While printing map in “Data View” window, it will print data display in “Data View” only. Similarly, while printing map in “Layout View” window, it will print full map.

5.3 GIS Database Application Manual for Samut Songkhram Province (for GIS Database Manager)

In the technological world, a digital system is becoming as the supporting tool for decision making system and mapping. At present, the Geographic Information System (GIS) is an effective tool for production, rectification, improvement, gathering, exploration, analysis, and demonstration. It has been applied to various projects because its convenience and fast-and-easy to develop or manage complicated spatial data. The natural resources and environmental problems, in particular, can identify the impact to quality of life both direct and indirect. Consequently, it is properly to use a GIS system for an effective environmental quality management in provincial level.

a. Introduction to ArcGIS

ArcGIS, one of GIS programs developed by ESRI, is high capability to demonstrate, analyze, and manage geographic information. It can apply to a variety of field works and manage a large file with attractive Graphic User Interface (GUI).

ArcGIS 9.2 is latest version which operating under Windows (98/NT2000/XP2002) or higher. ArcGIS’s components are ArcView, ArcEditor, and ArcInfo. In case of using any software operation is depended on propose and requirement of each organization. ArcView can view any data running by ArcSDE. In contrast, ArcEditor and ArcInfo can rectify data running under ArcSDE which is Client/Server software for spatial data management in term of DBMS (Database Management Systems). The above three components of ArcGIS are comprises of;

ArcView has ArcCatalog, ArcMap, and ArcToolbox programs which can explore, manage, analyze, and rectify data and create a map.

ArcEditor has all ArcView’s functions. It also has additional tool for rectify data as Coverage and Geodatabase.
ArcInfo has all ArcEditor’s functions. It also has Geoprocessing and ArcWorkstation (ARC, ArcEdit, ArcPlot, INFO, ARC Macro Language or AML) as an additional tool.

Details of each component are described below.

**a.1 ArcView**

ArcView has a capability of Data Visualization, Query, Analysis, and Map Creation under Windows operation with a tool for Exploring, Selecting, Displaying, Editing, Analyzing, Symbolizing, Classifying Data, and Metadata.

ArcView’s structure is composed of ArcCatalog, ArcMap, and ArcToolbox. It can view data directly to a file or network and web-enabled. ArcView was created from COM (Component Object Model) technology; therefore, the customization and Macros program (Visual Basic for Applications (VBA) or Visual Basic, C++, and Delphi extensions can be applied. Main capabilities of ArcView are;

- Explore, Display, and Query spatial data
- Access and edit Shapefile and Personal geodatabase
- Spatial analysis with Geoprocessing
- Mapping with various tools and Wizards program
- 2D and 3D reporting and graph
- Co-ordinates system projection
- Data annotation
- Map display with the Internet system
- Import/ Export compatible with various data file types

Furthermore, it also have Extensions Program to increase capability of ArcView comprises of Spatial Analyst, ArcView 3D Analyst, ArcPress, Geostatistical Analyst, and StreetMap for instance.

**a.2 ArcEditor**

ArcEditor is a medium size of ArcGIS composed of all ArcView’s function components. It is designed for Enterprise GIS Organization as their name with a capability for data edition in Enterprise GIS. For example, under the core system of ArcInfo and ArcSDE with a Relational Database Management System (RDBMS), one of user can editing data by use ArcEditor and another user can viewing or searching data by use ArcView in the same time.

ArcEditor is comprises of all ArcView’s function components and additional component of data editing tools for Shapefile, Coverage, Personal geodatabase, and Enterprise geodatabase.

**a.3 ArcInfo**

ArcInfo is the most capability of ArcGIS with all function components of Arcview and ArcEditor. It also has completed ArcToolbox and ArcInfo Workstation (ARC, ArcEdit, ArcPlot, AML and all extensions). Hence, ArcInfo is a completed GIS program with various functions such as data creating, editing, querying, mapping, and analyzing.

ArcInfo is usable for data analysis function completely and comply with other application program. Because ArcInfo was created from COM (Component Object Model) technology, it
can distribute Objects by define their principal and behavior. The main capabilities of ArcInfo are;

- Graphical User Interface (GUI) in Windows system
- Client/Server architecture
- High efficiency data processing tools such as creating, managing, querying, overlaying, analyzing, and display.
- Ability to edit one database by various users
- Other high effectiveness tools such as auto change co-ordinates system (On-the-fly projection), data type changing, and data import or export.

### a.4 ArcMap, ArcCatalog, and ArcToolbox

All ArcGIS (ArcView, ArcEditor, and ArcInfo) are have 3 mains programs separated by function as ArcCatalog (data management), ArcMap (mapping management), and ArcToolbox (analysis management). Those 3 programs are working simultaneously.

ArcCatalog is usable for source selection, data creation, and metadata.

ArcMap is usable for display, query, edit, and create map document.

ArcToolbox is useable for spatial data analysis, database analysis, and convert and import-export data.

### a.5 ArcMap

ArcMap is usable for display, edit spatial data, and create map, graph, and report. ArcMap can provide data viewing as "appear on the map like what seeing on screen" and able to drag-and-drop data from ArcCatalog by open map documents in ArcMap then drag data from ArcCatalog to display area of ArcMap directly.

GIS database that show on the map in ArcMap is called as Layer. Each layer separated each data type and source with Table of Content (TOC) display of ArcMap. The TOC default position at left side but it is able to move to other position.

Layer order in TOC means data showing order in map section. The top order will show on top, thus the background should be located lowest layer in order to not cover an important data.
While map is showing, user can find other interested data by click at their Feature then access to ArcMap database. There is easy to design the map annotation of electronics document and publishing. For some data which appropriate to present as graph or report, ArcMap is also manageable.

### a.6 ArcCatalog

ArcCatalog is application program for database connection. The main effectiveness is an applicable to browse and organize data source, spread map document or data. Graphic interface of ArcCatalog is look like the Windows Explorer, but different on that it can browse data, map, and metadata.

The data on disk drive or network system can access by click the button of “Connect to Folder” and select the pathway of data. ArcCatalog is able to connect with various database includes SDE and OLE DB databases.
Figure 99: ArcCatalog Program

The selected group of data is called “Catalog”. The “Catalog Tree” is located on the left side, while the right side is “Catalog Contents”. The right side of ArcCatalog program is composed of 3 components; Content (data lists), Preview (figure or table), and Metadata.

a.7 ArcToolbox

ArcToolbox is a tool for advance analysis GIS data such as coordinate system conversion or data type conversion (for example, convert Shapefile to Geodatabase). User can import data with “drag-and-drop” working from ArcCatalog to ArcToolbox.
In addition, user can create own tool as “.exe” or “.dll” file types.

There are more than 140 tools of ArcToolbox in ArcInfo such as Conversion Tools, Map Analysis Tools (Union, Clip, Split, Buffer etc.).

ArcToolbox in ArcInfo also has linkage to ArcInfo Workstation by Open Development Environment (ODE) which allow ArcInfo user to use AML and DLL.

b. Data Handling

b.1 Data Composition and Import

Layer can create by use ArcCatalog program. Normally, when installed ArcGIS program, it will located on Start/All Programs/ArcGIS/ArcCatalog
Starting by right click at the “Directory” which need to keep layer and select “New” to create layer such as Shapefile, Coverage, Personal Geodatabase etc. Then the box will appear to fill in the name, type (such as Point, Polyline, and Polygon, and spatial reference edition) click “Edit” button.

Right click and select Properties to create Field as Attribute of layer by type the name in “Field Name” and select data type in “Data Type” (display as Dropdown Menu).
Figure 103: Define Field to Layer

This layer will use for graphic data composition in section of spatial data editing and attribute data editing of ArcMap.

Data import by click “Add Data” button at File > Add Data in Main Menu

Figure 104: Main Menu

Otherwise click at Data button on standard menu or open ArcCatalog Program and drag data from ArcCatalog to ArcMap.

Figure 105: Standard Menu

b.2 Data Editing

Data can be edited with ArcMap, a part of ArcGIS program, by Graphic Data Editing and Attribute Data Editing

b.2.1 Graphic Data Editing

It is necessary to open “Editor Toolbar” in ArcMap before start to data editing. If Editor Tool is not show, when right click at Menu Bars or Toolbars it will be appear hidden function and click Editor.
If currently use Standard Tool, the Editing button will appear on toolbar and click to add Editor Tool. The position of Editor Tool can move as user defined.

Also select the task of Start Editing, Save Editing, or Stop Editing on Editor Toolbar.

In case of Coverage data type, it has to convert by right click and select “Export” in ArcCatalog program to Shapefile or Personal Geodatabase before editing.

Data editing in ArcMap will begin on Start editing. The editing data will temporary store in Edit session until finish or save, then record editing data in original file.

The history of editing data in Edit session will show on map display but still not record in original file until save editing data.

A variety of button such as Dropdown Menu on Editor Toolbar is gray, means “Disabled”, because it is still not order to edit. Then click “Start Editing” from Editor Toolbar.
Object movement; click “Start Editing” buttons will Enabled, the “Edit” is main tool for select and move object. Click at Edit (this tool may activated (on object, it will be Highlighted.

When point the mouse at object, pointer will be change as 4 directions arrow symbol means ability to move object position. It should be noted that buttons on Editor Toolbar are enabled.
Object Rotation: click Rotate button and move object around Selection Anchor. The Anchor moving will be effect to object rotation.

It can specify the degree of rotation; positive degree means rotate clockwise and negative degree means anticlockwise.

Sketch is an outline drawing tool. The sketch is a group of all spots composed to be object (Vertices) and lines (Edge composed to be object) Segments. The movement of one spot within object called Vertex, Edit tool is usable for move this Vertex position. When click at Edit and double click at object, their Sketch will be appeared with Vertices and Segments. And when point mouse above the Vertex and drag Vertex in the new position, the figure of Sketch will be changed.
Delete Vertex; use Context menu help to edit object. Right click at Sketch by point mouse above the left below Vertex and right click to show Sketch then select Delete Vertex

![Figure 113: Delete Vertex](image)

Insert Vertex; as same as delete vertices, add the vertices by point mouse above the Sketch line and right click to open Context menu then select Insert Vertex

![Figure 114: Insert Vertex](image)

Split Tool use to split one line into two lines. Start by select the line and use Split tool at the position that want to split. It is default as copy an attribute data of original line to the new one.
Delete object; select object or data from Table of Content and click Delete at Standard toolbar or click Delete at Keyboard.

The editing session as described above is show a variety of tools useful for editing, besides user can use various tool on Standard toolbar such as Cut, Copy, and Paste object between layers and Delete object. User can also use Undo and Redo command, for instance, use Undo to reuse latest working.
Save change and leave ArcMap program; Click Stop Editing from Editor Menu and click Yes when dialog box appear to ask save change or not. Or select File from Main Menu and click Exit and click No when dialog box appear to ask save document or not.

b.2.2. **Attribute Data Editing**

If user wants to edit an attribute data, use editing option by perform Start Editing and view attributes by click attributes button then the attributes window will be appeared.

The attributes window is divided into 2 parts; 1) Data view located on left side is object lists and 1) Right side is details of selected object from left side.

If select object more than one layer, each layer composed of selected object in list of data viewing. User can access interested object by click (+)symbol to expand the list. User can edit attribute data by click Field of each data appeared in right side and edit in Value to change the new one.
If user wants to change value of all objects, it can do by click at the name of layer and type a new value in data field as same. Then below of all selected data field will change to the new one.

Value in all PERIMETER field of WELL_POINT layer will change to be 15.
User can copy or cut to each value or all value of attribute data and paste as each object or all selected objects.
Additionally, for calculated option in ArcMap, user can edit attribute data of an object by create a simple calculation of define condition in Field Calculator. The Field Calculator will activate to selected object, if no one it will activate to all object.

To use Field Calculator, start with editing session first and open the table of each layer by right click at their name in Table of Contents and select “Open Attribute Table”. When the table appeared, right click at the heading of data which want to edit, select Calculate Values from menu to show Field Calculator Window.

![Field Calculator Windows](image)

Figure 122 : Field Calculator Windows

To define a condition in Field Calculator, it has a field, function, and operation options support to user. User can click in area of field, the list of field will be appeared in Expression box for define condition. Otherwise user can type a condition directly as below example; the PERIMETER field is edited to be sum with 10 to each perimeter.

Using Field Calculator is useful for advance calculation and can be edit only selected data or edit all data in table.

When user defined a condition in Field Calculator already and click OK, the value in field will change as defined condition or calculation.
c. **Map Printing**

The provided file is comprise of Layout or map printing format, just move the map to the wanted position, specify scale, edit heading and other then able to print out.

Figure 123 : Field Calculator Windows

Figure 124 : Mode Layout View
Anyway, it has to change as Mode Layout View (usually working in Map Display) by click Layout View at the left below window or select View > Layout View on Main Menu.

To create Map Layout, it is necessary to define size and printing property first; because ArcGIS will change Layout as paper size (default paper size is set as A4). If user wants to print other sizes, they should specify paper size by right click at outer Layout frame.

If user wants to change other details, they can double click to edit default map composition or add new element by click Insert at Main Menu.
c.1 Adding the Direction) North Arrow)

![North Arrow Addition](image1)

Figure 127 : North Arrow Addition

c.2 Adding the Scale) Scale bar & Scale Unit)

![Scale Addition](image2)

Figure 128 : Scale Addition

Other than to select scale format to display, user has to specify map unit too. When completed Insert Scale Bar, change the unit of measurement by right click at Scale bar and select Properties. Then the alternating Scale bar properties window will be appeared, select “Scale and Unit Tab” to change unit.
The Study on Supporting System for Administrations on Natural Resources and Environmental Management in the Kingdom of Thailand

JICA
Kokusai Kogyo Co., Ltd.
Ex Corporation

2-112

Figure 129 : Change the Unit of Measurement

c.3 Adding the Legend

As figure below, the name of layer will be appeared for user to define symbol of layer. The left frame is all names of layer and the right side is layer need to added symbol.

To edit symbol, Legend has to convert as Graphic by right click at Legend Frame select Convert To Graphic and right click Ungroup again. Then Legend will be separated to single Graphic which can rename, delete, change color, and regroup.

Figure 130 : Adding the Legend

c.4 Adding Map Title
After completed map editing, click Menu File and select Print Preview to verify before printing that map is outside paper margin or not and select Print.

In case of color map printing is not available or want to use as annotation in other programs such as Microsoft Word, PowerPoint, or HTML format, ArcGIS is compatible to convert map file in other file format as follows:

- PDF (Portable Document Format) is an Electronic Paper which can display on web in document format both text and picture.

- SVG (Scaleable Vector Graphic) support to Graphic presentation which can reduce or expand or move picture without lost details. It can present through Web browser and SVG Viewer.

- Picture file group such as
  - BMP (Windows Bitmap)
  - JPEG (Joint Photographic Experts Group)
  - TIFF (Tag Image File Format)
  - EMF (Enhanced Windows Metafiles)
  - EPS (Encapsulated Postscript)
c.5 Export Map by click File Menu and select Export Map

![Export Map](image)

Figure 133: Export Map

d. Geographic Information Database Program for Environmental Quality Management

The Geographical Information Database for Environmental Quality Management is a development of application program for support to GIS usability and convenient access to database. User who does not have deeply knowledge can use this database with a Graphic User Interface (GUI) that helpful to decrease complexion of procedures and confusing of data access.

This program was developed by Visual Basic for Applications (VBA) based on ArcMap 9.2 in order to benefit of specific work for environmental quality management of Samut Songkhram Province.

Geographic Information System for Environmental Quality Management Installation

Install program by copy folder in CD-ROM to disk drive as required. The folder is GisSamutsongkhram as details described below.

<table>
<thead>
<tr>
<th>Folder Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GisSamutsongkhram</td>
<td>Folder of Samut Songkhram Province</td>
</tr>
<tr>
<td>Configdata</td>
<td>Folder of configuration program storage</td>
</tr>
<tr>
<td>GisData</td>
<td>Folder of data storage</td>
</tr>
<tr>
<td>Coverage</td>
<td>Folder of coverage data storage</td>
</tr>
<tr>
<td>Satellite</td>
<td>Folder of satellite photo storage</td>
</tr>
<tr>
<td>Topo</td>
<td>Folder of topographic map storage</td>
</tr>
<tr>
<td>GIS_ENV_SKM.mxd</td>
<td>Program file (ArcMap Document)</td>
</tr>
</tbody>
</table>
d.1 Open Project File

After completed program installation, open ArcMap program which generally located in Start/All Programs/ArcGIS/ArcMap

![Figure 134: ArcMap Program](image)

Program file can open by two ways, the first way open with ArcMap program and select project file (An Existing Map) and select file [GIS_ENV_SKM.mxd](image)

![Figure 135: Open Project File](image)

The second way is select menu File > Open at Main Menu and select file [GIS_ENV_SKM.mxd](image) from folder (Browse for maps)
Otherwise double-click file GIS_ENV_SKM.mxd which copy to disk drive.

When open project file, welcome window will be appeared.

![Program Welcome Window](image)

**Figure 136 : Program Welcome Window**

Then, click Login to the page of Geographic Information Database for Environmental Quality Management of Samut Songkhram Province, the Study and Development of Provincial Natural and Environmental Resources Management System Project.

![Geographic Information Database Program](image)

**Figure 137 : Geographic Information Database Program**

If user edits the default position of GUI and save change in original file, the position of GUI will change as user edited while open it next time.

The GUI of Geographic Information Database for Environmental Quality Management Planning of Samut Songkhram Province is divided as usability as follows:
d.2 Main Menu

This part is defined as default of ArcGIS program and auto run when ArcGIS program is opened always. This main menu is cannot be removed.

![Main Menu](image)

The important commands orders are 1) File has orders to Add Data, Save, Print etc. 2) Edit has orders to Cut, Copy, Paste etc. 3) View has orders to Zoom, Toolbars etc. 4) Insert has orders to input map compositions 5) Selection has orders to Zoom to Selection, Clear Selected Features etc. 6) Tools has orders to Editor, Graph, Report etc. and 7) Window has orders to Magnifier, Table Of Content (TOC) etc.

d.3 Specific Function Development of Project

This function is specific develop to the Geographic Information Database for Environmental Quality Management Planning of Samut Songkhram Province Project only for convenient to user in order to database access. It is help to reduce complex procedures and confuse data access with function components of GIS Database, Attribute, Graph, Query, Link, and Home Position “Functions Created within Program”.
d.4 Toolbars

A group of tools prepared by ArcGIS for manage to graphic data. The tool sorts from the top to bottom are described as follows;

```
  | Continuous zoom/move
  | Zoom in
  | Zoom out
  | Fix zoom in
  | Fix zoom out
  | Move
  | Show all boundaries
  | Previous boundary
  | Next boundary
  | Select object
  | Cancel select object
  | Select composition
  | Specify details
  | Find
  | Go to x,y
  | Measure
  | Hyperlink
```

Figure 141: Toolbars

d.5 GIS Database of Project

The database lists will appear when click GIS Database button on the bar of specific function development of project. It has two databases, which user can select one by one, such as PEQMP GIS Database and DEQP GIS Database. For more details, please see sub-section “GIS Database Windows” in section “Functions Created within Program”.
d.6 Table of Content (TOC)

A list of all data in program which can open/close layer as requires from Check Box in front of the name of layer. Besides, it is able to click to the + symbol at the front to show hidden details or click to the - symbol to hide details.

In addition, it is able to select view format as Display, Source, or Selection by click the bar in the left of below TOC window.
d.7 Map Display Areas

The area to show Graphic Data and Attribute Data.

The order at left of below window will allow user to select Data View (show data), Layout View (show map printing layout), Refresh (may display adjustment), and Pause Drawing.
e. Specific Function Development of Project

This program has divided into 6 parts; database window, attribute, graph, query, link, and home position. The functions of each part are the following expressed.

e.1 GIS Database Window

The project database consists of two parts; PEQMP GIS Database and DEQP GIS Database.

To open-close layer in window by click to mark a check symbol in front of the layer (Check Box)

Besides, when double click to checking layer in window, program will expand to display in those layer field.

![GIS Database Window](image)

**Figure 145 : GIS Database Windows**
### e.2 Attribute

Attribute is a tool for show details of selected object corresponding with database window. When click attribute button, check box in front of layer, and select object on the map, program will show their attribute. However, the attribute display format will different as program set up to access data in each layer.

![Figure 146: Attribute Data Display](image1)

The attribute data can export to Excel Spreadsheet (Microsoft Excel Worksheet) by click export button.

![Figure 147: Export Button (Export to Excel)](image2)

When click at export button, the window of Export to Excel will be appeared.
The frame “All Fields” at left side will show the name of all fields. User can check box in each field to select an export field, then the selected field will be appeared in the right frame “Export Fields”.

If user wants to export all fields, click Select All button. Otherwise if user wants to cancel all fields, click Clear Select button.
In the frame “Export Fields”, user can arrange the order of field export by select the field and click arrow to lift field up or down as requires.

Click OK button when finished for export fields to Excel, then the system will run Excel program for user to save data in Excel file.

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<td>28</td>
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</table>

Figure 150 : Export to Excel

Besides, in order to show attribute details, it can present with a graph by click Show Graph button, then result will show the graph as program set up. For more details, please see in Graph section.

![Show Graph Button](Show Graph.png)

Figure 151 : Show Graph Button

e.3 Graph

Use for display data in graph pattern. The usability characterization as same as Attribute buttons that it will show graph of selected object related to database window.

When check box in front of the field, click Graph button and select object on the map, program will show graph data. Graph types of each field will show column, bar, or pie as appropriate with each field.
Some field has to choose parameter, beginning time, and ending time of graph display.

If any field is does not have graph display result, dialog box will appear to notice user.

Query

Query button is use for search data in Amphoe or all Amphoes in Province. User can define and select field of query from the database.
Click Query button; select one or all Amphoe and field data then click search, details of selected data will be appeared.

Besides, user can export result to Microsoft Excel.

Figure 155: Query

e.5  Link

The fields of town plan, tourism location, wastewater treatment plant, solid waste disposal site, and water supply plant are able to use Link button.

When click Link button and select object, the window will appear to show linkage data. For example, town plan data will link to Adobe Acrobat program to open town plan data file in “.pdf” format.
e.6 Home Position

Home Position is usable for set the screen back to the original setting at the beginning (show the map cover all area of Samut Songkhram Province).
Besides, it has many tools and functions without showing in window, but can open and use by right click on area of Menu Bars or Toolbars then hidden functions will be appeared.

---

Figure 157: Home Position Display

Figure 158: On-off Tools and Functions Display
f. **Usability Description of Each Field**

The field is divided into three main parts; PEQMP GIS Database, DEQP GIS Database, and Base Map.

- **Geographic Information System**
  - **PEQMP GIS Database**
    - สถานีวัดคุณภาพอากาศ ศพ. (Air Quality PCD)
    - สถานีวัดคุณภาพเสียง (Noise Quality Monitoring Stations)
    - สถานีวัดคุณภาพน้ำ JICA (Water Quality Monitoring Stations JICA)
    - สถานีวัดคุณภาพน้ำ ศพ. (Water Quality Monitoring Stations PCD)
    - สภาพภูมิอากาศ (Weather)
    - โรงงานอุปกรณ์ (Factories)
    - สถาบันการแพทย์ (Hospital)
    - แหล่งทรัพยากรธรรมชาติ (Tourist and Natural and Cultural Heritage Sites)
    - สถานีกำจัดขยะ (Disposal Site)
    - โรงผลิตน้ำประปา (Water purification plant)
    - สถานีวัดระดับน้ำ (Water Level Section)
    - โรงสlaughter (Slaughter house)
    - ระบบบำบัดน้ำเสีย (Waste water treatment plant)
    - แผนภูมิพื้นที่ (Provincial Development Plan)
    - การจราจรพื้นที่ พ.ศ. 2550 Spot 2007
    - การจราจรพื้นที่ พ.ศ. 2550 Landset 2007
    - การจราจรพื้นที่ พ.ศ. 2540 Landset 1997
    - การจราจรพื้นที่ พ.ศ. 2531 Landset 1988
    - สิ่งแวดล้อม (Streams and Rivers)
    - สิ่งแวดล้อมทางการขนส่ง (Transportation)
    - ประชากร (Population)
    - เศรษฐกิจและสังคม (Economic index)
  - **DEQP GIS Database**
    -  그러면 (Places)
    - สถาบันการศึกษา (Schools)
    - จุดเกิดอุบัติเหตุ (Accidental Point)
    - น้ำ (Well)
    - ดิน (Soil Series)
    - ความลาดชัน (Slope)
    - ระดับความสูง (Spot Height)
    - ระดับความสูง (Elevation)
    - ทิศทางความลาดชัน (Aspect)
    - น้ำใต้ดิน (Aquifer)
    - ศูนย์น้ำ (Water Body)
    - ทะเลสาบ (Bash)
    - ทะเลสาบ (Watershade)
    - ที่กักเก็บน้ำที่มีสภาพแวดล้อมที่แตกต่าง (Ramsar Wetland Site)
  - **Base Map**
    - แผนที่พื้นฐาน (Base Map)
    - หมู่บ้าน (Villages)
    - อำเภอ (Amphoe)
    - ตำบล (Tambon)
    - เทศบาล (Municipalities)

*Figure 159: List of all GIS Fields of Project*

Details of each layer and described below.
f.1 PEQMP GIS Database

f.1.1. Air Quality Monitoring Station of PCD (Air Quality PCD)

When click Attribute and select station, program will show window of air quality monitoring station of PCD (Air Quality PCD). If click Export to Excel, program will show window as addressed in page 39.

![Figure 160: Details of Air Quality Monitoring Station of PCD](image)

When click Graph and select station, program will show graph window.

![Figure 161: Graph of Air Quality Monitoring Station of PCD](image)

User can select parameters and data collecting period by select the beginning time and check the box to select ending time of air quality monitoring of PCD (Air Quality PCD).
f.1.2. Noise Quality Monitoring Stations

When click Attribute and select station, program will show window of Noise Quality Monitoring Stations.
When click Graph and select station, program will show graph window.

User can select parameters and data collecting period by select the beginning time and check the box to select ending time of Noise Quality Monitoring Stations.
Then click show graph.
f.2 Water Quality Monitoring Stations of JICA

When click Attribute and select station, program will show window of Water Quality Monitoring Stations of JICA.

![Figure 168: Details of Water Quality Monitoring Stations of JICA](image)

When click Graph and select station, program will show graph window.

![Figure 169: Graph of Water Quality Monitoring Stations of JICA](image)

User can select parameters and data collecting period by select the beginning time and check the box to select ending time of Water Quality Monitoring Stations of JICA.
Then click show graph.

**Figure 171 : Example Graph of Water Quality Monitoring Stations of JICA**

f.2.1. **Water Quality Monitoring Stations of PCD**

When click Attribute and select station, program will show window of Water Quality Monitoring Stations of PCD. User can choose to view Raw Data or Summary Data by click selection bar at the top.
The Study on Supporting System for Administrations on Natural Resources and Environmental Management in the Kingdom of Thailand

Kokusai Kogyo Co., Ltd.
Ex Corporation

Figure 172: Raw Data of Water Quality Monitoring Stations of PCD

<table>
<thead>
<tr>
<th>WQ_STA_JDN</th>
<th>COUNT</th>
<th>DATE</th>
<th>AAT</th>
<th>WT (degree)</th>
<th>FN</th>
</tr>
</thead>
<tbody>
<tr>
<td>MK01</td>
<td>1</td>
<td>1997/01/04</td>
<td>30.3</td>
<td>7.8</td>
<td></td>
</tr>
<tr>
<td>MK01</td>
<td>1</td>
<td>1998/03/18</td>
<td>30.3</td>
<td>7.4</td>
<td></td>
</tr>
<tr>
<td>MK01</td>
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<td>1999/01/26</td>
<td>27.5</td>
<td>7.7</td>
<td></td>
</tr>
<tr>
<td>MK01</td>
<td>1</td>
<td>2000/07/02</td>
<td>24.8</td>
<td>7.43</td>
<td></td>
</tr>
<tr>
<td>MK01</td>
<td>1</td>
<td>2001/02/02</td>
<td>27.27</td>
<td>7.55</td>
<td></td>
</tr>
<tr>
<td>MK01</td>
<td>1</td>
<td>2002/01/07</td>
<td>27</td>
<td>7.7</td>
<td></td>
</tr>
<tr>
<td>MK01</td>
<td>1</td>
<td>2003/01/06</td>
<td>27.5</td>
<td>7.9</td>
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</tr>
<tr>
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<td>2004/02/02</td>
<td>27</td>
<td>7.7</td>
<td></td>
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<tr>
<td>MK01</td>
<td>1</td>
<td>2005/12/01</td>
<td>26</td>
<td>7.4</td>
<td></td>
</tr>
</tbody>
</table>

When click Graph and select station, program will show graph window.

Figure 173: Summary Data of Water Quality Monitoring Stations of PCD

<table>
<thead>
<tr>
<th>WQ_STA_JDN</th>
<th>Number</th>
<th>Year</th>
<th>DO (mg/l)</th>
<th>BOD (mg/l)</th>
<th>TCB (Mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MK01</td>
<td>1/40</td>
<td>1997</td>
<td>4.34</td>
<td>1.5</td>
<td>28650</td>
</tr>
<tr>
<td>MK01</td>
<td>1/41</td>
<td>1998</td>
<td>3.6</td>
<td>0.96</td>
<td>7729</td>
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<tr>
<td>MK01</td>
<td>1/42</td>
<td>1999</td>
<td>4.52</td>
<td>1.34</td>
<td>6200</td>
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<tr>
<td>MK01</td>
<td>1/43</td>
<td>2000</td>
<td>4.62</td>
<td>1.24</td>
<td>14460</td>
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<tr>
<td>MK01</td>
<td>1/44</td>
<td>2001</td>
<td>4.26</td>
<td>1.728</td>
<td>4040</td>
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<tr>
<td>MK01</td>
<td>1/45</td>
<td>2002</td>
<td>4.44</td>
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<td>1/46</td>
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<td>4</td>
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<td>MK01</td>
<td>1/47</td>
<td>2004</td>
<td>4.76</td>
<td>1.02</td>
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<tr>
<td>MK01</td>
<td>1/49</td>
<td>2005</td>
<td>3.62</td>
<td>1.28</td>
<td>13000</td>
</tr>
</tbody>
</table>

When click Graph and select station, program will show graph window.
Figure 174: Graph of Water Quality Monitoring Stations of PCD

User can select parameters and data collecting period by select the beginning time and check the box to select ending time of Water Quality Monitoring Stations of PCD.

Figure 175: Define Condition of Water Quality Monitoring Stations of PCD
Then click show graph.

Figure 176: Example Graph of Water Quality Monitoring Stations of PCD

f.3 Weather

When click Attribute and select station, program will show window of Weather. The data is consists of steam, cloud, humidity, precipitation, wind speed, sunlight, and temperature. User can select data type at left bar.

Figure 177: Weather Data
When click Graph and select station, program will show Weather Graph window. User can select to view data of cloud graph, steam graph, humidity graph, precipitation graph, wind speed graph, sunlight graph, and temperature graph.

![Figure 178: Window Selection of Weather Graph](image)

When select graph, window will be appeared to show selected graph as example below.

![Figure 179: Windows of Cloud Graph](image)
f.4  Factories
When click Attribute and select factory, program will show window of factory details.

![Figure 180: Window of Factory Details](image)

f.5  Hospital
When click Attribute and select hospital, program will show window of hospital details.

f.6  Tourist and Natural and Cultural Heritage Sites
When click Attribute and select tourism location, program will show window of tourism location details.
When click Link and select tourism location, program will show window of tourism location pictures

f.7  Solid Waste Disposal Site
When click Attribute and select solid waste disposal site, program will show window of solid waste disposal site details.
When click Link and select solid waste disposal site, program will show window of solid waste disposal site pictures.
f.8 Water Purification Plant
When click Attribute and select water purification plant, program will show window of water purification plant details.
When click Link and select water purification plant, program will show window of water purification plant pictures.

f.9 Water Level Section
When click Attribute and select water level section, program will show window of water level section details.

f.10 Slaughter House
When click Attribute and select slaughter house, program will show window of slaughter house details.

f.11 Wastewater Treatment Plant
When click Attribute and select wastewater treatment plant, program will show window of wastewater treatment plant details.
When click Link and select wastewater treatment plant, program will show window of wastewater treatment plant pictures.

f.12 Provincial Development Plan
When click Attribute and select provincial development plan, program will show window of provincial development plan details.
When click Link and select provincial development plan, program will open Adobe Acrobat to show provincial development plan file (.pdf).

f.13 Land Use in 2007 (B.E. 2550) Spot 2007

When click Attribute and select any position on the map of land use in 2007 (B.E. 2550) Spot 2007, program will show details.

![Figure 182: Land Use Data in 2007 (B.E. 2550) Spot 2007](image)

When click Graph and select any position on the map of land use in 2007 (B.E. 2550) Spot 2007, program will show graph.

![Figure 183: Land Use Graph in 2007 (B.E. 2550) Spot 2007](image)

f.14 Land Use in 2007 (B.E. 2550) Landsat 2007

When click Attribute and select any position on the map of land use in 2007 (B.E. 2550) Landsat 2007, program will show details.
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Figure 184: Land Use Data in 2007 (B.E. 2550) Landsat 2007

When click Graph and select any position on the map of land use in 2007 (B.E. 2550) Landsat 2007, program will show graph.

Figure 185: Land Use Graph in 2007 (B.E. 2550) Landsat 2007

f.15 Land Use in 1997 (B.E. 2540) Landsat 1997

When click Attribute and select any position on the map of land use in 1997 (B.E. 2540) Landsat 1997, program will show details.
Figure 186 : Land Use Data in 1997 (B.E. 2540) Landsat 1997

When click Graph and select any position on the map of land use in 1997 (B.E. 2540) Landsat 1997, program will show graph.

Figure 187 : Land Use Graph in 1997 (B.E. 2540) Landsat 1997

f.16 Land Use in 1988 (B.E. 2531) Landsat 1988

When click Attribute and select any position on the map of land use in 1988 (B.E. 2531) Landsat 1988, program will show details.
When click Graph and select any position on the map of land use in 1988 (B.E. 2531) Landsat 1988, program will show graph.

Figure 188 : Land Use Data in 1998 (B.E. 2531) Landsat 1988

Figure 189 : Land Use Graph in 1988 (B.E. 2531) Landsat 1988

f.17 Streams and Rivers

When click Attribute and select stream and river, program will show window of stream and river details.
f.18 Transportation Route
When click Attribute and select transportation route, program will show window of transportation route details.

f.19 Population
When click Attribute and select population, program will show window of population details.
When click Graph and select the position of population data, program will show graph of population numbers of Samut Songkhram Province.

Figure 190: Population Graph

f.20 Socio-economic Economic Index
When click Attribute and select any position of socio-economic data, program will show window of socio-economic details of the province.
When click Graph and select any position, program will show graph of socio-economic data.
f.21 **DEQP GIS Database**

When click Attribute and select the position in each field under DEQP GIS Database, program will show details window to explain the selected object as below example.

![DEQP GIS Database Example](image)

- Ports
- Geology
- Places
- Schools
- Accidental Point
- Well
- Soil Series
- Slope
- Spot Height
- Elevation
- Aspect
- Aquifer
- Water Body
- Basin
- Watershade
- Ramsar Wetland Site

**f.22 Base Map**

Base Map is usable to specify object position by administration boundary area divided into 4 levels as follows;

- Villages
- Amphoe
- Tambon
- Municipalities
## Appendix

### Related Table for Program Function with Samut Songkhram Province GIS Database

<table>
<thead>
<tr>
<th>PEQMP GIS Database</th>
<th>Attribute</th>
<th>Graph</th>
<th>Link</th>
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</thead>
<tbody>
<tr>
<td>1. Air Quality PCD</td>
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<td>✓</td>
</tr>
<tr>
<td>2. Noise Quality Monitoring Stations</td>
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<td>✓</td>
</tr>
<tr>
<td>3. Water Quality Monitoring Stations JICA</td>
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<td>✓</td>
</tr>
<tr>
<td>4. Water Quality Monitoring Stations PCD</td>
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<td>✓</td>
</tr>
<tr>
<td>5. Weather</td>
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<td>✓</td>
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<tr>
<td>6. Factories</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>7. Ports</td>
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<td>✓</td>
<td></td>
</tr>
<tr>
<td>8. Hospital</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>9. Tourist and Natural and Cultural Heritage Sites</td>
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</tr>
<tr>
<td>11. Water purification plant</td>
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</tr>
<tr>
<td>12. Water Level Section</td>
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<td>✓</td>
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</tr>
<tr>
<td>13. Slaughter house</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>14. Waste water treatment plant</td>
<td></td>
<td>✓</td>
<td>✓</td>
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<td>15. Provincial Development Plan</td>
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<td>16. Landuse year 2007 (Spot-5)</td>
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<td>✓</td>
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<tr>
<td>19. Landuse year 1988 (Landsat-5)</td>
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</tr>
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<td>21. Transportation</td>
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<td></td>
</tr>
<tr>
<td>22. Population</td>
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</tr>
<tr>
<td>23. Economic index</td>
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</table>
### Related Table for Program Function with Samut Songkhram Province GIS Database (Cont.)

<table>
<thead>
<tr>
<th>DEQP GIS Database</th>
<th>Attribute</th>
<th>Graph</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td>2. Places</td>
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<td></td>
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</tr>
<tr>
<td>3. Schools</td>
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<td></td>
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</tr>
<tr>
<td>4. Accidental Point</td>
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</tr>
<tr>
<td>5. Well</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Soil Series</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Slope</td>
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<td>8. Spot Height</td>
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</tr>
<tr>
<td>9. Elevation</td>
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<tr>
<td>10. Aspect</td>
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<td></td>
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</tr>
<tr>
<td>11. Aquifer</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Water Body</td>
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<td></td>
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</tr>
<tr>
<td>13. Basin</td>
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<td></td>
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</tr>
<tr>
<td>14. Watershade</td>
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<tr>
<td>15. Ramsar Wetland Site</td>
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#### Base Map

<table>
<thead>
<tr>
<th>Base Map</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Villages</td>
<td>✓</td>
</tr>
<tr>
<td>2. Amphoe</td>
<td>✓</td>
</tr>
<tr>
<td>3. Tambon</td>
<td>✓</td>
</tr>
<tr>
<td>4. Municipalities</td>
<td>✓</td>
</tr>
</tbody>
</table>
5.4 ArcReader Manual for Samut Songkhram Province (for GIS Database User)

ArcReader is an application program for map display, attribute data viewing, and published map document (*.pmf) printing. This program is based on ArcGIS with ArcPublisher using, and is also available for free to download.

a. Open ArcReader

Click “Start” at Windows taskbar and go to ArcGIS > ArcReader, then click to open program

b. ArcReader Components

1) Menu
2) Toolbars
3) Table of Contents
4) Data View
5) Layout View
6) Status Bar
c. ArcReader Instructions

ArcReader instructions can access from “Menu” or “Toolbars”. The Menu options are provided below.

Frequently used instruction in Menu can access from Toolbars. When point the mouse to each tool, it will have balloon pop-up to show their name and explanation at “Status Bar”. All features are described below.

### c.1 File Toolbars

<table>
<thead>
<tr>
<th>Tool</th>
<th>Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>🗂️</td>
<td>Open</td>
<td>Open “Published Map Documents” file (*.pmf)</td>
</tr>
<tr>
<td>🖼️</td>
<td>Recent Files</td>
<td>Open used file</td>
</tr>
<tr>
<td>📄</td>
<td>Print</td>
<td>Map printing</td>
</tr>
<tr>
<td>🎨</td>
<td>Toggle Table of Contents</td>
<td>Show/hide “Table of Contents”</td>
</tr>
<tr>
<td>🏡</td>
<td>Toggle Application Into Full Screen Mode</td>
<td>Switch to normal and full screen</td>
</tr>
</tbody>
</table>

### c.2 Navigation Toolbars

<table>
<thead>
<tr>
<th>Tool</th>
<th>Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>🕳️</td>
<td>Zoom In</td>
<td>Expand the map by click desired area or drag mouse as square area</td>
</tr>
<tr>
<td>🕳️</td>
<td>Zoom Out</td>
<td>Compress the map by click desired area or drag mouse as square area</td>
</tr>
<tr>
<td>🕳️</td>
<td>Continuous Zoom/Pan</td>
<td>Continuous expand/compress the map by hanging mouse then move down to expand or move up to compress</td>
</tr>
<tr>
<td>🕳️</td>
<td>Fixed Zoom In</td>
<td>Expand the map in center area</td>
</tr>
<tr>
<td>🕳️</td>
<td>Fixed Zoom Out</td>
<td>Compress the map in center area</td>
</tr>
<tr>
<td>🕳️</td>
<td>Pan</td>
<td>Move the map by hanging mouse then move to desired direction</td>
</tr>
<tr>
<td>🕳️</td>
<td>Full Extent</td>
<td>Show the coverage map</td>
</tr>
<tr>
<td>🕳️</td>
<td>Go Back To Previous Extent</td>
<td>Back to previous screen before expand/compress or move the map</td>
</tr>
<tr>
<td>🕳️</td>
<td>Go Back To Next Extent</td>
<td>Back to next screen before expand/compress or move the map</td>
</tr>
<tr>
<td>🕳️</td>
<td>Zoom To Scale</td>
<td>Show the map in specified scale</td>
</tr>
</tbody>
</table>

1:100,000
### c.3 Data Toolbars

<table>
<thead>
<tr>
<th>Tool</th>
<th>Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Identify" /></td>
<td>Identify</td>
<td>Look up attribute data by click to the tool of desired data</td>
</tr>
<tr>
<td><img src="image" alt="Find" /></td>
<td>Find</td>
<td>Explore data by click to fill in the term condition</td>
</tr>
<tr>
<td><img src="image" alt="Go To XY" /></td>
<td>Go To XY</td>
<td>Go to XY position by click to fill in the co-ordinates</td>
</tr>
<tr>
<td><img src="image" alt="Measure" /></td>
<td>Measure</td>
<td>Distance measure by click to estimate distance of the map</td>
</tr>
<tr>
<td><img src="image" alt="Hyperlinks" /></td>
<td>Hyperlinks</td>
<td>Linkage to hyperlinks data</td>
</tr>
</tbody>
</table>

### c.4 Layout Toolbars

<table>
<thead>
<tr>
<th>Tool</th>
<th>Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Zoom In" /></td>
<td>Zoom In</td>
<td>Expand the map in “Layout View” by click desired area or drag mouse as square area</td>
</tr>
<tr>
<td><img src="image" alt="Zoom Out" /></td>
<td>Zoom Out</td>
<td>Compress the map in “Layout View” by click desired area or drag mouse as square area</td>
</tr>
<tr>
<td><img src="image" alt="Pan" /></td>
<td>Pan</td>
<td>Move the map in “Layout View” by hanging mouse then move to desired direction</td>
</tr>
<tr>
<td><img src="image" alt="Fixed Zoom In" /></td>
<td>Fixed Zoom In</td>
<td>Expanding center area of the map in “Layout View”</td>
</tr>
<tr>
<td><img src="image" alt="Fixed Zoom Out" /></td>
<td>Fixed Zoom Out</td>
<td>Compressing center area of the map in “Layout View”</td>
</tr>
<tr>
<td><img src="image" alt="Zoom Whole Page" /></td>
<td>Zoom Whole Page</td>
<td>Show the coverage “Layout View”</td>
</tr>
<tr>
<td><img src="image" alt="Zoom To 100%" /></td>
<td>Zoom To 100%</td>
<td>Show 100% scale of “Layout View”</td>
</tr>
<tr>
<td><img src="image" alt="Go Back To Previous Extent" /></td>
<td>Go Back To Previous Extent</td>
<td>Back to previous screen before expand/compress or move the map in “Layout View”</td>
</tr>
<tr>
<td><img src="image" alt="Go Back To Next Extent" /></td>
<td>Go Back To Next Extent</td>
<td>Back to next screen before expand/compress or move the map in “Layout View”</td>
</tr>
<tr>
<td><img src="image" alt="Change Title" /></td>
<td>Change Title</td>
<td>Rename map in “Layout View”</td>
</tr>
<tr>
<td><img src="image" alt="Zoom To Percent" /></td>
<td>Zoom To Percent</td>
<td>Show “Layout View” in specified scale</td>
</tr>
</tbody>
</table>

### c.5 Layer Effects Toolbars

<table>
<thead>
<tr>
<th>Tool</th>
<th>Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Layer List" /></td>
<td>Layer List</td>
<td>Select desired layer</td>
</tr>
<tr>
<td><img src="image" alt="Transparency" /></td>
<td>Transparency</td>
<td>Modify transparency of the selected layer</td>
</tr>
<tr>
<td><img src="image" alt="Swipe Layer" /></td>
<td>Swipe Layer</td>
<td>Modify hidden layer</td>
</tr>
</tbody>
</table>

### c.6 Markup Toolbars
The Study on Supporting System for Administrations on Natural Resources and Environmental Management in the Kingdom of Thailand

JICA Kokusai Kogyo Co., Ltd.
Ex Corporation

<table>
<thead>
<tr>
<th>Tool</th>
<th>Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>✍️</td>
<td>Pen</td>
<td>Graphic drawing on the map</td>
</tr>
<tr>
<td>📝</td>
<td>Highlighter</td>
<td>Graphic highlighting on the map</td>
</tr>
<tr>
<td>🗑️</td>
<td>Eraser</td>
<td>Delete graphic on the map</td>
</tr>
</tbody>
</table>

d. Open Published Map Documents

Click to "Open" or click to menu “File > Open” then select “Published Map Documents” file (*.pmf) and click to “Open”

In addition, user can open used files by click to “Recent Files” or go to “Windows Explorer” then double-click at “Published Map Documents” file (*.pmf) to open and access program directly.

e. Table of Contents Usage

“Table of Contents” is a space to show data list and symbol. User can access step-by-step as shown below.

e.1 Open/close data layer

User can open/close layers to display in “Data View” and “Layout View” from “Table of Contents” by select ☑ in front of wanted layer to display or select ☐ in front of wanted layer to not display. The open/close selected layer is comprised of data label and layer.

e.2 View hidden layer

User can view hidden layer and their symbol by click ☑ to show details of layer or click ☐ to hide details of layer.
e.3 View layer properties

User can view layer properties such as general data and data source by right-click to layer and choose “Properties”.
f. Data View Usage

“Data View” is a map display window which user can display selected layer of the map from “Table of Contents”. User allowed applying various tools for mapping from “Navigation Toolbars”. When point the mouse at “Data View”, the geographical co-ordinates will appear in status bar also.

If current status is “Layout View”, it can back to “Data View” by click to menu “View > Data View”.

g. Layout View Usage

“Layout View” is a map printing window which user can display selected layer of the map from “Table of Contents”. User allowed applying various tools for mapping from “Navigation Toolbars” to defined scale and boundary for display mapping in “Layout View”. For display a printing map, user can apply various tools in “Layout Toolbars”. When point the mouse at “Data View”, the geographical co-ordinates will appear in status bar also.

User can go to “Layout View” by click to menu “View > Layout View”.

h. Magnifier Window Usage

“Magnifier Window” is a tool for details map showing without mapping adjustment in “Data View”. User can access to this function by click to menu “Window > Magnifier”.

In this regard, user can move “Magnifier Window” to the position that wants to expand. Then choose the wanted size to be enlarged by right-click at “Magnifier Window” and select “Magnifier Factor”.
i. Attribute Data Viewing

User can use “Identify” tool to view an attribute data by click to “Identify” at the position that want to view their attribute data in “Data View” or “Layout View”.

User can also use “Identify” tool to drag frame in “Data View” or “Layout View” for display a group of selected data.
The “Identify” command will use the top layer as default; therefore, it can not select wanted layer in sometime. User can specify a condition to “Identify” by using “Identify from”.

Furthermore, the “Identify” view is allowed user to apply other commands by right-click to activate selected layer as follows.

- **Flash** – Flash to layer
- **Zoom To** – Expand to layer
- **Pan To** – Move to layer
- **Sort Ascending** – Data sort from less to more
- **Remove from Tree** – Delete layer from “Identify” window
- **Copy Record** – Copy attribute data
The “Identify” window also shows geographical co-ordinates of active layer in “Location”. User can change the co-ordinates system to display by click to “Choose Units”.

j. Data Searching

“Find” is a tool for data searching. User can explore by click to “Find” and fill the condition in “Find” window, then click to button. Finding results will appear at below window.

From “Find” window in search results, user can apply other commands by right-click to activate a search results as follows.
Flash – Flash to layer
Zoom To – Expand to layer
Pan To – Move to layer
Identify – View attribute data of layer
Add to My Places – Create “My Places” position
Manage My Places – Manage “My Places” position

k. My Place Usage

“My Places” is a data making to identify the position or place which user want to use again without searching. From “Find” window in search results, user can bookmark any results in “My Places” by right-click to wanted data and select “Add to My Places”.

User can manage “My Places” by click to menu “Tools > My Places”.
1. **Go to XY Position**

User can use “Go To XY” tool to go to XY position by fill co-ordinates in “XY” gap and apply below commands.

- Pan To – Move to co-ordinates position
- Zoom To – Expand to co-ordinates position
- Flash To – Flash to co-ordinates position
- Mark XY – Show co-ordinates point on the map
- Text XY – Show co-ordinates value on the map
- Label XY – Show co-ordinates label on the map
- Undo – Select previous co-ordinates
- Choose Units – Change co-ordinates input system
m. **Distance Measurement**

User can use “Measure” tool to measure a distance by click “Measure”, then “Measure” window will appear to show below commands.

- Measure Line – Length measurement
- Measure An Area – Area measurement
- Measure A Feature – Position measurement
- Snap to Features (on/off) – On/off move the measured position to data
- Show Total (on/off) – On/off show total distance measurement
- Choose Units – Change unit of measurement
- Clear and Reset Results – Clear “Measure” window

In order to measure, user can click to the beginning position and click to the next position until to the last position for distance or area measurement. Results will show in “Measure” window.

n. **Linkage to External Data**

Some layer of “Published Map Documents” is link to external data such as picture, document, website etc. User can view those linkages in “Table of Contents” and click to “Hyperlinks” tool. The linkage data will show symbol, user can click to view details.
Display Layer Modification

Display layer can modify by 2 methods of “Layer Effects Toolbars” as follows.

Layer List – Layer transparency adjustment

Select layer by click to “Layer List” from “Layer Effects Toolbars”, then click “Transparency” tool to adjust by hanging mouse at transparency bar and move up to increase or move down to decrease layer transparency.
0.2  **Swipe Layer – Manage hidden layer**
Select layer by click to “Layer List” from “Layer Effects Toolbars”, then click “Swipe Layer” tool to move a selected layer by hanging mouse and move up/down or left/right.

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**p. Graphic Drawing on the Map**
User can draw a graphic to highlight an interested data on the map to use for another propose such as report or presentation. In order to labeling on the map, click “Markup Toolbars” to mark any figure by following tools.

- **Pen – Graphic drawing on the map**
- **Highlighter – Graphic highlighting on the map**
- **Eraser – Delete graphic on the map**

After used “Markup Toolbars”, a pmfink file will be created to keep the created graphic file. It has a same file name with “Published Map Documents”. Next time to open “Published Map Documents”, program will run dialog box to ask user that want to use “Markup” with “Published Map Documents” or not? User can determine on this option.
q. Map Exportation

User can export mapping data to picture as Bitmap Files (*.bmp) to use for report or presentation by click to menu “File > Export Map”. Then browse and save file location, put the file name, and click to save data.

While exporting map in “Data View” window, it will export data display in “Data View” only. Similarly, while exporting map in “Layout View” window, it will export full map.

r. Map Printing

User can print out map by click menu “File > Page Setup” to define paper size and click .

After that, click menu “File > Print” to define printer properties and click .
While printing map in “Data View” window, it will print data display in “Data View” only. Similarly, while printing map in “Layout View” window, it will print full map.