

Milford Road



Dowmer

Realising the future of roads



Milford Road risk management

Using ArcGIS Online, Collector and Survey123

- Context
- The challenge
- Approach
- The apps
- Next steps

Milford Road

GREAT JOURNEYS TO KEEP NEW ZEALAND MOVING





Rainfall

CLIMATE EXTREMES

2016

@NIWAWEATHER

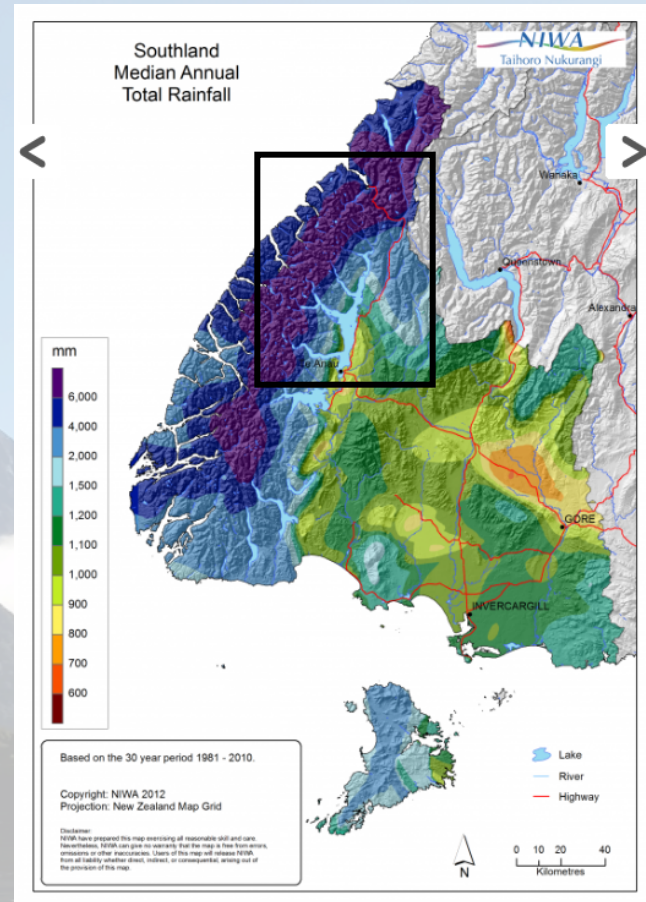
Rainfall



Wettest year
on record for
Milford Sound
9259 mm
(records began
1929)

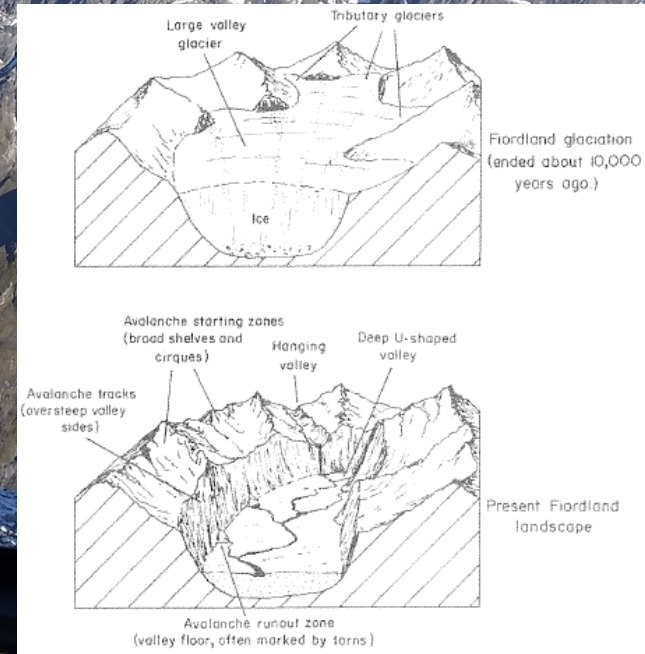
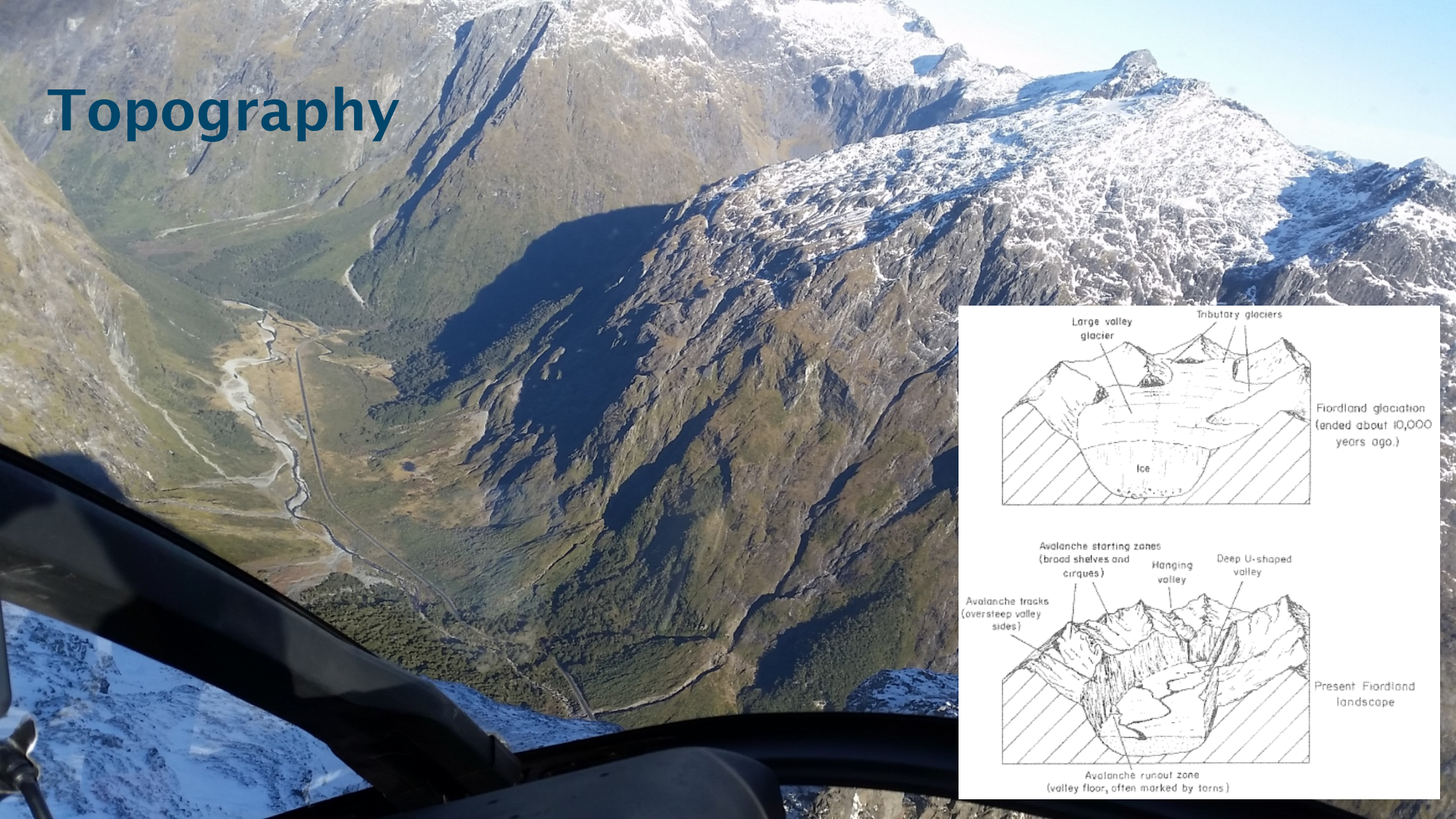


Second wettest year
on record for
South West Cape
(Stewart Island)
1545 mm



Milford Road

Topography



History



Men at work on the Homer Tunnel, Southland. Raine, William Hall, 1892-1955 :Negatives of New Zealand towns and scenery, and Fiji. Ref: 1/2-024836-F. Alexander Turnbull Library, Wellington, New Zealand. <http://beta.natlib.govt.nz/records/22346543>

Tourism



The challenge

Rockfall



?



APPENDIX C: ROCKFALL RATING SYSTEM

Introduction
Road Features
Slope Steepness
Check Effectiveness
This is designed for the South and part of the West is consistent with the slope angle. In the proposed context, use the slope angle for the proposed context and the slope angle for the proposed context.

APPENDIX E: ROCKFALL RATING FIELDSHEET

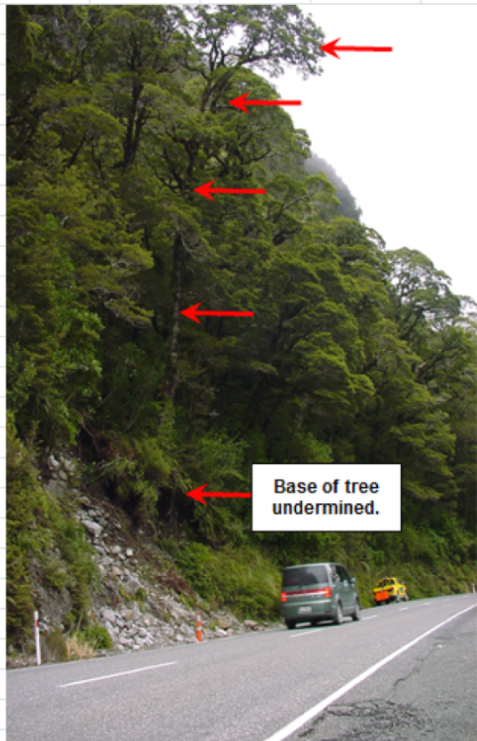
Rating	Category	Sub-category	Sub-rating	Weight
1	Low	Low	Low	1
2	Low	Low	Medium	2
3	Low	Low	High	3
4	Low	Medium	Low	4
5	Low	Medium	Medium	5
6	Low	Medium	High	6
7	Low	High	Low	7
8	Low	High	Medium	8
9	Low	High	High	9
10	Medium	Low	Low	10
11	Medium	Low	Medium	11
12	Medium	Low	High	12
13	Medium	Medium	Low	13
14	Medium	Medium	Medium	14
15	Medium	Medium	High	15
16	Medium	High	Low	16
17	Medium	High	Medium	17
18	Medium	High	High	18
19	High	Low	Low	19
20	High	Low	Medium	20
21	High	Low	High	21
22	High	Medium	Low	22
23	High	Medium	Medium	23
24	High	Medium	High	24
25	High	High	Low	25
26	High	High	Medium	26
27	High	High	High	27

Version	Source Address	Time	Category	Sub-category	Sub-rating	Notes
1	08475 21 2020	08475 21 2020	Rockfall	Low	1	Rockfall over 100m, 1m x 100m area.
2	08475 21 2020 & 01 01 2020	08475 21 2020	Rockfall	Low	1	Lower buffer released onto road nearby required in steep substrate. Lower distance from road and (sub)structure impact - surface erosion leading to roadfall.
3	08475 21 2020 & 01 01 2020	08475 21 2020	Rockfall	Low	1	Impervious Slope
4	08475 21 2020 & 14 01 2020	08475 21 2020	Rockfall	Low	1	Scoured from top of slope (off road waterfall). Possible trigger on mg 4.4 (2) (a).
5	08475 21 2020	08475 21 2020	Rockfall	Low	1	Rockfall around road.
6	08475 21 2020	08475 21 2020	Rockfall	Low	1	Rockfall from Ely, 30m removed from 60m low.
7	08475 21 2020	08475 21 2020	Rockfall	Low	1	Rockfall
8	08475 21 2020	08475 21 2020	Rockfall	Low	1	Rockfall
9	08475 21 2020	08475 21 2020	Rockfall	Low	1	Rockfall
10	08475 21 2020	08475 21 2020	Rockfall	Low	1	Rockfall
11	08475 21 2020	08475 21 2020	Rockfall	Low	1	Rockfall
12	08475 21 2020	08475 21 2020	Rockfall	Low	1	Rockfall
13	08475 21 2020	08475 21 2020	Rockfall	Low	1	Rockfall
14	08475 21 2020	08475 21 2020	Rockfall	Low	1	Rockfall
15	08475 21 2020	08475 21 2020	Rockfall	Low	1	Rockfall
16	08475 21 2020	08475 21 2020	Rockfall	Low	1	Rockfall
17	08475 21 2020	08475 21 2020	Rockfall	Low	1	Rockfall
18	08475 21 2020	08475 21 2020	Rockfall	Low	1	Rockfall
19	08475 21 2020	08475 21 2020	Rockfall	Low	1	Rockfall
20	08475 21 2020	08475 21 2020	Rockfall	Low	1	Rockfall
21	08475 21 2020	08475 21 2020	Rockfall	Low	1	Rockfall
22	08475 21 2020	08475 21 2020	Rockfall	Low	1	Rockfall
23	08475 21 2020	08475 21 2020	Rockfall	Low	1	Rockfall
24	08475 21 2020	08475 21 2020	Rockfall	Low	1	Rockfall
25	08475 21 2020	08475 21 2020	Rockfall	Low	1	Rockfall
26	08475 21 2020	08475 21 2020	Rockfall	Low	1	Rockfall
27	08475 21 2020	08475 21 2020	Rockfall	Low	1	Rockfall





Trees



Tree likely to topple onto the highway, expected to block both lanes.



Base of tree undermined

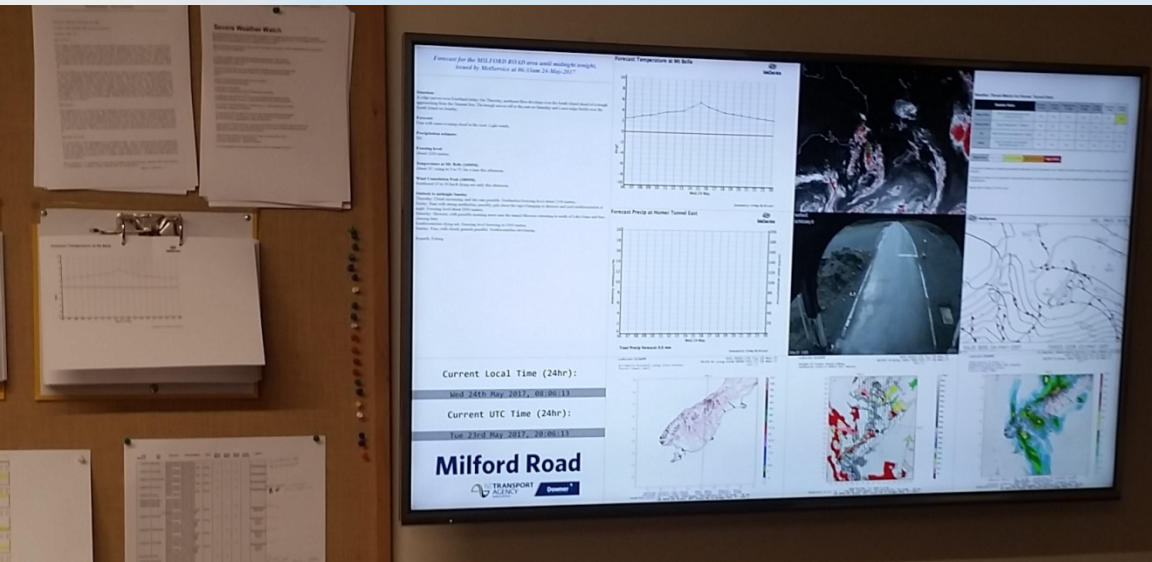


Milford Road

Avalanche

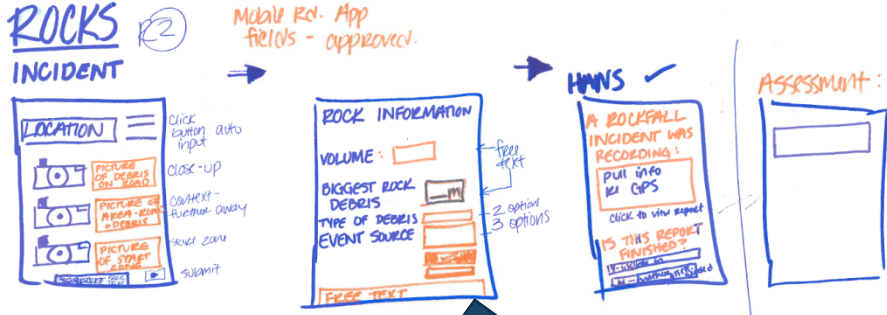


Other information sources



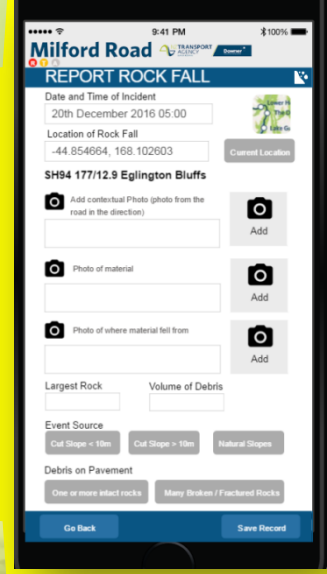
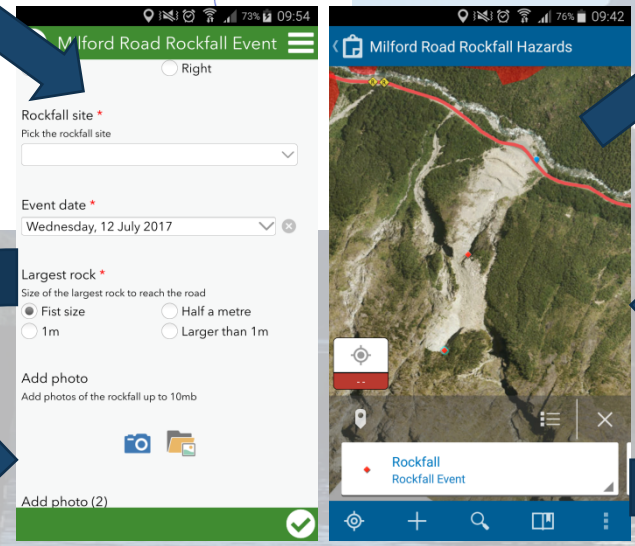


Approach



done right away before anything has been moved

done by crew after hazard removed from Road.
Information

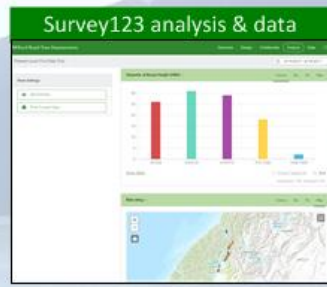


Milford Road

Milford Road



Proof of Concept



Milford Alliance office (Te Anau)

The apps – Survey123

Survey123 for ArcGIS

My Surveys

Help

Andrew

Milford Road Rockfall Event

Overview

Design

Collaborate

Analyze

Data



Milford Road Rockfall Event

Record new rockfall

1

Location of rockfall on road

If your GPS can't locate you, ensure you enter a valid RS/RP

Set Location

2

Reference Station (State Highway 94)

ONLY NEEDED IF NO GPS - pick which RS the rockfall is on

-Please Select-

3

Route Position

ONLY NEEDED IF NO GPS - Enter the RP in Km from the RS

123



Add



Edit



Appearance



Settings

Common Questions



Singleline Text



Multiline Text



Single Choice



Multiple Choice



Dropdown



Rating



Number



Date



Time



GeoPoint



Image



Email



Website



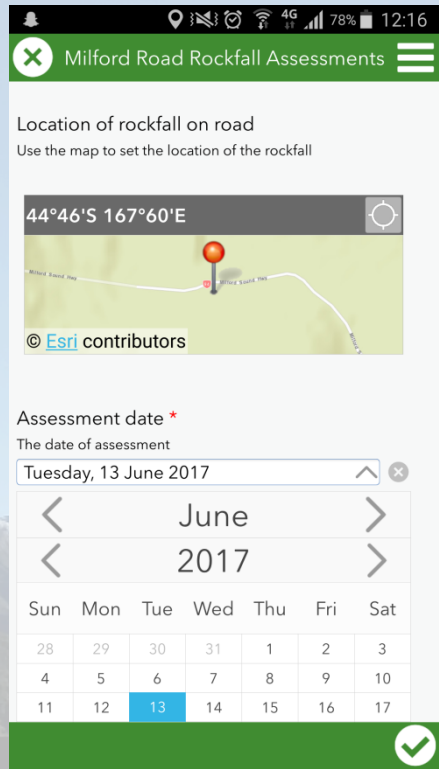
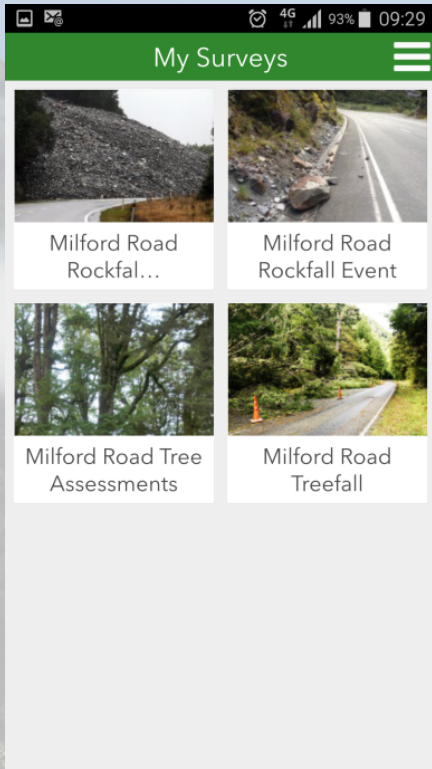
Note

Saved



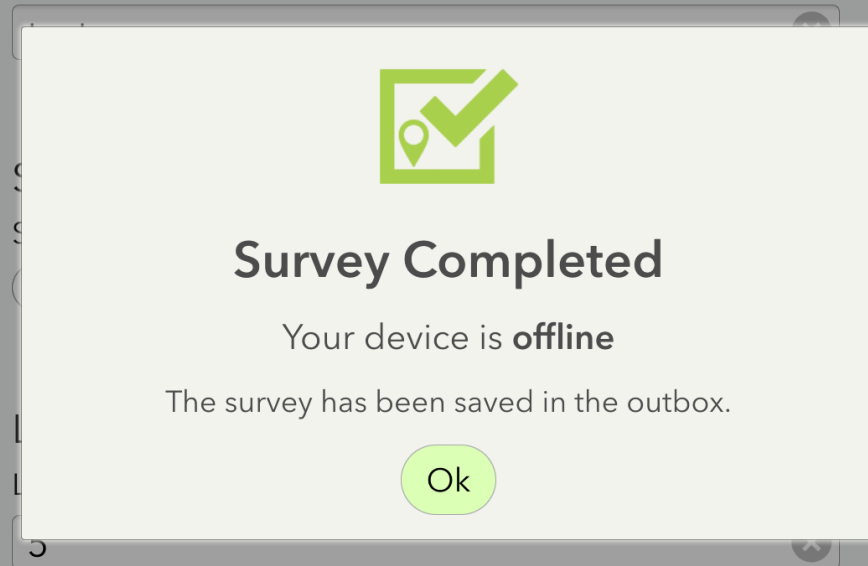
Preview

Publish



Rock fall site name *

Name of the site



Slope height *

Height of the slope

- 7.6m
- 15.2m
- 22.9m
- 30.5m



Content

My Content

My Favorites

My Groups

My Organization

+ Add Item ▾

Create ▾

Folders

New

Mathy - Archived

Mathy - ONRC (Sharon)

Milford Road Maps

Milford Road Surveys

Public map symbols

Survey-Milford Road Rockfall Assessments v2

Survey-Milford Road Tree

Search Milford Road Surveys



1 - 16 of 30 in Milford Road Surveys

Sort by: Date Modified ▾ ↓

<input type="checkbox"/>	Title			Modified
<input type="checkbox"/>	Milford Road Tree Assessments	Form		Jun 6, 2017
<input type="checkbox"/>	Milford Road Tree Assessments	Feature Layer (hosted)		Jun 2, 2017
<input type="checkbox"/>	Milford Road Rockfall Assessments	Form		May 29, 2017
<input type="checkbox"/>	Milford Road Rockfall Assessments_stakeholder	Feature Layer (hosted, view)		May 23, 2017
<input type="checkbox"/>	Milford Road Rockfall Event_stakeholder	Feature Layer (hosted, view)		May 23, 2017
<input type="checkbox"/>	Milford Road Treefall_stakeholder	Feature Layer (hosted, view)		May 15, 2017
<input type="checkbox"/>	Milford Road Rockfall Event	Form		May 15, 2017

Milford Road

Milford Road Rockfall Assessments

The survey has changes that have not been published yet. Users can see these changes only after you publish the survey in [Design](#) page.

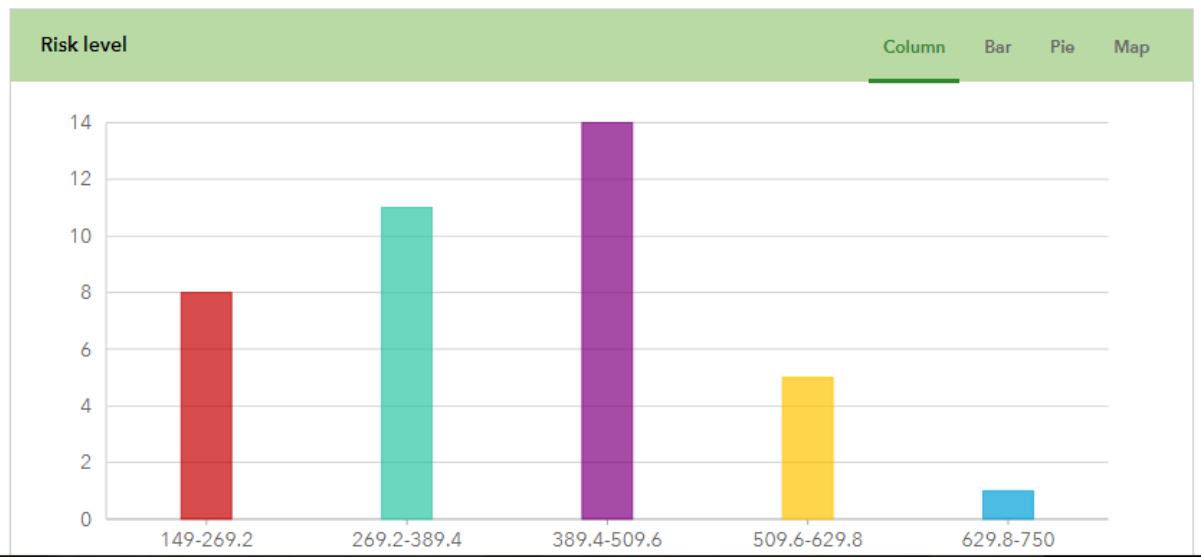
Filtered Count: 88 (Total: 88)

4/19/17 - 5/23/17

Answered: 3 Skipped: 85

View Settings

- Set Visibility
- Print Current View



Collector for ArcGIS

Home ▾ Milford Road Rockfall Hazards

New Map Create Presentation Andrew ▾

Details

Add ▾

Edit

Basemap

Analysis

Save ▾

Share

Print ▾

Directions

Measure

Bookmarks

Find address or place



About Content Legend

Contents

- Rockfall Event
- Rockfall Hazards (v2)
- Rockfall Hazards (v1)
- Tree Hazards
- Avalanche Zones
- Zones
- geotiffs

survey123
9aab9eea82404c16862de018c3755b58
- metadata



Web Map Settings

Save As

Allow others to save a copy of this item.

Offline Mode

Enable offline mode.

Application Settings

Select the tools and capabilities to enable in applications that access this web r

Routing

Measure Tool

Basemap Selector

Find Locations [-]

Hint text

Place or Address

Feature Layer (hosted) Settings

Editing

Enable editing.

Keep track of created and updated features.

Keep track of who created and last updated features.

Enable Sync (disconnected editing with synchronization).

• Who can edit features?

Share the layer to specific groups of people, the organization or publicly via t

This layer is currently shared with: [Milford Road app test users](#)

• What kind of editing is allowed?

Add, update, and delete features

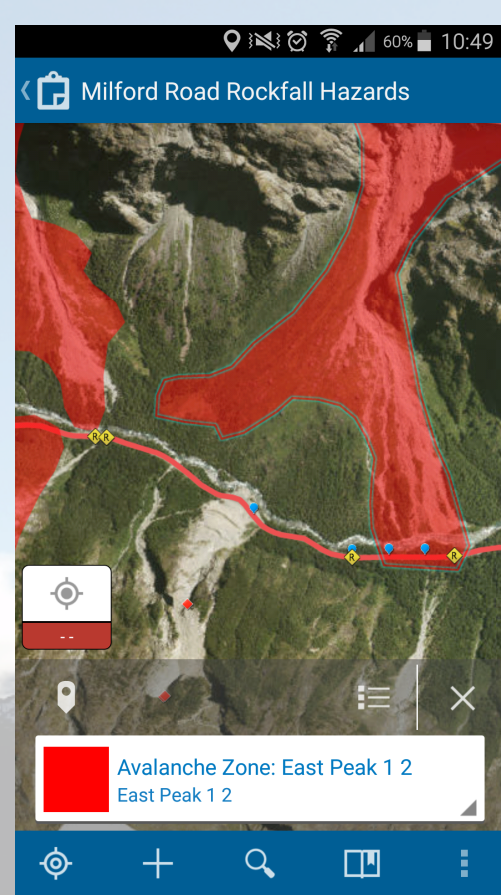
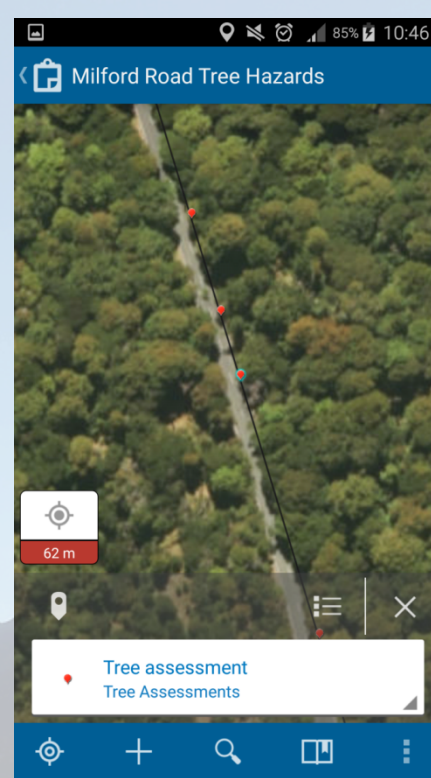
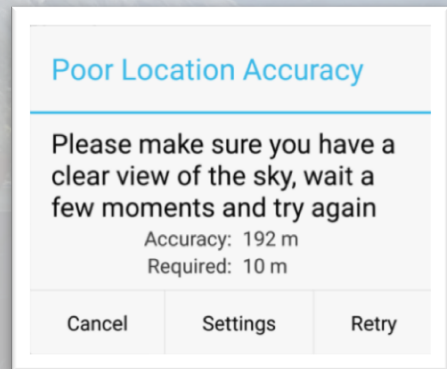
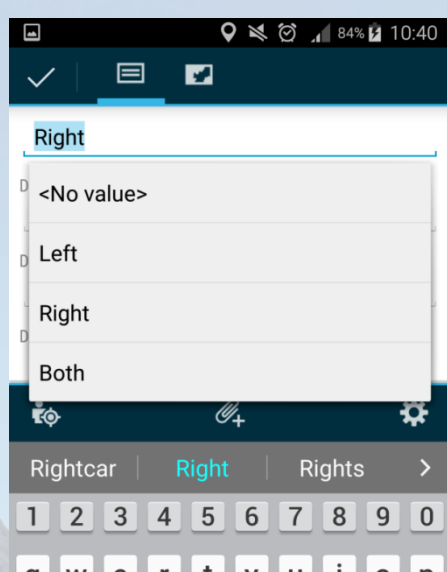
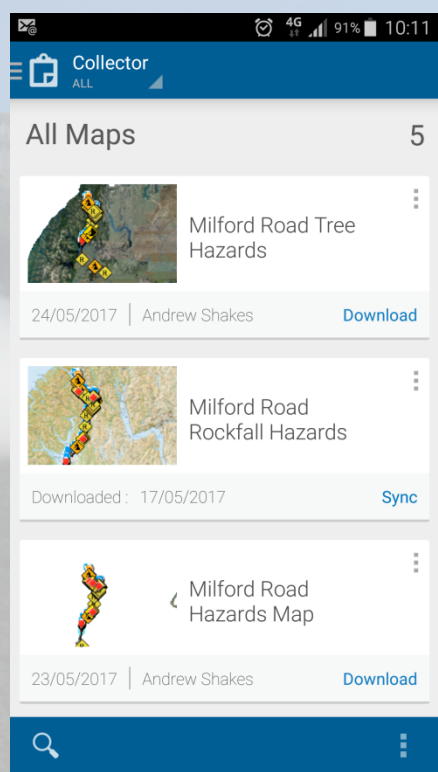
Only update feature attributes

Only add new features

• What features can editors see?

Editors can see all features

Editors can only see their own features (requires tracking)



Milford Road



ArcGIS Online



Find address or place

Map navigation icons: zoom in, zoom out, full screen, print, measure, home, refresh

Legend

Tree Hazard heatmap

High

Low





Legend

Rockfall Event

- ◆ Survey Point

Rockfall Assessments

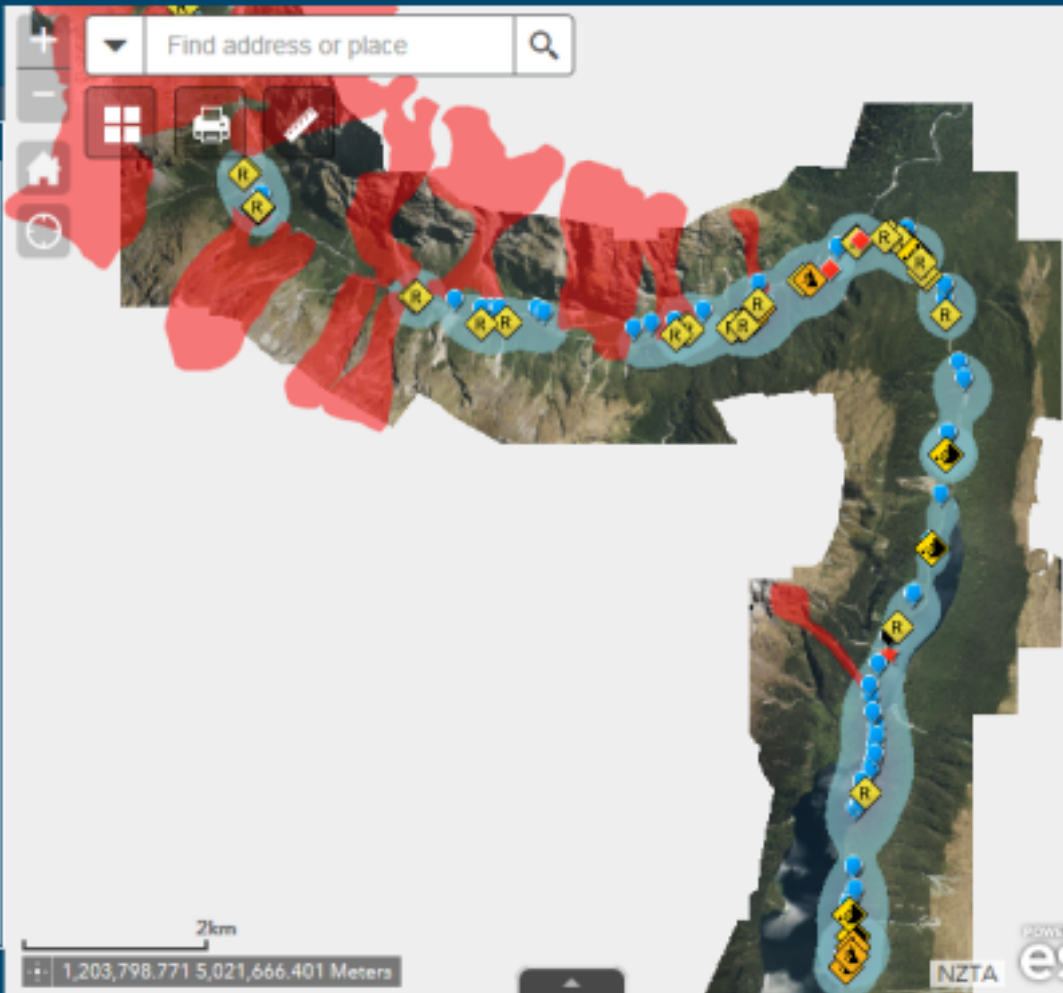
- ⬠ Retaining wall
- ⚠ Landslide
- ⚠ Rockfall
- ⚠ Ground hazards

Tree Assessments

- 4
- 3
- 2
- 1
- 0
- Other

Treefall

- ★ Survey Point

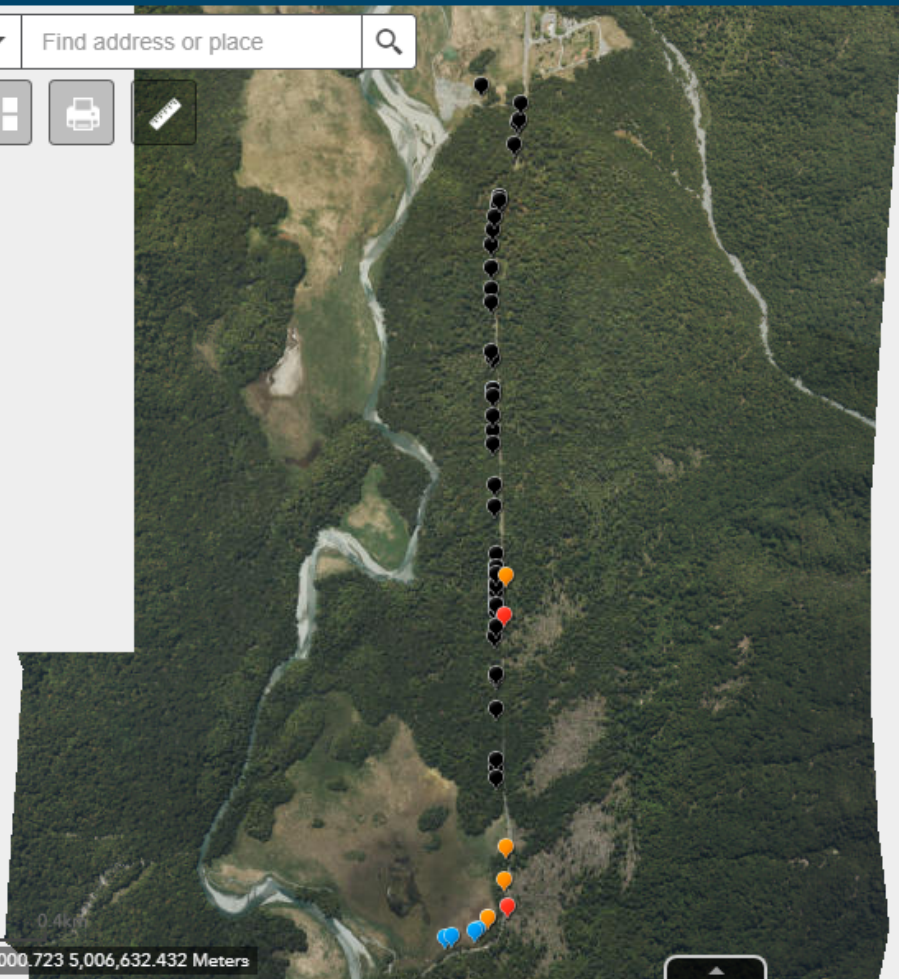




Legend

Tree Assessments

- 4
- 3
- 2
- 1
- 0
- Other



1,210,000.723 5,006,632.432 Meters

Next steps



Questions

- Air New Zealand and Jetstar operate flights to Queenstown
- Bus tours to Milford Sound...

Milford Road