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 Earth Sciences
 New Zealand
 Te Whatu Ao

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Land Movement Report

Sample property, Whangārei

LEGAL DESCRIPTION WITHHELD

LS-261014-043484 • ISSUED 14 OCTOBER 2026

9 MEASURED POINTS • 1,777 READINGS • FIRST READINGS MAY 2015 TO APR 2018, LAST READINGS APR 2024 TO JUN 2025; EACH POINT'S DATES ARE IN APPENDIX A • SATSENSE, FROM COPERNICUS SENTINEL-1

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A record of satellite radar measurements at 9 points at Sample property, Whangārei (first readings May 2015 to April 2018, last readings April 2024 to June 2025; each point's dates are in Appendix A), supplied by SatSense Ltd from Copernicus Sentinel-1 data, with public records about the site. It is not an inspection or an engineering assessment. It does not say that the land or any building is stable or unstable, safe or unsafe, or whether anything needs to be done.

Contains modified Copernicus Sentinel data 2015-2025, processed by SatSense Ltd. Issued by Avant Global Limited (NZBN 9429052017506), trading as LandSure, 56 Reotahi Road, Whangārei 0174. support@landsure.ai

Summary

● Under 5 mm a year ● 5 to 10 mm a year ● 10 mm a year and over Colour shows the size of SatSense's rate for a point. It is not a judgement about the ground.

Historical Land Movement Report

Copernicus Sentinel-1 radar data, processed by SatSense Ltd.

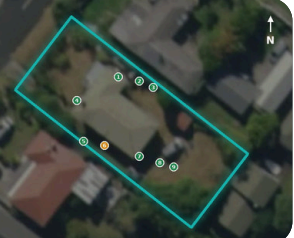
PROPERTY

Sample property,
Whangārei

RECORDS

first readings May 2015 – Apr 2018, last readings Apr 2024 – Jun 2025;
each point's dates are in Appendix A

legal description withheld · 809 m²



ABOUT THIS REPORT

What it is. A record of satellite radar measurements at 9 points on hard surfaces at Sample property, Whangārei; each point's own first and last reading are given below. The measurements were supplied by SatSense Ltd, made from Copernicus Sentinel-1 radar data. The report also shows public records about the site. Every figure is printed with its source.

What it is not. It is not an inspection: nobody visited the property. It is not an engineering or geotechnical assessment, a survey, a valuation, a LIM, a hazard assessment or a forecast. It does not say that the land or any building is stable or unstable, safe or unsafe, and it does not say whether anything needs to be done.

What was measured, and what was not. Only the 9 points shown were measured. Lawns, gardens and bush are not measured, and no point there is not the same as no movement. Each point stands for an area of about 5 x 20 m, drawn at the position SatSense supplies. The satellite does not see soil layers, fill, groundwater or foundations. Movement is measured along the satellite's slanted line of sight, not straight up and down. Sudden movement may not be recorded. The latest last reading was on 9 Jun 2025. Nothing after a point's last reading is covered.

MEASURED

9 points measured. 8 under 5 mm a year. 1 from 5 to 10. 0 at 10 and over.

3 points more than 5 m inside the boundary: 0.2 to 0.4 mm a year.

6 points within 5 m of the boundary line: 0.2 to 8.4 mm a year. Their positions cannot be assigned to one side with certainty.

LandSure's own straight-line fit of Point 6's readings gives 7.9 mm a year; the SatSense rate is 8.4. Classes use the SatSense rate (page 12). Period of SatSense's stated rates, derived by LandSure from the readings (not stated by the supplier): to Sep 2022 (081A), to Feb 2023 (146D). Readings run to Jun 2025. Of the 9 records, 8 start more than 12 months after May 2015 and 1 ends more than 12 months before Jun 2025. First readings 3 May 2015 to 9 Apr 2018; last readings 1 Apr 2024 to 9 Jun 2025, 492 days (more than 16 months) to 926 days (more than 30 months) before this report was issued. Each point's own dates are in Appendix A (page 31). Longest gap between readings: 114 days (15 Dec 2021 to 8 Apr 2022; a gap in Sentinel-1 coverage; Scoular et al. 2026), Point 4.

LARGEST SATSENSE RATE

8.4

mm a year, towards the satellite
Point 6, 2.2 m inside the boundary
± 4.6

LONGEST RECORD

more than 10

years
Point 4, 3 May 2015 to 9 Jun 2025; 3,690 days
shortest: Point 5, 2,184 days (nearly 6 years)

READINGS

1,777

at 9 points: 1 seen from the west, 8 from the east
usual gap 12 days; 159 to 274 per point

Points in each rate class

8

UNDER 5 MM/YR

mean rate 0.4 mm a year,
direction ignored

1

5 TO 10 MM/YR

mean rate 8.4 mm a year,
direction ignored

0

10+ MM/YR

no point

Colours show the size of SatSense's rate for a point, in three classes: under 5, 5 to 10, and 10 mm a year and over. The class limits are taken from the colour scales of SatSense's own maps. They are not a New Zealand standard and are not engineering criteria. Page 4 sets out where the limits come from.

What this report measured

Of the 9 points with a rate, 8 have a SatSense rate under 5 mm a year and 1 has one from 5 to 10 mm a year, each over the period printed on this page. The colour comes from that rate and from nothing else. Rates over shorter stretches of a record vary more and are printed on page 12. They do not change the colour.

SatSense rate of each point. +0.2 to +8.4 mm a year (a minus sign is away from the satellite). Each point's rate and its ± are on its record.

Final 24 months of each record. 9 of 9 points: from -2.4 (Point 1) to +16.5 mm a year (Point 6), each over the final 24 months of that point's own record; dates and ± are on each record.

Listed steps or fast changes. 2 of 9 points (4, 5) have a listed change in their record; dates and sizes are on the point records. The report does not identify a cause.

Records ending early. 1 of 9 points has no reading supplied after Apr 2024; later movement there is not measured. The readings do not record why this record ends; SatSense says a record can stop when the reflecting surface changes, and its end is not a measurement of anything.

Within 5 m of the boundary. 6 points: each is within 5 m of the boundary; its position cannot be assigned to one side with certainty.

Points one inside a building outline and one outside it. Points 1 and 6, 13.8 m apart, differ by 52.9 ± 34.4 mm over Apr 2018 to May 2025. Scatter of each point: 2.7 and 7.3 mm.

Ground outside the building outlines. Points 6 and 7, 7.2 m apart, differ by 54.2 ± 33.3 mm over Apr 2018 to May 2025. Scatter of each point: 7.3 and 1.6 mm.

Seasonal movement. 1.8 to 9.8 mm yearly swing fitted to each of 9 points, line of sight.

Heavy rain. 5 wettest days checked: 0 differences larger than both the scatter and 3 standard errors; largest +7.30 ± 20.2 mm (Point 6, scatter 7.27 mm) around 31 May 2020.

Council hazard mapping. Not included: the council has not yet confirmed its data may be used in a LandSure report; see the LIM.

Streams and water. Nearest mapped watercourse 198 m from the boundary (1:50,000 map).

Slope of the land. 7 degrees on average.

The wider region. GNSS station 7 km away: -1.4 mm a year, up-down.

Earthquakes. 3 of magnitude 4+ within 150 km.

Page numbers point to the detail of each line.

LandSure lists a change of 15 mm or more within 150 days. This setting is LandSure's own. The report does not identify a cause.

Summary: the key measurements

● Under 5 mm a year ● 5 to 10 mm a year ● 10 mm a year and over Colour shows the size of SatSense's rate for a point. It is not a judgement about the ground.

SATSENSE RATES

Page 8

8.4

mm a year, largest rate, towards the satellite
Point 6 is 2.2 m inside the boundary line (within 5 m of the boundary; its position cannot be assigned to one side with certainty). Page 8. The other 8 points: 0.2 to 1.1 mm a year.

BUILDING OUTLINE

Page 18

52.9 ± 34.4 mm

line-of-sight difference between Points 1 and 6, inside and outside a building outline, over 13.8 m (1 in 261)

The combined scatter of the two points' readings is 7.8 mm. Same-pass points, since Apr 2018 (last shared date May 2025). Points 1 and 6 are both within 5 m of the boundary; their positions cannot be assigned to one side with certainty.

GROUND OUTSIDE THE BUILDING OUTLINES

Page 23

54.2 ± 33.3 mm

line-of-sight difference between Points 6 and 7, outside the building outlines, over 7.2 m (1 in 133)

The combined scatter of the two points' readings is 7.4 mm. Same-pass points, since Apr 2018 (last shared date May 2025). Points 6 and 7 are both within 5 m of the boundary; their positions cannot be assigned to one side with certainty.

THROUGH THE SEASONS

Page 19

1.8–9.8 mm

yearly swing fitted to each of 9 points, line of sight
Pooled over the 8 points of the descending view: closest to the satellite around August, furthest from it around February. The report does not identify a cause.

HEAVY RAIN

Page 20

0 of 5

wet days checked, with a difference larger than both the scatter and 3 standard errors

Readings in the 60 days before and after the five wettest days were compared. No difference was larger than both the scatter and 3 standard errors; the largest: +7.30 ± 20.2 mm on Point 6 around 31 May 2020 (scatter 7.27 mm). This is a difference in the readings around that date. The report does not identify a cause.

THE WIDER REGION

Page 21

-1.4

mm a year, height trend at GNSS station WHNG

Height at GeoNet station WHNG, 7 km away: trend -1.4 ± 0.1 mm a year (LandSure straight-line fit to the station's daily heights from 3 May 2015 to 9 June 2025, 98% of the days in the report period; ± 2 standard errors, widened because neighbouring daily heights are not independent). The result depends on the period fitted. It does not measure this property.

The record at this property

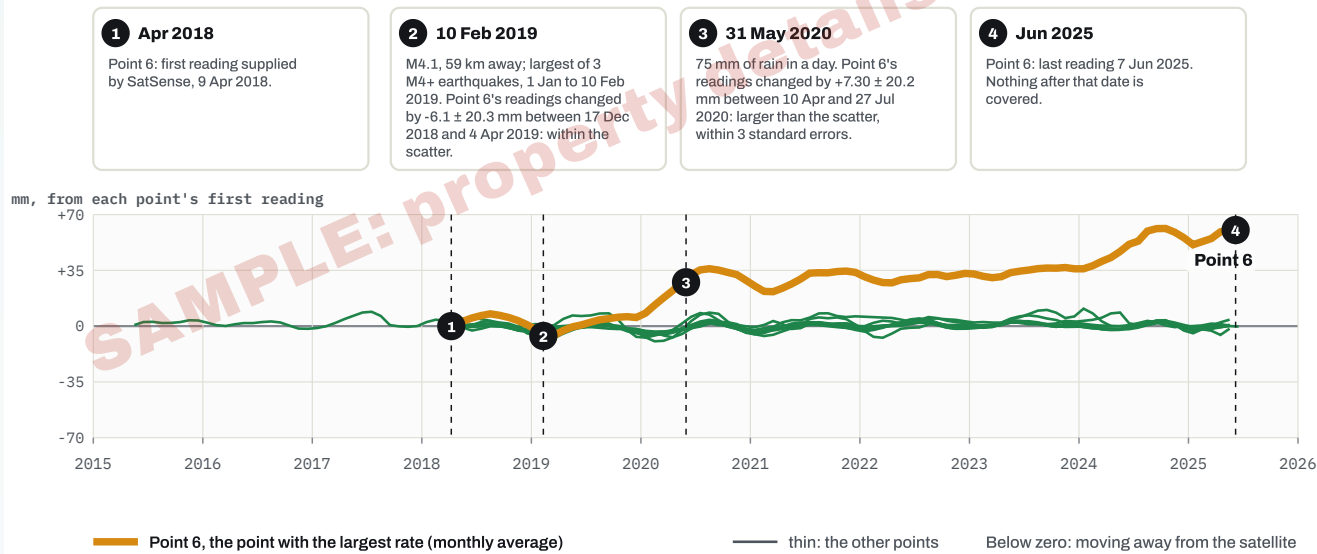


FIGURE 1. The story of the record. Each line is one measured point, starting at zero on its first reading, in the colour of its rate class. The numbers on the line match the boxes above it. Each numbered box states a difference in the readings around its date. The report does not identify a cause. Point 6 is within 5 m of the boundary; its position cannot be assigned to one side with certainty. Source: SatSense InSAR; NASA POWER; GeoNet, CC BY 3.0 NZ.

What this report contains

9 measured points inside the boundary, each with its own record (pages 12 to 16).

1,777 dated readings, first readings 3 May 2015 to 9 April 2018, last readings 1 April 2024 to 9 June 2025; each point's dates are in Appendix A; usual gap 12 days.

2 viewing directions: 1 point seen from the west, 8 from the east (page 6).

21 public and licensed sources read or used, of the 23 sources listed in Appendix B, each with its licence and date.

Every point's position, rate, scatter and record dates (Appendix A).

Where to start reading

Buying	Owning	Engineer or surveyor
Summary	Seasonal movement	One record per point
The measured points and their rates	Heavy rain and earthquakes	Appendix A - every measured point
Difference between plotted positions inside the same building outline	Where it sits	The measurements beside published reference values
		Streams, rock and soil
		Appendix B - method
		12
		31
		22
		27
		35

How to read this report

● Under 5 mm a year ● 5 to 10 mm a year ● 10 mm a year and over Colour shows the size of SatSense's rate for a point. It is not a judgement about the ground.

ON THIS PAGE

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



FIGURE 2. The areas this report uses (an illustration, not to scale). Points inside the boundary are reported in full. Outside it, to 100 m, only positions are shown. A point inside the boundary and within 5 m of the line is flagged: its position cannot be assigned to one side with certainty.

The three rate classes

Under 5 mm a year

A SatSense rate below 5.0, in either direction.

5 to 10 mm a year

A SatSense rate of 5.0 or more and below 10.0.

10 mm a year and over

A SatSense rate of 10.0 or more.

Colours change at 5 and 10 mm a year, measured along the satellite's line of sight; each is the edge LandSure uses to pick a colour. Both come from SatSense's own maps: plus or minus 5 is where the default colours of SatSense's own web map change (SatSense InSAR User Guide, January 2025) and 10 mm a year is where its published national map reaches full colour (Scoular et al. 2026, Figure 1). Some published C-band InSAR studies use plus or minus 2 mm a year as their stability threshold when mapping landslides over a region (Bianchini et al. 2013; Raspini et al. 2018); a rate under it does not show that ground is stable (Barra et al. 2017). These values come from a map guide and studies written for other purposes. The colours describe the size of the measured rate. They are not a judgement about whether the ground is stable.

The class limits are taken from the colour scales of SatSense's own maps. They are not a New Zealand standard and are not engineering criteria.

Negative is movement away from the satellite; positive is towards it. Rates are in millimetres a year and readings in millimetres. SatSense confirmed the sign and the mm-a-year scale to LandSure on 8 October 2026. Rates are along the satellite's line of sight. A line-of-sight figure shows only part of any movement, so the full movement can be larger; every figure carries measurement error, so the true value can also be smaller, including zero. A point measuring little or no movement does not show that ground is stable: movement may be too small, too fast, in a direction the satellite hardly sees, or in a place it cannot measure (Barra et al. 2017; Scoular et al. 2026).

How this report is designed to be used

THE SAME TEXT IS PRINTED ON EVERY REPORT.

It is designed to be read alongside the property's LIM, building report and record of title. It contains none of them.

It may be shown, whole and unaltered, to an engineer, surveyor or building inspector. Appendix A gives each point's position, rate, scatter and record dates. Page 23 lists ground-investigation records near the property by their New Zealand Geotechnical Database numbers. Appendix B lists every source and method. LandSure offers reliance to the customer only (terms clause 11).

Every chart scale and class edge is fixed and is the same on every LandSure report issued from 14 October 2026, so a later report for the same property can be laid beside this one.

The latest last reading in this report was on 9 June 2025; each point's own last reading is on page 12. Nothing after a point's last reading is covered.

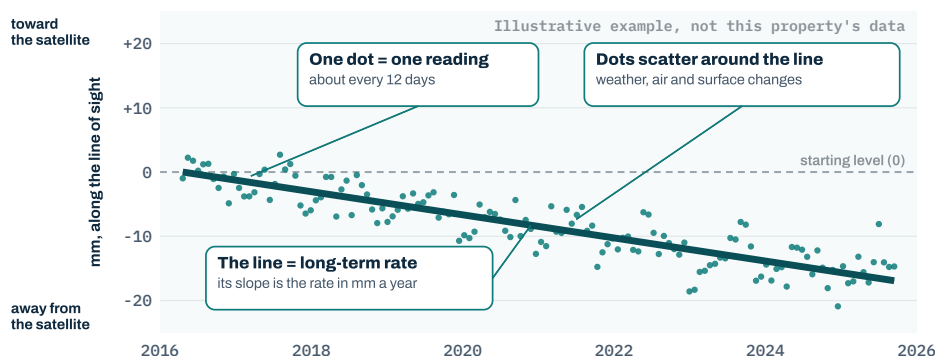
Only a site investigation by a Chartered Professional Engineer can establish whether a site is stable. Where there is visible cracking, tilting, ground fissures, disturbed drainage or recent slippage at a property, that evidence takes precedence over anything in this report.

What is in this report

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How to read a movement chart

Each dot is one reading. Readings scatter by a few millimetres. A trend comes from many readings.



What the chart shows

- 1 Direction**
Is the line rising, falling or flat?
 - 2 Rate**
How steep is it, in mm a year?
 - 3 Through the record**
Is the slope the same from start to end, or does it change?
- Zero is the point's first reading**
It is where each record began, not a fixed height.

i A flat line is little change along this view

It does not rule out north-south movement, which the satellite barely sees.

How InSAR works

ON THIS PAGE

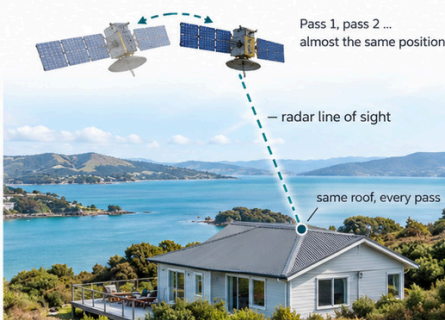
A radar satellite measures the distance to the same spots on the ground again and again, for years. The change in that distance, along the satellite's slanted line of sight, is what every chart in this report shows. On this property, 1 point was measured from the ascending view and 8 from the descending view.

How InSAR measures ground movement

A radar satellite measures the distance to the same spots on the ground again and again. Tiny changes in that distance are the measurement.

1 The satellite looks again and again

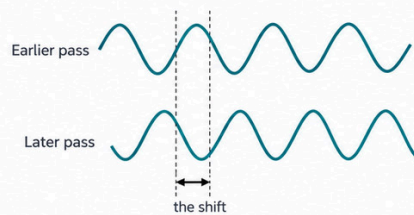
Every pass, about every 12 days, it views the same place from almost exactly the same position.



It looks sideways, 29° to 46° from vertical, never straight down.

2 Any change in distance shows in the echo

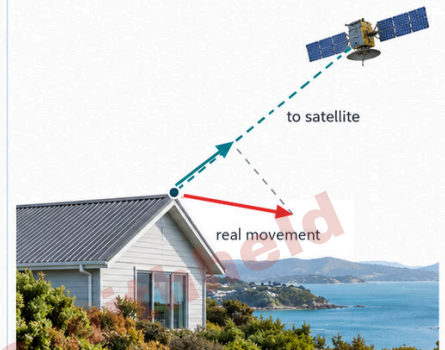
The radar times where in its wave cycle the echo returns. If the roof has moved, the echo comes back shifted.



One full cycle of shift = 2.8 cm of change in distance.

3 What the satellite sees

Only the part along the line of sight is measured.



Many passes, one history

Hundreds of readings over the years build each point's movement history. Sentinel-1 C-band radar, 5.405 GHz, wavelength 5.55 cm.

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	first readings 3 May 2015 to 9 April 2018, last readings 1 April 2024 to 9 June 2025; each point's dates are in Appendix A
Readings per point	159 to 274
Usual gap between readings	12 days
Longest gap between readings	114 days (15 Dec 2021 to 8 Apr 2022; a gap in Sentinel-1 coverage; Scoular et al. 2026), Point 4
Points on this property	9: 1 from the ascending view, 8 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

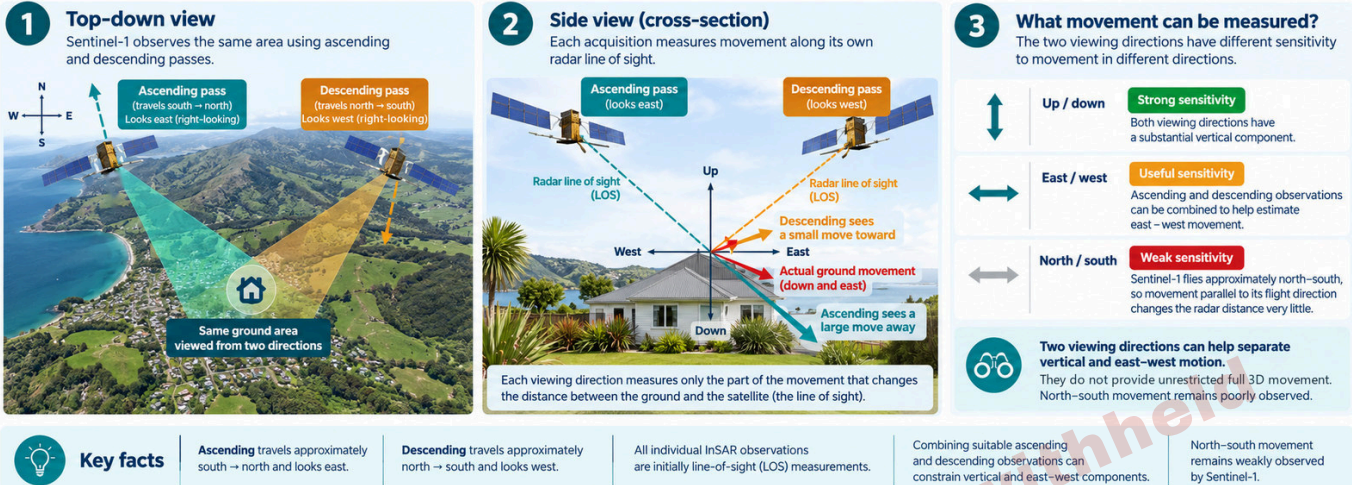
● Under 5 mm a year ● 5 to 10 mm a year ● 10 mm a year and over Colour shows the size of SatSense's rate for a point. It is not a judgement about the ground.

ON THIS PAGE

On this property 1 point was measured from the ascending view and 8 from the descending view. Each view sees a different share of the same movement, so their rates are not expected to match. An ascending pass travels north and looks east, so it sees the ground from the west; a descending pass travels south and looks west, so it sees the ground from the east.

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, grouped by the view that measured it. Rate: the filled diamond is SatSense's rate for the point, on the colour scale. Trace: the point's whole record, in the colour of that rate, starting at zero on its first reading, on the same fixed +/-60 mm frame as the point records. A difference between the two views is not an error: each measures the part of the movement along its own line of sight. Source: SatSense.

Measurement coverage

ON THIS PAGE

On this property, the position SatSense supplies falls inside a LINZ building outline for 1 of the 9 points and outside every outline for 8. Grass, garden and bush do not form points, so any such ground here has none.

How to read this page: it shows where measured points can form and which kinds of movement the method can see. Where there is no point, the report cannot say how the ground moved. The other pages use slope, rock and water records. Council records are not included in this report.

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.

Sentinel-1 C-band radar
Looks to the right (side-looking)

Typical viewing angle:
29° – 46° from vertical

Radar line of sight (LOS)

Water
Usually no measurement points

Exposed rock
Often provides reliable measurements

Building
Often provides reliable measurements

Concrete / pavement
Often provides reliable measurements

Retaining wall
Often provides reliable measurements

Foreshortening
Features on a radar-facing slope can appear compressed together

Layover
On very steep slopes, features can overlap in the radar signal

Radar shadow
The radar cannot see behind this slope. No measurements are possible.

Surfaces that usually work well

- Buildings**
Stable structures often provide reliable measurements.
- Concrete / paved surfaces**
Hard, stable surfaces often provide reliable measurement points.
- Retaining walls**
Stable, man-made structures can act as persistent radar reflectors.
- Exposed rock**
Stable exposed rock can provide reliable radar targets.

Surfaces that are often unreliable

- Grass, gardens and soil**
Soft or changing surfaces often do not provide reliable measurements.
- Vegetation**
Leaves, grass and branches change over time, which can make the radar signal inconsistent.
- Bare soil (e.g. farmland)**
May provide measurements in some cases, but can be unreliable due to seasonal and moisture changes.
- Water surfaces**
Usually do not provide measurement points because the radar signal is reflected away.

Terrain effects can prevent measurements

- Foreshortening**
Features on a radar-facing slope can appear compressed together.
- Layover**
On sufficiently steep terrain, parts of the slope can arrive before lower parts, causing features to overlap.
- Radar shadow**
The radar cannot see behind this slope. No measurements are possible in the shadowed area.

! 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 swings back and forth through the year; 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 a point's record can break or end. The end of a record is not a measurement of a slip, and this report cannot be used to conclude that no sudden event occurred.

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

The measured points and their rates

● Under 5 mm a year ● 5 to 10 mm a year ● 10 mm a year and over Colour shows the size of SatSense's rate for a point. It is not a judgement about the ground.

WHAT WAS MEASURED

9 measured points on the property: 1 with a position inside a building outline, 8 outside the outlines. Points form only on hard surfaces, so lawns and gardens have none.



Key to the map

- UNDER 5 MM A YEAR 8 points on the property
- 5 TO 10 MM A YEAR 1 point on the property
- 10 MM A YEAR AND OVER 0 points on the property

FIGURE 4. The whole property: boundary plus 20 m. Circles are measured points on the property, numbered as in every chart and table and coloured by the size of SatSense's rate, as in the table below (grey: too short a record for a rate class).

The measured points

POINT	WHERE	SURFACE (LINZ OUTLINES)	PASS	SATSENSE RATE MM/YR	CROSS-CHECK MM/YR (DIFFERENCE)	SCATTER MM	READINGS	RATE CLASS
1	3.7 m inside the line, within 5 m of it (see note)	inside a building outline	descending	+0.2 ±1.0	+0.2 (0.0)	2.7	191	UNDER 5 MM/YR
2	1.8 m inside the line, within 5 m of it (see note)	outside the outlines	descending	+0.6 ±0.6	+0.6 (0.0)	1.6	193	UNDER 5 MM/YR
3	1.2 m inside the line, within 5 m of it (see note)	outside the outlines	descending	+0.4 ±0.7	+0.4 (0.0)	1.5	192	UNDER 5 MM/YR
4	inside the boundary	outside the outlines	ascending	+0.3 ±1.1	+0.3 (0.0)	3.4	274	UNDER 5 MM/YR
5	0.3 m inside the line, within 5 m of it (see note)	outside the outlines	descending	+1.1 ±2.3	+1.1 (0.0)	4.1	159	UNDER 5 MM/YR
6	2.2 m inside the line, within 5 m of it (see note)	outside the outlines	descending	+8.4 ±4.6	+8.3 (0.1)	7.3	192	5 TO 10 MM/YR
7	4.7 m inside the line, within 5 m of it (see note)	outside the outlines	descending	+0.2 ±0.8	+0.2 (0.0)	1.6	192	UNDER 5 MM/YR
8	inside the boundary	outside the outlines	descending	+0.2 ±0.8	+0.2 (0.0)	1.7	192	UNDER 5 MM/YR
9	inside the boundary	outside the outlines	descending	+0.4 ±1.3	+0.4 (0.0)	2.5	192	UNDER 5 MM/YR

SatSense rate: the rate SatSense reports for the point, along the line of sight; the rate class and the marker colour come from this and from nothing else. Negative is away from the satellite. The $\pm$ is larger than the rate for 7 of the 9 points: each of those rates is smaller than its uncertainty. $\pm$ after a rate is LandSure's cross-check, not SatSense's: two standard errors, widened (Appendix B). **Cross-check:** a straight line LandSure fits to the same SatSense readings over the period SatSense's rate covers, with its difference from SatSense's rate in brackets; where that period is not established, the fit of all the readings, with no difference; it never sets a colour. **Scatter:** the typical distance of a reading from that line (root mean square). **Pass:** the direction the satellite was travelling; see page 6. 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. Each point is drawn at the position SatSense supplies for it. SatSense describes each point as "representing the radar returns from a 5 x 20 m area" and says the measurement is often that of a dominant reflector in that area, whose location "might be slightly different to where it is plotted" (SatSense InSAR User Guide, January 2025).

Points near the boundary line. Points 1, 2, 3, 5, 6 and 7 are flagged. Each is within 5 m of the boundary; its position cannot be assigned to one side with certainty. SatSense's supplied position for each is inside the boundary, so each is reported in full. The 5 m margin is LandSure's own and is the same on every report.

What was requested and supplied. 5 supplied points lie within 5 m outside the boundary line. They are shown as positions only.

Movement across the property

● Under 5 mm a year ● 5 to 10 mm a year ● 10 mm a year and over Colour shows the size of SatSense's rate for a point. It is not a judgement about the ground.

WHAT WAS MEASURED

Each disc is a measured point, coloured by its SatSense rate. Nothing is shown between points because nothing was measured there.



FIGURE 5. Each disc is a measured point, coloured by its SatSense rate. Disc size is fixed for legibility. It is not the area measured. Nothing is shown between points. The numbered dot at the centre of a disc is the position SatSense supplies for the point; teal is the boundary. The number on a white tag is SatSense's rate for that point, in mm a year. Source: SatSense InSAR; Sourced from LINZ. CC BY 4.0.

COLOUR OF EACH DISC

- 10 mm a year and over
- 5 to 10 mm a year
- Under 5 mm a year

The size of SatSense's rate for a point, in either direction. Direction is not a colour. Minus: away from the satellite; plus: towards it.

+0.2

SMALLEST RATE TOWARD THE SATELLITE
Point 8

+8.4

LARGEST RATE TOWARD THE SATELLITE
Point 6

Reading the colours

Colours change at 5 and 10 mm a year, measured along the satellite's line of sight; each is the edge LandSure uses to pick a colour. Both come from SatSense's own maps: plus or minus 5 is where the default colours of SatSense's own web map change (SatSense InSAR User Guide, January 2025) and 10 mm a year is where its published national map reaches full colour (Scoular et al. 2026, Figure 1). Some published C-band InSAR studies use plus or minus 2 mm a year as their stability threshold when mapping landslides over a region (Bianchini et al. 2013; Raspini et al. 2018); a rate under it does not show that ground is stable (Barra et al. 2017). These values come from a map guide and studies written for other purposes. The colours describe the size of the measured rate. They are not a judgement about whether the ground is stable.

Between the discs

Nothing is drawn between points. This report does not estimate movement for ground that was not measured. The direction of movement is read from the sign of the number beside a point, not from a colour.

Every reading, 2015 to 2025

● Under 5 mm a year ● 5 to 10 mm a year ● 10 mm a year and over Colour shows the size of SatSense's rate for a point. It is not a judgement about the ground.

WHAT WAS MEASURED

Every reading of every point, since the satellite first saw it: 1,777 readings at 9 points. Single readings of Point 6, the point with the largest rate, scatter about 7.3 mm around a straight line through them.

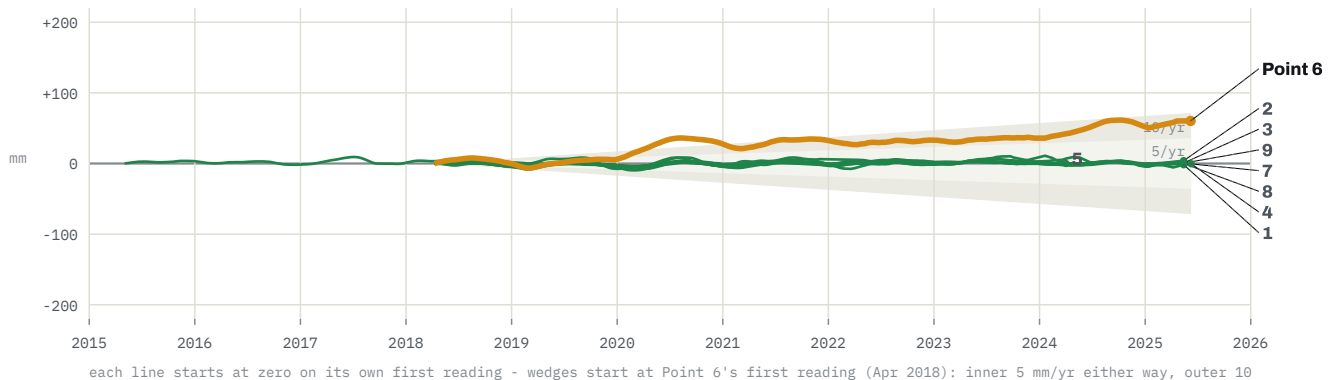


FIGURE 6. Movement of every measured point on the property since its first reading, every reading plotted. The vertical scale is fixed at plus or minus 220 mm on every LandSure report and is never fitted to the data, so two reports can be compared by eye. Each line is drawn in the colour of its point's rate class; Point 6, the point with the largest rate, has the heavier line. Source: Movement data: SatSense InSAR (Copernicus Sentinel-1).

The rate inside each calendar year

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
1 Point 1	-	-	-	-3.2	+0.2	+5.3	-1.9	+6.1	-2.2	-10.0	-
2 Point 2	-	-	-	+2.1	-4.5	+6.4	+1.7	-3.5	+0.6	+2.9	-
3 Point 3	-	-	-	-2.3	-1.1	+2.6	+1.5	-1.5	-1.4	+3.1	-
4 Point 4	+11.7	-2.6	-3.2	-7.5	-3.9*	+6.1*	+8.7	+2.1	+1.1	-2.0	-
5 Point 5	-	-	-	-5.7	-0.8	+6.0*	+5.1	+0.7	-1.7	-	-
6 Point 6	-	-	-	-2.2	+7.8	+20.5	+9.8	-1.4	-0.5	+23.1	-
7 Point 7	-	-	-	-2.7	-1.1	+2.4	+1.3	-1.3	-1.7	+3.3	-
9 Point 9	-	-	-	-2.4	-0.9	+3.5	+0.9	-0.9	-2.6	+4.8	-

FIGURE 7. The 8 points with the largest rates, of 9, 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 point's own seasonal swing (one yearly wave fitted to its whole record) is removed from the readings first, so a wet or dry season at the start or end of a year does not tilt that year's line. The bars are grey and carry the signed rate: a single year's rate is a short, noisy window, swings more than the whole-record rate, so it takes no colour class. Row markers are the points' own, in their class colours. * marks a year that holds a step or fast change named on the point's record. A year is left blank (-) when it holds fewer than 8 readings or spans less than 200 days, or when the point's record is under 2 years or 24 readings, too short to measure its seasonal swing.

Change in mean reading

POINT	FIRST 12 MONTHS: MEAN (READINGS)	LAST 12 MONTHS: MEAN (READINGS)	CHANGE IN MEAN READING	SCATTER	POINT	FIRST 12 MONTHS: MEAN (READINGS)	LAST 12 MONTHS: MEAN (READINGS)	CHANGE IN MEAN READING	SCATTER
1 Point 1	-0.9 mm (28)	+0.3 mm (23)	+1.3 mm	2.7 mm	5 Point 5	-1.4 mm (26)	+6.5 mm (22)	+7.9 mm	4.1 mm
2 Point 2	-0.4 mm (28)	+1.3 mm (25)	+1.7 mm	1.6 mm	6 Point 6	+2.2 mm (27)	+57.9 mm (20)	+55.7 mm	7.3 mm
3 Point 3	-0.5 mm (28)	+0.3 mm (25)	+0.8 mm	1.5 mm	7 Point 7	-1.2 mm (28)	-0.5 mm (25)	+0.7 mm	1.6 mm
4 Point 4	+1.9 mm (16)	+1.0 mm (33)	-0.9 mm	3.4 mm	9 Point 9	-1.1 mm (28)	+0.3 mm (25)	+1.4 mm	2.5 mm

Each mean is taken from the point's own first reading; the change is the second mean less the first (a minus sign: further from the satellite). It is worked out only where each window holds 8 or more readings and the record is 3 years or longer. It is a difference between two means of readings, not a rate and not a fit (Appendix B). The table lists the 8 points with the largest rates, of 9; the figure for every point is on its point record.

How to read this page: the top figure plots every reading of every point from that point's own first reading, on a fixed scale. The lower figure prints the straight-line rate inside each calendar year, which is a short window and varies more than the whole-record rate. The table sets the mean of each point's first 12 months of readings beside the mean of its last 12 months. Each point's rate over the last 24 months of its record is printed on its point record.

Steps and fast changes: LandSure lists a change of 15 mm or more within 150 days that is at least 50% of the change along the point's trend line; a smaller share is not listed. Largest change within 150 days not listed under this rule: 27 mm, Point 6 (Jan 2020 to Jun 2020).

The regional record near this property

ON THIS PAGE

The nearest NZ SeaRise coastal site is 0.9 km from this property. Its published vertical rate is +0.1 mm a year, smaller than its stated uncertainty of ± 2.4 (the publisher's one standard deviation).

How to read this page: it prints a published figure for the coast near the property, with the national figures of the same record. The record is vertical land movement as described by NZ SeaRise, so it is not like-for-like with the rates of this report's points and is not compared with them. It does not measure this property.



MM A YEAR, THE NEAREST COASTAL SITE

+0.1

± 2.4 : smaller than its uncertainty

TO THE NEAREST COASTAL SITE

0.9 km

quality 1.0 of 5 (1 is best)

MM A YEAR, MIDDLE VALUE OF ALL SITES

-0.9

8,173 sites, -8.3 to +3.9

FIGURE 8. Every NZ SeaRise coastal site round the property, coloured by its published vertical rate. The nearest is ringed with its rate. Dashed: the 5 km reach within which a coastal figure is shown.

Where the nearest coastal site sits among all the sites

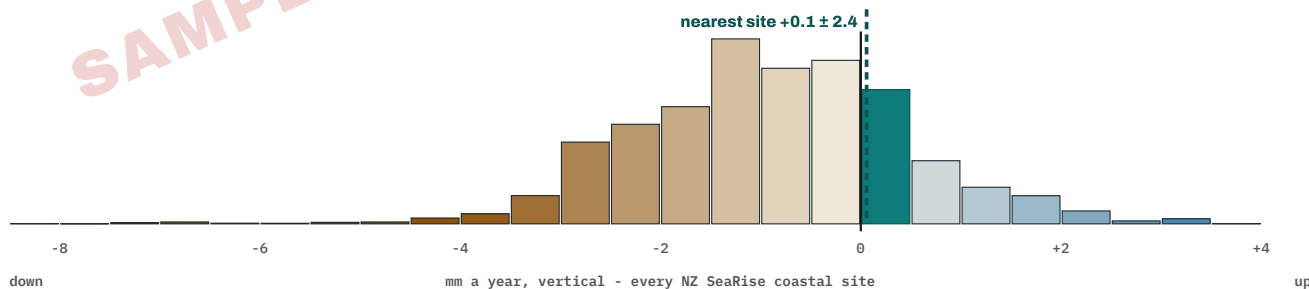


FIGURE 9. Each bar counts the NZ SeaRise coastal sites with that published vertical rate. The middle value of the sites is -0.9 mm a year. The teal bar holds the site nearest this property. Source: NZ SeaRise (Naish et al. 2024), Zenodo 11398538, CC BY 4.0.

The national figures

The NZ SeaRise site file holds 8,173 coastal sites. Their published vertical rates run from -8.3 to +3.9 mm a year, and the middle value (median) is -0.9. These three figures were worked out by LandSure from the NZ SeaRise site file (Naish et al. 2024, CC BY 4.0).

How this record differs from this report's measurements

The coastal figures are vertical land movement as described by NZ SeaRise, worked out from InSAR and GNSS data for coastal sites 2 km apart. The rates in this report are along the line of sight of Sentinel-1, against the data provider's own reference. SatSense's processing filters out long-wavelength regional movement and smooths each record (Scoular et al. 2026, section 2), so its rates are local and relative. They are not like-for-like with NZ SeaRise rates, and the two are never subtracted.

One record per point

● Under 5 mm a year ● 5 to 10 mm a year ● 10 mm a year and over Colour shows the size of SatSense's rate for a point. It is not a judgement about the ground.

WHAT WAS MEASURED

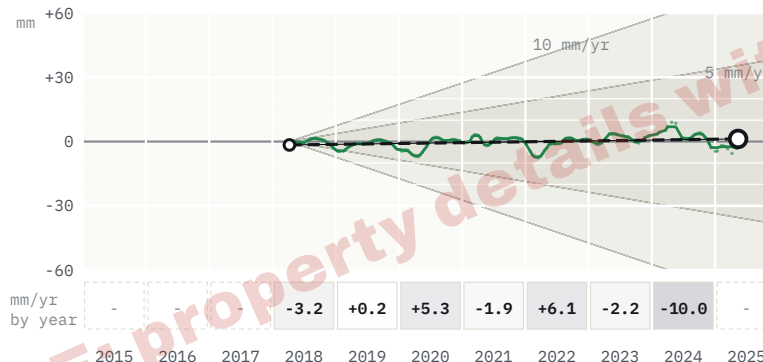
One card per point: where it is, every reading, and its rate in each calendar year. The big number is SatSense's rate for the point, in mm a year; the card's colour is the class of that rate.

card colour and label, from SatSense's rate only: ■ under 5 mm a year ■ 5 to 10 mm a year ■ 10 mm a year and over · dots: every SatSense reading, starting at zero on the point's first reading · line through the dots: the readings smoothed; dots and line are in the colour of the point's rate class · dashed dark line: LandSure's cross-check, a straight line fitted to the same readings, small circle at its start, large circle at its end; it is printed as a plain number ("Cross-check") with its difference from SatSense's rate and never sets a colour · grey wedges: where a steady 5 and 10 mm a year from the point's first reading would be, either way; drawn for scale only · dark bracket: a listed step or fast change, with its size; dated under the card · strip: the rate inside each calendar year, with the point's own seasonal swing removed first, in grey, darker for a larger rate (white 0, darkest 20 mm a year or more), * where the year holds a listed change; a single year's rate is a short, noisy window and takes no colour class · scale bar: ▼ SatSense's rate on the colour scale · last 24 mo.: the cross-check rate over the final 24 months of the point's own record, plus or minus 2 standard errors of the fit, widened because successive readings are not independent; "not calculated" under 3 readings · every scale is fixed and identical on every report, a closer view than Figure 6

1 Point 1

3.7 m inside the boundary line (within 5 m of the boundary; its position cannot be assigned to one side with certainty) · position inside a LINZ building outline

UNDER 5 MM/YR



MM A YEAR
SATSENSE
RATE
 ± 1.0
(LANDSURE'S):
SMALLER
THAN ITS
UNCERTAINTY

+0.2

-10 -5 0 +5 +10
Cross-check fit +0.4 mm/yr

Difference 0.2 from rate

Scatter 2.7 mm

Readings 191

Record Apr 2018-May 2025
STARTS LATE

Pass descending

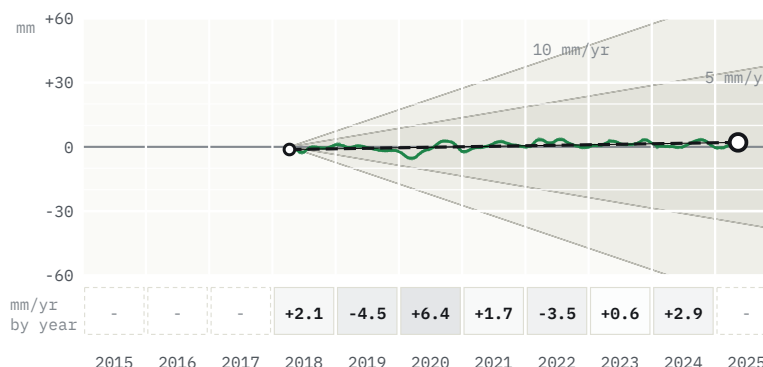
Last 24 mo. -2.4 $\pm$ 4.8 mm/yr

SatSense's rate for this point matches a straight-line fit of its readings up to Feb 2023 (difference 0.05 mm a year). Readings after that date are shown in this report but appear not to be included in SatSense's rate. LandSure fit over the same period: +0.2 mm a year (difference from SatSense's rate 0.0). LandSure fit of all readings to May 2025: +0.4 mm a year. Before Apr 2018: no readings; earlier movement is not measured (the report period starts May 2015). Longest gap between readings: 48 days (15 Dec 2023 to 1 Feb 2024). Cross-check, last 24 months of the record (May 2023 to May 2025, 43 readings) -2.4 $\pm$ 4.8 mm a year; whole record +0.4 $\pm$ 1.0; difference -2.8 $\pm$ 4.9. Last 48 months +0.5 $\pm$ 2.3. Over the record the 24-month rate has ranged from -2.5 to +3.2. None of these readings are in SatSense's rate. Change in mean reading. Mean of the first 12 months of readings (28) to mean of the last 12 months (23): +1.3 mm. Scatter 2.7 mm.

2 Point 2

1.8 m inside the boundary line (within 5 m of the boundary; its position cannot be assigned to one side with certainty) · position outside the LINZ building outlines

UNDER 5 MM/YR



MM A YEAR
SATSENSE
RATE
 ± 0.6

+0.6

-10 -5 0 +5 +10
Cross-check fit +0.5 mm/yr

Difference 0.2 from rate

Scatter 1.6 mm

Readings 193

Record Apr 2018-May 2025
STARTS LATE

Pass descending

Last 24 mo. -0.2 $\pm$ 1.8 mm/yr

SatSense's rate for this point matches a straight-line fit of its readings up to Feb 2023 (difference 0.01 mm a year). Readings after that date are shown in this report but appear not to be included in SatSense's rate. LandSure fit over the same period: +0.6 mm a year (difference from SatSense's rate 0.0). LandSure fit of all readings to May 2025: +0.5 mm a year. Before Apr 2018: no readings; earlier movement is not measured (the report period starts May 2015). Longest gap between readings: 48 days (15 Dec 2023 to 1 Feb 2024). Cross-check, last 24 months of the record (May 2023 to May 2025, 48 readings) -0.2 $\pm$ 1.8 mm a year; whole record +0.5 $\pm$ 0.6; difference -0.7 $\pm$ 1.9. Last 48 months -0.1 $\pm$ 0.7. Over the record the 24-month rate has ranged from -2.0 to +2.6. None of these readings are in SatSense's rate. Change in mean reading. Mean of the first 12 months of readings (28) to mean of the last 12 months (25): +1.7 mm. Scatter 1.6 mm.

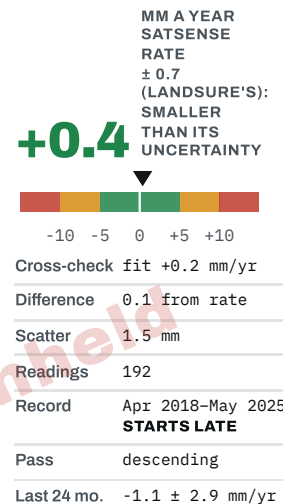
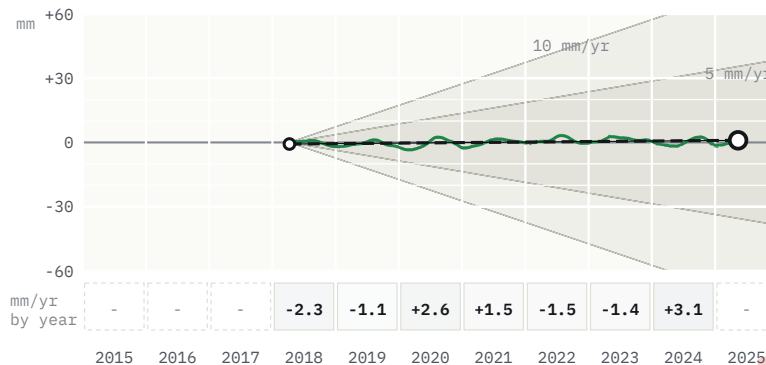
One record per point

● Under 5 mm a year ● 5 to 10 mm a year ● 10 mm a year and over Colour shows the size of SatSense's rate for a point. It is not a judgement about the ground.

card colour and label, from SatSense's rate only: □ under 5 mm a year □ 5 to 10 mm a year □ 10 mm a year and over · dashed line and "Cross-check": LandSure's straight-line fit, a plain number that never sets a colour · grey wedges: 5 and 10 mm a year, for scale · grey year cells: no colour class · *: the year holds a listed change · full key on the first page of point records

3 Point 3

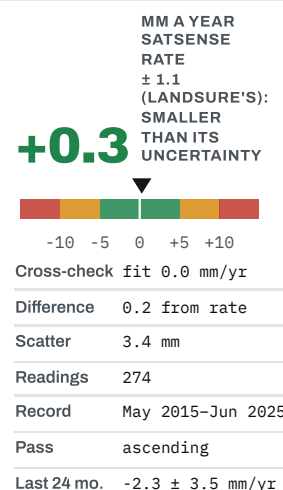
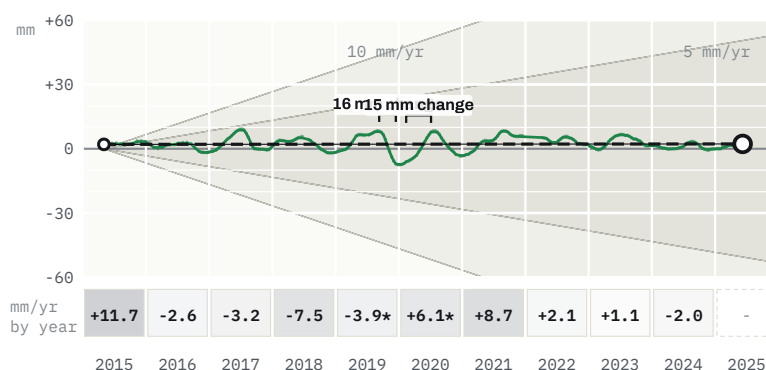
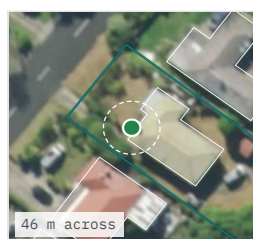
1.2 m inside the boundary line (within 5 m of the boundary; its position cannot be assigned to one side with certainty) · position outside the LINZ building outlines



SatSense's rate for this point matches a straight-line fit of its readings up to Feb 2023 (difference 0.00 mm a year). Readings after that date are shown in this report but appear not to be included in SatSense's rate. LandSure fit over the same period: +0.4 mm a year (difference from SatSense's rate 0.0). LandSure fit of all readings to May 2025: +0.2 mm a year. Before Apr 2018: no readings; earlier movement is not measured (the report period starts May 2015). Longest gap between readings: 48 days (15 Dec 2023 to 1 Feb 2024). Cross-check, last 24 months of the record (May 2023 to May 2025, 48 readings) -1.1 ± 2.9 mm a year; whole record +0.2 ± 0.7; difference -1.3 ± 3.0. Last 48 months -0.2 ± 1.1. Over the record the 24-month rate has ranged from -1.4 to +1.7. None of these readings are in SatSense's rate. Change in mean reading. Mean of the first 12 months of readings (28) to mean of the last 12 months (25): +0.8 mm. Scatter 1.5 mm.

4 Point 4

inside the boundary · position outside the LINZ building outlines



SatSense's rate for this point matches a straight-line fit of its readings up to Sep 2022 (difference 0.02 mm a year). Readings after that date are shown in this report but appear not to be included in SatSense's rate. LandSure fit over the same period: +0.3 mm a year (difference from SatSense's rate 0.0). LandSure fit of all readings to Jun 2025: 0.0 mm a year. Longest gap between readings: 114 days (15 Dec 2021 to 8 Apr 2022; a gap in Sentinel-1 coverage; Scoular et al. 2026). Cross-check, last 24 months of the record (Jun 2023 to Jun 2025, 64 readings) -2.3 ± 3.5 mm a year; whole record 0.0 ± 1.1; difference -2.3 ± 3.6. Last 48 months -1.5 ± 1.5. Over the record the 24-month rate has ranged from -2.6 to +5.4. None of these readings are in SatSense's rate. Change in mean reading. Mean of the first 12 months of readings (16) to mean of the last 12 months (33): -0.9 mm. Scatter 3.4 mm. Readings show a change of about 16 mm between Sep 2019 and Dec 2019. Also a change of about 15 mm between Feb 2020 and Jul 2020.

LandSure lists a change of 15 mm or more within 150 days. This setting is LandSure's own. The report does not identify a cause.

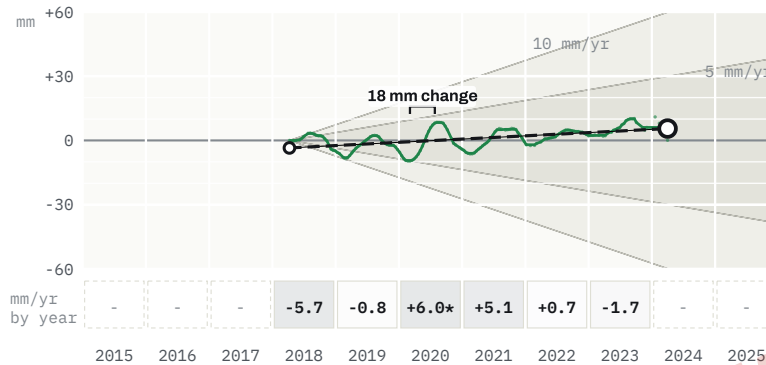
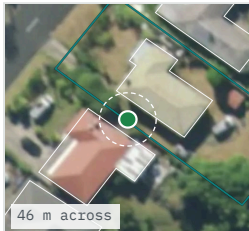
One record per point

● Under 5 mm a year ● 5 to 10 mm a year ● 10 mm a year and over Colour shows the size of SatSense's rate for a point. It is not a judgement about the ground.

card colour and label, from SatSense's rate only: under 5 mm a year 5 to 10 mm a year 10 mm a year and over · dashed line and "Cross-check": LandSure's straight-line fit, a plain number that never sets a colour · grey wedges: 5 and 10 mm a year, for scale · grey year cells: no colour class · *: the year holds a listed change · full key on the first page of point records

5 Point 5

0.3 m inside the boundary line (within 5 m of the boundary; its position cannot be assigned to one side with certainty) · position outside the LINZ building outlines

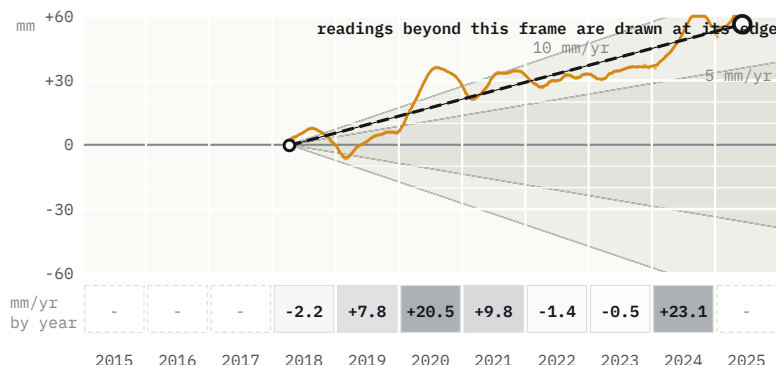


MM A YEAR SATSENSE RATE ± 2.3 (LANDSURE'S): SMALLER THAN ITS UNCERTAINTY
+1.1
-10 -5 0 +5 +10
Cross-check fit +1.5 mm/yr
Difference 0.4 from rate
Scatter 4.1 mm
Readings 159
Record Apr 2018–Apr 2024
STARTS LATE ENDS EARLY
Pass descending
Last 24 mo. +3.0 ± 2.7 mm/yr

SatSense's rate for this point matches a straight-line fit of its readings up to Feb 2023 (difference 0.01 mm a year). Readings after that date are shown in this report but appear not to be included in SatSense's rate. LandSure fit over the same period: +1.1 mm a year (difference from SatSense's rate 0.0). LandSure fit of all readings to Apr 2024: +1.5 mm a year. Before Apr 2018: no readings; earlier movement is not measured (the report period starts May 2015). After Apr 2024: no reading was supplied; movement since then is not measured. According to SatSense, a point's record can stop, or start, because of changes through time to how the ground surface reflects the radar, such as abrupt changes to ground surfaces or a new roof being installed (SatSense InSAR User Guide, January 2025, FAQs). SatSense also says dense vegetation gives few points, because growth cycles and leaves moving between images disrupt the measurements, and the European Ground Motion Service says seasonal changes such as vegetation growth or ploughing can prevent measurement points being detected (European Ground Motion Service webinar answers, 7 June 2023). The readings do not record which of these, if any, applies to this point. The end of a record is not a measurement of anything. Longest gap between readings: 48 days (3 Dec 2023 to 20 Jan 2024). Cross-check, last 24 months of the record (Apr 2022 to Apr 2024, 49 readings) +3.0 ± 2.7 mm a year; whole record +1.5 ± 2.3; difference +1.5 ± 3.6. Last 48 months +1.8 ± 3.0. Over the record the 24-month rate has ranged from 0.0 to +3.4. Change in mean reading. Mean of the first 12 months of readings (26) to mean of the last 12 months (22): +7.9 mm. Scatter 4.1 mm. Readings show a change of about 18 mm between Mar 2020 and Jul 2020.

6 Point 6

2.2 m inside the boundary line (within 5 m of the boundary; its position cannot be assigned to one side with certainty) · position outside the LINZ building outlines



MM A YEAR SATSENSE RATE ± 4.6
+8.4
-10 -5 0 +5 +10
Cross-check fit +7.9 mm/yr
Difference 0.5 from rate
Scatter 7.3 mm
Readings 192
Record Apr 2018–Jun 2025
STARTS LATE
Pass descending
Last 24 mo. +16.5 ± 10.7 mm/yr

SatSense's rate for this point matches a straight-line fit of its readings up to Feb 2023 (difference 0.06 mm a year). Readings after that date are shown in this report but appear not to be included in SatSense's rate. LandSure fit over the same period: +8.3 mm a year (difference from SatSense's rate 0.1). LandSure fit of all readings to Jun 2025: +7.9 mm a year. Before Apr 2018: no readings; earlier movement is not measured (the report period starts May 2015). Longest gap between readings: 48 days (14 Jan 2025 to 3 Mar 2025). Cross-check, last 24 months of the record (Jun 2023 to Jun 2025, 44 readings) +16.5 ± 10.7 mm a year; whole record +7.9 ± 4.6; difference +8.6 ± 11.6. Last 48 months +7.9 ± 7.0. Over the record the 24-month rate has ranged from -1.2 to +24.6. None of these readings are in SatSense's rate. Change in mean reading. Mean of the first 12 months of readings (27) to mean of the last 12 months (20): +55.7 mm. Scatter 7.3 mm.

One record per point

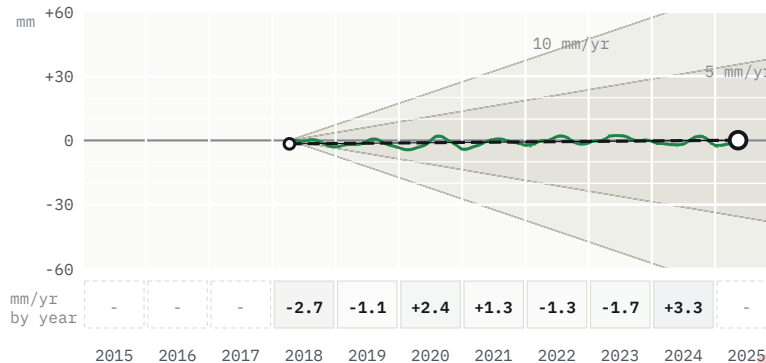
● Under 5 mm a year ● 5 to 10 mm a year ● 10 mm a year and over Colour shows the size of SatSense's rate for a point. It is not a judgement about the ground.

card colour and label, from SatSense's rate only: under 5 mm a year 5 to 10 mm a year 10 mm a year and over · dashed line and "Cross-check": LandSure's straight-line fit, a plain number that never sets a colour · grey wedges: 5 and 10 mm a year, for scale · grey year cells: no colour class · *: the year holds a listed change · full key on the first page of point records

7

Point 7

4.7 m inside the boundary line (within 5 m of the boundary; its position cannot be assigned to one side with certainty) · position outside the LINZ building outlines



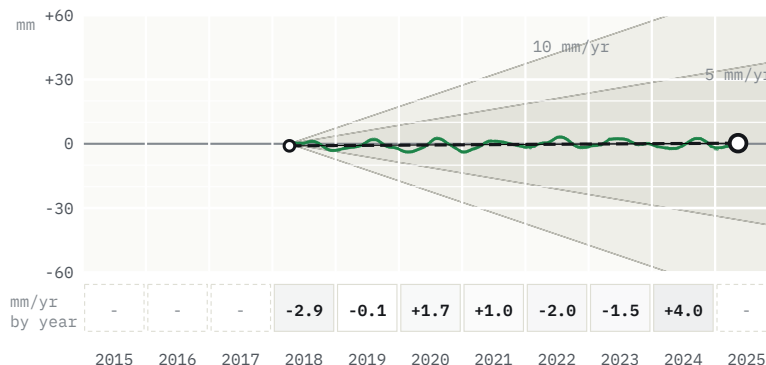
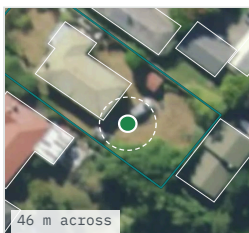
MM A YEAR SATSENSE RATE ± 0.8 (LANDSURE'S): SMALLER THAN ITS UNCERTAINTY
+0.2
-10 -5 0 +5 +10
Cross-check fit +0.2 mm/yr
Difference 0.0 from rate
Scatter 1.6 mm
Readings 192
Record Apr 2018–May 2025 STARTS LATE
Pass descending
Last 24 mo. -1.3 ± 2.9 mm/yr

SatSense's rate for this point matches a straight-line fit of its readings up to Feb 2023 (difference 0.00 mm a year). Readings after that date are shown in this report but appear not to be included in SatSense's rate. LandSure fit over the same period: +0.2 mm a year (difference from SatSense's rate 0.0). LandSure fit of all readings to May 2025: +0.2 mm a year. Before Apr 2018: no readings; earlier movement is not measured (the report period starts May 2015). Longest gap between readings: 48 days (15 Dec 2023 to 1 Feb 2024). Cross-check, last 24 months of the record (May 2023 to May 2025, 48 readings) -1.3 ± 2.9 mm a year; whole record +0.2 ± 0.8; difference -1.5 ± 3.0. Last 48 months -0.1 ± 1.3. Over the record the 24-month rate has ranged from -1.4 to +1.8. None of these readings are in SatSense's rate. Change in mean reading. Mean of the first 12 months of readings (28) to mean of the last 12 months (25): +0.7 mm. Scatter 1.6 mm.

8

Point 8

inside the boundary · position outside the LINZ building outlines



MM A YEAR SATSENSE RATE ± 0.8 (LANDSURE'S): SMALLER THAN ITS UNCERTAINTY
+0.2
-10 -5 0 +5 +10
Cross-check fit +0.2 mm/yr
Difference 0.0 from rate
Scatter 1.7 mm
Readings 192
Record Apr 2018–May 2025 STARTS LATE
Pass descending
Last 24 mo. -1.1 ± 3.6 mm/yr

SatSense's rate for this point matches a straight-line fit of its readings up to Feb 2023 (difference 0.00 mm a year). Readings after that date are shown in this report but appear not to be included in SatSense's rate. LandSure fit over the same period: +0.2 mm a year (difference from SatSense's rate 0.0). LandSure fit of all readings to May 2025: +0.2 mm a year. Before Apr 2018: no readings; earlier movement is not measured (the report period starts May 2015). Longest gap between readings: 48 days (15 Dec 2023 to 1 Feb 2024). Cross-check, last 24 months of the record (May 2023 to May 2025, 48 readings) -1.1 ± 3.6 mm a year; whole record +0.2 ± 0.8; difference -1.3 ± 3.7. Last 48 months -0.2 ± 1.5. Over the record the 24-month rate has ranged from -1.2 to +1.8. None of these readings are in SatSense's rate. Change in mean reading. Mean of the first 12 months of readings (28) to mean of the last 12 months (25): +0.9 mm. Scatter 1.7 mm.

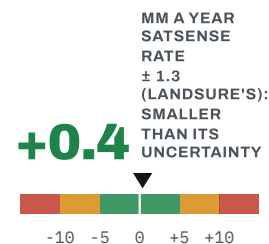
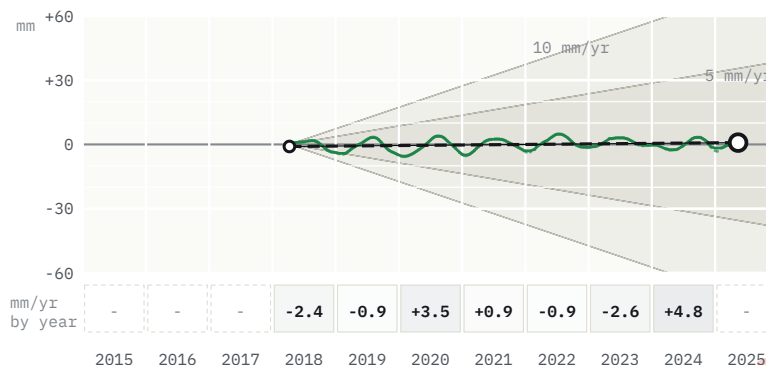
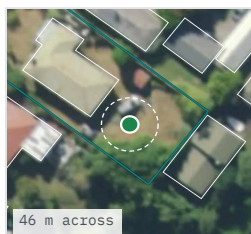
One record per point

● Under 5 mm a year ● 5 to 10 mm a year ● 10 mm a year and over Colour shows the size of SatSense's rate for a point. It is not a judgement about the ground.

card colour and label, from SatSense's rate only: under 5 mm a year 5 to 10 mm a year 10 mm a year and over · dashed line and "Cross-check": LandSure's straight-line fit, a plain number that never sets a colour · grey wedges: 5 and 10 mm a year, for scale · grey year cells: no colour class · *: the year holds a listed change · full key on the first page of point records

9 Point 9 inside the boundary · position outside the LINZ building outlines

UNDER 5 MM/YR



Cross-check fit +0.3 mm/yr

Difference 0.1 from rate

Scatter 2.5 mm

Readings 192

Record Apr 2018-May 2025
STARTS LATE

Pass descending

Last 24 mo. -1.2 ± 4.4 mm/yr

SatSense's rate for this point matches a straight-line fit of its readings up to Feb 2023 (difference 0.00 mm a year). Readings after that date are shown in this report but appear not to be included in SatSense's rate. LandSure fit over the same period: +0.4 mm a year (difference from SatSense's rate 0.0). LandSure fit of all readings to May 2025: +0.3 mm a year. Before Apr 2018: no readings; earlier movement is not measured (the report period starts May 2015). Longest gap between readings: 48 days (15 Dec 2023 to 1 Feb 2024). Cross-check, last 24 months of the record (May 2023 to May 2025, 48 readings) -1.2 ± 4.4 mm a year; whole record +0.3 ± 1.3; difference -1.5 ± 4.6. Last 48 months -0.3 ± 2.2. Over the record the 24-month rate has ranged from -2.1 to +2.6. None of these readings are in SatSense's rate. Change in mean reading. Mean of the first 12 months of readings (28) to mean of the last 12 months (25): +1.4 mm. Scatter 2.5 mm.

The street around you

● Under 5 mm a year ● 5 to 10 mm a year ● 10 mm a year and over Colour shows the size of SatSense's rate for a point. It is not a judgement about the ground.

ON THIS PAGE

This report gives rates for this property only. The white dots are measured places outside its boundary, out to 100 m. They are shown as positions only. This report holds no rate for them.

9

INSIDE THE BOUNDARY
reported in full in this report

129

OUTSIDE IT, WITHIN 100 M
positions only, no rates

163

SUPPLIED OUTSIDE THE PROPERTY
counted only: not listed

HOW MANY MEASURED PLACES NEARBY

fewer more measured places
- a count, not movement



FIGURE 10. The surroundings of this property; the key is on the map. Dashed line: 100 m from the boundary on every side. White dots: measured places outside the boundary, shown as positions only. The shading shows how many measured places lie close together, each spread over about 4 m, from pale (fewer) to dark teal (more measured places); it is relative to this map only. Where there is no shading, no measured place was supplied nearby. **IT IS A COUNT, NOT MOVEMENT:** no rate is shown for these places in this report.

What the white dots are

Each white dot is the position SatSense supplies for a place where it has a movement record, standing for an area of about 5 x 20 m. A record may show movement, or very little. The dot does not show which.

129 places within 100 m of the boundary carry a satellite measurement. They are drawn as white dots and carry no rate in this report. Full detail is shown for this property only. The positions are read from LandSure's free property-checker feed, the same one the website draws. Part of the 100 m area could not be read when this report was made, so there may be more measured places than are shown. That is a gap in this report, not a finding about the ground.

What the shading shows

How many measured places lie close together. Darker teal means more measured places; the darkest shade is the densest part of this map. It is a count, not movement, and it is not a judgement about any property. Where there is no shading, no measured place was supplied nearby. Coverage of the national dataset depends on vegetation, slope and slope aspect (Scoular et al. 2026).

Difference between plotted positions inside the same building outline

WHAT WAS MEASURED

The line-of-sight difference between Points 1 and 6, two same-pass points one inside a building outline and one outside it, is 52.9 ± 34.4 mm over 13.8 m (1 in 261), since Apr 2018 (the first reading date both points share; the last is May 2025). The combined scatter of the two points' readings is 7.8 mm. Points 1 and 6 are both within 5 m of the boundary; their positions cannot be assigned to one side with certainty. 5 other pairs with a point inside a building outline were compared; the table below lists the pairs, the largest slope first. The line-of-sight difference between Points 6 and 7, two same-pass points outside the building outlines on the property, is 54.2 ± 33.3 mm over 7.2 m (1 in 133), since Apr 2018 (the first reading date both points share; the last is May 2025). The combined scatter of the two points' readings is 7.4 mm. Points 6 and 7 are both within 5 m of the boundary; their positions cannot be assigned to one side with certainty. These points are outside the building outlines on the property, so this is not a difference between points inside one outline.

Why this page prints differences

Published building criteria are written in terms of the difference in movement across a building, not the movement of one point (B1/VM2 C.2.1.2; MBIE (December 2012), Table 2.3). This page prints the same kind of quantity for pairs of measured points on this property.

For scale only: an informative appendix to Building Code Verification Method B1/VM2 (MBIE, 2025, C.2.1.2) gives a design figure of 25 mm of differential settlement over 6 m for new foundations. This building is not assessed against it. The row for this figure, with its source and how it differs from this measurement, is on page 22.

The pairs compared

POINTS	WHERE	APART	LINE-OF-SIGHT DIFFERENCE	FIRST TO LAST SHARED DATE	SCATTER OF EACH POINT	COMBINED SCATTER OF THE TWO POINTS	SLOPE
6 and 7	outside the outlines; Points 6 and 7 within 5 m of the boundary	7.2 m	54.2 ± 33.3 mm	Apr 2018 to May 2025	3 and 1.6 mm	7.4 mm	1 in 133
6 and 8	outside the outlines; Point 6 within 5 m of the boundary	11.5 m	54.7 ± 33.1 mm	Apr 2018 to May 2025	3 and 1.7 mm	7.5 mm	1 in 211
1 and 6	inside and outside an outline; Points 1 and 6 within 5 m of the boundary	13.8 m	52.9 ± 34.4 mm	Apr 2018 to May 2025	7 and 7.3 mm	7.8 mm	1 in 261

Pairs are listed with the largest slope first, then pairs whose difference is smaller than the scatter, then pairs under the minimum separation. The table lists the pairs named at the top of this page and the pairs with the largest slopes; the other 25 pairs compared are not listed.

The 9 points on this property make 36 pairs: 28 compared, 8 seen from opposite directions, 0 from different tracks or with too few shared dates. Rules applied to every pair, the same on every report: two points more than 80 m apart are not compared; a pair needs at least 24 reading dates that both points share; and two points measured on different satellite tracks are not compared, even when both tracks are descending or both are ascending, because each track has its own reading dates and its own viewing angle.

Every pair compared is two same-pass points (measured on the same satellite track, so seen from the same direction on the same dates). The line-of-sight difference is LandSure's straight-line fit to the date-by-date difference between the two points' readings, times the years between the first and last dates both share. A slope is that difference over the distance between the two points, and is worked out only where the difference is larger than the combined scatter. The satellite measures roofs and paving along a slanted line of sight, and only the change since its first reading; this page is not a floor-level survey.

Seasonal movement

WHAT WAS MEASURED

Fitted to each point's own readings, the yearly wave swings 1.8 to 9.8 mm from closest to furthest along the line of sight, across the 9 points. Pooled over the 8 points of the descending view, the fitted yearly wave swings about 4.8 mm towards and away from the satellite: closest to the satellite around August, furthest from it around February. The report does not identify a cause.

1.8–9.8 mm

YEARLY SWING, PER POINT
fitted to each of 9 points, line of sight

August

CLOSEST TO THE SATELLITE
pooled wave, descending view

February

FURTHEST FROM THE SATELLITE
pooled wave, descending view

1,503

READINGS IN THE POOLED WAVE
from the 8 points of the descending view

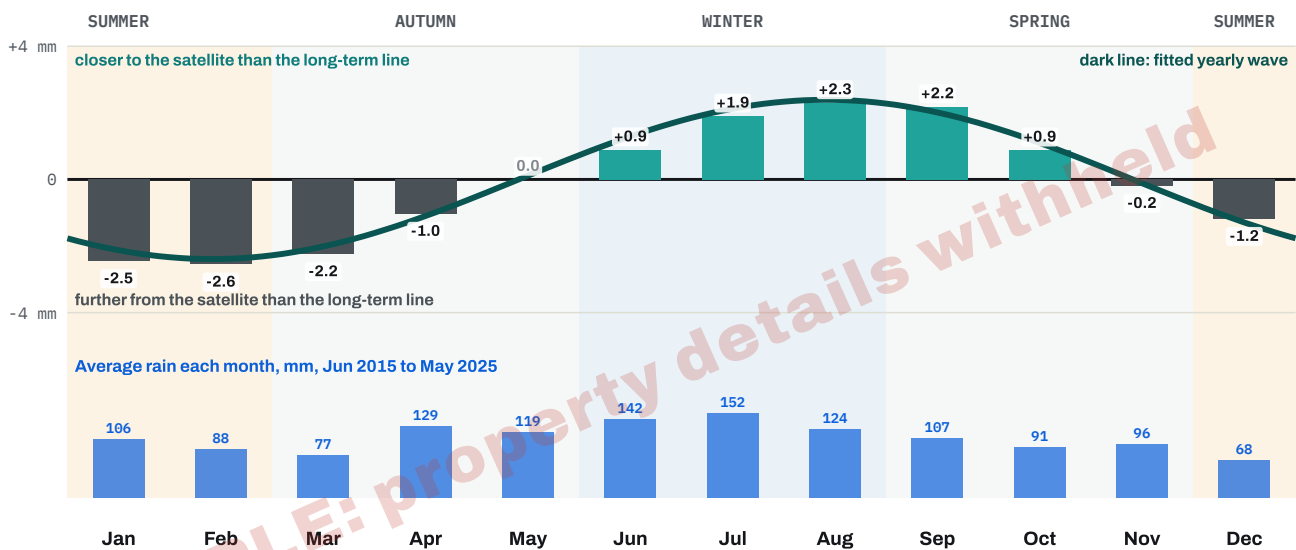


FIGURE 11. Each bar is one calendar month averaged over every year measured, for the 8 points of the descending view: how much closer to the satellite (teal) or further from it (grey), along the line of sight, the measured surfaces sat than their long-term line. The dark line is the single yearly wave fitted to all of those readings; the months in the headline come from that wave. Readings from the two viewing directions are not pooled together. The blue bars underneath are the average rain in each calendar month from June 2015 to May 2025, the years the satellite measured, counting whole months only. These are different years from the January 2001 to December 2020 averages on the climate page, so the two sets of bars differ. Source: SatSense InSAR; NASA POWER daily rain.

HOW TO READ THIS PAGE

1. This page separates a pattern that repeats every year from the long-term trend line, so the two are not confused.
2. Find a month along the bottom.
3. Its bar shows whether the measured surfaces sat a little closer to the satellite or further from it than their long-term line in that month, in millimetres along the line of sight.
4. The rain below it is the average for the same calendar month. The report does not identify a cause.

A yearly swing and a trend

Seasonal shrinking and swelling of clay-rich soils has been measured by InSAR at Karekare and in Gisborne (Brook et al. 2026). A yearly swing is a pattern that repeats in the readings and is printed apart from the long-term rate. This report does not identify a cause for the wave fitted here.

The two figures

The yearly wave fitted to each point here is 1.8 to 9.8 mm along the satellite's line of sight. The largest SatSense rate on the property is +8.4 mm a year (Point 6), also along the line of sight. The first is a yearly back-and-forth; the second is the rate over the whole record. This report does not compare them.

Yearly wave fitted to each point: 1.8 to 9.8 mm along the line of sight (SatSense readings, 9 points). Pooled over the 8 points of the descending view: 4.8 mm; over the 1 point of the ascending view: 6.4 mm. Soil class is set by a soil test or the council. This report does not indicate it.

Heavy rain and earthquakes

● Under 5 mm a year ● 5 to 10 mm a year ● 10 mm a year and over Colour shows the size of SatSense's rate for a point. It is not a judgement about the ground.

WHAT WAS MEASURED

After none of the 5 wettest days in the record did the mean of the readings change by more than both the point's scatter and 3 standard errors. The largest change was 7.30 mm (Point 6, after 31 May 2020), against a scatter of 7.27 mm and 3 standard errors of 30.3 mm. The report does not identify a cause. Point 6 is the point with the largest rate on the property, so the comparison is made on it; where it has fewer than 3 readings on either side of a wet day, the point with the next-largest rate that has 3 or more on each side was used.

How to read this page: for each of the 5 wettest days in the record, the readings in the 60 days before are averaged and compared with the readings in the 60 days after. The table prints both means, the difference and the point's scatter. Earthquakes of magnitude 4 and over are marked on the chart at their dates.

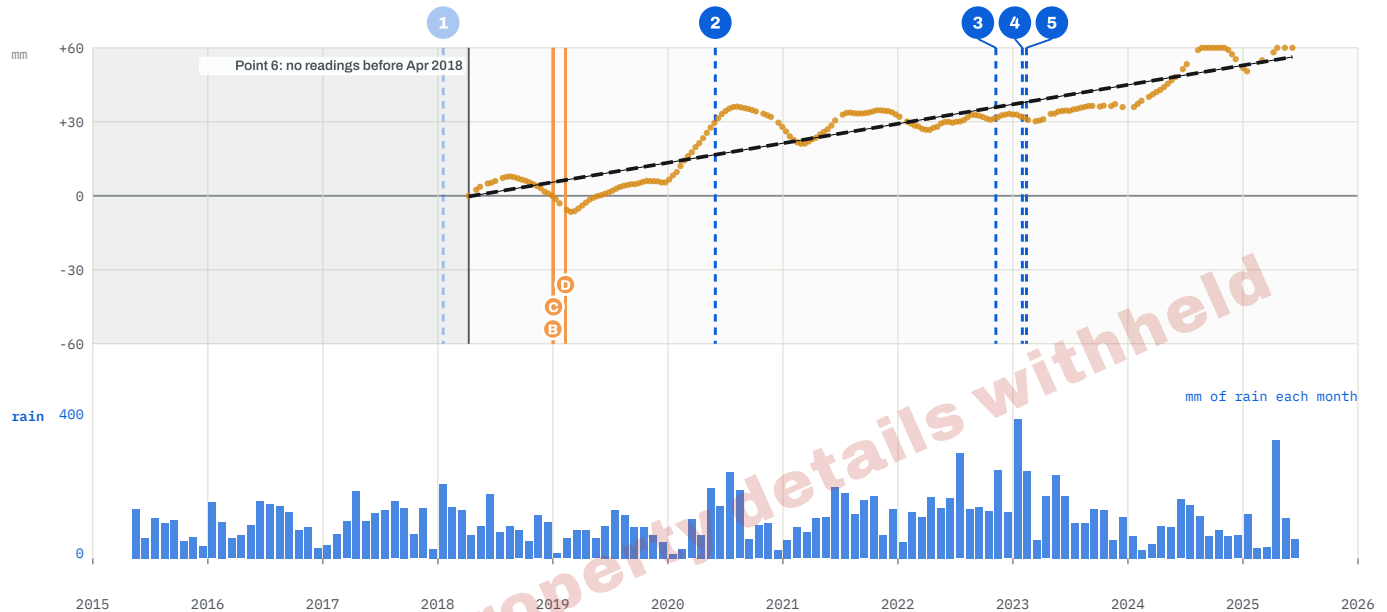


FIGURE 12. Point 6: every reading (dots, in the colour of the point's rate class), starting at zero on its first reading, and LandSure's straight-line cross-check (dashed dark line). Numbered blue marks: the five wettest days. Coloured ticks: earthquakes of magnitude 4 and over within 150 km during the record; lettered ticks are the largest, lettered as in the table on the earthquake page (page 28). Bars below: rain in each month. Point 6's record runs Apr 2018 to Jun 2025 (unshaded); faint numbered marks could not be compared on this point, and only earthquakes inside the record are marked. Source: SatSense InSAR; NASA POWER daily rain; GeoNet, CC BY 3.0 NZ.

Readings before and after the wettest days

DAY	RAIN	POINT	MEAN BEFORE (READINGS)	MEAN AFTER (READINGS)	DIFFERENCE $\pm$ 2 STANDARD ERRORS	SCATTER	RESULT
1 18 Jan 2018	78 mm	4	-1.8 mm (5)	+1.3 mm (5)	+3.1 $\pm$ 7.8 mm	2.9 mm	WITHIN 3 STANDARD ERRORS
Point 6's record starts after this day, so Point 4, the point with the next-largest rate that has readings either side of it, was used. The difference (3.1 mm) is larger than the scatter but not larger than 3 standard errors (11.8 mm).							
2 31 May 2020	75 mm	6	+9.4 mm (5)	+16.7 mm (5)	+7.30 $\pm$ 20.2 mm	7.27 mm	WITHIN 3 STANDARD ERRORS
The difference (7.3 mm) is larger than the scatter but not larger than 3 standard errors (30.3 mm).							
3 8 Nov 2022	71 mm	6	-3.7 mm (5)	-3.9 mm (5)	-0.2 $\pm$ 20.2 mm	7.3 mm	WITHIN SCATTER
4 31 Jan 2023	77 mm	6	-4.2 mm (5)	-7.6 mm (4)	-3.3 $\pm$ 20.3 mm	7.3 mm	WITHIN SCATTER
The 60 days either side overlap with day 5 (13 Feb 2023), so these rows are not separate tests.							
5 13 Feb 2023	141 mm	6	-4.7 mm (5)	-8.1 mm (4)	-3.3 $\pm$ 20.3 mm	7.3 mm	WITHIN SCATTER
The 60 days either side overlap with day 4 (31 Jan 2023), so these rows are not separate tests.							

How the comparison is made. Each reading is taken as its distance from the point's straight trend line, with any step or fast change taken out of the trend. For each wet day those distances are averaged over the 60 days before the day and over the 60 days after it; the difference is the mean after less the mean before (a minus sign: further from the satellite, along its line of sight). A mean needs 3 or more readings; with fewer on either side the row reads "too few readings to compare" and has no result. The scatter is the RMS (root-mean-square) distance of the point's readings from its trend line over its whole record, with any step or fast change taken out; it includes the seasonal swing. The standard error (SE) of the difference is the scatter times the square root of (1/readings before + 1/readings after), widened because successive readings are not independent (Appendix B); each difference is printed with plus or minus 2 SE. The result column prints the difference beside the scatter, as numbers, only when the difference is larger than 3 SE and larger than the scatter; otherwise it reads "within scatter", or "within 3 standard errors" where the difference is larger than the scatter but not larger than 3 SE. This rule is LandSure's own and is the same on every report. Wet days less than 60 days apart share readings and are not separate tests. 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

ON THIS PAGE

Height at GeoNet station WHNG, 7 km away: trend -1.4 ± 0.1 mm a year (LandSure straight-line fit to the station's daily heights from 3 May 2015 to 9 June 2025, 98% of the days in the report period; ± 2 standard errors, widened because neighbouring daily heights are not independent). The result depends on the period fitted. It does not measure this property. The station measures the height of one spot; the satellite measures the points on this property along a slanted line of sight.

GNSS station and InSAR

The station measures height at one place. The satellite measures points on a property along its line of sight.

1 GNSS station: one spot, in 3D

Tracks one fixed monument in all three directions.

2 InSAR: many spots, one direction

Points are radar targets, not instruments on the ground.

3 Comparing the two

To set the two side by side, the station's 3D movement would have to be turned into the radar's direction, over the same years. This report does not do that.

GNSS station this property

i One station, one place The station's record is printed as published data for the place where the station stands. It does not measure this property.

What the GNSS station measured

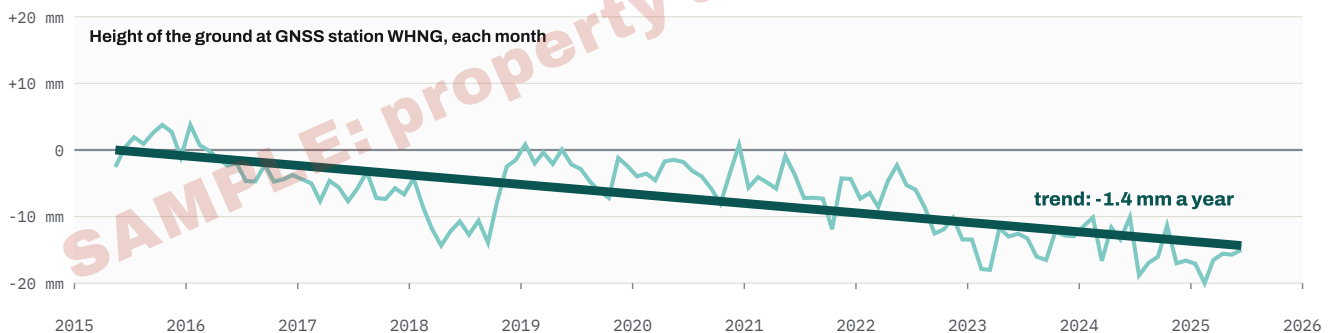


FIGURE 13. The pale line is the height at station WHNG, averaged each month. The dark line is a straight line fitted to those monthly values. The rate printed, -1.4 mm a year, is LandSure's straight-line fit to the daily heights. It does not measure this property. Source: GeoNet, CC BY 3.0 NZ.

The numbers, side by side

WHERE	RATE	WHAT IS MEASURED
GNSS station WHNG	-1.4 ± 0.1 mm a year	height (up-down) at the station, 7 km away; LandSure straight-line fit to GeoNet heights
The middle point on the property (median of 9 points)	$+0.4$ mm a year	SatSense rate, along the satellite's line of sight
The point with the largest rate (Point 6)	$+8.4$ mm a year	SatSense rate, along the satellite's line of sight

The station's trend is a height at one place 7 km away. The points' rates are along the satellite's line of sight on this property. They measure different directions in different places, so they are not expected to match. Comparing them would need the station's movement turned into the satellite's line of sight over the same years; this report does not do that. The station does not measure this property.

The measurements beside published reference values

● Under 5 mm a year ● 5 to 10 mm a year ● 10 mm a year and over Colour shows the size of SatSense's rate for a point. It is not a judgement about the ground.

ON THIS PAGE

This page prints this property's main measurements next to figures that other bodies have published, with the source of each figure and what it was written for. None of the published figures was written for satellite readings of a single property, so each row says how the two differ. The report draws no conclusion from any row.

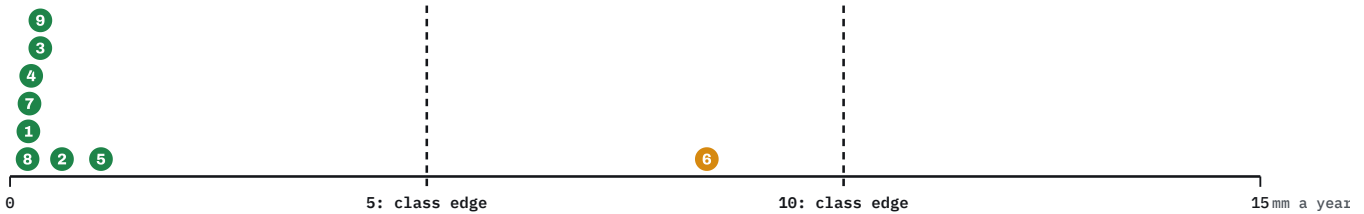


FIGURE 14. Each point's SatSense rate on one scale, direction ignored. Each disc is one measured point, in the colour of its rate class. The dashed marks at 5 and 10 mm a year are the edges of the three rate classes, the same on every report. The class limits are taken from the colour scales of SatSense's own maps. They are not a New Zealand standard and are not engineering criteria. The axis is fixed at 0 to 15 mm a year on every report. Source: SatSense InSAR.

WHAT WAS MEASURED	THIS PROPERTY	PUBLISHED REFERENCE VALUE	SOURCE	WHAT IT WAS WRITTEN FOR	HOW IT DIFFERS FROM THIS MEASUREMENT
Largest SatSense rate, along the line of sight	+8.4 mm a year (± 4.6), Point 6. Scatter of its readings about a straight line: 7.3 mm.	approximately 1 mm a year	SatSense FAQ (satsense.com/faqs, read 10 October 2026)	SatSense's stated accuracy for an average rate	Stated for the technique in general, not for this point.
		plus or minus 2 mm a year	Bianchini et al. 2013, section 5.3; Raspini et al. 2018, Figure 1	Separating points treated as stable from points treated as moving in regional landslide mapping	A regional convention. A rate under it does not show that ground is stable (Barra et al. 2017).
		plus or minus 5	SatSense InSAR User Guide, January 2025 (the guide writes the value as 5 mm)	Where the default colours of SatSense's own web map change from white to colour	A map display setting that its users can change, not a criterion.
		plus or minus 10 mm a year	Scoular et al. 2026, Figure 1 (SatSense and Earth Sciences New Zealand)	The colour limits of SatSense's published national map	A map scale, not a criterion.
		16 mm a year: the limit between the "extremely slow" and "very slow" landslide velocity classes	Hung et al. 2014, Table 2; Cruden and Varnes 1996	Describing the speed of a known landslide	A class for a landslide's actual movement, not a line-of-sight rate at a building. This report does not identify any landslide.
Fitted yearly wave, along the line of sight	1.8 to 9.8 mm, highest to lowest, across the 9 points. Pooled over the 8 points of the descending view: 4.8 mm; over the 1 point of the ascending view: 6.4 mm.	22, 44, 78, 90 mm for expansive soil classes S, M, H, E	B1/AS1 Second Edition (MBIE, effective 28 July 2025), paragraph 2.3.8.2(b), which adds clause 7.5.13 to NZS 3604	500-year design surface movement for foundations on classified expansive soil	Vertical soil-surface design values; this is a line-of-sight wave on roofs and paving. The report does not classify the soil.
Mean slope inside the boundary	7 degrees.	LUC slope group B, 4 to 7 degrees	Land Use Capability Survey Handbook, 3rd edition (Lynn et al. 2009), Table 6	Land-use capability mapping	Not an instability class.
Nearest NZ SeaRise coastal site	+0.1 $\pm$ 2.4 (the publisher's one standard deviation) mm a year, vertical, 0.9 km away.	middle value -0.9 mm a year; range -8.3 to +3.9 (8,173 sites; worked out by LandSure from the NZ SeaRise site file)	NZ SeaRise (Naish et al. 2024), CC BY 4.0	Vertical land movement at coastal sites, for sea-level projections	Vertical land movement as described by NZ SeaRise; a different method and direction. Not like-for-like with this report's points.
GeoNet GNSS station used	Station WHNG, 7 km away: height trend -1.4 $\pm$ 0.1 mm a year (LandSure straight-line fit to GeoNet heights). The result depends on the period fitted.	none	GeoNet, CC BY 3.0 NZ	Continuous positioning of one station	One spot; vertical. Not like-for-like with this report's points.

A line-of-sight figure shows only part of any movement, so the full movement can be larger; every figure carries measurement error, so the true value can also be smaller, including zero. A measurement smaller than a reference value does not settle any question the reference was written to answer.

Records not read or not included

RECORD	WHY IT IS NOT IN THIS REPORT
Mapped erosion type & severity	the publisher's licence (Landcare Data Use Licence cl 2.2(a)) does not allow it, or findings made from it, to be passed on in a report
Nearest active fault; Recorded landslides within 1 km	licensed for non-commercial use only
Council landslide mapping; Liquefaction (council mapping)	the council has not yet confirmed that its data may be used in a LandSure report
Coastal / inundation exposure	not connected for this district

Whangārei District Council's hazard and pipe maps are not included: the council has not yet confirmed that its data may be used in a LandSure report. The council's own information is on the property's LIM.

What these comparisons can and cannot settle

Only a site investigation by a Chartered Professional Engineer can establish whether a site is stable. This report gives that engineer a measured record to start from: 9 points, 1,777 readings, May 2015 to Jun 2025 (each point's position, rate and scatter: Appendix A). SatSense's stated rate for each point: its first reading to 11 Sep 2022 (081A), 6 Feb 2023 (146D), as derived by LandSure from the readings (the supplier does not state the period).

Ground investigations on record

ON THIS PAGE

8 ground investigations are on record within 250 m of this property. The nearest is 109 m from the boundary (RC, 2020). A record nearby is not a finding about this land.



FIGURE 15. Ground investigations on record within 250 m of the boundary (yellow line). Dark numbered markers are the nearest 12, numbered as in the table; small white dots are further records. Records at the same spot share one marker; where markers crowd, the number sits beside its dot on a short line. Positions as published by the New Zealand Geotechnical Database.

What these are

Records of ground investigations held in the New Zealand Geotechnical Database. This report prints where each record is and its type code, date and depth as the database publishes them.

What this report does not hold

The logs themselves. They sit behind the database's registration and belong to whoever did the work. Each can be looked up there by its NZGD ID, so this report lists where the records are, not what they say.

TYPE (NZGD CODE AND NAME)	DATE	DEPTH	FROM BOUNDARY	NZGD ID
1 RC (Rotary Cored Borehole)	Feb 2020	30 m	109 m	160369
2 RC (Rotary Cored Borehole)	Feb 2020	30 m	110 m	160368
3 RC (Rotary Cored Borehole)	Jan 2020	20 m	128 m	160371
4 RC (Rotary Cored Borehole)	Jan 2020	21 m	128 m	160370
5 RC (Rotary Cored Borehole)	Mar 2020	19.5 m	149 m	160375
6 RC (Rotary Cored Borehole)	Mar 2020	25.5 m	158 m	160374
7 RC (Rotary Cored Borehole)	Jan 2020	22.5 m	215 m	160372
8 RC (Rotary Cored Borehole)	Jan 2020	15 m	215 m	160373

Types within 250 m: RC (Rotary Cored Borehole) 8. Each name is read from the type list of the New Zealand Geotechnical Database's own map service when this report is made. LandSure adds no name of its own.

Source: New Zealand Geotechnical Database, public investigation locations (CC BY 4.0), queried live for this report. A record nearby is not a finding about this land. A record's absence means nothing has been uploaded, not that the ground is untested.

Title, parcels and buildings

ON THIS PAGE

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

810 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
165 m² of outline



FIGURE 16. The boundary this report was made for (teal), LINZ building outlines (white; filled teal for those on the property) and mapped watercourses (blue). Building outlines are traced from aerial imagery and can lag new building work. The boundary (LINZ NZ Primary Parcels) and the building outlines (LINZ NZ Building Outlines) come from different LINZ datasets and can be out against each other, so this drawing cannot be used to judge where a building sits against a boundary.

Legal records

APPELLATION	TITLE	PARCEL TYPE	AREA
legal description withheld this report	title number withheld	DCDB	809.0 m ²

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.

Buildings and measured points

Measured points form on hard surfaces such as roofs and paving. Where a position falls inside a LINZ building outline, the rate describes that building and the ground under it together if the building is the surface that reflected the radar. The data does not record which surface that was. The satellite reading does not separate a building from the ground under it. The table below lists each building outline on the property and the measured points whose position falls inside it.

Buildings on the property, and the plotted positions inside them

OUTLINE	FOOTPRINT	PLOTTED POSITIONS INSIDE IT	WHAT THAT MEANS
Building A	165 m ²	Point 1	If the building is the surface that reflected the radar, the rates of these points describe it and the ground under it together. The data does not record which surface that was.

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

Aerial photos over the years

● Under 5 mm a year ● 5 to 10 mm a year ● 10 mm a year and over Colour shows the size of SatSense's rate for a point. It is not a judgement about the ground.

ON THIS PAGE

Three LINZ aerial surveys of the property at the same scale, named for 2014-2015 to 2023-2025. No interpretation is made.



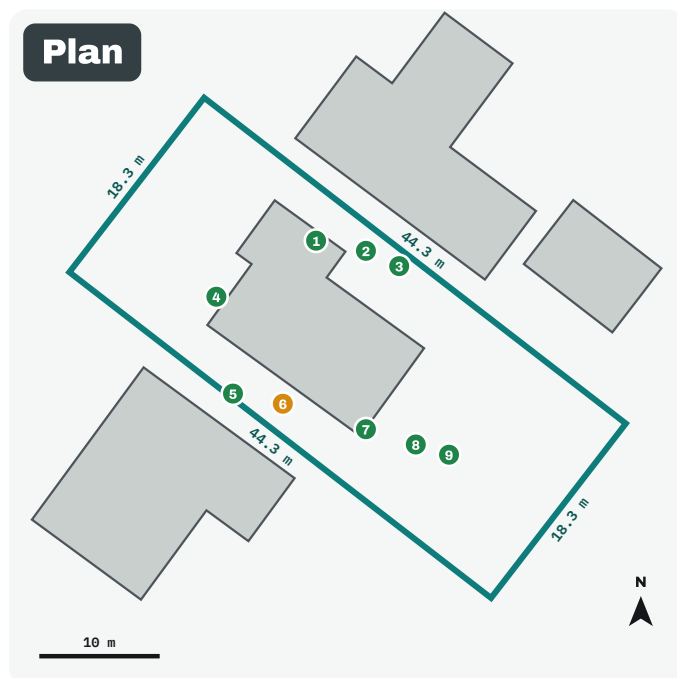
Northland 0.1m Urban Aerial Photos (2014-2015)



Northland 0.4m Rural Aerial Photos (2014-2016)



Northland 0.3m Rural Aerial Photos (2023-2025)



The boundary used for this report, drawn to scale: the length of each boundary edge, buildings and measured points. The boundary and the building outlines come from different LINZ datasets and can be out against each other: this drawing cannot be used to judge where a building sits against a boundary.

Photos: LINZ aerial surveys. Northland 0.1m Urban Aerial Photos (2014-2015), Northland 0.4m Rural Aerial Photos (2014-2016): sourced from the LINZ Data Service and licensed by Northland Aerial Imagery Consortium (NAIC); Northland 0.3m Rural Aerial Photos (2023-2025): sourced from the LINZ Data Service and licensed by National Institute of Water and Atmospheric Research, for re-use under the Creative Commons Attribution 4.0 International licence. Licensors are as LINZ lists them (page read 13 October 2026). Each photo is labelled with the survey years named by LINZ. The teal outline is the boundary used for this report. The earliest survey (2014-2015) may have been flown before or after the satellite record began in May 2015; LINZ names its surveys by year only.

Heights and slope

ON THIS PAGE

The land falls 4 m across the property, with a mean slope of 7 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

7°

MEAN SLOPE

about 1 m of fall in every 8.1 m, on average

south-west

THE LAND FACES

downhill direction of the whole property

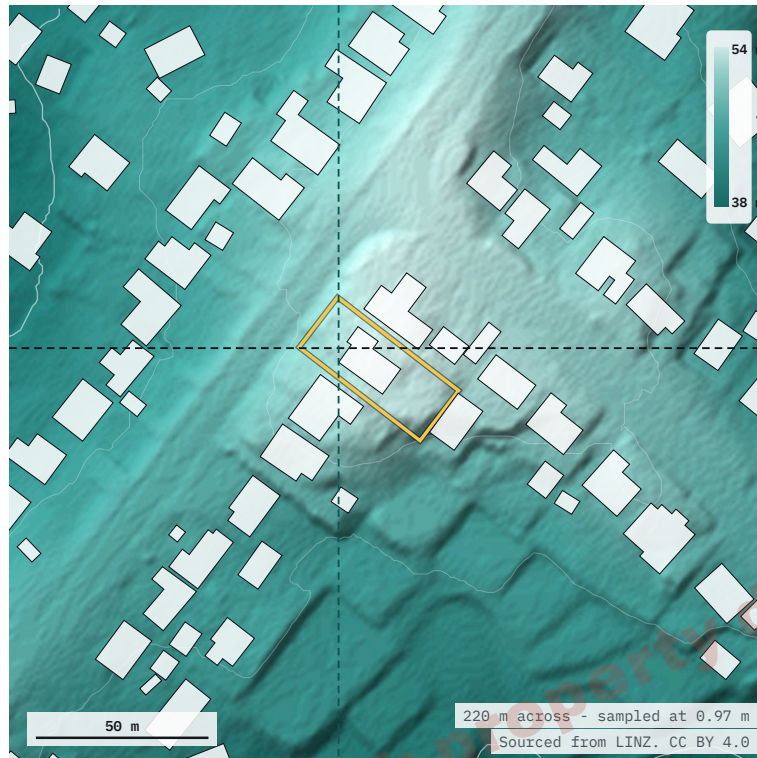


FIGURE 17. The ground from above, tinted by height from the LINZ elevation model: the darkest teal is the lowest ground, the palest the highest (scale at right). The tint shows height only. Shading shows slopes lit from the north-west; white lines are contours every 5 m. Yellow: the property. White: building outlines. Dashed lines: the two slices in Figure 19 (black west to east, teal south to north).

How steep, by share of the land

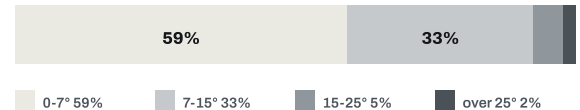
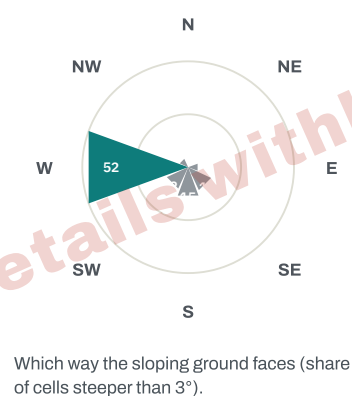


FIGURE 18. Share of the property in each slope range, from 862 elevation cells centred inside the boundary (about 810 m²), slope taken over about 5 m.



Where the figures come from

Heights, fall, slope and facing direction are measured from the LINZ elevation model inside the boundary used for this report. They describe the shape of the ground. This report draws no conclusion from them.

Heights are from LINZ's elevation model of bare ground (its sources are in Appendix B). The vertical datum is not stated here because the tile service does not state it.

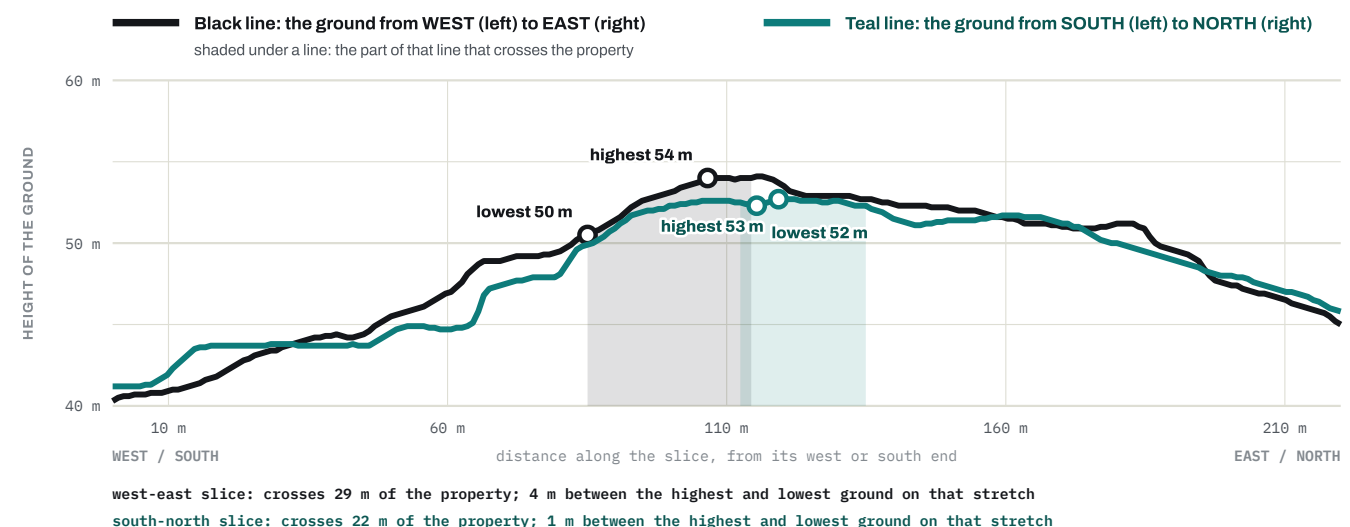


FIGURE 19. Two slices through the ground, as if the land were cut with a knife along the two dashed lines on Figure 17 and looked at from the side. **BLACK** is the slice from west to east; **TEAL** is the slice from south to north. Each is placed where it crosses the most of this property. The tinted area under a line is the stretch that lies on the property, with its highest and lowest ground marked; the rest is neighbouring land. Heights are drawn about 3 times taller than distances so the shape can be seen. Sourced from LINZ. CC BY 4.0.

Streams, rock and soil

ON THIS PAGE

Mapped water near the property, the mapped rock unit and the modelled soil class, each with its source. The Geological Map of New Zealand 1:250,000 maps the rock here as Ruatangata Sandstone of Waro Subgroup (Te Kuiti Group) in Northland Allochthon.



FIGURE 20. 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 watercourse on the LINZ Topo50 map (1:50,000), measured from the boundary
Lake or pond	214 M	nearest lake on the LINZ Topo50 map (1:50,000), measured from the boundary
Lowest ground	50 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. Whangārei District Council's hazard and pipe maps are not included: the council has not yet confirmed that its data may be used in a LandSure report. The council's own information is on the property's LIM.

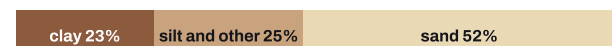
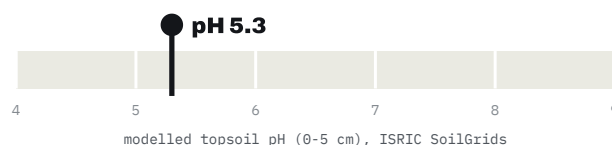
Rock under the property

GEOLOGICAL UNIT	MAIN ROCK	MADE OF	GNS MAP CODE
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 2023, CC BY 4.0. Regional mapping at 1:250,000, reproduced as published. It is not a site investigation.

Soil

Most probable class in the 250 m grid cell: Cambisols (probability 28%). ISRIC SoilGrids v2.0, CC BY 4.0. Not a test of this section's soil.



Texture bar (fine earth, 0-5 cm): clay and sand are the grid's values; silt and other is what remains to make 100%. ISRIC SoilGrids v2.0, CC BY 4.0: a global model on a 250 m grid that uses the class names of the World Reference Base. The pH, clay and sand figures are the model's values for the top 5 cm of the same grid cell. Not a test of this section's soil.

Earthquakes near the property

● Under 5 mm a year ● 5 to 10 mm a year ● 10 mm a year and over Colour shows the size of SatSense's rate for a point. It is not a judgement about the ground.

ON THIS PAGE

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 - 22 Feb 2019

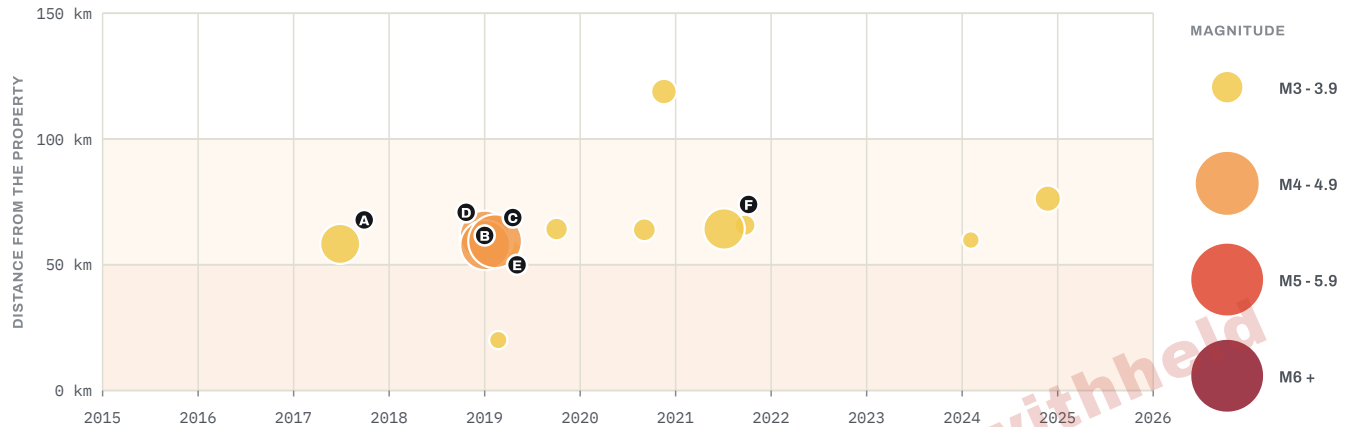


FIGURE 21. Every earthquake of magnitude 3 or more within 150 km of the property between May 2015 and June 2025. Across: when. Up: how far away. Size and colour: magnitude. The shaded band is the nearest 50 km. Lettered: the largest, listed in the table below. Rows the catalogue types as something other than an earthquake are left out. Source: GeoNet (Earth Sciences New Zealand and the Natural Hazards Commission), CC BY 3.0 NZ.

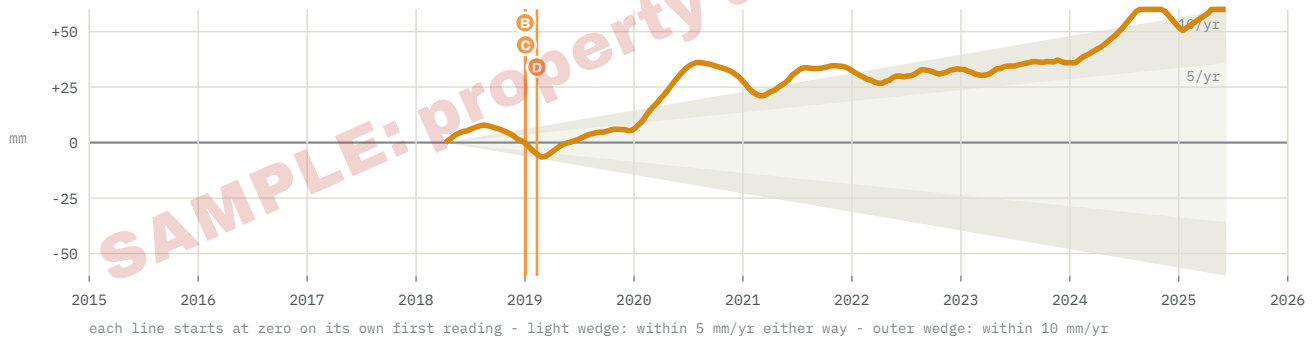


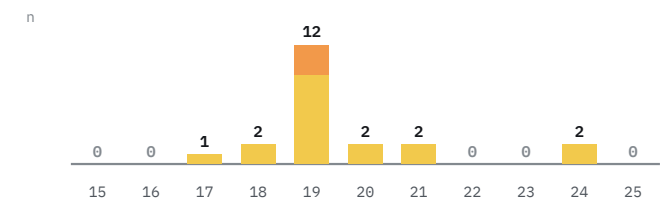
FIGURE 22. Point 6, the point with the largest rate on the property, on a fixed scale of plus or minus 60 mm, with every magnitude 4+ earthquake from Figure 21 marked at its date; the largest are lettered as in the table below. The report does not identify a cause.

The largest in the search

KEY	DATE	MAGNITUDE	DEPTH	DISTANCE	GEONET ID
A	28 Jun 2017	M3.7	5 km*	58 km	2017p481995
B	01 Jan 2019	M4.0	12 km*	62 km	2019p000442
C	03 Jan 2019	M4.0	12 km*	58 km	2019p004126
D	10 Feb 2019	M4.1	12 km*	59 km	2019p108878
E	11 Feb 2019	M3.5	12 km*	59 km	2019p111840
F	05 Jul 2021	M3.8	9 km	64 km	2021p500168

* Depth fixed by GeoNet's analyst because it could not be measured (GeoNet depth type 'operator assigned'). Treat it as approximate.

By year



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. Dates are New Zealand dates (GeoNet records times in UTC).

Sun, land cover and climate

ON THIS PAGE

Hills and ridges around the property block 3% of the possible direct sun across the year; the other 97% reaches it. Buildings, trees and cloud are not included.

97%

OF POSSIBLE DIRECT SUN

reaches the property after the hills are allowed for, 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

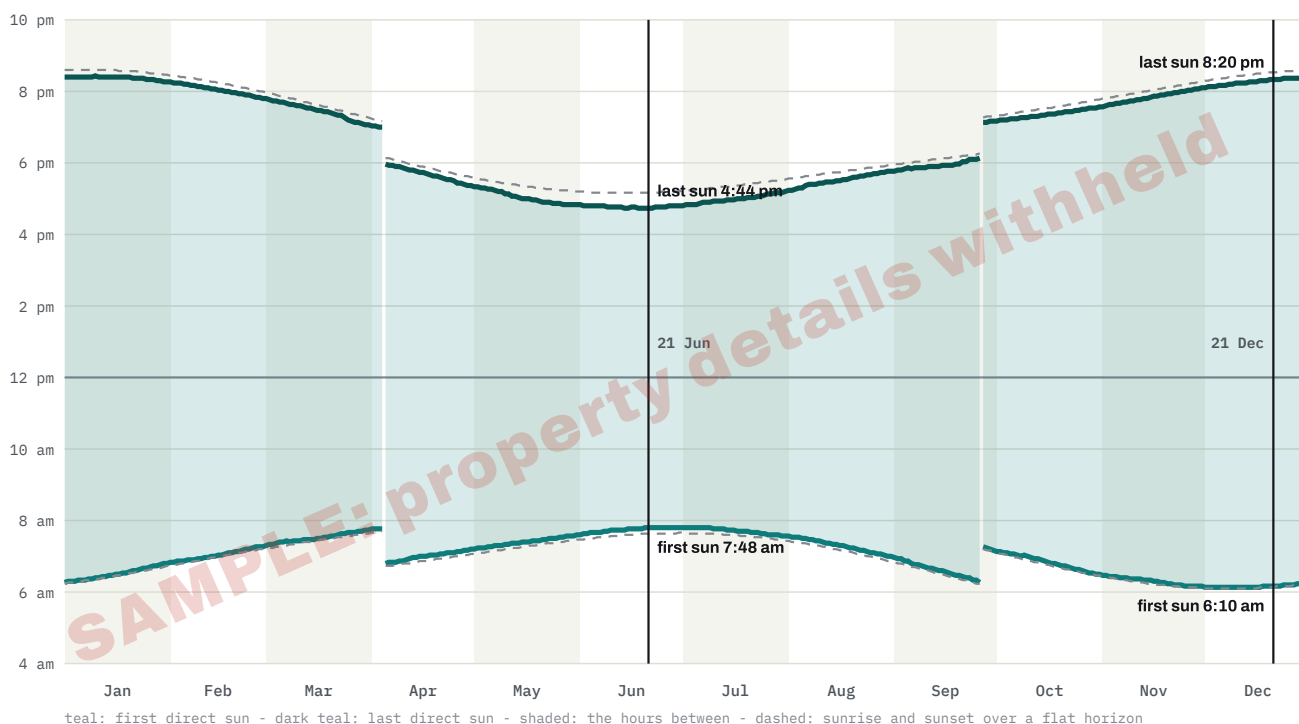


FIGURE 23. First and last direct sun on each of the 365 days of the year, after the hills around the property. Calculated from the LINZ elevation model within 8 km and the sun's position; each day is its own calculation and nothing is averaged. Clock times as read in New Zealand: daylight time (+1 h) until 5 April 2026 and from 27 September 2026, standard time between. Buildings, trees and cloud are not included. Sourced from LINZ. 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 24. Land cover class mapped at this property in each edition of the Land Cover Database. The class is the same in all 6 editions, 1996 to 2023. Mapped from satellite imagery with a smallest unit of one hectare, so a single section inside a larger block takes the block's class. Source: LCDB v6.0, Manaaki Whenua, CC BY 4.0.

The climate year

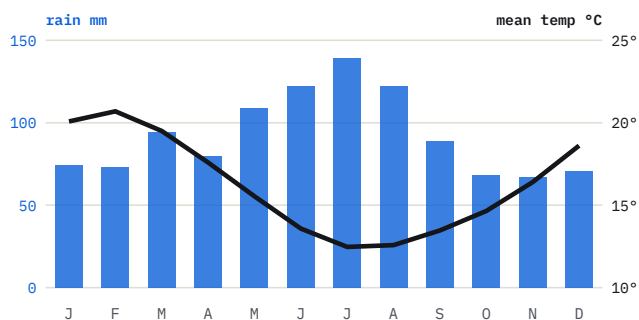


FIGURE 25. Mean monthly rain and temperature, January 2001 to December 2020. NASA POWER grid cell, about 50 km across. Source: NASA POWER.

Where it sits



FIGURE 26. The wider area.



FIGURE 27. The local area.



FIGURE 28. The neighbourhood.

this area in numbers

PEOPLE, 2023

2,025

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

PRIVATE DWELLINGS

654

4% unoccupied on census night (Stats NZ's category; it includes homes whose residents were away)

HOUSEHOLDS OWNING

39%

their home, or in a family trust

PEOPLE 65 AND OVER

+35%

change 2013 to 2023

LAND AREA

1.0 km²

statistical area area code withheld

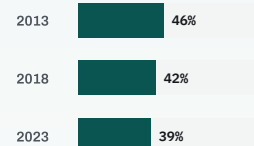
Population



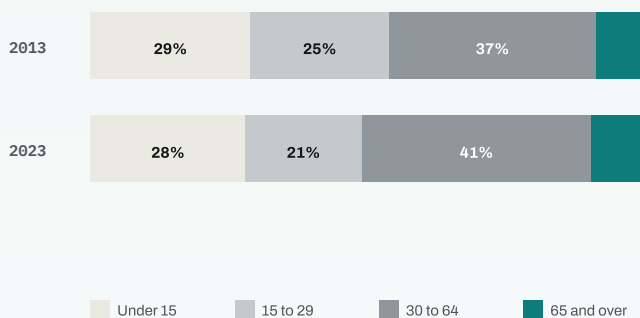
Dwellings



Home ownership



Age groups, 2013 and 2023



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.

Appendix A - every measured point

● Under 5 mm a year ● 5 to 10 mm a year ● 10 mm a year and over Colour shows the size of SatSense's rate for a point. It is not a judgement about the ground.

Every measured point on the property. **Rate** is the velocity SatSense supplies, in millimetres a year along the satellite's line of sight; negative is away from the satellite; the **rate class** is read from this rate and from nothing else. **Cross-check** is LandSure's least-squares straight line through the readings that fall in the period of SatSense's rate, with its difference from SatSense's rate in brackets (where that period is not established, the line through all the readings, with no difference); it never sets a colour. **Scatter** is the typical distance of a reading from that line. **Ends early** marks a point with no reading in the last 12 months or more of the report period: movement there since its last reading is not measured. SatSense says a record can stop when the surface that reflects the radar changes (SatSense InSAR User Guide, January 2025). The readings do not record why the record for a point stops, and its end is not a measurement of anything.

± after a rate is LandSure's cross-check, not SatSense's: two standard errors, widened (Appendix B). The ± is larger than the rate for 7 of the 9 points: each of those rates is smaller than its uncertainty.

SatSense's API description says its map tiles colour points with velocity_averaged (3-month averaged displacements), so a colour here can differ from its map. The last-24-month rate on each point's record is also fitted over twice the window, and over the window moved back in 6-month steps (12 readings needed) for its lowest and highest rate; these are numbers only.

163 further points were supplied outside the boundary. They are counted and are not listed; the map on page 17 shows where measurements exist around the property.

POINT	SATELLITE PASS	SATSENSE RATE MM/YR	CROSS-CHECK MM/YR (DIFFERENCE)	SCATTER MM	READINGS	FIRST READING	LAST READING	RATE CLASS
ON THE PROPERTY								
1	descending	+0.2 ±1.0	+0.2 (0.0)	2.7	191	Apr 2018	May 2025	UNDER 5 MM/YR
2	descending	+0.6 ±0.6	+0.6 (0.0)	1.6	193	Apr 2018	May 2025	UNDER 5 MM/YR
3	descending	+0.4 ±0.7	+0.4 (0.0)	1.5	192	Apr 2018	May 2025	UNDER 5 MM/YR
4	ascending	+0.3 ±1.1	+0.3 (0.0)	3.4	274	May 2015	Jun 2025	UNDER 5 MM/YR
5	descending	+1.1 ±2.3	+1.1 (0.0)	4.1	159	Apr 2018	Apr 2024 ENDS EARLY	UNDER 5 MM/YR
6	descending	+8.4 ±4.6	+8.3 (0.1)	7.3	192	Apr 2018	Jun 2025	5 TO 10 MM/YR
7	descending	+0.2 ±0.8	+0.2 (0.0)	1.6	192	Apr 2018	May 2025	UNDER 5 MM/YR
8	descending	+0.2 ±0.8	+0.2 (0.0)	1.7	192	Apr 2018	May 2025	UNDER 5 MM/YR
9	descending	+0.4 ±1.3	+0.4 (0.0)	2.5	192	Apr 2018	May 2025	UNDER 5 MM/YR

Period of SatSense's stated rate, as derived by LandSure from the readings (the supplier does not state the period): from each point's first reading to 11 Sep 2022 for Point 4 (track 081A) and to 6 Feb 2023 for Points 1, 2, 3, 5, 6, 7, 8, 9 (track 146D).

Appendix A - every measured point

Where each measurement was made, as SatSense supplies it. Latitude and longitude are WGS84 degrees to five decimal places; easting and northing are NZTM 2000 in whole metres. Each point is drawn at the position SatSense supplies for it. SatSense describes each point as "representing the radar returns from a 5 x 20 m area" and says the measurement is often that of a dominant reflector in that area, whose location "might be slightly different to where it is plotted" (SatSense InSAR User Guide, January 2025). SatSense states no positional accuracy in metres. Distances in this report are worked out before this rounding. This report uses the readings SatSense supplied for it. A request made at a later date may return different readings, so a later report on the same property can differ.

POINT	WHERE	LATITUDE	LONGITUDE	NZTM EASTING	NZTM NORTHING
ON THE PROPERTY					
1	3.7 m inside the boundary line (within 5 m of the boundary; its position cannot be assigned to one side with certainty)	withheld	withheld	withheld	withheld
2	1.8 m inside the boundary line (within 5 m of the boundary; its position cannot be assigned to one side with certainty)	withheld	withheld	withheld	withheld
3	1.2 m inside the boundary line (within 5 m of the boundary; its position cannot be assigned to one side with certainty)	withheld	withheld	withheld	withheld
4	inside the boundary	withheld	withheld	withheld	withheld
5	0.3 m inside the boundary line (within 5 m of the boundary; its position cannot be assigned to one side with certainty)	withheld	withheld	withheld	withheld
6	2.2 m inside the boundary line (within 5 m of the boundary; its position cannot be assigned to one side with certainty)	withheld	withheld	withheld	withheld
7	4.7 m inside the boundary line (within 5 m of the boundary; its position cannot be assigned to one side with certainty)	withheld	withheld	withheld	withheld
8	inside the boundary	withheld	withheld	withheld	withheld
9	inside the boundary	withheld	withheld	withheld	withheld

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. Contains modified Copernicus Sentinel data 2015-2025, processed by SatSense Ltd.	Supplied to LandSure by SatSense Ltd under licence	first readings May 2015 to Apr 2018, last readings Apr 2024 to Jun 2025; each point's dates are in Appendix A	READ
Neighbourhood positions	LandSure property-checker feed (SatSense positions only)	Supplied to LandSure by SatSense Ltd under licence	live	PARTLY 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): 1 m models from aerial laser survey (LiDAR) where a survey covers the area, the 8 m national model (2012) elsewhere. The tile service does not say which applies at a given place	CC BY 4.0	latest served	READ
Geology	GNS Science (now Earth Sciences New Zealand) 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 to 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. LandSure is not affiliated with or endorsed by the European Union or the European Space Agency.

LINZ data. Parcels and titles, building outlines, and rivers, lakes and coast: Contains data sourced from the LINZ Data Service licensed for reuse under CC BY 4.0. Aerial imagery and elevation: Sourced from the LINZ Data Service and licensed by (licensor varies by survey; see LINZ's copyright statement), for re-use under the Creative Commons Attribution 4.0 International licence. LINZ's copyright statement: www.linz.govt.nz/copyright. Toitū Te Whenua LINZ does not own the copyright of the aerial imagery or the elevation data, and the map tiles do not say which survey they come from; LINZ lists the surveys and their licensors at linz.govt.nz/products-services/data/licensing-and-using-data/attributing-elevation-or-aerial-imagery-data. The LINZ Aerial Imagery Basemap also contains satellite imagery from © Maxar Technologies and modified Copernicus Sentinel data, licensed by Sinergise Ltd, and bathymetric data from © GEBCO Compilation Group (2020) GEBCO 2020 Grid. Aerial surveys shown on page 25: Northland 0.1m Urban Aerial Photos (2014-2015), Northland 0.4m Rural Aerial Photos (2014-2016): sourced from the LINZ Data Service and licensed by Northland Aerial Imagery Consortium (NAIC); Northland 0.3m Rural Aerial Photos (2023-2025): sourced from the LINZ Data Service and licensed by National Institute of Water and Atmospheric Research, for re-use under the Creative Commons Attribution 4.0 International licence. Licensors are as LINZ lists them (page read 13 October 2026).

Left out, and why

DATA	REASON
Rates, readings and positions of points outside the boundary	Full detail is shown for this property only. The 163 points supplied outside the boundary are counted and shown as a density map only.
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.
Whangārei District Council: land instability (the council's landslide mapping); liquefaction vulnerability category; surface depression ponding areas (2021); modelled catchment flow paths (2021); stormwater mains; wastewater mains; water supply mains	Not included: the council has not yet confirmed that its data may be used in a LandSure report. The council's own information is on the property's LIM.
Council flood and coastal mapping	Not included in this report. 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
Published figure for new foundations	MBIE Verification Method B1/VM2, Second Edition (effective 28 July 2025), Appendix C (informative), clause C.2.1.2	Crown copyright, published guidance	2025	USED
Region	Stats NZ Regional Council 2025: Northland Region	CC BY 4.0	2025	READ
Vertical land movement at coastal sites	NZ SeaRise vertical land movement (Naish et al. 2024), Zenodo record 11398538	CC BY 4.0	as described by NZ SeaRise	USED
Ground investigations on record	New Zealand Geotechnical Database, public investigation locations	CC BY 4.0	live	READ
Expansive soil design figures	B1/AS1 Second Edition (MBIE, effective 28 July 2025), paragraph 2.3.8.2(b), which adds clause 7.5.13 to NZS 3604	Crown copyright, published guidance	2025	USED
Council hazard and pipe maps	Whangārei District Council	use in a LandSure report not yet confirmed by the council	-	NOT INCLUDED

Whangārei District Council's hazard and pipe maps are not included: the council has not yet confirmed that its data may be used in a LandSure report. The council's own information is on the property's LIM.

Attribution, in each publisher's words. GeoNet: We acknowledge the New Zealand GeoNet programme and its sponsors NHC, Earth Sciences NZ, LINZ, NEMA and MBIE for providing data/images used in this study. NASA POWER: The data was obtained from National Aeronautics and Space Administration (NASA) Langley Research Center's Prediction Of Worldwide Energy Resources (POWER) project funded through the NASA Earth Science Division. The data was obtained from the POWER Project's Climatology 2.10.1 version on 2026/10/14. The data was obtained from the POWER Project's Daily 2.10.0 version on 2026/10/14. New Zealand Geotechnical Database: Contains data sourced from the New Zealand Geotechnical Database and licensed for reuse under CC BY 4.0.

Published sources cited in this report

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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, in millimetres a year along the satellite's line of sight. It is the only figure that sets a point's colour class. LandSure also fits a straight line to every series by least squares, as a cross-check: both figures are printed with their difference and the cross-check never sets a colour. Only the agreement over SatSense's period (next row, within 0.5 mm a year) can stop a report; a fit of all of a point's readings more than 5 mm a year from SatSense's rate only prints a warning for the person checking it. Where the two sit either side of a colour edge, the point's record gives both numbers and says that the colour uses SatSense's rate.
Period of SatSense's rate	The export does not state the period SatSense's rates cover. For each satellite track, LandSure fits a straight line to every supplied point's readings up to each reading date in turn (a point takes part with 12 or more readings up to that date) and finds the date at which those fits best match the rates SatSense supplied. The period is taken as established only when the root-mean-square difference there is under 0.1 mm a year and is no more than a third of the difference for fits of the whole records; a track with one point is judged on that point alone. This is LandSure's inference from the numbers supplied, not a period stated by SatSense. Period of SatSense's stated rates, derived by LandSure from the readings (not stated by the supplier): to Sep 2022 (081A), to Feb 2023 (146D). Readings run to Jun 2025.
Sign and units	Negative is movement away from the satellite; positive is towards it. Rates are in millimetres a year and readings in millimetres. SatSense confirmed the sign and the mm-a-year scale to LandSure on 8 October 2026. For every point with a rate over 2 mm a year either way, LandSure checks that a straight line fitted to its readings has the same sign; a point that does not stops the report.
Colour classes	Under 5, 5 to 10, 10 and over, by the absolute value of SatSense's rate. Nothing else changes a point's class. A rate of exactly 5 is in the middle class and a rate of exactly 10 is in the top class. A point has its class colour on every map, chart and table in this report. A point whose record holds fewer than 24 readings or spans less than 18 months has no class and is drawn grey.
Which points are reported	Points inside the boundary are reported in full. Outside it, to 100 m, only positions are shown. A point is inside when the position SatSense supplies for it is inside the boundary this report was made for; an excluded area within the boundary is outside it. Every count, rate and record in this report comes from points inside the boundary. A point outside it, however close to the line, is counted and is not listed: no rate or reading of it is printed.
Points close to the boundary	Distance is measured to the nearest point of the boundary line, including the edge of any excluded area inside it. A point inside the boundary is flagged where it is within 5 m of the boundary; its position cannot be assigned to one side with certainty. It stays in the report. This rule is LandSure's own. The 5 m is not a positioning accuracy; a point stands for about 5 x 20 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. Reference lines and ticks are drawn at the two colour edges, 5 and 10 mm a year, in neutral ink.
Rate over the last months of a record	A straight line fitted to the whole record and another to the last 24 months of the point's own record (which can end before the report period does), each with plus or minus 2 standard errors, and their difference, whose standard error combines the two in quadrature (approximate: the window is part of the whole record). Under 3 readings in the window: not calculated. Numbers only: no colour, class or count depends on them.
Plus or minus	Every plus-or-minus figure LandSure works out is 2 standard errors, multiplied by the square root of $n / n(\text{eff})$, n being the number of readings the figure is worked out from and $n(\text{eff})$ the effective number of independent readings among them, $n / (1 + 2 \times \text{the sum over } k \text{ from } 1 \text{ to } n - 1 \text{ of } (1 - k/n) \times r^k)$, r being the lag-1 autocorrelation of that fit's residuals (0 to 0.98). For a mean over a few readings r is taken from the point's whole record. Neighbouring readings are not independent (SatSense smooths each record), so the uncertainty allows for that using the lag-1 autocorrelation of the residuals. It is still an estimate.
Steps and fast changes	LandSure lists a change of 15 mm or more within 150 days (the median of 3 readings each side) that is also at least 50% of the change along the point's fitted line. Each side needs 3 readings and a listed change spans at most 150 days. A change under 50% of the change along the trend is not listed, however large (the largest is on the every-reading page). It is called an abrupt step when most of it falls between two consecutive readings, and one reading is called out of line when it sits 27.7 mm or more from the readings either side. This setting is LandSure's own. Each listed change is given with its dates and size. The report does not identify a cause, and no colour class depends on a listed change. A reading about 27.7 mm from its neighbours equals half the radar wavelength of 55.5 mm, and is consistent with a processing ambiguity (Scoular et al. 2026, section 3.1). SatSense also states that a point loses coherence when it moves more than about 3 cm between two acquisitions (SatSense, by email to LandSure, 1 September 2025).
Rain and earthquake comparison; scatter	For the wettest days and the largest earthquake named on the summary. Each reading is taken as its distance from the point's trend line: the line fit of its whole record, with any step or fast change taken out of the trend. Those distances are averaged over the 60 days before the day and over the 60 days after it; a mean needs 3 or more readings; the difference is the mean after less the mean before. The scatter is the RMS (root-mean-square) distance of the readings from the same trend line over its whole record, with the readings inside a step or fast change left out. The standard error of the difference is the scatter times the square root of $(1/\text{readings before} + 1/\text{readings after})$, widened because successive readings are not independent; each difference is printed with plus or minus 2 standard errors. The difference is the result only when the difference is larger than 3 standard errors and larger than the scatter; otherwise "within scatter", or "within 3 standard errors" where it is larger than the scatter only. The point used is the one with the largest rate, or, where it has too few readings, the next-largest with 3 or more on each side. A step or fast change overlapping the 60 days is named beside the numbers. The report does not identify a cause. This rule is LandSure's own and is the same on every report. The scatter on each point card is the plain RMS about the straight line.
Change in mean reading	The mean of the point's readings in the first 12 months of its own record, and the mean in the last 12 months, each reading taken from the point's first reading; the change is the second mean less the first (a minus sign: further from the satellite). It is worked out only where each of the two windows holds 8 or more readings and the record is 3 years or longer; otherwise it is not printed. The scatter printed beside it is the root-mean-square distance of the point's readings from its straight line. It is a difference between two means of readings along the line of sight, not a rate and not a fit. Printed on the point records and the every-reading page only.
Yearly rate	A straight-line fit within one calendar year, after the point's own seasonal swing is removed: one yearly wave (a sine and a cosine of the time of year) is fitted together with a straight line to the point's whole record and subtracted, so the season a year starts and ends in does not tilt its line. A single year is a short, noisy window: it is printed in grey and takes no colour class. Shown only where the year holds 8 or more readings across 200 or more days and the record holds 24 or more readings over 2 or more years.
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.
Reproducing this report	Engine 0.4.0; report LS-261014-043484. LandSure keeps the issued report and its inputs for 12 months from issue, so a copy can be checked within that time.

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. The pass (ascending or descending) of each point is listed in Appendix A.
- A rate fitted over a short window can be affected by a yearly cycle in the readings: an annual cycle of shrinking and swelling of clay-rich soils has been detected by InSAR at Karekare and in Gisborne (Brook et al. 2026). Rates are shown only where a point has at least 24 readings spanning at least 18 months, which reduces this effect and does not remove it.
- 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'. A record can also end, or break, for reasons that have nothing to do with ground movement. SatSense gives changes through time to how the ground surface reflects the radar, such as abrupt changes to ground surfaces or a new roof being installed, as reasons (SatSense InSAR User Guide, January 2025, FAQs); it also says dense vegetation gives few points. The readings do not record why any record ends. 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.
- SatSense states that its average rates are accurate to approximately a millimetre a year and single readings to a few millimetres (SatSense FAQ, satsense.com/faqs, read 10 October 2026).
- SatSense's processing filters out long-wavelength regional movement and smooths each record (Scoular et al. 2026, section 2), so rates are local and relative. They are not like-for-like with NZ SeaRise or GNSS rates, and the uncertainties this report works out from the scatter are minimum values.
- Measurement sensitivity: the data records gradual movement. Where a place moves more than half the radar wavelength, about 2.8 cm for Sentinel-1, between two satellite passes, the reading is ambiguous (Scoular et al. 2026, section 3.1). Movement after a point's last reading is not captured.
- Measurement points form only on a surface that reflects the radar consistently (buildings, hard surfaces, exposed ground). Where a property has no such surface, for example under dense vegetation, there are 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 a record of measurements and public records. 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 supply or use.
- This product contains no groundwater or soakage measurement. Soil information shown is from a 250 m global model (ISRIC SoilGrids), 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 stated under 'Checking this report' below). 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.
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Checking this report

Record of this report

Report LS-261014-043484, issued 14 October 2026.

Measurements: 9 points, 1,777 readings, first readings 3 May 2015 to 9 April 2018, last readings 1 April 2024 to 9 June 2025; each point's dates are in Appendix A, supplied by SatSense Ltd from Copernicus Sentinel-1 radar data.

Made with engine 0.4.0. LandSure keeps the issued report with the inputs it was made from for 12 months from the date of issue, so a copy can be checked against the original within that time.

Email the report number, LS-261014-043484, to support@landsure.ai, in the 12 months after issue, to confirm this document is genuine. Terms of use version Rev G (10 October 2026).

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