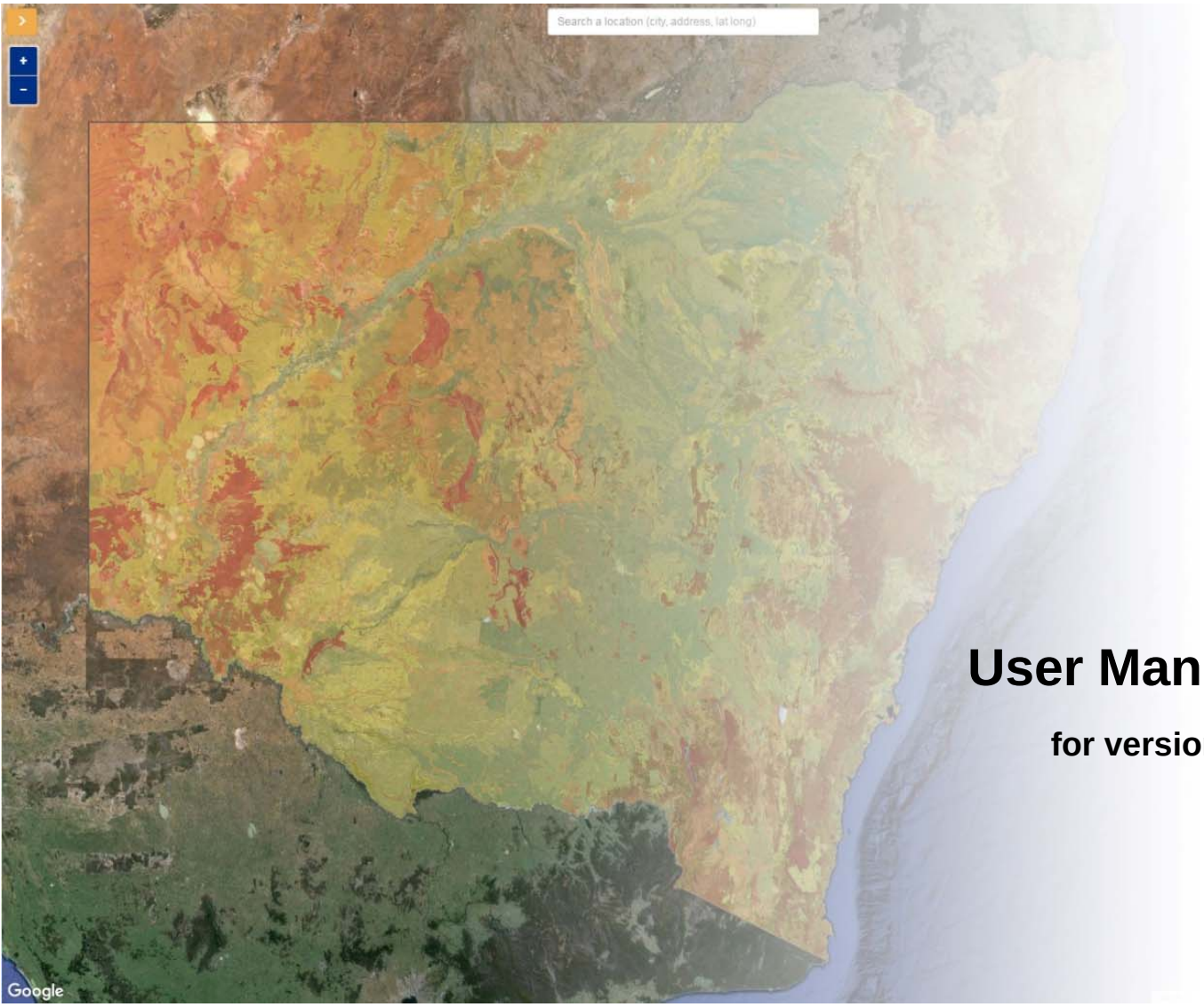
NSW GOVERNMENT | Office of Environment & Heritage

eSPADE



User Manual

for version 2.0

© Copyright State of NSW and Office of Environment and Heritage

With the exception of photographs, the State of NSW and Office of Environment and Heritage are pleased to allow this material to be reproduced in whole or in part for educational and non-commercial use, provided the meaning is unchanged and its source, publisher and authorship are acknowledged. Specific permission is required for the reproduction of photographs.

The Office of Environment and Heritage (OEH) has compiled this manual in good faith, exercising all due care and attention. No representation is made about the accuracy, completeness or suitability of the information in this publication for any particular purpose. OEH shall not be liable for any damage which may occur to any person or organisation taking action or not on the basis of this publication. Readers should seek appropriate advice when applying the information to their specific needs. This document may be subject to revision without notice and readers should ensure they are using the latest version.

Published by:
Office of Environment and Heritage NSW
59 Goulburn Street, Sydney NSW 2000
PO Box A290, Sydney South NSW 1232
Phone: (02) 9995 5000 (switchboard)
Phone: 131 555 (environment information and publications requests)
Phone: 1300 361 967 (national parks, climate change and energy efficiency information, and publications requests)
Fax: (02) 9995 5999
TTY users: phone 133 677, then ask for 131 555
Speak and listen users: phone 1300 555 727, then ask for 131 555
Email: info@environment.nsw.gov.au
Website: www.environment.nsw.gov.au

Report pollution and environmental incidents
Environment Line: 131 555 (NSW only) or **info@environment.nsw.gov.au**
See also www.environment.nsw.gov.au

OEH 2016/0451
December 2016

Preface

This document combines help and other supporting information for eSPADE version 2.0, providing you with a single source for background, helpful information and hints for use of eSPADE 2.0.

This is version 2.0.1 of this user manual.

Acknowledgements

This document was prepared by Humphrey Milford and Nicole Simons.

Our great thanks go to Chuong Tran (project manager/business analyst) and Frank Hong (application developer) for the creation of eSPADE, and to Fredrik Eriksson, Jonathan Nagy and Ariful Huq for their ongoing development and support of the system.

From the NSW Office of Environment and Heritage (OEH) our thanks go to Casey Murphy, Mark Young and Robin McAlpine for their technical input, and Brian Jenkins and Dr Greg Summerell for their support.

Funding for the development of this version of eSPADE was provided by the *National Partnership Agreement on Coal Seam Gas and Large Coal Mining Development* through the NSW Department of Primary Industries (DPI). In particular we thank Rebekah Gomez-Fort and John Friend from DPI for their involvement.

Contents

1. Introduction

The purpose of this document is to provide a user guide for the eSPADE 2.0 spatial viewer system.

2. Overview of eSPADE

2.1 What is eSPADE?

eSPADE is a Google Maps™ based information system that allows free, easy access to a wealth of soil and land information across NSW on both desktop and mobile devices. The data accessible through eSPADE is sourced mainly from the NSW Soil and Land Information System (SALIS).

2.2 What can I get with eSPADE?

You can access a wide variety of maps of landscape and soil features from across NSW, including the foundation soil profile dataset (over 70,000 individual soil observations) and the maps and descriptions from the Soil Landscape Mapping program. To get a quick overview of what soils mapping is available in your area of interest, use the **soil map index** available in the **Landscape layers** section.

2.3 What's in this version of eSPADE?

Version 2.0 of eSPADE introduces a range of new features including a single interface and common functions for desktop and mobile platforms, improved performance, and an expanded number of datasets accessible through a three-tiered menu system.

Also, as it is directly connected to the new NSW Soil and Land Information System (SALIS), eSPADE 2.0 provides access to the most up-to-date information on NSW's soil and land resources.

2.4 Who manages eSPADE?

The NSW Office of Environment and Heritage (OEH) is the custodian of SALIS, its datasets and its associated systems, including eSPADE. These systems are administered by OEH staff based in Parramatta. Their contact details are:

Mail: PO Box 644, Parramatta, NSW 2124

Email: **soils@environment.nsw.gov.au**

2.5 Feedback

We value your feedback!

If you have any questions or comments about any aspect of eSPADE or SALIS, please email us at **soils@environment.nsw.gov.au**.

3. System requirements

eSPADE is designed to operate on a wide range of fixed and mobile devices, ranging from desktop PCs and laptops to tablets and smartphones. However, older versions of Internet browsers will not support all eSPADE functions. For best performance, we recommend the following Web browsers:

- Mozilla® Firefox®, version 48 or higher
- Google® Chrome®, version 51 or higher

However, specific browsers may provide different levels of functionality depending on the platform and operating system you are using. For that reason, we strongly recommend that you keep your Web browser up-to-date.

4. Getting started

In this section we'll explore the various major components of eSPADE and how to use them.

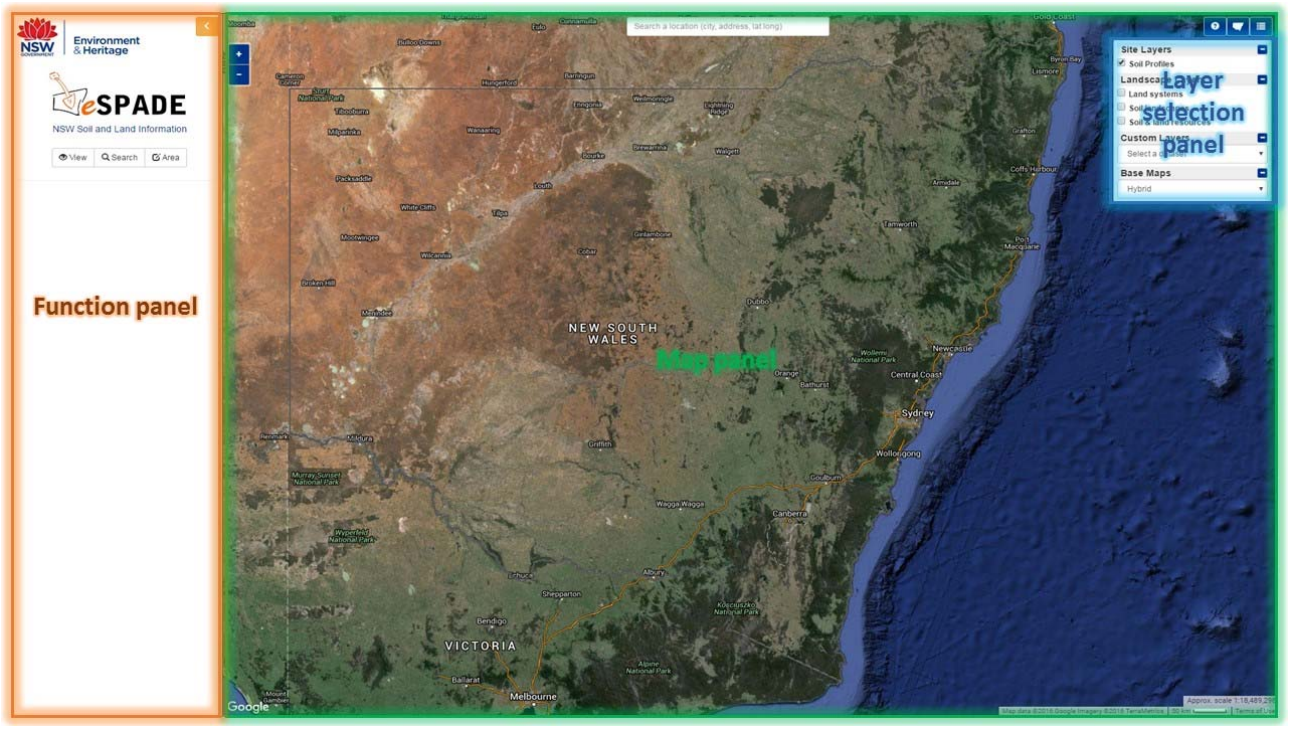


Figure 1 Major components of the eSPADE interface

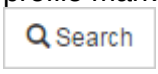
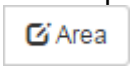
4.1 Function panel

The **Function panel** is located on the left side and can be hidden when not in use. This panel provides access to the various view, search, and area selection functions.

If the panel is not visible, then press the  button located in the top left corner of the map to open the panel.

To minimise the panel press the  button located in the top right corner of the panel.

There are three tabs available from the **Functions panel**:

1.  **View:** the functions on this tab allow you to select colour schemes to apply to soil profile markers.
2.  **Search:** the functions on this tab allow the querying of soil profiles and landscapes.
3.  **Area:** the functions on this tab are used to define an area on the map by either drawing a shape or loading a shape from a KML file. The defined area can then be used as part of the search criteria to find soil profiles and landscapes (via the **Search** tab).

4.2 Map controls

Several controls are located directly on the map that provide access to map-based functions. These are used to navigate around the map and specify what map layers you wish to display.

4.2.1 Zoom

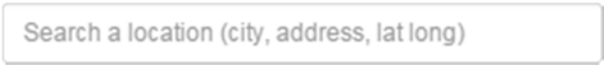
These paired controls, located in the top-left of the map screen, are used to increase or decrease the zoom level of the map. The zoom level can be increased by pressing the  button and decreased by pressing the  button.

If your mouse has a scroll wheel the zoom level may also be increased or decreased by scrolling the wheel forwards or backwards with the eSPADE browser page active.

4.2.2 Pan

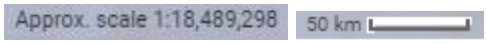
To pan the map, hold down the left mouse button on the map, move the mouse in the desired direction, and then release the left mouse button. On a touch-screen device, hold your finger on the screen and drag it in the desired direction.

4.2.3 Location search



You can type part or all of a location, such as a town, locality or street address, into this box, which is located in the top centre of the map panel. eSPADE will return a matching list of locations from Google's database in a drop-down list. Once you have selected the desired location, eSPADE will pan and zoom to display that location.

4.2.4 Map scale indicators



There are two map scale indicators located in the bottom right of the map. The first is an approximate scale ratio. The second is a distance scale in kilometres.

4.2.5 Show layer selection options

This icon is located in the top right of the map. Selecting this icon will display the **Layer selection panel**, which contains options for the various eSPADE layers that may be toggled on or off.

4.2.6 Reset to original extents

This icon is located in the top right of the map. Selecting this icon centres the map on the state of NSW and adjusts the zoom so the entire state can be seen on the map.

4.2.7 Info, help and feedback

This icon is located in the top right of the map. Selecting this icon opens up the manual you're reading now.

4.3 Layer selection panel

This panel allows you to switch on and off the various layers visible in the map panel. ***Figure 2*** (below) shows an example.

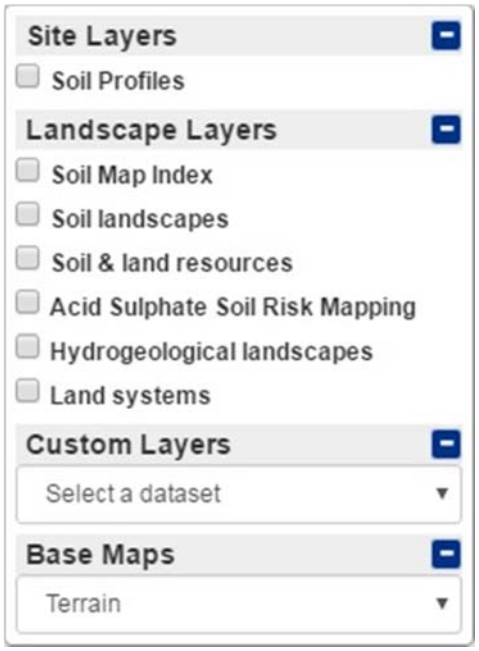


Figure 2 Layer selection panel

Layers are applied to the map from top to bottom in order of selection – except for the base map, which is always at the bottom.

Within this menu, you can use the **Expand** or **Contract** buttons to expand and contract the various sections. The default state is to have all items expanded.

4.3.1 Site layers

Site layers contain site-based point data. They are accessed directly from the SALIS database, and provide access to related data such as detailed reports. Currently the **soil profiles** layer is the sole site layer available through eSPADE. This layer can be classified using a number of key soil attributes via the **soil profile colour scheme** – see ***Section 7*** for more information.

To display the **soil profiles** layer, click or tap on its tick box ☐ so that it looks like this ☑. The layer will then be displayed in the map panel.

4.3.2 Landscape layers

Landscape layers contain outline map polygons linked to detailed reports. A number of layers are available through eSPADE – see ***Section 6*** for more information.

To display a **landscape layer**, click or tap on its tick box ☐ so that it looks like this ☑. The layer will then be displayed in the map panel.

ⓘ More than one landscape layer may be displayed at any one time.

You can use the **soil map index** available in the **Landscape layers** section to quickly determine which parts of which **landscape layer**(**s**) cover your area of interest.

4.3.3 Custom layers

Custom layers are image-based layers of specific soil and land attributes. Some are derived from landscape layers, whilst others are stand-alone.

To make layers easier to find, they are categorised into a hierarchical structure of **datasets** and **subsets**. You can think of these as 'folders' within which groups of related map layers are stored.

Only one custom layer may be displayed at any one time.

Custom layers are not searchable.

4.3.4 Base map

The base map underpins all other map layers in eSPADE. Only one base layer may be applied at any one time. To change the base map, see **Section 4.1**.

5. Basic functions

In this section we'll explore some basic functions of eSPADE, including how to display the various kinds of map layers.

5.1 Changing the base map

1. Left-click or tap on the  **Show layer selection** icon. The **Show layer selection** panel is displayed.
2. Select the **Base maps** drop-down list box.
3. In the drop-down list, select the base layer you wish to be displayed on the map.
4. The layer is displayed in the main map panel.

5.2 Displaying a site or landscape layer

See ***Section 6*** for more information on what layers are available.

1. Left-click or tap on the  **Show layer selection** icon. The **Show layer selection** panel is displayed.
2. In the **Site layers** or **Landscape ayers** section, click or tap on the tick box ☐ for the desired layer so that it looks like this ☑.
3. The selected layer is displayed in the main map panel, along with the legend and a link to the layer's metadata.
4. As the mouse cursor hovers over the map, an indicator below the legend displays the value mapped underneath the cursor (except for the **Soil profiles** layer).

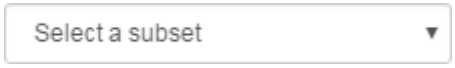
Not all layers are visible at all scales or in all areas of NSW.

You can use the **soil map index** available in the **Landscape layers** section to quickly determine which parts of which **landscape layer**(**s**) cover your area of interest.

5.3 Displaying a custom layer

1. Left-click or tap on the  **Show layer selection** icon. The **Show layer selection** panel is displayed.
2. In the **Custom layer** area, click or tap to select the 

Select a dataset drop-down list box.
3. In the drop-down list that appears, select the dataset containing the layer you wish to display.

   For some datasets, a 

Select a subset drop-down list box is displayed. Click or tap to select the subset containing the layer you wish to display from this list.

4. A 

Select a layer drop-down list box is displayed. In the drop-down list, click or tap to select the custom layer you wish to be displayed on the map.
5. The layer is displayed, along with the legend and a link to the layer's metadata.
6. As the mouse cursor hovers over the map, an indicator below the legend displays the value mapped underneath the cursor.
7. To switch off a custom layer, select the **Select a dataset** item in the 

Select a dataset drop-down list box.

If the message No data at this zoom level is displayed below the legend, zoom out until the map appears.

If the custom layer selection drop-down lists do not appear, or do not function correctly, you should upgrade your Web browser to the latest version. Alternatively, use another Web browser that provides up-to-date support for JavaScript.

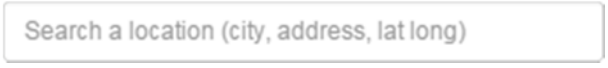
5.4 Changing custom layer transparency

Click-drag or tap-drag to move the **transparency slider** to the left (to increase layer transparency) or the right (to decrease layer transparency).

The **transparency slider** only applies to custom layers.

6. Working with soil profiles

6.1 Viewing individual soil profiles

1. Locate your area of interest, either by using the  **Zoom** controls or by using the 

Location search field.
2. Left-click or tap on the  **Show layer selection** icon. The **Show layer selection** panel is displayed.

3. If the tick box next to the **Soil Profiles** item is unchecked (like this ☐), click or tap (until the tick box is like this ☑) to display the **Soil Profiles** layer. **Soil profiles** appear as circular white markers like this ○, whilst **stations** (monitoring sites intended for repeated observation over time) are displayed as triangular white markers like this △.
4. To select a soil profile colour scheme, in the **View** tab of the **Function panel**, use the **Select soil profile colour scheme** drop-down list box to select the desired colour scheme. The soil profile points in the main map will now be coloured according to the criteria specified in the colour scheme, which are displayed in the **View** tab.
5. Left-click or tap on the marker of the soil profile you wish to interrogate. A pop-up window appears. ***Figure 2*** below shows an example.

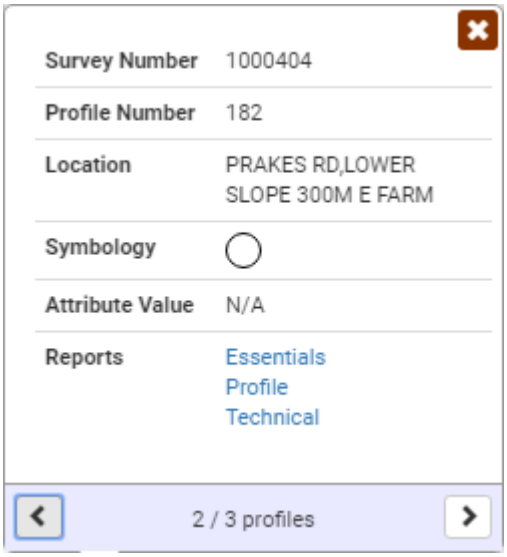


Figure 3 Profile pop-up

6. If multiple soil profiles are located closely together, you can use the < **left** and > **right** record navigation buttons to cycle through the soil profiles at/near the selected location. The number of profiles is listed at the bottom of the pop-up window (see ***Figure 3*** above).
7. Once you have identified the soil profile of interest, left-click or tap on the Essentials, Profile or Technical link in the **Reports** section of the pop-up to view that report for the selected soil profile.

ⓘ You may need to zoom in to display the **Soil Profiles** layer, as it is not displayed at higher scales due to the number of points involved.

6.2 Searching soil profiles by key attributes

In this section you'll find out how to find soil profiles using key attributes such as survey number, station number, soil profile number, soil test group and SALIS contributor number.

6.2.1 Search fields

Survey No / Name

This field allows you to enter part or all of a survey number or name by which to search. You can think of a **survey** as a folder or container in which one or more profiles are stored. These profiles are related, usually through being collected in the same area for the same purpose or project by the same person or organisation.

Each survey is uniquely identified by its number (typically seven digits) and its name.

Profile Name (contains)

Each profile has its own name, which describes its location.

Profile No

Each profile has its own number, which is unique within its parent **survey** or **station**. If you are searching for a particular profile number you can enter that number in this field to narrow down your search.

Profile Id

Each profile record has its own unique number, which is system-generated by SALIS upon its creation. If you know part or all of the identifying number of a particular profile you can enter it here, and eSPADE will return a list of matching profiles from which you can select a profile record.

Station No

In addition to its association with a survey, each profile may be associated with a **station**. A station is a location at which one or more profiles are described over a period of time for the purpose of monitoring land and soil change. If you are searching for a particular station number you can enter that number in this field to narrow down your search.

Sample Test Group

This field allows you to search for profiles with particular kinds of soil test results recorded for them. Select an item from the drop-down list and eSPADE will return only profiles that have results recorded within the selected class. If, for example, you wished to search for profiles with pH laboratory test results recorded for them you would select the “pH [R & H ch. 4]” item from the list.

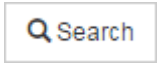
Contributor Number (Described By)

Each person who has contributed profile information to SALIS has their own unique four-digit identifying number. If you know the number of the person who collected the profile information you are seeking you can enter that number into this field.

Use area select as search boundary

If you have already defined a search area in the **Area** tab (see ***Section 5.3***), you can tick this box (like this ☑) and carry out your search only within that area.

6.2.2 Search procedure

1. In the **Function** panel, select the 

Search tab.
2. Enter your search criteria into one or more of the available fields. eSPADE performs an additive (“and”) search, combining the criteria you enter to narrow down the search results.

   You can enter part of a search word into the **Survey No / Name** and **Profile Name (contains)** fields and eSPADE will return a list of matching items from which you can select one. For example, we can enter “well” in the **Survey No / Name** field and select the "[1001004] CROOKWELL RD REALIGNMENT" item from the drop-down list that appears.

3. Left-click or tap on the 

Submit button to execute the search. The results will appear in the **Search Results** table immediately below. See ***Section 5.4*** for information about the **Search Results** table.

4. When you have finished with your search, you can left-click or tap on the Reset **Reset** button to clear the search criteria and search results.

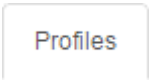
6.3 Searching soil profiles by area

6.3.1 Selecting soil profiles using a circle

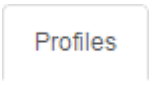
1. In the **Function** panel, select the Area **Area** tab.
2. In the Area **Area** tab, select the **Selection shape type** drop-down list box.
3. Select the **Circle** item. This will allow you to define a circular area on the map by placing first the centre-point and then a point on the circle's circumference.
4. Left-click or tap on the **Draw** button.
5. Left-click or tap on a point on the main map panel to set the centre-point of the circle, then move the pointer and left-click or tap again to set the circumference of the circle.
6. Select the Search **Search** tab.
7. Select the Profiles **Profiles** tab.
8. Ensure that the **Use area select as search boundary** tick box is checked (like this ☑).
9. Left-click or tap on the Submit **Submit** button to return a list of all soil profiles within the area you have selected.
10. You can use the search fields in the Profiles **Profiles** tab to further refine your search.
11. Press the Reset **Reset** button to clear the search criteria and search results.
12. In the Area **Area** tab, press the Clear **Clear** button to clear the circular shape drawn on the map.

6.3.2 Selecting soil profiles using an irregular polygon

1. In the Area **Area** tab, select the **Selection shape type** drop-down list box.
2. Select the **Polygon** item. This will allow you to draw an irregular shape on the map.
3. Left-click or tap on the **Draw** button.
4. Left-click or tap on a point on the main map panel to set the starting point of the polygon, then move the pointer and left-click or tap again to set the next point. Continue placing points until you have defined the shape of your polygon - the last point should be placed on the same spot as the first.
5. Select the Search **Search** tab.

6. Select the 

Profiles tab.
7. Ensure that the **Use area select as search boundary** tick box is checked (like this ☑).
8. Left-click or tap on the 

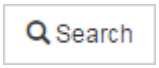
Submit button to return a list of all soil profiles within the area you have selected.
9. You can use the search fields in the 

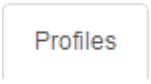
Profiles tab to further refine your search.
10. Press the 

Reset button to clear the search criteria and search results.
11. In the **Area** tab, press the 

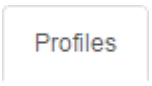
Clear button to clear the irregular polygon drawn on the map.

6.3.3 Selecting soil profiles using a rectangle

1. In the **Area** tab, select the **Selection shape type** drop-down list box.
2. Select the **Rectangle** item. This will allow you to draw a rectangular shape on the map by defining the location of two corners of the rectangle.
3. Left-click or tap on the  **Draw** button.
4. Left-click or tap on a point on the main map panel to set the first corner of the rectangle, then move the pointer and left-click or tap again to set the location of the other corner.
5. Select the 

Search tab.
6. Select the 

Profiles tab.
7. Ensure that the **Use area select as search boundary** tick box is checked (like this ☑).
8. Left-click or tap on the 

Submit button to return a list of all soil profiles within the area you have selected.
9. You can use the search fields in the 

Profiles tab to further refine your search.
10. Press the 

Reset button to clear the search criteria and search results.
11. In the **Area** tab, press the 

Clear button to clear the rectangular shape drawn on the map.

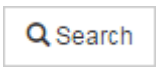
6.3.4 Selecting soil profiles using a pre-defined shape in KML

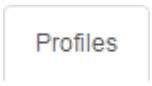
If you have the spatial definition of a search area, typically generated using Geographic Information System (GIS) software, you can apply that definition in eSPADE as a searchable area. You will need to provide the search area definition in **Keyhole Markup Language** (**KML**) format.

1. In the 

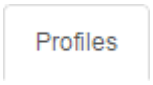
Area tab, select the  **Upload KML file** button.

2. In the **Upload KML** window that appears, paste the entire KML code for your defined area into the **KML Content** field.
3. Left-click or tap on the 

Submit button. The KML shape will now be displayed in the main map panel.
4. Select the 

Search tab.
5. Select the 

Profiles tab.
6. Ensure that the **Use area select as search boundary** tick box is checked (like this ☑).
7. Left-click or tap on the 

Submit button to return a list of all soil profiles within the area you have selected.
8. You can use the search fields in the 

Profiles tab to further refine your search.
9. Press the 

Reset button to clear the search criteria and search results.
10. In the **Area** tab, press the 

Clear button to clear the KML shape drawn on the map.

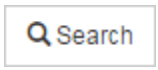
6.4 Search Results

The **Search Results** table lists the profiles (if any) returned by your search. The profiles are listed by profile number in ascending order.

If there are more than 10 profiles returned, the table is divided into two or more pages. These are accessible by left-clicking or tapping on the page numbers listed (like this: 1 2 3 (etc.)) below the results table. You can also use the < and > links to move to the next or previous page.

To zoom and centre the map on a soil profile, left-click or tap on its  **Go to profile** button. eSPADE zooms and centres on that profile, highlights it in the map view and opens its pop-up window.

6.5 Generating reports for multiple soil profiles

1. Use the controls in the 

Search and/or 

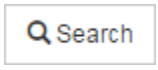
Area tabs to retrieve the profile(s) you wish to export.
2. Left-click or tap on the 

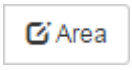
Bulk action button.
3. In the pop-up menu that appears, left-click or tap on the **Generate soil essentials report** to produce **Soil Essentials** reports for all of the profiles on the active page of the **Search Results**.
4. Left-click or tap on the **Generate soil profile report** to produce **Soil Profile** reports for all of the profiles on the active page of the **Search Results**.
5. Left-click or tap on the **Generate soil technical report** to produce **Soil Technical** reports for all of the profiles on the active page of the **Search Results**.

If your search returns more than ten profiles then the **Bulk action** will only generate reports for the active page of the **Search Results**, i.e. only 10 profiles at a time.

6.6 Export soil profile locations to KML

You can export the basic identifying attributes and spatial locations of the soil profiles returned by a search as **KML** code for use in another spatial viewer (e.g., Google Earth™) or in GIS software such as ESRI ArcGIS®.

1. Use the controls in the 

Search and/or 

Area tabs to retrieve the profile(s) you wish to export.
2. Left-click or tap on the 

Submit button.
3. Left-click or tap on the 

Bulk action button.
4. In the pop-up list that appears, left-click or tap on the **Export to KML** item. A KML file containing the identifiers and locations of the profiles on the active page of the **Search Results** is generated.

7. Working with landscape layers

eSPADE allows you to access a large number of land and soil map datasets from various areas in NSW. These are grouped under the general heading of **Landscapes**. This section of the eSPADE help guide describes the various tasks you can perform using these soil map layers.

Most of the layers are searchable using the tools in eSPADE. **Reports** detailing the soil and landscape characteristics of individual map units, and **Custom layers** providing maps of specific soil and landscape attributes, limitations and hazards, are available for some of these layers. The table below shows which. For more information about these layers, see **Sections 8** and **9** and the **Soil data** and **Soil maps** pages on the OEH website.

Layer name	Example identifier	Searchable	Reports available	Custom layers available
Soil landscapes	9030bt	✓	✓	✓
Soil and land resources	bty	✓	✓	✓
Acid sulphate soil risk mapping	Ap2	×	×	✓
Hydrogeological landscapes	HGL_CW_4	✓	✓	✓
Land systems	LSBr	✓	✓	×

7.1 Using the Soil map index layer

The **Soil map index** layer provides an up-to-date picture of the soil map coverage of NSW. Each map dataset is displayed in its own colour.

A number of areas in NSW are covered by more than one soil map dataset, so there are further colour categories for the different combinations of soil map datasets. These are listed in the legend.

For more information about each mapped area, left-click or tap on it. A separate Web page will open to display details of the soil map coverage you've selected.

7.2 Viewing individual landscapes

1. Left-click or tap on the  **Layer selection** button. The **Layer selection** panel is displayed.
2. Zoom into a section of the map to see your selected soil map unit layer more clearly. You may wish to uncheck the **Soil profiles** check box to remove the **Soil profiles** layer from the map display, so that the soil map units may be seen more clearly.
3. In the **Landscape layers** section, left-click or tap on the tick box of the soil map unit layer you wish to display.
4. Left-click or tap on one of the polygons in the soil map layer. For all layers except **Acid Sulphate Soil risk mapping** a pop-up box will appear, displaying basic details of the unit you have selected. ***Figure 4*** below shows an example.

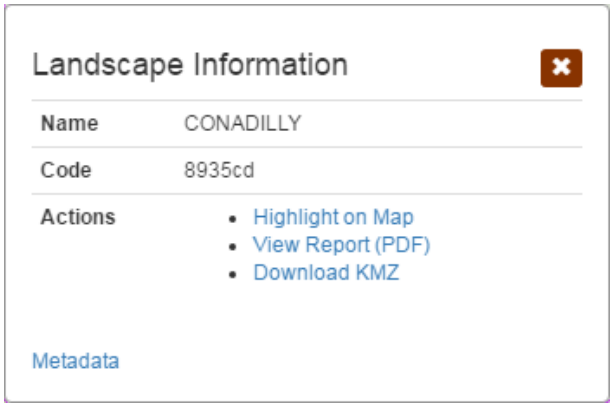


Figure 4 Landscape pop-up

5. To display the full extent of the soil map unit (where available), left-click or tap on the **Highlight on Map** link in the pop-up box.
6. If a report is available for the soil map unit you've selected, a link will be displayed in the pop-up box. Click on that link to display the report.
7. You can download a spatial data file of the selected soil map unit by left-clicking or tapping on the **Download KMZ** link. **Keyhole Markup language, Zipped** (**KMZ**) files can be used in other spatial viewers such as Google Earth or in Geographic Information System (GIS) software such as ESRI ArcGIS.
8. To remove the highlight, left-click or tap on the  **Close** button to close the pop-up box.

7.3 Searching landscapes by key attributes

7.3.1 Search fields

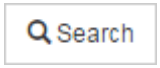
Landscape Name

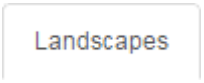
This field allows you to enter part or all of a landscape name by which to search. You can enter part of a search word and eSPADE will return a list of matching items from which you can select one.

Landscape Code

This field allows you to enter part or all of a landscape code by which to search. You can enter part of a code and eSPADE will return a list of matching items from which you can select one. For example, entering “8934” will return a list of all soil map units from the soil landscape mapping of the Curlewis 1:100,000 map sheet.

7.3.2 Search procedure

1. In the **Function** panel, select the 

Search tab.
2. Select the 

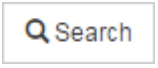
Landscapes tab.
3. Enter part/all of a landscape name into the **Landscape Name** field, or part/all of a landscape code into the **Landscape Code** field.
4. A list of soil map units matching the text you've entered in the **Landscape Name** and/or **Landscape Code** will appear. You may continue entering more text to refine the list, or select an item from the list to autocomplete the text box.
5. Left-click or tap on the 

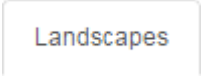
Submit button to execute the search. The results will appear in the **Search Results** table immediately below.

7.4 Searching landscapes by area

7.4.1 Selecting soil map units using a circle

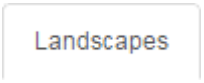
1. In the **Function** panel, select the 

Area tab.
2. Select the **Selection shape type** drop-down list box.
3. Select the **Circle** item. This will allow you to define a circular area on the map by placing first the centre-point and then a point on the circle's circumference.
4. Left-click or tap on the  **Draw** button.
5. Left-click or tap on a point on the main map panel to set the centre-point of the circle, then move the pointer and left-click or tap again to set the circumference of the circle.
6. Select the 

Search tab.
7. Select the 

Landscapes tab.
8. Ensure that the **Use area select as search boundary** tick box is checked (like this ☑).
9. Left-click or tap on the 

Submit button to return a list of all soil map units within the area you have selected.

10. You can use the search fields in the 

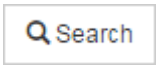
Landscapes tab to further refine your search.
11. Press the 

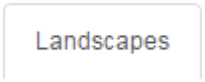
Reset button to clear the search criteria and search results.
12. In the **Area** tab, press the 

Clear button to clear the circular shape drawn on the map.

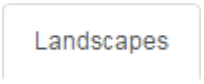
7.4.2 Selecting soil map units using an irregular polygon

1. In the 

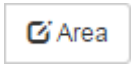
Area tab, select the **Selection shape type** drop-down list box.
2. Select the **Polygon** item. This will allow you to draw an irregular shape on the map.
3. Left-click or tap on the  **Draw** button.
4. Left-click or tap on a point on the main map panel to set the starting point of the polygon, then move the pointer and left-click or tap again to set the next point. Continue placing points until you have defined the shape of your polygon - the last point should be placed on the same spot as the first.
5. Select the 

Search tab.
6. Select the 

Landscapes tab.
7. Ensure that the **Use area select as search boundary** tick box is checked (like this ☑).
8. Left-click or tap on the 

Submit button to return a list of all soil map units within the area you have selected.
9. You can use the search fields in the 

Landscapes tab to further refine your search.
10. Press the 

Reset button to clear the search criteria and search results.
11. In the 

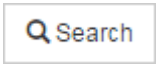
Area tab, press the 

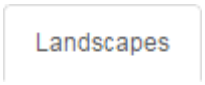
Clear button to clear the irregular polygon drawn on the map.

7.4.3 Selecting soil map units using a rectangle

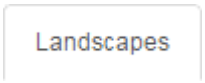
1. In the 

Area tab, select the **Selection shape type** drop-down list box.
2. Select the **Rectangle** item. This will allow you to draw a rectangular shape on the map by defining the location of two corners of the rectangle.
3. Left-click or tap on the  **Draw** button.
4. Left-click or tap on a point on the main map panel to set the first corner of the rectangle, then move the pointer and left-click or tap again to set the location of the other corner.

5. Select the 

Search tab.
6. Select the 

Landscapes tab.
7. Ensure that the **Use area select as search boundary** tick box is checked (like this ☑).
8. Left-click or tap on the 

Submit button to return a list of all soil landscapes and other map units within the area you have selected.
9. You can use the search fields in the 

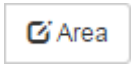
Landscapes tab to further refine your search.
10. Press the 

Reset button to clear the search criteria and search results.
11. In the **Area** tab, press the 

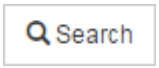
Clear button to clear the rectangular shape drawn on the map.

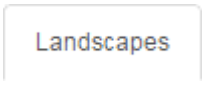
7.4.4 Selecting soil map units using a pre-defined shape in KML

If you have the spatial definition of a search area, typically generated using Geographic Information System (GIS) software, you can apply that definition in eSPADE as a searchable area. You will need to provide the search area definition in **Keyhole Markup Language** (**KML**) format.

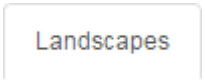
1. In the 

Area tab, select the  **Upload KML file** button.
2. In the **Upload KML** window that appears, paste the entire KML code for your defined area into the **KML Content** field.
3. Left-click or tap on the 

Submit button. The KML shape will now be displayed in the main map panel.
4. Select the 

Search tab.
5. Select the 

Landscapes tab.
6. Ensure that the **Use area select as search boundary** tick box is checked (like this ☑).
7. Left-click or tap on the 

Submit button to return a list of all soil landscapes within the area you have selected.
8. You can use the search fields in the 

Landscapes tab to further refine your search.
9. Press the 

Reset button to clear the search criteria and search results.
10. In the **Area** tab, press the 

Clear button to clear the KML shape drawn on the map.

7.5 Search Results

The **Search Results** table lists the landscapes (if any) returned by your search. The landscapes are listed by code in ascending numerical/alphabetical order.

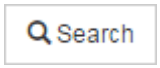
If there are more than 10 landscapes returned, the table is divided into two or more pages. These are accessible by left-clicking or tapping on the page numbers listed (like this: 1 2 3 (etc.)) below the results table. You can also use the < and > links to move to the next or previous page.

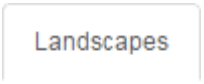
1. To zoom and centre the map on the full extent of a soil map unit, left-click or tap on its  **Go to landscape** button. The selected soil map unit is displayed in red.
2. For additional contextual information, left-click or tap to activate the relevant **Landscape layer** in the **Layer selection** panel. You can then see the surrounding soil map units in the map panel.
3. To access the report (in PDF format) for the selected soil map unit (where available), left-click or tap on the **View Report** link in the pop-up window in the bottom left of the map panel (where available for your selected map layer).
4. To download the spatial information for the selected soil map unit, left-click or tap on the **Download KMZ** link in the pop-up window in the bottom left of the map panel (where available for your selected map layer). **KMZ** files can be used in other spatial viewers such as Google Earth or in Geographic Information System (GIS) software such as ESRI ArcGIS.
5. Press the 

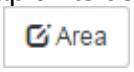
Reset button to clear the search criteria and search results.

If your search returned multiple results you may use the functions in the **Bulk action** pop-up list to perform functions across all map units in the active page of the **Search Results**.

7.6 Generating reports for multiple landscapes

1. In the **Function** panel, select the 

Search tab.
2. Select the 

Landscapes tab.
3. Select the required soil map units using one or more of the search fields. You can also use the area selection tools in the 

Area tab - if so, ensure that the **Use area select as search boundary** tick box is checked (like this ☑).
4. Left-click or tap on the 

Submit button to return a list of all soil map units matching your criteria.
5. Left-click or tap on the 

Bulk action button.
6. In the pop-up menu that appears, left-click or tap on the **Generate landscape report** item to produce reports for the active page of the soil map units returned by your search.

If your search returns more than ten landscapes then the **Bulk action** will only generate reports for the active page of the **Search Results**, i.e. only 10 landscapes at a time.

8. Soil profile colour schemes

eSPADE provides a range of soil profile colour schemes in which Public soil profiles from across NSW have been classified using various specific soil attributes, including soil type (Australian Soil Classification or Northcote Principal Profile Form, to subdivision level), soil texture, pH, erosion hazard and salinity. You can find information about each of these layers in this section. See ***Section 5.1*** to find out how to apply a colour scheme.

8.1 Australian Soil Classification (ASC) Order

This colour scheme categorises each profile according to the **ASC Order**, if recorded. For descriptions of the ASC Orders, see Isbell, R.F. 2002, *The Australian Soil Classification, Revised Edition*, CSIRO Publishing, Collingwood, Victoria.

Values used in this field are described in the legend. Profiles without a recorded value are displayed in the map panel with the default white marker, like this ○.

8.2 Erosion hazard

This colour scheme categorises each profile according to the values recorded, if any, in the Erosion Hazard field. Erosion hazard refers to a site's susceptibility to the prevailing agents of erosion and is dependent upon a number of factors including climate, landform and geomorphic activity, soil erodibility and land use.

Values used in this field are taken from **Milford H.B., McGaw A.J.E and Nixon K.J. (eds.) 2001, *Soil Data Entry Handbook (3rd Edition)*, NSW Department of Land and Water Conservation, Sydney**, which also provides further information on these factors. These values are:

- **Slight** - the combination of slope, runoff/run-on and soil erodibility is such that no appreciable erosion damage is likely to take place.
- **Moderate** - significant short-term soil erosion may occur as a result of the combination of steep slope gradient, high soil erodibility and adverse runoff/run-on factors. Control can be obtained with such management techniques as topsoiling, vegetative techniques, phasing development and the implementation of structural works.
- **High** - major soil erosion, in some cases long-term, can be expected to occur. Control of this risk will require the adoption of appropriate management techniques or intensive soil conservation works.
- **Very high** - major short-term and long-term erosion damage can be expected on this land. The combination of slope, soil erodibility and runoff/run-on ratings makes intensive soil conservation works necessary.
- **Extreme** - even with intensive short-term and long-term soil conservation works, significant soil erosion is likely to occur on this class of land.

Profiles without a recorded value are displayed in the map panel with the default white marker, like this ○.

8.3 Field pH – topsoil

This colour scheme categorises each profile according to the field pH (acid, neutral or alkaline) of the topsoil, if recorded. Field pH has been measured using the Raupach Indicator method, a pH meter, or a test strip. Ranges of values used in this field are described in the legend.

'Topsoil' is defined in this case as the uppermost layer recorded in the soil profile.

Profiles without a recorded value are displayed in the map panel with the default white marker, like this ○.

8.4 Field pH – subsoil

This colour scheme categorises each profile according to the field pH (acid, neutral or alkaline) of the subsoil, if recorded. Field pH has been measured using the Raupach Indicator method, a pH meter, or a test strip. Ranges of values used in this field are described in the legend.

'Subsoil' is defined in this case as:

1. the B2 horizon if identified; otherwise
2. any subtype of the B2 horizon if identified; otherwise
3. any B horizon.

Profiles without a recorded value are displayed in the map panel with the default white marker, like this ○.

8.5 Known profile depth

This colour scheme categorises each profile according to the lower depth for the lowest layer recorded, i.e., the depth to which the observation of the soil profile has been made. This may or may not refer to the actual depth of the soil profile, i.e., the start of the underlying substrate. Alternatively it may mean that the soil profile description was halted due to other factors, such as equipment refusal.

The ranges of values used in this field are described in the legend. Profiles without a recorded value are displayed in the map panel with the default white marker, like this ○.

8.6 Lab pH 1:5 soil:0.01M $CaCl_2$ – topsoil

This colour scheme categorises each profile according to the laboratory-tested soil pH (using the 1:5 soil:0.01M calcium chloride extract method) of the topsoil, where recorded. The pH has been tested using method 4B1 as described in Rayment G.E. and Lyons D.J. 2011, *Soil chemical methods* - Australasia, CSIRO Publishing, Collingwood, Victoria. The ranges of values used in this field are described in the legend.

'Topsoil' is defined in this case as the uppermost layer recorded in the soil profile. Profiles without a recorded value are displayed with the default white marker, like this ○.

8.7 Lab pH 1:5 soil:0.01M $CaCl_2$ – subsoil

This colour scheme categorises each profile according to the laboratory-tested soil pH (using the 1:5 soil:0.01M calcium chloride extract method) of the topsoil, where recorded. The pH has been tested using method 4B1 as described in Rayment G.E. and Lyons D.J. 2011, *Soil chemical methods - Australasia*, CSIRO Publishing, Collingwood, Victoria. The ranges of values used in this field are described in the legend.

'Subsoil' is defined in this case as:

1. the B2 horizon if identified; otherwise
2. any subtype of the B2 horizon if identified; otherwise
3. any B horizon.

Profiles without a recorded value are displayed in the map panel with the default white marker, like this ○.

8.8 Lab pH 1:5 soil:water – topsoil

This colour scheme categorises each profile according to the laboratory-tested soil pH (using the 1:5 soil: water method) of the topsoil, where recorded. The pH has been tested using method 4A1 as described in Rayment G.E. and Lyons D.J. 2011, Soil chemical methods - Australasia, CSIRO

Publishing, Collingwood, Victoria. The ranges of values used in this field are described in the legend.

'Topsoil' is defined in this case as the uppermost layer recorded in the soil profile. Profiles without a recorded value are displayed in the map panel with the default white marker, like this ○.

8.9 Lab pH 1:5 soil:water – subsoil

This colour scheme categorises each profile according to the laboratory-tested soil pH (using the 1:5 soil: water method) of the topsoil, where recorded. The pH has been tested using method 4A1 as described in Rayment G.E. and Lyons D.J. 2011, *Soil chemical methods - Australasia*, CSIRO Publishing, Collingwood, Victoria. The ranges of values used in this field are described in the legend.

'Subsoil' is defined in this case as:

1. the B2 horizon if identified; otherwise
2. any subtype of the B2 horizon if identified; otherwise
3. any B horizon.

Profiles without a recorded value are displayed in the map panel with the default white marker, like this ○.

8.10 Northcote Principal Profile Form (PPF)

This colour scheme categorises each profile according to the Principal Profile Form, where recorded, as defined in Northcote K.H. 1971, *A factual key for the recognition of Australian soils*, 3rd edition, Rellim Technical Publications, Glenside, South Australia. The PPF classification has been applied to subdivision level in this layer, but classification to further levels of the schema are almost always available through the reports for each individual soil profile.

The ranges of values used in this scheme are described in the legend. Profiles without a recorded value are displayed in the map panel with the default white marker, like this ○.

8.11 Salinity

This colour scheme categorises each profile according to an in-field assessment of salinity at the site, where recorded. Values used in this field are:

- No salting evident - the effect of salting is not apparent in the vegetation or on the soil surface.
- Salting evident - growth of salt sensitive plants is inhibited but that of salt-tolerant plants is not affected; patches of bare ground may occur.
- Strongly evident - only a few species of salt-tolerant plants survive and much of the ground is bare with a surface crust; free salts are often visible on the ground surface.

Values used in this field are taken from **Milford H.B., McGaw A.J.E and Nixon K.J. (eds.) 2001, *Soil Data Entry Handbook (3rd Edition)*, NSW Department of Land and Water Conservation, Sydney**.

Profiles without a recorded value are displayed in the map panel with the default white marker, like this ○.

8.12 Sampled status

This colour scheme categorises each profile according to whether soil samples have been collected and tested.

The range of values used in this field are described in the legend. Profiles without a recorded value are displayed in the map panel with the default white marker, like this ○.

8.13 Soil reaction trend

This colour scheme categorises each profile according to the 'soil reaction trend' concept originally described in Northcote K.H. 1971, *A factual key for the recognition of Australian soils*, 3rd edition, Rellim Technical Publications, Glenside, South Australia. This describes the general direction of change in pH through the soil profile, i.e., the change of pH with depth, and relies on pH being recorded for both topsoil and subsoil layers to be effective.

The pH used is the 1:5 soil:water method defined as method 4A1 as described in Rayment G.E. and Lyons D.J. 2011, *Soil chemical methods - Australasia*, CSIRO Publishing, Collingwood, Victoria.

Values used in this field are:

- Strongly acid trend - the surface soil has a pH >7.0 and the deep subsoil has a pH <6.5.
- Acid trend - the surface soil has a pH <7.0 and the deep subsoil has a pH <6.5.
- Neutral trend - the surface soil has a pH 5.0 - 8.0 and the deep subsoil has a pH 6.5 - 8.0.
- Alkaline trend - the surface soil has a pH >5.0 and the deep subsoil has a pH >8.0.

Deep subsoil in this case is considered to be either the lower portion of the B horizon or the BC horizon.

Profiles without a recorded value, or profiles that do not match the ruleset, are displayed in the map panel with the default white marker, like this ○.

8.14 Texture groups – topsoil

This colour scheme categorises each profile according to the in-field assessment of field texture of the topsoil, if recorded. Field soil textures are grouped using definitions from Northcote K.H. 1971, *A factual key for the recognition of Australian soils*, 3rd edition, Rellim Technical Publications, Glenside, South Australia. Definitions of the individual soil texture classes used are found in **Milford H.B., McGaw A.J.E and Nixon K.J. (eds.) 2001, *Soil Data Entry Handbook (3rd Edition)*, NSW Department of Land and Water Conservation, Sydney**. Values used are described in the legend.

'Topsoil' is defined in this case as the uppermost layer recorded in the soil profile. Profiles without a recorded value are displayed in the map panel with the default white marker, like this ○.

8.15 Texture groups – subsoil

This colour scheme categorises each profile according to the in-field assessment of field texture of the subsoil, if recorded. Field soil textures are grouped using definitions from Northcote K.H. 1971, *A factual key for the recognition of Australian soils*, 3rd edition, Rellim Technical Publications, Glenside, South Australia. Definitions of the individual soil texture classes used are found in **Milford H.B., McGaw A.J.E and Nixon K.J. (eds.) 2001, *Soil Data Entry Handbook (3rd Edition)*, NSW Department of Land and Water Conservation, Sydney**. Values used are described in the legend.

'Subsoil' is defined in this case as:

1. the B2 horizon if identified; otherwise
2. any subtype of the B2 horizon if identified; otherwise
3. any B horizon.

Profiles without a recorded value are displayed in the map panel with the default white marker, like this ○.

9. Site and landscape layer reference

9.1 Soil profiles

This layer displays all Public soil profiles from the NSW Soil Profiles dataset, which is stored in SALIS. Because of the number of profiles (exceeding 45,000), the soil profiles layer does not display at a Statewide level, but will appear as you zoom in below 1:300,000 scale.

By default each soil profile is located with a white circular marker like this ○, whilst **stations** (monitoring sites intended for repeated observation over time) are displayed as triangular white markers like this △. You can select a different soil profile colour scheme in the **View** tab. To find out more about an individual soil profile, left-click or tap on its marker; a small window will appear allowing you to access one of three different report formats describing the site and soil profile information collected at that point, including laboratory soil test results (if any).

The soil profiles that form this dataset have been collected over the last 60 years by several hundred individuals of varying backgrounds and expertise for widely varying purposes. Furthermore, methods of locating profiles may not have been particularly accurate, especially in the case of data collected a long time ago before the introduction of precision digital locating technology, e.g., non-degraded Global Positioning System (GPS). Consequently the quantity, quality and accuracy of data recorded at different points in NSW may vary substantially. In providing this information in good faith, OEH advises users that because of these possible limitations the data should not be relied on in isolation without corroboration with other datasets and/or on-site investigation.

9.2 Soil landscapes

This dataset covers various areas of Central and Eastern NSW at scales of 1:100 000 (in urban, peri-urban, coastal and other areas of high land use pressure) and 1:250 000 (in rural areas). This information is not seamless but is discrete to each individual map sheet area.

As you zoom in further you will see soil landscape tags displayed on the map - each tag consists of the soil landscape's code preceded by the map sheet number. The code and name of a soil landscape is usually associated with a typical location of that landscape. For example, the Blacktown (**bt**) soil landscape on the Penrith 1:100 000 map sheet is identified by the code **9030bt**.

Some of the soil landscapes (outlined in dark orange) have reports available for them, while others (outlined in lighter orange) do not as yet. To find out more about an individual soil landscape in this layer, left-click or tap anywhere within one of the polygons; a small window will appear with the soil landscape's name and code plus a hotlink allowing you to access the published description for that soil landscape in PDF format, if available. There is also a hotlink allowing you to highlight the complete range of the selected soil landscape.

In the legend there is also a link to the metadata record for this layer.

9.3 Soil and land resources

This dataset is an enhancement of Soil Landscape mapping to create seamless datasets across whole priority catchment areas. As you zoom in further you will see soil landscape tags displayed on the map – these differ from the tags in the soil landscape layer by being unique across NSW, and therefore don't include map sheet numbers. For example, the Blacktown (**bty**) soil landscape in the **Soil and land resources** layer is identified by the code **bty**.

To find out more about an individual soil landscape in this layer, left-click or tap anywhere within one of the polygons; a small window will appear showing a thumbnail photo of the landscape, its name and code and some summary information, with a hotlink allowing you to access a report describing the features of that soil landscape. There is also a hotlink allowing you to highlight the complete extent of the selected soil landscape.

In the legend there is also a link to the metadata record for this layer.

9.4 Land systems

This dataset dates from the 1970's and covers the Western Division of NSW with broadscale (1:250 000) map units describing the landscape and soils across this large area. As you zoom in further you will see land system tags displayed on the map – each tag consists of the land system code preceded by the letters 'LS' (for Land System). For example the Barrier (**Br**) land system is identified by the code **LSBr**.

To find out more about an individual land system in this layer, left-click or tap anywhere within one of the polygons; a small window will appear with the land system's name and code plus a hotlink allowing you to access the published description for that land system in PDF format. There is also a hotlink allowing you to highlight the complete range of the selected land system.

In the legend there is also a link to the metadata record for this layer.

9.5 Acid Sulphate Soil risk mapping

This layer predicts the distribution of acid sulphate soils (ASS) throughout coastal NSW at elevations below 10 m ASL, providing information on acid sulfate soil distribution and indicating land uses that are likely to create an environmental risk by exposing ASS to air.

The mapping, produced at 1:25,000 scale, combines a detailed analysis of landform elements and present and past coastal depositional environments, along with extensive data collection including ASS-specific laboratory soil tests. The related **custom layers** show the probability of acid sulphate soils, estimated depth to acid sulphate soils, and other relevant factors.

For more information see the **Acid sulphate soil risk maps** page. In the legend there is also a link to the metadata record for this layer.

9.6 Hydrogeological landscapes

Hydrogeological landscape mapping integrates lithology, regolith, landform, climate and vegetation for the identification of groundwater flows, salinity hazard and water quality. It has been mapped in specific areas of the state at varying scales according to requirements. For more information see the **Hydrogeological landscapes** pages. In the legend there is also a link to the metadata record for this layer.

In eSPADE each hydrogeological unit is prefixed by the letters 'HGL_', then the section of the dataset (e.g., a Central West HGL unit carries the prefix 'CW_'), then its number within that section. For example, the **Dubbo basalt (east)** hydrogeological landscape has the code '**HGL_CW_4**'.

10. Custom layer reference

In this section you'll find background and interpretative information about the various custom layers available in the **Custom Layers** section of eSPADE.

10.1 Acid Sulphate Soil risk mapping

10.1.1 Acid Sulphate Soil probability

This map combines the various aspects of acid sulphate soil risk assessment into a single map showing probability of occurrence. The legend in the **layer selection panel** shows the classes and colours used to categorise acid sulphate soil risk. In the legend there is also a link to the metadata record for this layer.

Colours in the red range show areas assessed as having a high probability of occurrence (with map tags beginning with 'H'), whilst colours from orange to yellow show areas assessed as having

a low probability of occurrence (with map tags beginning with 'L'). Lighter colours show areas where any acid sulphate soils will be at greater depths beneath the land surface.

Areas coloured dark grey with map tags beginning with 'X' are Disturbed Terrain where no assessment of acid sulphate soil risk is possible, whilst areas coloured light grey with map tags beginning with 'N' indicate no known occurrence.

10.1.2 Acid Sulphate Soil landform process

This map show the dominant landform process identified during the acid sulphate soil risk mapping program. The legend in the **layer selection panel** shows the classes used. Colours are the same as those used to map landform process in the soil landscape dataset, whilst map tags indicate the acid sulphate soil risk class. In the legend there is also a link to the metadata record for this layer.

10.1.3 Acid Sulphate Soil elevation ASL

This map shows the dominant elevation class identified during the acid sulphate soil risk mapping program. The legend in the **layer selection panel** shows the classes used. In the legend there is also a link to the metadata record for this layer.

10.2 Statewide land and soil layers

10.2.1 Australian Soil Classification

This layer displays dominant soil types across NSW classified using the revised Australian Soil Classification as described in Isbell, R.F. 2002, *The Australian Soil Classification*, Revised Edition, CSIRO Publishing, Collingwood, Victoria. A legend in the **layer selection panel** shows the colours used for each Order, and also provides a link to the metadata for this layer.

10.2.2 Data confidence

This layer displays a map of NSW showing the levels of confidence ascribed to soil mapping in various parts of the State. Categories used are:

- **Good**— All necessary soil and landscape data is available at a regional scale (1:100,000) to undertake the assessment of LSC and other soil thematic maps.
- **Fair**— Most soil and landscape data is available at a catchment scale (1:250,000) to undertake the assessment of LSC and other soil thematic maps.
- **Low**— Limited soil and landscape data is available at a reconnaissance catchment scale (1:100,000 to 1:250,000) which limits the quality of the assessment of LSC and other soil thematic maps.
- **Very Low**— Very limited soil and landscape data is available at the state scale (1:250,000 - 1:500,000) and the LSC and other soil thematic maps should be used as a guide only.

10.2.3 Land and Soil Capability

This layer displays a map of the soils and landscapes of NSW classified using the *Land and soil capability assessment scheme: second approximation* (OEH 2012). This eight-class system indicates the inherent physical capability of the land and soil to sustain a range of land uses and management practices in the long term without degradation to soil, land, air and water resources.

The map provides a broad-scale regional assessment of the dominant LSC class within each mapped unit. A legend at the bottom of the screen shows the colours used for each LSC class, and also provides a link to the metadata for this layer. For more information about the LSC assessment scheme, see **http://www.environment.nsw.gov.au/soils/20120394lsc2spubslandingpage.htm**.

Values used are:

- **1**— Very slight to negligible limitations. Land capable of sustaining high impact land uses (e.g. cultivation) and no special land management practices required.

- **2**— Slight but significant limitations. Land capable of sustaining high impact land uses which can be managed by readily available, and easily implemented management practices.
- **3**— Moderate limitations. Land capable of sustaining high impact land uses using more intensive, readily available and accepted management practices.
- **4**— Moderate to severe limitations. Land generally not capable of sustaining high impact land uses unless using specialised management practices with high level of knowledge, expertise, inputs, investment and technology. Limitations are more easily managed for lower impact land uses (e.g. grazing).
- **5**— Severe limitations. Land not capable of sustaining high impact land uses except where resources allow for highly specialised land management practices to overcome limitations (e.g. high value crops). Lower impact land uses (e.g. grazing) can be managed by readily available practices.
- **6**— Very severe limitations. Land incapable of sustaining many land use practices (e.g. cultivation, moderate to high intensity grazing and horticulture). Highly specialised practices can overcome some limitations for some high value products. Land often used for low intensity land uses (low intensity grazing).
- **7**— Extremely severe limitations. Land incapable of sustaining most land uses. Limitations cannot be overcome.
- **8**— Extreme limitations. Land incapable of sustaining any land use and best left undisturbed and managed for conservation.

10.2.4 Great Soil Groups

This layer displays dominant soil types across NSW classified using a modified version of the Great Soil Groups classification as described in Stace H.C.T, Hubble G.D., Brewer R., Northcote K.H., Sleeman J.R., Mulcahy M.J. and Hallsworth E.G., 1968, *A handbook of Australian soils*, Rellim Technical Publications, Glenside, South Australia. A legend at the bottom of the screen shows the colours used for each Great Soil Group, and also provides a link to the metadata for this layer.

10.2.5 Hydrologic Soil Groups

This layer displays a Statewide estimation of hydrological soil groups using a four-class system developed by the United States Department of Agriculture and published in Chapter 7 of the *National Engineering Handbook – Part 630 Hydrology*, last updated in January 2009. Each dominant Great Soil Group (see above) across the State has been assigned one of these Hydrologic Soil Groups. The four classes used are:

- **A**— soils having high infiltration rates, even when thoroughly wetted and consisting chiefly of deep, well to excessively-drained sands or gravels. These soils have a high rate of water transmission.
- **B**— soils having moderate infiltration rates when thoroughly wetted and consisting chiefly of moderately deep to deep, moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission.
- **C**— soils having slow infiltration rates when thoroughly wetted and consisting chiefly of soils with a layer that impedes downward movement of water, or soils with moderately fine to fine texture. These soils have a slow rate of water transmission.
- **D**— soils having very slow infiltration rates when thoroughly wetted and consisting chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material. These soils have a very slow rate of water transmission.

In the legend there is also a link to the metadata record for this layer.

10.2.6 Inherent Soil Fertility

This layer displays a map of the soils and landscapes of NSW classified using a general, relative fertility classification scheme based on Great Soil Group classes (see above). This provides a broad-scale regional assessment of the dominant inherent soil fertility class within each mapped unit. The scheme is a modified version of that described in Charman, P.E.V. 1978 (ed.), *Soils of New South Wales: their characterisation, classification and conservation*, Tech. Handbook No. 1, Soil Conservation Service of NSW, Sydney. Categories used are:

- **Low**;
- **Moderately low**;
- **Moderate**;
- **Moderately high**; and
- **High**.

In the legend there is also a link to the metadata record for this layer.

10.3 Land use

This series of layers displays results from the 2006 survey of land use across NSW classified using the 18-class **Australian Land Use and Management** (ALUM) classification.

These layers were sourced from the 50 m National landuse grid. Because of the size and complexity of the dataset it has been smoothed and divided into 13 parts. These are based on the boundaries of the Local Land Services (LLS) in NSW, except for the Western LLS area, which has been divided into 3.

The 18 classes used in these layers are:

- **Nature conservation**;
- **Other protected areas**;
- **Minimal use**;
- **Grazing, native vegetation**;
- **Production forestry**;
- **Grazing, modified pasture**;
- **Plantation forestry**;
- **Dryland cropping**;
- **Dryland horticulture**;
- **Land in transition**;
- **Irrigated pastures**;
- **Irrigated cropping**;
- **Irrigated horticulture**;
- **Urban and intensive uses**;
- **Intensive animal and plant production**;
- **Rural residential and farm infrastructure**;
- **Mining and waste**; and
- **Water**.

To learn more about the National land use classification and mapping, visit the Federal Government's Department of Agriculture and Water Resources website at **www.agriculture.gov.au/abares/aclump/land-use/land-use-mapping**.

10.4 Hydrogeological landscapes

10.4.1 Overall salinity hazard

This map show the overall salinity hazard identified during the hydrogeological landscapes mapping program. The legend in the **layer selection panel** shows the classes used. This layer uses a five class system (very low, low, moderate, high, very high). In the legend there is also a link to the metadata record for this layer.

10.4.2 Land salinity

This map show the land salinity hazard identified during the hydrogeological landscapes mapping program. The legend in the **layer selection panel** shows the classes used. This layer uses a three class system (low, moderate, high). In the legend there is also a link to the metadata record for this layer.

10.4.3 Salt export

This map show the salt export hazard identified during the hydrogeological landscapes mapping program. The legend in the **layer selection panel** shows the classes used. This layer uses a three class system (low, moderate, high). In the legend there is also a link to the metadata record for this layer.

10.4.4 EC, in-stream

This map show the EC, in-stream hazard identified during the hydrogeological landscapes mapping program. The legend in the **layer selection panel** shows the classes used. This layer uses a three class system (low, moderate, high). In the legend there is also a link to the metadata record for this layer.

11. Related resources

eSPADE is one of a number of interrelated, interconnected systems and resources developed and managed by the NSW Office of Environment and Heritage. ***Figure 5*** (below) shows how these fit together.

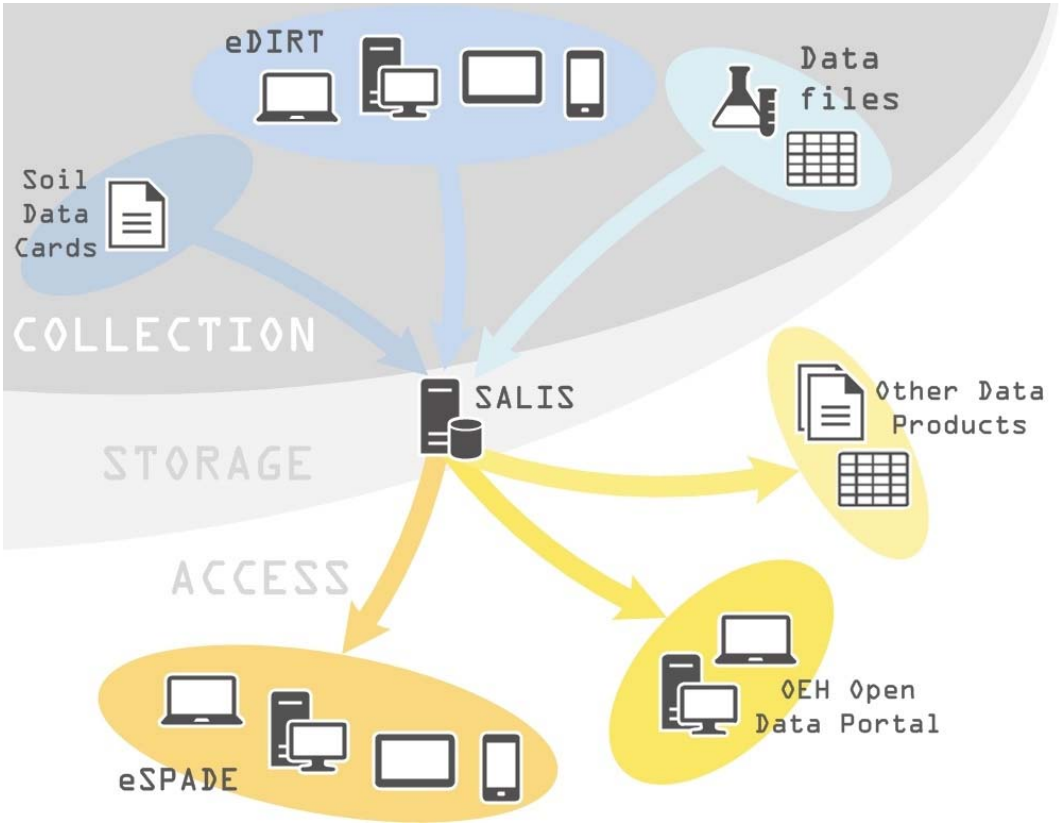


Figure 5 Major components of the eSPADE interface

11.1 Land and soil mapping

We map soils and landscapes to understand their distribution, the processes by which they develop, their capability and suitability for various uses, what risks may be involved and how they can be safely addressed. To learn more, see our **Land and soil maps** page at **www.environment.nsw.gov.au/soils/soilmaps.htm**.

11.2 Land and soil information

Soils are an important, non-renewable natural resource. Healthy soils support a healthy environment: they support plant and animal productivity and biodiversity, they promote water and air quality, and they underpin our food and fibre supplies, so they are vital for our survival.

To productively and sustainably manage our land and soils we need to know where our best and worst landscapes and soils are, and what we can do with them without causing degradation. For this, we need a comprehensive, high-quality, accessible resource of soil and land information.

To learn more, see our **Land and soil information** page at **www.environment.nsw.gov.au/soils/data.htm**.

11.3 Soil and Land Information System (SALIS)

SALIS is a large database of information collected over many years by earth scientists and other technical experts. It contains descriptions of soils, landscapes and other geographic features, and is used by the NSW Government, other organisations and individuals to improve planning and decision-making for natural resource management. The database is constantly updated as new information on the State's soil resources becomes available.

To learn more, see the SALIS webpage at **www.environment.nsw.gov.au/soils/data/SALIS.htm**.

11.4 Electronic Digital Infield Regolith Tool (eDIRT)

eDIRT is an internet application for the in-field digital recording of soil profile information, even in remote areas without an Internet connection. Replacing the previous generation of scannable Soil Data Cards, eDIRT is quicker and easier to use and improves data quality by following standards and using thorough in-built validation.

To learn more, see the eDIRT webpage at **www.environment.nsw.gov.au/soils/data/edirt.htm**.

11.5 OEH Open Data Portal

Using OEH's Open Data Portal you will be able to discover and access OEH data and information. We encourage you to use OEH data to analyse, understand and develop tools and applications about the environment. In addition to open datasets, the OEH Open Data Portal also provides information about unpublished datasets.

To learn more, visit the Data Portal's homepage at **data.environment.nsw.gov.au**.