ENVIRONMENTAL MANAGEMENT FRAMEWORK FOR THE UMGUNGUNDLOVU DISTRICT MUNICIPALITY

Decision Support Tool User Manual

Institute of
Natural Resources

ENVIRONMENTAL MANAGEMENT FRAMEWORK FOR THE UMGUNGUNDLOVU DISTRICT MUNICIPALITY

Environmental Management Framework Report

Prepared For

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Introduction

The Umgungundlovu District Municipality's Environmental Management Framework (EMF) Decision Support Tool (DST) has been developed to provide users of the EMF with an interactive, web based tool for accessing environmental information about the district. The tool's spatial querying ability allows users to understand the environmental sensitivity and development potential of any particular parcel of land within the District and the potential constraints to various kinds of development that may exist in and around a potential development site. This is important information for land owners, potential developers, planners, decision makers and a range of other stakeholders.

The fact that the DST is available on the internet is significant as it makes the EMF information available to anyone with internet access and represents an important step towards facilitating efficient sustainable development and information dissemination. It also improves the ability of the District to update information that has been released into the public realm as users will not be required to re-collect data when the EMF is updated.

Important notes

Perhaps one of the most important things to note when using the DST is that the spatial data being provided is complex and the volume of data being transferred over your internet connection is therefore relatively large. The loading of maps and the querying of the data may take some time, especially if you are working through a slow connection. It is important to be patient and, once you have clicked on a map item, not to then click multiple times thinking that your click instruction has not registered or that something has 'frozen'. This is particularly true the first time you load a particular layer as, once loaded, the data is cached on the local drive and loads far quicker from then on.

Recommended use specifications

The DST has been developed using Mozilla Firefox version 54 and Google Chrome version 59 browsers. It has been tested using Internet Explorer version 11. It is therefore recommended that this website be viewed in one of the following browsers:

1. Google Chrome version 59 (or later)
2. Mozilla Firefox version 54 (or later)
3. Internet Explorer version 11 (or later)

A screen resolution of 1366 x 768 is recommended, but a resolution of at least 1280 x 720 should be used.

Landing page

The DST landing page consists of a title banner, a tool bar and a map window as is illustrated in Figure 1. These components are discussed in more detail in the following sections.
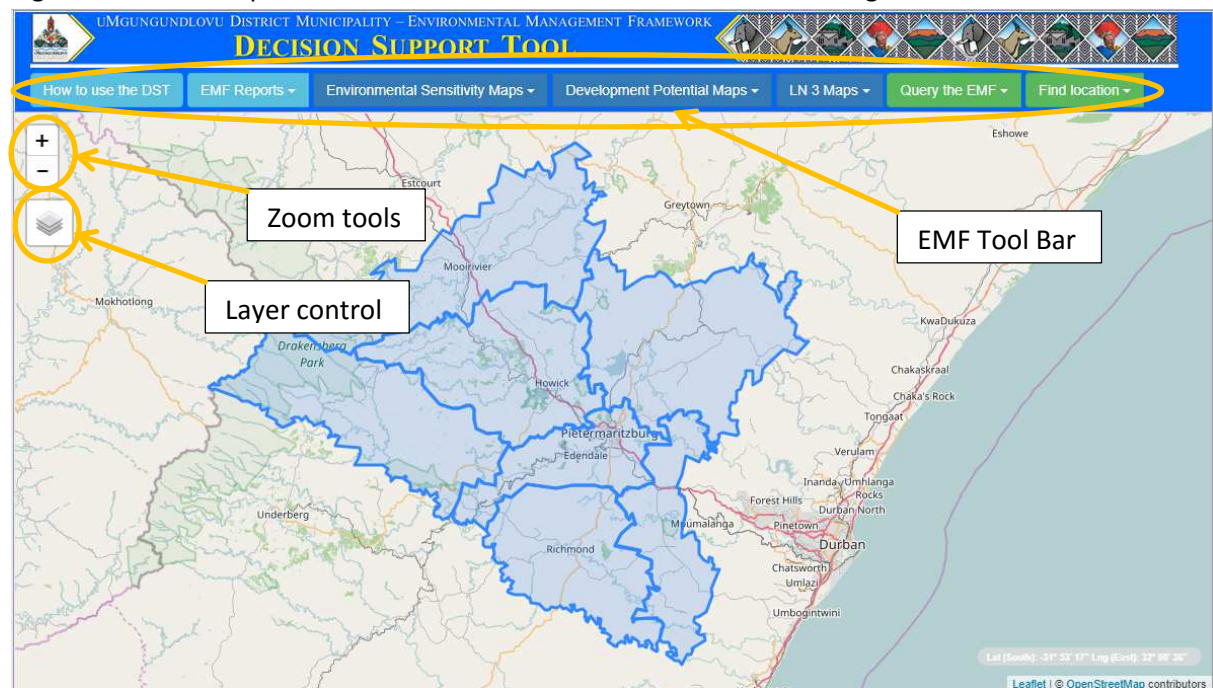

Figure 1: The EMF DST landing page showing the various interactive components

Map Tools

Zoom and Pan Options

The map is in 'pan mode' by default and the user can at any point change the position of the map by panning. Pan around the map by clicking and holding the left mouse button and 'dragging' the map so as to locate the area of interest.

You can zoom to the scale you wish to work at by using one of the following options:

1. By clicking the '+' (zoom in) button or '– ' (zoom out) button repeatedly until the desired scale is reached
2. By positioning the cursor over the area of interest and rolling the mouse wheel forward to zoom in to this area or backwards to zoom out away from the area
3. By holding down the shift key, clicking and holding down the mouse button and dragging the cursor to create a rectangle around the area of interest. When you release the mouse button, you will zoom into the area of the rectangle

Base Map Options

Figure 2: The layer control box

There are two base map options available in the DST. These are:

1. Open Street Map Topographical Map and
2. Google Earth Satellite Imagery

To toggle between these, click on the layer control icon in the top left of the map window (below the zoom in/out buttons) and select the option you wish to use in the layer control box. The layer control also allows you to switch two other contextual layers on and off i.e. the Local Municipality boundaries and the Surveyor General (SG) cadastre boundaries. It is important to note that these layers are not visible at all scales and the SG layer is only available when zoomed in to village / neighbourhood scale and the local municipality boundary layer is only visible when zoomed out to District scale.

EMF Tool Bar

The EMF tool bar consists of seven buttons as is illustrated in Figure 3 below. Each of these are described individually below.
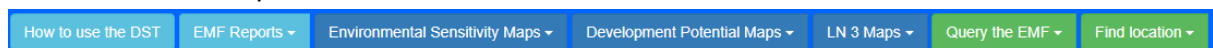

Figure 3: The EMF Tool Bar

EMF Reports

All of the EMF project reports are available through the DST. By clicking on the "EMF Reports" button, the user is provided with a list of the project reports, any of which can be downloaded by clicking on the particular report's name (Figure 4). This list includes the project's various specialist reports.
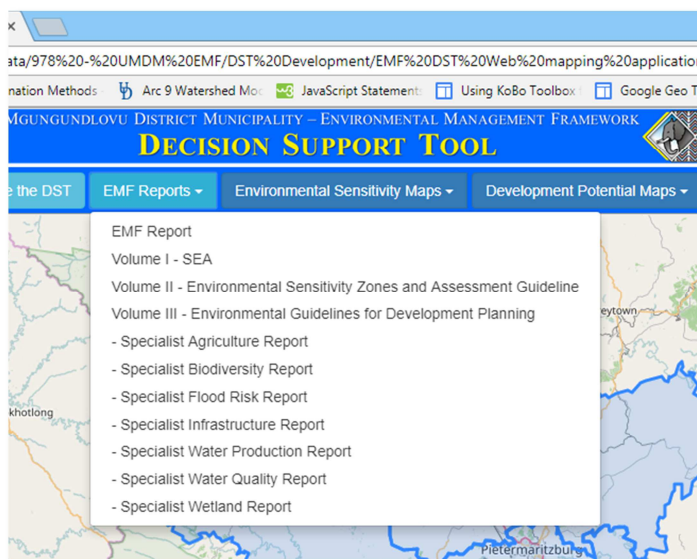

Figure 4: The project reports are all available for download through the EMF Reports dropdown list
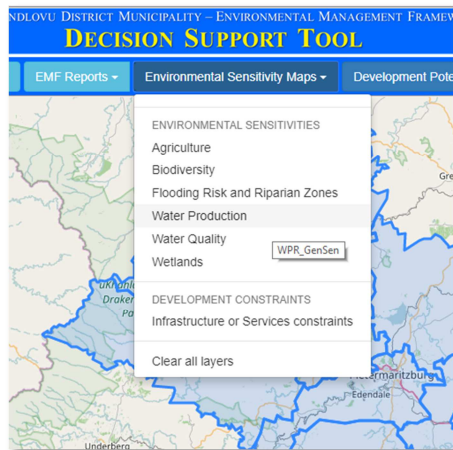
Environmental Sensitivity Maps

Figure 5: Dropdown list of environmental sensitivity layers

The Environmental Sensitivity Maps dropdown list allows the user to view the various sensitivity components' spatial layers. By clicking on any of the layers listed in the dropdown list, the map of that component is loaded into the map window as a semi-transparent overlay on top of the base map. It is important to remember that some of these layers are very complex spatial files and will take a while to load (sometimes several minutes if using a slow internet connection). Users will be reminded of this when selecting one of the following large layers:

1. Biodiversity
2. Wetlands
3. Agriculture

Please do be patient and allow the data to load without repeatedly clicking the layer or clicking on other buttons.

Only one layer can be viewed at a time and if another layer is selected the first layer will be switched off and replaced by the next selection. Any sensitivity layer can be removed from the map without replacing it with another by clicking on the "Clear all layers" option at the bottom of the dropdown menu.

The sensitivity layers all use the same colour coding for four categories of sensitivity. This colour scheme is shown in Figure 6.
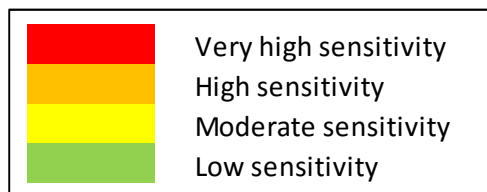

Figure 6: Colour coding for sensitivity mapping
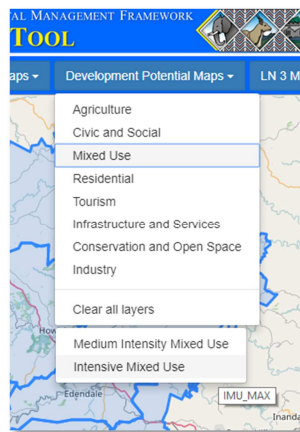
Development Potential Maps

Figure 7: Development Potential Maps

The Development Potential Maps dropdown list provides access to the spatial component of the development potential assessment. Each of 32 different development typologies (based on planning categorisations) has been assessed against the various environmental sensitivities, and parcels of land categorised according to suitability for that particular development type. The dropdown list is a two level list with the first level providing a generalised list of development type categories. When clicking on an item in the first tier (e.g. "Mixed Use" as in Figure 7), a second tier will open below the list allowing a more specific development type to be selected (e.g. "Medium Intensity Mixed Use" or "Intensive Mixed Use" as in Figure 7).

As with the sensitivity layers, the development potential maps are loaded as a transparent overlay on top of the selected base map. They are symbolised using the same colours as the sensitivity maps but in this case they represent constraints to the development type being considered. This scheme is shown in Figure 8. Importantly, the transparency of the layer means that the colour of the background will influence the appearance of the layer colour. This should be taken into consideration when viewing the data.
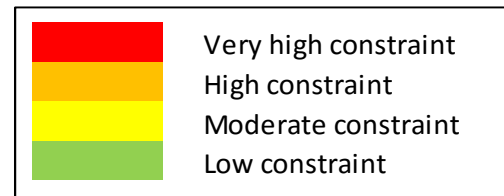

Figure 8: Colour coding for development constrains

Listing Notice 3 Maps

Listing Notice 3 requires that if the listed set of activities impact areas identified as sensitive in an accepted EMF, this triggers the requirement for an impact assessment. As part of the EMF study, all

Figure 9: Listing Notice 3 Maps

activities identified in the LN 3 regulations have been assessed and clustered into two groups based on their general impacts. Spatial layers have then been developed identifying areas which have been determined to be very highly sensitive and which are not covered by any of the other LN 3 triggering categories. Two separate layers have been developed which effectively cover the impacts associated with two groups of activities. The grouping of activities is shown in Table 1 and the respective spatial layers simply labelled Map 1 and Map 2. Three activities are not applicable in Umgungundlovu District Municipality. These layers are accessible through the "LN 3 Maps" button (Figure 9).
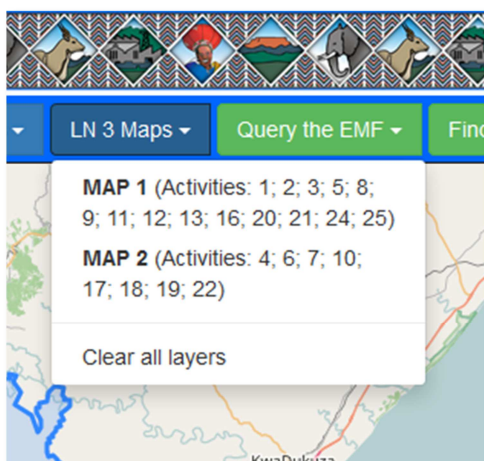
Table 1: Listing Notice 3 activities grouped and allocated to an LN 3 map layer

| | Listing Notice 3 Activities | | |
| | Map 1 | Map 2 | n/a |
Environmental Constraint Layer	Activities: 1; 2; 3; 5; 8; 9; 11; 12; 13; 16; 20; 21; 24; 25	Activities: 4; 6; 7; 10; 17; 18; 19; 22	Activities: 14; 15; 23
High Biodiversity Area (CBA's and Agro-biodiversity zones)	No	Yes	No
Flood risk / Riparian Area (1:100 year flood risk area)	Yes	Yes	No
Wetland footprint and 32m buffer area	Yes	Yes	No

Navigating To a Specific Location

Navigating to a specific location in the DST can be achieved in multiple ways.

1. The easiest way is (if you are familiar with the location) to zoom in to an appropriate scale and pan to the location using the base map to orientate yourself.

2. If you are unfamiliar with the location, but have geographic coordinates, you can use the "Find Location" button to select either the Decimal Degrees option or the Degrees Minutes and Seconds option for entering coordinates. Once selected, a dialogue box will appear (Figure 10) allowing you to enter the Latitude and Longitude. Once coordinates are entered, zoom to the location by clicking the "Zoom to Coordinates" button. A locational marker will mark the position and will be labelled with the coordinates entered (Figure 11). All locational markers can be cleared using the "Clear all marked locations" option in the "Find Location" dropdown list.

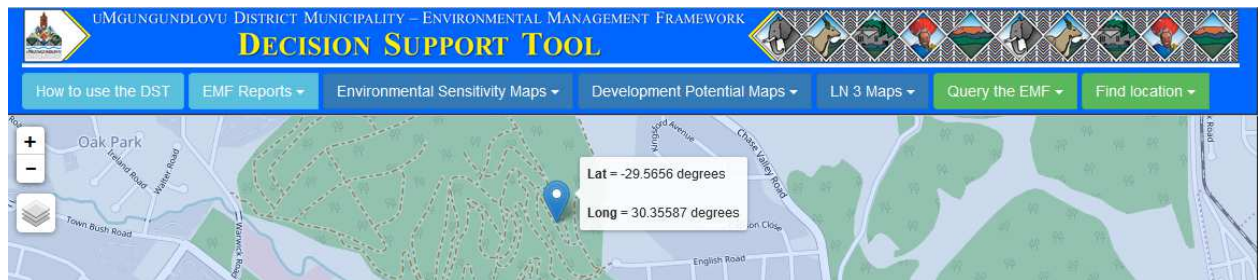**Figure 10: Find a location using geographic coordinates**

Figure 11: Location marker with coordinates labelled.

3. The third way to find a location is to use the Surveyor General's 16 digit identifier (starts with N0FT000…) to locate a surveyed property boundary. This option is also found under the "Find Location" button and clicking it will make a magnifier glass icon appear. Click on this to open a text box into which you can enter the 16 Digit SG code of the property you are interested in. If given a little time, matching suggestions are provided after the user types in the first few digits and after entering sufficient digits, the user can simply click on the correct code when it appears (Figure 12).
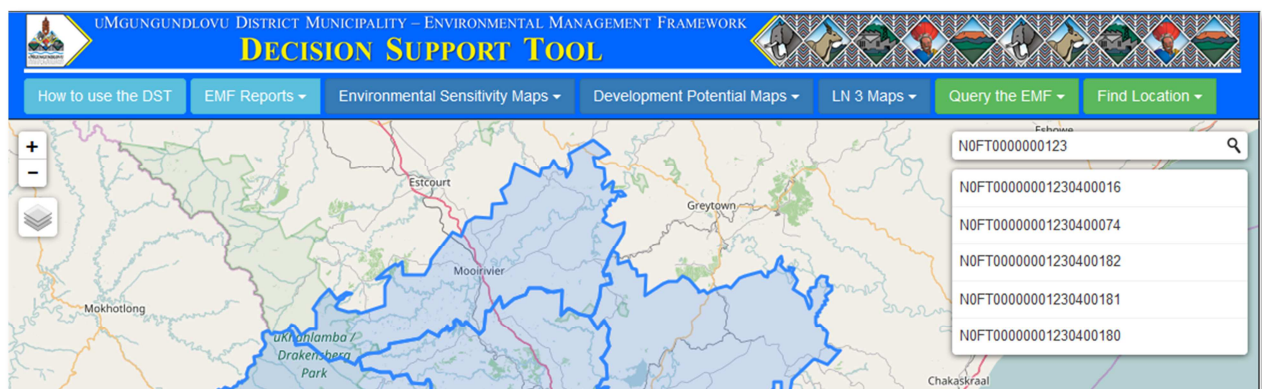

Figure 12: Searching for a location using a 16 digit SG code with suggestions provided.

Querying the EMF

A key aim of the DST is to provide a summarised output of the sensitive environmental features that are found in a stipulated area. This is achieved using a spatial intersect query whereby the user defines the area of interest using a set of drawing tools and the DST retrieves EMF information regarding that area. The drawing tools are exposed when the user selects the "Query EMF by user defined area" option in the "Query the EMF" dropdown list (Figure 13). The user can then select to draw either a line feature (for linear developments such as powerlines, pipelines, roads etc.), a polygon feature including a circle, square or multiple side/freehand polygon feature (for non-linear developments) or a point feature (for developments with a small footprint such as cell phone towers).
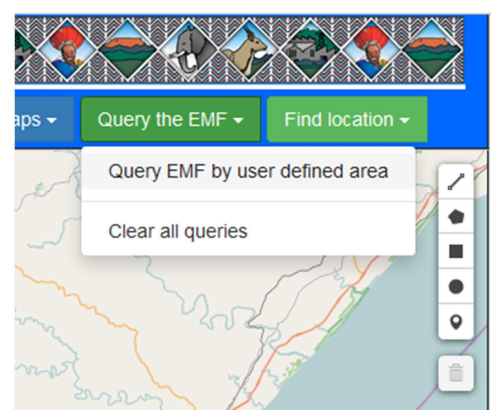

Figure 13: Querying the EMF using a set of shape drawing tools.

When drawing a line feature:
1. Select the line drawing tool (top icon).
2. Click on the map to place points at the start of the line, at each point where the line you wish to draw changes direction, and at the end of the line.
3. To finish the line feature, click again on the last point. The DST will then automatically begin the query process.

When drawing a polygon (multi-sided) feature:
1. Select the multi-sided polygon drawing tool (second from top).
2. Trace the boundary of the area you are interested in by clicking on the map.
3. Finish the polygon feature by clicking again on the first point to close the polygon and begin the query process.

When drawing a square feature:
1. Select the square drawing tool (third from top).
2. Click on the map where one of the corners of your square area will be located and hold down the mouse button.
3. Drag the cursor towards where the opposite corner will be.
4. When the square covers the area of interest, release the mouse button and the square will be completed and the query process begun.

When drawing a circle feature:
1. Select the circle drawing tool (fourth from top).
2. Click on the map where the centre of the circle will be and hold the mouse button down.
3. Drag the cursor away from the centre point to enlarge the circle to the required radius.
4. Release the mouse button when the required radius is reached to complete the circle and initiate the querying process.

When drawing a point feature:
1. Select the point drawing tool (bottom icon).
2. Simply click on the map at the location of interest to initiate the query process at that point.

Applying a buffer to a drawn query feature

Once the query feature has been drawn and the query process has been automatically initiated, the user will be asked if they wish to apply a buffer to the query feature they have just drawn. If so, the user can enter a buffer distance (in metres) into the dialogue box. If not, the default value of zero metres can be left unchanged.

In Figure 14, a line feature is drawn and a buffer of 50m is applied. Figure 15 shows the buffered output of this option.
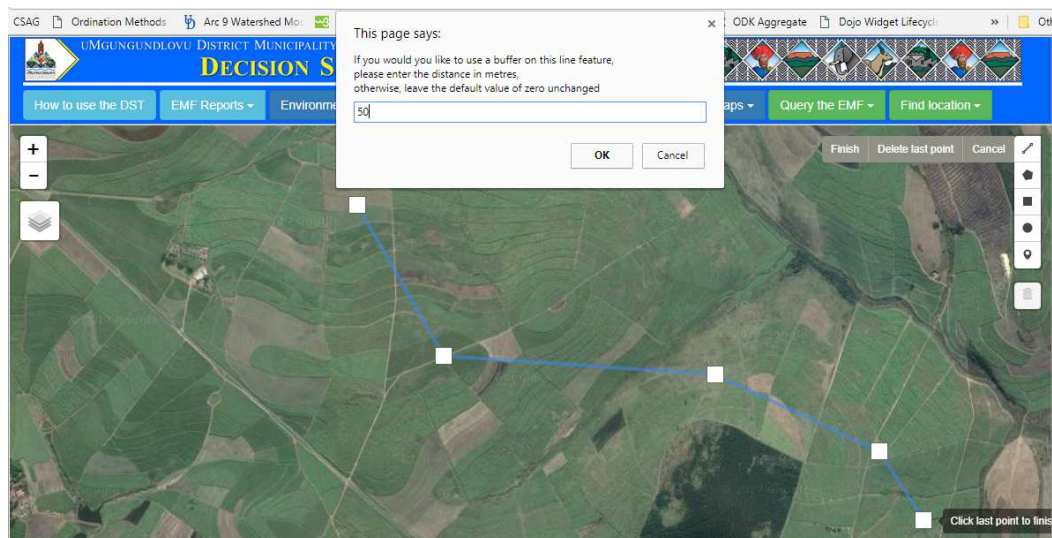
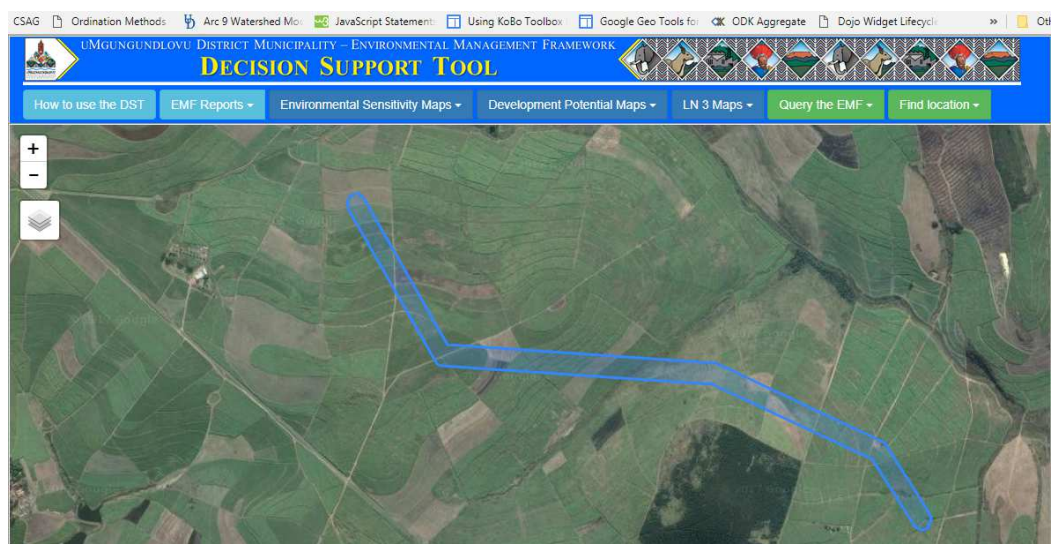**Figure 14: Querying the EMF using a line feature and applying a buffer of 50m.**

Figure 15: Output of buffering the line feature by 50m

Output report

Once the query process has been initiated, the DST queries the EMF GIS database stored on ESRI servers. This process can take some time and the user should be patient while the results are retrieved, especially if they are using a slow internet connection.

Once the results are retrieved, they are loaded into a frame located above the map window. The output report documents the sensitive environmental features that are intersected by the query area. Importantly, although more than one of the same environmental feature type (e.g. High production water yield area or Critical Biodiversity Area) may have been intersected, these are only reported once. The report also provides development planning objectives for that feature type together with EIA guidelines. A link to a guidance document for each feature type is also provided.

A date stamp and a replication of the map window are also included in the output to provide the spatial and temporal context of the query.

Two buttons will allow the user to:
1. Export the output to PDF
2. Close the output window

It is important that the user uses the "Close" button and does not use the "Back" button in the browser in an attempt to return to the DST, as the report is in fact not a new webpage, but is embedded in the DST page and this will result in the browser exiting the DST altogether and returning to the previous webpage visited.