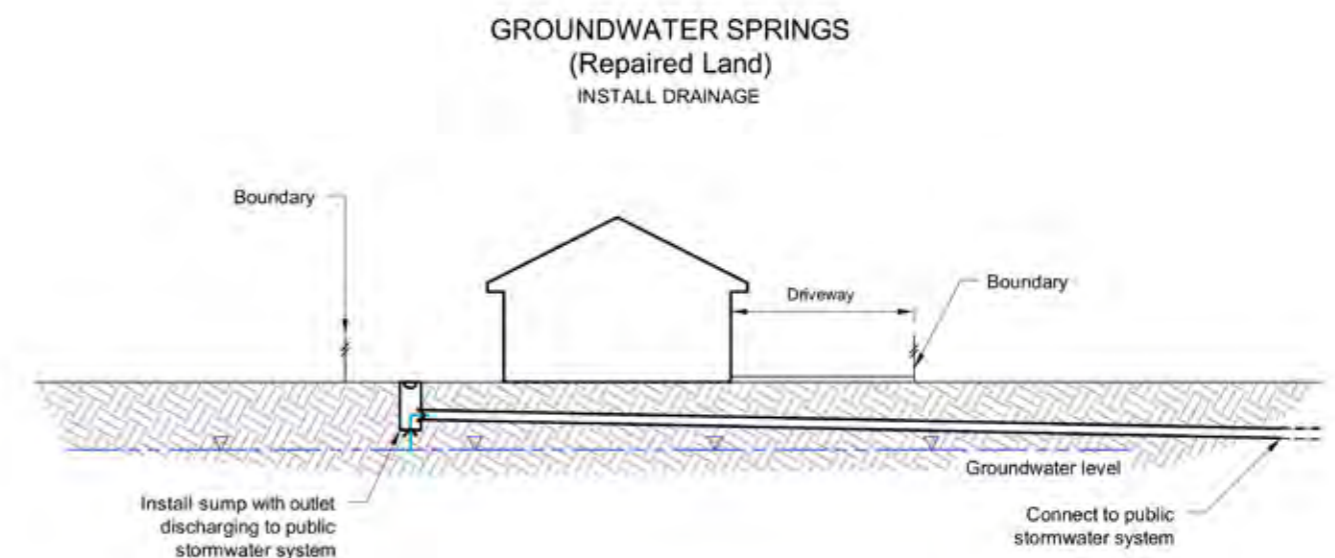
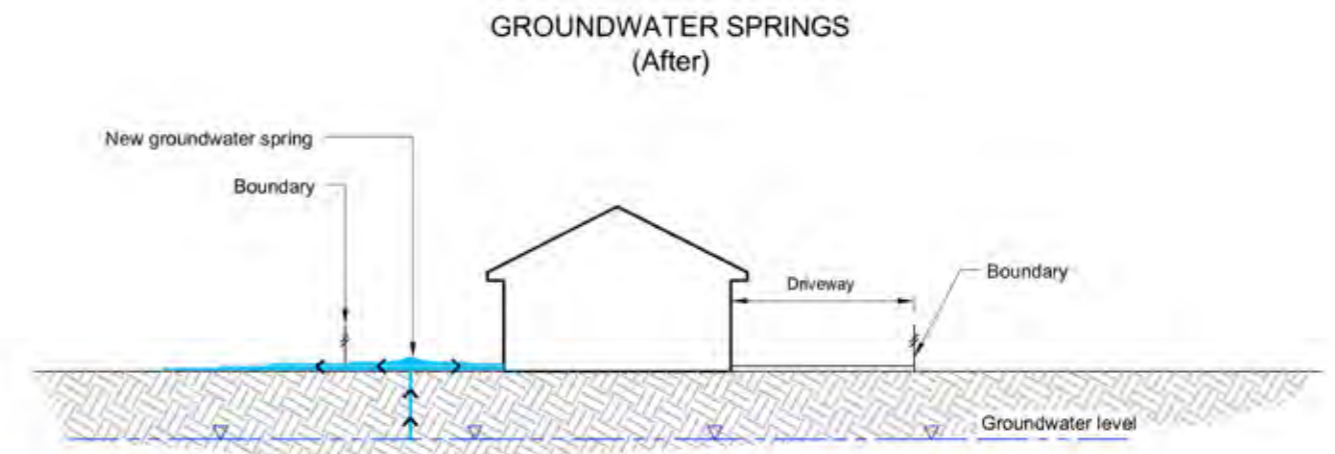


## Potential repair methods

Groundwater spring has emerged and is now flowing over the ground where this was not happening before the earthquake.

### METHOD: Install drainage

This may comprise a sump with an outlet pipe discharging to the nearest public stormwater system. The outlet pipe should be detailed to ensure it does not block and it can be maintained.



# Inundation by ejected sand and silt

The land is considered damaged if sand and silt has been deposited on the ground surface which affects the physical use of the land.

## Potential repair methods

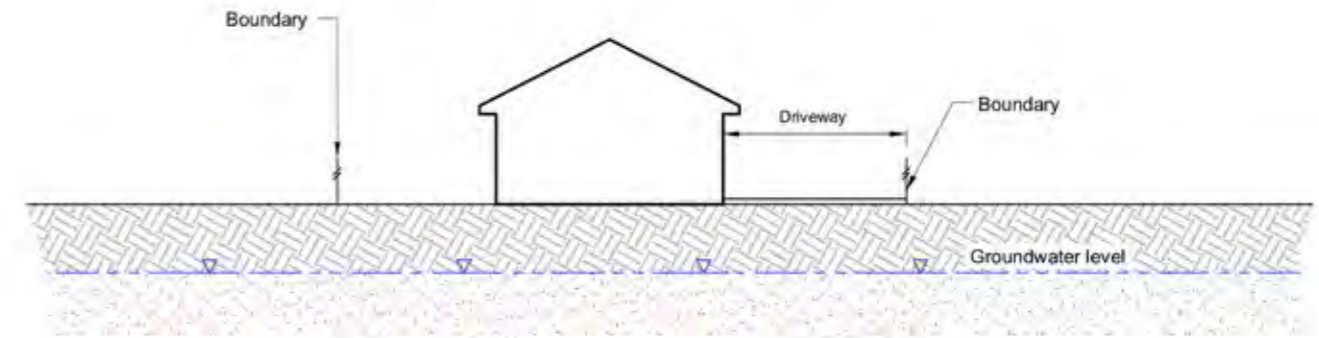
Inundation by ejected sand and silt where a significant volume has been deposited to the ground surface.

### **METHOD: Earthworks to remove sand and silt offsite**

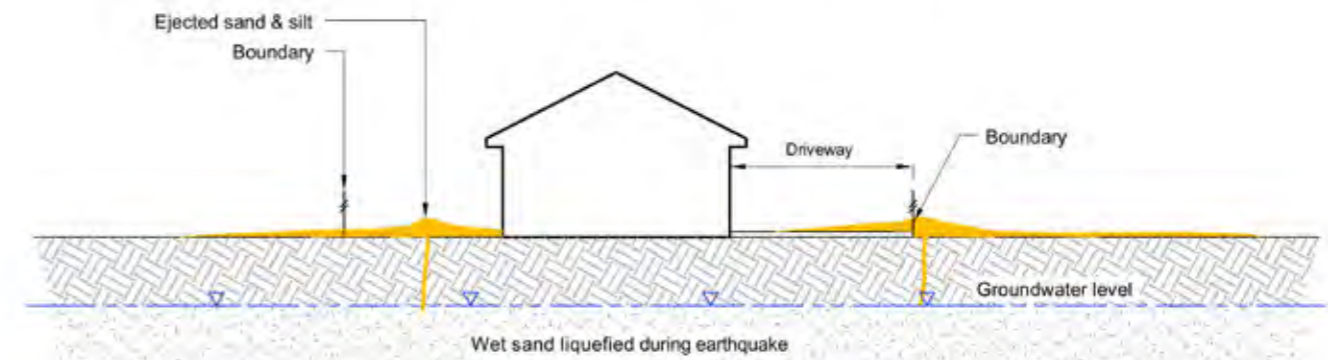
Remove the ejected material (by hand or using an excavator) and dispose of it offsite if not required to fill undulations.

Silt and sand that is required to be removed from beneath the house will likely need to be excavated by hand.

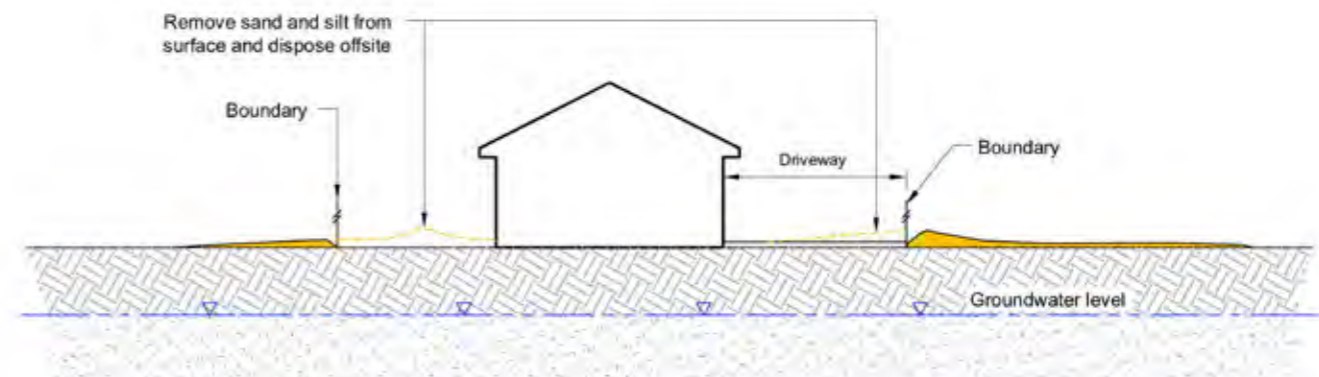
INUNDATION BY EJECTED SAND & SILT  
(Before)



INUNDATION BY EJECTED SAND & SILT  
(After)



INUNDATION BY EJECTED SAND & SILT  
(Repaired Land)  
EARTHWORKS TO REMOVE SAND AND SILT OFFSITE



**For further information about your settlement**

If you have further queries about your settlement, please email [info@eqc.govt.nz](mailto:info@eqc.govt.nz) or call 0800 DAMAGE (0800 32 62 43). The international number is +64 4 978 6400.

**For further information about land repair**

If you need further information about land repair, please contact your local authority: Christchurch City Council, Waimakiriri District Council or Selwyn District Council.

The Earthquake Commission  
Level 20  
Majestic Centre  
100 Willis Street  
Wellington

**Email** [info@eqc.govt.nz](mailto:info@eqc.govt.nz)

**Web** [www.eqc.govt.nz](http://www.eqc.govt.nz)

**0800 DAMAGE (0800 32 62 43)**