

Using NAFI – viewing maps of current fires

The North Australian Fire Information (NAFI) Website provides maps of fire based on satellite images to help fire managers across regional and remote northern Australia.

The home page has a number of features to help you get the fire map you need:



1 Read this advice on uncertainty first. The satellites used are only capable of mapping the approximate location of active fires and their detection of fires is affected by cloud cover and other factors

2 You can quickly bring up a map of your local area using this menu of pre-set maps. Clicking on the arrows on the left will reveal more local pre-set maps as shown below. Clicking on a map title will then bring up a map of recent fire activity in that area.





You can also bring up map of recent fire activity by clicking on the satellite image on the right. You will get a fire map across the broad region you click on: e.g. across the Top End of the NT. The satellite image also shows the cloud – courtesy of Geoscience Australia’s Sentinel website.



Underneath the banner is a set of tabs that bring up different menus on the left so you can explore different fire management tasks. The standard left-side menu is “View Fire Maps” as this is what most people want to do first. By clicking on the other tabs at the top you can bring up new menus with tools that help you:

- track active fires
- view maps of past patterns of burning (fire history)
- download data from the NAFI site
- create a printable report that analyses the fire patterns in an area you select and displays them as tables, maps and graphs
- use other tools such as a list of all the fire map layers on the site, the SavBAT emissions calculation tool, and links to fire information.
- access a menu of help information on how to use the NAFI site.

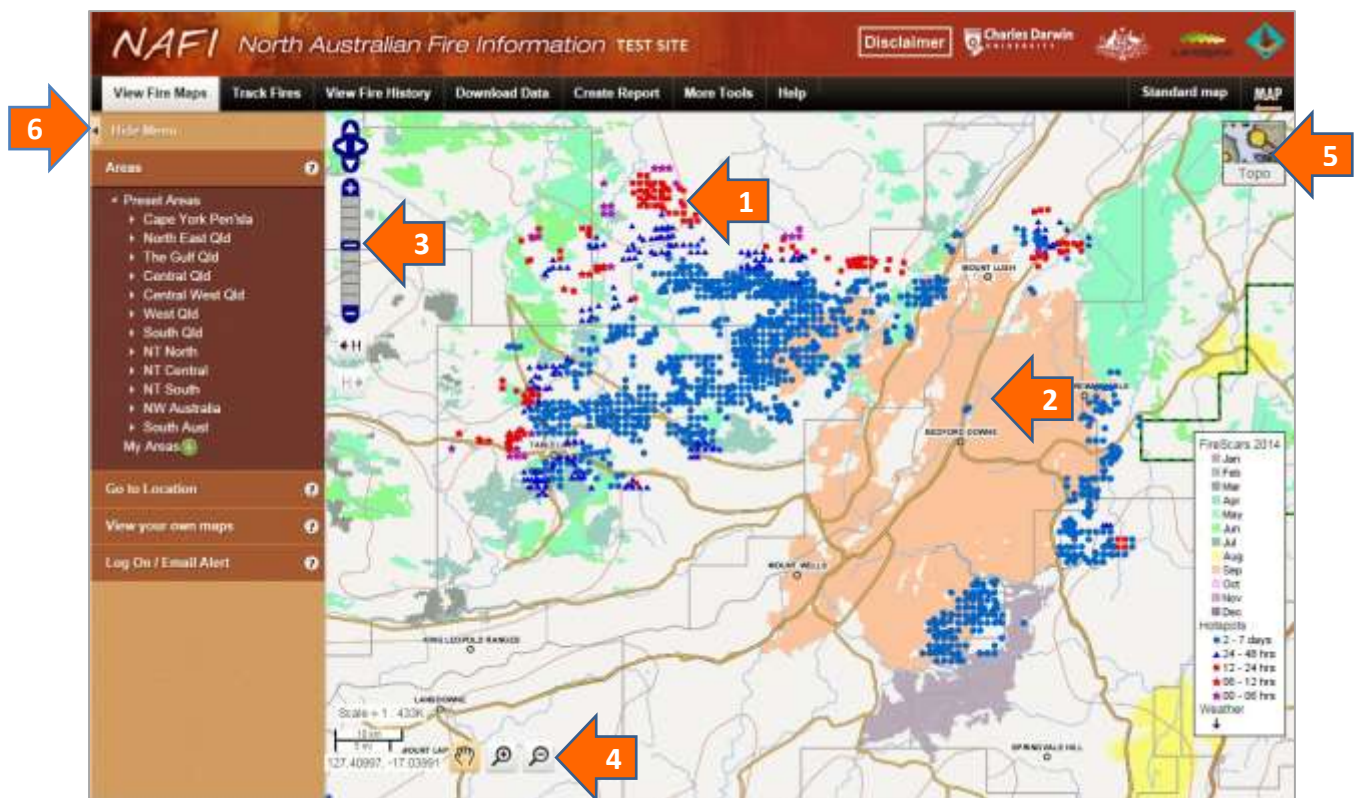


As well as a help menu, you can also view videos on how to use the NAFI site from the home page. Just above the videos there is also a link to the latest developments on the NAFI site, such as data updates or new tools.








Occasionally there will be developments that affect the maps of recent fire activity that are useful to know about – such as extensive cloud cover in the fire season that limit the detection of burning fires, or a technical problem that has interrupted the fire mapping. This information will be displayed in the menu bar above the map, in the space to the right of the standard menu tabs.

The Fire Maps















The maps of recent fire activity show:

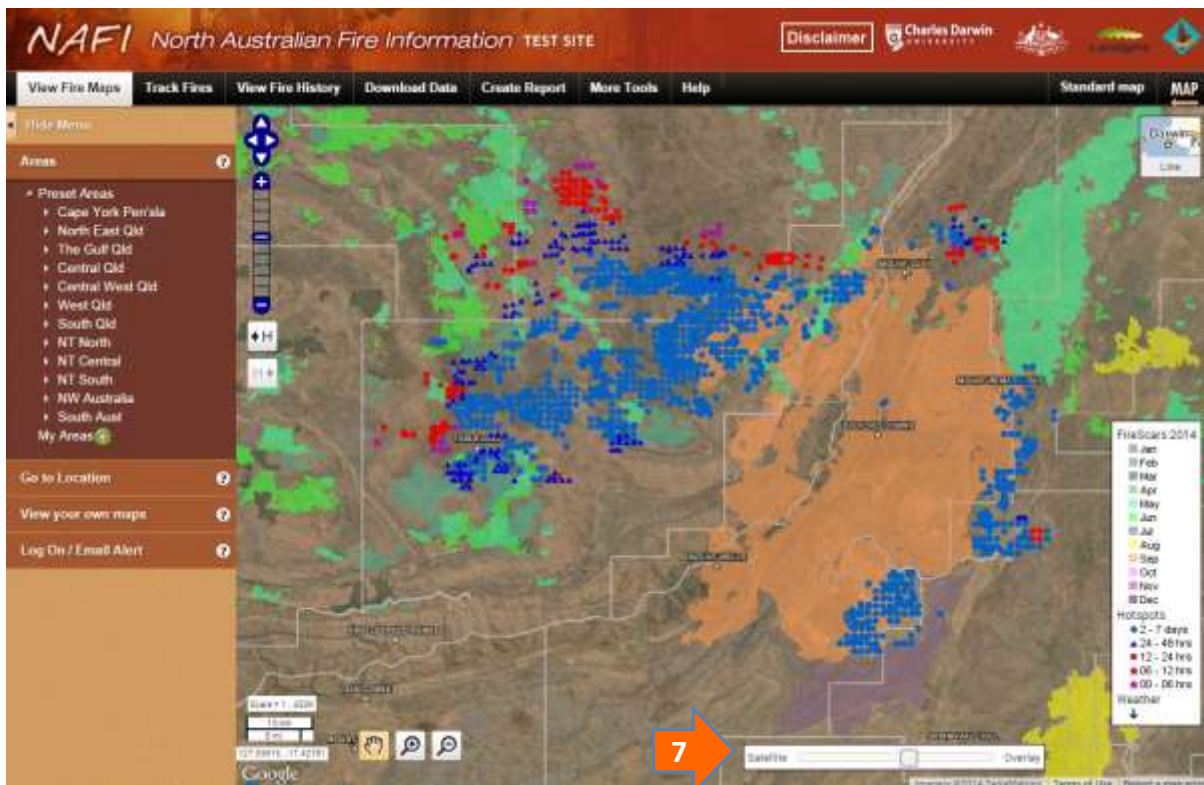
1 Actively burning fires from the last two days are displayed as coloured points, or “hotspots” with the pink and red hotspots indicating more recently detected burning fires and the blue hotspots indicating fires detected earlier as shown below.

-  Fires detected in the last six hours
-  Fires detected in the last 6 - 12 hours
-  Fires detected in the last 12 – 24 hours
-  Fires detected in the last 24 – 48 hours
-  Fires detected in the last 2 – 7 days

2 Areas of land burnt in the current calendar year are shown as coloured patches with the colour corresponding to the month in which they were detected as being burnt – and the warmer colours (yellow, orange, pink and purple) allocated to those warmer months where fires are generally more intense.

 January	 May	 September
 February	 June	 October
 March	 July	 November
 April	 August	 December

- 3 The standard navigation is similar to that used on *Google Maps* with a slider bar and arrows for panning. Move the cursor to pan across larger distances on the map. The “H” history buttons below the slider bar allow you to quickly go back and forwards through all the maps you have made in your visit.
- 4 Alternatively, you can use the zoom in and zoom-out by rectangle tools along with a pan button as featured on the old NAFI site.
- 5 You can choose from different background map options by clicking on the small image in the upper left of the map as you would in Google Maps. You can choose from line/topo maps (default), line maps, and topo maps as well as the Google satellite image.
- 6 You can hide the left-side menu by clicking on the arrow, top left, to make more room for the map. Clicking the arrow again restores the menu.



- 7 If you select the Google satellite image as a background, you can use the slider bar at the bottom of the screen to fade the fire scars so that the background features become easier to see behind the fire scars.

! YOU NEED TO REFRESH THE MAPS TO SEE THE LATEST HOTSPOTS. The hotspots are usually updated a few times a day (see *More about hotspots*) but if you leave a NAFI fire map displayed for a long time hoping to see the hotspots update you will be disappointed – nor will moving the map about by small distances (panning) update the information as this also draws on stored maps to make panning quick. To see the latest hotspots you need to either zoom in or out, or pan by a large distance to get the maps to update. If you visit the site briefly for the latest hotspots, and then close the site and visit it again later on, it will also display updated maps.

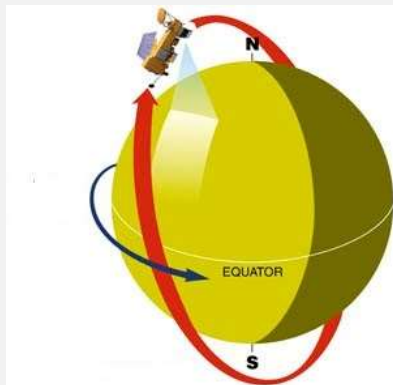
More about hotspots

How accurately are the hotspots mapped?

- The locations of the hotspots on the map are accurate to within approximately a kilometre of their actual location. This error may be greater under some conditions.
- The great majority of hotspots represent actual fires or heat sources such as smokestacks. Occasionally hotspots may be triggered by very hot rock surfaces, smoke plumes or errors in the automated process that detects the hotspots from a satellite image. In the latter case, the hotspots may appear in a line running diagonally across the map. These are usually removed as soon as they are detected.

How frequently updated are the hotspots?

- Active fires large enough to be detected by the satellites can have their position updated up to four or five times a day, but often less than this rate.



The NAFI site sources data from five satellites which have orbits that pass over the poles. These satellites only get to see a given location twice a day: once in the day and once at night.

Broadly speaking there are five hotspot updates a day corresponding to the different satellites passing over twice a day:

1. Very early morning pass (around 1-3am CST) Aqua and NPP satellites
2. Early morning pass (around 4-6am CST) NOAA 18 and NOAA 19 satellites
3. Late morning pass (around 10am-12pm CST) Terra satellite
4. Early afternoon pass (around 1 – 3pm CST) Aqua and NPP satellites
5. Late evening pass (around 10pm-12am CST) Terra satellite

Note that these times are Central Standard Time (NT time). The hotspots will actually be displayed on the NAFI site between 30 minutes and 3 hours after the satellite pass itself (see below).

- Most hotspots are displayed on the NAFI site between 30 minutes and 3 hours after they are detected by the satellites as they need to be processed at a downlink station and sent across the network to the NAFI server. A smaller number of hotspots are supplied to NAFI many hours after they were detected as they are earlier satellites passes that have been processed in a different way (e.g. by being sourced from NASA in the US) and are displayed to provide a more complete record. Because of this inherent delay the NAFI site is not suitable for tracking fast moving fires.

More about fire scars

How accurately are the fire scars mapped?

The mapped fire scars are usually a more comprehensive and accurate record of burning than the record of hotspots. The burnt areas are mapped from satellite images of fire that have a pixel size of 250m – a recently burnt area is shown in false-colour red at left. This contrasts with the approx. 1 km. resolution of the hotspot mapping.



This 250m resolution is suitable for broadly mapping the areas burnt by large open-country fires, but it won't pick up the smaller scale patchiness that often characterises early dry season fires.

Each year the NAFI fire scar mapping is compared with the actual burnt areas through aerial surveys and show that in the savanna landscapes the mapping is between 85-90% accurate. The accuracy drops in the more wooded, moister northern and coastal regions – and in the more developed landscapes further south.

How frequently are the fire scars mapped – and how accurately are they dated?

In the northern fire season, the fire scar mapping in a given area of the fire-prone far north (north of 20 degrees South) is usually updated once a week – occasionally twice a week.

The mapping is done manually with the operator using software that compares the most recent satellite image to earlier ones and picks out the changes in dark areas – which may be new burnt areas. Operator knowledge and pattern-matching software refine the fire scar mapping.

Because there may be a few days to a week between the two images that are compared to detect new fire scars, it is uncertain exactly when in that interval the new burns detected actually occurred. If the interval between the two images covers the end of one month and the beginning of the other, then the fire scar is given the colour corresponding to the month with the most days in the interval.

So, the cut-off date between one month and the next in the fire scar mapping is only approximate for most months.

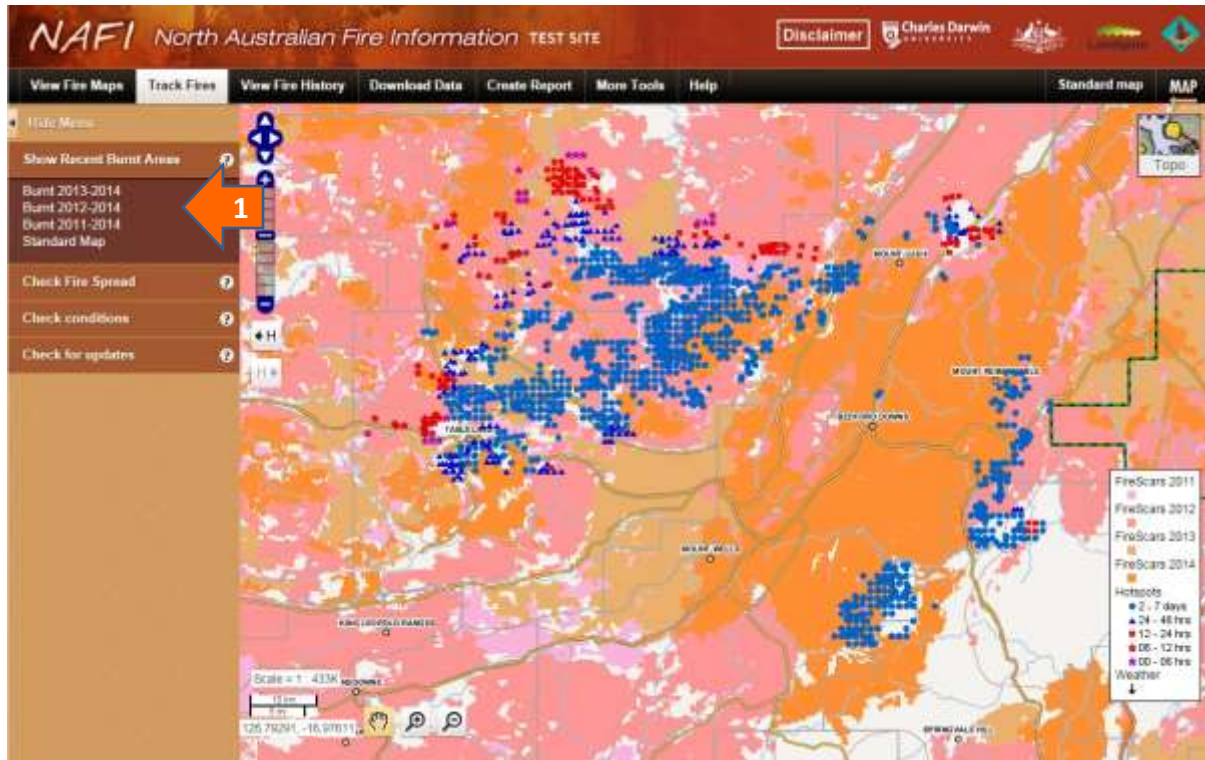
July-August cut-off

The exception is the cut-off date between July and August as this is important for Carbon Farming Initiative Savanna Burning projects. By selecting the appropriate images, the NAFI mappers ensure that their mapping identifies all July fire scars correctly and does not assign August scars to July.

Tracking Fires

Beyond locating fires, the NAFI site can also be used to get more information on the behaviour of an active fire. The tools for this are found in the **Track Fires** menu – click the tab to the right of the View Fire Maps tab. You should then see the left hand menu with the various tools for tracking fires.

Tracking fires: Show Recent Burnt Areas



1

By clicking on one of the layers in the **Show Recent Burnt Areas** menu you can display the most recent one to three years of fire scars, which in the far north can be a good guide to grassy fuel levels. In the map above the white and pale pink areas have not been burnt for three and two years respectively and may have more fuel available for fire. To restore the map of current year fire scars, click “Standard Map”. Using the satellite image background and the slider bar to fade the fire scars can also be useful.

Tracking fires: Check Fire Spread



This menu item has the *Get hotspot times* and *Animate hotspots (last 7 days)* tools useful for checking how rapidly and in what direction a fire is spreading as well as where it may have started.

Get hotspot times

The **Get hotspot times** tool displays in a table the times at which all hotspots in an area you select were detected by satellite. This table can be useful for finding out more about how a fire is spreading and where it may have started from. This tool can be used on recent hotspots as well as those from past months and years.

A screenshot of the NAFI (North Australia and Rangelands Fire Information) website interface. The top navigation bar includes 'View Fire Maps', 'Track Fires', 'View Fire History', 'Download Data', 'Create Report', 'More Tools', and 'Help'. The left sidebar has a 'Check Fire Spread' menu with 'Get hotspot times' circled in blue. A 'Search Results' window is open, displaying a table with 1101 results found. A yellow boundary is drawn on the map, and a small yellow circle is at the cursor tip. An orange arrow labeled '1' points to the yellow circle, another orange arrow labeled '2' points to the search results table, and a third orange arrow labeled '3' points to the 'Get hotspot times' menu item. A legend for 'FireScars 2016' is visible in the bottom right corner.

Date(EST)	Source	Sat.	Log Id
02/07/2016 11:45	Sentinel	Terra	1087458
02/07/2016 11:45	Sentinel	Terra	1087458
02/07/2016 12:05	Landgate	Terra	1087463
02/07/2016 12:05	Landgate	Terra	1087463
02/07/2016 12:05	Landgate	Terra	1087463
02/07/2016 12:05	Landgate	Terra	1087463
02/07/2016 12:05	Landgate	Terra	1087463
02/07/2016 12:05	Landgate	Terra	1087463
02/07/2016 12:05	Landgate	Terra	1087463
02/07/2016 12:05	Landgate	Terra	1087463
02/07/2016 12:05	Landgate	Terra	1087463

- 1 Clicking on the **Get hotspot times** tool (circled in blue) will produce a small yellow circle at the tip of your cursor – which allows your cursor to draw a boundary around a fire that you want to get hotspot times for.

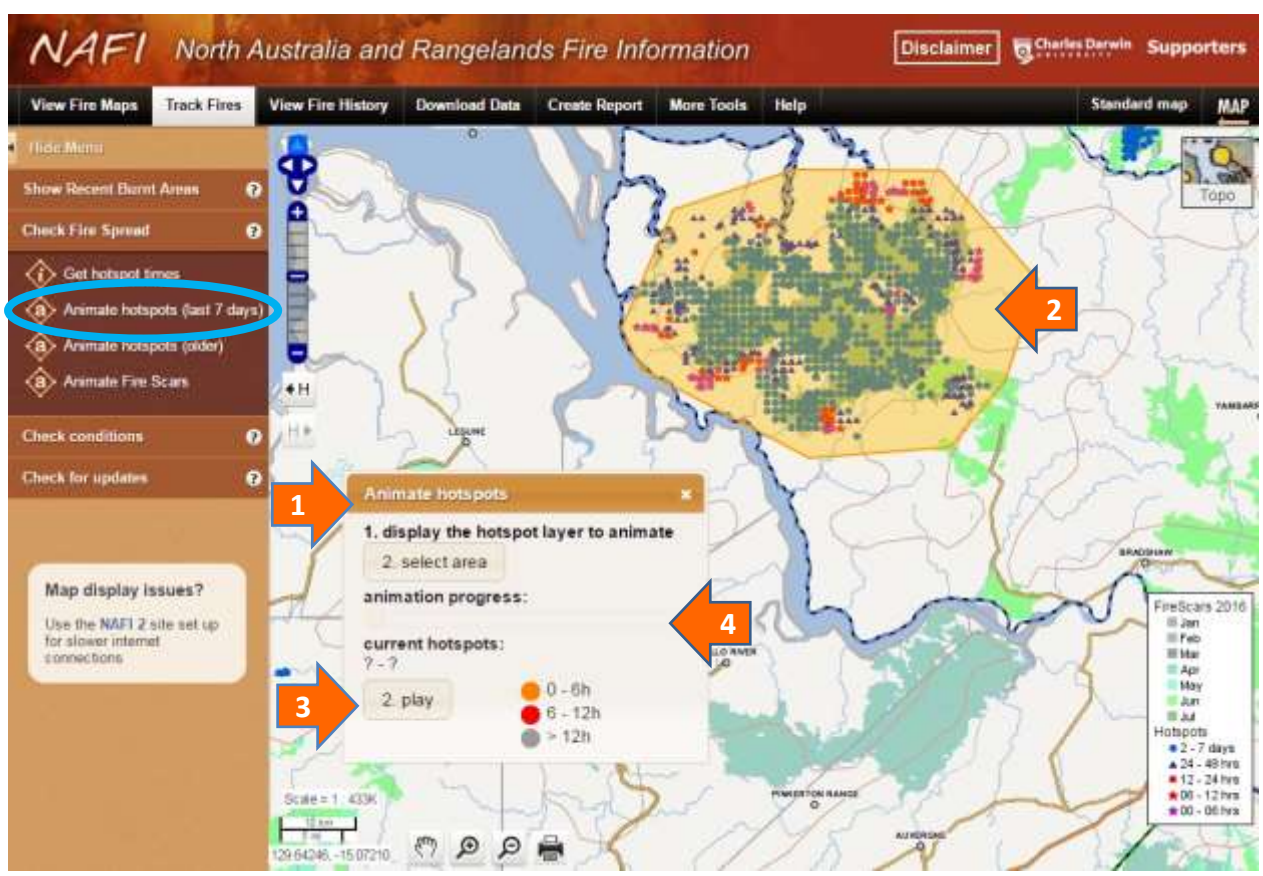
2 Double-clicking the completed boundary will highlight the area selected and bring up a list of all the hotspots within the area and the times at which they were detected by the satellites – as well as which satellite detected them, what organisation the data was sourced from and the Log Id (used by site administrators). You can drag the table to a convenient place on the screen with the cursor.

3 You can highlight details of a hotspot in the table and that hotspot will be highlighted in the map in yellow (circled in red). The table is ordered with the earliest hotspots at the top, so highlighting the topmost hotspots in the table can give you information on where the fire may have started.

! THE LOCATION OF THE EARLIEST DETECTED HOTSPOT MAY NOT BE WHERE THE FIRE STARTED. The actual early stages of a fire may have been too cool to be detected by satellites or may have occurred on days where detection was hampered by cloud cover.

Animate hotspots (last 7 days)

The **Animate hotspots (Last 7 days)** tool creates a mini-movie of the spread of a recent fire by animating the hotspots based on their time of detection. This can give an idea of how a fire is spreading, but care should be taken interpreting these animations given that the satellites may not have detected all hotspots in a fire. This tool is for hotspots up to a week old.



1

Clicking on the **Animate hotspots (Last 7 days)** tool (circled in blue) will bring up a panel at the bottom of the screen – you can drag this with the cursor if you need to position it next to your hotspots of interest.

The first step is a link that reminds you to display the appropriate hotspots to animate in the map window if you haven't already navigated there.

2

Next, click the “2. select area” button on the panel and you will be able to draw a boundary around the hotspots of interest. Double-click to highlight the area.

3

Then click the “3. play” button on the panel to start the animation of the hotspots in the highlighted area. This may take a little while as the “loading” symbol displays in the lower right of the map, but soon you should see the slider bar move across the panel as the hotspots are cycled through the colours orange (0-6 hours after detection), red (6-12 hours after detection) and grey (over 12 hours after detection).

4

After the animation has played you can grab the slider bar with the cursor and move the animation back in time to analyse the fire spread in more detail.

! THE ANIMATION MAY NOT PROVIDE A FULL VIEW OF FIRE SPREAD. Because the satellites may not have detected all the hotspots associated with a fire due to cloud cover or other conditions, the animations of fire spread should be interpreted with caution.

Tracking fires: Check Conditions



This menu allows you to check the cloud conditions as seen by the satellites that detect the fires, and to view recent lightning activity.

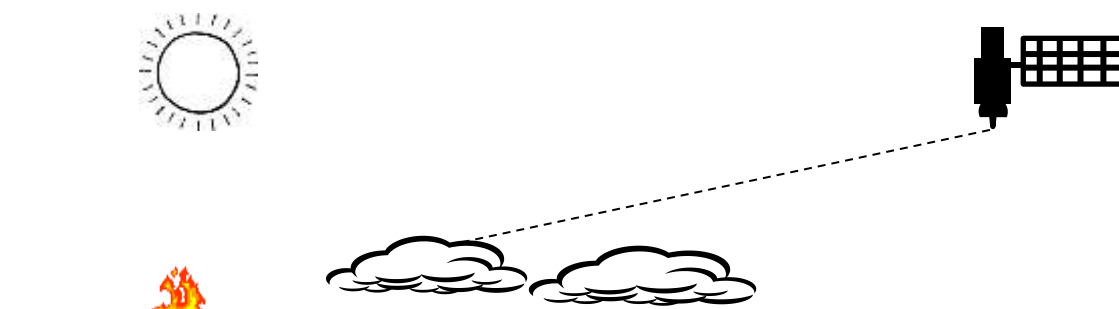
These tools can be useful when checking an active fire – to see if cloud cover might be limiting satellite detection, to verify hotspots are a fire by looking for smoke plumes, and to see if lightning strikes may have been involved in starting a fire.

Check Clouds

Clicking **Check Clouds** will open an image in a new tab or window that shows the view of the map area by the most recent Terra or Aqua satellite. The image may appear a bit blurry if you are zoomed in, but it will show the current cloud cover and the presence of smoke plumes. For example, the image below shows significant cloud cover in the satellite's view of a NAFI map area. In this case if you have a fire in the area arrowed, it will likely not be detected by the satellite due to cloud cover, and will not show up on NAFI.



The satellites are often passing low in the sky when they take a photo of a fire. In this case although it may be sunny overhead, it is the clouds towards the horizon that may be preventing detection of a fire. Using Check Clouds will provide the satellite's eye view to verify if this is happening.

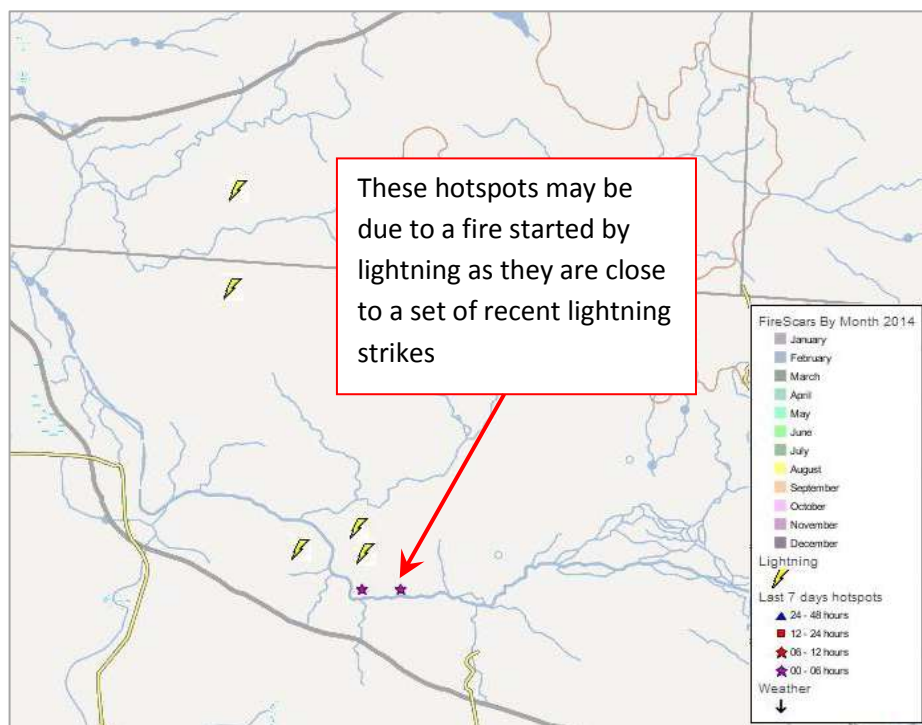


You can also use the **Check Clouds** tool to verify that a hotspot or group of hotspots on a NAFI map are actually fires. As shown below, many active fires will show up as smoke plumes –such images can also give a good guide to prevailing winds.



Show Lightning, Query Lightning

Selecting **Show Lightning** allows the display of satellite detected lightning strikes on your NAFI map. You will have to zoom in some way to see the lightning strikes displayed. Viewing lightning strikes can be useful in deciding if a fire may have been started by lightning.



Because of the potentially very large number of lightning strikes, the NAFI site only displays the last few days of lightning strike observations, but it can be useful to get a more accurate idea of the timing of a lightning strike to see if it corresponds to a fire. You can do this by selecting **Query Lightning**. You will then be able to select a group of displayed lightning strikes just as you can a group of hotspots (see above). After double-clicking to select the

lightning strike/strikes a table will be displayed that shows the time at which the lightning was detected.

! MANY DISPLAYED LIGHTNING STRIKES MAY NOT BE AT GROUND LEVEL. Because the lightning strikes are detected by satellites rather than by an on-ground detection system, many of the strikes detected in an area may be cloud-to-cloud strikes. So you may see a lot of strikes in your area, but not be aware of many strikes on the ground.

Other useful tools for tracking fires

Querying Fire Scars

If you want to find the dates that a particular fire scar was mapped between, you can query fire scars using the **More Tools** menu above the map. (fire scars are mapped by comparing a satellite image of an area with an image of the same area from an earlier date - see “More About Fire Scars” above).

NAFI North Australian Fire Information TEST SITE

Disclaimer Charles Darwin UNIVERSITY

View Fire Maps Track Fires View Fire History Download Data Create Report More Tools Help Standard map MAP

Hide Menu

Map Layers

- Weather
- Base
- Fire history 1K 97-10
- Fire history 250m 00-13
- Firescars 250m
- Hotspots

Save as standard map

query active layer 1

get hotspot times

Links & Information

SaveBAT

Google Earth, WMS

Report a problem

Map Legends

Search Results

1 results found

year	firescarid	month	startDate	endDate	region	sensor
2014	87	July	2014/06/30 - 2014/07/08	2014/06/30 - 2014/07/08	QLDN	TERRA

Scale = 1 : 433K

142.71070, -14.74896

FireScars 2014

- Jan
- Feb
- Mar
- Apr
- May
- Jun
- Jul
- Aug
- Sep
- Oct
- Nov
- Dec

Hotspots

- 2 - 7 days
- 24 - 48 hrs
- 12 - 24 hrs
- 06 - 12 hrs
- 00 - 06 hrs

Weather

1 Click on “query other active layers” and you should see a yellow point appear at end of your cursor (as shown circled in red) – next click on the fire scar of interest and you will see the mapping period and other information displayed. If not, check that the “firescars by month (Current year)” layer is selected as active in the Map Layers.

Viewing Fires on Google Earth

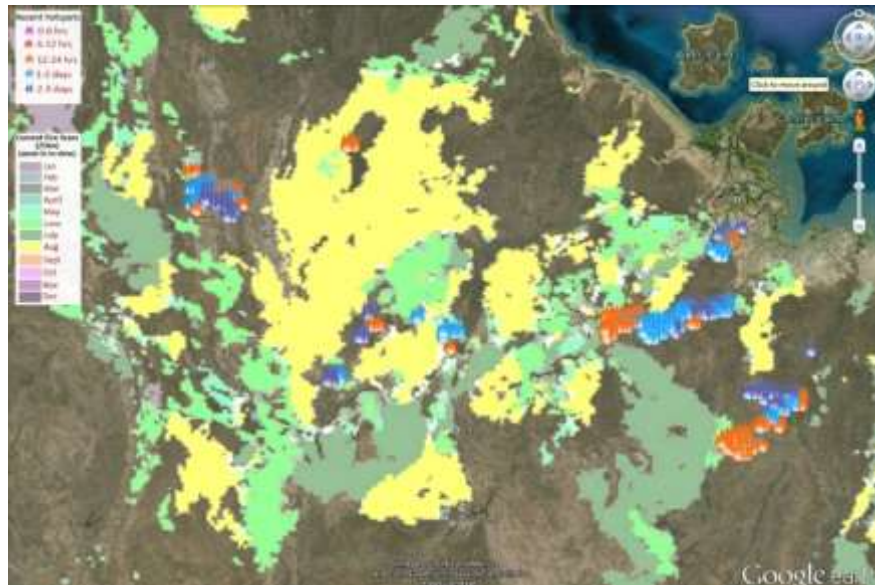
You can view the main fire maps from NAFI on Google Earth by downloading kml files (*Google Earth* files) from the site. You can either go to the **Download Data** Tab and then open the **Data as .kml file** menu (above) or go to the **More Tools** Tab and open the **Google Earth, WMS** menu (below):



There are a few kml files you can download that are useful for monitoring active fires:

- **Current fire data.** Clicking on this link will bring up a dialog box that allows you to download the kml file that displays the last 3 days of hotspots and the current year-to-date fire scars.

Clicking on the downloaded kml file should then display the recent hotspots and fire scars in Google Earth. As this is a network linked file, saving it to “My Places” on Google Earth means that the latest fire data will be sourced from NAFI each time you open Google Earth.

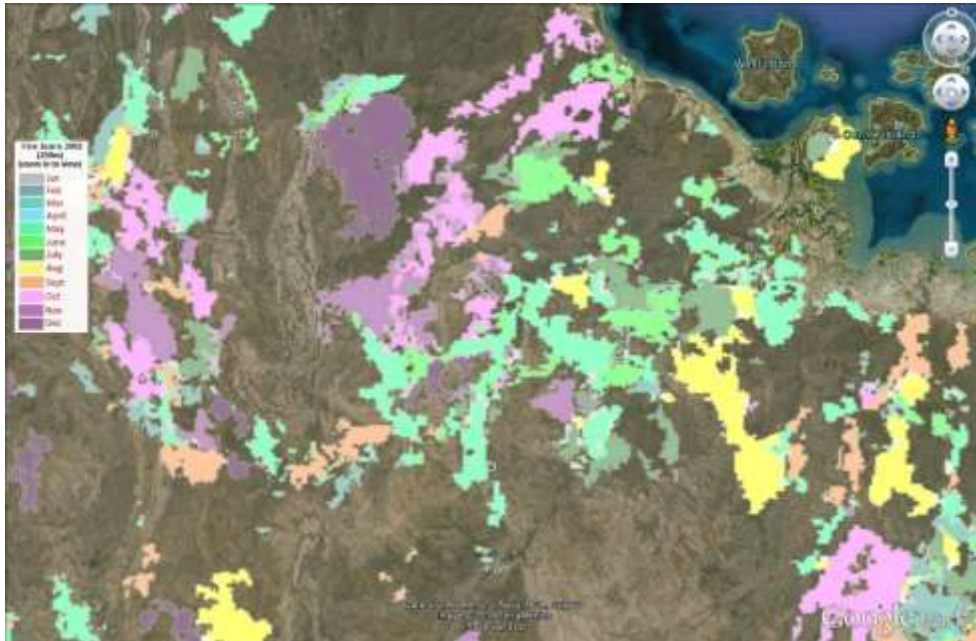


- **Past Year's fire scars.** Clicking on this link will bring up a dialog box that allows you to download the following kml files:
 - *Fire scars by year (from 2006).* Clicking on this link will download the kml file that displays the fire scars colour-coded by year for each year from 2006 to the current year. Follow the same procedure as above – and as for the current hotspots and fire scars, if you save it to “My Places” on Google Earth, it will update the data automatically (i.e. the current year's scars). This layer is useful for showing what country has been burnt in recent years, which can be used to estimate grassy fuel in many areas of the far north.



HINT: If you display more than one of these layers, the most recent layers need to be on top, as more recent burns will replace older burn histories. Depending on how you ticked the boxes, the initial layering in *Google Earth* may not be like this – so once you have all your layers displayed, move the map around until the scars refresh and they should display in the correct order.

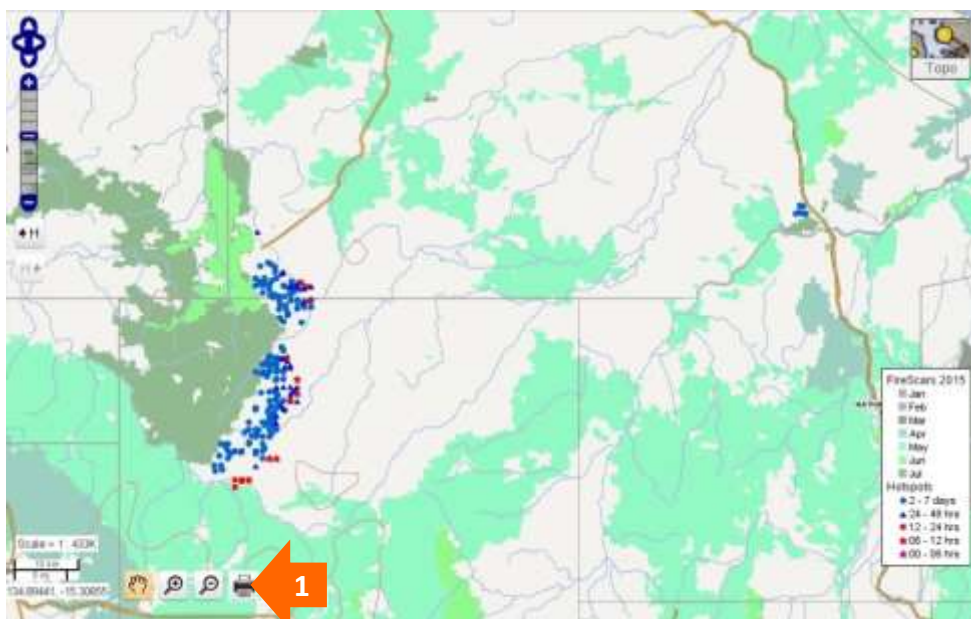
- *Fire scars by month (from 2000)*. Clicking on this link will download the kml file that displays the fire scars colour-coded by month (like the current fire scars) for each year from 2000 to the year before the current year. This layer is useful for showing the seasonal pattern of burning in earlier years.



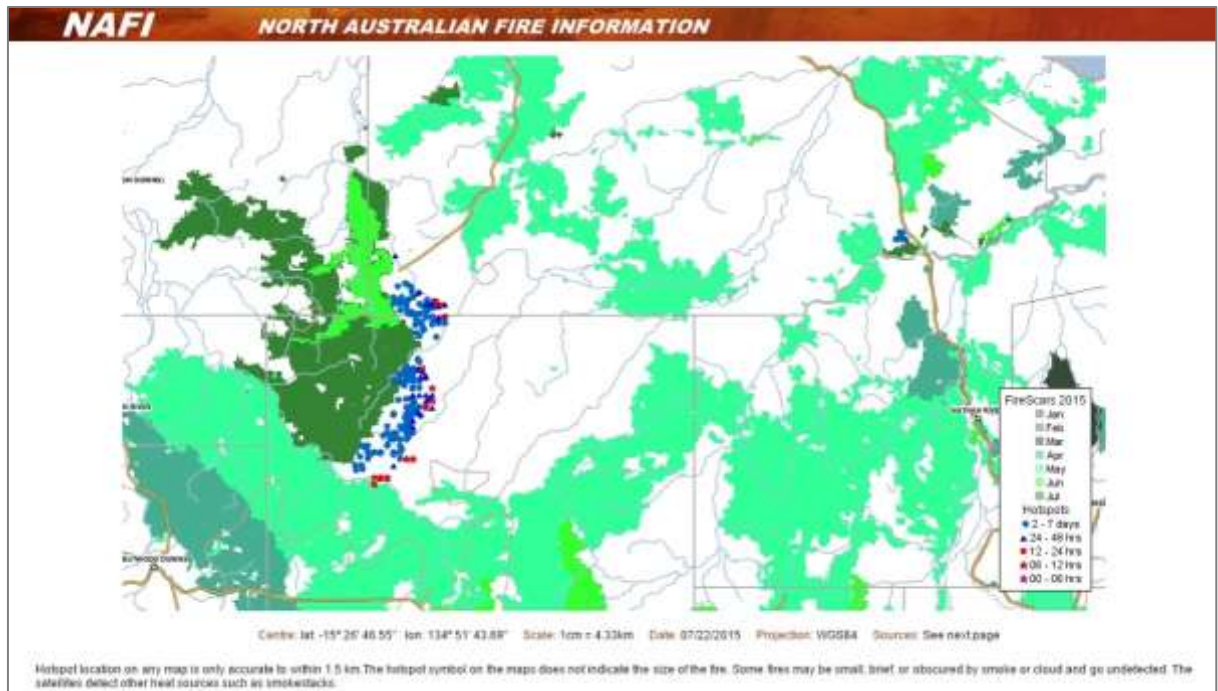
Printing and other useful tools

Printing a map

- 1 You can print out a displayed NAFI map by clicking on the print icon at the lower left of the map.



This will produce a printable map and a description of the data sources used in the map in a new tab or widow as shown below.



NAFI NORTH AUSTRALIAN FIRE INFORMATION

DATA SOURCES

250m Fire scars Fire scars by month are provided on a periodic basis by Cape York Peninsula Sustainable Futures in Queensland and the Darwin Centre for Bushfire Research in the NT and WA. These fire scars and the fire history (250m) layers derived from them are mapped from satellite imagery sourced from the Moderate Resolution Imaging Spectroradiometer (MODIS) on the NASA Earth Observing Satellites with a spatial resolution of 250m x 250m pixels (at Nadir).

1km Fire Histories The 1997-2010 fire history (1km) layers are based on fire scar data sourced from Landgate WA and are derived from satellite imagery sourced from the Advanced Very High Resolution Radiometer (AVHRR) on NOAA satellites with a spatial resolution of 1.1m x 1.1km pixels (at Nadir).

Hot spots Hot spot data is acquired from NOAA and MODIS satellite imagery by Landgate WA and Geoscience Australia. The imagery is automatically processed on acquisition to identify hot spots and then uploaded to the NAFI database at which time it becomes available on the NAFI web site.



Lightning Lightning data is acquired from <http://flash.eos.washington.edu/> by Landgate WA. The data is automatically uploaded to the NAFI database on a 24 hour basis at which time it becomes available on the NAFI web site.

Other data Digital cadastral boundaries and other related information such as Park boundaries and railway corridors have been provided by the respective state and territory government agencies.

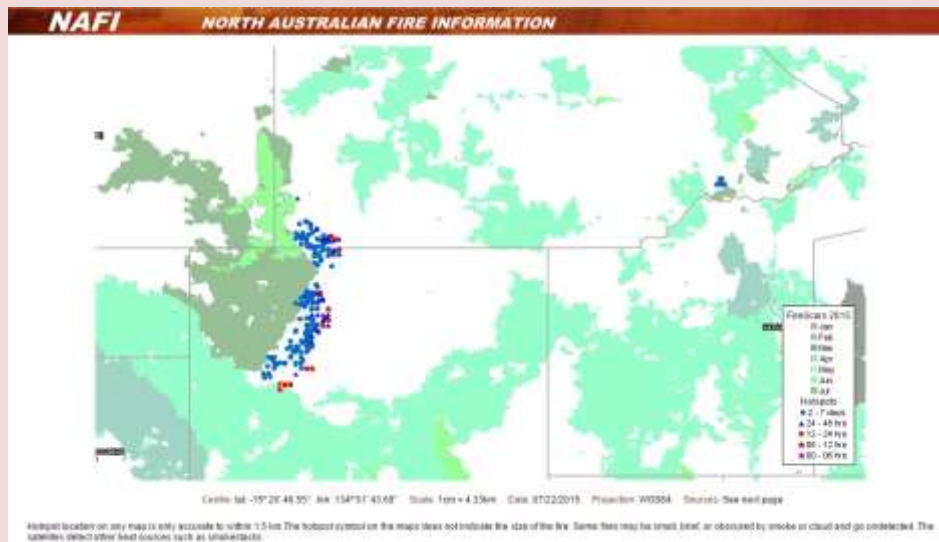
Topography Geoscience Australia produces a topographic map series of the entire country at various scales. The Global Map Australia 1M 2001, GEODATA TOPO 2.5M 2003, GEODATA TOPO 10M 2002 are used on this site to provide topographic context for the hot spots and fire scars at appropriate scales.

WAC (World Aeronautical Charts) © Airservices Australia 2003. For information purposes only. Not for operational or navigational use. All rights reserved. World Aeronautical Charts at 1M scale are used to provide context for hot spots and fire scars in the NAFI Map Viewer.

You can then print this page out.

- In the Chrome and Firefox browsers you should select the menu icon  in the top right of the page and then select the “Print” option.
- In recent versions of Internet Explorer such as IE 11 you will need to select the gear icon  and then select “Print”. With Internet Explorer it can help to use the “Page setup...” option under the “Print” option to set the page to landscape.
- In older versions of Internet Explorer such as IE 8 the “Print” option appears on its own in the top menu. Clicking the arrow to the right bring up the print preview and page setup options.

! YOU CAN'T PRINT OUT THE GOOGLE SATELLITE IMAGE BACKGROUND. Because you need a special licence to print out the Google Satellite image background used on NAFI, we can't print this from the maps. So if you print out a map with the satellite imagery as a background, the print will use a blank background map as shown below:



Measuring distances and areas

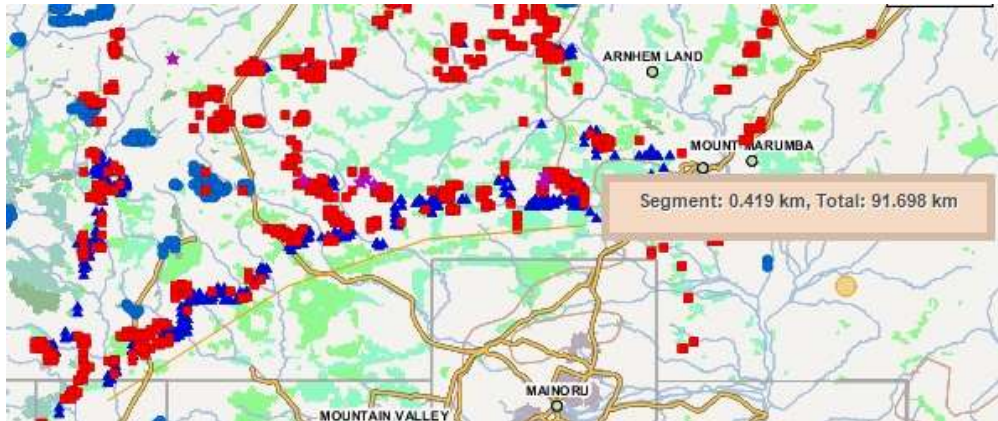
You can measure distances and areas on the NAFI maps by going to the **More Tools** tab and then the **Measure Distance & Area** menu.



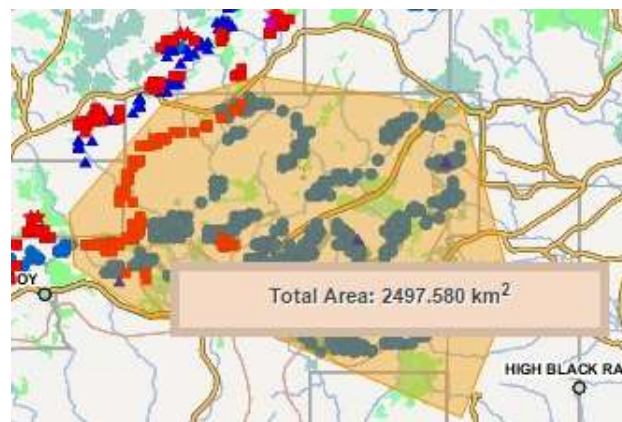
To measure a distance, click on the “Measure Distance/Reset” link and instructions will appear below. Simply draw the distance you want to measure with the cursor on the map. You can measure along roads, rivers or boundaries with several clicks of the cursor. Double-click to finish. This distance will be displayed next to the end-point (see below).

To reset for another measure – re-click the link. To exit the measure tool, click the pan navigation button.

To measure an area, click on the “Measure Area/Reset” link which works in a similar way – but will always measure the area enclosed by the line drawn with the cursor. As with the distance tool, the area is displayed on the map (see below).



Measuring distance



Measuring area

Hiding/displaying the map legend

You can hide or re-display the map Legend (the list of layer colours in the lower right of the display) by going to the **More Tools** tab and then the **Map Legends** menu, and clicking “Toggle Legend”.



You can also view the legend for the background maps used on the NAFI site (the symbols used for roads, railways, airfields, contours etc.). Click on **Legend for NAFI background maps**.