



LINZ Basemaps aerial, CC BY 4.0

Land Movement Report

Sample property, Whangārei

TITLE WITHHELD

LS-SAMPLE • ISSUED 26 SEPTEMBER 2026
MEASURED MAY 2015 TO JUN 2025 • SATSENSE INSAR

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Summary

10-Year Historical Land Subsidence Report

InSAR Satellite Deformation Analysis

INSAR DATA FROM EUROPEAN SPACE AGENCY'S SENTINEL-1 SATELLITE.

PROPERTY

Sample property, Whangārei

PERIOD

May 2015 – Jun 2025

OVERALL RESULT

MONITOR

The fastest of 14 measured points places this property in the monitor band.

Property overview

Address	Sample property, Whangārei
Legal description	Withheld (sample)
Land area	809 m ²
Measured	May 2015 to Jun 2025
Satellite views	4 from the west, 10 from the east
Readings	2,980

Measured point summary

13

STABLE

average 0.4 mm/yr

1

MONITOR

average 8.4 mm/yr

0

INVESTIGATE

none

FASTEST POINT

+8.4

mm a year, Point 11

LARGEST TOTAL

+60.3

mm, Point 11

SCREENING LEVEL

SL3

moderate

Triage: what the checks found

NEEDS A CLOSER LOOK

Ground movement	10
1 of 14 points beyond the stable band.	
Speeding up	11
2 points faster in the last 24 months.	
House moving evenly	19
34.5 mm between Points 10 and 11; beyond the national limit.	
Council landslide mapping	24
Mapped high on the property.	

WORTH KNOWING

Heavy rain	21
Point 11 moved +7.3 mm after the rain of 31 May 2020.	
The wider region	22
GNSS station 7 km away: -1.4 mm a year, up-down.	
Earthquakes	29
3 of magnitude 4+ within 150 km.	

LOOKS GOOD

Seasonal movement	20
4.0 mm rise and fall each year.	
Streams and water	28
Nearest stream 198 m away.	
Slope of the land	27
8 degrees on average.	

NOT CHECKED HERE

Council liquefaction mapping	24
Council lists it as 'undetermined'.	

Page numbers point to the detail. The colours of the movement bands are LandSure's screening scale; no New Zealand standard exists for satellite movement rates. House movement is judged against the Building Code's national guidance.

Summary: the key findings

GROUND MOVEMENT

Page 10

+8.4

mm a year, fastest point

Point 11 moves fastest. 2 points have sped up in the last 24 months.

THE HOUSE

Page 19

34.5 mm

between Points 10 and 11, around the house, 4 m apart

Beyond the Building Code's national design guidance of 25 mm over 6 m (1 in 240). A floor-level survey by a professional is the usual next step.

THROUGH THE SEASONS

Page 20

4.0 mm

rise and fall each year

Highest around August, lowest around February. That timing matches ground that swells a little when wet and shrinks as it dries.

HEAVY RAIN

Page 21

+7.3 mm

shift after 31 May 2020

After one of the five wettest days of the record (75 mm on NASA's 50 km rain grid), Point 11 shifted by more than its normal wobble. That happened around the same time; it does not prove one caused the other.

COUNCIL SLOPE MAPPING

Page 24

High

landslide susceptibility

Whangārei District Council maps this land as high susceptibility: slopes here could move, which is why the satellite record matters. It does not mean a slip has happened.

THE WIDER REGION

Page 22

-1.4

mm a year up-down, GNSS station WHNG

GeoNet's GNSS station 7 km away shows the ground there sinking slowly. It is regional context: it does not measure this property.

Ten years at this property

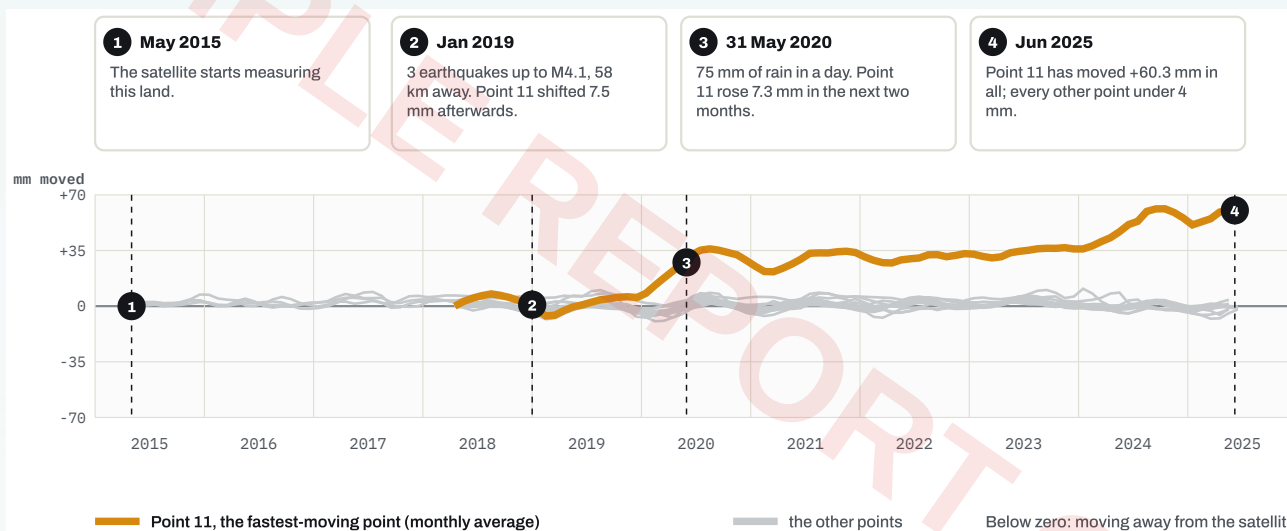


FIGURE 1. The story of the record. Each line is one measured point, starting at zero on its first reading. The numbers on the line match the boxes above it. A change that lines up with an event does not prove the event caused it. Source: SatSense InSAR; NASA POWER; GeoNet, CC BY 3.0 NZ.

What this report cannot tell you

What is underground. The satellite measures hard surfaces from orbit. It does not see soil layers, fill, groundwater or foundations.

Places with no measured point. Lawns, gardens and bush return no steady echo. No point there is not the same as no movement.

What happens next. The record shows how the ground behaved in the years measured. It is not a forecast, a LIM or a geotechnical investigation.

Where to start reading

Buying

Summary	2
Where the measurements are	8
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Owning

Seasonal movement	20
Heavy rain and earthquakes	21
Services in the road	32
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Engineer or surveyor

Point records	11
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Water, rock and soil	28

How to read this report

WHAT WE FOUND

Every page opens with its main finding in a box like this one. Then comes a picture, the numbers behind it, and a short note on what it can and cannot tell you.



FIGURE 2. The areas this report uses (an illustration, not to scale). Points on your land, or within 5 m of the boundary line on either side, are charted, rated and counted; those near the line are flagged. Points 5 to 10 m outside are charted but never set the rating. Out to 100 m, yellow dots show only where measurements exist.

The traffic lights

Stable under 5 mm a year

The usual background movement of New Zealand ground.

Monitor 5 to 10 mm a year

Measurable movement, or a point that has sped up recently.

Investigate 10 mm a year and over

Steady movement where a professional review is the usual next step.

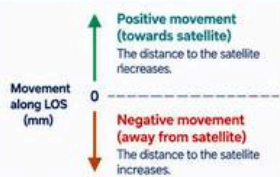
Rates are measured along the satellite's line of sight. These bands are LandSure's screening scale: no New Zealand standard sets bands for satellite movement rates. How evenly a house moves is judged against the Building Code's national guidance.

How to read a movement chart

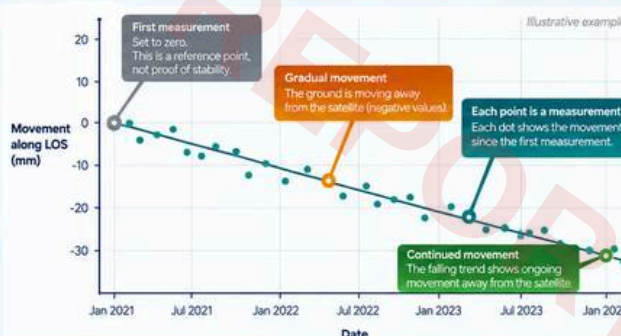
The chart shows how the ground at a selected location has moved over time, measured along the satellite's radar line of sight (LOS).

1 What the axes show

The vertical axis shows movement along the satellite's line of sight (LOS), relative to the first measurement. The horizontal axis shows time.



Each dot is a measurement from the same ground location over time.



3 Things to keep in mind



Look for the overall trend

A consistent rising or falling trend is more important than small point-to-point changes.



Some variation is normal

Individual points can vary due to measurement noise, weather and other factors. Focus on the overall pattern.



Check the time period

Note the start and end dates. Longer time periods can provide a clearer picture of long-term movement.



These are LOS measurements

The chart shows movement along the satellite's radar line of sight, not vertical movement. See the GNSS comparison section for how different measurement directions relate.



Key takeaway

The chart shows movement relative to the first measurement (zero).

Positive values mean movement towards the satellite. Negative values mean movement away from the satellite.

Look for the overall trend, not individual points.

This is movement along the radar line of sight (LOS). It is not the same as vertical movement.

What is in this report

1 Cover and summary

2 Summary: the key findings

3 How to read this report

4 How InSAR works

5 Two viewing directions

6 Measurement coverage

7 Where the measurements are

8 Movement across the property

9 Ten years of movement

10 Point records

15 Point records, within 10 m

17 The street around you

18 Is the house moving evenly?

19 Seasonal movement

20 Heavy rain and earthquakes

21 Comparison with a nearby GNSS (GPS) station

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23 Land stability mapping

24 Title, parcels and buildings

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46 Appendix B - data and licences

47 Appendix B - further sources

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49 Appendix C - limits and terms

How InSAR works

WHAT WE FOUND

A radar satellite measures the distance to the same spots on the ground again and again, for years. The change in that distance, along the satellite's slanted line of sight, is what every chart in this report shows. On this property, 4 points were measured from the ascending view and 10 from the descending view.

How InSAR measures ground movement

By comparing repeated radar images, InSAR detects tiny changes in distance between the satellite and the ground, along the radar line of sight.

1 A radar satellite takes repeated images

The same area is imaged again and again from nearly the same position and viewing geometry.



2 We compare the radar phase

A tiny change in the distance to the target causes a change in the phase of the returned radar signal.

The same target at two times



Sentinel-1 C-band radar

Frequency: 5.405 GHz

Wavelength (λ): ≈ 5.55 cm

One complete phase cycle (2π) corresponds to ≈ 2.8 cm of line-of-sight (LOS) distance change.

Technical reference (for experts):

$$|\Delta d_{LOS}| = \frac{\lambda |\Delta \phi|}{4\pi}$$

What the satellite actually measures



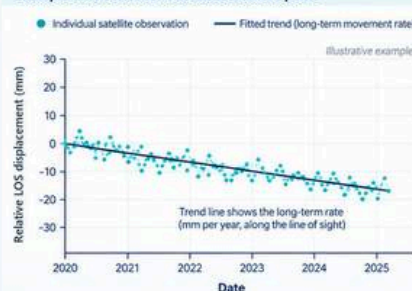
The satellite only measures the part of the movement that changes this distance along the radar line of sight.

Movement in other directions (e.g. sideways) may be only partly seen, or not seen at all.

3 Repeating this over time shows movements

By comparing many observations, we can see whether a point is stable or moving, and at what rate.

Example time series for one measurement point



Key takeaways

- InSAR measures changes in distance along the radar line of sight using the phase of repeated radar images.
- For Sentinel-1, one complete phase cycle (2π) corresponds to about 2.8 cm of LOS distance change.
- Many measurements over time make it possible to identify very small long-term movement rates.
- The satellite does not see every direction of movement equally.



Next: See the next diagram to learn why we use two viewing directions, and how that helps us understand different components of movement.

The measurements behind this report

Satellite	Sentinel-1, the European Union's Copernicus radar satellites, operated by the European Space Agency
Radar	C-band, 5.405 GHz, wavelength 5.55 cm
Processing	SatSense
First and last reading	3 May 2015 to 9 June 2025
Readings per point	159 to 274
Usual gap between readings	12 days
Points on this property	14: 4 from the ascending view, 10 from the descending view

Every reading is a change in distance along the satellite's line of sight, measured from that point's first reading. The dates, counts and gaps above are read from this property's own records.

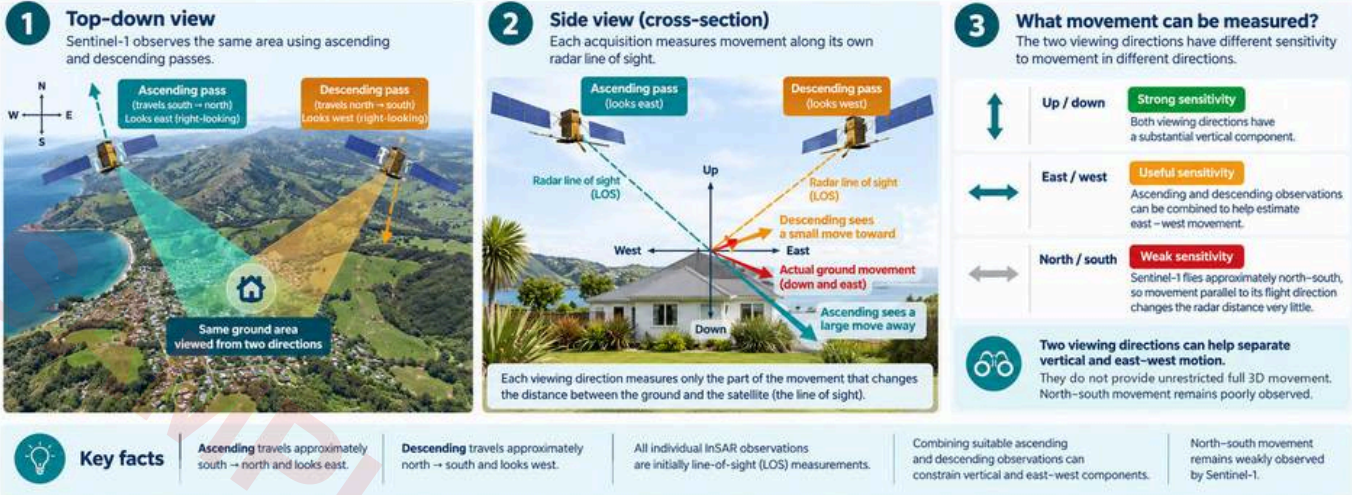
Two viewing directions

WHAT WE FOUND

On this property 4 points were measured from the ascending view and 10 from the descending view. Each view sees a different share of the same movement, so their rates are not expected to match.

Two viewing directions, different perspectives

Sentinel-1 observes the same area from ascending and descending passes. Each viewing direction measures movement along its own radar line of sight.



The two views on this property

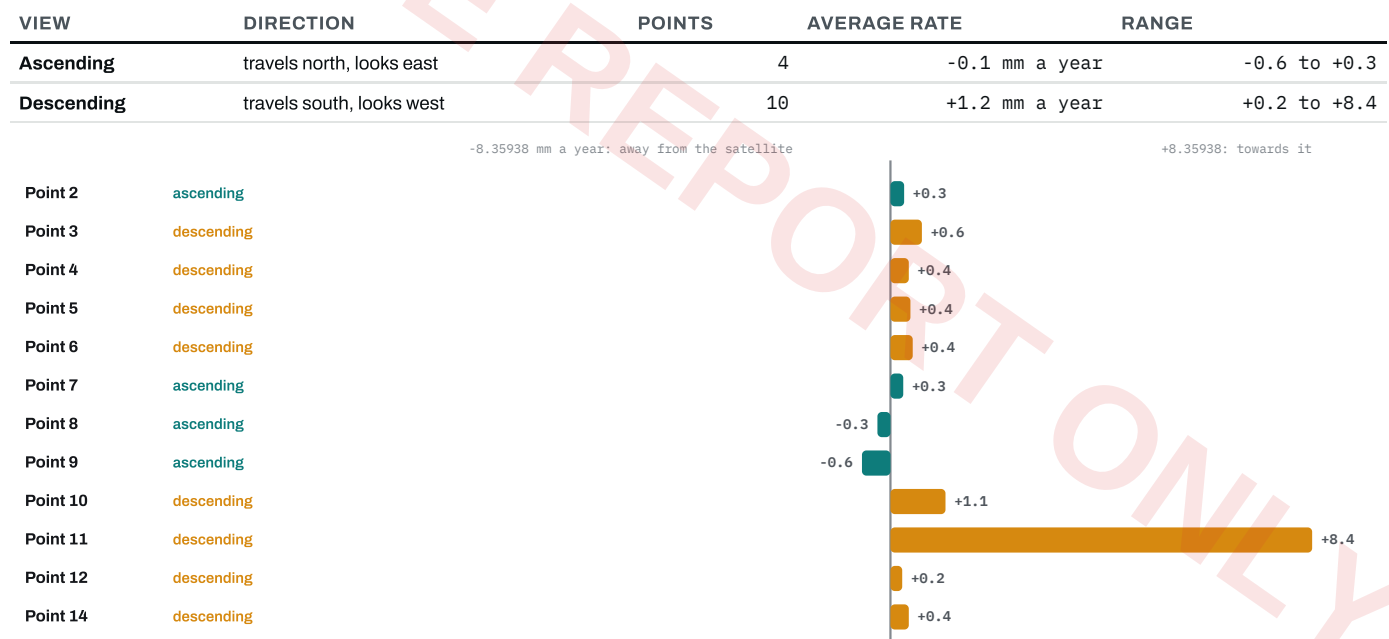


FIGURE 3. Every point on the property, by view: its rate along that view's line of sight. Negative is away from the satellite, positive is towards it. The 12 fastest points are shown; all 14 are in Appendix A. Source: SatSense.

A difference between the two views is not an error: each measures the part of the movement along its own line of sight.

Measurement coverage

WHAT WE FOUND

On this property, 1 of the 14 points formed on buildings and 13 on paving or open ground. The lawn and garden have none, which is normal.

What this means for you: Where there is no point, the report cannot say how the ground moved. The other pages use slope, rock, water and council records to describe those areas instead.

Where InSAR can – and cannot – measure

InSAR needs a clear, stable radar reflection and a direct view from the satellite. The type of surface and the surrounding terrain both affect whether measurements are possible.



! NO POINT ≠ NO MOVEMENT

The absence of a measurement point does not mean the ground is stable. It may simply mean the surface or terrain is unsuitable for reliable InSAR measurement.

What kinds of movement it can see

HOW WELL	MOVEMENT	WHY
WORKS WELL	Slow, steady movement over years	Many readings add up to a clear trend of a few millimetres a year.
USE AS A GUIDE	Movement that changes with the seasons	Real, but it rises and falls; the seasonal page separates it from the long-term trend.
USE AS A GUIDE	New buildings and resurfaced ground	A point's record starts only when its surface appears, so the record is shorter.
SEES PART ONLY	North-south movement	The satellite travels roughly north-south, so this hardly changes its distance to the ground.
SEES PART ONLY	Fast or sudden movement between passes	Large jumps can break the tracking; how large depends on the ground and the processing.
NOT MEASURED	Slips, collapses, earthworks, demolition	The surface changes and the point's record ends or breaks.

A measurement from orbit is not a site investigation. It shows how hard surfaces moved; it does not show what lies beneath them.

Where the measurements are

WHAT WE FOUND

14 measured points on the property: 1 inside a building outline, 13 on paving or open ground. Points form only on hard surfaces, so lawns and gardens have none.

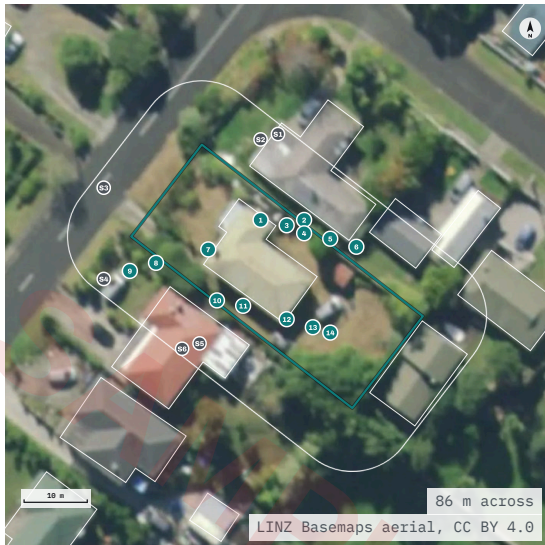


FIGURE 4. The whole property: boundary plus 20 m. Teal circles are measured points on the property, numbered as in every chart and table. The thin white line is 10 m outside the boundary.

The measured points - the 12 fastest, points on the property first (20 in all; every one is in Appendix A)

POINT	WHERE	SURFACE (LINZ OUTLINES)	PASS	RATE MM/YR	LINE FIT MM/YR	SCATTER MM	READINGS	BAND
11	on the boundary line (2.2 m inside it)	open ground or paving	descending	+8.4	+7.9	7.3	192	MONITOR
10	on the boundary line (0.3 m inside it)	open ground or paving	descending	+1.1	+1.5	4.1	159	MONITOR
3	on the boundary line (1.8 m inside it)	open ground or paving	descending	+0.6	+0.5	1.6	193	STABLE
9	on the boundary line (4.4 m outside it)	open ground or paving	ascending	-0.6	-0.5	2.5	272	STABLE
6	on the boundary line (2.2 m outside it)	open ground or paving	descending	+0.4	+0.3	2.9	194	STABLE
5	on the boundary line (0.7 m outside it)	open ground or paving	descending	+0.4	+0.2	1.7	192	STABLE
14	on the property	open ground or paving	descending	+0.4	+0.3	2.5	192	STABLE
4	on the boundary line (1.2 m inside it)	open ground or paving	descending	+0.4	+0.2	1.5	192	STABLE
2	on the boundary line (0.5 m outside it)	open ground or paving	ascending	+0.3	-0.4	2.7	271	STABLE
8	on the boundary line (0.9 m outside it)	open ground or paving	ascending	-0.3	-0.6	2.3	274	STABLE
7	on the property	open ground or paving	ascending	+0.3	0.0	3.4	274	STABLE
12	on the boundary line (4.7 m inside it)	open ground or paving	descending	+0.2	+0.2	1.6	192	STABLE

Rate: the rate SatSense reports for the point, along the line of sight; the band comes from this. Negative is away from the satellite. **Line fit:** LandSure's straight-line fit to the same readings, as a check. **Scatter:** the typical distance of a reading from that line (root mean square). **Pass:** the direction the satellite was travelling; see page 3. Coordinates are in Appendix A.

Why the points are where they are. Points form on surfaces that reflect radar steadily: roofs, paving, exposed rock. Grass, trees and water do not, so open ground often has none. The absence of a point is a gap in measurement and says nothing about the ground there. A point inside a building outline records the building and the ground together.

Points on the boundary line. 11 measured points (1, 3, 4, 10, 11, 12, 2, 5, 6, 8, 9) lie within 5 m of the boundary line and are included in this report as points on the property. A radar point is placed on the ground with some error and a boundary is a surveyed line, so a point this close cannot be assigned to one side of it with certainty and may belong to the neighbouring property. 5 of them were placed just outside the line (2, 5, 6, 8, 9).

Movement across the property

WHAT WE FOUND

The colours spread each point's average movement across the property. Green means little movement. The dots are the real measurements; the colour between them is only a guide.

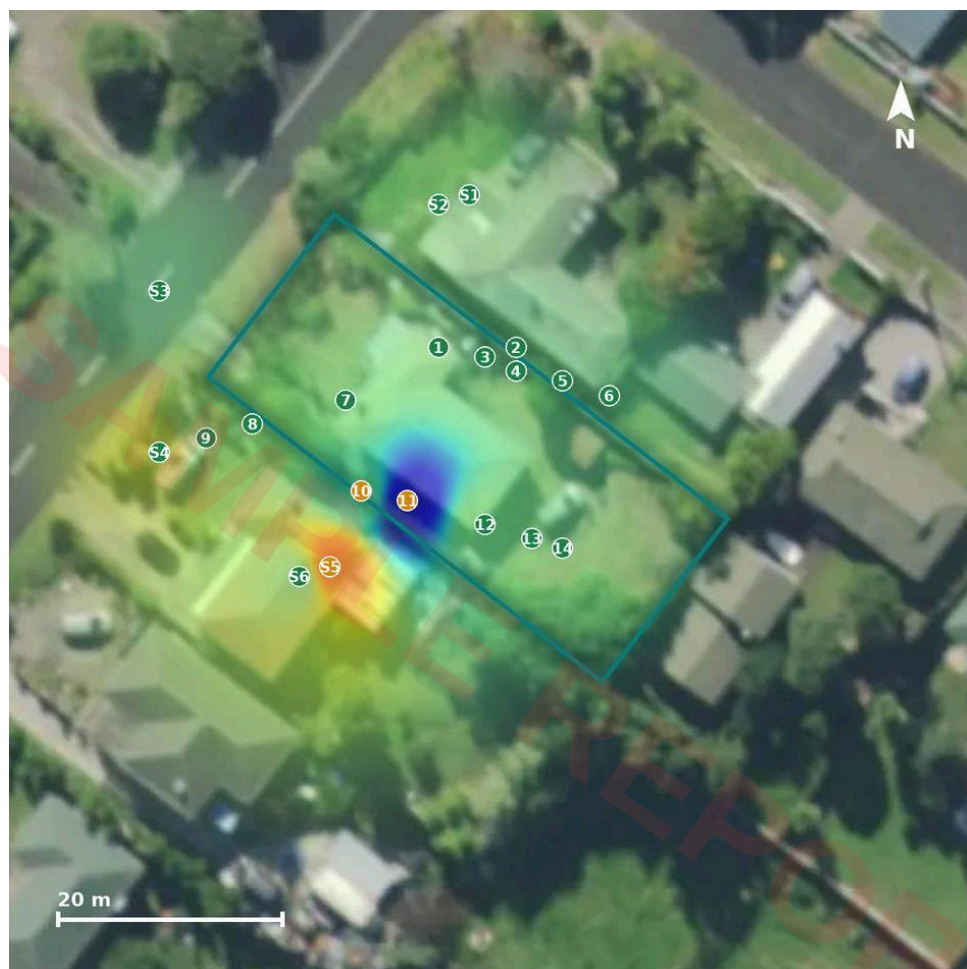
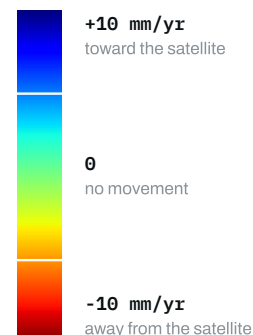


FIGURE 5. The average rate of every measured point, spread into a colour surface between them. Colour is strongest near a measurement and fades away from it, so the surface never claims more than the points show. Numbered dots are the measured points; teal is the boundary. Source: SatSense InSAR; LINZ aerial, CC BY 4.0.



-5.5

FASTEST AWAY FROM THE SATELLITE
Point S5

+8.4

FASTEST TOWARD THE SATELLITE
Point 11

IN PLAIN WORDS

Reading the colours

Green means the ground barely moved. Towards red, the surface moved away from the satellite. Towards blue, it moved toward it. The white marks on the colour bar are the edges of the stable band.

IN PLAIN WORDS

Measured and in between

Only the dots are measurements. The colour between them is an estimate from the nearest dots, shown to help the eye. The rating never uses the colour.

Ten years of movement

WHAT WE FOUND

Every reading of every point, since the satellite first saw it. The largest total change is +60.3 mm at Point 11 over 7.2 years.

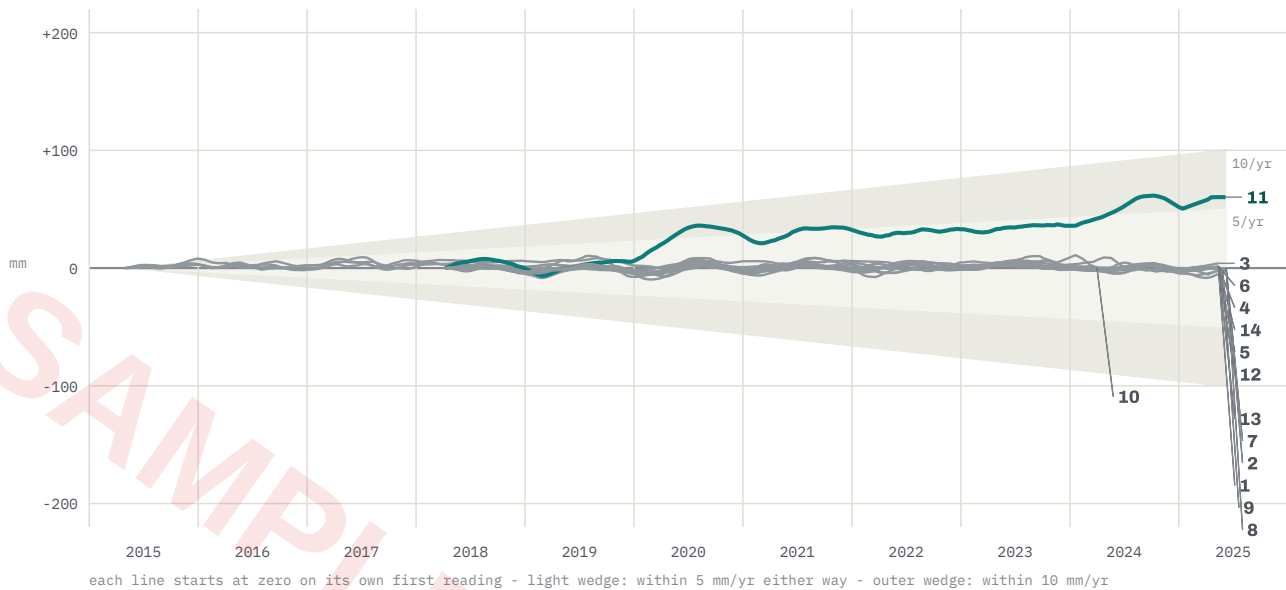


FIGURE 6. Movement of every measured point on the property since its first reading, every reading plotted. The vertical scale is fixed at plus or minus 220 mm on every LandSure report and is never fitted to the data, so two reports can be compared by eye. Point 11, the fastest, is drawn in teal. Source: Movement data: SatSense InSAR (Copeinicus Sentinel-1).

The rate inside each calendar year

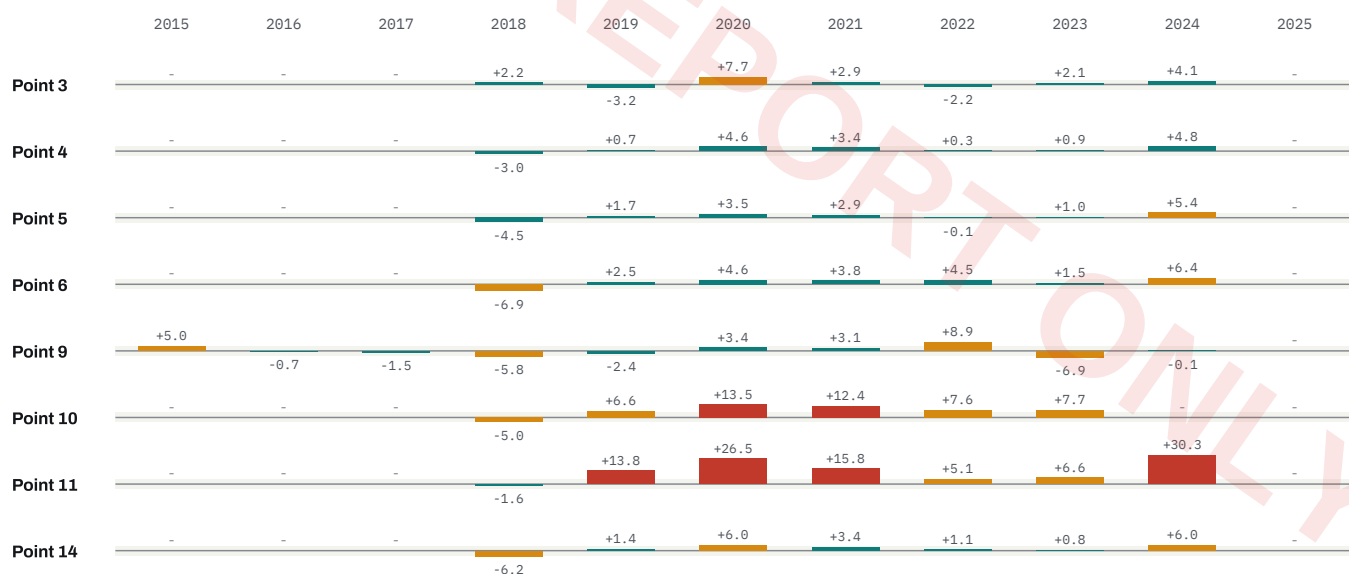


FIGURE 7. The 8 fastest of the 14 points are shown. The straight-line rate within each calendar year, for each point, in mm a year on a fixed scale of plus or minus 30. The pale strip is the stable band. A single year is a short record and swings more than the ten-year rate; a year is left blank (-) when it holds fewer than 8 readings or spans less than 200 days. Teal: inside the stable band. Amber: monitor band. Red: beyond it.

Reading the two figures together

The top figure answers "how far has it gone". The lower figure answers "was that steady". A point that drifts at the same small rate every year is behaving differently from one that was still for eight years and moved in the last two, even where their ten-year rates match. The engine tests this directly: it compares each point's last 24 months against its whole record, and the result is on the Summary page.

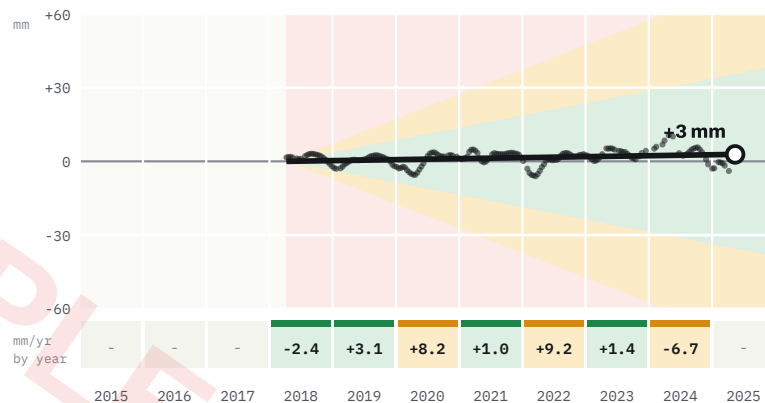
Point records

WHAT WE FOUND

One card per point: where it is, every reading, and its movement in each calendar year. The big number is its average movement in mm a year.

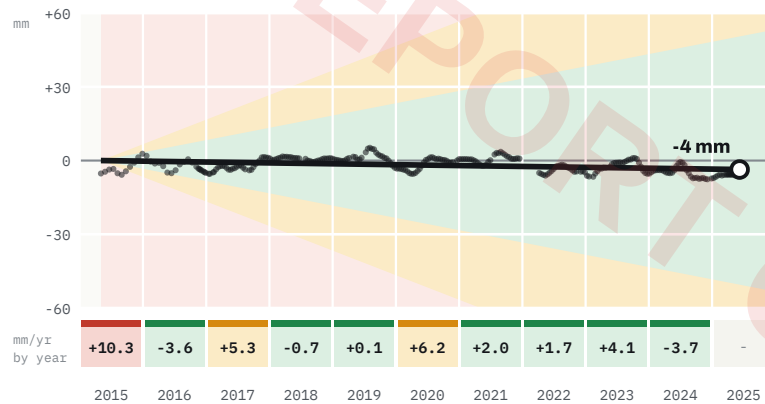
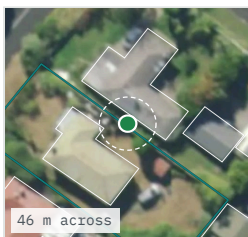
stable, under 5 mm a year monitor, 5 to 10 investigate, over 10 dots: every reading black line: LandSure's straight-line fit, with the change along it strip: the rate inside each calendar year scale bar: ▼ SatSense rate (sets the band), ▲ line fit every scale is fixed and identical on every report, a closer view than Figure 6

1 Point 1 on the boundary line (3.7 m inside it) · on a building

STABLE**+0.2** MM A YEAR
SATSENSE RATE

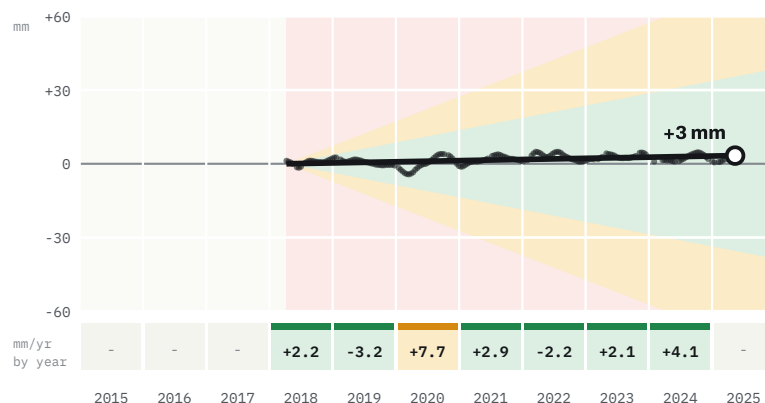
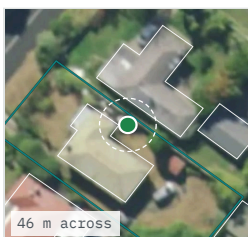
Line fit	+0.4 mm/yr
First to last	-2 mm
Scatter	2.7 mm
Readings	191
Record	Apr 2018 - May 2025
Pass	descending
Last 24 mo.	not faster

2 Point 2 on the boundary line (0.5 m outside it) · open ground or paving

STABLE**+0.3** MM A YEAR
SATSENSE RATE

Line fit	-0.4 mm/yr
First to last	-1 mm
Scatter	2.7 mm
Readings	271
Record	May 2015 - Jun 2025
Pass	ascending
Last 24 mo.	not faster

3 Point 3 on the boundary line (1.8 m inside it) · open ground or paving

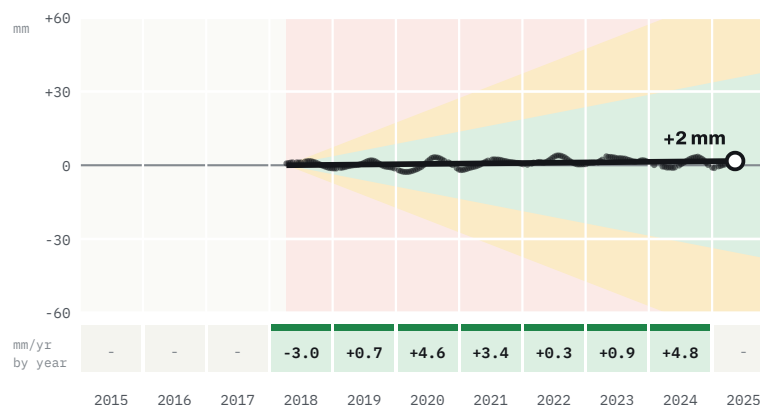
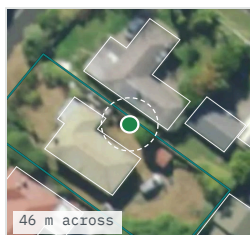
STABLE**+0.6** MM A YEAR
SATSENSE RATE

Line fit	+0.5 mm/yr
First to last	+4 mm
Scatter	1.6 mm
Readings	193
Record	Apr 2018 - May 2025
Pass	descending
Last 24 mo.	not faster

Point records

4 Point 4 on the boundary line (1.2 m inside it) · open ground or paving

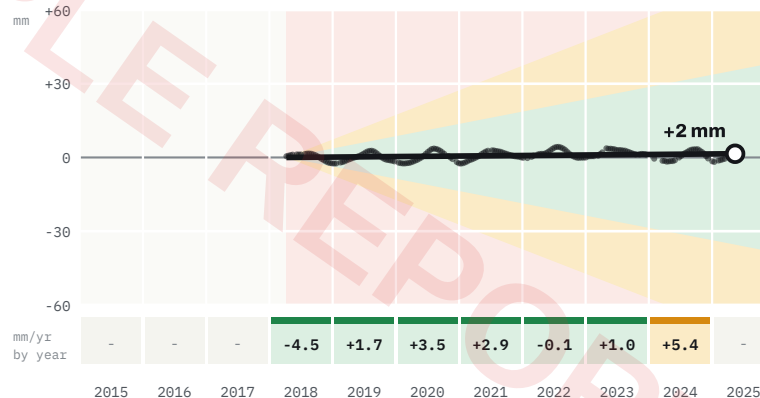
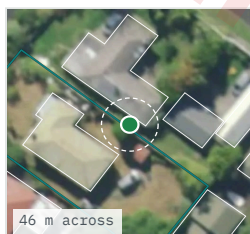
STABLE



+0.4 MM A YEAR SATSENSE RATE	
Line fit	+0.2 mm/yr
First to last	+1 mm
Scatter	1.5 mm
Readings	192
Record	Apr 2018 - May 2025
Pass	descending
Last 24 mo.	not faster

5 Point 5 on the boundary line (0.7 m outside it) · open ground or paving

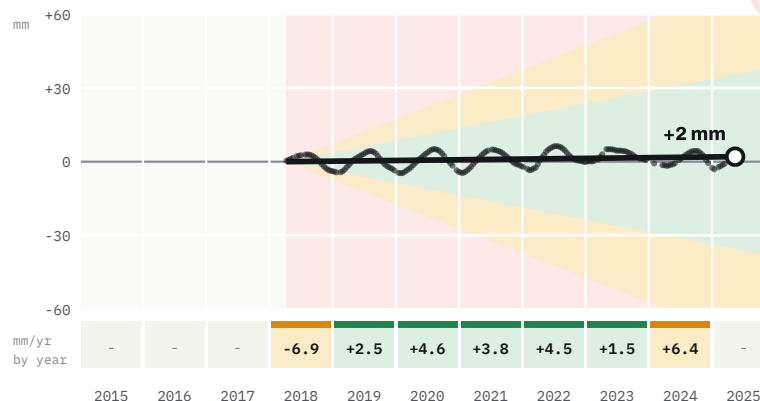
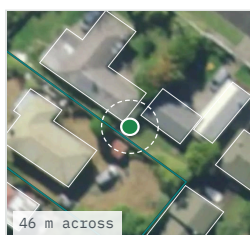
STABLE



+0.4 MM A YEAR SATSENSE RATE	
Line fit	+0.2 mm/yr
First to last	0 mm
Scatter	1.7 mm
Readings	192
Record	Apr 2018 - May 2025
Pass	descending
Last 24 mo.	not faster

6 Point 6 on the boundary line (2.2 m outside it) · open ground or paving

STABLE

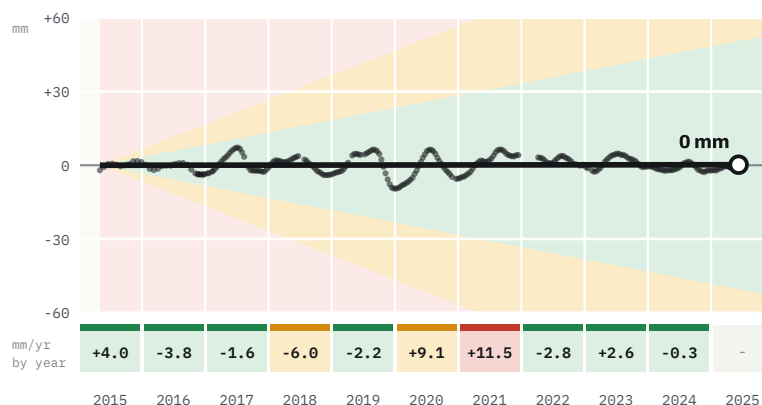
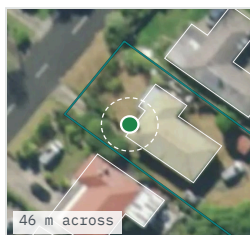


+0.4 MM A YEAR SATSENSE RATE	
Line fit	+0.3 mm/yr
First to last	+2 mm
Scatter	2.9 mm
Readings	194
Record	Apr 2018 - May 2025
Pass	descending
Last 24 mo.	not faster

Point records

7 Point 7 on the property · open ground or paving

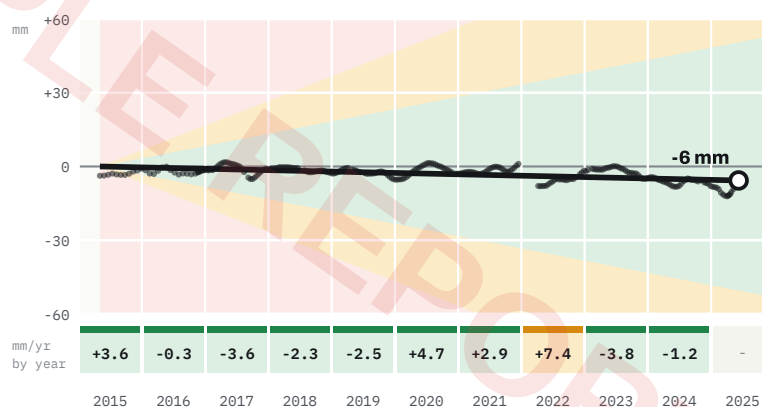
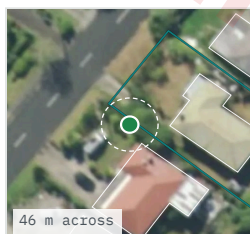
STABLE



+0.3 MM A YEAR SATSENSE RATE	
Line fit	0.0 mm/yr
First to last	0 mm
Scatter	3.4 mm
Readings	274
Record	May 2015 - Jun 2025
Pass	ascending
Last 24 mo.	not faster

8 Point 8 on the boundary line (0.9 m outside it) · open ground or paving

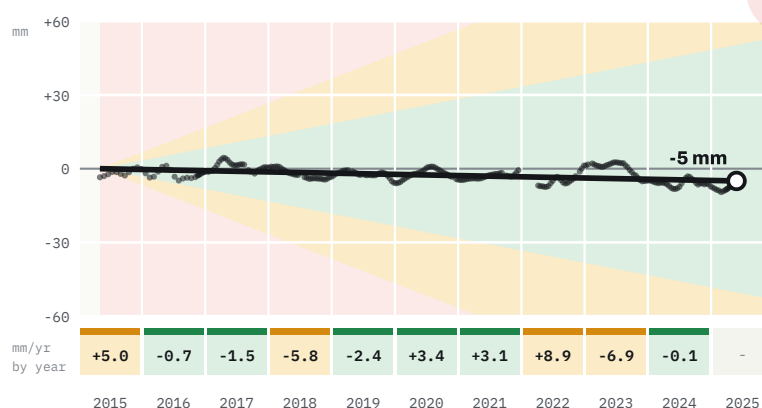
STABLE



-0.3 MM A YEAR SATSENSE RATE	
Line fit	-0.6 mm/yr
First to last	-2 mm
Scatter	2.3 mm
Readings	274
Record	May 2015 - Jun 2025
Pass	ascending
Last 24 mo.	not faster

9 Point 9 on the boundary line (4.4 m outside it) · open ground or paving

STABLE

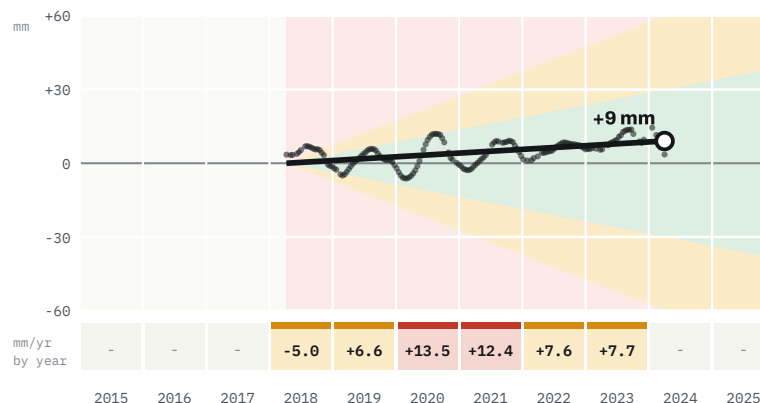
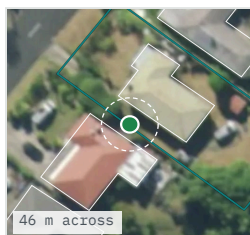


-0.6 MM A YEAR SATSENSE RATE	
Line fit	-0.5 mm/yr
First to last	-2 mm
Scatter	2.5 mm
Readings	272
Record	May 2015 - May 2025
Pass	ascending
Last 24 mo.	not faster

Point records

10 Point 10 on the boundary line (0.3 m inside it) · open ground or paving

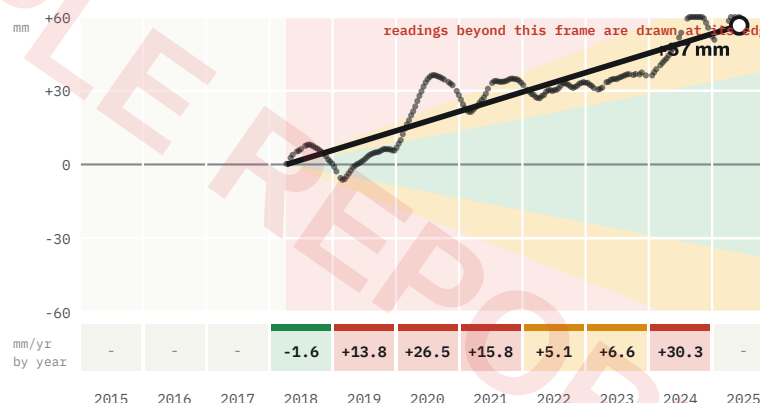
MONITOR



+1.1	MM A YEAR SATSENSE RATE
Line fit	+1.5 mm/yr
First to last	0 mm
Scatter	4.1 mm
Readings	159
Record	Apr 2018 - Apr 2024
Pass	descending
Last 24 mo.	faster

11 Point 11 on the boundary line (2.2 m inside it) · open ground or paving

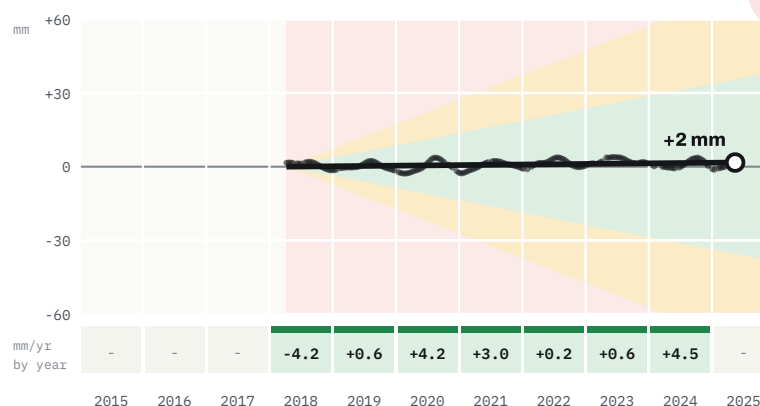
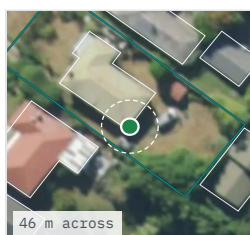
MONITOR



+8.4	MM A YEAR SATSENSE RATE
Line fit	+7.9 mm/yr
First to last	+60 mm
Scatter	7.3 mm
Readings	192
Record	Apr 2018 - Jun 2025
Pass	descending
Last 24 mo.	faster

12 Point 12 on the boundary line (4.7 m inside it) · open ground or paving

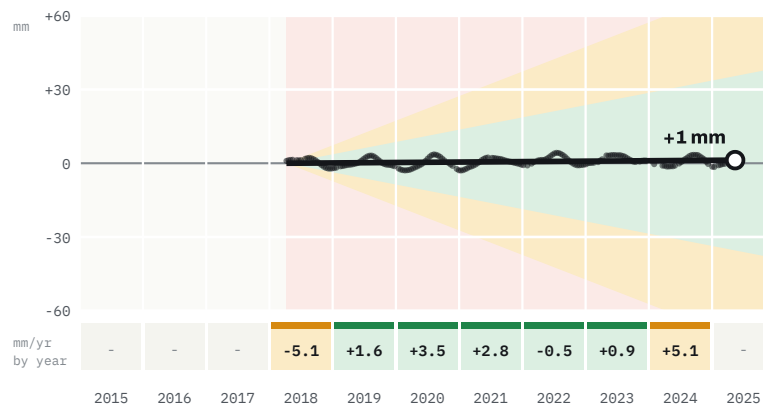
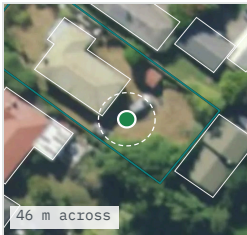
STABLE



+0.2	MM A YEAR SATSENSE RATE
Line fit	+0.2 mm/yr
First to last	0 mm
Scatter	1.6 mm
Readings	192
Record	Apr 2018 - May 2025
Pass	descending
Last 24 mo.	not faster

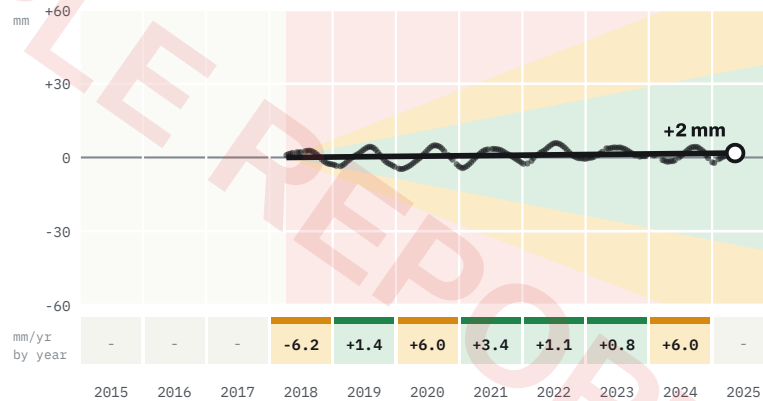
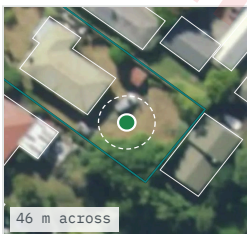
Point records

13 Point 13 on the property · open ground or paving

STABLE

+0.2		MM A YEAR SATSENSE RATE
Line fit	+0.2 mm/yr	
First to last	0 mm	
Scatter	1.7 mm	
Readings	192	
Record	Apr 2018 - May 2025	
Pass	descending	
Last 24 mo.	not faster	

14 Point 14 on the property · open ground or paving

STABLE

+0.4		MM A YEAR SATSENSE RATE
Line fit	+0.3 mm/yr	
First to last	0 mm	
Scatter	2.5 mm	
Readings	192	
Record	Apr 2018 - May 2025	
Pass	descending	
Last 24 mo.	not faster	

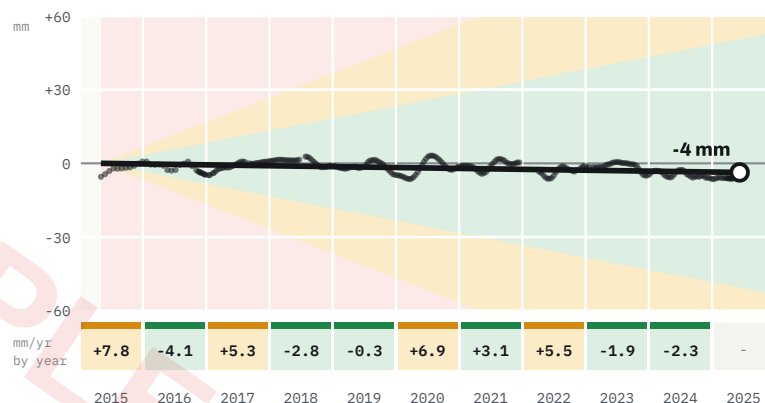
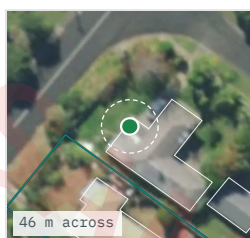
Point records, within 10 m

WHAT WE FOUND

One card per point: where it is, every reading, and its movement in each calendar year. The big number is its average movement in mm a year.

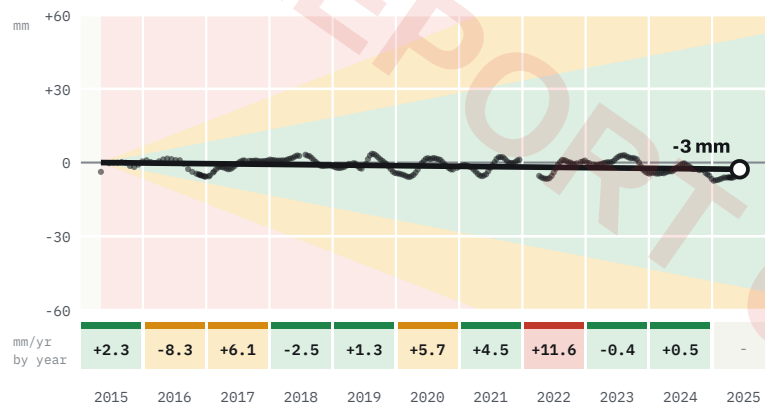
stable, under 5 mm a year monitor, 5 to 10 investigate, over 10 · dots: every reading · black line: LandSure's straight-line fit, with the change along it · strip: the rate inside each calendar year · scale bar: ▼ SatSense rate (sets the band), ▲ line fit · every scale is fixed and identical on every report, a closer view than Figure 6

S1 Point S1 8.7 m outside the boundary · on a building

STABLE**-0.1** MM A YEAR
SATSENSE RATE

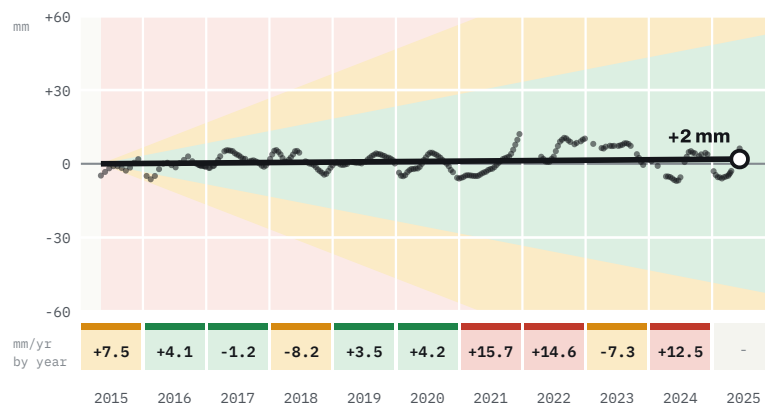
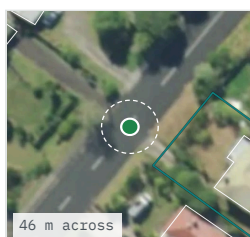
Line fit	-0.4 mm/yr
First to last	+1 mm
Scatter	2.2 mm
Readings	275
Record	May 2015 - Jun 2025
Pass	ascending
Last 24 mo.	not faster

S2 Point S2 6.3 m outside the boundary · open ground or paving

STABLE**-0.2** MM A YEAR
SATSENSE RATE

Line fit	-0.3 mm/yr
First to last	-1 mm
Scatter	2.6 mm
Readings	273
Record	May 2015 - Jun 2025
Pass	ascending
Last 24 mo.	not faster

S3 Point S3 8.1 m outside the boundary · open ground or paving

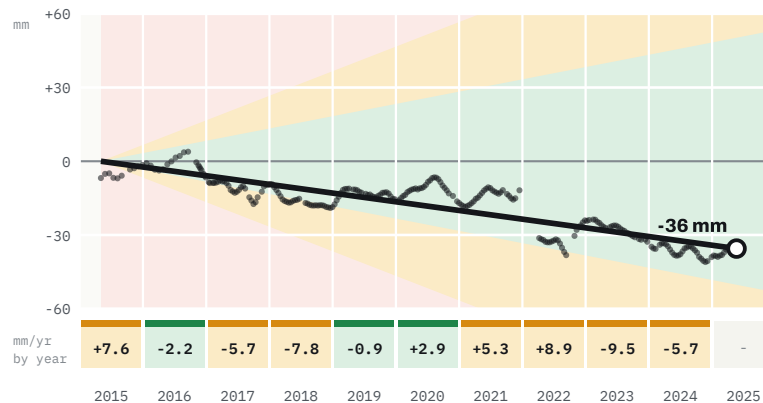
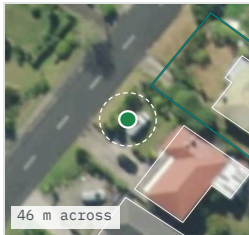
STABLE**+0.3** MM A YEAR
SATSENSE RATE

Line fit	+0.2 mm/yr
First to last	+11 mm
Scatter	4.1 mm
Readings	242
Record	May 2015 - Jun 2025
Pass	ascending
Last 24 mo.	not faster

Point records, within 10 m

S4 Point S4 7.9 m outside the boundary · open ground or paving

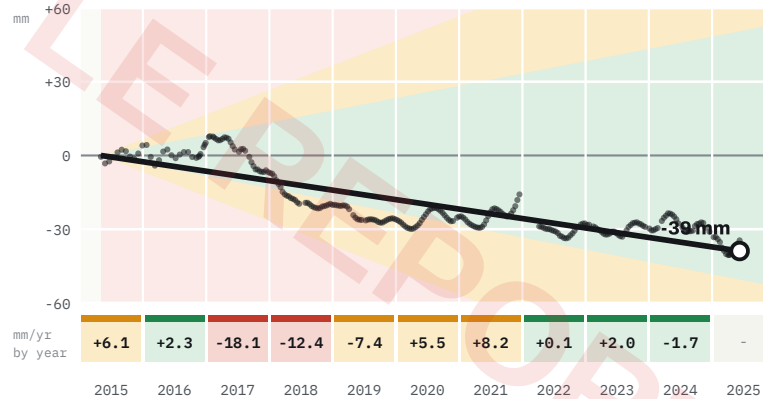
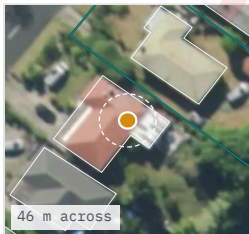
STABLE



-2.6	MM A YEAR SATSENSE RATE
Line fit	-3.5 mm/yr
First to last	-28 mm
Scatter	5.3 mm
Readings	255
Record	May 2015 - May 2025
Pass	ascending
Last 24 mo.	not faster

S5 Point S5 6.7 m outside the boundary · on a building

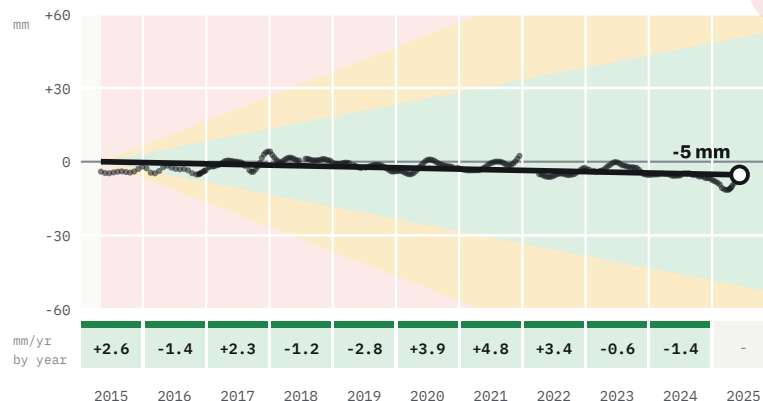
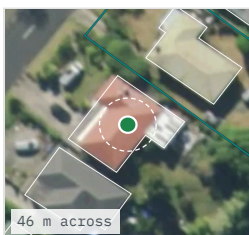
MONITOR



-5.5	MM A YEAR SATSENSE RATE
Line fit	-3.8 mm/yr OTHER BAND
First to last	-34 mm
Scatter	6.5 mm
Readings	267
Record	May 2015 - Jun 2025
Pass	ascending
Last 24 mo.	not faster

S6 Point S6 9.0 m outside the boundary · on a building

STABLE



-0.1	MM A YEAR SATSENSE RATE
Line fit	-0.5 mm/yr
First to last	-2 mm
Scatter	2.4 mm
Readings	274
Record	May 2015 - Jun 2025
Pass	ascending
Last 24 mo.	not faster

The street around you

WHAT WE FOUND

Detailed movement is bought for your land and the 10 m beside it. Beyond that, to 100 m, the map shows only where the satellite has measurements, so you can see how well the street is covered.

14**ON THE PROPERTY**

rated, charted in full

6**WITHIN 10 M**

charted in full, not part of the rating

110**WITHIN 100 M**

positions from this report's export

152**SUPPLIED, NOT RATED**

data files available on request

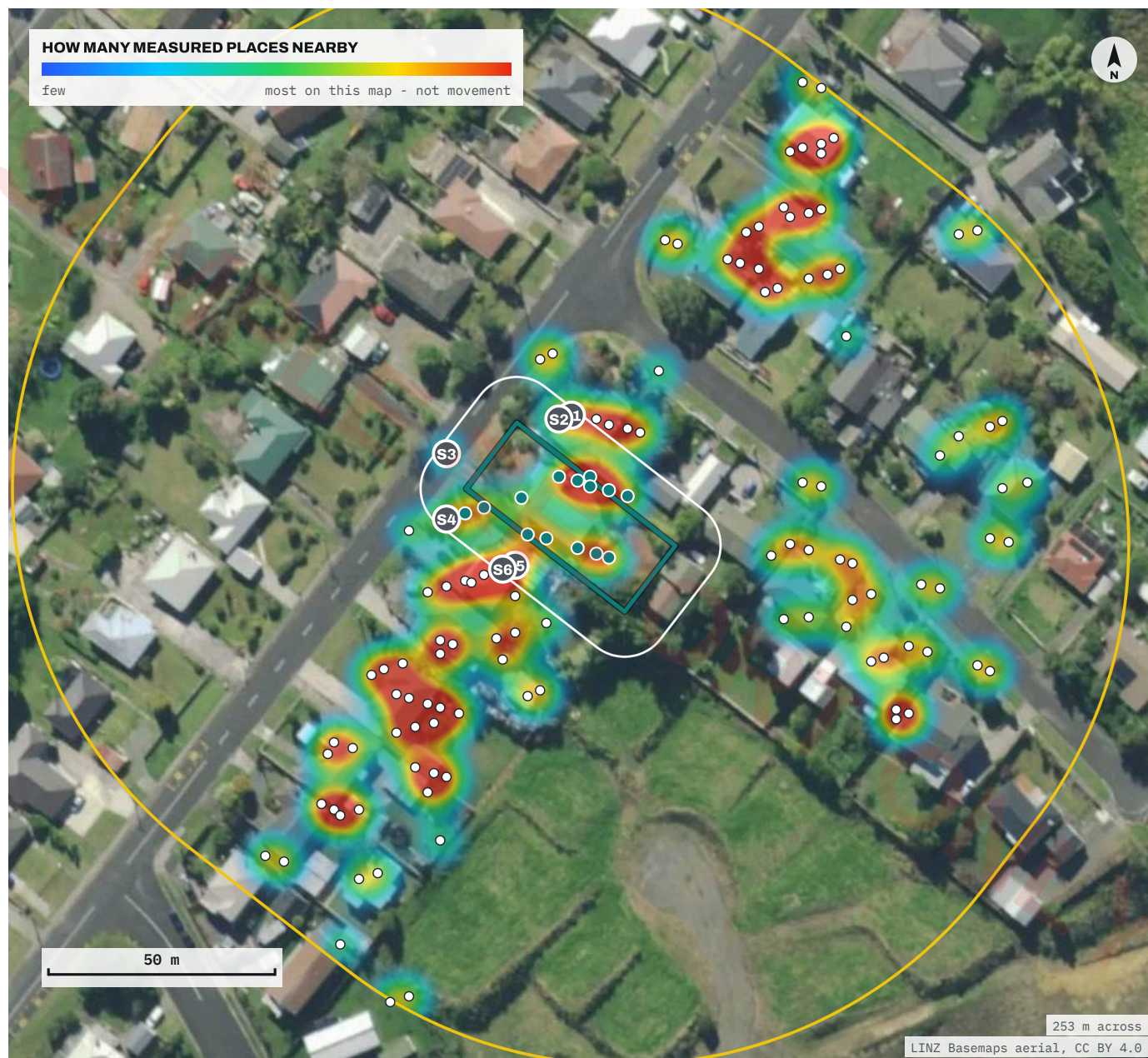


FIGURE 8. The neighbourhood. Yellow line: 100 m from the boundary on every side. White line: 10 m. Teal dots: the measured points on the property. Grey numbered circles: measured points within 10 m, charted on their own page. White dots: a measurement exists here. The heatmap shows where measured places cluster, each spread over about 4 m, from blue (few) to red (the most on this map); it is relative to this map only. Gaps are lawns, trees, water or open ground. **IT IS A COUNT, NOT MOVEMENT:** no rate is known for these places.

What the white dots are

Positions from the movement export for this report, out to where that export reaches (110 positions). The wider neighbourhood feed did not answer when this report was made, so ground beyond that is not shown - not a finding that it is unmeasured.

What the colour tells you

Where the satellite can measure, and how densely. Warmer colours mean more measured places packed together, usually roofs, paving and rock; red is the densest part of this map, not movement. Bare aerial is grass, trees or water, where the radar finds nothing to hold on to. If several neighbouring sections moved the same way, the cause would be wider than one property; the warmer patches are where that comparison could be made.

Is the house moving evenly?

WHAT WE FOUND

Points 10 and 11, on the ground around the house and 4 m apart, differ by 34.5 mm over the whole record (1 in 123). Beyond the Building Code's national design guidance of 25 mm over 6 m (1 in 240). A floor-level survey by a professional is the usual next step. The most direct comparison, Points 1 and 11 on the house and the ground beside it, 14 m apart, is within the guidance (1 in 260). 49 other pairs were compared; the table below shows the steepest.

What this means for you: Uneven movement is what damages houses. A house that moves as one piece, even if it moves a little, is usually sound.

IN PLAIN WORDS

Why even matters more than fast

A whole house that settles a few millimetres together usually does no harm. Cracks and sticking doors come from one part moving more than another. So engineers look at the difference in movement across a building, not the movement of one spot.

IN PLAIN WORDS

The New Zealand yardstick

The Building Code's national foundation guidance (B1/VM2, 2025) designs houses to cope with no more than 25 mm of difference over 6 m, a slope of 1 in 240.

The pairs compared

POINTS	WHERE	APART	DIFFERENCE OVER THE RECORD	SLOPE	SHARE OF THE NATIONAL ALLOWANCE	
10 and 11	ground and ground	4.2 m	34.5 mm	1 in 123		UNEVEN
					1:240 national	
11 and 12	ground and ground	7.2 m	54.2 mm	1 in 133		UNEVEN
					1:240 national	
11 and 13	ground and ground	11.5 m	54.7 mm	1 in 211		UNEVEN
					1:240 national	
1 and 11	house and ground	13.8 m	52.9 mm	1 in 260		EVEN
					1:240 national	
11 and 14	ground and ground	14.4 m	54.1 mm	1 in 266		EVEN
					1:240 national	
3 and 11	ground and ground	14.4 m	52.6 mm	1 in 274		EVEN
					1:240 national	
4 and 11	ground and ground	14.9 m	54.2 mm	1 in 275		EVEN
					1:240 national	
5 and 11	ground and ground	17.4 m	54.4 mm	1 in 319		EVEN
					1:240 national	

The other 43 pairs compared are all within the national guidance, or too close together to measure a slope.

40 other pairs of points were seen from opposite satellite directions and are not compared, because their numbers are not like for like.

The guidance applies to floor levels surveyed inside a house. The satellite measures roofs and paving along a slanted line, and only the movement since its first reading, so this page shows how evenly the house has moved, not a floor-level survey. Sources: Building Code Verification Method B1/VM2 (MBIE, second edition, 2025), Appendix C, clause C.2.1.2.

Seasonal movement

WHAT WE FOUND

The ground rises and falls about 4.0 mm each year: highest around August and lowest around February. That timing matches ground that swells a little when wet and shrinks as it dries.

What this means for you: A yearly rise and fall is normal and reverses itself. Knowing its size stops a wet winter being mistaken for the ground moving away.

4.0 mm

YEARLY RISE AND FALL
peak to low point of the fitted wave

August

HIGHEST
the measured surfaces

February

LOWEST
the measured surfaces

2,980

READINGS USED
from 14 points

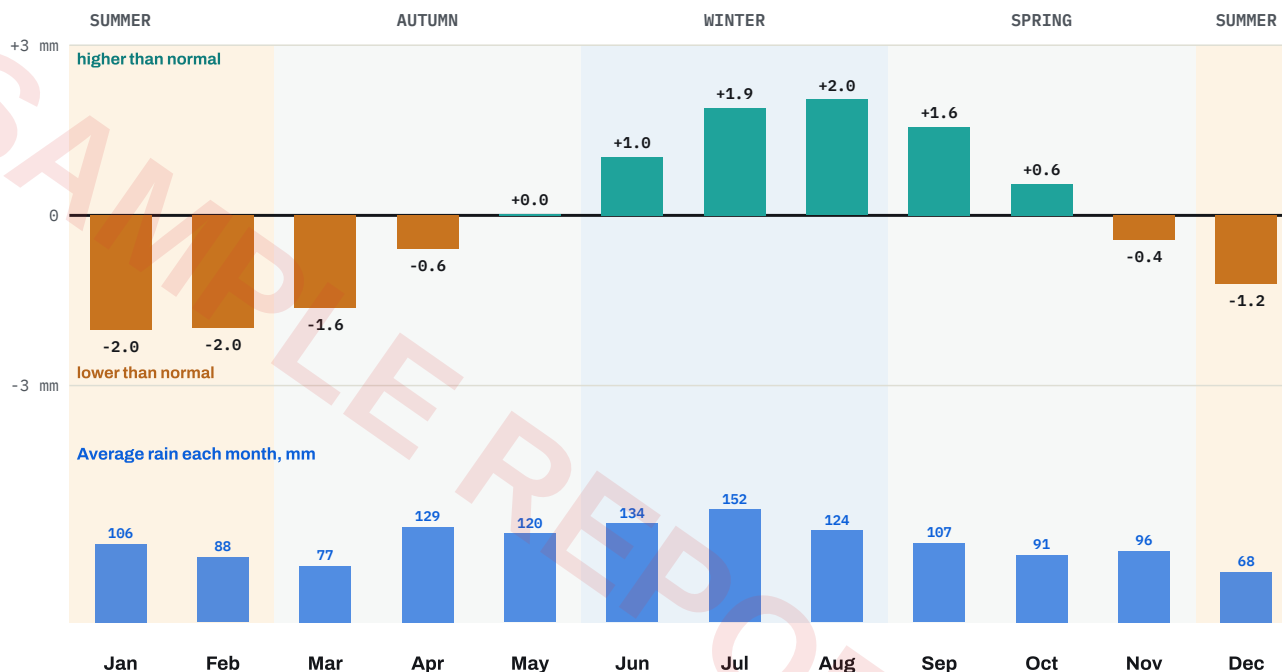


FIGURE 9. Each bar is one month of the year, averaged over every year measured. It shows how much higher (teal) or lower (orange) the measured surfaces sat that month than their long-term line. The blue bars underneath are the average rain for the same months. Source: SatSense InSAR; NASA POWER daily rain.

HOW TO READ THIS PAGE

1. Find a month along the bottom.
2. Its bar shows whether the ground sat a little higher or lower than normal in that month, in millimetres.
3. Look at the rain below it. Ground that swells when wet sits higher in the rainy months and lower in the dry ones.

IN PLAIN WORDS

Why ground moves with the seasons

Soils with clay in them take up water and swell in wet months, then dry and shrink in summer. Roofs and paving also expand slightly in the heat. A regular yearly rise and fall of a few millimetres is common and is not the same as the ground moving away.

IN PLAIN WORDS

How big is this?

The yearly swing here is 4.0 mm. The fastest point's steady movement is 8.4 mm a year. A swing larger than the yearly trend is common on clay soils, and it is why a single wet winter should not be mistaken for the start of a trend.

Heavy rain and earthquakes

WHAT WE FOUND

Of the five wettest days, Point 11 clearly moved after 1. Point 11 is the fastest-moving point, so it is the one most likely to show a reaction.

What this means for you: Ground that shifts after heavy rain can do so again. Knowing whether it happened here tells you how the land behaves in a storm.

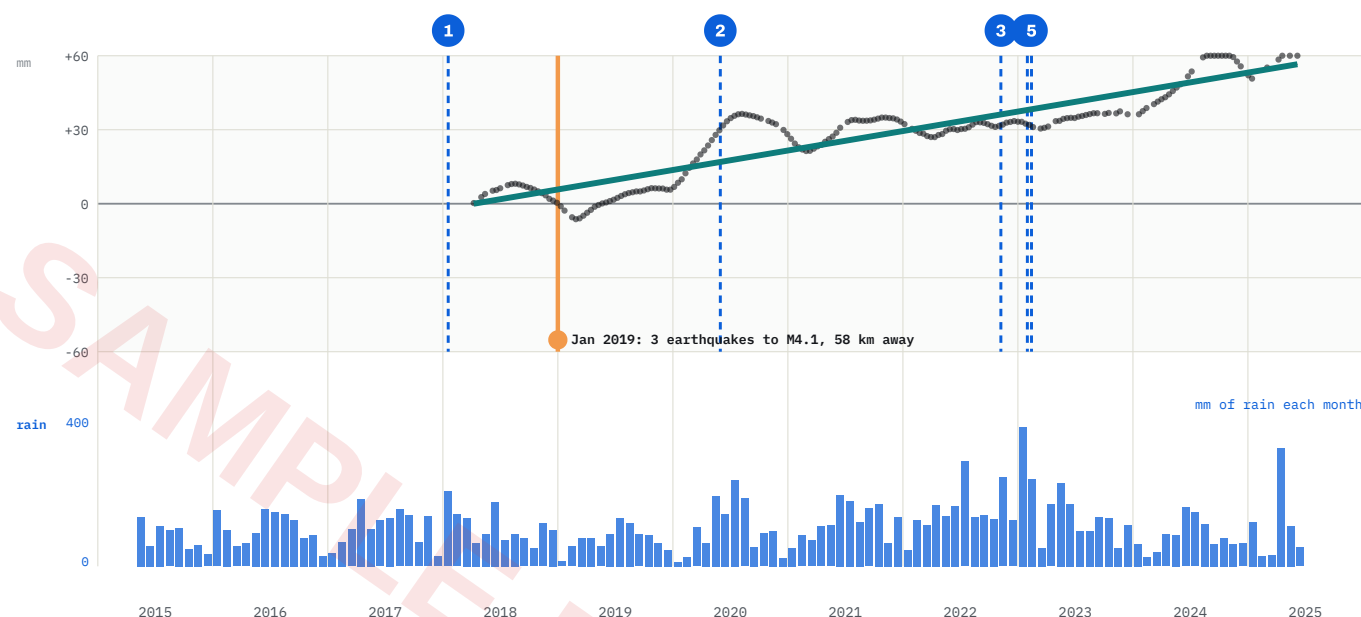


FIGURE 10. Point 11: every reading (dots) and its trend (teal line). Numbered blue marks: the five wettest days. Coloured lines: earthquakes of magnitude 4 and over within 150 km. Bars below: rain in each month. Source: SatSense InSAR; NASA POWER daily rain; GeoNet, CC BY 3.0 NZ.

Did the ground move after the heaviest rain?

DAY	RAIN	RESULT	WHAT HAPPENED
1 18 January 2018	78 mm	BEFORE THE SATELLITE MEASURED THIS POINT	This storm came before the satellite began measuring Point 11 in April 2018, so its effect cannot be seen.
2 31 May 2020	75 mm	THE GROUND REACTED	In the two months after, Point 11 sat on average 7.3 mm higher than in the two months before. Its readings normally wobble by about 7.3 mm, so this is a real shift, not noise. It happened after the rain; it does not prove the rain caused it.
3 8 November 2022	71 mm	NO CLEAR REACTION	Before and after, Point 11's readings differ by only 0.2 mm on average, well inside their normal wobble of about 7.3 mm.
4 31 January 2023	77 mm	NO CLEAR REACTION	Before and after, Point 11's readings differ by only 3.3 mm on average, well inside their normal wobble of about 7.3 mm.
5 13 February 2023	141 mm	NO CLEAR REACTION	Before and after, Point 11's readings differ by only 3.3 mm on average, well inside their normal wobble of about 7.3 mm.

How the check works: the readings from the two months before each wet day are averaged and compared with the two months after. Rain figures come from NASA's worldwide record on a grid about 50 km across, so they show when the region had heavy rain, not the exact amount on this street.

Comparison with a nearby GNSS (GPS) station

WHAT WE FOUND

GeoNet's GNSS (GPS) station WHNG, 7 km away, shows the ground there sinking about 1.4 mm a year. It measures one spot, straight up and down; the satellite measures your land along a slant. So it is regional context, not a second measurement of your property.

What this means for you: If the whole region is rising or sinking, every property in it shares that. It does not explain movement at one spot on your land.

GNSS station and InSAR

A nearby GNSS (GPS) station measures movement at one fixed point, often many kilometres away. InSAR measures movement along the satellite's line of sight at many points. Comparing the two gives regional context.

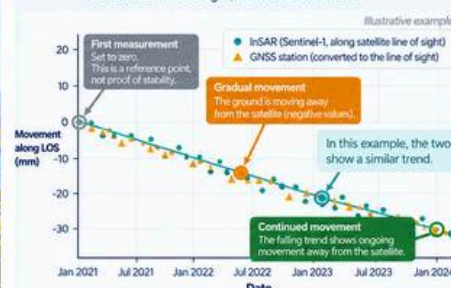
1 Two different instruments

A GNSS station measures 3D movement at a single point on the ground. Sentinel-1 InSAR measures movement along the satellite's line of sight at many points across the area.



2 Comparing the measurements

An illustrative example (not this property). For a like-for-like comparison, the GNSS station's 3D movement is converted into the satellite's line of sight, over the same dates.



This report shows the station's own up-down record as regional context. It does not make this conversion.

3 What the comparison tells us

When the two show a similar pattern, it suggests the area is moving with the wider region.



Similar trend

Movement in the same direction at a similar rate points to a regional pattern. It does not confirm what is happening on your property.



Some differences are normal

The two are kilometres apart, measure different directions, and may cover different dates. Local ground can also behave differently.



Use together

GNSS provides accurate 3D movement at one point. InSAR provides movement across many points. Together they give a more complete picture.



Key takeaway

A nearby GNSS station shows whether the wider region is moving. InSAR shows movement at many points on and around your property. The station does not measure your property.

The distance to the GNSS station for this property is given in the report.

What the GNSS station measured

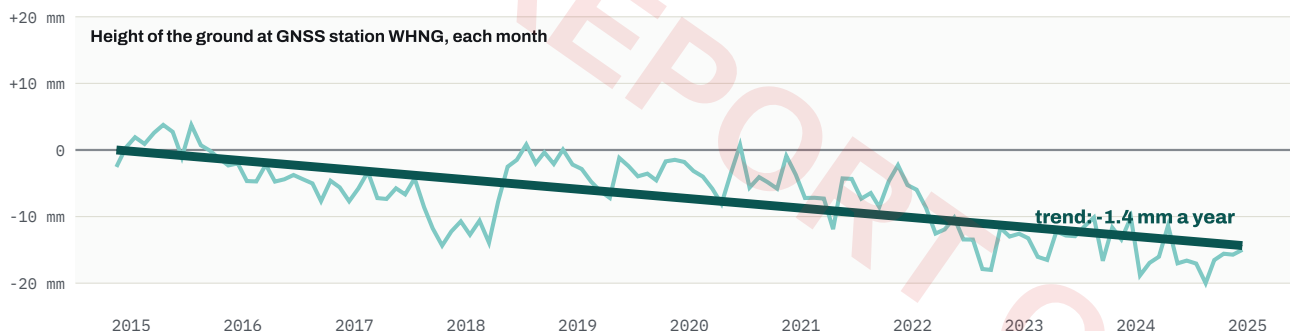


FIGURE 11. The pale line is the height of the ground at station WHNG, averaged each month; it wiggles with the seasons. The dark line is its long-term trend: -1.4 mm a year.

Source: GeoNet, CC BY 3.0 NZ.

The numbers, side by side

WHERE	AVERAGE MOVEMENT	WHAT IS MEASURED
GNSS station WHNG	-1.4 mm a year	up-down, at the station, 7 km away
A typical point on your land	+0.4 mm a year	along the satellite's line of sight
Your fastest point (Point 11)	+8.4 mm a year	along the satellite's line of sight

These measure different directions in different places, so they are not expected to match. Comparing them exactly would need the station's movement turned into the satellite's line of sight over the same years; this report does not do that.

Screening level

WHAT WE FOUND

Screening level SL3 - Moderate. It combines how fast the fastest point moves with what national records say about the site, on a five-step scale.

Screening level **SL3 - Moderate**. It combines the measured movement, L3 Possible - 5–10 mm/yr, or acceleration detected, with what open records say about the site, C3 Moderate susceptibility (based on 2/7 factors).

The level is read from the grid at right. Rows are the measured movement of the fastest point. Columns are site susceptibility, scored from the factors in the table below: each factor that could be read scores 0, 1 or 2, and the total is scaled to five classes. A factor that could not be read, or may not be included, is left out of the score and the class is marked as based on fewer factors.

What this classification is, and is not, is set out in Appendix C.

MEASURED MOVEMENT	SITE SUSCEPTIBILITY				
	C1	C2	C3	C4	C5
	L1	SL1	SL1	SL1	SL2
	L2	SL1	SL1	SL2	SL3
	L3	SL2	SL2	SL3	SL4
	L4	SL2	SL3	SL4	SL5
	L5	SL3	SL4	SL5	SL5

FIGURE 12. The screening grid, green to red from level 1 to level 5. This property's cell is outlined in black.

Site factors

FACTOR	SCORE	WHAT WAS READ	SOURCE AND LICENCE
Slope (measured)	1 OF 2	7.8° mean across the property - 8–15° (rolling)	LINZ elevation model, sampled inside the boundary CC BY 4.0
Soil (global grid)	1 OF 2	Cambisols (28%) - Young soils with limited profile development. Behaviour varies widely with parent material. [WRB order, global 250 m grid]	ISRIC SoilGrids v2.0 (Poggio et al. 2021), CC BY 4.0 – global 250 m grid, World Reference Base taxonomy CC BY 4.0

Not scored in this report: mapped erosion type & severity (Landcare Data Use Licence (non-commercial)); nearest active fault (non-commercial - not licensed for this product); recorded landslides within 1 km (non-commercial - not licensed for this product); liquefaction category (varies); coastal / inundation exposure (varies). A factor that is not scored is left out of the total, and the class is marked as based on fewer factors. Reasons are in Appendix B.

What each level means

LEVEL	THE USUAL RESPONSE IN PRACTICE AT THIS LEVEL
SL1 Very Low	Routine periodic monitoring. No professional intervention indicated by the InSAR record.
SL2 Low	Continue scheduled InSAR monitoring; review at next reporting cycle.
SL3 Moderate - this property	Standard practice response at this level: site-specific review by a Chartered Professional Engineer (Geotechnical) and increased monitoring frequency.
SL4 High	Standard practice response at this level: CPEng geotechnical investigation before land is relied on for a transaction, consenting decision, or earthworks.
SL5 Very High	Standard practice response at this level: prompt professional geotechnical investigation, with interim risk-management measures considered pending that advice.

What the colours rest on

The grid itself	The form of the qualitative risk matrix in the Australian Geomechanics Society's Practice Note Guidelines for Landslide Risk Management (AGS 2007), the framework New Zealand geotechnical practice works to.
The band edges, 5 and 10 mm/yr	LandSure's screening convention. No New Zealand standard sets rate bands for satellite ground-movement data, and these are not taken from one. They are pending review by a Chartered Professional Engineer.
The 16 mm/yr reference	The landslide velocity scale of Cruden and Varnes (1996), updated by Hungri, Leroueil and Picarelli (2014): below 16 mm a year is its slowest class, "extremely slow". New Zealand InSAR landslide studies report against it. Every LandSure band edge sits below it.
Buildings	For scale only: the Building Code verification method for foundations, B1/VM4 Appendix B, designs for a probable maximum differential settlement of 25 mm over 6 m. That is a design tolerance for a building. This report measures ground and roofs from orbit and does not assess any building against it.

Method version M-2026.07.

Land stability mapping



IN PLAIN WORDS

Susceptibility, in plain words

How easily a slope could fail, judged from its steepness, rock and soil. It is a map of where slopes could fail, not a record of slips that have happened.

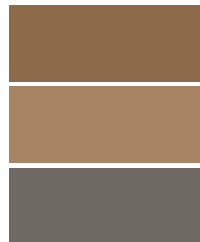
IN PLAIN WORDS

Why it sits beside the satellite record

The council map says where slopes are prone to move. The satellite record says whether this ground has actually moved over ten years. Read together, they are stronger than either alone.

FIGURE 13. Whangārei District Council land instability mapping round the property (white). Each area is coloured by its landslide susceptibility class.

Moderate High



SOIL

Cambisols

SoilGrids 250 m model, 28% likely

TOPSOIL TEXTURE

23% clay, 52% sand

SoilGrids 250 m model

ROCK

Ruatangata Sandstone of Waro Subgroup (Te Kuiti Group) in Northland Allochthon

sandstone: sandstone, limestone, conglomerate. QMAP 1:250,000

the national records do not state how deep each layer runs, so the column is drawn in order, not to scale

FIGURE 14. The ground under the property as national records describe it, from the surface down. Source: ISRIC SoilGrids, CC BY 4.0; GNS Science QMAP, CC BY 4.0.

COUNCIL LAYER	HERE	WHAT WAS FOUND	MAPPED BY
Land instability (landslide susceptibility)	HIGH	mapped on the property	Tonkin + Taylor
Liquefaction vulnerability category	NOT ASSESSED	the council's category here is 'undetermined': its study did not assess this land in detail	Tonkin & Taylor Ltd

Liquefaction categories mapped within 250 m: Undetermined. Liquefaction is ground that can turn soft in strong shaking; it matters most on low, wet, sandy land.

Council layers are queried live for this report and are not copied or kept. The service states no licence; source: Whangārei District Council. The property's LIM carries the council's formal hazard information.

Title, parcels and buildings

WHAT WE FOUND

The legal parcel, its title and the buildings on it, from LINZ. 1 building outline sits on the property.

809 m²

SURVEYED AREA
LINZ record for the title

806 m²

AREA OF THE BOUNDARY USED
The supplied boundary closely matches the surveyed legal parcel area.

1

BUILDING OUTLINES
LINZ, traced from aerial imagery

20.4%

OF THE LAND UNDER ROOF
164 m² of outline



FIGURE 15. The boundary this report was made for (teal), neighbouring legal parcels (dashed), LINZ building outlines (white; orange for those on the property) and mapped watercourses (blue). Building outlines are traced from aerial imagery and can lag new building work.

Legal records

APPELLATION	TITLE	INTENT	AREA
Withheld (sample)	Withheld	DCDB	809 m ² this report

From LINZ NZ Primary Parcels, read when this report was made. The title reference is the starting point for a title search; memorials, easements and covenants are on the title itself and are not shown here.

Why buildings matter to this report

Most measured points form on roofs and paving. A point on a building records the building and the ground together: settlement of a foundation and movement of the land beneath it look the same from orbit. The table below lists each building outline on the property and the measured points that fall inside it.

Buildings on the property, and the points on them

OUTLINE	FOOTPRINT	MEASURED POINTS INSIDE IT	WHAT THAT MEANS
Building A	164 m ²	Point 1	The rates of these points describe this building and the ground under it together.

An outline is the roof edge as traced from an aerial photograph, so a point just outside one may still be on the building's paving or eaves. Footprint is the area of the outline, not floor area.

Aerial photos over the years

WHAT WE FOUND

3 LINZ aerial surveys of this property, from 2015 to 2025, side by side at the same scale.

What this means for you: Look for new buildings, earthworks, retaining walls, cleared trees or slips between the photos. Changes like these help explain movement in the satellite record.



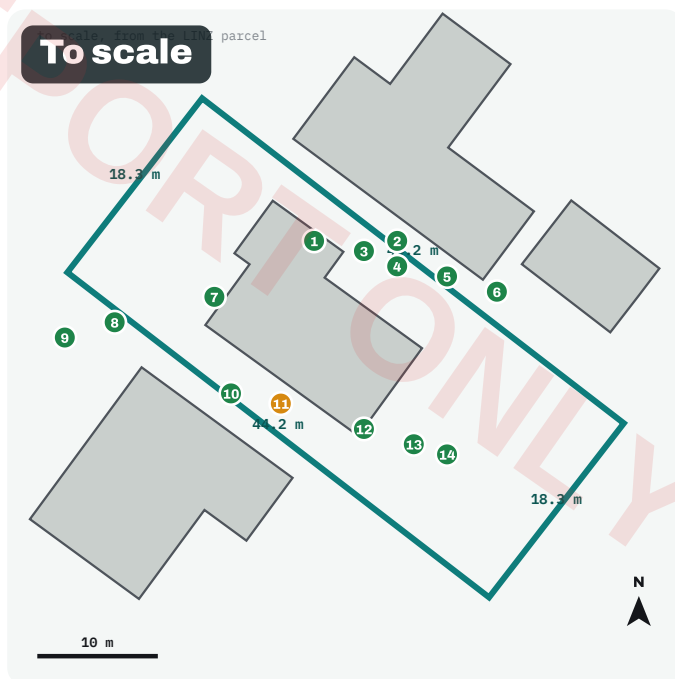
Northland 0.1m Urban Aerial Photos (2014-2015)



Northland 0.4m Rural Aerial Photos (2014-2016)



Northland 0.3m Rural Aerial Photos (2023-2025)



The property from its LINZ parcel: the length of each boundary, buildings and measured points.

Photos: LINZ aerial surveys via LINZ Basemaps, CC BY 4.0. Each photo is labelled with the survey named by LINZ. The teal outline is the property boundary. Photos taken before the satellite record began show what the land looked like beforehand.

Heights and slope

WHAT WE FOUND

The land falls 4 m across the property, with a mean slope of 8 degrees, facing south-west.

50-54 m

HEIGHT OF THE LAND

lowest to highest ground on the property

4 m

OF FALL ACROSS IT

within the boundary

8°

MEAN SLOPE

1 m of fall in every 7.3 m

south-west

THE LAND FACES

mean downhill direction

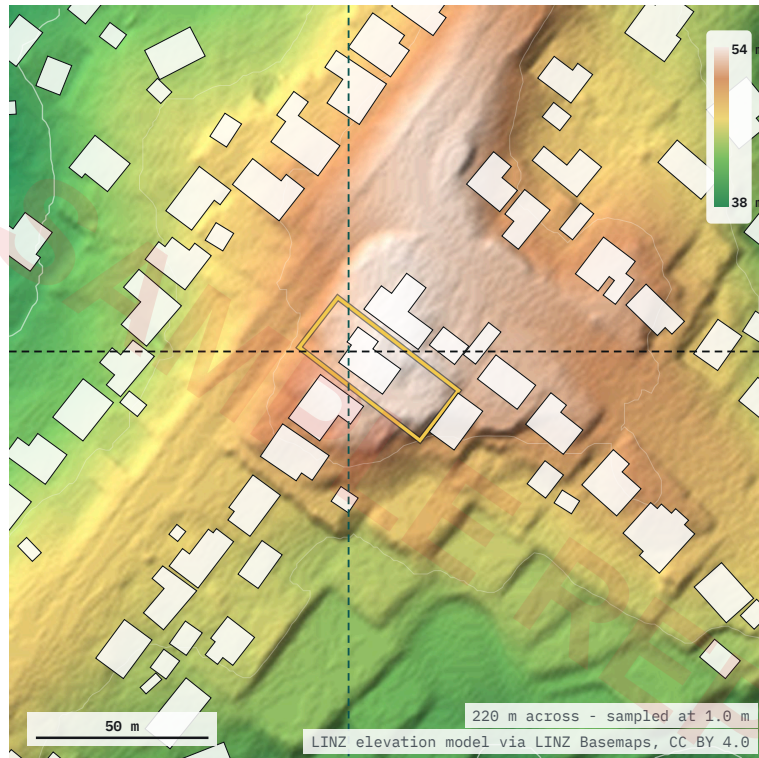


FIGURE 16. The ground from above in colour, from LIDAR: green is the lowest ground, warm tones the highest (scale at right). Shading shows slopes lit from the north-west; white lines are contours every 5 m. Yellow: the property. White: building outlines. Dashed lines: the two slices in Figure 18 (black west to east, teal south to north).

How steep, by share of the land

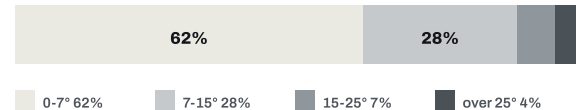
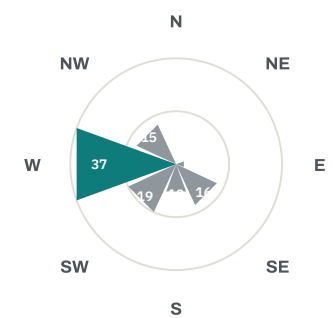


FIGURE 17. Share of the property in each slope range, from 920 elevation cells inside the boundary.



Which way the sloping ground faces (share of cells steeper than 3°).

Why slope is here

Slow movement on sloping ground usually runs downhill. A point moving away from the satellite on a slope that faces away from it may be moving along the slope, not sinking. The measured slope is also one of the site factors in the screening level.

Heights are from an aerial laser survey of bare ground, as served by LINZ. The vertical datum is not stated here because the tile service does not state it.

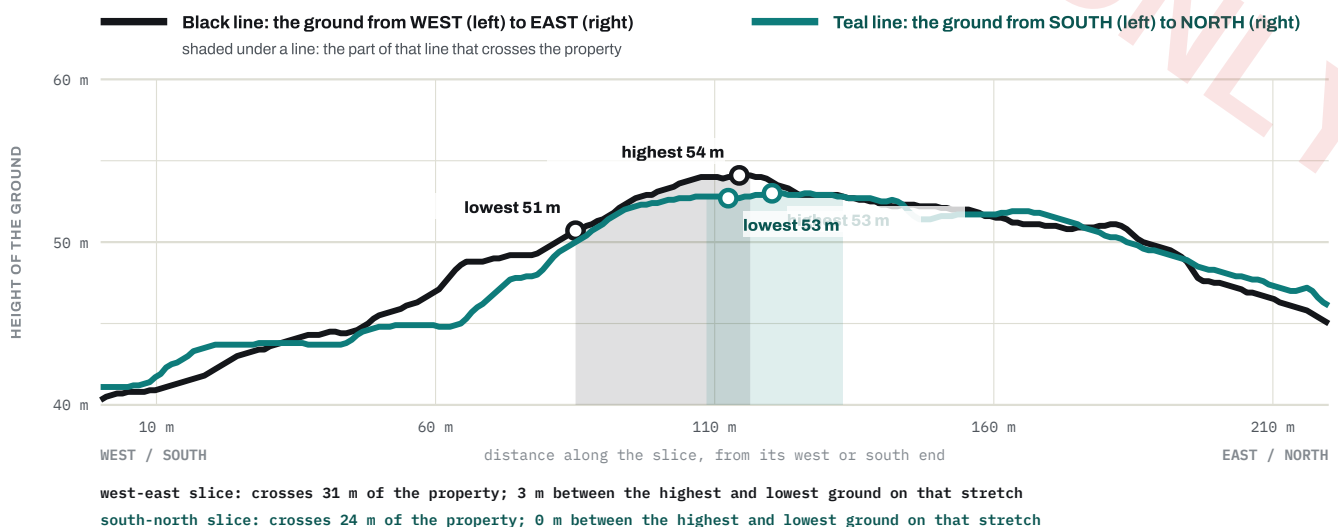


FIGURE 18. Two slices through the ground, as if the land were cut with a knife along the two dashed lines on Figure 16 and looked at from the side. **BLACK** is the slice from west to east; **TEAL** is the slice from south to north. Each is placed where it crosses the most of this property. The tinted area under a line is the stretch that lies on the property, with its highest and lowest ground marked; the rest is neighbouring land. Read it for where the property sits on the slope - near a crest, part-way down, or at the foot - and for any step or bench in the ground. Heights are drawn about 3 times taller than distances so the shape can be seen. Source: LINZ elevation model, CC BY 4.0.

Streams, rock and soil

WHAT WE FOUND

Where water sits around the property, and what the ground is made of. The rock under it is mapped as Ruatangata Sandstone of Waro Subgroup (Te Kuiti Group) in Northland Allochthon.

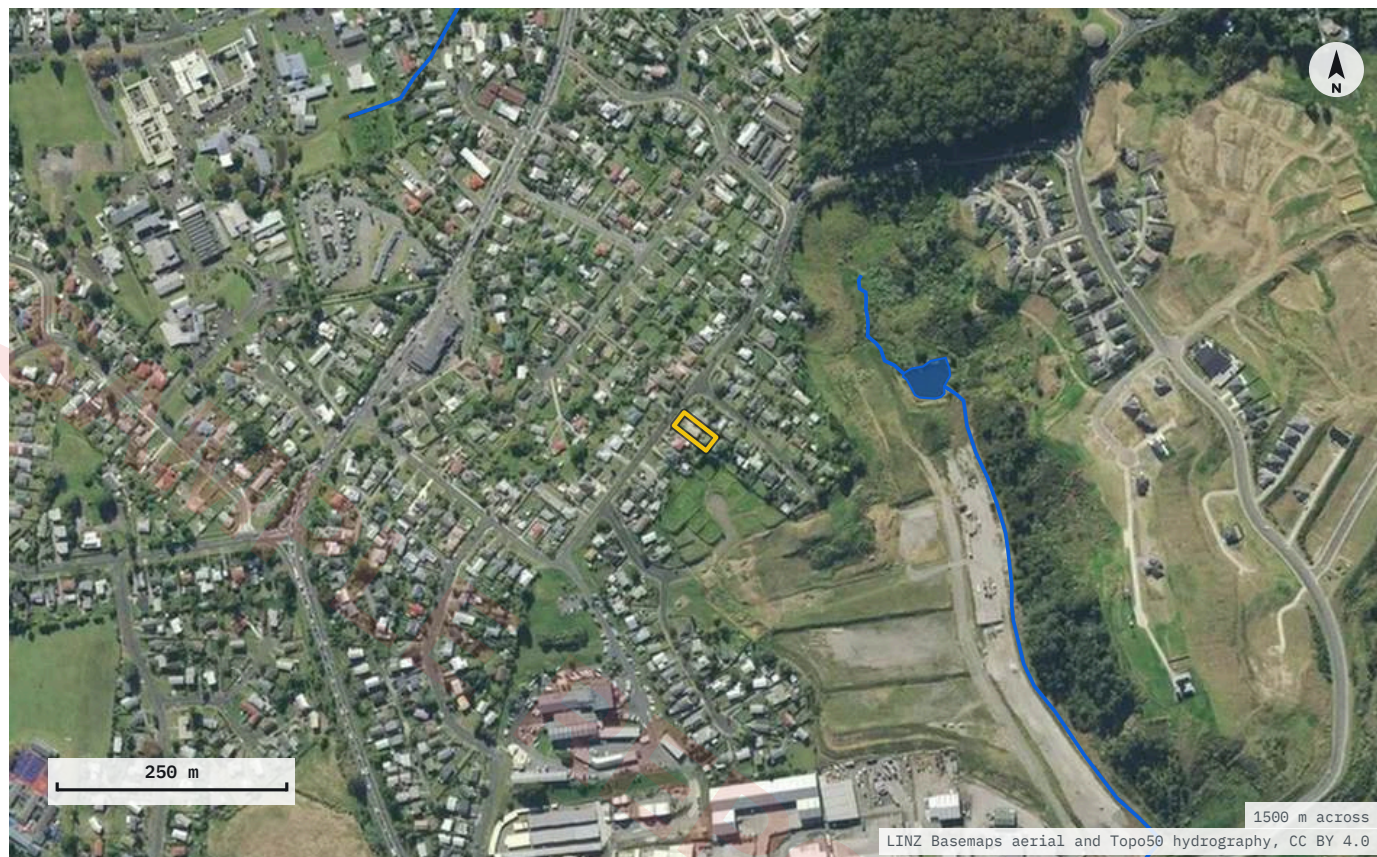


FIGURE 19. Mapped water around the property (yellow). Blue: river centrelines and lakes. These are 1:50,000 topographic features: small drains, piped streams and overland flow paths are not on them, and this is not a flood map.

Distance to mapped water

Watercourse	198 M	nearest mapped watercourse, measured from the boundary
Lake or pond	214 M	nearest mapped lake, measured from the boundary
Lowest ground	51.0 m	lowest point of the property in the LINZ elevation model

Flood, coastal-inundation and tsunami mapping is held by the regional and district councils and is on the property's LIM. It is not part of this report.

Why water is here

Water is the most common driver of slow ground movement: it softens soil, raises and lowers the water table through the year, and erodes the toe of slopes and banks. A measured point close to a watercourse or a coastal edge is read with that in mind.

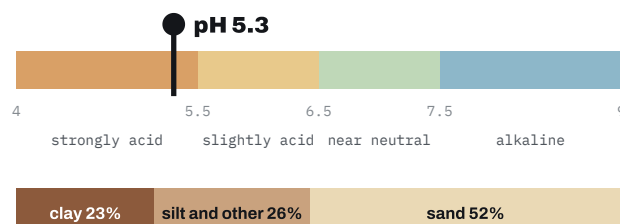
Rock under the property

GEOLOGICAL UNIT	MAIN ROCK	MADE OF	SYMBOL
Ruatangata Sandstone of Waro Subgroup (Te Kuiti Group) in Northland Allochthon	sandstone	sandstone, limestone, conglomerate	mE01.sst9_all

Geological Map of New Zealand 1:250,000 (4th ed., 2023), GNS Science, CC BY 4.0. Regional mapping: a unit boundary can be hundreds of metres from where it is drawn, and the map is not a site investigation.

Soil

Soil group	Cambisols (28% likelihood in the grid)
What that group is	Young soils with limited profile development. Behaviour varies widely with parent material.



share of the fine earth, from the grid's clay and sand values; the rest is

ISRIC SoilGrids v2.0, CC BY 4.0: a global model on a 250 m grid using international soil group names. It gives the likely soil of the area, not a test of this section's soil.

Earthquakes near the property

WHAT WE FOUND

21 earthquakes of magnitude 3 or more within 150 km during the measured years, 3 of them magnitude 4 or more.

21**EARTHQUAKES, M3 AND OVER**

within 150 km, during the measured years

3**OF MAGNITUDE 4 AND OVER**

same search

M4.1**LARGEST**

10 Feb 2019 - 59 km away

20 km**CLOSEST**

M3.1 - 21 Feb 2019

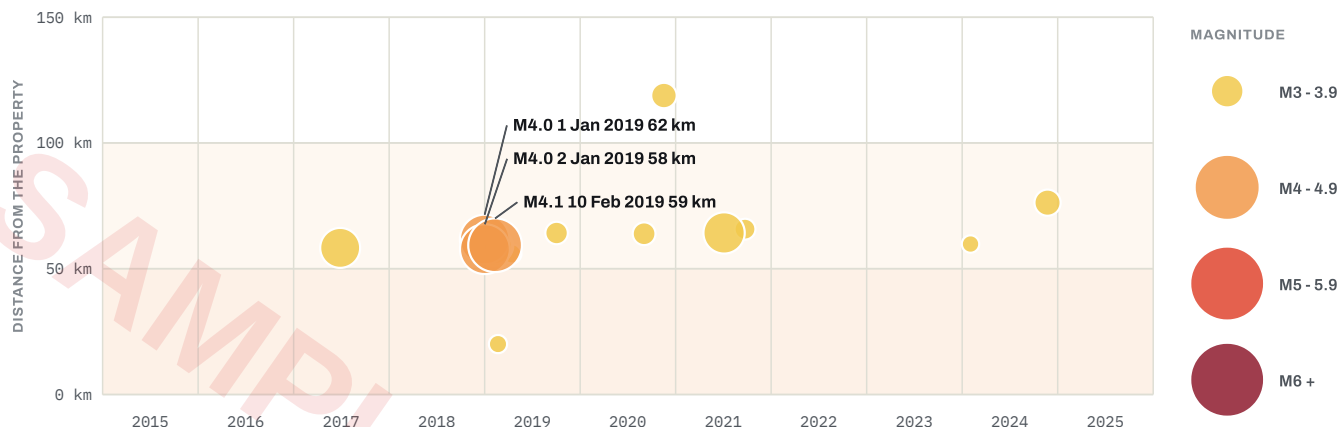


FIGURE 20. Every earthquake of magnitude 3 or more within 150 km of the property between May 2015 and June 2025. Across: when. Up: how far away. Size and colour: magnitude. The shaded band is the nearest 50 km. Rows the catalogue types as something other than an earthquake are left out. Source: GeoNet (Earth Sciences New Zealand and the Natural Hazards Commission), CC BY 3.0 NZ.

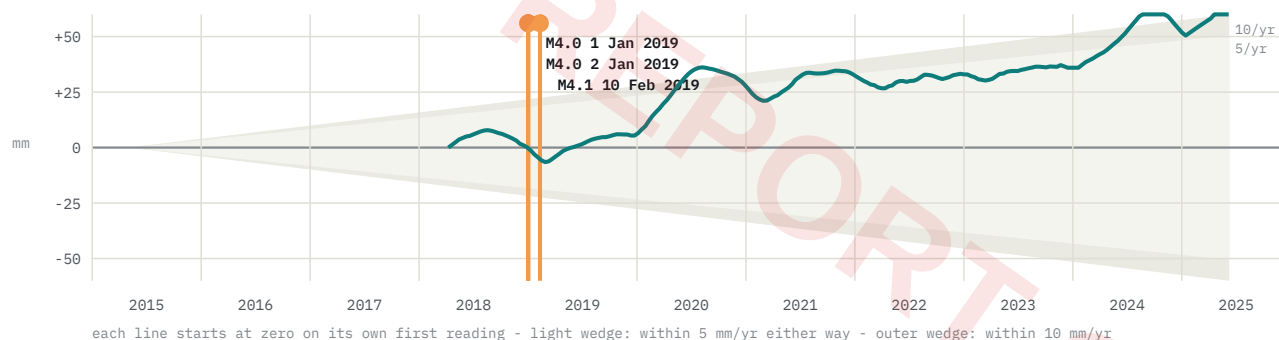
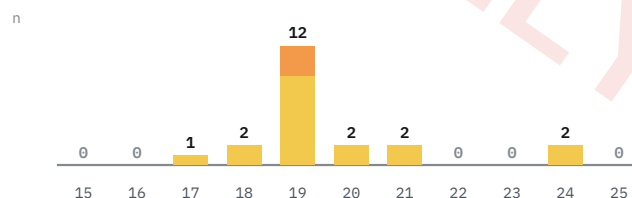


FIGURE 21. Point 11, the fastest on the property, on a fixed scale of plus or minus 60 mm, with every magnitude 4+ earthquake from Figure 21 marked at its date. A step in the line at a marked date is a reason to look closer, not proof of a link: the marks are there so a reader can rule an earthquake in or out.

The largest in the search

DATE	MAGNITUDE	DEPTH	DISTANCE	GEONET ID
10 Feb 2019	M4.1	12 km	59 km	2019p108878
02 Jan 2019	M4.0	12 km	58 km	2019p004126
01 Jan 2019	M4.0	12 km	62 km	2019p000442
05 Jul 2021	M3.8	9 km	64 km	2021p500168
28 Jun 2017	M3.7	5 km	58 km	2017p481995
11 Feb 2019	M3.5	12 km	59 km	2019p111840

By year



Earthquakes of magnitude 3 and over within 150 km, counted by calendar year and coloured by magnitude.

What this page does not cover

This is the record of shaking during the measured years. It is not a statement of earthquake hazard, and it says nothing about active faults: the national active-fault database is licensed for non-commercial use and is not part of this report. Distance is from the property to the point on the surface above where the earthquake began.

Sun, land cover and climate

WHAT WE FOUND

The hills around the property keep 97% of the possible direct sun across the year.

97%

OF POSSIBLE DIRECT SUN

kept after the surrounding terrain, across the year

8.9 h

DIRECT SUN, 21 JUNE

7:48 am to 4:44 pm

14.2 h

DIRECT SUN, 21 DECEMBER

6:10 am to 8:20 pm

54 m

HEIGHT USED

ground at the centre of the property, plus 1.8 m

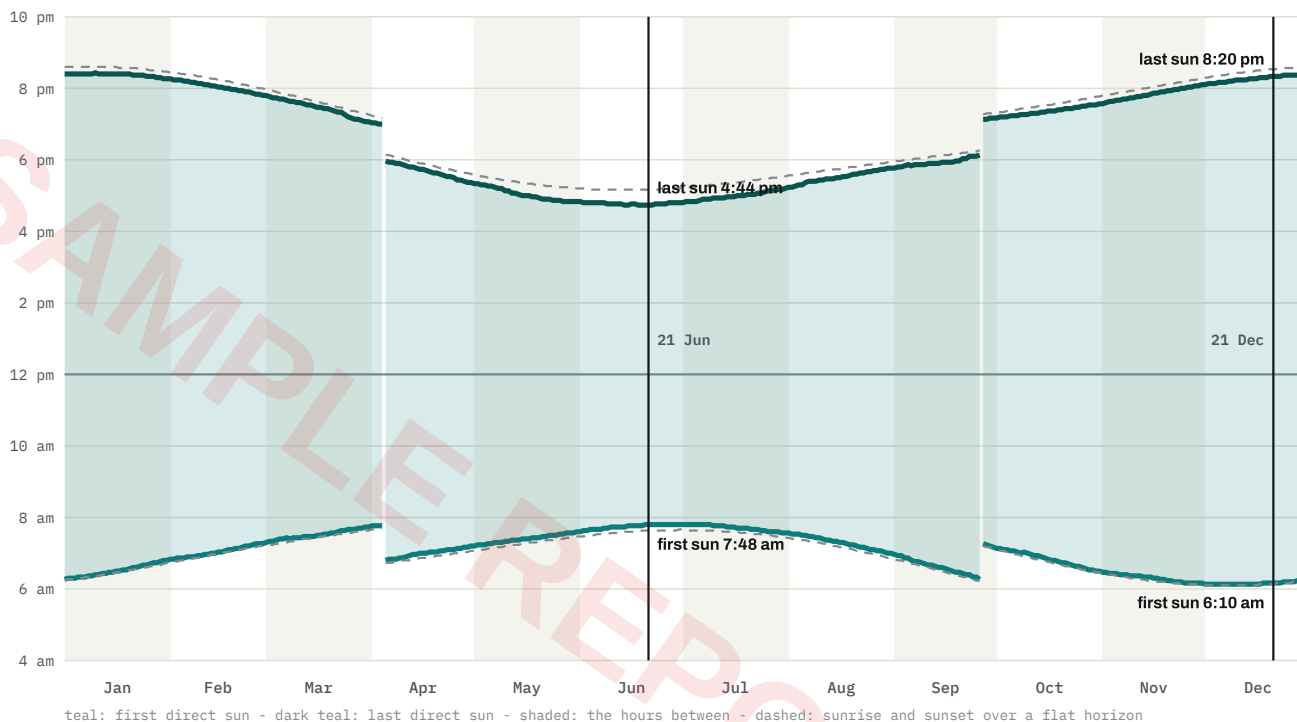


FIGURE 22. First and last direct sun on each of the 365 days of the year, after the hills around the property. Calculated from the LINZ elevation model within 8 km and the sun's position; each day is its own calculation and nothing is averaged. Clock times as read in New Zealand: daylight time (+1 h) until 5 April 2026 and from 27 September 2026, standard time between. Buildings, trees and cloud are not included. Source: LINZ elevation model, CC BY 4.0 - solar position: NOAA equations.

Land cover since 1996

1996	2001	2008	2012	2018	2023
Built-up Area (settlement)	Built-up Area (settlement)	Built-up Area (settlement)	Built-up Area (settlement)	Built-up Area (settlement)	Built-up Area (settlement)

Figure 23. Land cover class mapped at this property in each edition of the Land Cover Database. The class has not changed across the six editions. LCDB v6.0, Manaaki Whenua, CC BY 4.0. Mapped from satellite imagery with a smallest unit of one hectare, so a single section inside a larger block takes the block's class.

The climate year

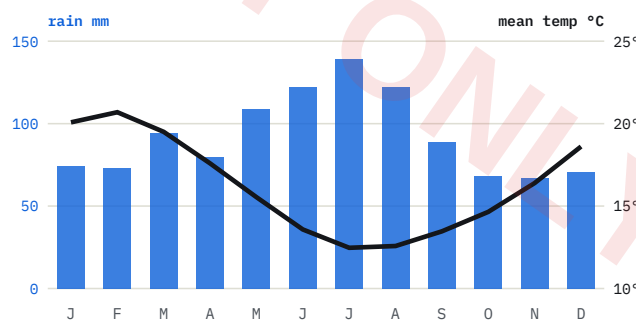


FIGURE 24. Mean monthly rain and temperature, January 2001 - December 2020. NASA POWER grid cell, about 50 km across. Source: NASA POWER.

Where it sits



FIGURE 25. The wider area.

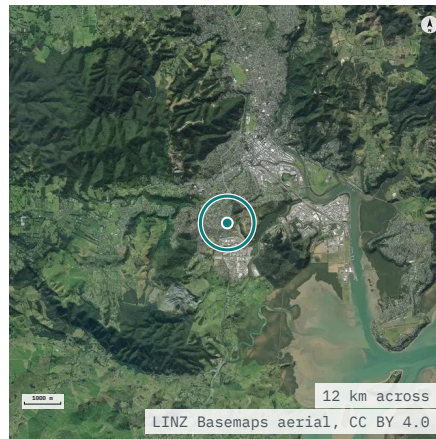


FIGURE 26. The local area.



FIGURE 27. The neighbourhood.

This area in numbers

2,025

PEOPLE, 2023

+3.2% since 2018, +20.0% 2013 to 2018

654

PRIVATE DWELLINGS

4% empty on census night

39%

HOUSEHOLDS OWNING

their home, or in a family trust

+35%

PEOPLE 65 AND OVER

change 2013 to 2023

1 km²

LAND AREA

statistical area withheld

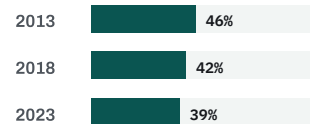
POPULATION



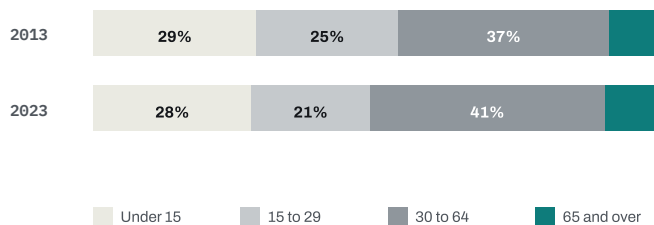
DWELLINGS



HOME OWNERSHIP



AGE GROUPS, 2013 AND 2023



IN PLAIN WORDS

Statistical area

For the census, Stats NZ divides the country into small areas that usually hold one to four thousand people. This is the one the property sits in. Its edges do not always follow suburb names.

Stats NZ 2023 Census, statistical area 2 (SA2), CC BY 4.0. Empty dwellings include holiday homes.

Services in the road



FIGURE 28. Council water, wastewater and stormwater mains, modelled flow paths and ponding areas round the property (white), with the measured points on the property. Where a pipe runs close to a measured point, the two can be read together.

■ stormwater main ■ wastewater main ■ water main ■ modelled flow path ■ ponding area

MAPPED BY THE COUNCIL	NEAREST	AROUND THE PROPERTY
Water supply mains	NONE	nothing mapped within 250 m
Wastewater mains	1 m	65 mapped features within 250 m
Stormwater mains	66 m	77 mapped features within 250 m
Surface depression ponding areas (2021)	137 m	5 mapped features within 250 m
Modelled catchment flow paths (2021)	47 m	82 mapped features within 250 m

IN PLAIN WORDS

Why pipes appear in a ground report

Leaking pipes soften the ground around them, and moving ground can crack pipes. Engineers look at the two together. Distances run from the boundary to the nearest mapped pipe. Private drains on the section are not mapped by the council.

Appendix A - every measured point

Every measured point supplied for this report. **Rate** is the velocity SatSense supplies, in millimetres a year along the satellite's line of sight; negative is away from the satellite. **Line fit** is LandSure's least-squares fit to the same readings. **Scatter** is the typical distance of a reading from that line. Points marked X were supplied but lie beyond the detailed zone; they are listed with SatSense's rate and are not rated. Data files with this table and every reading are available on request.

POINT	SATELLITE PASS	RATE MM/YR	LINE FIT MM/YR	SCATTER MM	READINGS	FIRST READING	LAST READING	BAND
ON THE PROPERTY								
1	descending	+0.2	+0.4	2.7	191	Apr 2018	May 2025	STABLE
2	ascending	+0.3	-0.4	2.7	271	May 2015	Jun 2025	STABLE
3	descending	+0.6	+0.5	1.6	193	Apr 2018	May 2025	STABLE
4	descending	+0.4	+0.2	1.5	192	Apr 2018	May 2025	STABLE
5	descending	+0.4	+0.2	1.7	192	Apr 2018	May 2025	STABLE
6	descending	+0.4	+0.3	2.9	194	Apr 2018	May 2025	STABLE
7	ascending	+0.3	0.0	3.4	274	May 2015	Jun 2025	STABLE
8	ascending	-0.3	-0.6	2.3	274	May 2015	Jun 2025	STABLE
9	ascending	-0.6	-0.5	2.5	272	May 2015	May 2025	STABLE
10	descending	+1.1	+1.5	4.1	159	Apr 2018	Apr 2024	MONITOR
11	descending	+8.4	+7.9	7.3	192	Apr 2018	Jun 2025	MONITOR
12	descending	+0.2	+0.2	1.6	192	Apr 2018	May 2025	STABLE
13	descending	+0.2	+0.2	1.7	192	Apr 2018	May 2025	STABLE
14	descending	+0.4	+0.3	2.5	192	Apr 2018	May 2025	STABLE
WITHIN 10 M OF THE BOUNDARY								
S1	ascending	-0.1	-0.4	2.2	275	May 2015	Jun 2025	STABLE
S2	ascending	-0.2	-0.3	2.6	273	May 2015	Jun 2025	STABLE
S3	ascending	+0.3	+0.2	4.1	242	May 2015	Jun 2025	STABLE
S4	ascending	-2.6	-3.5	5.3	255	May 2015	May 2025	STABLE
S5	ascending	-5.5	-3.8	6.5	267	May 2015	Jun 2025	MONITOR
S6	ascending	-0.1	-0.5	2.4	274	May 2015	Jun 2025	STABLE
SUPPLIED, BEYOND 10 M OF THE BOUNDARY - NOT RATED								
X1	ascending	+2.0	+0.3	5.3	268	May 2015	Jun 2025	NOT RATED
X2	descending	-0.4	+0.1	2.3	181	Apr 2018	Mar 2025	NOT RATED
X3	ascending	+0.0	-0.4	2.4	270	May 2015	Jun 2025	NOT RATED
X4	ascending	+0.1	-1.1	3.8	268	May 2015	Jun 2025	NOT RATED

Appendix A - every measured point

POINT	SATELLITE PASS	RATE MM/YR	LINE FIT MM/YR	SCATTER MM	READINGS	FIRST READING	LAST READING	BAND
SUPPLIED, BEYOND 10 M OF THE BOUNDARY - NOT RATED								
X5	descending	-2.7	-2.4	4.0	194	Apr 2018	Jun 2025	NOT RATED
X6	descending	-1.3	-1.6	3.1	185	Apr 2018	May 2025	NOT RATED
X7	descending	-3.7	-5.7	6.3	184	Apr 2018	May 2025	NOT RATED
X8	ascending	+0.0	-1.0	3.6	251	May 2015	May 2025	NOT RATED
X9	ascending	-0.3	-1.3	4.2	262	May 2015	May 2025	NOT RATED
X10	ascending	-0.8	-2.5	4.2	258	May 2015	May 2025	NOT RATED
X11	descending	-2.8	-2.3	3.4	189	Apr 2018	Jun 2025	NOT RATED
X12	ascending	-0.6	-2.0	3.7	270	May 2015	Jun 2025	NOT RATED
X13	descending	-2.3	-1.7	4.3	189	Apr 2018	May 2025	NOT RATED
X14	ascending	-0.6	-1.3	2.7	268	May 2015	Jun 2025	NOT RATED
X15	ascending	-1.1	-1.9	3.4	267	May 2015	Jun 2025	NOT RATED
X16	descending	+0.2	-0.1	2.1	188	Apr 2018	Jun 2025	NOT RATED
X17	ascending	-0.2	+0.9	2.9	273	May 2015	Jun 2025	NOT RATED
X18	ascending	-0.3	-2.0	4.0	273	May 2015	Jun 2025	NOT RATED
X19	ascending	-0.3	-0.2	3.2	266	May 2015	Jun 2025	NOT RATED
X20	ascending	+0.3	-0.5	2.2	274	May 2015	Jun 2025	NOT RATED
X21	ascending	-0.0	-1.1	3.5	268	May 2015	Jun 2025	NOT RATED
X22	ascending	+0.5	-0.4	2.7	276	May 2015	Jun 2025	NOT RATED
X23	ascending	+0.5	+0.3	3.5	266	May 2015	Jun 2025	NOT RATED
X24	descending	+0.8	+0.1	3.0	190	Apr 2018	May 2025	NOT RATED
X25	descending	+1.2	+0.2	2.6	194	Apr 2018	May 2025	NOT RATED
X26	descending	+1.2	+1.1	2.6	188	Apr 2018	Jun 2025	NOT RATED
X27	descending	-0.1	+0.1	2.9	187	Apr 2018	Apr 2025	NOT RATED
X28	descending	+0.3	+0.3	1.9	193	Apr 2018	May 2025	NOT RATED
X29	ascending	-0.3	-2.4	5.4	269	May 2015	Jun 2025	NOT RATED
X30	ascending	+0.1	-0.7	3.0	273	May 2015	Jun 2025	NOT RATED
X31	ascending	-0.6	-0.9	2.2	271	May 2015	Jun 2025	NOT RATED
X32	ascending	+0.3	-0.6	2.6	275	May 2015	Jun 2025	NOT RATED

Appendix A - every measured point

POINT	SATELLITE PASS	RATE MM/YR	LINE FIT MM/YR	SCATTER MM	READINGS	FIRST READING	LAST READING	BAND
SUPPLIED, BEYOND 10 M OF THE BOUNDARY - NOT RATED								
X33	ascending	+0.6	-0.3	2.5	274	May 2015	Jun 2025	NOT RATED
X34	ascending	-1.9	-1.6	2.6	270	May 2015	Jun 2025	NOT RATED
X35	ascending	-0.4	-0.1	3.0	271	May 2015	Jun 2025	NOT RATED
X36	ascending	-0.5	-0.4	2.7	272	May 2015	Jun 2025	NOT RATED
X37	descending	+0.0	+0.4	2.7	191	Apr 2018	Jun 2025	NOT RATED
X38	descending	+0.5	+0.5	2.1	191	Apr 2018	May 2025	NOT RATED
X39	ascending	-4.1	-4.8	4.1	248	May 2015	Apr 2025	NOT RATED
X40	descending	+0.4	+0.2	1.5	192	Apr 2018	May 2025	NOT RATED
X41	ascending	-3.9	-4.2	4.0	262	May 2015	Jun 2025	NOT RATED
X42	descending	+0.6	+0.2	1.9	192	Apr 2018	May 2025	NOT RATED
X43	descending	+1.5	+0.9	4.1	164	Apr 2018	Feb 2024	NOT RATED
X44	ascending	-1.1	-1.5	3.1	241	May 2015	Apr 2025	NOT RATED
X45	descending	+1.1	+1.0	3.4	169	Apr 2018	Jan 2025	NOT RATED
X46	descending	+1.0	+0.5	2.0	193	Apr 2018	May 2025	NOT RATED
X47	descending	+1.9	+1.3	3.0	184	May 2018	May 2025	NOT RATED
X48	descending	+0.7	+0.3	2.6	193	Apr 2018	May 2025	NOT RATED
X49	ascending	-4.1	-5.0	4.4	270	May 2015	Jun 2025	NOT RATED
X50	ascending	-0.5	-1.3	3.6	247	May 2015	May 2025	NOT RATED
X51	descending	+1.8	+1.7	2.0	197	Apr 2018	Jun 2025	NOT RATED
X52	descending	+1.8	+1.5	2.6	194	Apr 2018	Jun 2025	NOT RATED
X53	descending	+0.9	+0.6	1.8	192	Apr 2018	May 2025	NOT RATED
X54	descending	+0.3	+0.3	2.5	194	Apr 2018	May 2025	NOT RATED
X55	ascending	+0.9	+0.8	4.2	185	May 2015	Dec 2022	NOT RATED
X56	descending	+5.4	+3.0	5.6	187	Apr 2018	May 2025	NOT RATED
X57	descending	+3.4	+1.8	3.2	190	Apr 2018	May 2025	NOT RATED
X58	ascending	-0.2	-0.4	2.1	274	May 2015	Jun 2025	NOT RATED
X59	ascending	+0.4	+0.3	3.1	266	May 2015	Jun 2025	NOT RATED
X60	descending	+0.5	+0.7	1.9	194	May 2018	Jun 2025	NOT RATED

Appendix A - every measured point

POINT	SATELLITE PASS	RATE MM/YR	LINE FIT MM/YR	SCATTER MM	READINGS	FIRST READING	LAST READING	BAND
SUPPLIED, BEYOND 10 M OF THE BOUNDARY - NOT RATED								
X61	descending	+0.3	0.0	1.5	192	Apr 2018	Jun 2025	NOT RATED
X62	ascending	-0.5	-1.3	3.5	270	May 2015	Jun 2025	NOT RATED
X63	descending	+0.1	-0.1	1.6	192	Apr 2018	Jun 2025	NOT RATED
X64	ascending	-0.6	-1.0	2.9	272	May 2015	Jun 2025	NOT RATED
X65	ascending	-0.6	-0.4	3.3	267	May 2015	Jun 2025	NOT RATED
X66	descending	-0.3	+0.1	2.0	189	May 2018	Apr 2025	NOT RATED
X67	ascending	-1.5	-2.6	5.5	251	May 2015	Jun 2025	NOT RATED
X68	descending	-0.3	-0.7	2.8	188	Apr 2018	Jun 2025	NOT RATED
X69	ascending	+0.5	+0.5	5.0	175	May 2015	Dec 2021	NOT RATED
X70	ascending	-4.3	-7.3	9.7	243	May 2015	Apr 2025	NOT RATED
X71	descending	+2.0	+1.3	2.3	181	Apr 2018	May 2025	NOT RATED
X72	ascending	-5.0	-3.5	6.0	268	May 2015	Jun 2025	NOT RATED
X73	ascending	-0.5	-1.7	4.6	266	May 2015	May 2025	NOT RATED
X74	descending	-0.2	-0.2	1.8	193	Apr 2018	May 2025	NOT RATED
X75	descending	+0.6	+0.4	1.8	193	Apr 2018	May 2025	NOT RATED
X76	descending	+0.3	-0.2	1.2	192	Apr 2018	May 2025	NOT RATED
X77	descending	+0.3	-0.1	1.2	192	Apr 2018	May 2025	NOT RATED
X78	ascending	-0.1	-0.1	2.9	268	May 2015	Jun 2025	NOT RATED
X79	ascending	-2.3	-3.0	5.1	275	May 2015	Jun 2025	NOT RATED
X80	descending	-0.3	+0.5	2.5	187	Apr 2018	May 2025	NOT RATED
X81	ascending	-2.1	-3.4	5.8	270	May 2015	Jun 2025	NOT RATED
X82	ascending	-1.6	-2.2	3.7	253	May 2015	Jun 2025	NOT RATED
X83	descending	+0.9	+1.1	2.3	191	Apr 2018	May 2025	NOT RATED
X84	ascending	-2.6	-2.4	2.1	274	May 2015	Jun 2025	NOT RATED
X85	descending	+1.0	+1.1	2.1	179	Apr 2018	May 2025	NOT RATED
X86	ascending	-2.7	-3.4	3.4	275	May 2015	May 2025	NOT RATED
X87	ascending	-3.7	-6.6	9.6	260	May 2015	Jun 2025	NOT RATED
X88	descending	+0.4	+0.7	1.7	195	Apr 2018	May 2025	NOT RATED

Appendix A - every measured point

POINT	SATELLITE PASS	RATE MM/YR	LINE FIT MM/YR	SCATTER MM	READINGS	FIRST READING	LAST READING	BAND
SUPPLIED, BEYOND 10 M OF THE BOUNDARY - NOT RATED								
X89	ascending	+3.6	+3.5	5.7	190	May 2015	Dec 2022	NOT RATED
X90	descending	-0.2	-0.3	1.6	189	Apr 2018	May 2025	NOT RATED
X91	descending	+0.1	-0.2	1.4	194	Apr 2018	May 2025	NOT RATED
X92	descending	+0.5	+0.5	2.5	190	May 2018	May 2025	NOT RATED
X93	descending	+0.0	-0.4	1.5	188	Apr 2018	May 2025	NOT RATED
X94	descending	+0.6	+0.5	1.5	192	Apr 2018	May 2025	NOT RATED
X95	descending	-0.0	-0.2	1.2	192	Apr 2018	May 2025	NOT RATED
X96	ascending	-1.8	-1.4	4.2	271	May 2015	May 2025	NOT RATED
X97	ascending	-1.7	-0.8	5.6	250	May 2015	Jun 2025	NOT RATED
X98	ascending	-2.6	-2.7	3.0	270	May 2015	Jun 2025	NOT RATED
X99	ascending	-2.9	-3.1	2.6	273	May 2015	Jun 2025	NOT RATED
X100	descending	+1.2	+0.7	2.2	193	Apr 2018	May 2025	NOT RATED
X101	descending	+0.6	+0.5	2.2	195	Apr 2018	May 2025	NOT RATED
X102	ascending	-1.8	-3.0	4.4	253	May 2015	Mar 2025	NOT RATED
X103	descending	+0.8	+0.1	1.9	191	Apr 2018	May 2025	NOT RATED
X104	descending	+0.7	+0.9	2.1	192	Apr 2018	Jun 2025	NOT RATED
X105	descending	+0.5	+0.5	1.6	194	Apr 2018	May 2025	NOT RATED
X106	ascending	-3.9	-5.1	5.2	250	May 2015	Jun 2025	NOT RATED
X107	descending	+1.5	+0.7	2.1	190	Apr 2018	May 2025	NOT RATED
X108	descending	+1.3	+0.7	2.3	194	Apr 2018	May 2025	NOT RATED
X109	ascending	-0.4	-0.6	3.1	273	May 2015	Jun 2025	NOT RATED
X110	ascending	-0.3	-0.5	3.1	273	May 2015	Jun 2025	NOT RATED
X111	descending	+1.2	+1.2	3.3	134	Apr 2018	Jan 2023	NOT RATED
X112	descending	+0.9	+0.5	2.2	189	May 2018	Jun 2025	NOT RATED
X113	descending	+0.6	+0.3	1.6	192	Apr 2018	May 2025	NOT RATED
X114	descending	+0.7	+0.6	1.6	195	Apr 2018	May 2025	NOT RATED
X115	ascending	+0.2	0.0	3.4	270	May 2015	Jun 2025	NOT RATED
X116	ascending	-0.3	-0.6	3.4	269	May 2015	Jun 2025	NOT RATED

Appendix A - every measured point

POINT	SATELLITE PASS	RATE MM/YR	LINE FIT MM/YR	SCATTER MM	READINGS	FIRST READING	LAST READING	BAND
SUPPLIED, BEYOND 10 M OF THE BOUNDARY - NOT RATED								
X117	descending	+1.2	+0.4	2.3	187	Apr 2018	May 2025	NOT RATED
X118	descending	+0.9	+1.1	2.5	194	Apr 2018	May 2025	NOT RATED
X119	ascending	-2.2	-1.9	2.3	273	May 2015	Jun 2025	NOT RATED
X120	ascending	-1.9	-2.2	2.4	274	May 2015	Jun 2025	NOT RATED
X121	ascending	-3.1	-4.0	4.6	260	Oct 2015	Jun 2025	NOT RATED
X122	ascending	-2.1	-2.0	2.2	274	May 2015	Jun 2025	NOT RATED
X123	ascending	-1.5	-1.3	1.9	274	May 2015	Jun 2025	NOT RATED
X124	ascending	-1.6	-1.5	2.2	273	May 2015	Jun 2025	NOT RATED
X125	ascending	-1.7	-1.9	6.3	188	May 2015	Jan 2023	NOT RATED
X126	ascending	-1.4	-1.9	3.0	274	May 2015	Jun 2025	NOT RATED
X127	descending	+0.7	+0.4	2.6	191	Apr 2018	May 2025	NOT RATED
X128	ascending	-1.6	-2.0	3.0	274	May 2015	Jun 2025	NOT RATED
X129	ascending	-7.7	-6.7	4.1	272	May 2015	Jun 2025	NOT RATED
X130	descending	-0.2	-1.1	3.8	187	Apr 2018	May 2025	NOT RATED
X131	ascending	+0.2	-0.5	2.6	274	May 2015	Jun 2025	NOT RATED
X132	ascending	-0.4	-1.9	4.7	268	May 2015	Jun 2025	NOT RATED
X133	descending	+0.8	+0.1	2.9	187	Apr 2018	May 2025	NOT RATED
X134	ascending	-1.1	-1.1	3.1	173	May 2015	Dec 2021	NOT RATED
X135	ascending	-5.4	-5.4	4.4	195	May 2015	Feb 2023	NOT RATED
X136	descending	+0.1	+0.4	2.1	160	Apr 2018	Feb 2024	NOT RATED
X137	descending	+0.6	+0.6	1.9	193	Apr 2018	May 2025	NOT RATED
X138	descending	+0.5	-0.3	2.6	184	May 2018	Mar 2025	NOT RATED
X139	ascending	-1.7	-2.0	2.3	271	May 2015	Jun 2025	NOT RATED
X140	ascending	-2.2	-1.1	3.8	271	May 2015	Jun 2025	NOT RATED
X141	descending	+0.9	+1.0	1.9	192	Apr 2018	Jun 2025	NOT RATED
X142	descending	+1.1	+1.2	1.9	194	Apr 2018	Jun 2025	NOT RATED
X143	descending	+2.8	+1.5	4.2	191	Apr 2018	Jun 2025	NOT RATED
X144	descending	+1.9	-1.1	7.9	182	Apr 2018	May 2025	NOT RATED

Appendix A - every measured point

POINT	SATELLITE PASS	RATE MM/YR	LINE FIT MM/YR	SCATTER MM	READINGS	FIRST READING	LAST READING	BAND
SUPPLIED, BEYOND 10 M OF THE BOUNDARY - NOT RATED								
X145	descending	+2.4	+1.9	2.4	163	Apr 2018	May 2024	NOT RATED
X146	ascending	-0.1	-2.5	7.2	255	May 2015	Jun 2025	NOT RATED
X147	descending	+1.0	+0.9	2.4	189	Apr 2018	May 2025	NOT RATED
X148	descending	+1.0	+1.1	2.6	157	Apr 2018	Dec 2023	NOT RATED
X149	ascending	+1.5	+1.5	3.9	168	May 2015	Dec 2021	NOT RATED
X150	ascending	-1.3	-1.4	3.2	190	May 2015	Jan 2023	NOT RATED
X151	ascending	-1.0	-1.4	3.3	266	May 2015	Jun 2025	NOT RATED
X152	ascending	-0.2	+0.9	4.5	235	May 2015	Jun 2024	NOT RATED

Appendix A - every measured point

Where each measurement was made. Latitude and longitude are WGS84 degrees; easting and northing are New Zealand Transverse Mercator 2000, in metres. SatSense places a point to within several metres.

POINT	WHERE	LATITUDE	LONGITUDE	NZTM EASTING	NZTM NORTHING
ON THE PROPERTY					
1	on the boundary line (3.7 m inside it)	-35.743851	174.310928	1,718,535.1	6,043,669.4
2	on the boundary line (0.5 m outside it)	-35.743851	174.311005	1,718,542.0	6,043,669.3
3	on the boundary line (1.8 m inside it)	-35.743858	174.310974	1,718,539.2	6,043,668.5
4	on the boundary line (1.2 m inside it)	-35.743870	174.311005	1,718,541.9	6,043,667.2
5	on the boundary line (0.7 m outside it)	-35.743877	174.311050	1,718,546.1	6,043,666.3
6	on the boundary line (2.2 m outside it)	-35.743889	174.311096	1,718,550.2	6,043,665.0
7	on the property	-35.743893	174.310837	1,718,526.7	6,043,664.9
8	on the boundary line (0.9 m outside it)	-35.743912	174.310745	1,718,518.4	6,043,662.9
9	on the boundary line (4.4 m outside it)	-35.743923	174.310699	1,718,514.3	6,043,661.6
10	on the boundary line (0.3 m inside it)	-35.743965	174.310852	1,718,528.0	6,043,656.8
11	on the boundary line (2.2 m inside it)	-35.743973	174.310898	1,718,532.1	6,043,655.9
12	on the boundary line (4.7 m inside it)	-35.743992	174.310974	1,718,539.0	6,043,653.7
13	on the property	-35.744003	174.311020	1,718,543.1	6,043,652.4
14	on the property	-35.744011	174.311050	1,718,545.9	6,043,651.5
WITHIN 10 M OF THE BOUNDARY					
S1	8.7 m outside	-35.743729	174.310959	1,718,538.0	6,043,682.9
S2	6.3 m outside	-35.743736	174.310928	1,718,535.2	6,043,682.1
S3	8.1 m outside	-35.743805	174.310654	1,718,510.3	6,043,674.8
S4	7.9 m outside	-35.743935	174.310654	1,718,510.1	6,043,660.4
S5	6.7 m outside	-35.744026	174.310822	1,718,525.1	6,043,650.1
S6	9.0 m outside	-35.744034	174.310791	1,718,522.4	6,043,649.3
SUPPLIED, BEYOND 10 M OF THE BOUNDARY - NOT RATED					
X1	119.9 m outside	-35.742996	174.311813	1,718,616.4	6,043,763.1
X2	122.8 m outside	-35.743031	174.311920	1,718,626.0	6,043,759.2
X3	100.3 m outside	-35.743057	174.311554	1,718,592.8	6,043,756.7
X4	97.6 m outside	-35.743069	174.311523	1,718,590.0	6,043,755.4

Appendix A - every measured point

POINT	WHERE	LATITUDE	LONGITUDE	NZTM EASTING	NZTM NORTHING
SUPPLIED, BEYOND 10 M OF THE BOUNDARY - NOT RATED					
X5	99.1 m outside	-35.743080	174.311569	1,718,594.2	6,043,754.1
X6	101.0 m outside	-35.743088	174.311615	1,718,598.3	6,043,753.2
X7	102.5 m outside	-35.743099	174.311661	1,718,602.4	6,043,751.9
X8	92.1 m outside	-35.743179	174.311600	1,718,596.8	6,043,743.1
X9	89.4 m outside	-35.743191	174.311569	1,718,594.0	6,043,741.8
X10	86.2 m outside	-35.743198	174.311523	1,718,589.8	6,043,741.0
X11	86.2 m outside	-35.743198	174.311523	1,718,589.8	6,043,741.0
X12	83.9 m outside	-35.743206	174.311493	1,718,587.1	6,043,740.2
X13	87.8 m outside	-35.743210	174.311569	1,718,594.0	6,043,739.7
X14	102.4 m outside	-35.743244	174.311890	1,718,622.9	6,043,735.5
X15	100.1 m outside	-35.743252	174.311859	1,718,620.1	6,043,734.7
X16	73.4 m outside	-35.743317	174.311478	1,718,585.5	6,043,728.0
X17	78.1 m outside	-35.743320	174.311569	1,718,593.8	6,043,727.4
X18	75.7 m outside	-35.743328	174.311539	1,718,591.0	6,043,726.6
X19	72.5 m outside	-35.743336	174.311493	1,718,586.9	6,043,725.8
X20	66.7 m outside	-35.743355	174.311417	1,718,580.0	6,043,723.8
X21	96.0 m outside	-35.743362	174.311951	1,718,628.2	6,043,722.3
X22	64.0 m outside	-35.743366	174.311386	1,718,577.2	6,043,722.6
X23	92.6 m outside	-35.743370	174.311905	1,718,624.1	6,043,721.5
X24	51.7 m outside	-35.743382	174.311188	1,718,559.2	6,043,721.1
X25	52.7 m outside	-35.743389	174.311218	1,718,562.0	6,043,720.3
X26	56.8 m outside	-35.743420	174.311340	1,718,573.0	6,043,716.7
X27	57.8 m outside	-35.743427	174.311371	1,718,575.7	6,043,715.8
X28	59.3 m outside	-35.743439	174.311417	1,718,579.8	6,043,714.5
X29	70.2 m outside	-35.743439	174.311615	1,718,597.8	6,043,714.3
X30	67.6 m outside	-35.743450	174.311584	1,718,595.0	6,043,713.0
X31	64.4 m outside	-35.743458	174.311539	1,718,590.8	6,043,712.3
X32	58.5 m outside	-35.743477	174.311462	1,718,583.9	6,043,710.2

Appendix A - every measured point

POINT	WHERE	LATITUDE	LONGITUDE	NZTM EASTING	NZTM NORTHING
SUPPLIED, BEYOND 10 M OF THE BOUNDARY - NOT RATED					
X33	56.1 m outside	-35.743484	174.311432	1,718,581.1	6,043,709.4
X34	59.4 m outside	-35.743572	174.311630	1,718,598.9	6,043,699.4
X35	17.1 m outside	-35.743607	174.310913	1,718,534.0	6,043,696.5
X36	14.8 m outside	-35.743618	174.310883	1,718,531.3	6,043,695.3
X37	28.1 m outside	-35.743641	174.311172	1,718,557.5	6,043,692.4
X38	11.4 m outside	-35.743736	174.311020	1,718,543.5	6,043,682.0
X39	77.2 m outside	-35.743740	174.312012	1,718,633.2	6,043,680.4
X40	12.1 m outside	-35.743748	174.311050	1,718,546.3	6,043,680.7
X41	74.2 m outside	-35.743752	174.311981	1,718,630.4	6,043,679.1
X42	13.9 m outside	-35.743755	174.311096	1,718,550.4	6,043,679.8
X43	14.9 m outside	-35.743763	174.311127	1,718,553.1	6,043,678.9
X44	67.0 m outside	-35.743771	174.311905	1,718,623.5	6,043,677.1
X45	61.7 m outside	-35.743809	174.311859	1,718,619.3	6,043,672.9
X46	31.3 m outside	-35.743862	174.311523	1,718,588.9	6,043,667.4
X47	78.9 m outside	-35.743862	174.312073	1,718,638.5	6,043,666.8
X48	34.7 m outside	-35.743870	174.311569	1,718,593.0	6,043,666.5
X49	73.3 m outside	-35.743874	174.312012	1,718,633.0	6,043,665.6
X50	15.6 m outside	-35.743958	174.310562	1,718,501.8	6,043,658.0
X51	69.4 m outside	-35.743973	174.311981	1,718,630.1	6,043,654.6
X52	73.6 m outside	-35.743980	174.312027	1,718,634.2	6,043,653.7
X53	25.3 m outside	-35.743984	174.311493	1,718,585.9	6,043,653.9
X54	29.5 m outside	-35.743996	174.311539	1,718,590.0	6,043,652.6
X55	21.3 m outside	-35.744007	174.311447	1,718,581.7	6,043,651.4
X56	36.5 m outside	-35.744015	174.311615	1,718,596.9	6,043,650.4
X57	39.3 m outside	-35.744022	174.311646	1,718,599.7	6,043,649.5
X58	12.6 m outside	-35.744045	174.310745	1,718,518.2	6,043,648.1
X59	16.1 m outside	-35.744057	174.310699	1,718,514.1	6,043,646.8
X60	15.6 m outside	-35.744061	174.310715	1,718,515.4	6,043,646.4

Appendix A - every measured point

POINT	WHERE	LATITUDE	LONGITUDE	NZTM EASTING	NZTM NORTHING
SUPPLIED, BEYOND 10 M OF THE BOUNDARY - NOT RATED					
X61	54.9 m outside	-35.744064	174.311813	1,718,614.8	6,043,644.6
X62	19.6 m outside	-35.744068	174.310654	1,718,509.9	6,043,645.6
X63	59.1 m outside	-35.744072	174.311859	1,718,618.9	6,043,643.7
X64	23.2 m outside	-35.744080	174.310608	1,718,505.8	6,043,644.4
X65	44.5 m outside	-35.744083	174.311691	1,718,603.7	6,043,642.7
X66	12.0 m outside	-35.744087	174.310822	1,718,525.1	6,043,643.3
X67	40.9 m outside	-35.744095	174.311646	1,718,599.6	6,043,641.5
X68	33.4 m outside	-35.744129	174.311539	1,718,589.8	6,043,637.8
X69	28.8 m outside	-35.744133	174.311478	1,718,584.3	6,043,637.4
X70	12.5 m outside	-35.744141	174.310898	1,718,531.9	6,043,637.3
X71	41.7 m outside	-35.744148	174.311630	1,718,598.1	6,043,635.6
X72	18.4 m outside	-35.744160	174.310822	1,718,524.9	6,043,635.3
X73	21.9 m outside	-35.744171	174.310776	1,718,520.8	6,043,634.1
X74	29.8 m outside	-35.744175	174.310638	1,718,508.4	6,043,633.8
X75	28.8 m outside	-35.744183	174.310669	1,718,511.1	6,043,632.9
X76	56.0 m outside	-35.744186	174.311783	1,718,611.8	6,043,631.1
X77	60.3 m outside	-35.744198	174.311829	1,718,616.0	6,043,629.8
X78	32.2 m outside	-35.744202	174.310638	1,718,508.3	6,043,630.8
X79	52.1 m outside	-35.744209	174.311722	1,718,606.3	6,043,628.7
X80	24.7 m outside	-35.744213	174.310791	1,718,522.1	6,043,629.4
X81	50.1 m outside	-35.744217	174.311691	1,718,603.5	6,043,627.9
X82	38.9 m outside	-35.744221	174.310547	1,718,500.0	6,043,628.8
X83	71.6 m outside	-35.744225	174.311951	1,718,627.0	6,043,626.7
X84	42.4 m outside	-35.744232	174.310501	1,718,495.9	6,043,627.6
X85	74.7 m outside	-35.744236	174.311981	1,718,629.7	6,043,625.4
X86	45.1 m outside	-35.744244	174.310471	1,718,493.1	6,043,626.4
X87	25.0 m outside	-35.744274	174.310883	1,718,530.3	6,043,622.5
X88	45.1 m outside	-35.744282	174.310532	1,718,498.6	6,043,622.1

Appendix A - every measured point

POINT	WHERE	LATITUDE	LONGITUDE	NZTM EASTING	NZTM NORTHING
SUPPLIED, BEYOND 10 M OF THE BOUNDARY - NOT RATED					
X89	27.7 m outside	-35.744286	174.310852	1,718,527.5	6,043,621.3
X90	44.1 m outside	-35.744289	174.310562	1,718,501.3	6,043,621.2
X91	42.5 m outside	-35.744301	174.310608	1,718,505.4	6,043,619.9
X92	41.5 m outside	-35.744308	174.310638	1,718,508.2	6,043,619.0
X93	60.5 m outside	-35.744312	174.311752	1,718,608.9	6,043,617.2
X94	40.0 m outside	-35.744320	174.310684	1,718,512.3	6,043,617.7
X95	63.3 m outside	-35.744320	174.311783	1,718,611.6	6,043,616.3
X96	61.8 m outside	-35.744331	174.311752	1,718,608.9	6,043,615.1
X97	45.0 m outside	-35.744339	174.310623	1,718,506.7	6,043,615.6
X98	48.2 m outside	-35.744347	174.310577	1,718,502.6	6,043,614.8
X99	51.7 m outside	-35.744358	174.310532	1,718,498.4	6,043,613.6
X100	61.8 m outside	-35.744377	174.310379	1,718,484.6	6,043,611.7
X101	60.3 m outside	-35.744389	174.310425	1,718,488.7	6,043,610.4
X102	64.7 m outside	-35.744400	174.310364	1,718,483.2	6,043,609.2
X103	55.2 m outside	-35.744427	174.310577	1,718,502.5	6,043,605.9
X104	53.7 m outside	-35.744438	174.310623	1,718,506.6	6,043,604.6
X105	52.7 m outside	-35.744446	174.310654	1,718,509.3	6,043,603.7
X106	57.9 m outside	-35.744476	174.310608	1,718,505.2	6,043,600.4
X107	74.2 m outside	-35.744499	174.310349	1,718,481.7	6,043,598.2
X108	73.5 m outside	-35.744511	174.310379	1,718,484.4	6,043,596.9
X109	70.2 m outside	-35.744511	174.310440	1,718,489.9	6,043,596.8
X110	73.7 m outside	-35.744522	174.310394	1,718,485.8	6,043,595.6
X111	103.0 m outside	-35.744537	174.312134	1,718,643.0	6,043,591.8
X112	64.6 m outside	-35.744572	174.310638	1,718,507.8	6,043,589.8
X113	90.8 m outside	-35.744602	174.310211	1,718,469.1	6,043,586.9
X114	89.3 m outside	-35.744614	174.310257	1,718,473.2	6,043,585.6
X115	78.7 m outside	-35.744637	174.310486	1,718,493.9	6,043,582.8
X116	82.2 m outside	-35.744648	174.310440	1,718,489.7	6,043,581.6

Appendix A - every measured point

POINT	WHERE	LATITUDE	LONGITUDE	NZTM EASTING	NZTM NORTHING
SUPPLIED, BEYOND 10 M OF THE BOUNDARY - NOT RATED					
X117	103.2 m outside	-35.744724	174.310181	1,718,466.2	6,043,573.4
X118	96.1 m outside	-35.744778	174.310394	1,718,485.4	6,043,567.2
X119	96.8 m outside	-35.744881	174.310562	1,718,500.4	6,043,555.6
X120	100.0 m outside	-35.744892	174.310516	1,718,496.3	6,043,554.4
X121	103.2 m outside	-35.744904	174.310471	1,718,492.1	6,043,553.2
X122	108.9 m outside	-35.745010	174.310577	1,718,501.6	6,043,541.2
X123	110.9 m outside	-35.745018	174.310547	1,718,498.8	6,043,540.4
X124	113.9 m outside	-35.745029	174.310501	1,718,494.7	6,043,539.2
X125	115.6 m outside	-35.745033	174.310471	1,718,491.9	6,043,538.8
X126	148.9 m outside	-35.745045	174.309860	1,718,436.7	6,043,538.3
X127	148.9 m outside	-35.745045	174.309860	1,718,436.7	6,043,538.3
X128	152.8 m outside	-35.745060	174.309814	1,718,432.5	6,043,536.6
X129	155.9 m outside	-35.745068	174.309769	1,718,428.4	6,043,535.8
X130	143.3 m outside	-35.745087	174.310028	1,718,451.8	6,043,533.4
X131	167.7 m outside	-35.745106	174.309616	1,718,414.5	6,043,531.8
X132	171.2 m outside	-35.745117	174.309570	1,718,410.4	6,043,530.6
X133	161.6 m outside	-35.745171	174.309830	1,718,433.8	6,043,524.3
X134	159.4 m outside	-35.745174	174.309875	1,718,437.9	6,043,523.9
X135	165.6 m outside	-35.745197	174.309799	1,718,431.0	6,043,521.4
X136	155.2 m outside	-35.745213	174.310013	1,718,450.3	6,043,519.5
X137	153.7 m outside	-35.745224	174.310059	1,718,454.4	6,043,518.1
X138	152.7 m outside	-35.745232	174.310089	1,718,457.1	6,043,517.3
X139	159.7 m outside	-35.745274	174.310028	1,718,451.5	6,043,512.7
X140	154.5 m outside	-35.745346	174.310272	1,718,473.5	6,043,504.3
X141	166.5 m outside	-35.745350	174.310028	1,718,451.4	6,043,504.2
X142	165.6 m outside	-35.745358	174.310059	1,718,454.2	6,043,503.3
X143	161.7 m outside	-35.745399	174.310226	1,718,469.3	6,043,498.5
X144	175.7 m outside	-35.745510	174.310150	1,718,462.2	6,043,486.3

Appendix A - every measured point

POINT	WHERE	LATITUDE	LONGITUDE	NZTM EASTING	NZTM NORTHING
SUPPLIED, BEYOND 10 M OF THE BOUNDARY - NOT RATED					
X145	174.9 m outside	-35.745522	174.310196	1,718,466.4	6,043,485.0
X146	168.5 m outside	-35.745621	174.310776	1,718,518.6	6,043,473.3
X147	172.8 m outside	-35.745651	174.310715	1,718,513.1	6,043,470.0
X148	173.1 m outside	-35.745663	174.310776	1,718,518.6	6,043,468.6
X149	183.1 m outside	-35.745754	174.310776	1,718,518.4	6,043,458.5
X150	193.6 m outside	-35.745861	174.310883	1,718,527.9	6,043,446.5
X151	207.2 m outside	-35.745987	174.310913	1,718,530.5	6,043,432.5
X152	208.3 m outside	-35.745995	174.310883	1,718,527.7	6,043,431.7

Appendix B - data and licences

Data read for this report

WHAT	SOURCE	LICENCE	PERIOD OR VINTAGE	THIS REPORT
Ground movement	SatSense InSAR, processed from Copernicus Sentinel-1 radar	SatSense partner licence	May 2015 to Jun 2025	READ
Neighbourhood positions	LandSure property-checker feed (SatSense positions only)	SatSense partner licence	live	NOT READ
Aerial imagery	LINZ Basemaps	CC BY 4.0	latest served	READ
Parcels and titles	LINZ NZ Primary Parcels	CC BY 4.0	live	READ
Building outlines	LINZ NZ Building Outlines	CC BY 4.0	live	READ
Rivers, lakes, coast	LINZ Topo50 hydrography	CC BY 4.0	live	READ
Elevation	LINZ elevation model (terrain tiles)	CC BY 4.0	latest served	READ
Geology	GNS Science QMAP 1:250,000, 4th edition	CC BY 4.0	2023	READ
Soil	ISRIC SoilGrids v2.0	CC BY 4.0	2020 release	READ
Earthquakes	GeoNet earthquake catalogue	CC BY 3.0 NZ	live	READ
Land cover	Land Cover Database v6.0, Manaaki Whenua	CC BY 4.0	1996 to 2023	READ
Climate	NASA POWER climatology	Open; acknowledge NASA	January 2001 - December 2020	READ
Sun position	NOAA solar position equations	Computed	-	READ

"Not read" means the source did not answer when this report was made. Nothing in the report is estimated in its place.

Left out, and why

DATA	REASON
NZLRI slope, erosion, rock and Land Use Capability; FSL soil, drainage, permeability and pH	The Landcare Data Use Licence, clause 2.2(a), does not allow the data, or findings made from it, to be passed to a third party.
S-map soils	Licensed CC BY-NC-ND 4.0: non-commercial use only, and no derived works.
GNS active faults; GNS landslide database	Licensed for non-commercial use.
Council flood, coastal, liquefaction and landslide mapping	Licensing differs by council, and many state none. This information is on the property's LIM.

Appendix B - further sources

WHAT	SOURCE	LICENCE	PERIOD OR VINTAGE	THIS REPORT
Daily rain	NASA POWER daily precipitation	Open; acknowledge NASA	May 2015 to Jun 2025	READ
GNSS (GPS) ground station	GeoNet continuous GNSS - station WHNG	CC BY 3.0 NZ	live	READ
Area census figures	Stats NZ 2023 Census, SA2	CC BY 4.0	2013, 2018, 2023	READ
District	Stats NZ Territorial Authority 2026	CC BY 4.0	2026	READ
House movement criteria	B1/VM2 second edition (MBIE, 2025), Appendix C	Crown copyright, published guidance	2025	USED
Region	Stats NZ Regional Council 2025: Northland Region	CC BY 4.0	2025	READ
Land instability (landslide susceptibility)	Whangārei District Council	not stated on the service	live	READ
Liquefaction vulnerability category	Whangārei District Council	not stated on the service	live	READ
Surface depression ponding areas (2021)	Whangārei District Council	not stated on the service	live	READ
Modelled catchment flow paths (2021)	Whangārei District Council	not stated on the service	live	READ
Stormwater mains	Whangārei District Council	not stated on the service	live	READ
Wastewater mains	Whangārei District Council	not stated on the service	live	READ
Water supply mains	Whangārei District Council	not stated on the service	live	READ

Council layers are queried live for each report and are not copied or kept. Where a council service states no licence, that is what is printed.

Appendix B - method

How each figure in this report is worked out

ITEM	METHOD
Rate of a point	The velocity SatSense supplies with each point. LandSure refits every series by least squares against the real reading dates as a check, prints both figures, and refuses the report if any point differs by more than 5 mm a year.
Bands	Stable: under 5 mm a year in either direction. Monitor: 5 to 10. Investigate: 10 and over. A point whose last 24 months run at 1.6 times its whole-record rate, or more, is raised to monitor.
Rating of the property	The band of the fastest rated point on the property. Points outside the boundary never count toward it.
Zones	Distance from the nearest point of the boundary line, including the edge of any excluded area inside it. Detailed zone 10 m; neighbourhood 100 m.
Chart scales	Fixed on every report and never fitted to the data: plus or minus 220 mm for the all-points history, plus or minus 60 mm for point records, plus or minus 30 mm a year for yearly rates.
Yearly rate	A straight-line fit within one calendar year. Shown only where the year holds 8 or more readings across 200 or more days.
Seasonal pattern	The mean, by calendar month, of each reading's distance from its own point's fitted line.
Slope	The mean slope of every cell of the LINZ elevation model whose centre lies on the property.
Sunlight	Terrain horizon in 1-degree steps from the elevation model within 8 km. Sun position every 2 minutes on each of 365 days. Buildings, trees and cloud are not included.
Screening level	Method M-2026.07. Rows: the measured movement of the fastest point. Columns: site factors that could be read, each scored 0, 1 or 2 and scaled to five classes.
Reproducing this report	Engine 0.4.0; report LS-SAMPLE . The same inputs give the same report.

Appendix C - limits and terms

Limits of the measurement

- InSAR measures surface deformation along the line-of-sight between the satellite and the ground. It does not directly measure vertical settlement. The satellite viewing geometry (orbit direction and incidence angle) affects which components of movement are visible and is stated in the Report Provenance where supplied by the data provider.
- Trends over short windows can be influenced by seasonal ground behaviour, such as shrink-swell of clay soils through wet and dry cycles. Ratings apply minimum observation-count and time-span gates to reduce, but not eliminate, this effect.
- Dense vegetation, steep terrain, water bodies and building changes can reduce data quality locally.
- **IMPORTANT** - sudden events break the record, they are not recorded: InSAR tracks slow, gradual movement (millimetres per year) by comparing repeated satellite images of the same ground surface. A sudden or large event - a landslide or slip, major earthworks, demolition, or new construction - changes the surface so much that the satellite can no longer match its earlier reflections. When this happens the affected measurement points break, jump, or stop rather than recording the event. A gap or abrupt end in a point's history must never be read as 'no movement' - it can mean the opposite. This report cannot be used to conclude that no sudden movement event has occurred.
- InSAR displacements are relative measurements: values describe each point's movement relative to the data provider's processing reference, not an absolute national datum. Comparisons within this report are internally consistent.
- Measurement sensitivity: this data is designed for gradual movement in the range of millimetres to a few centimetres per year. Movement faster than the satellite can track between passes, or movement between the report period's end and the report date, is not captured.
- Measurement points require a consistently reflective surface (buildings, hard surfaces, exposed ground). Heavily vegetated parts of a property typically have few or no measurement points - absence of points is a coverage limitation, not evidence of stability.
- InSAR does not identify the physical cause of movement by itself. This report should be considered alongside site inspections, geotechnical advice, local drainage information, ground works, and other relevant property records.
- This report is intended for risk awareness and decision support. For structural or geotechnical assessment, consult a qualified professional.
- LandSure does not provide engineering certification. Consult a qualified professional for site-specific advice.
- This report does not constitute geotechnical, engineering, valuation, legal, insurance or financial advice, and no advisor-client relationship is created by its purchase or use.
- This product contains no groundwater or soakage measurement. Soil permeability shown is regional-scale national mapping, not a site test, and must not be used for drainage or effluent design.
- **TERMS OF USE:** this report is an information product supplied only to the commissioning customer under the LandSure Terms of Use accepted at purchase (version on the Data Provenance page). Its title describes its subject matter - the historical ground-movement record, in all directions including uplift - not a finding about the property. It is not advice, an assessment, a certification, a prediction or a guarantee, and no other person may rely on it. To the maximum extent permitted by law, liability is excluded and otherwise limited to the amount paid; rights that cannot lawfully be limited are preserved.
- Decisions about purchasing, insuring, developing or remediating land should not be made on this report alone; such decisions remain the sole responsibility of the reader, who should obtain site-specific advice from a Chartered Professional Engineer (Geotechnical) or other suitably qualified professional.
- This report is not an EQC / Natural Hazards Commission assessment, is not produced under any statutory scheme, and has no standing in any insurance or NHC claim process.
- This report is prepared for the commissioning customer, for general information as at the report date, using third-party data reproduced in good faith without independent verification. It is not intended for, and must not be relied on by, any third party (including lenders and insurers), and LandSure has no duty to update it after issue.

The screening classification

The Screening Level classification is an information-product data screening derived from satellite InSAR measurement and, where stated, open government data. It applies a qualitative matrix consistent with frameworks used in New Zealand geotechnical practice, but it is not a geotechnical assessment, engineering opinion, or certification under the Building Act 2004, and it does not discharge any duty of a vendor, purchaser, insurer or council. Where site susceptibility factors are marked unassessed, the classification is provisional and conservative defaults apply.

References for the screening grid

- AGS (2007). Practice Note Guidelines for Landslide Risk Management. Australian Geomechanics Society, Vol 42 No 1. (NZGS-adopted framework.)
- MBIE/NZGS. Earthquake Geotechnical Engineering Practice, Modules 1–6. Ministry of Business, Innovation & Employment / NZ Geotechnical Society.
- Building Act 2004, ss 71–74 (building on land subject to natural hazards).
- MBIE (2017). Planning and engineering guidance for potentially liquefaction-prone land.
- Resource Management Act 1991, s 106 (subdivision consent - land instability).

Checking this report

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