This chapter includes the results in snap shot format, of SDSS so developed implementing all the system features explained in last chapter’s section 5.5. It also includes step by step instructions for operating the developed features in SDSS, serving as a user manual for the end user.

6.1 BASIC TOOLSET: Basic tool bar contains a set of basic tools used for map operations which includes

- Navigation Tools
- Extend Tools
- Overview Tool
- Identify Tool
- Find Tool
- About Info Tool
- Map Control Tool

![Image of Basic Toolset](Image)

**Figure 6.1:** Basic toolset

6.1.1 Navigation Tools

Navigation tools are the set of tools that will allow user to fully interact with the map. Navigation tools consist of Zoom-In, Zoom-Out and Panning tool to view the different extent of the map.
- **Zoom-In Tool:**

![Map while Zooming IN](image1)

**Figure 6.2:** (a) Map while Zooming IN, (b) Map showing Zoomed In Result

- **Zoom-Out Tool:**

![Map while Zooming OUT](image2)

**Figure 6.3:** (a) Map while Zooming OUT, (b) Map showing Zoomed Out Result

- **Pan Tool:**

![Map with Panned cursor](image3)

**Figure 6.4:** Map with Panned cursor
6.1.2 Extend Tools:

It is a set of three tools i.e. Previous, Next and Full Extent tool. Previous extend allows user to go to the previous extent when the user changes the map extent. Next Extent allows user to return to the next extent when you have gone to previous extent. Full Extent allows user to view the map at the full extent.

Figure 6.5: (a) Previous extend, (b) Next Extend, (c) Full Extend
6.1.3 Overview Tool

The Overview Map shows the location of current view in context with the larger geographical area.

**Figure 6.6: Overview map**

6.1.4 Identify Tool

**Figure 6.7:** (a) Click on the feature on map which needs to be identified

When users select the Identify tool and clicks on the map, it retrieves information (attributes) of all active layers at that point and displays them in the Results window. Users can view all the basic information pertaining to each of the attribute of all active layers at
the point selected on the map, in the result window. The result widow is a part of the Identify Panel. The identified layers are populated in the combo -datagrid.

![Image of Spatial Decision Support System](image)

**Figure 6.7:** (b) Identify tool’s result shown in result window, with clicked point highlighted.

### 6.1.5 Find Tool

![Image of Find Tool](image)

**Figure 6.8:** (a) Find Tool
Find tool is a set of components, it consists of combo-box to select the various layers and field, another component is a text-box which is editable. The user can either enter the text to be searched or select the default values in case of the localized search. There is a find button, the click of which give the user desired output and the result will be shown in the result panel which is tree-view and simultaneously zooms to the searched features on the map.

Figure 6.8: (b) Find Tool showing result in grid, selected feature is also highlighted on map

6.1.6 About Info Tool

Figure 6.9: (a) About Info gives brief about the developed SDSS application
Figure 6.9: (b) About Info pops up at the time of start

About info basically provide an overview about the project. It gives a brief detail about the SDSS so developed, in a dialog box, which acts as start up page, when the web application is run for the first time.

6.1.7 Map Control

Figure 6.10: Map control display with Navigation and scale bar
Map control is basically used to display the map in the application. The map can be zoomed -in and zoomed-out by the mouse roll over and roll out respectively. It also includes built -in feature of panning to the area of interest. Associated with Map control is a navigation bar and scale bar. Navigation Bar can be used to zoom in and zoom out the map extent on the mouse click. Scale Bar can be used to show the scale of the map in current context.

6.2 DATA (MAP) TOOL

With the help of this tool user can select the data/map that needs to be seen in Map control. The data for developed SDSS is segregated in two maps (i) Street Map i.e. the background data, (ii) Jodhpur Map i.e. layers which contain electrical distribution network features together with the ward boundary.

![Figure 6.11: (a) MAP/DATA tool highlighted.](image1)

![Figure 6.11: (b) MAP/DATA tool highlighted.](image2)
6.3 LAYER / LEGENDS TOOL

![Figure 6.12: Map legends tool.]

6.4 NETWORK TRACING TOOL (Network analysis)

Network tracing tools are the core component of SDSS so develop, they performs electrical tracing (Network Analysis) of complete feeder. Network analysis involves network trace, or tracing. The term tracing is used here to describe building a set of network elements according to some procedure. You can think of tracing as placing a transparency on top of a map of your network and tracing all the network elements that you want to include in your result onto the transparency. When working with networks, tracing involves connectivity. A network element can only be included in a trace result if it is in some way connected to other elements in the trace result. The trace result is the set of network features that is found by the trace operation.

After selecting the feature (Complete Feeder/ DT/ Pole) whose network needs to be traced user click on the trace button, which gives the result in form of list showing the flow of electricity between from source point to the respective destination points.

6.4.1 Trace Full Feeder

This network analysis tool gives the result in form of list showing the flow of electricity between FROM pole/ DT (source) to To pole / DT (Destination), the tool gives an option to save the tracing result in PDF format on users’s system. It also highlight the result on map by selecting the connected network features like Poles, Distribution Transformers(DT), cables, lines and buildings.
Figure 6.13: (a) Trace Full Feeder Tool highlighted on tools list.

Figure 6.13: (b) List of Feeder network showing FROM and TO points, network also highlighted on Map

Figure 6.13: (c) Traced network result saved in PDF format
6.4.2 Trace DT Network

![Image of Trace DT Network Tool]

**Figure 6.14:** (a) Trace DT network Tool highlighted on tools list.

This network analysis tool first ask for selecting the distribution transformer (DT) whose network needs to be traced, after selection it gives the result in form of list showing the flow of electricity between from source DT to the connected poles, the tool gives an option to save the tracing result in PDF format on your system. It also highlight the result on map by selecting the connected network features like Poles, Distribution Transformers(DT), cables, lines and buildings.

![Image of Map with Trace DT Network Tool]

**Figure 6.14:** (b) DT’s available in feeder are listed and highlighted on map, select DT whose network needs to be traced.
Figure 6.14: (c) Selected DT’s network highlighted on Map, with info window

Figure 6.14: (d) Save as dialog opened to save the DT network in PDF format

Figure 6.14: (e) Selected DT’s network saved in PDF format
6.5 ANALYSIS TOOLS

6.5.1 Ward wise Substation details

![Figure 6.15: (a) Ward Wise Substation details tool highlighted on Toolbar](image)

This analysis tool provides the list of ward wise substation i.e. number of substation in each ward and its details, by analysis various attributes from different layers, to give specific format result. This analysis includes various operations like selection, intersection, querying and analyzing. The result is also highlighted on map on click of any ward, an info window pops up showing the technical details of its substation i.e. substation name, capacity etc.

![Figure 6.15 : (b) Ward with single substation](image)
6.5.2 DT summary report
This analysis tool provides the list of all the distribution transformers (DT) so connected to the feeder, and their details in tabular as well as chart form, by analysis various attributes from Distribution transformer layer, to give specific format result. This analysis includes various operations like selection, querying and analyzing.

**Figure 6.16:** (b) DT summary report with info window on map for selected DT

<table>
<thead>
<tr>
<th>S.No</th>
<th>DT ID</th>
<th>Capacity (KVA)</th>
<th>Transformer Type</th>
<th>No Load Loss</th>
<th>Full Load Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>073/01605DT001</td>
<td>100</td>
<td>Normal</td>
<td>250</td>
<td>1760</td>
</tr>
<tr>
<td>2</td>
<td>073/01605DT002</td>
<td>100</td>
<td>Normal</td>
<td>250</td>
<td>1760</td>
</tr>
<tr>
<td>3</td>
<td>073/01605DT003</td>
<td>100</td>
<td>Normal</td>
<td>250</td>
<td>1760</td>
</tr>
<tr>
<td>4</td>
<td>073/01605DT004</td>
<td>100</td>
<td>Normal</td>
<td>250</td>
<td>1760</td>
</tr>
<tr>
<td>5</td>
<td>073/01605DT005</td>
<td>100</td>
<td>Normal</td>
<td>250</td>
<td>1760</td>
</tr>
<tr>
<td>6</td>
<td>073/01605DT006</td>
<td>25</td>
<td>Normal</td>
<td>85</td>
<td>685</td>
</tr>
<tr>
<td>7</td>
<td>073/01605DT007</td>
<td>100</td>
<td>Normal</td>
<td>260</td>
<td>1760</td>
</tr>
</tbody>
</table>

**Figure 6.16:** (c) DT summary report close-up
The result is also highlighted on map on click of any DT, an info window pops in showing the technical details the selected transformer i.e. number of poles connected, capacity etc.

6.5.3 Affected customers tool
This tool basically helps the DISCOM officials to identify the affected customers if there is any fault in DT / pole, or if any DT/Pole is shutdown.

![Affected customers tool highlighted on Toolbar](image1.png)

**Figure 6.17:** (a) Affected Customers tool highlighted on Toolbar

This tool lets the user to select DT or pole whose connected customer’s needs to be identified. When DT or pole is selected, then the tool lists the entire customer whose electrical source is the selected pole / DT, by analysis various attributes from different layers, to give specific format result. This analysis includes various operations like selection, intersection, querying and analyzing.

![Select affected customers by DT / Poles](image2.png)

**Figure 6.17:** (b) Select affected customers by DT / Poles

It also highlights all the customers on the map. User can zoom to any particular customer by clicking on it from the result list.
Figure 6.17: (c) Highlighting customers affected due to failure of selected DT

Figure 6.17: (d) Zoomed to particular customer from the selected customer list

Figure 6.17: (e) Highlighting customers affected due to failure of selected Pole
Figure 6.17: (f) Zoomed to particular customer from the selected customer list

6.6 CUSTOMER DETAILS

Figure 6.18: (a) Customers Details tool highlighted on Toolbar

Figure 6.18: (b) Customers Details search by typing / given values
This tool gives the detailed information about the consumer. With the help of customer details tool, one can search for a particular consumer whose details need to be given. The details include: Name of consumer, Meter ID, Connection Date, Last Six Months Consumption, Sanction Load, Supply Voltage, Billed unit of December Month, Billing amount of December Month, Billed unit of February Month, Billing amount of February Month. The searching can be done in two major ways i.e. search by typing and search by given values.

![Customer Details](image1)

**Figure 6.18:** (c) Search results listed for entered text

![Spatial Decision Support System](image2)

**Figure 6.18:** (d) Selected customer Highlighted on map, details also listed in separate dialog
Figure 6.18: (e) Alert message if entered text/value not found

Figure 6.18: (f) Search by given values

Figure 6.18: (g) Selected customer highlighted on map, details also listed in separate dialog
6.7 HELP

The help document has been created in such a way so as to present the vision of the project, providing brief regarding the developed web applications. It also includes step by step description about the modules and tools so developed. This help menu basically aim to provide the guidelines for the SDSS and it can be referred to as user manual.

Figure 6.19: Help Menu