

Drones (UAVs)



TAFE **NSW**

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Outline

- **Types of Drones**
- **CASA rules and regulations**
- **Drone Apps**
- **Produce maps using Cloud, Software**

Types of Drone (CASA)



Types of Drones (CASA)

- **micro** - 100 grams or less
- **very small** - more than 100 grams and less than 2 kilograms
- **small** - at least 2 kilograms and less than 25 kilograms
- **medium** - at least 25 kilograms and less than, or equal to, 150 kilograms
- **large** - greater than 150 kilograms.

Types of Drones

- **Toy** – \$200 to \$500, flight time 5-10 minutes, basic camera, no GPS
- **Racing** – \$200 to \$500, flight time 5-10 minutes, basic camera and video, some GPS enabled
- **Aerial Photography** - \$1000 to \$25,000, flight time 20-25 minutes, HD camera and video, GPS enabled

Toy Drones



Racing Drones



Aerial Photography Drones



Fixed Wing Drones



Rotor/Fixed Wing Comparison

Summary Comparison



Maneuverability



Price



Size / Portability



Ease-of-use



Range



Stability



Payload Capacity



Safer Recovery from Motor Power Loss



Takeoff / Landing Area Required



Efficiency for Area Mapping



Rotor/Fixed Wing Comparison



CASA rules and regulations

- Rules came into affect 29th Sept 2016
- Rules still developing and will change -recent changes 20th Oct 2017
- One major incident and likely tougher rules will apply....
- No license necessary for recreational use up to 25kg (150kg?) if operate under SOC
- No license necessary for commercial use < 2kg, or >2kg < 25kg over own land (SOC).
- All other activity, Remote pilot licence (RePL) is required
- Once you have gained your RePL, you may operate commercially with an ReOC (RPA operators certificate) holder, or apply to get your own certificate

IMPORTANT SAFETY INFORMATION

You must only fly during the day and keep your drone **within visual line-of-sight**.

This means being able to see the aircraft with your own eyes (rather than through a device) at all times.



You must **not fly your drone higher than 120 metres (400ft)** above the ground.

You must keep your drone at least **30 metres away from other people**.



You must not fly your RPA **over or near an area affecting public safety or where emergency operations are underway** (without prior approval).

This could include situations such as a car crash, police operations, a fire and associated firefighting efforts, and search and rescue.



You must only fly **one RPA at a time**.



You must **not fly over or above people**. This could include beaches, parks, events, or sport ovals where there is a game in progress.

You must keep your drone **at least 5.5km away from controlled aerodromes**.

Flying **within 5.5km of a non-controlled aerodrome or helicopter landing site (HLS) is possible**, but only if no manned aircraft are operating to or from the aerodrome. If you become aware of manned aircraft operating to or from the aerodrome/HLS, you must manoeuvre away from the aircraft and land as soon as safely possible.



It is **illegal to fly for money or economic reward** unless you have a drone operators certificate, or you are flying an excluded RPA in the sub-2kg or private landholder category.



Remember, you must not **operate your drone in a way that creates a hazard** to another aircraft, person or property.

Respect personal privacy
Don't record or photograph people without their consent —this may breach state laws.

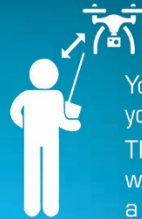


WHAT YOU NEED TO DO TO GET FLYING

1. Go to the CASA website and notify us **five business days before** flying.

- » To notify CASA, you will need an aviation reference number (ARN). If you do not already have an ARN, you will need to apply for one.
- » Your notification is only valid for 24 months, so you will need to re-notify CASA every two years.

2. Operate within the **standard operating conditions**:



You must only fly during the day and keep your drone **within visual line-of-sight**. This means being able to see the aircraft with your own eyes (rather than through a device) at all times.



You must not fly your RPA **higher than 120 metres** (400ft) AGL.



You must keep your RPA at least **30 metres** away from **other people**.

You must not fly your RPA **over or near an area affecting public safety or where emergency operations are underway** (without prior approval).

This could include situations such as a car crash, police operations, a fire and associated firefighting efforts, and search and rescue.



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Drone registration and accreditation scheme

28 March 2019

CASA is planning to introduce a drone registration and accreditation scheme from July 1 – but it has yet to be finalised.

It will be phased in and recreational users will not have to register until November.

This follows [consultation](#) with the community from 25 January to 22 February 2019, where we sought feedback on the details.

The proposed registration and accreditation requirements apply (with certain exceptions) to:

- ▶ drones more than 250 grams operated recreationally
- ▶ all drones operated commercially regardless of weight.

Key parts of our proposal were:

- ▶ flyers under 16 years of age need to be supervised by someone 18 or older who is accredited
- ▶ accreditation will be an online education course to make sure you know the rules - basically, watching video and answering a quiz
- ▶ registration for recreational flyers will be less than \$20
- ▶ for commercial flyers registration is likely to be from \$100 to \$160 per drone.
- ▶ CASA has yet to determine if you can register early or if there will be any leeway around the time of registration.

Drone Type Categories

Drone type categories

There are four distinct drone type training categories for the Remote Pilot Licence (RePL).

- Multirotor
- Fixed Wing
- Powered Lift
- Helicopter

Drone type weight categories

Drone type weight categories

There are also drone weight categories per individual drone aircraft type. While officially there are only two, in reality, there are three. The drone aircraft weight is based on the Maximum Take Off Weight (MTOW), that is the aircraft including fuel/batteries and payload.

The first weight category covers aircraft less than 25kg. The Civil Aviation Safety Authority will further restrict this, to less than 7kg, if your [Remote Pilot Licence](#) training has been conducted on an aircraft less than 7kg. This weight category is independent of manufacturer and payload. You can fly any aircraft of the drone aircraft type you hold a Remote Pilot Licence for, up to the maximum allowable weight.

Once the drone MTOW is above 25kg, the licensing is per individual aircraft type. That is, your Remote Pilot Licence will be for the individual manufacturer and aircraft design.

MULTIROTOR	FIXED WING	POWERED LIFT	HELICOPTER
<7kg	<7kg	<7kg	<7kg
<25kg	<25kg	<25kg	<25kg
Per aircraft type	Per aircraft type	Per aircraft type	Per aircraft type

Apps for where you can Fly a Drone

Can I fly there? (CASA, free)

RWY Check (CASA approved, cost)



Wrong....



Wrong again....



App for flying a Drone

DJI



Apps Capturing Drone Map Data

Maps Made Easy
Drone Deploy
Pix4D



Cloud solutions for Processing Drone Map Data

Maps Made Easy
Drone Deploy
Pix4D



Pay as you go



\$100 US a month



\$350 US a month

Software solutions for Processing Drone Map Data

Agisoft

Pix4D

Microsoft Image Composite Editor



\$3500 US



\$8700 US



Free (Mosaic only)

Drone Deploy Flight Plan (2cm)

The screenshot displays a drone flight planning application interface. On the left is a control panel with the following elements:

- Map Plan**: A dropdown menu with a settings icon.
- 3:58**: Estimated flight time in minutes.
- 2**: Area to be covered in Hectares.
- 42**: Number of images to be captured.
- 1**: Remaining battery level.
- Resolution: 2.0 cm / px**: A slider control set to 2.0 cm per pixel, with a **68m** field for the flight altitude.
- Structures Mode**: A toggle switch currently turned off.
- Live Map**: A toggle switch currently turned off, with a sub-description: "Generates an instant 2D map as the drone flies, in addition to normal image capture."
- Advanced**: A button with a right-pointing arrow.
- Don't own a drone?** and [Test the simulator](#): A link to a simulator.
- HELP**: A help icon.

The main area shows an aerial satellite-style map of a building complex. A blue rectangular flight plan is overlaid on the map, with a green line indicating the path. A green dot at the top left of the path is labeled **START**. On the right side of the map, there are navigation controls: a compass, a zoom-in (+) button, a zoom-out (-) button, and a blue square button with a white camera icon.

Drone Deploy Flight Plan (1cm)

Map Plan

9:35	2	165	1
Minutes	Hectares	Images	Battery

Flight Altitude
Resolution: 1.0 cm / px

35m

Structures Mode

Live Map

Generates an instant 2D map as the drone flies, in addition to normal image capture.

Advanced

Don't own a drone? [Test the simulator](#)

HELP



Drone Deploy Flight Plan (3D or structures mode)

Map Plan

12:21 2 247 1
Minutes Hectares Images Battery

Flight Altitude 35m
Resolution: 1.0 cm/px

Structures Mode

Improves quality of 3D structures by capturing perimeter photos.

Live Map

Generates an instant 2D map as the drone flies, in addition to normal image capture.

Advanced >

Don't own a drone? [Test the simulator](#)

HELP



Drone Deploy Flight Plan (advanced options)

The screenshot displays the 'Advanced Settings' menu for a drone flight plan. The left sidebar contains various settings, and the main area shows an aerial map with a flight path overlaid on a building complex.

Advanced Settings

- 10:20 Minutes
- 2 Hectares
- 154 Images
- 1 Battery
- Automatic Settings:
- Front Overlap: 75%
- Side Overlap: 70%
- Roll: 42°
- Mapping Flight Speed: 15m/s
- Starting Waypoint: 1
- Obstacle Avoidance:
- Show Existing Map:
- Low Light:
- Set Exposure Manually in DJI Go:
- Set Focus Manually in DJI Go:

The map view shows a flight plan with a green grid pattern over a building complex. A 'START' marker is located at the bottom left corner of the flight area. The interface includes a back arrow, a zoom-in (+) button, a zoom-out (-) button, and a home button.

Download Products & Formats (Maps Made Easy)

Advanced Output	Download by April 23, 2019, 7:18 p.m. Why?
GeoTIFF (TIF)	Download (341.8 MB)
Full Resolution Image (JPG)	Download (30.5 MB)
DEM (TIF)	Download (21.2 MB)
Colorized DEM GeoTIFF (TIF)	Download (11.2 MB)
Colorized DEM (JPG)	Download (995.7 KB)
3D Google Earth (KMZ)	Download (8.8 MB)
Point Cloud (LAS)	Download (294.4 MB)
Point Cloud XYZ RGB (TXT)	Download (19.7 MB)
3D Model (OBJ)	Download (251.5 MB)
3D Material (MTL)	Download (261 bytes)
3D Texture (JPG)	Download (7.0 MB)

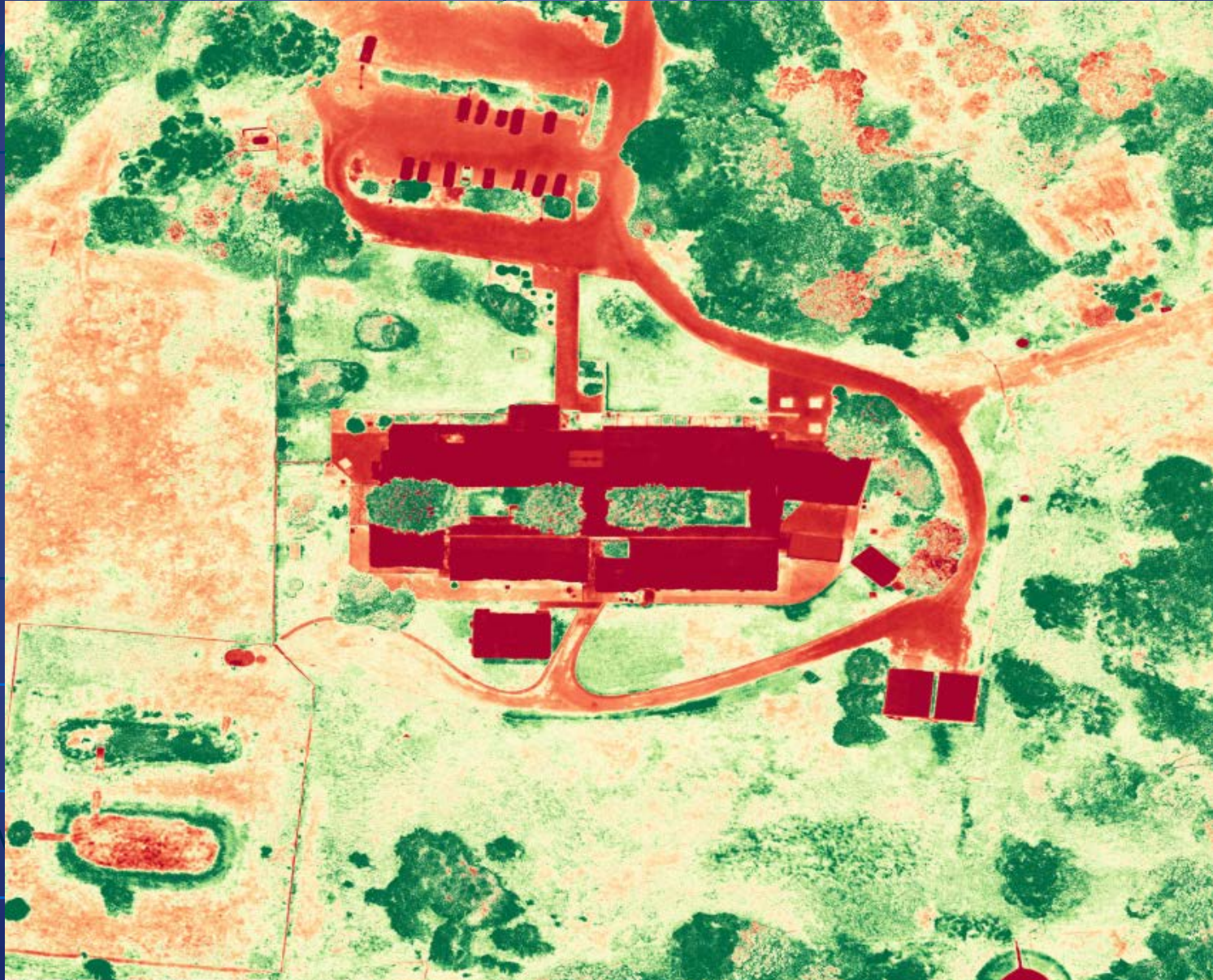
Aerial Photograph (Ortho)



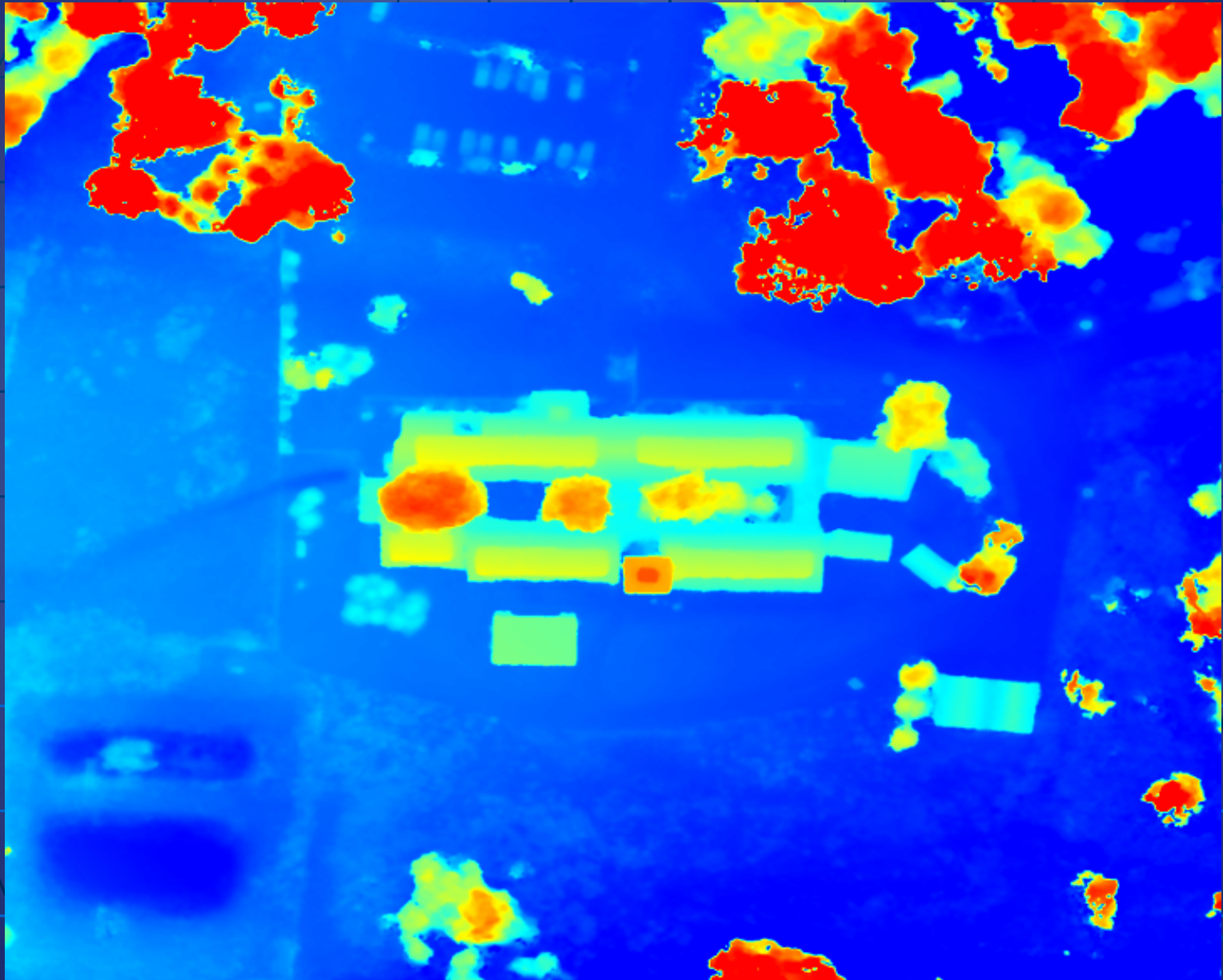
3cm Resolution



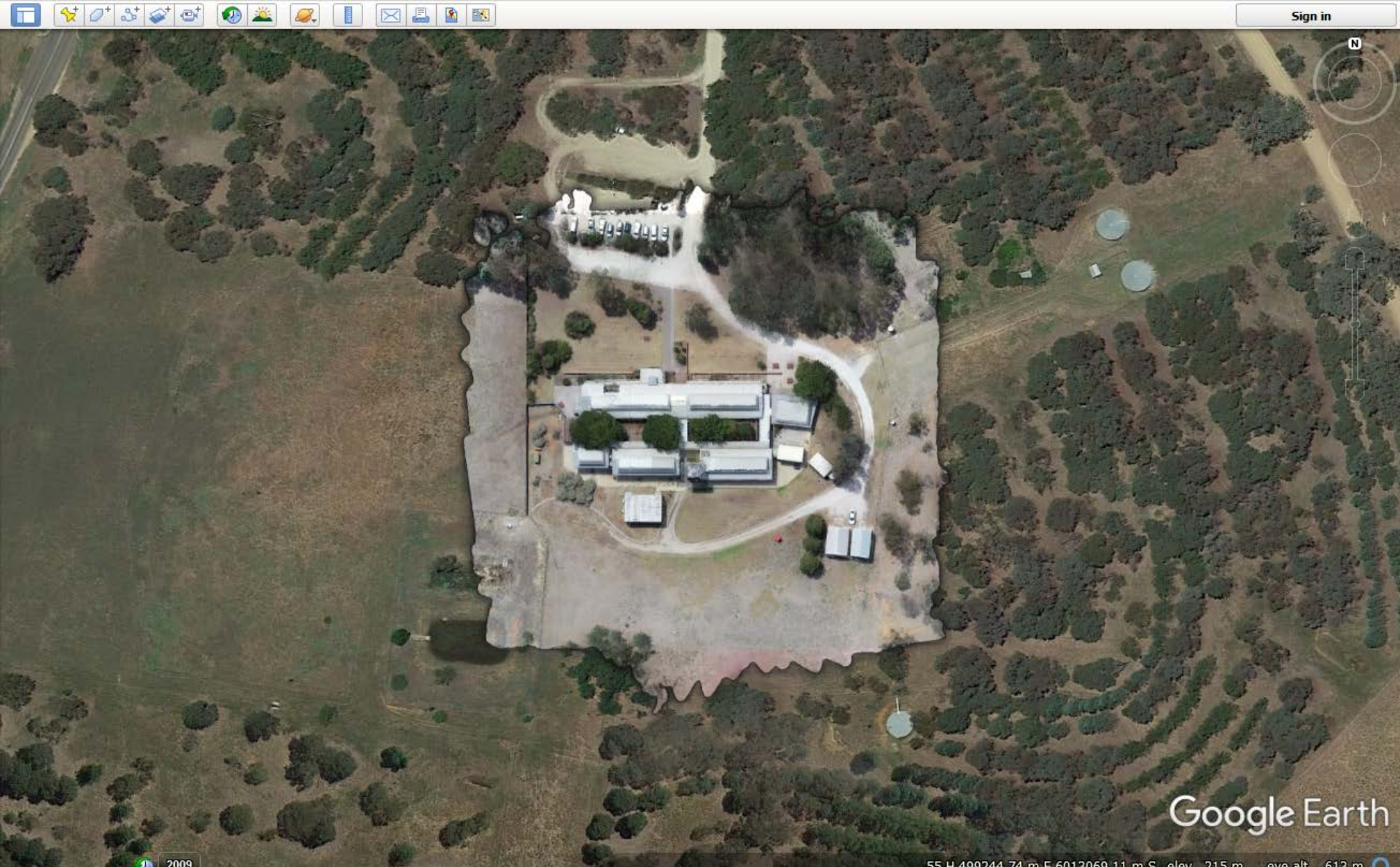
Vegetation Health



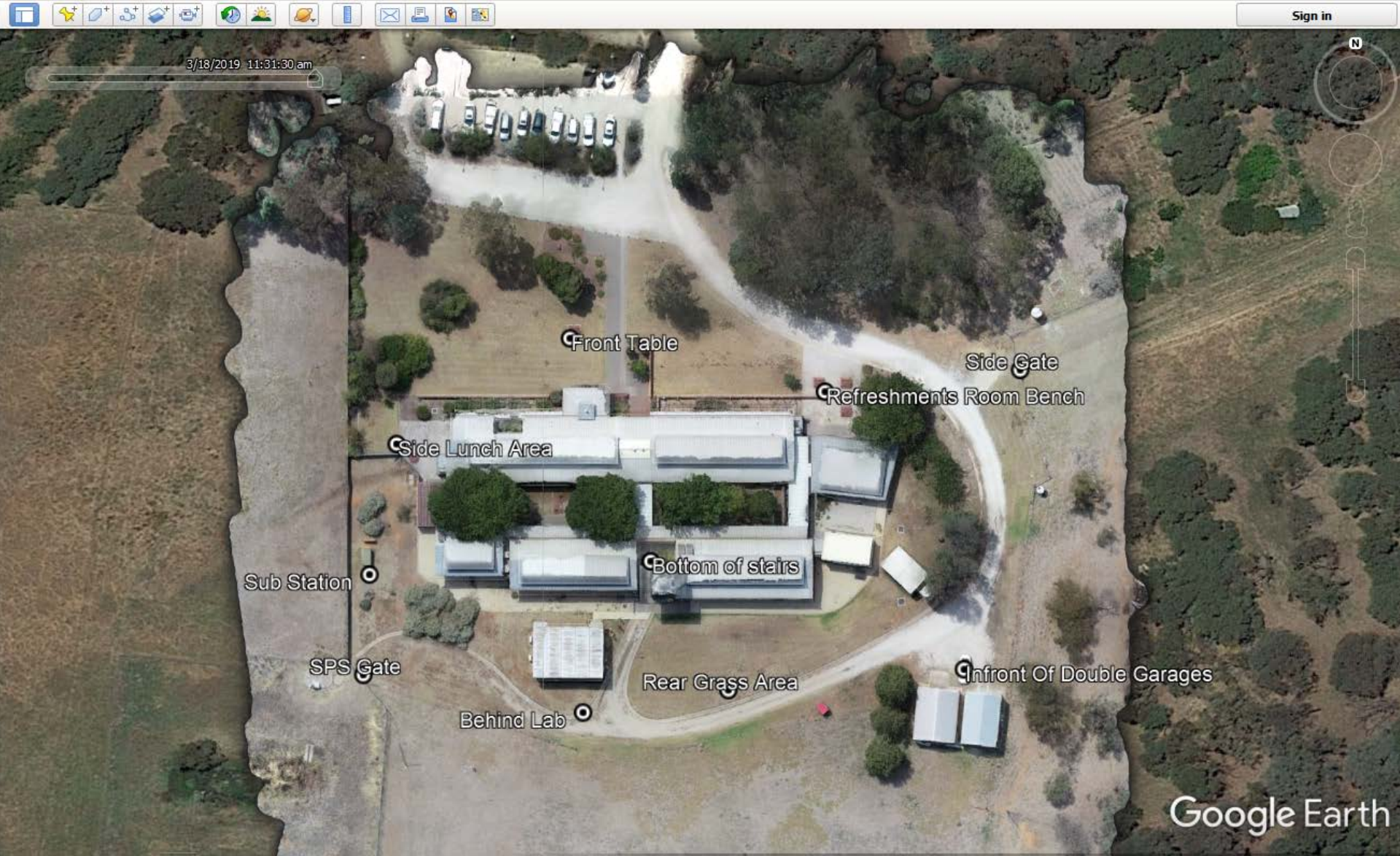
Elevation



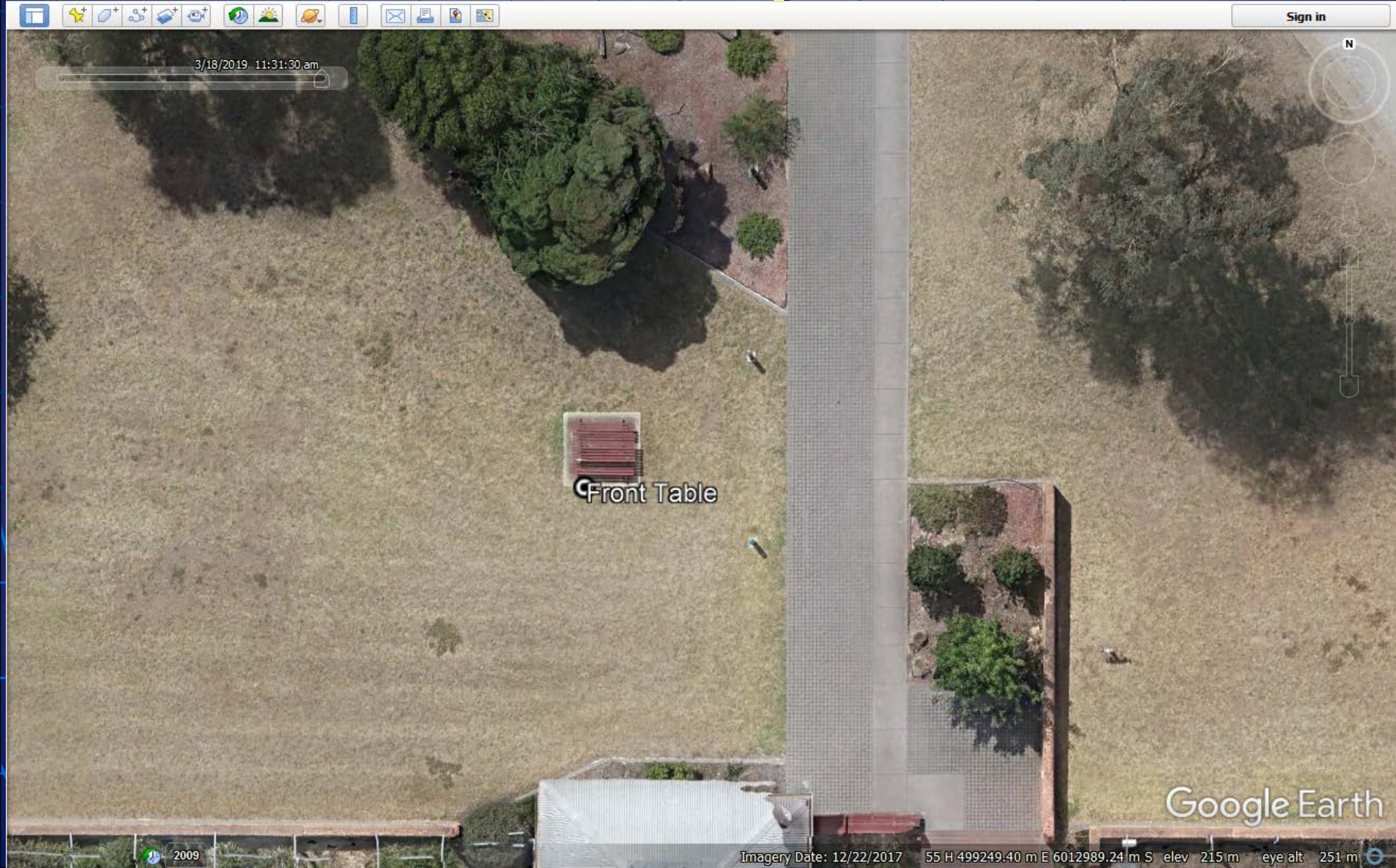
Google Earth Pro (super overlay)



Google Earth Pro with GPS points



Google Earth Pro with GPS points



3/18/2019 11:31:30 am

Sign in

Front Table

Google Earth

2009

Imagery Date: 12/22/2017 55 H 499249.40 m E 6012989.24 m S elev 215 m eye alt 251 m

Google Earth Pro with 3D overlay



Google Earth